Distributed Energy, Utility Scale:
30 Proven Strategies to Scale VPPs

PRESENTED BY

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ESIG FALL TECHNICAL WORKSHOP

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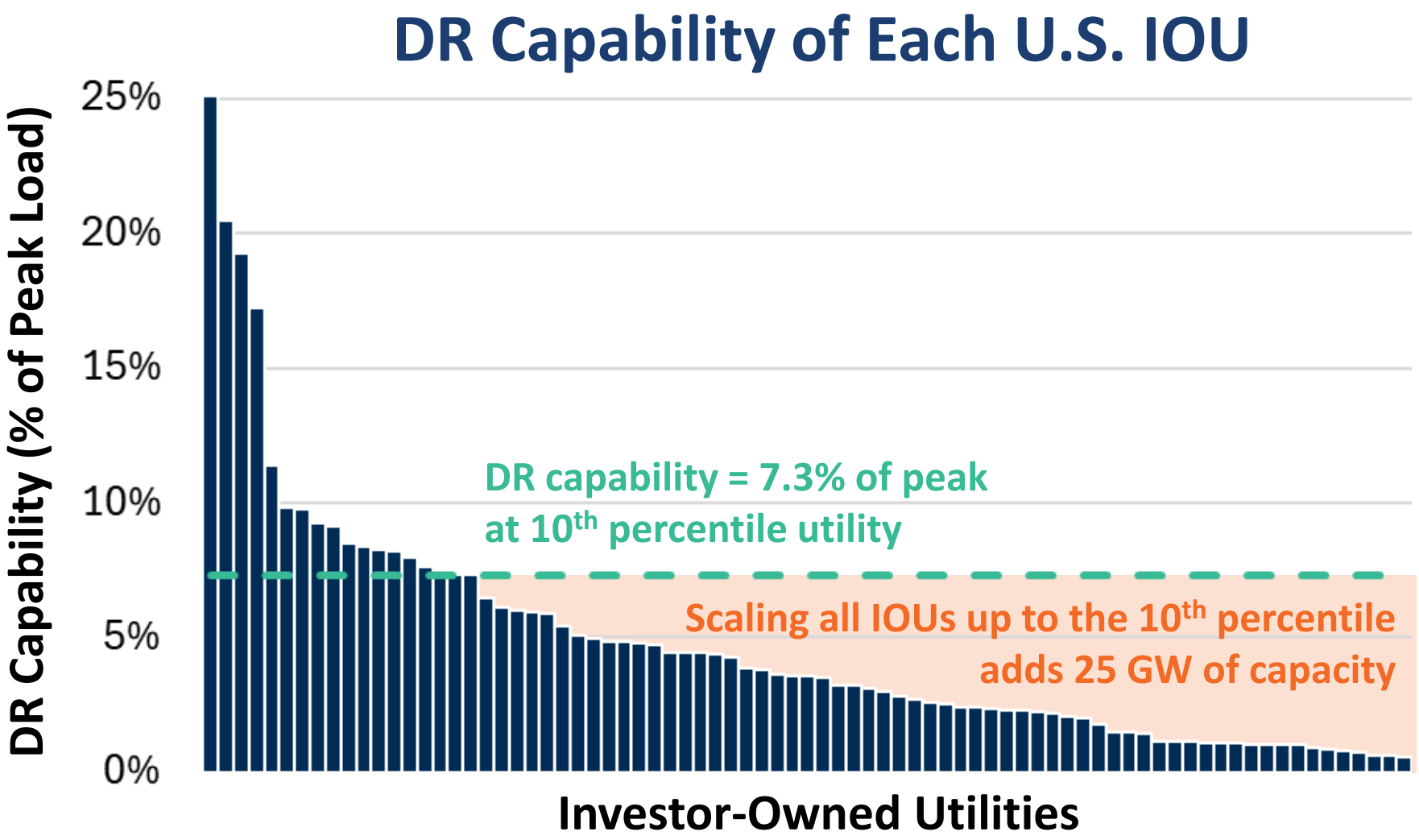
Brattle

