MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Stakeholder Meeting 1

February 27, 2020

9 AM – 4 PM

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

AGENDA

9:00 am	Welcome & Introduction	Anne Armstrong-Cusack, Director, Customer Service Tremaine Phillips, Commissioner, MPSC
9:20 am	Summary of Grid Mod Programs Nationally	Tom Stanton, NRRI
9:40 am	MI Power Grid Summary, Tasks, & Timeline	Kayla Fox, MPSC Staff
9:50 am	MPSC Case Review & Utility Survey Results	Joy Wang, MPSC Staff
10:05 am	Break	
10:15 am	Current Pilot Processes	Consumers, DTE, & I&M (25 min each)
11:30 am	Utility Pilots: Issues and Best Practices Part 1	Annika Todd-Blick, LBNL
12:00 pm	Lunch on Your Own (Shove It Pizza Truck onsite)	
1:00 pm	Utility Pilots: Issues and Best Practices Part 2	Annika Todd-Blick, LBNL
1:30 pm	From Pilot to Product: Viewpoints on Utility Pilot Design	Nekabari Goka, Oracle
2:00 pm	Utility/Stakeholder Input on Process and Content	Utility/Stakeholder Presentations (10 min each)
2:30 pm	Break	
2:45 pm	Utility/Stakeholder Input on Process and Content	Tamara Dzubay, Ecobee Jeremy Kraft, EMI Consulting Amy Ellsworth, Cadmus
3:25 pm	Discussion: Workgroup Process and Content	Moderated by MPSC Staff
3:55 p.m.	Closing Comments	Joy Wang, MPSC Staff
4:00 p.m.	Adjourn	

National Regulatory Research Institute

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

Summary of state grid modernization programs and actions, including pilot projects

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

February 27, 2020

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

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- 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,
  - New *PURPA Tracker* summary of state PURPA rules and regulations, on the NRRI Website.

Today's topics

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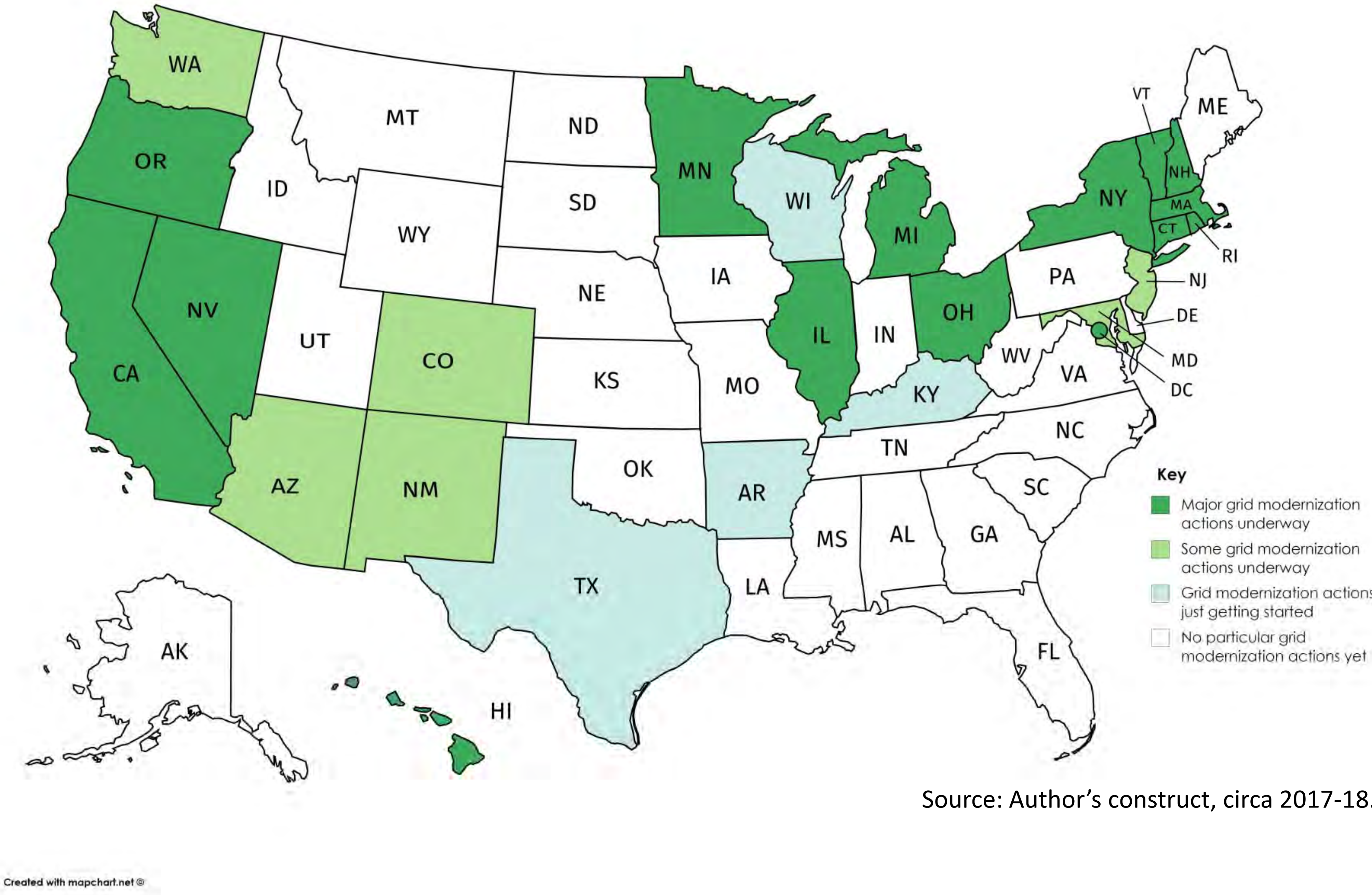
❶ Summary of major grid modernization actions in >20 states, in seven major categories

❷ Summary of Grid Mod pilot projects and programs in >20 states

❸ *Summary of NWA and DR pilot projects and programs in ten states – not counting Michigan*

❹ *Introduction to the "regulatory sandbox"* concept

Preliminary map: Where the action is on Grid-Modernizing



Source: Author's construct, circa 2017-18.

What is driving these changes now?

Utilities are facing six major challenges of our times:

❶ Aging infrastructure needing replacement;

❷ New expenditures on grid-modernization and to meet tightening environmental requirements are putting upward pressure on revenue requirements and rates;

❸ Slow-growing, flat or even declining needs for serving traditional loads;

❹ 21st century requirements for power quality, reliability, resilience;

❺ Imagined, potential, and real erosions of the natural monopoly, triggered in part by economies of scale and scope in manufacturing and implementing distributed energy resources; and,

❻ Global climate emergency, with palpable customer and community interest in more clean and distributed power.

Grid Modernization Actions Proliferating (2019)

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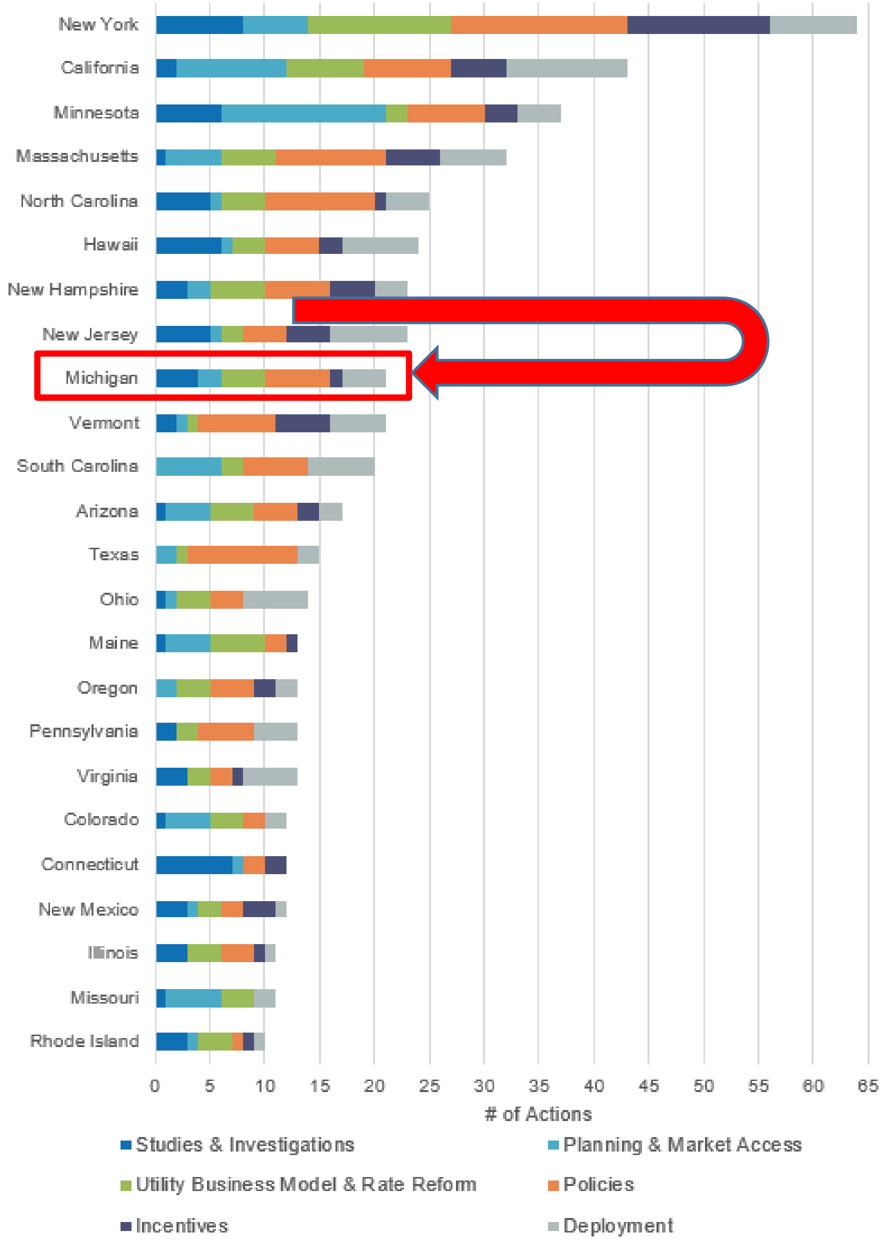

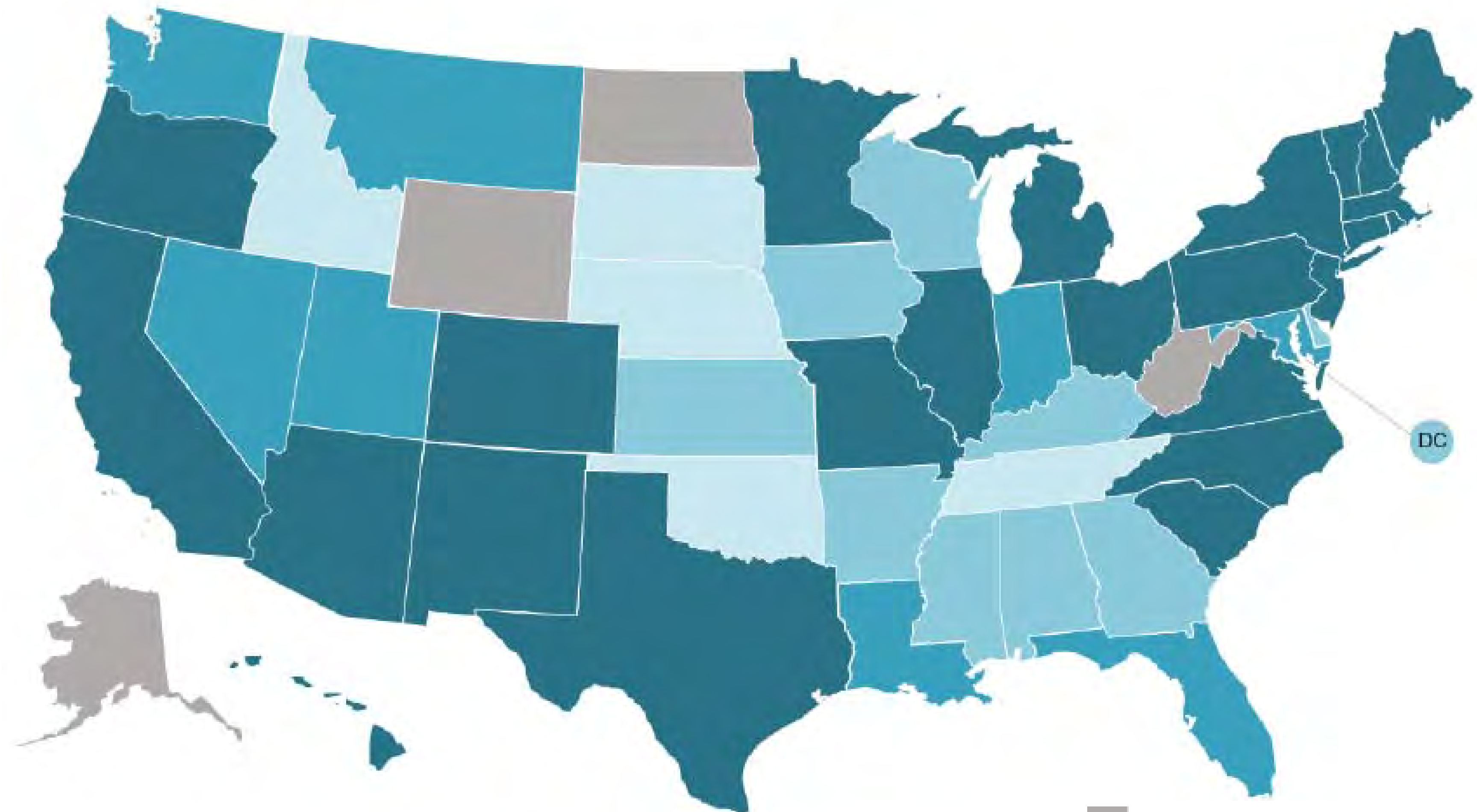

Source: North Carolina Clean Energy Technology Center, *The 50 States of Grid Modernization: 2019 Review and Q4 2019 Quarterly Report*, February 2020.

Note: NC-CETC counts at least some proposed legislation that has not yet been enacted.

Major Grid-Mod Actions Underway in ~20 states & DC

- Broad grid-modernization dockets (22 states)
- Utility business model reviews (15 states)
- Incorporating DER into IRP (8 states)
- Updating distribution system planning methods (12 states)
- Geo-targeting, microgrids, and NWAs (9 states)
- Energy storage studies, procurement (14 states)
- Others: broad rate reforms (4 states); BTM storage and solar+storage rates (4 states); storage financial incentives (4 states); data access dockets (3 states); and more… beneficial electrification, EVs, …

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Grid-Modernization Pilots

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- Tentative count includes ~20+ states that are engaged in about ~60+ grid-mod pilots.
- Major topics for state & utility pilot projects:

TOU & other time-varying rates	Non-wires alternatives, geo-targeting, and microgrids	New technologies & customer-facing services	Energy storage, including procurements	Other (e.g., REC accounting, broad Grid-Mod topics)
~ one dozen	~11 states	~8 states	~8 states	~ two dozen

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Summary of NWA Pilots

- Major activities currently in Colorado, Connecticut, DC, Illinois, Maine, Maryland, Massachusetts, New Jersey, New York, Rhode Island, Washington/Oregon.
- Other notable NWA actions not necessarily called pilots: California, Hawaii, Michigan, Puerto Rico, Vermont
- Major factors needed for NWA success:
    - Ample lead time for NWA acquisition (e.g. 2-5 years) and basic knowledge of the otherwise-needed, more traditional, T&D investments
    - A robust benefit-cost analysis (BCA) framework and modeling capability
    - Pathways to cost-recovery and monetizing benefits for NWA technologies
    - Regulatory incentives and utility business models that are not major barriers to NWA implementation

Notable advantages of NWA projects include…

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- … ability to target high value areas,
- … ability to avoid infrastructure siting concerns,
- … flexibility to be built incrementally and rapidly deployed using existing infrastructure, and
- … opportunity to provide enhanced reliability in diverse geographic locations.
- NWAs also provide a test bed for innovation; technologies and approaches piloted in NWA projects are later often adopted within statewide programs.

(Northeast Energy Efficiency Partnership, 2017, EM&V Forum and Policy Brief: State Leadership Driving Non-Wires Alternative Projects and Policies. https://neep.org/sites/default/files/resources/NWA%20brief%20final%20draft%20-%20CT%20FORMAT.pdf.)

U.S. NWA spending is doubling every 2 to 3 years

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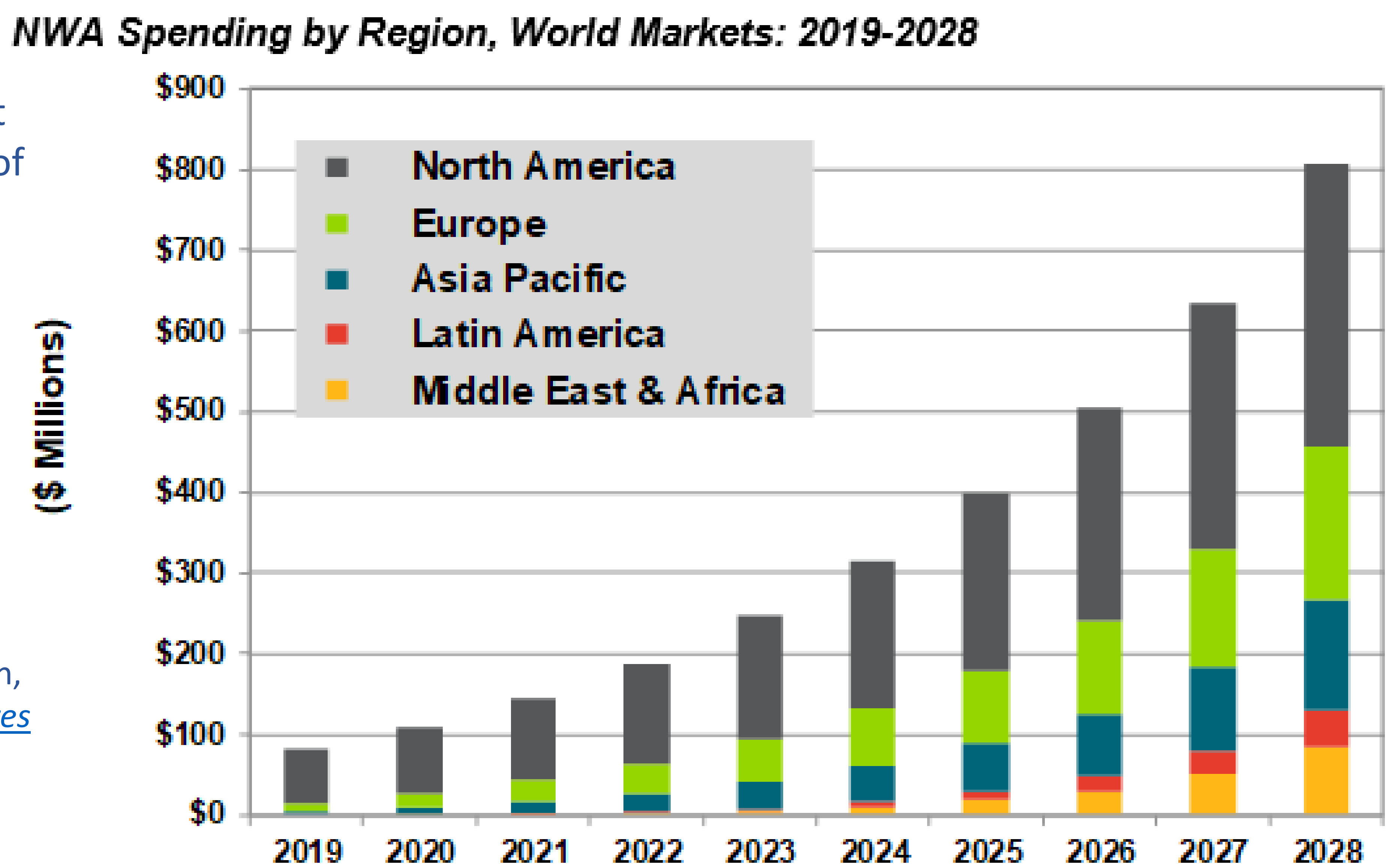
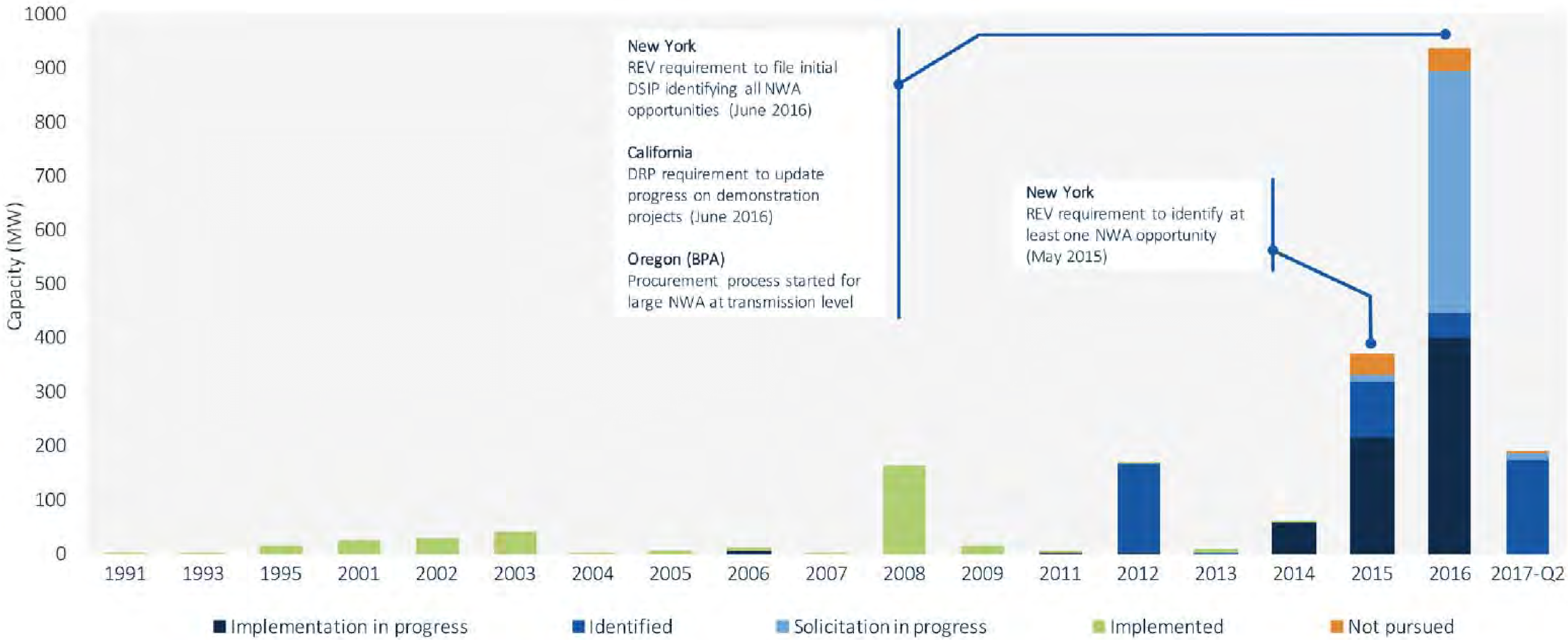
- IEA sustainable development scenario estimates ~$1.2 trillion power sector investment per year needed to 2040, ~2/3 of all energy supply investment.
- World Bank estimates 200 million remote microgrids will be needed to achieve UN SD goal #7, Sustainable Energy for All, by 2030.

Sources: https://www.iea.org/reports/world-energy-outlook-2019/electricity#abstract; World Bank ESMAP Report No. 014/19; graph used with permission, ©Navigant Research, 3Q2019, *Non-Wires Alternatives Tracker*.



NWAs are not new, but the prospecting and hits are proliferating



Source: Muñoz-Álvarez, Daniel, 2017, *Non-Wires Alternatives Projects: Emerging Utility Revenue Sources for the Distributed Energy Market* [brochure], GTMResearch.

Highlights from State & Utility NWA Pilot Programs (1)

- State laws (year enacted) explicitly require NWA analysis, and adopting non-wire solutions when cost-effective, in Colorado (2019), Connecticut (2017), Maine (2010, 2019), Maryland (2019), Rhode Island (2006), and Vermont (2005).
- Projects can be at essentially any voltage levels, T or D, wherever there are growing constraints on the electric grid, and ranging in avoidable costs in several orders of magnitude from roughly <$100,000 to >$1 billion.
- Resources can be owned and operated by various combinations of utilities, third-parties, and customers.
- Resources can be leveraged by various combinations of bilateral contracts, rate or other financial incentives to customers, and rate-basing utility investments.

Highlights from State & Utility NWA Pilot Programs (2)

- "Campus" and "community" approaches are prominent in Colorado, Illinois, Maine, Massachusetts, New York, and Rhode Island.
- Project prospecting requires some changes in planning techniques for both T and D systems, including greater transparency: Utility modelers and planners are likely to be the first to know – but might not be required to publicize – where and when investigating NWA opportunities makes the most sense.
- As experience grows and DER options proliferate, cost-effective NWA options are growing apace: Typical results show successful NWAs are averaging as much as 5 to 10 times less expensive, compared to the otherwise-planned, traditional wire-based solutions.
- See supplemental slides 37–65, for program and pilot project details from 11 states plus DC, with links to source material.

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❹ ***Introduction to the "regulatory sandbox"*** **concept**

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.” https://www.oeb.ca/_html/sandbox/index.php
- 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

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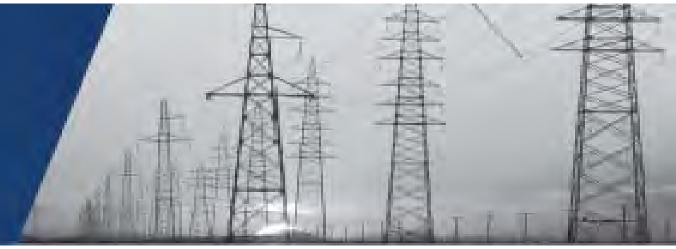

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Supplemental Slides: Where to learn more

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

February 27, 2020

Selected readings (1)

- Argonne National Lab, 2017, *Energy Zones Mapping Tool. https://ezmt.anl.gov/*
- Clean Coalition, 2016, *Community Microgrids*, http://www.clean-coalition.org/
- Celtic Energy, 2017, *Resilient Microgrids for Rhode Island Critical Services*, Report for Rhode Island Office of Energy Resources, http://www.energy.ri.gov/documents/SRP/RI-microgrid-exec-summary-170331.pdf
- Enernex, 2019, *Non-Wires Alternatives,* Presentation to Ohio PowerForward Distribution System Planning Workgroup, https://www.puco.ohio.gov/industry-information/industry-topics/powerforward/powerforward-collaborative-and-workgroups/distribution-system-planning-workgroup/may-7-2019/enernex-presentation/
- Lovins and Rocky Mountain Institute, 2002, *Small is Profitable*. https://rmi.org/insight/small-is-profitable-the-hidden-economic-benefits-of-distributed-generation-and-other-distributed-resources/

Selected readings (2)

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- MIT Energy Institute, 2016, *Utility of the Future*. http://energy.mit.edu/research/utility-future-study/
- *Non-Wires Alternatives: Case Studies from Leading U.S. Projects*, 2018, report by Smart Electric Power Alliance, Peak Load Management Alliance, and E4TheFuture, https://e4thefuture.org/wp-content/uploads/2018/11/2018-Non-Wires-Alternatives-Report_FINAL.pdf
- Northeast Energy Efficiency Partnership, 2017, *EM&V Forum and Policy Brief: State Leadership Driving Non-Wires Alternative Projects and Policies*. https://neep.org/sites/default/files/resources/NWA%20brief%20final%20draft%20-%20CT%20FORMAT.pdf
- Patterson, 1999, *Transforming Electricity: The Coming Generation of Change*. ISBN: 1 85393 346 0.
- Pacific Northwest National Laboratory *Modern Distribution Grid Project* [Webpage], https://gridarchitecture.pnnl.gov/modern-grid-distribution-project.aspx.
- Rocky Mountain Institute, 2015, *The Economics of Load Defection*. http://www.rmi.org/electricity_load_defection
- Sandia National Labs, 2017, *Microgrid Design Tool Kit. goo.gl/m7ccZw*
- Smart Electric Power Alliance (SEPA), 2016, *Beyond the Meter* reports and *Planning the Distributed Energy Future*, https://www.solarelectricpower.org/
- SEPA, 2017, *51st State Ideas: 'Role of the Utility' Summary of Submissions. Smart Electric Power Alliance, August 2017. https://sepapower.org/our-focus/51-state-initiative/phase-3/*

Selected NRRI Reports (available for download from www.nrri.org)

- Stanton and Sklar, 2020, NRRI Insights: *Utility Tariff On-Bill Financing: Provisions and Precautions for Equitable Programs*, https://www.naruc.org/nrri/nrri-library/nrri-insights/
- Stanton, *Weaving the DER Pieces Together in the 'Land of Steady Habits'*, Presentation to National Council on Electricity Policy Annual Meeting & Workshop, May 2018, http://electricitypolicy.org/2018/05/18/annualmeetingrecap/
- Stanton and Nordman, "Regulating 'Energy Ladder' Products and Services: Delivering Vital Energy Services Using Off-Grid, Mini-Grid, and Micro-Grid Power Systems," *ICER Chronicle* ***7*** (August 2017), 37-45. http://icer-regulators.net/download/icer-chronicle-edition-7/
- Stanton and Kline, 2016, *The Ecology of Community Solar Gardening: A 'Companion Planting' Guide*, NRRI 16-07.
- Barua, Costello, Kline, Phelan, Stanton, 2016, *Future Drivers and Trends Affecting Energy Development in Ontario: Lessons Learned from the U.S.* (Mowat Energy Research Report #137). https://munkschool.utoronto.ca/mowatcentre/emerging-energy-trends/
- Stanton, 2012, *Are Smart Microgrids in Your Future? Exploring Challenges and Opportunities for State Public Utility Regulators*, NRRI 12-15.
- Stanton, 2012, *Consultant Report for Maine PUC Docket 2010-267: Smart Grid Coordinator*, NRRI 12-02.
- Stanton, 2015, *Distributed Energy Resources: Status Report on Evaluating Proposals and Practices for Electric Utility Rate Design*, NRRI 15-08.
- Stanton, 2015, *Getting the Signals Straight: Modeling, Planning, and Implementing Non-Transmission Alternatives*, NRRI 15-02.

Selected NARUC Resources

- April 2019. *The Value of Resilience for Distributed Energy Resources: An Overview of Current Analytical Practices*, report prepared by Converge Strategies for NARUC and Solar Energy Innovation Network (SEIN). https://pubs.naruc.org/pub/531AD059-9CC0-BAF6-127B-99BCB5F02198
- Meister Consultants Group, Inc. (2017). Practical Guide to the Regulatory Treatment of Mini-Grids. Report for National Association of Regulatory Utility Commissioners. https://pubs.naruc.org/pub/E1A6363A-A51D-0046-C341-DADE9EBAA6E3
- NARUC/NASEO Task Force on Comprehensive Planning. https://www.naruc.org/taskforce/ [includes Michigan, Indiana, and Ohio, among 14 states plus Puerto Rico].

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Supplemental Slides: State Actions on Grid Modernization

Tom Stanton, Principal Researcher, Energy and Environment
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States with broad grid-modernization activities

- California
- District of Columbia ***Power Path DC*** (née ***MEDSIS***)
- Connecticut
- Hawaii
- Illinois ***NextGrid***
- Maryland
- Massachusetts
- Michigan **MI Power Grid**
- Minnesota **e21**
- Nevada
- New Hampshire
- New York ***REV***
- Ohio ***PowerForward***
- Oregon
- Rhode Island ***Power Sector Transformation***
- Vermont

Major state actions (1)

- **Addressing how to evaluate DER in IRP:** California, Connecticut, Hawaii, Michigan, Nevada, New Mexico, New York, Washington
- **Modernizing distribution system planning (DSP)**: California, Connecticut, Hawaii, Maryland, Massachusetts, Michigan, Minnesota, Nevada, New Hampshire, New York, Rhode Island, Washington
- **Addressing non-wire alternatives (NWAs):** California, Connecticut, Hawaii, Illinois, Massachusetts, Michigan, New Hampshire, New York, Rhode Island, Vermont, plus Bonneville Power Administration

Major state actions (2)

- **Utility business-model reviews:** Arkansas, District of Columbia, Connecticut, Hawaii, Massachusetts, Michigan, Minnesota, Nevada, New Hampshire, New York, Oregon, Rhode Island, Vermont
- **Geo-targeting and microgrids:** Arizona, California, Connecticut, Hawaii, Illinois, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Rhode Island
- **Energy storage studies & procurement targets:** Arizona, California, Connecticut, Hawaii, Maryland, Massachusetts, Michigan, Nevada, New Mexico, New York, Ohio, Oregon, Rhode Island, Vermont, Washington

New utility business ventures?

