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Today's Topic -DER Monetization Strategies – Value Allocation and Revenue Streams from New Set of Flexible Assets

Hosted by Bryce Yonker, Grid Forward

Agenda

12:05 EST	Overview of the landscape for DER revenue generation strategies for grid operators, by Ron Nelson, Director at Strategen
12:20 EST	Angela Long, Manager Distributed Resource Planning at Portland General Electric
12:40 EST	Bryan Hannegan, CEO of Holy Cross Energy
13:00 EST	Doug McMahon, Managing Director at ENGIE





DER Revenue Generation Strategies for Grid Operators

Ron Nelson | February 23, 2021



Agenda





Strategen is a globally connected, impact driven firm on a mission to decarbonize energy systems

Our firm has the demonstrated ability to help clients

envision, accelerate, and create the clean energy future.

Taxonomy of DER Monetization Strategies



Monetize Services



Taxonomy of DER Monetization Strategies





DER Monetization Strategies

Direct Ownership of DERs

Arizona Public Service

+ APS Solar Partner

 Nation's first utility-owned deployment of residential rooftop solar systems

+ APS Solar Communities

- Up to \$45M to spend over three years
- Limited-income customers and the agencies that serve them

PPL Corporation

+ DER Management Plan Pilot

- DER owners are required to install a ConnectDER device
- PPL will monitor and control DERs
- ConnectDER devices will be rate based
- PPL will benefit from operational improvements (e.g., streamlined interconnection, improved forecasting, and voltage management)

https://www.aps.com/en/About/Sustainability-and-Innovation/Technology-and-Innovation



DER Monetization Strategies

Performance Mechanisms (PIMS and shared savings)

+ Objective

- To align utility incentives and revenue opportunities with DER deployment
- + Performance Incentive Mechanism (PIM)
 - Financial rewards and penalties to encourage utilities to meet specific targets
- + Shared Savings Mechanism
 - Structure for allocating program-specific utility savings between shareholders and ratepayers
- + Suite of performance opportunities (DR, EE, EV, etc.)



Performance Mechanisms - Examples

Xcel Minnesota	Hawaii PBR	NY Storage	
+ Energy Efficiency - Conservation	+ Grid Services PIM - Metric: grid services (kW)	+ Revenue sharing mechanism	
Improvement Program	 Incentive: \$/kW award + RPS-A PIM 	- utility-scale solar procurement	
- Make-ready infrastructure	- Metric: annual RPS compliance (% by year)	 schedule and dispatch rights 	
+ Proposed PIMs - DR (pending), Emissions,	 Incentive: reward/penalty for exceeding/missing target 	- 30% excess revenues to utility shareholders and	
Managed EV charging, building electrification	 \$20/MWh for 2021-22; \$15 for 2023; \$10 after 	70% to ratepayers	

DER Monetization Strategies

Earning a Return on Opex

- + Solution sets are limited due to an inherent bias towards Capex
- + DER solutions require operational expenditures
 - Data infrastructure
 - SaaS
 - Payments for DER grid services
- + New regulatory framework can realign incentives
 - Capitalize a prepaid contract
 - Earn a return on payments for DER service solutions





Earning a Return on Opex - Examples

NY and HI Alt Reg's	CA Distribution Deferral	Illinois Cloud Computing
 + NY Prepaid Contracts Opportunity to rate base 	+ Competitive solicitation framework	+ Update regulatory accounting treatment
prepaid contract to lease software services	 Pilot DER deployment to defer traditional distribution capital 	 "level the playing field" between on-premise and cloud-based solutions
+ Hawaii- Multi-year rate plan with	expenditures + Incentive mechanism	 Mostly applicable to prepaid contracts
 revenue cap Exceptional project recovery mechanism 	- 4% pre-tax incentive on annual payment for DERs that defer investment	 Pay-as-you-go reward lower than prepaid contract

DER Monetization Strategies

Million Rate Base Model

+ Utility provides customers a menu of DER technologies

- Utility has prequalified and tested the technologies and vendors

+ Customer pays through on-bill financing

- Customers own the technology after asset is amortized

+ Customer experiences lowest possible technology cost

- Utilities can purchase at scale, negotiate discounts
- Utilities face low cost of money to finance the assets



DER Monetization Strategies

Million Rate Base Model - Examples





Bat

Batteries



PV Systems



Smart Thermostats Water Heaters

6.....



Illustrative DER Monetization Strategy



Monetizing Services





Thank you

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+ + +

+ + +

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RON NELSON

Director Advanced Rate Design & DER Integration

- + Leads projects on electric regulatory issues related to distributed energy resource integration and compensation, advanced rate design, and the utility business model.
- + Previously worked as an Economist for the Minnesota Attorney General's Office representing consumers on topics including cost of service, community solar gardens, the costs and benefits of grid modernization, cost modeling, rate design, and utility business models.
- + M.S. in Agriculture and Resource Economics from Colorado State University; B.A. in Environmental Economics from Western Washington University.

