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Redeveloping Regional Economies for Present and Future Generations: Prosperity for People Within Ecological Limits

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Discussion Draft

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Redeveloping Regional Economies for Present and Future Generations

Prosperity for people within ecological limits

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Redeveloping Regional Economies for Present and Future Generations

Prosperity for people within ecological limits

EXECUTIVE SUMMARY

Abstract

Many scientists and scholars believe the world is headed toward multiple ecological and social crises during the lifetime of much of the world's population. If they are correct, a shift in how economies work will be necessary. We will no longer be able to rely on the ever expanding use of natural resources with the attendant pollution from their extraction, processing, transport, disposal, and social costs including civil disruptions and wars associated with greater scarcity. A number of proposals have been made that offer either comprehensive or partial solutions to the regional and global dimensions of these impending crises. One intriguing voluntary and business-oriented solution proposes a framework for trustees for future generations to access sufficient capital for the redevelopment of local economies. They would use the funds, principally raised by long-term bonds, to solicit competitive proposals from business and other partnerships to contract to deliver carefully measured outcomes needed by both current and future generations. This paper critically analyzes this solution and reviews other proposed or existing solutions. It concludes that this new approach should be evaluated and demonstrated along with others to test the viability of tools that could be used to achieve both necessary short and essential long-term outcomes. New tools include long-term finance for life cycle measured outcomes, an institutional framework for contracts with businesses and others to deliver the outcomes, including early replacement of the most problematic infrastructure and systems, and ultimately market mechanisms to enhance revenue from aggregation and sale of standardized outcomes to the global finance community.

What is the problem?

Scientists and other scholars believe our current economy is reaching critical ecological limits and is adversely affecting natural systems such as climate, biodiversity, fresh water availability and ocean acidification. At the same time, persistent inequities in the current global economy risk social disruptions that can affect security and prosperity for all. Some call for a new operating system to create stable economies that support widely accepted social and cultural values such as wellness, security, employment, and ecological health.

While not all agree, especially over means, most people share the goal of universal prosperity for humans as the purpose of the political economy. Some argue that both the capacity and the

opportunity to thrive are required to achieve the goal. While achieving prosperity for all requires making provision for the future, most economic models until recently have discounted the interests of future generations. What if future generations had the opportunity to invest in the current economy to assure the health of the planet they will inherit, while all of us have the prosperity needed to live satisfying lives?

Core attributes of a prosperity driven economy

An economy that will provide prosperity for both current and future generations would probably have at least the following core attributes:

Outcome-based focus. Its purpose is to produce beneficial outcomes for humans and nature across the full range of services humans want and need, including security, wellness, employment, ecosystem services, culture, community and relationships.

Local and global in scope. It addresses local and global economies together as a whole system to resolve both local and global problems by finding appropriate solutions at both levels; local outcomes contribute to global ones.

Intergenerational. It protects and furthers the interests of future generations while also delivering benefits to current ones.

Integration among sectors. It achieves maximum efficiency at least cost by assuring that investments promote multiple beneficial outcomes simultaneously.

Scientifically sound. It relies on careful, scientifically measured standards for outcomes using life-cycle analysis to avoid unintended consequences.

Timeliness. It is designed to achieve ecological and social integrity in time, e.g. before exceeding ecological limits that result in irreversible, catastrophic impacts and before prosperity and liberty is reduced by massive social disruptions, disease, famine and wars.

Governance and institutional pathways. It has clearly identified and widely supported methods to agree on necessary outcomes and metrics and to manage implementation.

Sufficient financial capacity. It has the financial capacity to effect needed changes, including the means to phase out and replace unsustainable infrastructure and systems.

Political viability. It is realistically achievable under existing political systems.

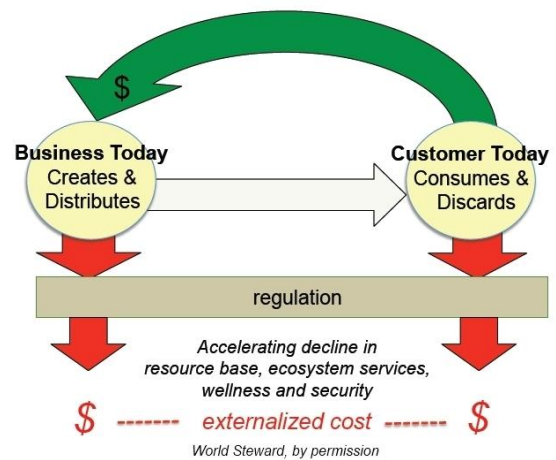
There are many other attributes that could be suggested. These, however, appear to be essential elements that are needed for a sufficiently rapid transformation to deal with the ecological and social challenges the world currently faces.

What is Intergenerational Finance™?

This paper presents a critical analysis of a proposal for an enhanced economic operating system that intends to deliver all these attributes in a voluntary and profitable market framework. The purpose of our analysis is to examine this approach, together with other proposals or existing systems that share some or all of these attributes. The new concept, called Intergenerational Finance™ (IGF™)¹ by its creator Hank Patton, is designed to facilitate and accelerate the transition to an economic system that gives investors and managers access to what Patton argues is the larger wealth created by managing whole systems with the interests of future generations in mind. This greater wealth comes from investing in human capital, wellness, security and cultural capacity and from stewarding ecosystems to restore or enhance their inherent abundance. Conceived as a business partnership between the future and the present, IGF™ proposes a suite of practical finance and market mechanisms that give future generations buying power in today's economy, and contemporary managers new business opportunities for valuable – but currently not merchantable – long-term outcomes.

Figure 1 - (at right) Illustrates the dominant two party business-consumer economic model that has brought prosperity to many, but despite regulatory controls, creates substantial externalized impacts with long term adverse consequences for people and nature.

Traditional two party extractive/exhaustive relationship:



Partnering with Posterity

A paradigm shift: the three party transaction

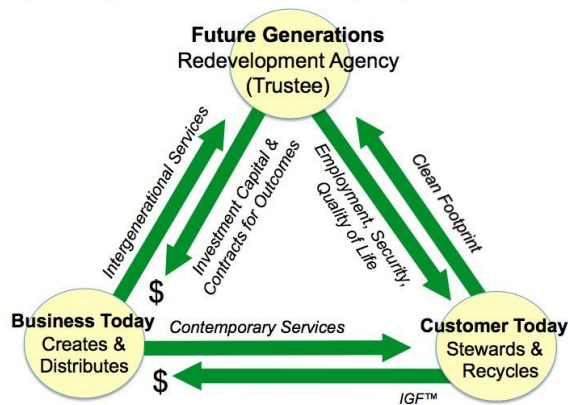


Figure 2 - (above) Illustrates the positive impacts that could come from introducing a third party to the current economic model, transforming what business delivers to current and future generations.

The essential idea of Intergenerational Finance™ is to enable trustees for future generations to make investments in today's economy that will produce valuable outcomes, including wellness, security, employment, and ecosystem integrity, that benefit current and future generations. Through long-term bonds and contracts with businesses and others, the trustees can incentivize the early retirement of inefficient and harmful infrastructure and systems and leverage their replacement with clean and efficient ones that produce marketable beneficial outcomes in multiple sectors. Mr. Patton

¹The terms Intergenerational Finance™ and IGF™ are trademarked by Mr. Patton and associates to reserve their use only in conjunction with a specified international set of vetted third party standards (contract metrics) for life cycle outcomes. His stated intent is to transfer ownership of these terms, and a scenario planning software that uses IGF™ metrics to build and compare intergenerational business cases, to an appropriate non-profit international standard setting body to develop and maintain the catalog of standards for measuring intergenerational services.

describes the flows of funds and services among trustees, contracting businesses and customers as a business partnership with posterity. Contracts would be outcome-based and measured using life-cycle science to assure they produce desirable benefits, like long term employment, wellness, security, zero waste and ecosystem integrity, without unintended harmful health, ecological and social impacts. The benefits would be greatly enhanced if similar efforts are pursued in as many regions as possible, allowing the trade of measured outcomes among them and the creation of secondary markets for those which can be standardized. In this way, both local and global outcomes would come from local redevelopment, attracting investment from global as well as local sources. Outcomes like climate stability, elimination of trans-boundary pollution, habitat for migratory species and communicable disease prevention, for which global markets do exist or may develop, will benefit residents and contribute to achieving global goals.

To bring a functioning intergenerational economy into existence, a number of challenging but practicable developments will need to occur. Most of them are extensions of models that already exist. Developments include:

The creation of **regional or ecosystem-based entities** that have the capacity to define, through inclusive, preferably democratic, processes, the goals, outcomes and metrics for highly integrated redevelopment plans and contract proposals. Trustees would oversee redevelopment planning and implementation to assure that current residents would receive the benefits they desire, while future ones would inherit natural, human and social capital that would enable them to thrive.

Each entity would have the ability to issue or access **large and long-term bonds** or utilize other funds to raise the substantial amounts of capital needed to induce the retirement of equity trapped in unsustainable infrastructure. This should happen at the necessary scale and speed to create early, valuable benefits from eliminating inefficiency, waste, pollution and social harms from their continued operation. Funds received by the owners of these assets would then be reinvested in integrated systems that deliver beneficial outcomes for current and future generations, making it profitable for owners and managers to voluntarily replace and redevelop their old assets and retrain and expand their workforce. Contracts for outcomes would be similar to feed-in tariffs, providing a stability and predictability that permit long term investment and repayment over time. To achieve efficiencies from integration, the bond should fund investments that produce multiple outcomes across a variety of sectors and jurisdictions. Further, the bonds would serve as a stable savings vehicle for residents and also attract the power of the global finance community seeking more predictable returns from instruments for local redevelopment, as recently evidenced by a call for low-carbon investment opportunities from Swiss Re and others. ²

²Leading insurers and reinsurers, including Swiss Re, collectively representing assets of more than \$3 trillion, have announced they are seeking investment-grade opportunities to invest in bonds of at least \$300 million where revenues are specifically allocated to climate change solutions. Their justification is: "A low carbon economy is needed if we are to avoid dangerous climate change and the consequent social, economic and environmental costs." They cite IEA estimates that making the right investments now will generate cumulative efficiency savings equivalent to USD\$112 trillion. Call to increase opportunities to make low carbon fixed income investments" by the ClimateWise investor alliance issued at Durban, South Africa, December 5, 2011.

Revenues needed to pay debt service and other costs would come from the sale of: services from the new integrated systems; aggregated outcomes to interested purchasers; and, as they develop, secondary markets for securitized standardized outcomes. Financing the delivery of outcomes over the full term of the benefits would provide a stable source of funds for debt service.

Contract metrics for bidding for contracts to deliver desired outcomes would be used in the solicitation of proposals for early retirement, redevelopment investments and other transactions. They would be based on life-cycle science to assure that negative externalities are minimized or eliminated. Standards would be designed to achieve maximum efficiency, zero waste and optimal integration.

A **transactional framework** in which the entity would be empowered to issue requests for proposals from partnerships among businesses, agencies, organizations and others in a transparent competition for access to the bond funds and other intergenerational capital and markets. The successful partnerships would design or bring together innovative, highly efficient, fully integrated systems that deliver greater wealth and benefit at least cost and risk over their full life-cycle. Winning bidders would deliver valuable services at low carbon and least cost to both the present and the future. They would gain access to reliable long term revenue, assuring stable returns over the term of their contracts and attracting the interest of large investors in the global financial markets.

An important characteristic of the new system is that it would be *business oriented and voluntary*. Only businesses that wished to do so would participate. Both existing and new businesses might prefer to use IGF™ as a better way to eliminate waste and increase efficiency, access new capital and eco-industrial partnerships, invest in new technologies and markets, reduce risk and uncertainty, and gain revenue from services they would otherwise be unable to create or market.

Because IGF™ is a game changing idea and depends on a complex set of interrelated concepts, it is challenging to understand on an abstract level. So we have developed a hypothetical scenario for how it might play out in a realistic setting (see **HYPOTHETICAL SCENARIO** section below).

How do other solutions address the problem?

While IGF™ may be sufficiently robust to be considered among potential solutions to the basic problem of assuring the long-term prosperity of humans while keeping nature's services intact, there are questions about its implementability, particularly in the short-term. We decided to look for other solutions that either exist or have been proposed that may have an equal or greater chance of succeeding or could be combined with IGF™. We looked at solutions in eight different categories to assess their potential for success in addressing some or all of the basic problems. The nine groups with examples of each are:

1. **Investment** – Norway's sovereign wealth fund and tax funded programs advocated by Lester Brown and Jeffrey Sachs.

2. **Market** – World Sustainable Business Council’s Vision 2050, Harish Hande’s SELCO model, Bonneville Environmental Foundations Green Tags program, Amory Lovins’ Reinventing Fire, and the ethical markets alliance of Calvert-Henderson.
3. **Regulatory** – Regulation of externalities; cap and trade and corporate reform.
4. **Finance** – Social impact and community forestry bonds.
5. **Collaboration** – Elinor Ostrom’s self organizing cooperatives and grassroots initiatives like Transition Towns.
6. **Ecosystem** – Watershed management regimes like the Chesapeake Bay program and New York City reservoirs watershed agreement; Geoffrey Heal’s Ecosystem Service District.
7. **Voluntary** – Corporate Social Responsibility and Socially Responsible Investing initiatives.
8. **Cross-cutting** – Gus Speth’s World on the Edge; Tim Jackson’s Prosperity Without Growth; Peter Barnes’ Sky Trust; UNEP’s Greening the Economy plan.

We used two sets of criteria to evaluate these different approaches. The first was a set of roughly 20 that were drawn from the literature, which were then grouped into four different sets – economic, ecological, institutional and integral, the last being those that didn’t fit the other three. These criteria enabled us to identify some potential strengths and weaknesses of each of the eight groups and the individual solutions we selected. We scored them using a plus/zero/minus test, but found that this exercise was not nearly as useful as simply describing the advantages and disadvantages of the solutions. The criteria will benefit from further development so they can form the basis for more in depth assessments of the viability of the solutions. Our judgments will also benefit from different perspectives.

The exercise of evaluating these groups helped us to take the next step, to look at the nine groups through a different lens, comparing them with the core attributes listed above, which we believe are critical to a timely solution to the basic problem. Through that analysis we were able to identify solutions that are likely to have greater potential than others; however none of them are likely to succeed by themselves. For example, investment approaches, if large enough amounts of capital could be deployed from sovereign wealth funds or tax revenues, could effect the early retirement of harmful assets and the massive restoration of ecosystem services. However, they face enormous political hurdles in redeploying funds from favored investments in today’s economy. A few, like Reinventing Fire, have great potential for near-term success but are limited largely to the infrastructure and energy sectors. Others, like ecosystem efforts – Chesapeake Bay or ecosystem service districts, are at the right scale to produce both local and global outcomes, but address only natural resource issues.

Some ideas address the whole system on a reasonably rapid timetable, like the World Sustainable Business Council Vision 2050 and UNEP Greening the Economy plan, but lack mechanisms to assure that the economy will reach the benchmarks they set forth. Some have potential to provide avenues for grassroots efforts to address many issues, like the SELCO solar initiative in India and Ostrom’s self-organizing regimes for addressing commons issues, but do not address the full range of economic needs. Speth and Jackson offer a range of solutions which could make a difference but they rely heavily on government investment and regulation, as well

as changes in individual consumer behavior and political transformation. In short, there does not presently appear to be any approach that likely has a clear pathway to solving the complex, whole system challenges the world faces.

On the other hand, each of the solutions groups have strengths that could contribute to a whole system solution. These strengths include:

Investment – mobilizes capital at a large scale for investment in outcomes.

Market – engages business entrepreneurship and self interest in delivering valuable outcomes at least cost.

Regulatory – sets standards for many valuable outcomes and addresses side effects of economic activity; establishes price on the margin for some outcomes.

Finance – provides analysis and investment for achieving beneficial outcomes.

Collaborative – addresses common resources that need protection and stewardship; self-organizing; incorporates local knowledge, ownership, accountability and long term perspective for effectiveness and efficiency.

Ecosystems – attention on a geographic region in which integrated outcomes can be produced.

Voluntary – engages individuals and organizations in identifying and acting toward common social and environmental benefits.

Cross-cutting – changes cultural and consumer consciousness from things to value outcomes; educates, motivates and builds alliances for political change.

We attempted to imagine a whole systems solution that would build on these strengths and address the shortcomings we found in each of the solutions groups. We encourage others to fashion whole system solutions that fully meet the core attributes and are therefore strong candidates for implementation.

Conclusion

1. There is a clear need for whole system, integrated solutions that can propel the transition of local, regional and global economies to enable humans to thrive in harmony with nature both now and in the future.
2. No one system to date has been implemented or proposed that can credibly bring about that transition at the speed and scale required.
3. A combination of solutions based on the best parts of all the groups is theoretically possible and certainly desirable.
4. IGF™ as a whole system solution, with its innovations in governance, markets for life-cycle measured outcomes, early retirement of problem assets, and long-term finance for business-led solutions, including sale of local outcomes to global markets, has

promise and should be studied and demonstrated along with the best of the other solutions.

Challenges

If IGF™ and the tools and concepts embedded in it deserve at least the same attention as other proposed solutions to the world's dilemma, obstacles to its implementation have to be addressed, as they would with any other combination. The principal issues it faces are:

DEBT – IGF™ envisions the issuance of very large and long-term financial instruments to raise sufficient capital to leverage the transfer of equity from trapped investments in unsustainable systems and to invest in systems that meet life cycle standards for beneficial investments. Will there be enough local, regional, national and global capacity to issue the amounts of debt needed? Will revenues from the delivery of beneficial outcomes be sufficient to pay for debt service, costs and profits? Will there be adequate security for the new debt? Would laws need to be changed to allow for the issuance of a new kind of debt?

MARKETS – The new system envisions new markets for the highly efficient delivery of goods and services that produce the valuable life cycle outcomes contracted for. Some of these goods and services will result in traditional outcomes, like food, water, and shelter, but others will be novel, such as the wellness benefits from relocation of trapped equity into cleaner infrastructure or services, the reduction of future risks by assuring price stability for energy, and the restoration of ecosystem services. Secondary markets for aggregated outcomes such as pollution reduction, lowered recidivism, and certain wellness benefits will have to be created or expanded to provide additional revenue streams. Can these markets be developed in time and produce the revenues needed for IGF™ to work? Are governments and the rest of the global policy community able to cooperate in establishing common goals and procurement objectives for outcomes that have both local and global importance?

METRICS – The metrics for outcomes must be identified and defined for multiple scales: ecosystem, bioregional and global. Very importantly, over time, valuable outcomes need to be aggregated (securitized) to facilitate their sale in global markets. Will the scientific community have adequate data and measurement tools to get to sufficient precision, including life-cycle impacts, for outcomes to be standardized for market transactions? For social outcomes, such as employment, income, personal security, mobility, and community well being, measures will depend on agreements as to what constitutes desired outcomes and the activities that best achieve those outcomes. These measures will vary significantly from culture to culture.

GOVERNANCE – If new institutions like a watershed or ecosystem entity are created to enable outcomes to be selected democratically and metrics to be developed objectively, how will they be integrated with existing governments and processes for public involvement in decision-making? Will organizations that currently influence government

policy through lobbying and campaign contributions be able to game or dilute the new system? Can the governance process function successfully in the absence of independent media?

EQUITY RELOCATION – Large amounts of capital may be needed initially to leverage the first movers to make the switch to cleaner systems. Will alternative systems be attractive enough to overcome resistance to change by asset owners, workers and communities invested in the old?

BOUNDARIES/SCALE – Will bioregions and ecosystems naturally fit into the envisioned basin/watershed framework? Are there other frameworks in which IGF™ can be implemented?

PHASING – What are the candidate regions to initiate and demonstrate the concept?

CULTURAL – Can IGF™ succeed without transformation of individual and community consciousness to value quality of life over increasing consumption and material throughput?

POLITICAL – Can IGF™ get started without the transformation of politics from money driven to concern over values and outcomes?

PUBLIC ACCEPTANCE – What will need to be done in each region or ecosystem to introduce and test this new approach to redevelopment and job creation?

The first four questions are specific to IGF™, although they may be relevant to others. The last five are common to all the solutions listed above. We offer some arguments that may respond to some of these issues for both IGF™ and other solutions.

Next Steps

The first step is to offer the ideas for a new operating system for today's economy for review, starting with this conference. This will generate requests to clarify either the concepts underlying IGF™ or the analysis of other systems. Or, perhaps there are ideas we missed that can answer the crucial questions more robustly or, there are other proposals for whole system solutions we should consider.

Next we would like to see volunteer communities, watersheds, or regions attempt to demonstrate some of the innovative tools in IGF™, even if the lack of complete metrics for the full range of valuable outcomes precludes a full scale demonstration. For example:

- The dedication of a significant capital fund, perhaps through a state or municipal bond, that is designed to produce valuable and measured integrated outcomes.
- Identification of the possible benefits of integrated investments, for example: wellness, employment, security and ecosystem outcomes, from replacement of energy from a fossil powered facility or a hydroelectric dam by investments in efficiency and

renewable energy, but also in education, training and other socially useful activities that have potential returns on investment.

- Accurate measurement of the possible benefits and their expression insofar as possible in units that can be standardized for ultimate sale to purchasers within or outside the boundaries of the demonstration area.
- Repayments to the fund from a variety of revenue sources, including the direct sale of electricity and efficiency services, as well as the sale of measured outcomes to insurers, governments, organizations, foundations or others, including residents of the region benefitting from the redevelopment, new jobs and other services. The fund would be available over an appropriately long-term to allow for sufficient revenue to accrue to pay for the benefits from early retirement.
- The creation of an entity that represents future generations, and plans and implements new systems. Among other things, it would solicit proposals for local redevelopment through partnerships among business, government and others and enter into contracts with the partnerships that make capital from the fund available to them to produce intergenerational services. It could provide the service of aggregation of validated outcomes for sale where external markets for standardized outcomes exist and as new ones emerge. The entity performing these services could be an existing utility or other existing organization, ideally with democratic governance, with protocols to assure quality of measurement and a process for monitoring and verification of outcomes delivered under the contracts, with changes to assure the integrity of the selection and measurement of desired outcomes.
- To complement this fund, a pilot partnership with the federal government to demonstrate the efficacy and cost effectiveness of an integrated life cycle approach may also be feasible. Since the Federal budget carries much of the burden of long term failures in wellness, education and employment, agencies may be willing to invest in local outcomes that deliver budgeted services at lower cost.

One of the hoped for results of the conference being held at Portland State on June 5-6, 2012 will be the outline of one or more demonstration projects and some candidate ecosystems, regions, districts or cities.

Watershed Redevelopment in Partnership with the Future (A Hypothetical Scenario)

Background

The Governor of the State of Liberty, concerned that current economic policies were not producing sufficient jobs, income and personal security, wellness, environmental quality and other good things for its residents, decided to demonstrate a top-to-bottom redevelopment of the economy in one area of state. She convened a statewide group of leaders and citizens, representing all sectors of society and asked them to select a watershed for a major redevelopment demonstration project.

The Happiness Watershed

A group of leaders she convened recommended the Happiness River Watershed, which contained a number of aging facilities, including a coal fired power plant, a dam and factories that were still producing income and other benefits but whose adverse effects on human health and natural resources were well documented. The lower end of the watershed is urbanized and the upper watershed is mainly agricultural and forest land. The watershed is divided among three counties and is served by two utilities. There are concentrations of low-income residents near a port and manufacturing district.

Governance for Planning and Decision-Making

The Governor appointed a retired State Senator to convene a solutions-oriented team, which would be broadly representative of all interests, jurisdictions and points of view within the watershed. The group reached consensus on the following:

- The need for a long-term vision aimed at prosperity for current and future generations and based primarily on businesses being able to deliver most of the outcomes needed.
- A set of goals and outcomes the members believed would achieve as fully as possible the long-term vision. Outcomes might include those benefits to the watershed that, in their aggregate would provide solutions to global problems like climate change or ocean health.
- In order to assure that all outcomes produce multi-generational, permanent prosperity, scientific metrics based on rigorous life-cycle analysis must be part of a redevelopment/full employment plan.
- Enterprises that will create these outcomes should have access to the future value their investments will deliver.

- An assessment should be made of the area’s resources and key issues. The assessment should be accompanied by recommendations for implementing the watershed goals, including metrics, governance, finance, citizen involvement, and other activities intended to achieve current and future prosperity.

A planning team undertook the assessment and produced a redevelopment plan, which developed the goals and associated life-cycle outcomes. Goals were established in three categories:

1. Economic – full employment; adequate and secure household income; affordable housing, food, energy, mobility and essential goods
2. Social – healthy individuals; personal security; opportunities for education, information, training, culture and community activities; resilience in the event of natural disasters or infrastructure failure.
3. Environmental – healthy air; abundant & clean water; accessible green space; fully functioning ecosystem services such as flood protection, productive soils, pollination, healthy forests, proportional contributions to climate stability, fisheries and other global needs; well functioning natural resource stocks to achieve social and economic goals without compromising future needs.

The plan includes recommended life-cycle based outcomes and metrics for transactions that would achieve the project’s goals. Examples of the outcomes and some of the metrics for them are:

- Security – water availability for all residents expressed in acre/ft of storage and gallons saved by conservation; healthy diet measured by calories and nutrition essentials; personal safety in home and streets, measured by recidivism and crime rate per precinct.
- Wellness – incidence of cardiovascular, mental, respiratory, digestive, diet related, genetic etc. disorders measured against healthy benchmark populations; # lost school and work days; substance addiction rates.
- Employment – employment rates; income level of lowest 15%; job turnover rate.
- Energy – negawatts (amount of energy not produced or consumed) created through radical efficiency; kilowatts produced from renewable energy.
- Ecosystem – air and drinking water quality that meets consensus scientific targets measured in standard units; health of water bodies measured in concentrations of contaminants and abundant populations of native organisms; organic and chemical content of soils; well functioning critical ecosystem services.
- Community – elimination of areas disproportionately impacted by any harmful uses, inadequate resources, pollution, etc.; community participation, opportunities per

neighborhood, measured by availability per inhabitant; resilience in face of emergencies benchmarked vs. best practices.

- Personal – Adequate time for family, friends, hobbies, culture and other enjoyable pursuits, measured hrs/day spent at work, commuting and in sleep.

The plan includes provisions for:

- Retirement of unsustainable assets and systems to produce early valuable gains. Assets and systems include the power plant, the dam, and inefficient heating, cooling and process systems in major manufacturing, commercial, health care and residential buildings.
- Investments in replacement systems with dramatically lower life-cycle impacts and costs.
- Investments in job creation in services to provide wellness, including healthy food and opportunities for exercise, affordable housing, mobility, essential goods, security, resiliency, education, cultural and community opportunities.
- Irrevocable features to assure feasibility of investments over the long-term, like a German-style feed-in tariff for guaranteed purchase of excess power created by individual business or home investments in renewable energy.
- Facilitation of and incentives for integrated system designs that make contributions to multiple outcomes at the least cost.
- Mechanisms for the aggregation of outcomes suitable for sale into existing or potential markets.

Governance for Implementation

The planning team also proposed the creation of a new economic redevelopment entity, representing both current and future generations, to provide financing, contracting, and management services in the redevelopment process. Its governing body would be initially selected by the Governor and later separately elected. It would be responsible for:

- Coordinating ecosystem assessment, planning and consensus building processes.
- Disbursing the proceeds of bonds, to leverage the retirement of unsustainable assets and reinvestment in equivalent or better overall outcomes.
- Issuing requests for proposals to deliver the services needed to achieve the outcomes.
- Awarding and managing contracts for services and payments for debt service.
- Aggregating and bundling outcomes suitable for sale in available secondary markets.
- Monitoring the achievement of outcomes in the region.

Finance

Capital financing was recommended for a suite of tools, including:

- Conventional market loans, mortgages, REITs, government loans and grants.
- Pension funds, foundation related investments and negotiated purchases of outcomes by insurers, large employers, foundations and others.
- The majority of funds would come from a long-term bond which would be issued by the new entity in an amount sufficient to cover the capital costs of phasing out existing unsustainable public and private infrastructure and investing in sustainable systems to deliver the desired outcomes. It would be financed over the long-term to capture the benefits from early retirement, and assure the replacement of assets and the repayment of the bond. The bond would be secured by assets and systems in the area and by other pledges of revenue, guarantees or securities. Because of its inherent security, it would be of investment grade so that pension funds, local financial institutions and residents could purchase it.

Revenues to pay debt service on the bond, costs of services delivered and profits for the participating businesses would come from:

- Fees for service.
- Revenues from enterprises and other conventional sources.
- Contracts for direct purchase of outcomes by insurers, large firms, agencies, foundations and others.
- Existing markets for outcomes such as carbon, water, air and water quality and ecosystem services.
- Potential markets for environmental, wellness, security and other markets as they emerge in response to similar redevelopment efforts in other areas.

Request for Proposals

The plan included a draft request for proposals to achieve these outcomes through competitive bids from individual businesses, partnerships among businesses, consortia of businesses, government agencies and nonprofits, or any other arrangement that could produce the outcomes in the most efficient and integrated ways.

The plan and RFP envision the integration of outcomes as fully as possible to achieve its goals with maximum efficiency and least cost. Each of the outcomes was given a specific target to be achieved through the contracting process. Bidders for contracts would be expected to propose projects or actions that, individually or together would contribute to as many outcomes as possible. An example might be the use of funds from the retirement of the coal burning plant in

a variety of projects, like renewables, transportation improvements, building upgrades, and restoration of ecosystem services that would contribute to the measured outcomes for air quality, employment, security, resilience and mobility. Some of these outcomes might be purchased by businesses, agencies or, in the case of carbon, sulfur and mercury reductions, in national or international markets. The greenhouse, laundry and biogas digester figure illustrates how integration of investments helps produce multiple outcomes.

IGF™ Equity Relocation Case Study, Eco-District Scale:

TWO CLASSIC BUSINESSES from the EXHAUSTIVE PARADIGM

What opportunities are available here for long term value creation?



Energy intensive businesses caught between rising fuel prices and capital trapped in old infrastructure can find their enterprises as risk when critical thresholds are reached, as for example when a laundry must

re-fit coin slots on a bank of washing machines to recover rising energy cost, or when a greenhouse cannot recover rising heat and transport costs from production. Such businesses, though important for the healthy function of communities, become unstable and even unsellable in a climate of fuel price and supply risk and instability.



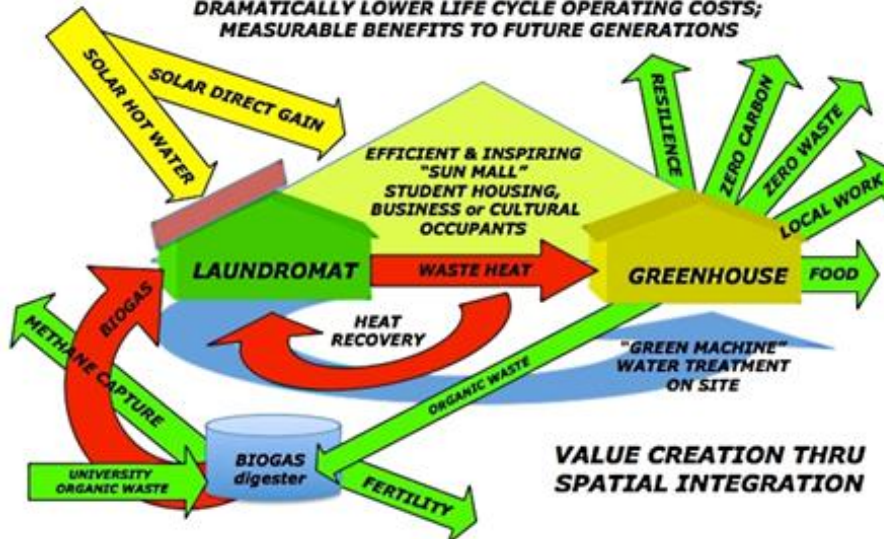
Designed to support transactions at multiple scales from small local partnerships as illustrated here, to large watershed or airshed collaborations, the *equity relocation function* of IGF™ supports the early retirement of legal but dirty and inefficient assets, providing a framework by which a local authority may extend long term financing to voluntary, competitive redevelopment proposals, accompanied by irrevocable contracts for measurable life-cycle outcomes.

Access to long term capital and contracts for a broad range of measurable outcomes is designed to leverage the relocation of capital out of systems with significant negative impacts and inefficiencies, into productive and radically efficient partnerships designed to deliver a spectrum of standard measurable benefits to their communities and future generations. Because these outcomes meet rigorous vetted third-party standards, they can be bundled and sold (aggregated and securitized) in secondary markets.

IGF™ Equity Relocation Case Study, Eco-District Scale: A UNIVERSITY SCENARIO

SAME ENTERPRISES IN SUSTAINABLE COLLABORATION

DRAMATICALLY LOWER LIFE CYCLE OPERATING COSTS; MEASURABLE BENEFITS TO FUTURE GENERATIONS



VALUE CREATION THRU SPATIAL INTEGRATION

World Steward, by permission

Implementation

After an extensive public process, an advisory vote from all residents of the watershed resulted in an overwhelming approval, in part because all the elected leaders in all the jurisdictions backed it. Also, legislation needed to resolve some technical issues was approved by a bipartisan vote. The governing board of the new entity issued the draft RFP and received a number of highly competitive bids from multiple partnerships and consortia. Contracts were awarded to multiple consortia because no one single bid had sufficiently encompassed all the goals and outcomes. The financing package was finalized, including the bond, which while very large was smaller than expected because of efficiencies in delivering outcomes through integrated investments and business plans.

Long-term contracts with appropriate re-openers for changes of circumstance, new scientific knowledge and other unforeseen or unknowable future events were negotiated with the winning bidders. Contracts included replacement of some of the larger harmful infrastructure including the power plant and dam. New infrastructure needed to produce outcomes in highly efficient ways through the redesign of a number of towns and city neighborhoods were made possible by the longer payback periods that the bond allowed.

A major international insurance group committed to acquire at least one billion dollars in redevelopment bonds over five years, secured by revenues from net zero carbon and other clean and socially useful investments, with no effect on state or municipal debt amounts or limits.

Results of Watershed Redevelopment

After the first seven years, an independent evaluation found that overall, significant progress had been made on the goals and contracted outcomes, including:

- Replacement of harmful infrastructure – The entire problematic infrastructure had been retired and replaced through greater efficiency and renewable energy facilities.
- Employment – The number of total jobs increased, including some in manufacturing, because the area had become known for having a low level of life-cycle impact in the production of goods.
- Security – The new jobs, together with other efforts, dramatically reduced poverty and crime rates.
- Wellness – Because of dramatically reduced emissions from the power, manufacturing and trucking sectors, admissions to hospitals and early deaths from respiratory problems had steadily decreased, and fewer hours were lost to work and school. Healthier diets, in part from more available and accessible fresh produce, reduced heart disease, diabetes and other problems.

- Ecosystem – A number of ecosystem services that had been damaged by historical actions were fully or partially restored, paid for in part by a charge on utility bills that assured current and future security for those services.
- Personal investments – While the bonds issued to finance the redevelopment were held in portfolios all around the world, an unusually large percentage were held by residents of the watershed for savings in education and retirement.
- Contribution to global outcomes – Projections from the evaluation of outcomes delivered by the new system indicated that, if similar efforts in other areas around the world were made, negative social and environmental impacts could be reduced over the next several decades to levels that greatly increased security, employment and wellness and moved the world much closer to living within planetary ecosystem limits.

CHAPTER 1 : INTRODUCTION & NEED FOR ECONOMIC TRANSFORMATION

Introduction

Humanity and the natural systems on which we depend are facing a monumental set of challenges as resources are depleted, millions go hungry or are without adequate employment and incomes, businesses face new and increased risks, and enormous investments in reducing global and local pollution and in poverty reduction and health improvement have fallen short of reversing environmental and social trends. New ideas have emerged over the last few decades and some show considerable promise in making progress. Arguably, we have the innovative knowledge, tools and entrepreneurship to turn these challenges into opportunities. But at present, we lack the appropriate policy, financial, measurement, governance and market frameworks to take advantage of these new ideas. To address the need for a new framework, some scholars and thought leaders calling for a new operating system for global and regional economies that will deliver the outcomes that people want and need, like health, income and personal security, while protecting and restoring natural ecosystems so they retain their capacity to support current and future generations.

Portland State University's Institute for Sustainable Solutions has funded a research project to produce a critical analysis paper that will provide a clear statement of the vision, goals and potential components of an outcome driven economic and business system at regional and global scales and to compare it with other proposals to transform the current material growth and short term profit driven economy to one that serves the needs of both current and future generations. This paper will critically analyze various proposed solutions to the dilemma of creating real wealth and security for all humans while preserving natural capital and the essential services it provides.

Initially, we describe an idea for a proposed new framework that addresses the basic problem of humans thriving within nature's limits by giving future generations a financial stake in today's economy so that it produces good outcomes for both current and future inhabitants of individual regions and of the planet as a whole. The proposed system, called Intergenerational Finance^{TM3} by its originator, is designed to give future generations a financial stake in today's economy so that it will produce good outcomes for both current and future inhabitants of the planet. It is intended to address some of the key scientific, financial, governance and political obstacles to making the transformation.

We then compare that idea with other current or proposed solutions that have been advanced as addressing the basic problem, using several sets of criteria. Finally we examine the challenges and obstacles that the new framework and other solutions face. We also propose a number of next steps, including demonstrations of the new framework's tools in real settings. It is hoped

³ See footnote in Chapter 2 for a full explanation of the trademark.

that this paper will spark robust dialogue about developing practical, politically achievable ways forward to meet the most complex and critical challenge humanity has yet faced.

Need for Transformation of Global and Regional Economies

Many leading scientists, policy makers and leaders in business and society have concluded that current patterns of exponential growth and extractive consumption of the resources and ecosystems of a finite planet are unsustainable. A cornucopia of insightful papers, books, conferences, films, events and campaigns increasingly warn about the perils of unsustainable management and the political, social, and environmental instability that must result. Suggested planetary boundaries for biodiversity, climate change and acidification of oceans are already being exceeded and a number of other boundaries are in danger of being crossed.⁴ There is increasing agreement that the current economic model of ever increasing growth in gross domestic product and primary focus on short term profit is failing to provide for human needs for all people while severely damaging natural capital and the ecosystem services it provides.⁵ But current policy interventions tend to emphasize economic growth and increased income as the best, if not the only, path toward these outcomes. As a result, the interests of future generations are largely ignored by discounting the values of the services they will need to thrive.

A number of scholars and institutions have called for a new operating system for today's economies. Tim Jackson, a leading British economist, has identified the need for a new ecological macroeconomics that doesn't rely on relentless consumption growth and expanding material throughput.⁶ The United Nations Millennium Declaration, adopted by its General Assembly in 2000 underscores the shared responsibility of nations for managing worldwide economic and social development, and, after reciting essential values like freedom, equality, tolerance, fairness and social justice, endorses the precepts of sustainable development, saying: "Only in this way can the immeasurable riches provided to us by nature be preserved and passed on to our descendants. The current unsustainable patterns of production and consumption must be changed in the interest of our future welfare and that of our descendants."⁷ Gus Speth, founder of the World Resources Institute and former administrator of the United Nations Development Programme, has said: "...a fundamental question facing societies today—perhaps

⁴ Steffen, Costanza et al, How Defining Planetary Boundaries Can Transform Our Approach to Growth, *Solutions Journal*, May 2011

⁵ The relationship between economy and environment was the primary focus of the PCAST Report to the President [on] Sustaining Environmental Capital: Protecting Society and the Economy, July 2011. The report emphasized two central messages, namely that "... the economic and environmental dimensions of societal well-being are both indispensable, as well as tightly intertwined." and that, the federal government, in developing its national economic policy, "... must not fail to address the threats to both the environmental and the economic aspects of well-being that derive from the accelerating degradation of the environmental capital—the Nation's ecosystems and the biodiversity they contain—from which flow "ecosystem services" underpinning much economic activity as well as public health, safety, and environmental quality." President's Council of Advisors on Science and Technology (U.S.), Report to the President Sustaining Environmental Capital: Protecting Society and the Economy, July 2011

⁶ Jackson, *Prosperity without Growth*, 2009. p. 141

⁷ Resolution adopted by the General Assembly 55/2, 8 Sept. 2000, retrieved from <http://www.un.org/millennium/declaration/ares552e.htm>

the fundamental question—is how can the operating instructions for the modern world economy be changed so that economic activity both protects and restores the natural world?”⁸

The failure of global, national and regional political systems to address these increasing problems has many causes, including large sunk investments in assets that are harmful to prosperity, inadequate measurement of beneficial outcomes for people and nature and the lack of robust governance and transactional frameworks for reallocating capital and economic activity to clean and harmless ways of creating real wealth. Other critical issues are the reliance of current economic systems on exponential growth in gross national product, increasing productivity of labor, and growing material throughput, all while ignoring externalities, failing to take into account the full life cycle impacts of investments, discounting the needs of future generations and underestimating the difficulty of decoupling increases in economic activity from environmental and social impacts.