U.S. Generation Capacity: Supply and Demand

	2016 to 2023 (Historical)	2023 to 2030 (Forecast)
Demand: Peak Load Growth	**24 GW (+3%)** **Limited growth** - Overhang from 2009 recession - Efficiency improvements - Decoupling of GDP and electricity demand	**>100 GW (+14%)** **Massive growth** - Data centers - Building electrification - Electric vehicles - Advanced manufacturing
Supply: Investment in Capacity for Resource Adequacy	**$90 billion (83 GW)** **Persistent investment despite limited demand growth** - Coal replacement - Renewables integration - Increasingly volatile weather	**$250-$350 billion (~240 GW)** **Likely infeasible with traditional generation resources** - Equipment shortages - Interconnection delays - Affordability concerns - Decarbonization constraints ***Innovative solutions are needed to address supply/demand gap***

Opportunity to Scale VPPs



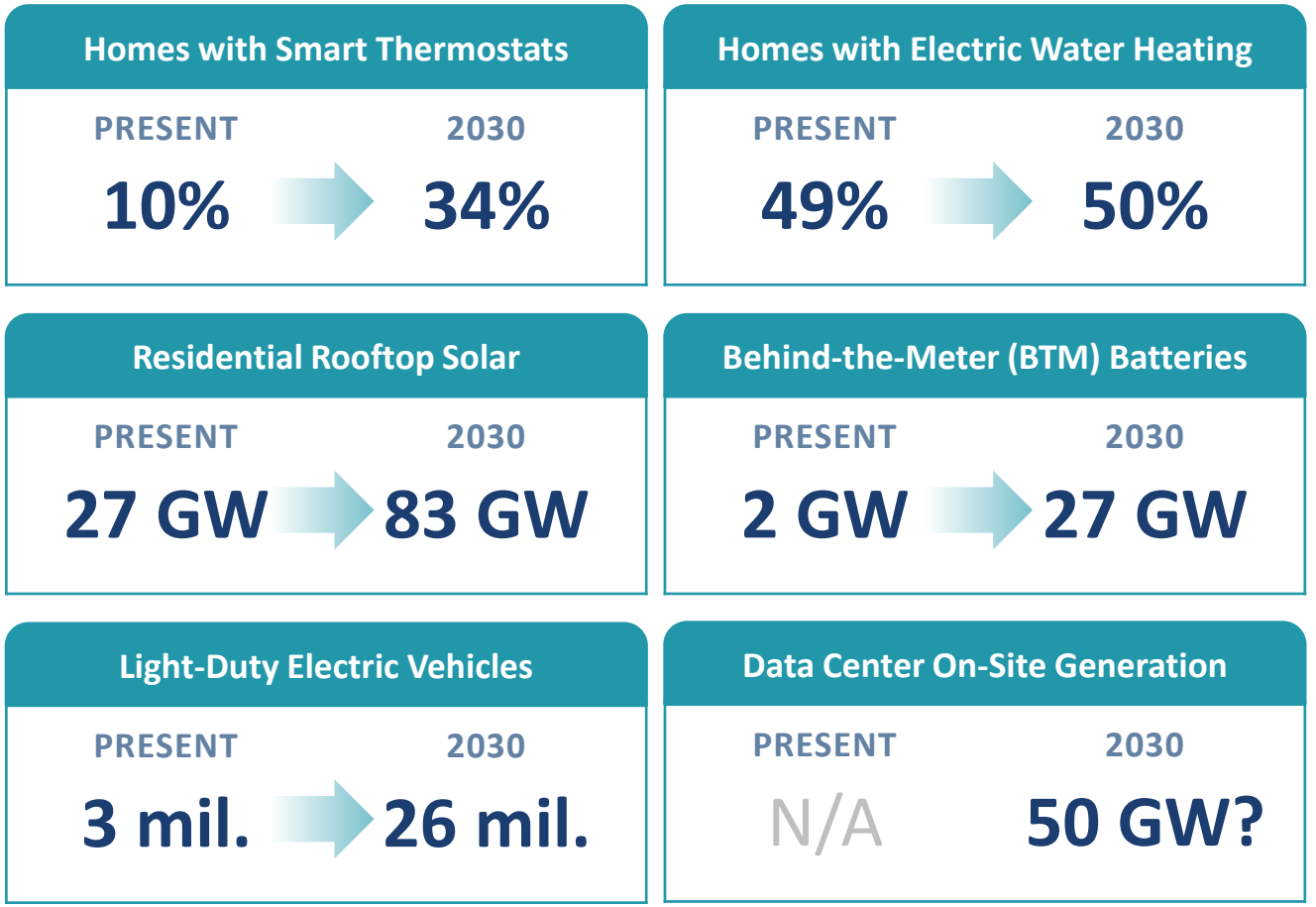
Gap between top 10% and remaining 90% of utilities suggests there could be a large opportunity to scale programs at most utilities.

