

## Regional Profiles Task Update

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**Smart Grid Demo Advisory Meeting**  
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### Regional Profiles Task

**Clarify regional drivers, challenges, and activities to integrate distributed resources**



**• Deliverables**

- Webcasts/workshops
- Regional profiles summary document, including integration activities and regional demonstration needs

**• Scope emphasizes Distributed Resources:**

- located along the distribution system or customer-side of the meter
- distributed generation, storage, dispatchable load, PHEV, etc. integrated to respond in coordinated fashion
- renewable resources located at the distribution system level



Clarify regional activities and their relationships to support collaboration, enhance leverage, and identify demonstration needs within regional contexts

## Task Objectives

- **Secondary Research – to characterize regional drivers for Distributed Resource integration**
  - Regional market conditions (economics)
  - Regional resource constraints (reliability)
  - State policy and financial incentives
  - Utility programs and tariffs to support distributed resource integration
- **Surveys - to collect information by region on**
  - Uses and Enablers of Distributed Resources
  - Status of Distributed Resources
  - Potential of Distributed Resources
  - Demographics of Respondents
- **Workshops - to gather further information by region on**
  - Integration Objectives, Barriers, and Activities
  - Recipients of Benefits and Desirability of Distributed Resources by Stakeholder Types
  - Other insights
- **Collect inputs for formulating Integration Framework (Task 1.2)**
  - Relate utility programs, retail tariffs, and pilot implementations

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3

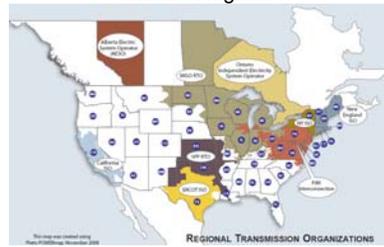
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## Examples of Regional Considerations

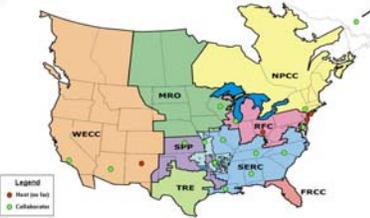
Census Regions



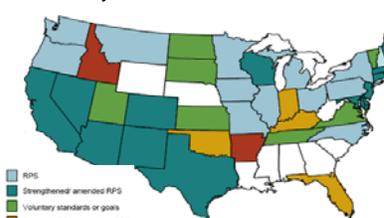
Market Regions



Reliability Regions



State-by-State Policies and Incentives

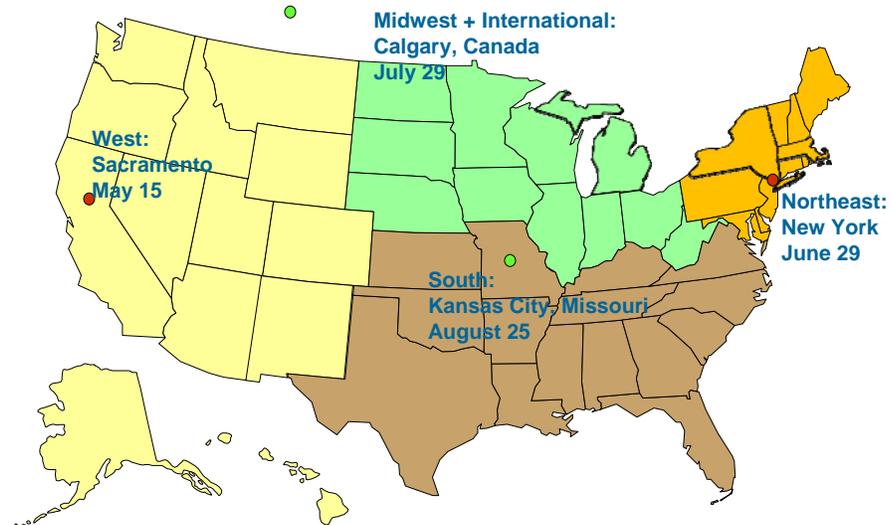


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4

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## Regions Defined for Workshop and Survey Invitations



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5

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## Objectives for Distributed Resource Integration: What utilities are using distributed resources for?