⁸ Speth, *The Bridge at the End of the World*, 2008, p. 7

CHAPTER 2 : INTERGENERATIONAL FINANCE (IGFtm)

This chapter describes a proposal that intends to accelerate the transition to an enhanced economic operating system driven by the real needs of people and the integrity of ecosystems. The idea is to create practical finance and market mechanisms to give future generations buying power in today's economy in order to deliver real benefits to them and ourselves in a voluntary and profitable market framework. We illustrate it in a hypothetical scenario at the end of this chapter. In subsequent chapters, we will compare this idea with other proposals or existing systems that share some or all of the attributes claimed for it.

The new concept, called Intergenerational Intergenerational Finance™ (IGF™)⁹ by its creator Hank Patton, is designed to facilitate and accelerate the transition to an economic system that gives investors and managers access to what Patton argues is the larger wealth created by managing whole systems with the interests of future generations in mind. This greater wealth comes from investing in human capital, wellness, security and cultural capacity and from stewarding ecosystems to restore or enhance their inherent abundance. Conceived as a business partnership between the future and the present, IGF™ proposes a suite of practical finance and market mechanisms that give future generations buying power in today's economy and contemporary managers new business opportunities for valuable --but currently not merchantable --long-term outcomes.

The essential idea of Intergenerational Finance™ is to enable trustees for future generations to make investments in today's economy that will produce valuable outcomes, including wellness, security, employment, and ecosystem integrity, that benefit current and future generations. Through long-term bonds and contracts with businesses and others, the trustees can incentivize the early retirement of inefficient and harmful infrastructure and systems and leverage their replacement with clean and efficient ones that produce marketable beneficial outcomes in multiple sectors. Mr. Patton describes the flows of funds and services among trustees, contracting businesses and customers as a business partnership with posterity. Contracts would be outcome-based and measured using life-cycle science to assure they produce desirable benefits, like long term employment, wellness, security, zero waste and ecosystem integrity, without unintended harmful health, ecological and social impacts. The benefits would be greatly enhanced if similar efforts are pursued in as many regions as possible, allowing the trade of measured outcomes among them and the creation of secondary markets for those which can be standardized. In this way, both local and global outcomes would come from local redevelopment, attracting investment from global as well as local sources. Outcomes like climate stability, elimination of trans-boundary pollution, habitat for migratory species and communicable disease

⁹ The terms Intergenerational Finance™ and IGF™ are trademarked by Mr. Patton and his associates to reserve their use only in conjunction with a specified international set of vetted third party standards (contract metrics) for life cycle outcomes. His stated intent is to transfer ownership of these terms, and a scenario planning software that uses IGF™ metrics to build and compare intergenerational business cases, to an appropriate non-profit international standard setting body to develop and maintain the catalog of standards for measuring intergenerational services.

prevention, for which global markets do exist or may develop, will benefit residents and contribute to achieving global goals.

To bring a functioning intergenerational economy into existence, a number of challenging but practicable developments will need to occur. Most of them are extensions of models that already exist. Developments include:

The creation of **regional or ecosystem-based entities** that have the capacity to define, through inclusive, preferably democratic, processes, the goals, outcomes and metrics for highly integrated redevelopment plans and contract proposals. Trustees would oversee redevelopment planning and implementation to assure that current residents would receive the benefits they desire, while future ones would inherit natural, human and social capital that would enable them to thrive.

Each entity would have the ability to issue or access **large and long-term bonds** or utilize other funds to raise the substantial amounts of capital needed to induce the retirement of equity trapped in unsustainable infrastructure. This should happen at the necessary scale and speed to create early, valuable benefits from eliminating inefficiency, waste, pollution and social harms from their continued operation. Funds received by the owners of these assets would then be reinvested in integrated systems that deliver beneficial outcomes for current and future generations, making it profitable for owners and managers to voluntarily replace and redevelop their old assets and retrain and expand their workforce. Contracts for outcomes would be similar to feed-in tariffs, providing a stability and predictability that permit long term investment and repayment over time. To achieve efficiencies from integration, the bond should fund investments that produce multiple outcomes across a variety of sectors and jurisdictions. Further, the bonds would serve as a stable savings vehicle for residents and also attract the power of the global finance community seeking more predictable returns from instruments for local redevelopment, as recently evidenced by a call for low-carbon investment opportunities from Swiss Re and others.¹⁰

Revenues needed to pay debt service and other costs would come from the sale of: services from the new integrated systems; aggregated outcomes to interested purchasers; and, as they develop, secondary markets for securitized standardized outcomes. Financing the delivery of outcomes over the full term of the benefits would provide a stable source of funds for debt service.

¹⁰Leading insurers and reinsurers, including Swiss Re, collectively representing assets of more than \$3 trillion, have announced they are seeking investment-grade opportunities to invest in bonds of at least \$300 million where revenues are specifically allocated to climate change solutions. Their justification is: "A low carbon economy is needed if we are to avoid dangerous climate change and the consequent social, economic and environmental costs." They cite IEA estimates that making the right investments now will generate cumulative efficiency savings equivalent to USD\$112 trillion. Call to increase opportunities to make low carbon fixed income investments" by the ClimateWise investor alliance issued at Durban, South Africa, December 5, 2011.

Contract metrics for bidding for contracts to deliver desired outcomes would be used in the solicitation of proposals for early retirement, redevelopment investments and other transactions. They would be based on life-cycle science to assure that negative externalities are minimized or eliminated. Standards would be designed to achieve maximum efficiency, zero waste and optimal integration.

A transactional framework in which the entity would be empowered to issue requests for proposals from partnerships among businesses, agencies, organizations and others in a transparent competition for access to the bond funds and other intergenerational capital and markets. The successful partnerships would design or bring together innovative, highly efficient, fully integrated systems that deliver greater wealth and benefit at least cost and risk over their full life-cycle. Winning bidders would deliver valuable services at low carbon and least cost to both the present and the future. They would gain access to reliable long term revenue, assuring stable returns over the term of their contracts and attracting the interest of large investors in the global financial markets.

An important characteristic of the new system is that it would be business oriented and voluntary. Only businesses that wished to do so would participate. Both existing and new businesses might prefer to use IGF™ as a better way to eliminate waste and increase efficiency, access new capital and eco-industrial partnerships, invest in new technologies and markets, reduce risk and uncertainty, and gain revenue from services they would otherwise be unable to create or market.

The huge political and economic challenge is to transform today's economy into one that produces beneficial outcomes for people and nature while taking advantage of the human capacity and drive to innovate and be entrepreneurial. It is possible to conceive of a business partnership with future generations that will deliver valuable outcomes without the devastating externalities that the current business framework creates.

Why life cycle science?

Life cycle science requires all environmental and, in a growing number of cases, social impacts of a product, project and service be disclosed. IGF™ depends on life cycle science in several ways: 1. In establishing metrics for desired outcomes, such as for avoidance of mercury emissions tied to adverse health outcomes, life cycle science would be used to identify and measure all environmental, health and social impacts associated with the mining, transportation, processing, combustion, emission and waste management of the fuel or process causing the emissions as well as any proposed alternative means of providing the services produced by the mercury emitting process. and 2. In assessing the desirability of projects, processes or activities financed through an IGF™ framework, proposals would use a similar analysis to assure that no unanticipated adverse impacts would occur and that there are no alternate means of producing the desired outcome with lower overall impacts. An example of using life cycle science in measuring a global standard outcome is the recent effort by OPEN-EU, in monitoring compliance with the European Union carbon standard, to track embedded carbon in products and services sold in the EU but manufactured/processed elsewhere.

Business should be able to thrive in partnership with government and the non-profit sector by taking advantage of the great wealth that well designed, integrated systems can provide. It is important that the new system be voluntary and competitive to attract the good ideas that innovation and entrepreneurship can bring. But to access the capital needed to transform the current system, it will be necessary to have scientifically valid standards for outcomes, based on rigorous science, including life cycle analysis. These standards must be free from gaming by participants. Agreement to adhere to them will provide access to financing.

The scale of financing necessary to transform currently damaging systems for delivering energy, products, health, food, employment, transportation, security, shelter and other essential needs must match the scale of the equity trapped in these systems. The building block for a new system should be a local or regional ecosystem like a watershed. Outcomes from each ecosystem would be aggregated through secondary markets to achieve outcomes at larger scales, including global.

In order to be able to raise the necessary capital, finance and market mechanisms must be secure and pay adequate returns. To attract the vast capital now aimlessly shifting from place to place in overnight markets for minuscule returns, instruments should be firmly grounded in valuable infrastructure and in transactions that produce secure and reliable income for paying debt service and other costs, including profits for participating businesses. These instruments should prove to be secure investments for institutions and a savings vehicle for individuals, with a potential upside if returns exceed the basic rate promised in the instrument.

New governance structures will be required, preferably at ecosystem scale, for a variety of political and implementation purposes, including creating agreements on desired outcomes, establishing metrics for outcomes for which none exist at a larger scale or are unique to the ecosystem, managing the aggregation of outcomes from different sources for bundling and sale into secondary markets, collecting payments for debt service on bonds issued at ecosystem or larger scales, managing the process for entering into contracts from partnerships to deliver outcomes in exchange for access to bond proceeds, and tracking progress on achievement of outcomes. A utility type entity may be the most effective means of performing many of these activities.

To achieve the multiple outcomes required, investments and contracts for the delivery of services will be successful to the extent that projects are designed to integrate as many outcomes as possible across sectors, jurisdictions, physical structures, time and flows. Geographic scale is extremely important. It must be large enough to be able to encompass sufficient outcomes to make investment viable but not so large as to make it more difficult to achieve important community level outcomes. Watersheds, which are nature's way of organizing its own economy, are suggested as the basic building block. To enhance success, there will need to be systems in place across entire regions and at multiple levels to capture the full wealth from integrating multiple outcomes. To the extent that global outcomes are identified and markets developed for them, the transformation will be accelerated.

To achieve all of this will require major changes in how business is done:

1. The development of **metrics** for valuable outcomes at the appropriate global, regional (basin/large ecosystem) and local (watershed) scales. The metrics will be sufficiently precise that outcomes can be standardized so transactions can be made in them. The standards will need to be developed using life cycle science to assure that no externalities prevent the achievement of the full benefits envisioned.

Examples of important outcomes for which standards must be developed to make transactions in them are:

- a. **Security:** ample healthy food; sufficient water resources; personal safety, affordable housing, price stability for essential goods and services, reduced addictions, recidivism, and community resilience
- b. **Wellness:** personal health (e.g. cardiovascular, mental, respiratory, digestive, genetic), lost school and work days, self esteem, personal growth, community vibrancy and cultural capacity
- c. **Employment:** full employment, meaningful work, adequate income, opportunity for advancement
- d. **Energy:** radical efficiency, renewable energy
- e. **Infrastructure:** design for zero waste, durability and reuse of products; self supporting buildings; hyper efficient mobility systems
- f. **Ecosystem:** clean, toxics free air and water; healthy soils; biodiversity within and across ecosystem boundaries; ecosystem services restoration and protection
- g. **Culture:** education, meaningful activities for all

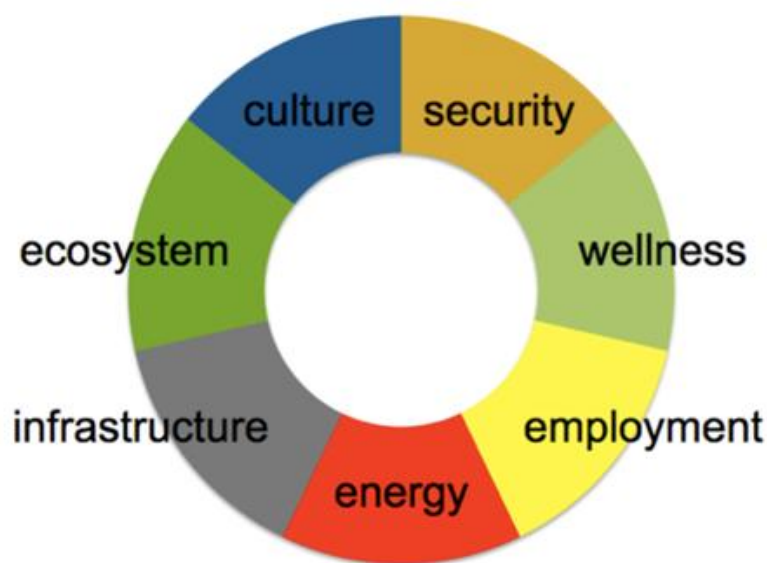


Figure 2.1 - Most valuable outcomes can be categorized under these seven categories.

A key concept is that wherever possible outcomes must be sufficiently standardized to be biddable, i.e. firms and partnerships that contract to deliver outcomes must be able to charge an appropriate price for them and be able to aggregate units for bundling and sale to secondary markets. Some very valuable outcomes, such as time spent with friends and family will not be measurable in economic terms but can be designed to be a positive externality of the measurable outcomes delivered, e.g., a shorter work week increases family time.

2. Raising sufficient **capital** to finance the retirement of problematic assets and their replacement with clean infrastructure and highly efficient systems and processes. It is envisioned that one way to finance the relocation of trapped equity would be the issuance of very large and sufficiently long term revenue bonds that would perform double duty: providing capital for the relocation of trapped assets and a savings vehicle for residents of the ecosystem. Interest and principal repayments would be made from economic activities created by investment of the bond proceeds and from the sale of bundled outcomes on secondary markets. For example, small amounts of carbon avoided or retired through multiple transactions in different projects across a variety of sectors could be aggregated and bundled into a tradable security and sold on the global carbon market. Security for the repayment of the bonds could be in the form of pledges of both revenues and community assets within the ecosystem, from credit or payment guarantees from higher level institutions or pools and other sources satisfactory to financial markets. Other finance models might be developed parts of the world with command and control economies that have large amounts of capital under their control.
3. The development of both current and secondary **markets** for the sale of outcomes. Recipients of services that successful firms and partnerships offer will pay for them, much as they pay for many services in today's economy. In order to deliver outcomes as efficiently as possible, successful partnerships may offer energy, wellness, security, employment, mobility, dietary, shelter, education and other services in a variety of forms, such as community integrates services across sectors, structures and flows, capturing multiple outcomes with radically efficient investments. Secondary markets will look more like current ones with the major difference that the bundled securities will have been strictly vetted to assure the promised outcomes are real.
4. New **transactional frameworks** and institutions for enabling the new finance and markets to operate as efficiently as possible. These include:
 - a. An international process for developing the metrics required for transactions for global outcomes. An organization like the International Standards Organization (ISO) could take on this task, bringing scientists, engineers, finance and governance experts, environmental and social justice advocates and others together to develop standards based on life cycle science.
 - b. A similar process at the regional (bi-national, national, bi-state, state, large ecosystem) level preferably focused on outcomes common to multiple ecosystems.

- c. At the watershed or other ecosystem level, a process for human and natural resource assessment, planning and consensus building to identify desired outcomes and create metrics for outcomes not included in global or regional standards.
- d. A utility or similar entity or entities, representing current and future generations, to be responsible for:
 - i. Coordinating ecosystem assessment, planning and consensus building processes
 - ii. Collecting proceeds of bonds, whether issued by government or itself
 - iii. Issuing requests for proposals to deliver services and determining the winning bids
 - iv. Awarding and managing contracts for service delivery and payments for debt service and management
 - v. Monitoring contract implementation, enforcing contracts and/or insurance or performance bonds
 - vi. Tracking and bundling outcomes suitable for sale in secondary markets, unless contractors bid for the privilege, and selling into those markets
 - vii. Assuring debt service payment are made
 - viii. Monitoring achievement of outcomes in the region

Principal Arguments in Support

1. As a business partnership with future generations, IGF™ envisions benefits flowing both ways. It does not sacrifice prosperity for current generations to assure prosperity for future ones. Unlike many of the solutions discussed in the next two chapters, including regulatory, public investment and tax approaches, IGF™ is designed to appeal to all sides of the political spectrum. It focuses on shared values like prosperity, protecting children and future offspring, providing security, wellness, ecosystem services, and freedom. It is a voluntary approach in that it only requires use of standard metrics for outcomes if a firm or consortium chooses to compete for the capital funds. Once initial financial returns are realized, it is expected that the number of investors and participants will increase.
2. Full employment will be a primary outcome, delivered in numerous ways, including work to produce other vital outcomes, like personal and community security and wellness, restoration of natural resources and ecosystem services, education and locally grown food. One source of funding for permanent jobs might be an employment fund

paid for in part from contributions from those agreeing to be employed. Another source would be from reduction of costs to the government, the health care system and insurance companies, by paying for health and safety outcomes rather than direct services.

3. IGF™ requires no significant expansion in government programs. Conceivably government will shrink as outcomes like security and wellness are delivered through contracts with the IGF™ entity. Government will still play a key role in helping create the frameworks for goals, metrics, finance and markets. It can also use its procurement capacity to create or assist new markets for outcomes. Also, government policies can provide incentives to participants by allowing irrevocable commitments, such as feed-in-tariffs, to assure investors that policy will not be reversed because of political change.
4. IGF™ promotes achieving outcomes from each investment or expenditure. It requires integration of investments across sectors, jurisdictions, physical infrastructure, time and flows to achieve the greatest benefit.
5. IGF™ should appeal to the business community. It creates opportunities for robust partnerships among businesses, individual entrepreneurs, agencies, non- profits and universities to deliver the highest level of integrated outcomes. It also promotes competition among these partnerships in producing proposals to achieve the greatest outcomes and in earning wealth. It reduces risk by integrated design that avoids dependence on increasingly scarce and expensive resources. It minimizes exposure to volatile prices for energy and other raw materials. It provides ample opportunities for the business community to apply its entrepreneurial and innovative capabilities to bounty hunt for creation of co-benefits or elimination of negative externalities.
6. IGF™ will yield wealth across multiple business-economic scales. Robust secondary markets for securitized outcomes provide a stable, predictable source of wealth (unlike fraudulent mortgages and vaporous insurance bets) for investors and financial institutions. Contracts in secondary markets are secured by the real and measurable outcomes in the ecosystem where they are delivered. Participants in emerging ecosystem markets will be able to sell valuable outcomes into broader markets. Long term revenue bonds will be a sound savings instrument for residents' education, retirement and major purchases, as well as a secure investment by public and private pension funds and other investors interested in stable returns with an upside potential in out-years (hybrid instrument).
7. IGF™ provides strong incentives for radical resource and operational efficiencies. It accelerates the introduction of clean technology and services. It provides an affordable means for early retirement of unsustainable infrastructures and systems. In fact, early adopters will be rewarded for taking the risks of moving to more sustainable platforms first as the cost of equity relocation will decline over time. A new form of equity relocation insurance could be made available to make the transition less risky. The cost

of insurance will be lower if the design maximizes efficiency and reduces risks from resource or service disruptions or price volatility.

8. IGF™ will make it harder for politically influential players to skew the process for narrow gain. To reduce the potential for political gaming, science based metrics will be developed and agreed to through standard consensus-based processes, like those used by the International Standards Organization (ISO).

Issues and questions about IGF™

There are a number of practical, political, legal, governance, market and other questions that can and will be raised about IGF™. We identify them briefly here and explore them further in Chapter 4 Critical Analysis, including some possible responses. Among the questions are:

1. **DEBT.** IGF™ envisions the issuance of very large and long-term financial instruments to raise sufficient capital to leverage the transfer of equity from trapped investments in unsustainable systems and to invest in systems that meet life cycle standards for beneficial investments. Will there be enough local, regional, national and global capacity to issue the amounts of debt needed? Will revenues from the delivery of beneficial outcomes be sufficient to pay for debt service, costs and profits? Will there be adequate security for the new debt? Would laws need to be changed to allow for the issuance of a new kind of debt?
2. **MARKETS.** The new system envisions new markets for the highly efficient delivery of goods and services that produce the valuable life cycle outcomes contracted for. Some of these goods and services will result in traditional outcomes, like food, water, and shelter, but others will be novel, such as the wellness benefits from relocation of trapped equity into cleaner infrastructure or services, the reduction of future risks by assuring price stability for energy, and the restoration of ecosystem services. Secondary markets for aggregated outcomes such as pollution reduction, lowered recidivism, and certain wellness benefits will have to be created or expanded to provide additional revenue streams. Can these markets be developed in time and produce the revenues needed for IGF™ to work? Are governments and the rest of the global policy community able to cooperate in establishing common goals and procurement objectives for outcomes that have both local and global importance?
3. **METRICS.** The metrics for outcomes must be identified and defined for multiple scales: ecosystem, bioregional and global. Very importantly, over time, valuable outcomes need to be aggregated (securitized) to facilitate their sale in global markets. Will the scientific community have adequate data and measurement tools to get to sufficient precision, including life-cycle impacts, for outcomes to be standardized for market transactions? For social outcomes, such as employment, income, personal security, mobility, and community well being, measures will depend on agreements as to what constitutes

desired outcomes and the activities that best achieve those outcomes. These measures will vary significantly from culture to culture.

4. **GOVERNANCE.** If new institutions like a watershed or ecosystem entity are created to enable outcomes to be selected democratically and metrics to be developed objectively, how will they be integrated with existing governments and processes for public involvement in decision-making? Will organizations that currently influence government policy through lobbying and campaign contributions be able to game or dilute the new system? Can the governance process function successfully in the absence of independent media?
5. **EQUITY RELOCATION.** Large amounts of capital may be needed initially to leverage the first movers to make the switch to cleaner systems. Will alternative systems be attractive enough to overcome resistance to change by asset owners, workers and communities invested in the old?
6. **BOUNDARIES/SCALE.** Will bioregions and ecosystems naturally fit into the envisioned basin/watershed framework? Are there other frameworks in which IGF™ can be implemented?
7. **PHASING.** What are the candidate regions to initiate and demonstrate the concept?
8. **CULTURAL.** Can IGF™ succeed without transformation of individual and community consciousness to value quality of life over increasing consumption and material throughput?
9. **POLITICAL.** Can IGF™ get started without transformation of politics from money driven to concern over values and outcomes?
10. **PUBLIC ACCEPTANCE.** What will need to be done in each region or ecosystem to introduce and test this new approach to redevelopment and job creation?

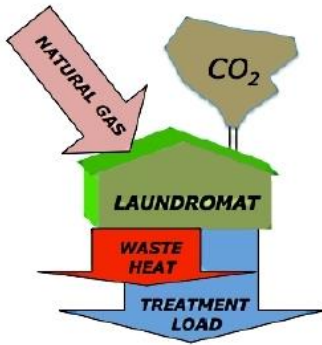
Illustrations of IGF™ redevelopments

Here are two examples prepared by Hank Patton of how IGF™ financed redevelopments might play out at two scales: a neighborhood/district redesign and a large power plant in a rural watershed. Each represents only one project within the ecosystem/region/district for which a bond might be issued:

IGF™ Equity Relocation Case Study, Eco-District Scale:

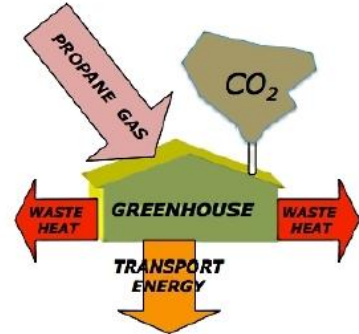
TWO CLASSIC BUSINESSES from the EXHAUSTIVE PARADIGM

What opportunities are available here for long term value creation?



Energy intensive businesses caught between rising fuel prices and capital trapped in old infrastructure can find their enterprises as risk when critical thresholds are reached, as for example when a laundry must

re-fit coin slots on a bank of washing machines to recover rising energy cost, or when a greenhouse cannot recover rising heat and transport costs from production. Such businesses, though important for the healthy function of communities, become unstable and even unsellable in a climate of fuel price and supply risk and instability.



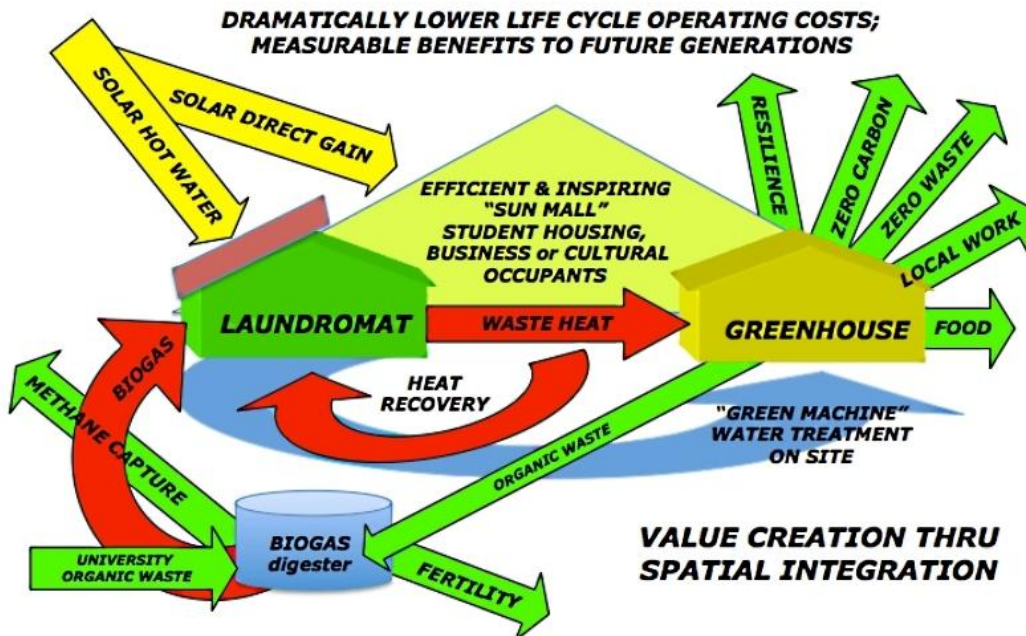
Designed to support transactions at multiple scales from small local partnerships as illustrated here, to large watershed or airshed collaborations as illustrated on the next page, the *equity relocation function* of IGF™ supports the early retirement of legal but dirty and inefficient assets, providing a framework by which a local authority may extend long term financing to voluntary, competitive redevelopment proposals, accompanied by irrevocable contracts for measurable life-cycle outcomes.

Access to long term capital and contracts for a broad range of measurable outcomes is designed to leverage the relocation of capital out of systems with significant negative impacts and inefficiencies, into productive and radically efficient partnerships designed to deliver a spectrum of standard measurable benefits to their communities and future generations. Because these outcomes meet rigorous vetted third-party standards, they can be bundled and sold (aggregated and securitized) in secondary markets.

IGF™ Equity Relocation Case Study, Eco-District Scale: A UNIVERSITY SCENARIO

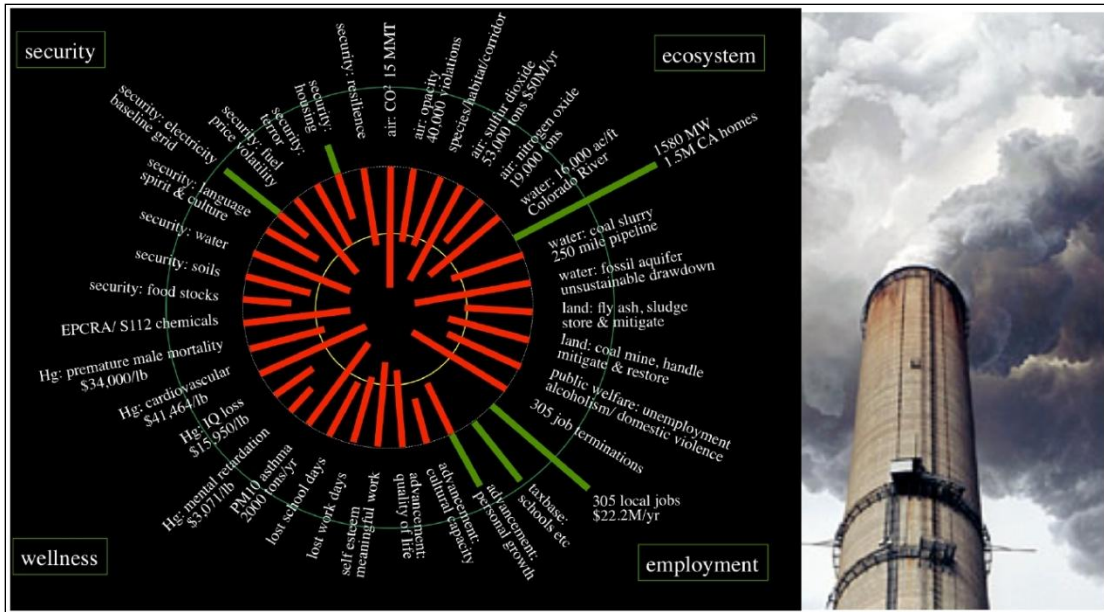
SAME ENTERPRISES IN SUSTAINABLE COLLABORATION

DRAMATICALLY LOWER LIFE CYCLE OPERATING COSTS; MEASURABLE BENEFITS TO FUTURE GENERATIONS



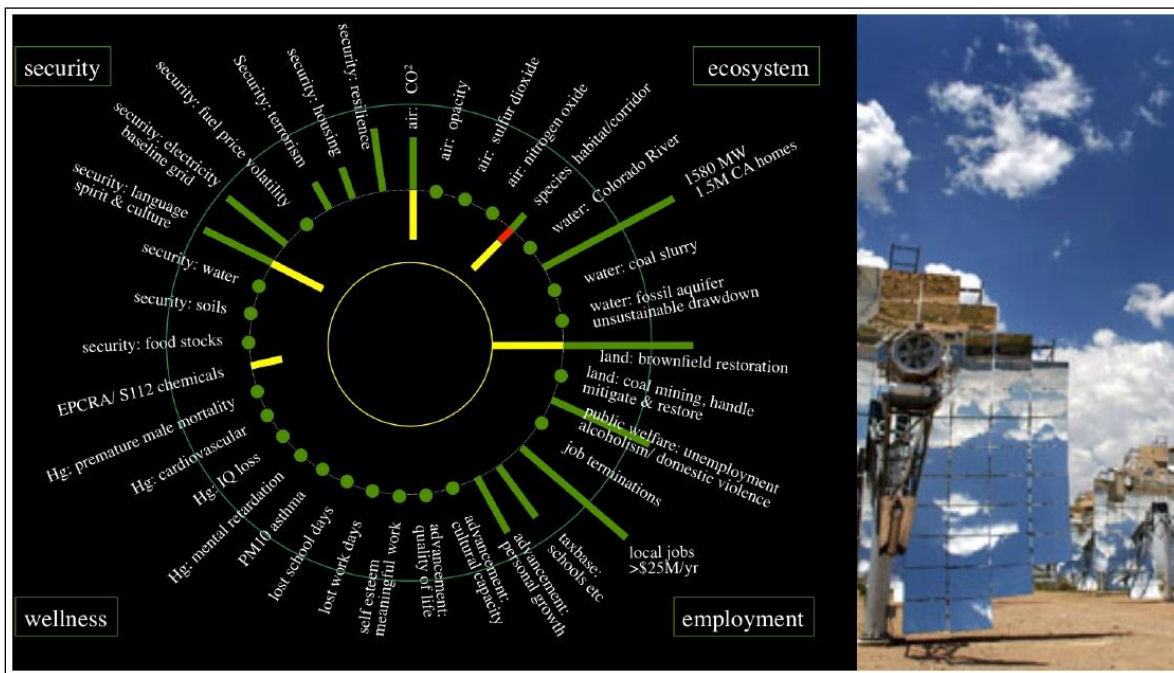
VALUE CREATION THRU SPATIAL INTEGRATION

**IGF™ Equity Relocation Case Study, Air-Shed Scale:
Mojave Generating Station, Black Mesa Coal, 1580MW**



World Steward, by permission

A consent decree addressing air opacity violations was entered in 1999 by which Southern California Edison, without admitting guilt, agreed to retrofit the 1580 Megawatt Mojave Generating Station by 2005 or close the facility. The plant was shut down on December 31st 2005. The circular histograms here, a product of Outcome Composer™ software, contrast system outcomes generated by a fully integrated intergenerational investment with the traditional fragmented approach that does not measure or manage strategic life cycle costs and benefits.



World Steward, by permission

HYPOTHETICAL SCENARIO

IGF™ is a rich and complex idea that challenges assumptions about what is possible, To make it more understandable we have written a story about a possible use of the concept in a hypothetical but quite possible scenario. The green text boxes highlight the basic insights of IGF™ where they are illustrated in the story.

An Intergenerational Redevelopment Demonstration Project

Background. The Governor of the State of Liberty was concerned that international and national economic bubbles and other instabilities were not producing the permanent jobs, adequate incomes, security, wellness, robust natural systems, mobility, shelter and other good things needed for both present and future generations and which she had claimed she would deliver in her most recent election.

Calling together advisors from in and outside government to discuss a new approach, she decided to demonstrate a top to bottom redevelopment of the economy in one area of state where business and elected leaders were agreed that the present economy was not working for too many of its residents and businesses.

She convened a statewide group of business, utility, government, tribal, labor, nonprofit, academic, technology, planning, and other people involved in the economy and also ordinary citizens, representing all sectors of society. She asked them to select a watershed or other region within the state for a major redevelopment demonstration project.

The Happiness Watershed. After considering the entire state, the group decided to focus on a medium size region: the watershed of the Happiness River. There were a number of aging facilities, both private and public, that were still producing income and other benefits but whose adverse effects on human health and natural resources were well documented. These included a coal fired power plant, a hydroelectric dam cutting off migration of important fish species and several energy inefficient factories that were gave off harmful emissions, though in amounts permitted under current law.

The urbanized area at the lower end of the river has a university, a port, a number of traditional businesses, including a manufacturing area near the port, a large health care industry, and a number of commercial, real

To make the most efficient use of resources and integration of various natural resource outcomes, IGF™ would work best on an ***ecosystem*** level, such as a medium or large watershed or basin. It could also work on metropolitan or other regions with sufficient population, business and natural resource bases.

estate, banking and insurance. It also has some high tech businesses, mostly spun off from the university. A major Interstate and railroads passed through the city.

The upper watershed is mainly agricultural, including food/energy crops, livestock and dairy. At the highest point, there are commercially owned forest lands and a state owned wilderness park.

One of the key elements of IGF™ is the ability to **retire harmful assets**, like fossil fuel burning facilities, before their useful life has been reached and redeploy the investors' equity into clean and more harmless platforms, like wind and solar plants.

The watershed is divided among three counties, with the majority of it in one county. It is served by two utilities.

Its social mix is somewhat typical of the State as a whole, with about a 15% poverty rate. There are concentrations of low income residents near the port and manufacturing districts. A state health department study has documented disproportionately high levels of asthma and other health problems in the area, particularly among young people and seniors.

According to recent surveys, there is widespread discouragement across the area with the ability of government and business to solve employment, security, economic and environmental problems

Local leaders from most sectors in the area indicated to the Governor's group they would be willing to try something new.

Consensus on vision, goals & implementation. The Governor decided to proceed to the next step and appointed a well respected, retired State Senator whose district encompassed most of the area to act in her stead as convener. Together they selected a solutions oriented team with additional members from the area, which they named the Happiness Watershed Redevelopment Design Group (Haward). The group was broadly representative of all interests and points of view within the watershed.

The success of IGF™ depends on well functioning **collaborative governance** capacity that is transparent, inclusive and democratic. The first step is the creation of the capacity for assessment, visioning, planning and goal setting.

In a number of open meetings and public workshops over six months, the Haward group reached consensus on the following:

IGF™ proceeds from the premise that the purpose of an economy is to provide both **prosperity** and life satisfaction to people and to assure that resources remain available to serve the needs of future generations.

1. The need for a long-term vision aimed at prosperity for current and future generations and based primarily on businesses being able to deliver most of the outcomes needed. Enterprises that create these outcomes should have access to the future value their investments will deliver. Government, other organizations, churches, and citizens would also play key roles in delivery of desired outcomes. A key agreement was that participation in the redevelopment would be voluntary, with participants able to access new funding for investment.

2. A set of goals and outcomes the members believed would achieve the long-term vision. The goals and outcomes were broad, ranging across a variety of concerns, including: jobs, education, security, wellness, food, ecosystem services, mobility, shelter, water, common and unique culture, time and spaces for play, art, lifetime, protection and restoration of natural systems, learning, accurate and timely information, institutional integrity. The members wanted to be sure that the goals included contributions to solving global problems like climate change or ocean health where net benefits to the watershed communities made it feasible.

A hallmark of the thinking behind IGF™ is that beneficial **outcomes** are the primary focus of investments and transactions rather than material goods or highly specific services. Businesses will compete with or partner with each other and with government and others to achieve as many outcomes as possible from individual investments or contracts.

IGF™ depends on **rigorous contract metrics for measurable outcomes**, with sufficient precision to support proposals that radically shrink the industrial footprint, reduce cost per outcome, and achieve as many benefits for the region and ecosystem as creative entrepreneurship can deliver.

3. In order to assure that all outcomes produce multi-generational, permanent prosperity, scientific metrics based on rigorous life-cycle analysis must be part of a redevelopment/full employment plan.

4. An assessment should be made of the area's resources and problems, accompanied by recommendations for implementing the watershed goals for employment, business

activity, ecosystem services, wellness, personal safety, income security, infrastructure etc. through partnerships among business, government, tribes, NGO's and others. Full citizen involvement in the assessment and recommendation development would help assure that the goals, outcomes, metrics, governance, finance and other elements had strong public support.

After an extensive public process in each of the counties and cities in the watershed and an open selection process, a group of experts from a variety of disciplines, including science, business, finance, planning, law, engineering, etc was selected to create a redevelopment plan

Redevelopment Plan One year after the Governor's initial call, the experts produced a redevelopment plan to achieve the goals and associated life cycle measured outcomes through an innovative assessment, planning, governance, financing and contracting process. They made the following recommendations:

Goals. There was broad public support for goals in three categories:

1. Economic -- full employment; adequate and secure household income; affordable housing, food, energy, mobility and essential goods.
2. Social -- healthy individuals; personal security; opportunities for education, information, training, culture and community activities; resilience in the event of natural disasters or infrastructure failure.
3. Environmental -- healthy air; abundant & clean water; accessible green space; fully functioning ecosystem services such as flood protection, productive soils, pollination, healthy forests, proportional contributions to climate stability, fisheries and other global needs; well functioning natural resource stocks to achieve social and economic goals without compromising future needs.

The plan emphasized that most of the goals are integrated with each other in ways that investments in one can produce multiple outcomes, allowing investments to be measured and rewarded for maximum integration.

The mix of resources and uses within the Happiness watershed allow the potential for extensive **integration** of investments and outcomes for greatest efficiency and least cost.

Metrics for desired outcomes need to be based on *life cycle science* to assure that negative externalities are eliminated and that outcomes can be standardized to allow them to be sold in primary markets and aggregated for bundling for sale in secondary markets.

Metrics. After consulting with, local, national and international academic, business, life cycle scientists, engineers and other, the experts recommended life cycle based metrics for the outcomes needed to meet the goals were recommended. Wherever expert consensus was possible, the metrics were expressed both for making contractual commitments to deliver the outcomes as part of area redevelopment and as indicators of progress toward achieving the goals. The actual number of measurable units delivered for each outcome would depend on agreement on what was needed to reach the goal and the timing of delivery contained in the winning set of bids or negotiated in the contract with the winning bidders. The plan included recommended life-cycle based outcomes and metrics for transactions that would achieve the recommended goals. Some of the measures recommended to achieve and track the outcomes were:

- Security-- water availability for all residents expressed in acre/ft of storage and gallons saved by conservation; healthy diet measured by calories and nutrition essentials; personal safety in home and streets, measured by recidivism and crime rate per precinct; housing, measured by rooms per pop.; no. homeless; units at affordable % of income etc;
- Price stability, measured by % volatility of prices of essential goods, like energy, food, water, education, clothing, housing, mobility options
- Wellness-- incidence of cardiovascular, mental, respiratory, digestive, diet related, genetic etc. disorders vs benchmark population; # lost school and work days; substance addiction rates; rate of participation in wellness, community building activities, etc.
- Employment-- employment rates; income level of lowest 15%; job satisfaction; job turnover rate
- Energy-- negawatts (amount of energy not produced or consumed) achieved through radical efficiency; kilowatts produced from renewable energy
- Ecosystem--air and drinking water quality that meets consensus scientific targets measured in standard units; health of water bodies measured in concentrations of contaminants and abundant populations of native organisms;

- Organic and chemical content of soils; soil loss rate; biodiversity index; levels of critical ecosystem services; material input and output in producing goods and services;% of waste requiring reprocessing, recycling or disposal; durability of products produced or purchased
- Community reduction of % of population in areas disproportionately impacted by harmful uses, inadequate resources, pollution etc.;% population with degrees, certificates, etc.;
- community activity opportunities per neighborhood/area; resilience in face of emergencies benchmarked vs. best practices;
- # independent media in entire area investigating and reporting on governance and whole system outcomes, including possible fraud, corruption and system gaming
- Personal-- time for family, friends, hobbies, culture and other enjoyable pursuits, measured hrs/day spent at work, commuting and in sleep; cultural and recreational opportunities within reach of home; availability and use of counseling and similar services

Other plan components. The plan included provisions for:

- Retirement of unsustainable assets and systems to produce early valuable gains. Assets and systems include the power plant, the dam, and inefficient heating, cooling and process systems in major manufacturing, commercial, health care and residential buildings.
- Investments in replacement systems with dramatically lower life-cycle impacts and costs.
- Investments in job creation in services to provide wellness, including healthy food and opportunities for exercise, affordable housing, mobility, essential goods, security, resiliency, education, cultural and community opportunities.
- Irrevocable features to assure feasibility of investments over the long-term, like a German-style feed-in tariff for

Ecosystem based entities would be able to mobilize capital at the necessary scale and speed to **retire equity trapped in unsustainable assets** and relocate it into integrated systems that deliver beneficial outcomes for all generations, allowing old line fragmented industries to move their capital positions and labor into clean systems, supported by irrevocable long term contracts in maximally efficient and productive resource management sectors.

guaranteed purchase of excess power created by individual business or home investments in renewable energy.

