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Distributed Generation: How Localized Energy Production Reduces Vulnerability to Outages and Environmental Damage in the Wake of Climate Change

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DISTRIBUTED GENERATION: HOW LOCALIZED ENERGY PRODUCTION REDUCES VULNERABILITY TO OUTAGES AND ENVIRONMENTAL DAMAGE IN THE WAKE OF CLIMATE CHANGE

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I. INTRODUCTION

In 2005, our nation's energy infrastructure faced a mighty challenge when Hurricane Katrina struck the Gulf Coast. More than 1.7 million people in the Gulf states lost power, and it took utility companies several weeks to restore service to their customers.[1] Five years later, disaster struck again when an explosion on the Deepwater Horizon offshore oil rig released 205.8 million gallons of oil into the Gulf of Mexico.[2] The environmental disaster devastated the Gulf Coast and brought the region's offshore oil operations, as well as its fishing and tourism

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[1] NAT'L OCEANIC & ATMOSPHERIC ADMIN., HURRICANE KATRINA, www.ncdc.noaa.gov/special-reports/katrina.html (last updated Dec. 29, 2005).

[2] NAT'L OCEANIC & ATMOSPHERIC ADMIN., GULF OIL SPILL, www.education.noaa.gov/Ocean_and_Coasts/Oil_Spill.html (last updated Apr. 10, 2011). *See* Jeremy Repanich, *The Deepwater Horizon Spill by The Numbers*, POPULAR MECHANICS (Aug. 10, 2010, 12:39 PM), www.popularmechanics.com/science/energy/coal-oil-gas/bp-oil-spill-statistics.

industries, to a standstill.[3]

These monumental disasters sounded alarms, warning us that our country's centralized, large-scale power grids, running primarily on coal, natural gas and oil, were all too prone to catastrophic failure. With the aftermath of natural disasters only worsening as a result of climate change,[4] every region in America is susceptible to blackouts.[5] The Midwest battles tornadoes for half the year and winter storms for the other half,[6] while seismologists postulate that the West Coast is long overdue for an earthquake akin to Chile's 8.8-magnitude quake of 2010 and Japan's 9.0-magnitude quake of 2011.[7] Natural disasters of all degrees are often accompanied by widespread blackouts and fallen power lines, the effects of which may be felt for weeks by a nation that relies so heavily on electricity.[8]

Unfortunately, natural disasters are not the only cause of massive blackouts.[9] In September 2010, a downed transmission line between Arizona and Southern California left nearly five million people without electricity in the face of record-high temperatures in Arizona, California, and Mexico.[10] These accidental outages are merely a symptom of a much larger problem: a poorly configured infrastructure that wastes energy and underutilizes valuable resources. At the capstone of the infrastructure's pyramid of problems is the troublesome truth that our reliance on exhaustible energy sources cannot sustain itself in the face of climate change and a perpetually-increasing international demand for energy.[11]

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[3] *See* Harold F. Upton, CONG. RESEARCH SERV., THE DEEPWATER HORIZON OIL SPILL AND THE GULF OF MEXICO FISHING INDUSTRY (Feb. 17, 2011), *available at* www.fas.org/sgp/crs/misc/R41640.pdf; U.S. ENVTL. PROT. AGENCY, AMERICA'S GULF COAST: A LONG TERM RECOVERY PLAN AFTER THE DEEPWATER HORIZON OIL SPILL (Sept. 2010), *available at* www.epa.gov/indian/pdf/mabus-report.pdf.

[4] *See generally Climate Change, Worsening the Aftermath of Natural Disasters?*, THE HUMANITARIAN FORUM, (Sept. 18, 2010), www.humanitarianforum.org/news.php/en/64/climate-change-worsening-the-aftermath-of-natural-disasters.

[5] *See* OFFICE OF TECH. ASSESSMENT, U.S. CONG., PHYSICAL VULNERABILITY OF ELECTRIC SYSTEMS TO NATURAL DISASTERS AND SABOTAGE 9–14 (June 1990), *available at* www.fas.org/ota/reports/9034.pdf.

[6] *Id.*

[7] *E.g.*, Susanne Rust, *Is California Next in Line for Big Quake?*, CALIFORNIA WATCH, CTR. FOR INVESTIGATIVE REPORTING (Mar. 16, 2011), *available at* californiawatch.org/dailyreport/california-next-line-big-quake-9242.

[8] *See* OFFICE OF TECH. ASSESSMENT, *supra* note 5, at ch. 3.

[9] *E.g., Southern California Hit by Major Power Failure*, NBC NEWS (Sept. 9, 2011, 1:21 AM), www.msnbc.msn.com/id/44446563/ns/us_news-life/t/southern-california-hit-major-power-failure/#.TxN2lvmwUQ8.

[10] *Id.*

[11] *See* JEREMY RIFKIN, THE THIRD INDUSTRIAL REVOLUTION 28–31 (Emily Carleton ed., 2011) (discussing the shortsightedness of America's reaction to the oil spill in the Gulf of Mexico in April 2010, how the continuance of "dangerous oil drilling expeditions in remote terrains yield an

America's outdated and problematic energy model requires drastic change, which can be accomplished by replacing massive power plants with localized energy production and delivery through a method known as distributed generation.[12] Distributed generation (DG)[13] is a self-sufficient energy production model that uses small-scale renewable energy sources to generate enough electricity to fuel individual demand.[14] Most notably, DG opens the door for the democratic participation of individuals who own and desire to own DG technologies to meet their own demands for electricity—upending the electrical utility industry's "natural monopoly" model that has drained ratepayers for decades.[15]

A modernized energy policy maximizing the use of renewable energy would make renewable energy more accessible to individual citizens.[16] At the individual level, incentive-driven DG policies make renewable energy technologies more economically attractive and profitable for the ratepayer.[17] On a larger scale, DG could enable America's densely populated urban communities to supply their own energy demand by making energy generation (supply) part of the interconnected urban community itself.[18] The vast potential that DG holds for improving the country's energy infrastructure has gone untapped, but the international fight over oil,[19] national goals for domestic energy security and self-reliance,[20] and the advancement of technology that is available for renewable energy growth all present America with a great opportunity for change.[21]

This Comment breaks down the working parts of America's energy infrastructure, assessing how the current model could be converted into one that is more efficient, cost effective, and environmentally sustainable. It looks beyond general energy legislation, focusing

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insignificant amount of oil at best," and how "oil will continue to flow but at dwindling rates and higher costs").

[12] VA. TECH, CONSORTIUM ON ENERGY RESTRUCTURING, DISTRIBUTED GENERATION ch. 1.3 (2007), www.dg.history.vt.edu/ch1/benefits.html.

[13] A table of acronyms is included at the end of this Comment for ease of reference.

[14] VA. TECH, *supra* note 12.

[15] *Id*.

[16] *See generally* BILL POWERS & SHEILA BOWERS, DISTRIBUTED SOLAR PV—WHY IT SHOULD BE THE CENTERPIECE OF U.S. SOLAR ENERGY POLICY (Sept. 10, 2010), *available at* solar.ehclients.com/images/uploads/dist_solar_pv_centerpiece_of_us_solar_policy.pdf.

[17] *Id*.

[18] *Id*.

[19] *See generally* JAMES DIGEORGIA, THE GLOBAL WAR FOR OIL (2005).

[20] *See generally* THE WHITE HOUSE, BLUEPRINT FOR A SECURE ENERGY FUTURE (Mar. 30, 2011), *available at* www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf.

[21] *Id*.

specifically on chartered, proposed, and failed energy legislation in California. Part II of this Comment examines the weaknesses of America's current energy infrastructure, looking at the history of the energy industry and the nation's resulting reluctance to adopt renewable technologies despite the shortcomings of the current model. Part III presents DG and expands upon the potential it possesses to empower Americans in a democratic movement to reinvent their energy infrastructure. Part IV explores how energy policy and its legal implications at all levels have hindered the success of DG, and how those policies could be improved to better support DG development. Part V examines the roll of California's agencies in promoting and enforcing the State's DG policies, focusing on specific successes and failures. Part VI looks to other countries that have successfully integrated distributed generation into their national energy strategies, and suggests specific legal and structural changes necessary to make DG successful in the United States. The Conclusion presents an overarching goal for the future of DG, renewable energy, and energy infrastructures both in the United States and abroad.

II. AMERICA'S RELIANCE ON CENTRALIZED POWER

During the Second Industrial Revolution, America prospered into an industrial and economic superpower, using cheap oil to fuel its engines.[22] As a result, Americans quickly became addicted to the seemingly limitless energy that oil had to offer.[23] For decades, the industrial engine—and the American economy—ran smoothly, well-lubricated by oil.[24] Then, in 2008, oil prices hit a record $147.27 per barrel.[25] The price spike set off an economic meltdown that quickly enveloped the world, and America was forced to look elsewhere to fuel the economic engine.[26]

America's centralized energy system is modeled on large-scale refineries and plants that are most often sited far from the city centers to which they supply electricity.[27] These plants are powered primarily by

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[22] RIFKIN, *supra* note 11, at 23.

[23] *Id*.

[24] *Id*.

[25] *Id*.; Christopher Johnson, *Timeline: Half a Century of Oil Price Volatility*, REUTERS (Nov. 20, 2008, 11:02 AM), www.reuters.com/article/2008/11/20/us-oil-prices-idUKTRE4AJ3ZR20081120.

[26] *See* RIFKIN, *supra* note 11.