### Objectives



- Market Economics
- Low Carbon Future
- Reliability
- System Security & Protection
- Power Quality
- Enhanced Innovation and Customer Choice
- Defer capital expansion
- Meet regulatory requirement
- Serve isolated remote load

### Additional Objectives?

- Congestion Management

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6

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## Barriers for Distributed Resource Integration

### Barriers

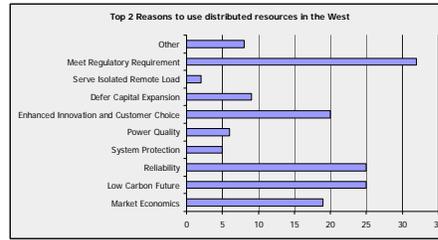
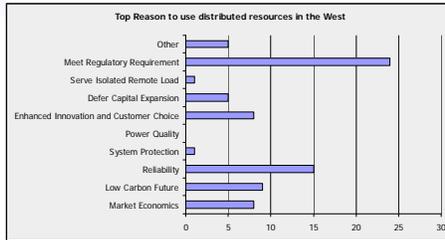


- Automation
- System operator confidence
- Economic justification
- Wholesale market structures
- Retail rates
- Customer convenience
- Aggregation
- Measurement & billing
- Safety & monitoring
- Building codes & permits
- Planning & engineering

### Additional Barriers?

## Western Region Survey Highlights

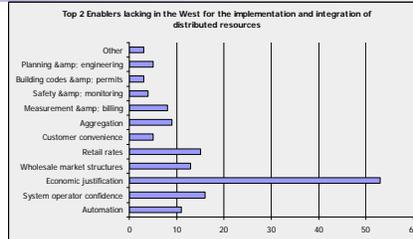
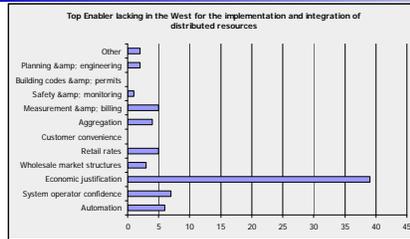
## West Survey Results: Top Reasons for Distributed Resources



Reasons	Top Reason	Second Best	Third Best	Fourth Best	Fifth Best	Response Count
Market Economics	8	11	11	11	8	49
Low Carbon Future	9	16	10	9	5	49
Reliability	15	10	4	11	6	46
System Protection	1	4	4	7	4	20
Power Quality	0	6	2	5	8	21
Enhanced Innovation and Customer Choice	8	12	22	7	6	55
Defer Capital Expansion	5	4	13	11	14	47
Serve Isolated Remote Load	1	1	3	3	3	11
Meet Regulatory Requirement	24	8	4	2	9	47
Other	5	3	0	1	1	10
<i>answered question</i>						76
<i>skipped question</i>						3

Next best reasons include supporting a low carbon future, enhancing innovation & customer choice, and improving market economics.

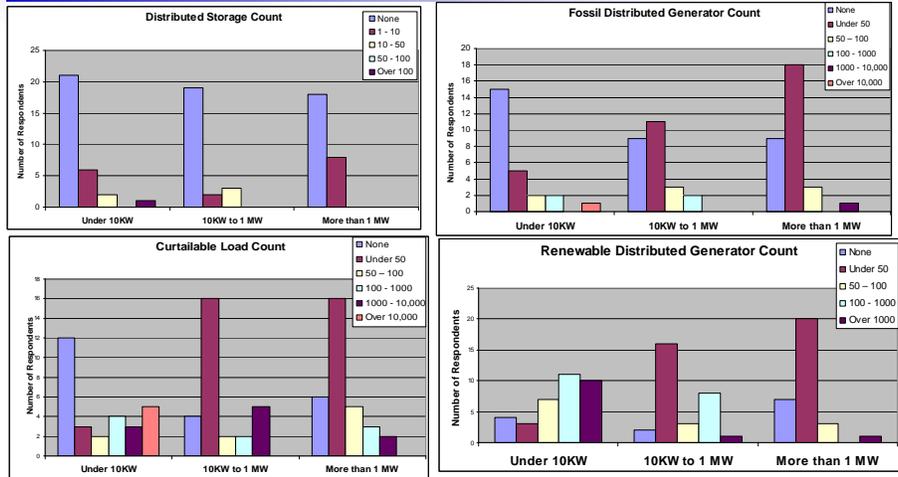
## West Survey Results: Enablers that are Lacking for Distributed Resources



