MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Stakeholder Meeting 4

The meeting will begin shortly at 1:02 pm to allow people to join.

May 14, 2020

1:00-3:30 PM

MPSC

Michigan Public Service Commission

MI POWER GRID

Making the Most of Michigan's Energy Future

Welcome and Overview

Joy Wang
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MPSC Staff
Smart Grid Section

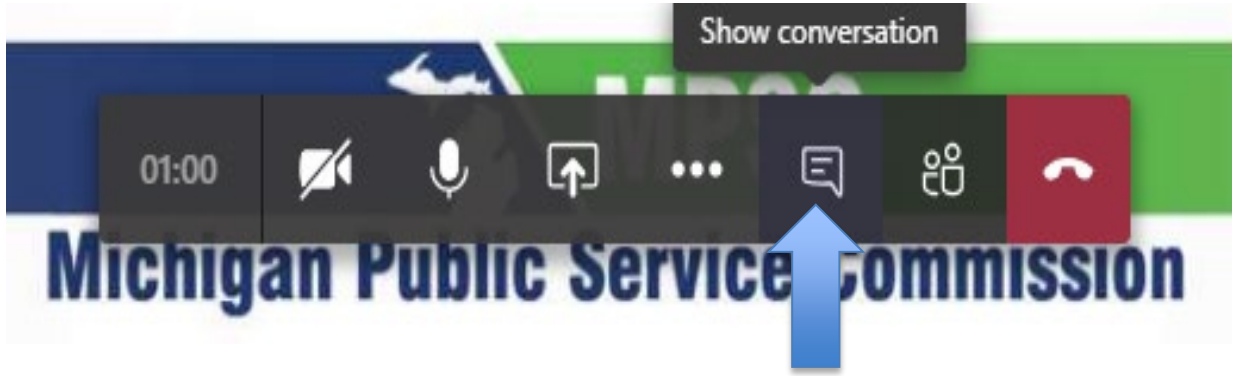
MPSC
Michigan Public Service Commission

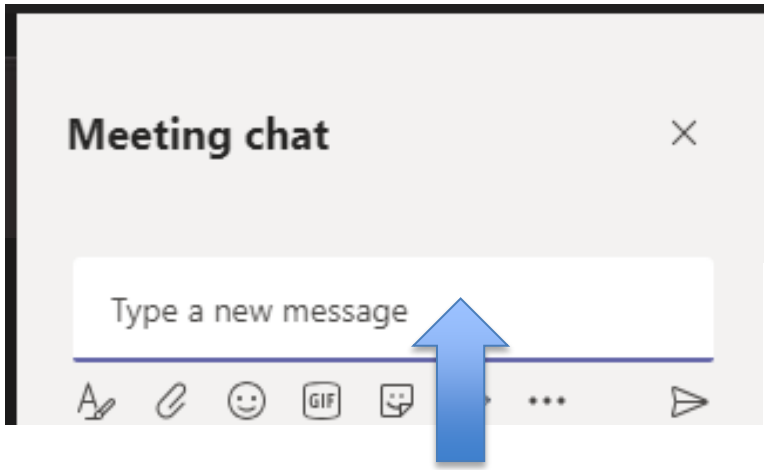
Agenda

1:00 p.m.	Welcome & Overview of Last Meeting	Joy Wang, MPSC Staff
1:05 p.m.	Facilitating Utility and Regulatory Innovation: Implementing Hubs, Links, Sandboxes, and More	Tom Stanton (NRRI)
1:35 p.m.	Utility Pilot Definitions: Case Studies	Consumers: Emily McGraw & Heather Prentice DTE: Keegan Farrell & Richard Mueller I&M: Jon Walter
2:35 p.m.	Agility, Prudence, and the Commission's Approach to Pilot Projects	Douglas Jester (5 Lakes Energy)
2:45 p.m.	Panel: Agility and Accountability	Consumers Energy: Ryan Kiley DTE: Camilo Serna I&M: Andrew Williamson *Moderated by MPSC Staff*
3:25 p.m.	Closing Comments	Joy Wang, MPSC Staff

Housekeeping

- This meeting is being recorded
- Recording and slides posted on workgroup website in about a week
- All audience members will be muted
- Please type questions into the chat box
  - To access chat box:

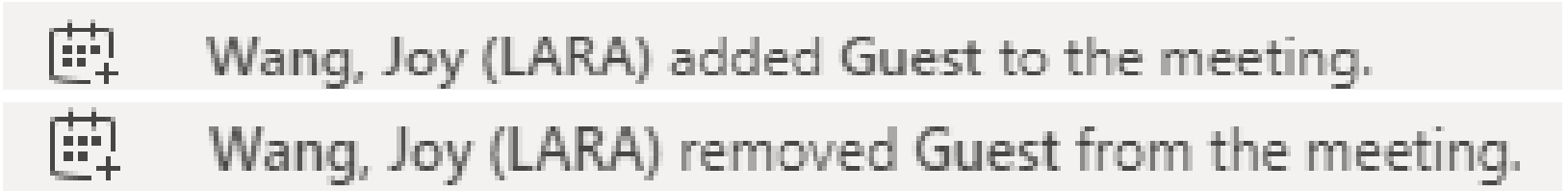




- Staff will ask chat box questions during Q&A

Housekeeping, cont.

- During the panel discussion, if clarification of your question is needed, we will ask you to unmute.
  - To unmute:
    - Phone: Press *6
    - Teams: Click mic button
  - Please mute yourself again after your clarification.
- Chat box notes when audience member enter/exit.
  - These notices are automatic:



- If Teams via web browser is not working, try a different web browser. Some browsers that may work are:
  - Google Chrome, Internet Explorer, and Mozilla Firefox

Overview of March 30 Meeting

- Three presentations
  - Sanem Sergici (Brattle)
    - Pilot Design Best Practices and Lessons Learned from Pricing and Technology Pilots
  - Stephen George (Nexant)
    - Industry Insights: Pilot Design and Best Practices
  - Ben Dueweke (Walker-Miller Energy Services)
    - Community EWR Pilots in Detroit

Overview of March 30 Meeting, cont.

- Topics covered:
  - Recommendations regarding pilot best practices
    - What to expect in pilot information submitted to Commission
  - Recommendations on what to expect from the Commission
  - Importance of program recruitment and outreach for pilot success

- Recording and presentation slides available at workgroup website

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May 14, 2020
MI Power Grid Stakeholder Meeting:
Energy Programs and Technology Pilots

Facilitating Utility and Regulatory Innovation: Implementing Hubs, Links, Sandboxes, and More

Tom Stanton, Principal Researcher, Energy and Environment
National Regulatory Research Institute

What is NRRI?

- The National Regulatory Research Institute (NRRI) was founded in 1976 by the National Association of Regulatory Utility Commissioners (NARUC). NRRI serves as a research arm to NARUC and its members, the utility regulatory commissions of the 50 US states and DC.
  - Mr. Stanton is assigned to support primarily the NARUC Committee on Energy Resources and the Environment (ERE). He is a member of the NARUC Staff Subcommittee on ERE, and Staff Subcommittee on Rate Design.
- NRRI's primary mission is to serve state utility regulators by producing and disseminating relevant, high-quality research that provides the analytical framework and practical tools necessary to improve their public interest decision-making.
- ***Ideas presented are my own, and are not necessarily those of the NRRI Board of Directors or other NRRI staff.***
- ***Mentions of specific companies and organizations are to provide examples only, and do not imply any endorsement by NRRI.***
- *NRRI publications are freely available at www.nrri.org, and archives of NRRI Webinars are being posted at YouTube.com, "NRRI Media" channel.*

Brief intro… Tom Stanton

- Tom Stanton is Principal Researcher, Energy and Environment, at NRRI, where he has worked since fall 2010. Mr. Stanton's work for NRRI includes state public policy research papers and education about all kinds of distributed and renewable energy resources.
- A life-long Michigan resident, prior to joining NRRI Tom worked for 10 years at the Michigan Energy Office followed by over 22 years with the Michigan PSC Staff.
- Mr. Stanton earned a B.A. in Communications and M.A. in Journalism, both from Michigan State University, and an M.S. in Public Administration from Western Michigan University.
- Some current projects include:
  - With NARUC Committee on Consumers and the Public Interest (CPI), mini case studies of best practices in services for low-income customers, and in reducing utility bill payment delinquencies and disconnections;
  - Microgrids and remote mini-grids policy frameworks, possibly including all steps on the "energy ladder" of products and services;
  - Survey of Grid-Modernization Activities in the states; and,
  - Works in progress including *COVID-19 State Response Tracker* on the NARUC web site, and *PURPA Tracker* summary of state PURPA rules and regulations, coming soon on the NRRI Website.

Today's topics

❶ What are the main types of innovations platforms states and countries are implementing already?

❷ What are the pros and cons of regulatory sandboxes?

❸ What tensions and risks are associated with innovations platforms?

❹ What does experience and research show so far, about possible paths forward?

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Defining “regulatory sandbox” (1)

- General definition: “A regulatory sandbox is a framework set up by a… sector regulator to allow small scale, live testing of innovations by private firms in a controlled environment (operating under a special exemption, allowance, or other limited, time-bound exception) under the regulator’s supervision.” (Jenik and Lauer, p. 1, footnote omitted, citing UK Financial Conduct Authority [FCA] report).
- The UK FCA sandbox is “a ‘safe space’ in which businesses can test innovative products, services, business models, and delivery mechanisms while ensuring that consumers are appropriately protected” (Allen, p. 596, citing *Innovate Finance*, https://perma.cc/57R4-95LX).

Defining “regulatory sandbox” (2)

- “[T]he sandbox is ‘pragmatic, information- and experience-based, directed toward ongoing problem-solving, and built around highly participatory and carefully structured dialogue.’” (Allen, p. 582, citing Cristie Ford, New Governance in the Teeth of Human Frailty: Lessons from Financial Regulation, *2010 WIS. L. REV.* 441, 445).
- “[T]he regulatory sandbox approach represents a kind of ‘structured experimentalism’” – Regulated and unregulated entities have opportunities to test, pursuant to a testing plan agreed to and monitored by the regulator, innovative products or services, business models, or delivery mechanisms. … Regulators may require applicants to incorporate appropriate safeguards to insulate the market from the risks associated with their innovative business. (Chen 2019, p. 4).

What are, and where are, innovations platforms?

- There were FinTech sandbox examples in over 20 countries by 2017 (Jenik and Lauer, p. 1), and 50 countries by 2019 (Buckley, p. 4). “FinTech” applies broadly to the financial sector, including banking, capital markets, insurance, investment management, and more (Chen 2018, pp. 3-7).
- Energy regulatory sandboxes are already operating in Ontario, the Netherlands, Singapore, and the United Kingdom.
- Sandboxes are also operating for other industries in several countries, including Japan and Taiwan (e.g., sandboxes for regulatory flexibility in health care, environmental management, and transportation).
- What’s in a name? Tools similar to sandboxes are variously called: “innovation facilitators… part of a broader ecosystem for innovation” including hubs, incubators, accelerators, and sandboxes (Jenik and Lauer, p. 1).

Basic components of sandbox setup & rules

- **Set the objectives of the sandbox.**
- **Clarify eligibility for who can apply to participate in the sandbox.**
- **Establish criteria to be specified in sandbox applications regarding risks, safeguards, and other restrictions. What does the applicant have to show?** (see Tsai et al., p. 9)
- **Limit the timing for applications and reviews, and for the sandbox tests themselves. Describe the basic requirements needed for testing.** (see Tsai et al., p 9)
- **Specify the regulator's ranges of actions before, during, and after sandbox tests.**
- **Establish mechanisms to monitor and evaluate costs and benefits, both to the regulator and for sandbox innovators. Provide maximum practical transparency?**

Source: Author's adaptation, based in part on Jenik and Lauer, p. 3

- The sandbox setup should "clearly articulate guiding principles that evince a commitment to preserving consumer protection and financial stability." (Allen, p. 583).
- There is a need for "a formal process in place… to assess whether the sandbox is meeting its stated goals… ." (Allen, p. 617)

What is an innovation platform designed to achieve?

- Multiple diverse parties participating, improving “cross-talk,” and allowing for open communications.
- Increasing the speed of innovation.
- Best managing potentially disruptive innovations.
- Rapid testing on a small scale with small risks, quick learning, and small failures (if and when failures do occur).
- Replicating anecdotal **examples of historical successes** with innovation, that were aided by organizational design, architectural design, happy accident, etc.
- Preventing repetitions of anecdotal **examples of historical failures**, where innovations “have been underwhelming” and the existing regulatory system “has stumbled.”

Source: Adapted from Allen, pp. 613-15, and Brownfield, pp. 605-06.

Do FinTech and GridMod offer similar innovations opportunities?

- Do incumbent advantages present barriers to new entry?
- Might new entrants can have difficulty obtaining financing?
- Is there uncertainty about market acceptance? A risk that incumbents or regulators might bet on the wrong horses?
- Are there added complexities due to regulatory differences between wholesale and retail markets?
- Are there “Catch 22s” for regulatory entrepreneurship – trying to get permission before the benefits can be demonstrated, or acting first and getting permission later?

What goals and objectives might apply?

Major group	Tentative list of major goals and objectives by interest group
Regulatory authorities	• Traditionally: safe, reliable, accessible regulated services at reasonable rates • More recent additions in many states: utility policies and services that are equitable, using resources that are environmentally benign or restorative, resilient, and which support economic development
Innovators	• Opportunity to showcase new products and services • Access to public utility network services, and often to data that is possibly accessible only from utilities • Access to markets
Utilities	• Improving operations and reducing operations and maintenance (O&M) costs • Improving customer service • Managing future competitive and potentially disruptive threats • Gaining experience with possible future business models and investment opportunities
Consumer Advocates	• Consumer privacy protections and preventing unwarranted access to consumer data by utilities and third-parties • Consumer protections and limiting consumer risk, including oversight of and input into decisions about utility cost allocation and rate design • Well-designed performance metrics and assessment tools • Visibility and transparency of innovations processes
Participating Customers	• Reduce bills • Be innovators or early adopters • Meet public commitments for obtaining and using clean, renewable, or low- or no-emissions energy sources
Source: Author's construct.	