[27] VA. TECH, CONSORTIUM ON ENERGY RESTRUCTURING, DISTRIBUTED GENERATION ch. 1.1 (2007), www.dg.history.vt.edu/ch1/introduction.html.

combustion fuels, including oil, natural gas, and coal.[28] Since the utility companies contractually control many of the country's combustion fuel plants and connecting transmission lines, utilities can provide electricity to massive, regional markets, creating natural monopolies where consumers have no choice among service providers.[29] For many ratepayers, the location is everything—each utility company services a designated area.[30] In California, the investor-owned utilities have divvied up the land into three major and a few minor jurisdictions.[31] This jurisdiction scheme is an endgame in which the utilities control all the pieces in play, moderated only slightly by federal agencies like the Federal Energy Regulatory Commission (FERC)[32] and state regulatory commissions[33] with respect to market oversight, consumer/ratepayer protection, permitting, and land-use regulation.[34] Furthermore, the long-distance transmission and distribution (T&D) system that keeps the nation connected results in an average of seven percent of energy loss every year,[35] which is no drop in the bucket for a country boasting a net generation of 3,754,486,282 megawatt hours of electricity in 2010.[36] A seven percent transmission loss in 2010 meant that 262,814,039.74 megawatt hours of power were wasted on electricity transmission and distribution alone—that's enough electricity to power more than twenty-four million American homes for an entire year.[37]

Waste is not the only disadvantage of the centralized infrastructure. The oil-driven mega-model results in substantial greenhouse gas

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[28] *Id.*

[29] U.S. GEN. ACCOUNTING OFFICE, ELECTRICITY MARKETS: FERC'S ROLE IN PROTECTING CONSUMERS (June 6, 2003), *available at* www.gao.gov/assets/100/91938.pdf.

[30] *See* CALIFORNIA'S ELECTRIC INVESTOR-OWNED UTILITIES (IOUS), *available at* www.energy.ca.gov/maps/serviceareas/CA_Electric_IOU.pdf (last visited Aug. 7, 2012).

[31] *Id.*

[32] *See* FED. ENERGY REGULATORY COMM'N, MARKET OVERSIGHT, www.ferc.gov/market-oversight/market-oversight.asp (last updated June 13, 2012).

[33] *See* NAT'L ASS'N OF REGULATORY UTIL. COMM'RS, REGULATORY COMMISSIONS, www.naruc.org/commissions.cfm (last visited Jan. 20, 2012).

[34] *See generally* U.S. GEN. ACCOUNTING OFFICE, *supra* note 29.

[35] U.S. ENERGY INFO. ADMIN., FREQUENTLY ASKED QUESTIONS: HOW MUCH ELECTRICITY IS LOST IN TRANSMISSION AND DISTRIBUTION IN THE UNITED STATES?, www.eia.gov/tools/faqs/faq.cfm?id=105&t=3 (last updated July 9, 2012).

[36] U.S. ENERGY INFO. ADMIN., STATE ELECTRICITY PROFILES (Jan. 30, 2012), www.eia.gov/electricity/state/.

[37] U.S. ENERGY INFO. ADMIN., FREQUENTLY ASKED QUESTIONS: HOW MUCH ELECTRICITY DOES AN AMERICAN HOME USE?, www.eia.gov/tools/faqs/faq.cfm?id=97&t=3 (last updated Dec. 6, 2012) (calculated by converting megawatt hours to kilowatt hours at one megawatt hour per 1,000 kilowatt hours, and dividing the converted rate by the average annual electricity consumption for a U.S. residential utility consumer: 276,523,164,820kWh/11,496 kWh = 24,053,859.15274878, or approximately twenty-four million homes).

emissions,[38] environmental disruption caused by the sheer footprint of huge power plants and transmission lines,[39] and dangerous wastewater and oil spills.[40] The oil industry and the regulatory bodies that oversee it are both to blame for the damage caused by the Exxon Valdez Oil Spill in Alaska in 1989,[41] the harsh effects of the Cosco Busan Oil Spill in the San Francisco Bay in 2007,[42] and the monumental disaster of the Deepwater Horizon Oil Spill in the Gulf of Mexico in 2010.[43] The Deepwater Horizon disaster was a direct result of a lack of regulatory oversight of the drilling industry.[44] Unfortunately, spills are not the only manifestations of oil's environmentally harmful effects. On September 9, 2010, a Pacific Gas & Electric (PG&E) natural gas pipeline exploded in San Bruno, California, revealing a gas pipeline's destructive capabilities and the extreme inadequacy of safety regulations in California.[45] In response to the incident, the California Public Utilities Commission forced PG&E to examine its entire network, and PG&E discovered thirty-eight pipelines that were leaking gas into the environment.[46] All of these events represent the ugly side-effects of American reliance on fossil fuels and an outdated energy model. Nevertheless, because of a historical reliance on oil, Americans continue to expect oil—an exhaustible resource—to meet their ever-increasing energy demands.[47] The reality is that international energy demand is quickly surpassing oil supply, and countries with indefinite plans to rely primarily on oil are destined for a rude awakening well within the lifespan of the current

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[38] NAT'L OCEANIC & ATMOSPHERIC ADMIN., GLOBAL WARMING: FREQUENTLY ASKED QUESTIONS no. 2, www.ncdc.noaa.gov/oa/climate/globalwarming.html (last updated Aug. 20, 2008).

[39] *See generally* U.S. ENVTL. PROT. AGENCY, OIL: ELECTRICITY FROM OIL, www.epa.gov/cleanenergy/energy-and-you/affect/oil.html (last updated Dec. 28, 2007).

[40] *Id*.

[41] Bill Mintz, *Report Fixes Blame for Alaskan Oil Spill/Captain, Exxon, Coast Guard Faulted*, HOUSTON CHRON., Aug. 1, 1990, at A1, *available at* www.chron.com/CDA/archives/archive.mpl/1990_719914/report-fixes-blame-for-alaskan-oil-spill-captain-e.html.

[42] Henry K. Lee, *Feds Find Fault All Around in Cosco Busan Spill*, SFGATE (May 8, 2009 4:00 AM), www.sfgate.com/bayarea/article/Feds-find-fault-all-around-in-Cosco-Busan-spill-3162084.php.

[43] Brittan J. Bush, *Addressing the Regulatory Collapse Behind the Deepwater Horizon Oil Spill: Implementing a "Best Available Technology" Regulatory Regime for Deepwater Oil Exploration Safety and Cleanup Technology*, 26 J. ENVTL. L. & LITIG. 535, 545–48 (2011) (discussing regulatory failure under the Continental Shelf Lands Act).

[44] *Id*.

[45] Joan Lowy, *San Bruno Explosion Report Released, Pacific Gas & Electric Fully Blamed*, HUFFINGTON POST (Sept. 26, 2011, 5:50 PM), www.huffingtonpost.com/2011/09/26/san-bruno-explosion-report-ntsb-pacific-gas-electric_n_982098.html.

[46] *E.g.*, John Upton, *PG&E Inspection Finds 38 Gas Leak*s, BAY CITIZEN (Oct. 25, 2010, 8:53 PM), www.baycitizen.org/pge/story/pge-finds-38-gas-leaks-first-phase/.

[47] *See* RIFKIN, *supra* note 11, at 28-30.

generation.[48]

When the energy crisis began sweeping the globe in the 1970s, renewable energies peeked out from behind experimental curtains.[49] With each passing year, renewable technologies become more accessible and more affordable.[50] Modern renewables, namely solar, wind, and hydro power, promise exceptional benefits. Most notably, renewable technologies provide potentially inexhaustible sources of energy production.[51] In the wake of the 2008 economic crisis and spiking oil prices, America is considering how to implement renewables into its energy infrastructure, but true progress first requires an acknowledgement that the current model needs to be replaced in its entirety with something better suited to modern and sustainable living.[52]

III. DISTRIBUTED GENERATION: AN OVERVIEW

Distributed generation is an energy production method that creates energy close to its point of consumption.[53] Small-scale renewable energy technologies, such as rooftop solar panels and small wind turbines, harness energy that is then turned into electricity by small, modular generators.[54] The result is a more reliable, secure source of energy that provides electricity without many of the negative consequences of our current model.[55] Additionally, those who supply their own energy using DG have the added benefit of selling surplus energy to an integrated smart grid when their production surpasses their demand.[56] The option to sell surplus energy reduces the risk of energy waste by providing

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[48] *Id.* at 15 (referencing The International Energy Agency's 2010 World Energy Outlook report, which concluded that "global peak production of crude oil probably occurred in 2006 at seventy million barrels per day.").

[49] *See generally* DANIEL YERGIN, THE QUEST: ENERGY, SECURITY, AND THE REMAKING OF THE MODERN WORLD (2011).

[50] *E.g.*, Eric Martinot & Janet Sawin, *Renewable Global Status Report 2009 Update*, RENEWABLE ENERGY WORLD (Sept. 9, 2009), www.renewableenergyworld.com/rea/news/article/2009/09/renewables-global-status-report-2009-update.

[51] NAT'L RENEWABLE ENERGY LAB., LEARNING ABOUT RENEWABLE ENERGY, www.nrel.gov/learning/re_basics.html (last updated May 18, 2012).

[52] *See* RIFKIN, *supra* note 11, at 70–72 (discussing "The Checklist" of Rifkin's five pillars that make up the revolutionized infrastructure).

[53] VA. TECH, *supra* note 27, at ch. 1.1.

[54] *Id.*

[55] *Id.* (e.g., energy lost in transmission and the environmental impacts of large power plants).

[56] CAL. PUB. UTILS. COMM'N, DISTRIBUTED GENERATION IN CALIFORNIA, www.cpuc.ca.gov/PUC/energy/DistGen/ (last updated Dec. 23, 2010). *See also* CAL. PUB. UTILS. COMM'N, NET SURPLUS COMPENSATION (AB 920), www.cpuc.ca.gov/PUC/energy/DistGen/netsurplus.htm (last updated Oct. 4, 2011).

consumers with the financial motivation to make sure that all energy that is produced is used, either in their own homes or by other consumers.[57] As a result, energy consumers can become less reliant on the utility companies and are finally given options that elude them in the current system.[58] Perhaps most importantly, DG enables consumers to choose from a variety of small-scale renewable energy options.[59]

The biggest roadblock DG faces is a sheer lack of policy support.[60] Energy policy, primarily Title XIII of the Federal Energy Independence and Security Act of 2007, dictates the regulation of the utility companies, the composition of our electricity generation mix, and which government entity is responsible for each component of the sector.[61] While there are a handful of supplemental policies already in place for renewable energy in general—even distributed generation in particular—these rules and regulations are restricted by the old paradigm for energy production, which places a heavy emphasis on large-scale power plants and powerful utilities.[62] Add to the mix years of regulation, deregulation, and reinstituted regulation of the energy sector, and the laws controlling our energy infrastructure have become so muddled and inconsistent that renewable energy and distributed generation are barely affected by the policies intended to promote clean and sustainable energy.[63]

This inconsistency in support stems primarily from the hierarchical structure of the nation's energy policy.[64] While the United States President's Energy Policy and federal legislation supposedly reign supreme, state and local governments have passed numerous overlapping laws that differ from federal legislation, creating quite the legislative

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[57] *See* Tiffany Hsu, *Schwarzenegger Signs 2 Renewable Energy Bills, Vetoes Others*, L.A. TIMES (Oct. 13, 2009), *available at* articles.latimes.com/2009/oct/13/business/fi-solar13.