Answer Options	Top Reason	Second Best	Third Best	Fourth Best	Fifth Best	Response Count
Automation	6	5	9	8	8	36
System operator confidence	7	9	4	6	6	32
Economic justification	39	14	8	1	5	67
Wholesale market structures	4	10	4	7	2	26
Retail rates	5	10	14	5	2	36
Customer convenience	0	5	3	6	8	22
Lack of Aggregation	4	5	9	4	8	30
Measurement & billing	5	3	3	7	1	19
Safety & monitoring	1	3	6	10	7	27
Building codes & permits	0	3	2	4	1	10
Planning & engineering	2	3	5	5	9	24
Other	2	1	2	1	4	10
<i>answered question</i>						74
<i>skipped question</i>						5

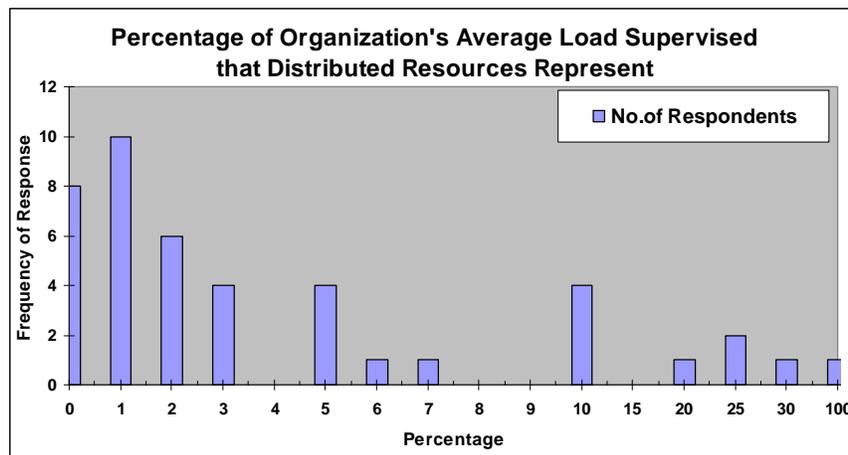
Next greatest barriers are retail rates, wholesale market structures, and automation

## West Survey Results: Histogram of Responses on No. Units Installed



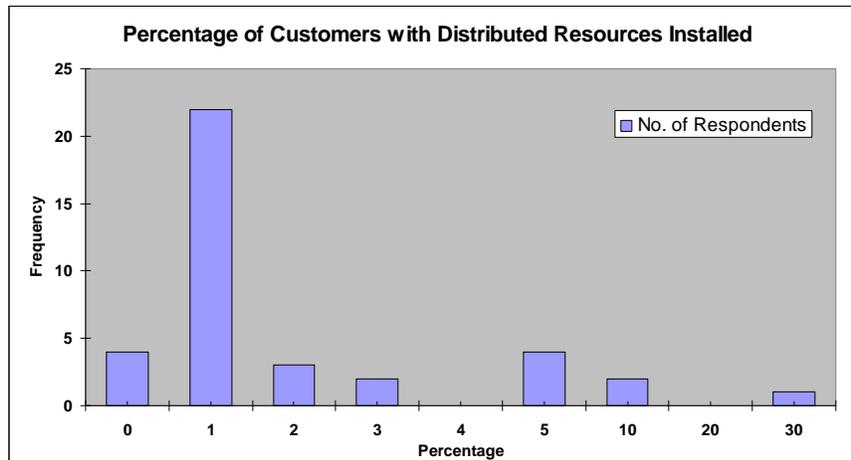
**Most respondents indicated mid and large sized installations found in limited numbers (under 50) for each resource type, and lack of distributed storage**

