THE IMPACTS OF INTERNATIONAL AID ON THE ENERGY SECURITY OF SMALL ISLAND DEVELOPING STATES (SIDS): A CASE STUDY OF TUVALU

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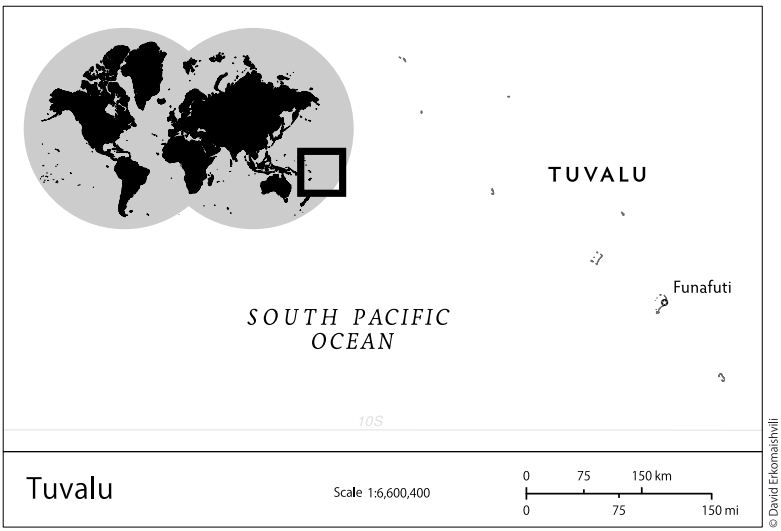
Abstract: *Tuvalu is a small island developing state (SID) with least developed country (LDC) status. The island has gained international attention due to the threat to its land territory as a result of climate change and subsequent sea-level rises. At the United Nations Climate Change Conference, held in Copenhagen in December 2009, Tuvalu was described as being at serious risk of becoming the first state to become uninhabitable due to the impacts of climate change. The majority of climate change scientists agree that a key driver of climate change is the burning of fossil fuels, predominantly for energy production. Energy security is multifaceted and connections can be drawn between the energy demands of the wealthier, industrialised states and the less developed states that are experiencing the detrimental impacts of the meeting of these demands. For Tuvalu, the lack of access to adequate, affordable, reliable, safe and environmentally benign energy is a severe development constraint. Currently, Tuvalu is close to being a totally oil dependent economy (83% of primary energy), whose energy security is dependent upon foreign aid to ensure its ability to pay international oil companies. Costs of all imported goods are exacerbated by its geographical isolation. This paper analyses the impact of international aid on energy security in Tuvalu and comments on the Tuvaluan Government's commitment to 100% renewable energy – "being carbon neutral" – by 2020. Although this is a commendable aspiration it is clear that even if Tuvalu were to end reliance on fossil fuels it would still be at risk of disastrous inundation unless the industrialised states radically reduce their own dependency on such fuels and dramatically reduce the global levels of greenhouse gas emissions.*

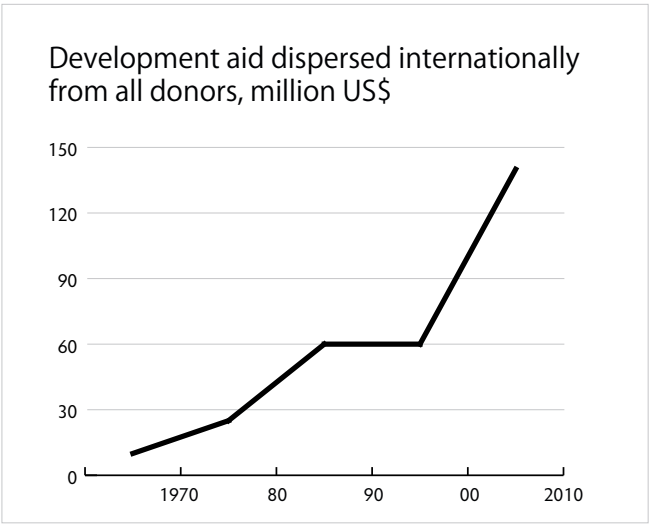
Keywords: aid, bioenergy, climate change, development, energy sector, energy security, natural resource, renewable energy, Tuvalu