Examples of existing energy innovations sandboxes

- Netherlands: community microgrids, neighborhood scale solar and storage, energy management by homeowner associations. (Uihlein, p. 10; Van der Waal et al., pp. 6-7).
- Ontario: innovations sandbox (https://www.oeb.ca/_html/sandbox/)
- Singapore: residential energy storage for peak load reductions (https://www.ema.gov.sg/sandbox.aspx)
- UK: community solar; community wind; customer-engagement app combining home banking, energy use, energy provider choice; EV charging stations; peer-to-peer trading; thermal-storage heating; VPPs; and more. (Uihlein, p. 10; UK Office of Gas and Electricity Markets (OFGEM) Case Studies, https://www.ofgem.gov.uk/publications-and-updates/innovation-link-case-studies)

See Supplemental Slides for more details

Other states' energy innovations platforms (1)

State	Name and major focus of innovations support platform
California	• California Energy Commission Launched the California Energy Innovation Ecosystem in 2016. Funding comes from a system benefits fund, called the Electric Program Investment Charge (EPIC) program. • CalTestBed – "Funded by the California Energy Commission, provides… vouchers to clean energy innovators," which can be used at any of ~30 pre-authorized test bed facilities.
Connecticut	• "Equitable Modern Grid" investigations, using "100-day Sprint Dockets" for particularly pressing issues. Connecticut is presently investigating regulatory sandbox practices.
District of Columbia	• DC PSC is establishing a Pilot Projects Governing Board as part of its Modernizing the Energy Delivery System for Increased Sustainability (MEDSIS) proceeding. MEDSIS Working Group 6 proposed a governance model and list of stakeholders to participate, and established project selection criteria, screening methods, monitoring, and evaluations protocols.

See Supplemental Slides for more details

Other states' energy innovations platforms (2)

State	Name and major focus of innovations support platform
Georgia	• Georgia is developing a key microgrid-research and demonstration platform, and a Smart Neighborhood™ project. • Two utility pilots already led to widespread energy efficiency programs.
Illinois	• Illinois is home to an Illinois Science and Energy Innovation Foundation, "grantmaking… to create a more energy literate society that's ready for the smart grid." • Illinois also has *Smart Grid Test Beds*, and the Illinois Commerce Commission has authorized two **innovative microgrids**, one in Chicago and the other near the campus of the University of Illinois at Champaign-Urbana.
New Jersey	• An explicit goal of the 2019 New Jersey Energy Master Plan is to "expand the clean energy innovation economy" (pp. 215-229). Aspects include: growing **supply chain clusters** for clean-energy subsectors; establishing **clean energy workforce training**; providing **innovative financing**, including a **statewide green bank**; capitalizing on **off-shore wind**; establishing **clean-tech innovations center** and **clean buildings hub**.

See Supplemental Slides for more details

Other states' energy innovations platforms (3)

State	Name and major focus of innovations support platform
New York	• CleanTech Accelerators were announced in April 2020. • The New York State Energy Research and Development Authority (NYSERDA) "innovation ecosystem," includes 66 program areas. • "REVConnect [b]rings companies and New York's electric utilities together to accelerate innovation, adopt new business models and technologies, and advance New York State's Reforming the Energy Vision (REV) goals."
Oregon	• Oregon state Innovation Council, since 2005. • Oregon Energy Office is home to a Planning & Innovation Division. • Oregon is home to GridForward, a regional Grid Modernization collaborative.
Vermont	• A multi-year regulation plan for Green Mountain Power Corp., adopted in 2019, includes "new initiatives and innovative pilots" along with "innovation and performance metrics."

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Benefits of innovations sandboxes done right

- **Opening the sandbox is a "signaling function" that the regulator is "flexible and open to innovation" (Allen, pp. 611-12; Buckley et al., p. 6)**
  - Attraction for innovators and innovation clusters – which can trigger economic development that could be future-proof
- **Potential to speed regulatory learning, with low costs of initial failures (Buckley et al., pp. 16-22)**
  - "Competent authorities are now able to accumulate technical expertise and operational knowledge with regard to disruptive technologies and innovative business models, which will further facilitate a deliberation process for regulatory design and reform based on the data collected through the demonstrations under the sandbox framework." (Tsai et al., p. 15)
  - Three-way learning, for regulators, utilities, innovators. (Zetzsche et al., p. 101)

Potential pitfalls, contra-indicators, and gotchas

- Does the regulator or regulatory staff know enough about innovations to pick winners and losers? (Buckley et al., p. 9)
- Are the innovators/innovations far enough down the path toward commercialization? Do they understand how the innovation might fit into the existing or a changed regulatory environment? (Buckley et al., p. 10)
- Who knows ahead of time what measures of success could be or should be, both for innovations platforms and for the individual innovations being attempted?

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Tensions affecting many utility innovations

- Monopoly gatekeeping and barriers to entry; a previous *natural monopoly* that is now facing multiple competitive, potentially disruptive threats
- Utilities enjoy a longstanding history of what is widely considered success, now being challenged by what could be a perfect storm of changing conditions and disruptive innovations
- We face a time crunch (or crush) for addressing promptly the global climate emergency, achieving net zero buildings and net zero GHG emissions.
- How can anyone know the costs and benefits until the experiments are completed? Are we asked to put carts before horses? What comes first, chickens or eggs?
- What do the innovators have to reveal publicly, before their products and services can be fully vetted and understood? Can innovators get their ducks in a row, before letting their cats out of the bags?

Risks inherent with sandboxes? (1)

- Is the sandbox a level playing field, or are too many advantages given to specific parties?
- Are the regulators' hands tied, preventing them from offering the relief that innovators might need?
- Does the process involve a potentially wasteful duplication of effort? Will parties still need all the traditional innovations activities, including pilot programs, in addition to the Sandbox opportunities?

Source: Buckley et al. 2019, pp. 23-26.

Risks inherent with sandboxes? (2)

- Parties including consumers could construe that sandbox approval implies some kind of endorsement by the regulator, which it does not. Conversely, consumers could construe they are not protected from abuses.
- Could there be a lack of standardization and replicability, such that even highly similar innovations or business models have to repeat similar experiments?
- Temporary regulatory relief does not constitute a long-term solution.
- Regulators and participating parties might divert resources to sandbox programs, thus slowing action on more comprehensive innovation policies and market engagement strategies.
- There are difficulties evaluating sandbox performance, exacerbated by a lack of performance metrics, and often much information is kept confidential.

Source: Chen 2019, pp. 8-10, 17-18.

Risks of innovations platforms gone wrong?

- There could be a misfit between IRP decisions made today and new solutions emerging tomorrow that could strand long-lived assets? Can regulatory reforms be rapid enough to match the speed of innovation?
  - "Waiting for perfect information before taking a formal regulatory position will often result in the maintenance of the regulatory status quo—an outcome that is likely to favor [incumbents]—even after there is a clear case for… advanc[ing] a well-delineated public interest." (Allen, pp. 603-04)
- "Sandboxes can only function properly where a solid foundation of financial and technical expertise meets regulatory openness and market demand." (Zetzsche et al., p. 103)
- What is the potential threat of utility system defection, at every scale from device to community?
- Will there be missed opportunities for innovation-based economic development?

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What to look for in an innovations ecosystem? (1)

- Rapid response to innovator questions, involving a team with increasing expertise in the innovations realm
- A team with sufficient expertise to identify both potential values of innovations and the readiness of innovations for early testing
- Some open, competitive mechanism to identify the best opportunities, like pitch competitions or calls for solutions to specific concerns
- Accessible funding sources, so that each new project does not need to find its own seed funding for initial tests

What to look for in an innovations ecosystem? (2)

- Creative problem solving to explore plausible business model options, and determine quickly whether limited trials can bend or break existing rules
- Multi-party negotiations under the watchful eye of the regulator, to design and rapidly implement experiments with robust designs including monitoring, possible opportunities for mid-course corrections, and evaluations, with an eye towards broader implementation if the early experiments prove successful

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May 14, 2020
MI Power Grid Stakeholder Meeting: Energy Programs and Technology Pilots

Supplemental Slides – Early Experiences with Public Utility Regulatory Sandboxes

Tom Stanton, Principal Researcher, Energy and Environment
National Regulatory Research Institute

Early experience from Ontario (1)

Ontario Energy Board Innovation Sandbox

- Provides two types of support to innovators: customized guidance from OEB staff team, and the opportunity to request temporary relief from a regulatory requirement. Guidance is provided by a cross-functional staff team, representing major OEB divisions.
- Written proposals are not required in order to receive guidance and information from OEB staff.
- There are no pre-set deadlines – Innovators can request guidance or temporary regulatory relief at any time.
- Of the 20 entities that approached the Sandbox in the first 6 months, most were interested in receiving information and guidance. 5 written proposals were received: 4 related to regulatory relief that OEB does not have the authority to provide (exemptions from regulation or legislation). 1 did not require any exemption, and is proceeding towards a pilot project.
- In tandem with the launch of the Sandbox, the OEB also launched two joint policy consultations on Responding to DERs and Utility Remuneration.

Source: https://www.oeb.ca/_html/sandbox/

Early experience from Ontario (2)

Ontario Energy Board Innovation Sandbox

- Utility partners are considered “key,” but there is no defined mechanism for matchmaking between innovators and utilities. Both gas and electric LDCs have participated, but no further information is publicly available.
- Other projects might still be moving forward, but OEB has no way to know.
- OEB may grant exemptions from OEB Codes, Rules, and licensing requirements, and under certain statutory provisions, but not generally from statutes and regulations.
- No funding is available through the Sandbox itself.

Source: https://www.oeb.ca/_html/sandbox/

Early experience from Singapore

Singapore Energy Market Authority Regulatory Sandbox

- Funding is available "to catalyze applied R&D" – "Over the past few years… over $100 million in grants, benefiting over 25 companies and 11 Institutes of Higher Learning/Research Institutes."
- The regulator issues "thematic challenge statements," asking innovators to help solve particular "top-of-mind" issues/challenges/problems (e.g. billing and settlement issues for self-generators; helping self-generators reduce required grid capacity). OR, applicants can submit their own proposals, unrelated to the specific calls.
- Website reports:
  - "Information on specific sandbox trials may be shared on a case-by-case basis."
  - One ongoing trial is announced, with a "transmission licensee," related to energy storage used for residential peak load shifting.

Source: https://www.ema.gov.sg/sandbox.aspx

Early experience from UK OFGEM

UK OFGEM Innovation Link

- UK Office of Gas and Electricity Markets (OFGEM) offers “bespoke guidance” about interpreting regulations and how they might apply to specific circumstances.
- “Fast, frank feedback service,” letting many applicants know they can proceed within the existing regulatory framework.
- “Unsuitable” candidates are offered support, engaging with the relevant policy team, for policy development and assistance.
- Much transparency, including published reports from “sandbox window 1” and “sandbox window 2” – numbers of initial applicants; numbers of innovators “supported” through initial service; numbers ultimately “offered” sandboxes; and synopses of the offered sandboxes.
- For ongoing projects, clear explanations provided of what rules are being tested, and how.

Source: https://www.ofgem.gov.uk/about-us/how-we-engage/innovation-link

OFGEM made mid-course corrections

Lessons Learned	New sandbox service, design
Innovators want to access the sandbox at their own time of need, not necessarily on the sandbox-team schedule	An on-demand service is more innovator friendly. Innovators should access the service when they feel the time is right, not be forced to ask for support too soon.
The scope of rules that could be eligible for bending is too narrow for some of the innovators' business models	OFGEM will look to expand the constellations of rules for which relief might be granted.
Innovators want to launch businesses, not trials; and, Start-ups want to signal to investors low regulatory risks	The sandbox can confirm whether non-traditional activities are permissible, and under what circumstances. Some flexibility can be available to support new market entry.
Innovators want clarity about what support is available	Guidance will be explicit about sandbox scope and the entry criteria for innovators to receive different sandbox services.
Innovators often need not full sandbox services, but just preliminary guidance about business models and how best to proceed	Innovators can access feedback before they are sandbox-ready. OFGEM will publish general guidance on common use-cases and issues arising from the feedback service. OFGEM, where possible, will make public the details of activities that have been confirmed as permissible.

Source: Adapted by author from OFGEM, 2020, *Innovation Sandbox Service – Overview,* https://www.ofgem.gov.uk/publications-and-updates/innovation-sandbox-service-overview

May 14, 2020
MI Power Grid Stakeholder Meeting: Energy Programs and Technology Pilots

Supplemental Slides – Prominent Innovations Platforms in the States

Tom Stanton, Principal Researcher, Energy and Environment
National Regulatory Research Institute

What is in this incomplete survey of states?

- Innovations platforms were identified through literature and internet searching, and were found in eight states plus the District of Columbia, so far. Those platforms are described briefly in the following pages.
- Utility pilot programs, by themselves, are generally not included in this survey unless they are accompanied by a broader innovations framework.
- Additional research is needed to explore similar platforms operating in other states and territories. Readers please let me know about other state innovations platforms. (Please email tstanton at nrri dot org with details.)

California's *CalTestBed Network*

- "We support diverse entrepreneurs to drive innovation and build equity into the global clean energy economy"
- "Funded by the California Energy Commission and the California Clean Energy Fund (www.calcef.org), this initiative is provid[ing] up to $8.8 million in testing vouchers to clean energy innovators… ." For prototypes with technology readiness level (TRL) scores of 5 to 7.
- Commitments include nine University of California campuses, and LBNL, representing nearly 30 eligible testbeds. The team will also build the organizational capacity of additional testbeds throughout the state, and connect with others nation-wide.
- The *CalTestBed Network* "will standardize entrepreneur-facing services, develop best practices, and collaborate on developing a robust pipeline of long-term, sustainable public and private funding for California's clean energy testbeds beyond the term of this program."
- A Uniform Contracting Mechanism (UCM) will be designed to streamline the process of contracting and invoice management by and between New Energy Nexus, Entrepreneurs, and multiple campuses and testbeds. UCM will include Standard User Agreements, Standard Terms and Conditions, and a Voucher Recipient Agreement.

