

# Using Regulatory Law and Policy to Advance the Smart Grid in Hawaii and the Asia Pacific Region

Seoul National University College of Law

Center for Energy and Environmental Law – “Law and Policy Challenges of Smart Grid”

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# Summary of key points

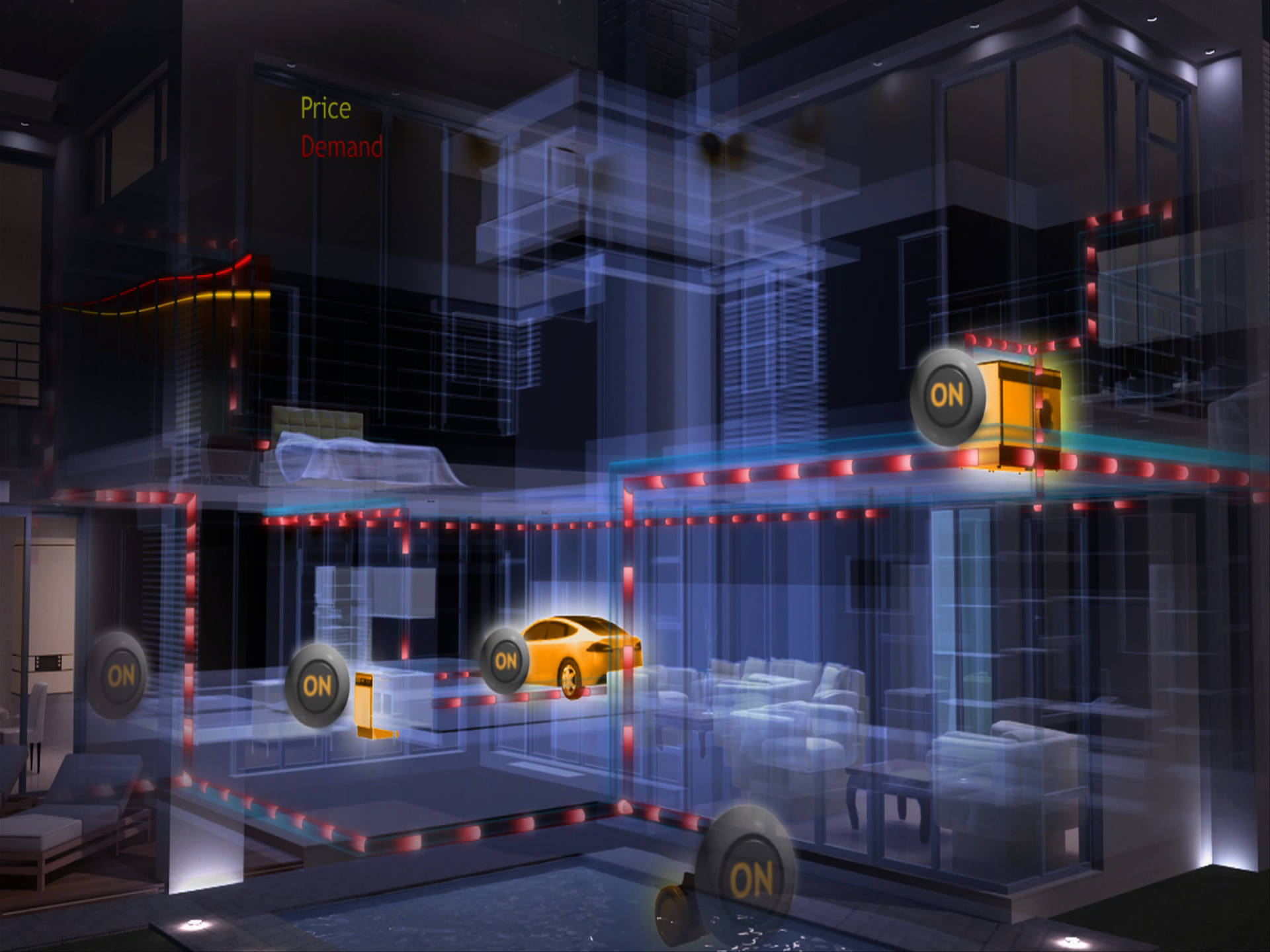
- \* Smart grid will transform electric systems
- \* Regulatory law and policy play a critical role
  - \* Regulatory process shapes smart grid
  - \* Smart grid shapes regulatory process
- \* Smart evolution of the regulatory process is needed
  - \* Increase distributed renewables
  - \* Promote advanced ratemaking and cost recovery
  - \* Address privacy and security concerns