Located 1100km north of Fiji, Tuvalu consists of nine atolls with a total landmass of 25 km² spread over an exclusive economic zone (EEZ) of around 750,000km². The physical characteristics of SIDS have enormous consequences for their economy. For example, there is no economy of scale for land-based production and due to transportation costs by the time any goods for export reach the international market they are very expensive. In addition, again due to high costs of transportation, any goods that are imported are also expensive and subject to disruptions in supply.[1] In Tuvalu, two inter-island boats service the eight outer-island settlements. Tuvalu's total population is around 11,000 and population density is high around 423 people per km² across Tuvalu as a whole and 1,610 per km² in Funafuti.[2] The copra market collapsed in 2002, so subsistence-farming households are increasingly reliant on remittances from family members working overseas.[3] The flat low-lying islands of Tuvalu make this tiny nation highly vulnerable to climate change impacts. Many NGOs and international organisations have run awareness campaigns in Funafuti, and Tuvaluan people appear to be alert of climate change issues.[4]

From an international perspective the particular environmental and development challenges faced by SIDS have been recognised. In 1994 the UN convened the first Global Conference on Sustainable Development of SIDS. This resulted in the Barbados Action Plan with fifteen priority areas, including energy resources. The *xx*
emphasis on the energy sector was designed to both reduce the financial burden on fuel importation, and shift the means of energy production towards more renewable sources. The text of the Action Plan is strong on aspiration but somewhat weaker with regard to the specifics and practicalities of implementation. The energy resources aspect of the plan is divided into a *Basis for action; National action, policies and measures; Regional action* and *International action*. The emphasis of the Plan appears to be geared towards creating a self-serving institutional framework. This criticism has been levelled at many aspects of the UN's Earth Summit process. There are Conferences of the Parties for the conventions on both climate change and conserving biodiversity, which have created their own momentum and a certain element of their targets, are met by simply having meetings. For example, the Barbados Action Plan Statement on Energy asks national governments to 'Implement appropriate public education and awareness programmes, including consumer incentives to promote energy conservation.'[5] Most Pacific Islanders are very aware of the rise in sea-level associated with climate change driven by the use of fossil fuels. They are also aware of the need to conserve energy supplies, especially as energy prices have risen dramatically. However, raising awareness is not the issue. The national action section of the Plan says nothing about the practical implementation of renewable energy schemes or any activity that would reduce energy poverty or increase access to a secure and sustainable energy source.

Figure 1. Development aid dispersed internationally from all donors (total million US$) from 1970 to 2010.



Source: OECD international development statistical database (http://stats.oecd.org/qwids)

There has been a marked increase in total development aid since 2002 (Figure 1). In September 2000, the UN adopted the Millennium Declaration which set a range of development goals. These goals (MDGs) included

1. End poverty and hunger;
2. universal education;
3. gender equality;
4. child health;
5. maternal health;
6. combat HIV/AIDS;
7. environmental sustainability and
8. global partnership.

Each of these has a target to be reached by 2015. Energy security is noticeably absent from this list, although there is an argument

that it is something required to underpin all of the above goals and targets.

Following the Millennium Summit of 2000, the UN convened a further World Summit in 2005 and a High Level Event on the MDGs in 2008 to assess what progress had been made towards meeting the various targets. Although there has been some progress made in each of the designated areas, most are falling short of the desired outcome despite the marked increase in development aid shown in Figure 1.

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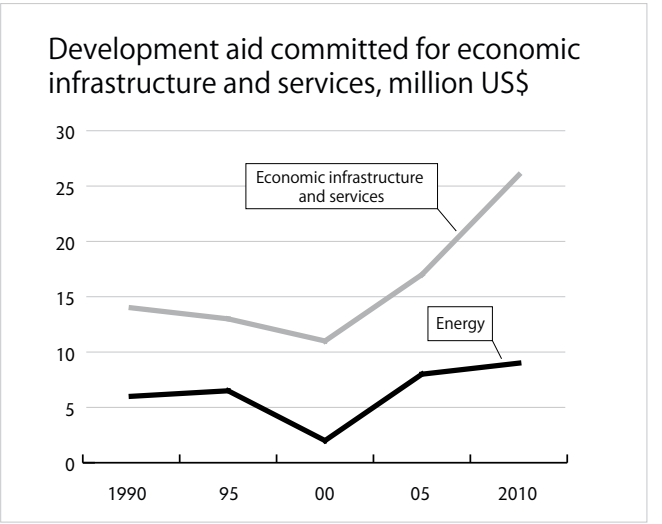
Various donors will have their own priority areas. There are also some very vocal critics of the whole development aid agenda, such as Dambisa Moyo.[6] The main criticisms tend to focus on a dependency culture developing, an increased risk of corruption and mismanagement of funds due to a lack of transparency and accountability and the general lack of mechanisms to facilitate performance feedback and revision of aid effectiveness. Of course these criticisms with regards to transparency and mismanagement of funds do not only apply to development assistance. There is a growing campaign to ensure that funds generated by natural resources and mineral extraction are more open to public scrutiny. The NGO Revenue Watch is at the forefront of calling for legislation to improve transparency of stock exchange transactions.[7] If achieved, this has the potential to create a greater sense of the two-way process of wealth creation and transfer. The critics of development aid budgets tend to overlook the overall patterns of trade and cash flows between the more and less developed economies. The vast majority of wealth travels from the developing to the developed economies.[8] In this broader context the debate surrounding the amount of aid "given" to the developing world creates an alternative perspective. Additionally, in industrialised countries tariff protection for agricultural products is higher than for manufactured products – around nine times higher when aid dispersed began to increase, as per Figure 1.[9] Tariff protection obviously puts many developing nations at a disadvantage where they rely on exporting agricultural products as a substantial contributor to their GDP. Industrial countries also subsidise their agricultural sectors. This has the effect of depressing world prices and pre-empting markets, putting developing countries at a severe disadvantage. For example, in the 1990s the European Commission was spending around €2.7 billion per year making sugar profitable