## Status of Distributed Resources in the West



**Most frequent response: distributed resources represent 1% of load supervised. Average of responses was 7% and Median was 2%.**

## Status of Customers with Distributed Resources in the West



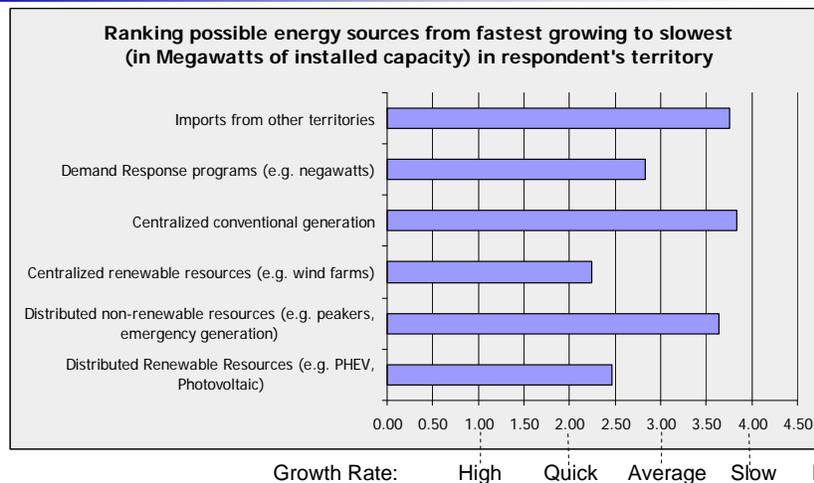
**Most frequent response: 1% of customers have distributed resources installed. Average of responses was 2.6% and Median was 1%.**

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13

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## Growth Rate of Distributed Resources in West



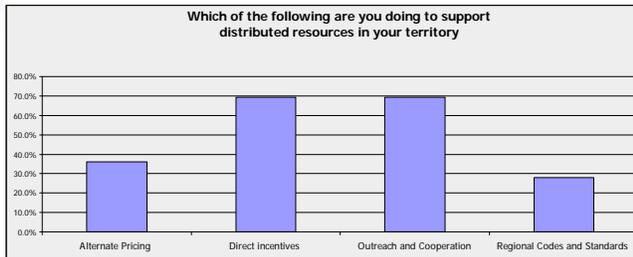
**Centralized and distributed renewables have quick growth rate, followed by demand response programs with average growth rate, and other sources with slow growth rate.**

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14

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## Implementation Types in the West: Motivation for Participant Engagement

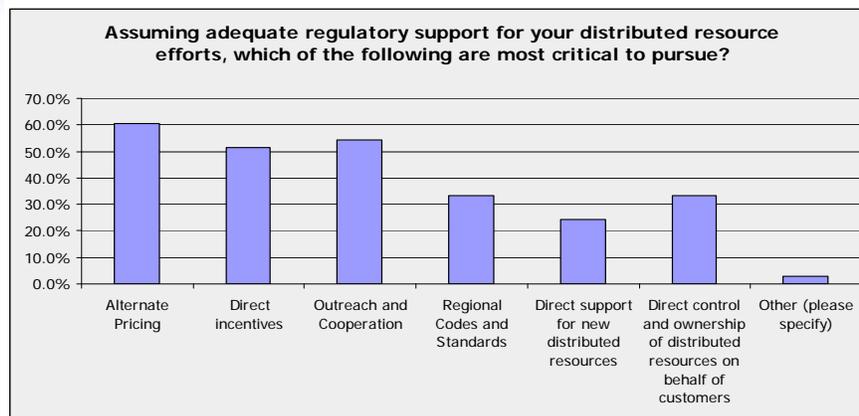


Which of the following do you think should be done to support distributed resources in your territory (Prioritize 1 to 5):