[58] *Id.*

[59] CAL. PUB. UTILS. COMM'N, DISTRIBUTED GENERATION IN CALIFORNIA, *supra* note 56 (examples of small scale renewable energy sources include solar photovoltaic panels, small wind turbines, and fuel cell cells).

[60] *See* Erica Gies, *Distributed Generation: Key Part of Our Energy Future—Phil Harris*, FORBES: GREEN TECH (June 30, 2011, 2:39 PM), www.forbes.com/sites/ericagies/2011/06/30/distributed-generation-key-part-of-our-energy-future-phil-harris/ (referring to administrative and bureaucratic barriers).

[61] *See* U.S. DEP'T OF ENERGY, LEGISLATION: ENERGY INDEPENDENCE AND SECURITY ACT OF 2007, SMARTGRID.GOV, www.smartgrid.gov/federal_initiatives/legislation (last visited July 22, 2012).

[62] *See* Gies, *supra* note 60.

[63] *See generally* VA. TECH, CONSORTIUM ON ENERGY RESTRUCTURING, DISTRIBUTED GENERATION ch. 1.2 (2007), www.dg.history.vt.edu/ch1/history.html (explaining a history of increasingly complicated and overlapping energy policy, namely in California).

[64] *See generally* Howard A. Learner, *Restraining Federal Preemption when There Is an "Emerging Consensus" of State Environmental Laws and Policies*, 102 NW. U. L. REV. 649 (2008), *available at* www.law.northwestern.edu/lawreview/v102/n2/649/LR102n2Learner.pdf.

mess.[65] Meanwhile, the regulatory agencies that provide policy guidelines and assistance base their policy decisions on the need to achieve goals, rather than on how the government, the utilities, and the public should work together to achieve those goals.[66] This goal-oriented policy is problematic because it ignores the intangible benefits that can come from distributed generation.[67] Most importantly, DG's reliable, secure, and close-to-home energy production capabilities vastly reduce the system's vulnerability to massive power outages[68] while, at the same time, reducing the environmental impacts that large-scale plants and extensive transmission lines have on valuable land.[69]

Even with DG's many benefits, the technology cannot reach its full potential without the support of infrastructure and pro-DG policy.[70] Unfortunately, the technology is unappealing to those regulating the energy sector and the utility companies that provide nearly all American with their electricity.[71] Consequently, energy policy is severely lacking in support for DG, and its benefits for the ratepayer remain untapped.[72]

IV. DISTRIBUTED GENERATION MAXIMIZATION AND WHAT IS HOLDING IT BACK

When maximized in an urban setting, DG can provide many benefits to the community and to the environment.[73] At the individual

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[65] *Id.*

[66] *See generally* AIR RES. BD., CAL. ENVTL. PROT. AGENCY, ET. AL., CALIFORNIA CLEAN ENERGY FUTURE, MEETING CALIFORNIA'S ENERGY AND ENVIRONMENTAL GOALS IN THE ELECTRIC POWER SECTOR IN 2020 AND BEYOND (Nov. 9, 2011), www.cacleanenergyfuture.org/documents/All_Metrics.pdf (plans are goal-oriented rather than focused on agency cooperation).

[67] AMORY B. LOVINS, SMALL IS PROFITABLE: THE HIDDEN ECONOMIC BENEFITS OF DISTRIBUTED GENERATION (AND OTHER DISTRIBUTED RESOURCES) 42–43 (2002), *available at* www.rmi.org/Knowledge-Center/Library/U01-13_SmallIsProfitable (discussing how policies focus on the wrong "rewards" rather than focusing on benefits to the society at large).

[68] U.S. DEPT. OF ENERGY, THE POTENTIAL BENEFIT OF DISTRIBUTED GENERATION AND RATE-RELATED ISSUES THAT MAY IMPEDE THEIR EXPANSION: A STUDY PURSUANT TO SECTION 1817 OF THE ENERGY POLICY ACT OF 2005 2.1-2.17 (Feb. 2007), energy.gov/sites/prod/files/oeprod/DocumentsandMedia/1817_Report_-final.pdf.

[69] *See generally* SOLAR DONE RIGHT, ENVIRONMENTAL IMPACTS OF LARGE-SCALE SOLAR PROJECTS (Sept. 9, 2010), *available at* solar.ehclients.com/images/uploads/env_impacts_of_lg-scale_solar_projects.pdf (citing impacts that large scale plants have on the environment).

[70] U.S. DEP'T OF ENERGY, *supra* note 68.

[71] *Id.* at ii-iv.

[72] *Id.*

[73] *See generally* CRAIG LEWIS, CLEAN COAL., DISTRIBUTED GENERATION + SMART GRID: SUCCESS DEPENDS ON SIGNIFICANT INTERCONNECTION REFORM (2011), *available at* www.energy.ca.gov/2011_energypolicy/documents/2011-06-22_workshop/presentations/20_Craig_Lewis_-_CA_Clean_Coalition.pdf.

level, DG offers an individual the opportunity to become an energy entrepreneur who can attract capital and equity into an investment that benefits the community at large.[74] By producing local energy that is cheaper (based on mandated, fixed rates), more reliable, and more secure, distributed generation systems have enormous potential to pay for themselves with a quick rate of return.[75] By adding upfront financial incentives and energy or financial credits for contributing electricity to the smart grid, DG systems could pay for themselves even sooner.[76]

On a larger scale, DG can drive employment and generate tax revenue at virtually no cost to the government.[77] Diverting the cost can be accomplished by making solar panel and wind turbine manufacturers responsible for one hundred percent of distribution grid (D-grid) upgrade costs without any need for reimbursement from the government.[78] For example, when a solar panel manufacturer improves its technology, it could be held responsible for replacing its customers' panels with the new panels at no cost to the customer and without financial support from the government.[79] New and localized jobs will be created for the design, manufacture, installation, and connection of solar panels and other renewable technologies and for the smart grid, all of which offers the great potential of strengthening local economies while, at the same time, bringing domestic energy production to the forefront of our energy infrastructure.

In addition to economic benefits, the use of DG and a smart grid, which manages DG-contributions virtually, can enable local systems to reduce their peak loads (i.e., high periods of demand, such as early morning and dinnertime) by having consumers meet their own demand.[80] This method, known as "demand response," is highly favored in energy procurement planning because it prevents utilities from providing more energy than is demanded at a given time, which reduces the amount of wasted energy.[81] Demand response systems can thrive with DG because consumers can manage their own periods of high demand without utility

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[74] *Id.* at 6.

[75] *Id.* at 6, 10.

[76] *Id.* (showing how California's DG incentive programs expedite the payback of investments in DG technologies).

[77] *Id.* at 6, 15.

[78] *Id.* at 15.

[79] *Id.*

[80] U.S. DEP'T OF ENERGY, *supra* note 68, at 4.

[81] FED. REGULATORY ENERGY COMM'N, STAFF REPORT: ASSESSMENT OF DEMAND RESPONSE AND ADVANCED METERING 11 (rev. Dec. 2008), *available at* www.ferc.gov/legal/staff-reports/demand-response.pdf.

oversight.[82] DG also allows consumers to provide ancillary services such as reactive power and voltage support, and the technology improves overall power quality and reliability for consumers connected to the smart grid.[83] With urbanization on the rise, this type of smart infrastructure is needed to support massive populations. DG provides energy security when traditional, vulnerable grids crash; price stability immune to utility manipulation; less demand for utility-scale energy; and fewer or zero emissions coming from the renewable energy sources for distributed generation.[84]

All of these potential benefits raise the question of why our energy system is so behind in employing this option. First and foremost, the current regulatory scheme is extremely unfavorable to DG.[85] This is because investor-owned-utilities (IOUs) such as California's Pacific Gas & Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E) do not profit from DG programs.[86] It is no coincidence that their reasons for being against DG are the same reasons why consumers would profit from DG because when consumers begin to meet their own demand, they gain control over production, and the IOUs lose control.[87] Another cause for IOU concern is the fact that utilities are relatively unfamiliar with DG technologies, or at least they pretend to be, which creates an air of uncertainty and risk that make it unattractive to utility companies.[88] Between uncertain risks, a lack of experience with DG, and the prospect of having to abandon their profitable business models, utility companies have generated little to no data, models, or analytical tools for evaluating DG systems.[89] In turn, this lack of data makes utilities even more wary of DG.[90] This self-fulfilling prophecy has led utilities away from DG, even though state commissions like California's Public Utilities Commission (CPUC) attempt to promote DG's potential for helping our energy crisis.[91] Unfortunately, under the structure of California's current system, the IOUs have so much bargaining power in the legislative process that nothing short of the

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[82] *Id.* at 11, 12.

[83] U.S. DEP'T OF ENERGY, *supra* note 68, at 4.

[84] *See* Gies, *supra* note 60 (promoting DG's many benefits for urban communities).

[85] U.S. DEP'T OF ENERGY, *supra* note 68, at 1-4.

[86] *Id.* at 3-4.

[87] *Id.* at 4.

[88] *Id.*

[89] *Id.*

[90] *Id.*

[91] *See, e.g.*, Press Release, Cal. Pub. Utils. Comm'n, CPUC Approves Feed-in Tariffs to Support Development of Onsite Renewable Generation (Feb. 14, 2008), *available at* docs.cpuc.ca.gov/PUBLISHED/NEWS_RELEASE/78824.htm.