for European farmers and shutting out low-cost imports of tropical sugar.[10] This had deleterious effects on the sugar exports for SIDS such as Fiji and Mauritius. Mauritius turned this situation around by using bagasse and excess sugar to produce electricity (via cogeneration) and bioethanol for use as a petrol substitute. Fiji, however, did not follow the example of Mauritius and their export market for sugar has yet to recover. Although both are ACP countries and had defined export quotas for the EU under the Sugar Protocol of the Lomé Convention, prices paid for the quotas were not protected. This point reinforces the structural disadvantages and imbalances facing many developing economies.

The example of Tuvalu is a very small entity in the overall global political economy of international trade. There are a relatively small number of exported goods in comparison to imports and development assistance. Some sub-Saharan states have lower per capita rates of development assistance than the Pacific region, and also export significantly higher-value exports of both natural resources and export crops. A much higher percentage of Tuvalu's GDP is in the form of development assistance in comparison to the majority of sub-Saharan states. This raises questions regarding the effectiveness of aid programmes in the Pacific region if a higher proportion of aid is being directed here, yet there appear to be relatively poor levels of improvement in the targeted areas. In addition to the disparities in the amount of aid given to sub-Saharan and Pacific Island states there is also a qualitative difference. For the sub-Saharan states the emphasis tends to be on basic needs such as food security and health. Whereas in Tuvalu and other Pacific Island states the emphasis is more on developing infrastructure and supporting the bureaucracy and delivery of government services.

The following section examines the position of energy as a donor priority in relation to development assistance for broader economic infrastructure.

Figure 2. Development aid committed for economic infrastructure and services



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Source: OECD international development statistical database (http://stats.oecd.org/qwids)

The Organisation for Economic Cooperation and Development sector category *Economic Infrastructure and Services* includes economic infrastructure, transport and storage, communications, energy, banking and finance, business and other services. From 1990 to 2009, aid committed for *Economic Infrastructure and Services* accounted for between 29% (in 1991) and 12% (in 2005) of total international aid. From 1990–2009, aid committed for *Energy* has accounted for between 11% (in 1991) and 4% (in 2005) of total international aid.[11] In recent years, much of the aid available for energy services has been for policy development. So in real terms the proportion of aid for practical sustainable energy projects, which deliver energy services to the rural poor, has declined markedly. As the Tuvalu case study shows much of the multilateral aid money available for energy projects in the decade of 1995–2005 was spent on energy policy. Yu and Taplin have argued that energy security issues have not been prioritised with a resulting negative impact on 'social and economic development and environmental protection.'[12]

The current emphasis of multilateral overseas development assistance (ODA) on energy policy development owes much to the fact that in the 1990s development aid related research and analysis highlighted the lack of consensus and ineffectiveness of past aid programmes and espoused the virtues of policy development. For example, a World Bank assessment concludes: 'policy-based aid should be provided to nurture policy reform in credible reformers.'[13] This is a welcome development but remains meaningless unless it results in a marked improvement in the implementation of development aid projects. Where aid is spent in accordance with policy, progress is usually made. However, as the following analysis shows, aid is not always spent in accordance with policy.

