

# Thoughts for IEA DSM Task XVII

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# Organizing our work and information

Key issues to address:

- Issue
- Actors
- Detail on issues, sub-issues
- Leading projects, demos, studies, efforts

# Large Renewables Integration

<b>Actors</b>	<b>Status and key issues</b>	<b>Projects</b>
Industry	<ul style="list-style-type: none"><li>• Wind penetration nearing 10% in some areas</li><li>• Growing wind turbine and project size changes integration issues</li><li>• Reduce technology costs relative to other generation technologies</li><li>• Extensive R&amp;D underway</li><li>• Wind production forecasting improving greatly, reducing integration costs</li><li>• EHV transmission planning, interconnection and construction</li><li>• Role of energy market, balancing energy services and products</li><li>• Labor force adequacy -- planners, installers, engineers</li><li>• Managing environmental animals, habitat) impacts from wind development</li></ul>	<ul style="list-style-type: none"><li>• 20% Wind by 2030 Vision Study</li><li>• BPA's non-Wires transmission evaluation process</li><li>• Valuation of, compensation for wind capacity</li><li>• System voltage impacts, low-voltage ride-through rules</li><li>• Integration -- implementation and cost</li><li>• Use of power electronics for grid integration</li></ul>
Utilities		
Wind producers		
State and federal government (policy)		
Local government (siting)		

# Small Renewables Integration

## Actors

Vendors

Government  
research

Governmental  
policy,  
especially  
RPS

Consumers

Utilities

State regulators

## Status and key issues

- Interconnection policies
- Physical/technical interface
- Installation
- Work force availability
- Compensation for feed of customer generation onto grid
- PV, others -- high cost of acquisition and acquisition is prohibitive
- Need to lower costs of small-scale renewables relative to retail end-use electricity prices

## Projects

- Valuation of emissions offsets, compensation
- Compensation for value of generation behind the meter
- Valuation, compensation for emissions offsets
- Community wind developments
- Utility concern over backfeeds into grid

# Distributed Generation (non-renewable) and Storage

## Actors

Consumers

Vendors

Utilities

Government  
policy

Local building and  
efficiency  
standards

## Key issues

- Cost of devices -- need to increase efficiency, reduce emissions, reduce costs
- Diesel/combustion -- safety (esp re CO inhalation and backfeed concerns)
- Ease of installation and use
- Air quality and GHG emissions
- Plug-in hybrid electric vehicles
- Battery technologies and cost
- CHP widespread for industrial uses
- Need common interface, communication and control schemes
- Business models -- individual or fleet; utility or consumer control?

## Projects

- Dept of Energy
- California energy Commission
- NYSERDA
- Con Edison
- Distributed Utility Assc.

# Energy Efficiency and DR

## Actors

Vendors

DOE

State regulators

T&D utilities

End use customers

State and federal  
regulators

Consultants and  
advocates

Energy service  
companies

## Status and key issues

- EE very cost-effective relative to supply resources
- National Action Plan for Energy Efficiency
- Growing penetration of EE; slower growth of DR
- How to develop EE and DR into full equivalents of supply resources
- Advanced metering spreading slowly
- “The building as a battery”
- Developing data and technology to characterize changing load profiles
- Advanced metering and meter data management
- Efficiency standards for buildings, devices

## Projects

- Building automation
- Vendors -- Site Controls, Enernoc, GridPoint, City of Austin zero-net energy house
- CA, NY, NJ lead states
- PPL, SCE, City of Austin, DTE, SCE
- Lawrence Berkeley, NRELabs, Environmental Protection Agency, Dept of Energy, FERC

# Smart Grid

## Actors

Vendors,  
industry  
Dept of Energy  
State regulators  
Utility asset  
purchasers

## Key issues

- Isolated applications
- Multiple smart grid advocates and analysts
- Interoperability and standards are critical for successful applications to integrate and cooperate
- Utility industry reluctance to adopt standards, protocols from other industries
- Breadth of players -- from user devices up to power plant -- creates huge scope and challenge
- Too much proprietary technology, slow move toward open architectures

## Projects

- Many by vendors, consultants
- Lots of agent-based work
- Individual demos on very small scale
- Drivers are advanced metering, system reliability
- Smart devices v. smart systems
- Multiple smart grid advocates

# Integration

## Actors

- Vendors
- Research organizations
- Utilities

## Key issues

- Development of architecture, tools for control, communications, cooperation from device up through distribution and transmission to power plant
- Market structures complicate integration -- how to cover costs of new technologies
- Consumer interests don't support "grid optimization"
- Utilities want control, consumers want freedom
- Compensation for integration capabilities and value
- Design system for net variability, not element-specific intermittency
- Design interoperability around functions, not technologies -- physical, semantic and communications, business rules

## Projects

- Hawaii sustainable energy transformation
- City of Austin sustainable city
- California

# Overarching Themes in the U.S.

- How to translate value of benefits into compensation
- Who pays for what? How to create multiple revenue streams to cover the cost of broadly beneficial technologies?
- Lack of government leadership and commitment to wide strategy for advanced technologies and sustainability
- How to structure utility compensation, incentives to support (or not sabotage) DG, renewables, DSM
- Complications from wholesale competition and functional disaggregation (liberalisation) in many states
- Diverse actions and rules from state to state, no strong federal regulation
- Relatively low energy prices discourage customer action
- Need to continue improving technologies -- effectiveness, cost/kWh, installation cost, integration cost
- Who's in charge, the customer or utility? Control v. cooperation, collaboration of distributed resources