

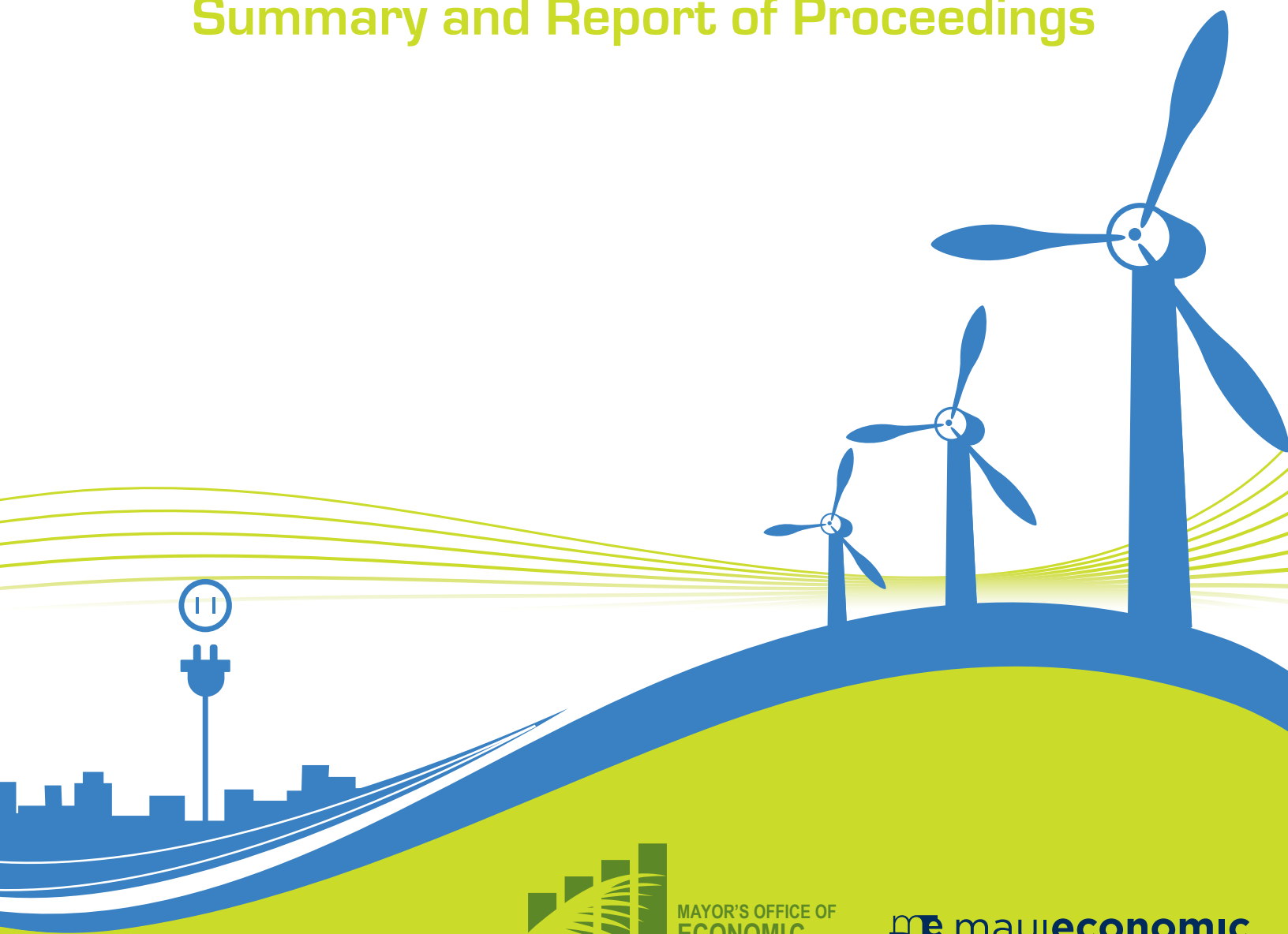


Electric Utilities

The Future Is Not | What It Used to Be

Conference + Exhibition | March 26-28, 2014
Maui Arts & Cultural Center

Summary and Report of Proceedings



MAYOR'S OFFICE OF
ECONOMIC
DEVELOPMENT
MAUI COUNTY



maui**economic**
DEVELOPMENTBOARD

Electric Utilities: The Future Is Not What It Used To Be

Summary and Report of Proceedings

Table of Contents

Conference Program.....	3
Executive Summary	6
Session 1: Opening Welcome and Keynote Introduction	8
Session 2: The Shifting Landscape of the Utility Business Model: What are the Key Drivers of Change?	16
Session 3: Expectations of Tomorrow’s Utility Customers	20
Session 4: The Evolving Energy Mix in a 21 st Century Utility	24
Session 5: The Regulation of Electric Utilities in Japan Post Fukushima: An Overview	28
Session 6: The Role of Technology in Transforming to a 21 st Century Utility	30
Maui Topics Discussion	33
Session 7: Redefining the Customer’s Role in the Utility of the Future.....	36
Session 8: How Will the Electric System Change in the Future?.....	42
Session 9: Hawaii’s Unique Place in the Emerging Energy Transformation.....	48
Closing Remarks.....	50
Appendix: Bibliography of Conference Speakers.....	52

CONFERENCE PROGRAM

WEDNESDAY, MARCH 26

8:30 SESSION 1: OPENING WELCOME AND KEYNOTE REMARKS

OPENING CEREMONY

Kapono'ai Molitau, Kumu Hula, Nā Hanona Kulike O Pi'ilani

E KOMO MAI (WELCOME)

Teena Rasmussen, Economic Development Director, County of Maui

Jeanne Skog, President and CEO, Maui Economic Development Board

OUR COMMUNITY URGENTLY NEEDS YOUR IDEAS

Alan Arakawa, Mayor, County of Maui

8:45 KEYNOTE REMARKS

Alice Madden, Principal Deputy Assistant Secretary for Intergovernmental and External Affairs, U.S. Department of Energy

Julia Hamm, President & CEO, Solar Electric Power Association (SEPA)

L. Hunter Lovins, President, Natural Capitalism Solutions

10:50 SESSION 2: THE SHIFTING LANDSCAPE OF THE UTILITY BUSINESS MODEL: WHAT ARE THE KEY DRIVERS OF CHANGE?

Jonathan Koehn, Regional Sustainability Coordinator, City of Boulder, *Moderator*

Hermína Morita, Chair, Hawaii Public Utilities Commission

William "Bill" Parks, Senior Technical Advisor, Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy

Lauren Azar, Former Commissioner, Wisconsin Public Service

1:20 SESSION 3: EXPECTATIONS OF TOMORROW'S UTILITY CUSTOMERS

Maurice Kaya, Program Director, PICHTR, former head of the State Energy Office, *Moderator*

Dawn Weisz, Executive Officer, Marin Clean Energy

Michael Mount, Vice President, Pace Global, a Siemens Business

Tom Plant, Vice President, State Policy at Advanced Energy Economy

Will Rolston, Energy Coordinator, County of Hawaii

2:20 SESSION 4: THE EVOLVING ENERGY MIX IN A 21ST CENTURY UTILITY

Jay Griffin, Policy and Research Director, Hawaii Public Utilities Commission, *Moderator*

Jennifer DeCesaro, Special Advisor, Office of the Secretary of Energy, U.S. Department of Energy

Ken Geisler, Vice President of Strategy, Siemens Smart Grid, North America

Jonathan Koehn, Regional Sustainability Coordinator, City of Boulder

David Bissell, President and CEO, Kauai Island Utility Cooperative

- 3:40 **SESSION 5: THE REGULATION OF ELECTRIC UTILITIES IN JAPAN POST FUKUSHIMA: AN OVERVIEW**
Kazuhiko Ogimoto, Project Professor, Institute of Industrial Science, University of Tokyo
- 4:10 **SESSION 6: THE ROLE OF TECHNOLOGY IN TRANSFORMING TO A 21ST CENTURY UTILITY**
Doug McLeod, Energy Commissioner, County of Maui, *Moderator*
Kazuhiko Ogimoto, Project Professor, Institute of Industrial Science, University of Tokyo
Kazuyuki Takada, Deputy Director, Smart Community Department, NEDO
Fumitoshi Emura, Department Manager, Smart City Project Division, Hitachi, Ltd.
Mark Glick, Administrator, Hawaii State Energy Office, DBEDT
Michael Reiley, President, HNU Energy
- 5:10 Video Presentation by Hitachi, Ltd.

THURSDAY, MARCH 27

- 7:45 **Maui Topics Discussion**
Sebastian “Bash” Nola, Energy Consultant, *Moderator*
Carl Freedman, Owner, Haiku Design and Analysis
Mat McNeff, Manager of Engineering, Maui Electric Company
Matias Besasso, Owner, Rising Sun Solar + Electric
Bob King, Founder, Pacific Biodiesel
Don Guzman, Council Member, Maui County
- 9:00 **GREETING**
Doug McLeod, Energy Commissioner, County of Maui
- 9:05 **KEYNOTE REMARKS**
Ron Binz, Former Chief, Colorado Public Utilities Commission
- 10:20 **SESSION 7: REDEFINING THE CUSTOMER’S ROLE IN THE UTILITY OF THE FUTURE**
Lorraine Akiba, Commissioner, Hawaii Public Utilities Commission, *Moderator*
Neil “Dutch” Kuyper, Chief Executive Officer, Parker Ranch
H. Ray Starling, Program Director, Hawaii Energy
Bob Lachenmayer, Smart Cities Manager, Schneider Electric
Ben Springer, Senior Associate, Energy Futures Coalition
- 12:50 **SESSION 8: HOW WILL THE ELECTRIC SYSTEM CHANGE IN THE FUTURE?**
Bob Lachenmayer, Smart Cities Manager, Schneider Electric, *Moderator*
Ron Binz, Former Chair, Colorado Public Utilities Commission
L. Hunter Lovins, President, Natural Capitalism Solutions
Richard Rosenblum, Chief Executive Officer, Hawaiian Electric
Ben York, Sr. Project Engineer, Electric Power Research Institute
Kyle Datta, General Partner, Ulupono Initiative

2:20 **SESSION 9: HAWAII'S UNIQUE PLACE IN THE EMERGING ENERGY TRANSFORMATION**
Constance Lau, President and Chief Executive Officer, Hawaiian Electric Industries Inc.

2:50 **CLOSING REMARKS**
Hermína Morita, Chair, Hawaii Public Utilities Commission

FRIDAY, MARCH 28

8:00 **OPTIONAL FIELD TOURS**
Tour #1 | Kaheawa Wind Farm, Hosted by First Wind
Tour #2 | Energy Through Agriculture, Hosted by Hawaiian Commercial & Sugar
Tour #3 | Smart Technologies Project, Hosted by Hitachi, Ltd. and NEDO

Executive Summary

Maui is a leader in adoption of renewable energy onto the grid and has developed a justified reputation as an ideal test bed for innovative new technologies. On Maui and beyond, emerging approaches and technologies are reshaping the electric grid, turning it from a one-way conduit for distributing power into a far more decentralized, intelligent network for improving energy reliability and efficiency across businesses, homes and communities. Meanwhile, for decades, electric utilities have changed little, and the ground is shifting beneath them. A consensus clearly exists in the community for increased penetration of renewable energy to replace fossil fuels, and customers increasingly demand more choice, control, transparency, sustainability, and engagement. Among the drivers for change in the utility model are affordability, aging infrastructure, consumer empowerment and preferences, energy independence as a national security issue, the advent of electric vehicles, and climate change.

At the same time, traditional centralized power generation is being replaced by distributed generation -- giving the advantage of more resilient, reliable systems -- and rapidly evolving technologies allow for the integration of a diverse portfolio of renewable resources. Technology is also creating a new reality of micro-grids, two-way grids, smart grids and communications innovations that contribute to significant energy efficiencies. These advances are changing the operations and rationale of utilities just as it has done in every other sector of economic activity and lifestyle. Underlying discussions is the recognition that the future of our energy systems is tied to broader economic development, with better-paid and more numerous jobs and an opportunity to launch and develop an energy innovation cluster.

Several conference presentations acknowledged the presence and participation of utility leaders and representatives from Hawaii and elsewhere; the conference itself was sponsored in part by Hawaii's utilities: Hawaiian Electric Company, Maui Electric Company, and Hawaii Electric Light Company. However, in the words of former Department of Energy Secretary, Stephen Chu, utilities are in danger of being "FedExed", referring to the rapidly shifting U.S. Postal Service model that has been transformed and overtaken by external events and trends. The purpose of the conference was to explore common ground between the current business model of utilities and proponents of change and a new energy paradigm, while recognizing that a "win-win" solution was achievable and desirable. New, different energy provider models such as Municipal Utilities and Community Choice Aggregators were presented for consideration and discussed. Significant discussion took place over utilities' "stranded assets" as the energy transition occurs, and who should pay the associated costs.

Several speakers alluded to the evolution of customer expectations and role as energy providers as well as consumers ("prosumers.") Customer service is expected to become paramount in supporting end-user choice and involvement, with utilities as an energy services provider, not just a power generator and distributor. The utility of the future must become more nimble and engage with customers in a more strategic way, involving the whole community, so that customers are educated on issues and options.

Speakers advocated for the role of utilities to evolve into enablers and facilitators during the new, transitional phase as the details of a renewable energy future are forged and defined. At the same time, it was acknowledged that certain essential features of existing utility service must be retained, such as reliability, resilience, and safety.

The role of regulators and the necessity to meet challenges with political will were highlighted together with the key role that consumer education can play to ease the transition. Utilities of the future are likely to feature Performance Based Regulation and best-practice metrics are under discussion and evaluation. The importance of quick and effective decision-making by regulators was also emphasized. In terms of a diverse, integrated renewable energy portfolio, Maui's potential to farm biofuel on existing agricultural acreage represents a unique opportunity, particularly because of biofuel's significance as a potential "bridge fuel" to replace imported fossil fuel during a transitional period. The integration of electric vehicles both as a medium for storage and a solution to transportation energy demands is exemplified by the U.S.-Japan JUMPSmartMaui initiative, a successful demonstration project with global implications. Together with other renewable energy resources and demand-side innovations, Maui is already in the process of designing a road map for the future of an integrated smart grid.

The transition to a new energy future will involve new partnerships, collaborations and broad coalitions, and implementation of innovation requires political leadership. Civil discourse of the kind displayed at the Maui conference is essential, with active listening and a relaxation of personal agendas among the qualities inherent in finding common ground and shaping utilities' role as a sustainable energy services provider in the future as well as default power coordinator and distributor. Together with less adversarial dialogue, there must also be a willingness to problem-solve and compromise.

Conference conveners (the County of Maui and MEDB) summarized proceedings in terms of four "C"s:

- *Change*: It's here, it's scary, promising, arduous, and exciting;
- *Collaboration*: All stakeholders are responsible for change, and they need to come together;
- *Customers*: They have choices and responsibility and must keep engaged and listen as plans are implemented;
- *Conversation*: A quality this conference was designed to foster and which must continue. We cannot afford "business as usual."