25 GW is a quarter of projected demand growth through 2030.

VPP potential will continue to grow

Drivers

- Declining DER costs
- Technological advancement
- Policy incentives
- Wholesale market reform
- The decarbonization imperative



Note: Estimates are for US, based on review of various industry analyst projections.

Our Work with LBNL: 30 Strategies to Scale VPPs

Purpose:

- Identify strategies that successful VPPs have used to expand customer enrollment and achieve scale.
- Provide a guide for utilities, aggregators, and regulators looking to scale/set up VPP programs.

Interviews
with 15 VPP administrators that have successfully scaled their programs

Focused on
strategies that were used to enroll and retain customers in programs

Impact and feasibility survey
to help new VPPs programs prioritize implementation of the strategies

Note: This presentation is based on preliminary study findings and is subject to revision before publication.

Focus Areas

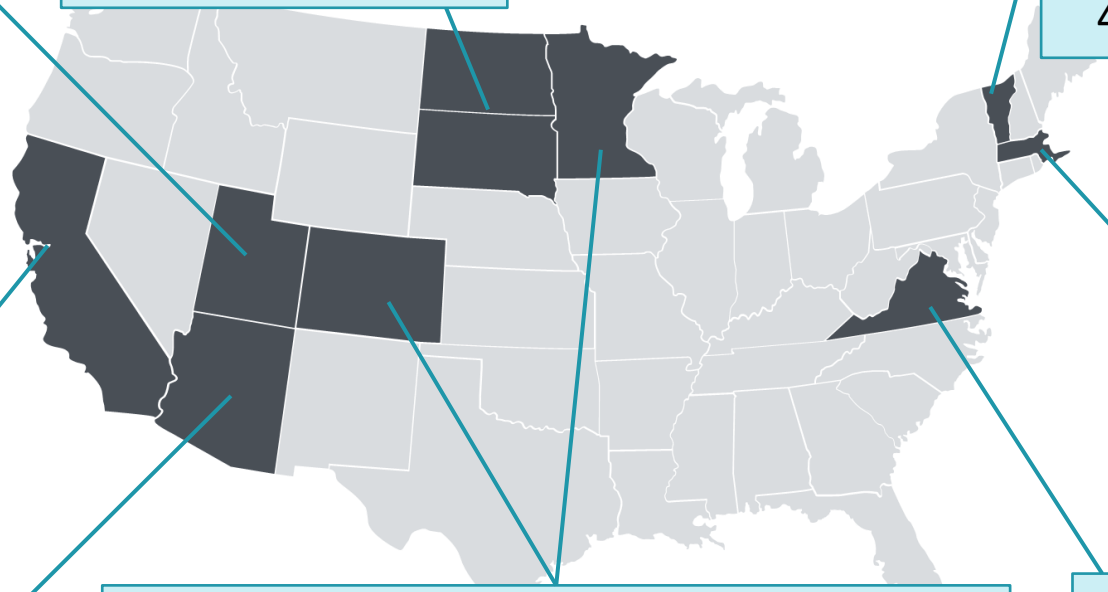
1. Marketing programs to customers
2. Setting up the enrollment process
3. Leveraging ecosystem partners for program success
4. Designing customer incentives
5. Engaging and retaining customers in the program