Primary Source: https://www.CalTestBed.com

Connecticut's *Equitable Modern Grid Framework*

- Connecticut Public Utilities Regulatory Authority (PURA) is setting up an "innovations pilots" process, which might include a regulatory sandbox approach. Docket No. 17-12-03RE05 – *PURA investigation into distribution system planning of the electric distribution companies – Innovation Pilots*.
  - This Docket "examine[s] potential mechanisms for establishing a regulatory sandbox – a safe, but monitored place to test new ideas and validate their benefits in the real world… ." (Docket *Notice*, November 13, 2019, p. 1.)
- PURA is preparing to "retain[] a consultant to provide expertise in: "(1) electric utility regulatory sandboxes; (2) state-level programs for fostering energy innovation; and, and (3) state public utility commissions." The Authority intends to issue final RFPs in early May, and then hire consultant(s) to begin work in summer 2020.

Connecticut's *100-Day Sprint Dockets*

- The "Sprint" concept originates from methods used in *Agile* software programming. Like a charrette, a sprint process is used to … (See, for example, Agile Alliance, *Advancing the Practice of Agile* [web page], and Project Management Institute [web site search], *Agile*, both retrieved April 4, 2020.)
- PURA is using a "100-day Sprint model," when it determines that rapid action is warranted on a given topic, and the Authority wishes to be informed by input from all interested stakeholders.
  - Authority staff will serve as facilitators for each Sprint track, and for each track the designated staff will author a report with recommendations based on discussions and information presented in the Sprint process.
  - "The Authority finds that adopting the 100-Day Sprint model will enable a hands-on, collaborative problem-solving environment."
- Already identified for Sprint treatment are four topics relating to "energy assistance and utility arrearage-forgiveness programs." (PURA Press Release, January 22, 2020.)

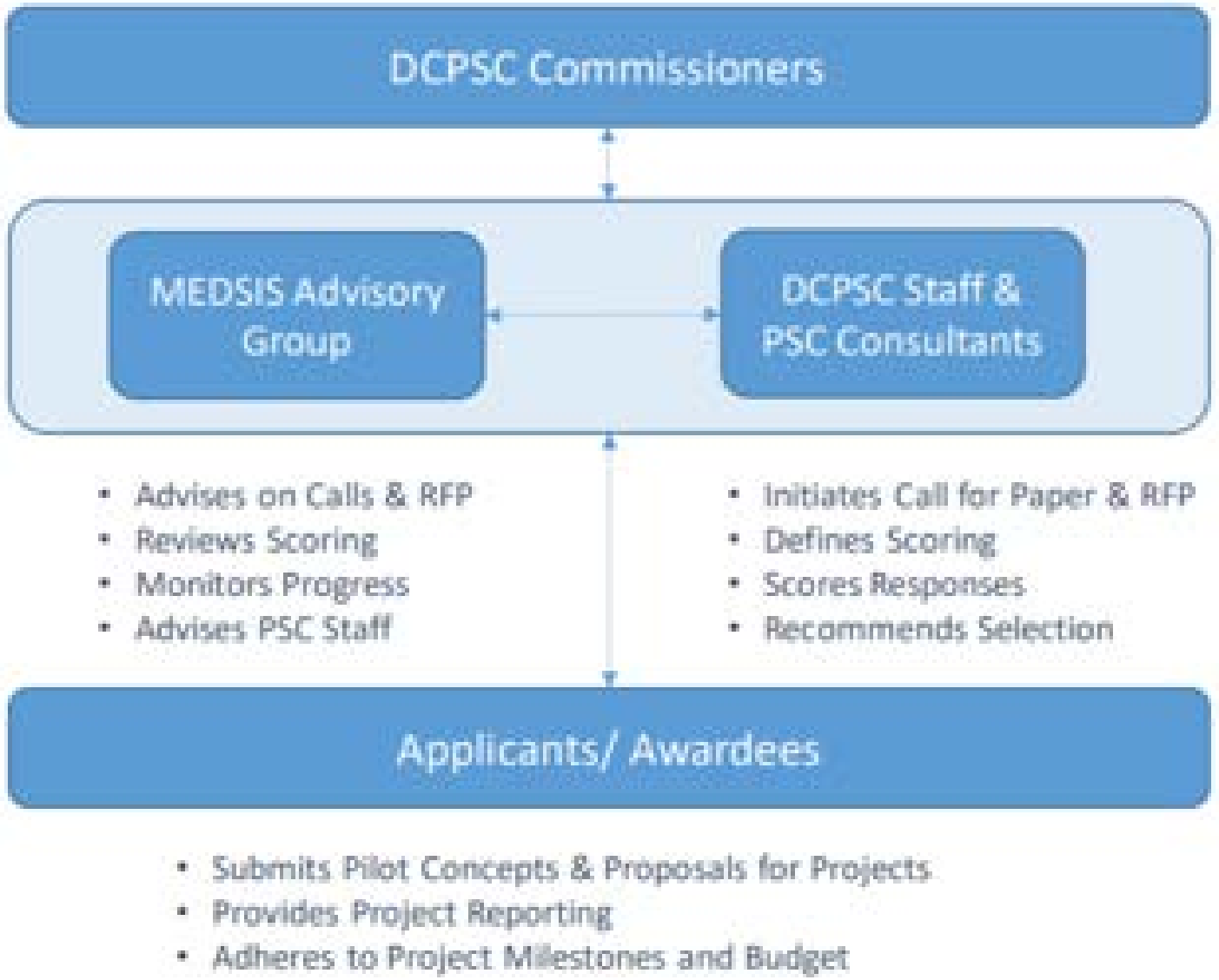
District of Columbia's *MEDSIS Pilot Projects* effort

- DC PSC is establishing a *Pilot Projects Governing Board* as part of its Modernizing the Energy Delivery System for Increased Sustainability (MEDSIS) proceeding.
- $21.55 million in pilot project funding is available, as a condition of the 2016 PEPCo Holdings and Exelon merger.
- A MEDSIS pilot projects working group (WG6), facilitated by the Smart Electric Power Alliance (SEPA), made recommendations to the DC PSC. WG6 was tasked with identifying a governance model, identifying stakeholders to participate in governance, and establishing selection criteria, screening methods, monitoring, and evaluations protocols for projects.

Sources: DC PSC January 24, 2020 *Order in Docket No. FC-1130, item no. 515, Order No. 20286*, https://edocket.dcpsc.org/public/search/casenumber/fc1130; and, *Final Report of the DCPSC MEDSIS Stakeholder Working Groups Version 1.0*, May 31, 2019, https://dcpsc.org/PSCDC/media/PDFFiles/HotTopics/GridModernizationFinalReport.pdf.

DC MEDSIS WG6 – Pilot Projects & Demonstrations

- WG6 met monthly from 10/2018 thru 03/2019.
- WG6 studied: program models from California and New York; grid-mod actions in five other states; pilot projects from a few individual utilities; and, the DOE Technology Readiness Level (TRL) Model.
- WG6 developed proposals for both “fast-track” and “non-fast-track” pilots.



Source: **WG-6 summary, in *Final Report of the DCPSC MEDSIS Stakeholder Working Groups*, pp. 340–351.**

Georgia's non-utility innovations efforts

- Georgia has what it calls centers of innovation operating under the auspices of the Georgia Department of Economic Development, and an Advanced Technology Development Center (ATDC) that is affiliated with Georgia Institute of Technology (Georgia Tech). The ATDC has regional offices in five Georgia communities. These centers are not specifically focused on innovations for regulated industries, but could be sources of support for those efforts.
- The State of Georgia also hosts a platform for innovations in K-12 education. https://gosa.georgia.gov/press-releases/2018-08-29/gosa-and-innovation-fund-foundation-announce-six-innovation-summit-pilot

Georgia Power's Links to Georgia Tech

- Georgia Power is also working with Georgia Institute of Technology Strategic Energy Institute, to implement a Microgrid for Technology Square. The installation will include a fuel cell, battery storage, diesel generator, and natural gas generator, but it is also designed to adapt to new and additional DERs. For example, in the future it will accommodate microturbines, solar panels, and electric vehicle chargers.

  Georgia Tech students and professors will work with this "living laboratory" to gather data on controllers, cybersecurity devices and energy economics, while offering insights on how microgrids can effectively integrate into and operate as an integral part of the overall electrical grid. The microgrid will also provide insight on how smart energy management systems interact with the grid to achieve optimal energy usage.

Georgia Power's Ongoing Pilot Programs

- Georgia utility companies can undertake energy efficiency pilot programs using funding for DSM Programs. Two Georgia Power pilot projects already led to Full Scale DSM Programs, including a *Residential Thermostat Demand Response Program* and *Commercial Behavioral Energy Efficiency Program*. (Docket No. 42311, Georgia Power 2019 DSM Plan, Application – Document No. 175474, *3 2019 DSM Program Plans*).
- Georgia Power's website invites interested parties to submit ideas for energy efficiency pilot programs. https://www.georgiapower.com/miscellaneous-pages/search-results.html?q=Pilot
- A Georgia Power on-line *Marketplace* offers consumers opportunities to purchase energy and water saving products.

Georgia Power 2019 Pilot & Demo Programs

- Georgia Power will own and operate up to 80MW of battery storage, “to demonstrate the deployment, integration and operation… to maximize the value of storage” integrated into its system.
- In its Smart Neighborhood project, the utility and its partners are working to “understand the interactions between rooftop solar, in-home battery storage, energy efficiency measures, and [the] electric grid.” The new homes, connected to a microgrid, offer many features, including “optimal insulation for maximum efficiency, advanced heating and cooling systems, LED lighting, electric vehicle chargers, and home automation featuring smart thermostats, smart locks, smart light switches, smart outlets, outdoor cameras and voice control.”

Illinois *Science and Energy Innovation Foundation*

- State legislation in 2011 made provisions for establishing a non-governmental Illinois Science and Energy Innovation trust or foundation. The purpose was to "benefit technological advances in the area of electric grid modernization and operation".
- The enabling legislation also identified the specific purpose of "providing consumer education regarding smart meters and related consumer-facing technologies and services… and educat[ing] each participating utility's low-income retail customers, including low-income senior citizens."
- The Foundation was initially seeded with utility shareholder dollars, but the legislation stated that it should become self-funding in the future.

Illinois Utilities Open *Smart Grid Test Beds*

- Also added in a 2011 law, Illinois made provisions for each participating utility company to identify one or more network locations to be identified as a *Smart Grid Test Bed*. The purpose for the Test Beds is "to maximize the opportunity for real-time and real-world testing of Smart Grid technologies and services… open to all qualified entities wishing to test programs, technologies, business models, and other Smart Grid-related activities… ."
- The utilities retain control of their grids and operations, "and may reject any… activities that threaten the reliability, safety, security, or operations of its network… ."
- The program calls for independent evaluations after four years.
- Utilities may recover all prudently incurred and reasonable costs associated with the test beds and may charge user fees to recover the costs of administering the test beds.

Illinois Microgrid, Energy, and Water Innovations

- Illinois is home to two important microgrid pilot programs, one is a joint project of Commonwealth Edison and Illinois Institute of Technology, in the Bronzeville area in Chicago, and the other at the Ameren utility company Technology Applications Center near the campus of University of Illinois at Champaign-Urbana.
- Illinois is also home to two NGOs that are specializing in energy and water industry innovations.
  - Clean Energy Trust is a non-profit dedicated to identifying, funding, and growing high-impact clean-tech startups from the Midwest. The Trust "makes seed investments and provide[s] mentorship, coaching, access to a national network, and patient, hands-on support to help entrepreneurs scale and succeed."
  - Current is a Chicago-based non-profit water innovation hub, focused on water technologies and development of a "blue economy" and the energy-water nexus.

University of Illinois Cyber-Security Test Bed

- In 2016, the University of Illinois Urbana-Champaign announced receipt of an $18.7 million grant from the U.S. Defense Advanced Research Projects Agency (DARPA), to develop a test bed for grid security, with the ability to develop and validate cyber-security tools.

  This Cyber Resilient Energy Delivery Consortium (CREDC) is a "collaboration between universities, national labs and private industry aimed at bolstering the security and reliability of a power grid."

  One report says the Test Bed is "like having a flight simulator, but for the power grid."

New Jersey – Expanding the clean energy innovation economy (1)

- An explicit goal of the 2019 New Jersey Energy Master Plan is to "expand the clean energy innovation economy" (pp. 215-229). Plans include: growing supply chain clusters for clean-energy subsectors; establishing clean energy workforce training; providing innovative financing, including a statewide green bank; capitalizing on off-shore wind; establishing a clean-tech innovations center and a clean buildings hub.
- New Jersey provides Community Energy Planning Grants. New Jersey Board of Public Utilities (BPU) *Press Release*, 2/6/20, "NJBPU Awards First $25,000 Community Energy Planning Grant to Bergen County"
- Community Solar Energy Pilot Program, including "Special Consideration for Underserved and Environmental Justice Communities"

New Jersey – Expanding the clean energy innovation economy (2)

- New Jersey Economic Development Administration (NJEDA) issued an RFI on "Mechanisms for strengthening New Jersey's Cleantech Innovation Ecosystem." Responses were due on 2/7/2020.
  - [I]n collaboration with the NJ Board of Public Utilities (BPU) Clean Energy Program (CEP)… . NJEDA and BPU [are] interested in receiving comments, questions, recommendations, facts, information, ideas, and responses that will help the NJEDA and BPU better understand the scope and characteristics of the existing ecosystem, recognize challenges, and develop potential programs/actions that can be undertaken to effectively strengthen and position NJ as a leader in cleantech innovation.
- March 2020 – NJEDA issues RFI "on the need for a 'Green Fund' to support investments in clean energy technology."
- In 2018, New Jersey legislature revived the state's Commission on Science, Innovation, and Technology.