Smart grid will transform  
electric systems

# Smart grid benefits

- \* Improve efficiency and increased use of renewables
  - \* Reducing cost to produce, deliver, and consume electricity
- \* Drive economic growth
  - \* Downward pressure on rates; job growth
- \* Increase system reliability
  - \* Reduce impacts from outages
- \* Promote environmental protection
  - \* Reduced conventional and greenhouse gas emissions
- \* Improve system security
  - \* Defend against natural and other attacks on the grid

Price  
Demand



# Federal and state smart grid regulatory law and policy

# Energy Independence and Security Act (2007)

- \* U.S. federal support for smart grid development
- \* It is “**policy of the United States to support the modernization of the Nation’s electricity transmission and distribution system**” 42 U.S.C.A. § 17381, *et seq.*
- \* Identifies thirteen key objectives
- \* Smart Grid Advisory Committee
- \* Smart Grid Task Force

# Federal regulation – FERC

- \* FERC (Federal Energy Regulatory Commission)
- \* *New York v. FERC*, 535 U.S. 1 (2001)
  - \* FERC jurisdiction – wholesale sales
  - \* PUC jurisdiction – retail sales
- \* Federal coordination to develop interoperability standards
- \* FERC Interoperability Standards Order (July 19, 2011)
  - \* Allows states to act first
  - \* Does not impose mandatory standards



# State regulation – PUCs

- \* State jurisdiction
  - \* Distribution system
  - \* Energy efficiency programs
  - \* Electric vehicles
- \* Commissions are not courts, regulators are not judges
  - \* Courts confined to pleadings and evidence
  - \* PUCs consider broader public interest
- \* *Preside or Lead?* (Scott Hempling)

# Indiana PUC challenged FERC

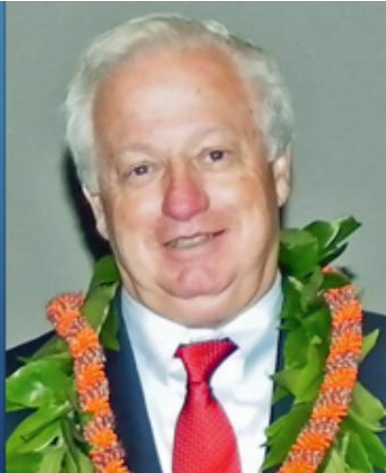
- \* FERC Order 719
  - \* ISOs (Independent System Operators) and RTOs (Regional Transmission Organization)
  - \* Must grant market access to ARCs (Aggregators of Retail Customers) for demand response
- \* Indiana PUC issued order enjoining retail customers from selling demand response to wholesale markets
- \* D.C. Circuit ruled against Indiana PUC in *Ind. Util. Reg. Comm. v. FERC*, 668 F.3d 735 (D.C. Cir. 2012)

# Hawaii Public Utilities Commission

- \* Executive branch agency
- \* Three Commissioners
- \* Appointed by Governor, confirmed by Senate
- \* Six-year terms
- \* Legal, industry, government backgrounds
- \* Major focus areas
  - \* Achieving clean energy objectives
  - \* Sustainable utility business model
  - \* 21<sup>st</sup> century grid (interisland cable and smart grid)

# PUC Commissioners

Public Utilities Commission



# Using the smart grid to increase renewable energy

# From electric utilities to iUtilities

- \* Regulatory compact guides utility behavior
  - \* Exclusive franchise for natural monopoly
  - \* Charges based on cost plus reasonable profit
  - \* First proposed in 1898 (Samuel Iswell, Pres. Commonwealth Edison in Chicago, IL)
- \* Monopoly power confers economic and political power
- \* Smart grid challenge – use regulatory law and policy to encourage innovation and change
  - \* Transform conventional utility to iUtility



# Utilities advancing smart grid

- \* Smart meter pilot project on Oahu in 2006
- \* In 2008, advanced metering infrastructure docket
- \* In 2010 smart grid road map in Docket No. 2010-0080
- \* Smart meter deployment planned for 2014
  - \* 5,000 meters
  - \* Residential and commercial
  - \* Time of use electric vehicle rates



# Utility planning addresses smart grid

- \* June 28, 2013 Integrated Resource Planning Report
- \* Chapter 12, “Smart Grid Implementation and Analysis”
- \* Smart grid related to “**large increase in distributed generation**”
- \* 13 smart grid capabilities including DER control
- \* Utilities to take “conservative approach”
- \* Business case and cost-benefit analyses

# Smart grid linked to growth in renewables

- \* IRP Report – smart grid for solar PV added at **“unprecedented rate”**
- \* Potential adverse impacts to grid operation
- \* Difficult to determine true daytime load
- \* Smart grid provides continuous real-time monitoring
- \* Smart grid road map focus on renewable integration
  - \* Reduce excess energy
  - \* Manage variability
  - \* Manage power quality