The two-day conference, *Electric Utilities: The Future Is Not What It Used To Be* was attended by a diverse group of 242 participants of whom 30% were residents of Maui, 42% from Oahu and other Hawaiian islands, 22% from the U.S. mainland, and 6% from international locations. The private sector accounted for 68% of participants, the public sector 22%, and non-profits 10%. Women made up 30% of attendees.

Session 1: Opening Welcome and Keynote Remarks

Teena Rasmussen, Director, Office of Economic Development, County of Maui

The context of the conference is the dilemma that utilities face today with the development of renewable energy at a faster rate than utilities can absorb. These issues are complex and are best explored from multiple points of view, and conference presenters were specifically selected by the Conference Program Committee because they could provide direct, diverse, and unconstrained viewpoints.

Jeanne Unemori Skog, President and CEO of Maui Economic Development Board, Inc. (MEDB)

The work and mission of MEDB centers on diversification of Maui's economy, focusing on knowledge-based sectors and innovation. Maui's abundant natural resources mean that renewable energy is one such promising sector, and the high cost of energy on Maui impacts every resident and business.

Demographic highlights of conference attendees are as follows:

- 75 (30%) are women;
- 53 (22%) are from the public sector (Federal, State or County);
- 168 (68%) are from the private sector, and 24 (10%) from non-profits.
- In terms of location, 73 (30%) are Maui residents;
- 104 (42%) are residents of other Hawaii islands;
- 54 (22%) are from the mainland USA;
- 11 are from Japan, and 3 from Canada.

Alan Arakawa, Mayor, County of Maui

Among Maui's abundant renewable energy resources are the sun, wind, waves, and geothermal energy. Adequate renewable energy sources are not the problem; rather, the structures of our municipal utility systems are not poised to handle the supply of clean energy. This conference is a forum for participants to speak seriously about how to evolve from the traditional model that has existed since the time of Thomas Edison to something more appropriate for the 21st century – the Utility of the Future.

A key issue for Maui County is the high cost of energy production; the County has some of the highest energy costs in the nation. Peak use is in the evenings, with little seasonal variation. Solar PV is changing demand curve patterns; on Molokai, for example, the typical nighttime minimum load has been replaced by daytime minimum load because of the supply provided by residential PV systems during the day. Similar trends are likely for other Hawaiian islands over time. Currently, an average of 30% of Maui Island's energy comes from renewable energy sources, a statistic of which Maui is rightly proud, and peak demand is about 200 megawatts (mW). Since 2006, Arakawa noted, Maui Island has added 72mW of wind power and 40mW of distributed PV. This progress is a continuation of the statewide Hawaii Clean Energy Initiative (HCEI), launched in 2008.

Progress notwithstanding, the long-term goal must be 100% renewable energy. The increase in Maui's renewable energy has been accompanied by some controversy; not least the relatively slow pace of renewable energy adoption -- and cost. Maui's biggest concern is the affordability of electricity.



Maui Mayor Alan Arakawa

Renewable energy has not caused a reduction in prices, and the average resident uses 20 kilowatt hours (kWh) per day at an average cost of \$250 per month. The curtailment of wind power by the utility has also caused concern, with over 1 gigawatt (gW) hours per month curtailed. There is also public confusion over the extent to which solar PV can substitute wind power on Maui, with some circuits at, or close to, saturation. The public wants to install PV and reduce electricity bills to the minimum connection charge of less than \$20 per month, and “do their part.” Maui urgently needs the help and wisdom of conference participants because the issues are too complex for one island to solve on its own.

Keynote Speakers

The three keynote presentations provide perspectives on what is driving change in the utility industry, and offer alternatives for future directions.

Alice Madden, Principal Deputy Assistant Secretary for Intergovernmental and External Affairs, U.S. Department of Energy

The utility industry has changed so little for so long, and the ground is now shifting beneath the utilities. It is little wonder that there are obstacles and psychological barriers to change. Other paradigms are changing: The U.S. has become a net exporter of energy, an unlikely reality just a few years ago. Thanks to distributed generation, large-scale solar, clean energy technologies, demand side management and net-metering, energy is no longer centralized before its distribution. These trends have raised questions about the role utilities will play and the nature of the transformation to a low-carbon economy. Challenges, whether technological, economic, or political, are best addressed in an integrated fashion.

As DOE moves to raise its profile in renewable energy matters, the department realizes that action primarily will take place at the local and state level. No leaders act in a vacuum; they need to build broad coalitions. The DOE recognizes the importance of taking a more comprehensive approach and being a more relevant stakeholder in order to play a more timely and relevant role as big issues roll out. In this vein, Secretary of Energy Moniz often talks about “raising our game” with cities and states.

To be more responsive and relevant, DOE is framing a lot of the work it does in terms of economic development, and it is impressive that the opening session to this conference set the context in this economic development framework. Local municipalities and elected officials want new job creation, and in the post-recovery (ARRA) world where DOE is no longer spending major funds, emphasis has shifted to help with job creation, workforce retraining and leveraging financial mechanisms to help develop a clean energy economy. A good analogy is that of “teaching a man to fish.” DOE can also help build regional collaborations -- Hawaii is a perfect example -- as well as public-private partnerships.

A confluence of several events since Secretary Moniz began his tenure in 2013 is particularly pertinent to the themes of this conference:

- Release of the President’s Climate Action Plan. DOE’s role includes involvement in:
 - Power generation
 - Appliance standards
 - Building efficiency
 - Battery technologies
 - Clean vehicles
- EPA’s power plant rules
- DOE’s focus on The Grid of the Future
- DOE’s Loan Program (relaunched with renewed vigor post-Solyndra)
- The President’s announcement of Quadrennial Energy Review

The DOE is fully committed to making the transition to a low-carbon and reliable energy future as smooth and as low-cost as possible.

Reliability is key; Superstorm Sandy proved that without a reliable grid, infrastructure cannot function, underscoring the need both to “modernize and harden” how we generate, transmit, and consume electricity. Following the storm, for example, the DOE signed an MOU with the state of New Jersey for a micro-grid system for New Jersey Transit’s rail system. A future electricity grid should include some of the following features, as a minimum:

- An active role for customers based on response demand, storage, and distributed generation;
- Increased diversity in generation technology, including significant amounts of renewable energy;
- Advanced communications and improved intelligence and control;
- Flexible architecture to accommodate economic, technical, and environmental change;
- Security from cyber and physical attacks as well as extreme weather events;
- Increased resiliency to demand uncertainty.

Such considerations show real challenges for a traditional utility model. There is a need to find a dynamic way to pay for electrical infrastructure and reliability while recognizing utilities’ rights and responsibilities to charge fair rates. An equitable cost allocation should be secured, with cost-effective and socially

beneficial investment and universal, affordable access. Given that there are over 2,000 publicly-owned utilities in the U.S., over 200 investor-owned utilities, almost 900 co-ops and 9 federal agencies, there is no “one size fits all” solution, yet there are many ways to comprehensively address these issues.

One of these solutions, and the most popular, is net-metering (NEM), with 43 states allowing regulated sale of customer-generated power back to utilities. However, with the rapid growth of solar PV penetration onto the grid, controversy has arisen between different interest groups. This has placed pressure on legislators and regulators who may not have all the information they need to make educated decisions. Solar advocates argue for NEM systems and their local and environmental benefits; utilities and consumer groups raise concerns about NEM customers paying their full share for grid service. This debate reflects a lack of transparency and consistency of method in evaluations and determination of the costs and benefits of integrating distributed generation onto the grid. DOE is confident that a balance of interests can be achieved. Consumers, customers, utilities, industries, and governments are all in this together and must come to a consensus.

Two DOE programs are central to its work in this area:

- Loan Program that has invested \$30bn with a \$50bn ROI. This has launched 5 large-scale solar projects; 10 more have followed using this model, privately financed. DOE has also invested \$8bn in developing advanced, low-carbon emitting fossil fuel energy sources; and \$16bn in advanced new technology vehicle manufacturing. A new renewable energy loan portfolio program is forthcoming.
- Climate Change Action Plan (2013) that features a Quadrennial Energy Review (QER). DOE is leading this government-wide integrated policymaking analysis process. The first phase of the QER will focus on energy infrastructure: transmission, storage and distribution, and modernization and replacement to meet 21st century economic, environmental and security needs. A series of regular stakeholder meetings is due to start in April 2014.

In conclusion, serious challenges lie ahead but there has never been a more exciting or important time to be working in this arena. With innovation and dedication to collaboration, together we can address these challenges.

Julia Hamm, President & CEO, Solar Electric Power Association (SEPA)

Of SEPA's 900-plus member businesses and organizations, about one-half are directly engaged in the solar industry, with the other half electric utilities, providing SEPA with a balanced and broad perspective. SEPA represents over one-half of all U.S. electric customers, and through its members, 94% of all solar PV systems connected to the U.S. grid.

Renewable energy is changing the energy landscape and a major issue is the maintainance by utilities of control over their grids and systems to effectively accommodate all needs. One example of the pace of change is reflected in a recent PPA agreement that the City of Austin is preparing to sign for solar power at a rate of just five cents per kWh. The City received more than 30 bids, demonstrating the trend of price reduction for large-scale solar projects – a harbinger of affordability. There are over 10gW of solar electricity connected to the U.S. grid, and of that, 4gW were connected in 2013 alone – a very rapid growth rate. As another example, San Diego Gas & Electric are interconnecting 1,200 customers per month, close to double the rate for 2013.

In Hawaii, 10% of HECO customers (almost 30,000) have PV systems, and of these, about half were installed in 2013. Many eyes, nationally and internationally, are focused on Hawaii, to see how things will develop -- hence the focus on the Utility of the Future: "Utility 2.0". Among the issues to be faced:

- Customer Expectations: Satisfying the demand for choice, for clean energy, and energy independence;
- Grid Integration: Maintaining reliability and system safety under a new paradigm of customer-generated energy;
- Business Sustainability: Recognizing the demands of customers and regulators while maintaining a sustainable business.

Among the solutions for utilities of the future are:

- Rate design changes;
- Regulatory model changes (e.g. decoupling; performance-based rate making such as the UK's RIO model);
- Business model changes so that the grid will be a platform; utilities will move away from supplying energy and instead control the grid and inputs – a regional transmission operator.

In terms of what is needed, looking forward:

- Focusing on high-end objectives, agreed upon by all sides. HCEI is very impressive and far ahead of most places in bringing stakeholders together to discuss objectives;
- Educating all relevant and diverse parties about the issues. This conference shows Hawaii is also ahead in this regard, providing the kind of forum where this can happen;
- Willingness to compromise. Major transition planning cannot be achieved overnight and transition must involve win-win solutions;
- Partnering is a critical component for transition to be successful. Partnerships mean that diverse stakeholders (utilities, RE providers, etc.) can win, survive, and thrive so that outcomes are in everyone's best interests.

As Henry Ford said: "If everyone is moving forward together, then success takes care of itself."

L. Hunter Lovins, President, Natural Capitalism Solutions

What is done in Hawaii will determine what is done in the rest of the world, which presents an awesome obligation – after all, this is paradise, and we have the opportunity to preserve it. In thinking about the future of the utility industry, Ernest Hemingway's words are instructive: "Everything is your fault, if you're any damn good." If the utilities are to have a future, which is not a given, it will be because they get good at it. Another instructive message lies in the "Black Swan" syndrome described by author Nassim Taleb. This informs us that we don't think of, or anticipate, innovations until they happen; Taleb theorized that low-probability, high-impact events beyond the norm are accelerating. The winners in our society are those who accept this notion and exploit the opportunities presented. Many currently in the energy policy realm owe their careers to one such single, surprise event in 1973 (the OPEC "oil shock"), yet assume a surprise-free future. The one thing we can be sure of is that the future will not be like that.

Global drivers of change, that will change everything, include:

- The loss of ecosystem services;
- Our carbon-constrained world;
- Volatile energy prices;
- Economic instability;
- Vulnerability;
- The evolution of economies in China and India;
- Water availability.

In the electric utility industry, things are more fragile and less transparent than we might like, as demonstrated by a recent little-publicized event in Metcalf, CA, in which 17 transformers were destroyed in 19 minutes by vandals. To cite the analogy of former Energy Secretary Stephen Chu, utilities are in danger of being “FedExed,” just as the Post Office got “FedExed,” as rooftop solar modules drop in price. Chu is correct in suggesting that utilities need a new business model; monopoly power in today’s world of distributed generation won’t work. As evidence of this trend, the top 20 European utilities have lost an estimated \$600 billion in value over the last five years.

Climate change is real, and burning fossil fuel has raised global temperatures by an average of 2°C., causing severe weather events. Continuing at this rate could raise temperatures by 6°C., according to climate scientists, which is not survivable. *We know how to solve the problem, at a profit.* Companies taking the lead in reducing their carbon footprint and reporting on it have higher returns on equity, more stable cash flow, higher growth, and twice the average total return compared to the Global 500.

In 2013, the Carbon Disclosure Project announced that if U.S. businesses reduced emissions by 3% per year (and they have a blueprint for how this can realistically be done), savings of \$150bn. p.a. can be achieved, climate change can be curbed, and rising temperatures stabilized. We have numerous examples of simple measures for reducing fossil fuel consumption to cut carbon emissions. Jigar Shaw, founder of Sun Edison, proposes a thesis for creating “climate wealth” by encouraging companies to sell climate change solutions. Shaw states that because of technological innovation, cutting emissions will always be cost-effective -- cutting emissions is the low-hanging fruit that will grow back.

Existing buildings are a good place to start cutting waste, and can be extraordinarily cost-effective -- for example with motion detectors and LED lighting. HSBC, the financial services company, estimates that the scope of energy efficiencies in the “built environment” market is \$87bn. By 2020, this potential market could be \$245bn. McKinsey forecasts potential U.S. savings of \$1.2 trillion by the year 2020, compared to an investment of \$520bn. Net Zero energy buildings are now being designed and built: Sustainability is happening and it pays. Wal-Mart’s adoption of green policies is another clear tipping point. The Harvard Business Review reports: “Sustainability isn’t the burden on bottom lines that many executives believe it to be...sustainability should be a touchstone for innovation...In the future, only companies that make sustainability a goal will achieve a competitive advantage.” Companies in the Dow Jones sustainability index outperform the general market, a trend confirmed by a recent Goldman Sachs report.

The success of the solar industry comes despite \$1.9 trillion in subsidies to the fossil fuel industries, and the solar growth rate is doubling every year. Worldwide, there are more than 100GW of solar installed, with notable growth in China and Japan. The utilities and others should not bet on renewable energy *not*

happening. As Mark Jacobsen's Stanford study demonstrated, 100% renewable energy is a realistic goal. Among the benefits of the "Regenerative Energy Economy" are:

- Better jobs created and employment for more people (3 million) than fossil fuels;
- Outperformance of the general economy during recession;
- Better opportunities offered, with higher pay (13% more than the median wage);
- Expansion of the manufacturing sector (25% of energy jobs created), versus 9% in the rest of the economy;
- More robust job growth (13% in 2012, 17% in 2013); green jobs are increasing five times faster than any other sector.

