Barriers and Opportunities to Broader Adoption of Integrated Demand Side Management at Electric Utilities

March 8, 2018

Jennifer Potter†, Elizabeth Stuart‡, and Peter Cappers‡

† Hawaii Natural Energy Institute
‡ Lawrence Berkeley National Laboratory
Outline for Presentation

- Introduction and Overview
- Motivations and Benefits of those Currently Pursuing IDSM
- Regulatory and Utility, Barriers to Implementation of IDSM
- Actions Taken to Implement IDSM
- Opportunities for Expanding IDSM Portfolios
- Optimal Future IDSM Portfolios
Demand-side management (DSM) is the planning and implementation of programs designed to influence electric and gas utility customer uses of energy in ways that will produce desired changes in a utility's or customer’s energy profile.
Current DSM Program Offerings

- Energy Efficiency
- Distributed Generation and/or Storage
- Electric Vehicles
- Demand Response
- Time-based Rates

- Programs that incentivize customers to change their load profile
- Programs that incentivize deployment of technologies that use less energy
- Programs that incentivize customers that adopt DG technologies, (e.g. photovoltaics, fuel cells)
- Programs that incentivize the deployment of EV chargers or grid-integrated EV smart chargers
- Electricity rates paid by customers in which rates vary for different days, times of the day, or events
Policies enacted to encourage DSM

- Energy Efficiency Resource Standards
- Loading Order
- Integrated Resource Planning
- Integrated Demand Side Management
- Non-Wires Alternatives
Policies enacted to encourage DSM

- Energy Efficiency Resource Standards
- Loading Order
- Integrated Resource Planning
- Integrated Demand Side Management
- Non-Wires Alternatives
Policies enacted to encourage DSM

- Energy Efficiency Resource Standards
- Integrated Resource Planning
- Non-Wires Alternatives
- Integrated Demand Side Management
- Loading Order
Policies enacted to encourage DSM

- Energy Efficiency Resource Standards
- Integrated Resource Planning
- Non-Wires Alternatives
- Integrated Demand Side Management
- Loading Order
Policies enacted to encourage DSM

- Energy Efficiency Resource Standards
- Integrated Resource Planning
- Loading Order
- Integrated Demand Side Management
- Non-Wires Alternatives
Policies enacted to encourage DSM

- Energy Efficiency Resource Standards
- Integrated Resource Planning
- Non-Wires Alternatives
- Integrated Demand Side Management
- Loading Order
Integrated Demand Side Management

The integration/cooperation of delivery for three or more of: (1) Energy Efficiency, (2) Demand Response, (3) Distributed Generation, (4) Storage, (5) Electric Vehicle, and (6) Time-Based Rate programs to residential and commercial electric utility customers.
Current IDSM Program Offerings

Integrated Demand Side Management

- Energy Efficiency
- Distributed Generation and/or Storage
- Time-based Rates
- Electric Vehicles
- Demand Response
Limited Industry Experience with IDSM

California
- IDSM Proceeding began in 2009
- Focused on “duck curve”

Hawaii
- Current DR docket and DER initiatives
- 3rd party administered EE

New York
- Reforming the Energy Vision (REV)
- 40+ customer focused initiatives

Massachusetts
- Grid modernization
- Non-wires alternatives

Colorado
- Perf. based utility regulation (HB1250)
- AMI in progress
Objectives of Scoping Study

- Identify barriers and opportunities for increasing implementation of integrated demand side management (IDSM) programs by:
  - Highlighting examples of programmatic mechanisms that have been or could be deployed for delivering IDSM technologies;
  - Identifying benefits reported by program administrators that IDSM has provided or may provide to the bulk power and distribution system;
  - Identifying a prioritized set of barriers that has been or could be experienced by program administrators to more fully implement IDSM; and
  - Discussing efforts that have been or could be undertaken to overcome these barriers.
Survey & Interview of Program Administrators and Implementors