Answer Options	1-Very important	2-Important	3-Somewhat important	4-Least important	5-Should not do
Alternate Pricing – pricing structures change what a	12	11	4	4	2
Direct incentives – financial incentives that reward	10	16	6	2	2
Outreach and Cooperation – information exchange	8	15	8	1	1
Regional Codes and Standards – changes in regional	5	11	8	6	4

**Direct Incentives and Outreach & Cooperation are widely implemented and important to do, while Alternative Pricing is not as widely practiced yet very important to do.**

## Distributed Resource Integration Efforts Most Critical to Pursue



**Alternative Pricing is most critical to pursue, followed by Outreach & Cooperation and Direct Incentives. Next are Regional Codes & Standards and Direct Control & Ownership.**

## Types of Contracts Customers Would Accept for Distributed Resource

Most common response per category of acceptability:

- Direct load control is acceptable now to customers
- Subscription for demand limiting on critical days would be acceptable with customer education
- Real-time market pricing would receive low acceptability even with customer education
- Subscriptions for demand limiting services are unacceptable
- Don't know about acceptability of subscriptions for matching demand to generation nor pre-payment for power

Answer Options	Acceptable now to customers	Acceptable with customer education	Low acceptability even with customer education	Unacceptable	Don't know	Response Count
• Subscriptions for demand limiting services (e.g. subscriptions for matching demand to generation)	1	8	13	7	3	32
• Subscriptions for emergency demand only (e.g. the subscription for demand limiting on critical days (e.g. subscription for direct load control (e.g. the customer subscriptions to control variable generation (e.g. the pre-payment for power (e.g. credits loaded into the subscription for premium power (e.g. the utility offers subscription for priority service (e.g. if the power goes load matching (e.g. the customer agrees to allow real-time market pricing (e.g., the customer agrees	4	11	10	0	7	32
• Subscriptions for emergency demand only (e.g. the subscription for demand limiting on critical days (e.g. subscription for direct load control (e.g. the customer subscriptions to control variable generation (e.g. the pre-payment for power (e.g. credits loaded into the subscription for premium power (e.g. the utility offers subscription for priority service (e.g. if the power goes load matching (e.g. the customer agrees to allow real-time market pricing (e.g., the customer agrees	3	8	12	4	3	30
• Subscriptions for emergency demand only (e.g. the subscription for demand limiting on critical days (e.g. subscription for direct load control (e.g. the customer subscriptions to control variable generation (e.g. the pre-payment for power (e.g. credits loaded into the subscription for premium power (e.g. the utility offers subscription for priority service (e.g. if the power goes load matching (e.g. the customer agrees to allow real-time market pricing (e.g., the customer agrees	5	15	8	2	1	31
• Subscriptions for emergency demand only (e.g. the subscription for demand limiting on critical days (e.g. subscription for direct load control (e.g. the customer subscriptions to control variable generation (e.g. the pre-payment for power (e.g. credits loaded into the subscription for premium power (e.g. the utility offers subscription for priority service (e.g. if the power goes load matching (e.g. the customer agrees to allow real-time market pricing (e.g., the customer agrees	7	14	8	2	0	31
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• Subscriptions for emergency demand only (e.g. the subscription for demand limiting on critical days (e.g. subscription for direct load control (e.g. the customer subscriptions to control variable generation (e.g. the pre-payment for power (e.g. credits loaded into the subscription for premium power (e.g. the utility offers subscription for priority service (e.g. if the power goes load matching (e.g. the customer agrees to allow real-time market pricing (e.g., the customer agrees	3	9	15	2	3	32
• Other	2	1	0	0	0	3

**DLC is acceptable now to customers, followed by “subscription for demand limiting on critical days” - the most acceptable contract with customer education**

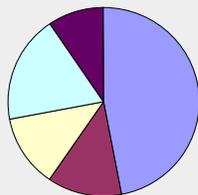
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17

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## Demographic of Respondents

Does your organization have a role in the approval of new distributed resources?