Interviewees: Utilities

Rocky Mountain Power
- 300 MW peak demand reduction capability
- 20% enrollment among all residential customers
- 14.3 MW battery VPP program

OtterTail Power's
- DR capability over 15% of its system peak demand

Green Mountain Power
- Enrolled ~1% of residential customers in its battery program, with forecasts of 4-8% by 2030



National Grid
- 2,900 battery VPP participants at the start of 2023 (30.7 MW)
- Over 300 MW of capacity enrolled in thermostat program

PG&E
- 50 MW smart AC program
- 30 MW residential battery VPP managed by Sunrun

Arizona Public Service
- 100 MW smart thermostat VPP

Xcel Energy
- Over half of eligible residential customers enrolled in some form of AC load control in MN – 515 MW of DR capability
- Both MN and CO utilities in the top 10% of IOUs by DR capability

Duke Energy
- 16% of residential customers enrolled in a smart thermostat program in NC – over 1,500 MW of capacity

Interviewees: Aggregators/Platform Providers

Residential Focus	**EnergyHub**	*1.3 million devices; 1.9 GW*	Energy Hub helps utilities manage smart thermostat, battery, EV programs. Enrolled 100,000 customers (90 MW) in Ontario's smart thermostat program in just 6 months.
	RenewHome	*225,000 customers*	RenewHome helps customers manage their energy use. Built 3 GW residential VPP, with a goal of 50 GW by 2030.
	Uplight	*7.8 GW of capacity*	Uplight provides platform to manage customer DERs. Worked with Consumers Energy's thermostat program to enroll 10,000 customers per week.
Commercial and Industrial Focus	**CPower**	*7 GW of capacity*	CPower helps customers manage and monetize their DERs. Portfolio of large customers, with 6.3 GW of capacity, more than 17,000 sites.
	Voltus	*7 GW of capacity*	Voltus helps customers manage and monetize their DERs. Over 13,000 sites enrolled across over 60 programs to provide grid services.
Electric Vehicle Focus	**Ev.Energy**	*150,000 EVs*	Ev.Energy offers a platform to optimize EV charging and has enrolled EVs at over 40 utilities. CA programs reduce charging load at peak by > 90%.
	WeaveGrid	*Over 15 utility partners*	WeaveGrid helps utilities use vehicle telematics to manage EV charging. Partnered with PG&E on Resilient Charging Pilot, where ~5,000 EVs were provided managed charging options to enhance grid resilience.