- Facilitation of and incentives for integrated system designs that make contributions to multiple outcomes at the least cost.
- Mechanisms for the aggregation of outcomes suitable for sale into existing or potential markets.

Governance. Together with the Haward Group, the experts on the consultant panel recommended the goals and metrics as well as finance and implementation options to the Governor and her original advisory group. They in turn recommended the elected leaders of all the jurisdictions within the watershed that they hold an advisory vote among all the residents on the goals, outcomes and metrics. They also proposed the creation of a new entity to provide for the financing, contracting and management of the redevelopment process.

IGF™ proposes an ***adaptive institutional framework for governance and trusteeship***, using existing or new ecosystem based elected bodies, to issue and manage capital raised through bonds, solicit competitive proposals for redevelopment based on integrated design, award contracts and control finance, monitor performance and verify outcomes for bundling and sale in secondary markets.

The new economic redevelopment entity would be chartered to represent both current and future generations. Its governing body would be initially selected by the Governor to represent all sectors and interests within the watershed. After five years, it would consist of separately elected trustees who would be sworn to uphold the charter's purposes and to be guided in their decisions by the goals adopted for the redevelopment area. The original appointed trustees would not be eligible for re-election for another five years. Among other powers, the entity would be responsible for:

- Coordinating ecosystem assessment, planning and consensus building processes
- Disbursing the proceeds of bonds, whether issued by government or itself, to leverage the retirement of unsustainable assets like the dam and coal plant on reinvestment in better overall outcomes.
- Issuing requests for proposals to deliver services and determining the winning bids
- Awarding and managing contracts for service delivery and payments for debt service and management
- Monitoring contract implementation, enforcing contracts and/or insurance or performance bonds

- Aggregating and bundling outcomes suitable for sale in secondary markets, and facilitating sale into those markets
- Assuring debt service payments are made
- Monitoring achievement of outcomes in the region

Finance. The group met with finance, legal, business and other experts to explore the financing for the redevelopment plan. They decided upon these options for financing:

Capital Financing

- conventional--market loans, mortgages, REITs etc
- Government loans and grants
- Direct investment by pension funds etc.
- negotiated purchases of outcomes by insurers, large employers, foundations and others
- a long term bond which would be
 - issued by the new economic redevelopment entity or one or more existing state, county or local governments, the principal utility, an agency/authority or a new utility which could be created under existing law.
 - in an amount sufficient to cover the capital costs of phasing out existing unsustainable public and private infrastructure and leveraging the old investments into sustainable systems
 - for a term long enough to capture the benefits from early retirement and replacement of assets
 - secured by the revenues from the contracts to deliver valuable long term outcomes and, to the extent necessary to assure investors, by assets and systems in the area that meet life cycle certified standards of sustainability and pledges of revenue, guarantees or other security that agencies, municipalities or other parties are willing to provide
 - debt service to be repaid from overall revenues from the contracting parties
 - of investment grade so that it could be purchased by pension funds, local financial institutions and residents

One of the core insights of IGF™ is its reliance on **long term financial/savings instruments**, providing the capital to fund efficient infrastructure, leverage early retirement and redevelopment of fragmented systems and other integrated life-cycle investments, while concurrently providing a secure savings vehicle for local and other investors.

Revenues

- fees for service, revenues from enterprises and other conventional sources,
- contracting for direct purchase of outcomes by insurers, large firms, agencies, foundations and others,
- existing markets for outcomes such as carbon, water, air and water quality and ecosystem services,
- potential markets for environmental, wellness, security and other markets as they emerge in response to similar redevelopment efforts in other areas
- to support access to these markets, it was decided to incorporate into the redevelopment program a capacity to aggregate or bundle outcomes for sale by the entity and/or by the contractors.

Request for Proposals. The plan provided for implementation of all goals through integration of outcomes as fully as possible. It included provisions for:

To assist with the repayment of debt service and assure an adequate return to bidders contracting to deliver outcomes, IGF™ contemplates the aggregation and ***sale of certified outcomes to secondary markets***, also permitting the global finance industry to more competitively employ its resources in the intergenerational marketplace.

- retirement of unsustainable assets and systems, including the coal fired power plant, the dam and highly inefficient heating, cooling and process systems in major manufacturing, commercial, health care and residential buildings to produce early valuable gains;
- leveraging investment into replacement systems for producing necessary comfort, process and other necessities at dramatically lower life cycle impacts and costs;
- investment in job creation in services to provide wellness, healthy food and opportunities for exercise, affordable housing, mobility, essential goods, security, resiliency, education, cultural and community opportunities etc.
- irrevocable features to assure feasibility of investments over long term, like a German style feed in tariff for guaranteed purchase of excess power created by individual business or home investments in renewable energy
- facilitation of and incentives for integrated physical and system designs that make contributions to multiple outcomes at least cost
- mechanisms for the aggregation of outcomes suitable for sale into existing or potential markets.

IGF™ relies on **partnerships** among businesses, state and federal agencies and non-governmental organizations to contract for the delivery of outcomes.

nonprofits or any other arrangement that could produce the outcomes in the most efficient and integrated ways, through investments that produced multiple outcomes. The RFP was structured so that it called for competitive bids for the delivery of measurable outcomes, not simply projects or stand alone services. It provided potential pathways for integration of outcomes, but left to the innovation of entrepreneurs to look for the most efficient and robust means of delivering them. It encouraged partnerships among businesses, agencies and organizations to assure that as many outcomes as possible could be delivered across sectors and political boundaries.

The plan included a draft request for proposals to achieve these outcomes through competitive bids from individual businesses, partnerships among businesses, consortia of businesses, government agencies and

Fair and transparent **competition** among proposals assures that innovation and entrepreneurial spirit will

Voluntary participation by those seeking access to capital and agreeing to deliver desired outcomes, including early retirement of legal unsustainable assets.

The plan and RFP and the draft legislation to permit the new contracting and finance system all made it clear that participation in the relocation of equity was voluntary. Firms and organizations that participated would be able to access the new source of capital but would not be obliged to do so. The Plan did spell out the benefits to firms that chose to move early, including receiving a higher price for their assets than was likely for later participants and the potential for successful proposals to earn irrevocable long term contracts for life cycle outcomes.

Implementation. The Haward Group conducted an extensive public process for further input before the advisory vote and adopted the recommendations with some changes. The advisory vote was held and resulted in overwhelming approval, in part because all the elected leaders in all the jurisdictions had backed and in part because the plan was seen as responsive to the concerns of voters about employment, security, wellness and ecosystem integrity.

Successful bidders earn **irrevocable long term contracts** for life cycle outcomes.

Legislation to address some technical issues involving bonding and contracting was approved by the Legislature in the next session by a bipartisan vote.

After the legislation was signed by the Governor, she appointed the first set of members of the governing board of the Present and Future Redevelopment Entity (PFRE) for the Happiness watershed. Members were chosen from a list recommended by the elected officials. The board put the draft RFP out for extensive comment by the public, prospective contractors, academia, the media, and elected officials, both within the Happiness Watershed and statewide. It then adopted the draft with changes and issued it with a sufficiently long period for response to allow for the maximum number of interested businesses, agencies and others to request clarification, form partnerships and engage non-bidding businesses, organizations and the public in how they would participate.

To be effective, a whole system redevelopment plan should be based on widely supported goals, preferably resting on a broad **consensus** among the population of the region.

Upon receipt of a number of highly competitive bids from multiple partnerships and consortia, PFRE evaluated them with the help of the original advisory board and the consultant panel. It awarded contracts to multiple consortia because no single one had sufficiently encompassed all the goals and outcomes. The bidders had been motivated by a number of things to be as innovative as they could in order to obtain access to potentially large amounts of capital but also by the prospect that they could provide a lower risk environment for businesses and more secure access to the resources needed to make future business investment predictable.

At the same time, PFRE was engaged with the State, local municipalities and the financial community in determining the amount, term and other conditions of financing for the capital investments envisioned in the RFP. These could not be finalized until the bids were accepted because the winners had found a more efficient way to achieve the outcomes specified than had been envisioned by the designers, so the actual capital component, while still very large, was smaller than expected.

Very long term contracts with appropriate re-openers for changes of circumstance, new scientific knowledge and other unforeseen or unknowable future events were negotiated with the winning bidders. Financing included a 50+ year bond for retirement and replacement of some of the larger trapped equity investments, including the dam, several factories, a large number of diesel engines, all the CAFO's and the coal fired power plant. The bond also could be used to pay for infrastructure needed to produce outcomes in highly efficient ways, but which needed longer payback periods than other forms of financing allowed. These included streets, utilities, transit, community facilities called for by the redesign of a number of towns and city neighborhoods to achieve wellness, employment, mobility, security and community outcomes.

Security for the repayment of the bonds was achieved through pledges of both revenues and community assets within the watershed. Investors were able to accept these pledges in part because the revenues dedicated to repayment of the bond rested on more predictable and reliable design and infrastructure and systems than in similar regions that had not pursued a whole system redevelopment initiative.

Results of Watershed Redevelopment. After the first seven years, PFRE arranged for an independent evaluation which found that overall, significant progress had been made on all the goals and contracted outcomes:

Replacement of harmful infrastructure. All of the problematic infrastructure had been retired and the investment leveraged into highly efficient g new or rehabilitated infrastructure and renewable energy facilities. Restoration of fish runs in the river above the dam had begun. CO2 and other harmful emissions had been drastically reduced. Energy costs per household and business showed remarkable declines after the bond financed program for building retrofits and on site renewables.

Employment. The number of total jobs had increased, returning unemployment to below previous records. New jobs were created in both traditional and new sectors, Some of the new jobs in manufacturing resulted in part because the area had become known for having one of the lowest levels of life cycle impact in the production of goods, giving it an advantage in European,Japanese and some US markets that increasingly demanded the least impact products. Other new jobs were in natural resource and ecosystem services restoration, a relatively new field, where government, the building industry, and residents were increasingly demanding credits and offsets for new and pre-existing damage to natural resources and services. Construction of new buildings and other infrastructure to implement community redesign also provided new employment as did new businesses attracted to more consumer friendly centers with increased numbers of people living nearby.

Security.

The new jobs, together with other efforts, dramatically reduced the poverty and crime rates. Part of the bond and investments by state and local corrections, education, economic development, natural resource and other agencies had been used to jumpstart local programs to reduce recidivism, train and retrain unemployed teenagers and young adults and a large number of ecosystem restoration programs. Incidence of recidivism was significantly reduced and jail and prison populations dropped well below previous rates of incarceration. Surveys of community confidence in income and personal security, availability of choices, etc showed dramatic improvement

Wellness. Because of dramatically reduced emissions from the power, manufacturing and trucking sectors, admissions to hospitals for and early deaths from respiratory problems had steadily decreased and fewer hours are lost to work and school. Healthier diets, in part from more available fresh produce, reduced heart disease, diabetes and other problems.

Ecosystem. Excessive applications of Nitrogen and Phosphorus, which were causing major algae problems in the river and contributed to the dead zone in the estuary downstream, were eliminated by a variety of innovative agreements, which reduced fertilizer applications and employed processed waste from livestock operations. Among the innovations were

payments from downstream public and private interests affected by excess nutrients. A number of ecosystem services, such as flood control, fisheries habitat, aquifer replenishment, clean water, and healthy soils, that had been damaged by historical actions were fully or partially restored, paid for in part by public and eleemosynary sources, but also by a charge on utility bills that assured current and future security for those services.

Personal investments. While the bonds issued to finance the redevelopment were held in portfolios all around the world because of the promise of more secure returns, an unusually large percentage were held by residents of the watershed for savings for education and retirement.

Contribution to global outcomes. Projections from the evaluation of outcomes delivered by the new system indicated that, if similar efforts in other areas around the world were made, global impacts could be reduced over the next several decades to levels that greatly increased security, employment and wellness and moved the world much closer to living within planetary ecosystem limits.

CHAPTER 3 : ALTERNATIVE SOLUTIONS

Introduction

One of the main purposes of this paper is to compare IGF™ with other existing or proposed solutions that are intended to achieve, or be stepping stones toward, a truly sustainable economy. We have looked at a variety of proposed solutions, a few having similar scope and intentions as IGF™, others with lesser ambition but which contain tools, mechanisms or ideas that are compatible with or could lead to a sustainable economy as complements to IGF. There are several ideas that could be tremendously powerful if integrated with IGF™ and/or other solutions.

We have used two sets of criteria to help evaluate these solutions. A finer set of criteria is used in this chapter to evaluate how likely solutions are to achieve their stated goals as well as contribute to overall system change. In the next chapter, we review the solutions using some core attributes that we believe any system must have if it is going to comprehensively address the goal of global and local sustainable outcomes across generations. The benefit of the fine criteria set is that they provide consistent context for the comparative evaluation of diverse solutions. The core attributes criteria set will allow us to see which ones might, with modifications, form the basis for resolving the present world social and environmental crises. The core attributes will also examine the extent to which these other solutions are compatible with or be integrated with IGF™.

Most solutions we looked at do not purport to address whole system change, either geographically or substantively, but some may be complementary to such change. They may share one or more goals or tools with IGF™ and other whole system change solutions. Or success in achieving their goals will allow progress toward attainment of the larger goal or will achieve a larger goal in a different way.

Criteria

The purpose of using a criteria set is to establish the context in which we are qualitatively comparing different solutions. While there is a diverse array of strategies represented in the solutions there are many common objectives for sustainable outcomes. These outcomes can be not only explicitly connected to the solutions, but commonly cited as necessities for fostering a more sustainable operating system. These criteria are more functional than the non-specific “three legged stool” of sustainability--economic, social, environmental--, allowing for a conclusion to be drawn on whether a given solution meets a criterion (Van Cauwenbergh et al. 2007). While sustainability is not readily measured, it can be viewed by comparing different systems, be it comparing the same target at different points in time or between two different targets (Lopez-Ridaura et al. 2002). This paper takes the latter approach.

The criteria were developed by identifying reoccurring themes in selected literature, which we then expanded upon. Some of these themes included: the need for economic and political equity

and inclusion of multiple relevant stakeholders, and reliable quality employment, self reliance and community resilience, adaptability, and ecological integrity (Van Cauwenbergh et al. 2007, Lopez-Ridaura et al. 2002, Valentin & Spangenberg 2000). Many of the criteria also echo human needs as defined by Manfred Max-Neef in “Development and human needs” (Max-Neef 1994). In addition to utilizing these, we add other important criteria for proposed solutions, such as retirement of equity trapped in unsustainable capital. We organize these criteria into the commonly used pillars of sustainability: ecological, economic, institutional (which includes social and political), while adding integral as a fourth category. Integral criteria apply to all of the previous categories; for instance for a project to be feasible, it has to be economically, ecologically, and institutionally feasible.

Economic	
Correct incentives	The model does not create new, and corrects for existing, perverse incentives while also incentivizing desirable outcomes.
Resistant to rent-seeking/ corrupt behavior	Public decisions are not affected by private stakeholders seeking to use money or power as levers of self-serving influence
Employment opportunities	Creates a positive impact on the quality and quantity of jobs available, dependence on external subsidies and finance is reduced, and labor conditions are not harmful.
Retires unsustainable assets	Model provides for accelerated and orderly retirement of unsustainable asset-classes.
Integrates into existing markets	Realistic financial strategy
Ecological	
Life-cycle clean	Also known as “cradle to cradle” clean, environmental impacts are negligible at each step of a service or project's life, from raw material extraction to eventual disposal.
Scientifically sound	Conformance with life cycle assessment and other tools or standards assessing the sustainability of a project, including rigorous peer-review among a pluralism of relevant disciplines.
Ecosystem function/health	Impacts on ecosystem functionality and biodiversity are negligible or beneficent. The precautionary principle is employed when potential environmental detriment is unknown or uncertain.
Waste Reduction/conservation	Waste produced by a given process is radically reduced by building efficient systems or recycling resources as inputs for other systems.
Institutional	
Resilient under political volatility	Changes in political party or government structure are unlikely to unseat the integrity of the project
Effective governance	Provides for effective governance through creation of new and alignment of existing political institutions

Security factors	Promotes development of civil security and social integrity, as well as a sufficient capacity for adequate defense of same
Equitable/Progressive	Cultivates equal opportunities between individuals and communities. This allows for those affected by resource degradation more arenas for justice as well as reduces socioeconomic stratification, and consequently its corrosive impacts on community health, health (public, mental, physical), crime rates, economic mobility, and other indicators of wellness ¹¹
Public health/wellness	Plans for positive impact on mental and physical health, also favors preventative over curative strategies.
Socially acceptable	Does not conflict with the prevailing sentiment and moral attitudes of the population
Integral	
Feasibility	The model has a reasonably high likelihood of being implemented in the near future because it doesn't require complete destruction of entrenched political and cultural institutions.
Geographic flexibility	The model can be implemented in a variety of cultural, environmental, political, and economic settings, and allows for clearly defined boundaries
Temporal flexibility	The model can incorporate goals in the short, medium, and long term.
Scalability	The model can be implemented on multiple scales, easily nested within and between one another. Smaller scale outcomes contribute positively to system-wide objectives.
Responsive to local conditions	A place-based approach to problems of sustainability, reflecting the geographic particulars and local variation of individual economic-human-ecologies.
Alignment of multiple interests	Can be seen as a positive development from the perspective of a wide range of interests, such as business, environmentalist, community, etc

The criteria and the core attributes are not claimed to be complete or definitive, but they are sufficient to make some first order judgments about whether solutions have the capability to be successful in addressing the fundamental crises the world faces while not being harmful in some way to society or nature. These are ultimately subjective judgments based on our own knowledge and experience. In the end, we believed it was a useful way to compare different solutions with each other and with IGF™. We are eager to hear from others about the completeness and accuracy of both sets so as many people as possible can engage in discussion about what combinations will work best.

¹¹For a brief overview of the the impacts of social stratification see <http://image.guardian.co.uk/sys-files/Guardian/documents/2009/03/13/inequality.pdf>

Solutions

Candidate solutions were identified through academic and non-academic literature but are not the result of an intensive attempt to find all that might be suitable for examination. We looked for a sufficient number and variety that would enable us and future researchers to be able to examine any proposed solution against a suitable list of criteria.

The solutions we looked at seemed to divide roughly into eight groups, with considerable overlap:

Regulatory - The use of government legislation and monitoring to prevent socially undesirable practices

Public Sector Investment - Strategic investment by governments, especially those with substantial surpluses from highly profitable industries such as oil

Ecosystems - Institutions which both seek to protect ecosystem health and are structured around natural ecosystem boundaries.

Collaborative - Institutions structured utilize a wide range of perspectives in decision-making

Voluntary - Not for profit organizations that aim to empower those concerned about specific issues.

Finance - New bonds and other financial tools tailored for the longer time frame required to generate savings from environmental and social investments.

Market - Promoting the alignment of social and business interests through “triple bottom line” accounting and other strategies

Cross-Cutting - Global, comprehensive approaches to solving the impending problems of global ecological limits and widespread social dysfunction.

We assigned each individual solution to the group that best fit its overall approach. We evaluated both selected individual solutions and each group as a whole. For some, we used a simple plus/zero/minus scoring system (+/0/-) for the purpose of identifying the strong and weak points of the various solutions to facilitate comparisons and potential for contribution to a whole system solutions set. No statistical analysis was attempted or would be meaningful. The scoring sheets for the solutions we scored are in appendix A which will be available at the ISS website.

The table below summarizes the major advantages and disadvantages we found with each of the eight solutions groups.

Solutions group	Advantages	Disadvantages
Regulatory	Established, access to many resources	frequently non-integrative in approach, easily gamed by vested interests
Public Investment	Substantial financial resources	Some cases of conflict of interest if revenue is from unsustainable source
Ecosystem	Relevant for biophysical world, efficiency gains for inter-institutional coordination	frequently poorly funded, goals of limited scope
Collaborative	More robust decision making with multiple perspectives	not effective with uncompromising participants
Voluntary	Empowers citizens , many examples of success	Approaches highly fragmented, not effective in many contexts
Finance	Substantial financial resources, can be structured with positive incentives	Innovative ideas are largely untested or in initial pilots
Market	Substantial financial and intellectual resources that could be deployed in sustainable projects	Propensity for greenwashing, vested interests in protecting sunk unsustainable capital, limited by profitability
Cross-cutting	Whole system, integrated approach	Depend on major political and cultural changes

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REGULATION

SUMMARY OF GROUP

Regulation of the economy takes many forms, including government based treaties, laws and administrative rules, and agreements and informal understandings among individuals, landowners, organizations, businesses and governments. Regulation touches or controls almost every economic transaction from world trade to lunch carts. Some regulation deliberately targets externalities from economic activity, like pollution, unemployment or unsafe food. Almost all regulation occurs in the context of the economy in which it operates and accepts most of the assumptions on which that economy is based.

EXISTING SOLUTIONS

There is no coherent corpus of regulation that is aimed primarily at creating conditions of sustainability for present or future generations. The types of regulation addressed in this group are those that attempt to prescribe behavior in those realms of economic activity that most affect long term outcomes, mostly those which limit the negative impact of the economy on people and nature. They include consumer protection, environmental controls, health and worker safety, financial and economic regulation, and disclosure of risks. They are only a small piece of the regulatory pie.

We explore cap and trade in more detail as a regulatory scheme advocated by some as major tool for dealing with unsustainable environmental impacts and natural resource scarcity. We also look at suggested reforms of the basic law of corporations, advocated by some as a way to assure that actions by the most prominent organizations that drive the economy will have long term benefits for people and nature

EVALUATION

Our conclusion is that, while regulation produces predictability and security in a wide range of activities and has helped solve some very difficult problems in some circumstances, it is not likely by itself to produce the whole system outcomes the world needs. Regulation scores best on the integral criteria because of its inherent flexibility, scalability, and its widespread acceptance as a mode of dealing with problems, although there is increasing skepticism that it can by itself solve fundamental problems. It scores less well on the other criteria. In economics, it is highly vulnerable to gaming and too prone to create perverse incentives. It does not have an effective means to retire unsustainable assets, with some potential exceptions such as cap and trade. In the ecological sphere, regulation is too fragmentary, and single purpose focused. It does not often use appropriate science, including life cycle science, follow the precautionary principle or pay adequate attention to ecological health. Regulation is particularly problematical

on the institutional criteria. It is vulnerable to capture by regulated parties, top down and therefore not democratic in adoption and implementation, inadequately promotes security, creates disproportionate impacts on less favored sectors or communities, does not integrate well across sectors or issues, and is increasingly out of synch with broad sectors of the population.

POSSIBLE SOLUTIONS

If regulatory tools were the principal means of achieving a prosperous and harmless economy, much of what is already on the books would remain, but would need to be substantially revised and expanded to eliminate perverse incentives and negative externalities and to achieve desired beneficial outcomes, while providing protection to individuals and enterprises. New and existing regulations would need to be subjected to full life cycle analysis to avoid creating new adverse incentives or externalities.

Regulation of Externalities

Summary of Concept

Within the current operating system for the world's economies, there are many examples of regulations that attempt to address negative externalities and other adverse effects of economic activity that inhibit or prevent the necessary changes to make it sustainable for people and nature. Regulatory tools include both laws and administrative regulations, whether promulgated at the local, regional, national or international level. They include any prescription designed to control or manage conduct of businesses, public agencies, non-profit organizations or individuals in any field related to the operation of the economy, including economic, financial, environmental, criminal or social activities.

Goals

Regulation has been defined as “the employment of legal instruments for the implementation of social-economic policy objectives.... individuals or organizations can be compelled by government to comply with prescribed behavior under penalty of sanctions.”¹ In the context of this paper, the social and economic policy objectives are those which affect the otherwise unaccounted for impacts of the current economic system on people and nature.

Methods

Here are a few examples of the types of regulation of economic activity to mitigate some of the negative impacts of economic activity:

- clean air and water, toxic releases to land, mining, etc.
- consumer protection
 - product safety
 - access for people with disabilities
 - margin requirements
 - insured deposits
 - nursing homes and halfway houses

- anti-fraud
- health and worker safety
 - food and drug safety
 - occupational hazards
 - restaurant and other food service
- disclosure of risks
 - environmental
 - financial
 - tobacco and nutritional labels
- economic regulation
 - limitations on monopoly behavior
 - rate setting for utilities and insurance companies
 - anti-trust
 - corporate powers and prohibitions
 - market entry (licensing)
 - market solutions such as cap and trade

This is only a very small sampling. In industrialized countries, there are very few areas of human activity that are not touched in some way by regulation. However, no particular regulatory scheme attempts to manage the economy as a whole system so that it operates within ecological limits while providing for the prospering of current and future generations. The history of regulation is one of response by government to specific problems, not a proactive pursuit of a vision of a just and sustainable society. Because regulation occurs in the context of the current economic system, with its vast investments in infrastructure and systems that would be less valuable if regulation is increased, there is enormous incentive to resist regulatory initiatives that limit the ability of firms to maximize profit from those existing systems.

Initiatives like the Millennium Ecosystem Assessment and the Millennium Development Goals have made it clear that while regulation and investment have slowed down some adverse social and environmental trends, most are headed in a negative direction.

Evaluation

Advantages:

- Can be implemented largely within existing legal, regulatory systems
- Methods are by and large well established and accepted by courts
- Expertise is available or can be trained
- History of many problems having been at least partially solved by effective regulation

Disadvantages

- Government regulation does not encompass the full range of actions that may affect current and future generations
- Existing system has been either captured or stymied by regulated interests; additional regulation is likely to be successful only at the margin
- Focuses on individual or small number of sources of harm, such as individual pollutants, drugs, devices or other manufactured or financial products rather than whole systems
- Fragmented agency authorities, expertise and budgets make integration of outcomes

- across agencies and levels of government extremely challenging
- Not integrated among economic, environmental and social outcomes
- Currently doesn't examine full life cycle impacts of actions, activities or products

Cap and Trade Systems

Summary of Concept

Cap and trade is a regulated market method for reducing the amount of pollution emitted into the environment or for reducing the depletion of renewable resources such as fisheries and forests or non-renewables, such as metals and other minerals that are not readily reabsorbed into the earth. Cap and trade turns the right to emit carbon or other pollutants into a commodity that can be traded on the open market. Caps may be allocated by permitted allowances or by auction. Auction allows funds collected to reduce other taxes, such as regressive sales or payroll taxes, or to be invested in sustainable infrastructure such as clean energy systems.

Goals

The primary goal behind a cap and trade system to lower greenhouse gas or other harmful emissions or to minimize depletion of natural resources such as minerals. A secondary goal is to minimize the cost of meeting a set emissions or extraction target.

Methods

The basic concept involves two parties, the governing body and the regulated companies or units emitting pollution. The government sets a cap on pollution, limiting the amount of carbon dioxide or other harmful outputs that companies or others are allowed to release. The cap is reduced on an annual or other schedule, and a tradable market is established for surplus or purchasable allowances. The government auctions or issues credits which allow companies to pollute a certain amount, as long as the aggregate pollution equals or less than the set cap. Since some companies can reduce polluting emissions more inexpensively than other companies, they may engage in trading any extra permits. Companies that can more efficiently reduce pollution sell permits to companies that cannot easily afford to reduce pollution. The companies that sell the permits are rewarded while those that purchase permits must pay for their negative impact. In some systems, a portion of all traded credits must be retired, causing a net reduction in emissions each time a trade occurs.

More specifically, after the governmental body sets a limit or cap on the amount of a pollutant that can be emitted, the limit or cap is allocated or auctioned to firms in the form of emissions permits which represent the right to emit or discharge a specific volume of the specified pollutant. Firms are required to hold a number of permits or carbon credits equivalent to their emissions. The total number of allowances cannot exceed the cap, limiting total emissions to that level. Firms that need to increase their emission allowances must buy permits from those who require fewer permits.

The transfer of permits is referred to as a trade. In effect, the buyer is paying a charge for polluting, while the seller is being rewarded for having reduced emissions. Thus, in theory, those

who can reduce emissions most cheaply will do so, achieving the pollution reduction at the lowest cost to society. Revenue generated under a cap and trade system either to the government or the seller can be invested in the development of clean energy and energy efficiency or used for other purposes.

Currently, the European Union has instituted an Emissions Trading Scheme that utilizes cap and trade principles, and the same system is favored in several U.S. States. California passed AB32 last year and will be implementing its cap and trade program in 2013.

A cap is an enforceable limit on emissions that is lowered over time— aiming towards an international, national or state emissions reduction target. For example. the European Union Emissions Trading Scheme (EU ETS) for carbon dioxide, the leading greenhouse gas, requires members states to allocate a fixed number of permits for emitting carbon, and the total number of permits is reduced every year by 1.47% through 2020, when carbon emissions will be 21% lower than when the ETS was launched in 2005.

Evaluation

Advantages

Many economists urge the use of "market-based" instruments such as emissions trading to address environmental problems instead of prescriptive "command and control" regulation which they criticized for being excessively rigid, inefficient and insensitive to geographical and technological differences.. In market based system like cap and trade system, individual companies are free to choose how or if they will reduce their emissions. Cap-and-trade is designed to reduce overall emissions by rewarding the most efficient companies and providing less efficient companies with incentives to work toward greater efficiency over time, while ensuring that nationwide emission limits can be met at the lowest economic cost. In addition to reducing pollution or greenhouse-gas emissions that contribute to global warming, many cap-and-trade proposals call for the government to auction emission permits to companies that are required to reduce their emissions, which would create an ongoing, potentially large revenue stream. The revenue generated by the cap-and-trade system could be used to finance social services, economic development and environmental initiatives, and to help communities cope with the effects of climate change. Cap-and-trade programs meet several criteria under the economic and ecological categories as they promote pollution reduction and healthy ecosystems.

Disadvantages

Economists and others debate whether a cap and trade system or a carbon tax is more effective in reducing carbon emissions. Since emissions trading requires a cap to effectively reduce emissions, the cap is a government regulatory mechanism and therefore subject to all the uncertainties and gaming of any regulatory scheme. Successful cap and trade systems need to have an extremely strict and knowledgeable governing body. Accountability on the part of the companies involved must be assured. . Cap and trade programs have faced challenges in political feasibility and social acceptance. Political gaming and economic fluctuations are major challenges. For example, in the European system, over allocation of permits, the Euro debt crisis and weak economies have contributed to lack of demand for and liquidation of holdings in carbon allocations and deeply lowered the price of carbon, and slowed expected aggressive carbon reduction activity.

Possible New Cap and Trade Solution

Cap and trade would need to be applied to the entire set of ecological and natural resource issues to which it would be useful. These would include all pollutants and the resources whose extraction leads to the release of the pollutants. It would be more efficient to apply caps to resources rather than emissions, e.g., to coal and oil extraction rather than power plants, buildings and vehicles, thereby lessening the impacts from construction and operation of the emission points by encouraging design for lower emissions and wastes associated with cleaning up the emissions. Application to fisheries, forestry, waterways is already being done successfully in some instances to restore stocks and allow for sustainable yields but would need to be applied universally to natural resource extraction.

Corporate Reform

Summary of Concept

Corporations and the corporate form itself have been criticized for contributing to the present state of the world's social and environmental problems, in particular for their single minded pursuit of shareholder value to the virtual exclusion of other values: community, health, natural resources, alleviation of poverty, among them. Cavanagh, Marder et al., *Alternatives to Economic Globalization, A Better World is Possible*. Corporate reform is aimed at transformation of the corporation to put these other values on a par with or higher than increasing profit, growth and shareholder value.

Goals

Since corporations are the major engine of the economy, it is asserted that reform will help achieve the transformation needed to put prosperity for people and protection of natural resources as the primary goal of the economy. By freeing the corporation from the single minded pursuit of gain, the power and innovation of business can be energized to solve social and environmental problems and create a just and sustainable society

Methods

Much effort at reforming corporations is addressed at moderating the effects of their behavior through the regulatory schemes mentioned earlier. Some corporations seek to achieve better outcomes through voluntary initiatives such as Corporate Social Responsibility (CSR) discussed in the Voluntary group or adoption of principles regulating the conduct of their business, like the CERES principles discussed in the Markets group.

Another voluntary effort now underway called the benefit corporation that could lead to widespread corporate reform is based upon the idea that the interest of stakeholders not just shareholders of a corporation should be considered. Through including stakeholder interests, the benefit corporation model aims to align corporate interests with avoiding externalities and commons issues that normally are not internalized. Currently, corporate law dictates that maximizing the financial interests of the shareholders is the primary purpose of the corporation, making it difficult for businesses to take employee, community, and environmental interests into

consideration when making decision. If a corporation makes a decision that is socially responsible at the expense of potential profit, it could be held liable for a breach of fiduciary duty. This model creates an inherent legal obligation to prioritize private pecuniary gain over public well being. The benefit corporation ideology proposes to remedy this by expanding the legal rights and obligations of its stakeholders and managers. Effectively this means that the corporation is then free to pursue and prioritize sociably beneficial outcomes without facing legal action by its shareholders. Another benefit, according to B Lab, the non-profit that provides certification and other services to benefit corporations, is use of transparent performance standards that will “enable consumers to support businesses that align with their values, investors to drive capital to higher impact investments, and governments and multinational corporations to implement sustainable procurement policies.”. Benefit corporation laws have been signed in seven states and are under consideration in seven or more others. To become a benefit corporation, a corporation needs to amend its articles of incorporation to expand the responsibilities of the corporation to include consideration of the interests of employees, consumers, the community, and the environment, give legal permission and protection to officers and directors to consider all stakeholders, not just shareholders, create additional rights for shareholders to hold directors and officers accountable to these interests and publish an annual report on its social and environmental performance. While achieving the benefit corporation status is entirely voluntary, these requirements become obligatory. This means that the stakeholders would have a right to initiate action against a company for not living up to the benefit corporation standards. But the company would be legally protected from actions by shareholders who are dissatisfied with quarterly returns.

The most extreme form of regulation of corporate activity that has been suggested is to mandate change in the nature of the corporation. As summarized by Speth, these can include

- Revoke corporate charters for gross violations of public interest
- Exclude corporations from doing business in a particular jurisdiction, for similar reasons
- Roll back limited liability, to expose directors, managers and shareholders to personal liability for gross negligence or other defined violations.
- Eliminate corporate personhood, thereby limiting the capacity to claim constitutional rights
- Take corporations out of politics altogether, to limit their influence on policy and elections
- Reform corporate lobbying, giving outside directors decisive influence on positions taken
- More extensive disclosure of environmental, social and financial risks,
- Most fundamentally, change the nature of the corporation to from a mandate to give primacy to maximizing shareholder wealth to recognizing and rewarding the contributions of employees, customers, communities, suppliers, government and future generations.

Speth recognizes that most of these reforms are not achievable now, but may become possible when dissatisfaction with the status quo becomes more urgent with the advent of social or environmental crises or the growth of new citizen movements.

Critique of Corporate Reform

Advantages

- The benefit corporation model could provide a potentially desirable framework from which to begin economic change. It allows existing institutions to evolve into more dynamic entities. Creates the social incentive and justification for business directed at increasing quality of life.
- The creation of legitimate goals other than profit that are enforceable by stockholders substantially changes the scope of corporate operation. Creates legal framework for directing the goals of a corporation for the sake of increased quality of life. Because the model is voluntary and little restructuring is needed to integrate it into the existing framework, the model is highly feasible for the individual firm, although not for the broader society.
- The model could have beneficial effects on the ecosystem in which the corporation is located, but until all corporations with significant impacts in the ecosystems adopt the model, its effects will be limited.
- The inclusion of stakeholders in corporate interests, and the right to direct corporate goals to increase their quality of life is positive as is the transparency in reporting significant corporate activities. Right to a legal cause of action for stakeholders could encourage both democratic process and socially acceptable solutions.

Disadvantages

- Mandatory regulatory constraints advocated by Speth are limited by the political power of the corporate sector. Voluntary actions are limited by the extent to which they limit the competitiveness of the corporation within a system that doesn't have a means to take externalities into account.
- The voluntary benefit corporation model does not necessarily create incentive for those exclusively interested in investment. It potentially creates a conflict of interest between shareholders and stakeholders: it is ambiguous in the level of deference given to shareholders. Its major drawback is that it does not create incentives in the general market for socially beneficial outcomes.

EVALUATION OF REGULATORY GROUP

ECONOMIC

Regulation often creates perverse incentives because life cycle impacts are not usually factored in. This shifts impacts from one set of people or one environmental medium to another. Current regulatory incentives tend to favor producing numbers rather than outcomes. Regulation is highly vulnerable to gaming by interested parties. Large firms have the capacity to influence legislators and regulators to soften, delay or eliminate regulations. Impact on employment is generally positive over time, although there are often winners and losers. Very few regulations force retirement of unsustainable assets or systems. Exceptions include ending slavery, child labor, boiler room operations, untreated waste streams, and most whaling, where those bans have worked. Rules have sometimes been integrated into markets as is the case with much financial regulation, cap and trade rules, and some utility regulation such as feed in tariffs. Alignment across sectors can occur to the extent rules have been negotiated or generally accepted.

ECOLOGICAL

Current regulatory initiatives do not use life cycle assessment of all impacts throughout the extraction-processing-transportation-production-use-disposal chain. Regulations can produce good outcomes when based on scientifically sound and broadly accepted standards, e.g., safe drinking water standards (mostly), DDT, CFC, lead in gasoline bans, seat belts, smoking restrictions. Standards are not generally vetted for non target effects. Ecosystem health is rarely factored into rules. Exceptions are cap and trade, some resource extraction and harvesting, habitat protection and indirect effects of some air and water rules. The precautionary principle is not often explicitly employed but CFC treaty, some pesticide and food safety rules implicitly incorporate similar thinking. Regulation aims at reducing waste but is only partially successful. Reduction of waste is often a purpose of regulation, including mineral management, some utility regulation, recycling requirements, but also regulation can increase waste, such as environmental requirements that shift harmful components from one medium (air) to another (water, soil) or create unnecessary “paperwork”.

INSTITUTIONAL

Regulation is subject to expansion or curtailment with change in political parties. The governance associated with regulations is typically top down, expert and single agency driven. Most rules are within single or limited number of subjects, corresponding to expertise of agency. Integration is rare at national and state level, occurs occasionally and partially at regional level, e.g., Adirondack Park. Public comment is increasingly allowed but true consensus driven, integrated and collaborative rules adoption and implementation are rare. Some regulations are now negotiated with regulated parties and impacted businesses and representatives of the public interest, using consensus principles, but usually regulated parties dominate. Expert model is most common. Local interests usually not represented at all unless rules are applicable only within a limited geography. Many rules are aimed at civil and social integrity and their defense, e.g. health, reduction of violence, but on the whole may tend to exacerbate insecurity, e.g., inadequate provisions for communities impacted by extraction or trade rules; trans-boundary effects. Disproportionate impacts more likely within a one-size-fits-all system but can be tempered with locally developed standards and implementation. Most rules tend to be focused on fixing specific problems rather than on prevention. Exceptions include product bans like DDT and other bioaccumulative persistent toxins or defective toys, which have the effect of encouraging other solutions (less persistent pesticides, safer toys). Regulation is frequently considered a necessary evil, or at best an appropriate compromise. It has increasingly been treated with public skepticism, in part because of its falling short of delivering promised outcomes and its dealing only with pieces of larger problems. The financial cost of compliance with rules falls mainly on business sector and individuals, who often regard it as an extra expense that burdens what they want to do or accomplish.

INTEGRAL

Regulation can be integrated into existing framework. In most cases it is the existing framework. Regulation can be very flexible in concept and implementation, but is not always designed for that purpose, in part because of single agency/single purpose focus. Rule makers generally have a bias for standard solutions. A good example of recent flexibility is in OR and WA approach to fish consumption by tribal members as that affects local water quality standards. Harmonizing

rules across jurisdictions can be difficult, which has led to institutional changes like creation of Federal government, European Union and various past and present empires. Rules can take a long time to promulgate, but are adaptable to near term implementation. depending on the scope of the changes in current activities being contemplated. Rules are inherently temporally flexible. Changes can be introduced in stages to allow for adjustments in long standing behavior. Smaller scale outcomes contribute positively to system-wide objectives. Regulation does not always work well on multiple scales, usually for institutional/governance reasons; e.g., states want to change national standards to fit local business, ecological or cultural circumstances, but Federal government resists in order to keep market entry relatively the same in all states. Most rules are not place based and usually ignore local variations. In Ostrom examples, local owners/managers/residents create highly adapted rules to deal with very local circumstances. Rules are usually designed to provide stability and certainty, but are not always successful, which leads to changes being required. Good rules have intrinsic value when they successfully create predictable conditions for harmless commerce and individual behavior; e.g., standards for volume, weight, currency; opportunities to recycle, compost. Rules are ethically appealing when perceived as fair, reasonable and promoting good conduct. Most rules fall short of these public expectations.