In addition, renewable energy has a National Security dimension; the U.S. Navy is using biofuel and renewable energy, and is aiming for 50% of its total needs by 2020.

The "distributed future" is here: On Maui and in Hawaii, Pacific Biodiesel, Ulupono Initiative, and Sustly Pacific are leading the way. Change is hard; we will have to change everything and the world we grew up in no longer exists. We will need to transform our world for increased resilience to, and insulation from, crises; improved quality of life; and greater prosperity for all.



Keynote speakers (from left to right): Hunter Lovins, Julia Hamm, and Alice Madden

Doug McLeod, County of Maui Energy Commissioner, moderated a Q&A featuring the three Keynote speakers.

- **Is the so-called utility “death spiral” a reality?** Investor-owned utilities (IOUs) are motivated, through profitability, to be flexible and follow regulatory processes, but they need to evolve quickly. They also need to consult all stakeholders and undertake transition planning. The pace of utilities’ change is not uniform across the U.S., but progress is already being made. The keynote speakers views regarding the reality of the “death spiral” ranged from “possible but unlikely” to “very possible and a matter of utilities’ choice.”
- **Would Hawaii benefit from increased utility competition (e.g. utility cooperatives)?** Competition is already here through distributed generation and utilities are increasingly aware of the importance of customer choice. Smart, market-based regulation and incentives for efficiencies would also benefit customers. Cooperatives are not necessarily the answer, although typically, they are more nimble in reacting to change. At the same time, IOUs have shown they can transform quickly under good leadership.
- **Is the 5c per kWh solar rate (City of Austin) a reality?** It was agreed that it is a reality -- Sun Edison’s bid was one of 30 or more that fell in the same general range. The rate includes a 30% investment tax credit, which contributes to the rate. Solar prices are falling dramatically and solar energy is the cheapest way to meet customers’ needs and desires, in addition to producing energy. Utilities will need to view their market as customers, not simply ratepayers.

Session 2: The Shifting Landscape of the Utility Business Model: What are the Key Drivers of Change?

Delivering safe and reliable electricity will always form the bedrock of what customers expect from their energy providers, but the modern utility will need to expand its vision to provide diverse energy choices for their customers, communities and shareholders. This panel explores an energy utility future that minimizes cost, risk, and environmental impact, and maximizes opportunity, options, and societal benefit.

Lauren Azar, former Commissioner, Wisconsin Public Service

Understanding the current utility framework will help shape future change. Historically, important factors for utilities have been:

- Highly capital intensive infrastructure needed to produce and deliver energy involved assuming risk and raising finance to build the infrastructure. Data already presented on distributed generation and especially utility-scale solar costs show that the capital intensity of delivery is dramatically changing. Utilities are no longer the sole provider for energy generation.
- Development of a framework through which private investment finances this public investment. The current system prevents investment in infrastructure, raising questions about whether incentives are still needed to build it.
- Safety, reliability and cost issues have led typically to a single energy entity, avoiding duplication. Safety and reliability are still essential, but at a reasonable cost.

The question relevant now is how well this framework services us today and in the future given changes in technology, policy and energy economics.

From the vantage point of former public utility commissioner, utilities take a view that is too short-term, especially regarding profits and stock price; they must instead take a long-term view. A major threat to utilities is stranded assets – underappreciated capital. Although utilities took on the risk of creating infrastructure, it is paid for by ratepayers. Utilities should facilitate private investment to build infrastructure and facilitate distributed energy, a transformation that will be expensive. Stephen Chu, former DOE Secretary, says he hopes that utilities do not end up acting like Big Tobacco and cause interference, but instead just ‘go with the flow.’ Regulators may need to increase oversight of safety and reliability issues as new players enter the marketplace. Among other issues for regulators are:

- Challenge ensuring low-income customers have access to services;
- Mechanisms for dealing with stranded costs and assets that are no longer economic. Communities need to decide how to spread out these costs;
- Division of shared costs between ratepayers and shareholders;
- Innovation should be supported, for example by encouraging new community-based generation and storage and facilitating grid entry.

Bill Parks, Senior Technical Advisor, Office of Electricity Delivery and Energy Reliability, U.S. Department of Energy

Three goals of the Hawaii Clean Energy initiative (HCEI) were to protect consumer interests; open the market to clean, renewable energy technologies; and create a financially healthy utility structure to help innovation, while providing reliable, cost-effective service. A good start has been made, but there is a

long way to go before Hawaii is self-sufficient and sustainable. We need to continue to push the utilities/regulatory/provider/consumer boundaries to create an integrated, cost-effective energy system.

The Federal DOE intent was always that Hawaii should be a model for the world, and this still applies. There is a greater urgency now than when we started in 2008. Key drivers for change include:

- Aging infrastructure;
- Reduced energy consumption;
- Consumer preferences;
- Need for transformation cost control;
- Energy independence;
- Consumer interaction;
- Increasing interdependence of land, water, gas and other infrastructure;
- Electric transportation;
- Security. Since 2012, half of cyber attacks in the US are on utility systems;
- Reliability;
- Mitigation of climate change;
- Affordability;
- Improvement of revenue models as well as business models;
- Right of customers to be grid connected.

Key elements of the Federal role are:

- To advance technology, R&D and outreach. Already, 130 smart grid projects are to be completed nationally by 2015. Maui is on the leading edge of this change;
- To challenge our understanding of the fundamentals of electricity and re-examine the math of electricity;
- To advance grid modeling and computation, and learn how to control it using new systems.

Ultimately, we should focus on creating future models for utilities that feature:

- New services to provide power backup if renewable energy drops;
- Protection of consumer needs (regulatory), which may need to change;
- Adequate revenue streams to move capital projects.

What are needed are integrated, complex energy systems that are efficient, cost-sensitive, and provide consumer benefits.

Hermina Morita, Chair, Hawaii Public Utilities Commission

From a regulator's perspective, one of the challenges of effecting a clean energy transformation is moving the discussion and focus from a "clean energy 1.0 model" to a "2.0 model." In the old ("1.0") model, policies were based on rewarding early adoption of renewable energy technologies. The model was simple to understand, quantify, and promote. These policies were primarily focused on project costs, but as technologies advance and costs diminish, these policies have distorted the market with an adverse effect on ratepayers unable to afford or participate in renewable energy programs. This model cannot react quickly to fix these distortions.

The “2.0 model” recognizes that transformation and requires a systems approach where energy policy is shaped by technology and economics to advance three core regulatory goals, which echo some of the earlier discussion:

- To encourage prudent investment in asset utilization and optimization (utility and non-utility, distributed and non-distributed) that bring efficient and cost-effective benefits and value to electrical systems that serve the public interest;
- To appropriately allocate fixed costs to maintain and enhance the electric system;
- To ensure accessibility, fairness, and opportunity for all ratepayers to benefit from clean energy policies.

A second challenge can only be addressed by utilities themselves: To act as a systems integrator, acting as agnostic and price sensitive to optimize the system in achieving affordable, safe, reliable and sustainable electric service that meets community objectives and environmental values. With emerging smart technologies, progressive utility executives are becoming increasingly aware of “big data” as the next frontier for innovation and competition, and increased productivity. Acting on this data requires a huge cultural shift within utilities to accommodate a new data-driven model.

The simplest analogy to make is that of bacon and eggs for breakfast: The pig is committed...but the chickens are just involved. To realize this paradigm shift, the utilities must be committed, while the rest of us are just involved.

Jonathan Koehn moderated a Q&A featuring the three session presenters.

- **Who will pay for the so-called utility “stranded assets?”** Also described as “the burden of bad investment,” these costs can be considered as already borne by emerging markets and ratepayers. The panel of presenters agreed this issue is complex and relates to the ability to continue to invest in public infrastructure. Investor Owned Utilities (IOU) must continue to provide capital to ensure infrastructure is safe and reliable and continues to be built. Conversely, if huge losses are incurred by institutional investors (such as pension funds) and utilities, infrastructure is imperiled. If utilities are to remain financially viable under the existing business model, the issue of stranded assets must be resolved. The Utility of the Future will need to shift to more flexible systems. Large centralized generation that is debt funded is prohibiting utilities from shifting quickly to adapt to the changing energy landscape. Regulated states are particularly susceptible.
- **How does Maui compare to the mainland regarding stranded assets?** Fortunately, in Hawaii, this issue is less significant but the way forward must be methodically planned, and the right investments made at the right time. There *will be* a cost of transition, and the key is to mitigate the magnitude of that cost, preferably through rapid, cost-effective and systemic responses. We cannot afford delay, and small “baby steps” should be taken now. In Hawaii, there are greater choices in the generation portfolio and it is important to understand all the consequences and plan for them. There is no single path during this transition, and many potential alternatives. EPA emission regulations make it important to take a systems approach to mitigate costs.



Panelists (from left to right): Jonathan Koehn, Hermina Morita, Bill Parks, and Lauren Azar

- **What are some of the issues regarding a Statewide grid?** The choices facing Hawaii are producing and using energy locally or transitioning to a statewide grid by means of an undersea cable. Maui and the Big Island in particular have choices to make about participating in a statewide system. The most important process is to conduct a dialogue to understand all the options and consider the trade-offs, taking into account the overall value to the community and issues of sustainability.
- **Does it make sense to expand the Hawaii grid and strengthen the central utility model in the light of stranded assets?** Future demand will require a reliable generation backbone as a backup system until technology enables more localized, truly self-sufficient systems, which is likely to take time to realize.

Session 3: Expectations of Tomorrow's Utility Customers

Advancements in technology have enabled customers to have an increasing say over how they obtain electricity services at increasingly competitive prices. At the same time, society demands a strong backbone of an electricity system that must be maintained to deliver reliable energy. This session explores the changing dynamics of the utility customer base and how those pressures affect the future delivery of utility services.

Maurice Kaya, Program Director, PICHTR (former head of the State Energy Office)

Hawaii is at the forefront of many exciting developments in renewable energy that are harbingers of things to come. Currently, a major issue of stress and debate in the utility environment relates to customer expectations. The rapidly changing dynamics are beginning to allow customers to choose how they obtain their electricity, and there is heightened customer awareness of the ability of new technologies. These dynamics strain the fabric of the current electricity system and the relationship between utilities and customers. Our community needs to rely on a strong “backbone utility system” as not everyone can take advantage of technological advancements.

Dawn Weisz, Executive Officer of Marin Clean Energy (MCE)

MCE is a Community Choice Aggregator (CCA) in Marin County, California that was formed as a result of State legislation in 2002 that enabled local governments to become power purchasers for the community. MCE is a “nimble and flexible” local government agency with an elected Board drawn from the community, with set rates, policies and PPAs. MCE was launched in 2010 following much preparation and research, and its customer base has grown from an initial 7,000 to 125,000; it has become the default power generation suppliers for all their customers. MCE generation charges replace those of the incumbent utility on customer bills, but the utility continues to transmit and distribute energy. Although the incumbent monopoly utility spent \$45m. to oppose the creation of MCE and staged a misinformation campaign, utility management changes have subsequently resulted in a positive relationship. Since its launch, MCE has received many requests from neighboring communities and municipalities wanting to join their program, and there are other similar CCA programs in development across California. Customers can opt out from membership of MCE and return to the monopoly provider (PG&E). Among the benefits for MCE customers are cheaper energy, choice for using renewable energy, and reduction in greenhouse gas emissions (20% lower than PG&E).

MCE has 22 power supply contracts with 12 suppliers. Base load is supplied by biomass and geothermal energy, with additional wind and PV solar sources; 54mW of new power is currently being built. In Marin County, MCE has 75% customer participation. MCE has an energy efficiency program with a focus on the multi-family sector and retrofitting, and a collaborative pilot program with Tesla to incorporate battery storage. Other programs include smart meters, feed-in tariff, and net metering. MCE's experience is that customers prefer choice, and use it as a means of protecting the environment as well as to save money; it also provides choice over the type of energy customers use and how it is used.

Michael Mount, Vice President, Pace Global

Pace Global is the management consulting arm of a much larger company, Siemens, with a focus on energy supply management and energy consulting. It manages \$15bn. worth of energy portfolios of large corporations and 50kWh of electricity on their behalf, giving the company a broad perspective on

the energy retail market. Pace Global works with energy suppliers and generators as well as utilities and is involved in risk management, strategic planning and fuel supply forecasting.

There are parallels for the utility industry with the history of other technologies, such as the telephone, which was also invented in the 19th century and which has seen prodigious technology advances in the last 25 years. Like landline telephones, electric utilities provided the sole service available. As technical advances continue in renewable energy, an abiding and major issue is safety. As certain as the fact that energy technologies will evolve further, customer expectations will expand, and rules, regulations and laws will change. Customers will demand:

- Further technology advances;
- Choices in price, quality and sources of energy;
- Competition;
- Connected and independent micro-grids;
- Energy districts formed to collectively buy and/or generate electricity.

All of these issues will impact what the future will bring for utilities.

Tom Plant, Vice President for State Policy, Advanced Energy Economy

A notable example of using performance metrics to encourage utilities to meet customer satisfaction and efficiencies is the United Kingdom's RIO model. In the earlier discussion of utilities' responsibilities (Session 2), the issue of customer service was not addressed; utilities do a great job managing complex systems, generation and distribution, but there is no reason to assume that innovation or implementing customer programs lies within their core competency.

An alternative approach would be to introduce a competitive environment on the customer side, developing customized technologies to address what customers want by means of a utility platform, for example, smart technologies. Apps can be developed by tech companies (for example, Apple or AT&T) rather than utilities, meeting the different needs of different customers. One example is the Boulder Smart Grid City, which through smart meters and other interface technologies allow energy advances in customers' homes. However, after deployment, the utility largely ignored the customer side of the interface as this is not their core competency.

Utilities should develop rate structure apps and innovation infrastructure to allow customers to set and meet their energy goals – and then ensure that customers can access them. Smart meter penetration should be accessible to customers as well as utilities, and customers should have open access to their energy data in real time, without depending on utility approval. Ideally, the relationship between utilities and customers should be open to others on a competitive basis.

Will Rolston, Energy Coordinator, County of Hawaii

The Big Island has the highest penetration of renewable energy: 50%. Any further implementation of renewables must be cost effective as well as a logical fit and match for the existing system. Likewise, energy efficiencies must match existing utility efforts. Further, the existing utility system should be transparently analyzed for efficiencies, including some legacy contracts like avoided costs, and especially fossil fuel generation.

Decoupling carries a danger of moving the energy system to a "Frankenstein" type system that does not fit the current model. It is important to create incentives for utilities and use performance-based metrics

that utilities can profit from, while benefitting customers. Because of new technologies such as micro-grids and community smart grids, further new technologies such as battery and storage advances will help increase renewable energy and a more reliable system. Regulatory policies need to realign, possibly by means of a “master docket” that coordinates developments. Customer-side projects that could drive down rates need to be implemented.