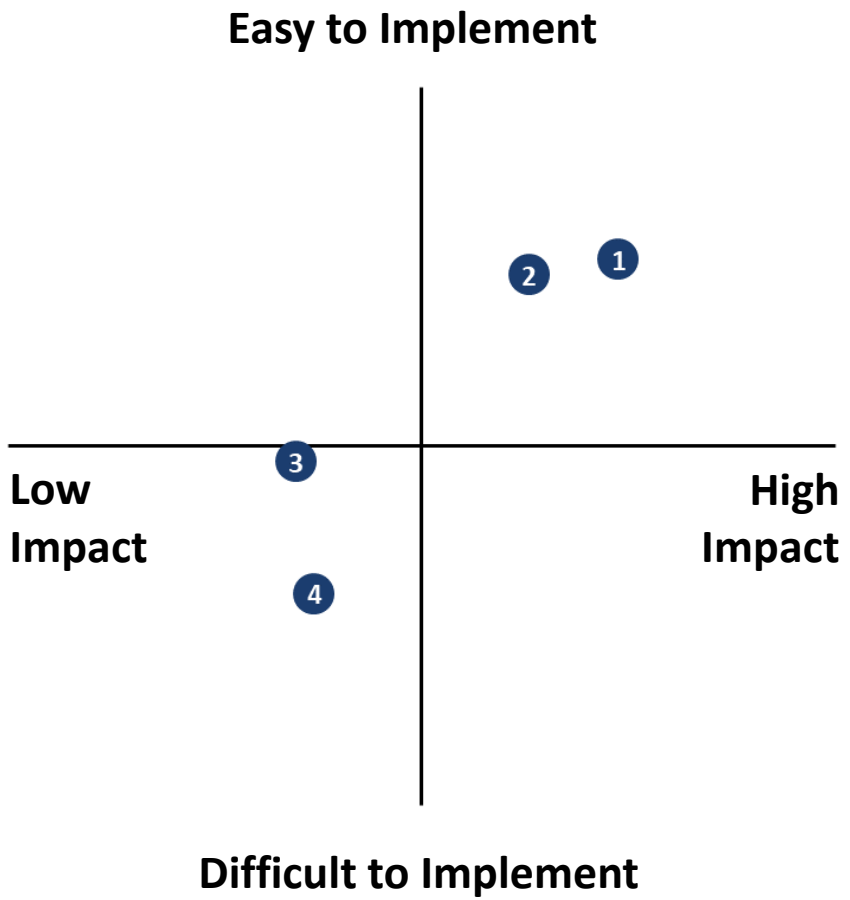
30 Strategies: Marketing

1 **Concise messaging about program benefits**
Deliver clear and simple messaging about the benefits of participation.

2 **Multiple motivators for participation**
Develop marketing campaigns that include messaging focused on additional motivators beyond incentives.

3 **Top-of-funnel marketing**
Develop campaigns that funnel customers toward a broad set of programs focused on a common theme.

4 **In-person promotional events**
Supplement other marketing channels with in-person events in key areas.



30 Strategies: Enrollment Process

5 Seamless enrollment process
Minimize friction in the customer enrollment process.

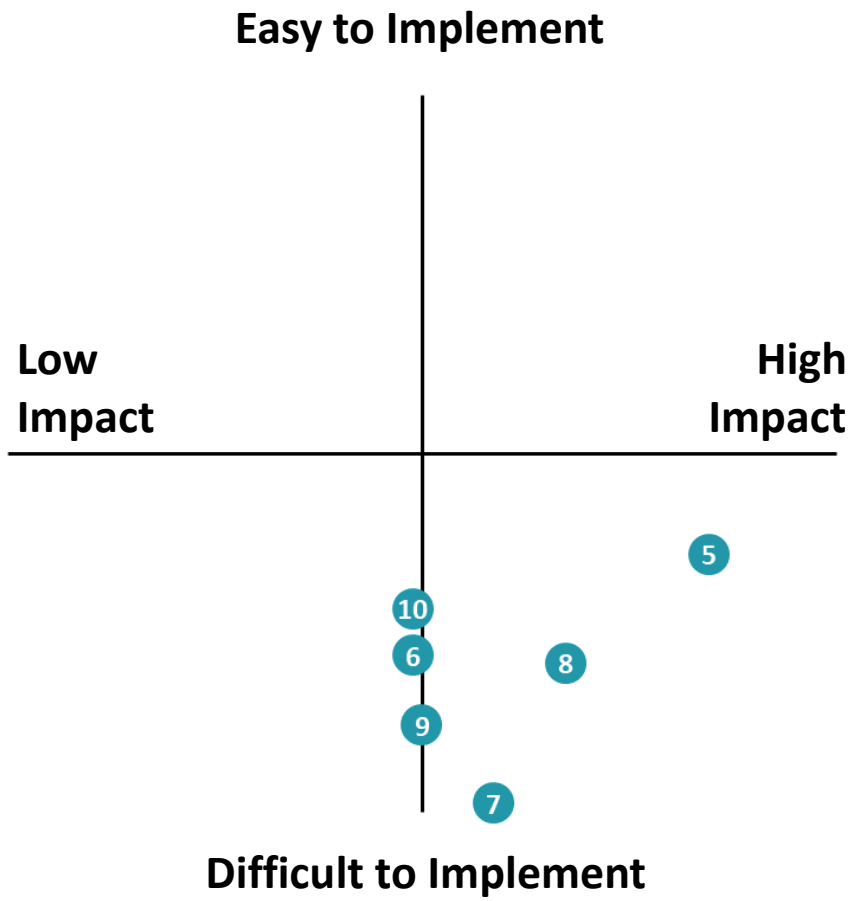
6 Pre-enroll devices sold on utility marketplaces
Offer easy/default pre-enrollment of devices sold on utility marketplaces.