POSSIBLE WHOLE SYSTEM SOLUTION

Many existing regulatory programs will, with moderate or radical changes, likely be part of any long term solution. Any solution that the world adopts to address its dilemma of harmonizing real growth with ecological limits and prosperity for all humans will need rules, both formal and informal, to achieve system goals. Many of the regulatory areas mentioned above will play a part, including both existing and new rules. We have not cobbled together a set of existing regulations or proposals that might by themselves address whole system change. What follows are some elements that might contribute to such change.

If regulatory tools were the principal, politically feasible means of achieving a prosperous and harmless economy, much of what is already on the books would remain, but would need to be substantially revised and expanded to eliminate perverse incentives and negative externalities and to achieve desired beneficial outcomes, while providing protection to individuals and enterprises. New and existing regulations would need to be subjected to full life cycle analysis to avoid creating new adverse incentives or externalities.

Because existing programs are not fully scientifically based, a new regulatory framework would require robust metrics for socially and ecologically desired outcomes. The new metrics would be primarily used for defining the desired results from new or revised rules and for measuring their effectiveness in achieving them.

Since regulation covers almost every aspect of human activity from extraction of minerals from the earth to the smallest financial transaction, it is possible to conceive of a very comprehensive redesign of the governance for regulatory regimes to attempt to achieve the necessary changes in the economic system. A significant expansion/reform of the regulatory regime would need to include:

- Aggressive enforcement of existing laws and standards, after they have been revised to eliminate perverse externalities and create positive benefits throughout their life cycle, and to avoid unnecessary regulatory burdens.
- New regulation to require that all externalities be accounted in contracts for delivery of goods and services so that they would be reflected in prices thus favoring those with the lowest negative profile. This might be achieved by mandating things like
 - Design for and implementation of zero waste throughout the life cycle of products/services
 - Durability of materials and parts to allow for very long term reuse of products until no longer serviceable
 - Maximum interchangeability of parts
 - Full product responsibility, including taking back no longer serviceable items
- Intensified pre-approval analysis for new projects, bills, regulations, policies,
- to enhance/replace traditional cost benefit analysis, incorporating:
 - Full life cycle analysis of environmental and social impacts
 - Application of the precautionary principle to shift burden of showing harmlessness to the proponent of project, product, rule, etc)
 - Requirement for the decision-maker to reject or modify the action to avoid harmful impacts and/or create beneficial ones, including the power to integrate with other compatible actions to increase benefits and/or reduce costs.
- Transformation of corporations' purposes and powers to enable them to focus on whole system outcomes: e.g., requirement to serve community, other stakeholders, and future generations, increased accountability, limited political role, etc.)

Even if regulation by itself were not able to effect whole system change, many existing and potential new regulatory programs may be compatible with other efforts. For example, market solutions will require, as they do today, laws and rules to assure the integrity of transactions that achieve beneficial outcomes.

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PUBLIC SECTOR INVESTMENT

SUMMARY OF GROUP

Direct intervention in the economy by government institutions can be contrasted with regulatory or incentive-based action taken by the state. Federal, state, and local government spending represents a significant fraction of all purchases and investments in the economy. Just as private consumers and corporations can “vote with their dollars,” public sector agencies can exercise considerable influence over the course of economic development by making investments which meet not only their fiscal goals but their ecological and communitarian goals as well or conversely, by withholding public investment from such projects and proposals as fail to meet those goals.

EXISTING SOLUTIONS

- Sovereign wealth funds
 - Alaska Permanent Fund
 - New Mexico State Investment Council
 - Norway Government Pension Fund
- Proposed Oregon Mutual Fund (Treas. Wheeler)
- Carbon Tax / Tobin Tax (hybrid regulatory / public investment approaches)

EVALUATION

Although many nations today find themselves facing budget deficits, particularly during the ongoing global recession, other countries have found themselves with a surplus of cash reserves. Nations that export natural resources, especially oil and gas, often accumulate revenues in excess of those needed to pay for existing government programs and services. Although some level of

cash in reserve may be helpful, the relatively low liquidity preferences of many states lead them to invest their surplus in one of several ways.

The question of what investment might best serve the purpose and interests of the investor is not unique to public institutions. Private individuals and corporations also face the question of whether to accumulate savings, to invest in development or expansions of their own operations, or to purchase security interests in other businesses from capital markets. However, while private investors typically make decisions primarily, if not solely, on the basis of expected (monetary) returns, public investment is often motivated by an additional set of concerns regarding the public interest. While some public investment agencies, such as pension funds, are first and foremost responsible for the growth in asset-values of their portfolios, in order to continue to make payments to their citizen beneficiaries, public investment agencies may also structure their investments in such a way as to advance other social goals, such as improving education systems, infrastructure development, and the like.

While public-minded investment is in some ways comparable to a private enterprise investing in capital expansion or growing its business, the returns on public investment may not manifest on government balance sheets for long periods. Returns on public investment may not even take the form of monetary accumulation—improvements in social conditions, economic prosperity, or ecological well-being may be worth more than direct monetary returns to the public investor. Various states have answered the question posed by the opportunity to invest public monies in several ways.

SOVEREIGN WEALTH FUNDS

Globally, state-owned sovereign wealth funds control trillions of dollars worth of assets. These publicly owned funds, unlike managed private wealth, are not necessarily bound to pursue the accumulation of profit above all else. Instead, public investment managers might apply a broader concept of fiduciary duty. Protecting the wider public's wider interests, by maintaining and enhancing all manner of common and public resources, could be understood as the primary responsibility of public investment agencies, in place of the narrowly construed mission of merely accounting for the monetary valuation of those assets legally owned by the state. This principle can be applied at any level of public investment decision making, including municipal, regional, state, federal, or international public agencies.

Norway

A prominent example of public sector investment can be found in Norway's Government Pension Fund (formerly the Petroleum Fund). Actually comprised of two separate funds (petroleum and pensions), the Norwegian state's sovereign wealth fund is the largest in Europe, and among the largest stockholders on the planet. The Norwegian fund invests state petroleum revenues in order to achieve "the highest possible risk-adjusted return within the guidelines set

by the ministry [of Finance],” according to the NBIM website. In other words, while the public investor, in this case the Norges Bank Investment Management, is investing in global capital markets with an eye toward financial returns and growth of the fund, the investments it makes are directed by the political, and ethical, guidelines handed down by Norway’s Ministry of Finance. This arrangement stands in stark contrast to the investment management of private sector entities, which are not typically bound by such considerations.

The current rules governing the management of Norway’s investments of sovereign wealth preclude investments in certain companies based on ethical considerations. Companies involved in the manufacture of certain types of weapons, such as cluster bombs or nuclear arms, are excluded from “the investment Universe” of the fund. Other companies are excluded from public sector investment based on their records of human rights violations, corruption charges, or other serious ethical breaches. Tobacco firms are also off the table for investment of Norwegian public capital, as of 2010. These decisions are not taken for any fiscal reason, but are instead directives given to fund managers from the ministry and the Ethical Council established to create such guidelines by decree of the sovereign (in this case, King Harald V). The Norwegian public investment strategy presents a clear-cut example of the balancing of profit motive with other social, ethical, and political motivations.

Petroleum Revenues and Public Holdings

Other sovereign wealth funds (SWFs) have taken differing approaches to the combination of diverse public interests in creating a coherent public investment strategy. Saudi Arabia created a SWF in the 1970’s, with the mandate to invest directly in Saudi companies, in order to stimulate the development of the national economy. (The smaller, pension-oriented portion of the Norwegian SWF is similarly oriented toward investment in national companies.) The original SWF, the Kuwait Investment Authority, was created not by a national government, but by the British Empire, in order to invest Kuwaiti oil revenues in capital markets. In the United States, the Alaskan Permanent Fund also collects oil revenues in order to make investments in the public interest. However, the Alaskan model differs substantially from the approaches taken by sovereign oil exporters. Rather than making substantial investments in the Alaskan economy or global capital markets, a Permanent Fund Dividend is paid to all residents of Alaska each year. Alaskans, through amendment to their state’s Constitution, have made the political decision that individual citizens, rather than public investment managers, are in the best position to advance the public interest, and so pay a “dividend” to each of them, in much the same fashion as a corporation pays dividends to its public shareholders.

Summary of Concept

Governments at all levels procure enormous quantities of materials, goods and services. The World Trade Organization views government procurement as an important aspect of international trade, given the considerable size of the procurement market (often 10-15 percent of GDP) (“Government Procurement”). In the United States, total procurement by all levels of government may exceed 20% of GDP, two-thirds of which is state and local purchasing (13% of GDP). The federal government procures over \$500 billion of services and goods annually, which is more than the GDP of all but 16 countries (“About us”).

A number of governments have adopted guidelines to prefer purchases of products, from vehicles to paper that have lower environmental or social impacts. One of the more far-reaching is an Executive Order issued by President Obama in 2009 that sets sustainability goals for Federal agencies and focuses on making improvements in their environmental, energy and economic performance. The Executive Order required Federal agencies to set a 2020 greenhouse gas emissions reduction targets; increase energy efficiency; reduce fleet petroleum consumption; conserve water; reduce waste; support sustainable communities; and leverage Federal purchasing power to promote environmentally-responsible products and technologies (Executive Order 13514).

Given the significant size of government purchasing, combined with much larger procurement of businesses, lowering the footprint of procurement of today’s goods and services would be a significant contribution to global sustainability. In the absence of standards or other legislated requirements, incentives to replace high impact goods and services with low impact means of achieving the same or better results, or inclusion of social as well as environmental outcomes, a purely voluntary approach would likely not be able to achieve the substantial shifts necessary in sufficient time. But attention to procurement will be essential in any new system, particularly where procurement dollars can be shifted to direct purchase of outcomes.

Evaluation

Economic. Procurement programs can be designed to provide the right incentives but are especially vulnerable to gaming and corruption by parties interested in being favored by narrow standards or closed processes. Programs can be well integrated into existing markets and could be used to replace harmful investments or systems.

Ecological. Some governments are using life cycle measures in procurement decisions. They can be designed to and sometimes do reduce waste, but do not generally use science to maximize the potential for reduction, partly because of the influence of providers.

Institutional. Government procurement programs are vulnerable to political change, are not democratic and don’t necessarily lead to changes in governance. They are not usually designed with social outcomes, like wellness, security and equity, in mind would not be expected to have significant effect in those areas.

Integral. Procurement programs are eminently feasible and can be used at multiple scales. Large

scale programs do not usually align with place based or other interests.

Increased Government Investment

Two recent works highlight the potential role of public investment strategies in solving the social, environmental and economic crises of the current century:

Plan B, Brown, Lester R., World on the Edge

Brown believes that the world faces a perfect storm of food shortages, water scarcity, climate change, costly fossil fuels, mass migration and other social upheavals, perhaps as soon as 2020. Quoting Porritt, there may occur “the ultimate recession”, from which there may be no recovery. His prescription is to restructure the economy in time to avoid this decline. Brown’s prescription for the necessary massive restructuring is called “Plan B”. The two policy cornerstones of the plan are 1) restructuring taxes by lowering income taxes and imposing a tax on carbon emissions, to include all the indirect costs associated with fossil fuel burning and 2) a shift of public investment to deal with threats to our security from climate change, population growth, water shortages, poverty, food scarcity, and failing states. Plan B incorporates a number of policies in addition to a carbon tax that will lead to phasing out of fossil fuels and replacement with renewables, especially wind. These policies include tighter efficiency standards for vehicles, products and buildings, taxing other forms of pollution, waste and other externalities, urban design for people not vehicles, investing in rail and other alternative forms of transportation, removing perverse subsidies for fossil fuel and shifting them to wind, solar and other alternative energy sources, feed in tariffs and various mandates to accelerate the shift. For natural resource restoration, Plan B envisions a series of policies to restore world forests, grasslands, soils and other natural support systems, including demand reductions, such as in paper and fuel wood use, selective harvesting, tree plantations on degraded lands, limits on deforestation, soil conservation, reduced grazing, and fisheries reserves. On the human side, Plan B focuses on eradicating poverty, stabilizing population, and rescuing failing states. It advocates policies such as literacy programs, media campaigns and facilities for reproductive health, contraception and family size, universal primary education with gender parity and subsidized meals, nutrition for women, infants and children, safe and reliable water supplies, vaccines for childhood diseases, debt relief and market access and other targeted development programs for failing states. For food needed for 8-9 billion people projected for 2050, Plan B proposes a number of alternatives to high fertilizer and water inputs to increase production, including developing drought and cold resistant hybrids, various kinds of multi cropping on single pieces of land, land tenure reforms, better irrigation practices, local water users associations environmentally sound aquaculture, use of roughage for animal feed, local food production in and near cities, shifts in diet, global price stability mechanisms and other ways of getting more out of existing agricultural lands.

Brown’s economic pathway for the shift of investment from unsustainable assets to clean ones in time to head off the impending ecological and social crises he predicts is a combination of

regulatory, policy and tax actions. Regulatory ones include efficiency standards for vehicles, buildings and appliances and tighter pollution standards. He advocates taxes on carbon and other emissions and on deforestation, excessive water withdrawals and overfishing in order to get to full cost pricing of fuels and resource extraction. He advocates tax shifting rather than additional revenue so that new revenues from carbon and other taxes are reinvested in clean technologies, especially wind, for which he estimates the need for \$600 billion annually in a crash program to install 4,000 gigawatts of capacity by 2020, or returned to taxpayers. Policies include ending perverse subsidies to fossil fuels and shifting them to renewables (about \$500 billion per year). The biggest policy shift would be to reduce military expenditures drastically to more effective security measures like clean energy, poverty reduction food production, family planning, education and health. Brown calculates the total worldwide cost of achieving basic social goals, including education, health and family planning, and of restoring or stabilizing soils, forests, rangelands, fisheries, water tables and biological diversity as \$185 billion annually (2010) in comparison to the US military budget of \$661 billion and the world military budget of \$1,522 billion.

Sachs, Jeffrey D., The Price of Civilization

Sachs concentrates on the U.S. economy and sees the roots of the recent economic crisis in moral terms, the decline of civic virtue, especially among the political and economic elite. He sees the rich and powerful as failing to behave with respect, honesty and compassion toward the rest of society and the world. To achieve a good society for the twenty first century, he argues that we need to pay the price of civilization through paying our fair share of taxes, becoming educated about society's needs and acting as stewards for future generations.

Sachs argues for a mixed economy, with an increasing role for government in areas where the market by itself cannot produce efficiency, fairness and sustainability. Government institutions must provide public goods such as infrastructure, scientific research, regulation of externalities, ensure basic fairness so that less well off have the opportunity for education and employment, and escape from poverty and promote sustainability of natural resources for the benefit of future generations. p.46

He proposes a path forward that starts with a set of economic goals and timelines for the United States, such as attaining a 5% unemployment rate by 2015 and maintaining it at that level until 2020. Other goals to be met, mostly by 2020 or sooner, include improving the quality of work life, increasing the quality and access to education, reducing poverty in half, reducing greenhouse gas emissions, increasing low carbon energy supplies, eliminating the budget deficit, limiting corporate financing of elections, reducing military expenditures drastically and establishing national metrics for happiness. To meet these goals, he lays out some of the most important policy initiatives:

- A new labor market framework, mostly by improving the skills of the workforce, with more job sharing and public investment in infrastructure.
- Investing in schools in areas of poverty and in assuring an increasing number of young people who complete a bachelors degree.
- Investing in early childhood, such as affordable day care, to prevent failures in later life

and reduce costs of crime and dysfunction.

- Real health care reform, to reduce costs while improving access.
- Achieving energy security, through a national strategy to transition to a low carbon energy economy, in part through taxing fossil fuels at an increasing rate and subsidizing low carbon alternatives at a declining rate.
- Ending military waste, such as ending current wars in the Middle East, base closures, and canceling dubious high cost weapons systems.
- New measures of quality of life, to enable policy to focus more on what contributes to life satisfaction and well-being,

To reduce the deficit to manageable levels and to make the necessary investments in education, poverty reduction, job retraining and public infrastructure, Sachs advocates a series of cost reductions and higher taxes. Most of the budget reductions would come from the military and health care reforms beyond those enacted in 2010. Increased investments would add to the deficit remaining after those reductions. To substantially close the gap, he proposes a range of options including raising taxes on the wealthiest one percent, eliminating major tax loopholes and shelters, tightening corporate taxation, increasing tax collections through compliance, higher taxes on fossil fuels, small taxes on financial transactions and a value added tax, similar to those in Europe. All of this would be designed to stabilize the debt-to-GDP ratio at about 60%.

Sachs does not underestimate the political challenges to achieving these changes, and suggests a third party or even constitutional changes to allow for longer terms and more proportional representation. In the end, he relies on the Millennial Generation, currently mostly in their 20's to focus on decisive issues, such as education, the environment, geopolitics and diversity.

EVALUATION OF PUBLIC INVESTMENT GROUP

The Sovereign Wealth Fund examples mentioned above are clear examples of public sector investment, and the balancing of multiple, and sometimes competing, motives involved in such decisions. All of the SWFs however are fairly narrow in scope, primarily aimed at the accumulation of financial asset-values, with only secondary consideration of ethical limits, national goals, or political boundaries, typically introduced in the form of limits or specific exclusions placed on the freedom of state financial managers to invest profitably. Existing public investment agencies are typically not authorized to “spend” money independently of legislative action or parliamentary approval. Although many SWF agencies routinely finance deficits emanating from other corners of the public budget, or book expenditures corresponding to particular public interests, such as the Alaska Permanent Fund Dividend, these agencies serve the public interest only through those channels sanctioned by their respective sovereign principals.

Whether or not one takes issue with the fiscal wisdom of elevating the opinions of elected politicians above the experience of career public servants, in finance or any other arena, this is the solution presently offered by way of solving the problems of bureaucracy. Public investors are not typically authorized by constitutions or statutes to make fiscal policy decisions, but only to execute those made by the political bodies of states. Perhaps rightly so, as it is an alarming

prospect at best to leave the fiscal power entirely in the hands of undemocratic institutions, no matter how technically skilled their agents may or may not be. Nevertheless, the practical effect of this arrangement is to confine most if not all other-than-profit-motivated financial investment activity to those institutions best able to navigate the murky waters of legislative process, as well as those individuals wealthy enough to be able to finance their own philanthropic initiatives. Regular individuals remain free to pursue their own agendas, but are not often able to secure financing of any significance on the basis of returns to be paid in any form other than hard currency.

PROPOSED SOLUTIONS

Contrary to this status quo, we are able to imagine hypothetical other forms of public investment, motivated neither solely by private interest nor by statutory compulsion, though perhaps assisted by one or both. Whether created and managed by public institutions or the private sector, public interest financial centers could provide an additional, perhaps competitive, source of capital to enterprising borrowers looking to finance projects motivated by social and ecological requirement, not at the expense of, but in addition to the individual interests necessarily involved in any such proposal. If developers of “social capital” or “ecosystem services” were routinely able to access sources of finance capital dedicated to achievement of ethical, as well as fiscal, concerns, the returns on prudent investments of this sort could be quite substantial.

Proposals are currently being floated in several US states that would enable some state financial managers to expand the range of their considerations in making some or all public sector investments, beyond merely their narrow fiduciary duty in the pecuniary sense. Admission of ethical limits, or social goals for that matter, does not necessitate the abandonment of fiscal integrity or revenue efficiency. On the contrary, the possibilities for public sector investments on even a modest scale offer significant potential for savings in other areas of government deficit expenditures, which are in many cases offset by accumulation derived from state investors’ positions in various asset markets. In essence, whole states are presently reduced to behaving like individual speculators in the market, largely in order to make up for considerable public expenditures intended to remediate social and ecological problems that could be mitigated, or in some cases avoided entirely, by a system of prudent public investment. Whether or not such an experiment will be undertaken in one or more of the “laboratories of democracy” remains to be seen.

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ECOSYSTEM-BASED INSTITUTIONS

SUMMARY OF GROUP

Ecosystem based solutions are those that center on piece of geography and attempt to achieve improved ecosystem services and other natural resources benefits consistent with economic prosperity within the boundaries of that geography. Ultimately, sustainable outcomes for people and nature, both now and into the indefinite future must be achieved at an ecosystem level. Broader regional and global outcomes can be aggregated from those achieved in multiple ecosystems,. Thus the management of ecosystems to produce sustainable outcomes for natural systems consistent with stable employment and other beneficial outcomes is crucial, even though some of the actions required will have to come from other ecosystems.

EXISTING SOLUTIONS

The solutions described in this group do not attempt to achieve comprehensive whole system outcomes in the human as well as the ecological spheres, but they are directed toward that part of the dilemma where humans recognize there are limits to what nature can provide and absorb. These solutions therefore may be an essential, part of any comprehensive effort to assure a prosperity for present and future generations.

In this group are both solutions that are being implemented and those that have been proposed, including initiatives for:

- Watershed and basin restoration and management
- Districts which use innovative planning and finance to achieve sustainable outcomes

EVALUATION

Advantages

- These solutions are likely to be feasible, scalable, geographically and temporally flexible, responsive to local conditions and capable of involving multiple interests.
- They are uniquely able to define and measure local assets and challenges, both natural and cultural.
- They are adaptable to different geographies, times and scales. They are inherently focused on an intergenerational horizon.
- Finance models already exist for many of the needed outcomes

Disadvantages

- They tend to be focused on single or small sets of issues and problems means.
- Absent a network of similar solutions for other areas, it may be difficult for an individual district or watershed or basin to meet criteria for full employment, replacement of unsustainable assets, and financing. Integration across neighboring ecosystems or those farther away with similar assets and problems is extremely difficult under the current political economic system.
- Even within the area, achieving the powers needed to achieve economic and ecological goals may be problematical.
- The absence of a full life cycle scientific analysis in most of them reduces the likelihood that they will meet ecological goals, even within the more sophisticated watershed/basin approaches.

Summary of Concept

The ecosystem most commonly considered for comprehensive, integrated management of natural resources is the watershed. As defined by John Wesley Powell, the nineteenth century geographer, a watershed is "that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course...." He made it clear that he included humans among those living things, logically part of the same community as others. His understanding of the interconnectedness of things within a system was largely ignored, even as scientists and thinkers like George Perkins Marsh, Aldo Leopold and Wendell Berry have kept the notion alive. In more recent times, the concept of watershed health has reintroduced the importance of system thinking. As defined in a California report:

"Watershed management integrates many issues through the protection, use, restoration, and enhancement of water quality, water quantity, ecosystems, estuaries, managing hydropower plants, and floodplains." ("Addressing the need" 2002)

Basins encompass many watersheds. The Mississippi and the Nile are examples of very large basins. A watershed can be as small as a tributary of a medium size river or a major river flowing into an even bigger one. All have different challenges of scale.

Watershed solutions can take many forms. In a sparsely inhabited watershed where land is owned or controlled by a government or private entity, decisions on economic and other uses are made unilaterally, sometimes with input from beneficiaries, as in the case of watersheds around reservoirs. In most cases, ownership of lands in a watershed are a mix of private and public, individual and corporate.

It takes extraordinary collaboration to manage the watershed for both ecological and economic goods. The New York City Watershed Agreement is an example of a management regime where the City, which owns the immediate area around the reservoirs, but not the entire watershed, shares decision-making on rules and investments with farmers, forest owners and others inhabiting the areas not owned by the City (Gray 2003). More commonly, decisions affecting watersheds are made by various parties, often without regard to the common resources and ecosystem services associated with them.

Watershed groups that attempt to coordinate decisions and investments have been formed in many states in recent decades in the United States. Oregon has one of the more comprehensive watershed programs. Under Oregon Law, formation of a watershed council is a local government decision, with no state approval required. Watershed councils are locally organized, voluntary, non-regulatory groups established to improve the conditions of watersheds in their local area. Councils are required to represent the interests in the basin and be balanced in their

makeup. Oregon Revised Statute 541.388. Council members include farm, forest, industrial and other landowners, Federal, state, tribal and local officials, representatives from a broad variety of business, advocacy, educational and cultural organizations and other residents. They ordinarily operate by consensus.

Larger ecosystem based solutions seek to achieve conservation goals more efficiently by coordinating efforts throughout a large area that is interconnected ecologically, typically a basin. Like watersheds, these solutions tend to be multi-jurisdictional and institutionally complex, involving many public and private players. The focus is usually on human-ecological connections, and aiming for reduction in pollution by creating positive incentives as well as through education about conservation techniques.

A well known example is the Chesapeake Bay Program, which started in 1983 as an effort to reduce non-point source pollution (especially from nitrogen and phosphorus) and has grown to include a wide range of objectives to improve the quality of the Chesapeake Bay. The program is broken up into various committees, which range from local tributary councils, to larger ones in charge of coordinating different efforts. Represented are six states, Washington D.C., the EPA, state natural resource management agencies, scientific experts, industry and agriculture representatives, citizens, and environmental groups (Hassett et al. 2005). Committee decisions can lead to a variety of outcomes, such as recommendations that go on to become legislation, and the publication and disbursement of technical guides. While environmental quality has improved significantly over the past few decades, the Program has had mixed results achieving its environmental quality goals (NRC 2011).

Other examples of large scale programs are:

- National Estuary Programs-e.g., The Lower Columbia River Estuary Program
- Bay Delta Program (lower Sacramento River)
- Puget Sound Partnership
- Mississippi River Basin Heathy Watersheds Initiative

Goals

Using Oregon as an example of the watershed approach, the principal goal is to bring together local stakeholders from private, local, state, and federal interests in a partnership. The councils plan watershed protection and restoration strategies in a holistic way--from ridge top to ridge top, and from headwaters to mouth. Through the watershed partnership, council members collaborate to identify issues, promote cooperative solutions, focus resources, agree on goals for watershed protection and enhancement, and foster communication among all watershed interests.

Like other large scale restoration efforts, the Chesapeake Bay Program's objectives are:

- a) Restore living resources, such as oyster beds
- b) Foster habitat health, especially areas important to larger ecosystem
- c) Improve water quality
- d) Support more ecologically sound watershed land use
- e) Cultivate individual stewardship

Methods

Again using Oregon as an example:

Local watershed councils plan, develop, and implement projects to maintain and restore the biological and physical process in watersheds to contribute to the sustainability of their communities.

Councils often identify landowner participants for important projects, develop priorities for local projects, and establish goals and standards for future conditions in the watershed. On-site projects are implemented in an effort to enhance the watershed's ability to capture, store, and beneficially release water.

- Education projects are undertaken to inform people about watershed processes and functions.
- Watershed councils provide coordinated review of land management plans to local, state, and federal decision-makers.
- Watershed councils help bring state, federal and private funding to local communities for ecosystem restoration, monitoring and education,

In the Chesapeake example, decisions are made by various committees, at different scales and within different boundaries such as:

- Executive Council
- Scientific and Technical Advisory Committee
- Citizen's Advisory Committee
- Implementation Committee
- US EPA liaison office

Committees coordinate policy and investments, set goals and advise member organizations on strategies

Evaluation

Advantages

- Exist at a whole ecosystem scale at a local level but collectively cover the entire land mass of the planet
- Relatively compact scale allows for integration of issues and solutions, at present mostly environmental ones
- Watershed health is an inherently intergenerational goal, because it focuses on restoring and maintaining sustainable systems.
- Restoration of watershed health is based strongly on science. Because of local

knowledge, watershed groups are able to identify resources of local and regional concern that need protection or could benefit from investment

- Because most watershed based systems respond fairly rapidly to scientific management, most can be restored within the current or next generation.
- The inclusive and collaborative nature of watershed groups often allows decisions to be made that are otherwise difficult
- Watershed groups have been adept at attracting and coordinating government and other investments in projects

Disadvantages

- Watersheds with groups or councils are presently weakly linked, making basin or larger scale outcomes less likely to occur.
- Watershed groups are mainly concerned with environmental outcomes, though broad based membership assures economic and cultural concerns are taken into account.
- Non-inclusion of social and economic outcomes dilutes intergenerational benefits of watershed management. No mechanism for integration with markets, but see Willamette Ecosystem Marketplace discussion below
- Rigorous standards for non environmental and many environmental outcomes are lacking
- investments lack life cycle analysis to assure that externalities will be addressed.
- Without inclusion of non-environmental outcomes, gains in restoration of natural resources and ecosystem services risk being overwhelmed by negative externalities and social dislocation over the long term
- Governance mechanisms do not include all interests that have an impact on watershed health, much less the prosperity of watershed inhabitants.
- Financing of watershed restoration much less other needed outcomes is largely dependent on government and foundation grants, not on revenues generated within the watershed, including fees or taxes related to ecosystem service benefits. Replacement of large damaging infrastructure left to government or to changing markets.

District-based solutions

Summary of Concept

District based solutions are those centered either on a particular geography, which may or may not coincide with an ecosystem, or more typically on a specific political jurisdiction or part of one. They are designed to deliver one or more services to residents and/or property owners within their service territory. They are typically financed largely by charges to individual users. Typical examples are electric and water utilities, but they may include specialized services such as irrigation, weed or storm water runoff control, lighting, facilitation of agriculture and a host of other. As a form of governance they are the most prolific. In the United States alone there are over 30,000 districts of one kind or another. Here we will look at two models that have been

proposed to achieve a variety of integrated ecosystem and some economic outcomes.

Ecosystem Service Districts

Professor Geoffrey Heal and colleagues have proposed ecosystem service districts (ESD) as a “mechanism to help ensure that natural capital is protected and maintained with the same care and concern as that given to built and human capital”. (Heal, Erhlich & Daily et al. 2001). Similar to Soil and Water Conservation Districts, on which they are modeled, ESD’s would be created for a geographic area aligned with natural ecosystem boundaries, not political jurisdictions. They would also have a role in overcoming the existing fragmentation of substantive jurisdiction among many agencies and actors.

EcoDistricts

According to the leading proponent of Ecodistricts, the Portland Sustainability Institute (PoSI), “an EcoDistrict is a neighborhood or district with a broad commitment to accelerate neighborhood-scale sustainability. EcoDistricts commit to achieving ambitious sustainability performance goals, guiding district investments and community action, and tracking the results over time.”

Up until now, most ecodistrict proposals have focused on environmental performance, particularly energy and water self sufficiency and elimination of waste materials, rather than the full range of sustainability goals, including economic and social. But the concept appears to be a potentially scalable system that could be compatible with a transformation to a fully sustainable economy.

Goals

Ecosystem Service Districts’ principal purpose would be to maximize the value to society of nature’s services, by a combination of management regimes, including using social valuation tools designed to guide prices for needed services that reflect both positive and negative externalities.

EcoDistrict goals include transforming neighborhoods to operate as single, interconnected systems, achieving as nearly as possible zero net energy, water and resource use. Future goals may include food self sufficiency and restoration of plant and animal communities to near pre-settlement conditions. It is also a stated goal that ecodistricts be replicated in other places within the City or Portland and elsewhere. PoSI’s sustainability performance goals are:

- 1) Community Vitality – Healthy, equitable, and vital communities with active and diverse participation.
- 2) Air Quality and Carbon – Beyond carbon neutrality and healthy air quality.
- 3) Energy – Net-zero energy usage annually.
- 4) Access and Mobility – Healthy, clean, and affordable transportation options.
- 5) Water – Water, in all its forms, meets both natural and human needs.
- 6) Habitat and Ecosystem Function – Integrate built and natural environments for healthy

urban ecosystems.

- 7) Materials Management – Zero waste and optimized materials management (Portland Sustainability Institute 2010, pp. 11-12).

Methods

Ecosystem Service Districts. Powers accorded to ESD's could include generating information, such as comparing the cost of service provision through both natural and built means, a coordinating function, to achieve better actions among jurisdictions and avoid counterproductive ones, land use powers, including zoning and condemnation or taxing authority, which could be used in part to facilitate the movement toward the optimal allocation of services through pricing (pp. 335-6). In order to facilitate the creation of ESD's the authors advocate:

- A. A systematic, quantitative cataloging of the sources and consumer of ecosystem services at a local level, building up to a national assessment, followed by a determination of the ecological and economic attributes of the various service types and flows, including how exploiting or impairing one service will affect others and the social benefits and costs of various alternative schemes.
- B. The mapping of ecosystem service areas that would locate suppliers, consumers and threats relevant to each service, and
- C. A series of transitional steps, including starting with better known services like flood control and water purification, small scale experimental efforts and promoting models of success (pp. 357-361). The scope of ESD's could be very large, such as Mississippi Valley Authority to coordinate land use policies throughout the basin to ensure provision of flood control and water purification services. They envision a nested structure of ever-larger Districts. They believe it necessary to build a political constituency over time as the public better understands the importance of ecosystem services and call for a Federal Interstate Panel on Ecosystem Capital to build that understanding (pp.362-3)

EcoDistricts. PoSI uses a four step method to create an EcoDistrict:

- 1) Engagement to Governance – Creating a shared vision and agreeing on a mechanism for governing the EcoDistrict, its projects and potential investments.
- 2) Assessment and Strategy Development – Developing an understanding of the challenges faced by the community to meet the ambitious performance goals, and the creation of specific strategies to meet those goals.
- 3) Feasibility and Project Implementation – The interaction of the EcoDistrict with PoSI, the City, and other key stakeholders to assess the catalytic potential of various strategies and investments, and the development of an implementation strategy.
- 4) Ongoing Monitoring – Ongoing evaluation of the impacts of and lessons learned from implementing the strategies, and the modification of or development of new strategies as a result (Id., p. 15 and 16).

Other Special Districts

Districts of various kinds are used for an extremely wide variety of purposes, mostly fairly narrow, but are mentioned here because of their ability to raise revenue from within a specific geography, although rarely coterminous with an ecosystem. A few existing and proposed ones seem to have the capability either to integrate different kinds of compatible investments or across multiple jurisdictions or both.

Public Utility Districts in Washington State, which have democratically elected commissioners, and are authorized to “conserve the water and power resources of the State of Washington for the benefit of the people thereof, and to supply public utility service, including water and electricity for all uses.” (Title 54 RCW, 2008).

Eugene Water and Electricity Board. An example of a utility making investments of ratepayer funds to assist local farmers reduce chemical inputs to the utility’s drinking water funds and gain access to markets for the crops grown with cleaner inputs is the’ McKenzie Watershed Healthy Farms Clean Water Program.

Clean Water Services. Another example from Oregon is the program to pay farmers to manage riparian areas to produce cooler water on tributary streams in lieu of a massive investment in cooling the effluent from a wastewater plant discharging to the Tualatin River in order to meet state water quality standards to protect fish (“Watershed based permit fact sheet”).

Puget Sound Partnership. A proposed basin-wide utility that would attempt to integrate a number of environmental restoration actions across multiple jurisdictions has been proposed by the Partnership in its 2008 Action Agenda for restoring the Sound. A regional Puget Sound improvement district would be authorized by the Legislature and come into existence with an affirmative vote of counties in the district. A majority of members would be county elected officials. The district would be authorized to collect tax and fee revenue and allocate it to the highest priority actions and programs in the Action Agenda. Specific tax and fee options would require approval by a public vote of the voters in the district. The district would contract with state agencies, counties, cities, nonprofits, and other jurisdictions and entities as appropriate to complete the necessary projects. Potential revenue sources include: flush fee (household and business fee for sewer connection and on-site sewage systems); water use fee; and pollution discharge fees (“Action Agenda” 2008, pp. 140).

New York City Watershed agreement, discussed above, is a rare example of a utility deliberately using its revenues to address service delivery, ecosystem services protection and economic and cultural enhancement at the same time. The City made the agreement with Federal and state agencies, municipalities, businesses and farmers in the watersheds for the protection of the ecosystem services of natural filtration of runoff into the reservoirs. It thereby avoided billions of dollars in treatment of its water. The agreement provided for best farm management practices, upgrades of infrastructure, voluntary purchases of key parcels, and investments in economic development, all paid for by ratepayers.

Watershed Finance districts. USEPA’s Environmental Financial Advisory Board has proposed to provide an ecosystem based means of financing the most efficient investments to achieve water

quality and other environmental objectives and fairly allocating the costs of paying for debt service and other costs ("EFAB report: Sustainable," 2011).

The recommendations in this report emphasize the importance of a well designed collaborative approach to identifying issues and fairly allocating responsibilities and charges. The report emphasizes the need for a watershed wide district or entity to undertake the management of a multi-jurisdictional collaboration and also the financing of agreed upon infrastructure or other improvements, practices and land and water management activities.

Evaluation

Advantages

- Districts are often formed at an appropriate geographic scale for whole system management to achieve many critical outcomes needed by a sustainable economic system, neither too small or too large.
- Districts either cover or have the potential to scale up to cover an entire watershed or basin and to contract with other districts in or outside the political jurisdiction for needed services that can't be generated within its boundaries.
- Districts are or have the potential to be concerned with the full range of ecological issues that affect local, regional and global ecosystems.
- Districts plan, and implement decisions and make investments that have intergenerational outcomes and could apply life cycle science to assure outcomes are beneficial.
- Districts generally have governance methods and institutions that assure continuity and management for the long term
- If those institutions are well founded and supported, EcoDistricts would be likely less susceptible to gaming and rent seeking behavior by large outside organizations
- Some districts use life cycle science to measure selected outcomes.
- Many districts have capacity to finance investments that have intergenerational outcomes.

Disadvantages

- Districts have focused largely on a limited number of discrete services, such as utilities, or specific environmental or natural resource management. These objectives are limited by law. New types of districts, like Ecosystem Services Districts, would be required to achieve a full range of sustainability goals that could be linked to larger, regional and global outcomes
- To achieve sustainability goals, a new type of district would need to be aligned with the full range of community priorities, especially those which would achieve the employment, wellness, mobility, cultural, educational, security and other vital outcomes needed for full sustainability.
- Districts focus on specific infrastructure or services within the District, generally using traditional cost benefit analysis to judge the worthiness of investments. They do not yet address the full life cycle impacts of investments or of goods and services exported from or imported into the district. Accordingly, they cannot assure that intergenerational

impacts or benefits are addressed

- Most districts employ governance methods that favor the narrow interests of the persons chiefly benefitting from the district's mission, even when the boards are democratically chosen.
- Districts' financial capacity is necessarily limited to the scope of its authorized purpose. They lack the ability to finance investments that have a very long payback in the absence of markets or payments for benefits not currently measured and valued. They lack a transactional framework to retire large, unsustainable systems
- A challenge for Districts attempting to achieve ecosystem wide sustainable outcomes is the absence of a source of patient capital. Conventional financing that is willing to wait for returns from energy efficiency, renewable energy and ecosystem services investments that may take years to realize and be smaller than from other, shorter term projects. This may have to do with both the scale of the district and the need for markets to aggregate and trade sufficient presently unmeasured and therefore undervalued beneficial outcomes from energy savings, lower insurance risks, improved security, higher property values, etc. that could assure financing could go forward.
- The difficulty in holding property owners, businesses, residents and leaders together for the long haul is also a challenge. Building institutional governance capacity that is democratic, inclusive, transparent and solutions oriented would help assure longevity.

EVALUATION OF ECOSYSTEMS GROUP

ECONOMIC

Without a linked network of Districts or Basin plans, which individually have adopted a comprehensive set of measurable economic, social and environmental goals needed to achieve full sustainability and have the authority to implement them, it will be difficult for the Ecosystem based solutions to meet the economic criteria. Without the network or an expansion of scale, it would be difficult for an individual watershed or basin to meet the tests for full employment, replacement of unsustainable assets, and financing. It is questionable whether a district or basin entity could achieve the necessary planning, implementation and finance powers without political agreement to grant them. If the powers sought were principally regulatory, that agreement may be extremely hard to achieve.

ECOLOGICAL

Without linkages to networks of similar districts or to broader regional, national or international capacities, it may be difficult for individual ecosystem based units to provide the kind of scientific rigor needed to assure ecological and social outcomes are beneficial throughout the life cycle of investments and actions planned. On the other hand, these units would be uniquely able to define and measure local assets and challenges, both natural and cultural. Smaller units would be very strong on the ecosystem function and waste reduction criteria.

INSTITUTIONAL

Ecosystem based units could meet most of the institutional criteria, depending upon the kind of governance they adopt. To meet the wellness and many of the security criteria, they will depend in part on actions taken in other districts or at broader regional levels (e.g., basin, national, international).

INTEGRAL

Ecosystem based solutions are well suited to meet most of these criteria, Scalability downward would be a problem if the model were applied to too large an area. Many of the advantages of local and small might be lost. Networks among districts and collaboration with higher level institutions would be needed to assure success.

In conclusion, ecosystem based solutions would have several impressive advantages as parts of a whole system rebalancing of the political economy. At their best, as in the cases of Ecosystem Service Districts and EcoDistricts, they are most powerful in their pursuit of ecosystem health over the long term. The finance models used by utilities and special districts are also adaptable to a wide variety of purposes, from paying for infrastructure to the direct provision of services. Ecosystem based initiatives like watershed and basin collaborations are potentially very powerful in scaling up to larger regions and to an integrated set of outcomes.

The greatest limiting factor is the historic focus of all these entities on single purpose or a handful of purposes rather than on the health and prosperity of the district/watershed/basin as a whole. An electric, water, sewer, irrigation, weed control, etc. entity plays an important role in economic activity, as do those like watershed and basin councils that focus on ecological restoration. But none have been conceived or have the powers necessary to integrate all these and other economic and social activities into an efficient economic system that creates prosperity for all while restoring and protecting ecosystems and their essential services.