Energy generation is an input for all kinds of economic development, and when energy costs are high, economic development becomes harder. It is important to get the right projects that make sense onto the grid, and to allow for a “bubbling up” of innovations from the customer side. Hawaii is a petri dish for energy and utility change, and everyone is watching.

Maurice Kaya moderated a Q&A featuring the four session presenters.

- **What are the opportunities for energy efficiencies in the context of customer expectations?**
Customer bills and electricity cost represents the greatest “pain point” for customers. Energy efficiencies and the intelligent deployment of efficiency resources must be developed to accrue benefits to the entire system. The panel suggested that in light of a recent report showing energy efficiency costs of 1.8 cents to 2.6 cents per kWh, taking advantage of efficiencies to offer lower rates to customers should be happening everywhere. Instead, there has been push-back from utilities on energy efficiency standards because they are not consistent with the utility business model, and customers are not being offered efficiency options. Informing customers of energy efficiency options via utility platforms and moving peak usage times would create savings for all ratepayers; effective efficiencies depend on giving the right price signals to customers.



Panelists (left to right): Maurice Kaya, Dawn Weisz, Michael Mount, Tom Plant, and Will Rolston

- **Can further details be provided regarding the MCE model?** The MCE rate structure was originally based on that of PG&E, the incumbent utility. Starting in 2010 at the same level, MCE rates are now lower than PG&E's, partly reflecting responsible procurement to minimize rate hikes. Utility "departing charge" rates payable to PG&E for customers choosing to join MCE were characterized as unrealistic and unfair. The MCE model is greener, more affordable, and involves no shareholder profits.
- **Regarding unintended consequences of innovation and new energy programs: How might such issues be resolved to allow for a mutual gains conversation?** Among the suggestions were using the Integrated Resource Process (IRP) as the mechanism, using a "clean sheet" approach with emphasis on micro-grids and smart grids, and planning to mitigate risk to consumers.

Session 4: The Evolving Energy Mix in a 21st Century Utility

Technological innovation, public policy, and customer preferences are changing how utilities and non-utility service providers meet the needs of energy consumers, and will shape the future energy mix. This session explores how utilities are adapting to these changes by integrating variable renewable energy sources, increasing utilization of distributed energy resources, and shifting towards cleaner, lower carbon fossil fuels.

Jay Griffin, Policy and Research Director, Hawaii Public Utilities Commission

A number of forces today are converging to shape the energy mix of the future. The cost of renewable energy is declining, natural gas is replacing coal on the mainland, and public policy is playing an increasing role. Customer preferences and empowerment are driving customers to assess options and choices to meet their energy needs. Hawaii is representative of an evolving energy mix in light of trends towards shifting load curves, particularly due to daytime PV supply. With the high rate of renewable energy penetration, more than 50% of daytime demand is now served by solar PV, yet oil is still serving a significant part of demand. Potential substitutes to fossil fuels continue to be sought and evaluated, as well as the right balance and combination of renewables.

Jennifer DeCesaro, Special Adviser, Office of the Secretary of Energy, U.S. Department of Energy

The DOE works with many partners in the public and private sectors as well as NGOs and others; it has enjoyed a longstanding relationship with the State of Hawaii through the Clean Energy Initiative (HCEI) and strong relationships also exist with DBEDT, the PUC, and other state agencies. Forward progress has continued since 2008 and many eyes are watching outcomes in Hawaii, which is the “canary in the coalmine” and on the leading edge of both policy and technical issues.

The DOE recognizes the importance of working with counties and local communities to advance the objectives of HCEI. At the beginning, all the stakeholders took a valuable step back to take a comprehensive overview of multiple systems involved in generation and transportation. The Hawaii model has been replicated in other places, most notably the U.S. Virgin Islands. Although Hawaii is unique because of its island systems, the challenges faced apply also to the mainland U.S. as well as globally. This has allowed Hawaii to become a leader in new policy and technical approaches, offering new business models for both utilities and developers. The DOE now has a focus of scaling this model to other states and communities. Hawaii’s Energy Excelsator, a program of PICHTR, as well as fuel cell research, provides great examples of the DOE’s partnership development of programs in Hawaii. The DOE is actively working with the state and utilities on the integration of renewable energy resources onto the grid.

The most significant lesson that Hawaii can draw from the DOE’s work elsewhere, especially in the Caribbean, is the importance of looking beyond state boundaries to other cities, states, or countries to identify new technologies, alternative applications of existing technologies, and to evaluate and implement new policies. Likewise, the importance of keeping the community engaged; transparency will be critical in moving things forward. Education is a key, and MEDB’s great work in developing K-12 energy modules is an example to others of the critical importance of developing comprehensive workforce opportunities to complete the picture, a facet also of the Virgin Islands initiatives. During the transition to

a new paradigm, “bridge fuels” are an important means of strategizing for the long term. In the Virgin Islands, for example, generators allow for diverse fuel inputs so that oil can be replaced by natural gas, without restricting future options.

Ken Geisler, Vice President of Strategy, Siemens Smart Grid, North America

Most renewable energy technologies currently are “very implementable”; it is not the technology holding us back but some level of system design. The current centralized model has safety issues, delivery and efficiencies built on. The trend towards decentralization, which puts generation closer to where it will be used not only helps reduce losses and improve efficiencies, but also provides more resilient and reliable systems. The future model is likely to feature “energy districts” (micro-grids) for a loose patchwork quilt of local and regionally centralized generation – a logical mix.

The future system should also consist of four layered elements. The base layer is reliability, which already exists; next, automated efficiencies and technical grid management, which is also prevalent. A third level of sustainability can be reached by government incentives and driven by consumers. At the highest level, the system needs resilience for local stability and the integration of further renewables. These final layers involve customers as well as County and State planners and policymakers. Each energy district could be separable when grid issues and problems arise, such as severe storms. Going forward, everything we have discussed needs to come together.

Jonathan Koehn, Environmental Manager and Regional Sustainability Coordinator for the City of Boulder, Colorado

It is important to be mindful of our capabilities and appreciate how far we’ve come in such a short time in shifting the utility business model. Boulder is currently served by a large Investor-owned utility (Xcel Energy) that does business in eight states. Over the past several years, Boulder has been exploring the possibility of municipalizing its electric utility. While municipal utilities (MUs) are not unique -- there are 29 MUs in Colorado, and over 2,000 in the U.S. -- the process to move from being served by an Investor Owned Utility (IOU) to an MU is not often done. IOUs fight every municipalization attempt as it undermines their maximized profit business model. Boulder’s interest in running an electric utility was born out of the recognition that the utility model of today is not working. Boulder is attempting to create a new and replicable model that is based on a customer-centric approach. While Boulder’s municipalization effort began as a process to access cleaner sources of energy (Xcel Energy’s Colorado portfolio is 79% fossil-fuel based), the opportunities have evolved into an issue of economic growth and vitality. The new business model of the local utility is one by which energy is treated as a service rather than a commodity. The utility can also be the host for innovation and incubation of demand-side management and local generation technologies.

Here is a clear message to utilities: You have got to listen to your customers, who are much more than simply ratepayers. The business model is evolving and utilities have to figure a way to collaborate with customers; this plays out in resource options. Simply layering renewable energy on top of a fossil fuel base will not work going forward; it’s about true customer choice. Boulder has been working with local residents and businesses to address their most important energy-related issues and the MU soon realized that in the utility model of the future, the utility should assume the role of facilitator. Allowing for maximized efficiency, local generation and innovation (transactive energy, microgrids, etc.) the new utility can focus on its core competency of providing safe and reliable energy, while allowing the private sector to create the energy marketplace, similar to what has occurred with the iPhone and apps.

Boulder's goal is not to replicate but to transform and create a new business model that involves local generation and efficiency as a "core ring", then building a retail utility around that. The current model treats efficiencies and renewable energy as an appendage.

As with the Marin model, the incumbent utility, Xcel Energy, continues to fight Boulder every step of the way, fearing that this precedent could become a domino. Other communities are interested in following the MU model, spurred by projected utility rate increases, limited amount of customer control or ability to choose, no access to consumption data, and tighter restrictions. Change is upon us and we must take control of our destiny as our communities have requested. Boulder voters have approved the process to continue to move toward the creation of a new and innovative energy utility. The legal process will create a new precedent in utilities' stranglehold on their customers, and hopefully this process will pave the way for the new utility model to emerge.

David Bissell, President and CEO, Kauai Island Utility Cooperative (KIUC)

Kauai is out in front with its renewable energy efforts: From a starting point of 5% renewables in 2006, the island now has 15%, with a further 25% to be added in the next year, including 24mW of utility-scale solar. There are 2,100 customer solar sites with more coming on-line; Kauai's average daytime load is 50 to 60mW. A primary issue is the lack of daytime load to take on all the PV energy, which can be solved by creating load via incentive rates; smart meters to facilitate time-of-use rates; and storage to convert daytime solar production to nighttime loads. KIUC is expecting 80 responses to a recently released energy storage RFP. The alternative of curtailment is a last resort.

The KIUC model is the only co-op in Hawaii and was formed in 2002, replacing the incumbent IOU (Citizens). Main features of this model are:

- 9 elected directors;
- Members rather than shareholders or customers;
- Equity has grown from 0% to 25%;
- Shared financial interest in co-op's success;
- Tax-exempt "profits" returned to members;
- Access to low-interest capital;
- Same technical and regulatory challenges as IOUs;
- Same fixed costs and rate issues as IOUs.

Jay Griffin moderated a Q&A featuring the four session presenters.

- **In terms of policy delays and best-case changes, what is most needed from regulators?** Speed and quick decision making were cited by the panel as essential for transformative change. However, incremental change may also help move the process of change along. Looking beyond new utility models and policies to what would support transformation (for example, planning and creating energy districts) was a further suggestion, together with allowing fuels in a mixed portfolio to compete head-to-head without concern for stranded assets or other extraneous factors.



Panelists (from left to right): Jay Griffin, Jennifer DeCesaro, Ken Geisler, Jonathan Koehn, and David Bissell

- **What impacts on customers can be expected from new, alternative business models?** A key advantage of the cooperative model or municipal utilities is the non-profit orientation where members/customers benefit rather than external investors. Other demonstrated impacts include lower rates, lower rate increases, less dependence on imported oil, lower emissions, and customer choice. The regulatory environment currently “boxes in” utilities, a major issue for the current business model.
- **What are some advantages of energy districts and micro-grids?** Separate cohesive functioning areas within the grid mean that in the event of outages, some areas and functions can remain operative -- for example, identified essential services such as transportation corridors and health facilities. Identification can be based not only on economic decisions but also advance community agreement and planning. The concept of utility resilience will be an important topic as we see the real world impacts of climate change playing out in real life.

Session 5: The Regulation of Electric Utilities in Japan Post Fukushima: An Overview

This session featured a four-part analysis of energy policy in Japan since the 2011 Fukushima incident when the nuclear power plant was severely damaged by a tsunami. Following this event, all 50 nuclear plants in the country were shut down, resulting in the loss of 30% of Japan's generation capacity. Under Japan's previous energy plan, this 30% nuclear generation was expected to increase to 50% by 2030.

Kazuhiko Ogimoto, Project Professor, Institute of Industrial Science, University of Tokyo

A new national energy plan was announced in February 2014 in which the Japanese government prioritized maximization of renewable energy and deregulation of the electricity market. The new plan identified three objectives:

- to secure a stable supply of electricity;
- to suppress rates as far as possible;
- to expand consumer choice and business opportunities.

In turn, the national plan identified three agendas:

- cross-regional coordination of transmission power system operators by 2015;
- full retail competition by 2016;
- unbundling of the transmission and distribution sector by 2020.

The deregulation of Japan's electricity market and its nine major power systems will be overseen by the Organization for Cross-regional Coordination of Transmission Operators (OCCTO) – a process that will facilitate the accommodation of more renewable energy onto the grid. Other changes include the introduction of a feed-in-tariff policy (2012) which started with an initial rate equivalent to 42 cents per kWh and which has been reduced progressively to 38 cents, with a target rate of 32 cents. As of 2013, Japan has 7gW of solar PV integrated into the grid, and a continuing high rate of growth.

In terms of energy forecasting through 2030, much depends on whether the nuclear power program will resume, increase, or be terminated altogether by then. Several energy mix scenarios can be presented, which collectively demonstrate that Japan's supply structure needs to be reformed, and that reduced nuclear power would increase fuel costs. Japan faces challenges of renewable energy integration, and variation and uncertainty of supply endanger the stable operation of energy systems. Increased PV penetration onto the grid translates into difficulties balancing demand and supply, although geothermal energy as a base load substitute can balance variable loads.



Professor Kazuhiko Ogimoto

To maximize flexibility of energy resources, there are five potential solutions to the issues of variability and the reduced amount of balancing (firm) power. These include:

- Maximum use of traditional generation (best use of geothermal, hydro, and pumped storage);
- Aggressive use of variable renewable energy generation, allowing for curtailment if necessary;
- Activation of demand by variable tariffs and distributed energy management;
- Strengthening of transmission system;
- Improvement of system operation including forecasting for wind and PV.

Optimizing the integration of renewable energy will result in lower costs, but time is needed to develop sources and infrastructure. The U.S. – Japan Smart Grid Demonstration Test Project on Maui is an example of innovative technology that allows for more renewable energy integration.

Session 6: The Role of Technology in Transforming to a 21st Century Utility

Innovative, emerging approaches are reshaping the electric grid – turning it from a one-way conduit for distributing power into a far more decentralized, intelligent network for improving energy reliability and efficiency across businesses, homes and communities. This session examines how demonstration projects funded by the Japanese government are attempting to use grid modernization as a way to support increased use of renewables, including the use of EVs to store curtailed energy.

Doug McLeod, Energy Commissioner, Maui County

Given that the previous session provided a fascinating insight into how Japan, a nation of 80 million, is trying to turn their energy policy “on a dime.” It is interesting to compare the frustration experienced on Maui, with a population of just 150,000, and Hawaii with just over 1 million. In terms of energy, a connection exists between Japan and Maui with the NEDO project and JUMPSmartMaui (JSM). Following the Fukushima disaster and the sudden need for energy conservation, opportunities were created for demonstration projects to be conducted and Maui was a beneficiary.

A short video on JSM provided cultural background and the traditional importance of sustainability in Hawaii -- especially the harnessing of natural resources. The County of Maui is also working towards the goal of fossil fuel independence by installing 21 PV systems on County facilities, saving \$20m over the next 10 years. Maui is leads the nation for new solar installations and has the most residential PV per capita. JSM is led by NEDO, a Japanese government agency, with several partners, including DBEDT, Hitachi, UH-HNEI, HECO and MECO, HNU Energy, MEDB, the County of Maui, Mizuho Bank, and Cyber Defense (a Japanese company.) MECO was acknowledged as an excellent project partner that deserves respect for being instrumental in staging the conference. JSM has involved cooperation at the national and local level, with the objective of exploring a sustainable way of life for future generations and developing and demonstrating smart technologies, such as EVs.