Organizations participating in the scoping study

<table>
<thead>
<tr>
<th>Avangrid</th>
<th>Pacific Gas and Electric (PG&amp;E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTE Energy (DTE)</td>
<td>Consolidated Edison (ConEd)</td>
</tr>
<tr>
<td>Hawaiian Electric Company (HECO)</td>
<td>Southern California Gas (SoCalGas)</td>
</tr>
<tr>
<td>Sacramento Municipal Utility District (SMUD)</td>
<td>Hawai‘i Energy (Leidos)</td>
</tr>
<tr>
<td>Southern California Edison (SCE)</td>
<td></td>
</tr>
</tbody>
</table>
Reported Motivations and Benefits of those Currently Pursuing IDSM
Program Administrator Motivations for Implementing IDSM Programs

- Compliance with regulatory mandates to offer IDSM
- Ability to deliver increased number or broader range of demand side technology options and services that are capable of optimizing customers’ end use energy consumption
- Reducing the market confusion that customers might experience about different demand side program offerings
- Increasing customer engagement and satisfaction
- Ability to improve program delivery cost-effectiveness
- Ability to deliver IDSM that better meets locational and/or temporal grid needs
- Reducing duplicative efforts between EE and DR

Count of respondents (n=12)
Benefits of IDSM that are Materializing or Showing Potential to Materialize

- Increased renewable generation interconnected onto the grid
- Saving more energy/helping to meet EE targets beyond what EE programs can deliver alone
- Reducing customer confusion around DSM program
- Improving the cost-effectiveness of DSM programs
- Addressing locational and/or temporal grid needs
- Reducing peak demand beyond what DR programs can deliver alone
- Increasing customer participation in DSM programs/delivering DSM to more customers

Count of Respondents (n=12)
Regulatory and Program Administrator Barriers to Implementation of IDSM
Regulatory Barriers to Implementing IDSM

- Separate/distinct program budgets for EE, DG, DR and Storage
- Lack of effective metrics for evaluating cost-effectiveness of integrated programs
- Separation of responsibilities across industry partner organizations for delivering different DSM technologies...
- Regulatory rules for EM&V (lack of integrated rules)
- Telemetry requirements &/or functionality

Count of Respondents (n=12)

- No Answer
- Least significant
- Slightly Significant
- Moderately Significant
- Very Significant
- Most Significant
Regulatory Barriers to Implementing IDSM

Separate/distinct program budgets for EE, DG, DR and Storage
Lack of effective metrics for evaluating cost-effectiveness of integrated programs
Separation of responsibilities across industry partner organizations for delivering different DSM technologies...
Regulatory rules for EM&V (lack of integrated rules)
Telemetry requirements &/or functionality

Count of Respondents (n=12)

- No Answer
- Least significant
- Slightly Significant
- Moderately Significant
- Very Significant
- Most Significant
Regulatory Barriers to Implementing IDSM

- Separate/distinct program budgets for EE, DG, DR and Storage
- Lack of effective metrics for evaluating cost-effectiveness of integrated programs
- Separation of responsibilities across industry partner organizations for delivering different DSM technologies...
- Regulatory rules for EM&V (lack of integrated rules)
- Telemetry requirements &/or functionality

Count of Respondents (n=12)

- No Answer
- Least significant
- Slightly Significant
- Moderately Significant
- Very Significant
- Most Significant
Program Administration Barriers to Offering or Expanding IDSM

- Separation of responsibilities within organizations for delivering different DSM technologies (e.g., EE department)
- Customer market confusion about program & technology offerings
- Technological interoperability
- Technological controllability

Count of Respondents (n=12)

No Answer
Least significant
Slightly Significant
Moderately Significant
Very Significant
Most Significant
## Program Administration Barriers to Offering or Expanding IDSM

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Count of Respondents (n=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separation of responsibilities within organizations for delivering different DSM technologies (e.g., EE department)</td>
<td></td>
</tr>
<tr>
<td>Customer market confusion about program &amp; technology offerings</td>
<td></td>
</tr>
<tr>
<td>Technological interoperability</td>
<td></td>
</tr>
<tr>
<td>Technological controllability</td>
<td></td>
</tr>
</tbody>
</table>