- Specific new utility infrastructure, e.g.:
  - AMI and all grid-modernization investments;
  - Utility-scale and community-shared solar, customer-sited renewables, and storage with any and all of those;
  - Utilities owning and operating advanced inverters;
  - Utilities offering BTM electric and thermal storage
- Other expansions, e.g.:
  - in-home & cloud-based equipment;
  - indoor and outdoor lighting;
  - bundled telecomm, internet, home-security;
  - appliance warranty and repair services;
  - financing for any and all utility products and services; and,
  - landscaping and irrigation services

Utility-driven developments

- Forays into microgrids:
  - ComEd Bronzeville + Illinois Institute of Technology Project
  - ConEd Brooklyn-Queens Demand Management Project
  - Duke’s McAlpine (North Carolina) “utility-controlled, single-customer microgrid”
  - Ameren’s Champaign, Illinois, microgrid
  - Arizona Public Service / Sonnen *Mandalay Homes* solar+ storage+ aggregated-controls in a 2,900-home “clean energy hive” virtual power plant
- Dozens of community-solar projects, notably many in states with no statewide legislation or program
- Virtual power plants (VPPs)
  - California – SCE, Nest, and SoCal Gas collaborate on the *rush hour rewards* program – 50MW virtual power plant
  - Massachusetts – Unitil, in North Andover, residential solar-plus-storage
  - New Hampshire – Liberty Utilities residential battery storage, including bring your own battery (BYOB)

Customer driven developments

- Not explicitly geo-targeted
  - User-selected market-based solutions
  - Example: corporate clean energy commitments
- Location-specific and geo-targeted
  - Non-wires alternatives to T &/or D investments
  - Department of Defense microgrids; “public purpose microgrids;” university campuses
  - Voluntary climate actions & Net-zero developments
  - Market-based enticing, even contagious solutions, with neighbors emulating neighbors
  - Off-grid, cordless, and village-scale systems

Customer-favorite DER choices

- Renewable Energy Buyers for clean power <www.rebuyers.org> – "more than 60 iconic, multinational companies" with the goal of adding 60GW new renewable energy in U.S. by 2025
- Community solar, community storage
- "6 to 9 nines" reliability – at Defense Department bases and in public purpose microgrids
- PACE and tariff on-bill (TOB) financing – comprehensive energy makeovers, using other people's money
- Other: LED lighting; Rooftop solar; BTM batteries, EVs and V2G; BIPV; IOT; precision agriculture; and more…

Developments driven by third-parties

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- Examples where cost-effective DER are already proving capable of generating major changes:
  - Booth Bay Harbor, Maine
  - BTM storage for demand-charge savings
  - Aggregated solar+storage
  - Peer-to-peer renewable energy, in Brooklyn
  - California “Rule 24” demand-response aggregators, offering small customers opt-in savings, using comprehensive DER to shape supply and demand to better match wholesale market price variations http://www.cpuc.ca.gov/General.aspx?id=6306

Blended developments – multiple stakeholders

- Projects led by multiple stakeholders, including utilities, customers, and third-parties, with regulatory encouragement, support, and oversight
  - Brooklyn-Queens Demand Management Project, followed by multiple NWAs for LIPA, NYSEG, and RGE
  - Clean-coalition community microgrid projects
  - New York Prize “opportunity zones” open to microgrid developments by all comers*, including utilities*
  - Xcel/Panasonic Peña Station Microgrid, Denver
  - Community shared-solar and -storage projects

Major ‘voluntary’ climate actions

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- Non-federal mandates on climate change, driving major changes in energy and water use:
  - Architecture 2030 and 2030 Districts – http://www.2030districts.org/
  - Climate Action in Financial Institutions – https://www.mainstreamingclimate.org/
  - Climate Mayors – http://climatemayors.org/
  - Global Covenant of Mayors – http://www.globalcovenantofmayors.org/region/north-america/ (see also Chicago Climate Charter)
  - [Investment] Portfolio Decarbonization Coalition – http://unepfi.org/pdc/
  - [University] Presidents’ Climate Leadership Commitments – http://secondnature.org/who-we-are/network/
  - “We are still in” – https://www.wearestillin.com/about

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Supplemental Slides: State Actions on NWA Programs and Pilots

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Colorado – 2019 Law for DSP & NWA Planning

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- New Colorado law SB 19-236, effective May 30, 2019, directs the Commission to promulgate rules establishing the filing of Distribution System Plans and the evaluation of Non-Wires Alternatives (NWA).
- Excerpt: Section 40-2-132, C.R.S., specifies that the Commission shall promulgate rules establishing: (1) a methodology for evaluating the costs and net benefits of using DER as NWA; (2) the size of new distribution projects requiring NWA analysis; (3) what should be included in a DSP filing including, the consideration of NWA and a process to evaluate DSP feasibility and economic impacts of NWA, and an estimate of peak demand growth or DER growth that merits analysis of new NWA projects; (4) a determination of the public interest in approval of NWA; and, (5) a determination of ratepayer benefits from NWA and benchmarks or accountability mechanisms.
- Distribution System Planning Docket No. 19M-0670E is "a precursor to the rulemaking." (12/3/2019 Decision No. C19-0957, p. 60) https://www.dora.state.co.us/pls/efi/EFI_Search_UI.Show_Decision?p_session_id=&p_dec=26969

Colorado – Peña Station "Next" Project

- Goal for Net-Zero-Energy, Carbon-Neutral, Transit Oriented Campus
- Xcel battery pilot project.
- Major 'smart cities' integration with multiple partners, including fifteen different contracts
- Sources:
  https://penastationnext.com/vision/;
  https://www.greenbiz.com/article/denver-it-took-village-build-microgrid;
  https://www.colorado.edu/faculty/hodge/research/pena-station-project;
  https://www.nrel.gov/docs/fy17osti/68998.pdf

The Peña Station vision of a connected community linked by a renewable-energy-powered microgrid has many potential applications, and almost as many stakeholders.

Connecticut Example: Grid-modernization Efforts

Jurisdiction	Broad Grid-Modernization Proceeding(s)	Business Model Review/ Revisions	DER in IRP	DSP	Geo-targeting, Microgrids, Non-wire alternatives	Energy Storage Studies, Procurement	Other
Connecticut	Yes	Yes	Yes	Yes	G, M, NWAs	Yes	Broad rate reform docket; Green Bank, RGGI, EERS, C-PACE, EV & BRT programs
Hawaii	Yes	Yes	Yes	Yes	G, M, NWAs	Yes	BTM energy storage rates
New York	REV	Yes	Yes	Yes	G, M, NWAs	Storage demonstration projects	Rate reform docket; DER value and compensation docket

- Connecticut is one of only three states working on all six of these grid-modernization actions, plus *Other* related efforts

Connecticut

- NWA pilot for Unitil. PURA 24 January 2018 Order in Docket No. 17-06-03. Docket No. 17-12-03 – PURA Investigation into Distribution System Planning of the Electric Distribution Companies. http://www.dpuc.state.ct.us/dockcurr.nsf/(Web%20Main%20View%5CAll%20Dockets)?OpenView&Start=3830

Connecticut Non-Wire Alternatives

- Connecticut is committed to filing NWA projects as part of the large facility Demand Response Pilots in the 2017 update of its [2016-18 C&LM Plan]. Utilities will consider for pilots [geo-targeting] areas that have been identified by ISO New England and other stakeholders as critical peak demand reduction areas.
- Outside of the energy efficiency program planning process, Connecticut utilities are also considering NWA projects as part of their Grid Side Enhancement Demonstrations.
- Source: Northeast Energy Efficiency Partnerships, *A Look Inside the Region's Latest Non-wires Alternative Projects and Policies* [Web page]. http://www.neep.org/blog/look-inside-region%E2%80%99s-latest-non-wires-alternative-projects-and-policies

Connecticut – legislation supports geo-targeting DER

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- “Localized targeting” means implementing DER where it will provide the greatest value to the utility system as a whole
- Conn. Gen. Stat.§16-244w. “demonstrating and investigating how [DER] …can be reliably and efficiently integrated into the operation of the electric distribution system in a manner that maximizes the value provided to the electric grid, electric ratepayers and the public… .”
- Proposals “shall be approved by [PURA] if the authority concludes that investment in such grid-side system enhancement is reasonable, prudent and provides value to ratepayers.”
- “The costs of the proposals [shall] be recovered from all customers through… electric rates for all customers of the electric distribution company pursuant to Conn. Gen. Stat. §16-244w(c).

Source: PURA 24 January 2018 Order in Docket No. 17-06-03

United Illuminating Company's geo-targeting program (1)

- Program includes: (1) targeted marketing of existing conservation & load management programs; (2) modified interconnection conditions; and, (3) "incentivizing DER rate rider."
  - Incentive will require "battery-ready advanced inverters" configured for "riding through certain electric system disturbances and allow the utility to specify various control settings [e.g. voltage control and reactive power] to provide system benefits"
- Goals: increase customer or third-party owned, behind the meter, residential solar PV installations from <1% to 10% of customers on two selected substation circuits, and to achieve peak demand reductions of over 1MW per circuit.
- Two specific distribution circuits are targeted because they are at risk of exceeding their rating, over a five-year planning horizon

Source: PURA 24 January 2018 Order in Docket No. 17-06-03

United Illuminating Company’s geo-targeting program (2)

- If successful, residential and commercial DER adoption from solar PV, energy storage, and other base load DG will increase DER nameplate capacity from 2% to at least 15% of combined circuit ratings, which would be higher than any other United Illuminating Company circuit.
- Advanced inverter settings to include voltage regulation, real and reactive power output
- DG participants will be compensated for their lost production opportunity, if they deliver ancillary services when needed, instead of energy.

Source: PURA 24 January 2018 Order in Docket No. 17-06-03

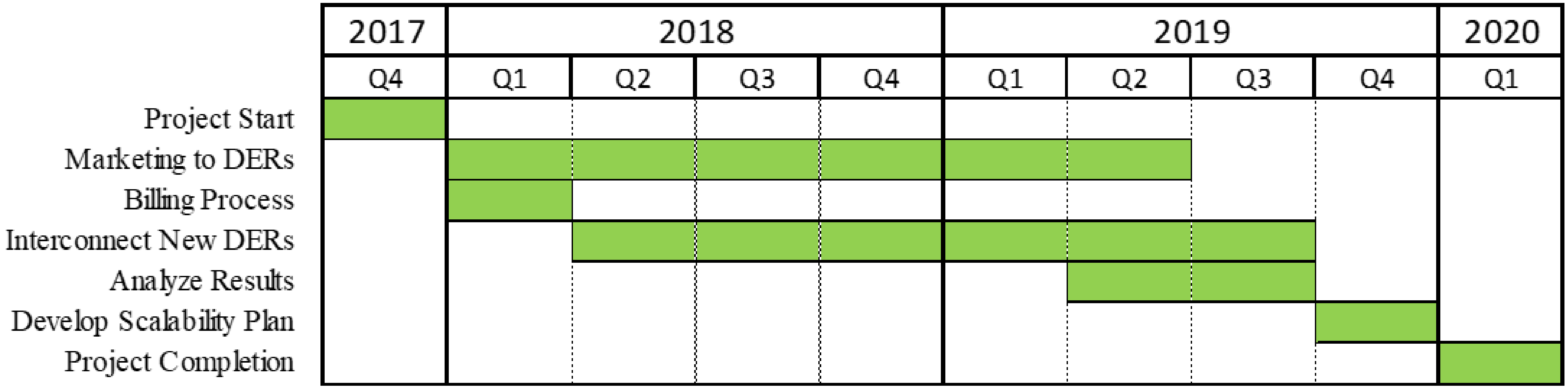
United Illuminating Company’s geo-targeting program (3)

- “This level may be sufficient to defer a distribution capacity investment for the two Ash Creek substation circuits: If so, the experience gained this program may be applied to future planning efforts.”
- “Absent implementation and success of the Localized Targeting project, the Company would apply a traditional utility approach to relieving the load on circuit 2660: construction of a new distribution circuit to provide 4.9 megawatts of load relief at an estimated cost of $625,000.”

Source: PURA 24 January 2018 Order in Docket No. 17-06-03

United Illuminating Company's geo-targeting program (4)

- UI proposed localized targeting program timeline:



- DER geo-targeting has to work in "Goldilocks" time – not too fast and not too slow – allowing ample time to nurture sufficient DER resources, to avoid specific T&D expenses

Source: 1 June 2017, United Illuminating Company Application in PURA Docket No. 17-06-03, Attachment 3, *Localized Targeting of DERs*

United Illuminating Company's geo-targeting program (5)

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- Integrates with existing state objectives

	Targeting of DERs	
Innovative Marketing	✓	Targeted marketing campaigns to engage customers
Deferred Costs	✓	Customer DERs defer a distribution capacity upgrade
Proactive Planning		
Energy Storage		
Transparency	✓	Stakeholders are engaged to address a local need
Procurement	✓	Solarize model is used for economies of scale
Policy Change	✓	Results inform future interconnection standards
Existing Synergies	✓	Existing programs are leveraged
Other	✓	DER transmission disturbance ride through capability

Source: 1 June 2017, United Illuminating Company Application in PURA Docket No. 17-06-03, Attachment 3, *Localized Targeting of DERs*

United Illuminating Company's geo-targeting program (6)

- UI proposal to CT-PURA for evaluating the program…

Use Case	Metric	Measures of Success
Effectiveness of localized targeting	Customer participation in existing programs and the targeted Solarize campaign	1. Percent attainment toward enrollment of 137 residential customers (10% adoption rate) in the targeted Solarize campaign 2. Number & capacity of non-residential customers enrolled
Effectiveness of an incentivizing customer rate	Customer DERs generate during the defined summer peak	Customer DERs installed during the demonstration project deliver over 1MW of summer peak load reduction
Advanced Inverter Functionality	Advanced inverter technology is leveraged to support interconnection and grid operations	1. Advanced Inverter ride through performance is verified 2. The number of interconnections where local inverter settings mitigated the need for additional interconnection costs
DER Integration into system planning	Performance data collected informs system planning efforts	A study of the operational performance of DERs and a statistical assessment of their actual peak coincidence factors. Successful deferral of a distribution capacity upgrade at Ash Creek Substation

Source: 1 June 2017, United Illuminating Company Application in PURA Docket No. 17-06-03, Attachment 3, *Localized Targeting of DERs*

Breakthroughs? Barriers? Both?

- Incomplete analysis by the utility of options and customer choices can leave valuable resources untapped
  - What would the customers want?
  - What would third-party developers offer?
- Commission recognizes risk of failure and paying for both DER deferment and distribution system upgrades
- We can have a smart grid and smart meters but still have inefficient rates and tariffs
- Is robust modeling of non-wires T&D alternatives a new standard for prudent utility planning?

DC *Power Path DC* (née MEDSIS) Pilot Projects

- 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
- *Docket Caption: In the Matter of the Investigation into Modernizing the Energy Delivery System for Increased Sustainability*
- Commission Order sets Pilot Projects Governance Board Structure and preliminary timeline, and approves (pp. 26-27, ¶69):
  - Pilot Projects Governance Model
  - Pilot Exclusion Criteria (for parties with apparent conflict of interest)
  - Pilot Project Selection Process with Two Step Screening
  - Pilot Project Screening and Scoring Template
- Pepco is preparing a benefit-cost analysis framework guidebook, for use when considering NWA projects (Order 20286, p. 26, ¶64).
- The Commission will select Governance Board members in a way that avoids potential conflicts of interest on the part of Board members (Order 20286, p. 27, ¶68).

DC PSC Proposes Defining “NWA” in a Rulemaking

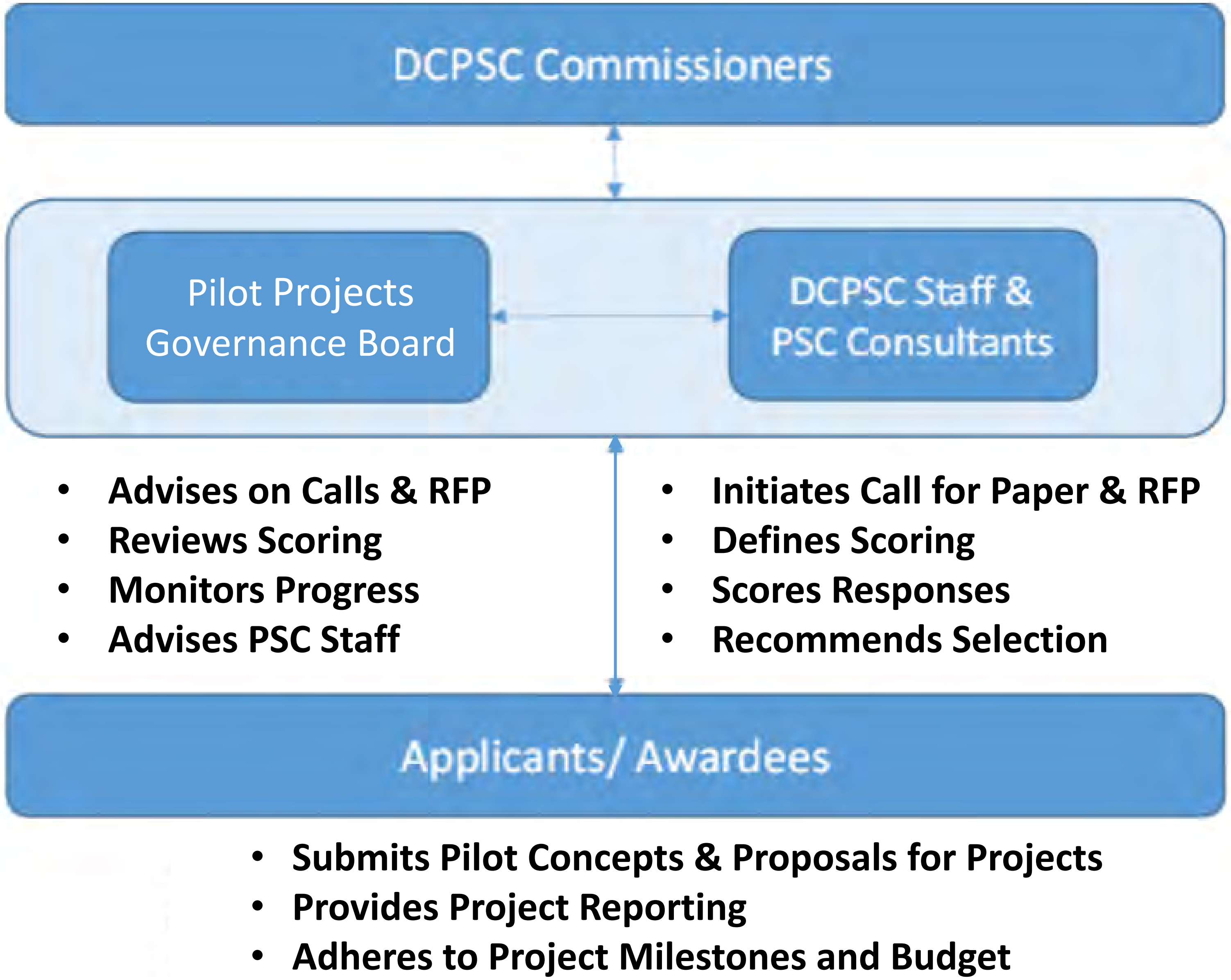
“Non-wires alternative (NWA)” means any action or strategy in the energy delivery system domain that uses non-traditional transmission and/or distribution solutions—such as distributed generation, energy storage, energy efficiency, demand response, and grid software and controls—with the intent to defer or replace the need for specific energy delivery system equipment investments. An NWA must meet energy delivery system needs and be more cost-effective than traditional transmission and/or distribution solutions… . An NWA must be sustainable, prudently-planned, secure, affordable, and non-discriminatory.”

—Order 20286, p. B-2

Concept for DC-PSC Pilot Projects Governance Board

- The Commission establishes the Pilot Projects Governance Board in conjunction with its Energy Efficiency and Energy Conservation Task Force (as discussed in Order No. 20236, FC-1148). (Order, p. 26).
- To avoid conflicts of interest, neither the electric nor gas utility company will be members of the Board, and the Commission asks only "interested stakeholders who will not respond to solicitations and seek… Pilot Project funding to file a request to be appointed to the Governance Board" (Order, p. 27).
- A dozen groups and individuals submitted requests to be appointed to the Pilot Projects Governance Board.
- First meeting of the Pilot Projects Governance Board was slated to take place this week.

https://edocket.dcpsc.org/public/search/casenumber/fc1130



Illinois – ComEd Bronzeville Microgrid Demo Pilot

- First utility rate-based microgrid, approved by Illinois Commerce Commission, in Docket No. 17-0331, February 28, 2018 Final Order.
- Includes $5 million for two DOE grant funded projects
- Incorporates pre-existing Illinois Institute of Technology microgrid
- Addressing security and resilience for 10 major facilities “providing critical services” including Chicago Public Safety Headquarters, the De La Salle Institute and the Math & Science Academy, a library, public works buildings, restaurants, health clinics, public transportation, educational facilities, and churches.
- Sources: https://www.icc.illinois.gov/docket/Documents.aspx?no=P2017-0331; https://www.businesswire.com/news/home/20180228006367/en/ComEd-Approved-Build-Microgrid-Clusters-Nation; https://bronzevillecommunityofthefuture.com/project-microgrid/

Maine – Boothbay Harbor pilot

- GridSolar, a third-party project coordinator, successfully solicited DER resources and contracted to produce and deliver an NWA solution to a transmission constraint.
- An $18 million rebuild of a 34.5kV line was postponed.
- The project was built out in 2012-2013, and NTA resources were deployed from late 2013 through 2015. The net cost over 10 years is estimated to save ratepayers approximately $18.7 million.
- Sources: Stanton, 2012, *Consultant Report for Maine PUC Docket 2010-267: Smart Grid Coordinator, NRRI 12-02,* https://pubs.naruc.org/pub/FA866348-ED7F-9A44-2C74-865F002BF9C6*;* https://neep.org/sites/default/files/resources/FINAL_Boothbay%20Pilot%20Report_20160119.pdf;

Maine – the NTA process continues

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- In Docket No. 2016-00049, the Commission considered establishing an NTA coordinator. The Commission determined in its December 15, 2017 Order:

  [T]he NTA-related policy goals set forth in [Maine's] Smart Grid Policy Act [] are more likely to be realized in an efficient and effective manner by removing the incentives in existing rate-setting paradigms that cause T&D utilities to favor wires solutions over non-wires ones, thus, allowing the utilities to consider all of the options on a comparable basis and pursue the solution that meets reliability needs in a manner that is least cost to ratepayers. The Commission directs CMP and Emera to file, within six months of the date of this Order, rate proposals that address this incentive issue by putting wires and non-wires solutions on an equal footing from a rate-making incentive perspective.

- Sources: Stanton, 2012, *Consultant Report for Maine PUC Docket 2010-267: Smart Grid Coordinator, NRRI 12-02,* https://pubs.naruc.org/pub/FA866348-ED7F-9A44-2C74-865F002BF9C6; https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2016-00049&FRM=0; https://neep.org/sites/default/files/resources/FINAL_Boothbay%20Pilot%20Report_20160119.pdf.

Maine – the NTA process will be formalized

- In 2019, the legislature passed *An Act to Reduce Electricity Costs through Nonwires Alternatives*, PL 2019, ch. 298.
- The Act established the position of nonwires alternative (NWA) coordinator in the Office of the Public Advocate. Generally, the duties of the NWA coordinator are to investigate and identify nonwires alternatives to transmission and distribution line projects and to evaluate the costs and benefits of such nonwires alternatives compared to utility capital investments in the transmission and distribution system.
- The Commission's rulemaking is taking place in Docket No. 2018-00171
- Sources: https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2020-00010&FRM=0.

Maryland – Kicking off storage pilots for IOUs

- 2018 statewide future of energy storage report, "of regulatory reforms and market incentives that may be "necessary or beneficial" to increase the use of energy storage in the state," was followed by 2019 legislation, MD SB573, requiring the state's four IOUs to undertake two storage pilots each, including "at least two of four utility ownership models... a utility-only model; utility and third-party model; a third-party ownership model; and a virtual power plant model." (UtilityDive, 2019).
- All energy storage technologies can be included, regardless of size, storage medium, or operational purpose. (Laws of Maryland, Ch. 427, § 7-216(A)(2)(II)).
- **Utilities "shall give priority to projects that directly defer or replace an existing or anticipated distribution need**." (Ch. 427, § 7-216(D)(3)).
- Maryland's Energy Storage Working Group filed, in Case No. 9619, proposed metrics and value streams for use in considering pilot projects.
- Applications – due on or before April 15, 2020 – will include best estimates of benefits and costs, rate impacts, and "societal benefits... such as incremental reliability and resiliency, greenhouse gas emission reductions, and learning benefits." (Ch. 427, § 7-216(E)).
- MD PSC is directed to work in consultation with the MD Energy Administration and Office of People's Counsel, to provide an Interim and Evaluation Reports to the legislature, by July 1, 2024 and July 1, 2026, respectively. (Ch. 427, § 7-216(J)–(K)).

Maryland – Four models for storage pilots

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Project Type	Storage Ownership	Storage Control for Grid Reliability	Storage Operation in Wholesale Markets	Direct Effect on Ratepayer Revenue Requirements
Multiple-Use 1: Utility only	Utility	Utility	Utility	Coverage of storage investment less revenue from wholesale market transactions
Multiple-Use 2: Utility and 3rd Party	Utility	Utility	3rd party	Coverage of storage investment less 3rd party lease or contract for wholesale transactions
3rd Party Ownership	3rd party	Utility	3rd party	Utility payment to 3rd party for priority access to storage for grid reliability
Virtual Power Plant	Customer or 3rd party	Utility via aggregator; utility as aggregator	Utility and/or 3rd party as aggregator, if at all	Utility payment to aggregator for priority access for grid reliability; Utility payment to storage owner if utility is aggregator

Source: Nitzan Goldberger, Energy Storage Association, Personal Communications 25, February 2020.

Massachusetts – Worcester Smart Energy Solutions Pilot

- 2015, two-year "comprehensive smart grid pilot program" with critical peak pricing and peak time rebates for ~15,000 customers; extended to four-years.
- Customer portal provides data and valuable energy saving tips.
- "Customers have been able to reduce usage by as much as 30% on peak days, and to save an average of $100 a year in energy costs. Halfway into its intended two-year duration, …less than 3% of customers drop out, a 72% customer satisfaction rate, and total customer bill savings of $1.25 million. Additionally, customers have collectively saved 2,300 megawatt-hours."
- Worcester "Sustainability Hub" facility operating since 2011.
- Evaluation reports filed in Massachusetts DPU Docket No. 10-82, at https://eeaonline.eea.state.ma.us/DPU/Fileroom/dockets/bynumber
- Sources: https://www.nationalgridus.com/new-energy-solutions/Community-Projects/Massachusetts/Worcester-Smart-Energy-Solutions; https://www.nationalgridus.com/new-energy-solutions/Community-Projects/Worcester-Sustainability-Hub/About-The-Hub.

New Jersey – NWS pilot program by 2021

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- "Consistent with the state's goal of transitioning to a clean energy economy established in this Energy Master Plan (EMP), as well as the mandates of the Clean Energy Act of 2018 and Executive Order No. 28, electric public utilities must begin routinely and methodically integrating non-wires solutions (NWS) into planning and operations as an alternative or complement to traditional infrastructure, capacity upgrades, or expansions… . NJBPU will enable electric public utilities to propose a pilot program to identify approaches, best practices, and opportunities for making NWS standard practice in their infrastructure planning, investment, and operations." (New Jersey *2019 Energy Master Plan – Pathway to 2050*, Goal 5.1.4, p. 179).
- "NJBPU anticipates that the full process of proposing, implementing, and evaluating NWS pilot programs and integrating them into future [Integrated Distribution Plans] filings will be completed by December 2021" (NJ 2019 Energy Master Plan, p. 180).
- Sources: https://www.madrionline.org/wp-content/uploads/2019/10/MADRI_IDP_Final.pdf.

New York – Brooklyn-Queens Demand Management

- Initial application in Docket No. 14-E-302. The BQDM Project was established in 2014 and extended in a July 2017 NY PSC Order.
- "The Commission Order "recognizes the success of the BQDM program and authorizes Con Edison to continue the BQDM Program for the benefit of customers beyond the original three-year term of the program, subject to the original $200 million budget and the existing shareholder incentive provisions." (Order, p. 3).
- "Through the BQDM Program, Con Edison has been consistently successful in meeting its implementation checkpoints on time and under budget." (Order, p. 3).
- The utility, Consolidated Edison (ConEd), shall file quarterly reports regarding BQDM Program activities and expenditures and semi-annual benefit cost analysis reports. (Order, p. 13).
- The utility is authorized to spend up to $200 million, not more than $50 million of which can be spent on "utility-side non-traditional solutions." (Order, p. 13).
- Source: http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=14-E-0302&submit=Search

New York – Many more pilots

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- "requiring NWAs as a core component of system planning" (NEEP, 2017, p. 5).
- NY PSC NWA Shareholder Incentives for ConEd are approved in a January 2017 Order in Case 15-E-0229. Cost savings from NWA net benefits, for an initial $60 million program, will be shared 70% to ratepayers and 30% to shareholders.
    - The Commission states, "incentive opportunities should be financially meaningful and structured such that they encourage enterprise-wide attention at the utility and spur strategic, portfolio-level approaches beyond narrow programs" (Order, p. 3).
- More non-wire alternatives for other utilities:
    - Central-Hudson, three NWA projects, in Case 14-E-0318
    - Long-Island Community Microgrid Project
    - National Grid's Buffalo Distributed System Platform.
    - NYSERDA New York Prize grant program.

Rhode Island – National Grid Pilots

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- 2006 Comprehensive Energy Conservation, Efficiency, and Affordability Act establishes "Least-Cost Procurement" policy, investing in "all cost-effective" energy efficiency before additional supply. EDC (National Grid) must develop an annual "System Reliability Procurement" (SRP) Plan, considering customer and utility-sited energy resources to maximize benefits to Rhode Island's energy system.
- *Tiverton/Little Compton Pilot – 2012 thru 2017. Average B/C Ratio 1.32 (NEEP 2017, pp. 11-12).*
- *Volt/VAR Optimization*
- ***Sources:*** http://rieermc.ri.gov/wp-content/uploads/2018/08/2019-srp-report-1st-draft-presentation_final.pdf; http://rieermc.ri.gov/wp-content/uploads/2018/09/2019-srp-report-final-draft.pdf; http://www.ripuc.ri.gov/eventsactions/docket/4545-NGrid-Presentation-DemandLink-Pilot_5-14-15.pdf; https://www.nationalgridus.com/new-energy-solutions/Community-Projects/Rhode-Island/DemandLink; https://www.nationalgridus.com/new-energy-solutions/Community-Projects/Rhode-Island/Volt-VAR-Optimization

Washington – South of Allston Pilot

- Bonneville Power Administration project, initially identified in 2009, potentially deferring by 5-years or more (or avoiding?), a $1 billion, 80-mile, 500kV, new transmission line [I5 Corridor Reinforcement Project] from Washington to Oregon,
- Using bilateral DR contracts and generation redispatch, to reduce load and defer the line.
- Sources: https://www.bpa.gov/transmission/CustomerInvolvement/Non-Wire-SOA/Pages/default.aspx; https://www.bpa.gov/transmission/CustomerInvolvement/Non-Wire-SOA/Pages/south-of-allston-non-wires---rfo.aspx; Fedie, Ryan, 2018, *Modernizing Transmission and Non-Wires Alternatives*, presentation to NARUC National Council on Electricity Policy Annual Meeting and Workshop, https://pubs.naruc.org/pub/666FF821-0A80-84C9-25A0-2C908F24632B.

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots: Summary, Tasks, & Timeline

Kayla Fox

MPSC Staff

Compliance & Investigation Section

U-20645

- Focused, multi-year stakeholder initiative to maximize the benefits of the transition to clean, distributed energy resources for Michigan residents and businesses.