New York's CleanTech Accelerators

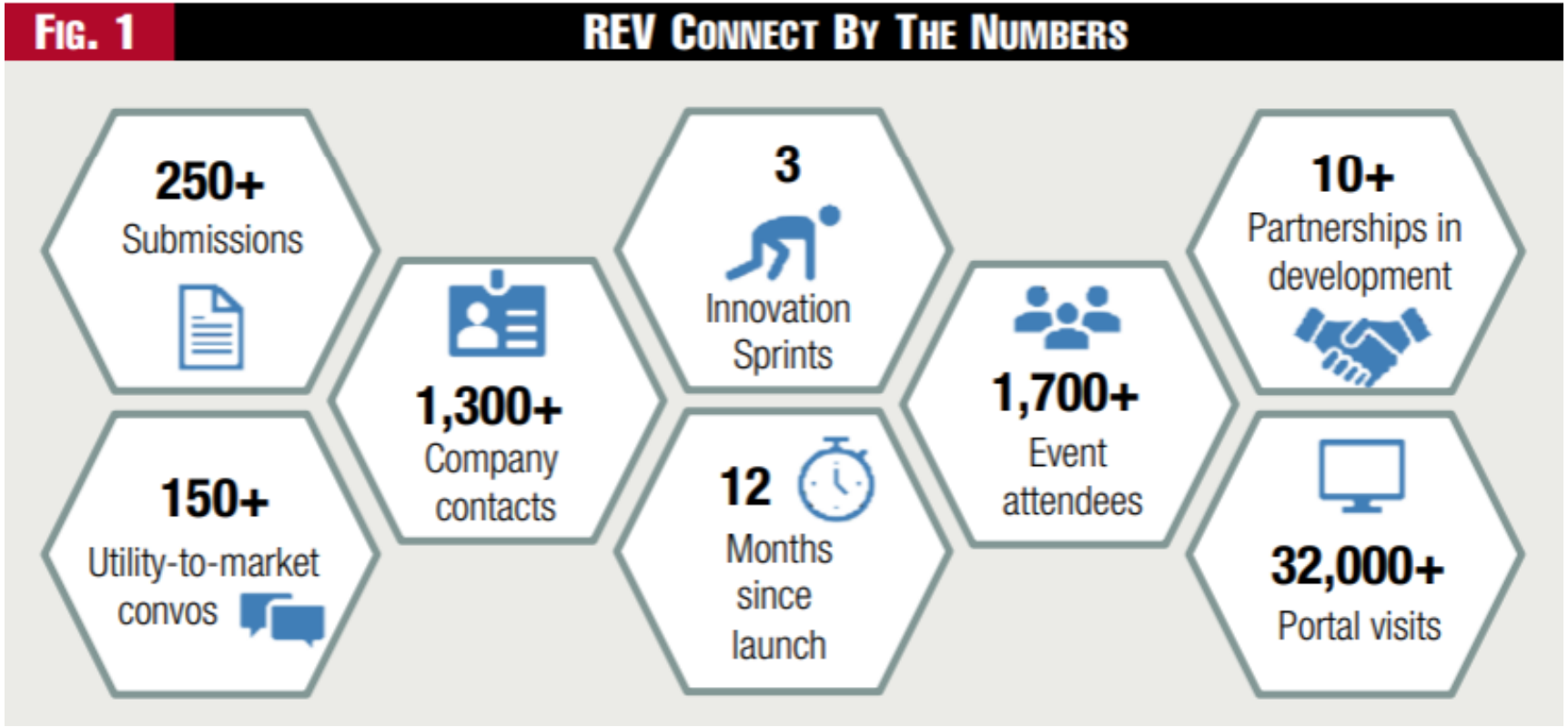
- CleanTech Accelerators, announced April 2020, will be administered by NextCorps in Rochester and NEX-NY in Brooklyn. NextCorps support is $10 million over five years. NEX-NY funding is $6 million over 30 months.
- "Together, the new accelerators will have **diverse focus areas across all clean energy technologies and markets** – such as advanced buildings, energy storage and fuel cells, smart grid, industrial energy efficiency, renewable electricity and fuels, and clean transportation – to help with the specific needs of participating companies. The goal of the accelerators is to ultimately broaden the number of **clean energy startup companies operating in New York State as the state grows a clean energy economy**."
- "As a result of NYSERDA's technology investments and business development support, more than 440 new and improved clean energy products have been commercialized."

Source: NYSERDA, April 9, 2020, https://www.nyserda.ny.gov/About/Newsroom/2020-Announcements/2020-04-09-NYSERDA-Launches-Two-Cleantech-Accelerators-for-Entrepreneurs-to-Bring-Clean-Energy-Solutions-to-the-Marketplace [emphasis added]

New York's Extensive Innovations Platform

- New York State Energy Research and Development Authority (NYSERDA) has 64 ongoing program areas, inviting innovations for 19 different sectors and ten different technology types. https://www.nyserda.ny.gov/Researchers-and-Policymakers/Research-and-Innovation-Centers, https://www.nyserda.ny.gov/All-Programs.
- REV Connect is the New York ***Innovation Accelerator***, designed to "bring[] companies and electric utilities together to accelerate innovation, develop new business models, and deliver value to New Yorkers." https://nyrevconnect.com/

New York's REV Connect Progress



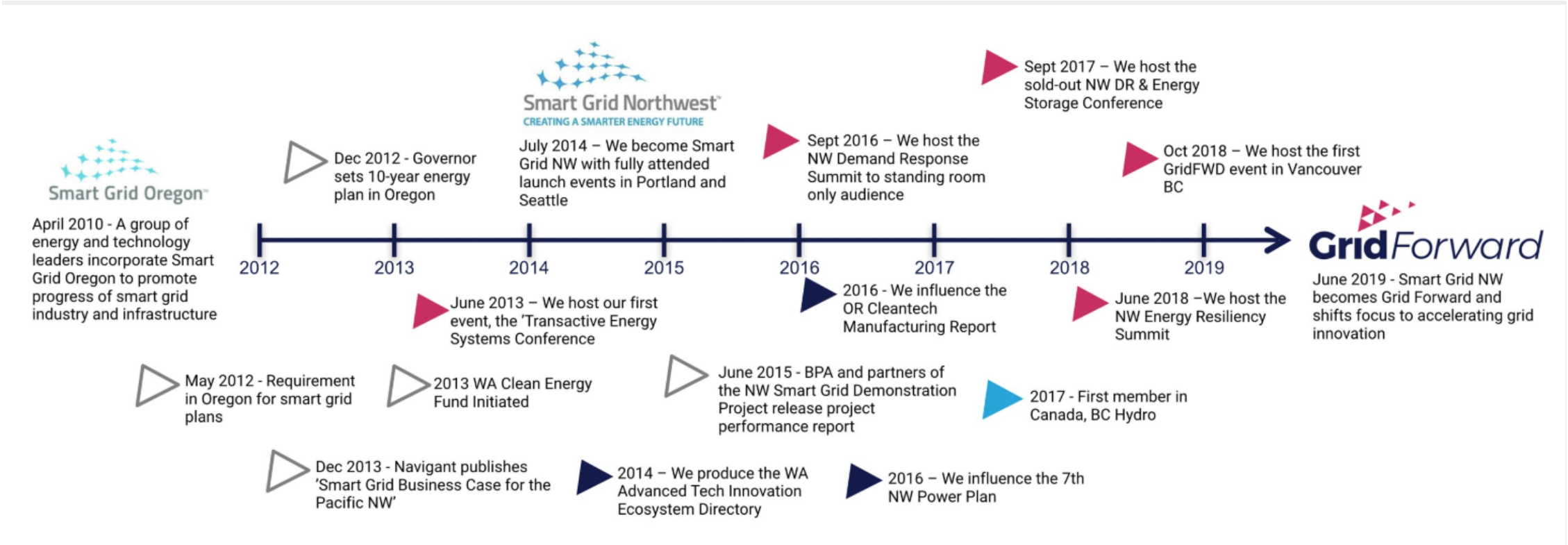
- Source: Bradley, Dan, and H. Christine Richards, "Four Learnings from REV Connect," *Public Utilities Fortnightly*, 2018. https://nyrevconnect.com/wp-content/uploads/2018/12/Public-Utilties-Fortnightly-REV-Connect-4-Learnings-FINAL.pdf. See also, Bradley, Dan, and H. Christine Richards, "How REV Connect's Innovation Sprints Redefine Utility Procurement," *Public Utilities Fortnightly*, February, 2019. https://guidehouse.com/-/media/www/site/insights/energy/2019/rev-connect-innovation-under-deadline.pdf

Oregon – Building Innovation into the State's DNA

- Oregon started a state Innovation Council in 2005. It is a public-private partnership designed to bring new jobs and new companies to the state. The council does not specifically target regulated utility industries, but projects have been funded which support electric vehicles, wave energy, clean tech research and development, energy efficiency, wind energy, and more.
- Oregon Energy Office is home to a Planning & Innovation Division, which works on program areas authorized by the state legislature. A strategic framework plan: "Provides policy leadership to keep Oregon on the cutting edge of energy sector innovation, collaborating with stakeholders to leverage our technical expertise as reflected in the development of white papers, pilot projects, program improvements, rule revisions and legislative proposals." (Framework, p. 1)

Oregon consortium making grid-mod a reality

- Oregon is also home to a regional consortium called GridForward, which is "a member-based non-profit organization that brings together utilities, solution providers, government agencies, regulators, advocates and others to work together on making grid modernization a reality."



Vermont's "new initiatives and innovative pilots" (1)

- A Commission approved multi-year regulation plan for Green Mountain Power Corp., adopted in 2019, provides for "new initiatives and innovative pilots" along with "innovation and performance metrics." (Vermont Public Utility Commission, May 24, 2019 Order in Case No. 18-1633-PET, https://epuc.vermont.gov/?q=node/64/132296/FV-BDIssued-PTL.)
  - Green Mountain Power (GMP) can offer "New Initiatives," which are "transformative, customer-facing energy projects that require an initial upfront capital investment by GMP and are forecasted to contribute a net positive benefit to non-participating customers through new sources of revenue or cost savings over the life of the program." (Order, p. 30, ¶66).
  - "GMP may not spend more than $5 million on New Initiatives during the term of the Plan without seeking approval from the Commission… ." (Order, p. 30, ¶68).
  - "The Plan includes 26 new "innovation and performance metrics… . There will be no penalties or incentives associated with GMP's performance on these metrics during the term of the Plan. It is appropriate to gain experience with these new innovation and performance metrics before linking them to financial incentives or penalties. (Order, p. 32, ¶s 74, 77, 78).

Vermont's "new initiatives and innovative pilots" (2)

- A Commission approved settlement between GMP and Renewable Energy Vermont sets criteria for the new initiatives and pilots, including third-party participation and extending or expanding bring-your-own-device (BYOD) pilots. (3/27/2019 *Stipulation/MOU/ Settlement Agreement* filed by Renewable Energy Vermont, https://epuc.vermont.gov/?q=node/64/132296/FV-ALLOTDOX-PTL)
  - "GMP will provide competitive market participants with transparent and nondiscriminatory access to GMP's DER platform, marketing, and billing services to allow customer and third-party ownership arrangements of DER products, and to facilitate efficient integration into the grid." (MOU, p. 5, ¶9).
  - "[F]or any new GMP tariff or pilot program… GMP will provide a comparable, parallel third-party offering(s)… for any GMP pilot …program offering where feasible. This provision is… intended to ensure that customers have choice and that energy service providers have competitive opportunity to provide products and services deployed on the customer side of the electric energy services market." (MOU, pp. 5-6, ¶10).
  - Third-Party offerings may require interconnection and interoperability with the utility grid, and may include an option for customers to elect to pay… through appropriate charges on their GMP bill. (MOU, p. 6, ¶10).

May 14, 2020
MI Power Grid Stakeholder Meeting: Energy Programs and Technology Pilots

Supplemental Slides – Regulatory Sandbox Duplicates from February 27 Presentation

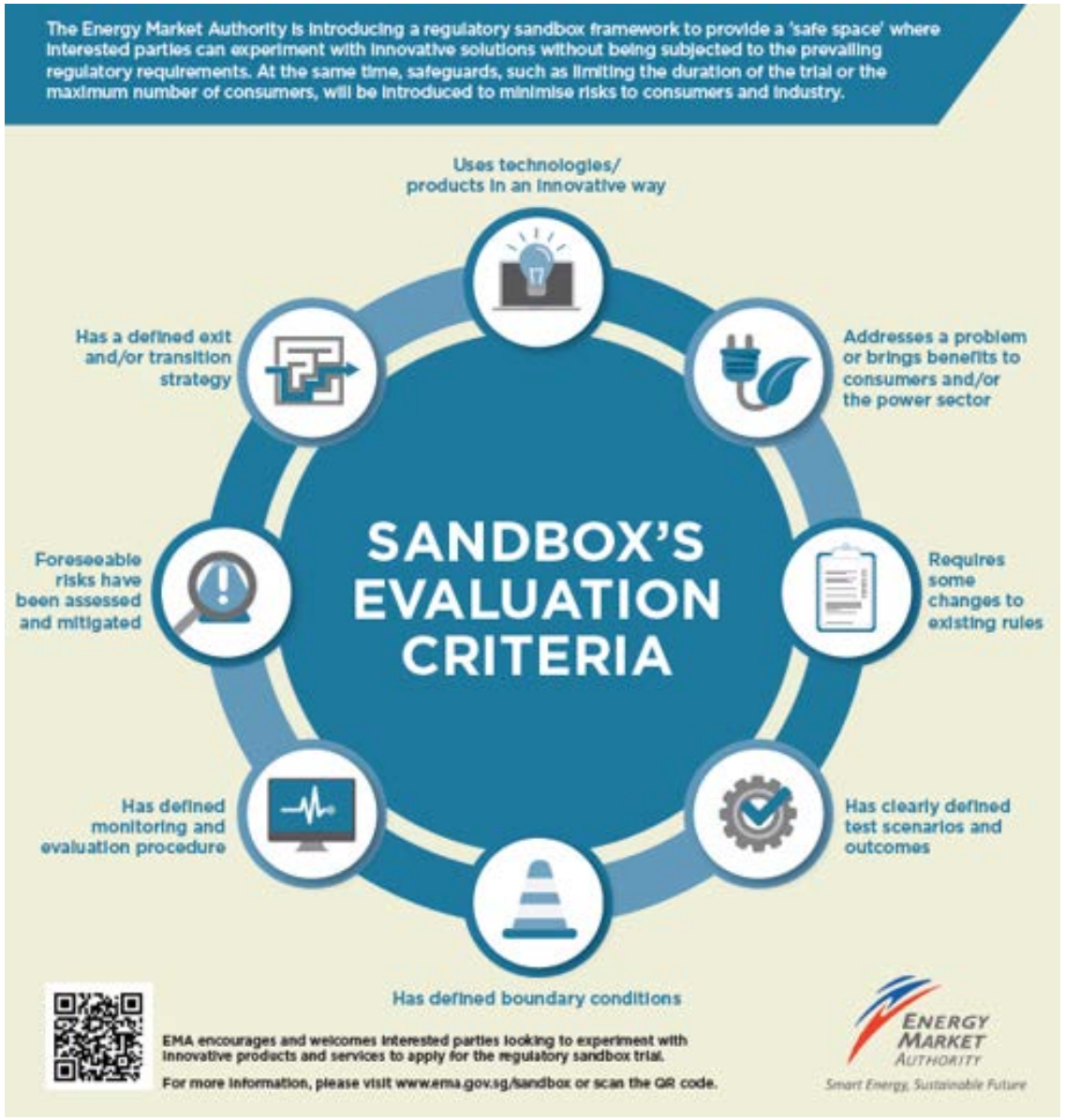
Tom Stanton, Principal Researcher, Energy and Environment
National Regulatory Research Institute

Would a “regulatory sandbox” help?