# DOE Maui smart grid project

- \* Funded by U.S. Department of Energy
- \* Voluntary, opt-in program
- \* Goal include 15% reduction in peak demand
- \* AMI information to system operators and planners
- \* Participants receive
  - \* In-home display, smart thermostat and smart water heater control system
  - \* Solar PV monitoring system
  - \* Access to energy data via secure website

# Japan-U.S. Maui Smart Grid Project

- \* Residential program
- \* Smart utility control systems
- \* Electric vehicle charging system
- \* Maui selected based on abundant renewable energy
- \* \$40 million in funding
  - \* U.S. Department of Energy
  - \* Hawaiian Electric Companies
  - \* Japan NEDO
  - \* Hitachi Ltd.
- \* Program operational from 2013-15



# Cooperative smart grid initiative

- \* Kauai Island Utility Cooperative
- \* \$5.5 million in U.S. Department of Energy funding
- \* 33,000 smart meters
- \* AMI infrastructure
- \* 1,000 in-home displays
- \* 500 load control devices
- \* **“Reduced dependency on fossil fuels requires grid modernization”**

State law can support smart  
grid regulatory process

# Maine smart grid law

- \* Maine passed smart grid law (P.L. 2010 ch. 539)
- \* Directs Maine PUC to investigate smart grid position
  - \* Docket No. 2010-267 (2010)
  - \* Should Maine create a new Smart Grid Coordinator?
  - \* Are regulatory incentives needed?
- \* Smart Grid Coordinator would manage access to smart grid functions and infrastructure
- \* Docket dismissed pending smart grid pilot



# Hawaii smart grid law

- \* Chapter 269, Hawaii Revised Statutes
- \* Part IX, “Electric Reliability”
- \* Commission may adopt reliability standards and interconnection requirements
- \* Establishes “Hawaii Electric Reliability Administrator”
- \* Grants Commission jurisdiction over any **“user, owner or operator”** of the **“Hawaii electric system”**
- \* State equivalent to NERC (North American Electric Reliability Corporation)

# Act 34 promotes smart grid

- \* Purpose of Act 34 (2013) is to establish State policy “to support implementation of advanced grid modernization technology”
- \* Section 269-145.5, “Advanced grid modernization technology, principles”
- \* Commission “**shall consider the value of improving electrical generation, transmission and distribution systems and infrastructure . . . through the use of advanced grid modernization technology**”

# Act 34 defines “advanced grid modernization technology”

- \* Includes “**equipment, facilities, and associated processes**”
- \* May improve “**reliability, resiliency, flexibility, and efficiency of the Hawaii electric system**”
- \* Automatic restoration from power outages
- \* Protect grid from physical and cyber attacks
- \* Accommodate “**energy generation and storage choices**”

# Act 34 to increase renewables

- \* Act 34 needed to aid **“progress toward the widespread use of renewable energy requires modernized electrical infrastructure”**
- \* Act 34 will support initiatives to **“break the State’s petroleum dependence”**
- \* Committee reports identify goals of Act 34
  - \* Achieve Renewable Portfolio Standards
  - \* Facilitate renewable energy
- \* PUC testified Act 34 is to increase renewables
- \* Hawaii Solar Energy Association testified in strong support



# Smart grid and demand response

- \* Utility IRP Report supports smart grid for DR
  - \* Substantial amounts of variable generation
  - \* Spinning reserves for frequency control
  - \* Controlling load may be more cost effective than spinning reserve
- \* Smart grid's “**killer app**” with 20% demand reduction
  - \* Time-based and incentive-based
  - \* Economic DR and emergency DR
- \* FERC Order 745 compensates DR providers at same rate as electricity providers in wholesale market

# Residential and commercial DR

- \* Residential Direct Load Control program
  - \* Interruptible program
    - \* Electric water heaters (monthly \$3 credit)
    - \* Air conditioning systems (monthly \$5 credit)
  - \* One-way communications only
  - \* Based on projected responses
  - \* Need AMI for actual response
- \* Commercial and Industrial Direct Load Control Program

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# PUC Docket No. 2010-0165

- \* Fast Demand Response Pilot Program
- \* “Quick start” (less than 10 min.) bridge resource
- \* Facilitate increased variable renewables
- \* Automated and semi-automated
- \* Market feedback for modifying the CIDLC program

# PUC Docket No. 2011-0392

- \* Utility currently offer static time of use rates
  - \* Residential and commercial
  - \* Curtailment riders for commercial customers
- \* AMI needed for dynamic pricing
- \* Utility filed application for Commercial and Industrial Dynamic Pricing pilot program
- \* Consumer Advocate agreed to base rate cost recovery, subject to reporting requirements