- Engages utility customers and other stake-holders to help integrate new clean energy technologies and optimize grid investments for reliable, affordable electricity service

- Includes outreach, education, and regulatory reforms

Key Drivers

- Declining prices of distributed energy resources
- Changing resource mix
- Customer preferences for clean energy
- Electrification of transportation and buildings
- Environmental and sustainability goals

Core Areas of Emphasis

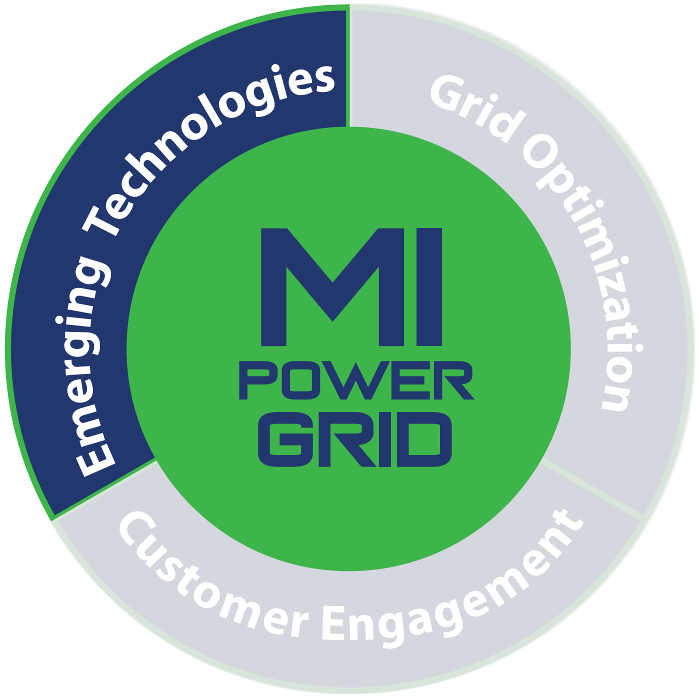
- **Customer Engagement**
  - Customer Education and Participation
  - Innovative Rate Offerings
  - Demand Response
  - *Energy Programs and Technology Pilots*

- **Integrating Emerging Technologies**

- **Optimizing Grid Performance and Investments**

Core Areas of Emphasis

- **Customer Engagement**
- **Integrating Emerging Technologies**
  - Interconnection Standards and Worker Safety
  - Data Access and Privacy
  - Competitive Procurement
  - New Technologies and Business Models
- **Optimizing Grid Performance and Investments**



Core Areas of Emphasis

- **Customer Engagement**
- **Integrating Emerging Technologies**
- **Optimizing Grid Performance and Investments**
  - Financial Incentives/Disincentives
  - Grid Security and Reliability metrics
  - Advanced Planning Processes

MI POWER GRID Timeline

OCT 2019
JAN 2020
APR
JUL
OCT
JAN 2021
APR
JUL
OCT

October 2019 – October 2021
Rulemakings, workgroups, collaborate on areas of focus

October 17, 2019
Governor's announcement and Commission order kicking off MI Power Grid initiative

September 30, 2020
Staff MI Power Grid status report due

Q3 2021
Final overview of actions

Near-Term Priorities

- Interconnection Rules
- Distribution Planning
- *Energy Programs and Technology Pilots*
- Demand Response
- Grid Security and Reliability

October 2019

March 2020

Workgroup Tasks

- Engage with utilities and stakeholders
- Understand outcomes and apply lessons learned from existing pilot projects
- Investigate past Commission-approved pilots
- Identify pilot best practices
- Propose objective criteria for the Commission to utilize when evaluating proposed utility pilot projects

Workgroup Tasks, cont.

- Work with utilities and stakeholders to identify potential areas for additional pilot proposals including:
  - electric vehicle infrastructure
  - distributed generation,
  - microgrids,
  - on-bill financing,
  - storage, and
  - third-party-owned community solar power.
- Staff report posted to docket
  - Includes findings for the above items, as well as a description of the stakeholder process and recommendations.

Workgroup Timeline

February 27, 2020	Stakeholder Meeting 1
March 19, 2020	Stakeholder Meeting 2
April 16, 2020	Stakeholder Meeting 3
June 30, 2020	Final Staff Report Due

How to Get Involved

Go to: www.michigan.gov/MIPowerGrid

Customer Engagement

Providing Michigan residents and businesses with the demand-side technologies, programs, and price signals that will allow these customers to be more active and effective participants in the state's transition to increased clean and distributed energy resources.

Integrating Emerging Technologies

Ensuring timely and fair grid access and appropriate information exchange to support customer-oriented solutions and reliable system operations.

Optimizing Grid Investments And Performance

Integration of transmission, distribution, and resource planning to increase transparency and optimize solutions; enhancement of tools, financial incentives, and regulatory approaches to adapt to technology change and customer preferences.

Customer Education And Participation

In order to maximize the value of clean and distributed energy resources for customers, significant attention needs to be given to educating and facilitating customer participation and access to new demand-side technologies, energy waste reduction programs, demand response offerings, time-based pricing and other related programs.

Learn More

Demand Response

Customers enrolled in demand response programs may be called upon to shift electricity consumption away from times of peak usage when electricity costs more to produce. These customers benefit through a lower rate. Demand response can also be a useful tool to avoid emergency situations where customer usage is expected to exceed available generation supply.

Learn More

Energy Programs And Technology Pilots

Utility companies use pilot projects to test new or experimental ideas. This helps utilities, stakeholders, and the MPSC learn what may work on a larger scale, as well as where to improve. Past pilot projects have involved energy waste reduction, electric vehicles, advanced metering infrastructure, and rates that vary based on when electricity is used. Having a standard process to evaluate pilot projects can help the MPSC and stakeholders decide whether expanding these programs is beneficial to customers.

Learn More

Energy Programs and Technology Pilots

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SIGN UP FOR ENERGY PROGRAMS AND TECHNOLOGY PILOTS UPDATES

To sign up for updates or to access your subscriber preferences, please enter your contact information below.

*Email Address

Questions?

Email:

Joy Wang (staff lead) at

WangJ3@Michigan.gov

MI POWER GRID

Making the Most of Michigan's Energy Future

Results: MPSC Case Review and Utility Survey

Joy Wang
MPSC Staff
Smart Grid Section

MPSC
Michigan Public Service Commission

Motivations: Workgroup Tasks

- Engage with utilities and stakeholders
- Investigate past Commission-approved pilots
- Understand outcomes and apply lessons learned from existing pilot projects
- Identify pilot best practices
- Propose objective criteria for the Commission to utilize when evaluating proposed utility pilot projects

MPSC Case Review

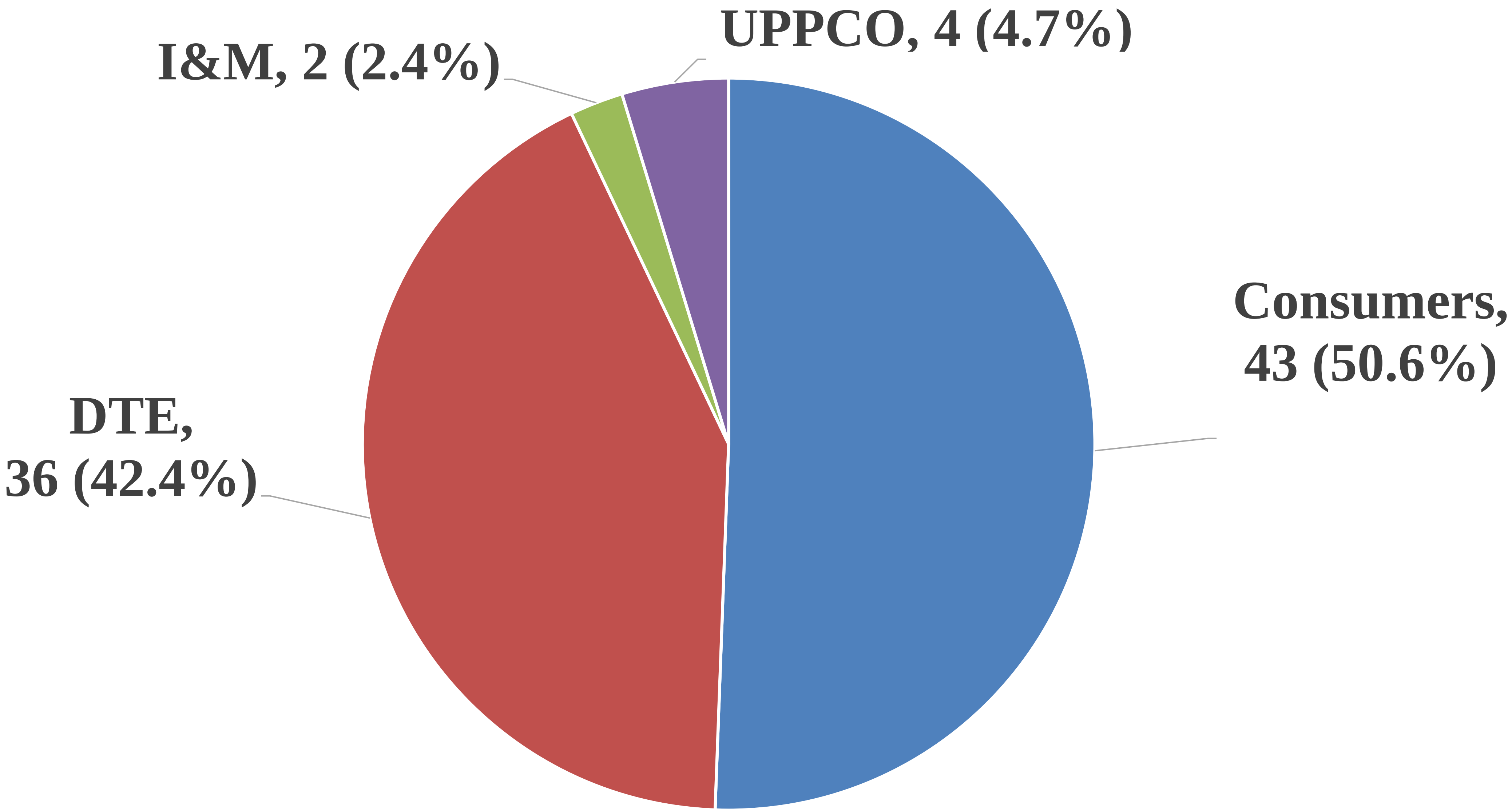
- Goal: Review approved pilots
- Reviewed Period: 2008 – 2019
- Scope: No EWR pilots*
- Total Reviewers: 14 staff
- Materials Reviewed: E-Docket materials
  - Commission Order
  - Company Application/Testimony
  - Staff Testimony
  - Filed Reports

* Note: Energy Waste Reduction (EWR) pilot review results will be presented at a future stakeholder meeting.

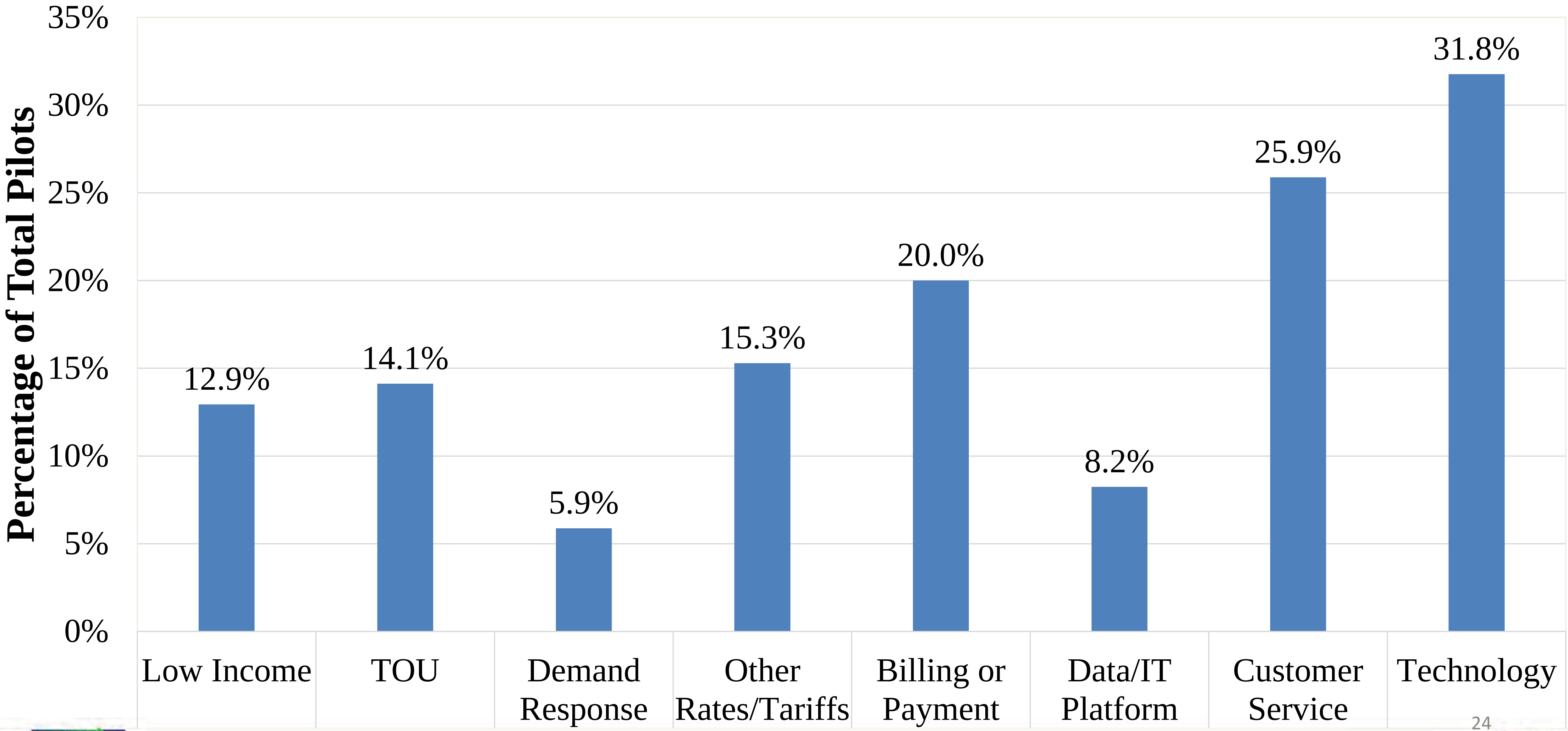
MPSC Case Review

- Total Cases Identified: 155 cases
  - Total Cases with Unique Pilots: 76 cases
- Total Unique Pilots: 85 pilots

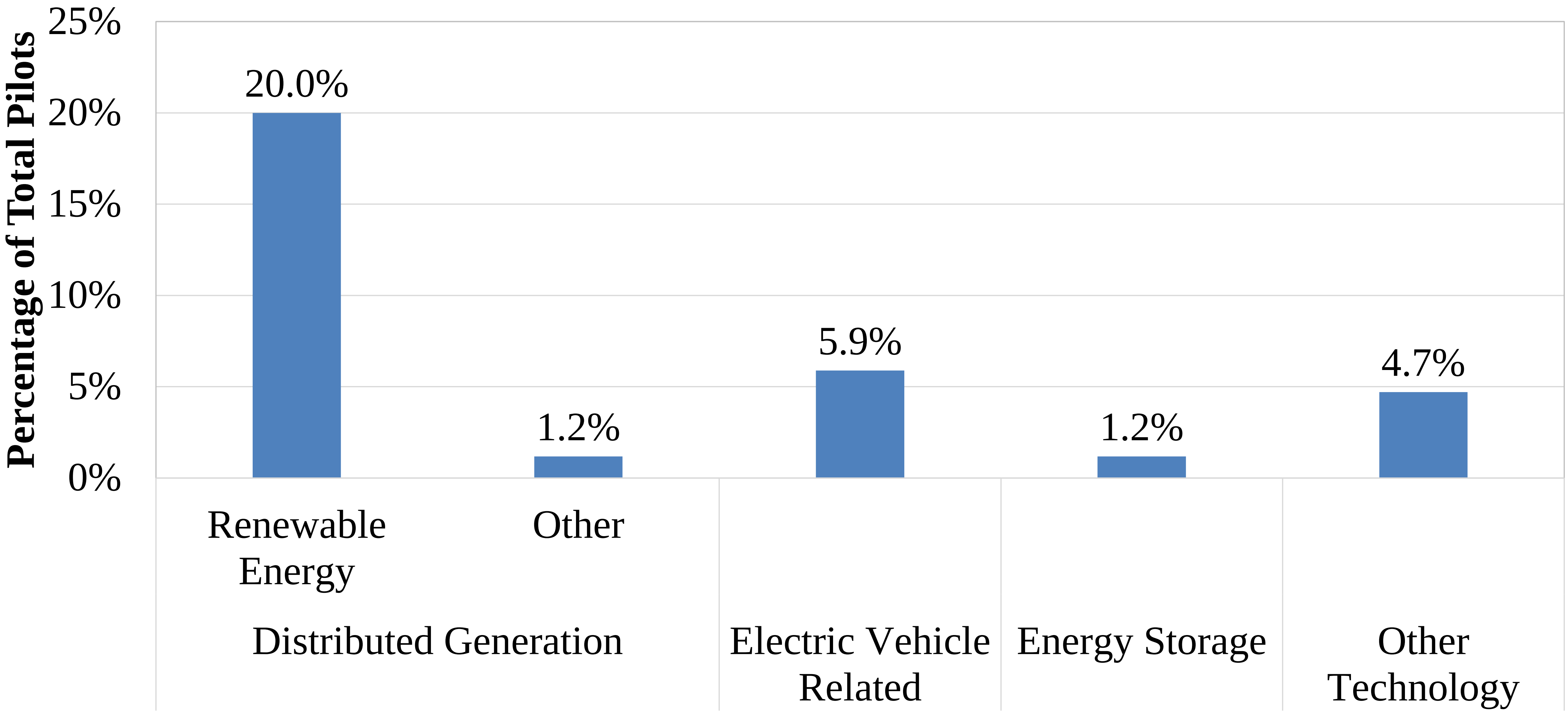
Four Investor Owned Utilities Represented



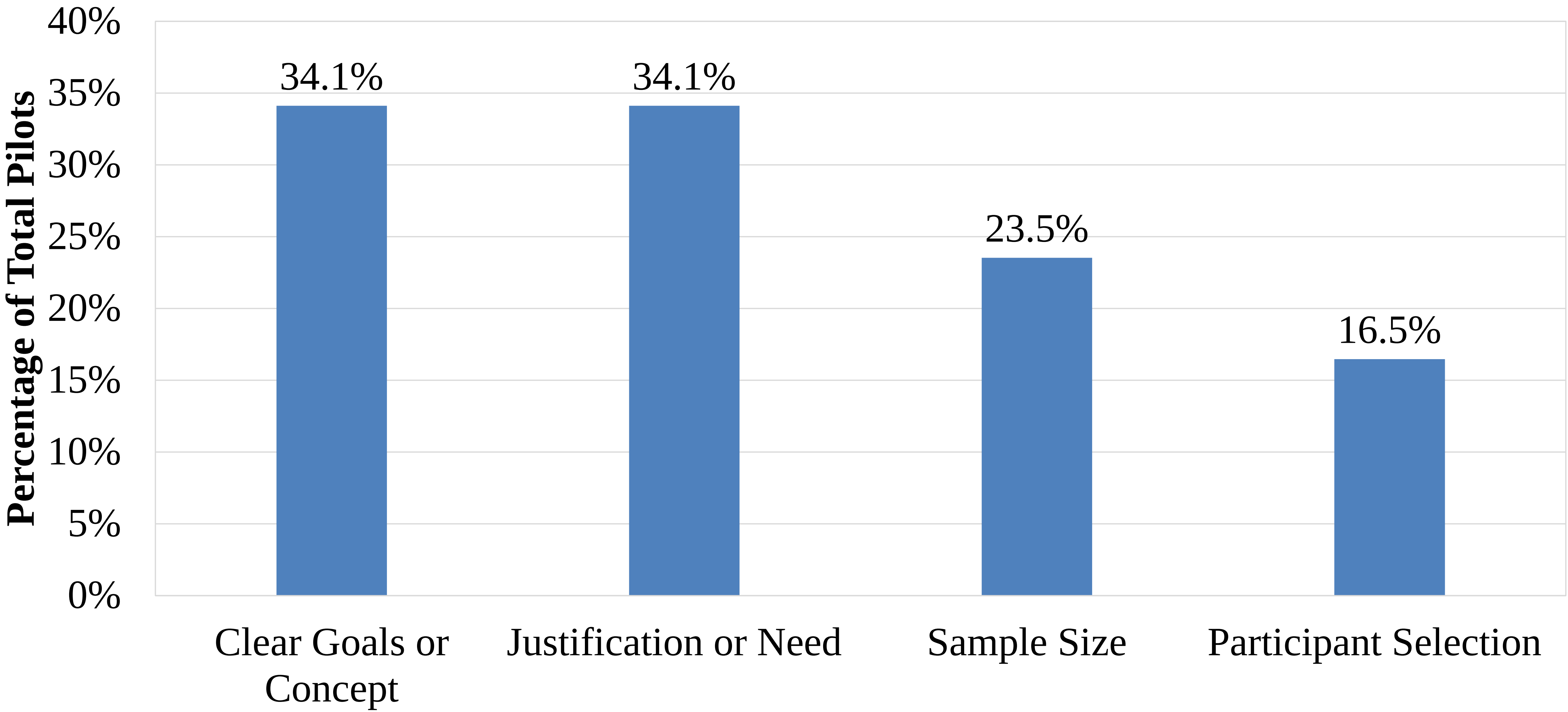
Pilot Areas Explored



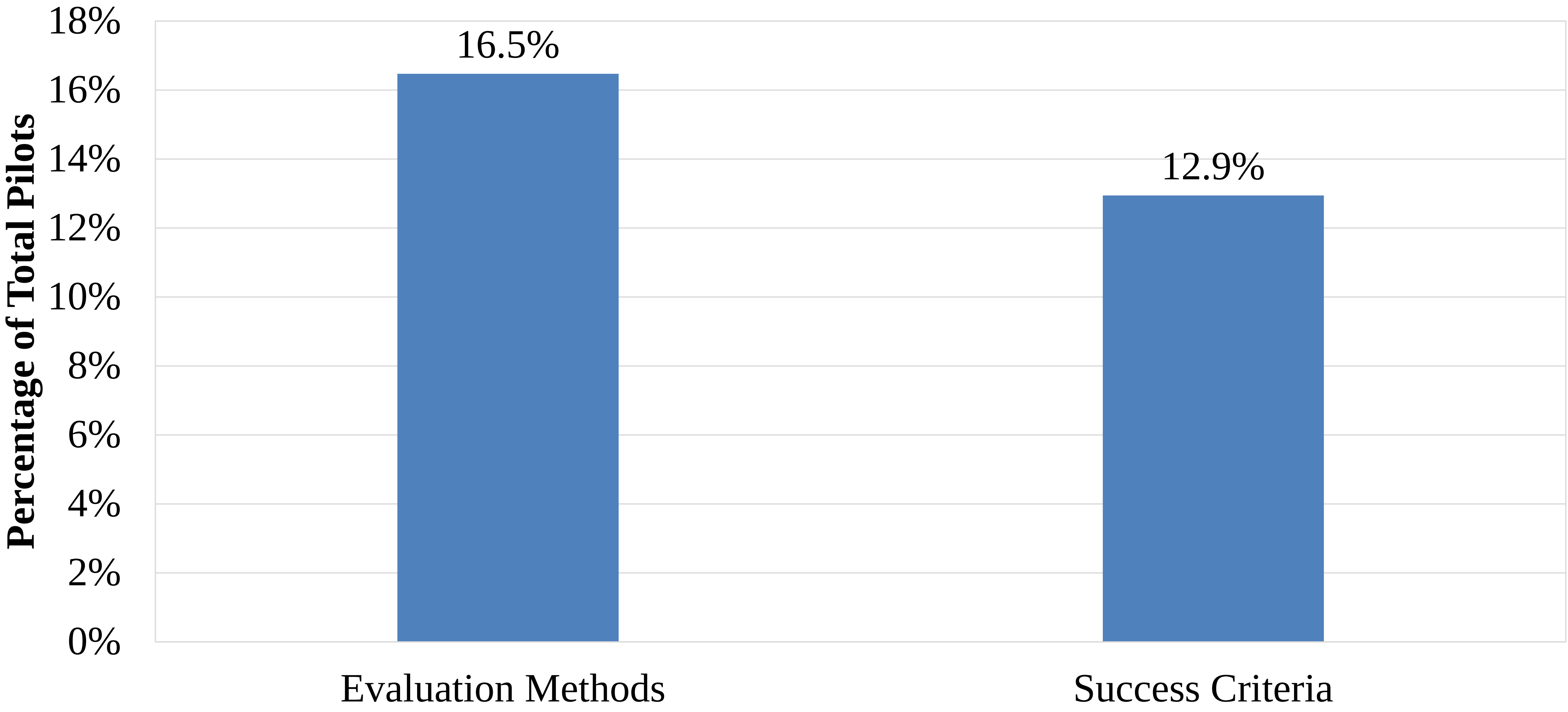
Breakdown of Technology Pilots (31.8%)



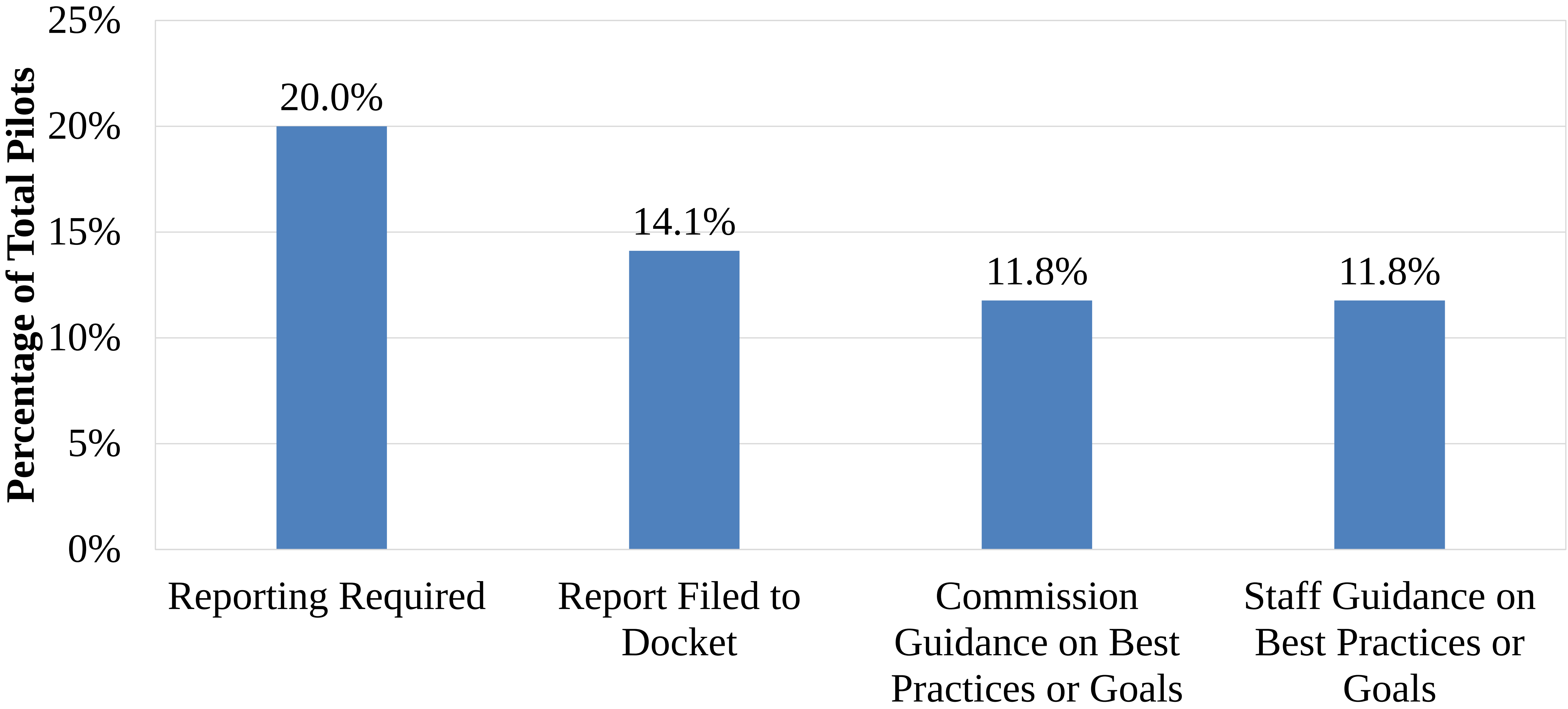
Pilot Design Not Always Provided



Evaluation Criteria Many Times Missing



Required Reporting & Guidance Limited



Pilots with Best Practice/Goals Guidance

Utility	Total Pilots Reviewed	Commission Guidance	Staff Guidance	Both Staff and Commission Guidance
Consumers Energy	43	5 (11.6%)	4 (9.3%)	4
DTE	36	5 (13.9%)	6 (16.7%)	3
I&M	2	0	0	0
UPPCO	4	0	0	0
Commission's Own Motion	12	6	5	5

* Note: Percentages displayed are a percentage of total pilots from the specific utility.

MPSC Case Conclusions

- Review found information regarding pilot design, success criteria, and evaluation methods are limited.
- “Pilot” use is loosely applied.
  - Defining what constitutes a “pilot” may be advisable.
- Staff and the Commission do not often provide guidance regarding pilot goals or best practices.
  - Commission guidance more likely in its own motions (50% vs 11.8%)
- Though a variety of pilots were explored, technology pilots were most popular.

Utility Survey Results

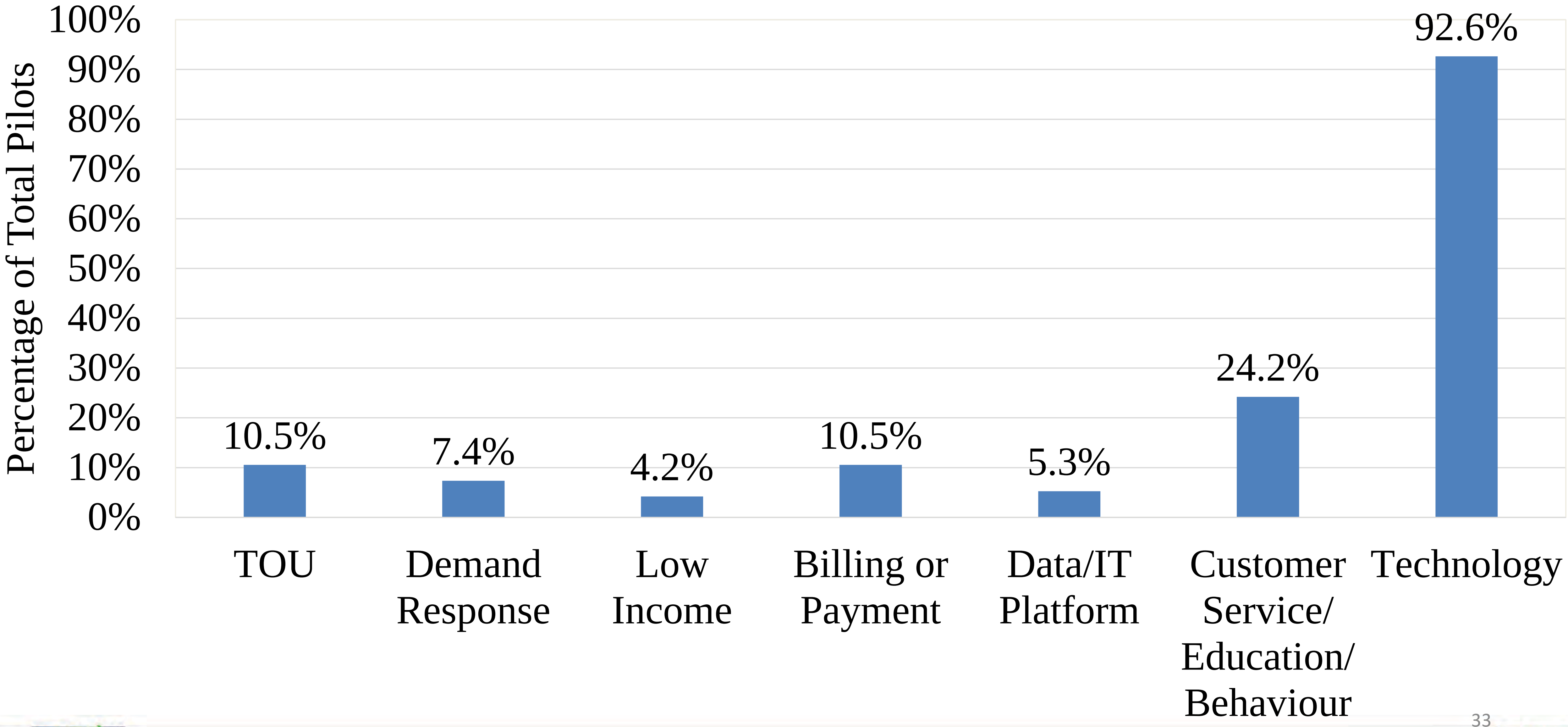
- Utility survey about pilots from 2008-2019
  - Included EWR pilot questions
- Survey sent to electric IOUs within Michigan

* Note: EWR pilot review results will be presented at a future stakeholder meeting.