7 Point-of-sale enrollment at retailers

8 Offer easy enrollment in multiple programs
Facilitate simultaneous enrollment in multiple programs.

9 Integrate value-add services into programs
Integrate “cool” services such as real-time consumption monitoring.

10 Provide referral incentives



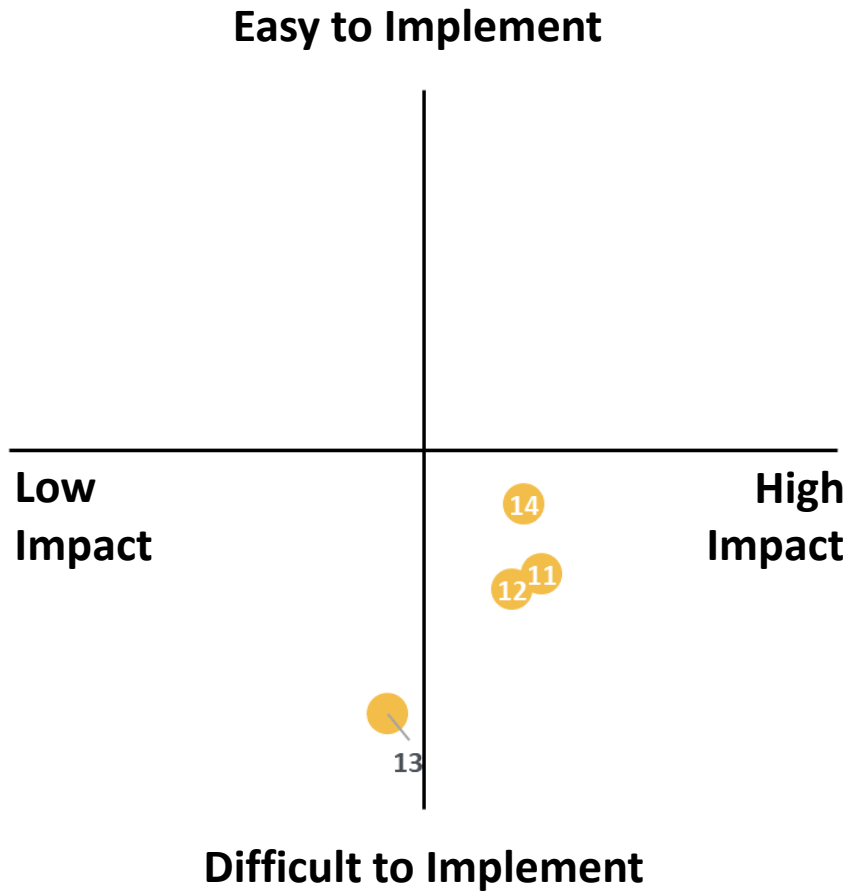
30 Strategies: Ecosystem Partners

11 Harmonized messaging from utilities and OEMs
Use partnerships with OEMs to send harmonized messaging about programs.

12 Engage customers through trusted entity
Partnering with OEMs to engage, enroll, and manage customers.

13 Partner with local installers
Leverage network of local contractors to help customers install new devices through a utility program.