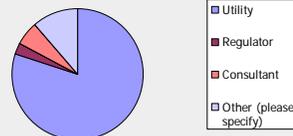
- Formal – we can approve or deny a request
- Formal – we have a vote, but not the only vote
- Formal – we have to provide input but we have no vote
- Informal only – we can provide information and attend hearings
- No

Do you have visibility into the strategic direction of distributed resources for your organization?



- Yes
- No

What kind of an organization do you work for



- Utility
- Regulator
- Consultant
- Other (please specify)

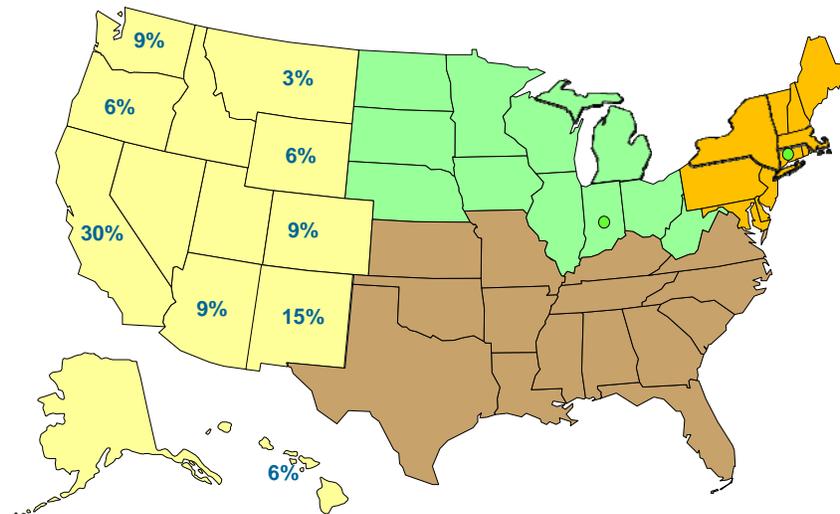
**47% of Respondents have Formal Approval Role and 73% have Strategic Visibility over Distributed Resources in their Organizations. 80% were from a Utility and 11% from Other (muni/ISO/federal power agency).**

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18

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## State Respondent's Organization is Located in



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19

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## Project Status

### • Surveys

- Questionnaire online and invitations sent to contacts by region
  - Invited West Region in May and collected 79 responses
  - Invited Northeast, South, Midwest, and International Regions in June

### • Workshops

- West Region completed
- Northeast June 29<sup>th</sup>
- Midwest & International – July 29<sup>th</sup>
- South August 25<sup>th</sup>

### • Interim Developments

- Regional drivers for distributed resource integration (Feb Advisory)
- Analysis of West Region Survey responses
- Summary of West Region Workshop findings
- What types of resources qualify as “renewable resource” by state

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20

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## Next Steps

- **Collect, Analyze, and Compare Survey Responses**
  - Characterize findings per region
  - Data mining of regional activities
  - Compare regional findings
- **Investigate Integration Barriers and Activities**
  - Survey additional utility programs and tariffs that support distributed resource integration
  - Interviews and workshop feedback
- **Integration Framework**
  - Relate utility programs, retail tariffs, and pilot implementations
  - Identify trends and gaps
  - Identify characteristics of other implementations enabled by smart grids towards overcoming integration barriers

## Smart Grid Advisory Group Feedback

- **Email feedback on**
  - Other regional factors impacting distributed resource integration
  - Review presentation slides for further feedback
- **Recommend candidates to be interviewed/surveyed**
  - Information leads on other utility program or tariff types that support distributed resource integration
- **Emerging applications of distributed resources**
  - Existing or planned implementations considered advanced
  - By objective: what utility is using distributed resource for?
  - Thoughts on additional characteristics of implementations enabled by smart grids towards overcoming integration barriers