Utility Business Model (UBM) Working Group

Sponsored by Smart Electric Power Alliance (SEPA), Electric Power Research Institute (EPRI), Gridwise Alliance, and Grid Forward

Angela Long, Manager of Distributed Resource Planning (DRP) February 23, 2021 | Oregon's Distribution System Planning (DSP) Overview



Angela Long is the Manager of Portland General Electric's (PGE's) Distributed Energy Resources (DRP) team, where she leads the integration of distributed energy resources (DERs) into utility-system planning, program planning and design, and valuation.

Currently, she is responsible for leading DRP efforts to establish a comprehensive and transparent framework for clean energy resources that furthers PGE's commitment to decarbonizing, electrifying, and preforming for its customers.

Angela has 13 years of professional energy experience in the utility, consulting and public sectors. Angela holds a Bachelor of Science in Environmental Science with a specialization in energy conversation and renewable energy from Ohio State University.



Introduction to PGE's DRP Team

•The Distributed Resource Planning (DRP) Team **integrates** diverse company activities in the field of distributed energy resources (**DERs**) under a single, consistent **analytical framework** to support **near-term and long-term planning and market engagement strategy**.

•The DRP Team achieves this by establishing **value streams and planning implementation** of DERs into PGE's systems and customer programs. The DRP Team serves as a **subject matter expert on DERs** throughout the organization and **with external stakeholders, regulators, and customers**.



Distribution System Planning (DSP)

The Public Utility Commission of Oregon (OPUC) opened **Docket UM 2005** to investigate distribution system planning and develop a planning process that allows utilities to optimize the efficiency of their distribution system and maximize the customer value. The intent of the DSP is to align with the <u>Senate Bill</u> (SB) 978 and Governor Brown's <u>Executive Order No.</u> 20-04.

Foster Transparency

Baseline Data & System Assessment

Forecasting of Load Growth, DER Adoption, and EV Adoption

Community Engagement

Gather Input

Hosting Capacity Analysis Grid Needs Assessment Solution Identification

Enable Effective Decision Making

Community Engagement Plan

Long-term Plan (**5-10 years**)

Near-term Action Plan (2-4 years)

DSP - Continued

Though **cybersecurity, community engagement funding, utility cost recovery, and regulatory development** were key focuses during the development of the DSP guidelines, the DSP does not include guidance on them. The DSP Guidelines do require OPUC Staff to host technical workshops to continue discussions on these topics.

This plan is intended to evolve over time

Crawl	Stage 1	Beginning with Initial Requirements of Utility DSP Filings, providing a foundation for future stages		
Walk	Stage 2		Advancing requirements increr capabilities and evolving g	nentally to better match growing utility rid, customer and community needs
Run	Stage 3			Achieving the long-term vision for distribution system planning capabilities and outcomes
		2021-2022 2023 and beyond		

Distribution System Plan – Part 2

October 15, 2021

Baseline Data & System Assessment

Identify the existing grid equipment inventory and financial data with locational granularity, and DER-related data

Utilize to leverage remote sensing technologies, asset financial planning processes, and integrate software systems to proactively monitor and support operation Hosting Capacity Analysis

Conduct a system evaluation to identify areas of limited DER growth

Provide a plan to conduct hosting capacity evaluations

Increased level of detail including addressing **emerging technology development**

Community Engagement Plan

4 public pre-filing workshops

Community Engagement Plan

Address energy burden, customer choice and resiliency

Non-wires Alternatives (NWA)

Consult with **customers, CBO, EJ** and partners, including compensation

Long-term Plan

The utility's vision for the distribution system over the next 5-10 years

Alignment with state policy goals and objectives

Acceleration of DERs and electrification

Distribution System Plan – Part 2

August 15, 2022

Forecasting of Load Growth, DER Adoption, and EV Adoption

Improve forecasting to account for DER impacts on load, as well as the ability of these resources to productively modify load

Improve the accuracy and granularity of existing and anticipated constraints on the distribution system

Input into Grid Needs Identification

Grid Needs Identification

Ensures a safe, reliable and resilient system that provides adequate power quality to the customers it serves

Holistic approach to grid needs by anticipating DER adoption by customers

Social and economic needs of the communities that depend on distribution systems

Community Engagement

Solution Identification

Proposes the equipment, technology or program(s) identified through grid needs

Advance a holistic distribution system planning

Consideration of a **wider** range of potential solutions

Propose 2 non-wires alternative projects

Community Engagement

Near-Term Action Plan (2-4 years)

Proposed solutions to address grid needs and other investments in the distribution system with projected spending

Relationship between DSP and other investments

Document current innovations and pilots to improve, modernize and /or enhance the grid

Holy Cross Energy is leading the responsible transition to a clean energy future.