Governor issuing a declaratory order will force them to fully implement DG systems into urban smart grids.[92]

With the energy hierarchy at a regulatory standstill, hope lies primarily in the hands of those who live in our nation's urban communities.[93] The urban habitat is a crucial one, given that more than half of the world's population lives tightly packed into urban environments with high demands for energy, water, and food.[94] According to a published study by Professor Mat Santamouris of the National & Kapodistrian University of Athens, the Save Programme of the European Commission estimated that ninety percent of the United States' population will be concentrated in urban habitats by 2050.[95] By 2100, eight percent of the world's total population will be living in urban environments.[96] Increased urbanization has led to an increased demand for energy security,[97] and distributed generation has great potential to meet this urban demand. With urban habitats becoming more prevalent in modern society, it is of utmost importance to make such communities self-sustaining.[98]

To start, the federal government must initiate a shift in the current power structure that will open the door for DG, effectively upending the current hierarchical order and empowering people to develop their own strategies to meet their energy needs. DG systems provide renewable energy that is both efficient and cost-effective.[99] Of course, handing such powerful reins over to local communities may be difficult for federal or state governments, but the current hierarchy does not seem to be doing the job very well, either.[100]

To many, it is no secret that the greatest cause of the hierarchical conflict is the nation's current energy policy.[101] Phil Harris, CEO of the American interconnection company Tres Amigas LLC,[102] said it best:

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[92] *Id.*

[93] DAVID GERSHON, EMPOWERMENT INST., STRATEGIES AND TOOLS FOR BEHAVIOR CHANGE, COMMUNITY ENGAGEMENT, AND THE REINVENTION OF OUR CITIES (2011), *available at* www.empowermentinstitute.net/lcd/lcd_files/LCD_Empowering_Citizens_v1.ppt (David Gershon, author of *Social Change 2.0*, discusses how community-wide change jumpstart the energy infrastructure makeover).

[94] MAT SANTAMOURIS, ENERGY AND CLIMATE IN THE URBAN BUILT ENVIRONMENT 4 (2001).

[95] *Id.* at 5.

[96] *Id.*

[97] *Id.* at 8-10.

[98] *Id.* at 14.

[99] *See generally* U.S. DEP'T OF ENERGY, *supra* note 68.

[100] *Id.*

[101] Gies, *supra* note 60.

[102] Tres Amigas, LLC, www.tresamigasllc.com/phillip-harris.php (last visited Jan. 18, 2012).

> We're not technology limited, we're not software limited, we're not science limited. There are many devices out there that could add value, but we need to upgrade the rules and regulations that are based on the old paradigm to make them work with the needs and technology that we have today.[103]

It is evident that technology is not the problem, especially considering that other countries are already utilizing less-technologically-advanced DG programs to their benefit.[104] In 2010, Germany added roughly twenty-five times more solar than California, even though California's solar is more cost-efficient.[105] While Germany's weighted average Wholesale Distributed Generation (WDG) solar rate is about $0.30 per kilowatt hour, the United States' tax credits and its solar resources (that is, hours of sunshine) decrease the price to less than $0.12 per kilowatt hour.[106] For comparison, the entire country of Germany receives an average of only 1,528 hours of sunshine per year, which is less than a third of their total daylight hours, while the sunny county of San Diego gets twice that amount.[107] So, with technology and sunshine out of the equation, all that remains is the daunting policy barrier.[108]

Even in the progressive state of California, where distributed generation programs are already in place, the policy-created investment procedure is so time-consuming and costly that the technology is not used to its full potential.[109] In order to improve the policy, it is necessary to first understand the hierarchical structure that controls America's energy infrastructure. For this, we look to California, a state that has the best potential—and the best chance—to lead the nation with a successful DG model.

Tres Amigas, LLC, is a company focused on providing the first common interconnection of America's three power grids.

[103] *See* Gies, *supra* note 60.

[104] *See* LEWIS, *supra* note 73, at 8.

[105] *Id.*

[106] *Id.* at 10.

[107] Mark Landler, *Germany Debates Subsidies for Solar Industry*, N.Y. TIMES, May 16, 2008, *available at* www.nytimes.com/2008/05/16/business/worldbusiness/16solar.html?pagewanted=all.

[108] Gies, *supra* note 60.

[109] *See generally* LEWIS, *supra* note 73, at 13 (stating that DG interconnection with California IOUs takes two years, on average, with the default cluster process taking up to 3.5 years, while SMUD does it in one fourth the time).

V. CALIFORNIA'S ENERGY INFRASTRUCTURE AND ITS POTENTIAL FOR SUCCESS

California has been leading the charge in renewable energy with its high standards and ambitious goals for more than thirty years.[110] Following California's deregulation of its wholesale electricity market in 1998 and the resulting energy crisis,[111] California passed AB 57 (amending California Public Utilities Code Section 454.5),[112] which resurrected electricity procurement among the state's IOUs. The reinstitution of regulation came with a new rule, known as the Long-Term Procurement Plan (LTPP), which requires the CPUC to hold a proceeding every two years to review and adopt the IOUs' ten-year procurement plans.[113] The purpose of the LTPP is to prevent future energy crises in the State by requiring utilities to plan for energy purchases ten years in advance.[114] CPUC must review and approve these plans, making sure that the plans are consistent with the State's energy policies and renewable energy targets, beginning with the plan's compliance with the Energy Action Plan Loading Order.[115] The most recent activity in the LTPP proceedings occurred on January 12, 2012, in LTPP's Rulemaking 10-05-006, when the CPUC voted unanimously to change the LTPP Loading Order.[116] The Loading Order sets a priority list of electricity sources for the utilities to use in their LTPPs, and this recent rulemaking clarifies the Loading Order to require utilities to exhaust their employment of energy efficiency and conservation, followed by renewable energy sources such as wind, solar, geothermal and even distributed generation before they may purchase any power from fossil-fuel plants.[117] This modification goes hand-in-hand with Governor Brown's recent Senate Bill 2 (1x) (codified as Public Utilities

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[110] Cal. Exec. Order No. S-14-08 (Nov. 17, 2008), *available at* gov38.ca.gov/index.php?/executive-order/11072/.

[111] Severin Borenstein, *The Trouble with Electricity Markets: Understanding California's Restructuring Disaster*, 16 J. ECON. PERSP. 191, 192-95 (2002) (describing California's 1998 deregulation and ensuing crisis), web.archive.org/web/20060905020641/econ.ucsc.edu/faculty/lkletzer/borenstein_jepw02.pdf.

[112] CAL. PUB. UTIL. CODE § 454.5 (Westlaw 2012).

[113] *See Long-Term Procurement Plan*, CAL. PUB. UTILS. COMM'N, www.cpuc.ca.gov/PUC/energy/Procurement/LTPP/ (last updated May 21, 2012).

[114] *Id.*

[115] *Long-Term Procurement Plan*, CAL. PUB. UTILS. COMM'N, www.cpuc.ca.gov/PUC/energy/Procurement/LTPP/ (last updated May 21, 2012).

[116] *See* CAL. PUB. UTILS. COMM'N, DECISION APPROVING MODIFIED BUNDLED PROCUREMENT PLANS para. 5 (Jan. 12, 2012), *available at* docs.cpuc.ca.gov/PUBLISHED/AGENDA_DECISION/155719.htm.

[117] *Id.*

Code Section 399.11-399.31),[118] which requires retail sellers and publicly-owned utilities to be producing thirty-three percent of their energy via renewable sources by 2020.[119] The tension that the recent rulemaking finally addressed was that utilities were only fulfilling the bare minimum of their annual percentage goals with energy efficiency and renewable energies, whereas now they must exhaust those resources before considering fossil fuels.[120]

CPUC's January 2012 LTPP Loading Order decision is relief for a state where complexity, coupled with a lack of cohesion amongst California's energy players, made SB 2 (1x) hard to decipher and even harder to enact.[121] California recognizes the need to address many issues, such as the need to streamline the siting, procurement, and permitting processes related to energy infrastructure investments.[122] Unfortunately, the three main state agencies responsible for energy policy are still missing crucial coordination skills and the ability to engage California's stakeholders, mainly because they have a handful of other federal, state, local, and regional entities to which they must answer.[123] The three agencies responsible for this charge are the California Public Utilities Commission (CPUC), the California Energy Commission (CEC), and the California Independent Systems Operator (CAISO).[124] Additionally, Governor Schwarzenegger signed AB 32[125] into law in 2006; which requires the California Air Resources Board (CARB) to coordinate with these agencies on energy activities.[126] Once you mix in the state's three powerhouse IOUs, PG&E, SDG&E, and SCE,[127] who have agendas of their own (namely, remaining profitable), the state agencies barely have a

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[118] CAL. PUB. UTIL. CODE §§ 399.11-399.31 (Westlaw 2012).

[119] CAL. PUB. UTILS. COMM'N, CALIFORNIA RENEWABLES PORTFOLIO STANDARD: QUARTERLY REPORT: 2ND QUARTER 2011 (Aug. 1, 2011), *available at* www.cpuc.ca.gov/NR/rdonlyres/1D24680C-BDF1-4EE9-A43F-59B309602172/0/Q2ReporttotheLegislatureFINAL.pdf.

[120] *See* CAL. PUB. UTILS. COMM'N, DECISION, *supra* note 116.

[121] David Nahai, *California's SB X 1-2 Law Walks Renewable Energy Tightrope*, RENEWABLE ENERGY WORLD (June 10, 2011), *available at* www.renewableenergyworld.com/rea/news/article/2011/06/californias-sb-x-1-2-walks-renewable-energy-tightrope.

[122] AIR RES. BD., ET. AL., *supra* note 66.

[123] BAY AREA ECON. FORUM, CALIFORNIA'S ENERGY FUTURE: A FRAMEWORK FOR AN INTEGRATED POWER POLICY 18 exhibit 7 (Nov. 2002), *available at* www.bayeconfor.org/pdf/CAenergyfuture.pdf.

[124] CAL. ENERGY COMM'N, WHO'S WHO IN CALIFORNIA ENERGY, www.energy.ca.gov/newsroom/links.html (last visited Jan. 16, 2012).

[125] CAL. HEALTH & SAFETY CODE § 38510 (Westlaw 2012).

[126] *See also*, AIR RES. BD., CAL. ENVTL. PROT. AGENCY, ENERGY ACTIVITIES, www.arb.ca.gov/energy/energy.htm (last visited July 22, 2012).

[127] CAL. ENERGY COMM'N, WHO'S WHO, *supra* note 124.

fighting chance. The result is a state with high hopes and imperfect performance toward achieving its ambitious goals.