A comprehensive National Energy Policy Framework (including Strategies and Activities) was developed by the Ministry of Works and Energy, Government of Tuvalu and National Workgroup, as part of the Pacific Islands Energy Policies and Strategic Action Project.[14] This project was facilitated regionally by SOPAC (from 2003 to 2006), and cost over $1,800,000 (USD). Funding agencies included UNDP-GEF and the Government of Denmark via a partnership between the Pacific Islands Forum Secretariat and the European Union Energy Initiative for Poverty Eradication for Sustainable Development (EUEI).

Prior to this, at the World Summit on Sustainable Development in 2002, Pacific Island Countries (PICs) launched a regional energy sector umbrella initiative: Pacific Islands Energy for Sustainable Development (PIESD). The objectives of this initiative were aligned with the objectives of the Pacific Islands Energy Policy and Plan (PIEPP) namely: 'i) Increased availability of adequate, affordable and environmentally sound energy for the sustainable development of all Pacific islanders; and ii) Accelerated transfer and adoption of clean and renewable energy technologies in the Pacific.'[15] These regional initiatives provided a broad energy policy framework, which PIEPSAP developed into national energy policy, strategies & activities. The Pacific Islands Greenhouse Gas Abatement through the Renewable Energy Project (PIGGAREP), which is currently being implemented, was designed as a practical follow-up to the PIEPP & PIEPSAP initiatives.[16] However, for many Pacific SIDS the efforts to devise appropriate energy policies, strategies and activities have yielded few results as far as PIEPP objectives are concerned re: adoption of renewable energy

sources and energy efficiency initiatives, and a move away from inefficient diesel generation technology.

The example of Tuvalu (section 3) highlights the disparities between the intentions of energy policy development and the actual implementation of energy provision on the ground. The reasons for this are a combination of international and external factors. At the local level politicians and most of the general population in the Pacific Island states are aware of the effects of climate change and the need for sustainable development. However, donors are not necessarily funding projects that are in line with national development priorities. This situation is particularly true for Tuvalu's energy policy and recent energy sector infrastructure development. For example, in 2004/5 JICA (Japan International Cooperation Agency) implemented three 180 diesel electricity generators. During the project planning phase discussions were held with NGOs, Government of Tuvalu (GoT) and engineers from Mitsubishi and DiNipon, who were the implementing agencies.[17] NGOs and GoT representatives lobbied for the generators to be able to run on coconut oil, but were told that the equipment required to do this was too expensive. As a result of this, in 2011 JICA were still paying for the fossil fuel to run the generators at a cost of one million (USD) per year.[18] This is a contentious issue as coconut oil biodiesel is an economically, culturally and environmentally sustainable fuel source for Tuvalu.[19]

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Table 1. Economic overview of Tuvalu

Year	2000	2003	**2005**	**2008**
GDP: Gross Domestic Product (million current US$)	12	-	25	32
Development aid contribution to GDP (million US$)	4	6	9	16
Development aid as a % of GDP	33	-	36	50
GNI: Gross National Income per capita (current US$)	1204	-	2383	3213
Available average income per capita (US$)	806	-	1525	1607
Exports (million US$)	-	0.15	0.1	0.1
Imports (million US$)	-	24	18.5	26

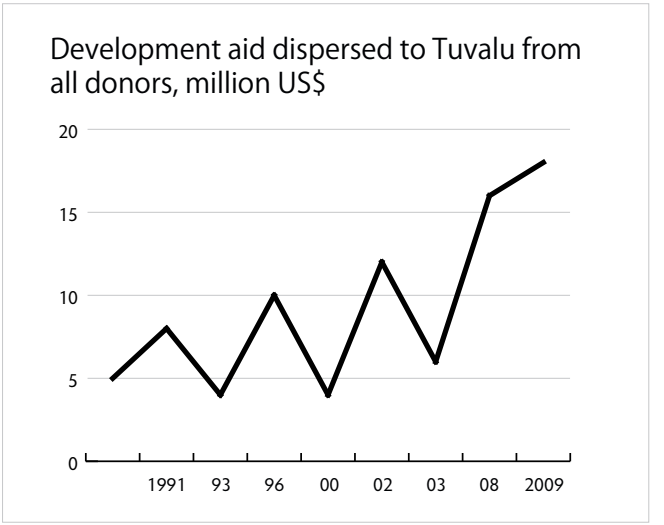
Sources: http://data.un.org/CountryProfile.aspx?crname=Tuvalu OECD international development statistical database (http://stats.oecd.org/qwids) and Government of Tuvalu[20]