Another weakness of the ecosystem based solutions is that they, for the most part, do not base their decisions on life cycle science, which would enable them to seek the most efficient means of achieving multiple outcomes across the spectrum of community and regional needs.

A major handicap is the inability of local solutions like these to integrate across geographic and political boundaries and different levels of government.

POSSIBLE WHOLE SYSTEM SOLUTION

To address some of the shortcomings of ecosystem based solutions in achieving the necessary enhancements to create a truly sustainable economy, it is possible to imagine a solution created through national or state/provincial legislation authority to constitute ecosystem based entities with responsibility for managing the ecosystem for human prosperity and sustainable ecosystem services.

The entity would have the powers to:

- a. assess human and ecosystem conditions and needs, using inclusive techniques to be sure that all relevant information, both scientific and local knowledge based, is collected and that all needs and wishes of the human population are documented.
- b. develop measurable goals, objectives and specific outcomes, with participation of all sectors of society, including those disproportionately impacted by current environmental or economic conditions, for all identified and agreed upon needs and wishes.

Metrics for the outcomes would be developed using life cycle science unless applicable ones exist in other ecosystems/districts or at higher levels

- b. create plans and programs for achieving those goals, with full participation of all affected interests, including financing for all outcomes from within the district or using committed and reliable revenues from outside sources, such as revenues collected at a higher level and distributed to eligible entities at the district/ecosystem level

- c. coordinate implementation and management of plans and programs

1. Financing and on the ground management could be accomplished through the same entity or other existing or new ones and/or the private sector.
 2. Private sector activities would continue as usual. Activities which impede the achievement of the outcomes would be altered or phased out by rule or market mechanism over time.
 3. Agreements with other similarly situated entities or with higher level ones to assist with or enhance each other's outcomes would be permitted and encouraged in the interests of efficiency.
 4. As markets for outcomes emerge, the entity could play a role in aggregating local outcomes for sale into these markets.
2. Created higher level coordinating capacity to perform similar functions but on a limited number of outcomes of more than local significance and to assist in the aggregation of scalable outcomes for purchase or trade.

EVALUATION OF PROPOSED SOLUTION

The proposed solution would address most of the shortcomings noted in the evaluation of the existing ecosystem solutions, but would face enormous challenges in implementation. For example,

There would be no assured way of financing the rapid retirement of unsustainable assets or of providing market options to allow for profitable migration of unsustainable business models to clean and harmless ones. The model may depend too much on education and gradual market development or conversely on heavy doses of regulation to assure outcomes will be achieved in a timely way.

In the absence of a relatively speedy transfer of trapped equity to sustainable platforms, the temptation of owners of current assets and systems to engage in rent seeking or self interested efforts to weaken the goals and outcomes would not diminish from the current system. The willingness of businesses to participate in the process of defining outcomes and reaching other necessary agreements would potentially decrease from their involvement in existing collaborations.

Accordingly, the resilience, governance, democracy and feasibility criteria would be hard to meet.

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COLLABORATIVE

SUMMARY OF GROUP

Collaborative solutions manage resources in ways that engage the communities associated with them in an inclusive way. The power is distributed rather than hierarchal. The premise is that by utilizing democratic principles the end solution will be both more efficient and more equitable, benefiting from the wider range of perspectives that are brought to the table. The distributed power structure also make it more difficult for outside actors to corrupt the goals of the organization. In many situations the collaborative way of organizing can be utilized, overlapping with other solution categories

The primary goal for collaborative solutions is to achieve a system that allows the integrity of a resource to be maintained or improved over a long period of time. There is a wide definition of what the resource is such as the larger economy in participatory economics, common pool resources in institutions studied by political economist Elinor Ostrom, and ecological/community

knowledge in Transitions towns.

EXISTING SOLUTIONS

There are a wide variety of institutions that utilize a collaborative approach. A sampling of examples that are related to sustainability include:

Transition towns

Certain common pool resource management regimes such as:

forestry

irrigation

fisheries

water basins

Community Supported Agriculture (CSAs) and other agricultural projects

Certain indigenous land management

Participatory economics

Certain worker-owned business models

Context Sensitive Solutions (urban planning)

Integration with other solutions

EVALUATION

Advantages

- Governance utilizes wide range of perspectives in decision making, which provides range of information, higher level of political equity, and greater alignment of multiple interests
- Appropriate for multiple scales, which can be nested in one another
- Distributed power structure buffer against rent seeking
- Responsive to local conditions
- Frequent focus on long term resilience

Disadvantages

- Collaborative decision may take longer in some situations
- Easily derailed by lack recognition of legitimacy by higher power structures, such as the federal government
- Fragile without venue for conflict resolution

COMBINATION WITH OTHER SOLUTIONS

Rules founded on the underlying principles collaborative solutions can be combined and built into other solutions. By making decision making more distributed and democratic, other institutions can benefit from the advantages of collaboration.

Management of the Commons through Collective Action - Elinor Ostrom

Summary of Concept

There are many examples of common pool resources (CPR), especially environmental CPR, being managed in participatory ways congruent with local community interests. Drawing on game theory and numerous case studies, much of Elinor Ostrom's work has sought to identify some common threads in the development of successful community managed commons, not least of which is a capacity for self organization and collective action among the stakeholders. Allowing stakeholders of a CPR to negotiate their own contract among themselves, many of the information and transaction costs that would be paid by an outside government regimes are minimized because local players often have better information on both CPR conditions, and appropriate fines and sanctions to encourage compliance. If one player offers a contract based on biased or incomplete information, the other players wouldn't agree to it (Ostrom 1990).

Goals

The primary goal of these systems is to develop an institutional arrangement that can manage a common pool resource in a way so it is not degraded over a long period of time. This arrangement seeks to be adaptable to unforeseen circumstances, as well as efficiently utilize local information.

Methods

Ostrom's examples include meadows, irrigation systems, water basins, and fisheries. Ostrom highlights similarities among successful examples in *Governing the Commons*:

- There are clearly defined boundaries, which helps to specify who is a stakeholder, that is who is authorized to use the CPR
- The rules are suited for local cultural, technological, and geographical conditions.
- There are venues for stakeholder participation in modifying rules allowing the system to have some flexibility to changing conditions
- There is some sort of monitoring system to hold stakeholders accountable
- There are sanctions that are relative in severity of how badly a rule is broken
- There are conflict-resolution mechanisms such as courts or other local arenas in which stakeholders can challenge other stakeholders or officials
- Stakeholders are allowed to organize by government authorities.
- There are multiple layers of “nested enterprise”, meaning coordinated rule structures within the system differing with the scale

As well as similarities among unsuccessful examples:

- Government opposition to the collaborative institution
- Government management de-incentivizes stakeholders from taking on the transition costs of developing rule scheme
- Difficult if many stakeholders have no long term interest in health of common
- Lack of trust among stakeholders delegitimizes rules
- No venues for communication or conflict resolution would make system inflexible
- Lack of monitoring or enforcement increases chances of cheating
- Too many stakeholders make agreement on rules harder to reach

Some examples of local CPR management

- Los Angeles water basins
- Inshore fishery in Alanya, Turkey
- Land management in Törbel, Switzerland
- Huerta irrigation systems in Valencia, Spain

CPR Databases

Resources such as Indiana University's Digital Library of the Commons and University of Michigan's International Forestry Resources and Institutions seek to provide databases of different common pool management regimes from around the world for future institutional development as well as for academic studies around the commons.

Evaluation

Collaborative common pool resource management provides a strong framework for resilient, equitable, locally-tailored governance. As Ostrom points out, collaborative governance is not appropriate for all situations.

Transition Towns

Summary of concept

Transition towns are grassroots efforts that have emerged over the last decade to build community resilience as a way to adapt to peak oil and climate change. The movement espouses the belief that because "small is inevitable" with today's environmental crises, it is better to localize today than to be forced to do so out of necessity in the future. The idea is that by reducing dependence on globalization, a community can not only become more resistant to shocks, but also foster stronger social connections (Hopkins, 2008).

Many of the concepts used in Transition towns were inspired by the permaculture movement, especially the 12 design principles outlined by *Holmgren in Permaculture: Principles and Pathways Beyond Sustainability*. Permaculture comes out of the combination of the words “permanent” and “culture”, which includes but is not limited to agriculture. Resilience and sustainability are key concepts in the permaculture movement. The design principles act as a framework for capturing the efficiencies in ecosystems when planning human systems.

1. Observe and Interact
2. Catch and Store energy
3. Obtain Yield
4. Self Regulation & accept feedback
5. Value/Use renewable Resources
6. No Waste
7. Design from patterns to details
8. Integrate instead of segregate
9. small and slow solutions
10. Use and value diversity
11. Use and value the marginal
12. Creatively use and respond to change

The approach of the movement is not to follow the usual environmentalist approach which prescribes solutions for government, but rather to develop ecological concepts in civil society. The group strives to use positive and opportunity-centered language as a way of bringing ecological concepts mainstream, arguing that Transitions ideas could be the foundation for a cultural renaissance. Decisions are made democratically, with participation from all encouraged as a way of fostering an ethic of empowerment. A major goal at the end of the 12 step process is the creation of a “Energy Descent Action Plan” for the community. There are over 400 official Transition communities in 8 different countries (Goldwasser 2009, Lewis 2008).

Goals

The goals of transition towns are to develop a local culture grounded ecological awareness, as well as community networks. By viewing a less energy intensive lifestyle as an opportunity, the movement aims to create a society that is fertile ground for new ecologically sound solutions, as well as well adapted to oncoming environmental issues.

Methods

- Re-skilling events where there are free classes on clothing repair, cloth dying, natural building, practical food growing techniques and other DIY skills
- Raising awareness of environmental issues with movie showings and discussion, talks by relevant experts open to the community, interviews on local media
- Community building activities to go along with educational events such as feasts, dances, and live music
- Focus groups organized around specific issues such as waste reduction, water resources, and food independence

- Cultivating a positive relationship with local governance
- Facilitating connections between existing environmentalist networks

Evaluation

Transition towns is unique in their exclusive focus on cultivating necessary changes in civil society. However this limits their engagement with larger power structures that impede both local and global sustainability. Their inclusiveness and utilization of cultural activities could build stronger ties between environmental sustainability and cultural identity. There have not been enough rigorous studies done to conclusively say how effective this has been, and commonly those who engage Transition towns are already environmentally inclined to begin with (O’Roarke 2008).

Parecon (Participatory Economics)

Summary of Concept

Parecon is an socio-economic system where production, consumption, and allocation are decided through a process of locally-grounded participatory democracy. It is conceived as an alternative to capitalist markets and to central planning, both of which give rise to endemic inequality. Within the workplace non-hierarchal structures are nurtured as much as possible, with individuals assigned a mixture of “empowering” and non-empowering tasks to avoid the establishment of a “coordinator class” (Albert & Hahnel 1991).

Proponents believe that these goals can be achieved while also promoting economic efficiency and diversity of ways of life. Parecon can in many ways correct inefficiencies created by hierarchy. By having a variety of empowering and non-empowering tasks, deterioration in concentration, effort, and moral from monotonous repetitious jobs could be avoided. Working a number of tasks would give workers a better idea of how the different parts of the production process fit together into the whole, which would make for more efficient problem solving and product development.

Voting power in a given decision is weighed according to how much the individual is going to be impacted by the decision's outcome. In addition to promoting equity this would internalize many externalities. If those living in one area wanted to start producing something which polluted another area, those living in the potentially polluted area would be able to vote against it (Hahnel 2004).

Goals

1. Promote economic efficiency
2. Cultivate equity by having payment based on effort
3. Self manage where by decision making power is proportional to degree to which the

- decision impacts a person or group
4. Promote an atmosphere of solidarity where the well being of all people are equally considered
 5. A variety of outcomes are possible

Methods

- Workers' Councils make decisions within workplace, establishing non-hierarchical management
- Consumers' Councils make decisions regarding production and allocation within community
- Facilitation Boards manage Worker'/Consumers' Council and vote to set prices

Evaluation

Parecon is theoretically well structured for equality, minimization of externalities, and general reduction of perverse incentives when compared to today's mixed capitalist system. Many critique that parecon would be overly bureaucratic, however it can also be said that it also reduces bureaucracy by eliminating the need for jobs like advertising and stock trading. It is hard to say conclusively how effective parecon is as there aren't any real examples of it on a larger scale. It is also arguably not feasible in the near term in the context of the individualism that runs deep in western culture.

EVALUATION OF COLLABORATIVE GROUP

ECONOMIC

The distributed power structure that characterizes collaborative solutions makes corruption more difficult because rent seekers can not merely target a few crucial players. It also implicitly incentivizes equity in many cases because of the greater number of perspectives that have voice in decision making as far as resource use. Equity is explicitly built into the rule system in the case of parecon. This makes corruption more difficult because the distributed power makes it difficult for rent seekers to target a few crucial players. Distributed power in a political institution, particularly parecon, gives communities directly harmed by unsustainable assets more power to shut them down. This is less effective if all participants have a high discount rate, thus substantially undervaluing outcomes far in this future.

While parecon does not integrate at all with existing markets (and is generally seen as a replacement or parallel system to today's market structures), other models do to varying degrees. Collaborative CPR management can integrate into markets when recognized as a legitimate institution by the government, whereas Transition Towns are inherently apolitical. Transition towns can integrate into markets, but only change incentives indirectly by shifting demand. None of these solutions explicitly create a finance mechanism to help business transition to cleaner platforms. Collaborative CPR management could potentially be used for retirement of

dirty assets in cases of the collaborative governance having strong monitoring and sanctioning powers.

ECOLOGICAL

With stakeholders from every step of the production process having a say in the production of a good, parecon is more likely to be life cycle clean, or at least closer to life cycle clean than the current paradigm. By giving those impacted by waste political agency, Parecon could reduce waste. Ecosystem health is one of the highest priorities in for Transition towns in particular and permaculture in general. For parecon, ecosystem health can often (but not always) be a positive outcome of the system because a wide number of interests involved in the development of the management regime, those who favor the precautionary principle have a avenue for their interests.

Ideally if the Transition Towns movement gains momentum and the permaculture principles are broadly incorporated into household, business, and government planning, production processes would become life-cycle clean. However this is dependent on the propagation of transition communities and earnest adoption of permaculture principles. Similarly ecological gains in a parecon setting would require idealistic and earnest adoption of the system.

Scientific assessment is not necessarily explicitly included in any of the models, but is likely to figure in many examples of collaborative CRP management and applications of permaculture principles. In many cases of CPR management particularly in developing areas the utilization of local knowledge can lead to a more effective management regime than outside expert knowledge.

INSTITUTIONAL

Collaborative solutions have varying degrees of resilience to political volatility. Parecon could be resilient because of its focus on devolving power to communities. Transitions Towns' exclusive focus on civil society makes them resilient to political volatility, but is often critiqued as a limiting factor in its potential for generating change. On the other hand collaborative CPR management regimes tend to be very sensitive to political volatility in many contexts, because recognition by local authority can have a huge impact on how functional the system is.

All of the solutions examined tend to prioritize democracy and equality, which in turn would have a positive impact on wellness. They vary tremendously in degree of social acceptability. Parecon is not socially acceptable within the western cultural norm of hyper individualism and competition. The Transition Towns aim to be as inclusive as possible. However because it is organized completely by volunteers, this could exclude those that are lower income and others who are less likely to have time available to devote to the movement. The movement would not in itself have much of an impact on equity or public health. It is generally going to be socially acceptable where it is successful because of its voluntary nature. One of collaborative CPR management's strengths is the provisioning of locally-tailored effective governance which stems from the emphasis on democracy and inclusivity. By promoting the integrity of common

pool resource, users can more securely plan on it being available in the future. While this solution does promote more social integrity by bringing stakeholders together, often a pre-existing social conflict and fragmentation could be a barrier to of this solution being implemented successfully. None of these solutions necessarily take into account health outcomes, or necessarily differentiate preventative or curative outcomes.

INTEGRAL

Collaborative solutions frequently tend to be geographically and temporally flexible, with a strong emphasis on locally tailored solutions. While there are examples of these solutions happening on multiple nested scales, there is a tendency for implementation on a smaller more local scale. One of collaboration's larger strong points is its explicit utilization of multiple interests. Not only does this work to bring in more perspectives and information, but builds legitimacy in the eyes of the stakeholders.

For collaborative solutions political and social feasibility is highly dependent on local context. While the limited scope of Transition towns make them fairly politically feasible to implement, but the degree of their success may be limited how strongly a community values conservation, resilience, and efficiency. Collaborative common pool resource management may only be feasible if participants have strong problem solving skills, or if there recognition by higher circles of governance, among other factors. Parecon is not very feasible socio-politically in the near future with today's dominant cultural norms and entrenched wealth and power inequality.

While there is the potential for a collaboration solution to focus on integrative outcomes, such as parecon's whole-economy structure, many examples today are focused around a few salient goals. While in many ways collaboration can bring more efficient decisions, the process of getting to this decision can sometimes be more time consuming than if the decision were in the hands of only a few stakeholders. This is also depend on the context.

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VOLUNTARY

SUMMARY OF GROUP

Voluntary solutions include non-regulatory, business, NGO, government or community led plans, agreements, self-imposed limitations on impacts of commerce or other activities, or broad based agreements or institutional arrangements to achieve sustainable outcomes in a locality, region or nation. They depend largely on initiatives taken by businesses, organizations and individuals in a particular geography or in a specific sector.

EXISTING SOLUTIONS

- Corporate and product responsibility initiatives
- Certification programs
- Government purchasing programs
- Government encouragement of voluntary initiatives
- Non-Governmental Organization led programs
- Foundation initiatives
- Religious and individual initiatives

CRITIQUE OF EXISTING SOLUTIONS

Advantages

- Require no or minimal new legislation or change in basic business models
- Have both global and local reach or potential
- Contribute to knowledge of changes needed to attain sustainable outcomes
- Community based programs have the greatest potential to find the most appropriate and efficient solutions

Disadvantages

- voluntary programs are uncoordinated with each other
- Some areas will move faster, may take a long time to get to a scale necessary to change demand curves
- Difficult to achieve agreements that would include full range of needed outcomes across all geographies
- Even to succeed at a partial system level, may need incentives for businesses and governments to participate at least at first
- Hard to engage residents struggling to thrive to assure their interests are advanced
- Businesses can only go so far without giving up market perceived competitive advantage
- Unlikely that voluntary agreements would ensure retirement of unsustainable assets or systems at the earliest time

POSSIBLE SOLUTIONS

An area-wide whole system voluntary model based on agreements on standards and outcomes, networked across regions.

EXISTING SOLUTIONS

Voluntary solutions include, singly or in combination, non-regulatory, business, NGO, government or community led plans, agreements or self-imposed limitations on impacts of commerce or other activities, or broad based agreements or institutional arrangements to achieve sustainable outcomes in a locality, region or nation. They may be encouraged or assisted by government action, but depend largely on initiatives taken by businesses, organizations and individuals in a particular geography or in a specific sector. Since most voluntary solutions are focused on specific activities or areas, larger scale outcomes would have to be achieved by networking and aggregation among multiple geographies or sectors.

The initiatives listed below are just a sampling of the thousands of voluntary programs and actions being undertaken across the planet. Some of those mentioned are also described in other sections.

Corporate Social and Product Responsibility

Summary of Concept

Over the last several decades, a number of businesses, consultants, and organizations have adopted the point of view that fundamental change to address environmental and social responsibilities will be essential for business to survive and thrive in the 21st century. There have been calls from within the business community for comprehensive global restructuring in initiatives like the World Sustainable Business Council's 2050 Plan discussed in the Markets group. Visionaries like Paul Hawken, John Elkington, and David Korten have predicted a transformation of corporate goals away from shareholder value increase being the predominant goal to encompass community, environmental, worker welfare, and other social goals.

Methods

Individual business leaders, like the late Ray Anderson of Interface Corporation, have explicitly broadened their companies' goals, to one degree or another, to include more social and environmental ones as the surest pathway to long-term profit. A movement to redefine the legal structure of corporations to include social goals has emerged recently. The B-Corp model has been adopted by a few states in the US and is under consideration by other states.

In addition to efforts for reform at the corporate level, there has been a growing interest at the product level to encourage more responsibility to reduce the environmental and social impacts of individual products. The Product Stewardship model attempts to extend producer responsibility to the impacts of supply chain, use and ultimate disposal of products they manufacture. This is also a regulatory strategy in some countries, particularly in Europe. This model is notable for explicitly adopting a life cycle approach in analyzing many of the impacts and in adopting strategies.

Similarly, some businesses have begun to pursue procurement of materials, products and services used in their business that have lower environmental or social footprints, e.g., avoidance of raw materials whose extraction is more harmful than competing sources, contracts for more efficient power, purchase of paper with high recycled content, refusal to buy products that use child labor, etc. Walmart's supply chain efficiency and environmental programs affect much of the retail product delivery system through out the world. An independent grocery's procurement of locally grown, low impact food products may affect only a small area.

These voluntary strategies are usually grouped together under the banner of Corporate Social

Responsibility (CSR). Conferences and organizations like Global 500, The Natural Step and the Global Reporting Initiative provide information and examples for corporations wanting to incorporate beneficial social and environmental outcomes in their business model.

In the financial world too, the Socially Responsible Investing (SRI) movement has provided information and investment opportunities for individual and fund investors to choose to invest in corporations based on their environmental and social intentions and records. Examples include the Henderson/Calvert, 21st c. and other SRI indexes, funds, etc.

Evaluation

Economic. Voluntary corporate initiatives have already demonstrated that many valuable outcomes are both consistent with the mission of the business and through efficiency or different business models can return value to shareholders. They are likely to create some positive and eliminate some perverse incentives. Some harmful systems may be replaced, as when relatively benign chemicals are substituted for those that have serious impacts over their full life cycle. They often will have positive effects on employment by providing opportunities for new entrants to deliver products or services but may put other firms who can't innovate or be more efficient out of work. They are well integrated into existing markets.

Ecological. Most initiatives are designed to and do result in positive environmental results, including waste reduction, but most are not evaluated for their life cycle impacts, so their effect on ecological resources is often unknown or undisclosed.

Institutional. While these programs operate independently of government, political changes can influence their success, for example, by withdrawing or failing to offer financial or other incentives. Some produce public health improvements, but not systemic change. They may create informal governance innovations such as product responsibility or supply chain networks that may be models for larger system change. They are not democratic and have limited transparency. They are often designed for and achieve some social acceptance, if not perceived as greenwashing.

Integral. Corporate initiatives have demonstrated feasibility, within their limited scope. They can be implemented in different geographies and times, and may be scalable depending on the size of the corporation and its supply chain. They may or may not be aligned with multiple business, advocacy, government and community interests.

Product Rating Systems

Summary of concept

Product rating systems are standards for sustainable production set by a private company or organization for the benefit of informing the conscientious consumer. Usually there is some kind

of indicator, from a symbol on a label to a sign on a building which is used as a selling point for a good or service. The idea is that if enough people change their consumption decisions and increase demand for sustainable products, it will shift demand away from products that are sourced in ethically questionable ways. There are varying degrees to which standards are demanding, as well as a variety of strategies for monitoring and testing products.

Goals

The primary goal of a product rating system is to advertise a company's sustainable practices. This is intended to entice the conscientious consumer to choose the well rated product over other similar products. On a large enough scale, certification can shift demand toward companies with better practices and push companies that don't meet product standards to improve their production methods.

Methods

Buildings. The Leadership in Energy and Environmental Design (LEED) and the Living Building standards both examine building structure. LEED focuses primarily on energy use, while Living Building examines location choice, water use, construction materials, equity (in the building's purpose), and beauty in addition to energy use. LEED bases its assessment on projected energy use, while Living Building also examines actual use after the structure is built.

Environmental Product Declarations. These “green labels” use rigorous protocols based on life cycle assessment to comprehensively evaluate production by examining impacts of mass and energy flows through the extraction, selling, use, and eventual disposal of a good. These “cradle to grave” ratings are developed using product category rules collaboratively developed by industry and independent organizations such as American Center for Life Cycle Assessment.. Life cycle assessments are done for these rules to assure full disclosure of impacts. LCA is in turn governed by standards adopted by the International Standards Organization. Environmental Product Declarations are in increasing use in the European Union, Japan and other countries. They are beginning to be developed in the US, especially in the building sector. They may become mandatory under rules adopted by countries limiting imports of products lacking EPD's. For the time being, they are mostly voluntary.

Other programs. Common to most certification systems are labels, signs, and other indicators and post certification monitoring and reporting. News coverage and word of mouth help a label gain a reputation. Some additional examples are:

- Certified Organic
- Dolphin Friendly
- Fair Trade
- Greenseal
- Blue Angel

Evaluation

There are a number of issues with product rating systems. Other than the EPD system and a few others like the Forest Stewardship Council (FSC), organizations can develop standards that don't disclose all impacts, so in many cases the line between "eco-label" and green washing is very fuzzy. This is exacerbated by the fact that there are so many product rating systems that it is challenging for the consumer to have up to date information rating the product rating systems. Also because the maker of the product usually pays for the certification, this can be difficult for producers that don't have a sufficient profit margin. For example, the FSC label certifies sustainably sourced lumber and other forest products. There are many forests in the developing world which are sustainably managed but can't afford the certification process and so can't access the benefits of certification.

Economic. Changes in demand from purchases by conscientious consumers will prompt other companies to change their policies, which would create a new positive incentive in a given market. In some cases this could lead to the early retirement of an unsustainable systems.. This model integrates well into existing markets. With the plethora of product rating companies and organizations in existence, some may be susceptible to corruption from a company looking to "green wash" their image.

Ecological. Some product rating systems consider cradle to grave effects, however others do not. Some product-raters incorporate scientific standards into their criteria, consider ecosystem functionality and waste reduction. Others do not.

Institutional. As most organizations involved in product rating are private and unaffiliated with the government, they are resistant to changing political winds, but do not encourage innovative new governance, or necessarily provide for democratic involvement. Many of the standards are related to public health and wellness, but do not aim at improvements in social outcomes. The success of some product rating systems, such as "dolphin safe" tuna, demonstrate social acceptability, even if flawed to some degree. However, they may only change behavior of environmentally conscious shopper,

Integral. Product rating systems, requiring no new legislation and little outside funding are highly feasible to implement. There is temporal flexibility, although because most standards seek to be universal, there is little flexibility over time and geography.

Non Governmental Organizations and Initiatives

Summary of concept

Many thousands of non-governmental organizations (NGO's) throughout the world are working to promote and bring about solutions to the challenges of social injustice and ecological diminishment. Some work to bring about change through government action; others through individual or common initiatives. Techniques vary considerably, from personal choices through

substantial interventions in governance or social systems. A few of the leading ones are profiled here and evaluated as a group.

Non-government organizations. As documented by the social networking organization, Wiser Earth, hundreds of thousands of organizations within civil society address social justice, poverty, and the environment. WiserEarth provides tools to help these organizations find each other, collaborate, share resources and build alliances. While Wiser Earth has no program for any particular type of reform, its premise seems to be that voluntary alliances among organizations with compatible missions could help make the shift to a harmless economy

Some organizations are attempting to change the existing economy by reaching agreement with widening circles of organizations, leaders and individuals on common goals. One of these is the Earth Charter movement. The Earth Charter has been drafted through a collaborative process, mostly among NGO's, with a few governments and others. Its website describes it as

“a declaration of fundamental ethical principles for building a just, sustainable and peaceful global society in the 21st century. It seeks to inspire in all people a new sense of global interdependence and shared responsibility for the well-being of the whole human family, the greater community of life, and future generations. It is a vision of hope and a call to action.

The Earth Charter is centrally concerned with the transition to sustainable ways of living and sustainable human development. Ecological integrity is one major theme. However, the Earth Charter recognizes that the goals of ecological protection, the eradication of poverty, equitable economic development, respect for human rights, democracy, and peace are interdependent and indivisible. It provides, therefore, a new, inclusive, integrated ethical framework to guide the transition to a sustainable future.”

The Earth Charter is intended primarily as an educational instrument.

A different approach is taken by NGO's that deliberately include businesses and business organizations in their initiatives. The Environmental Defense Fund and World Resources Institute are leading examples. EDF combines a traditional advocacy approach through campaigns, litigation and education to achieve environmental goals with a deliberate effort to work with businesses in partnerships that help achieve those goals. EDF has pioneered the use of market tools to assist in achieving environmental and health outcomes, such as the acid rain program it designed for the Clean Air Act revisions in 1990 and innovative fisheries markets that have helped fisheries remain stable off the West Coast of the US.

The World Resources Institute describes itself as “a global environmental think tank that goes beyond research to put ideas into action.” It works with governments, businesses and other organizations on solutions to global environmental challenges, like climate change, ecosystem services, biodiversity and water.

“WRI's premise is that environmental considerations are not incorporated into the overall financial analytical framework used by most actors in the capital markets. As such, investors possess insufficient information to adequately assess how environmental considerations impact a

company or project's risk/return tradeoff. WRI believes that markets that have fully discounted the environmental implications on risk and return will ultimately facilitate capital allocation to companies with sound environmental strategies" (Hanson, Ranganathan & Finisdore).

WRI works in part by collaborating with the business, investment and regulatory communities to improve disclosure of environmental risks and data and quantify the financial implications of environmental risks and opportunities.

An example of how WRI works with the business sector to change the way business approaches sustainability problems is its work with the World Business Council on Sustainable Development on a tool called the Corporate Ecosystem Services Review, designed to "help businesses develop strategies for managing risks and opportunities arising from their dependence and impact on ecosystems."

There are many other traditional advocacy organizations that have begun to adopt more of a partnership approach with business in addressing major global issues. For example, the Natural Resources Defense Council recently "opened an office in Beijing that is collaborating closely with local partners in government and the private sector on a range of cost-effective energy efficiency programs, and a series of initiatives to help China build stronger environmental laws, greater transparency, and better mechanisms for enforcement. This new office has also helped position us as the leading nongovernmental player in facilitating international climate negotiations between the U.S. and China."

Foundations. Another major voluntary force for change is the foundation world. Foundations have long attempted to ameliorate social conditions by funding new models of social change and leveraging government and, to a lesser extent, business investments in those models.

The wealth of foundations dedicated to social betterment is significant. The 25 top foundations worldwide hold over \$300 billion in assets ("Top Funders" 2012). In the United States, in 2009 there were 76,545 foundations with total assets of \$590 billion, including new gifts received that year of about \$41 billion. Annual grants given were about \$47 billion in 2008 but may have declined since then ("Highlights" 2011).

While most foundations steer clear of politically charged or highly controversial issues, they have nonetheless received criticism from various sides, from attempting to advance a socialist agenda, to undercutting local efforts to deal with problems like financing small business or improving health (Wormser 1993, Garrett 2007).

Some examples of the mission and focus of major foundations such as the Bill & Melina Gates Foundation illustrate both the breadth and some limitations of that model of social change:

"The Bill & Melinda Gates Foundation works to help all people lead healthy, productive lives. In developing countries, it focuses on improving people's health and giving them the chance to lift themselves out of hunger and extreme poverty. In the United States, it seeks to ensure that all people—especially those with the fewest resources—have access to the opportunities they need to succeed in school and life."

The Rockefeller Foundation was established in 1913 with mission to “promote the well-being of humanity around the world.” Despite that very broad mission, the foundation focuses its resources and energies on five interconnected issue areas:

1. Basic survival safeguards--Secure food, water housing and infrastructure
2. Global health--Accessible, affordable and equitable health services and systems
3. Climate and environment--Sustainable growth and resilience to climate change
4. Urbanization--Solutions for fast-growing cities
5. Social and economic security--Stronger safety nets, reinvigorated citizenship, re-imagined policy frameworks

Methods

NGO's use a variety of methods from educational efforts, investments in new models of effecting change, advocacy, litigation, political action, loans to entrepreneurs in areas of poverty, media campaigns, collaborative partnerships, negotiated agreements, and so on. Many of the efforts of NGO's are directed at individuals changing their behavior as consumers, stewards of natural resources and watchdogs of damaging actions by governments, businesses and landowners.

Evaluation

NGO's are a significant force in the world. They generally deal with discrete issues, even if some of them like EDF and WRI have a large number of big issues in their portfolio. The question is whether their advocacy, educational, and partnership methodology could eventually cause enough businesses, consumers and governments to change their economic behavior sufficiently to achieve a sustainable economy. NGO's tools are aimed at persuasion for others to change their behavior, even if they attempt to do so by demonstrating what sustainable behavior would look like. They are generally focused on a limited number of issues and compete with each other for funds to address them. With a few exceptions they do not see their role as part of a movement for whole system change and usually try to work within existing structures and processes for marginal gains. Foundations are limited by donors' or boards' interest in specific issues, not reform of world economy to produce better results for all. Partly because of the manner in which donors built the wealth they used to create foundations, they generally do not challenge the political and economic framework in which the donors thrived, even as they seek reforms within that framework.

Economic. Initiatives are usually aimed at creating correct and eliminating perverse incentives in the area of interest of the organization, foundation or group. They are also usually opposing or attempting to correct self interested behavior.

Ecosystem. Many initiatives are aimed at improving ecological health and avoiding waste, but only a few organizations use life cycle science to assure that actions with the least harmful impacts are pursued. Many adhere to the precautionary principle.

Institutional. Most organizations are resistant to political changes, since they generally exist to pursue goals that are independent of the identity of political leadership. They may have direct

and indirect effects on governance systems and many promote democratic values, even if their own structure and funding tends to insulate their decisions from democratic influence. Most pursue social goals such as security and wellness, although often with radically different policies.

Integral. Most look to create models that are feasible across different areas, time frames and scales. A minority seek to align multiple sectors in pursuit of the same objectives.

Government Encouragement of Voluntary Action

The basin/watershed initiatives discussed in the Ecosystems group were spurred by the need to comply with government issued standards, but rely largely on voluntary agreements and incentives to encourage land management and other economic activities to contribute to achieving the standards. Similarly, many government planning initiatives at all levels have relied on volunteers to advise on how to head off or soften some of the externalities of the modern industrial economy or to implement government policies. Some recent plans have more deliberately incorporated sustainability as a goal. For example, the UK Government Sustainable Development Strategy was relied on to be the UK Government's independent adviser on sustainable development ("Securing the future," 2005). It acted as watchdog for the UK government but was disbanded in 2011. Interestingly, the present government in the UK relies on business and civil society to achieve its sustainability goals.

Individuals

Some leading thinkers have concluded that the transitions required to sustain natural and human communities can only take be achieved in the context of a rise of a new consciousness. Speth, 199 et seq. Looking back from the second half of this century, Paul Raskin of the Great Transition Initiative writes that "Consumerism, individualism and domination of nature...have given way to a new triad: quality of life, human solidarity and ecological sensibility." The Earth Charter is another effort to describe the new thinking and ethical vision required to get the world out of its present dilemma. Speth looks to several different ways toward this new vision: political leaders painting a new narrative that resonates with people's deeply held values; natural catastrophes attributable to ecological tipping points; social movements; examples set by faith communities; and education. A recent example of the potential influence of religious organizations is the role played by the leader of Earth Ministry in Washington State to help persuade the owners of the last coal fired power plant in the state to accelerate its retirement.

ECONOMIC

Changes in demand from purchases by conscientious consumers may prompt other companies to change their policies, which would create a new positive incentive in a given market. These programs may on the other hand create or at least not ameliorate perverse incentives either because a program may operate on the margin or may encourage actions that are favorable in one sector (reduced toxic discharges, say) but exacerbate conditions in another (e.g., working conditions, unemployment, community deconstruction). Voluntary programs, being mostly non-governmental, are less susceptible to rent seeking behavior in the usual sense, but favored customers may press to avoid or take advantage of them. In the case of product certifications, with the plethora of product rating companies and organizations in existence, some, especially those that don't follow life cycle science, may be susceptible to corruption from a company looking to "green wash" its image. There is potential to affect employment both positively and negatively. For example, small companies may be unable to meet stringent new procurement guidelines but others may take their place. It is unlikely that voluntary programs will by themselves result in the accelerated retirement of unsustainable assets. Over the long term, customer demand for cleaner, socially positive business practices could lead to the early retirement of unsustainable assets. A distinct advantage is that these programs can be well integrated into existing markets, at least until the point when competitive disadvantages outweigh the programs' benefits. They could create new markets, particularly at the local and regional scales, as customers/consumers demand cleaner/safer/more socially responsible products/services offered competitors. Financing is/will be available for programs that promise a good short term return. Less likely where longer term outcomes are sought.

ECOLOGICAL

Voluntary programs may or may not create incentives for life cycle measured beneficial outcomes, because at present not many initiatives include life cycle analysis and are subject to greenwashing behavior and creation of perverse incentives. Some product rating systems, like environmental product declarations, consider cradle to grave effects, however others do not. Most voluntary programs are not rigorously based on scientific standards or have not been rigorously peer reviewed to assure that claims are accurate. Some product-raters incorporate scientific standards into their criteria, consider ecosystem functionality and waste reduction, but others do not. Because of the lack of scientifically measured outcomes, there is usually no way to assure that impacts on ecosystem functionality are negligible or beneficent. As with most other product or service decisions, the precautionary principle is not employed when potential environmental detriment is unknown or uncertain. An increasing number of NGO's are basing their initiatives and advocacy positions on the principle. Voluntary programs have the potential to reduce waste radically in given processes, especially where near term financial benefits accrue. Waste reduction is likely to be limited to individual processes or programs, not in the economy as a whole.

INSTITUTIONAL

As most organizations involved in voluntary activities are private and unaffiliated with the government, they will not be affected by changes in political party or government structure. To the extent they are embedded in business practice, result in greater efficiency, are accepted by local communities and consumers, voluntary initiatives will not generally be the target of politicians seeking advantage on the basis of policy choices or values of their opponents. Some programs may need incentives or changes in government policy that may require access to the political system. These may be individually contentious, especially if they increase costs or reduce revenues. While individual programs have effective governance structures to enable them to achieve their limited goals, they do not typically encourage innovative new governance. There is no institutional structure at present that could knit all the programs together to achieve short or long term sustainability goals. Voluntary programs range from top-down business or government programs that may seek input from customers or citizens, but are driven by business goals of enhanced efficiency and increased profit or cost reduction and do not necessarily provide for democratic involvement. Locally based programs will promote development of civil security and social integrity, but not sufficient capacity for their adequate defense. Business and government programs will not have much effect on security/integrity because they are narrowly focused. Local programs will tend to cultivate equal opportunities among individuals and nearby communities engaged in similar efforts. Until they achieve significant scale, neither locally based or business/government driven programs will have much positive effect on reducing socioeconomic stratification. Most of these programs will not have substantial effect on overall wellness, except to the extent use of products and services with lower environmental and social impacts become widespread. Most of these programs should be welcomed by most people.

INTEGRAL

Voluntary programs have a reasonably high likelihood of being implemented in the near future because they don't challenge existing political and cultural institutions or require new legislation and substantial government funding. If a strong movement to network locally based programs begins to emerge, a number of political and cultural institutions might see themselves as less relevant and begin to resist. Voluntary programs can be implemented in a variety of cultural, environmental, political, and economic settings, except as noted above. These programs are likely compatible with most short, medium, and long term goals. These programs can be implemented on multiple scales. For example, procurement programs can be coordinated with each other along the supply chain or among different levels of government. Certification and product stewardship programs can be utilized at any scale. Locally implemented programs are inherently place-based approaches and may incorporate local business and government programs that could be linked to larger scale ones. in ways that still reflect the geographic particulars of and local variation in individual economic-human-ecologies. Programs that are product oriented or very broad in their application, like some health initiatives that target a particular disease, may not be very responsive to local conditions. Most of these programs align with a wide range of interests, such as business, environmentalist, community, etc.

POSSIBLE WHOLE SYSTEM SOLUTIONS

In order to address the shortcomings of voluntary programs in achieving world wide sustainability in a reasonable time, say by 2050, one could envision a network of voluntary area-based whole system management units. The boundaries of the units could be set by global and regional agreement among members of civil society, including business and government representatives to assure their real interests are considered. Within each unit, which could encompass one or more ecosystems, volunteer teams representing all sectors would reach agreements to abide by rigorous, life cycle performance standards that minimized or avoided unsustainable effects and produced beneficial outcomes for residents and ecosystems. The standards would need to include the impacts of materials, energy and jobs imported into the area, movement of goods and people, and other transboundary effects. The teams would adopt goals and metrics, monitor agreements and trends. Team representatives could either utilize courts or other tribunals to enforce and/or media to publicize failure to abide by agreements.

Agreements would need to cover all sectors and interests within the area, to reduce the risks of undermining the integrity of the agreed upon goals, institutions and other actions. The political sector would need to agree to change its authorities and practices or redesign them to support the agreements. Well designed collaborative processes to reach agreements and necessary modifications would be essential. Disadvantaged and disproportionately impacted populations would need to be at the table and their capacity to share the same opportunities as all other populations credibly provided for.