Understanding the existing disorder first requires understanding the purpose of each government agency. First, the CPUC is an extremely powerful commission that regulates utility services and the utility infrastructure; its powers are vested directly by a California constitutional amendment[128] and supplemented with powers from the 1912 Public Utilities Act.[129] With respect to DG, the CPUC regulates policies and programs on both the consumer and the utility side of the meter, with incentive and procurement programs, respectively.[130] These programs include the California Solar Initiative, the Self-Generation Incentive Program (SGIP), and the Renewable Portfolio Standard (RPS) program.[131] In general, energy incentive programs like these are designed to enable the consumer to contribute to the power grid while, at the same time, receiving a financial or credit-based incentive for doing so.[132]

Next is the CEC, which is California's primary energy policy and planning agency.[133] The CEC is responsible for several goals,[134] including forecasting future statewide electricity needs, keeping historical data on energy, and promoting energy efficiency and conservation.[135] Each of the five divisions of the CEC carries out its own proceedings to address issues applicable to its goals.[136]

CAISO is a not-for-profit public-benefit corporation that has been managing California's transmission system since March 1998.[137] CAISO's responsibility is to "keep the lights on" in California by making sure that electricity needs are met by a competitive market.[138] It is answerable mainly to FERC, although it frequently collides with CPUC's LTPP proceedings, since the transmission system consists primarily of

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[128] Cal. Const. Art. 12, § 6 (Westlaw 2012) (CPUC then referred to as the Railroad Commission). *See* CAL. PUB. UTILS. COMM'N, PUC HISTORY & STRUCTURE, www.cpuc.ca.gov/PUC/aboutus/puhistory.htm (last modified Oct. 29, 2007).

[129] CAL. PUB. UTIL. CODE, D. 1, Pt. 1, Ch. 2 (Westlaw 2012).

[130] CAL. PUB. UTILS. COMM'N, DISTRIBUTED GENERATION IN CALIFORNIA, *supra* note 56.

[131] *Id.*

[132] *Id.*

[133] CAL. ENERGY COMM'N, www.energy.ca.gov/commission/overview.html (last visited Nov. 21, 2011).

[134] *Id.*

[135] *Id.*

[136] *Id.*

[137] CAL. ENERGY COMM'N, WHO'S WHO, *supra* note 124.

[138] CAL. INDEP. SYS. OPERATOR, ABOUT US, www.caiso.com/about/Pages/default.aspx (last visited July 22, 2012).

IOU transmission lines.[139]

Finally, CARB is a division of the California Environmental Protection Agency (CalEPA). CARB's mission is to ensure that air pollution control rules and regulations are implemented and enforced for any energy policy in California.[140] In 2000, CARB adopted a distributed generation certification program, which was required under Senate Bill 1298.[141] The program requires manufacturers that sell DG technologies to meet emissions standards.[142]

Collectively, these agencies serve to promote the most energy-efficient policies and ensure passage, implementation, and enforcement of those policies. However, the overlapping system is far from straightforward or simple and poses many conflicts.[143]

In 2010, CPUC, CEC, CAISO, CARB and CalEPA, together with the Office of the Governor, drafted an ambitious plan for California's Clean Energy Future.[144] Each agency contributed its own report to the Plan.[145] Collectively, the reports make up the State's Clean Energy Future Implementation Plan ("the Plan").[146] The Plan consists of many separate clean energy goals, including a target of 5,000 megawatts (MW)

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[139] CAL. INDEP. SYS. OPERATOR, REGULATORY RULES, www.caiso.com/rules/Pages/Regulatory/Default.aspx (last visited July 22, 2012).

[140] AIR RES. BD., CAL. ENVTL. PROT. AGENCY, ENERGY ACTIVITIES, www.arb.ca.gov/energy/energy.htm (last visited July 22, 2012).

[141] CAL. HEALTH & SAFETY CODE § 41514.10 (Westlaw 2012). *See* AIR RES. BD., CAL. ENVTL. PROT. AGENCY, DISTRIBUTED GENERATION PROGRAM, www.arb.ca.gov/energy/dg/dg.htm (last visited Nov. 21, 2011).

[142] AIR RES. BD., CAL. ENVTL. PROT. AGENCY, DISTRIBUTED GENERATION PROGRAM, www.arb.ca.gov/energy/dg/dg.htm (last visited Nov. 21, 2011).

[143] BAY AREA ECON. FORUM, CALIFORNIA'S ENERGY FUTURE: A FRAMEWORK FOR AN INTEGRATED POWER POLICY 18 exhibit 7 (Nov. 2002), *available at* www.bayeconfor.org/pdf/CAenergyfuture.pdf.

[144] AIR RES. BD. ET. AL., *supra* note 66.

[145] *See, e.g.*, CAL. PUB. UTILS. COMM'N, ORDER INSTITUTING RULEMAKING TO INTEGRATE AND REFINE PROCUREMENT POLICIES AND CONSIDER LONG-TERM PROCUREMENT PLANS (May 13, 2010), *available at* docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/117903.pdf (CPUC's final decision in the 2012 LTPP, which contributed to the Implementation Plan); CAL. ENERGY COMM'N, INTEGRATED ENERGY POLICY REPORT (2010), www.energy.ca.gov/2010publications/CEC-100-2010-001/CEC-100-2010-001-CMF.PDF (implemented into section 5.2.1 of the Implementation Plan); CAL. ENERGY COMM'N, STRATEGIC INVESTMENT PLAN (2009), www.energy.ca.gov/2009publications/CEC-700-2009-011/CEC-700-2009-011-CTD.PDF (implemented into section 6.2.1 of the Implementation Plan); CAL. ISO, ANNUAL TRANSMISSION PLAN (2011), www.caiso.com/Documents/Board-approvedISO2010-2011TransmissionPlan.pdf (implemented into section 6.2.2-6.2.6 of the Implementation Plan); AIR RES. BD., CAL. ENVTL. PROT. AGENCY, CLIMATE CHANGE SCOPING PLAN (2008), *available at* www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf (implemented into section 7 of the Implementation Plan; CARB is a department of the CalEPA, so this represents both of these agencies).

[146] CALIFORNIA CLEAN ENERGY FUTURE, IMPLEMENTATION PLAN (Nov. 9, 2011), www.cacleanenergyfuture.org/documents/CCEFImplementationPlan.pdf.

of installed renewable distributed generation "at the right locations on the power grid to support reliability and provide economic value."[147] When considered separately, the goals seem achievable by each agency's separate plan of attack. However, when viewed altogether and under the lens of the agencies' overlapping jurisdictions, the goals seem difficult to achieve.[148]

It is hard to see how each separate agency's responsibilities fit into the broad "energy future" picture that is painted by the Plan.[149] For example, while suggesting that achieving its goals requires looking "outside the box," the Plan fails to mention which programs meet these criteria.[150] Rather, the Plan states that it will allow room for new ideas and be open to a multi-faceted and integrated approach to achieving its goals.[151] More specifically, the Plan references Governor Schwarzenegger's Go Solar California and Small Generator Incentive programs, explaining that the Programs are "aimed towards" removing the barriers to behind-the-meter distributed generation like cost, installer infrastructure, availability of financing for projects, and getting consumers on board with DG.[152] What it fails to mention, however, is *how* the programs would remove the barriers and what would happen once they were gone.[153] All in all, the Plan makes empty promises because of a lack of integration between all of the agencies. In other words, all the pieces of the puzzle are there, but nobody has put them together yet.

At first glance, it appears that Californians have multiple paths available for investing in DG technologies. Applicants interested in DG have four different options: (1) CPUC's California Solar Initiative; (2) SGIP; (3) CEC's New Solar Homes Program; or (4) CEC's Emerging

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[147] CAL. PUB. UTILS. COMM'N, CALIFORNIA'S CLEAN ENERGY FUTURE, www.cpuc.ca.gov/PUC/energy/Climate+Change/future.htm.

[148] *See generally* CALIFORNIA CLEAN ENERGY FUTURE, IMPLEMENTATION PLAN (Nov. 9, 2011), www.cacleanenergyfuture.org/documents/CCEFImplementationPlan.pdf (in reference to the Plan's multiple statistical targets that, when viewed altogether, do not seem plausible, realistic, or even in agreement with one another; for example, there are several different projections for demand and for demand response results). *See also* CALIFORNIA CLEAN ENERGY FUTURE, IMPLEMENTATION PLAN (Nov. 9, 2011), www.cacleanenergyfuture.org/documents/CCEFRoadmap.pdf (showing just how overlapping and complicated the agencies' goals are when viewed altogether).

[149] *See generally* CALIFORNIA CLEAN ENERGY FUTURE, IMPLEMENTATION PLAN (Nov. 9, 2011), www.cacleanenergyfuture.org/documents/CCEFImplementationPlan.pdf.

[150] *Id.* See the Executive Summary for analysis of how drafting this report was approached by the collaborating agencies.

[151] AIR RES. BD. ET. AL., *supra* note 66.

[152] CALIFORNIA CLEAN ENERGY FUTURE, IMPLEMENTATION PLAN, 56-60 (Nov. 9, 2011), www.cacleanenergyfuture.org/documents/CCEFImplementationPlan.pdf.

[153] *Id.*

Renewables Program.[154] CPUC's programs are supported by the agency's pro-DG policies, including Rule 21 Interconnection, which enables eligible wholesale generators to connect DG systems to the electric grid, and the Net Energy Metering policies that establish tariffs, surplus compensation, credits, and credit transfer regulations for those contributing energy to the grid.[155] The California Solar Initiative program provides upfront incentives to California's electricity utility consumers who install solar electric systems on their homes, businesses, or other public sites under the Initiative.[156] SGIP provides incentives to those who install wind turbines, fuel cells, or energy storage systems for wind turbines or fuel cells under that program.[157] CEC's New Solar Homes Program, a sister to the California Solar Initiative, provides solar incentives for new residential construction that implements solar, and the Emerging Renewables Program provides incentives for small to midsized (less than thirty MW) wind and fuel cell systems in new construction.[158]

Despite these seemingly favorable options,[159] DG is still heavily undervalued in California.[160] The underutilization of this technology stems from the continued use of a system that is very difficult to change in a piecemeal fashion. Applicants interested in setting up DG sites must complete a long application and contract process, jumping through hoops created by overlapping and conflicting laws, rules, and regulations. Even with the current options, roughly ninety-seven percent of the allotted bid capacity for distributed generation fails to reach the contract stage due to the slow, costly, and non-user-friendly interconnection process, which can take up to four years to complete.[161] This means that, of the permitted amount of projects that may be entered into across all options, only three percent of applicants even reach the point at which they are drafting contracts with CPUC and CEC's programs.[162] Even fewer make it to the point at which they are actually producing energy, receiving incentives, and contributing their surplus production to the grid.[163] Given these statistics, the agencies' ambitious goals for innovations like DG

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[154] *See generally* CAL. PUB. UTILS. COMM'N, DISTRIBUTED GENERATION, www.cpuc.ca.gov/PUC/energy/DistGen/ (last updated Dec. 23, 2010) (elaborating on California's DG programs).