Holy Cross Energy (HCE) provides safe, reliable, affordable and sustainable energy and services that improve the quality of life for our members and their communities.

Founded in 1939, we serve more than 44,000 members in scenic Western Colorado with:

265 MW peak demand 3,000 miles distribution 120 miles transmission 165 employees

In 2020, 44% of our power supply came from wind, solar, biomass and hydroelectric power, as well as coal mine methane recovery.

Our "Journey to 100%"



These actions will allow HCE to achieve its vision of

100% carbon-free power supply by 2030

Carbon-neutral or better across the enterprise by 2035

in a way that does not sacrifice affordability, safety, or reliability for the sake of sustainability

- Energy Efficiency: obtain an additional 0.25% per year of energy efficiency improvements
- **Cleaner Wholesale Power Supply:** incorporate new, clean, dispatchable resources into HCE's power supply mix
- Local Clean Energy Resources: continue our existing agreements for energy from local biomass, hydro, solar, and coal mine methane projects
- Distributed Energy Resources: support installation of at least
 2 MW per year of new rooftop solar systems
- Smart Electrification: encourage the expanded use of electricity for transportation, building heating and cooling, and industrial processes

Progress to Date



New Resources Under Contract:

Eastern Colorado 100 MW wind 30 MW solar

HCE Service Area

5 MW solar 4.9 MW hydro 4.5 MW/20 MWh solar+storage 10 MW/20 MWh solar+storage 10 MW/20 MWh solar+storage



Fostering DERs for Grid Flexibility





Distributed Energy Resource Service Agreement

• Low interest on-bill payments for DERs and related costs

Peak Time Payback

 Credit for voluntary reduction in consumption during forecasted peak event

Time of Use

- Optional rate structure to encourage load shifting
- 24c/kWh on-peak (4-9 pm);
 6c/kWh off-peak

Distribution Flexibility

 Credit for allowing utility option to manage behind-the-meter DER assets

GreenUp

- Dynamic Renewable Pricing
 Credit for voluntary *increase* in
- consumption during forecasted "oversupply" events

PuRE Purchase 100% Renewable Energy

 Green pricing program to enable members to choose 100% renewable energy

"Electrifying Your Ride" EV Programs



Program Elements

FREE L2 EV chargers to every residential (limit 2) or commercial (limit 4) member

DER Service Agreement avoids up-front installation costs

Community DC fast charging supported by \$150k upgrades and engineering support

Transit and school buses supported with TOU rates, no demand charge, on-site solar









174 Home Charging Ports, 59 Commercial Charging Ports,5 DC Fast Chargers, 8 Transit Buses in 2020



"Power+" Energy Storage Program

Pilot program in 2021 and 2022: 5 MW/15 MWh BTM storage Combines DER Service Agreement & Distribution Flexibility tariff Target consumer cost: \$30/month for 10 years

> Initial install at HCE HQ avoided 12 interruptions/290 SAIDI minutes in Q4 2020 alone!



"Basalt Vista" Affordable Housing Project



- Habitat for Humanity, Pitkin County, Basalt School District
- 27 homes for teachers and local service workers
- Designed net-zero energy with *all electric* construction
- Adjacent to Lake Christine Fire affected area
- Cost-shared partnership with NREL and DOE Office of Electricity
- Demonstrate value of DERs to consumer *and* grid

Four homes with controllable loads

- 8kW rooftop solar PV
- Battery storage
- L2 EV charging
- Heat pump water heater
- Air source heat pump





For more information:

www.holycross.com

Follow us on Twitter and Facebook

Join us on our "Journey to 100%"



DER Monetization - Value Allocation and Revenue Streams from New Set of Flexible Assets

Doug McMahon

February 23, 2021

ENGIE Impact accelerates sustainability transformation for cities, corporations, and governments around the world.





2 | Confidential & Proprietary

DER monetization value streams – the basics





3 | Confidential & Proprietary





We co-create innovative financial models to enable decarbonization as-a-service.



Long-term financial and energy management engagements enable carbon transformation at a large scale.