Mark Glick, Administrator, Hawaii State Energy Office, Department of Business, Economic Development and Tourism (DBEDT)

DBEDT is involved in the discussion of technological transformation because the role of technology is so pivotal for the future in moving aggressively toward the HCEI goal of 40% renewable energy by 2030. Integration of transport initiatives such as JSM ensures that technology will play a key role. In its commitment to going beyond HCEI goals, DBEDT is taking a balanced approach:

- Maintaining a diversified renewable portfolio;
- Planning for an interisland, connected, integrated grid;
- Maintaining a balance of community concerns with technical, environmental, economic and cultural considerations;
- Leveraging Hawaii’s position as a test bed to launch an energy innovation cluster;
- Allowing the market to pick winners.

By 2012, Hawaii had already achieved 14.5% energy efficiencies and 13.7% of energy from a renewable portfolio. On Maui, 25% of the 132 circuits have renewable energy penetration beyond the daily minimum load, and 120 of Oahu’s 416 circuits (29%). An interisland grid will further increase PV

penetration and reduce curtailment, as well as lower and levelize energy rates. The JSM innovation and demonstration project, costing \$30m., provides a combination of smart grid, EV and renewable energy development.

Kazuyuki Takada, Deputy Director, Smart Community Department, NEDO

Several factors converge to establish Maui as an ideal test site:

- High energy costs driven by variable oil prices;
- Energy security threatened by imported fuels;
- A rapid growth of intermittent renewable energy, negatively impacting grid operations and reliability;
- Limited drivable distances suitable for EV range;
- Advanced smart grid technology that can enhance stability and balance demand.

In terms of the JSM system, so far, five DC fast charging stations have been installed on Maui, with 15 more planned, including a network extending to Hana, a geographically isolated community. Not only has the number of EVs on Maui grown dramatically, but a majority of Nissan Leaf owners are JSM volunteers.

Fumitoshi (“Frank”) Emura, Department Manager, Smart City Project Division, Hitachi, Ltd.

The JSM project can bring the business model here on Maui to other islands and to the world. JSM system operation targets the maximum utilization of renewable energy; EV batteries can help shift energy demand through integrating renewable energy generation forecasts with operating schedules of EV batteries. They also have the potential of discharging emergency power if needed when connected to a smart grid.

The JSM project feasibility study began in 2011, with volunteer recruitment in 2012; the demonstration is projected to continue through 2015. Implementation involves 200 EVs and 40 residential volunteers, to date. The results of JSM will allow Maui stakeholders to develop policies and practices to achieve long-term benefits.

Michael Reiley, President, HNU Energy

Partnerships and collaborations are what make such projects work to fulfil a vision for the future, and JSM is a successful example of that. HNU is responsible for installing the EV charging stations and the huge amounts of energy used in the transportation sector mean that EV technology expands the addressable market for renewable energy.

A key component of renewable energy – and a critical issue in its expansion -- is storage, and EVs are storage vehicles with a Lithium-Ion battery. HNU is heavily involved locally in energy storage, with a battery project to smooth energy generated at the Auwahi wind farm, and storage projects in Wailea and Kihei as well as on Molokai, the Big Island, and Oahu. HNU is also involved in energy efficiency, energy services and LEED projects, providing a holistic approach to energy. It has recently installed a 600kW system for UH-Maui College and completed an efficiency project for the Air Force at Hickham AFB on Oahu. In terms of future visioning, HNU collaborated with Hitachi to estimate the number of EVs required on Maui to capture nighttime wind curtailment (approx. 1.6GWh per month); the estimate of 3,000 shows the value of a demonstration project that gets all parties thinking.

Doug McLeod moderated a Q&A featuring the session presenters.

- **Have people in Japan heard about the JSM project and are they accepting of this demonstration project with national funding for a Hawaii project?** Maui is regarded as the ideal site, and there is nowhere in Japan that offers the same things. The project can be explained in terms of results and best practice solutions that can contribute to Japan's situation. EVs are a central aspect of JSM and the issues of EV range are a major issue that can be addressed here on Maui because of the limited distances involved. Hitachi would like to replicate the project in Okinawa, so lessons learned on Maui will prove valuable.



Panelists (from left to right): Doug McLeod, Kazuhiko Ogimoto, Kazuyuki Takada, Frank Emura, Mark Glick and Michael Reiley

- **Once the JSM proof of concept is complete, how will the system be maintained? Can it be upgraded in the future?** Following proof of concept, the intention is to pass the project onto local management or small business, or invite local interests to operate it as a joint venture or collaborative scheme. Technology is always being upgraded over time, and this is our expectation with the JSM project. Looking ahead, the next phase will consider micro-grids and distributed energy.
- **Can EVs alone function to stabilize the grid and provide enough storage, or will it be some combination of battery technology and EVs?** There are many possibilities for assuring stability, and environmental as well as economic issues should be considered, as well as planning for the short-term through the long-term. For Maui, Hitachi considers EVs to be the best way to manage the storage issue. Similar projects in the UK and Spain likewise use EVs, and with a limited budget, EV storage is a proven technology. The challenge is to develop aggregated storage to provide energy to the grid and to homes. Location is a defining issue, but Hitachi has a vision for the future where EV distributed generation substitutes for centralized generation.

The session concluded with a video presentation by Hitachi which focused on the importance of using renewable energy in Hawaii and its potential for reducing costs of government as well as energy and raising the quality of life. In this video, Maui Mayor Arakawa was cited as viewing renewable energy as a strong economic engine to improve community standards.

Maui Topics Discussion

This optional session presented an informal discussion of energy issues specific to Maui, such as the future for renewable energy, electricity rates, grid modernization, the scheduled retirement of the oil-fired Kahului generation plant, transmission and distribution improvements, the status of distributed generation, biofuel potential, and energy curtailment.

- **What are the panel's impressions and highlights of the conference discussions so far?**
 - Importance of affordability;
 - Involvement of the County and the Mayor's familiarity with energy issues;
 - As a leader in renewable energy penetration, Maui is a global demonstration site and exemplar;
 - Maui also a potential leader in transition for "Utility 1.0" to "Utility 2.0";
 - Changes ahead for utilities include issues of resource mix, customer relations and involvement, system operations and structure, separation of generation, transmission and distribution, regulatory relationship, etc.;
 - Despite portrayal of energy issues as polarized, evidence that many stakeholders share similar goals even if opinions on methods and timing differ;
 - Importance for future collaboration and partnerships;
 - Emphasis on customer side, not just technical issues, and importance of listening to customers;
 - Customer needs can create business opportunities;
 - Vision articulated that change can happen – and will happen;
 - Importance of energy efficiencies;
 - Importance of needs and concerns of utilities;
 - Importance of data analysis to create a more comprehensive, system-wide approach to load, generation, etc.
 - Reality of energy independence – using our local renewable energy resources for our collective benefit.
- **In terms of energy, what makes Maui different from the rest of Hawaii? Are Maui's energy issues more complex?**
 - To use a medical analogy, Maui is the patient on the operating table receiving a diagnosis. We need to keep the system running while analyzing and fixing what's wrong – it may take time.
 - In the absence of a single solution, we need stakeholders to work together to use innovation to resolve the transition.
 - All Hawaiian islands are different, in terms of demography, grid characteristics, renewable energy availability, etc. Maui has its own community identity and in turn, each island in the County (Lanai, Molokai, Maui) has its own identity. Maui, for example, is does not share a similar community or grid profile as Oahu.
 - Public meetings regarding the proposed undersea cable are instructive; they are held on Maui from a state perspective, but the audience needs to be addressed from a Maui perspective – we know how Oahu would benefit, but what's in it for Maui? This will be a major issue going forward and it's important to recognize how each island is different.

- A further issue setting Maui apart is its different renewable resource mix, with a wind capacity at 72mW compared to total grid peak demand of about 200mW, high PV penetration, and geothermal potential. Maui also has a high proportion of energy experts and professionals as well as producers.
- Biofuel is also a major potential resource for the islands comprising the County, with substantial agricultural acreage. Biofuel can be used for transportation as well as generation; transportation represents a very significant proportion of imported fuel and energy (especially aviation fuel). Potentially, there are significant long-term jobs stemming from the biofuel/agriculture nexus, and the largest farm in the State (HC&S) is here on Maui but we need to act quickly to preserve it and keep it economically viable. It represents a big opportunity to move forward with biofuel if we choose to take it. A proposed County ordinance requires County of Maui vehicle fleets to use biodiesel fuel.



Panelists (left to right): Bash Nola, Carl Freedman (hidden), Matt McNeff, Matias Besasso, Bob King, and Don Guzman

- **Maui leads the nation in deployment of Distributed Generation (DG -- rooftop solar, etc.) and the County has been aggressive in installing PV on County facilities. The huge growth in DG brings challenges and requires solutions. What are the predictable trends and challenges?**
 - In 2011-12, Maui ranked as #1 in the nation by SEPA for PV per capita, and by end-2013, about 8% of all Maui customers had PV systems.
 - DG systems will continue to grow, if not at past rates. Currently there is 45mW of installed DG and 25mW more planned, which will match or exceed wind energy supply and exceed any MECO generation unit. This penetration is already impacting the grid and interconnections, but MECO is working on solutions.
 - In the future, inverters will need to be more grid-supported, but the industry is already moving in this direction.
 - Solar installers and MECO are in alignment and have a shared agenda despite the issue of saturation sending the market into a tailspin. The renewable energy sector has become an important economic sector, and the inverter issue is representative of one that the solar industry is actively working on.



Panelists (left to right): Bash Nola, Carl Freedman, Matt McNeff, Matias Besasso, Bob King, and Don Guzman

- **What are the system impacts of PV to the grid on Maui? What is the status of interconnections?**
 - For Maui, like the rest of Hawaii, peak load is 6pm to 9pm, but peak PV generation is midday. The issue for utilities is managing increasing and decreasing loads during the day. Non-smart inverters will turn off in a grid contingency, so smart inverters and grid protection schemes will avoid utilities turning off more than the current load with net meter PV systems.
 - The current grid system is based on centralized generation and distribution with corresponding safety and reliability protections. The new grid is a two-way street, raising new safety issues. Technical solutions such as micro-grids must be part of the future for utilities.
 - The future role of utilities has to transform to facilitators and coordinators, and innovation requires political leadership. From an economic development standpoint, Maui must be ready with the necessary infrastructure as well as trained students to fill the new jobs being created.
 - The analogy of a two-way street, with no road markings, is apt, especially compared to the one-way street system we are used to. We've had no crashes so far, but solutions are complex and we need to be careful in devising the new system.
- **Biofuels are a renewable energy resource Maui can already be proud of. What is the potential for biofuel, what might be the effect on agriculture, and what does the future look like for biofuels?**
 - Biofuel is a link between energy and agriculture, and there are many co-products that can be used for ranching and biomass; Maui needs to start down this path. Biofuel is versatile in being a product for both heavy transportation (buses, trucks, etc. that need dense energy) and power generation, to provide firm power for the grid. Rather than providing base load, biofuel is ideal for solving rapid fluctuations in other renewable energy sources because it is quickly dispatchable.
 - Biofuel has the potential for preserving and creating local jobs and keeping dollars on Maui.
 - The County of Maui's Agriculture Committee is involved in researching crops for providing both food and energy for Maui.

Session 7: Redefining the Customer's Role in the Utility of the Future

This session explores trends that influence products and services that enable customers to manage their own energy, as well as the ways in which global trends affect energy efficiency and demand response programs. Other topics include the extent to which choice and competition can improve customer satisfaction and energy value, and whether utilities can facilitate the shift from consumers to "prosumers." The session also explores the emerging role that customers will play in defining the utility of the next century.

Lorraine Akiba, Commissioner, Hawaii Public Utilities Commission

Many game-changing events in technical advancement have occurred in Hawaii as a result of the Hawaii Clean Energy Initiative (HCEI), some of whose goals have already been exceeded, and fossil fuel use for electricity has declined by 15% over the last 5 years because of energy efficiencies and renewable energy. The state's efficiency programs are a shining example of how to serve the public interest by allowing customers to take more control of their energy use. The average electricity demand per meter has been reduced on every island, and aggressive renewable energy portfolio standards and efficiencies have been due in part to the courage and vision of legislative leaders.

These proceedings are like sending a postcard from the future, and the utility of the future will use innovative technology and programs to provide cost-effective service, value, and customer choice, including storage, EVs, demand side management, energy efficiency, and financing options. Distributed energy resources already reflect a vision for the future of other states and here in Hawaii we are designing a road map for the future of an integrated smart grid. We need to move to a sustainable business model with a closer relationship between utilities and customers.

Neil "Dutch" Kuyper, Chief Executive Officer, Parker Ranch

Founded in the 1840s, Parker Ranch is the oldest private business in Hawaii with the mission of stewardship. The profitability of the ranch has always been correlated to rainfall, but from the current perspective of a large-scale consumer and potential energy producer, this dynamic has been changed because of energy prices. The ranch's mission has become one of prioritizing energy because of its impact on business and the community. Personal income has not kept pace with energy costs and the cost of living and energy prices have disproportionately affected agriculture more than tourism and the working class more than the professional class. It seems as though utilities are profiting at the expense of residents and businesses. The issue becomes: Is there an alternative to the apparent incremental approach of the incumbent utility?

Parker Ranch has access to energy resources and hired Siemens and Booz Allen to make recommendations. The ranch is studying a potential micro-grid for Waimea as well as island-wide solutions for large-scale renewables and conventional technologies to lower electricity rates. The consumer response of the ranch is to study alternative strategies for leaving the utility's grid altogether. Electricity is a major ranch expense because of water pumping and moving to self-reliance is an attractive option; solving the energy issue could mean a solution to the Waimea community as well.

Energy prices have created two “tipping points” for Hawaii:

- The capacity to produce food on a commercial scale is restricted because of energy costs to move water;
- The negative impact of high oil prices on the Big Island’s utility (HELCO) which has its long-term assets in the wrong position for the next era of energy in Hawaii.

The ranch is convinced that this next era should consist of an aggressive shift to community-level solutions and large-scale renewable energy. HELCO has informed the ranch that it cannot take more ranch-generated wind onto the grid; “if the utility doesn’t want our wind, maybe the community does.”

The ranch is exploring the merits of a micro-grid and its own integrated resource plan for the Big Island to test alternative strategies to lower rates over the next 10 years – inspired by HCEI. In particular, the ranch sees the HCEI analysis of net present value (NPV) as a market signal intended for private interests to enter the energy debate. The greater economic value of transition is achievable if we collectively focus on the overall potential social benefit, and that is likely to be much larger than just the direct benefit of lower rates. For example, real estate values would be boosted, food productivity would rise and make commercial-scale food production profitable.

The utility’s strategy appears to reflect the lives of its assets. Parker Ranch believes that a strategy that reflects the lives of the ratepayer would be more socially beneficial. The ranch therefore advocates for an alternative competitive plan to transform the Big Island’s energy landscape over the next 10 years and it will be sharing it with the community in the coming months.