Tuvalu's economy is small, disjointed and extremely susceptible to external economic influences such as changes in oil prices. These factors have led to dependence on outside development assistance and a disregard of financial management. Since the local currency is the Australian Dollar (AUS$), the Government of Tuvalu cannot effectively use monetary policy as a tool for fiscal management. In addition, changes in exchange rates affect externally generated revenue such as remittances from Tuvaluan seafarers working overseas. The subsistence economic sector has been declining steadily, by around 0.8% per annum and currently represents around 5% of GDP.[21] Declining subsistence production is part of broader trends such as the growing importance of cash in meeting daily needs; declining outer island populations (excluding Funafuti and Vaitupu) and shifting demographics. This is because the 'economically active population' (aged 15–54) are leaving the outer islands to find paid jobs to support an increasing 'dependent' population of young and old.[22]

Currently foodstuffs represent around 25% of Tuvalu's imports and fossil fuels around 19%. Imports of fossil fuels are a major drain on foreign exchange resources and supply remains vulnerable to disruptions, especially in outer-islands due to transportation difficulties.[23]

Across Tuvalu, mode and average income per day ranges from $1.6 to $4.0 (USD) (Table 1), so the vast majority of people are living in energy poverty; 76% of those in the lowest income deciles live on the outer islands. 23% of the total population of the outer islands live on less than $1 (USD) per day. Household expenditure on domestic energy services currently represents 21% of total current household income on outer islands, and those in the lowest income deciles on Funafuti in theory would need to spend 61% of their total income to buy average level energy services. On the outer islands, diesel electricity generation is limited to between 12 and 18 hours a day. Electricity use in Funafuti is 6 to 7 times higher than on the outer islands combined. There is severe disparity in energy service provision between Funafuti and outer-islands.[24] In addition, many people in Funafuti cannot afford to use electricity, despite the introduction of a "life-line" tariff in 2008.[25]

Figure 3. Development aid dispersed to Tuvalu from all donors (total million US$) from 1990 to 2009



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Source: OECD international development statistical database (http://stats.oecd.org/qwids)

Tuvalu received $16.2 million (USD) in development aid payments in 2008, which accounts for half of its GDP (Table 1 and Figure 3). From 2003-2007 JICA provided $9 million (AUS$) for the installation of three 600kW diesel electricity generators, a new grid and connections to all houses in Funafuti. Since 2006 JICA have provided between one and two million (AUS$) to pay for diesel for the generators.

Bilateral donors, such as RoC-Taiwan, JICA, New Zealand Aid, AusAid and Canada Aid have tended to fund GoT or community requested "concrete" projects and infrastructure. In contrast to this, over the past decade, regional and international organisations (such as United Nations Development Program (UNDP) and Global Environment Facility (GEF), South Pacific Applied Geosciences Commission (SOPAC), Pacific Islands Forum Secretariat (PIFS), South Pacific Regional Environment Programme (SPREP), (etc) which all rely on multilateral aid), appear to have focused their development assistance on the formulation of policy frameworks

and energy policy development. Since 1999, energy policy efforts have had some degree of coordination via the regional organisation CROP – Council of Regional Organisations of the Pacific Energy Working Group.

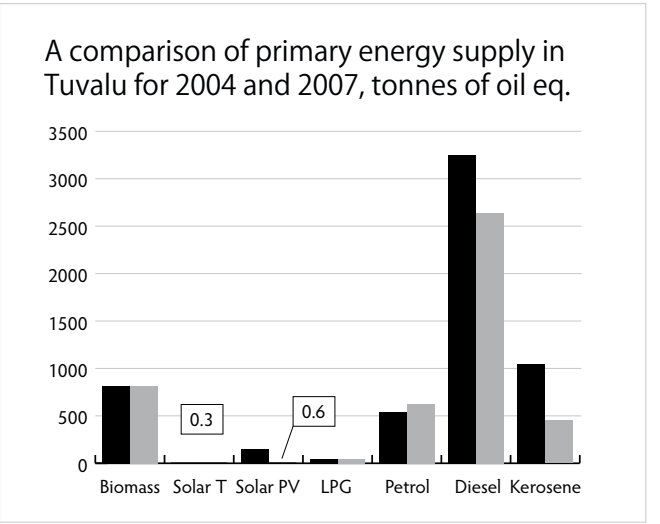
Figure 4 shows that in 2004, the total energy consumption was 4.6 ktoe, with oil accounting for 3.8 ktoe (82%) and biomass for 0.8 ktoe (18% of the total primary energy consumption.[26] This includes diesel charged by the two inter-island vessels (Nivaga II and Manu Folau) in Suva, Fiji. Annual energy consumption in 2004 was approximately 0.4 ktoe per capita.