- Regulatory sandboxes can establish special kinds of pilot programs, which include:
  - Collaborative decision making among multiple interested parties;
  - Combining rigorous regulatory oversight and ample flexibility, often rule-bending, needed to demonstrate new technologies and business models;
  - Developing well-defined and bounded experiments, limited in duration and expense, carefully monitored and evaluated;
  - Including a well-defined exit strategy and potential pathways to broader implementation

Learn more about “regulatory sandbox”

- Chicago Advanced Energy Task Force, *Exploring Innovation in Regulatory Sandboxes*, 2019 CAE Q1 Recap. https://goadvancedenergy.com/writing/2019/3/21/aeg-cae-q1-recap-exploring-innovation-in-regulatory-sandboxes
- Eggers, Turley, and Kishnani, 2018, “The Future of Regulation” [Electronic article], *Deloitte Insights*. https://www2.deloitte.com/us/en/insights/industry/public-sector/future-of-regulation/regulating-emerging-technology.html
- Maloney, Peter, “Brooklyn Microgrid Launches Campaign to Create Regulatory Sandbox” [Electronic article], *Microgrid Knowledge*, 18 October 2019. https://microgridknowledge.com/brooklyn-microgrid-regulatory-sandbox/
- Ontario Energy Board “Innovation Sandbox” [web page], https://www.oeb.ca/_html/sandbox/
- Sheahan and Zhang, “Experiment Without Penalty: Can ‘regulatory sandboxes’ foster utility innovation?” [Electronic article], *Smart Cities Dive, 21 March 2019*. *https://www.smartcitiesdive.com/news/experiment-without-penalty-can-regulatory-sandboxes-foster-utility-innov/551012/*
- Image source: Singapore Energy Market Authority, 2017, *Regulatory Sandbox for Energy Sector Innovations*, https://www.ema.gov.sg/sandbox.aspx



Pilot Case Studies

May 14, 2020

Ryan Kiley
Heather Prentice
Emily McGraw

Consumers Energy
Count on Us®

There are a variety of questions that pilots may be designed to answer

Technology

- Will it work as advertised
- Integration requirements
- Safety / security

Business Model

- Are we solving the customer problem
- Validating the solution design
- Measuring benefits

Scalability

- Size of opportunity
- Best way to engage customers
- Partner evaluation
- Program economics

Success criteria will vary greatly depending on the question identified

Pilot Principles / Definition

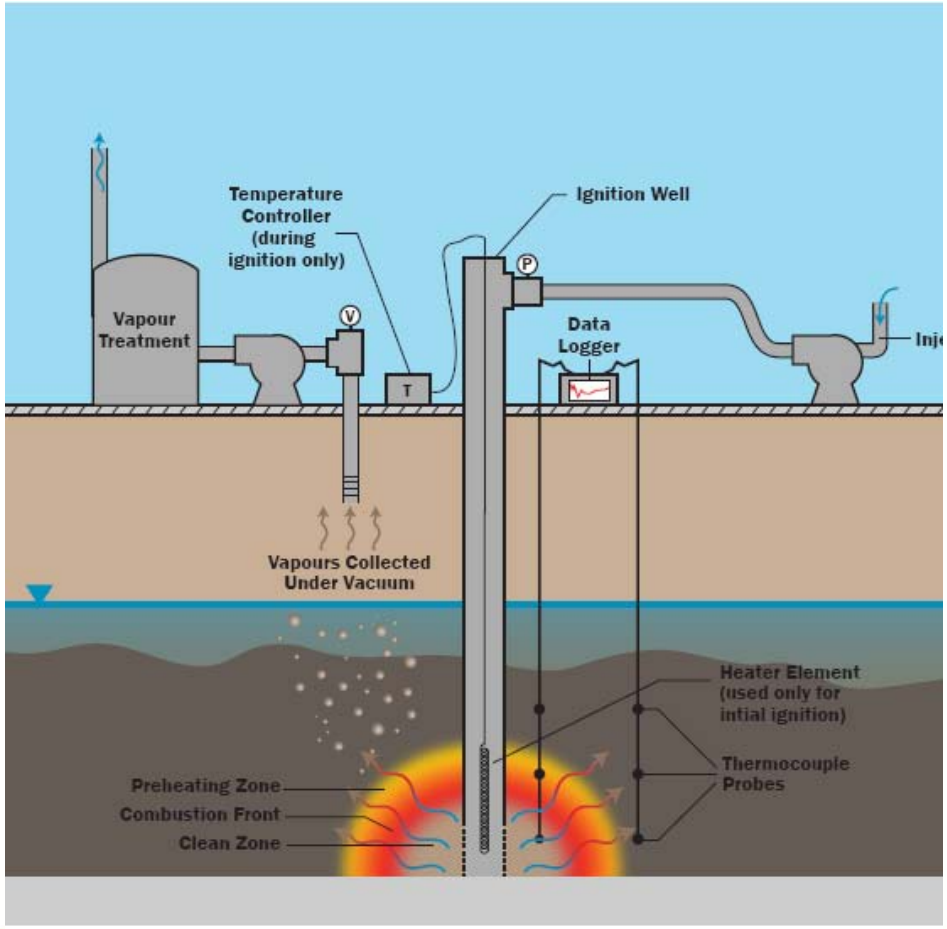
A pilot is a small scale, relatively short term experiment that helps an organization answer a question. Pilots will have defined objectives, time lines, sample sizes, evaluation methods, and success criteria.

Case Study: Manufactured Gas Plant (MGP) Remediation

MGP Remediation Pilot Study

- Goal:
  Evaluate technologies for remediation

- Performed Self-Sustaining Treatment for Active Remediation (STAR) pilot at the Manistee MGP site



MGP = Manufactured Gas Plant

Learnings – Pilot Results

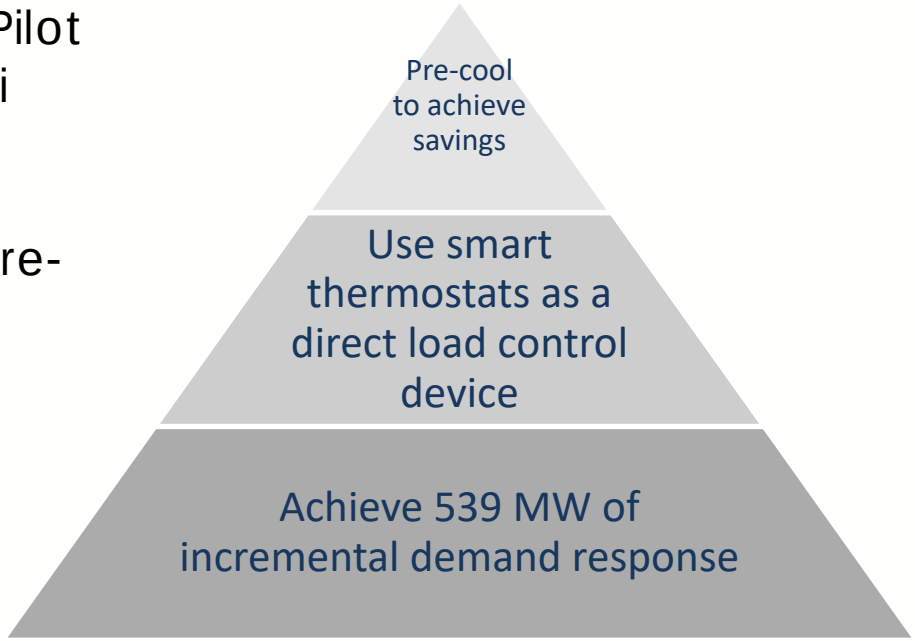
- Results evaluated on following criteria:
  - Radius of influence (distance from well location)
  - Post treatment sample results
  - Construction changes needed to go full scale
    - Increased energy requirements
    - Additional well points
  - Cost
- Decision - Not the most cost-effective remedial technology available

Case Study:
Demand Response
Bring Your Own Device

PILOT SUMMARY AND BUSINESS NEED

Bring Your Own Device (BYOD) Pilot

- Enrolled customers with a wi-fi connected smart thermostat
- Tested demand savings achieved using customized pre-cooling



BYOD PILOT OBJECTIVES

01

Demand Reduction

Evaluate peak demand reduction achieved by using pre-cooling algorithms customized on a per-home basis.

02

Customer Satisfaction

Collect participating customer feedback regarding their experience with the pilot.

03

Deploy DR Events

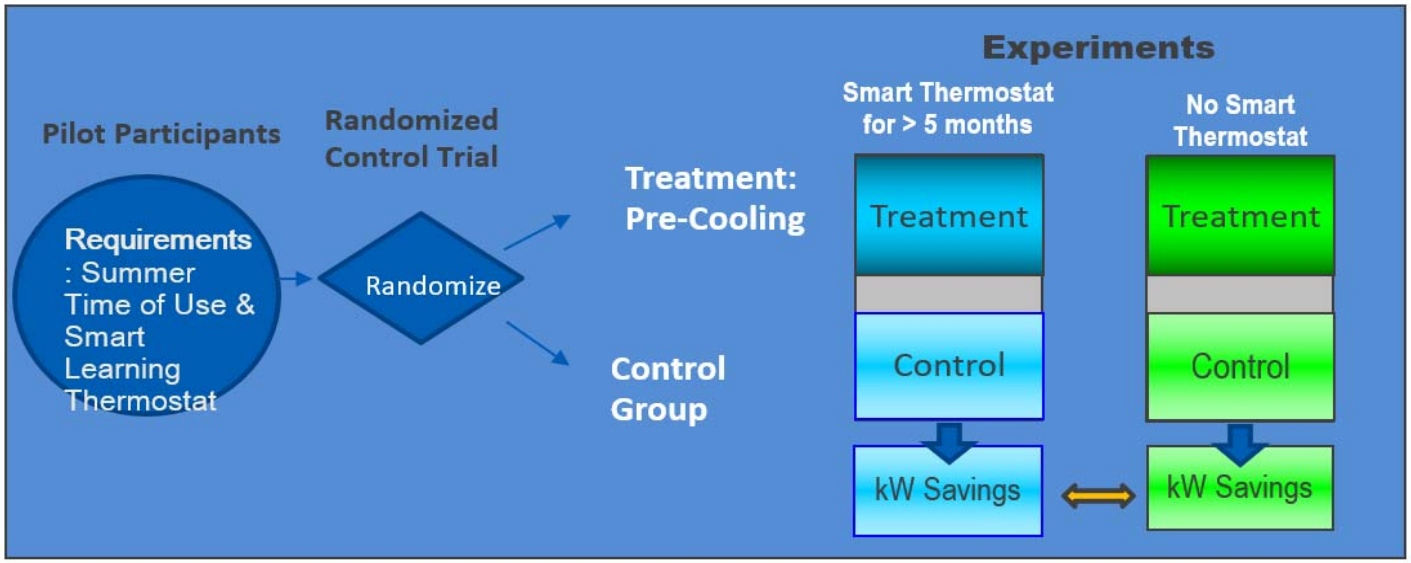
Evaluate the ability to successfully deploy events through the vendor platform and communicate with devices through customer Wi-Fi networks.