H. Ray Starling, Program Director, Hawaii Energy

Utilities should be commended for their sponsorship and representation at this conference and they should be credited for their contributions to the proceedings. The corporate culture of utilities creates aversion to risk, which will be hard to change; Hawaii Energy is a key enabler for the redefinition of the customer’s role in the utility of the future. In 2007, the Hawaii legislature sanctioned by statute a Public Benefits Fee, and a Public Benefits Fee Administrator (PBFA), transferring the program to the utilities to direct. SAIC – now known as Leidos – was awarded the contract to operate the program by the PUC, which in turn established Hawaii Energy as the program administrator. The PBFA began its work in the field of energy efficiency, but by statute its role includes supporting clean energy technology, demand response technology, energy use reduction and demand-side management infrastructure, subject to review and approval by the PUC.

In terms of redefining the customer role, PBFA’s role is to enable utility customers to become interactive participants in a dynamic, diversified smart grid, which provides coordinated distributed generation with conservation and efficiency at its core. There are three components of the PBFA vision:

- Efficiency programs involving clean energy stakeholders (customers, service providers, utilities, government, education institutions, PUC);
- Facilitation of smart energy management through educating and supporting decision makers, and by providing data and advice for decision making;
- Integration of energy efficiency with other clean energy. This will be achieved by:
 - Partnering with utilities for a smart grid;
 - Enhancing grid tolerance;
 - Making efficiencies a nimble, dispatchable grid resource;
 - Improving customer load management;

- Developing distributed generation and storage;
- Combining storage, EVs, and smart grid with active load management;
- Developing attractive time-of-use and real time rates.

Finally, it is important to recognize energy efficiency as a generation resource.

Bob Lachenmayer, Smart Cities Manager, Schneider Electric

The renewable energy discussion has progressed far beyond environmental issues, which are now a given, and many other drivers are coming into play, such as economic development, competitiveness, and risk analysis. In terms of the customer role, what are the outcomes we are trying to create? It is necessary to plan key driver outcomes rather than simply reacting to pressures and events. One problem is that we don't know what to do with the infrastructure we've inherited, and as demographic trends change and city populations rise, utilities experience increasing strains.

Regarding drivers, the most significant movement to date has occurred in regions or cities with a political entity that is willing to take necessary action. While we consider the role of customers, it is important to consider the "big picture" dynamics that drive utilities. Economic viability is directly related to resources provided by utilities, and as roles are changing, so it is necessary to hold more collaborative discussion – such as this conference – to discuss commonalities.

Utilities must consider their future role as enablers to connect needs of individuals with core related values of the community in a way that's not done today, and as efficiently and sustainably as possible. The revolution in telecommunications has been driven by customer access to choice, and Apple, for example, became a platform and enabler for apps and different innovations and technologies as options. This is a model that utilities can learn from and emulate; customers will engage as a result of increased personal choice.

Ben Springer, Senior Associate, Energy Futures Coalition (EFC)

EFC is a project of the U.N. Foundation, funded by Ted Turner and founded after 9/11 to address the country's energy future. Its work in proposing "Utility 2.0," commissioned by the Governor of Maryland, identifies key elements of the utility of the future:

- Reliability and resilience;
- Residential customer optionality;
- Physical/technological system upgrades;
- Large (commercial/industrial) optionality;
- Utility financial viability;
- Innovative regulatory models.

Five pilot projects were designed to encompass these goals; their key features included:

- Alignment of utility compensation with customers' changing needs and values;
- Smart grid deployment;
- On-bill financing;
- Creation of utility operated micro-grids;
- EV integration and utilization.

Utilities of the future are likely to feature Performance Based Regulation (PBR), and many states (including Hawaii) are studying performance metrics such as response time and customer service; the UK's OFGEM RIO model includes output and innovation metrics. Utilities must begin engaging with customers in a more strategic way, involving the community and focusing on desired outcomes and outputs. EFC is working with the utility in Maryland (Pepco) as well as regulators and consumer advocates, to develop a strategy and survey to allow customer input on electric service priorities such as reliability, affordability, safety, access to technology, etc. This data will be aggregated geographically and performance metrics would result in a bonus or penalty based on the utility's rate of return (for example, +/- one percent). Utilities have expressed concern about the additional reporting burden, but they should instead regard this as an opportunity to ascertain what customers want. Anticipated outcomes of this exercise include a more engaged customer base, more customer-focused utilities, and initiation of energy services for transition and integration.

Lorraine Akiba moderated a Q&A featuring the four session presenters.

- **Regarding the interaction between utilities and customers: What are the priority actions utilities or stakeholders should take to assist in the transformation from utilities as commodity providers to customer-oriented energy service providers?** Responses included:
 - Shift the paradigm to enable options and meet customer needs, as already discussed. There is no choice and “business as usual” is not an option, and for all sides to work together is crucial;
 - Educate customers regarding the issues, options, and possible solutions;
 - Encourage utilities to work in less adversarial ways, rewarding outreach to customers;
 - Increase transparency, reducing the credibility gap and rebuilding trust, and encourage utilities to engage customers;
 - Consider each side of the meter as a whole system, not separate;
 - Rethink the existing business model that has been profoundly affected by rising input costs beyond utilities' control;
 - Facilitate major, transformational, flexible capital and long-term planning.
- **How does Parker Ranch, as a potential energy provider, interface with the community to assess priorities?** Over the last 6 months the ranch has met with about a dozen different community groups including Native Hawaiians, farming groups and community associations. Being present in the community and responsive is important.
- **What does Parker Ranch need from regulators, the state, the utility, and the community to move the transition forward?** Most important is an open dialogue with the utility that includes the community and bringing parties together to engage in open discussion about what is possible, including conventional technologies and strategies.
- **How might the PBFA influence policy on building codes and efficiency?** Different county codes create inconsistencies and inspections are inadequate due to lack of funding. Hawaii Energy is pushing for consolidated, consistent codes and inspections.



Panelists (left to right): Lorraine Akiba, Dutch Kuyper, Ray Starling, Bob Lachenmayer, and Ben Springer

- **What is the current situation regarding the accessibility and ownership of customer data?** Utilities remain the best conduit of data. The PBFA uses customer data to identify outliers – very efficient or highly inefficient users. The issue is how far this information can be shared, but results can be used anonymously to provide advice, and expanding this function is planned. Privacy is an issue that utilities will have to resolve; a balance is important.
- **What are some best-practice incentives from other jurisdictions that can be used to incentivize utilities?** Incentives should be performance-based, and the RIO model in the U.K. is a good model of bonuses and penalties. The regulatory process needs to evolve as well.



JUMPSmartMaui Nissan Leaf Electric Vehicle on display at the Conference

Session 8: How Will the Electric System Change in the Future?

Utilities are moving away from central control to distributed control, where individuals have an option to be a producer and consumer. The modern utility will need to expand its vision to provide diverse energy choices for their customers, communities and shareholders. The session explores the emerging trends and addresses implications for business.

Richard Rosenblum, Chief Executive Officer, Hawaiian Electric Company (HECO)

Utilities are different kinds of organizations with three principal roles:

- Operation of the electricity system;
- Responsibility for balanced energy information and advice to help public policymakers define policy;
- Execution of public policy with the efficiency of a private enterprise business.

The Hawaii Clean Energy Initiative (HCEI) is a good example of public policy implementation for which the utility is partly responsible. Utilities are moving away from centralized control to distributed control where many can be producers and consumers.

Utilities and the electricity system used to be a monolith, processing fossil fuel to the consumer. The future will be different:

- Fossil fuel will be increasingly replaced by renewables;
- Centralized generation will be increasingly replaced by distributed generation;
- Less flexible large generating units will be replaced by more flexible small ones;
- The one-way grid will be replaced by a multi-directional grid;
- Customer indifference will be replaced by customer engagement. Customers want to be part of the process and this social and cultural change is the biggest of all.

In the future, the utility will be the glue that holds the other pieces of the electrical system together. The utility's job will change from doing everything to being the facilitator for all aspects of the system, which represents the biggest change since Thomas Edison's first power plant.

Ben York, Sr. Project Engineer, Electric Power Research Institute (EPRI)

A key question is how to gather all the resources connected to the grid into a single system that brings value or benefits to each resource and aspect: Resilience, voltage support, emissions reduction, enabling demand response, etc. It is not just a case of adding to the system, but integrating available resources and expanding the grid while maintaining all the positive attributes that customers are used to. If integration is not sufficiently achieved, problems will arise. However, if done strategically, the value of all other resources is raised.

The main essentials of the foundation for an integrated grid are:

- Grid modernization involving, for example, two-way energy flow and communications;
- Modernized and improved communication standards and interconnection rules (SOPs);
- Integrated planning and operations;
- Informed policy and regulation to match the technical specifications of the system.

Ron Binz, Former Chair, Colorado Public Utilities Commission

The stages of planning a smart grid parallel the stages of grief. The smart grid started out as a magic solution with lots of hype, followed by a crash (like despair), with the realization it may not work. Now, we're getting back to the stages of reality and acceptance.

With the future grid, the application of information technology (IT) to the electric sector will change it in unpredictable and fundamental ways, as it has done with everything else we do: Shopping, banking, entertainment, news gathering and so on. If every device, every mode of energy generation, and every form of consumption is visible to the grid, it will resemble an organism; if inputs and outputs are visible and controllable, it will be a completely different system than we're used to. Prodigious amounts of data will come from smart grid sensors, contributing to algorithm-driven grid control. The role of the utility will be like an orchestra leader, and will evolve as an energy services provider, not merely an energy provider and generator.

Put graphically, the present and future utility business model has two axes: the horizontal axis has assets on one side and value on the other; the vertical axis runs from commodity to services. The investor owned utility (IOU) is commodity-based with a rate formula based on assets. A performance based incentive model (such as the U.K.'s RIO) places emphasis on value rather than assets. The energy service utility of the future is based on service rather than commodity and is value-based rather than asset-based.

Kyle Datta, General Partner, Ulupono Initiative

We have a moral obligation to plan for the future, which is the rationale for this conference. If we work together, we can have an energy system that has lower and stable cost, lower risk, greater profitability, lower in carbon emissions, with equalized rates across the Hawaiian islands and that spurs economic growth – that is the vision. To reach that future, we need to be aware of the three “elephants in the room” that we must resolve:

- The need for gifted leadership to act, notably in the PUC to deal with real issues and to take timely, decisive action. We cannot afford the tendency in our culture to blame each other when things don't go well. Leaders must act responsibly to build trust; our leadership is long on intellect but the currency of leadership is trust and we must give our leaders the opportunity to earn our trust.
- The impending enormous rate increase coming from the switch to low-sulphur diesel fuel to meet mandatory EPA compliance.
- The use of liquid natural gas (LNG) could either thwart or support renewables. If we lock into long-term LNG contracts, treating it as a transitional, low-cost fuel, we will be thwarting the future of renewables. If we treat LNG strictly as a transitional fuel, the future of renewable sources will be more certain.

The new utility business model resembles an orchestra, but with audience participation, and it is more complex and diverse than ever before. Energy leaders and regulators must be on the same page as to how the music is played. Hawaii has now moved to the “prosumer” model rather than a strictly “consumer” model, with customers both producing and consuming energy – a profound shift. The largest customers can produce energy at lower rates than the utility, whether conventional or renewable. Smaller customers can also produce at lower rates and both can afford to leave the grid and be better off; however, society as a whole is better off if they stay on the grid.

The customer revolution is here and utility and regulatory leaders are ill-prepared for this reality. Regulatory thinking, in particular, has to change for the new century. We can no longer think that we should forego renewable energy, efficiencies, or distributed generation unless all ratepayers benefit, and that equality is more important than economics. It is the prosumers' capital at risk and they deserve the rewards of that risk. We must create incentives for a new utility partnership with customers, based on trust.

Going forward here in Hawaii, we must address several key issues:

- Full recovery of stranded assets – utility distribution system investment;
- The extent to which utilities are allowed on the customer side of electric meters as there is so much potential efficiency gain, and the inverse: "Prosumer" access to utility-side data;
- Use of the market to build out renewable energy infrastructure such as interconnecting the islands and LNG plants and distributed generation in the right mix and timescale;
- Utilities' means of paying for capital;
- Utilities' means of paying for grid upgrades (such as smart meters, etc.);
- Reduction of impacts of future volatility;
- Incentives for utilities to share savings.

If we can do one thing now, I would choose to give the PUC and Consumer Advocate the resources, budget, independence and capability to make good decisions in a timely manner.

L. Hunter Lovins, President, Natural Capitalism Solutions

We are responsible for the future and what we do now will be measured in that light. If we had taken certain actions in the past, we could now have free power. Distractions include natural gas hailed as a cheap energy source and the fracking boom, and while some reports dismiss the low (and falling) cost of PV as due to tax credits, oil, coal and gas also benefit from tax credits. Everything is subsidized but commercial PV prices (five cents in Austin) are real. Citing natural gas prices at 12 cents and solar at 11 cents, a recent Citi Group report hailed solar as cheaper and that "the age of renewables is here." Do the math; what kind of future do you want?

The first "Rule of Holes" is, when you're in one, stop digging. Utilities love big, centralized facilities from which they dispatch energy. But this is no longer the world we live in. I am the face of the utility "death spiral;" either the utility makes me happy, or the utility will die. I can leave the grid at any time, and if the utility makes me happy, I'll stay and we all win.

As discussed earlier, the fights of the past are in the past and costs are forever sunk, so the utilities should not try and load its customers with paying for depreciated fossil fuel plants. Let their investors pay for them just as any entrepreneur offering a failed product would lose their investment. We should question why a monopoly that we created and which may no longer be the best economic option has an incumbency. It should only survive if customers get the energy services they want and the process is transparent. The first principle of natural capitalism is that for successful companies, efficiency is essential because it buys time. The second principle is that we are going to redesign how we make and deliver all products and services because the status quo is unsustainable, and we can redesign the entirety of the electricity utility business, probably around a distributed model.

This needs to be a civil conversation. If the utilities forget their sunk costs, I'll forget my sunk anger! Let's start anew and build this future together. The integration of energy, food, water, waste, transportation, housing – essential services – must start getting rolled in together, in the context of the future. This is the conversation for Maui and Hawaii, as well as for the U.S. and the rest of the world. As for the kind of future we want, we should aim high. Look to Hawaiian mythology; the demigod Maui tamed the sun; that is the future of the electric utility industry.

Bob Lachenmayer moderated a Q & A featuring the five panel presenters.