By 2007, the total energy consumption had increased to 5.8 ktoe, with oil accounting for 4.8 ktoe (83%), biomass for 0.8 ktoe (14%) and solar 0.1 ktoe (2%) (Figure 1). Annual energy consumption in 2007 was approximately 0.5 toe per capita.[27] The kerosene use of 1045 toe in 2007 accounts for refuelling of the Air Pacific plane in Funafuti. From 2004 to 2007, petrol use decreased by 13% (Figure 1). This is mainly due to the impact of increased retail fuel prices. This has resulted in an increased use of "traditional" fishing canoes, rather than a large reduction in road vehicle use. The use of toddy ethanol to fuel small fishing boats could provide a viable role for toddy production.[28]

In 2004, a total of 1170 toe (36% of total national energy consumption) was used for domestic purposes, 91% of it (1070 toe) was used for cooking & boiling water. Biomass provided 64% (746 toe) of total domestic energy use, kerosene 23% (263 toe), electricity 10% (118 toe), and LPG 4% (43 toe). Solar energy provided 0.6 toe mainly for lighting and electrical appliances. These values have been estimated from in-country survey.[29] By 2007, a total of 1383 toe (25% of total national energy consumption) was used for domestic purposes, 88% of it (1213 toe) was for cooking and boiling water. Biomass provided 54% (746 toe) of total domestic energy use, kerosene 29% (401 toe), electricity 14% (193 toe), and LPG 3% (41 toe). Solar energy provided 0.6 toe mainly for lighting and electrical appliances (on Nuilakita the only electricity source is solar pv). These values have been estimated from in-country survey.[30] However, despite these increases in primary energy, there is relatively little impact

for those living on outer-islands, who remain up to 80% biomass energy dependent.

Figure 4. A comparison of primary energy supply in Tuvalu for 2004 and 2007 *xx*



In-country survey (2004-2009) (Woods et al. 2006; Hemstock, 2005; Hemstock, and Radanne, 2006; Hemstock 2010; Lifuka, 2009; Lotolau, 2009)

Source: In-country survey (2004–2009)[31]

Tuvalu is currently importing the vast majority of its energy (83%) in the form of fossil fuel, which is a major drain on foreign exchange resources. Without the annual AUS$2 million subsidy from JICA, electricity production on Funafuti would be economically unsustainable. Tuvalu's small size, remoteness, diseconomies of scale and the manner in which electricity tariffs are structured all contribute to an over-reliance on external aid programmes.[32] Obviously, in order for Tuvalu to improve its energy security situation, it must use its indigenous energy resources such as biomass, solar and wind.[33] However, as with fossil fuel technologies, renewable energy technologies (RETs) will require the capital costs of equipment to be covered by donor agencies.

Renewable Energy Technology Implementation (Tuvalu)

Tuvalu has had experience with renewable energy technologies (excluding traditional uses of biomass energy) since the early 1980s when 12v stand-alone solar photovoltaic (pv) systems were installed for domestic use. These systems ran well initially, but fell into disrepair when replacement components were needed. A "pay-to-hire" mechanism was implemented at the same time as the pv systems, with some families providing 100 coconuts per month for use of their system. However, these payments did not produce the revenue required to buy replacement components. In addition, safe disposal of spent batteries from solar systems proved problematic and lessons have been learnt from this. For example, the NGO Alofa Tuvalu is currently implementing low-tech domestic energy systems, such as biogas, along with extensive training for users so that repair and maintenance of systems can be carried out on site using available materials. In addition, new solar installations are grid connected and run by Tuvalu Electricity Corporation.[34] Tuvalu's capacity for wind generation is currently being assessed. For these recent renewable energy installations various approaches have been taken to ensure long-term sustainability of such as: capacity building via training and strengthening service provision; tariff setting; community involvement from the outset; appropriate technology which does not require the continuing intervention of foreign agency "Technical Assistance;" the build-up of a critical mass of similar apparatus throughout Tuvalu, so systems maintenance is cost effective; an integrated multi-disciplinary and multi-sector approach which builds on Tuvalu's existing infrastructure and institutions for service provision; and rigorous assessment of the natural resource base which can be sustainably accessed and harvested for use in the case of biomass energy projects.