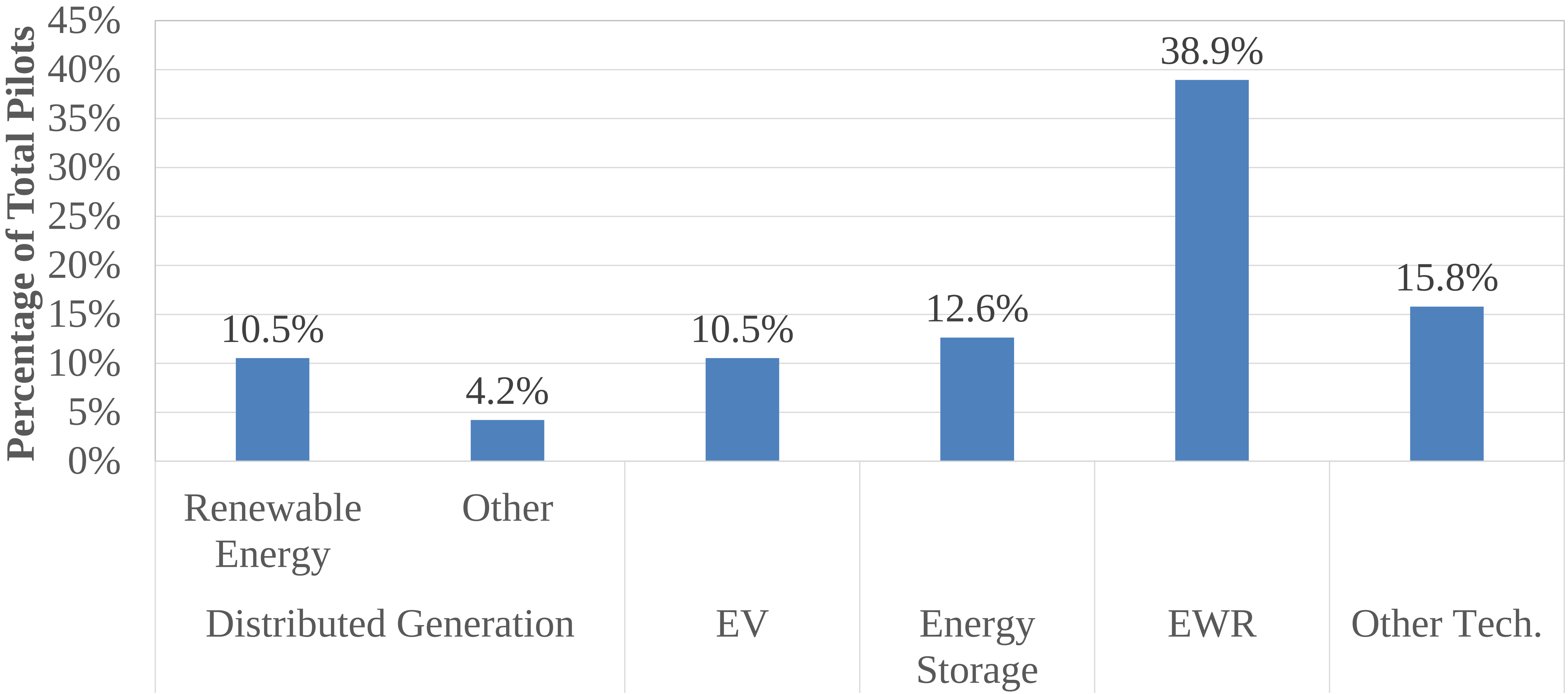
Survey Responses: Number of Pilots

Utility Respondents	**Total Reported Pilots from 2008-2019**
Consumers Energy	47
DTE	43
Indiana Michigan Power	5
Alpena Power Company	0
Total	*95*

Technology Pilots Dominate Pilot Types



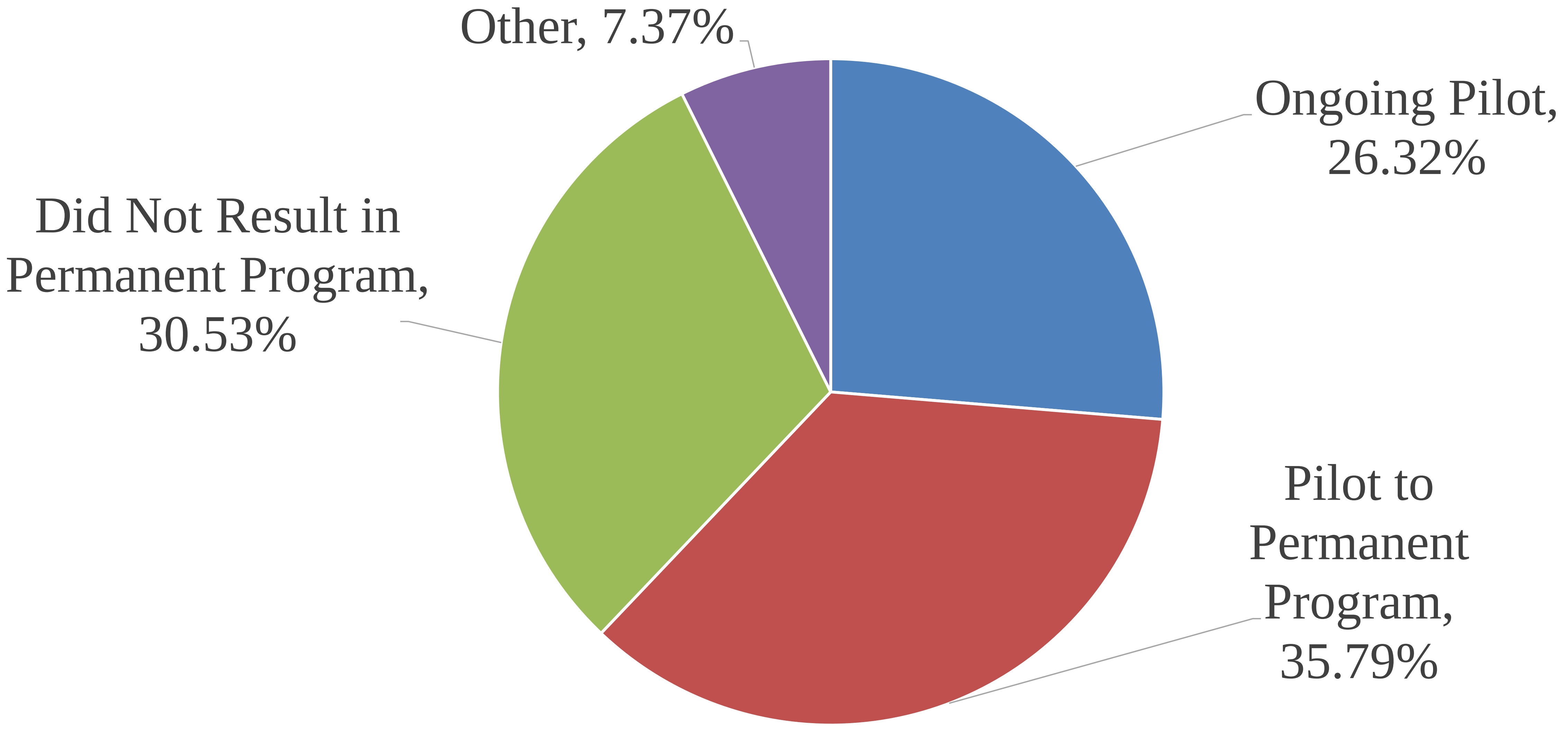
Breakdown of Technology Pilots (92.6%)



11.6% Pilots Test Multiple Technologies

Utility	Total Pilots	Multiple Tech
Consumers	47	2
DTE	43	8
I&M	5	1
Total	*95*	*11 (11.6%)*

Over 35% of Pilots Led to a Program



Most Pilots have Required Reporting

Utility	Total Pilots	Reporting Required	Pilots with Reporting Required (%)
Consumers Energy	47	31	66%
DTE	43	33	76.7%
Indiana Michigan Power	5	0	0.00%
Total	*95*	*64*	

Utility Survey Conclusions

- Utilities report majority of pilots have required reporting.
  - However, MPSC case review found lower incidence of required reporting and even less reports filed to e-dockets.
  - May suggest that much of utility pilot reporting might be more informal reporting to MPSC staff and/or stakeholders.
  - May be exacerbated by the exclusion EWR pilots from MPSC case review
- Over 35% of pilots became a permanent program.
  - Additional information on the pilots that did not result in a permanent program and how their learnings were used may be insightful.
- Exploration and application of new technologies appears to be the focus of the majority of Michigan pilots
  - Technology pilots were 92.6% of total pilots.

Questions Prompted by Review

- Should “pilots” be defined clearly?
    - Pilots vs. demonstration projects
- Should pilot reporting be required and formalized?
    - Should pilot results or data be reported and available?
- How can pilot data be used to greatest effect? Can it be shared across entities?
- What are the utilities’ current pilot processes?
    - What happens when pilots do not result in permanent programs?
    - How are the learnings used?
- What type of pilot design and evaluation information should be required?
- Should more uniform Commission guidance on pilots be provided?
    - Should it depend on the size, type, or nature of the pilot?

Questions?

Email:

Joy Wang (staff lead) at

WangJ3@Michigan.gov

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Break

10:05 – 10:15 AM

Stakeholder Meeting 1

February 27, 2020

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

AGENDA

9:00 am	Welcome & Introduction	Anne Armstrong-Cusack, Director, Customer Service Tremaine Phillips, Commissioner, MPSC
9:20 am	Summary of Grid Mod Programs Nationally	Tom Stanton, NRRI
9:40 am	MI Power Grid Summary, Tasks, & Timeline	Kayla Fox, MPSC Staff
9:50 am	MPSC Case Review & Utility Survey Results	Joy Wang, MPSC Staff
10:05 am	Break	
10:15 am	Current Pilot Processes	Consumers, DTE, & I&M (25 min each)
11:30 am	Utility Pilots: Issues and Best Practices Part 1	Annika Todd-Blick, LBNL
12:00 pm	Lunch on Your Own (Shove It Pizza Truck onsite)	
1:00 pm	Utility Pilots: Issues and Best Practices Part 2	Annika Todd-Blick, LBNL
1:30 pm	From Pilot to Product: Viewpoints on Utility Pilot Design	Nekabari Goka, Oracle
2:00 pm	Utility/Stakeholder Input on Process and Content	Utility/Stakeholder Presentations (10 min each)
2:30 pm	Break	
2:45 pm	Utility/Stakeholder Input on Process and Content	Tamara Dzubay, Ecobee Jeremy Kraft, EMI Consulting Amy Ellsworth, Cadmus
3:25 pm	Discussion: Workgroup Process and Content	Moderated by MPSC Staff
3:55 p.m.	Closing Comments	Joy Wang, MPSC Staff
4:00 p.m.	Adjourn	

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Current Pilot Processes

Stakeholder Meeting 1

February 27, 2020

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

Consumers Energy
Pilot Processes and Key Elements

February 27, 2020

Ryan Kiley

Consumers Energy
Count on Us®

Pilots are a way to test new approaches that still have significant open questions

Areas of focus can come from:

- Customer Feedback
- Strategic Planning Process
- Industry Trends

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

There is a high level process we follow for pilots

Opportunity Definition

- Market research and analysis
- Customer interviews
- Success criteria

Solution Testing

- Identify minimum viable product
- Partner as needed
- Test hypothesis
- Customer feedback

Launch Planning

- Planning for scale
- Internal handoffs as needed
- Developing marketing plan

Pilots will likely cycle between phases as we iterate

There are a few elements that are critical to fully leverage the potential of pilots

1. **Speed –** Ability to address customer needs and market conditions in real time as they come up
2. **Flexibility –** Ability to iterate on problem definition and solution tests multiple times without slowing down
3. **Funding –** Dedicated pilot funding levels agreed upon in advance will incentivize more rapid deployments

Questions?

Pilot Process and Approaches

MI Power Grid – Energy Programs and Technology Pilots Collaborative

February 27, 2020

DTE generally conducts two distinct types of pilots across the organization that usually follow a general process

Pilot Types Across DTE

Customer behavior	Operational technology
• E.g. Charging Forward, SmartCurrents, various EWR pilots	• E.g. Process automation, Trip Saver II, substation relay enhancements

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

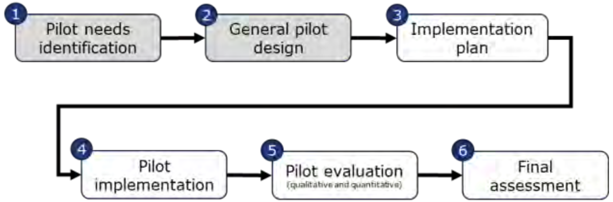
DTE Pilots' General Process

1. Pilot needs identification →
2. General pilot design →
3. Implemen-tation plan →
4. Pilot implement-tation →
5. Pilot evaluation (qualitative and quantitative) →
6. Final assessment

DTE

Embedded within the DTE process are key questions that help define specific and measurable objectives

Defining pilot objectives occurs across the needs identification and general pilot design steps



Customer behavior

- Understand specific customer needs
- Understand marketing approached for new programs
- Determine impact to energy, peak load, and bills
- Identify opportunities to explore new ways to design programs

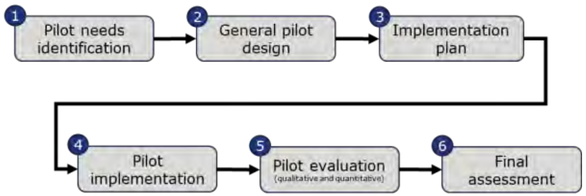
Operational technology

- Evaluate use cases against existing alternatives (including a no action alternative) for impact to system efficiency and reliability
- Identify and/or mitigate system integration challenges or complexities (e.g. internal training, device communication protocols, etc.)

Pilots are designed to test (or confirm) which solutions or problem solving approaches are in the best interest of our customers

Evaluation metrics are developed to address pilot objectives and demonstrate clear indications of performance

Determining and evaluating pilot success occurs across the pilot lifecycle, and the specific objectives inform the appropriate metrics to gauge pilot outcomes; these **may include specific policy objectives, cost efficiency, or customer experience**

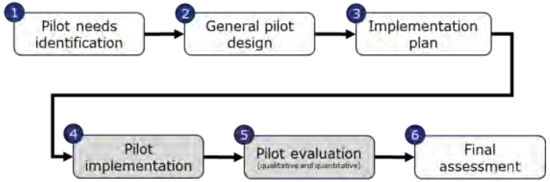


	Policy goals	Cost objectives	Customer experience
Example metrics	• % of low income program enrollment • Reduction in overall energy usage • Improvement in load factor	• How do capital or O&M costs compare to an alternative on a long-term basis? • Is the program cost effective per URSCT[1]	• What were enrollment and attrition rates, and what are the drivers? • Which channels did customers use to inquire about the program? • What was the impact to reliability?

1. Utility Resource System Cost Test, as directed by PA 295 and PA 341 and used for EWR evaluation

Periodic review of pilots in execution may identify a need to accelerate or pause the effort

Pilots are designed and implemented according to best practice and the unique objective of each pilot, **however not all will perform as intended** and may need to be redesigned or operate on modified timelines



Triggers will differ depending on the pilot type[1]

Customer behavior

- The program is "off-target" and cannot be course-corrected
- The pilot is no longer reasonable or prudent for customers

Technology

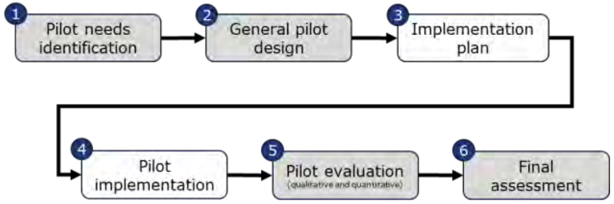
- Negative safety or reliability outcomes
- Technical or process issues that cannot be prudently solved
- The solution is uneconomical or introduces unexpected costs

All pilots present an opportunity for learning, and even pilots that do not perform as anticipated provide takeaways that will better support future technology or customer programs

1. Illustrative examples

Customer feedback on pilot need and execution is most applicable to our customer behavior pilots

Solicitation of customer **feedback is not defined by a single formal process or channel**, rather it is aligned to the unique pilot and the approaches which provide the most valuable perspectives



Channels[1]

- Design and needs surveys to identify addressable gaps
- Assessment surveys to determine pilot outcomes and customer experience
- Public forums, call center feedback, focus groups

Methods[1]

- Leverage DTE's Customer Research team for customer segmentation and survey design
- Engage expert facilitators for focus groups and solicitation design

1. Illustrative examples, not exclusive of all channels or methods

Pilots provide an opportunity to share outcomes with peers while also learning about efforts conducted by others

Partners[1]

- Commission and Staff
- Michigan utilities
- Stakeholders, experts, and advocates
- National utilities
- Customers

Forums[1]

Formal
- Commission proceedings
- Industry events and conferences
- Collaboratives

Informal
- Phone calls
- Email
- 1:1 meetings

Common topics of discussion

Staff

- Trade-offs between participants and non-participants
- Program design
- Low income participation
- Cost / benefit analysis
- Lessons learned and challenges
- Reliability of new technology
- Regulatory approach

Other utilities

- Program design
- Contracting strategy
- Pilot results
- Lessons learned from pilot and full-scale roll-out
- Customer feedback
- Reliability of new technology
- Regulatory approach
- Costs and benefits

Stakeholders

- Customer response and satisfaction
- Cost / benefit analysis
- Approach towards full roll-out
- Low income participation
- Pilot specific metrics

Customers

- Participation requirements
- Program specifics
- Opt-in and opt out rules
- Customer-specific benefits and considerations
- Application specific questions

1. Non-exhaustive

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I&M –Energy Programs & Technology Pilots

Michigan Public Service Commission

MI Power Grid Energy Programs and Technology Pilots Stakeholder Meeting

February 27, 2020

Pilots, In General

Pilot definition:

Test (a plan, project, etc.) before introducing widely.

Targeted, real world test bed that can be used to determine and confirm any or all of the following:

- Feasibility,
- Effectiveness,
- Operability, and
- Customer response and acceptance

Validate that an idea addresses a need (pain point) or provides value/benefit to customers

Pilot Initiation

- Idea/concept in search of a solution
  - New technology or technology application
  - New program
  - New customer offering / service
- Internal issue / problem resolution
  - How can we solve this issue?
  - How can we become more efficient?
- Customer feedback / stated need
  - “I need to reduce my operational costs.”
- Needs a sponsor to support and guide
  - This has potential but can it work?

Idea Generation: Global and US Accelerators and Partners

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FREE ELECTRONS

AusNet · innogy · TEPCO · edp · SPgroup · ESB Energy for generations · AMERICAN ELECTRIC POWER · CLP 中電 · origin · هيئة كهرباء ومياه دبي Dubai Electricity & Water Authority

Global Sustainable Electricity Partnership

AMERICAN ELECTRIC POWER · enel · PGE Polska Grupa Energetyczna · 国家电网有限公司 STATE GRID CORPORATION OF CHINA · EDF · المكتب الوطني للكهرباء و الماء الصالح للشرب Office National de l'Electricité et de l'Eau Potable · RusHydro · Kansai Electric Power power with heart · Hydro Québec · EUROSIBENERGO

STARTER

AMERICAN ELECTRIC POWER · edp · TurningTables · Verbund

AMERICAN ELECTRIC POWER

IEIC

enel · Hydro Québec

ILLUMINATIONLAB

EPRI ELECTRIC POWER RESEARCH INSTITUTE

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Start-up pitching is essential to our innovation process

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Example Need: THE GRID OF THE FUTURE

Decentralized

Intelligent devices from substations to customers' homes and premises – Industrial Internet of Things

Digitalized

Network services across multiple platforms providing customers with greater control over energy products and services

Decarbonized

Cleaner, greener more sustainable energy options

Idea to Pilot: The Innovation Engagement Process

1. Scout for focus area technologies
   - Utilize global accelerators
2. Develop scope of work and finalize contract
   - 6 pages, 6 questions
3. Conduct proof of concept test
   - Weekly calls for constant feedback
4. Develop Pilot Objective & Plan
   - Use results from proof of concept to determine next steps

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

KEEWI PROOF OF CONCEPT 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

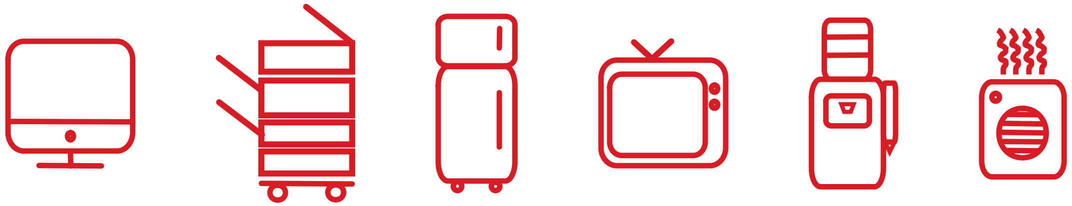
Plug Data Collection
Energy Use Insights
Space Utilization Insights

INTERVENTIONS

52 appliances
Sept 2019

Automated Plug Controls
Energy Use Reductions
Appliance-Specific Schedules

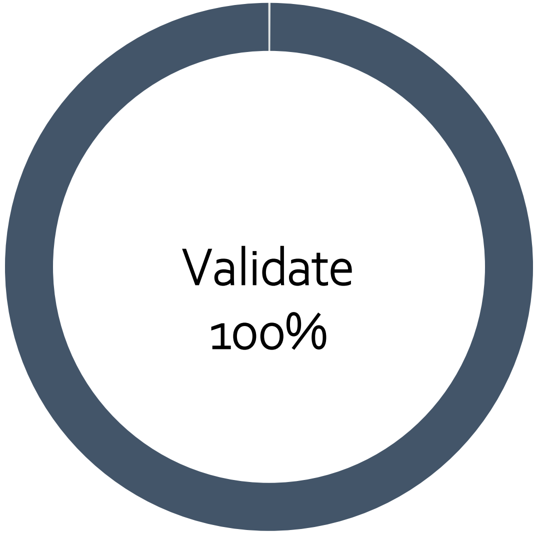
SAMPLE DEVICES MONITORED



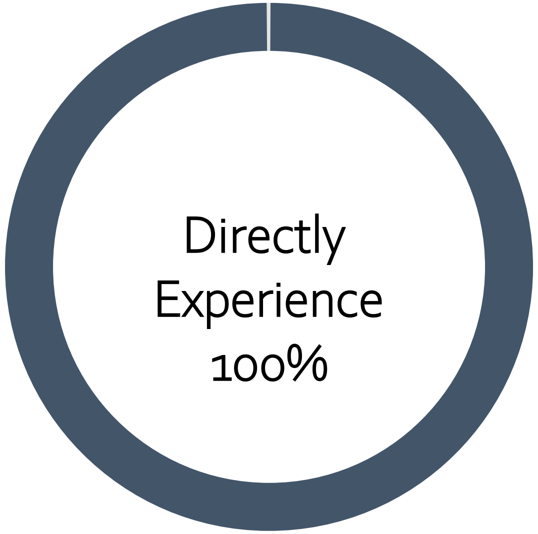
HARDWARE CHOICE

Flexible Adaptors

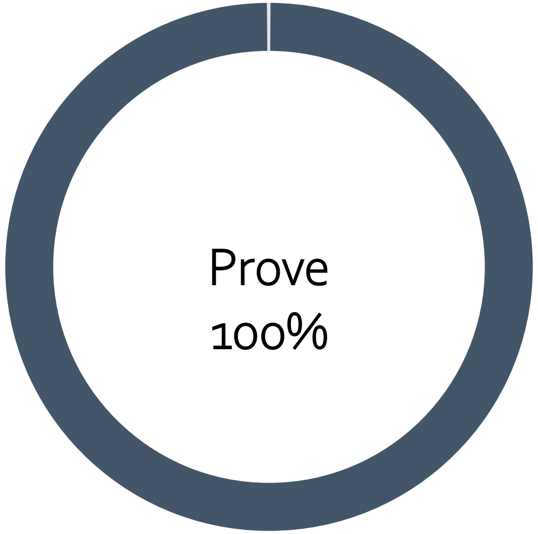
PROOF OF CONCEPT GOALS



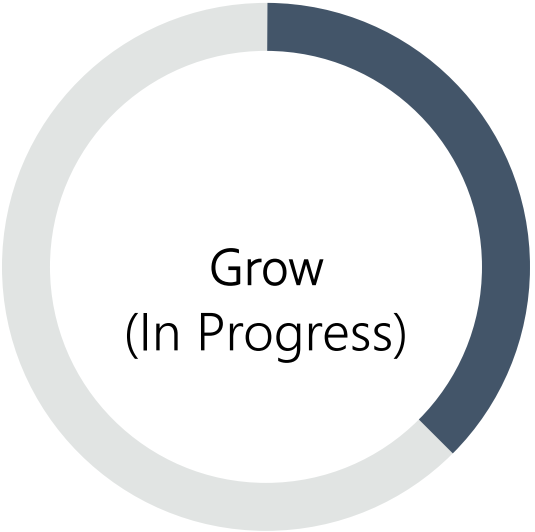
Keewi's ability to address plug load challenge



For AEP to work with Keewi solution



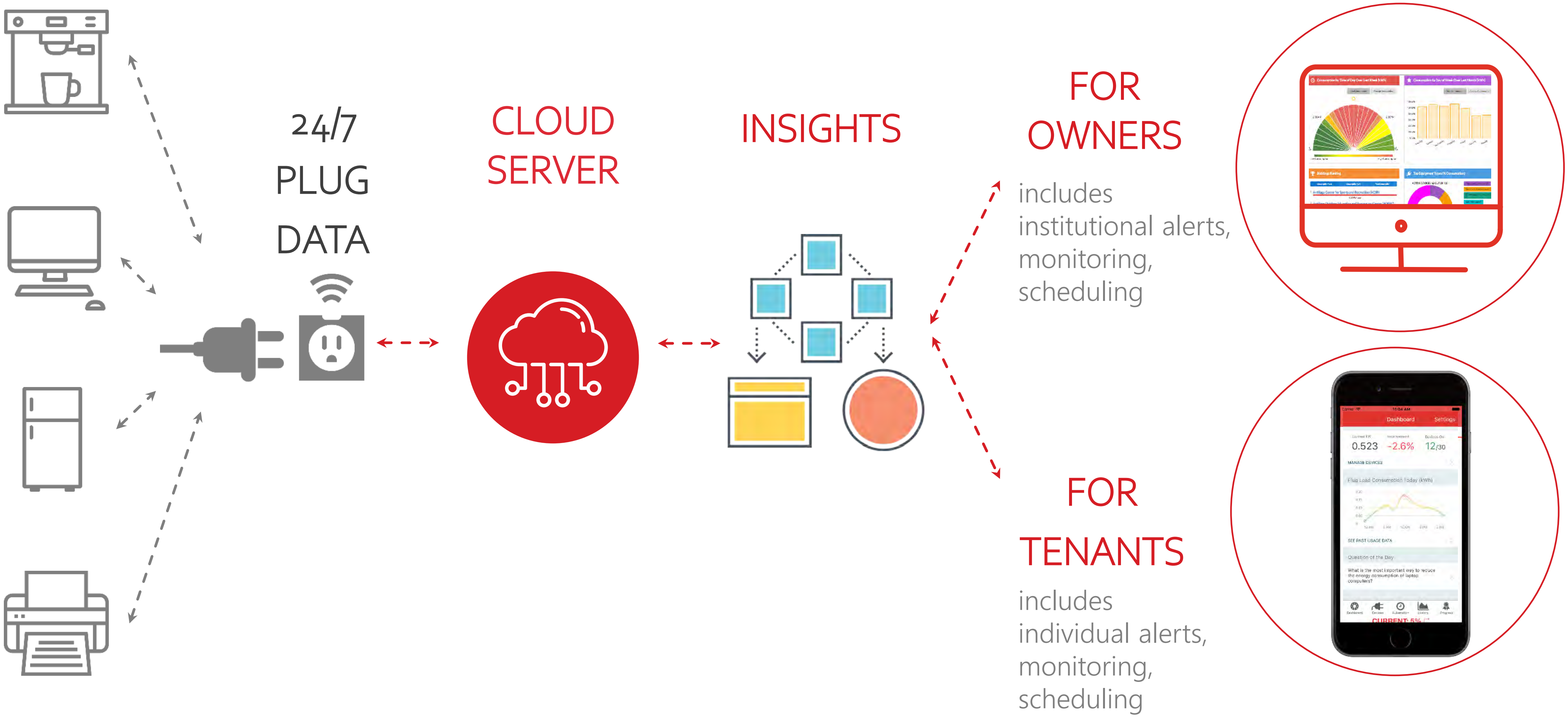
Collaboration between AEP & Keewi



Michigan Commercial Business Customer Pilot

What is the idea?

THE KEEWI SOLUTION



Why Are Pilots Needed?

- Confirm ability to realize idea/concept/technology potential value
- Gain experience and understanding before deploying at scale
- Assess customer acceptance
- Assess other benefits important to customers such as improved asset utilization, customer comfort, predictive maintenance

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Why is a Keewi Pilot Needed?

- 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?