[155] *Id.*

[156] *Id.*

[157] *Id.*

[158] *Id.*

[159] *Id.*

[160] *See* Gies, *supra* note 60.

[161] LEWIS, *supra* note 73, at 5, 13.

[162] *Id.* at 5.

[163] *Id.*

have left California with the need to achieve nineteen percent DG growth per year to reach its renewable DG goal between 2012 and 2020.[164] Thus, an unnecessarily complicated system prevents interested individuals from generating their own energy.

The DG system is further hindered by uneven bargaining power.[165] The IOUs have retained so much of the bargaining power in the contracting stage that little to no advancement of these programs is made.[166] Set with pre-defined terms and conditions, CPUC's tariff programs for small renewable generators come with non-negotiable contracts between the consumer and the utility companies.[167] These set contracts may be viewed as being easier for the consumer, but such standard contracts typically favor the party that drafts them.[168] Additionally, the vast majority of what little renewable DG is installed via these programs does not even contribute to the state's Renewable Portfolio Standard (RPS) targets, which keeps DG off the charts when officials are measuring the State's progress in its "[thirty-three percent] renewables by 2020" goal.[169] This means that, even if DG were a viable alternative, consumers are currently unable to see DG's effects on statewide reports, and the legislature has little evidence to support additional pro-DG policies.[170] Even so, CPUC does have an open proceeding, RPS docket R. 10-05-005, which could result in redefining DG to make it eligible to contribute to RPS goals.[171] On the whole, though, success for distributed generation can and will come only with a drastic overhaul of the interconnection framework to make DG more accessible and more appropriately valued.

Over the past few years, California has tried, and in a handful of cases, has succeeded, in passing pro-DG legislation. A few examples of this legislation include the following Senate Bills (SB) and Assembly

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[164] CALIFORNIA CLEAN ENERGY FUTURE, DISTRIBUTED GENERATION, www.cacleanenergyfuture.org/distributed-generation.html (last visited July 26, 2012) (assuming an annual growth rate of about 7.5% between 2016 and 2020 to achieve the 12,000 MW goal and accounting for the needed growth rate between 2012 and 2016).

[165] Press Release, Cal. Pub. Utils. Comm'n, *supra* note 91.

[166] *Id*.

[167] *Id*.

[168] *Id*.

[169] CAL. ENERGY COMM'N, CPUC-CEC COLLABORATIVE STAFF DATA REQUEST: INVITING COMMENTS ON RENEWABLE DISTRIBUTED GENERATION IN THE RENEWABLE PORTFOLIO STANDARD PROGRAM 2 (Oct. 21, 2012), *available at* www.energy.ca.gov/portfolio/documents/documents/2003-10-21_STAFF_DATA_REQ.PDF. *See also* CAL. PUB. UTILS. COMM'N, CALIFORNIA RENEWABLES PORTFOLIO STANDARD: QUARTERLY REPORT: 2ND QUARTER 2011, *supra* note 119.

[170] *See generally* CAL. ENERGY COMM'N, CPUC-CEC COLLABORATIVE STAFF DATA REQUEST, *supra* note 169.

[171] *See* CAL. PUB. UTILS. COMM'N, DECISION, *supra* note 116.

Bills (AB): SB 679[172] (added as Section 26142 to the Public Resources Code, on financial assistance for energy conservation projects); SB 790[173] (proposing to amend and add Sections to the Public Utilities Code, on community choice aggregation programs); SB 489[174] (amended and repealing sections of the Public Utilities Code, on net energy metering); and SB 836[175] (adding Section 911 to the Public Utilities Code, on cost reporting for renewable energy resources).[176] SB 679 appropriates $250,000 for the CEC to use to provide loans to eligible local government and public institutions for the installation of DG renewable energy sources and other energy conservation projects.[177] This bill provides strong support for DG because it sets money aside for DG projects, but the allotted money may also be spent on other projects like electric vehicle charging infrastructure.[178] SB 790 would require CPUC to institute a rulemaking proceeding by March 1, 2012, that will address how to govern the conduct of an electrical corporation with respect to Community Choice Aggregation programs.[179] As defined by a prior bill, AB 117,[180] Community Choice Aggregation "permits any city, county or city and county to aggregate the electric loads of residents, businesses and municipal facilities to facilitate the purchase and sale of electrical energy."[181] This has some potential for promoting DG programs within cities, but it is lacking the coordinating policy that would permit more residents, businesses, and municipal facilities to actually generate their own electricity via DG.[182]

Some California legislation promotes DG by expanding definitions

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[172] CAL. PUB. RES. CODE § 26142.

[173] Senate Bill No. 790, *available at* www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0751-0800/sb_790_bill_20111008_chaptered.pdf. *See also* Cal. Pub. Util. Code §§ 331.1, 365.1, 366.2, 380, 381.1, 395.5, 396.5, 707, 3260 (Westlaw 2012).

[174] CAL. PUB. UTIL. CODE §§ 2827, 2827.10, 2827.5, 2827.9 (Westlaw 2012).

[175] CAL. PUB. UTIL. CODE § 911 (Westlaw 2012).

[176] CTR. FOR SUSTAINABLE ENERGY, 2011 CALIFORNIA ENERGY LEGISLATION (Oct. 12, 2011, 8:15PM), energycenter.org/index.php/policy-a-planning/california-legislation/2509-2011-california-energy-legislation.

[177] *Id.*

[178] *Id.*

[179] The California Public Utilities Commission was issued a memorandum from the Office of Governmental Affairs on May 23, 2011, with a Legislative Subcommittee Recommendation to oppose the bill unless it was amended (*see* www.cpuc.ca.gov/NR/rdonlyres/57D333D1-9A22-45F6-891D-25473AE98FB6/0/SB_790_Leg_Memo_5_26_Comm_Agenda.pdf). The CPUC ruled in favor of this recommendation, and the bill was returned for amendments. At the time that this article went to press, there was no update on the progress of this bill.

[180] CAL. PUB. UTIL. CODE §§ 218.3, 366, 394, 394.25, 331.1, 366.2, 381.1 (Westlaw 2012).

[181] LOCAL GOV'T COMM'N, COMMUNITY CHOICE AGGREGATION, www.lgc.org/cca/what_is_cca.html (last visited Jan. 20, 2012).

[182] *Id.*

and altering reporting requirements under existing statutes. SB 489,[183] for example, revises the definition of an "eligible customer-generator" to require that the generator must utilize renewable sources in order to qualify for the CEC's Renewable Energy Resources Program.[184] This bill benefits DG by requiring such generators to be powered by wind, solar, or geothermal conductors.[185] SB 836[186] requires the CPUC to release data to the Legislature every six months for *all* costs that the CPUC approves for the utilities' electricity procurement contracts. This bill increases transparency of the utilities' activities, which enables the legislature to shape future policy to ensure that the utilities fulfill their obligations for renewables.[187] Similarly, SB 585[188] (amending Section 2851 and adding Section 2851.1 to the Public Utilities Code) adds $200 million to the cost limit for CPUC's California Solar Initiative program.[189] The bill also requires the CPUC to "establish and impose project cost caps for residential projects under the California Solar initiative, based on national and state installed cost data," which has the potential of encouraging more small-scale DG projects that are inherently less costly than large-scale projects.[190]

Even though these bills have some potential, the majority of California's energy legislation promulgates the existing infrastructure with support for fossil fuels and large-scale renewable energy projects that fail to generate the same benefits of small-scale renewable energy DG.[191] There are also many pro-DG bills that never make it out of their house of origin because their hearings are cancelled by their authors.[192] One of the most promising DG proposals of 2011, AB 1302,[193] would have required utilities to identify and designate zones for DG projects and thereafter make those DG projects priorities for completion by the utilities.[194] Several attempts were made at amending this bill, but its author cancelled its hearing, and it has not seen any legislative action

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[183] CAL. PUB. UTIL. CODE §§ 2827, 2827.10, 2827.5, 2827.9 (Westlaw 2012).

[184] *See* CTR. FOR SUSTAINABLE ENERGY, *supra* note 176.

[185] *Id.*

[186] CAL. PUB. UTIL. CODE § 911 (Westlaw 2012).

[187] S*ee* CTR. FOR SUSTAINABLE ENERGY, *supra* note 176.

[188] CAL. PUB. UTIL. CODE §§ 2851.1, 2851.1 (Westlaw 2012).

[189] S*ee* CTR. FOR SUSTAINABLE ENERGY, *supra* note 176.

[190] *Id.*

[191] *Id.*

[192] *Id.* (showing bills that were cancelled by their authors before hearings were scheduled, irrespective of reason for cancellation).

[193] AB 1302, *available at* www.leginfo.ca.gov/pub/11-12/bill/asm/ab_1301-1350/ab_1302_bill_20110527_amended_asm_v95.pdf (Feb. 13, 2011) (as last amended).

[194] S*ee* CTR. FOR SUSTAINABLE ENERGY, *supra* note 176.

since then.[195] Meanwhile, some chaptered bills exhibit anti-DG sentiment within the legislature. One example is AB 512[196] (amending Section 2830 of the Public Utilities Code), which disqualifies local governments from being eligible for supplying renewable energy generation to an electrical corporation.[197]

The passage of bills that discourage DG, coupled with the cancellation of bills that encourage DG, illustrates the general lack of persuasiveness that DG promoters have in the legislature. Recently, DG bills in the California Legislature have been sidelined for bills that focus on pipeline safety.[198] The San Bruno explosion in 2011 caused an immediate shift in legislative focus to address safety needs.[199] While this shift is understandable, it only promotes the continuation of our outdated, fossil-fuel-driven infrastructure by updating the use of oil pipelines, when we could be focused on moving away from the use of fossil fuels by replacing pipelines with high-tech renewable energy resources.