- No Answer
- Least significant
- Slightly Significant
- Moderately Significant
- Very Significant
- Most Significant
Program Administration Barriers to Offering or Expanding IDSM

Separation of responsibilities within organizations for delivering different DSM technologies (e.g., EE department)

Customer market confusion about program & technology offerings

Technological interoperability

Technological controllability

Count of Respondents (n=12)

- No Answer
- Least significant
- Slightly Significant
- Moderately Significant
- Very Significant
- Most Significant
Actions Taken to Implement IDSM
Activities Undertaken To Enable the Integration of DSM Delivery

Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of departments within my organization.

Developed and transitioned, or are in the process of transitioning, customers to retail rates that align with IDSM objectives (this could include active or pending proceedings and/or rate cases)

Developed education and outreach material that combined information about different DSM technologies and measures that historically fell under different program types to help customers gain knowledge about value of investing in different DSM technologies

Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of different organizations in the market, e.g., aggregators, program administrators.

Created internal and external training opportunities to increase utility staff and contractor capabilities in different IDSM technologies

Funding for some DSM programs has been consolidated and integrated.

Developed a number of pilots and innovative demonstrations in an attempt to integrated EE and DR program delivery

Count of Respondents (n=11)
Developed a number of pilots and innovative demonstrations in an attempt to integrated EE and DR program delivery.

Funding for some DSM programs has been consolidated and integrated.

Created internal and external training opportunities to increase utility staff and contractor capabilities in different IDSM technologies.

Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of different organizations in the market, e.g., aggregators, program administrators.

Developed education and outreach material that combined information about different DSM technologies and measures that historically fell under different program types to help customers gain knowledge about value of investing in different DSM technologies.

Developed and transitioned, or are in the process of transitioning, customers to retail rates that align with IDSM objectives (this could include active or pending proceedings and/or rate cases).

Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of departments within my organization.

Developed education and outreach material that combined information about different DSM technologies and measures that historically fell under different program types to help customers gain knowledge about value of investing in different DSM technologies.

Created internal and external training opportunities to increase utility staff and contractor capabilities in different IDSM technologies.

Funding for some DSM programs has been consolidated and integrated.

Developed a number of pilots and innovative demonstrations in an attempt to integrated EE and DR program delivery.
Activities Undertaken To Enable the Integration of DSM Delivery

- Developed a number of pilots and innovative demonstrations in an attempt to integrate EE and DR program delivery.
- Funding for some DSM programs has been consolidated and integrated.
- Created internal and external training opportunities to increase utility staff and contractor capabilities in different IDSM technologies.
- Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of departments within my organization.
- Developed education and outreach material that combined information about different DSM technologies and measures that historically fell under different program types to help customers gain knowledge about value of investing in different DSM technologies.
- Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of different organizations in the market, e.g., aggregators, program administrators.
- Created internal and external training opportunities to increase utility staff and contractor capabilities in different IDSM technologies.
- Funding for some DSM programs has been consolidated and integrated.
- Developed and transitioned, or are in the process of transitioning, customers to retail rates that align with IDSM objectives (this could include active or pending proceedings and/or rate cases).

Count of Respondents (n=11)
Activities Undertaken To Enable the Integration of DSM Delivery

- Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of departments within my organization.

- Developed a number of pilots and innovative demonstrations in an attempt to integrated EE and DR program delivery.

- Developed education and outreach material that combined information about different DSM technologies and measures that historically fell under different program types to help customers gain knowledge about value of investing in different DSM technologies.

- Funding for some DSM programs has been consolidated and integrated.

- Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of different organizations in the market, e.g., aggregators, program administrators.

- Created internal and external training opportunities to increase utility staff and contractor capabilities in different IDSM technologies.

- Developed and transitioned, or are in the process of transitioning, customers to retail rates that align with IDSM objectives (this could include active or pending proceedings and/or rate cases).

- Developed a number of pilots and innovative demonstrations in an attempt to integrated EE and DR program delivery.
Developed a number of pilots and innovative demonstrations in an attempt to integrated EE and DR program delivery

Funding for some DSM programs has been consolidated and integrated.