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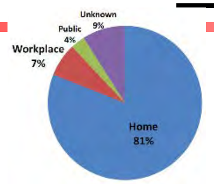
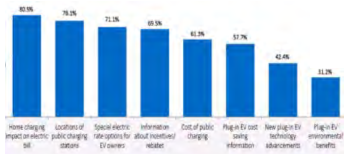
IM PLUGGED IN

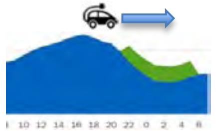
Component	Incentive	Details	Total Funding
Residential and Small Commercial	$500	Enroll in RS-PEV tariff via separate AMI meter; Subject to spending cap	$675,000
Multi-Unit Dwellings	up to $2,500	AMI meter for EVSE/bank; Subject to spending cap	
Fleet	up to $2,500	AMI meter for EVSE/bank; Subject to spending cap	
Workplace	up to $2,500	AMI meter for EVSE/bank; Subject to spending cap	
Corridor Fast Charging	up to $20,000	MEO locations only; Subject to spending cap	
New Service Costs (all components)	Waived	Subject to spending cap	

IM PLUGGED IN: INCEPTION

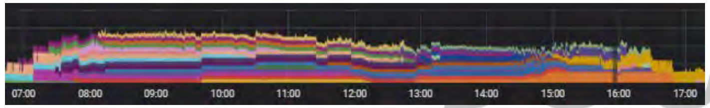
CUSTOMER



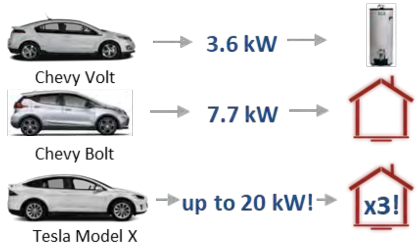


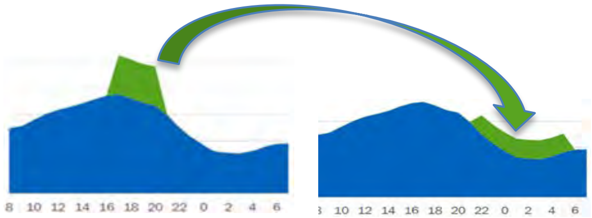


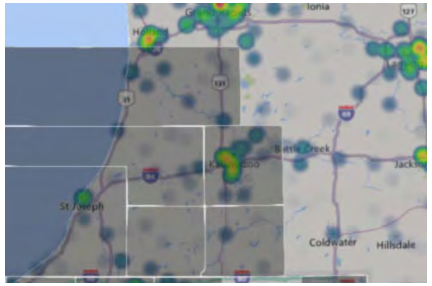
MARKET



UTILITY







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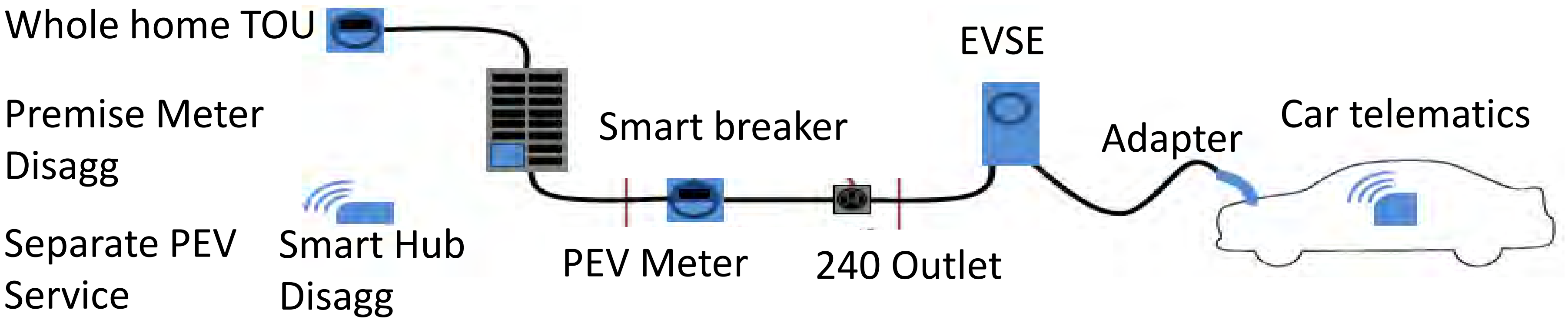
RESIDENTIAL / SMALL COMMERCIAL

1 Rush to known industry solution

2 Widen Aperture



3 CUSTOMER MARKET UTILITY

Lawrence Berkeley National Laboratory
Environmental Energy Technologies Division **Behavior Analytics**
Providing insights that enable evidence-based, data-driven decisions

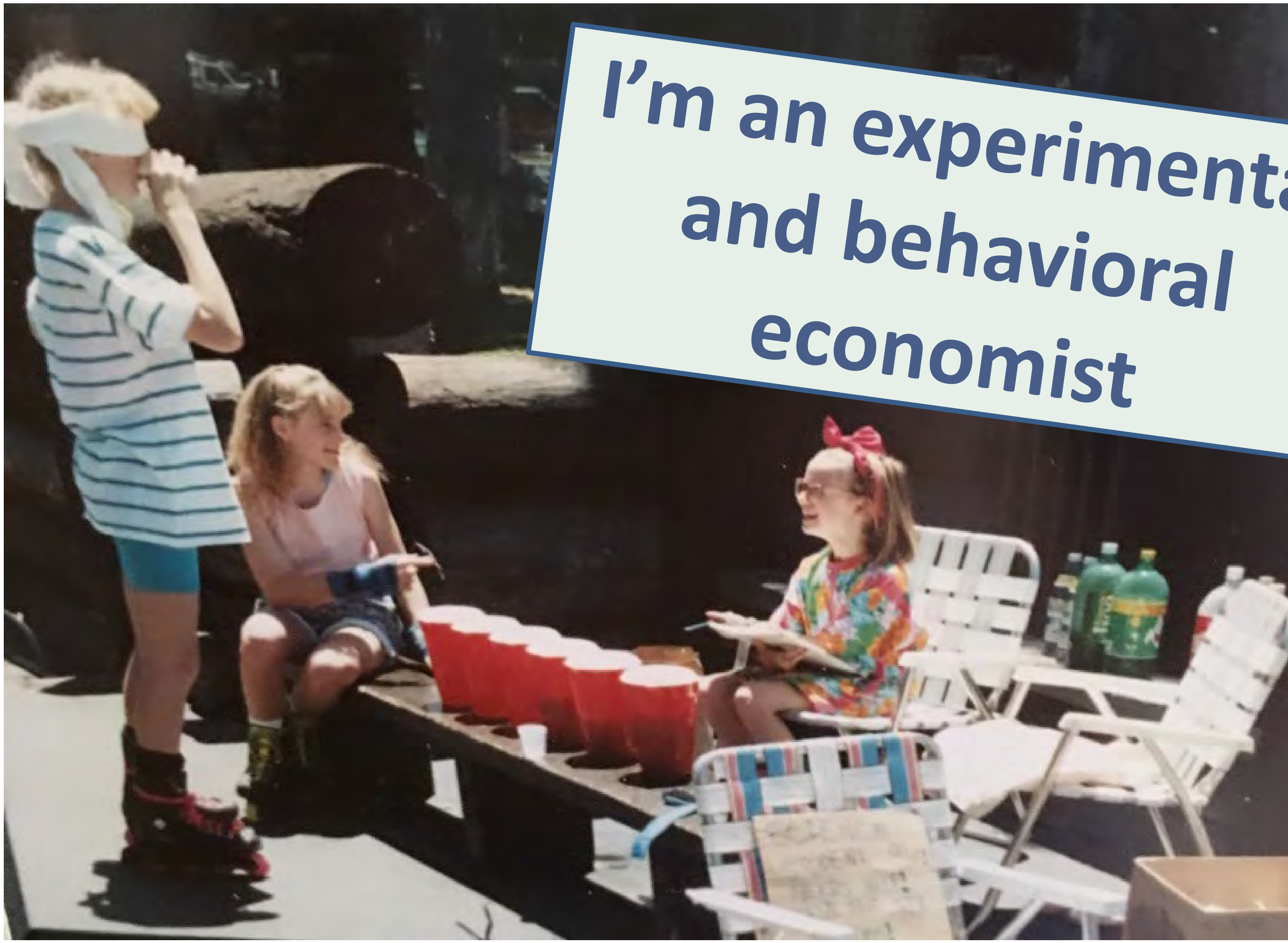
Utility Pilots:
Issues and Best Practices

guidance and best practices for program design, analysis and evaluation methods

Annika Todd, PhD

February 2020

Randomized Controlled Trial: Pepsi vs Coke blind taste test



I'm an experimental and behavioral economist

We are pleased to announce the seco

The way a blind taste test party works
item that they think other people may
(when they can't tell which is which).

For example:
-Coke vs. Pepsi
-Popov Vodka vs. Grey Goose Vodka
-High / Low quality digital compressio
-Homemade vs. Toll House cookies

To avoid duplication, once you choose
comments. We'll provide cups, bowls,
to bring your own.

This will be mostly people Annika and
academics. Please feel free to invite o
plan accurately). No dogs and no kids unless they do well at grown-up work parties (e.g., Asher, you should come). We will provide some nibbles.

Hope you can join us!

Instructions for the party - everyone is required to bring a taste test (unless you are from out of state). The way it will work is this:

You will bring your taste test in two (or three) receptacles (jars, bottles, plates, etc) that are masked / blinded, with labels removed or covered over (e.g., a 1 liter jug of coke and a 1 liter jug of pepsi, or a plate with expensive chocolate and a plate with inexpensive chocolate with the wrappers removed, etc.).

We will provide cups / plates / napkins for people to use to get a small sample of whatever you bring.

We will also provide labels so that you can label the two containers with A or B, and then a decoder label that tells people which one was which after they taste them.

Taste Test Cocktail Party 2014

HOST:
Ned and Annika 415-602-6263

WHEN:
Friday, May 23, 2014 at 6:00 PM

WHERE:
N+A
675 Alvarado Rd. Berkeley, CA 94705

More recently, last week I was testing…

Test: What is the best way to hide gray hair?

Results:

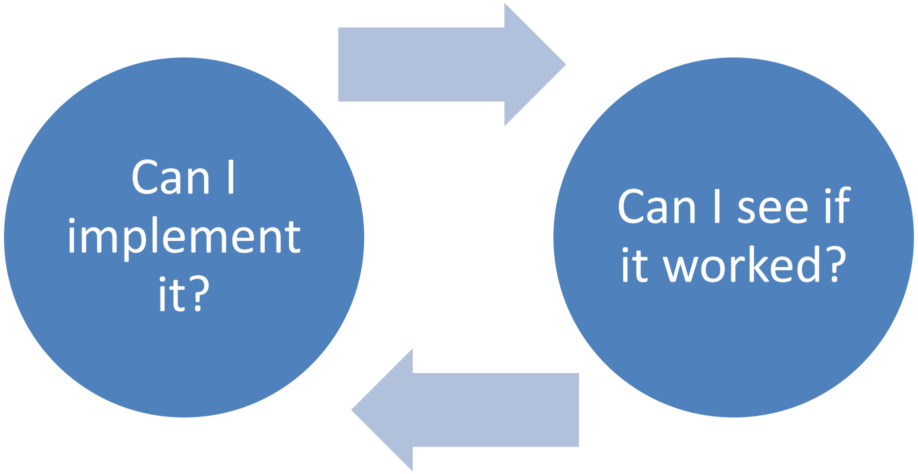
- Process evaluation: “Hints of strawberry” == neon pink
- Success metric: 100% of gray is covered!
- Satisfaction survey: husband -- “Is that permanent?”

Outline

- **Pilot Design Step 0: Design implementation in conjunction with the evaluation**
- Pilot Design Next Steps
- Why is the design and evaluation of pilots hard?
- What are key guidelines on best practice methods (and why are RCTs the gold standard)?

Planning your pilot: Step 0

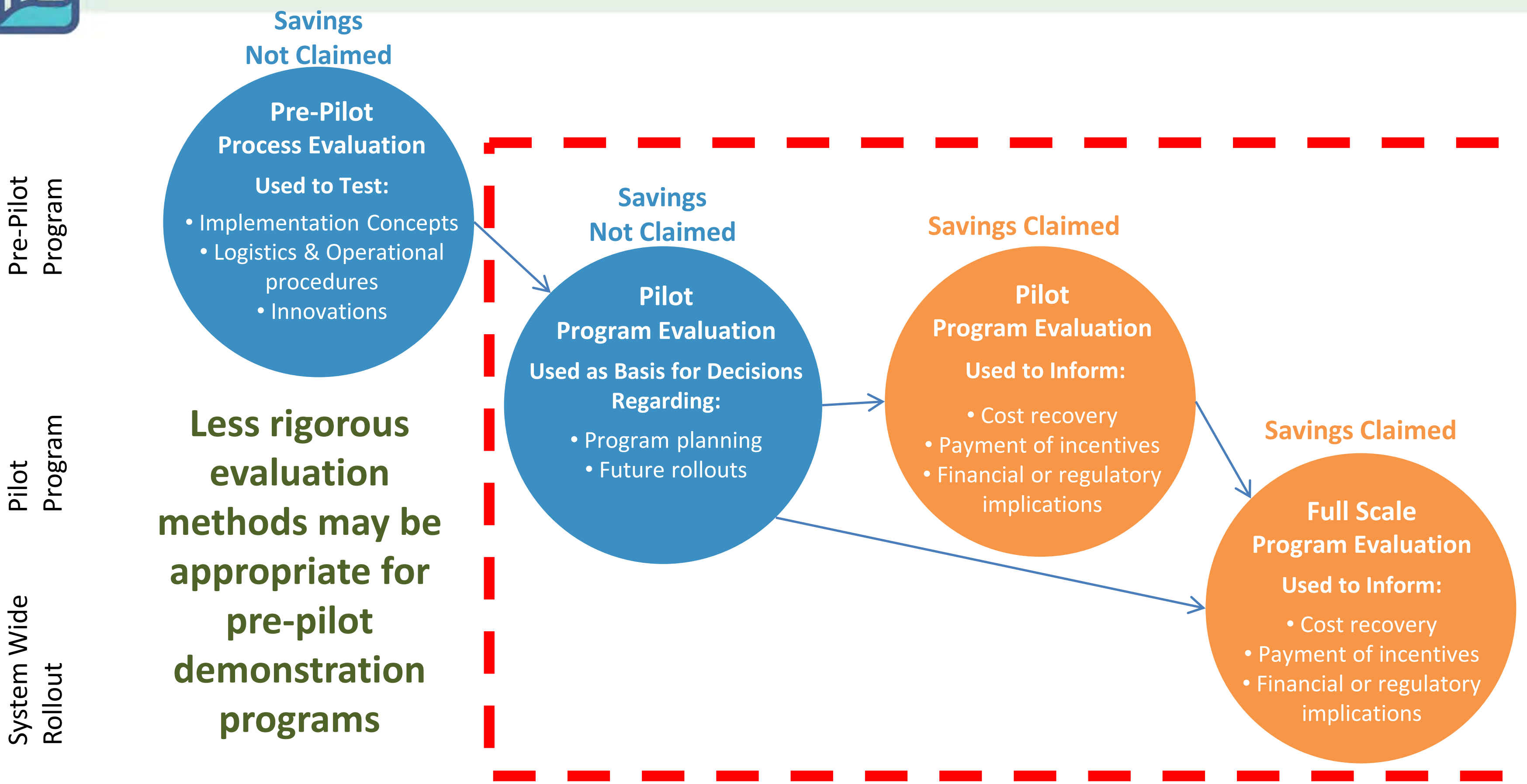
Design the implementation **in conjunction with the evaluation analysis plan!!!**



Outline

- Pilot Design Step 0: Design implementation in conjunction with the evaluation
- **Pilot Design Next Steps**
- Why is the design and evaluation of pilots hard?
- What are key guidelines on best practice methods (and why are RCTs the gold standard)?

What stage of the program life cycle?



Full scale programs that are claiming savings or are used to make decisions about future rollouts

What type of program? EE, DR, BB?

(Energy Efficiency, Demand Response, Behavior-based)

- Rebate program? Home Energy Reports program? Time of Use pricing program?

- Lines are blurred between EE, DR, and behavior

- Example 1: Behavioral Demand Response
  - Compare usage to neighbors *during peak hours* in order to reduce peak-load
    - Behavior
    - Demand Response
    - Also EE! Spillover – reduce during off-peak hours

- Example 2: Critical Peak Pricing, higher prices during peak hours on critical event days
  - Demand Response: reduce peak load
  - Behavior: re-program thermostat
  - Energy Efficiency: spillover – reduce during off-peak hours and non-critical days

What Do You Want to Learn About?

Voluntary vs. Default

Peak demand reduction

Bill management

Energy shifting

Impacts on subpopulations of interest

Flexibility

Customer retention

Customer acceptance

How will I tell if the pilot was a success?

- Identify the outcome **metrics:** we want to see…
  - An increase in customer satisfaction survey
  - A decrease in monthly customer bills
  - A reduction in summer peak load
  - The ease of implementation

- Identify **specific numbers**, like:
  - …by 5%
  - …to reach a cost-effectiveness target of $1.20 per kWh reduction

Determine the needed amount of accuracy: How sure do I need to be?

- What are the tradeoffs
  - How difficult is the best, most rigorous design?
  - What happens if the results are not accurate: blackouts? Lost revenue? Higher customer bills? Programs that are not cost effective?

- To what degree do I want to extrapolate the results
  - To the future, to other regions, to others who do not participate in the pilot?

What data do I need to collect?

Identify data collection needed, such as:

- hourly kwh data from each customer
- three customer surveys from the beginning, middle, and end of the pilot
- pilot cost details

What enrollment approach should I use?

MANDATORY

VOLUNTARY
(Opt-In)

DEFAULT
(Opt-out)

Marketing plan

- How will I educate customers about the contents of the pilot?

- How will I effectively engage customers to participate in the pilot through outreach and marketing?

Outline

- Pilot Design Step 0: Design implementation in conjunction with the evaluation
- Pilot Design Next Steps

Okay, all done, right?

- **Why is the design and evaluation of pilots hard?**
- What are key guidelines on best practice methods (and why are RCTs the gold standard)?

Outline

- Pilot Design Step 0: Design implementation in conjunction with the evaluation
- Pilot Design Next Steps

After lunch:

- **Why is the design and evaluation of pilots hard?**
- What are key guidelines on best practice methods (and why are RCTs the gold standard)?

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Lunch

12:00 – 1:00 PM

Stakeholder Meeting 1

February 27, 2020

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

LUNCH ON YOUR OWN 12 -1 PM

- Food Truck Onsite: Shove It Pizza Truck
- Some food/restaurant suggestions

American
- Buffalo Wild Wings
- Chick-fil-A
- Culver's
- Frank's Press Box
- Houlihan's
- Jersey Mike's Subs
- The Rusty Mug

Asian
- Panda Express
- Little Panda Chinese Restaurant
- Sushi Moto
- Ukai Hibachi Grill & Sushi

Italian
- Carrabba's Italian Grill
- Cottage Inn Pizza

Mexican
- Cancun Mexican Grill
- Chipotle
- El Burrito Mexicano

Mediterranean
- Zaytoon Mediterranean
- ChouPli Wood-Fired Kabob

Other
- Horrocks (soup, salad, & pizza bar)

AGENDA

9:00 am	Welcome & Introduction	Anne Armstrong-Cusack, Director, Customer Service Tremaine Phillips, Commissioner, MPSC
9:20 am	Summary of Grid Mod Programs Nationally	Tom Stanton, NRRI
9:40 am	MI Power Grid Summary, Tasks, & Timeline	Kayla Fox, MPSC Staff
9:50 am	MPSC Case Review & Utility Survey Results	Joy Wang, MPSC Staff
10:05 am	Break	
10:15 am	Current Pilot Processes	Consumers, DTE, & I&M (25 min each)
11:30 am	Utility Pilots: Issues and Best Practices Part 1	Annika Todd-Blick, LBNL
12:00 pm	Lunch on Your Own (Shove It Pizza Truck onsite)	
1:00 pm	Utility Pilots: Issues and Best Practices Part 2	Annika Todd-Blick, LBNL
1:30 pm	From Pilot to Product: Viewpoints on Utility Pilot Design	Nekabari Goka, Oracle
2:00 pm	Utility/Stakeholder Input on Process and Content	Utility/Stakeholder Presentations (10 min each)
2:30 pm	Break	
2:45 pm	Utility/Stakeholder Input on Process and Content	Tamara Dzubay, Ecobee Jeremy Kraft, EMI Consulting Amy Ellsworth, Cadmus
3:25 pm	Discussion: Workgroup Process and Content	Moderated by MPSC Staff
3:55 p.m.	Closing Comments	Joy Wang, MPSC Staff
4:00 p.m.	Adjourn	

Outline

- Pilot Design Step 0: Design implementation in conjunction with the evaluation
- Pilot Design Next Steps
- **Why is the design and evaluation of pilots hard?**
- What are key guidelines on best practice methods (and why are RCTs the gold standard)?

What is the "counterfactual" (the comparison group for measuring success)?

How can you tell if customers reduced kWh?

- Compared to themselves….
  - the day before?
  - the year before?
- Compared to "similar" households…
  - in a different area?
  - with a similar load profile?
  - with certain characteristics that match?

What is the “counterfactual” (the comparison group for measuring success)?

How ca... you tell if customers reduced kWh?

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What is the "counterfactual"
(the comparison group for measuring success)?

How can you tell if customers reduced kWh?

PROBLEMATIC

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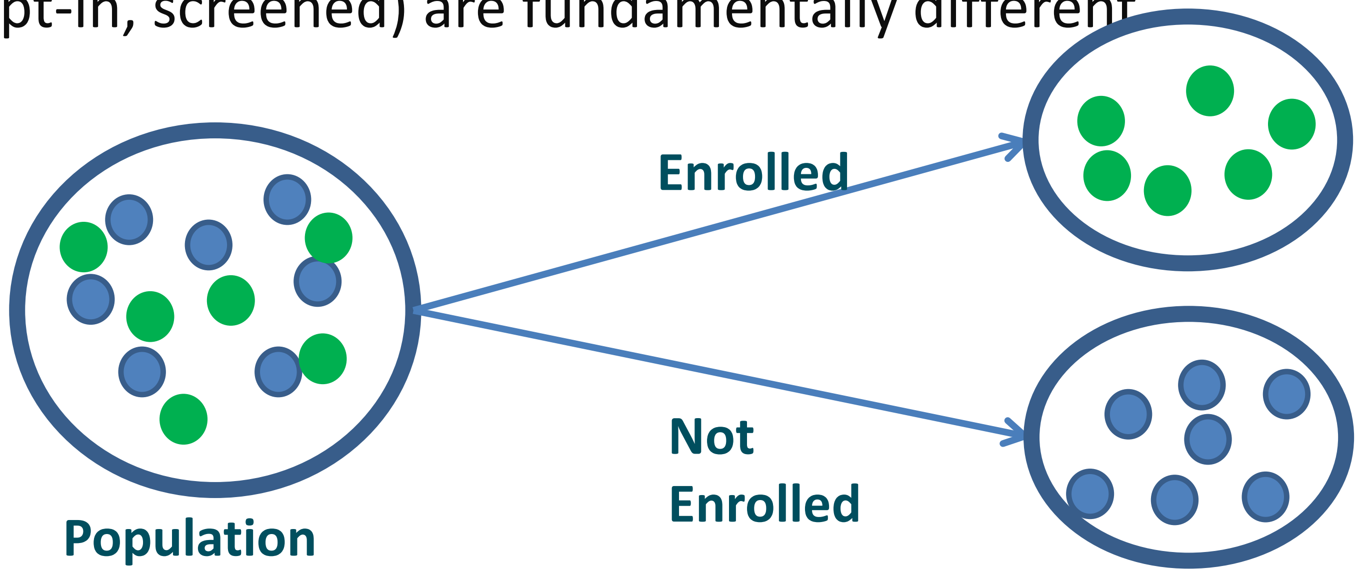
PROBLEMATIC

- Compared to “similar” househo…s…
  - in a …
  - with …
  - with … …h?

SELECTION BIAS!!!

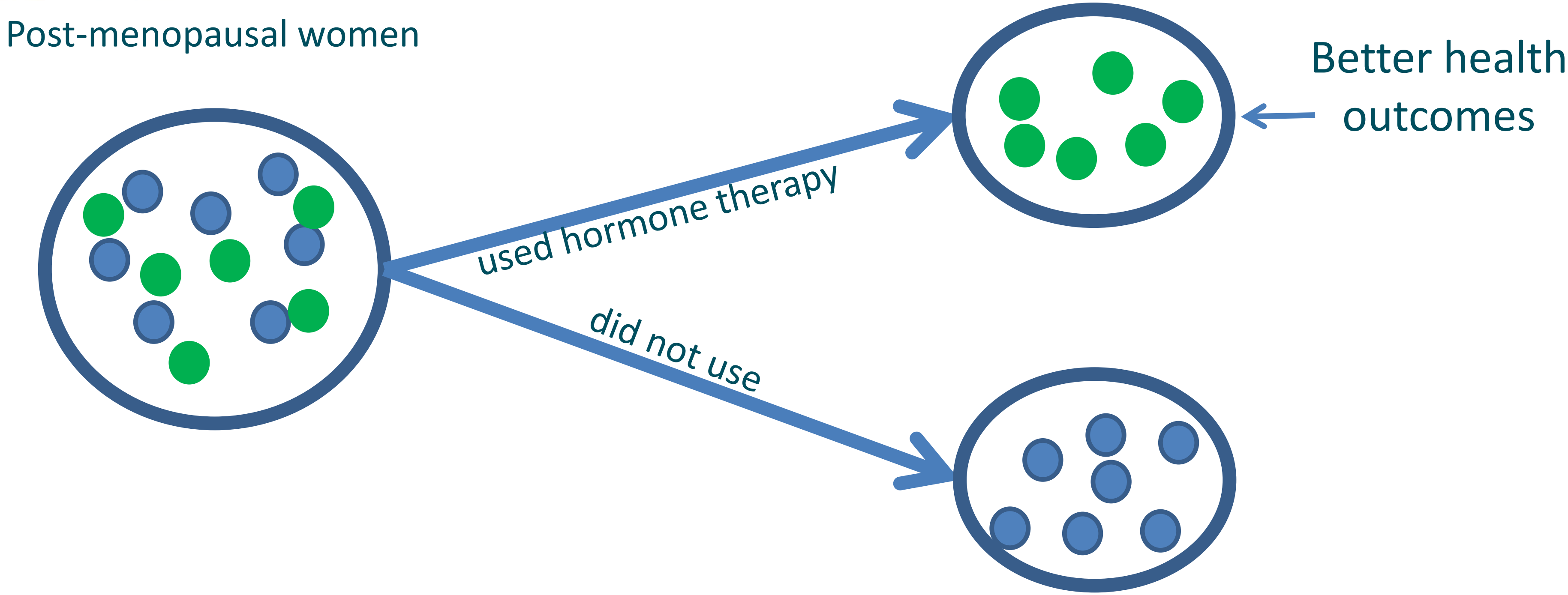
Why is evaluation of these programs hard?

- Strong problem of **“Selection Bias”**: households that join (e.g., opt-in, screened) are fundamentally different



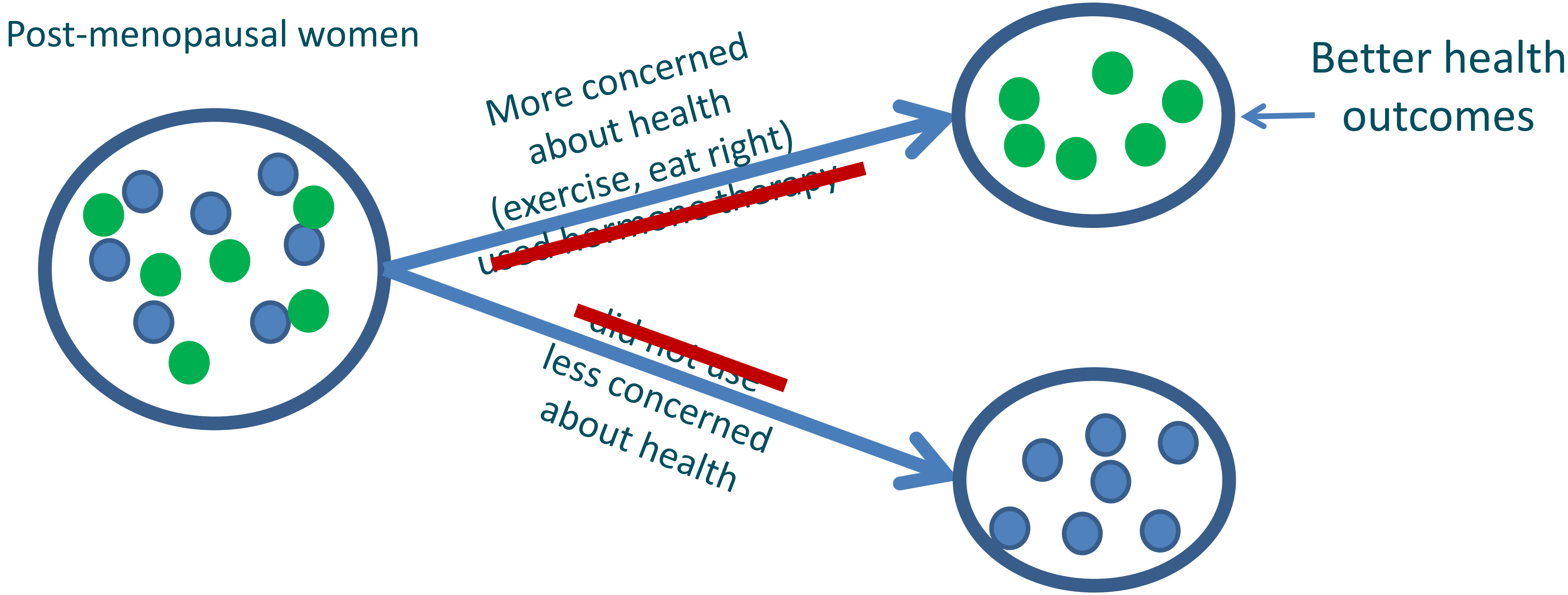
- Observed differences *might* be due to program, but might just be a difference between groups
- Selection bias can skew the results of the evaluation

Example: Post-menopausal hormone therapy



- 80’s study: women who used hormone therapy had better health outcomes. As a result, doctors recommended it to all post-menopausal women.
-
-
-

Example: Post-menopausal hormone therapy



- 80's study: women who used hormone therapy had better health outcomes. As a result, doctors recommended it to all post-menopausal women.
- Rigorous RCT study: hormone therapy has ***negative*** impacts - what happened?
- **Selection bias** in the non-RCT study: women who chose to use hormone therapy were different types of women
- Better health outcomes were because the two groups were different, NOT because of hormone therapy

What is the “counterfactual”
(the comparison group for measuring success)?

How ca you tell if customers reduced kWh?

PROBLEMATIC

- Com elves....
  - the day before?
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SELECTION BIAS!!!

What is the "counterfactual" (the comparison group for measuring success)?

How ca you tell if customers reduced kWh?

- Com elves....

PROBLEMATIC

Just ask them?

- with

- with ?

BIAS!

Randomized Controlled Trial: Pepsi vs Coke blind taste test

Which one do you like better?

Why is rigorous evaluation important, and why is it hard?

→ It is very important to accurately evaluate the effectiveness of these programs

- Cost effectiveness
- For planning purposes – want to select optimal program portfolios
- For validly claiming energy savings

Why is evaluation of these programs hard?