Biomass is a fuel that people are familiar with and currently provides 64% of energy to the domestic sector.[35] However, although continued use of traditional biomass will provide for basic needs, it will not solve the problem of providing the modern energy services required for economic growth and improved living standards. It is apparent that the modernisation of biomass energy use, via biogas, biodiesel and gasification, will involve some social and cultural changes. In addition further political and techno-economic changes will be

required for successful implementation of the biomass energy initiatives discussed. The successful implementation of sustainable modern biomass energy schemes is certainly a major, but achievable, challenge for Tuvalu. The following table lists identified constraining factors for such schemes, plus strategies to overcome these constraints. *xx*

Box 1. Constraints on renewable energy technology adoption and strategies to overcome the constraints

Constraints	Strategy
Lack of appropriate technology selection – mainly due to a reliance on outside aid which has dictated technology options.	Technology selection must follow energy policy strategies and activities. Aid for energy applications must take into account PIGGAREP, PICCAP, PIREP & PIEPSAP recommendations and GoT Energy Policy/Strategy. Only appropriate and established RET's should be implemented. An international agreement signed by all UN members and bilateral funders, such as RoC Taiwan, which states that all funded projects will be in accordance with national and regional policy.
Lack of technical expertise and institutional structure to plan, manage and maintain RE programs.	Training is the key to this barrier. Any RE intervention must have an associated training program. In addition, Tuvalu's existing facilities (TMTI, Amatuku) should be strengthened to provide ongoing training & back-up. All interventions should have an agreed management & economic plan, possibly with the set-up of a dedicated or strengthening of an existing (Tuvalu Electricity Corporation) service provider, as part of any project exit strategy.
Ineffective long-term management.	To be effective training must be given in organisational structure & accountability. A service provider needs to be set-up for any energy services. Dedicated specialist units with technical & financial expertise would be most beneficial. Regional accountability & provision of expertise may also be a useful role for existing regional institutions.
Misguided institutional mechanisms – including badly targeted subsidies and legislation which limits consumer choice (e.g. JICA fossil fuel subsidy; Funafuti electricity regulation – all electricity use has to be via connection to TEC; diesel fuel is duty and tax free for power generation; subsidised TEC tariffs.	Any legislation should at least provide a level playing field for all sources of energy. RET's reduce pollution & GHG emissions firstly by replacing polluting fossil fuels & secondly as they are zero net carbon emitters when used sustainably. Using bioenergy would revitalise Tuvalu's copra industry and help reach GHG commitments. It therefore makes sense for Tuvalu to introduce institutional mechanisms which favour renewables. Assisting with subsidy targeting and energy related legislation is a clear role for existing regional institutions. Although a National Energy Strategic Plan has been developed via PIEPSAP/PIREP, no help with existing legislation or targeting incentives has been given in order to alleviate RET implementation difficulties related to existing legislation and subsidies.

Requirement for complex project proposals by financing institutions and lack of awareness of available funding.	Reduce complexity. Additional training and support for TANGO (Tuvalu Association of NGO's), TEC and GoT. Engage the skills of international funding institutions and NGOs to help prepare funding requests. An internet based network/forum to provide further information on available funding. A business co-ordinator/ business development centre to appropriate funds for projects. These are all roles for existing regional institutions.
Focus of funding organisations on "market development" and "policy."	Re-focus on practical installation of RETs. The "market" will never be self-sustaining in a SIDS such as Tuvalu as there is no economy of scale, no export products and US$2 mode and US$4 median income per day. Tuvalu's energy sector is aid dependent and will remain so for the foreseeable future. Development of energy policy which supports RET implementation is pointless unless funders agree to follow it.

Discussion and Conclusions

To assess the final outcomes of this "policy-based" multilateral approach to development aid for energy, a future analysis of SIDS energy sectors will be required. However, it is apparent at this stage that there has been no success in increasing the renewable energy contribution to the national energy budget of Tuvalu, nor have there been any effective moves towards more efficient generation or end-use technologies. In addition, in contrast to the rhetoric surrounding the "policy-based" approach, Woods (et al) showed that successful RET implementation in SIDS was often due to the skill and enthusiasm of a few individuals, focused NGOs and entrepreneurs, rather than regional strategies, reports, feasibility studies and policy implementation.[36]

Tuvalu's decision-makers are aware of the value and potential of Tuvalu's indigenous energy resources. Unfortunately, they do not control the capital or have the capacity to capitalise on indigenous resources as a means of sustainable energy provision.[37] At the UNFCC Cop16/CMP6 (Bangkok, July 2009), the then Minister for Public Utilities and Industry, the Hon. Kausea Natano, declared: 'We look forward to the day when our nation offers an example to all – powered entirely by natural resources such as the sun and the wind,' and set a goal of having all Tuvalu's energy from renewable resources by 2020. Clearly, there is political backing of renewable energy technologies, at least intellectually. In practice however, the