- **Regarding the context of common ground for the agreed transition involving an integrated grid, cost efficient options to meet customer needs, and more renewable energy: “How do we rebuild the plane while we’re flying it?” How can we maintain core qualities we want, such as reliability and safety, while introducing other choices?**
 - There is a consensus that we must leave the past behind and focus on new technologies and circumstances while engaging in civil conversation involving political leadership, regulators, technical experts, customers, and others. The lack of transparency in the utility industry is because until now, no-one cared, but that time is passed and the trust issue must change.
 - One piece of good advice applies: “Don’t take down a fence until you know why it was put up.” Despite plenty of rhetoric, not a lot seems to be happening in terms of change. Utilities should be encouraged not only to be more transparent, but to take risks, and they should be investing in distributed generation and the opportunities presented by home energy controls and systems, and move towards an energy service business.
 - In a renewable energy future, customers must come to realize the new paradigm means they are part of the system and can opt out, but only at a cost so that the system is cost-effective for the larger community. Currently the centralized utility creates opportunities for things to happen, and customers do not have to participate. There will be many, subtle radical paradigm shifts involved and we will have to pick and choose them. We must share the discussions and test all the paradigms. The future will be dramatically different than the past and will challenge all of us – customers, policymakers, regulators and utilities.
 - An important need is to enable other players — intermediaries incentivized to be involved in these paradigm shifts. The paradigm of active customers is unfamiliar to most utilities but we must engage them. Government regulation is also involved, as in Germany, where political leadership and policy decisions are driving progress, but we will always have utilities, power plants, and transmission lines.
 - The discussion should not just be limited to the utility industry; a large amount of imported oil is consumed by the transportation sector. Water availability underlies every aspect of the economy, and energy and water are closely related. When you unlock water resources, you also unlock land, food, real estate, etc.
- **Regarding the issues of trust and engagement: How can utilities be helped to address these cultural changes to support system changes?**
 - Utility representatives and regulators should be commended for attending the conference in sizeable numbers. The players who need to have the conversation about the future are in attendance and participants must not let the conversation end here.

- Technology and cutting-edge marketing have changed most things in our lives today, and as Steve Jobs observed, “Our customers don’t know what they need until we tell them.” We will need intermediaries with talents and vision which utilities and legislators don’t possess.
- “We have to be okay with trying and failing.” We will make mistakes and we should not expect perfection. If leaders take ownership for failures and are accountable, things can change quickly. We need to get out in front, like Parker Ranch, which in a conservative sector like ranching, demonstrates the great cultural shift occurring.
- Further, we need to “do failure fast,” which is a lesson learned from Silicon Valley; we are better placed not dragging things out.
- Hawaii has a long tradition of using resources efficiently and working cooperatively. Nothing motivates change like a good crisis, and with such high energy prices, we’re there. Change is accelerating and leaders need to get together and lead; in Hawaii at least, people will follow competent leadership. People must force change, which should not come just from the top.
- **One final question: What’s next? What is our homework?**
 - Get our strategies and technical pieces in place – a challenge in itself, not just for Hawaii.
 - Priorities include understanding other people’s views, using active listening, and cutting back on our own agendas. The result will be generous amounts of middle ground and that’s what it will take to arrive at our common goal.
 - Give others the benefit of the doubt and be honest about data so good decisions can be made. Many partnerships are possible and waiting to happen, as this conference proves.
 - An alternative view is that we are in a race with catastrophe. If we allow “Business As Usual,” coral reefs will disappear and the oceans will acidify and humanity will be in peril. But we have the ability to learn, adapt quickly, and show resilience. We need grids that are not just smart but downright intelligent. Hawaii has given the world the concept of Talk Story and that’s what we have to do, to listen to each other’s stories and to our visions for the future. Then we need to craft the future together, and do it fast. “Do we rebuild the plane in flight? I think you land the sucker, and build a better one!”



Panelists (from left to right): Bob Lachenmayer, Richard Rosenblum, Ben York, Ron Binz, Kyle Datta, and Hunter Lovins

Session 9: Hawaii's Unique Place in the Emerging Energy Transformation

Constance Lau, President and Chief Executive Officer, Hawaiian Electric Industries, Inc. (HEI)

Other speakers have noted that it must be hard for participants from utilities to listen to the comments and criticism, but it is very important for the utilities to be here to take the opportunity to understand, discuss, and dialogue. Speakers have underscored that we are headed into a future that is not what it used to be and that it will take collaboration, partnerships, and broad coalitions. Here in Hawaii, that comes as second nature; culturally, we depend on each other and have to work together, consult and exchange ideas ("kuka kuka") in an open, constructive, and civil environment. At this conference, in the same spirit, the national and international representatives inform and enhance our discussions and challenge our thinking.

Our common purpose is to reduce dependence on foreign oil, and any disagreement is about how to do it, not whether to do it. Overall, Hawaiian Electric utilities on Oahu, Maui and the Big Island supply 18% renewable energy. Of Maui's 26% renewable energy, almost all --23% -- is variable, exceeding DOE Director Chu's threshold of 20% that brings reliability issues into play. The Big Island has 48% from renewables, and because of geothermal, only 20% is variable. This means that Maui is leading the state in integrating intermittent renewable energy.



Constance Lau

“I am a believer in people and I’m an optimist, and we want to be part of the solution, not the problem.” However, to reprise Hermina Morita’s “committed pig” analogy [Session 2], we on the utility side would rather not be the *kalua* or roasted pig! In Hawaiian lore, the story of Kamapua’a, the superhuman “hog man,” who is most identified with Maui, is instructive as an analogy. He was best known for his romantic pursuit of Pele, the fire and volcano goddess. Despite Pele’s power, Kamapua’a’s persistence allowed him to turn her lava rock into fertile soil. Like him, we want to turn the challenge of integrating renewables and an uncertain future into the fertile soil of collaboration and innovation and create a new paradigm.

Several utility “solution” initiatives are already underway to integrate increasing amounts of renewable energy onto the grid:

- A project with local technology company Referentia Systems to develop a data analysis tool to more quickly access and evaluate data on the electricity system – for example, solar availability;
- Remote light sensor technology at the Kahuku wind farm on Oahu to measure and forecast wind speed and direction to support reliability;
- Sonic detection and ranging technology to remotely measure wind speed and direction;
- Network of solar irradiance sensors to measure light and to make forecasts;
- Real-time renewable energy data available via website;
- Distributed Resource Energy Analysis and Management System (DREAMS), a DOE forecasting tool to support real-time grid operations, allowing increased stability and reliability and reducing operating costs.
- Partnership with the Sacramento Municipal Utility District together with several major companies (Siemens, Alstom, Referentia) validating Hawaii’s location as a demonstration site;
- *EV Race to the Sun*, a joint Japan-U.S. showcase event for electric vehicles, to take place on Haleakala;
- Battery storage technology development, including the JUMPSmartMaui project.

These and other projects show the world that Hawaii is forward-looking and that we can be a model for others. The U.S. Presidential Climate Change Plan, the Fukushima disaster that sent oil prices soaring, and Chinese interest in renewable energy to mitigate air pollution all underscore the importance of renewable energy development and Hawaii’s strategic positioning as a place that can help solve the larger energy picture. Initiatives in the transportation sector such as JUMPSmartMaui and Oahu’s electrified high-speed rail system demonstrate that we have an advantage of implementing system-wide thinking.

Hawaii’s Energy Excelsator, the brainchild of PICHTR with major funding from the DOE and the Office of Naval Research (ONR), is a model for supporting energy innovation startups with funding and strategic relationships. The program uniquely provides a sense of community by building around innovators and initiatives have already included projects with a focus on distribution, customer choice, and systems. It has the potential for boosting energy investment in Hawaii and helping entrepreneurs to solve tough problems.

In conclusion, Hawaii and Maui **can** lead in changing the utility paradigm and demonstrate to all how to pave the way to a clean energy future.

Closing Remarks

Hermina Morita, Chair, Hawaii Public Utilities Commission

Hawaii's clean energy transformation is a long-term commitment and will take leadership, sustained political will, public-private partnerships, community engagement, ingenuity, resources, and careful coordination. All these elements are here on Maui, and thanks are due to all involved in this conference for providing participants with the opportunity to learn, develop new networks and form new partnerships.

Several themes have emerged from this conference:

- The importance of partnerships;
- The desire to work in a less adversarial way;
- The need to problem-solve;
- The need to redesign;
- The desirability of integration;
- The importance of sound, sustainable practices as a result of strong economic outcomes.

These themes are part of the PUC's philosophy and key to achieving successful outcomes.



Hermina Morita

The ancient Hawaiians used resources with ingenuity within their *ahupua'a* (traditional land divisions) and had a *kuleana* (responsibility) to practice *aloha* (respect). Their resource practices involved *laulima* (cooperation), *malama* (stewardship), and *pono* (what is right). These practices acknowledged the interconnectedness of nature – the clouds, forest, stream, fishponds, ocean, and people – that was a systems approach to ensuring abundance and prosperity. This native wisdom is imprinted on Hawaii's genetic code and should be our guidepost in the transformation of our energy system. We each have a role to play as leaders in our families, communities, businesses, government and other entities to sustain this important legacy. We become partners to build a better future and build a model for the rest of the world. Our greatest resource of all is *aloha* – which we can also pass on to the rest of the world.

Teena Rasmussen (County of Maui) and **Jeanne Skog** (Maui Economic Development Board) concluded by summarizing the proceedings in terms of four "C's":

- *Change*: It's here, it's scary, promising, arduous, and exciting;
- *Collaboration*: All stakeholders are responsible for change, and they need to come together;
- *Customers*: They have choices and responsibility and must keep engaged and listen as plans are implemented;
- *Conversation*: A quality this conference was designed to foster. As conveners, we seek guidance on what the next steps should be. Most important, we cannot afford "business as usual."

Appendix: Bibliography of Conference Speakers

(Alphabetical order)

Akiba, Lorraine

Lorraine was appointed to the Hawaii Public Utilities Commission in January 2012. She worked previously in private practice as a law partner at McCorriston Miller Mukai MacKinnon LLP and Cades Schutte Flemming & Wright LLP. She headed the Environmental Practice Groups at both law firms with an emphasis in environmental and natural resources law. She previously served as the Director of the State of Hawaii Department of Labor and Industrial Relations and as Chair of the State of Hawaii Environmental Council. She is currently a member of the Advisory Council to the Board of Directors of the Electric Power Research Institute and has also held leadership positions at a number of professional organizations. She is currently a member of the National Association of Regulatory Utility Commissioners and serves on its Energy Resources and Environment Committee.

Azar, Lauren

Until 2013, Lauren Azar served as the Senior Advisor to the Secretary of the US Department of Energy (DOE), leading negotiations among 9 federal agencies to overhaul their evaluation of important transmission projects and representing the DOE in President Obama's initiative to streamline federal permitting. Previously, Lauren was a partner in a corporate law firm where she practiced for 13 years in the area of electric and water utilities before serving as President of the Organization of the Midwest Independent System Operators or MISO, (OMS), a non-profit organization of representatives from 13 states and 1 Canadian province. She also served as Commissioner at the Public Service Commission of Wisconsin. Most recently, Lauren has opened her own law firm, Azar Law LLC, where she provides business, regulatory and policy advice as well as traditional legal services.

Binz, Ron

Ron most recently served as the Chairman of the Colorado Public Utilities Commission, leading implementation of numerous policy changes championed by the Governor and the Legislature to bring forward Colorado's "New Energy Economy." Ron was an active member of the National Association of Regulatory Utility Commissioners, serving as Chair of NARUC's Task Force on Climate Policy. He is a member of the Harvard Electricity Policy Group, the Keystone Energy Board, and has served on the Advisory Council to the Electric Power Research Institute (EPRI). Prior to his appointment, Ron was President of Public Policy Consulting and President of the nonprofit Competition Policy Institute (CPI), and has also directed the Colorado Office of Consumer Counsel, the state's utility consumer advocate.

Bissell, David

David is the president and CEO of Kaua'i Island Utility Cooperative (KIUC), having joined KIUC as chief financial officer in August 2006 and becoming KIUC's acting chief executive in June 2010. Bissell brings more than 20 years of financial and electric utility management experience to KIUC. Before joining the cooperative, Bissell served as manager of financial forecasting and reporting for Cinergy Corp (now part of Duke Energy). He began his career in the utility industry at Hoosier Energy Rural Electric Cooperative in Bloomington, Ind., where he spent six years as a tax and audit manager. Bissell was named the 2013 Utility CEO of the Year by the Solar Electric Power Association in recognition of KIUC's integration of solar electric power into its renewable energy portfolio.

Datta, Kyle

Kyle is a founding partner of Ulupono Initiative, which was formed in 2009 to invest in three key areas to make Hawai'i more sustainable: more locally produced food, renewable energy, and waste reduction. Previously, Mr. Datta was the CEO of US Biodiesel Group, a national biodiesel firm; Managing Director of Research and Consulting at the Rocky Mountain Institute; and a Vice-President at Booz Allen Hamilton where he served as managing partner of the firm's Asia energy practice and head of the US utilities practice. Kyle is co-author of the Rocky Mountain Institute books "Winning the Oil End Game" and "Small is Profitable." Kyle serves on the board of directors for Blue Planet Foundation, Hawai'i BioEnergy and Parker Ranch.

DeCesaro, Jennifer

Jennifer serves as the Acting Director of the Technology-to-Market Program in the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE). In this capacity, she works across EERE to identify and address challenges related to the commercialization and deployment of energy efficiency and renewable energy technologies as well as looking at how to educate and develop a supporting workforce. Prior to her current role, Jennifer served as a Special Advisor for Renewable Energy and Transmission in the office of the Secretary of Energy and as the Market Transformation lead for the DOE's SunShot Initiative. In this capacity, she directed a broad portfolio of activities at the local, state and utility levels to reduce PV system costs and eliminate barriers to solar market development.

Emura, Frank

Frank has worked with Hitachi Ltd. since 1989 and is Department Manager of the Smart City Project Division, Hitachi Ltd. Previously, he was the Department Manager for the New Business Promotion Department for Infrastructure Systems and Senior Manager of the Global Business Promotion Center of the Smart City Business Division. He has also held positions with Hitachi as Senior Manager of Hitachi Automotive Products in the US, and Manager of the Automotive Systems Group Sales and Marketing Department.

Geisler, Ken

Ken has over 30 years of management and technical experience in defining, designing, developing and implementing large integrated solutions in the energy industry; he has served in various technical, management and executive roles for large international engineering companies. Most recently, Ken served as chief architect, Smart Grid, Siemens Energy & Automation, responsible for solution vision, direction, strategy, definition, design and initial implementations for all areas of EA business, including Smart Grid solutions related to transmission control centers; distribution control centers, distributed energy resources, substation intelligence and automation; distribution automation, demand side management and response; and the overall integrated solution. Previously, Ken was president, CEO and chairman of the board of Configured Energy Systems Inc.

Glick, Mark

Mark is Administrator of the Hawaii Department of Business, Economic Development & Tourism's State Energy Office, a post he has held since 2011. There, he leads Hawaii's internationally regarded clean energy program and economic transformation efforts. Glick has been a leader in alternative fuel transportation in the United States and abroad dating back to his tenure as senior advisor to the Texas Land Commissioner, when he played a decisive role in passage of amendments to the Texas Clean Air Act and similar provisions in the federal Clean Air Act Amendments of 1990. Glick has been a successful small business owner with a focus on reducing urban air pollution in the U.S. and abroad, as well as former Director of Economic Development for the Office of Hawaiian Affairs.