04

Customer Recruitment

Achieve customer recruitment targets to generate statistically significant results

BYOD PILOT EVALUATION METHOD



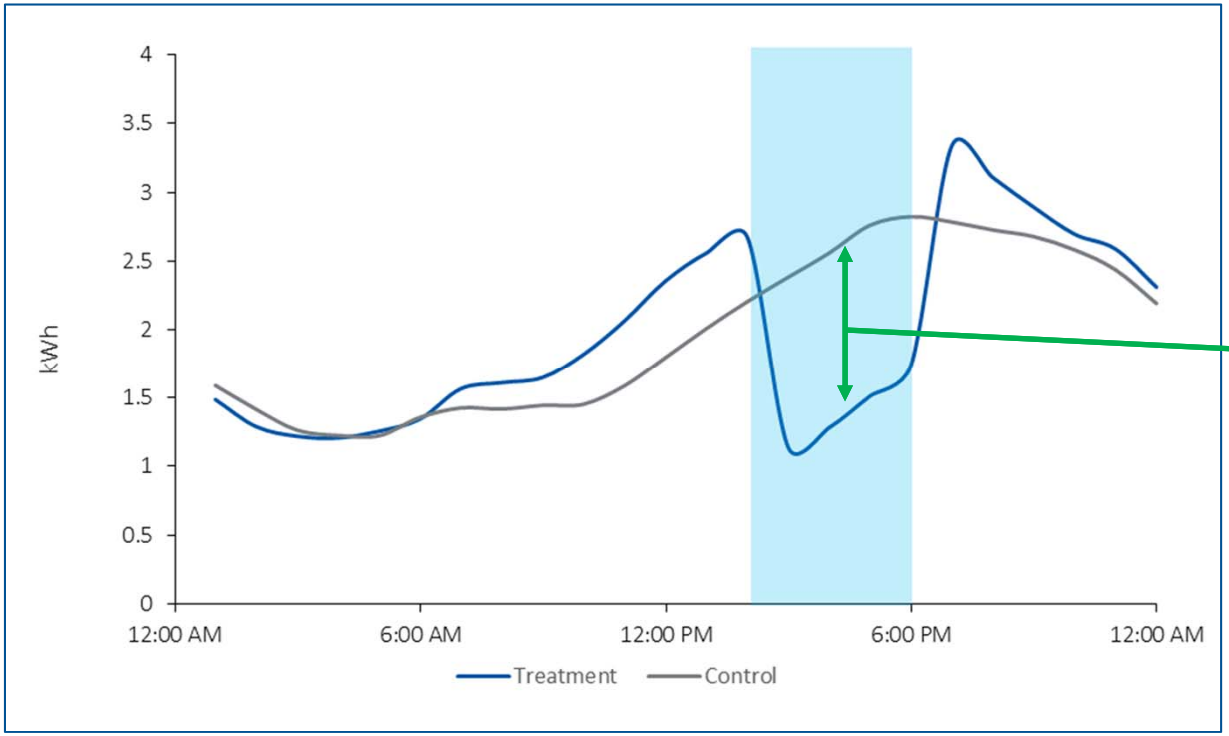
Non-Participants

- Control Group based on similar load profiles – will pull from Summer Time of Use participants.
- Will not need to contact non-participants – will simply pull their data from our systems

BYOD PILOT SUCCESS CRITERIA

- Understand Benefits to All Customers
- Measure Customer Satisfaction
- Measure Demand Reduction
- Achieve Customer Recruitment Targets
- Successfully Deploy Demand Response Events

DEMAND REDUCTION RESULTS



1.25 average kW/customer

DECISION TO GROW, MAINTAIN, OR END

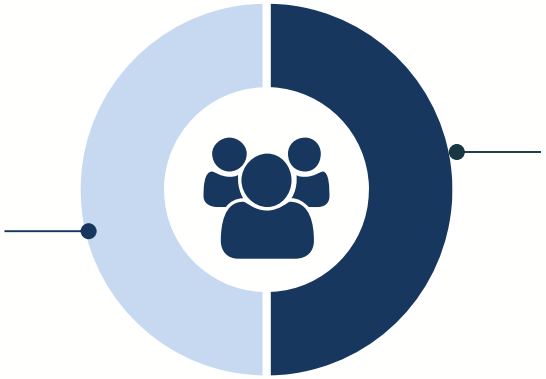
OBJECTIVE	RESULT
Customer Benefits	Levelized Cost of Capacity at scale is ~ $50K/MW < 75% of CONE
Customer Satisfaction	8.7 on a scale of 1 through 10, NPS of +65, CXI of 81
Measure Demand Reduction	1.25 kw/customer
Achieve Customer Recruitment Targets	Enrolled 2,400 Customers
Successfully Deploy Demand Response Events	Deployed 3 events in 2019

GROW

APPENDIX

CUSTOMER RECRUITMENT

Customers Purchasing A New Smart Thermostat
Targeting 1,050 households and offering $100 (up to free thermostat) incentive upon enrollment.



Customers With An Existing Smart Thermostat
Targeting 1,050 households and offering $75 incentive upon enrollment.

Leverage insights from EWR Programs to identify potential BYOD participants.

SmartCurrents

Dynamic Peak Pricing Pilot

May 14, 2020

Recalling the first meeting, DTE generally conducts two distinct types of pilots that follow a general process

Pilot Types Across DTE

Customer behavior

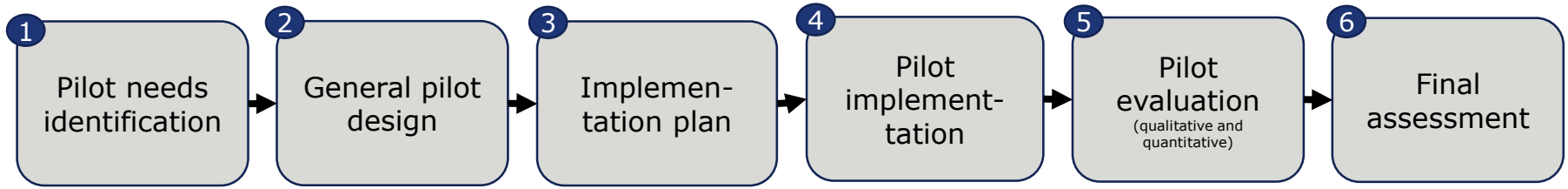
- E.g. Charging Forward, **SmartCurrents,** various EWR pilots

Operational technology

- E.g. Process automation, Trip Saver II, substation relay enhancements, **storage**

Common to both types of work are uncertain expected outcomes, and pilots can be a useful step in determining a range of likely outcomes and improvements that may be made

DTE Pilots' General Process



SmartCurrents was a two-year pilot program funded by the SmartGrid Investment Grant”

Customer behavior

1 Pilot needs identification

- SmartCurrents was a **residential consumer behavior study** based on the AMI installations and an experimental three-tier Time-of-Use (TOU) rate with a Critical Pricing Peak (CPP) overlay
  - *A major goal of the pilot was to offer innovative education and technology programs that increase customer engagement and satisfaction*

---

2 General pilot design

- SmartCurrents was designed to provide DTE with information about the **best ways to integrate dynamic peak pricing rates, enabling technologies, information feedback and customer education** to:
  - Induce a change in residential consumer overall energy consumption and demand response behaviors while opening up opportunities for customers to save on their energy bills
- The design of the pilot was coordinated among DTE, Ernst & Young, and a group of industry professionals referred to as the **Technical Advisory Group (TAG)**
- Energy & Environmental Resources Group (E2RG) assisted DTE in the Department Of Energy (DOE) build metrics and with evaluation
- Lawrence Berkeley National Labs (LBNL) also assisted in the evaluation of the results

The SmartCurrents pilot deployments were split into two different types of experiments

2

General pilot design

- A **quantitative cause and effect** experimental design with a Control Group to analyze usage and bill impacts from the different intervention approaches
  - Focused on testing the differences in behavior resulting from changes in pricing, enabling technology type and educational information
- A **qualitative informational** design to understand why and how customers react to pre-pay billing and smart home appliances
  - Create real opportunities for customers to reduce their energy spending by matching their consumption behaviors to electricity supply conditions

DTE's SmartCurrents explored research questions in three areas: Pricing, Technology and Information Feedback

2

General pilot design

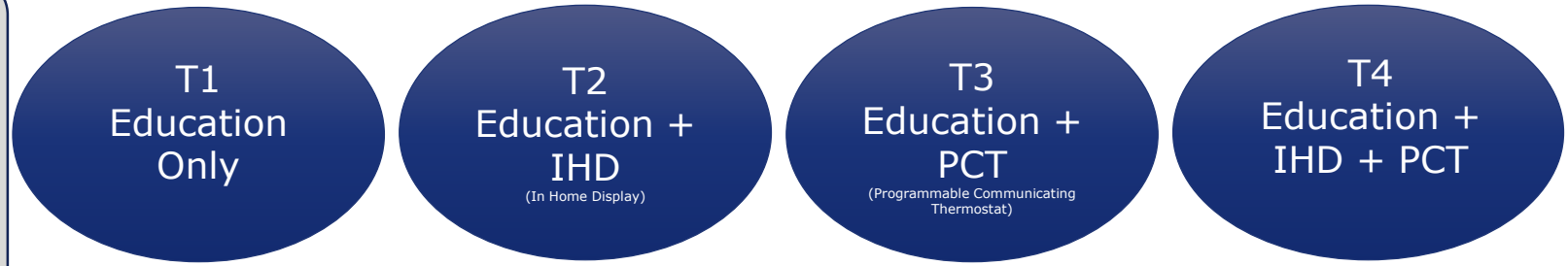
Pricing	Technology	Information Feedback
• Customer acceptance (surveys) • Character of response (analysis)	• Customer acceptance (surveys) • Character of response (analysis)	• Delivery mechanisms (web, IHD, PCT, mobile)

DTE focused on research questions and hypotheses around usage impacts and also examined customer satisfaction and acceptance through surveys, focus groups and marketing research

To understand if DPP rates would support a measurable and persistent load shift, a randomized control trial (RCT) was designed to include four treatment cells

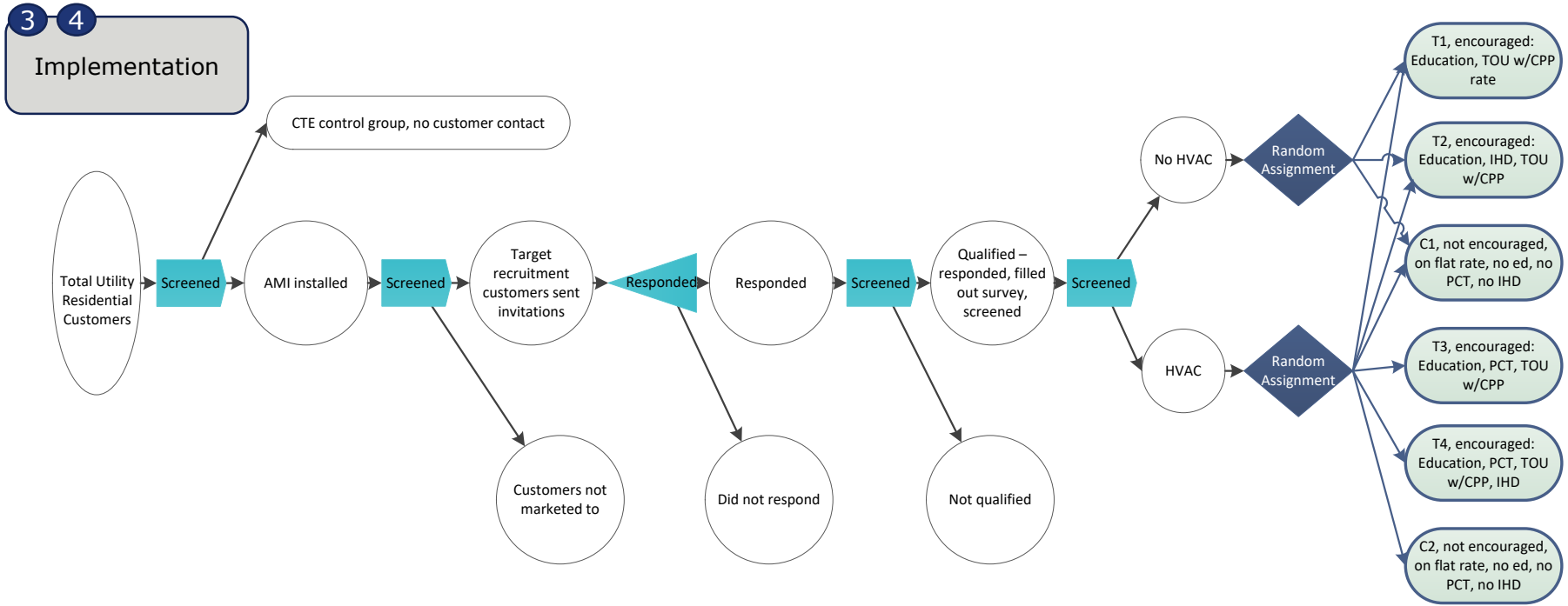
3

Implementation Plan



- Through the RCT, DTE sought to determine the "minimal viable" education and enabling technology approach that would achieve persistent demand response
- Each treatment cell was analyzed against 1 of 2 statistically significant control groups

Recruitment followed an opt-in approach that focused on customers who already had AMI installed



Once the sample groups and control groups were populated, DTE began calling events in 2012

4 Implementation

- From August of 2012 through August of 2013, **DTE called 11 DPP events** and analyzed the results from each to determine the amount of load reduction
- Over the course of the pilot, **DTE assessed any load shifting responses** as a result of the TOU component of the rate

5 Evaluation

- It was determined through the pilot that **customers who only received education reduced less** than customers who received an IHD and a PCT when compared to a statistically significant control group

The results from the SmartCurrents pilot conducted under the SGIG formed the basis of the current SmartCurrents design

6

Final assessment

- The SmartCurrents pilot that is available today provides participating customers a smart thermostat and also places them on the Company's DPP rate
  - **The inclusion of a smart thermostat is a key learning** leveraged from the original effort
- In exchange for the thermostat, the customers agree to allow the Company to offset the setpoint of their temperature 4 degrees during DPP events
  - Customers can override the Company's adjustment but are subject to the $.95 CPP charge
- In addition to leveraging learnings from the original pilot, the current SmartCurrents pilot has evolved since its original rollout in 2017
  - Reduced the number of CPP events from 20-14
  - Reduced the CPP price from $1.00/kW to $.95/kW
  - Various marketing techniques to improve enrollment numbers
- **Full report available for download at**: https://www.energy.gov/sites/prod/files/2017/08/f35/DTE-SmartCurrents_FINAL_Report_08152014.pdf

O’Shea Battery Storage Project

New Technology: Battery Storage Integration

5/14/2020

The O'Shea storage project expands upon an existing large solar array in the City of Detroit

Operational technology

- O'Shea park is an existing 2 MW urban solar farm in the City of Detroit.
- The project is to install a 1 MW/1MWh AC connected Li-Ion battery storage system.
- Controls will be integrated with existing 2MW solar array at O'Shea park.
- Even though the storage will be inside the Solar Park it can be dispatched independently.
- The solar and storage is connected to a 4.8KV distribution circuit.