picture is very different as per Figure 4. Tuvalu's balance of payments, and resulting dependency on overseas aid programmes, makes it very difficult to translate the well-intentioned aspirations of a fossil fuel-free future into a reality. Failures are not due to a lack of political will, and successes (though limited) are not due to policy formulation. Tuvalu's energy security is aid dependent – the majority of recent energy sector infrastructure has been paid for by external development aid. Subsidies which encourage the use of fossil fuels are also currently in place, such as the JICA donation to cover fuel costs of diesel for electricity generation. To improve energy security, aid has to be spent in line with needs, and with a view towards sustainability. In addition, multilaterally funded regional efforts to encourage renewables have previously placed much of their emphasis on policy and "market development" rather than practical help and actual RET installations, such as the e8 (which comprises ten leading electricity companies from the G8 countries) 40 kW grid-connected solar system in Funafuti.[38]

A pro-active role for existing regional institutions would be to assist with subsidy targeting and energy related legislation. Although a National Energy Strategic Plan has already been developed for Tuvalu via PIEPSAP, no help with existing legislation or targeting incentives has been given in order to alleviate policy implementation difficulties related to existing legislation. This oversight appears to indicate that there are inherent difficulties in applying relevant one-size fits all policy/strategic actions by regional organisations at a regional level. Since, although the National Strategic Energy Plan was targeted specifically at Tuvalu's needs, it did not account for Tuvalu's specific existing legislative and policy frameworks.

Despite the activity of the "alphabet-soup" of organisations and multilateral programmes active in the region, there is little evidence of successful practical grassroots initiatives, which actually improve access to renewable, or even just plain affordable, energy service provision for the rural poor of Tuvalu and other Pacific region SIDs. Currently, on a regional basis, it may be a case of "too many cooks spoil the broth," rather than "many hands make light work." Very little funding appears to filter down to actual practical initiatives. For example, PIGGAREP (the practical regional follow-up to the PIEPP and PIEPSAP), has only committed $16.2 million (USD) to projects that will directly increase RET generation capacity

and energy security out of a total budget of $33.3 million (USD).[39] Conversely, much time and effort goes into preparing national and regional reports, strategies and feasibility studies, and study after study appears to be generated with no apparent intention of following through on the findings. The streamlining of regional organisations and multilateral programmes appears to be necessary to allow limited development funds to be spent on practical solutions to energy security and the alleviation of energy poverty, rather than on allowing organisations to "feed themselves" by generating reports and feasibility studies. In addition, for countries such as Tuvalu, with limited capacity, the application processes which need to be completed in order to access funds are so torturously complicated that the funding organisations need to send a costly technical assistant to help with the application.

However, the development of regional and international *streamlined* support will be necessary to establish technical support and capacity to underpin the successful development of *practical* biomass energy projects and programmes if Tuvalu is going to achieve its carbon neutral target by 2020. This will be necessary in order to:

1. Promote the development of clusters of projects based around similar production, supply and conversion pathways with the aim of developing entrepreneurial capacity to carry out maintenance, repair and development of systems.
2. Establish academic research and development programmes in Universities (preferably at local level utilising in-country campuses) and linkages with international groups and the private sector already involved in bio-energy research and development in order to avoid re-inventing the wheel.
3. Ensure that multilateral and bilateral aid for the energy sector is in line with national energy policy and legislation.

The above discussion has highlighted a key element of the power dynamics that underpin international aid programmes. Much of the rhetoric surrounding such programmes is about raising awareness and community education agendas, yet in many instances local communities are fully aware of the problems they are facing and have a good sense of the measures required to address these problems. Tuvalu gained international attention when GoT representatives highlighted the extent and immediacy of the threat to low-lying atoll states at the UNFCC COP15 meeting in Copenhagen

in 2009.[40] GoT officials and the wider Tuvaluan community are not in need of a further set of workshops to raise awareness relating to the issue of climate change. They need direct practical assistance to reduce their reliance on imported fossil fuel. However, even if such plans were implemented this in itself would not significantly reduce the threat of sea-level rise. Tuvalu's contribution to global greenhouse gas emissions is miniscule when compared to the major industrialised economies. Without a major, meaningful commitment and resulting action to reduce such emissions, whatever policies Tuvalu attempts to enact will have little practical impact.

If past RET experience in the region is going to be built upon, and lessons learned, it is evident that a streamlined programme (with simple funding application requirements) for developing practical regional and national RET initiatives is required to assist the process of successful project development and implementation. This will also require significant community, local political and focused practical support. As there is no silver bullet solution to implementing RET strategies, each project should be developed and assessed on a case-by-case basis.[41]

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