Griffin, James "Jay"

Currently on a leave of absence from his post as assistant specialist for the Hawaii Natural Energy Institute, Jay serves as Chief of Policy and Research for the Hawaii Public Utilities Commission. He has won numerous awards, written for various publications and made a host of presentations relating to energy and costs. He has worked for the RAND Corporation as a policy analyst as well as a conservation organizer for the Sierra Club, Hawaii Chapter and a watershed inventory and assessment project manager for the Hanalei Heritage River Program. Jay is a member of the Hawaii Clean Energy Initiative Electricity Working Group and a mentor for the Hawaii Renewable Energy Venture Energy Excelsior.

Hamm, Julia

Julia is the President and CEO of the Solar Electric Power Association (SEPA), a national non-profit that helps its utility members make smart solar decisions. Julia has strong relationships with individuals at utilities and solar companies worldwide, and is knowledgeable about solar programs, policies, barriers, and trends. She is a frequent speaker at regional, national and international conferences and has authored numerous articles on solar trends and utility solar programs. Prior to leading SEPA, Julia worked as a senior associate at ICF International where she supported the U.S. Environmental Protection Agency with implementation of its ENERGY STAR program. In 2007 she was named one of the Top 10 Women in Cleantech by earth2tech.

Kaya, Maurice

Maurice has worked as a clean energy and environmental engineering consultant and as the energy administrator for the Hawaii Department of Business, Economic Development & Tourism. His vision for energy systems of the future emphasizes movement towards being carbon neutral, with systems sufficiently networked so that optimal balances between supply and demand are encouraged through levelized market signals, with benefits of clean energy systems accessible and affordable to all. Maurice strives to position Hawaii in leading the way to that future, recognizing the need to rapidly change entrenched systems that are designed around finite resources.

Koehn, Jonathan

Jonathan is the Regional Sustainability Coordinator for the City of Boulder, Colorado, where he oversees the city's sustainability agenda, specifically in relation to climate action and waste reduction, but more broadly across the complete spectrum of the city's sustainability goals. Most recently, Jonathan was the Environmental Affairs Manager for the city. Jonathan came to Boulder with more than 10 years of experience working with state, regional and local governments and its constituencies domestically and internationally to develop strategic and tactical solutions to energy, economic and climate challenges. Since 2009, he has been focused on the various aspects of Boulders energy efforts, and primarily, the city's municipalization exploration project.

Kuyper, Neil "Dutch"

Dutch has served as President and CEO, Parker Ranch Inc. (PRI), one of Hawaii's largest landowners, since 2011. In this role, he has acknowledged the value of diversity and sustainability, especially in the field of renewable energy. Before returning to his home state, the Punahou graduate spent 20 years in increasingly senior executive positions on the mainland and in Asia. Among his appointments, he served most recently as Chief Operating Officer with Capricorn Investment Group, previously holding the same position with Morgan Creek Capital Management, following extensive experience with Wellington Management, Boston Consulting Group and Coopers & Lybrand.

Lachenmayer, Bob

Bob is a Smart City Manager for Schneider Electric, working with cities to take a whole systems approach to efficiency and sustainability, leveraging the interrelationship between energy, water, transportation, security and other city systems to optimize the delivery of services while also meeting the community's core values. Bob has 30 years of experience in the electrical industry working with utilities, industrial end-users, original equipment manufacturers, and both commercial and residential customers. Bob chairs the Colorado Clean Energy Cluster (CCEC), a unique statewide organization fostering market transformation for clean energy. CCEC is focused on innovative and entrepreneurial ways to grow the clean energy sector through actionable projects and initiatives that are replicable and scalable and directly benefit Colorado clean energy companies.

Lau, Constance H.

Constance has served as President and CEO of Hawaiian Electric Industries (HEI) since May 2006, and also serves as chairman of Hawaiian Electric Company (HECO) and chairman of American Savings Bank. Born and raised in Honolulu, Constance joined the HEI companies in 1984. She is a director with Matson, Inc., and since 2012 has chaired the National Infrastructure Advisory Council (NIAC) which advises President Barack Obama through the Department of Homeland Security on the security of critical infrastructure sectors, including energy. She was named 2011 Woman of the Year by the Women's Council on Energy and the Environment in Washington, D.C., and serves on the boards of the Electric Power Research Institute, the Edison Electric Institute, and the Associated Electrical & Gas Insurance Services. She was named Pacific Business News (PBN)'s 2004 Hawaii Business Leader of the Year, and in 2013, she was named one of PBN's 10 to Watch for her leadership in clean energy and transportation.

Lovins, L. Hunter

Hunter is President of Natural Capitalism Solutions (NCS), a Colorado nonprofit that educates senior decision makers in the business case for a Regenerative Economy, and helps companies, communities and countries profit from implementing more sustainable business practices. An international consultant, professor, speaker, and author, Hunter has briefed heads of state, the Pentagon, the Government of Afghanistan, and about 30 other countries, as well as the United Nations and the US Congress. A founding mentor of the Unreasonable Institute, she teaches entrepreneuring and coaches social enterprises around the world. She is a founding partner in Principium, an impact investing firm. In her 30 years as an intellectual insurgent in sustainability, Hunter has written hundreds of articles and 14 books, including her international best-seller, Natural Capitalism, now in use in hundreds of colleges. Hunter is currently professor of Sustainable Business at Bainbridge Graduate Institute, University of Denver. She has won dozens of awards, including the 2012 the Rachel Carson Award. In 2013 she was inducted into the Hall of Fame of the International Society of Sustainability Professionals.

McLeod, Doug

Doug is Energy Commissioner for the County of Maui, a post he has held since 2011, and in this role works to implement the Mayor's policy of increasing the use of renewable energy while controlling cost impacts to residents. Doug has overseen the development and installation of solar PV at 21 County facilities, with an additional 18 systems planned. He has also implemented energy efficiency projects at more than a dozen County facilities with current projects including EV issues, off-grid generation, micro-grids, LED streetlights, wind farms, distributed wind energy, and proposals for an undersea cable. Doug previously worked as an attorney for energy companies and regulated electric and gas utilities, and has a background as a private developer of "green" commercial buildings on Maui. Doug has also developed Hawaii's first Feed-in Tariff PV system and the largest solar PC system on Maui.

Madden, Alice

Alice is Principal Deputy Assistant Secretary for Intergovernmental & External Affairs, US Department of Energy, serving as the interface between DOE and local, state, and tribal governments. She most recently served as the Timothy E. Wirth Chair in Sustainable Development at the University of Colorado working to advance a clean energy economy. Alice started her career in the high tech industry followed by an almost 10-year commercial litigation practice. In 2000, Alice was elected to the Colorado House of Representatives where she later served as the Majority Leader. One of her legislative focuses was building the foundation for what is now referred to nationally as the New Energy Economy. Alice then served as Climate Change Advisor to former Colorado Governor Bill Ritter and was a Senior Fellow on Climate Change for the Center for American Progress.

Morita, Hermina

Hermina was appointed by Governor Neil Abercrombie to the State of Hawaii Public Utilities Commission and named Chair of the Commission in 2011; her term expires in June 2014.

Upon her confirmation, Hermina resigned from her position in the State of Hawaii House of Representatives, where she had served as a Legislator for 15 years, serving for 13 years as the Chair of the House Energy & Environmental Protection Committee. Prior to her experience as a legislator, Hermina worked as a business manager in the retail, construction and visitor industries. She also served on the Kauai Planning Commission and Kauai Police Commission. She was born and raised on Lanai and currently resides on Kauai.

Mount, Michael

Michael Mount is Vice President at Pace Global Energy Services, a Siemens company providing energy advisory services. Previously, his experience included Mount & Associates, LLC, working in a similar capacity, and Director of Sales at OPEL Solar, a designer and marketer of solar trackers and project development for commercial and utility scale solar projects. Mount has also held high-level management consultant positions where he worked with energy utilities. His expertise covers a wide array of projects for electric and gas utilities, fossil and solar generation, and energy intensive industries.

Nola, Sebastian “Bash”

Bash is a renewable energy and utility consultant who brings more than 45 years of management experience in the energy industry to the conference. He spent 31 years of his career in key management positions at the Southern California Edison Company, the third largest investor owned electric utility in the nation. Bash managed and directed the activities of Edison’s generation planning function and their renewable and alternative generation resource program, successfully implementing over 2,000 MW of third party generation to the system through power purchase and electric interconnection agreements. Today, Nola serves as an independent consultant to the wind and renewable energy industry and has been involved in the development of Hawaii’s first wind generating facilities. Nola consults for Blue Planet Foundation and has participated in the State of Hawaii PUC’s Reliability Standards Working Group and in HECO’s Integrated Resource Planning Process as a PUC nominated Advisory Group member.

Ogimoto, Kazuhiko

After graduating from Tokyo University, Kazuhiko joined a wholesale power company, JPOWER, where he worked for power system planning, renewable energy research and development, on a high-voltage direct current (HVDC) converter project, a hydrogen system, operation and management of hydropower stations and substation, and technology development strategy. Kazuhiko then joined the Institute of Industrial Science at the University of Tokyo, where his major interests are holistic energy integration, energy system management, centralized/decentralized energy management technology, long-range energy technology development strategy, and plant maintenance and risk management. He is a member of several governmental committees for national energy strategy and technology development.

Parks, William “Bill”

Bill is the Senior Technical Advisor to the Assistant Secretary for the U.S. Department of Energy in the Office of Electricity Delivery and Energy Reliability. Prior management positions at DOE include Deputy Assistant Secretary for Electricity Research and Development, Deputy Director of the Office of Electricity, and various positions with program oversight of renewable energy, electricity and industry efficiency programs. In 2006, he was seconded to the State of Hawaii and was a principal architect of the Hawaii Clean Energy Initiative. His work has covered electricity technologies and policies; renewable energy and natural gas generation development, use, and planning; and broad contributions to distribution

generation. He has advised public and private sector energy activities at the local, state, federal and international levels and has over 30 years of experience in the energy sector with both the public and private sectors.

Plant, Tom

Tom is Senior Policy Advisor at the Center for the New Energy Economy. He served for 8 years in the Colorado state legislature, including stints as Chairman of the House Appropriations committee and Chairman of the Joint Budget Committee, and was named State Legislator of the Year. In 2007, Colorado Governor Bill Ritter appointed Tom to his Cabinet, directing the Governor's Energy Office. During his tenure, 57 bills were passed to usher in a new era of clean energy, with Colorado becoming a national trend-setter with an international reputation for policy leadership and a vibrant renewable energy industry. In 2011, Governor Ritter established the Center for the New Energy Economy at Colorado State University and Tom joined the Center as a Senior Policy Advisor. In 2012, he joined the Advanced Energy Economy Executive Team as the Vice President for State Policy.

Reiley, Michael

Michael is President of HNU Energy, a Maui-based complete energy solution provider and engineering firm that specializes in renewable energy generation, energy storage, and high-efficiency lighting products for all types of residential and commercial customers. With over 25 years of experience in high technology sectors, Michael has a unique blend of technical and management expertise, which he regularly puts to use tackling the challenges of the renewable energy field. Dr. Reiley currently serves on the Chancellor's Advisory Council of The University of Hawaii, Maui College, on the boards of multiple commercial companies, and has formerly served on the Board of Directors of several non-profits, including the Maui Economic Development Board.

Rolston, Will

Will is the Energy Coordinator for the County of Hawaii and has 25 years of experience in the power generation field as both a power generation engineer and energy analyst. He started as a power engineer for Westinghouse and Siemens, specializing in renewable energy projects. Will also has experience as an energy analyst for the investment firm Janus Capital and other private equity firms. In Hawaii, he was Renewable Projects Administrator for the Natural Energy Laboratory of Hawaii before his appointment as County of Hawaii – Energy Coordinator.

Rosenblum, Richard M.

Richard is President and CEO of Hawaiian Electric Company, Inc. (HECO). Previously, Richard has 32 years of experience in all facets of the utility business at Southern California Edison (SCE), one of the largest electric utilities in California. He had retired in June 2008 as SCE's senior vice president of generation and chief nuclear officer responsible for all power generating facilities, including nuclear and related fuel supplies. At SCE, he helped initiate one of the world's largest solar photovoltaic projects, with a goal of installing 250 megawatts of solar generating capacity on commercial rooftops in Southern California. Previously, he served as senior vice president of SCE's transmission and distribution business unit; vice president of engineering and technical services; and vice president of SCE's distribution business unit, including responsibility for customer service.

Ben Springer, Senior Associate, Energy Futures Coalition

Ben works on EFC's key programs related to energy efficiency, transmission policy, and the electric utility of the future. Previously, he worked in corporate sustainability with electric utility companies at Ceres. He also worked with David Gardiner & associates, a strategic advisory firm focused on climate change, clean energy, and sustainability.

Starling, H. Ray

Ray is Program Director for Hawaii Energy, the Public Benefits Fee program which administers Hawaii's energy efficiency program under contract with the Hawaii Public Utilities Commission. His team designs and implements various education, incentive and financing programs that promote clean energy in Hawaii. Prior to this position, he managed an energy consulting firm which developed renewable energy projects in Hawaii, including the West Maui Makila Hydro-Electric Plant. Additionally, Ray served in legal and executive positions at two electric utilities, including Hawaiian Electric Company. In 2009, he retired as a Major General in the Air Force Reserve after 37 years of service. Ray is the proud owner of a NET-ZERO home and a Nissan Leaf EV.

Weisz, Dawn

Dawn is the Executive Officer for Marin Clean Energy, where she has coordinated efforts to develop and launch the Marin Clean Energy (MCE) program, the first Community Choice Aggregation program in California. Under Dawn's leadership, MCE has initiated service to over 125,000 customers and entered into power supply agreements that have doubled the amount of renewable energy purchased in the community. She has 19 years of experience developing and managing renewable energy and energy efficiency programs while working for leading public agencies in the field. She previously managed energy and sustainability initiatives for the County of Marin and served as the Executive Director for Sustainable North Bay. In addition to guest lecturer invitations, she has also received awards from the U.S. Environmental Protection Agency, the U.S. Department of Energy, and the Power Association of Northern California.

York, Ben

Ben is Senior Project Engineer for Power Delivery and Utilization with the Distributed Renewables group at the Electric Power Research Institute (EPRI). He is the principal investigator and coordinator for EPRI's Value of an Integrated Grid study, where his primary research area is the integration of distributed energy resources into the power system, focusing on both technical and economic issues. Ben also contributes to other focus areas, including power electronics, photovoltaic balance-of-systems, and micro-grid technologies. Previously, Ben was a Bradley Fellow at the Virginia Tech Future Energy Electronics Center, where he was responsible for research, development, and demonstration of several products directly related to photovoltaic energy conversion. Ben has several publications and conference papers in the fields of electrical engineering, PV, and Thermoelectric Battery Energy Storage Systems.



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