Despite a relative stalemate in the legislature, various organizations outside the regulatory realm have come to DG's defense.[200] Although these organizations do not possess regulatory control, their reports draw attention to the benefits offered by DG and even propose legislation and frameworks for DG.[201]

In June 2011, the Clean Coalition, a California-based environmental advocacy group, released a report on distributed generation and the smart grid, highlighting the energy infrastructure's need for "significant interconnection reform."[202] The report revealed the Clean Coalition's legislative and regulatory reform program, its "D-Grid Vision."[203] The plan has six main components, which are as follows:

> (1) Viewing the grid as a two-way system so that grid planning should expect and encourage the delivery of electricity from renewable distributed generation resources; (2) Requiring utilities to create long-term distribution grid upgrade and investment plans that are transparent and that hold utilities accountable for investing in ways that maximize the ratepayer's investment in a DG system; (3)

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[195] *Id.* (establishing cancelled status of bill).

[196] CAL. PUB. UTIL. CODE § 2830 (Westlaw 2012).

[197] S*ee* CTR. FOR SUSTAINABLE ENERGY, *supra* note 176.

[198] *Id.* (showing a heavy focus on legislation that promotes pipeline safety).

[199] *Id*.

[200] *See, e.g.*, LEWIS, *supra* note 73; SOLAR DONE RIGHT, solardoneright.org/ (last visited Jan. 20, 2012). Both these organizations are discussed in further detail in the following paragraphs.

[201] *Id*.

[202] LEWIS, *supra* note 73.

[203] *Id.* at 19-20.

> Providing public access to grid data with detailed, regularly-updated information; (4) Identifying DG "priority zones" where interconnected DG best benefits consumers and provides economic benefits such as energy supply that is close to the point of demand, a decrease in new investments once systems are implemented, and an improved resilience of the DG-grid; (5) Including interconnection costs in the rate base for D-grid systems; and (6) Requiring interconnection processes to be fully transparent and for utilities to be held accountable to timelines and other required compliance.[204]

While the program has its merits, it, like most existing DG programs, is not without flaws. The Clean Coalition sends a mixed message by asking the Federal Energy Regulatory Commission (FERC) to issue a declaratory order that gives the states jurisdiction over D-grid interconnections (which FERC, for the most part, already has the broad jurisdiction to do under 42 U.S.C. Section 7172)[205] while simultaneously asking FERC to be the agency to hold utilities accountable for meeting deadlines and transparency requirements.[206] This power struggle would inevitably cause conflicts, resulting in deadlock between the state and federal levels and bringing otherwise promising projects to a halt. In the end, the Clean Coalition's program creates a similar set-up for failure, much like the one that exists in the current model for DG planning.[207] However, the Clean Coalition's proffered "proactive interconnection process" is fast and transparent, which would be a drastic improvement over the reactive process that is currently in place.[208] This shift from reactive to proactive procedure would put the power in the appropriate hands, enabling DG to be maximized.[209] While the Clean Coalition's program is not perfect, it could serve as a great foundation for the future of DG.[210]

Solar Done Right is another proactive, pro-DG organization.[211] Represented by a team of public land activists, solar power and electrical engineering experts, and other environmental activists, Solar Done Right supports the maximization of DG in cities and fights against the large-scale solar projects that threaten the nation's remaining wild-lands.[212]

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[204] LEWIS, *supra* note 73, at 33-38.

[205] 42 U.S.C. § 7172 (Westlaw 2012).

[206] LEWIS, *supra* note 73, at 17.

[207] *Id*. at 17.

[208] *Id*. at 6.

[209] *Id*. at 6.

[210] *Id*. at 17.

[211] *See* SOLAR DONE RIGHT, *supra* note 200.

[212] *See* SOLAR DONE RIGHT, ABOUT US, solardoneright.org/index.php/site/about/ (last visited Aug. 9, 2012).

The organization proposes a priority of strategies to end the nation's addiction to fossil fuels and reliance on large-scale generation plants.[213] The first step is reducing national demand and consumption via a combination of conservation and energy efficiency.[214] The second step in the switch would be for homes and businesses to "generate renewable energy at or near the point of use," that is, with distributed generation.[215] The final stage of this switchover is to maximize the use of DG by generating renewable energy via DG on larger scale within the existing environment of cities and the use of a smart grid.[216] Solar Done Right's "how to do solar right" approach encourages the same maximization of DG that has been promoted throughout this Comment. The organization is currently petitioning to have their policies for DG integration, as well as those aimed at stopping large-scale development on precious wild-lands, adopted by legislation.[217] This approach sheds a lot of light on the harsh environmental impacts that large-scale solar projects have on delicate habitats.[218] In an effort to protect these habitats, Solar Done Right encourages the use of the existing infrastructure—rooftops of buildings, parking structures, manufacturing plants—for renewable energy generation.[219] This poses far less risk to the environment and provides a source of energy that is closest to the point of consumption.[220] Solar Done Right provides foundational support for jumpstarting a comprehensive policy transformation that centers on DG.

Overall, California's foundational energy framework and legislation provide great footing for a major distributed generation movement that could thereafter be applied across the nation. By adjusting a few key DG policies and adopting the ideas of organizations like the Clean Coalition and Solar Done Right, California has enormous potential for making distributed generation a successful means of renewable energy production.

VI. CHANGING THE SYSTEM USING INTERNATIONAL MODELS OF SUCCESS

Several other countries have already begun the transition to DG

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[213] *Id.*
[214] *Id.*
[215] *Id.*
[216] *Id.*
[217] *See* SOLAR DONE RIGHT, *supra* note 200.
[218] *Id.*
[219] *Id.*
[220] *Id.*

energy economies.[221] Germany in particular has one of the most progressive energy infrastructures in the world.[222] Germany produces twenty percent of its electricity from renewable energy, fifty-one percent of which is owned by citizens or farms.[223] These distributed generation investments represent $100 billion worth of private investments in clean energy.[224] Following a sixty percent increase in its solar output in 2011,[225] Germany has seventeen gigawatts (GW) of solar installation, compared to the 3.6 GW of solar that the United States currently has installed.[226]

Germany's success is a curious phenomenon, especially considering that technology and greater sunlight exposure make American panels nearly one-third cheaper than their German counterparts.[227] The leading reason why the United States lags behind Germany is policy.[228] Germany has strong pro-DG policy, which is driven by Germans' political will to maximize efficiency, sustainability, and clean energy throughout the country.[229] Germans have embraced the notion that how people generate energy is a choice, as is the choice to not pollute the air with fossil-fuel-based energies.[230] Through legislation, Germany is empowering its citizens with a democratic choice of source of energy and the ability to contribute to the country's energy production.[231] Germany's recently revised feed-in-tariff (FIT) policies require utilities to connect every renewable energy producer—big or small—to the grid and to purchase

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[221] *See* KEMA, INC., DISTRIBUTED GENERATION IN EUROPE—PHYSICAL INFRASTRUCTURE AND DISTRIBUTED GENERATION CONNECTION (Apr. 29, 2011), *available at* www.energy.ca.gov/2011_energypolicy/documents/2011-05-09_workshop/documents/Memo%201_Physical%20Infrastructure%20and%20DG%20Interconnection.pdf (primarily discussing Spain and Germany).

[222] *See* Mat McDermott, *20% of Germany's Electricity Now Comes from Renewable Energy*, TREE HUGGER (Sept. 6, 2011), www.treehugger.com/renewable-energy/20-of-germanys-electricity-now-comes-from-renewable-energy.html (noting that Germany has impressive growth in renewable energy and that the country's feed-in-tariff program is the best in the world).

[223] Mat McDermott, *Over Half of Germany's Renewable Energy Owned by Citizens & Farmers, Not Utility Companies*, TREE HUGGER (Jan. 6, 2012), www.treehugger.com/renewable-energy/over-half-germany-renewable-energy-owned-citizens-not-utility-companies.html.

[224] *Id*.

[225] Mat McDermott, *Germany's Solar Power Output Up 60% in 2011*, TREE HUGGER (Dec. 29, 2011), www.treehugger.com/renewable-energy/german-solar-output-increases-60-percent-2011.html.

[226] McDermott, *Over Half of Germany's Renewable Energy Owned by Citizens & Farmers, Not Utility Companies*, *supra* note 223.

[227] LEWIS, *supra* note 73, at 10.

[228] McDermott, *20% of Germany's Electricity Now Comes from Renewable Energy*, *supra* note 222.

[229] *Id*.

[230] *Id*.

[231] *Id*.

all producers' output at a flat, attractive rate that is held steady by a long-term contract.[232] In addition to these FIT policies, Germany recently adopted a DG policy aptly named *eigenverbrauch*, or "own consumption," which raises the cost of self-generated energy in an effort to force consumers to conserve energy and not let any surplus energy go to waste.[233] This type of DG-specific legislation is the driving force that is enabling Germany to reform its energy infrastructure and reach these impressive numbers of renewable energy and distributed generation. Germany's progressive policy demonstrates the degree of success that is achievable by a country with the right mindset.[234]

In order to maximize the benefits offered by distributed generation, we can start by following Germany's progressive, democratic approach. The appropriate modification would be to empower consumers to have more of a say in how they can and will contribute to the D-grid, which is effectively made up of many individuals within a community. This method is supported by Solar Done Right's strategies for change in *Distributed Solar PV: Why It Should be the Centerpiece of U.S. Solar Energy*.[235] Solar Done Right recognizes that encouraging individual participation is not accomplished by allowing the IOUs to retain control over the system because individuals are not likely to submit to IOUs' control of the power they are generating.[236] Instead, those who will be contributing energy via distributed generation should control the system, thereby making the system more democratic in nature and thus more receptive to change.[237] When customers meet their own demand, they are quicker to respond to problems within their own system. Additionally, by diversifying points of generation, the failure of one generator would not cause blackouts across an entire city, which is often what happens under the current infrastructure.[238]

The necessary shift in the infrastructure should start with a change in the relationship between the IOUs and the state regulatory agencies. By shifting control from the IOUs to the state agencies CPUC, CEC, and CARB, DG-favorable programs on both sides of the meter can be expanded to provide bigger and better incentives to the individual.