→**Bad evaluation could lead to bad policy decisions**

- Implement programs that are not cost effective
- Screening out programs that may be cost effective

Outline

- Pilot Design Step 0: Design implementation in conjunction with the evaluation
- Pilot Design Next Steps
- Why is the design and evaluation of pilots hard?
- **What are key guidelines on best practice methods (and why are RCTs the gold standard)?**

Randomized Controlled Trial: Pepsi vs Coke blind taste test

Key recommendation: use a randomized controlled trial (RCT)

★★★★★	Randomized controlled trial (RCT)
★★★★☆	Regression discontinuity
★★★½☆	Variation in adoption
★★★☆☆	Propensity score matching
Not Advisable	Non-propensity score matching
Not Advisable	Pre-post comparison

Key recommendation: use a randomized controlled trial (RCT)

★★★★★ Randomized controlled trial (RCT)

★★★★ Regression discontinuity

- Primary recommendation – a program that is designed as a RCT results in:
  - Transparent, straightforward analysis
  - Robust, accurate, valid program impact estimates
  - **High degree of confidence in program evaluation**
  - RCTs are the gold standard

Key recommendation: use a randomized controlled trial (RCT)

Randomized controlled trial (RCT)

Regression discontinuity

- Why is designing a program as a (RCT) so important?
  - RCT means that households are assigned to the program randomly (as opposed to household choice or screening criteria)
  - Solves selection bias

Key recommendation: use a randomized controlled trial (RCT)

★★★★★ Randomized controlled trial (RCT)

Regression discontinuity

Variation in adoption

- RCTs have many different forms
- Can be used for Opt-in, Opt-out programs

Experimental vs. Quasi-experimental vs. Non-experimental

Experimental	Quasi-experimental	Non-experimental
• Randomized Controlled Trial (RCT) • Randomized Encouragement Design (RED)	• Non-equivalent Groups Design • Regression Discontinuity Design	• Descriptive Design • Correlational Design • Developmental Design • Survey Research Design

Key recommendation: use a randomized controlled trial (RCT)

★★★★★	Randomized controlled tri
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- If RCTs are not feasible, acceptable "quasi-experimental" methods
  - More opaque, complex analysis
  - Quasi-experimental methods try to correct for selection bias
  - Lower degree of confidence in validity of savings estimates

Lawrence Berkeley National Laboratory
Environmental Energy Technologies Division Behavior Analytics
Providing insights that enable evidence-based, data-driven decisions

Contact:

Annika Todd
atodd@lbl.gov

ADDITIONAL MATERIALS:

Resources

ADDITIONAL MATERIALS:

More Recommendations

Key recommendation 1: use a randomized controlled trial (RCT)

Randomized controlled trial (RCT)

Regression discontinuity

Variation in adoption

Propensity score matching

Non-propensity score matching

Pre-post comparison

Key recommendation 1: use a randomized controlled trial (RCT)

Randomized controlled trial (RCT)

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Variation in adoption

Propensity score matching

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Pre-post comparison

- If RCTs are not feasible, acceptable "quasi-experimental" methods
  - More opaque, complex analysis
  - Quasi-experimental methods try to correct for selection bias
  - Lower degree of confidence in validity of savings estimates

Key recommendation 2: avoiding potential conflicts of interest

- **Problem:** potential for a conflict of interest to arise regarding the validity of savings estimates
- **Recommendation:**

A third-party evaluator transparently defines and implements:

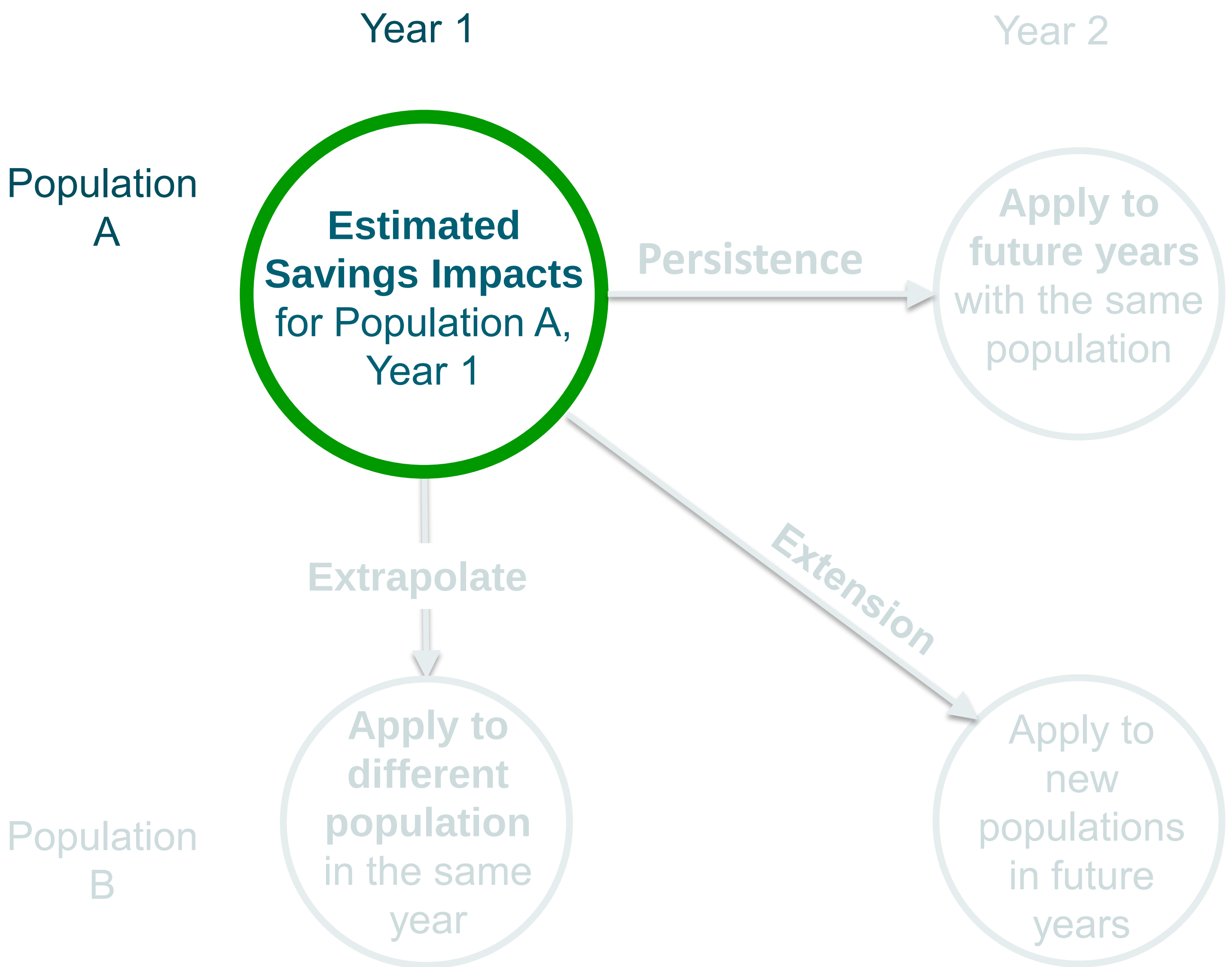
- Program evaluation
- Assignment of households to control and treatment groups
- Data selection and cleaning

Program implementer or sponsor implements any of the above

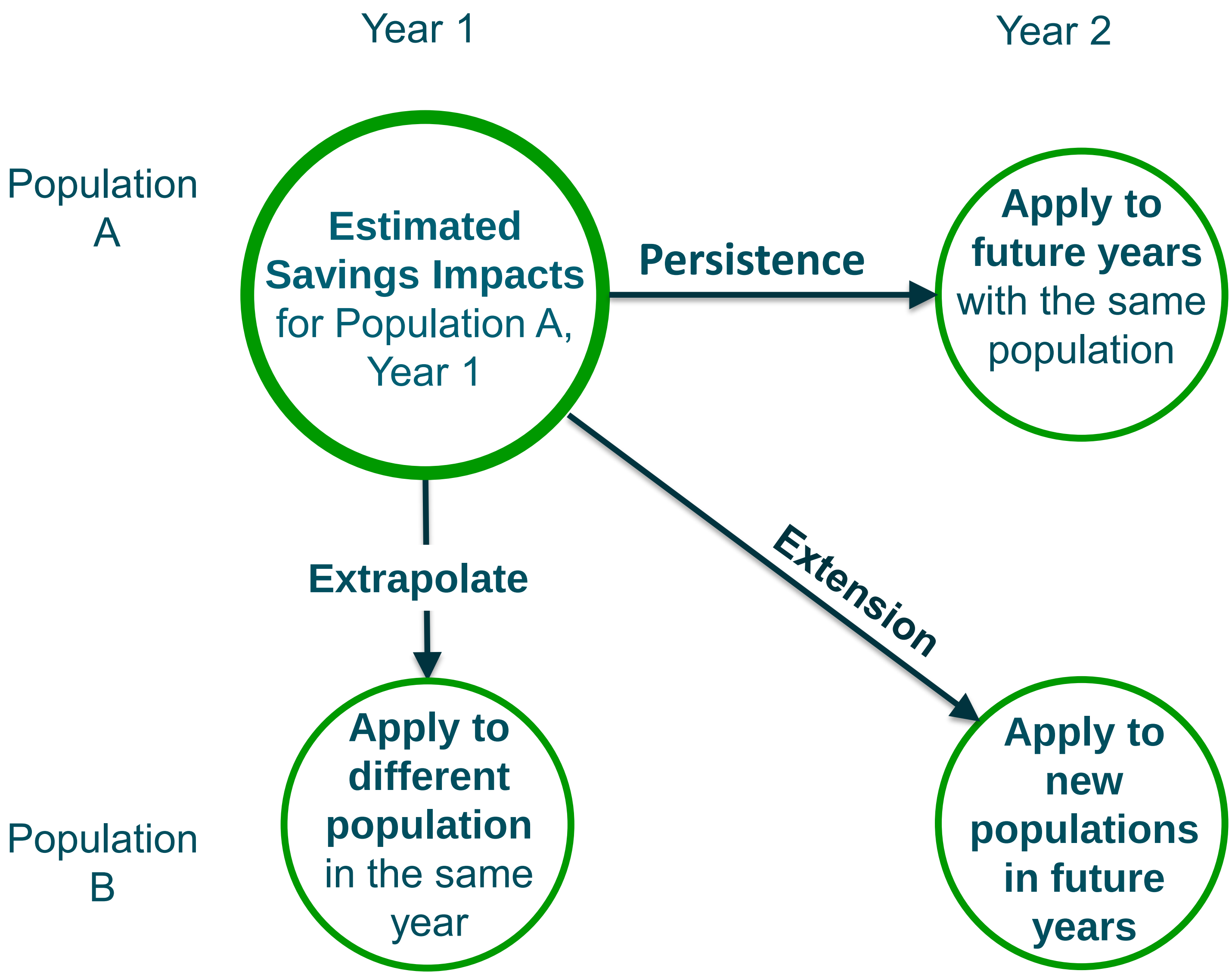
Key recommendation 3: accounting for potential double counting of savings

- **Problem**: the same savings may be claimed by two programs (e.g., a behavioral program & appliance rebate program both claim savings from appliances)
- **Recommendation:** estimate this “double counted savings” overlap to the extent possible by comparing control to treatment group
  - Easier for programs that can be *tracked* at the household level (e.g. installation of insulation by a contractor)
  - Should account for the measurement period (e.g., accounting for seasonal load impacts), and the effective useful lifetime of installed measures (when lifetime savings are reported)
  - Program costs should be appropriately allocated along with double counted saving

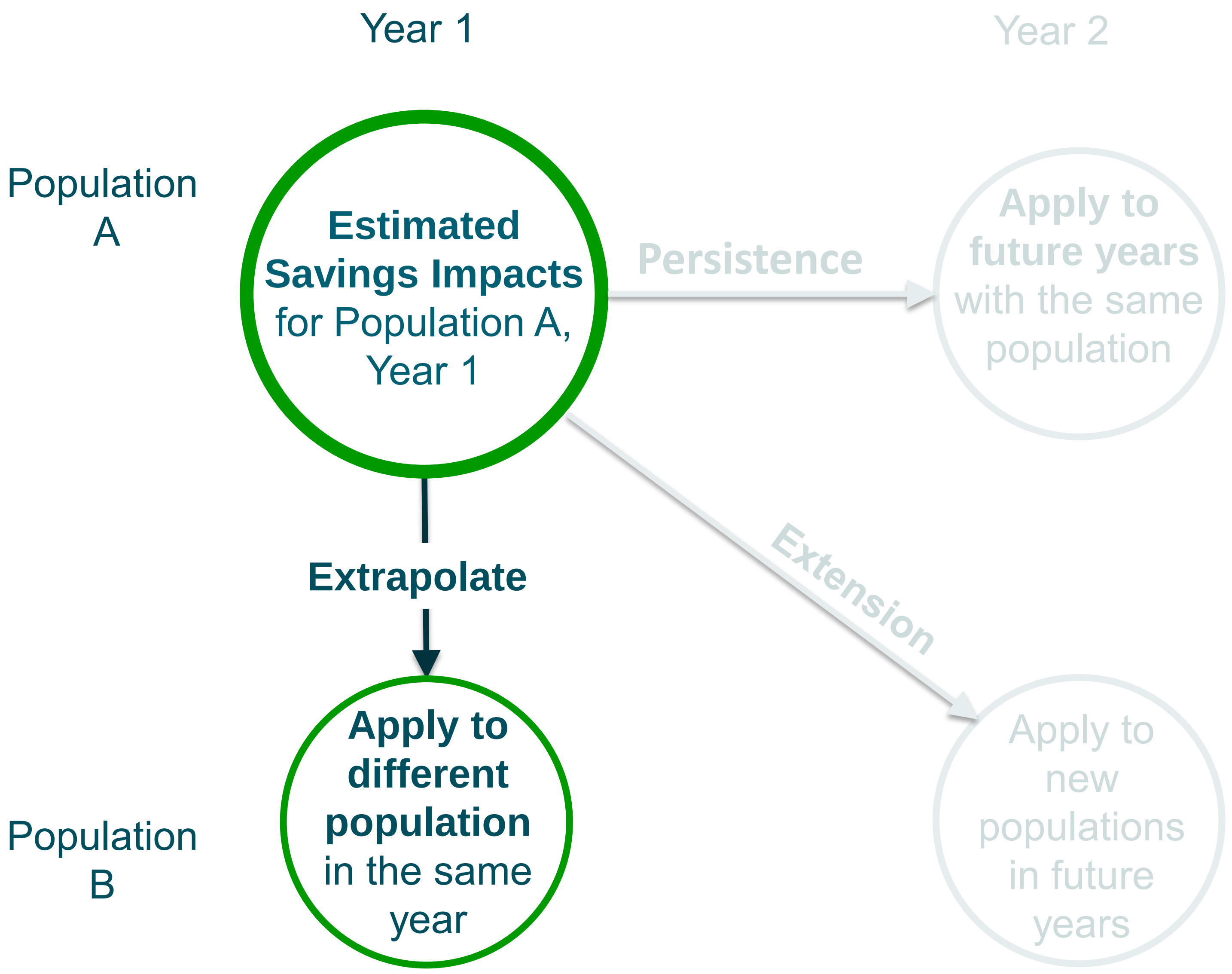
Key recommendations 1,2,3 address internal validity (for a given population, time frame)



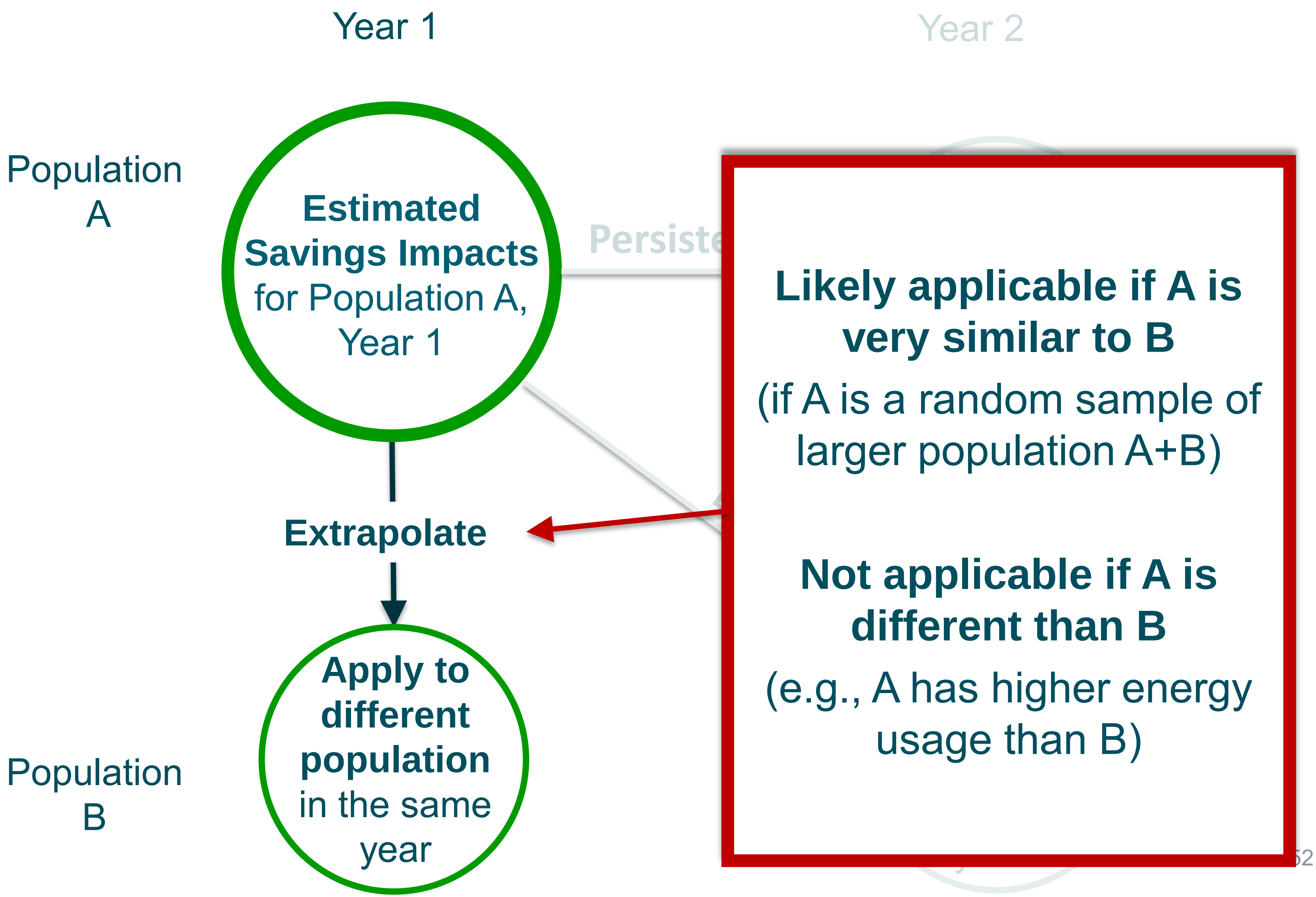
Recommendations for external validity: can the savings be applied to new situations?



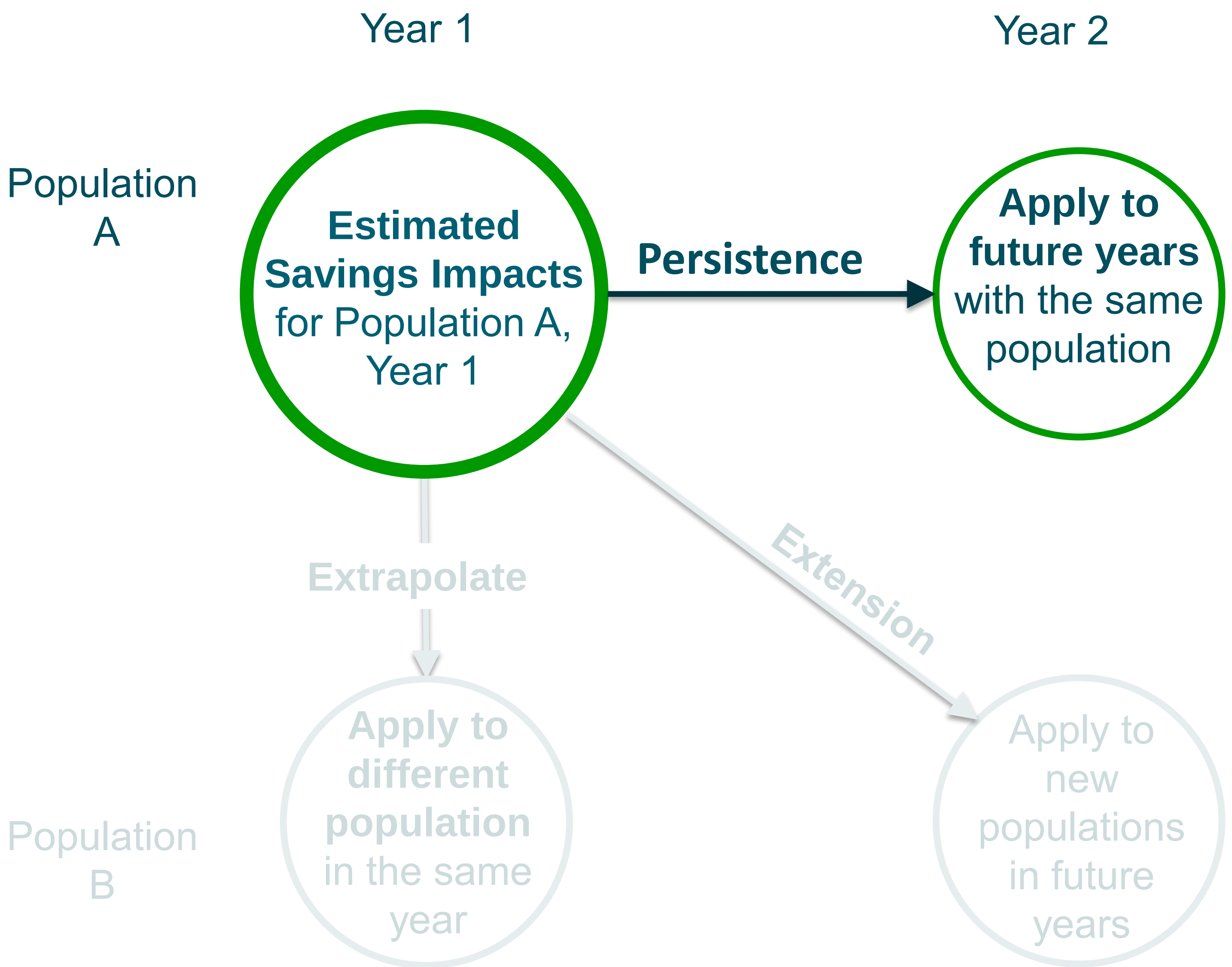
Are the savings applicable to different populations?



Are the savings applicable to different populations?



Do the savings persist over time if the program continues? If it stops?



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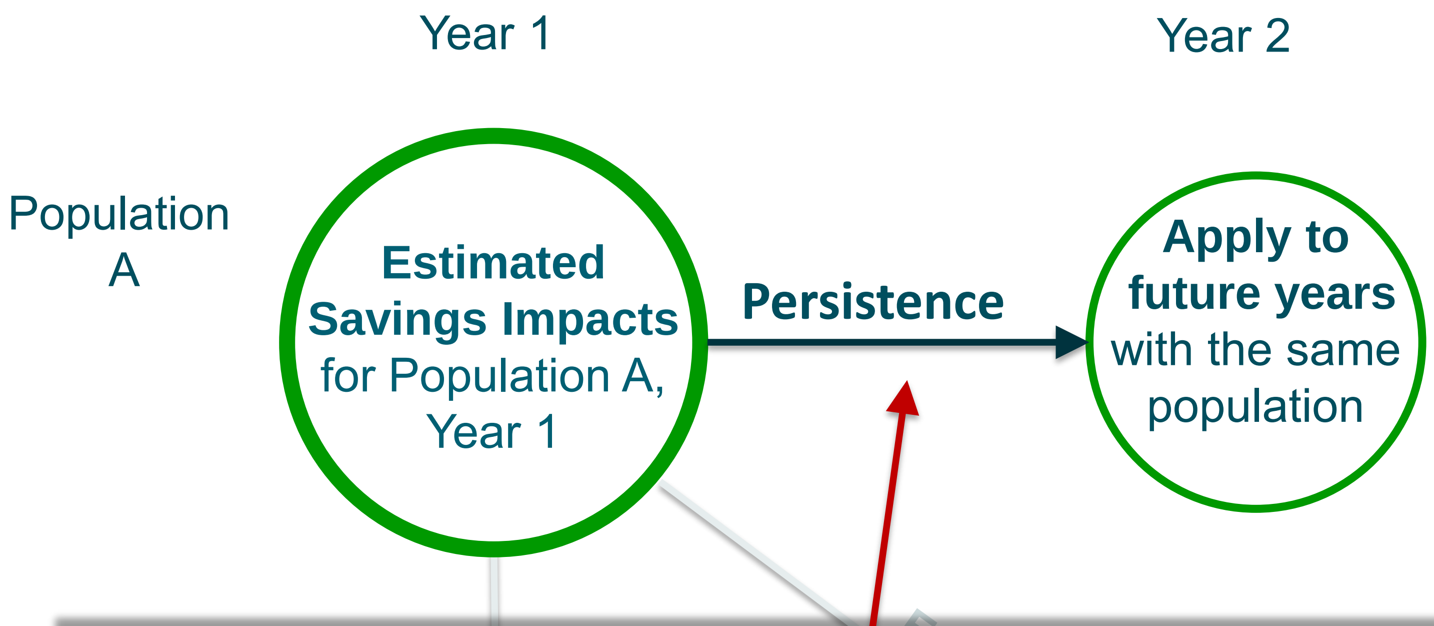
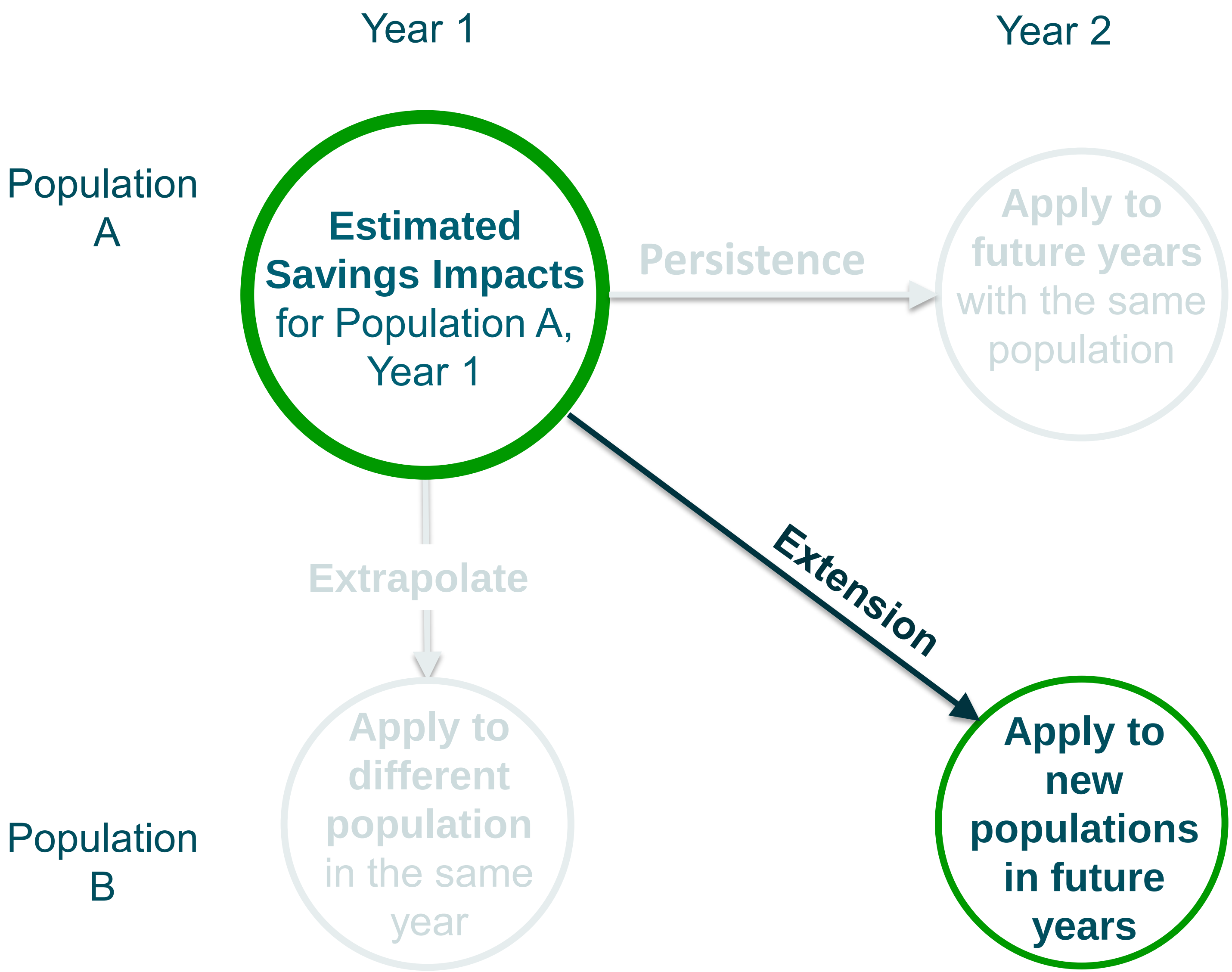


Until there is enough evidence on persistence in behavior-based programs, recommend:

- A control group is maintained for every year in which program impacts are estimated
- Evaluation is done each year initially, every few years after it has been running for several years

If the program is extended to a new population, is the initial savings impact valid?



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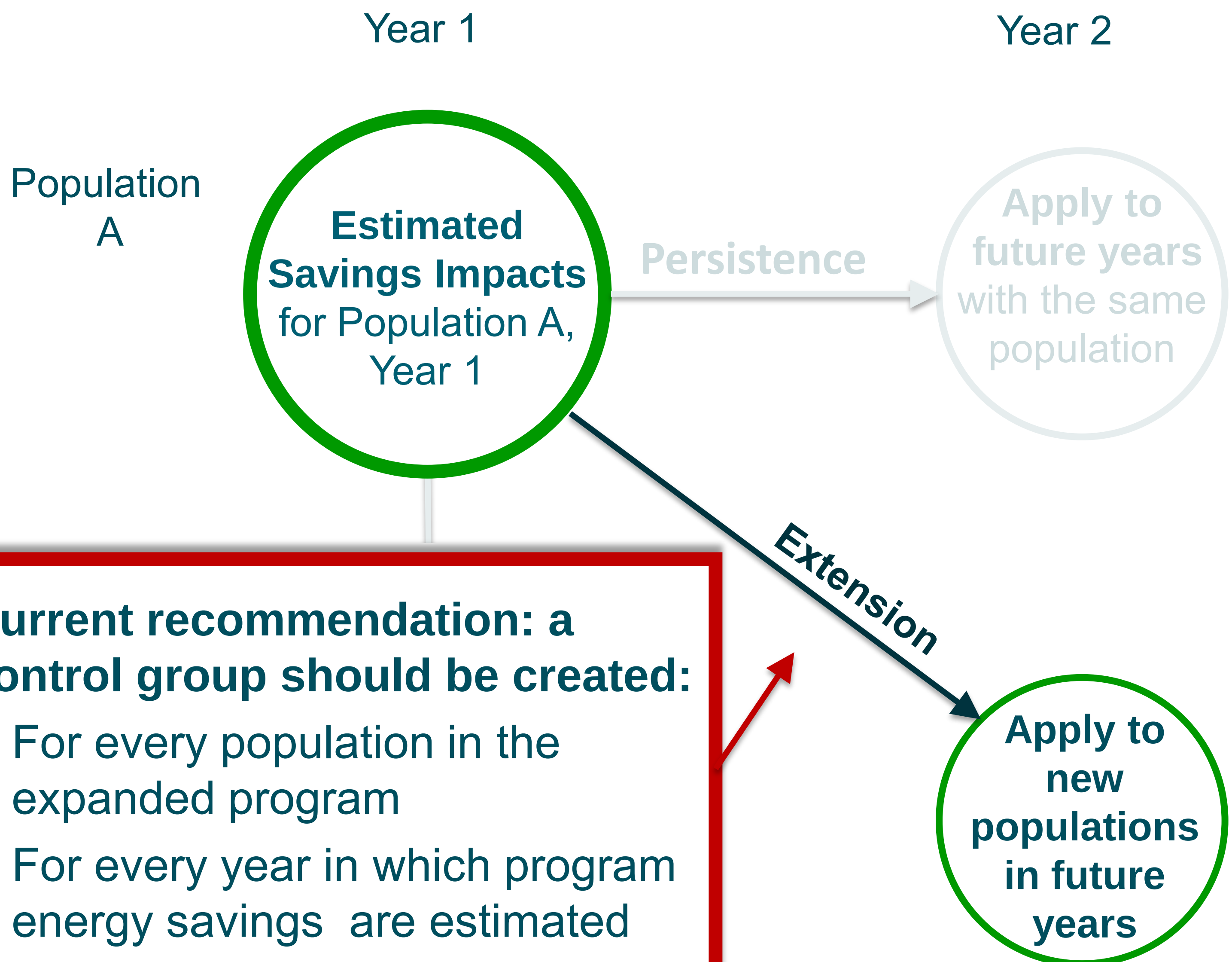


Current recommendation: a control group should be created:

- For every population in the expanded program
- For every year in which program energy savings are estimated

In the future, can we move away from RCTs into a deemed savings approach?

Once we have multiple years of conclusive evidence:

- Move away from RCTs (can be costly), towards a deemed savings approach
- Credibly predict persistence and rollouts to new populations
- For both planning and claiming savings purposes

→ **We are not yet at this point!**

Year 2

Persistence → **Apply to future years** with the same population

Extension → **Apply to new populations in future years**

Extrapolate → **Apply to different population** in the same year

Population B

Conclusions & next steps

- **Main point:** if the recommended methods are used (gold standard is RCTs), then we can be confident that the program's energy savings are valid
- **This issue is timely**
  - Around 40 utilities are currently offering behavior-based EE programs, considering going system wide
- **New research provides insights into:**
  - Persistence of behavior-based programs
  - What behaviors are causing the savings

Questions?