Ohio State University's strategy includes long-term, third-party partnerships due to reductions in state funding

100,000	2,000	\$115M
served	acres	annual spend
ÎÎ	Ωů	(S)

ENGIE is a long-term execution and investment partner with Ohio State University:

- Construction, operation and maintenance of heating and cooling networks
- Investment in academic initiatives (programs around sustainable development) and in an innovation center for energy
- Expected benefits: reduce energy bill by 25% in 10 years



Achieving energy optimization through an enterprise-wide systems approach



Sustainability **System Operations** 50-year lease agreement on the following utility systems: Electricity Chilled Water / Cooling Steam / Heating Natural Gas Geothermal **Energy Supply** Enhance effectiveness of procurement process for electricity, System Design natural gas and other energy sources

Partnership allows and promotes wholistic approach to energy infrastructure design to support sustainable campus development

Guaranteed minimum 25% energy use reduction over 10-years with estimated capital need \$250M

 Deploy smart meters to the entire Columbus campus at no cost to Ohio State

Academic Collaboration

- \$50M for new Energy Innovation Center
- \$25M for student financial aid
- 500 internships (\$5M)
- \$20M for sustainability curriculum, staff development
- \$9.5M for five faculty positions
- \$40.5M for philanthropy

Vehicle-to-everything (V2X)



More than smart charging, V2X offers:

- Electricity grid services ancillary services: frequency regulation, reduction of peak load) enabling potential reductions of the investment costs for further grid capacity
- Better energy management optimize
 available power and consumption
- Resiliency during emergency
- Accelerated renewables adoption and integration
- Mitigation of GHG emissions transport and electricity sectors

V2X unlocks promising capabilities from electric vehicles



V2G Project FCA plant in Mirafiori, Italy



FCA has selected ENGIE as the technology partner to build intelligent charging infrastructure for electric vehicles to interact with the public grid operated by Italian energy company Terna. This V2G project will represent the **largest plant of its kind in the world**, providing grid stabilization services in addition to recharging the **700car fleet**.

Goals

Demonstrate

feasibility of large-

of V2G technology





Drive development of associated V2G solutions

scale implementation

Results

64 32 bi-directional fast charging stations were installed to serve a fleet of 64

650

Vehicles by 2022

electric vehicles



Key Success Factors



Deep Mobility Offering

With both state-of-the-art EV infrastructure and enabling software



Project Development Expertise

With dedicated entities like EV Box who specialize in mobility



Optimizing resource utilization with other onsite energy resources such as solar power







California SCIF clean energy and mobility program



California SCIF, ENGIE, and JLL partnered to build solar photovoltaic (PV) panels, energy storage systems, and EV charging stations across seven locations throughout California. The charging stations will be used by fleet vehicles and will be available to employees.

Goals

150 EVSE Network of more than 150 Level II and DCFC EV charging stations, for fleet and workplace charging

18M kWh Total annual energy production from onsite solar panels, equivalent to offsetting ~14K tons of GHG emissions

4,240 avo kWh grid

Of battery storage, to avoid buying power from the electricity grid during peak times

Key success factors

Strong balance sheet



We leverage the right internal resources to deploy teams and capabilities that can handle complexity and scale.

Project development expertise



We incorporate dedicated experts and tools and manage various stakeholders, to achieve groundbreaking solar, storage, and EV charging solutions.

Cost savings



With different technology solutions, thorough evaluations, and specific recommendations, ENGIE achieves cost reductions such as demand charge decrease during peak times.

KIWI Innovative battery deployment in the UK



Leading provider of DR and battery management in the UK with >400MW DER under management (STOR, FFR, Capacity Market, FCDM) and 60+MW Battery operating in live markets

DERMS platform provides Power provides battery management services (including hardware, frequency measurement and EMS – control, management and dispatch of assets.

Goals





10+

60+

Active in multiple different programs (Frequency, DR, peak load, congestion mgmt..)

Drive highest NPV and GHG reduction at the lowest possible risk for customers

Results

Sites across the UK

MW of storage participating in the UK markets



Revenue Streams

Savings from discharging the battery at peak times, including:

- Transmission Use of System Charges
- Distribution Use of System Charges
- Capacity Market Service Charges
- Energy Arbitrage purchase electricity off peak for peak time use

Income in the form of contracts, including:

- Frequency Response (FFR, EFR, Fast Acting) National Grid ancillary service
- Capacity Market Gov't subsidy to encourage new build
- OTC / Day ahead / Intraday trading
- Balancing Mechanism participation
- Imbalance Energy trading



From tailoring solutions to mass customization – what is needed?



- Consumers need to think beyond renewable targets
- Insist 24x7x365 electrons
- Makes storage, local generation and flexibility truly valuable



- Reduce risk to utilities alternative revenue mechanisms for DER solutions
- Enable disruptors to solve the problems that utilities can't or don't want resolve
- Encourage partnership and collaboration ecosystem – software, hardware, utilities, markets & customers



Markets that enable greater connectivity

- Wholesale and Distribution market value stream stacking / flexibility
- Enabling the rise of the prosumer – network effects
- The greater the utilization potential of the asset and / or the more customers that can benefit from the asset, the easier to mass customize