Email feedback to: [achuang@epri.com](mailto:achuang@epri.com)

## Western Workshop – Preliminary Findings

## Preliminary Discussion Highlights

- Distribution is seen as the big winner in Distributed Energy Resources (DER)
- The largest benefits for the consumers and the environment are seen in:
  - Low Carbon
  - Reliability
  - Customer choice
- In general generation and transmission see few benefits from DER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Generation																					
Transmission																					
Distribution																					
Customer Choice																					
Reliability																					
Low Carbon																					
Environment																					

## Preliminary Discussion Highlights (continued)

- Non-Schedulable resources need enabler support more than any other type.
- Schedulable resources also need enabler support.
- Renewables are seen as needing more support than non-renewables.

Breakout Session #2

Barrier	Desirability			
	Not Schedulable	Day-Ahead or Longer Schedulable	Renewable	Non-Renewable
Automation	4	3	3	3
System operator confidence	4	1	2	1
Economic justification	4	4	3	3
Wholesale market structures	4	3	2	1
Retail rates	4	3	3	2
Customer convenience	4	3	3	2
Aggregation	2	3	2	2
Measurement & billing	4	4	3	2
Safety & monitoring	4	3	3	3
Building codes & permits	4	3	3	2
Planning & engineering	4	4	3	3

## Enablers and Desirability of Distributed Resources

Type of Resource	Renewable	Automation	Number of sites connected	Has this barrier										Desirable to me?										
				System operator confidence	Economic justification	Wholesale market structures	Retail rates	Customer convenience	Aggregation	Measurement & billing	Safety & monitoring	Building codes & permits	Planning & engineering	Distribution	Transmission Owner	ISO/RTI/TSO	Conventional Generation	Renewable Generation	Energy Retailer	Regulator	Government	Residential Customer	CGI Customer	Environment
Schedulable (e.g., Biomass that burns wood chips)	No	1	0	3	3	1	3	3	3	3	1	1	3	2	1	1	0	2	1	3	2	3	3	3
	No	2	0	2	2	2	2	1	2	2	3	3	2	2	1	1	0	1	3	2	1	0	3	3
	Yes	1	0	1	3	2	3	3	3	3	1	4	3	3	1	2	0	2	4	4	2	2	3	3
Variable (e.g., CHP & Solar PV)	No	1	0	3	1	2	1	3	2	3	1	1	1	0	0	0	0	2	1	1	1	1	0	3
	No	3	0	3	4	2	4	2	2	3	4	4	4	0	0	0	0	1	1	1	1	0	1	3
	Yes	1	0	4	4	3	4	3	3	3	4	4	4	0	0	0	0	2	1	2	1	0	0	3
Always on (e.g., biogas digester at sewage plant, landfill, dairy farm with no storage capacity for methane gas)	No	1	0	3	4	1	4	2	0	3	3	4	3	0	0	0	0	2	1	1	1	0	1	3
	No	3	0	2	3	1	3	1	0	2	2	3	2	0	1	1	0	2	1	1	1	0	1	3
	Yes	1	0	3	1	2	1	2	0	3	3	1	3	0	0	0	0	2	1	1	1	0	1	3
Yes	3	0	2	3	1	3	1	0	2	2	3	2	0	1	1	0	2	1	1	1	0	1	3	

## Preliminary Discussion Highlights

- Participants saw the following items
  - Little desire for DER for many stakeholders including residential, government, regulators, and others
  - The major winner in the western region for DER is the environment. No other stakeholder gains as much from DER.
- Variable resources have the largest set of barriers to overcome regardless of whether they are on transmission or distribution.
  - System operation, retail rates, safety, building codes, and planning and engineering were sighted by all participants as issues that need to be investigated for greater acceptance of these resources
- Always on resources and schedulable resources had many fewer issues and should be easier to integrate.

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