Agreements would need to be achieved at both the local (ecosystem, city/village), regional (multi state/province) and global levels, so that issues of concern at all are addressed. If are to be developed, global standards would be agreed upon among business, government, scientific, technological, consumer, resident (indigenous and immigrant) representatives meeting under the aegis of a voluntary standard setting organization like International Standards Organization, much as environmental management, life cycle assessment and other standards are today. Local and regional standards would be established for all matters affecting sustainable outcomes and human flourishing not covered by global ones. An intermediate level (basin, state, national) would be required for some issues of more than local but less than global concern.

Even with agreed upon standards, a voluntary approach would be premised on building changes in consumer/resident/business consciousness through educational, political and organizational efforts, leading to demand for products and services, both from business and government, that would be beneficial to both people and the environment, while avoiding negative externalities. Accountability would be achieved through active monitoring and reporting by interested citizens, organizations, employees etc.

Businesses would need to agree to compete on the basis of providing goods and services based on standards that they had a role in negotiating. The financial community would agree to finance projects, firms and activities that had been vetted to assure harmlessness.

A voluntary system for the necessary whole system transformation to a harmless society implies a major change in the role of government from a top down enforcer of rules of conduct for business and society to a more limited one of assisting local institutions to achieve their goals,

through research, technical assistance, network hosting, setting transboundary standards, investment in transboundary infrastructure, benchmarking and so on. It would need to retain a monopoly on violence and provide both criminal enforcement and civil dispute resolution capacity, although both could be delegated in whole or in part to community institutions, under appropriate safeguards. National security will be a concern for a long time but the defense establishment can use its resources to assist in reduction of energy and other unsustainable resource demand both from itself and by assisting communities.

Some of the obvious difficulties with an all voluntary approach are:

- It requires a shift in the basic business model of most firms and sectors, which will be extremely hard to achieve without new incentives or requirements
- It will be difficult to engage disadvantaged communities without providing resources
- Disproportionate impacts may still occur if standards/goals differ from area to area
- Involvement of all relevant stakeholders is possible but not assured
- Vested interests may be able to water down life cycle clean performance standards at all levels
- There is also a risk of gaming by interested parties in implementing agreements
- No assured financial means of transferring equity from damaging systems to harmless ones
- Risk of dilution of agreements with change in political parties

On the other hand, a voluntary approach might

- Appeal to public fed up with current governance models
- Create new collaborative governance models
- Be flexible with regard to geography and scale

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FINANCE DRIVEN SOLUTIONS

SUMMARY OF GROUP

Finance driven solutions focus on some mix of public and private sector finance mechanisms to drive the desired outcomes and associated projects. Much of the related work relies on the bond market in one form or another and/or various mechanisms typically associated with venture capital projects. These unique aspects help to distinguish the methods contained in the finance group from the other groups described in this section. That said, there is some overlap with other categories, particularly with some of the government expenditure based programs in the investment section. This includes for example, programs such as financial assistance programs for households and firms to help them offset the high costs of switching to more energy efficient and cleaner technologies. Many of these state and local finance programs are funded via mechanisms closely associated with direct expenditures from governments.

Regardless of the mechanisms driving the funding of the programs in the finance group, the finance programs like those in the other categories seek an end that involves improved outcomes whether environmental, economic or social in nature. In some cases the goal of the investment is to create a means by which households and firms can afford to invest in the upfront capital costs associated with energy efficiency and renewable energy. The ultimate end for these projects is typically improving environmental quality and economic efficiency. Still other programs focus on developing or maintaining some stock of natural capital such as a forest, wetland, or other natural resource often associated with providing ecosystem services. Finally some finance driven programs are geared toward providing beneficial outcomes associated with other social wellbeing measures such as reduced recidivism, lower health costs associated with homelessness, etc.

EXISTING SOLUTIONS

As described above there are several existing finance driven solutions that we examined during the creation of this report. These include the many state and local programs aimed at increasing investment in renewable energy and conservation such as rebates, revolving loans, property assessed clean energy (PACE) programs, and HUD powersaver programs to mention a few. These are described in more detail by the Environmental Protection Agency (EPA).¹² All of these solutions blend public and private sectors of the economy in creating a solution.

¹² Environmental Protection Agency, State and Local Climate and Energy Programs, <http://epa.gov/statelocalclimate/state/activities/financing.html>

Whether focusing on the private or public aspects of the economy most of the finance based approaches work (independent of economic growth¹³) to increase economic benefits, reduce externalities, and promote a sustainable stock of natural capital. More detailed descriptions of two innovative finance solutions, Social Impact Bonds (Pay for Success Bonds in the U.S.) and Community Forest Bonds, are provided below.

Social Impact Bonds (U.K.); Pay For Success Bonds (U.S.)

Summary of concept

Social Impact Bonds (Pay for Success in the U.S.)¹⁴ are a mechanism to improve performance of government programs, driven by the idea that public finance can be structured to pay for what works. They replace municipal bonds for social projects based on outcomes such as reduced recidivism (for prison release programs) and outcomes such as reduced street living related risks and costs like emergency room (ER) visits and school dropout costs (for housing programs). The general idea is that the bonds are privately financed then paid back by government agencies with cost savings that accrue as a result of the bond funded project. So, for example, if a program is funded with a bond that reduces recidivism to the point where a prison is shut down, some of the revenue that was saved by shutting down the prison will be used to repay the bond holders. This model, once its effectiveness is proven, can then be scaled up whether it is run by a public agency, private service provider, or charity. A theme surrounding social impact bonds is that the cost of prevention is typically significantly less than the downstream costs associated with fixing the problem after it has occurred.

Goals

The goals of the program are to help make programs more effective and efficient by introducing market incentives to pay for performance based outcomes. The social impact bonds are a win-win for government in the sense that, if a program fails to achieve results, then the bond does not need to be repaid by government revenues. Under the current system if programs fail to achieve results and many do, government still tends to fund the programs and is then hit with additional downstream costs associated with the failure of the program.

Principal Methods

The implementation begins by financial institutions issuing a bond. The bond is purchasable by [any investor] [large institutional investors] [socially responsible investors] [program related foundation investors] [others] One or more government agencies work with the funded program

¹³ Daly, Herman, "From a Failed-Growth Economy to a Steady-State Economy", Solutions, v1, issue 2, pgs.37-43.

¹⁴ Liebman, Jeffrey B., "Social impact bonds, a promising new financing model to accelerate social innovation and improve government performance", Center for American Progress, Feb 9, 2011, http://www.americanprogress.org/issues/2011/02/social_impact_bonds.html

to determine and describe the outcome of interest. The participating government agencies are the ones that are to experience reduced costs associated with successful program performance. Once a performance measure is agreed upon a control group is established. The performance of the program is measured against the performance of the control group. The larger the measured effect the greater the return to the bond investors. Another benefit from this system is that there is an incentive for outcomes associated with government services to be measured more and more accurately.

Advantages and Disadvantages

1. Projects such as those aimed at recidivism are quite flexible temporally and geographically and are feasible in a number of locations (given justice systems and similar programs exist in nearly every society). Projects may not scale up individually but they can be implemented at small scale in many locations where a government program/service already exists providing a large effect.
2. The programs are in general likely to be quite responsive to local interests and do align with multiple large scale interests in the sense that they seek to improve social program performance, increase service levels, and reduce government costs.
3. SIBs tend to be constrained at the moment to investments associated with social service programs.
4. SIB's tend to emphasize social programs that don't necessarily contain a identifiable ecological component. For example it is difficult to say whether social programs are life cycle clean regardless of how they are funded. It might prove difficult to assess ecological impacts directly as most SIB programs emphasize social programs. This is not a negative aspect just a missing one.
5. SIB programs are designed to integrate well into many existing frameworks surrounding social programs. Though integration can be difficult when there are multiple agencies involved, there are likely several programs with outcomes that can be very easily measured. The performance metrics for measuring outcomes are scientifically sound and have been well established by government programs over the years.
6. As a worst case outcome the status quo is simply met which implies negative outcomes are unlikely or are likely to be negligible. Additionally, security factors are low given that even if a program fails it is likely to at least maintain any existing status quo.
7. Stakeholders are not marginalized explicitly and incorporating a collaborative board seems quite feasible.
8. Though not in the environmental sense we associate with other methods discussed in this report, SIBs promote waste reduction and conservation of resources through program efficiency gains.
9. No legal dirty assets retired but SIB's have good incentive mechanisms that work to retire underperforming programs while promoting successful ones; increasing productivity and service levels.
10. As a financing mechanism SIBs should integrate with many existing government programs.
11. The most challenging constraints are associated with choosing and measuring the outcome of interest. Defining metrics for outcomes in some cases appear to be extremely challenging. Especially if there are several outcomes associated with a program. If a

program is only measured in terms of how it reduces recidivism then likely only one agency, e.g. dept. of justice, would need to be involved in the process. If on the other hand recidivism, school retention, and ER visits are measured outcomes of a program then there may be several agencies involved and determining the method of measurement and the control group to serve as the benchmark can become a much more difficult process.

12. One recent critique has been based on the idea that the programs do not have shareholders to answer to which might affect program performance.
13. There has been some concern in terms of rent seeking namely that programs might try to cherry pick clients or cases for their program creating an upward bias on program success so this aspect needs to be given special attention during program design and monitoring.
14. In terms of employment the programs might not create any new net jobs but will provide jobs in sectors where workers are already trained.
15. SIB's could be susceptible to political change in the sense that the programs must be approved by political agencies.
16. In theory one agency director may favor some programs over others so these types of potential biases will need to be considered when creating the board or committee in charge of SIB's.
17. programs that involve multiple outcomes and/or agencies may prove quite challenging to implement.
18. In general the SIB projects at the moment tend to be very small scale projects based on existing social programs. Nothing in the ballpark of the costs associated with retiring a coal fired or nuclear power plant. So it may be difficult to design for trapped equity problems.

Community Forestry Bonds

Summary of concept

Community Forest Bonds allow non-profit conservation organizations access to tax exempt municipal bonds for purchasing forests which are to be managed for long term conservation and sustainable timber management. The Community Forestry Conservation Act (H.R. 1982/S. 1105) facilitates the creation of CF Bonds. Supporters include conservation agencies, financial institutions, and various other organizations.

Goals

The goals of the program are conservation and managing destructive cyclical affects of both unsustainable timber harvesting and land development on rural employment and economies. Well designed programs will promote less volatility in timber producing regions (job markets and local economy), a steady and secure source of wood products to downstream purchasers, and a steady and secure source of ecosystem services which are associated with the forested region.

Principal Methods

Qualifying buyers can use the bonds to finance purchases of land and the sustainable working of forests on the land. The bonds are repaid with revenue streams from sustainable forestry practices and sales of timber.

Advantages and Disadvantages

1. CFBs are constrained regionally to forests and their conservation.
2. Revenue streams are only derived from sustainably harvested timber sales. As market for ecosystem service payments emerge it makes sense to imagine revenue streams to community forest bond holders accruing through payments for carbon sequestration offsets or for the development of community grassland bonds or community wetlands bonds both of which could be funded through revenue streams generated from payments received for ecosystem services.
3. Additional legislation is required. Under the CFC Act State governments need to pass legislation to make CF bonds an option. In fact, community forests themselves need to be protected at local, state, and federal levels with appropriate legislation at each level.
4. In general community forestry bonds and associated programs have incentives that promote sustainable eco-system services, maintain forests, and encourage harvesting close to the maximum sustainable yield level.
5. Monitoring systems similar to those used by the USDA-NRCS for easement monitoring are available to make programs resistant to rent seeking and corruption.¹⁵
6. The programs create forestry related jobs and will create a high degree of human capital development in the area of forestry science and management. Additionally programs promote job security by ensuring long term supplies of forest capital and with sustainably harvested labeling will create products that integrate into existing forestry markets.
7. Though programs do not retire unsustainable physical assets they do retire unsustainable management practices and encourage the development of sustainable management practices.
8. Since forestry bond programs are typically associated with lightly processed, early stage, or raw materials full life cycle assessment is not possible as forestry products once handed off to buyers might take any number of processing paths. That said the programs are well suited to providing life cycle clean raw materials to downstream manufacturers interested in purchasing LCA sound materials.
9. Program effects on forest ecosystems are improved since community forestry bond projects safeguard against overharvest.
10. The programs also serve a conservation purpose in that they preserve lands in their current states, i.e. as forests and ensure a stable capital stock for carbon sequestration, biodiversity, and in some cases riparian shading along waterways.
11. With an effective legal framework in place the forests can maximize resiliency to political change.
12. In general the programs well aligned or at least not at odds with existing political institutions

¹⁵ <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home>

13. Community forests are quite feasible in that they arise from ideas generated in the existing forestry management communities and are based on well established theories such as maximum sustainable yields.
14. The programs are geographically and temporally flexible to the degree that any local authority can establish and preserve the institutions necessary to foster their development over time.

EVALUATION OF FINANCE GROUP

As described above there are several advantages and disadvantages to the Finance based solutions discussed in this section. In some senses they represent suitable solutions relative to the performance criteria established in this paper yet they fall short in others.

ECONOMIC

The Financial programs have several advantages in terms of economic criteria. First, the underlying incentive mechanisms they are based on work to improve existing programs and to promote their scaling up. They can promote sustainable eco-system services flows and a healthy stock of natural capital. Rent seeking concerns have been addressed by giving special attention during program design and monitoring (e.g. Monitoring systems similar to those used by the USDA-NRCS for easement monitoring are available to make programs resistant to rent seeking and corruption¹⁶).

In terms of employment some programs likely won't create any new jobs but will make jobs in the field more productive in terms of the level of service they provide. Forestry related programs can create jobs and create a high degree of human capital development in the area of forestry science and management. Additionally the forestry programs promote job security by ensuring long term supplies of forest capital.

There are no legal but harmful assets retired though the promotion of successful social programs and retirement of underperforming programs serves a similar end. We might also say that programs do retire unsustainable management practices and encourage the development of sustainable ones.

Programs integrate well into existing frameworks in some cases and less so in others. Defining metrics for outcomes appears to be challenging for SIB program integration when there are multiple agencies involved but sustainably harvested labeling creates products that integrate into existing forestry markets like organic foods integrated into existing food markets.

¹⁶ <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/home>

ECOLOGICAL

Since SIB's are relatively new and only one project has been piloted it is difficult to assess ecological impacts. This is complicated too by the fact that SIB's tend to emphasize social programs that don't necessarily contain an identifiable ecological component. For example, without standard metrics for a whole range of activities needed to undertake social programs, from procurement to transportation, it is difficult to say whether social programs are life cycle clean regardless of how they are funded. Since forestry bond programs are typically associated with lightly processed, early stage, or raw materials full life cycle assessment is challenging as forestry products once handed off to buyers might take any number of processing paths. An environmental impact assessment could include a worst case analysis of potential impacts. The programs are well suited to providing life cycle clean raw materials to downstream manufacturers interested in purchasing LCA sound materials. In both cases the performance metrics for measuring outcomes are quite scientifically sound relative to performance measures implemented in environmental settings.

One great benefit of SIB's and their associate projects is that as a worst case outcome the status quo is simply maintained which implies additional negative outcomes are unlikely or are likely to be negligible. Program effects on forest ecosystems are improved since community forestry bond projects safeguard against overharvest. The programs also serve a conservation purpose in that they preserve lands in their current states, i.e. as forests and ensure a stable capital stock for carbon sequestration, biodiversity, and in some cases riparian shading along waterways.

INSTITUTIONAL

SIB's could be susceptible to political change in the sense that the programs must be approved by political agencies. In theory one agency director may favor some programs over others so these types of potential biases will need to be considered when creating the board or committee in charge of SIB's.

Community forests themselves need to be protected at local, state, and federal levels with appropriate legislation at each level. With an effective legal framework in place the forests can maximize resiliency to political change. In general the programs are well aligned or at least not at odds with existing political institutions. Throughout the program design process stakeholders are not marginalized explicitly and incorporating a collaborative board seems quite feasible.

Security factors are low across programs in the sense that given that even if a program fails it is likely to at least maintain any existing status quo. Disequity is not inherent in the programs and the means to develop the programs should be acceptable across a society and political parties.

INTEGRAL

In terms of aspects integral to program success, the projects are not all readily feasible though community forests are quite feasible in that they arise from ideas generated in the existing forestry management communities and are based on well established theories such as maximum sustainable yields. Projects are generally quite flexible temporally and geographically; they are feasible in a number of locations (given justice systems, forests, and related programs exist in nearly every society) to the degree that any local authority can establish and preserve the

institutions necessary to foster their development over time.

In general the projects at the moment tend to be very small scale projects. Nothing in the ballpark of the costs associated with retiring a coal fired or nuclear power plant. So it may be difficult to design for trapped equity problems. The projects also are constrained to existing programs. Though the projects may not scale up they can be implemented in theory at any location where a government program/service or natural capital infrastructure such as a forest already exists. So, as a financing mechanism they should integrate with existing government programs in many different regions. The programs are in general likely to be quite responsive to local interests and do align with multiple interests in the sense that they seek to improve social program performance, increase service levels, and reduce government costs.

HYPOTHETICAL SOLUTIONS

Combining the above mentioned finance solution we might envision a wide reaching series of projects that use market entrepreneurship to improve social and environmental outcomes while reducing costs for governments and improving government service levels.

- Create a master list of measureable outcomes ranging from social to environmental in nature. Examples include recidivism rates, temperature optimization along waterways, health benefits from carbon sequestration, reduced ER visit costs, and all the other benefits that we have seen measured in various projects. This could be a federally approved and monitored list.
- Have the benefits from these outcomes spread across several sectors for example the recidivism rates affect costs for Justice Depts., the water temperature rates affect costs for Depts. of fish and wildlife, carbon sequestration reduces costs for DHS and other health agencies, etc.
- Have every measureable outcome associated with one or more affected government agencies. One source of revenue for projects that improve outcomes will be payment from the federal state and local agencies that benefit from the offsets. This will create an incentive to reduce agency costs across government by allowing entrepreneurs to compete for program designs.
- As discussed previously these outcomes could be bundled and marketed as mutual fund / index funds containing a wide range of social and environmental programs aimed at reducing costs to government.

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MARKETS: BUSINESS LED SOLUTIONS

SUMMARY OF GROUP

Market solutions to the problem of serving the needs of both present and future generations are premised on delivering products and services with expectation of simultaneously making a profit and aligning commerce with the common good. Because markets unconstrained by social considerations are concerned with allocating resources as determined only by their supply and the demand for them, market solutions depend on increasing consumer demand for services that meet current and future needs. The demand for sustainable services is growing rapidly, but

hasn't effected change in economies at the scale and speed needed to serve current and future needs within planetary limits.

Markets have focused on trading in a wide variety of goods and services, including futures in commodities and securitized bundles of financial products. Generally, markets have focused on financial and built capital while undervaluing or ignoring externalities and the need to grow human, social and natural capital.

In recent years, diverse strategies are attempting to mitigate the general inability of monetized economics to value and make markets in long term consequences. "Triple bottom line" balance sheets are increasingly used by social venture and green investors to begin to account for natural and human capital, bringing attention to extensive hidden costs and subsidies as well as large untapped opportunities. Publicly-held companies, where shareholder interest in growth in financial capital drives toward singular focus on short term profit, have more difficulty than private or sole owners in bringing non-monetized values into the analysis of future opportunities. Alternative forms of procurement (certification, buying clubs) and ownership (cooperatives) as well as new partnership structures such as local manufacturing networks, are responding to demand for social and environmental accountability, although representing only a tiny fraction of world annual capital flows.

GOAL

The goal of business led solutions is to use market forces to address social and environmental issues through robust business ethics and increasing consumer awareness and demand.

EXISTING SOLUTIONS

WBCSD Vision 2050 - World Business Council for Sustainable Development
RMI Reinventing Fire - Rocky Mountain Institute
SELCO Solar
Bonneville Environmental Foundation
CERES Investor Coalition - The CERES Principle
BALLE - Business Alliance for a Local Living Economy
Calvert-Henderson Quality of Life Indicators
Markets and Payments for Ecosystem Service - Willamette Ecosystem Marketplace

EVALUATION

Advantages

- Access to investment capital at all scales, large cash-flows, infrastructure, transport, land, assets, marketing horsepower, brand & marketing expertise, analytics, logistics
- Networks/alliances can improve consumer and investor awareness and market behavior, expanding markets and reducing risk for green ventures
- Capital has great political influence, with potential for rapid policy change
- Capital can act to deploy large solutions rapidly when motivated to so

Disadvantages

- Large amounts of capital and labor trapped in established and still profitable products and markets. No system for redeeming the valuable retirement of legal but harmful operating assets and systems
- Markets focus on “growth” in unsustainable material throughput and lack access to means of creating growth in social and human values.
- Public companies are share driven: shareholder focus is on financial returns
- Fragmentation: Markets lack a framework for redevelopment of wholes rather than parts and for creating long-term sustainable benefits
- Propensity for firms to rebrand slightly improved product with greenwash

POSSIBLE SOLUTIONS

IGF™ is a possible market based solution that relies on the innovative capacity and drive for efficiency of firms and entrepreneurs to produce valuable outcomes for humanity, while generating profits for those delivering them.

World Business Council for Sustainable Development Vision 2050 project

Summary of Concept

In the WBCSD’s Vision 2050 project, 29 global companies representing 14 industries tackled the fundamental dilemma confronting the world: the ability of 9 billion humans expected to be living on the planet to attain or maintain the consumptive lifestyle that is commensurate with wealth in today’s affluent markets in a limited world of shrinking resources and potentially changing climates. They developed a vision, based on dialogues in 20 countries with several hundred

companies as well as experts, of a world on-track toward sustainability by 2050. This will be a world in which the global population is not just living on the planet, but living well and within the limits of the planet. By “living well”, they mean a standard of living where people have access to and the ability to afford education, healthcare, mobility, the basics of food, water, energy and shelter and consumer goods. By “living within the limits of the planet”, they mean living in such a way that this standard of living can be sustained with the available natural resources and without further harm to biodiversity, climate and other ecosystems.

Goals

In 2050, around 9 billion people live well, and within the limits of the planet

Methods

Their aim is to help leaders across governments, businesses and civil society avoid repeating mistakes of the past – making decisions in isolation that result in unintended consequences for people, the environment and the planet. They also intend Vision 2050 as a platform for ongoing dialogue. They developed a pathway with nine elements to connect a sustainable future with the present to see what a global attempt at sustainable development – with all the radical policy and lifestyle changes this would entail – would mean for business and markets in general and for the individual participating sectors. The elements demonstrate that behavior change and social innovation are as crucial as better solutions and technological innovation.

The critical pathway includes:

- Addressing the development needs of billions of people, enabling education and economic empowerment, particularly of women, and developing radically more eco-efficient solutions, lifestyles and behavior
- Incorporating the cost of externalities, starting with carbon, ecosystem services and water
- Doubling of agricultural output without increasing the amount of land or water used
- Halting deforestation and increasing yields from planted forests
- Halving carbon emissions worldwide (based on 2005 levels) by 2050, with greenhouse gas emissions peaking around 2020 through a shift to low-carbon energy systems and highly improved demand-side energy efficiency
- Providing universal access to low-carbon mobility
- Delivering a four-to-tenfold improvement in the use of resources and materials.

They recognize that the elements show the interconnectedness of issues such as water, food and energy – relationships that must be considered in an integrated and holistic way, with tradeoffs that must be understood and addressed.

They believe the transformation ahead represents vast opportunities in a broad range of business segments as the global challenges of growth, urbanization, scarcity and environmental change become the key strategic drivers for business in the current decade.

They see opportunities for business ranging from developing and maintaining low- carbon, zero-waste cities and infrastructure to improving and managing biocapacity, ecosystems, lifestyles and livelihoods.

These will also create opportunities for finance, information/communication technology and partnerships. In their view smarter systems, smarter people, smarter designs and smarter businesses will prevail.

A model of growth and progress will be sought that is based on a balanced use of renewable resources and recycling those that are not. This will spur a green race, with countries and business working together as well as competing to get ahead. Business leaders will benefit from this change by thinking about local and global challenges as more than just costs and things to be worried about, and instead using them as an impetus for investments that open up the search for solutions and the realization of opportunities.

The transformation they see will bring huge shifts in regulation, markets, consumer preferences, the pricing of inputs, and the measurement of profit and loss; all of which will impact business. Rather than follow change, business must lead this transformation by doing what business does best: cost-effectively creating solutions that people need and want. The difference is that the new solutions will be based on a global and local market place with “true values and costs”, the “truth” being established by the limits of the planet and what it takes to live well and within them.

Business, consumers and policy-makers will experiment, and, through multi-stakeholder collaboration, systemic thinking and co-innovation, find solutions to make a sustainable world achievable and desirable. Business leaders will need to manage companies through unprecedented transformational change, in parallel with governments getting the right policies and incentives in place.

The participating companies strongly believe that the world already has the knowledge, science, technologies, skills and financial resources needed to achieve the goal of Vision 2050 but the foundations for much of what is required will need to be laid at speed and scale in the current decade. At the same time, the map is far from complete. There are still many significant questions to be answered about governance, global frameworks for commerce, roles and responsibilities, and risks. Nevertheless, they optimistically assert that these can be answered in time for progress to be made.

Summary of Concept

Lovins offers market based solutions for four energy-intensive sectors of the economy: transportation, buildings, industry, and electricity. He argues that business can become more competitive, profitable, and resilient by leading the transformation from fossil fuels to efficiency and renewables over the next 40 years. This transition, he says, will build a stronger economy, a more secure nation, and a healthier environment. *Reinventing Fire* maps pathways for running a 158%-bigger U.S. economy in 2050 but needing no oil, no coal, and no nuclear energy. Lovins draws from massive data to show that the problems of fossil fuels are not necessary, either technologically or economically and can be avoided in ways that reduce energy costs, because technological progress has quietly been making fossil fuels obsolete. RF, preface, p. xii.

Goal

Run the US economy to produce the same 2050 economy as is currently projected but with half the delivered energy, replacement of all coal and oil and much natural gas /and for \$5 trillion less (in 2010 net present value)

Methods

The transition envisioned by Lovins will depend in part on new technology and smarter public policy, but even more on integrative design that combines technologies in new, often unexpected ways and novel business models and competitive strategies. p. xiii. These four tools together can create the “greatest business opportunity... of all time”. Lovins makes the business case for the transition without relying on the huge values created by reducing and then eliminating the hidden environmental and social costs of burning fossil fuel. p.3. This is because practically all energy efficiency initiatives and many renewables are already cost competitive without counting these hidden costs. RF’s market approach relies on businesses seeking huge opportunities for profit by combining technologies to wring more work from the same amount of energy and deploying renewable energy because of the efficiency gained. “The transition will create new industries with vast potential for jobs, profits and better, cheaper, more robust services.’ p.9

The three principles for achieving this transition are reducing use, modulating demand and optimizing supply. RF applies these principles in each of the four sectors but takes advantage of integration of outcomes among the sectors. For example, switching to electric cars to eliminate oil use would make the electric grid more efficient and resilient, speeding the electricity sector’s increased use of renewables.

Summary of Concept

SELCO Solar Pvt. Ltd, a social enterprise established in 1995, provides sustainable energy solutions and services to under-served households and businesses. It was conceived in an effort to dispel three myths associated with sustainable technology and the rural sector as a target customer base:

- 1) Poor people cannot afford sustainable technologies;
- 2) Poor people cannot maintain sustainable technologies;
- 3) Social ventures cannot be run as commercial entities.

Goals

SELCO aims to empower its customer by providing a complete package of product, service and consumer financing through grameena banks, cooperative societies, commercial banks and micro-finance institutions.

Methods

Technology: SELCO's products include solar lighting, thermal water heaters and inverter systems as well as efficient biomass and charcoal cookstoves. They are designed with end user's needs in mind.

Finance: SELCO partners with regional rural banks (grameen banks), commercial banks, NGOs and rural farmer cooperatives to help its customers obtain the credit to purchase solar lighting and thermal systems. Interest rates are based on the credit source and range from 5% to 14%. Customers typically put between 10-25% down, paying the balance over three to five years. SELCO and its partners have used a variety of strategies to finance upfront costs, including these high loan margin requirements, that have been a barrier to utilization of solar and other efficient systems. The borrower pays back those costs over a period that is long enough for them to afford them, often paying less than they had been for lighting and other services.

Green Tags (Renewable Energy Certificates) Bonneville Environmental Foundation

Summary of Concept

Bonneville Environmental Foundation pioneered the creation of Green Tags that separate environmental benefits, such as reductions in CO₂ and other pollutants, from the basic electricity production from renewable energy facilities, allowing the benefits to be sold separately to customers needing or wanting to purchase renewable energy to meet renewable portfolio standards, customer demands or other policies or requirements. In wide use today by utilities, government agencies and many businesses interested in reducing their environmental footprint, renewable energy certificates are an innovative way to meet requirements or demands for renewable energy without having to build facilities or contract for the delivery of electrons from producers within the same service territory. They thus help the creation of new renewable energy facilities in the most efficient locations and scales.

Goals

Under BEF's program, the goal is to support the generation of the maximum number of new renewable kWhs for the lowest cost by assuring that the premium paid by a customer for a green tag goes to the creation of renewable facilities, thus achieving new environmental benefits.

Methods

Renewable energy certificates represent the environmental attributes of the power produced from renewable energy projects and are sold separately from the electricity itself. They can be sold, traded or bartered. They are often used to demonstrate compliance with in the 30 or so states with renewable energy portfolio standards, where electric utilities are required to supply a certain percent of their electricity from renewables by a specified year. They can demonstrate compliance with requirements by purchasing RECs. A green energy producer is credited with RECs for the electricity it produces. Each REC is certified to make sure it doesn't get double-counted. The REC can then be sold on the open market and the energy is fed into the grid without any green attributes.

Green Reporting and Indicator Programs

Summary of Concept

A number of programs and initiatives have emerged in the decades since Earth Day to encourage greener business practices by businesses and investors. Some of these are detailed in the Voluntary Solutions section, especially the Corporate Social Responsibility and Socially

Responsible Investing initiatives, but they are just as easily characterized as market solutions, because their intent is to help create or to respond to demand for greener outcomes by consumers and the businesses that want to market to them. In addition to those listed in that section, there are several more that are worth mentioning.

BALLE (Business Alliance for Local Living Economies)

BALLE is a networking organization for businesses that prioritize social responsibility. It encompasses many regional networks in the US and Canada. It is motivated by the idea that economies characterized by local supply chains and small to medium sized independent businesses can not only have substantially less environmental impact and build community identity, but also be profitable. BALLE utilizes public awareness campaigns, such as the “Think Local First” campaign to educate consumers about the benefits of supporting independent merchants. They also conduct research and hold conferences.

Ceres Principles

The Ceres Principles is a set of sustainable business practices that are used to advance corporate responsibility and change market practices to build a healthier global economy. They were created as a way for corporations to reduce environmental and social-related risks in their management plans and to measure economic health in ways that are more meaningful than short-term profit. Corporations that publicly adopt and adhere to these principles are required to submit periodic reports that show continual performance improvement. The ten principles include:

- Protection of the biosphere
- Sustainable use of natural resources
- Reduction and disposal of wastes
- Energy conservation
- Risk reduction
- Safe products and services
- Environmental restoration
- Informing the public
- Management commitment
- Audits and reports

The non-profit Ceres, which was founded in 1989 after the Exxon Valdez oil spill in Alaska, collaborates with a network of investors, companies and public interest groups to identify the risks and opportunities that exist for corporations to shift to more sustainable practices. Their goal is to help build a global economy that is based on environmental stewardship and one that produces beneficial social outcomes.

Calvert-Henderson Quality of Life Indicators and others

The Calvert -Henderson Quality of Life Indicators were developed by an international futurist, Hazel Henderson and an asset management firm, Calvert, with a multi-disciplinary group of practitioners and scholars from government agencies, for-profit firms, and nonprofit organizations to develop more practical and sophisticated metrics of societal conditions. It was the first national, comprehensive effort to redefine overall quality of life using a systems approach.

The indicators cover 12 different domains: Education, Employment, Energy, Environment, Health, Human Rights, Income, Infrastructure, National Security, Public Safety, Re-creation and Shelter. Each indicator is related to the others but is displayed separately to show the wealth of detail. They are designed to be an alternate to the macro-economic indicators and limited accounting systems that dominate policy and economic decision-making and allow truer assessment of human well-being.

Other significant quality of life indicator programs include Bhutan's Gross National Happiness index, The Genuine Progress Indicator (See e.g. the GPI adopted by Maryland in 2010) and Sightline Institute's Cascadia Scorecard for the US Northwest and British Columbia.

Payment for Ecosystem Services

Summary of Concept

Payments for ecosystem services are payments a government, a non-profit organization or a business makes directly to providers of ecosystem services. Government payments for ecosystem services are the most common, usually to rural landowners to steward their land in ways that will generate ecosystem services. The Conservation Reserve Program in the United States, for instance, pays out over US\$1.5 billion to farmers each year in exchange for their protection of endangered wildlife habitat, open space, and/or wetlands. China has a similar program for erosion control. Mexico and South Africa focus on watershed services. PES may also take the form of tax incentives to landowners to steward ecosystem services on their land, either by protecting or enhancing them.

Ecosystem services markets allow buyers and sellers of services to engage in transactions, either on a voluntary basis or as part of a cap-and-trade program. In the latter, a regulatory body first sets a limit or "cap" on the amount of environmental degradation or pollution permitted in a given area and then allows firms or individuals to enter into transactions in order to meet the cap. Examples are the US acid rain program and the carbon markets emerging in Europe and California. Businesses or individual engage in voluntary markets for reasons of philanthropy, risk management, and/or in preparation for participation in a regulatory market.

Certification or green labeling programs also may have the indirect effect of consumers paying

for protecting ecosystem services. “When consumers buy certified products, they are paying not just for the product itself, but also for the manner in which it was produced and brought to market. Since such production and transport are often expensive means of production and transport, price premiums associated with certified products can be considerable. When consumers choose to pay the price premiums associated with products that have been labeled as ecologically friendly, they are choosing, in a sense, to pay for the protection of ecosystem services. Certification programs designed to reward producers who protect ecosystem services have been developed for a variety of products, including wood, paper, coffee and food, among others (“Ecosystem Marketplace”)

Payments for ecosystem services may sometimes take a hybrid approach, blending government funds other sources such as businesses, foundations or individuals. These may be from urban sources needing ecosystem services that are provided by rural communities. The model allows for collaborative arrangements between groups willing and able to pay for stewardship services. Difficulty for more market based payments stem from a difficulty in generating demand for the act of stewardship and ecosystem services that are generated via sound stewardship. One method for generating demand is by establishing a green labeling component to help generate demand for ecosystem services from business. One way to value ecosystem services is through surveys such as EWEB's survey of Eugene and Springfield consumers and how they value the McKenzie basin and the water it provides. One organization funding PES pilot projects is the Bullitt Foundation which, among other things, seeks to fund innovative programs that identify and leverage the complex relationships between upstream ecosystem services and the downstream communities engaged in market activities which rely on ecosystem services though most are external to the downstream market transactions.

Goals

The primary goal is conservation and sustainable provision of ecosystem services. The underlying goals of the program are to appropriately value ecosystem services and to establish appropriate demand for the ecosystem service toward the end of fair pricing. The PES programs also provide a method by which wealth can be transferred from urban to rural economies to help promote stable economies and sustainable management of natural capital.

Methods

For public valuation, a resource (natural capital) is identified and a survey is conducted to measure the value of the resource to a downstream consumer of the benefits generated by the ecosystem service. This then is used to establish a fair price to consumers for conservation efforts associated with the resource. Branding or labeling based on the resource is also a key aspect important for establishing and sustaining corporate demand for the ecosystem service.

Evaluation

Constraints. One primary constraint is associated with connecting those who have demand for an ecosystem service with the market benefits that accrue from the ecosystem services. Surveys are one mechanism by which the ecosystem service can be valued though this method is often

associated with a public utility. A utility such as EWEB has to act as an intermediary between consumers of the ecosystem service (water quality) and those supplying conservation services for the ecosystem. For corporate consumers of ecosystem services labeling to create a distinct market product based on the ecosystem service is an important standard that needs to be established.

Criteria PES programs promote conservation and healthy eco-systems. The approach provides mechanisms by which consumers of ecosystem services can interact in a market with suppliers of ecosystem services. PES programs can be implemented in a wide range of settings where public utilities exist and can serve as a market intermediary and where ecosystem based resources can be appropriately outlined for labeling purposes. LCA standards apply, for example, in the sense that water consumed as a downstream product takes into consideration full costs of maintaining the watershed associated with producing the water.

Ecosystem Services Markets: The Willamette Partnership

Distinct from payments for ecosystem services, ecosystem services markets are designed to bring purchasers and providers of ecosystem services together. Government agencies may participate as either one. One example of a blended market is the Willamette Ecosystem Marketplace.

The Willamette Partnership is a diverse coalition of conservation, city, business, agricultural, and science leaders in the Willamette River basin who are working to shift the way people think about, value, manage, and regulate the environment.

The Partnership includes people from Clean Water Services (the wastewater management service for the Tualatin River Basin), the Oregon Business Council, Wildwood, Inc. (an urban design and development firm), Defenders of Wildlife, Willamette Riverkeeper, The Conifer Group (a multifaceted real estate development company), the Oregon Association of Nurseries, Weyerhaeuser, the Oregon Association of Conservation Districts, SOLV (an organization that builds community through volunteer action), the Network of Oregon Watershed Councils, Portland's Bureau of Environmental Services, local law firms, and the state's universities.

The Ecosystem Credit Accounting System is a package of protocols, tools, and resources that allow buyers and sellers to trade in multiple types of ecosystem credits. The Willamette Partnership's Counting on the Environment project is piloting this system from September 2009 through September 2011.

The Ecosystem Credit Accounting System was built to provide the following:

- A more efficient and effective use of planned, compliance-driven expenses
- Opportunities to accommodate growth without environmental degradation
- Increased coordination among various conservation and restoration efforts
- Rewards for voluntary actions on private lands
- Healthier ecosystems

The first credits to be trading include wetlands, salmon habitat, upland prairie habitat, and the water temperature benefits created from riparian restoration.

The Partnership Board embraced a three-year strategic plan that calls for:

- I. Generating conservation success stories via markets and other incentives
- II. Transferring Counting on the Environment to new places and issues
- III. Building the Partnership's long-term capacity to succeed
- IV. Watching for other opportunities
- V. Supporting a healthier Willamette Valley

Summer 2011 also marked the two-year point since the Counting on the Environment standards were adopted for pilot use in the Willamette. Beyond the work to extend water quality trading into Washington and Idaho, we are also working on other issue areas. With Defenders of Wildlife and others, the Partnership helped build new metrics for oak, sagebrush, and floodplain habitat. The Partnership will be building a statewide framework for stream mitigation in Oregon. That work is funded by US EPA, the Meyer Memorial Trust, the City of Portland, and significant in-kind support from the Dept. of State Lands. We are also trying to connect Counting on the Environment to help leverage other incentive programs. Through a grant from NRCS, the Partnership and Salmon Safe will be linking their standards together, so farmers can access consumer markets with sustainable certification and ecosystem markets via salable credits. Similar work is happening with Washington-based Northwest Natural Resources Group and their Forest Stewardship Council monitoring program. The Bullitt Foundation is also supporting the work to extend the Counting on the Environment standards to other parts of the Northwest.

EVALUATION OF MARKETS GROUP

ECONOMIC

As currently constituted and regulated most markets incorporate a number of perverse incentives that favor short term gain over long term value and have weak means for correcting them or incentivizing desirable outcomes. But ecosystem services markets show the potential for valuing and measuring things of long term value. Markets generally are not resistant to rent-seeking behavior. Private interests have become increasingly adept at using money or power to influence public decisions. Markets have been historically and remain today the principal means of creating jobs of all kinds. It is inherently difficult for owners of assets in current market economies to retire unsustainable assets and systems. Finally, market solutions are inherently able to integrate into existing markets, taking advantage of the assets, other resources and skills of current market participants.

ECOLOGICAL

Markets have been the largest creators of environmental impacts, in part because they have not included in prices the cost of externalities like pollution. These costs have been largely socialized. Life cycle assessment is being increasingly used by large corporations to identify impacts which may be lessened or avoided, often discovering cost savings by using alternate materials or processes and by avoiding or recycling waste streams. Modern markets have become increasingly reliant on sound science, but have used it mainly to develop new products or services, not to diminish or eliminate externalities. Incentives or markets in benign outcomes or avoided externalities could provide valuable opportunities to bring market economies to a more sustainable, socially positive state. Markets historically have adversely affected ecosystems and their services, leading to significant decline in both. Awareness of the link between healthy ecosystems and robust economies has been growing, but is not pervasive. The precautionary principle is not in wide use. Market economies have been characterized by massive waste and inefficiency in the use of energy and materials. This has been changing as firms discover the favorable effects of greater efficiency and waste reduction on their bottom lines.

INSTITUTIONAL

Markets are highly susceptible to changes in politics, either by increased or decreased intervention or regulation. Firms in private market economies have developed more resilient governance structures to be able to deal with political changes or to initiate them. They also rely on government to provide substantial infrastructure and security. These structures are also usually highly flexible in order to respond to changes in demand, supply and risk

Markets do not depend on democratic principles for decision making but are highly responsive to changes in public preferences. They depend on a high degree of civil security and operate best where there strong social integrity, but they do not explicitly create either, except through taxes and voluntary activities. Markets have greatly advanced opportunities for individuals and communities but have also tended to create socioeconomic stratification. They have developed products and services that have had very positive effects on mental and physical health, but also have contributed to declines in health through harsh or challenging working conditions and disproportionate impacts on communities. In most countries, markets are seen as socially acceptable means for providing important benefits for people.