14 Exchange learnings with other utilities



30 Strategies: Incentive Design

15 Maximize the financial incentive

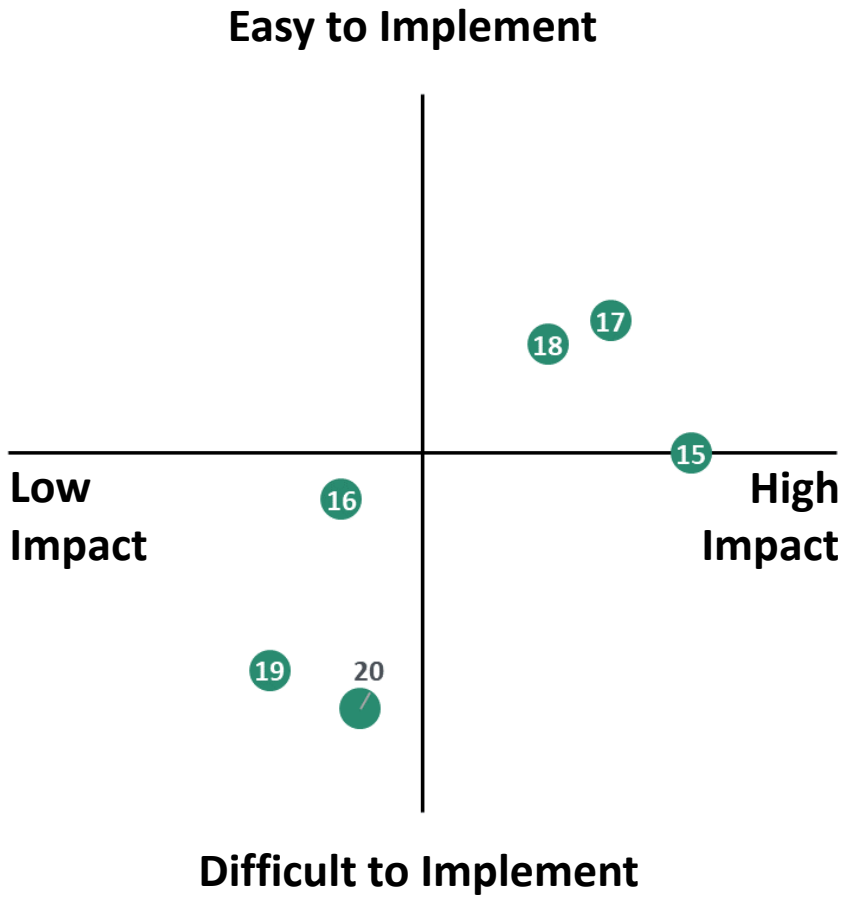
16 Ensure customer pays a portion of device cost
Offer an upfront incentive that pays only a portion of the cost of the device.

17 Offer ongoing participation payments

18 Bundle device financing options with programs

19 Align price signals
Avoid sending conflicting price signals through different programs and pricing structures.

20 Offer active and passive control models
Offer two types of programs, especially for EVs: A time-varying/dynamic pricing offering and an automated control program.



30 Strategies: Engagement and Retention

21 **Continuously improve program design over time**

22 **Regularly remind customers of their rewards**

23 **Payments through channels customer will notice** (E.g., Venmo)

24 **Communicate social impact of participation**
Inform customers of energy/emission reductions, benefits of their actions to the community.