- **Many guidelines and technical recommendations in the report:**
  - SEE Action website, www.seeaction.energy.gov
  - Lawrence Berkeley National Lab website: behavioranalytics.lbl.gov
- **LBNL can offer technical assistance** to state PUCs and energy offices for EM&V guidance and best practices for behavior-based EE programs

Mike Li: Michael.Li@hq.doe.gov

Annika Todd: atodd@lbl.gov

Additional Technical Recommendations

Additional internal validity recommendations

- **Problem**: how to ensure that the estimate of program impact savings is precise enough, not risky
- **Statistical significance recommendation**:
  - Define null hypothesis (the required threshold, e.g., cost effectiveness)
  - Estimate considered acceptable if statistically significant at 5% (i.e., 95% confidence)
  - 5% statistical significance *NOT* the same as 95/5

Additional internal validity recommendations

- **Historical data recommendation**: collect twelve months or more of historical data
  - Especially if program design is quasi-experimental

- **Analysis recommendation**: the model specification (econometric techniques, e.g., regressions) should:
  - Use panel data (many data points over time) vs. aggregated data
  - Not include interaction variables
  - If quasi-experimental, compare the *change* in energy usage vs. energy usage

Excluding Data from Households that Opt-out or Close Accounts

Data cleaning: which households to exclude

	Only data from households that closed accounts are excluded*; households that opt-out of the treatment or control group are included in the analysis (although the program impact estimate may be transformed to represent the impact for households that did not opt-out, as long as it is transparently indicated).
Not Advisable	Data from households that closed their accounts are included*
Not Advisable	Households that opt-out are excluded from the analysis

**If there is a compelling reason to include households that closed their accounts and the analysis is undertaken correctly to deal with unbalanced data sets, then it may be advisable.*

Cluster Robust Standard Errors

Ensure that the standard errors are robust and account for clustering

Equivalency Check

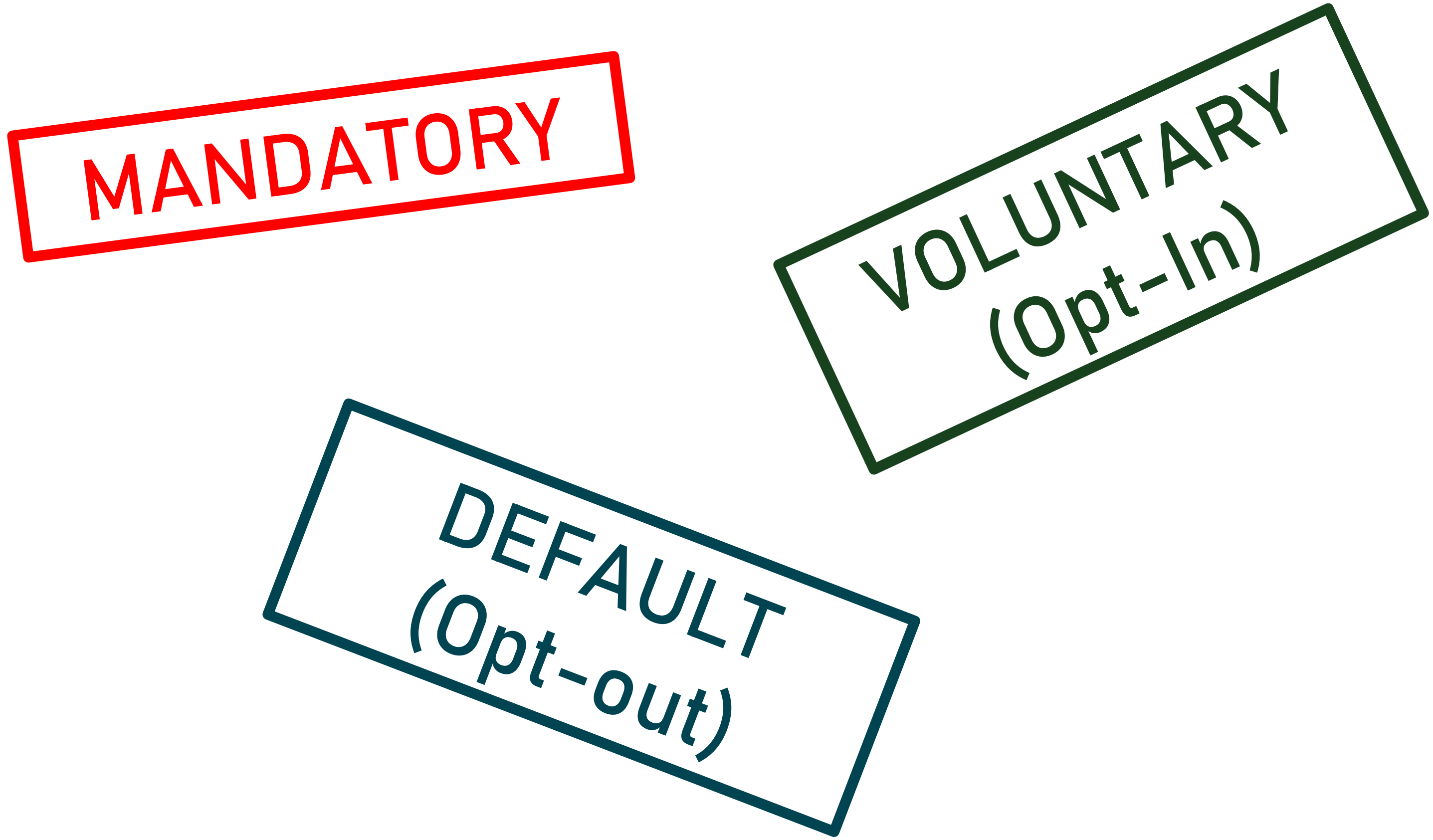
Validate that the control and treatment group are equivalent

★★★★★	An equivalency check is performed with energy use data as well as household characteristics
★★★☆☆	An equivalency check is performed with energy use data
Not Advisable	An equivalency check is not performed

ADDITIONAL MATERIALS:

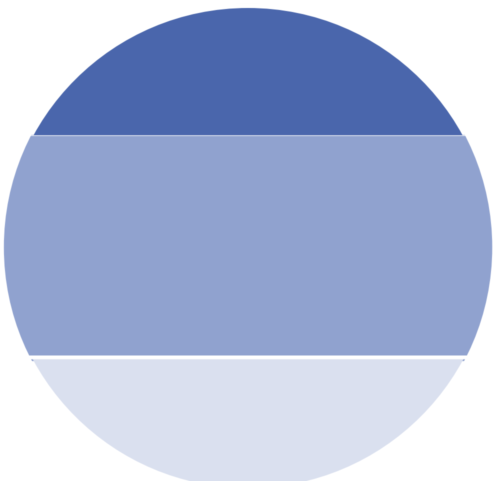
Enrollment Approaches

Enrollment Approaches



Customer Prototypes Under Different Enrollment Approaches

Population of Interest (POI)



Never Takers
- Join if made mandatory
- Do not join if required to opt-out

Customer Prototypes Under Different Enrollment Approaches

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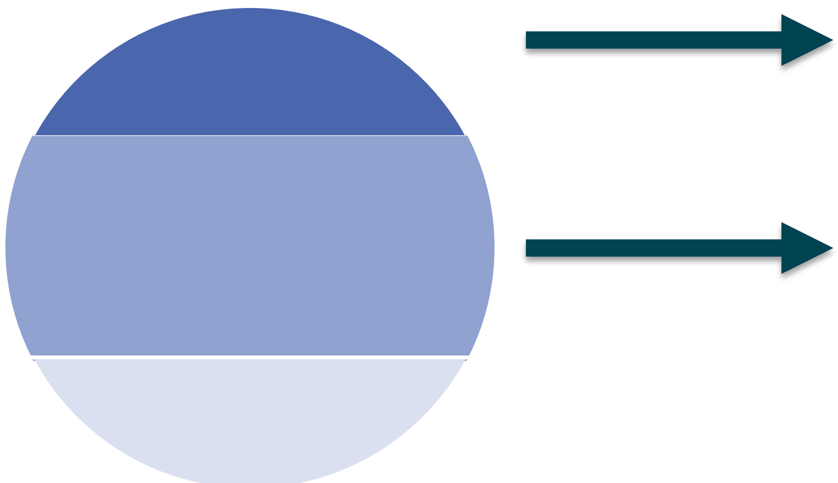

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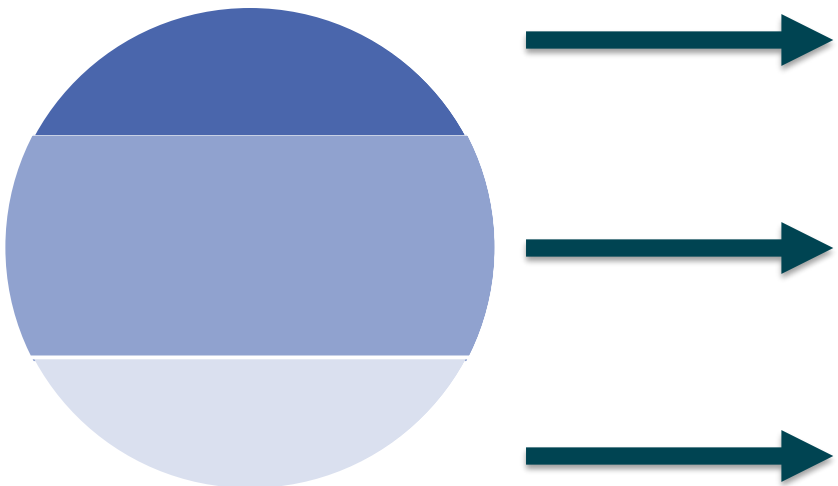

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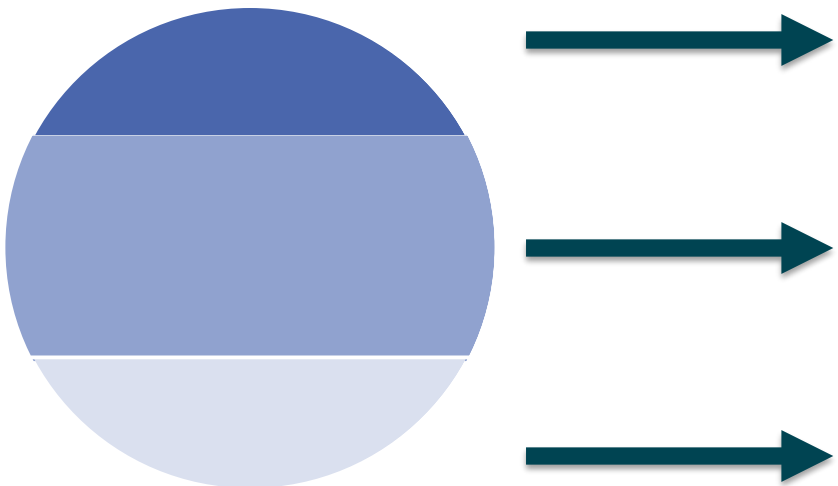

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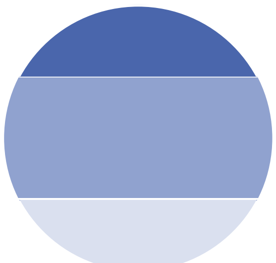
Critical Questions: How similar are these customers based on observable characteristics (e.g., usage, demographics, etc.)? How different are these customers in unobservable ways?

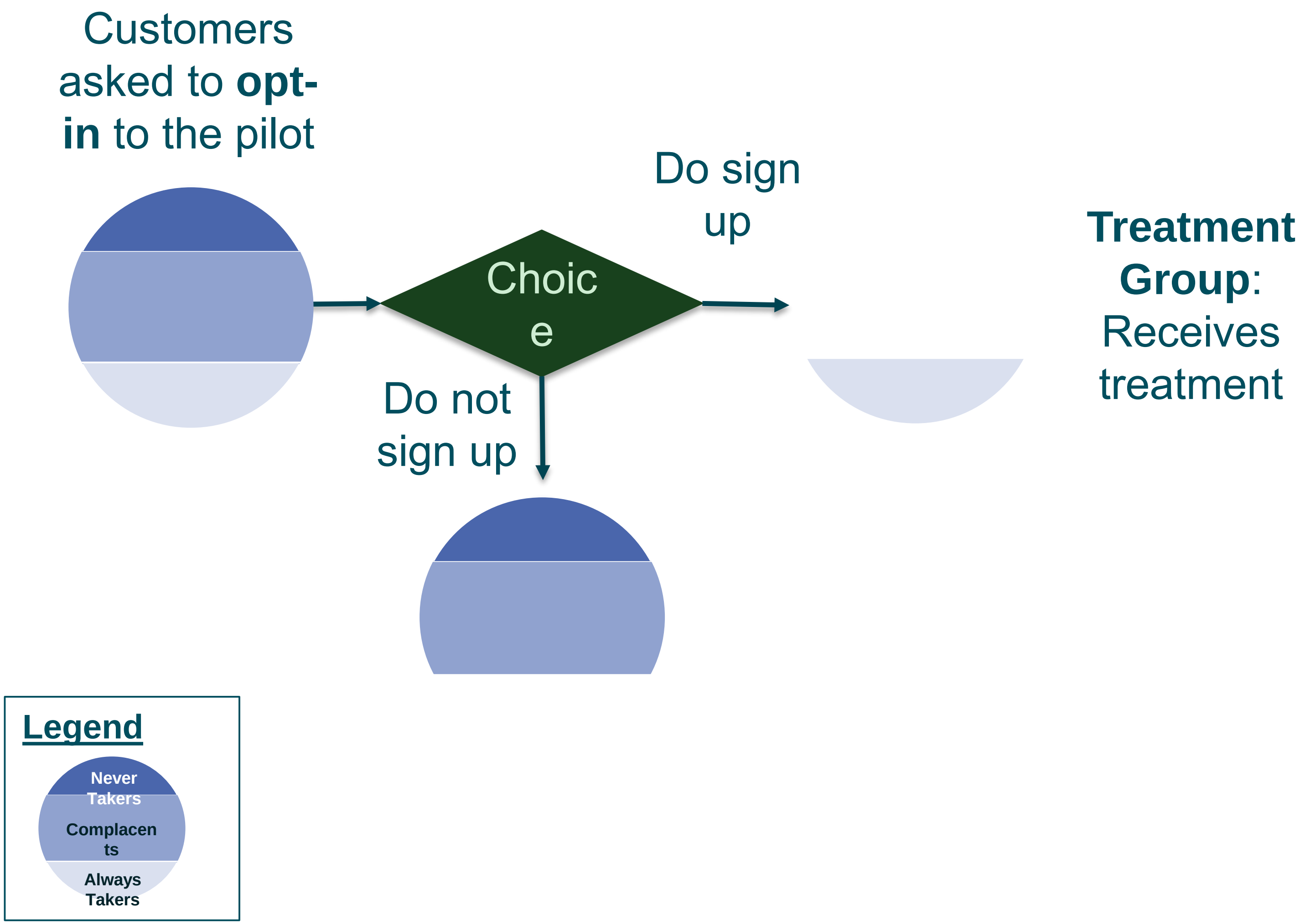
Common Study Design: Voluntary Enrollment

Customers asked to **opt-in** to the pilot



Legend

Common Study Design: Voluntary Enrollment



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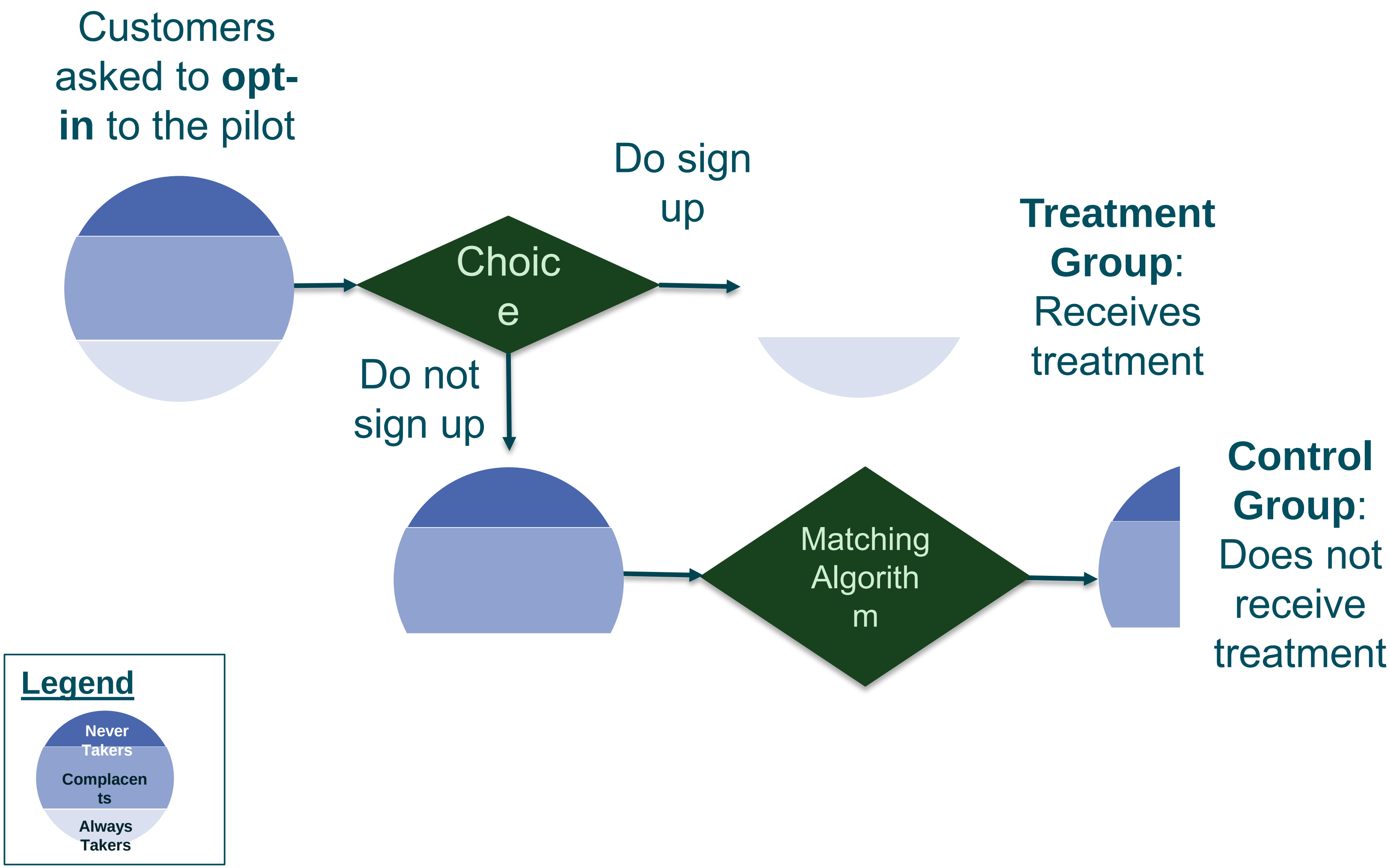

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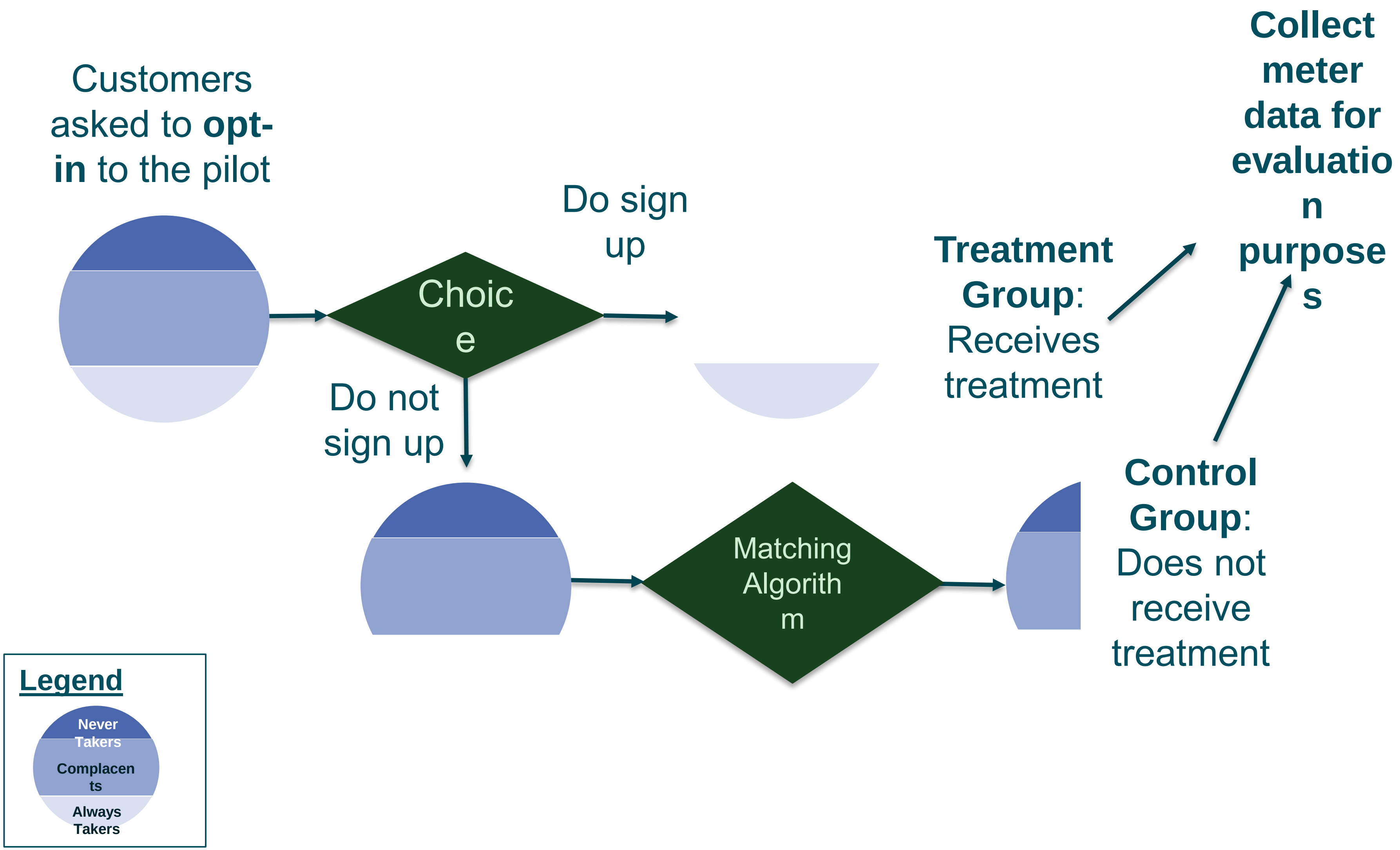
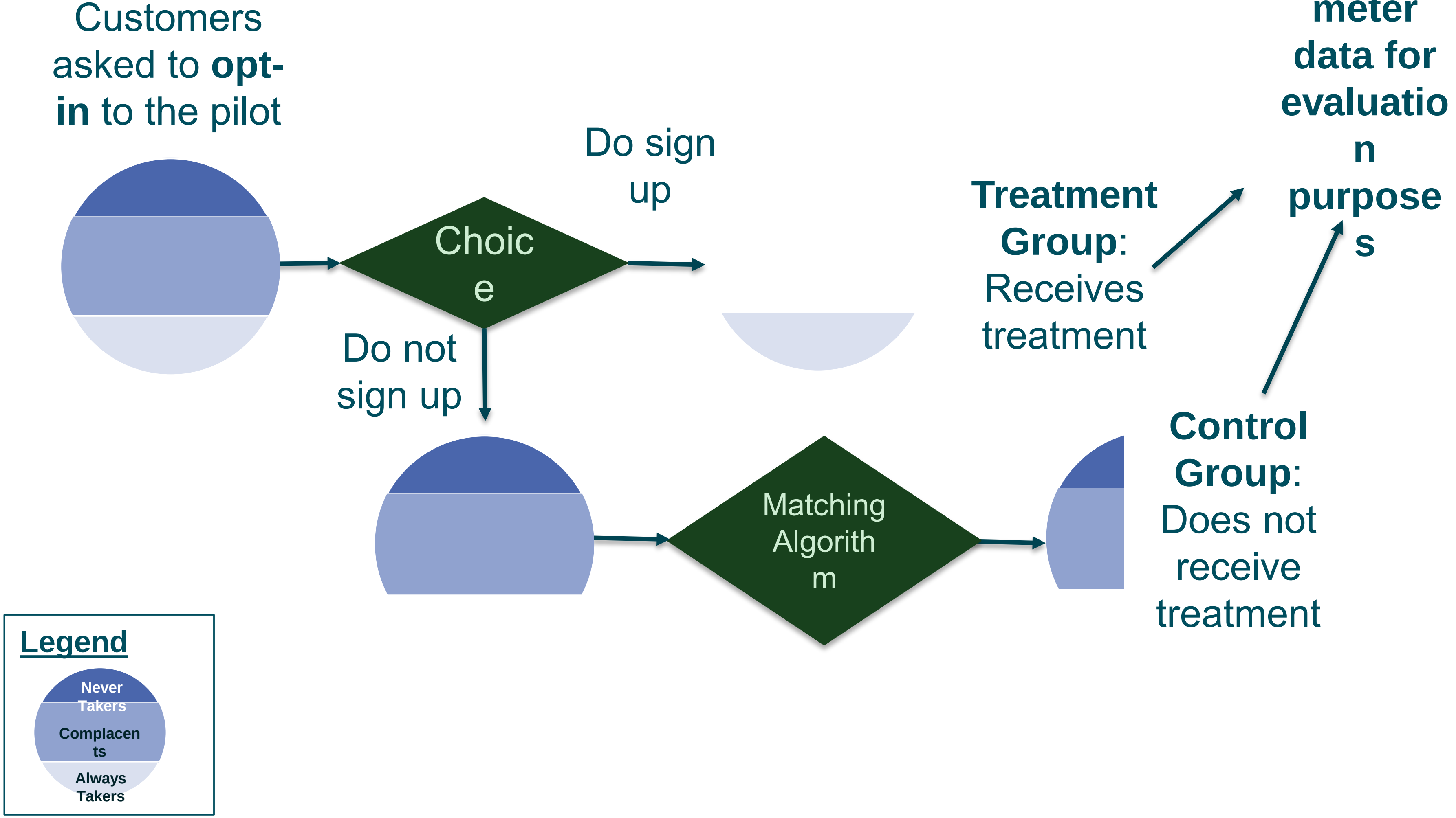


Common Study Design: Voluntary Enrollment

SELECTION BIAS LIKELY LEADS TO PROBLEMS WITH INTERNAL VALIDITY



Randomized Control Trial: Voluntary Enrollment

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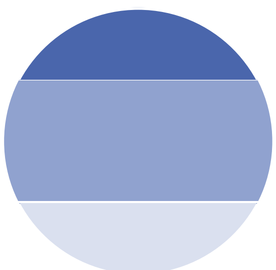

Legend

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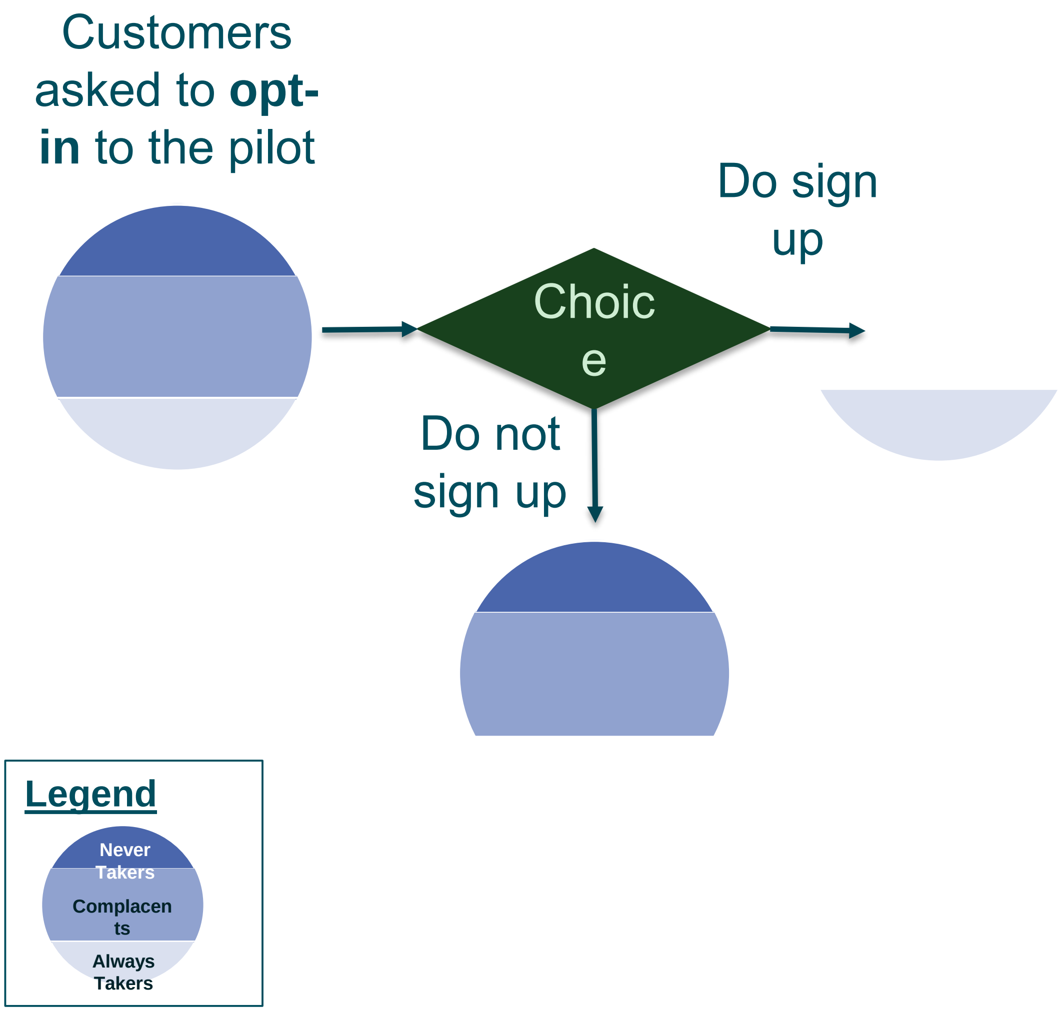

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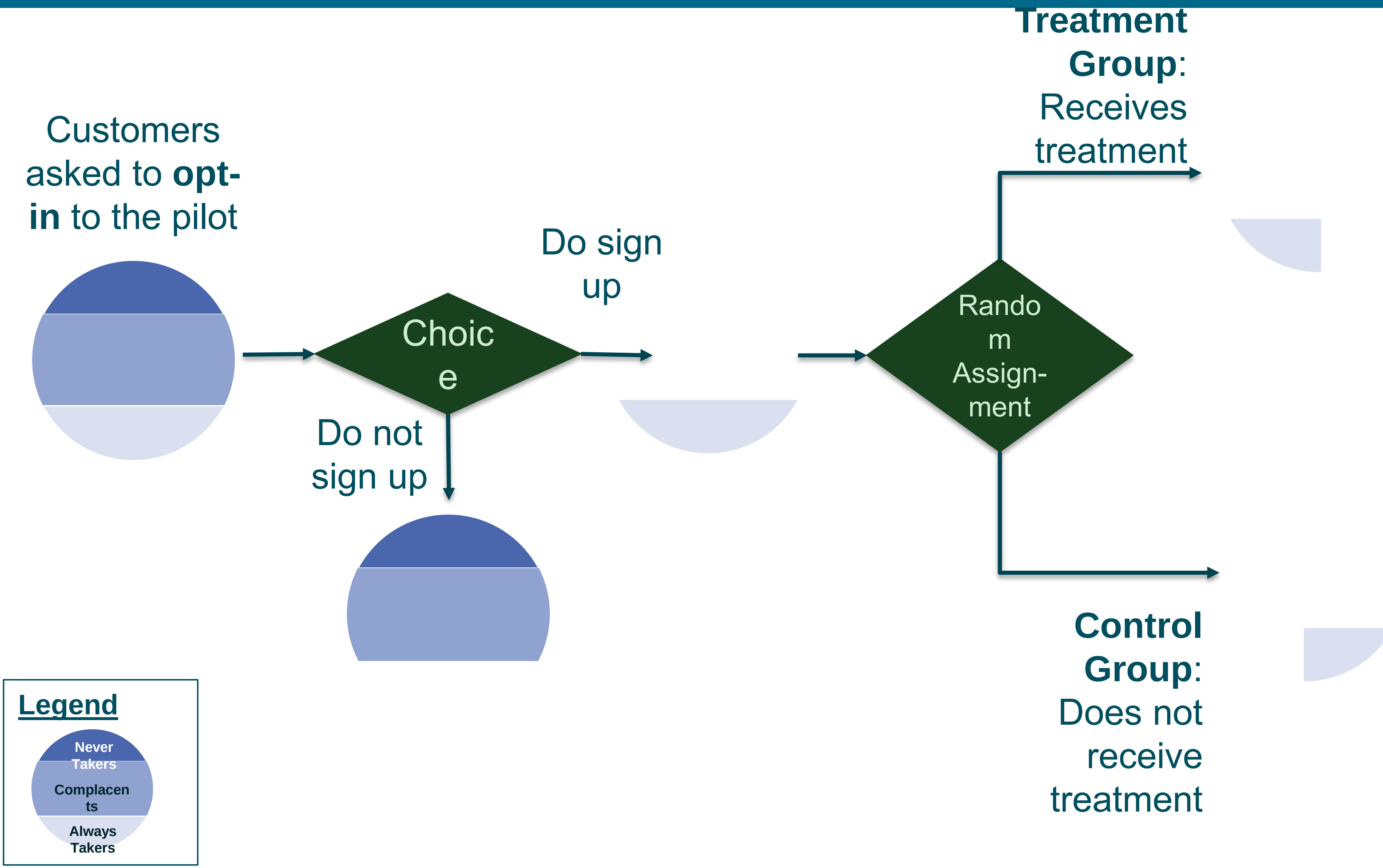