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[232] Craig Morris, *The Future of German FITs*, RENEWABLES INT'L (July 19, 2010), *available at* www.renewablesinternational.net/the-future-of-german-fits/150/523/28456/.

[233] *Id*.

[234] *See generally* PAUL RUNCI, UNIV. OF MD., RENEWABLE ENERGY POLICY IN GERMANY, PACIFIC NORTHWEST NATIONAL LABORATORY TECHNICAL LAB REPORT PNWD-3526 (Jan. 2005), *available at* www.globalchange.umd.edu/energytrends/germany/.

[235] POWERS ET AL., *supra* note 16.

[236] *Id*.

[237] *Id*.

[238] *See* Part I. Introduction, *herein*, for examples.

Unfortunately, these agencies are limited by what they can offer because of the degree of the IOUs' control over the grid.[239] By reducing or eliminating the IOUs' control, the agencies will regain their vested authority, at which point they will able to reconfigure and simplify the application process. Additionally, agencies could expand current programs or introduce new ones to allow even more people to apply. As of 2012, CPUC oversees only two incentive programs on the customer side of the meter, known as the California Solar Initiative and the Self-Generation Incentive Program (SGIP).[240] On the utility side, CPUC oversees several programs for wholesale distributed generation (WDG) that handle the net export of WDG-created electricity onto the electrical system side of the customer's electric meter.[241] These programs include the Feed-in-Tariff Small Renewable Energy Generators Program under the RPS, the Combined Heat and Power Tariff Program, and Utility PV programs for IOU-owned PV generation.[242] Programs like these, with the added support of policies akin to Germany's DG policies, present strong potential for maximizing DG within cities.[243]

California's customer-side DG programs are a good starting point for energy renovation, but each could use its own reform. CPUC's California Solar Initiative, which provides upfront incentives to electric utility customers who install solar systems on their home, business, and public sites, must be done specifically through the California Solar Initiative program.[244] SGIP provides upfront incentives to customers who utilize wind turbines, fuel cells, or energy storage systems for these systems through the program.[245] Although potentially beneficial, these two programs only cover the bare minimum, are extremely narrow in scope, and require customers to complete a carefully scrutinized process before they can begin generating their own power.[246] CEC also has DG programs, including the New Solar Homes Programs and the Emerging Renewables Program.[247] The New Solar Homes Programs is a sister to CPUC's California Solar Initiative and provides incentives for new residential construction that implement solar into building plans.[248]

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[239] CAL. ENERGY COMM'N, WHO'S WHO, *supra* note 124.

[240] CAL. PUB. UTILS. COMM'N, DISTRIBUTED GENERATION IN CALIFORNIA, *supra* note 56.

[241] *Id*.

[242] *Id*.

[243] RUNCI, *supra* note 234. The combination of programs like these could be used to maximize DG within cities.

[244] CAL. PUB. UTILS. COMM'N, DISTRIBUTED GENERATION IN CALIFORNIA, *supra* note 56.

[245] *Id*.

[246] *Id*.

[247] *Id*.

[248] *Id*.

CEC's Emerging Renewables Program provides incentives for wind and fuel cell systems that generate less than thirty MW.[249] While these agencies technically oversee these programs, the customers are within the jurisdiction of and thus subject to some control by PG&E, SDG&E, and SCE.[250] Frustratingly, deals made between the IOUs and FERC are beyond the scope of the three state agencies' control, even though they are the ones supposedly responsible for regulating the utility services and infrastructure.[251] It is a system fraught with flaws that gives too much bargaining power to the utilities, leaving too little in the hands of consumers.[252]

The big question is what must FERC and the three state agencies do to make the system better suited for DG programs? First, FERC and federal power should be limited to making legislation consistent across the nation so that DG providers can reach multiple markets without encountering inconsistencies between markets. National models would provide DG a better chance for success, because developers of small-scale renewables and generators would not have to drastically change their business models for each and every state. By requiring more transparency of models and ordering frequent updates, FERC could enable cities to model their own systems based on the successes and shortcomings of other cities. Improving the transparency of and increasing the available information about the interconnection process will make the process simpler, faster, and easier for consumers to use. After all, one of the biggest drawbacks of the current system is that it is not user-friendly, which turns otherwise interested consumers away from applying for DG systems. Reforming these rules and regulations will vastly improve the relationship between ratepayers and utilities, thus making our energy infrastructure fit better with the localized and democratic values that Americans hold dear. These values will be useful in guiding our nation's response to the global crises of climate change and an ever-urbanizing world.

Several respected individuals recognize the need for a shift in power. Among them are President of the Foundation on Economic Trends, Jeremy Rifkin,[253] and Founder and CEO of the Empowerment Institute, David Gershon.[254] In the interest of empowering individuals,

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[249] *Id.*

[250] *Id.*

[251] *Id.*

[252] *Id.*

[253] OFFICE OF JEREMY RIFKIN, FOUND. ON ECON. TRENDS, www.foet.org/JeremyRifkin.htm (last visited Jan. 16, 2011).

[254] *See* GERSHON, *supra* note 93.

these two men promote democracy and social change, both of which apply directly to the idea of empowering ratepayers with DG. In *The Third Industrial Revolution*, Rifkin encourages Americans to maximize the use of clean energy in urban models in the interest of promoting sustainability.[255] In the interest of our future, society must move away from the age-old Industrial Era to a modern, sustainable "Collaborative Era."[256] Rifkin believes that, by concentrating our efforts on implementing renewables into our power grids and creating a lateral power structure, we can leave behind the industrial past and enter into an era of democracy and entrepreneurship, where collaboration can enable sustainability to sweep the globe.[257] We can shift from an era that has long emphasized the top-down flow of authority and the importance of financial capital to an era that honors "creative play, peer-to-peer interactivity, social capital, participation in open commons, and access to global networks."[258] By using renewable energy distributed generation in our cities, we can achieve higher energy production, maximize sustainability, and create self-sufficient communities that are no longer dependent on far away, large-scale and overly powerful utility companies.[259] With a shift in focus to democracy and social change, America has great potential to make DG work in cities across the country. Rifkin's model "favors lateral ventures, both in social commons and in the market place, on the assumption that mutual interest, pursued jointly, is the best route to a sustainable economic development."[260]

Establishing a democratic structure is only half the battle, as implementation of the new laws requires the support of the people. Initiating the requisite behavioral change can and will come only with inspirational policy that gives people the power to enforce a new framework.[261] Addressing this complex challenge requires sociological expertise from individuals like David Gershon, who suggests methods for behavioral change and large system transformation in his latest book, *Social Change 2.0*.[262] First and foremost, it is necessary to close the gap between passed legislation and implemented legislation by changing urban behavior. Gershon advocates blending top-down policy change

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[255] *See* RIFKIN, *supra* note 11, at intro.

[256] *Id*. at 259–60.

[257] *Id*. at 126.

[258] *Id*. at 259.

[259] *Id.* at 55 (quoting Neelie Kroes, the EU commissioner responsible for competition policy, who favors a move toward "structural unbundling (i.e., separation of the supply and retail business from monopoly infrastructures)").

[260] RIFKIN, *supra* note 11, at 126.

[261] GERSHON, *supra* note 93.

[262] *Id*.

with bottom-up social change in a creative, synergistic way that maximizes change.[263] It is important to recognize that traditional methods will not work for such progressive plans, so we have to think outside the box before change can occur.[264] Social engagement based on connection, cooperation, collaboration, and an emphasis on community empowers people and implements policy in a one-two punch.[265] For a working model, we can look to Gershon's Cool City Challenge, for which the Empowerment Institute is working with three American cities and three Brazilian neighborhoods to achieve dramatic carbon reduction, vibrant livability, and green prosperity.[266] The chosen cities were announced at the June 2012 RIO+20 Climate Conference, and the results of the project will be announced at the 2016 Rio Olympics.[267] These projects will encourage individual involvement in renewable energy on a local, community level to build momentum for a wide-sweeping systemic change. The Cool City Challenge can be studied for the implementation of the wide-sweeping change proffered by this Comment. After all, change will not occur in a democratic society without societal support.

VII. CONCLUSION

America's outdated and vulnerable energy infrastructure is in desperate need of reform, one that can end our reliance on fossil fuels and enable American cities to become self-sustaining with localized, renewable energy distributed generation. With sustainability and democracy as our social motivators, we can bolster California's DG legislation with successful policies like Germany's FIT and "own consumption" laws. California has enormous potential to be the frontrunner in a national movement to make our energy infrastructure more reliable in the face of natural disasters and better suited for the urban habitat that so many call home. For nations around the globe, distributed generation has the ability to equalize power between utilities and ratepayers, between the government and the people, and perhaps most importantly, between the people and the Earth.

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[263] *Id.*

[264] *Id.*

[265] *Id.* at 28.

[266] EMPOWERMENT INST., COOL CITY CHALLENGE, *http://www.empowermentinstitute.net/lcd/lcd_files/Cool_City_Challenge.html*. For the study, the Empowerment Institute chose Davis, Palo Alto, and Sonoma in California and three neighborhoods in Sao Paulo, Brazil. These cities and neighborhoods have between 50,000 and 75,000 inhabitants and will be used to "scale up the Cool Community model and become global 'teaching cities.'"

[267] GERSHON, *supra* note 93.

VII. TABLE OF ACRONYMS

Basic Terms
DG: Distributed Generation
WDG: Wholesale Distributed Generation
D-Grid: Distribution Grid
T-Grid: Transmission Grid

Federal and State Energy Agencies
FERC: Federal Energy Regulatory Commission
CPUC: California Public Utilities Commission
CEC: California Energy Commission
CARB: California Air Resources Board

IOUs: Investor-Owned Utilities
PG&E: Pacific Gas & Electric
SDG&E: San Diego Gas & Electric
SCE: Southern California Edison

Policies and Programs
RPS: Renewable Portfolio Standard
FIT: Feed-in-Tariffs
EPACT: Energy Policy Act of 2005
PURPA: Public Utilities Regulatory Policy Act of 1978
CSI: California Solar Initiative
SGIP: Self-Generation Incentive Program