INTEGRAL

Markets have demonstrated feasibility under a variety of political and cultural institutions, so implementing changes in markets to produce better outcomes would also be likely feasible without destruction of those institutions. They also exist in every variety of cultural, environmental, political, and economic settings. They can incorporate goals in the short, medium, and long term, even though fundamentally focused to date on short term gains. They can be implemented on multiple scales, easily nested within and between one another. The world markets are increasingly connected to local ones. Markets on the other hand have not usually been sensitive to variations in local social and ecological needs that may vary from place to

place, yet have demonstrated the capacity to tailor product and service applications to individual customers. Markets, if they serve social and environmental needs, can be seen as a positive development from the perspective of a wide range of interests, such as business, environmental, community, etc

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CROSS-CUTTING SOLUTIONS

SUMMARY OF GROUP

We have reviewed a number of works that didn't fit within in any single group but took a more global, comprehensive approach to solving the impending problems of global ecological limits and widespread social dysfunction. Some of these included both very broad policy prescriptions as well as some of the more specific solutions addressed in the groups above. These works are briefly described below.

EXISTING SOLUTIONS

Although there is considerable overlap among them, we have summarized these cross cutting solutions under three headings:

- Transformation of Consciousness and Politics
- Steady State Economics
- Ownership of Commons -- Sky Trust
- Greening the Economy

EVALUATION

Advantages

- Whole system approach
- Focuses on purpose of economy: enabling people to thrive
- Growth in non-material values such as life satisfaction and human welfare vs. exponential growth in material things
- Recognizes context of reform is exceeding ecological limits and risking widespread social unrest
- Integrates political, economic and cultural change
- Recognizes a mix of strategies will be necessary

Disadvantages

- Reliance on strong government role in traditional areas like taxation, investment and regulation makes solutions depend on fundamental political change
- Emphasize use of metrics to guide policy rather than embed in market transactions
- Politically unlikely in near term; appear to wait for future generations to adopt change

***Transformation of Consciousness and Politics,
The Bridge at the End of the World - Speth, James Gustave***

Summary of Concept

Speth begins by making a compelling and well documented case for the impracticality and danger of continuing on the course of compounding material growth without regard to ecological limits and the risks of social disruption. He argues that material consumption, according to many studies in numerous cultures, does not, after a certain level of basic needs is met, add significantly to personal satisfaction, and that consumption in excess of basic needs is driven by factors such as desire to impress peers and potential partners and the opportunism of the market to cater to those desires. He argues that real growth is not in increasing consumption of material things but in human welfare and life satisfaction, including strengthened families and communities, secure incomes, wellness, more time for leisure, education and culture.

Real growth are increases in these and similar non-material things rather than destructive, exponential growth in material throughput. Since corporations are the main engines of material growth, Speth calls for their transformation through voluntary initiatives, regulation to eliminate externalities that harm people and ecosystems and reform of the very nature of corporations away from the sole focus being on increasing shareholder value to the idea that the wealth created by the corporation be the joint product of all resource providers--shareholders, employees, unions, future generations. government, customers, communities and suppliers. 181. Since a change of that magnitude is beyond the reach of today's politics, Speth sees three fundamental changes that will make it possible. The first is the coming ecological and social crises that will lead citizens, currently unaware of their extent, timing and inevitability, to demand fundamental change. The second is a transformation to a new consciousness change from consumerism and domination of nature to quality of life, connectedness with other humans and ecological sensibility. The change, as he sees it, is fundamentally intergenerational. The third is a new politics that will lead to far reaching government action to get the market to work for the environment instead of against it. Action is needed at local, regional, national and global levels. Starting at the local and bioregional level, he advocates for deliberative democracy, eventually at the global level, but with most decisions being made at the most local feasible level. His prescription for environmental politics is to broaden it to include social goals and political reform, as well as traditional ecological concerns, to build a powerful coalition for change through election of new leaders.

***Steady State Economics,
Prosperity without Growth - Jackson, Tim,
From a Failed-Growth Economy to a Steady-State Economy - Daly, Herman***

Summary of Concept

Daly, Jackson and others argue for the creation of a steady state economy which does not rely on growth in material throughput in order for humans to thrive in harmony with natural resources

and the ecosystem services they provide. Jackson points out that, with 9 billion people by 2050, carbon intensity per \$ of output needs to be 130 x lower than it is today. Costanza and colleagues make the case that some of these limits have already been exceeded on a global level (carbon, biodiversity and nitrification) and other significant ones are getting close to probable limits. Jackson argues that growth driven technology and efficiency cannot avoid exceeding those and other planetary and bioregional limits. A new set of goals for economics is needed. While prosperity has material dimensions--food, water, shelter, clothing--Jackson believes that it is “clear that something more than material security is needed for human beings to flourish. Prosperity has vital social and psychological dimensions. To do well is in part about the ability to give and receive love, to enjoy the respect of your peers, to contribute useful work and to have a sense of belonging and trust in your community. In short, an important component of prosperity is the ability to participate in the life of society.” Accordingly he calls for a new ecological macroeconomics and change in the culture of creative destruction and novelty to one of community and personal prosperity.

Jackson makes three basic recommendations for policy changes needed to transition to a sustainable economy.

1. Establish clear resource and environmental limits and integrating these limits into both economic functioning and social functioning. Means include resource and emission caps - and reduction targets. He and Daly both propose equal per capita allowances under an ecological cap, applied to carbon, non-renewables and emissions and taxing pollution rather than income/labor
2. Develop a new macroeconomics that does not rely on relentless consumption growth and expanding material throughput. Included would be a structural transition toward low carbon, labor intensive activities and sectors, accounting for value of natural capital and ecosystem services and integrating them into capital stock accounts, production functions and consumption flows. Investing in jobs, assets and infrastructures, when protecting or improving public assets would be prioritized. Like Daly, Henderson and others, he promotes a “Tobin tax” on international currency transfers as a way to reduce excessive mobility of capital and funding development. Also suggests increased public control over money supply by raising bank reserves to stabilize financial markets. 178-9.
3. Changing the social logic. To free people from over dependence on material consumerism in favor of other ways of thriving, he suggests a working time policy and shared work where output is reduced to meet ecological limits and to improve work life balance. To reduce health and social effects of systemic income inequalities through revised income tax, min and max income levels, access to education, anti-discrimination and anti crime measures and improving local environment. 181 To Measure capabilities and flourishing., there is a need to define an appropriate measurement framework for a lasting prosperity, including life expectancy, educ. participation, trust, community resilience and participation in life. E.g., Dutch capabilities index.181-2. Strengthening social capita is needed in many areas, including public spaces, community based sustainability initiatives, reducing geographical labor mobility, training for green jobs, access to lifelong learning and skills, more planning responsibility for locals, public service

broadcasting, etc. 182 To dismantle the culture of consumerism, he suggests stronger regulation of commercial media, esp. for children, more state support for public media, stronger trading standards like Fair Trade Initiative and product durability standards. He advocates using incentives where possible. 183-4

He lays responsibility for making progress “unequivocally with government,” 159 through indicators, policies, planning guidelines, wage policy, procurement, product standards, etc. “Freeing the macro-economy from the structural requirement for consumption growth will simultaneously free government to play its proper role in delivering social and environmental goods and protecting long-term interests. The same goal that’s vital for a sustainable economy is essential to governance for prosperity.” 169

Ownership of Commons -- Sky Trust

Summary of concept

In *Who Owns the Sky* (2001), Peter Barnes enumerates a multifaceted plan to integrate commons commodification into the free market. This plan he says, will not only be compatible with current market structuring, but it will actually have the potential to bolster national economic conditions. At the same time, this “Sky Trust” as he puts it, will create market incentives to preserve and efficiently manage carbon emissions by rewarding those who use carbon dioxide (CO₂) emitting technology. The economic incentives would be further advanced by inducing a psychological shift in how property rights are viewed in relationship to the ecological services that the planet as a whole provides. While the Sky Trust would in itself internalize the externality of the sky related issues, it could then also be used as an example for other commons related problems.

Goals

Barnes asserts that part of the problem with the management of the commons is that no one specifically is entitled to use them. While everyone has access to the air, no one feels as if it is their property, and therefore no one has a direct pecuniary interest in the sky’s well being. To solve this, the Sky Trust would distribute one share of sky ownership to each citizen. By giving citizens responsibility and benefits of the regulation atmosphere, the goal is to simultaneously curtail air pollutants (especially greenhouse gases) and promote citizen awareness of common pool resource issues.

Methods

Monetizing the sky would be accomplished through a standardized means of evaluation. This valuation process would blend the market forces’ with strict government regulation of the amount of CO₂ allowed into the atmosphere. To do this Barnes proposes that like current cap and trade systems, we allow the free trade of carbon licenses. However the carbon license itself only allows for a specified amount of carbon to be released and is therefore not a free pass to pollute.

Further, these licenses would be issued in limited supply annually after a comprehensive evaluation of global CO2 levels. This system would then allow for a profitable market to emerge in open trade of carbon licenses, a profit that could be put to good use as in investment in clean infrastructure and systems.

The Sky Trust would necessitate federal intervention and regulation. To that end, the Sky Trust would include the initiation of federal legislation that is similar to other current cap and trade programs. By limiting the service that our natural resources provide, Barnes says, we will be able to effectually regulate the users and polluters of the air. Much as the current cap and trade system, the sky trust would place a limit on commons use and at the same time form a new commodity for trade on the open market. While there has been some successful cases of cap and trade, Barnes proposes that that the sky trust should go one step further. He proposes that while downstream users should be regulated, the regulation of upstream users will be far superior.

To regulate upstream users, Barnes proposes the creation of a carbon licensing program that quantifies the remaining safely usable carbon storage in the atmosphere. A carbon license would be valued and sold on the basis of a comprehensive analysis and a hypothetical model of the monetary service that the atmosphere provides by sequestering CO2 emissions. The idea is that by placing value on something that we take for granted, the market will be forced to re assess its strategies and priorities. The re-assessment will then create market driven incentives for limiting the amount of carbon emissions. As carbon sequestering potential is diminishing or may have already been exceeded, the market's efficient use of such a resource becomes qualitative as well as quantitative.

United Nations Environment Programme (2011), Towards a Green Economy

The report makes an economic and social case for investing two per cent of global GDP in greening ten central sectors of the economy in order to shift development and unleash public and private capital flows onto a low-carbon, resource-efficient path. It claims that the transition can catalyze economic activity of at least a comparable size to business as usual, but with a reduced risk of the crises and shocks increasingly inherent in the existing model.

It lists a similar litany of the crises facing humans and the planet and states:

“Although the causes of these crises vary, at a fundamental level they all share a common feature: the gross misallocation of capital. During the last two decades, much capital was poured into property, fossil fuels and structured financial assets with embedded derivatives, but relatively little in comparison was invested in renewable energy, energy efficiency, public transportation, sustainable agriculture, ecosystem and biodiversity protection, and land and water conservation. Indeed, most economic development and growth strategies encouraged rapid accumulation of physical, financial and human capital, but at the expense of excessive depletion and degradation of natural capital, which includes our endowment of natural resources and ecosystems. By depleting the

world's stock of natural wealth – often irreversibly – this pattern of development and growth has had detrimental impacts on the well-being of current generations and presents tremendous risks and challenges for future generations. The recent multiple crises are symptomatic of this pattern.”

The report defines a green economy as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.”

It lists enabling conditions for a green economy that “can pave the way for the success of public and private investment in greening the world’s economies. At a national level, examples of such enabling conditions are: changes to fiscal policy, reform and reduction of environmentally harmful subsidies; employing new market-based instruments; targeting public investments to “green” key sectors; greening public procurement; and improving environmental rules and regulations as well as their enforcement. At an international level, there are also opportunities to add to market infrastructure, improve trade and aid flows, and foster greater international cooperation.

The report, its authors believe, “demonstrates that the greening of economies is not generally a drag on growth but rather a new engine of growth; that it is a net generator of decent jobs, and that it is also a vital strategy for the elimination of persistent poverty.

The report seeks to motivate policy makers to create the enabling conditions for increased investments in a transition to a green economy in three ways:

“Firstly, it makes an economic case for shifting investment, both public and private, to transform key sectors that are critical to green the global economy. It illustrates through examples how added employment through green jobs offsets job losses in the process of transitioning to a green economy.

Secondly, it shows how a green economy can reduce persistent poverty across a range of important sectors – agriculture, forestry, freshwater, fisheries and energy. Sustainable forestry and ecologically friendly farming methods help conserve soil fertility and water resources in general, and especially for subsistence farming, upon which depend the livelihoods of almost 1.3 billion people.

Lastly, it provides guidance on policies to achieve this shift: by reducing or eliminating environmentally harmful or perverse subsidies, by addressing market failures created by externalities or imperfect information, through market-based incentives, through appropriate regulatory framework and green public procurement, and through stimulating investment.”

One interesting finding is that the financial services and investment sectors control trillions of dollars and are positioned to provide the bulk of financing for a green economy transition. It notes that long-term institutional investors such as pension funds and insurance companies are increasingly seeing the potential for minimizing environmental, social and governance (ESG) risks by building up “green” portfolios. It calls for a regulatory framework that encourages long term investment as well as integrated and sustainability reporting on progress. 42 It also calls for

massive public financing from taxes and reductions in perverse subsidies for fossil fuel and other sectors.

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CHAPTER 4 : CRITICAL ANALYSIS

This chapter will address:

1. How the various solutions analyzed in the last chapter align with the core attributes needed for any practical solution to achieve a prosperous society where humans thrive within nature's limits.
2. Whether there is a possible comprehensive set of solutions or hybrid solution that takes the best from all of them.
3. How these solutions compare or are compatible with IGF™ or can enhance or be integrated into IGF™.
4. What major challenges do IGF™ and other solutions face in being implemented?
5. What steps might be taken to address these challenges?

In the previous chapter, we applied a set of criteria to identify the strengths and shortcomings of the nine groups of solutions we examined. We looked at how well they might meet those criteria in achieving goals related to some or all of the global and regional challenges our current economies face. We summarized the advantages and disadvantages of each of the groups. In this chapter, we look at the nine groups through a different lens, comparing them with certain core attributes to see which solutions might, with modifications or integration with other solutions, form the basis for resolving the present world social and environmental crises. Through this analysis we hope to identify solutions that are likely to have greater potential than others; recognizing that none of them are likely to succeed by themselves.

Core Attributes of Sustainable Solutions

In Chapter 1 we outlined the challenge in this century and beyond is how to provide for humans to thrive while living within nature's limits. In Chapter 2 we described Intergenerational Finance™, a novel proposal to meet the challenge. Its advocates claim that it will be able to do this because it is a whole system, integrated approach that enables regional economies to produce measured long term beneficial outcomes for people and nature that contribute to global outcomes as well. We have tried to identify the key elements or Core Attributes that support the claim that this system can achieve the needed transformation in a timely way. Proponents argue that IGF™ :

- a) focuses on achieving outcomes that are essential to attaining and maintaining the critical balance that allows humans to thrive within planetary limits
- b) addresses global and local economies together as a whole system to find appropriate solutions at both levels
- c) is intergenerational in scope and intent

- d) integrates all aspects of the economy that affect social and environmental outcomes
- e) does not rely primarily on government/publicly financed solutions
- f) engages and rewards business entrepreneurship and innovation in producing beneficial outcomes, in partnership with government and the civil sector
- g) relies on scientifically measured standards for outcomes based on full life cycle analysis
- h) achieves ecological and social integrity in time, i.e., before ecological limits are exceeded permanently or result in irreversible, catastrophic impacts and before social disruptions, like widespread disease and/or famine, resource wars, extreme physical security measures and curtailment of civil liberties
- i) has means of phasing out unsustainable systems
- j) has clearly identified governance and institutional methods to establish necessary outcomes and metrics and to manage implementation
- k) utilizes long term financing and primary and secondary markets to pay for outcomes
- l) is politically achievable under existing political systems

Some of these elements are tools or mechanisms that are aimed at goals that arguably could be attained in other ways using other solutions, such as those we have examined in Chapter 3. Winnowing out references to unique IGF™ elements, the Core Attributes that allow comparison between IGF™ and the other solutions appear to be:

- a. Outcome focus
- b. Global and local scope for outcomes
- c. Intergenerational effect by design
- d. Integration of outcomes among sectors
- e. Scientifically sound to assure long term beneficial outcomes
- f. Timeliness to avoid irreversible effects
- g. Clearly identified governance and institutional pathways to assure integrity and effectiveness
- h. Sufficient financial capacity to effect needed changes
- i. Political viability in near term

We will use these attributes to compare the various solutions we have looked at, including IGF™, to see which ones, alone or in combination, might be likely to achieve the needed economic transformation.

Most solutions we looked at do not purport to address whole system change, either geographically or substantively, but some may be complementary to such change. They may

share one or more goals or tools with IGF™ and other whole system change solutions. Or success in achieving their goals will allow progress toward attainment of the larger goal or will achieve a larger goal in a different way.

Comparison of Solutions with Core Attributes

Here is how we evaluated each of the eight solutions groups testing them with the Core Attributes:

Regulatory

- Outcome based. Not usually outcome focused but on guiding behavior to be more equitable, safe or environmentally sound. Many outcomes, like better health from safer food, or more financial security from sounder practices, are intended and sometimes achieved, but are not frequently measured.
- Global/local. Unusual to have universal regulation of global issues. Treaty on ozone depleting chemicals a notable example of an effective one. Some migratory bird treaties also have limited effect. International bans on trafficking in humans and on plastics and chemical disposal at sea only a partial successes. National or local regulation can have intended or real effect on global commons. Limits on sulfur and particulates have transboundary benefits, e.g., acid rain emission limits in US and Canada improved water quality in both countries. Regulations on products and substances are regularly benchmarked to best practices in regulations in other countries.
- Intergenerational. Regulations not typically intergenerational in intent, but may be in their effect. Some have been explicitly intergenerational, especially in natural resource sector. Wilderness, endangered species, water resource conservation and water quality regulations have embraced intergenerational values. Other regulations, like the limits on research on smallpox and other viruses are intended to protect present day people but are intergenerational in effect. Most regulations are designed and intended to deal with externalities, unintended consequences, harmful behavior and other ills with impacts on the present generation, although future generations may want to continue them.
- Integration of outcomes. Regulations do not typically integrate outcomes across sectors. They usually deal with individual or small number of sources of harm, such as pollutants, drugs, devices or other manufactured or financial products rather than whole systems. Fragmented agency authorities, expertise and budgets make integration of outcomes across agencies and levels of government extremely challenging. To a growing extent, because of environmental and other reviews, proposed activities are required to look at impacts across sectors. For example, a proposed shopping center's impacts on congestion and air quality must be analyzed in some jurisdictions before planning approval is given. There is no conceptual reason why regulation cannot be designed to

produce multiple outcomes. Regulatory bodies are not usually empowered or allowed to do so for historical reasons and because of the influence of regulated entities over legislative and regulatory bodies.

- Science based. Science is used extensively in setting standards in areas such as food, drugs, environmental quality, product and worker safety and natural resource management. Regulations in those areas do often not look at the life cycle or non target impacts associated with the matter being regulated. Regulation of water quality from fertilizers and pesticides does not take into account the life cycle impacts from resource extraction, transportation, processing and application and disposal of those substances on areas such as human and environmental health of people living and working in proximity to those activities and natural resources in those areas. It is likely that any attempt to do so would be strongly resisted.
- Timeliness. There is no agreement at global, national or local levels about the time remaining before various ecological and social tipping points are reached. Regulation, like most other solutions, is concerned mostly about present day, observable human and ecological conditions. Most regulatory schemes fail to achieve their stated objectives. It is extremely difficult to look to the regulatory arena to address future, as yet uncertain threats as the current debate over GHG regulation demonstrates. In particular, regulatory initiatives are not well positioned to be able to accelerate the transition from problematical systems to clean and healthy ones until economic reasons enable it to take place. The four decade long effort to phase out the most highly polluting coal plants in the US is only now having an effect as the cost to upgrade their ancient structures to standards becomes too high as alternative fuels become more competitive. Certainly gradually tightening standards recently enacted have played a significant role.
- Governance. One advantage of regulatory solutions is that the governance and institutional mechanisms for creating and revising regulations is very well established and has been able to evolve fairly rapidly as new information or values are introduced. The revolution in regulatory process in US environmental regulation in the 1970's and 1980's is an example of that flexibility, whatever one thinks of its efficacy and efficiency.
- Financial capacity. Regulatory requirements are usually met by firms raising prices and/or improving efficiency and governments shifting funds, raising taxes or becoming smaller and more efficient. Very large investments, like emissions controls on power plants, have been financed by raising capital or debt.
- Political viability. Using regulation by itself to effect large scale or whole system change is unlikely to be politically viable, mostly because of the problem of capture of the regulatory process by those with the greatest short term economic interest. Additional regulation is likely to be successful only at the margin without substantial political change.

Conclusion. Regulatory requirements, like caps or taxes on existing and new emissions, resource withdrawals and waste, and full disclosure of risks to investors and customers, can and do assist the introduction and use of cleaner and more harmless systems. Because of the problem of influence by regulated sectors invested in current systems, it is unlikely that regulatory approaches by themselves can bring about the necessary system change to avert ecological and social crises. As in the case of phasing out the dirtiest fossil fuel fired power plants, they can move correct policy in the right direction. Regulatory tools will be necessary in the transition to a new economy, especially in the development and use of standards for desirable outcomes and gradually tightening them to make alternative investments more attractive. Cap and trade solutions, which are both regulatory and market based, are worthy of particular attention, but have been subject to capture by participants.

Public Sector Investment

- a. **Outcome focus.** Most public investment schemes are focused on short term and relatively narrowly defined outcomes and lack means to identify and avoid unintended consequences or to account for or derive revenue from valuable co-benefits. Some have very sophisticated means for measuring the specific outcomes, especially those that can be sold in current markets, and could measure others for which future markets may develop. Some redevelopment investments, like energy efficiency upgrades with long term payback periods produce specific measurable outcomes, some of which are already marketable.
- b. **Global/local.** Most investments are at the local or regional level. With few exceptions, they do not explicitly design for or take credit for global outcomes.
- c. **Intergenerational.** Investment in very large infrastructure or working forests or agricultural lands or habitats for diverse species are explicitly intergenerational, although do not usually measure or account for all negative externalities or positive co-benefits of interest to future generations.
- d. **Integration of outcomes.** Public investment historically has been for very specific narrow purposes, like water, roads, dams, industrial sites, military preparedness, prisons, and hospitals. Generally laws and budget restrictions have made it difficult to create collateral beneficial outcomes with these large and often permanent investments, even if a relatively small portion of the available funds could produce very substantial co-benefits. Traditional cost benefit analysis has tended to undercount or ignore negative externalities and miss opportunities for making investments create multiple benefits. There have been some recent flexibility in road and some other programs to allow for use of funds to create benefits in non-program areas. Investment in wildlands, parks, managed forest and grazing lands, and other open spaces has always been justified by its multiple integrated outcomes.

- e. Science based. Proponents have often used science to justify investments that meet narrow objectives, but have rarely used full life cycle analysis to determine if either the primary purposes of the investment will be met or if unintended consequences will vitiate those purposes.
- f. Timeliness. Public investments have often exacerbated rather than solved problems, as by creating the opportunity for development that overwhelms or pollutes vital natural or cultural resources. If they are done in the future in harmony with design for a full array of valuable outcomes for the area they are intended to serve, they have the potential to be a vital, even decisive part of an economy that serves current and future generations.
- g. Governance. Public investment has the advantage of having well established institutional means of expending funds and managing projects, but has always been influenced or controlled by narrow, usually economically driven interests. If the terms of investment were to incorporate multiple outcomes, the ability of narrow interests to control would be lessened and those interests might find it to their advantage to partner in the production of those outcomes.
- h. Financial capacity. Taxes, debt, fees and other sources are traditional and often sufficient means to pay for projects, but are highly subject to resistance as to amount and incidence and to confinement to narrow purposes. Sources of patient capital for projects that take a long time to produce benefits and revenues have been historically scarce, except for some like water provision.
- i. Political viability. In one sense, public investment is highly feasible, often even in times of economic retrenchment. But when concerns over taxes and public debt become politicized, even normally non-controversial investments can be delayed or canceled. A challenge to backers of patient capital will be to show that investments for multiple outcomes can produce the kind of outcomes people want for themselves and their offspring.

Conclusion: Public investment will always be a significant contributor to human prosperity and ecosystem integrity. For efficiency, effectiveness and public acceptability, it will need to be transformed to produce multiple outcomes, often in partnership with other public agencies, regional and municipal entities and private business. Since many outcomes could be produced more efficiently by these partnerships, or by business or others alone, traditional areas of public investment could be taken on in new ways, including direct payment for some outcomes from public operating budgets, leaving pure public investment for those public goods for which there cannot or should not be any revenue derived.

Ecosystem Based Solutions

- a. Outcome based. Most solutions in this group are outcome based in that they seek to provide valuable ecological services, but tend to focus on specific outcomes from

individual projects and programs rather than identifying system wide outcomes and managing for them.

- b. Global/local. Watershed approaches exist at a whole ecosystem scale at a local level and collectively cover the entire land mass of the planet, but presently are weakly linked, making basin or global outcomes less likely to occur. Both watershed and smaller scale programs have the potential to be concerned with the full range of ecological issues that affect local, regional and global ecosystems. At both scales, programs have focused largely on a limited number of discrete services, such as utilities, or specific environmental or natural resource management. New kinds of governance, like Ecosystem Services Districts, would be required to achieve a full range of outcomes goals that could be linked to larger, regional and global outcomes
- c. Intergenerational. Watershed or other ecosystem health is an inherently intergenerational goal, because it focuses on restoring and maintaining systems that yield permanent services to humans. Non-inclusion of social and economic outcomes dilutes intergenerational benefits of ecosystem management. These initiatives do not yet address the full life cycle impacts of investments within their boundaries or of goods and services exported from or imported into the area. Accordingly, they cannot assure that intergenerational impacts or benefits are addressed
- d. Integration of outcomes. Watershed and other ecosystem based programs are mainly concerned with environmental outcomes. Smaller, district based programs focus on specific services. The relatively compact scale of both would allow for integration of issues and solutions. To achieve whole system goals, an ecosystem based program would need to be aligned with the full range of community priorities, including employment, wellness, mobility, cultural, educational, security and other vital outcomes. Without inclusion of non-environmental outcomes, gains in restoration of natural resources and ecosystem services risk being overwhelmed by negative externalities and social dislocation over the long term.
- e. Science based. Restoration of ecosystem health is based strongly on science, including local knowledge, but investments and other actions generally are undertaken without the benefit of life cycle analysis to assure that externalities will be addressed. Rigorous standards for non-environmental and many environmental outcomes would be needed to assure they will be achieved and to allow for outcomes to be consistently accounted for and, where appropriate traded in regional and larger markets.
- f. Timeliness. Because most watershed based systems respond fairly rapidly to scientific, adaptive management, most can be restored within the current or next generation. This assumes that the scientific, governance and finance attributes are met.
- g. Governance. The inclusive and collaborative nature of watershed groups often allows decisions to be made that are otherwise difficult, but most governance mechanisms do not include all interests that have an impact on watershed health or on the prosperity of watershed inhabitants. Districts generally have governance methods and institutions that assure continuity and management for the long term, but tend to focus on specific

infrastructure or services and often favor the interests of those benefitting from the district's mission. Holding property owners, businesses, residents and leaders together for the long haul is also a challenge. Building institutional governance capacity that is democratic, inclusive, transparent and solutions oriented would help assure longevity.

- h. Financial capacity. Watershed groups have been adept at attracting and coordinating government and other investments in projects, but financing of watershed restoration is largely dependent on government and foundation grants, not on revenues generated within the watershed, including fees or taxes related to ecosystem service benefits. Many districts have the institutional expertise to finance investments that have integrated intergenerational outcomes and very long payback periods, but are necessarily limited to the scope of their authorized purpose. Districts could be authorized to finance the replacement of large damaging infrastructure, currently left to government or to slowly changing markets, especially where there are markets or payments for benefits not currently measured and valued.
- i. Political viability. The formation of watershed, district and other entities for the purpose of addressing socially acceptable outcomes for environment and public health is very well established in the US and many other countries. To achieve whole system integrated outcomes, new or restructured entities would be needed. Since most existing programs deal with public goods, any entry into the sphere of private markets would be controversial.

***Conclusion:** Ecosystem based approaches are essential to the success of any whole system scenario. They have the potential to meet most of the core attributes and be the basic building block of a new or transformed system. The greatest obstacles to current ecosystem initiatives meeting their potential is their primary focus on ecological impacts and their inability to deal with the unregulated effects of economic activity. In most cases, the latter exceed the regulated impacts. An expansion of ecosystem based governance to include the prosperity of the entire population faces major political hurdles but if the intended effect is to assure the thriving of both people and nature and there are credible means for financing both, those hurdles could be jumped. These means would likely have to include applying life cycle science to all decisions and transactions and integrating economic, social and ecological outcomes in as many as possible. Linkages among ecosystem based units would need to be developed to allow for sale and trading of greater than local benefits that can contribute to global outcomes.*

Collaborative

- a. Outcome focus-As some collaborative solutions are more outcome focused than others it depends on the goals and strategies of the individual institution.

- b. Global/local-Most examples of collaborative solutions are explicitly local. One of their strengths is the utilization of local information. As Ostrom (1990) has documented, they can be scaled up, nesting individual organizations into a larger institutional structure.
- c. Intergenerational- The goal for collaborative solutions is usually to sustain itself across generations. The success is dependent on the institution's legitimacy, as well as the temporal preferences of the stakeholders.
- d. Integration of outcomes-The organization of a collaborative solution is usually motivated by one outcome, such as the long term health of a water basin or the financial success of a worker owned business. Parecon and Transition towns are more ambitious, seeking to link outcomes traditionally not integrated. As Parecon is theoretical and Transition Towns are still small scale, their success is not certain.
- e. Science based-There are many examples of goals and methods of collaborative solutions being firmly grounded in science, but this is not always the case. However frequently in cases where the stakeholders don't have access to scientific expertise, their collective on the ground expertise is very effective at informing decision making. In some cases in developing areas, local expertise is more effective than scientific specialists.
- f. Timeliness- A frequent critique of collaborative institutions is that the sometimes long process of dialogue and negotiation makes decision making slow. However, collaborative institutions tend to be more resilient to gaming by businesses and other entities that have a vested interest in maintaining the status quo.
- g. Governance- A common strength among collaborative solutions is their institutional structure. Successful examples of collaborative solutions have institutional structures that are tailored to fit the local environmental and social conditions, as well as the priorities of the stakeholders. The distributed power structure makes the institution resilient to gaming, and adds a wider range of perspectives to the decision making process.
- h. Financial capacity- Collaborative solutions sometimes have sufficient financial capacity, it depends on the context. For example, water companies negotiating the regulation of a water basin in the US, such as the LA Water Basin Authority, will not only have money for investigating water levels and monitoring each other, but also access to government resources such as the Army Corps of Engineers. By contrast Transition towns usually have very minimal budgets, and are dependent on the work of volunteers.
- i. Political viability- Much like financial capacity, political viability of collaborative solutions are highly dependent on context. There are many factors that can undermine political viability, such as an atmosphere of distrust, or there is no mechanism for monitoring agreements, or lack of recognition of larger governing entity.

***Conclusion:** Collaborative solutions are grounded in local agreements in the context of the surrounding culture and can be powerful building blocks to achieve both local and global outcomes.*

Voluntary

- a. Outcome based. Voluntary programs are intended to contribute to valuable outcomes. They can change culture, vision and goals and engage individuals and businesses in activities that contribute to large scale and long term solutions. Most programs lack an agreed upon set of outcomes or metrics, so there is no assurance that a sustainable state would be achieved in the time or to the extent needed.
- b. Global/local. Many voluntary programs have both global and local reach or potential.
- c. Intergenerational. To the extent that impacts on poverty, health, education and ecosystem services are lessened, voluntary programs have an intergenerational scope but they generally lack standards that would assure long term intergenerational protections.
- d. Integration of outcomes. No single approach involves all aspects of the economy, although in the aggregate they may reach many. For example, procurement policies and certification programs may lower some environmental impacts like habitat destruction and social impacts like child labor, while a B-Corp may build community capacity and assure secure employment. Voluntary programs are generally uncoordinated with each other, even if some, like procurement policies, are amenable to multi-organizational coordination.
- e. Science based. There is no assurance that impacts or outcomes sought by voluntary programs will be addressed and measured across their full life cycle.
- f. Timeliness. Voluntary programs depend largely on change in customer and business behavior so it could take a very long time without new incentives and business models to achieve the required change. Some businesses, other organizations and whole geographic areas will move faster than others so it may take a long time to get to a scale necessary to change consumer demand curves to the point necessary to make substantial improvements.
- g. Governance. The absence of coordinating or integrating mechanisms is an obstacle to achieving outcomes in the most efficient way. Some foundations have agreed to work together on specific outcomes they all share.
- h. Financial capacity. There is no clear source of patient financing to allow businesses or consumers to make major gains in social, environmental or economic outcomes.
- i. Political viability. Many voluntary programs require no or minimal new legislation to be effective, within their defined purposes. Community based programs put problem solving at the level at which community knowledge and the opportunity to find the most appropriate and efficient solutions exists, are democratic and adaptable to local conditions.

Conclusion. Individual business or sector programs and some community based programs are viable within their own spheres, but it is unlikely that broad scale change could occur on the basis of voluntary initiatives alone. Some steps are being taken to coordinate through industry associations, partnerships and educational initiatives but are inherently limited.

For businesses, going beyond the initial steps requires a change in the relationship between business and consumers that may be hard for both to adapt to in the absence of compelling incentives or disincentives. Businesses are limited in current conditions from going as far as they may wish because they may lose real or perceived competitive advantage.

Finance

- a. **Outcome focused.** Social impact and community development type bonds are outcome focused for a limited number of outcomes.
- b. **Global/local.** They attempt to meet local needs primarily, as small scale locally implemented programs. A networked system of local programs has the potential for global outcomes such as carbon sequestration and for global investment and institutional involvement as well
- c. **Intergenerational.** They are intergenerational in that they create benefits of value to future
and therefore provide an interesting investment opportunity for future generations. Some of this is due to the long term nature of the bonds used to finance such programs but some effects are unique to the programs themselves. The Social Impact bonds relating to recidivism, for example, aim to reduce all downstream associated costs, thereby freeing up resources for future generations and providing a safer society for them to live in. The Community Forest bonds are meant to maintain a natural capital stock with its associated ecosystem service flows and associated on-going industrial activities. This provides many goods and services for future generations including green space, job security, healthy ecosystem services, and life cycle sound sustainably managed raw materials generated by forests.
- d. **Integration of outcomes.** Current proposed uses are generally for single or small number of outcomes, but could be expanded to produce numerous related measured financeable social outcomes. Community Forests, for example, by their nature tend to integrate forestry management with construction, manufacturing, environmental services, recreation services, and others. The financing mechanism by itself would not drive cross sector integration, but the search for security for the bonds and revenue streams for debt service could facilitate sectoral integration.
- e. **Science based.** Social impact and community forestry bonds have so far been based on careful, scientifically based metrics, but all life cycle impacts have not been accounted for. There should be an incentive to do so since it would potentially increase security for

the bonds and create additional income streams to pay them off. For example, the outputs produced by a forest lands are ready subjects for life cycle assessment.

- f. Timeliness. Social impact bonds are a very small, emerging idea. However, the vast capital in the world that is currently underemployed or invested in risky financial derivatives and other short term vehicles could be attracted to investments in projects that yield secure, long term revenue based on strong and healthy communities. While still in their relative infancy, the energy efficiency and renewables finance programs and community forest are replicable in a wide variety of geographic, cultural and political settings. If similar programs were implemented worldwide, significant global outcomes (clearer air, stable temperatures, etc.) could be achieved.
- g. Governance. The finance driven solutions meld well with existing government structures and institutions. Though in some cases new legislation is needed to initiate programs, as in the case of many energy efficiency/renewables programs and community forest bonds, they are well aligned with existing governance and financing structures.
- h. Financial capacity. While these solutions operate at a very small scale compared with existing social and environmental programs, they have the potential to attract the trillions of dollars of capital in search of more secure investments. To the extent that they can access secondary markets for the currently unmeasured outcomes they deliver and can be networked with similar programs across their region, they have significant future potential for financial as well as on the ground success, especially when global private and public organizations become involved
- i. Political viability. *Because both programmatically and institutionally, these initiatives fit well with existing structures, processes and expectations, they have a better chance than most at being adopted without the need for political transformation. But they could be subject to gaming or corruption.*

Conclusion: Innovative finance options like social impact bonds have considerable promise as tools where traditional government programs are too narrow or inflexible to produce desired outcomes.

Markets

- a. Outcome focus. Markets are not inherently outcome focused but serve those pursuing increased enterprise value through production and sale of goods and services at competitive prices and least cost. Adverse or non-revenue producing outcomes are ignored except when consumer demand or government regulation requires them to be taken into account. When markets are created explicitly for outcomes, as in the case of sulfur, carbon and some ecosystem services, businesses are able to respond effectively.

- b. Global/local. Markets operate on all scales and, to the extent outcomes become capable of being bought and sold, could produce them at both global and local scales.
- c. Intergenerational. Markets have been allowed to ignore the interests of future generations by discounting their interests. Recently, it has been recognized that discounting the future value of natural resources has led to significant diminution in the services they currently provide. Markets can be designed to produce beneficial outcomes that will benefit both present and future.
- d. Integration of outcomes. Markets do not ordinarily explicitly recognize multiple beneficial outcomes but may unconsciously produce them, as where the reuse of goods produced for a primary market provide social, wellness or security benefits to secondary users. Some markets exist explicitly for secondary outcomes, as where fishers or poachers are paid to protect a diminishing resource rather than exploit it. Ecosystem services markets are designed to connect purchasers and sellers of such outcomes.
- e. Science based. Markets rarely take life cycle impacts of goods and services into account
- f. Timeliness. Unconstrained markets inevitably lead to exhaustion or pollution of resources with attendant social disruptions because they are not required to take the future fully into account. On the other hand, with proper incentives, transactional frameworks and metrics, markets have the potential to create a just and sustainable society more efficiently and therefore faster than other solutions.
- g. Governance. Markets exist within institutional structures that govern their conduct and limit unintended consequences to some degree. Businesses that participate in markets have flexible structures that promote innovation and nimbleness in responding to change. If markets in outcomes become widespread, the business sector has the capacity to respond effectively.
- h. Financial capacity. The financial capacity available to the business sector is vast. A market for outcomes would potentially have more than adequate means of financing relocation of trapped infrastructure and delivery of harmless services, if outcomes are well defined, measured and delivered.
- i. Political viability. Transformation of markets by fiat would be almost impossible under most political systems in the world today, even authoritarian ones, because of the vested interest of most businesses in their current infrastructure and systems. Providing a means of purchasing them using traditional sources is unlikely. A new form of capital and profitable means for employing it has the potential to attract the financing from the private sector that would make it possible for political systems to support the transformation.

Conclusion: The business sector, including government owned enterprises, has critical resources not duplicated by governments in scale and variety: access to investment capital at all scales, large cash-flows, infrastructure, transport, land, structures, other assets, marketing horsepower, brand & marketing expertise, analytics, logistics, etc. Its networks/alliances can improve consumer and investor awareness and market behavior, help expand markets and reduce risks for green ventures. Corporate capital has great political influence, with potential for

bringing about rapid policy change. Business can act to deploy capital for large solutions rapidly when motivated to so.

To address the current and future dilemmas and crises, markets need to replace exponential material growth with growth in commensurately valuable outcomes of greater worth to consumers and the ecosystems they depend on. Because shareholder focus is on financial returns only, large amounts of capital and labor are trapped in the infrastructure and systems for established products and markets. No system exists for leveraging the valuable retirement of legal harmful operating assets into profitable and harmless ones. Markets are fragmented: they lack frameworks for redevelopment of wholes rather than parts. The lack of markets for long-term benefits means achieving future goals for people and nature will become increasingly expensive. The lack of scientific metric for outcomes makes it possible for companies to rebrand slightly changed product with greenwash.

Cross-cutting Solutions

- a. **Outcome focus.** The intent of the solutions is outcome focused for current and future generations.
- b. **Global/local.** Most offer a variety of solutions that are intended to achieve outcomes at both global and local scales.
- c. **Intergenerational.** All of the solutions focus on protecting the natural resources of the planet for future generations and creating a society in which all people are able to thrive, but not at the expense of others.
- d. **Integration of outcomes.** They do not all explicitly embrace integration of outcomes across sectors but do call for a multi-sector approach. Vision 2050 recognizes the need for integration and the value from it.
- e. **Science based.** They rely significantly on science and technology to help eliminate externalities but don't specifically advocate for analysis of life cycle impacts as a means for assuring that investments, products and services have the desired effect. Some do call for the incorporation of externalities in pricing.
- f. **Timeliness.** They very forcefully urge that action be taken in the shortest time possible, but tend to rely on very substantial cultural and political transformation that will lead to new policies to guide or require business to do the necessary things. They do not suggest mechanisms for the early retirement of harmful assets and systems other than continued regulatory pressure from government supported by grassroots political pressure and eventual change in market demand.
- g. **Governance.** They rely on existing institutions for the most part to bring about needed changes. Speth and Jackson call for strengthening local capacity to deliver redesigned communities and systems for health, relationships, culture, entertainment and other beneficial outcomes. One major institutional change suggested by Speth is drastic reform of the corporation to expand its purpose to include community, ecological, labor, and social purposes.