25 **Call regular testing events**

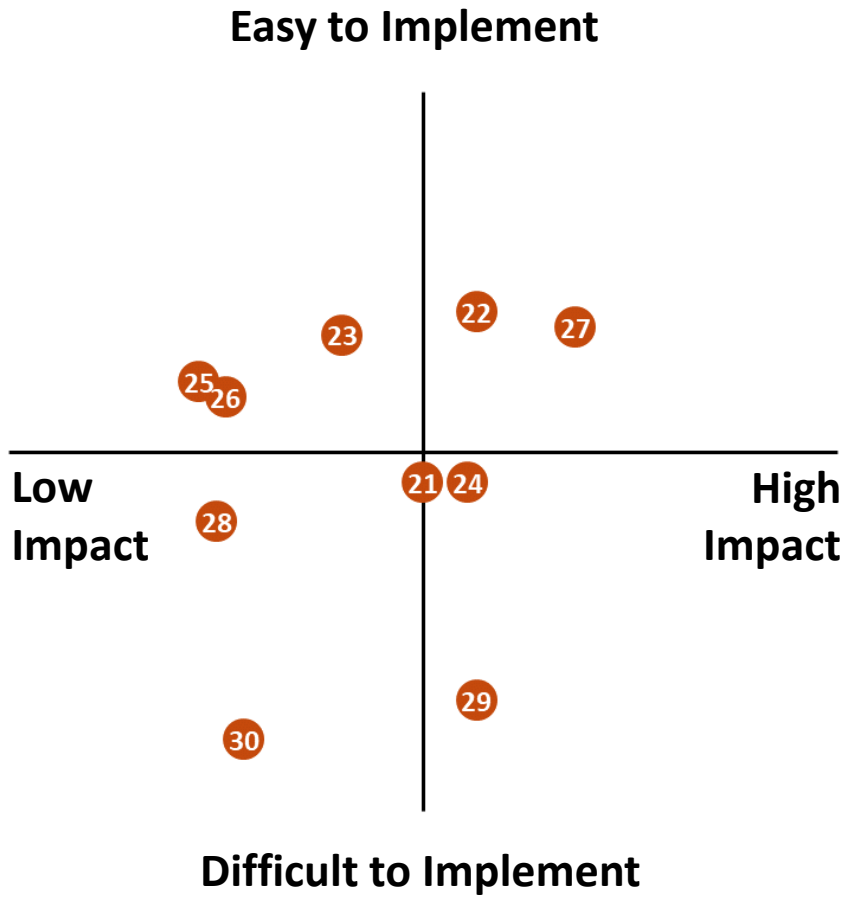
26 **Offer easy unenrollment**

27 **Offer flexibility to opt out of events**

28 **Limit event notifications** (specific to thermostat programs)
E.g., send one consolidated report at the end of the season

29 **Allow customers to set control range** (specific to thermostat programs)

30 **Continue offering physical switch-based programs**
Which offer certain benefits relative to smart thermostat programs



Recommendations

Regulators

1. Use the strategies as a checklist.
2. Consider requiring pilot proposals to include a plan to scale.
3. Review areas where existing regulations may be a roadblock.

Utilities

1. Benchmark against the 30 strategies.
2. Where additional funding is required, clearly define potential impacts and ratepayer benefits.
3. Streamline the enrollment process – key success theme in many of the interviews.

Aggregators

1. Advocate for solutions in a coordinated fashion.
2. Provide empirical support demonstrating the efficacy of these strategies to convince regulators and utilities.
3. Deliver on commitments to scale.

Speaker Information

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Expertise in policy analysis, regulatory economics, and strategic planning related to electrification and distributed energy resources (DERs).

Mr. Ramakrishnan has supported a range of clients, including utilities, regulators, renewable developers, and technology companies. He has led efforts to evaluate the electric grid impacts of electrification and DER adoption. He has worked with utilities and technology companies to conduct cost-benefit analyses of electrification programs, design electric rates for customers with emerging technologies, and illustrate the value of DERs and load flexibility to the electric system.

Clarity in the face of complexity

Brattle