Project Status

- Storage system procured
- Detailed design underway
- Installation and integration in Q3-Q4 of 2020
- Testing through 2021

DTE

The O'Shea storage project has a number of technical and process drivers to facilitate Non-Wires Alternatives

1

Pilot needs identification

Technical drivers and objectives

- Investigate the benefits that storage can bring to high penetration solar areas and on the networked 4.8KV system.
  - Power Quality, Overvoltage and Flicker mitigation
  - Peak deferral and peak shifting
- Develop standards for storage integration to be used by all future large storage projects
  - Cybersecurity, controls and protection

2

General pilot design

Process drivers and objectives

- RFP and Procurement policies
- Safety and operating procedures
  - Fire protection NFPA855, UL9450/UL9450a
  - Commissioning and testing procedures
  - Control room operations for storage
- Proof of concept for MISO market
  - Coordination between Merchant and Control room
  - FERC 841 compliance testbed

DTE

While it is still in the design phase, the project has already provided lessons that will inform assessment and evaluation

2 **General pilot design**

3 **Implementation Plan**

- Battery system pricing projections are very optimistic compared to actual cost of procurement and installation. Pricing often quoted is typically for very large and high volume installations. The enclosure and controls are likely equal to or more expensive than the batteries inside.
- Equipment layouts and control configurations vary greatly by manufacturer and are changing rapidly as the industry evolves and consolidates.
- A lot of work remains on integration of controls to utility systems and the procedures to coordinate different use cases to enable value stacking.
- Fire Protection standards continue to evolve, NFPA855 requirements have led to new UL testing for battery cell, module and systems. These are just beginning to be incorporated by vendors and coming to market.
- Involvement with municipalities and inspection departments is a critical step, significant learning and sharing is needed by all parties for safe projects.

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I&M Pilot Case Study

Michigan Public Service Commission
MI Power Grid Energy Programs and Technology Pilots Stakeholder Meeting
May 14th, 2020

ELECTRICAL PLUG LOADS:

A Challenge and an Opportunity

BUILDING OWNERS

Plug loads comprise 40% of building loads

Suboptimal building management without visibility and control of plug loads

UTILITIES

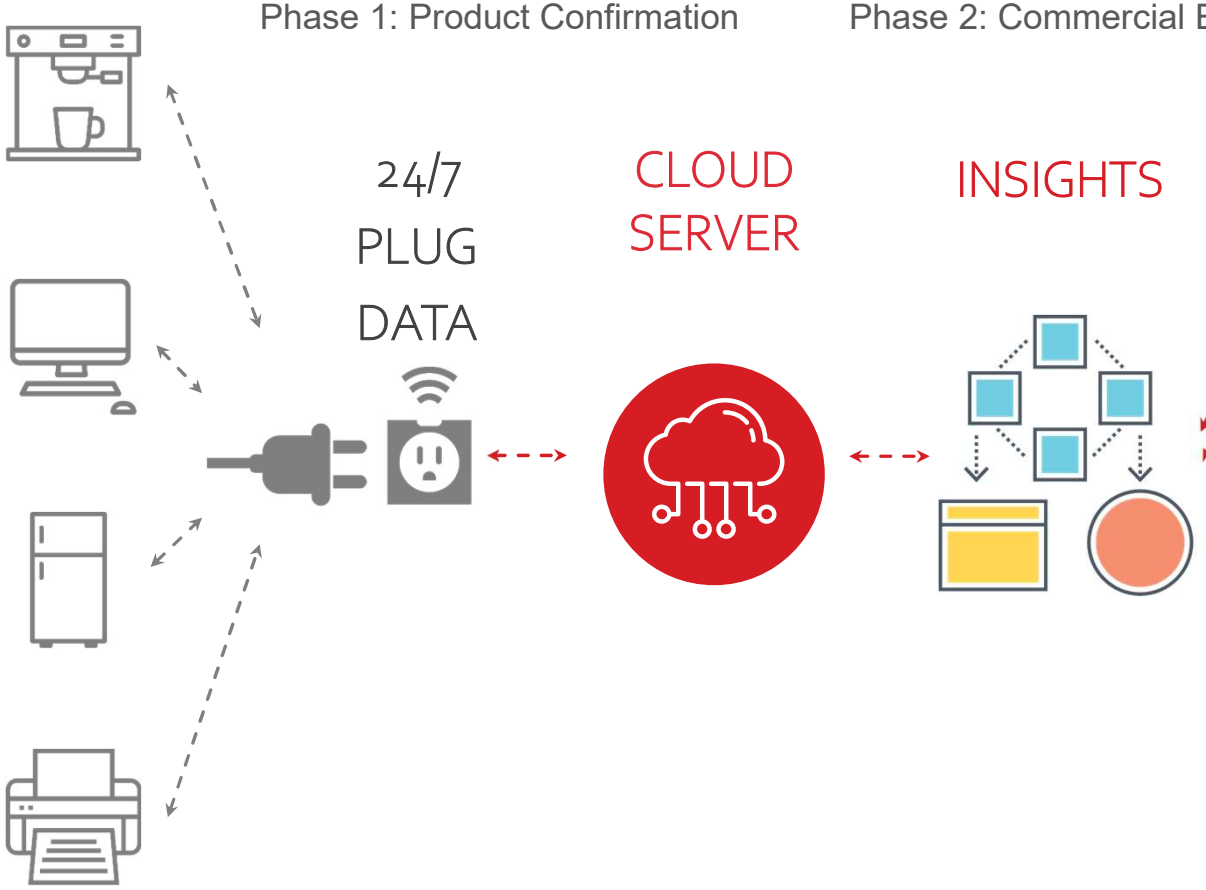
Service Offerings

Potential for Grid Optimization

THE PROSPECTIVE SOLUTION

Phase 1: Product Confirmation

Phase 2: Commercial Engagement



24/7 PLUG DATA

CLOUD SERVER

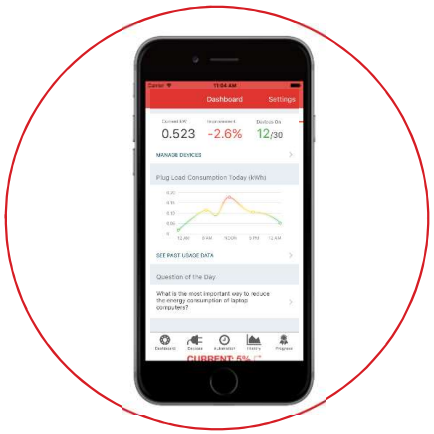
INSIGHTS

FOR OWNERS

includes institutional alerts, monitoring, scheduling

FOR TENANTS

includes individual alerts, monitoring, scheduling



Plug Load Control Pilot Phase 1 at AT I&M

I&M IN Service Centers at
1) Spy Run
2) Northeast

2 buildings

62 appliances

8 weeks

BASELINE

62 appliances
Aug 2019

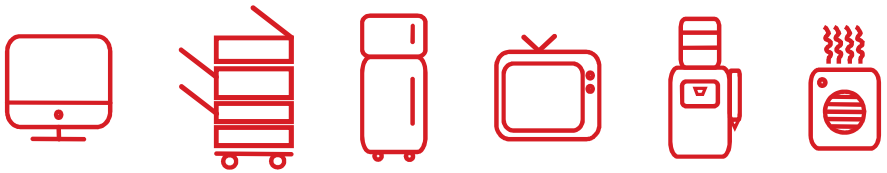
Plug Data Collection
Energy Use Insights
Space Utilization Insights

INTERVENTIONS

52 appliances
Sept 2019

Automated Plug Controls
Energy Use Reductions
Appliance-Specific Schedules

SAMPLE DEVICES MONITORED



HARDWARE CHOICE

Flexible Adaptors

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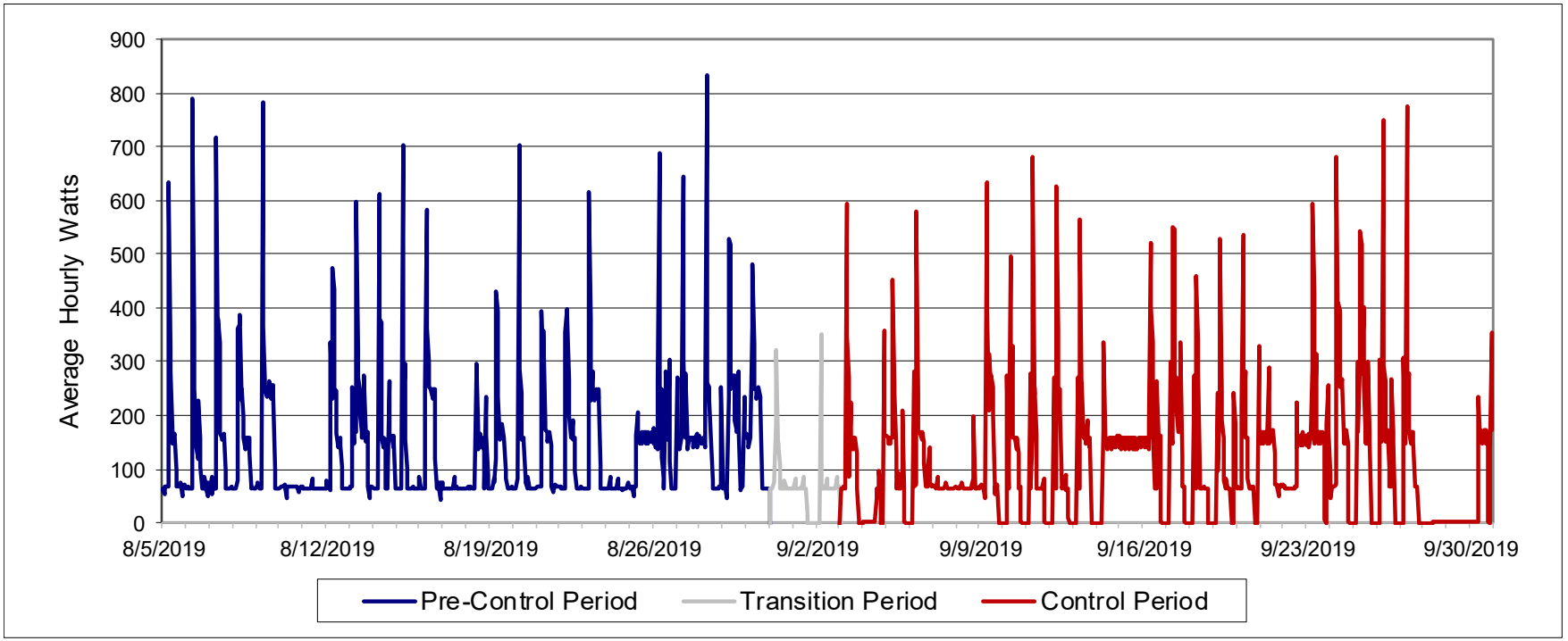
Phase 1 Success: Verified Annual Energy Savings



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Phase 1 Success: Verified Annual Energy Savings

Appliance Type	*Count of Appliances*	*Average per Appliance*		*Total*		*Percent Savings*
		Annual Baseline kWh Usage	*Annual kWh Savings*	*Annual Baseline kWh Usage*	*Annual kWh Savings*	
Computer Monitor	20	40.7	15.5	813.5	310.6	38%
Speakers, Computer	7	9.1	5.3	63.4	37.2	59%
Coffee Maker	3	963.7	186.9	2,891.1	560.7	19%
Fan, Portable	2	174.8	95.1	349.7	190.2	54%
Microwave	2	20.0	5.0	40.0	10.0	25%
Printer, Small	2	2.4	1.3	4.7	2.5	53%
TV, LCD	2	426.2	258.0	852.5	515.9	61%
Vending Machine (Non-Refrigerated)	2	230.6	111.0	461.3	222.0	48%
CFL Lamp	1	259.5	155.4	259.5	155.4	60%
Lamp, LED	1	226.4	139.2	226.4	139.2	61%
Other	1	85.8	51.1	85.8	51.1	60%
Paper Shredder	1	0.1	0.0	0.1	0.0	0%
Plotter	1	55.3	32.5	55.3	32.5	59%
Printer, Large	1	503.8	178.7	503.8	178.7	35%
Projector, Video	1	452.2	173.3	452.2	173.3	38%
Speakers, Powered	1	10.7	4.5	10.7	4.5	42%
Stapler	1	0.0	0.0	0.0	0.0	0%
Toaster	1	67.8	39.5	67.8	39.5	58%
Toaster Oven	1	2.9	0.0	2.9	0.0	0%
Total	51	3,532.1	1,452.2	7,140.7	2,623.2	37%