Created internal and external training opportunities to increase utility staff and contractor capabilities in different IDSM technologies

Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of different organizations in the market, e.g., aggregators, program administrators.

Developed education and outreach material that combined information about different DSM technologies and measures that historically fell under different program types to help customers gain knowledge about value of investing in different DSM technologies

Responsibilities for delivering some DSM technologies have been consolidated to one or a smaller number of departments within my organization.

Developed and transitioned, or are in the process of transitioning, customers to retail rates that align with IDSM objectives (this could include active or pending proceedings and/or rate cases)

Developed and transitioned, or are in the process of transitioning, customers to retail rates that align with IDSM objectives (this could include active or pending proceedings and/or rate cases)

Activities Undertaken To Enable the Integration of DSM Delivery

Count of Respondents (n=11)
Opportunities and Recommendations for Accelerating Adoption of IDSM
Regulatory Opportunities for Expanding IDSM

- Standardized cost-effectiveness metrics
  - No Answer
  - Low Importance
  - Modest Importance
  - Medium Importance
  - Significant Importance
  - High Importance

- Dedicated IDSM program budget
  - No Answer
  - Low Importance
  - Modest Importance
  - Medium Importance
  - Significant Importance
  - High Importance

- Regulatory rule changes for EM&V
  - No Answer
  - Low Importance
  - Modest Importance
  - Medium Importance
  - Significant Importance
  - High Importance

- Regulatory mandates – legislation or PUC orders to implement non-traditional DSM activities
  - No Answer
  - Low Importance
  - Modest Importance
  - Medium Importance
  - Significant Importance
  - High Importance
Regulatory Opportunities for Expanding IDSM

- Standardized cost-effectiveness metrics
- Dedicated IDSM program budget
- Regulatory rule changes for EM&V
- Regulatory mandates—legislation or PUC orders to implement non-traditional DSM activities

Count of Respondents (n=12)

- No Answer
- Low Importance
- Modest Importance
- Medium Importance
- Significant Importance
- High Importance
Regulatory Opportunities for Expanding IDSM

- Standardized cost-effectiveness metrics
- Dedicated IDSM program budget
- Regulatory rule changes for EM&V
- Regulatory mandates – legislation or PUC orders to implement non-traditional DSM activities

Count of Respondents (n=12)

- No Answer
- Low Importance
- Modest Importance
- Medium Importance
- Significant Importance
- High Importance
Program Administrator Opportunities for IDSM

- Dedicated IDSM administrative and program implementation activities
- Technological advancements in interoperability & controllability
- New IDSM market entrants

Count of Respondents (n=12)

- No Answer
- Low Importance
- Medium Importance
- Significant Importance
- Modest Importance
- High Importance
Program Administrator Opportunities for IDSM

- Dedicated IDSM administrative and program implementation activities
- Technological advancements in interoperability & controllability
- New IDSM market entrants

Count of Respondents (n=12)

- No Answer
- Low Importance
- Modest Importance
- Medium Importance
- Significant Importance
- High Importance
Program Administrator Opportunities for IDSM

- Dedicated IDSM administrative and program implementation activities
- Technological advancements in interoperability & controllability
- New IDSM market entrants

Count of Respondents (n=12)

- No Answer
- Low Importance
- Medium Importance
- Significant Importance
- Modest Importance
- High Importance
Future Opportunities for IDSM: Promising IDSM Technologies and Measures Over the Next 10 Years
Promising C&I IDSM Programmatic Opportunities

- Lighting Systems & Control
- Battery Storage
- RETRO-COMMISSIONING
- Electric Transportation
Promising Residential IDSM Programmatic Opportunities

- HVAC Controls
- Electric Vehicles
- Water Heating
- Battery Storage
- Advanced Solar Inverter
Thank you!

Jennifer Potter
808-669-7623
Jmpotter@Hawaii.edu

Elizabeth Stuart
510-495-2370
estuart@lbl.gov

Peter Cappers
315-637-0513
pacappers@lbl.gov