# Cost recovery and ratemaking

# Cost recovery for smart grid

- \* Utility proposes increased rates
- \* PUC reviews proposed increase in rate case
- \* Rate is “revenue requirement”
- \* Rates based on
  - \* “Prudent” operating and maintenance costs
  - \* Fair return on “used and useful” utility assets
- \* Surcharges and trackers accelerate cost recovery
- \* Fuel surcharges may be substantial

# Baltimore Gas & Electric tracker case

- \* Maryland Public Service Comm'n (June 21, 2010 order)
- \* Universal smart meter deployment
- \* Mandatory time of use rates
- \* Utility proposed cost recovery by prospective tracking mechanism
- \* Commission rejected tracking mechanism
  - \* Cost recovery via regular asset account
- \* Customer benefits not sufficiently established

# PUC Docket No. 2008-0303

- \* Utility proposed 451,000 smart meters
- \* Project cost of \$110,364,000
- \* Cost recovery
  - \* Pre-approved capital expenditures
  - \* Deferred cost accounting
  - \* Renewable Energy Infrastructure Program surcharge
- \* PUC denied application
- \* Need for overall smart grid plan with economic benefits

# Smart grid ratemaking

- \* “Results-based regulation” to promote smart grid
  - \* Revenues based on forward-looking business plan
  - \* Multi-year revenue cap promotes cost reduction
  - \* Earnings-sharing mechanism benefits customers
  - \* Performance metrics and incentives
  - \* Funding set aside for innovative projects
- \* UK’s “RIIO” Revenue, Incentives, Innovation, Outputs
- \* Cost of service regulation limits smart grid growth





# PUC Docket No. 2008-0274

- \* Original decoupling docket in 2008
- \* Hawaii Clean Energy Initiative priority measure
- \* Financially viable utility to reach clean energy goals
- \* Ratemaking or sales decoupling?
  - \* Energy efficiency programs not operated by utility
  - \* Public benefits fee administrator
- \* Regulatory lag
- \* Drain on utility management resources

# PUC Docket No. 2013-0141

- \* New decoupling docket (2013)
- \* Review of PUC-approved decoupling mechanism
  - \* Revenue Balancing Account
  - \* Revenue Adjustment Mechanism
- \* Performance metrics and incentives are major focus
  - \* Metrics include renewable energy added to grid
  - \* Incentives may include RAM rate adjustment
- \* Move toward performance-based ratemaking

# Privacy and health concerns



# Privacy and regulatory process

- \* Federal agencies have overlapping jurisdictions
  - \* FERC
  - \* Federal Communications Commission
- \* State PUC rules to protect electricity usage data
  - \* California, Texas, and Washington, D.C.
  - \* Customer must sign consent to release data
- \* High levels of federal-State coordination required



# PUC Docket No. 2012-0159

- \* KIUC is a member-owned cooperative
- \* Members objected to smart meter
  - \* Health
  - \* Privacy
- \* “Stop KIUC Smart Meters” website
- \* Member filed lawsuit in U.S. federal court on privacy
- \* Contested KIUC deferral “opt out” form

# PUC Transmittal No. 2013-03

- \* Cost to utility for opt-outs is \$340,000 per year
- \* KIUC filed application to amend utility rule
- \* New rule authorizes one-time “non-standard” meter charge (\$50 residential)
- \* Monthly “non-standard” meter charge (\$10 residential)
- \* Approximately 3,000 customers opt out
- \* Vote by coop members on fees is pending





# Hawaii and Asia-Pacific Region

# Smart grid growth in Asia-Pacific Region

- \* Asia
  - \* Smart meter market \$2.3 billion by 2020
  - \* 467 million smart meters by 2020
- \* Korea
  - \* Target 100% smart meter penetration rate by 2020
- \* Japan
  - \* Estimated 17 million smart meters by 2019
- \* China
  - \* Estimated 377 million smart meters by 2020
  - \* 59% of total Asian market by 2020

# Smart grid regulatory process varies internationally

- \* U.S. federal and state regulatory processes unique
- \* Smart grid may create similarities and differences
  - \* Similarities from global technology deployment
  - \* Differences from need to tailor solutions
- \* Smart grid drivers create shared regulatory dynamic
  - \* Information technology and “energy internet”
  - \* Shift to renewables to reduce fuel costs
  - \* Urgent necessity to decarbonize society

# Conclusion

- \* Smart grid will transform electric systems
- \* Regulatory process shapes smart grid
- \* Smart grid shapes regulatory process
- \* Smart evolution of the regulatory process is needed
  - \* Increase distributed renewables
  - \* Promote advanced ratemaking and cost recovery
  - \* Address privacy and security concerns
- \* Asia-Pacific cooperation key to smart grid growth





# Thank you

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