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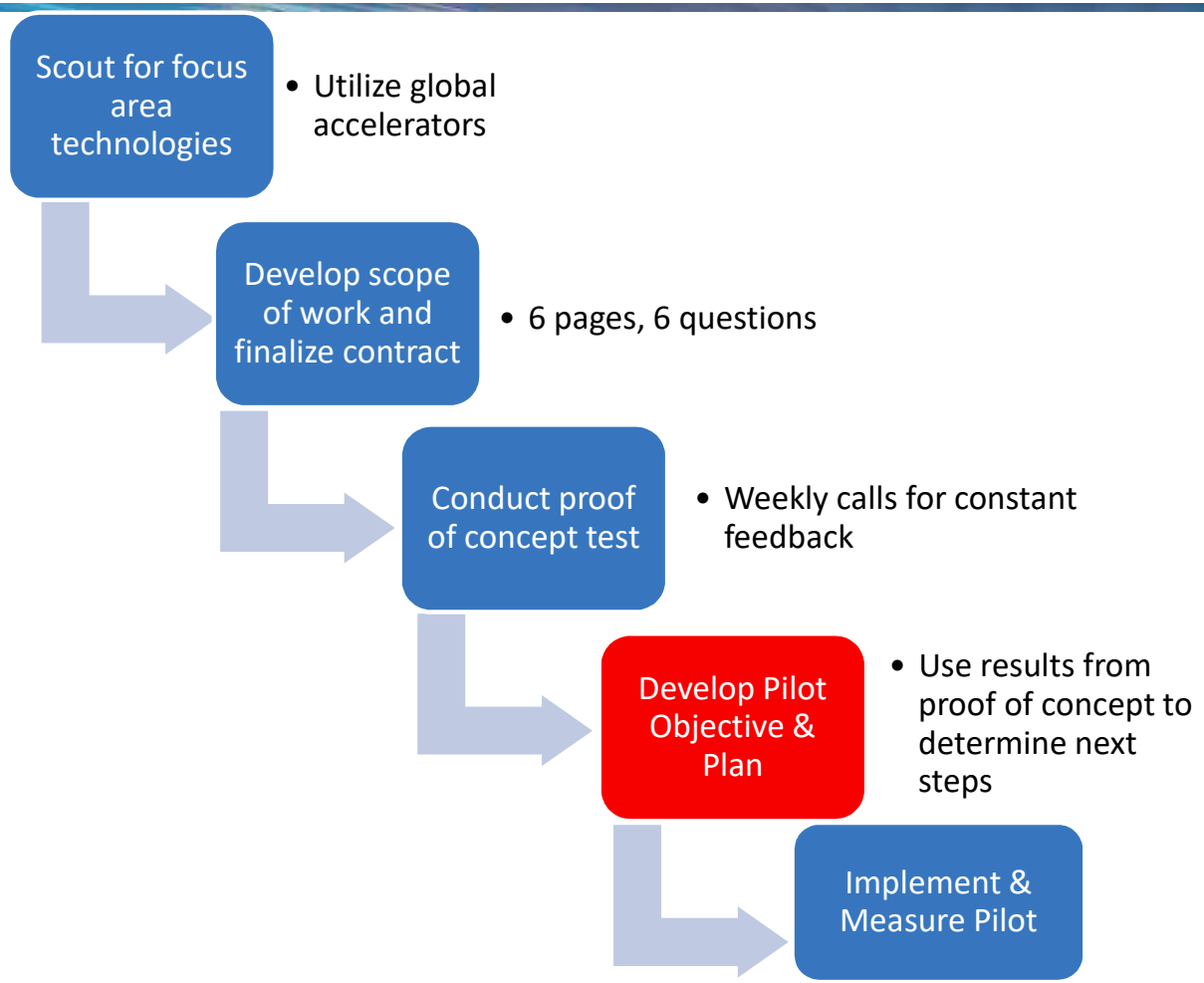
Initial Phase 2
Pilot Scoping

- How will commercial customers respond to plug load management?
- Which plug loads make the most sense to manage?
- How does it provide value to customers and I&M?
- How do customers benefit?
- What are customer pain points?
- Can this be a cost effective solution?

Pilot Phase 2: Business Plug Load Reduction Pilot (BPLRP)



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Phase 2 Pilot Proof of Concept

The BPLR Pilot will:

1. Engage I&M Michigan small and medium size commercial customers to control equipment plug loads during periods of low or no activity for the appliance being controlled;
2. Assess customer acceptance for remote management algorithm technology while optionally accessing and using the customer's office internet connection and Wi-Fi system for the control of their designated equipment;
3. Assess and confirm energy savings and customer electric bill cost reduction benefits stemming from the pilot intervention;
4. Assess the availability and appropriateness of the end-use equipment to be controlled within each pilot commercial business segment;
5. Determine the viability of a future program offering based on customer acceptance and feedback, and the cost and energy savings performance for both the vendor algorithm technology and the specific plug load controller equipment;
6. Determine a recommended commercial business model approach for the pilot technology, customer engagement methods, and utility support model.
7. Assess and validate additional customer benefit streams beyond energy efficiency and cost reduction for asset utilization, occupancy sensing, equipment health monitoring and preventative maintenance

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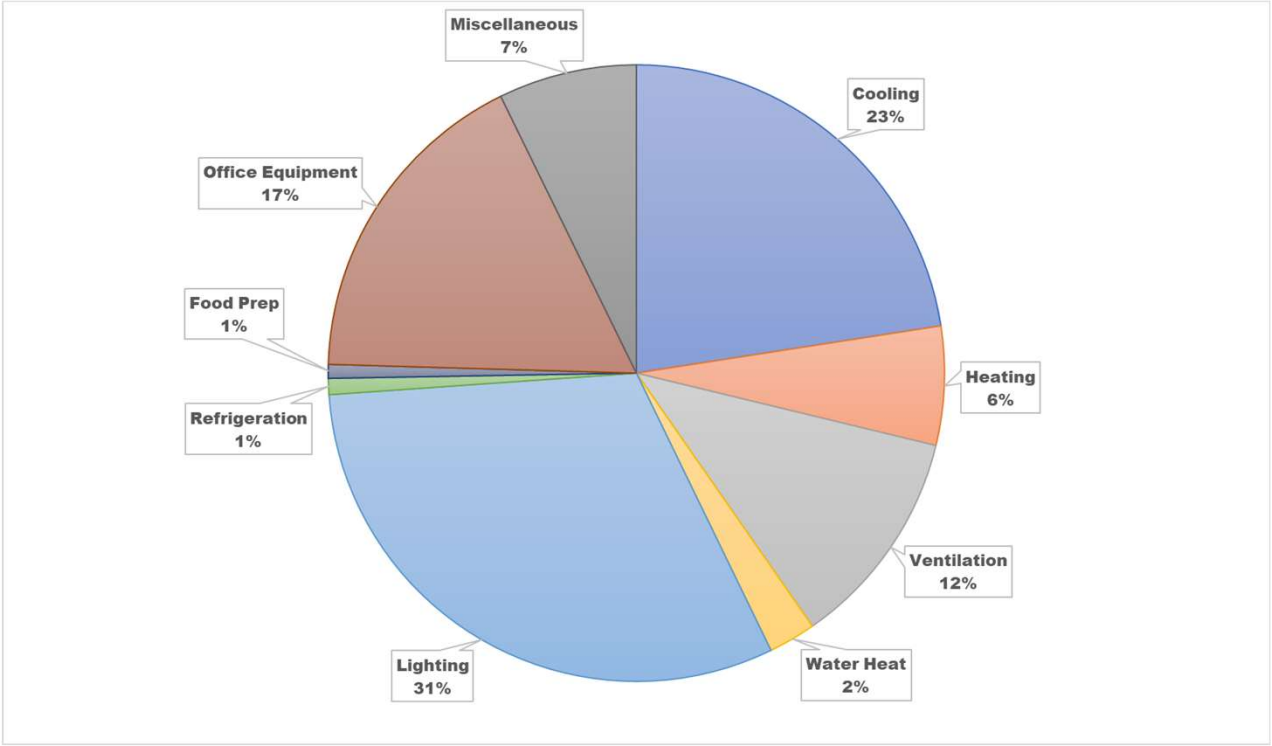
I&M Michigan Office Building
Disaggregated Electric Usage by End Use



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Energy & Customer Bill Savings Potential

			MPS End Use Commercial Segment - Office					
			MPS Ave ft^2 / Cust	4,561	Ave Annual Energy Use	74,745	Ave Bill (energy only)	$6,596
PLCA = Plug Load Controlled Appliance	Market Potential Study End-Use Category	Average Customer PLCA Measure Count	Adjusted Segment EUI (kWh / ft^2)	EUI Saved (kWh / ft^2)	Total Energy Saved	% Total Energy Saved	Customer Bill Savings ($)	% Bill Savings
Computer Monitor	Monitor	24.4	0.2808	0.1179545	537.99	0.72%	47.47	0.72%
Speakers, Computer	Other Misc.	6.99	0.0365	0.02044	93.23	0.12%	8.23	0.12%
Coffee Maker	Other Misc.	2.4	0.5071	0.0963528	439.47	0.59%	38.78	0.59%
Fan, Portable	Other Misc.	2	0.0804	0.042612	194.35	0.26%	17.15	0.26%
Microwave	Other Misc.	2	0.0151	0.00604	27.55	0.04%	2.43	0.04%
Printer, Small	Printer	5.01	0.0145	0.00841	38.36	0.05%	3.38	0.05%
TV, LCD	Other Misc.	1.6	0.1511	0.090672	413.55	0.55%	36.49	0.55%
Vending Machine (Non-Refrigerated)	Other Misc.	2	0.1011	0.047517	216.73	0.29%	19.12	0.29%
CFL Lamp	Other Misc.	1	0.0569	0.033002	150.52	0.20%	13.28	0.20%
Lamp, LED	Other Misc.	1	0.0497	0.02982	136.01	0.18%	12.00	0.18%
Other	Other Misc.	1	0.0222	0.01332	60.75	0.08%	5.36	0.08%
Paper Shredder	Other Misc.	1.02	0.0021	0.001239	5.65	0.01%	0.50	0.01%
Plotter	Printer	1.7	0.0258	0.0152456	69.54	0.09%	6.14	0.09%
Printer, Large	Printer	1.6	0.1794	0.0645696	294.50	0.39%	25.99	0.39%
Projector, Video	Other Misc.	1	0.1003	0.038114	173.84	0.23%	15.34	0.23%
Speakers, Powered	Other Misc.	1	0.0052	0.002756	12.57	0.02%	1.11	0.02%
Stapler	Other Misc.	0.98	0.0020	0.0012	5.47	0.01%	0.48	0.01%
Toaster	Other Misc.	1	0.0184	0.010672	48.67	0.07%	4.30	0.07%
Toaster Oven	Other Misc.	1.02	0.0027	0.001269	5.79	0.01%	0.51	0.01%
Total	ALL	58.7200	1.6514	0.6412	2,924.5382	3.91%	258.06	3.91%

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Phase 2 Energy Savings Verification Plan

Table 1. Estimated PLC Sample Size by Appliance Type

Appliance Type	*Potential Segment Average Customer PLCA Measure Count*					*Estimated Minimum Sample Size*	*Target Sample Size*
	Office	*School*	*Health*	*Public / Government*	*Total*		
TV, LCD	8	50	10	0	68	68	75
Coffee Maker	12	45	15	6	78	75	75
Printer, Large	8	10	3	5	26	26	75
Projector, Video	5	5	5	3	18	18	75
CFL Lamp	5	5	5	3	18	36[2]	75
Lamp, LED	5	5	5	3	18		
Vending Machine (Non-Refrigerated)	10	50	10	3	73	73	75
Fan, Portable	10	20	10	5	45	45	75
Desktop	69	104	32	36	240	75	75
Total	132	294	95	62	584	416	561

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Pilot Status

The Business Plug Load Reduction Pilot is currently on hold:

- Technology costs alone exceed I&M's pilot budget
- Technology business model open questions
  - In-premise program equipment ownership and ongoing maintenance
  - Plug load controller requirements for communication and data interface
  - Cost for ongoing service and support
- Can the technology become cost effective enough for future program viability?
  - ✓ Potential for 3% bill savings for customers with ongoing PLC management
  - ✓ From the utility perspective – High uncertainty
    - ❖ Future viability is suspect with high technology costs with forecasted at over $2 per kWh saved.

Agility, Prudence, and the Commission's Approach to Pilot Projects

5lakes energy

www.5lakesenergy.com

Perspective

- Pilot projects have costs, so cost recovery should be based on prudence
- Pilot projects sometimes involve rates, so must be reasonable
- Pilot projects are about learning
  - Exploring ideas or technologies
  - Evaluating options or proposals
  - Preparing to implement
  - Preparing to scale
- Learning is an iterative process, so requires some agility
- Prudence and agility can be in tension

Pilot Prudence

- Prudence should be decided before a pilot is undertaken
  - Is the learning something that can reasonably be expected to benefit customers or society?
  - Is the proposed pilot non-redundant with other learning methods?
  - Is the pilot well-planned?

Agility

- If costs are uncertain, deferred accounting for those costs should be used
- Review of deferred costs for recovery should be based on whether adjustments in the pilot or its costs were reasonable in light of events within the pilot and the pilot objectives
- Frequent stakeholder engagement and explicit adjustments in pilot plans enable assurance that adjustments were reasonable

Agility

- A high priority for future pilots must be responsive load
  - Load balancing with large renewables share of generation
  - Storage as a resource
  - Increasing load flexibility through technology
- Agility also comes from markets in which new ideas have freer entry (and exit)
- Rather than tariffs tailored to each pilot, consider a standing tariff for “advanced energy”

Advanced Energy Tariffs

- Every major customer class should have access to an Advanced Energy Tariff
- Advanced Energy Tariff can be used by the utility but also by 3rd party service providers on the basis of customer opt-in
- Advanced Energy Tariffs should be time-varying to fully reflect cost of service allocation by time, preferably dynamically

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MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Panel: Agility and Accountability

Stakeholder Meeting 4

May 14, 2020

MPSC

Michigan Public Service Commission

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots
Closing Comments

Stakeholder Meeting 4

May 14, 2020

MPSC

Michigan Public Service Commission

Thank You and Please Stay Engaged

- Thank you for your participation.
- Please stay engaged:
  - Sign up for the listserv if you have not already
    - Go to www.michigan.gov/MIPowerGrid → Customer Engagement → Energy Programs and Technology Pilots → Scroll to bottom to add email
  - Attend future meetings
    - Every other Thursday.
      - May 28: Time TBD; in the afternoon
      - June 11: Time TBD

Thank You and Please Stay Engaged

- Please stay engaged:
  - Speak at a future meeting
    - Limited slots available for stakeholder input/experiences on important pilot topics and best practices.
    - If interested or have suggested speakers, email: Joy Wang at WangJ3@Michigan.gov

Thank you!