- h. Financial capacity. They don't call for new finance mechanisms to raise capital but assume tax increases and regulatory mandates will provide the funds to effect the necessary transformation. Jackson's new macroeconomics comes closest to proposing new ways of investing capital so that it delivers long term value.
- i. Political viability. All of the cross cutting ideas are premised on political changes that must happen in order to bring about transformation, preceded by a change in consciousness or culture in the general population, or the coming to power of a new generation.

Conclusion: While many of the specific ideas they suggest (tax increases to fund investments, cap and trade to minimize ecosystem impacts, regulation to phase out harmful systems, investment in ecosystem services provision) are drawn from the eight solutions groups we looked at, these proposals, other than the Sky Trust, are distinguished by their insistence on using them all. What they lack is a specific set of protocols in areas like governance, markets for outcomes, early retirement of harmful assets, and long term finance that would help lead them to their goal of transformation of the economy at the earliest possible time. Their reliance on massive political change to release the grip on the current economy by self interested groups invested in keeping things the way they are seems likely to take a long time.

Tax and/or cap and trade approaches advocated by some of the authors are both market and regulatory solutions that in theory have the potential to move rapidly toward achieving the necessary transformation. For example, the cap and trade system in partial operation today for greenhouse gases (GHG) is a globally oriented system, with both local benefits in emission reduction and intergenerational benefits from reduction in climate change impacts. It is science based, using carefully vetted metrics. It takes into account life cycle concerns by applying to and giving credit for reductions all along the chain of production, transportation and use. Being limited to GHG, it does not integrate outcomes across sectors. The broader use of cap and trade and/or taxes for all resource extraction and all emissions advocated by Daly, Jackson and others would come closer but would not account specifically for social, employment and security outcomes. Investments made with funds produced by cap and trade surplus revenues or by taxes could address non-ecological outcomes, which might not be adequately measured or integrated into the system to assure effectiveness and efficiency. Cap and trade for GHG has a set of well developed institutions and mechanisms to assure the validity of reductions but its market system has been faulty, largely due to its susceptibility to gaming by interested parties. This would be a major challenge to wider use of cap and trade in the absence of countervailing institutions and/or forces. Like cap and trade, taxes on extractions and emissions face enormous political hurdles if they are sufficiently robust to eliminate adverse impacts in the near term, so both systems may fall short on being timely.

Intergenerational Finance™

- a. Outcome based. By its nature, IGF™ is concerned principally with outcomes. It suggests a new system of measurement, finance and marketing of outcomes to achieve desired redevelopment goals that are consistent with the thriving of humans and ecosystems.

- b. Global and local. It is designed to achieve valuable global outcomes through aggregation of myriad integrated and bundled/stacked outcomes at the local/ecosystem level.
- c. Intergenerational. IGF™ explicitly promotes and protects the interests of future generations.
- d. Integration of outcomes. It rewards those businesses and others that are able to integrate as many outcomes as possible with every investment and expenditure.
- e. Science based. Outcomes are measured using life cycle science to assure that negative externalities are eliminated or avoided.
- f. Timeliness. Because it is business based, there is no need for a new system that must start over or a whole new set of operating rules and financial exactions to fund public investments, regulatory programs and other actions to attempt to offset negative externalities, IGF™ may have a greater chance of achieving political acceptability. As a whole system framework, moreover, it would be harder for any one interest to gain disproportionate influence and at the same time IGF™ offers new market opportunities for businesses reliant on unsustainable goods and services.
- g. Governance. Regional, local or ecosystem entities contemplated to manage redevelopment activities are based on existing forms and require relatively few unfamiliar powers (e.g., bundling numerous small valuable outcomes for purchase in local, regional or global markets is familiar to those practiced in securitizing more risky investments).
- h. Financial capacity. Unlike general tax or fee revenues or large government issued debt, the regionally issued revenue bonds, not requiring government guarantees, could tap into the trillions of dollars in financial capital currently invested in socially valueless short term and often risky returns.
- i. Political viability. For all these reasons, the whole system approach of IGF™ would appear to have at least as good a chance of being supported by local and regional political structures, wary of one size fits all prescriptions from higher government levels. It should appeal to those higher levels too, by giving them a more efficient way of achieving their goals than project by project investments and inflexible regulations.

***Conclusion:** IGF™, not surprisingly, meets these core attributes as well or better than other solutions. The attributes were derived from looking at the IGF™ model and extracting from it the issues it is tries to address and the principal features it uses. At the very least, this analysis will challenge others to put forward better arguments for the solutions we looked at or other solutions we did not consider.*

Evaluation of Solutions

We will now explore the strengths of each of these groups and compare them with IGF™.

Principal advantages of each group

All of the solutions groups have components that could contribute to dealing with the global and regional dilemma. We have distilled the principal advantages of the various groups.

1. **Public Investment** by governments from sovereign wealth funds and other large pools of public capital produces valuable, although limited outcomes and can hasten the introduction of clean technology, help meet the goal of full employment, protect and restore some ecosystem services, and make new scientific discoveries.
2. **Regulation** has the capacity to lower the adverse impacts of unwanted externalities and provide incentives for better outcomes from economic activity.
3. **Market** approaches draw on the innovation, efficiency and entrepreneurial spirit of businesses to compete to use capital, labor and physical resources to deliver needed outcomes.
4. **Finance** is an essential tool for all the solutions to invest in infrastructure and systems that have both long and short term benefits.
5. **Ecosystems** approaches put proper emphasis on the management of unique local resources using local knowledge and expertise.
6. **Collaborative** mechanisms lead to high efficiency and widespread acceptance of needed solutions. They are self organizing and are superior in incorporating local knowledge
7. **Voluntary** agreements and initiatives can both change culture, vision and goals and engage individuals and businesses in activities that contribute to large scale and long term solutions.
8. **Cross-Cutting** solutions offer a variety of both systemic and specific solutions, ranging from a new macroeconomics to political and corporate reform to stronger regulation and higher taxes. They also call for new ways to measure progress in terms of human thriving rather than material outputs.

Comparison of IGF™ and leading solutions

IGF™ and the studied solutions share some specific areas of convergence, e.g.,

1. **Outcome focus.** IGF™ is focused on outcomes more than other solutions and unlike most of them attempts to incorporate them into individual transactions so they both produce and pay for multiple desirable outcomes. Many of the other solutions are aimed at producing the same kind of outcomes and so could be incorporated into an IGF™ type system.
2. **Global and local.** IGF™ and some of the solutions are inherently global and local in scope and intent. Some solutions attempt to achieve sustainable outcomes by the use of regulatory tools and large investments. Some like local forest, water and community redevelopment collaboratives rely on local initiatives. However, most don't have the means to capture the global outcomes, which are largely unmeasured and unaggregated. IGF™ more explicitly looks to local, ecosystem based institutions and structures to produce, measure, aggregate and sell both local outcomes needed and desired by residents of the area and global outcomes such as climate stability and oceans health.

3. **Intergenerational.** Very few solutions are explicitly intergenerational or have means to incorporate intergenerational interests. Some classic exceptions are the set asides of lands and water resources to benefit both current and future generations and payments for conservation of soil, fisheries and other resources. IGF™ is based on the notion of giving future generations a means for investment to insure that both human and natural capital is capable of serving all generations. The financing of traditional intergenerational investments is not conceptually different from IGF™, but lacks mechanisms for paying for or selling valuable measured outcomes to assist in paying for the investments over time.
4. **Integration.** IGF™ emphasizes integration of investments and actions to achieve desired outcomes more efficiently. IGF™ does this through a planning, design and contracting process that incentivizes firms to look for opportunities to eliminate problems and achieve multiple beneficial outcomes from individual expenditures across multiple sectors. Other solutions, like cap and trade and many public investments, produce integrated outcomes across sectors, but may not explicitly account for them or reward entrepreneurs for achieving them.
5. **Science.** IGF™ depends on accurate scientific measurement of outcomes, both for market transactions and for tracking progress. Current metrics for other solutions are not usually incorporated into transactions, although there are elements of that in some supply chain requirements by major retailers, where delivery of goods and services is tied to lower carbon footprints or higher wage levels. Contract metrics for IGF™ would go considerably further, covering most transactions. They would be standardized using life cycle science to assure that both local and global outcomes are not compromised by gaming the metrics for an individual firm or locality.
6. **Timeliness.** Because other existing and proposed solutions rely on long term amortization of existing unsustainable assets systems as caps or other rules became tighter or public investments replace them or mitigate their impacts, these solutions may not be able to leverage unsustainable assets and systems into socially and environmentally harmless and clean ones on a sufficiently rapid timetable to avoid the risk of various tipping points in social behavior and ecosystem services. To accelerate the timetable using existing solutions might require massive public investment or extremely strict regulation, both of which are not likely to be politically attainable. IGF™ envisions a more rapid and comprehensive program through a mechanism that would allow the early retirement of capital from unsustainable sunk capital and systems and its leveraging into cleaner, more socially useful ones, giving the owners of those assets the opportunity to profit from a more durable and predictable investment. IGF™ would thereby provide a means of retiring these systems at the earliest possible time, as those that converted first would receive higher payments for their assets.
7. **Finance.** The tools proposed for IGF™ to incentivize the retirement of old infrastructure and leverage investment into new platforms are similar to those in use today, such as revenue bonds for infrastructure and markets and fees for debt repayment. IGF™ proposes greatly expanded use of a financing tool that represents a hybrid of two traditional approaches: very long term bonds (used in the development of railroads in

the 19th century) and a revenue bond, relieving taxpayers of the burden of paying debt service. In the case of an IGF™ bond, part of the revenue stream would be unusual, if not unique: a bundled set of revenues from a wide variety of integrated outcomes, some for direct services like water, mobility, habitation, temperature conditioning, nutrition, clothing and furnishing, others for various forms of security like personal safety, price stability, ecosystem services and services to those in need. Some of these outcomes would be capable of being sold as securities in secondary markets.

8. **Governance.** Both IGF™ and other solutions build on existing institutions rather than calling on a totally new set of structures. Most proposed solutions would reform existing regulatory, finance and governance institutions to develop infrastructure and deliver services in accordance with tightened standards. The business community would play its traditional role, competing for the sale of goods and services, albeit with much cleaner footprints. IGF™ relies heavily on assigning new responsibilities on locally elected entities, akin to public utilities or management districts, to design, finance, and manage a set of integrated contracts for competitive delivery of services within an ecosystem or region that result in democratically agreed upon outcomes measured by both local and global standards. The business sector would be the primary source of delivery of these outcomes and would compete for contracts financed by long term revenue bonds and paid for by a variety of service charges, sale of products, and conveyance of bundled outcomes to third parties, such as international secondary markets. IGF™ may require existing local authorities to accommodate new infrastructure and services within land use, licensing and other local controls.
9. **Political.** Many of the existing proposed solutions would be politically impractical. They either rely too heavily on government regulation or cross-sector voluntary agreements that alter business expectations without necessarily providing alternate avenues of profitable opportunity. They may seek to limit rather than channel innovation. By addressing the core problem faced by business of how to transform equity sunk in unsustainable systems, IGF™ would have a distinct advantage over other solutions in allaying the intense pressure on current political institutions to continue these systems until the last dollar of profit has been wrung out of them.

Possible Hybrid Solutions

Since no one of these solutions by itself fully satisfies all Core Attributes or the 20+ criteria analyzed in Chapter 3, it is tempting to imagine a whole systems solution that would build on the strengths and address the shortcomings in each of the solutions groups. Rather than trying to combine them in an comprehensive hypothetical solution that would take advantage of the best elements from each of the solutions groups, we describe what each of them might contribute to whole system solution, followed by a very brief hypothetical scenario, and encourage others to fashion whole system solutions that fully meet the Core Attributes and are therefore strong candidates for implementation. A hybrid solution might incorporate some or all of these elements:

- a. **Public investment.** Mobilize large amounts of financial capital currently underemployed in very low margin, short term investments into secure instruments financing low risk regional redevelopment initiatives that retire harmful infrastructure and systems as rapidly as possible. Impose financial transaction taxes to avoid bubbles and shift investment from short term, uncertain gains to longer term real outcomes. Free up additional capital for reinvestment by reducing perverse incentives supporting unsustainable systems, reducing military expenditures and providing security outcomes more efficiently through redevelopment initiatives.
- b. **Regulation.** Adopt measures like declining caps or increased taxes on existing and new emissions, resource withdrawals and waste. Require full disclosure of risks to investors and customers based on their life cycle impacts. Incentivize the introduction and use of cleaner and more harmless systems. To avoid the gaming and perverse incentives of the current regulatory system, gradually tighten standards and requirements using life cycle science. Apply the precautionary principle to decisions about new products, services and other investments. Redirect corporate purposes and powers to encompass social, ecological and community health in the areas and markets served, while providing assurances of reasonable return.
- c. **Market.** Adjust critical markets by public private agreements and partnerships to achieve life cycle measured outcomes; integrate outcomes across sectors to maximize efficiency and assure adequate returns; assure natural and human protection by standards, metrics, plans, agreements, incentives for efficient design etc; and disclose potential negative impacts and externalities of projects, policies, products services and other economic activities.
- d. **Finance.** Authorize and facilitate local impact and community resource redevelopment bonds applied to a variety of difficult and complex regional social, natural resource and community development issues. Maximize opportunities for local, regional and national businesses and public entities to issue revenue based instruments to achieve measurable and valuable outcomes.
- e. **Ecosystems.** Create an ecosystem framework in law and enhance powers of ecosystem-based districts or other institutions to achieve integrated outcomes by agreements, knowledge dissemination, metrics, investments, market incentives, revenue measures and rules. Empower ecosystem based districts to issue bonds to finance sustainable infrastructure and to contract with private business, governments and non-profit organizations to protect and restore ecosystem services and to provide for human needs.
- f. **Collaborative.** Provide framework, technical assistance, incentives etc to empower local self organizing groups;
- g. **Voluntary.** Make maximum use of life cycle measured green labels and other tools to enable consumers to choose products and services with best overall outcomes.
- h. **Cross-cutting.** Develop a new macro-economic framework that integrates economic activity with long term goals for human happiness and natural systems viability. Foster cultural changes that value human thriving, ecosystem integrity and intergenerational equity as primary goals of economic activity.

A hybrid solution might draw on some of the most promising solutions we reviewed, such as

- Vision 2050: Overall target and goals; individual sector targets and goal; cross sector integration of desired outcomes.
- Reinventing Fire: reduce use of fossil fuel through efficiency; modulate demand through smart management; optimize supply through an expanding array of fuel choices
- Brown, Sachs, and the Public Investment group: Invest in clean infrastructure, human and natural capital
- Finance group: social impact and community redevelopment bonds to help finance needed investments.
- Jackson, Daly and others: cap and trade to all extractive and polluting activities; continually tighten caps on emissions and extractions; a new macroeconomics.
- Speth: Reform corporate purposes and powers to enable businesses to transact for social as well as financial returns; political reform; cultural change
- Ostrom, Heal et al: Empower local collaboratives to manage common resources and local problems; establish ecosystem service districts to manage and protect local water, soil, habitat resources and ecosystem services
- Tobin, Henderson et al: impose financial transaction taxes to avoid bubbles and shift investment from short term, uncertain gains to longer term real outcomes

Is IGF™ a Practical Solution? Obstacles and How They Might Be Overcome

Assuming that politicians, businesses, financiers, organizations, scholars and others believe that IGF™ is a promising solution, worthy of further analysis and practical demonstration on the ground, there are practical, political, legal, governance, market and other questions that can and will be raised about IGF™. We identified these at the end of Chapter 2 and revisit them here. We conclude that more work needs to be done to address many of these issues, but the best way to do that is to design identify some candidate watersheds or other areas to demonstrate IGF™ or some of its constituent tools in real settings. Many of the issues we have identified also apply to some or all of the alternative solutions but here we look primarily at IGF™.

1. DEBT. Will there be enough local, regional, national and global capacity to issue the massive amounts of debt needed to transfer equity from trapped investments in unsustainable systems and to invest in projects and systems that meet life cycle standards for clean investments? Are there other sources of funds that are or could be available, such as sovereign wealth funds,⁶ or new taxes on carbon, other externalities or currency transactions? Will the global concern about public debt and the bad name earned by securities issued for bundling insecure mortgages and other risky investments make it too difficult to introduce a new savings bond and new securities based on more

carefully vetted outcomes? Do the benefits for future generations outweigh the additional debt burden from the new bonds? Will the revenues from the delivery of beneficial outcomes be sufficient to pay for debt service, costs and profits? Will there be adequate security for the new debt? What types of security will be acceptable to the financial markets? Will financial markets be able to absorb multiple large bond offerings, especially if lower initial rates of return are required to enable the transfer of equity to clean assets? What laws would need to be changed to allow for the issuance of debt that might exceed current statutory or constitutional debt limits on size, duration and purposes for government issued or guaranteed debt, including the use of funds to pay for private activities and the payment of interest at increasing levels during the term of the bond as revenues grow? Will the expected returns be sufficient to entice the finance community to invest in debt issued by non-government entities?

Capital capacity. The amount of capital available for investment in positive outcomes is staggering, in the many trillions of dollars, most of it currently invested in very short term securities or cash equivalents that pay very low interest rates and don't directly produce outcomes. If the right kind of investment opportunity comes along, particularly one that is inherently less risky because it is invested in infrastructure needed for the long term prosperity of communities, there should be plenty of interested investors. The recent call from the reinsurance industry seeking opportunities to invest in bonds of at least \$300 million where revenues are specifically allocated to reducing risk from climate change is strong evidence that the money will be there when an investment grade bond for lower risk solutions becomes available. It is also possible that governments will be interested in providing capital to regional redevelopments that solve multiple problems across many, currently siloed, government programs. The capital could come from potential savings in security and social programs or from new dedicated tax or other revenues.

Excessive debt. Current political concerns around the globe about the size of both private and public debt will cause many to question new forms of debt, particularly in large amounts required to leverage old infrastructure into new platforms. If the competitive process for gaining access to the new capital is genuinely free, and the outcomes to be financed are those democratically chosen by the region, much of this concern will be satisfied. The real test will be the confidence of the market that proceeds will be invested in well vetted projects that, by meeting life cycle standards, won't create the uncontrolled risks of sub-prime mortgage backed securities.

Sufficient benefits. The likelihood that benefits to current populations and future generations will actually come about is greater than traditional investments because of the careful measurement of outcomes across sectors, structures, boundaries, and time. The life cycle science approach is one way to assure that purported benefits are more likely to occur than not and that unanticipated problems are minimized.

Sufficient revenues. For many outcomes, there are existing markets, including fee for service utility mechanisms. In an integrated system, where multiple outcomes are achieved from individual investments, revenues for traditional goods and services should increase or become

more stable as customers pay for multiple outcomes. At the same time, costs will decrease for many services as their delivery becomes more efficient.

Adequate security. In a fully functioning IGF™ framework, the basic security will be stable revenues from integrated, highly efficient systems delivering needed services. Systems will be more resilient by design so less susceptible to weather related and other natural calamities or social disruptions caused by scarcity. Until then, it may be necessary for debt service to be secured by pledges of assets or revenues within the region. These could take many forms including public or private assets, guarantees, insurance or others.

Legal changes. In some jurisdictions, it may be necessary to change laws to allow higher debt limits on revenue bonds as well as to authorize multiple purposes, private activities, longer terms, security pledges etc. For demonstration purposes, it would be desirable to find a utility, municipality, authority or other existing entity with adequate authority.

2. **MARKETS.** The new system envisions new markets for the highly efficient delivery of goods and services that produce the outcomes contracted for. Some of these markets will result in traditional outcomes, like food, water, and shelter, but others will be novel, such as the wellness benefits from relocation of trapped equity into cleaner infrastructure or services, the reduction of future risks by assuring price stability for energy, and the restoration of ecosystem services. Secondary markets for aggregated outcomes such as pollution reduction, lowered recidivism, and wellness benefits will have to be created or expanded to provide additional revenue streams. Especially in the early years, will there be adequate demand for the services provided and will subsidies for people with inadequate income be required to enable them to afford basic services? Also, how will the benefits of integration of services be realized soon enough to create valuable outcomes for sale in both primary and secondary markets?

Primary markets. Many of the services that will be delivered will be paid for as they are today, through ordinary retail type purchases from participating businesses or utility type bills for water, sewer, electricity and so on. Other services, like wellness improvements or recidivism reduction, that benefit both individuals and businesses and agencies will be paid in part by beneficiaries and in part through contracts for reduction of health and social costs to those firms and agencies.

Secondary markets. Where outcomes can be standardized in measurable units, they can be aggregated and securitized for sale in broader, including global markets, where they exist. It is not clear how many markets of this type can be developed or how quickly they can be put into operation. The early experience with carbon markets and ecosystem services markets has been slow and complex, but as the scientific, technical, finance and business sectors get more used to them, markets should be easier to set up. Until there are robust markets of this kind, regions using an IGF™ framework, will concentrate on outcomes that have existing markets or where there are willing business, agency or individual buyers. The full benefits of integration and aggregation will have to wait until sufficient markets can be developed for the wide range of valuable outcomes that are potentially available.

3. **GOVERNANCE.** If new institutions, like a watershed or ecosystem entity, are created to enable outcomes to be selected democratically and metrics to be developed objectively, how will they be integrated with existing governments and processes for public involvement in decision-making? How will the transfer of some government functions to private or public-private partnerships be done so as not to cause significant disruption of services, increased unemployment and public concern? What functions will be left to traditional governmental institutions or will they become largely buyers in the new markets, e.g., for wellness, security, mobility, and other services? Who will assure accountability for the actions of the new institutions? Will organizations that currently influence government policy through lobbying and campaign contributions be able to steer the new institutions away from democratically selected outcomes and objectively established metrics and standards for outcomes? Will political influence shift from existing forms of government to the trustees for future generations? Will there be people of sufficient knowledge, wisdom and personal integrity from all segments of society to serve in that function? How should they be selected?

Integration into existing institutions and processes. The IGF™ concept envisions new institutions, like a watershed or ecosystem entity, being created to enable outcomes to be selected democratically and metrics for them to be developed objectively. The challenge to blend those new institutions and processes in with existing ones is large, but not unprecedented. The corporation was invented to deal with the risks and management challenges of building large projects like canals crossing many boundaries. Public authorities have been created to undertake large scale schemes through new powers and financing tools. Compacts and treaties have been entered into among states and nations to address commons issues like water resources management. The World Trade Organization is the primary rule maker for international trade. There are also examples of multi-jurisdictional democratically controlled organizations like Portland, Oregon area's regional planning, land use control and waste management government. Soil and water conservation districts and some public utility districts also have democratically elected members. Proponents of IGF™ might initially have difficulty in convincing local authorities that a comprehensive redevelopment model would deliver net benefits to their citizens, especially if existing authorities and ways of doing business would need to be changed.

Accountability. In IGF™, accountability would be through the enforcement of contracts for the delivery of outcomes, audits of the operations of the regional entity, including benchmarking with other regions, investigations by media, elected bodies, academia and organizations and the electoral process for the trustees. Enforcement of contracts is a more effective and accepted process than enforcement of regulatory standards, so long as performance rather than money damages is the remedy specified by the contracts. Judges have more flexible tools than agencies for appropriate remedies. One important outcome that should be in the contract is the assurance of independent media.

Transfer of functions. Breaking down walls between government agencies and sharing or transferring functions with business or other non-government entities is often difficult, both institutionally and politically. IGF™ would not necessarily require wholesale transfer of functions from government. Under a well-designed plan and contract to deliver outcomes across a number of boundaries, it may become cheaper and more effective for agencies to contract with

the winning bidders to pay for services that achieve multiple benefits simultaneously, such as wellness, mobility, security, jobs and job training, etc. A government might pool resources from agencies to achieve outcomes within the mission of the agencies. A small beginning on this kind of integration of resources is the Federal Partnership for Sustainable Communities among the Departments of Transportation and Housing and Urban Development and the Environmental Protection Agency. The Partnership has issued several joint grant opportunities to help produce multiple outcomes in affordable housing, mobility, natural resource protection, poverty reduction and social justice. Ultimately, personnel from government agencies might find it more rewarding to work for one of the contractors than the agency itself. Contractors might be willing to replace benefits received by the employee from the agency in order to engage their skills to work on delivering outcomes. Agencies will gradually turn from delivering or assuring the delivery of services and developing and enforcing one size fits all regulations that only partially achieve their goals. Instead they will spend their time and resources on monitoring, research, training, information development and contributing to the integrity of life cycle standards for outcomes developed by others.

Political gaming. In an IGF™ system, the intense lobbying and influence peddling that currently occurs to maintain the viability of profitable but unsustainable infrastructure and systems will be gradually lessened as owners of that trapped equity and their employees are able to leverage it into new infrastructure, systems and jobs. It will be to the advantage of these owners and workers to get early access to the capital provided by bonds or other sources to leverage their trapped equity into new platforms.

Integrity of trustees. Setting up the financing and management entity would need to be done carefully so that no one or small set of interests could dominate. Rather than using electoral districts, election by outcome groups (wellness, security, energy, culture etc) or other innovative methods might be tried to assure balanced representation of all groups and interests in society from the entire region. There can be no guarantee that every trustee will put the region's interest ahead of their personal or their group interest. The independent media, audit, outcome reporting and other checks will be the surest way of assuring integrity.

4. METRICS. Establishing metrics for outcomes that meet the requirements for markets will be challenging. The outcomes themselves must be selected for the ecosystem and, if not already done at a bioregional or global level, must be identified and defined. At any level, there will be the question whether there is adequate data and science to get to sufficient precision, including life cycle impacts, to be standardized for market transactions. There will potentially be a very substantial number of outcomes to be defined and measured. The process for establishing the metrics, through international bodies, such as the International Standards Organization, for those that will not vary for individual ecosystems, such as greenhouse gases and other globally important emissions, will need to be phased so as not to overtax the bodies and individuals involved. For bioregional or ecosystem specific metrics, data may need to be gathered before metrics can be established. For social outcomes, such as employment, income, personal security, mobility, and community well being, measures will depend on agreements as to what constitutes desired outcomes and the activities that best achieve those outcomes. How valuable but immeasurable outcomes, like involvement in family

activities, are designed into the system as positive externalities will be challenging. Another challenge will be how to harmonize current and future trend indicators and transactional metrics.

Metrics for outcomes. The most familiar examples of existing metrics for outcomes are in the environmental field. The outcome of avoiding acidification of lakes in eastern U.S. and Canada has been addressed by creating a market for sulfur dioxide reductions, where emitters of more expensive to control SO₂ purchase credits earned by those who can control it more easily, under a declining cap. The cap is determined by scientific measurement of acid precipitation levels and acid content of lake water. The unit of measure is tons of SO₂ emitted from combustion sources. So the outcome of reduction in acidification is represented by the metric of the cap and the transactional metric is the ton of SO₂. These two metrics are all the market needs to have in order to exist (although there are many rules associated with assuring the integrity of the market and focus on the outcome). Life cycle science was applied in determining the downstream impact of the emissions on lakes, fish and other resources. It did not address the full life cycle impacts of the production of energy from combustion at the source of the emissions, which would have included all the environmental and social impacts from mining, processing, transporting and combusting the fuel (including impacts from carbon dioxide, mercury and other constituents in the emissions) and from operating the facilities and disposing of the residues. The challenge for IGF™ will be to develop similar metrics for all valuable outcomes, including social ones. Health, criminal justice, poverty and life cycle experts are increasingly trying to identify valuable outcomes and how to measure them, mostly to influence policy, rather than facilitate transactions. Social outcomes are tougher but not impossible to measure and create transactional metrics for. The social impact bond referred to in the Finance section of Chapter 3 for reducing recidivism in UK shows that it can be done. The number of asthma cases associated with residence within declining numbers of meters from certain highways and goods movement facilities is well documented. A market for reduction in asthma incidence, where industry and residents of the region pay contractors for reductions achieved would be similar to the social impact bond. That example is notable for its process of careful negotiation among all the interested parties on the metrics to be used in determining the payments received by the contractor. Ultimately, IGF™ might require an online encyclopedia of thousands of outcomes and their metrics.

Adequate data and science. While it seems the world is drowning in data, there is need for much more science and data to assure that outcomes are adequately described and measured and that life cycle impacts are fully accounted for. One of the most challenging needs is for metrics to account for both benefits and adverse impacts from integration--of both problems and solutions. For example, the cumulative, additive, synergistic and other effects of chemicals in humans and in nature is barely understood and extremely difficult to measure. Until more is known, a prudent outcome might be to avoid or minimize opportunities for such interaction. That outcome might be easier to describe and measure, in terms of levels in organisms with known effects. Having some outcome measure would make less toxic solutions for the product or service more valuable in the market.

Life cycle science. As noted, life cycle science is key to assuring that all impacts from investments and the products and services they support will first of all do no harm, will

adequately disclose all relevant effects and will avoid gaming by greenwashing. Life cycle science is still developing in the policy field and is having an increasing effect in disclosing the environmental impact of products through ecolabels created according to rigorous rules for each product category. In IGF™, both environmental and social impacts will need to be disclosed. With or without IGF™, investment by business, foundations and government in developing further both environmental and especially social impacts should be a high priority for assuring all development of infrastructure, manufacture of products and delivery of services will be as clean and harmless as possible.

Metrics at different levels. IGF™ embodies the subsidiarity principle, that is that solutions to problems should be devised and implemented at the lowest feasible level. Local outcomes can then be aggregated into regional and global ones. In developing metrics, the same principle should apply. Where local knowledge about resources, culture, people, employment etc. is superior to knowledge from away, it should prevail. Where outcomes have wide impacts and can be uniformly measured, then metrics should be developed at those higher levels. Assuring the integrity of both will require use of processes similar to those used to establish standards for other purposes, such as ISO standards. Locally developed metrics will use a negotiation process similar to that employed for the social impact bond to reduce recidivism.

Transactional metrics and indicators. Much of the work done in measuring outcomes to date has been for the purpose of developing indicators. The estimable work done by the Government of Bhutan in creating the Happiness Index and by Sightline for the Cascadia Region from California to Alaska are examples of high level indicators. They are designed to inform the public and influence policy makers to take individual and collective actions that will move trends in the right direction, and there are many examples of success. Many of the indicators used by these and other systems address outcomes for which transactional metrics must be developed in order for contractors to access the significant value of achieving them. For example, Sightline's pollution indicator measures the concentration of two types of long-lived toxic chemicals -- PCBs and PBDEs -- in human bodies, as manifested in mother's milk. An outcome that might be included in a transaction with a contractor in an IGF™ framework could be the reduction and eventual elimination of these and other bio-accumulative toxins in the bodies of the population of the region. The initial target would be set using a process that identified the known sources of the pollutants, their concentration in the population and any life cycle impacts from setting the cap at more than zero and from any strategies proposed to reduce those concentrations. The contractor would be paid for achieving agreed upon reductions and bonuses for getting lower than the target. The contractor would also be paid for any other outcomes the strategies it selected produced in other areas like wellness and employment.

Positive externalities. Some very valuable outcomes like time spent with family and friends, and enjoying cultural activities, might be the subject of contract metrics. For example, a reduction in time spent at gainful employment would be a measurable outcome that would not only increase time available for personal pursuit but also produce multiple valuable and compensable benefits, such as increased overall employment, lower stress related illnesses and more cultural opportunities. Some personal and cultural outcomes might be harder to create markets for but could be compensated through contract bonuses from savings elsewhere.

5. EQUITY RELOCATION. One of the major benefits claimed for is the early and rapid relocation of equity trapped in unsustainable assets like fossil fueled power generation into cleaner platforms provided through radical efficiency and renewable resources. The size of the problem on a global basis is huge, but would be less challenging on an ecosystem or bioregional basis. Still, large amounts of capital may be needed initially to persuade the first movers to agree to make the switch. What size of bond over what term will be needed? Will alternative systems be attractive enough to overcome resistance to change by asset owners, workers and communities invested in the old? Will clean and equitable systems be available soon enough to allow markets to capture the delta between them and the old system? Will some form of equity relocation insurance be necessary to assure asset owners that the new systems will work as designed? Will the cost of relocation come down as more and more asset owners seek funds for relocation?

Size and term of bond. This will depend on the number and value of the assets and systems to be relocated, the extent and value of the benefits created by early retirement of those assets, the term over which those benefits will be realized and the value of the new infrastructure required to produce the outcomes contemplated by the plan and contracts.

Incentives to owners and workers. The plan and contract will need to provide the expectation that revenue streams from the leveraging of old assets into new will be satisfactory, even if in some cases they may be lower than before but subject to less risk of forced retirement from regulatory change or other factors. Workers' expectations for secure, adequately paying jobs in the new system and during the transition to it may need to be met by commitments to providing temporary work and training for new skills. Investments of the bond in new systems that benefit communities where infrastructure is being retired and relocated will have to be sufficiently robust to overcome concerns that the community will be damaged.

Duration of transfer of equity process. The time it takes to transfer old infrastructure and systems to new ones will be a critical element of the contracts. It needs to be done in a way that allows the earliest possible redemption of the benefits gained by early retirement, for example, pollution credits from closing a combustion source. It must provide the shortest time for replacement or new assets or systems to come on line to create new jobs and revenue streams.

Equity relocation insurance. Insurance to assure that revenue streams and jobs will be available for some time in the event that relocation takes longer than anticipated would be a possible way of making it easier for owners and their employees and the community to support the process.

Decline in cost of relocation. Presumably the cost of relocation will decline as the first movers show it can be done, the risks of not taking advantage of it rise and the markets respond to the greater values from the new system.

6. BOUNDARIES/SCALE. How will boundaries of ecosystems and bioregions be established? Will bioregions and ecosystems naturally fit into the basin/watershed framework? How will effects that cross multiple basins be incorporated?

Establishing boundaries. Consensus that watersheds are preferred regions would be desirable. That would allow the system to be extended to the entire planet on a consistent basis. Existing jurisdictions need not be phased out. Like any service district the functions of the planning and financing entity could cross traditional district lines. In some cases, it may make more sense to begin with the service territory of the candidate infrastructure to be relocated, but protecting and enhancing watershed services should be incorporated into the planned outcomes. Where more than one basin may be involved, compacts, treaties or agreements will be needed.

Tiering. Watersheds as the basic unit would allow tiering of environmental outcomes in logical ways into entire basins. That should not interfere with tiering of social outcomes along traditional jurisdictional lines where that makes sense.

7. PHASING. What are the candidate regions to initiate and demonstrate the concept? Should there be a competition? Will national governments be willing to assist the first adopters with investment of sovereign wealth or other funds in lieu of or in addition to bonds? In the absence of robust markets for bundled outcomes, what provisions can be made to bank them until markets are developed?

Selection of candidate regions. Initially, demonstration projects should be determined by the potential regions/watersheds deciding to pursue one or more elements of the new system. If there are multiple candidates and potential investors so determine, a competition could be healthy.

Public investment. The public investment of funds for one or more projects might help demonstrate the concept, but should not be seen as a necessary component of future projects.

Banking of outcomes. Once outcomes have been described and defined, and consensus metrics developed, it would make sense for public and private cooperative efforts to find a way to bank them until markets are sufficiently developed.

8. CULTURAL. Can IGF™ succeed without transformation of individual and community consciousness to value quality of life over increasing consumption and material throughput? Can it be a part of that transformation?

Transformation of culture. The outcomes that IGF™ intends to facilitate are more valuable the earlier they are pursued. The use of finance to induce the early retirement of unsustainable assets and systems is designed to allow the business sector to lead the transformation to a cleaner, more equitable society. Once in the system, it will be to businesses' advantage to produce as many beneficial outcomes as possible, in order to gain access to capital and new markets. The transformation does not need to wait for a new consciousness, because the business sector will be fully engaged in producing the outcomes people have decided they want.

9. POLITICAL. Can IGF™ get started without transformation of politics from money driven to concern over values and outcomes?

Transformation of politics. Because IGF™ provides a means for businesses to trade in their old unsustainable platforms for new ones that are more secure and ultimately more valuable, business will be increasingly interested in influencing politics to assist in the transformation of the economy to one dominated by beneficial outcomes and universal values.

Conclusions from comparative analysis

Our conclusion is that no single solution we looked at satisfies all of the Core Attributes. Some did better than others. Most dealt with global or regional/local issues, but not both. Few specifically addressed intergenerational outcomes, although a number mentioned the need to do so. Most were concerned with single issues or sectors, without a plan or mechanism for integration of outcomes across social, economic and environmental outcomes sectors, or even within individual sectors. Rigorous science was absent from most, either in setting goals or standards or in measuring whether outcomes have been achieved. Other than the World Sustainable Business Council's Vision 2050 and Reinventing Fire, they do not have a stretch deadline for achieving their goals. Few addressed governance or institutional issues, asserting or assuming that substantial political change will be needed in order to develop the right institutional framework. Financing is often assumed to come largely from the public sector, with enhanced revenue. Few put business solutions first. None other than IGF™ have a plan for financing that raises sufficient capital and revenues to retire large unsustainable assets early. None have a clear pathway toward political viability of the proposed solutions. While IGF™ is structured to address all the Core Attributes, there are substantial questions about whether it will be feasible to develop contract metrics for sufficient outcomes soon enough to enable enough robust markets for outcomes to develop and pay for them as well as for debt service on the bonds.

CHAPTER 5: CONCLUSIONS AND NEXT STEPS

Conclusions

1. There is a clear need for whole system, integrated solutions that can accelerate the transition of local, regional and global economies to enable humans to thrive in harmony with nature both now and in the future.
2. No one system to date has been implemented or proposed that can credibly bring about that transition at the speed and scale required.
3. A combination of solutions based on the best parts of all the studied solutions groups is theoretically possible and certainly desirable.
4. IGF™ as a whole system solution, with its innovations in governance, markets for life-cycle measured outcomes, early retirement of problem assets, and long-term finance for business-led solutions, including sale of local outcomes to global markets, has promise and should be studied and demonstrated along with the best of the other solutions.

Next Steps

The first step is to offer the ideas for a new operating system for today's economy for review by interested people, starting with the conference on June 5 and 6, 2012 at Portland State University, in Portland, Oregon.. This will undoubtedly generate requests to clarify the concepts underlying IGF™ or to expand analysis of it and other systems or to look at other ideas we may have missed that can answer the crucial questions more robustly.

We would also like to see communities, watersheds, or regions volunteer to demonstrate some of the innovative tools in IGF™, even if the lack of complete metrics for the full range of valuable outcomes precludes a full scale demonstration. For example, a proposed redevelopment proposal might include one or more of the following elements:

- The creation of a significant capital fund, perhaps through a state or municipal bond, designed to produce valuable and measured integrated outcomes. The bond proceeds could be invested in retirement of one or more troublesome assets like a fossil fueled power plant or fleet of diesel engines and reinvestment in clean, efficient systems.
- Identification of the measurable benefits of integrated investments, for example: wellness, employment, security and ecosystem outcomes from replacement of energy from a fossil powered facility or a hydroelectric dam by investments in efficiency and renewable energy, but also in education, training and other socially useful activities that have potential returns on investment.

- Accurate measurement of those possible benefits insofar as possible in units that can be standardized for ultimate sale to purchasers within or outside the boundaries of the demonstration area.
- Repayments to the fund from a variety of revenue sources, including the direct sale of electricity and efficiency services, as well as the sale of measured outcomes to insurers, governments, organizations, foundations or others, including residents of the region benefitting from the redevelopment, new jobs and other services. The fund would be available over an appropriately long-term to allow for sufficient revenue to accrue to pay for the benefits from early retirement.
- The creation of an entity that represents future generations, and plans and implements new systems. Among other things, it would solicit proposals for local redevelopment through partnerships among business, government and others and enter into contracts with the partnerships that make capital from the fund available to them to produce intergenerational services. It could provide the service of aggregation of validated outcomes for sale where external markets for standardized outcomes exist and as new ones emerge. The entity performing these services could be an existing utility or other existing organization, ideally with democratic governance, with protocols to assure quality of measurement and a process for monitoring and verification of outcomes delivered under the contracts, with changes to assure the integrity of the selection and measurement of desired outcomes.
- To complement this fund, a pilot partnership with the federal government to demonstrate the efficacy and cost effectiveness of an integrated life cycle approach may also be feasible. Since the Federal budget carries much of the burden of long term failures in wellness, education and employment, agencies may be willing to invest in local outcomes that deliver budgeted services at lower cost.

Another next step would be the creation of a center at PSU to continue research into innovative finance for redevelopment for long term benefit for people and nature. In addition to research, the center would:

- assist communities or regions both in the Northwest and around the world interested in using the tools described in this paper.
- develop partnerships with other institutions around the world to develop the metrics required for valuable outcomes that are currently unmeasured and unmarketable.