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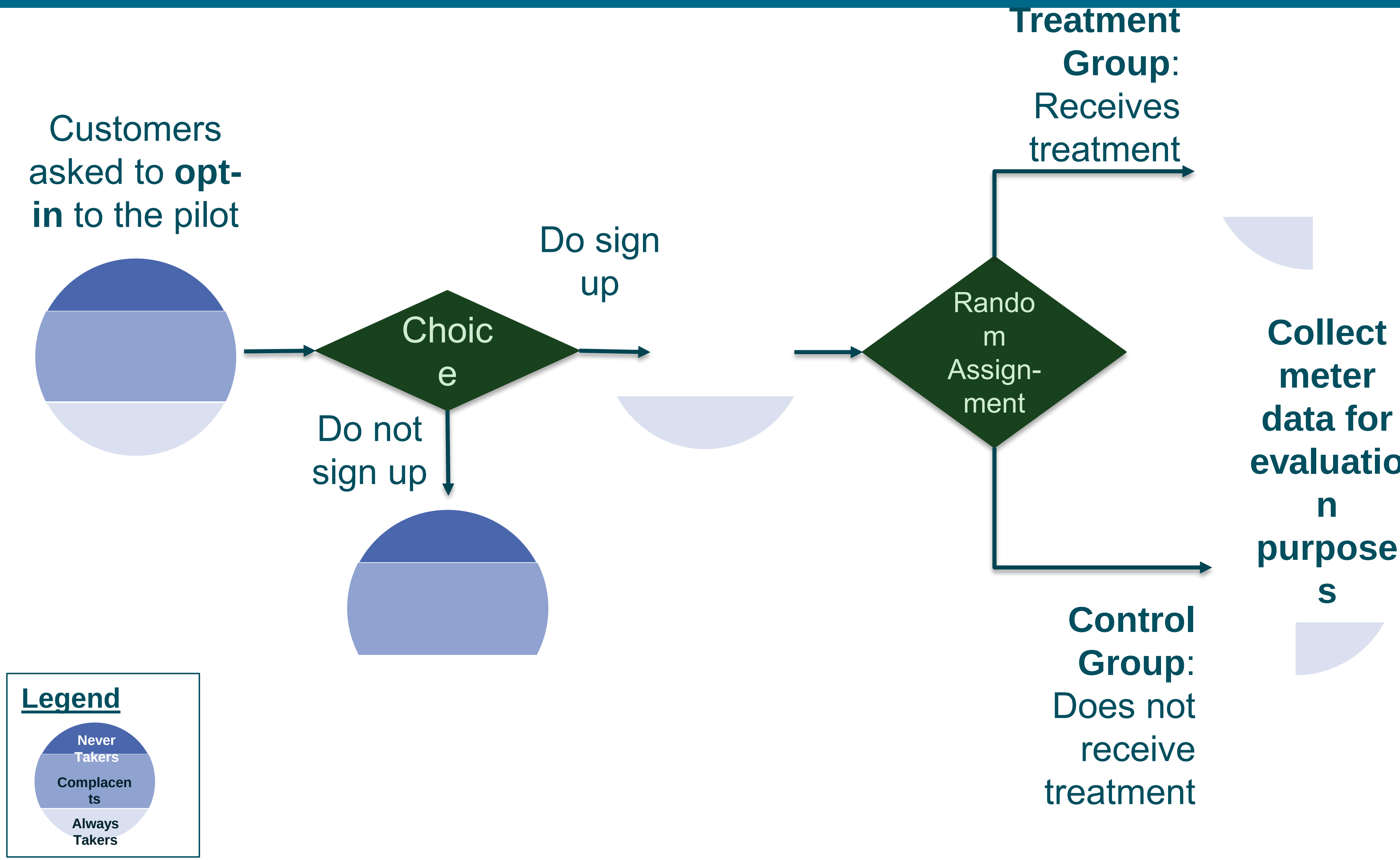
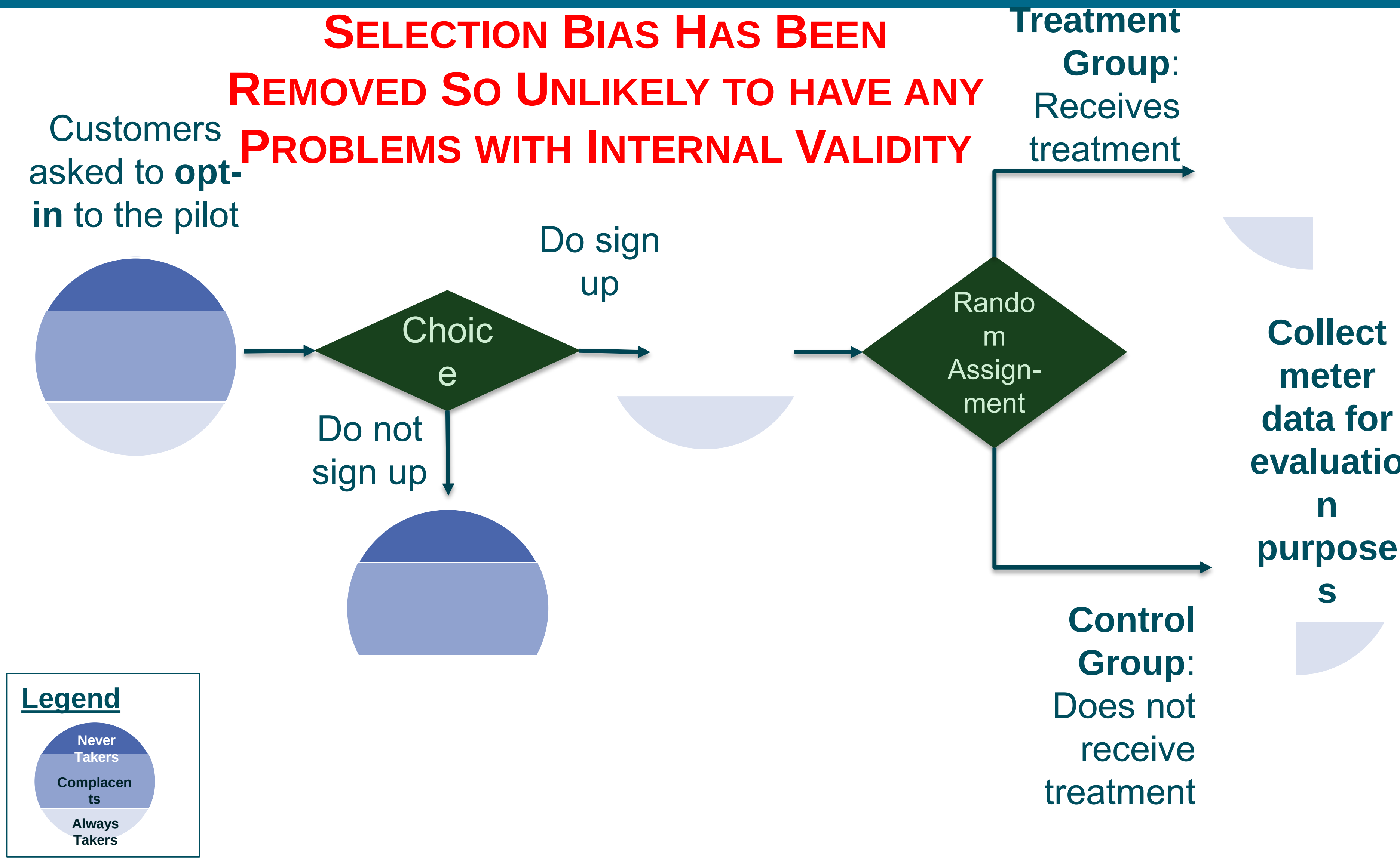


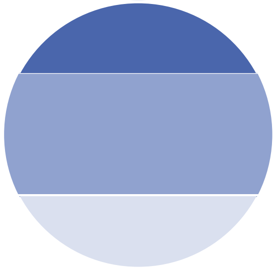
Randomized Control Trial: Voluntary Enrollment

SELECTION BIAS HAS BEEN REMOVED SO UNLIKELY TO HAVE ANY PROBLEMS WITH INTERNAL VALIDITY



Randomized Encouragement Design: Voluntary Enrollment

Population of Interest



Legend

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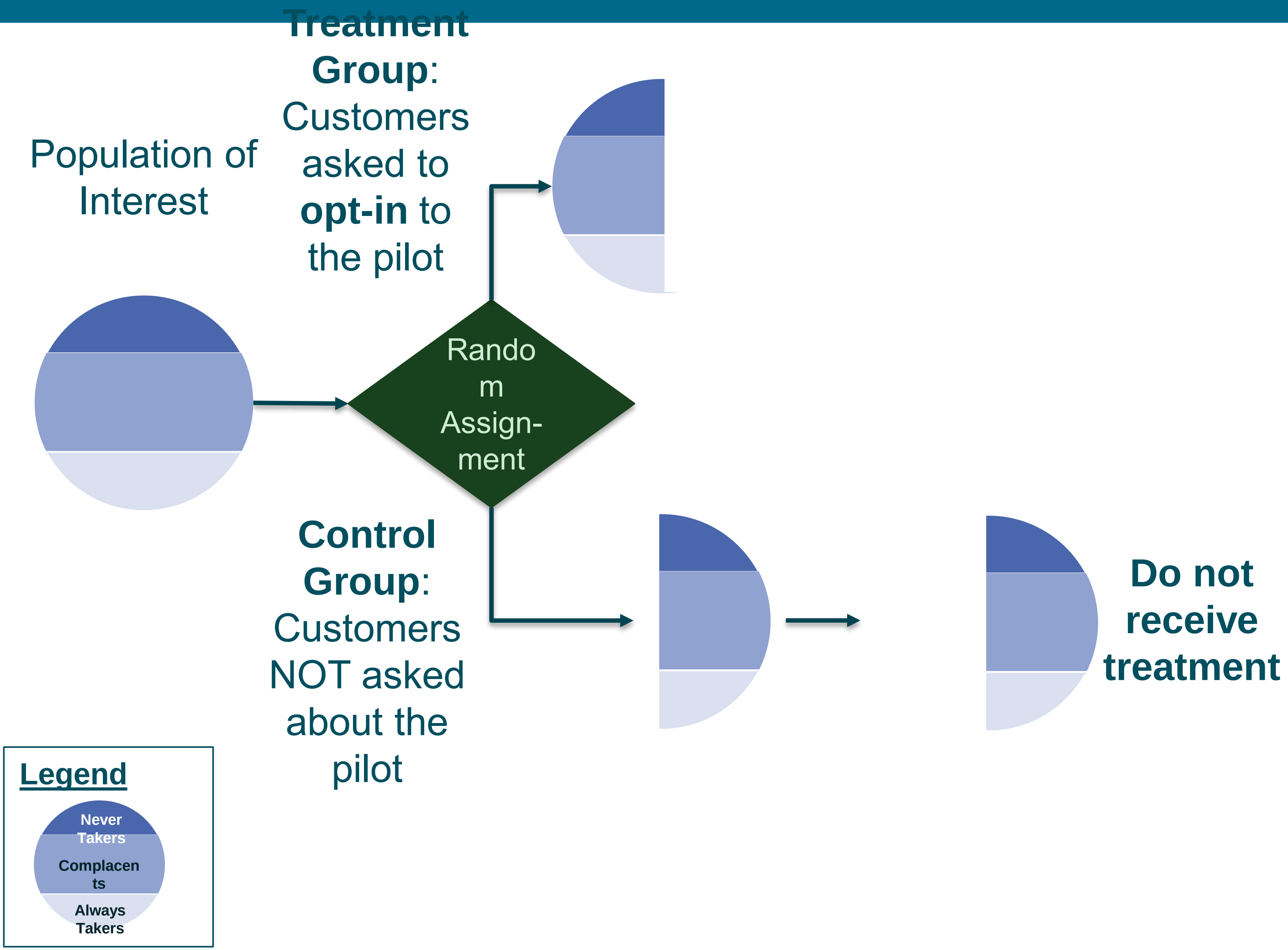

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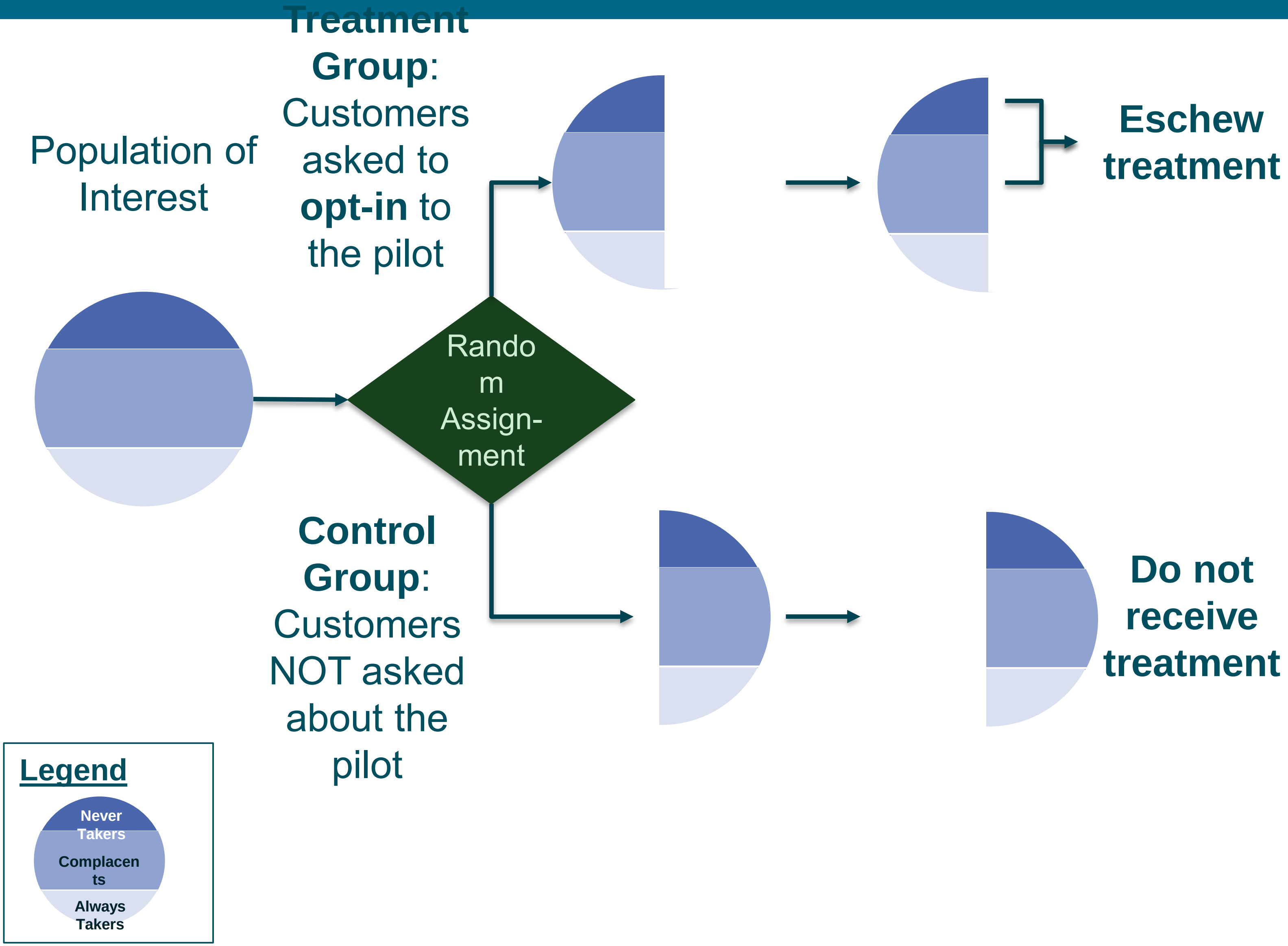

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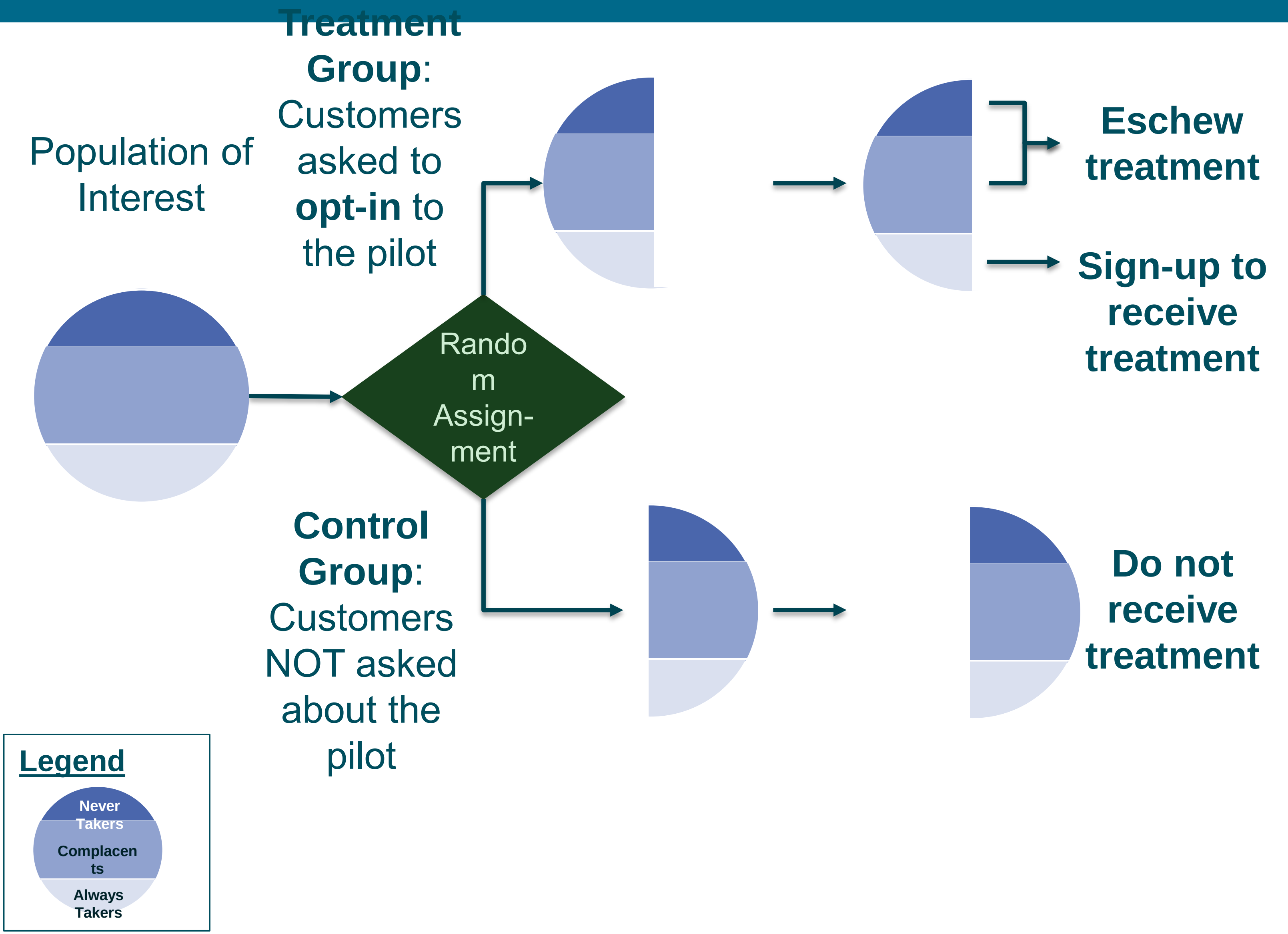

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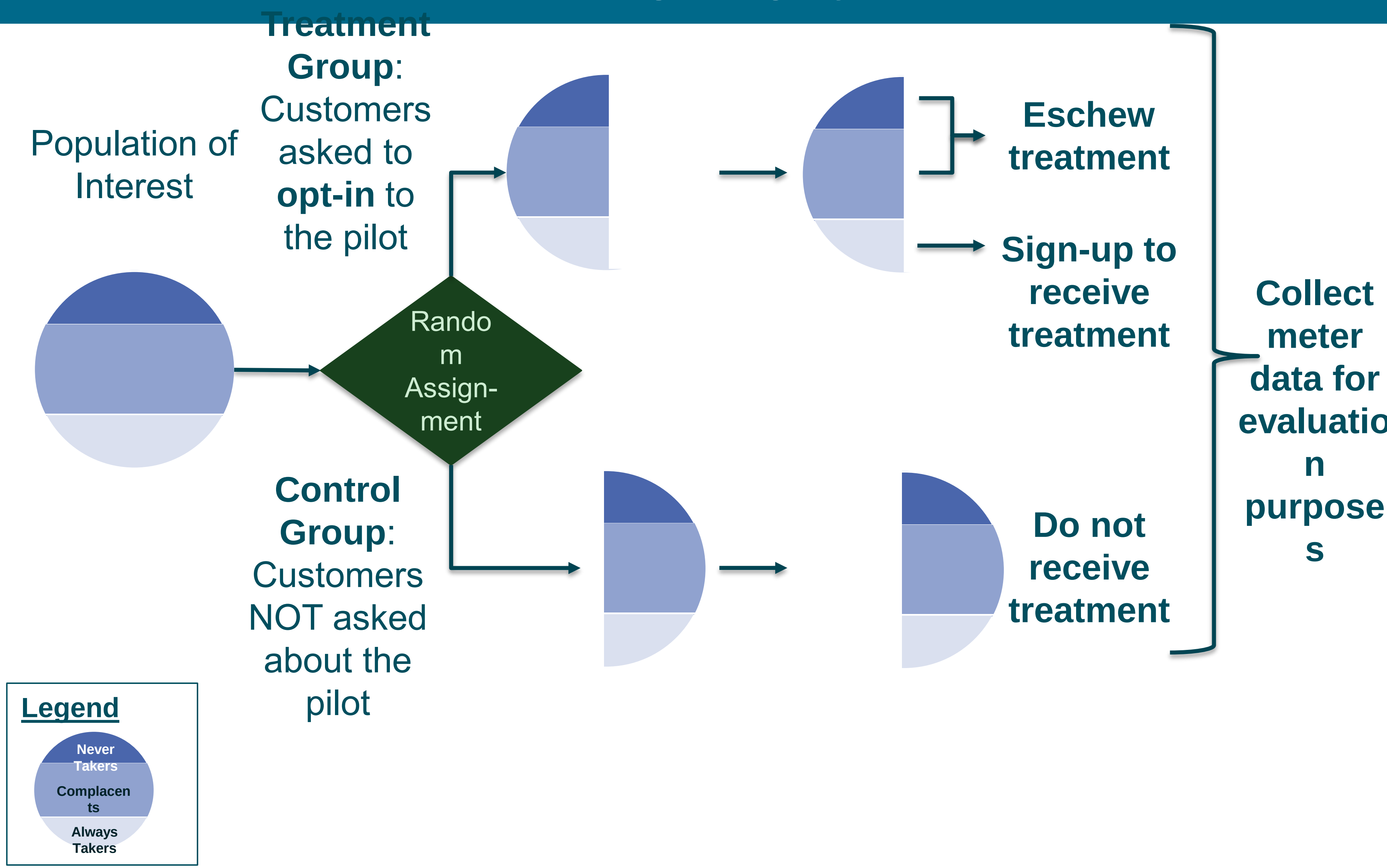
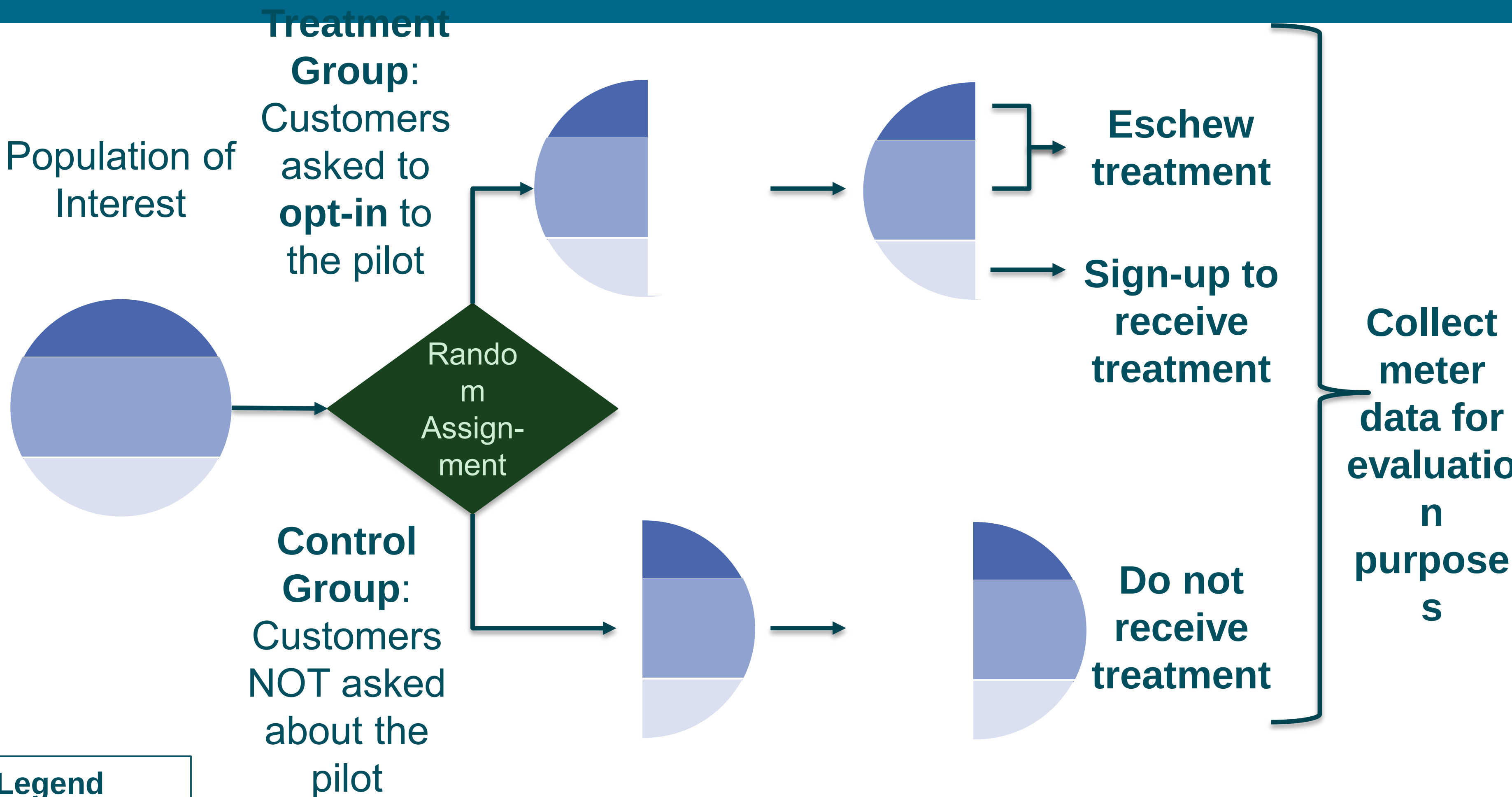
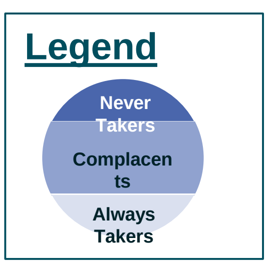


Randomized Encouragement Design: Voluntary Enrollment





SELECTION BIAS HAS BEEN REMOVED SO UNLIKELY TO HAVE ANY PROBLEMS WITH INTERNAL VALIDITY

ADDITIONAL MATERIALS:
Concerns and Cautionary Tales

Common Concerns with Pilot Designs w.r.t. Enrollment

- Can I ask someone to join the pilot but then not give them the treatment?
  - Tell customers the study has a limited enrollment
  - Delay access to the treatment for a subset of participating customers
- Can I give participating customers some financial incentive for joining?
  - Make sure if anything is provided, it is not large enough to be the main driver for participation.
  - Consider non-monetary incentives (e.g., donation to charity)

Cautionary Tale: "I Just Wanted the iPad!"

- Utility implemented a recruitment effort for their pricing pilot in June
- Recruitment material included solicitation for customers to complete a survey in order to be eligible to win an iPad
  - In so doing they would also be entered to participate in a pricing pilot – this was not obvious to some participants
- Utility confirmed participation in the pricing pilot six (6) months later (December)
  - Many participants said they did not remember signing up for the study, but vaguely remembered a survey and a chance to win an iPad
- 50% attrition rate ➔ Incapable of accurately and credibly estimate load impacts based on experimental design
- "Cancelled" the pilot and redesigned it

Cautionary Tale: Internal Tracking and Data Collection

- Utility designed experimental pilot with specific offers of rate and technology combinations to specific customers
- During enrollment, no technology eligibility or qualification information was collected by the utility of participants
- After enrollment, utility made primary and secondary technology assignments to participants
- Utility personnel then went out to install technology at customer premise
- If customer was ineligible to receive primary technology, then secondary technology was installed, etc.
- Data file that contained Primary and Secondary technology assignments was lost, so utility was only aware of what customers actually received
- This undermined the initial experimental design which in turn adversely affected the load impact evaluation effort

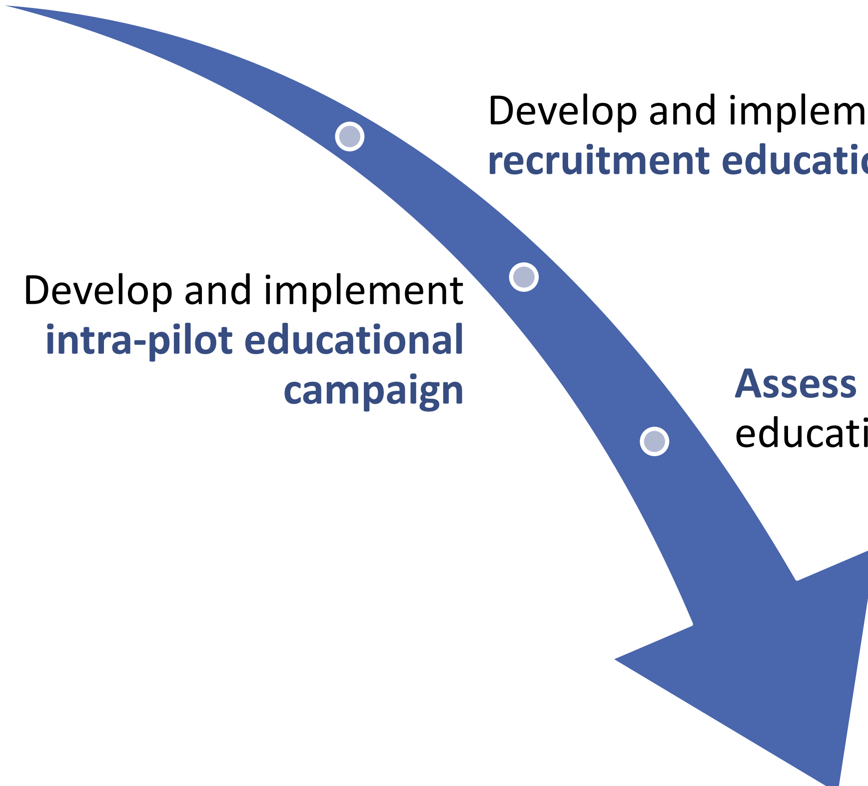
Education Plan

Perform **educational needs assessment**

Develop and implement **pre-recruitment educational campaign**

Develop and implement **intra-pilot educational campaign**

Assess effectiveness of various educational campaigns



Develop lessons learned for future educational activities

Outreach Plan

Identify key stakeholders who can support achievement of a successful pilot

Develop outreach strategy with key stakeholder groups

Implement outreach strategy

Assess effectiveness of outreach strategy

Develop lessons learned for future outreach activities

Marketing Plan

Perform market research to develop marketing campaign

Test your marketing messages and enrollment process through focus groups, online surveys, etc.

Implement marketing campaign **first through soft-launch** and then full hard launch

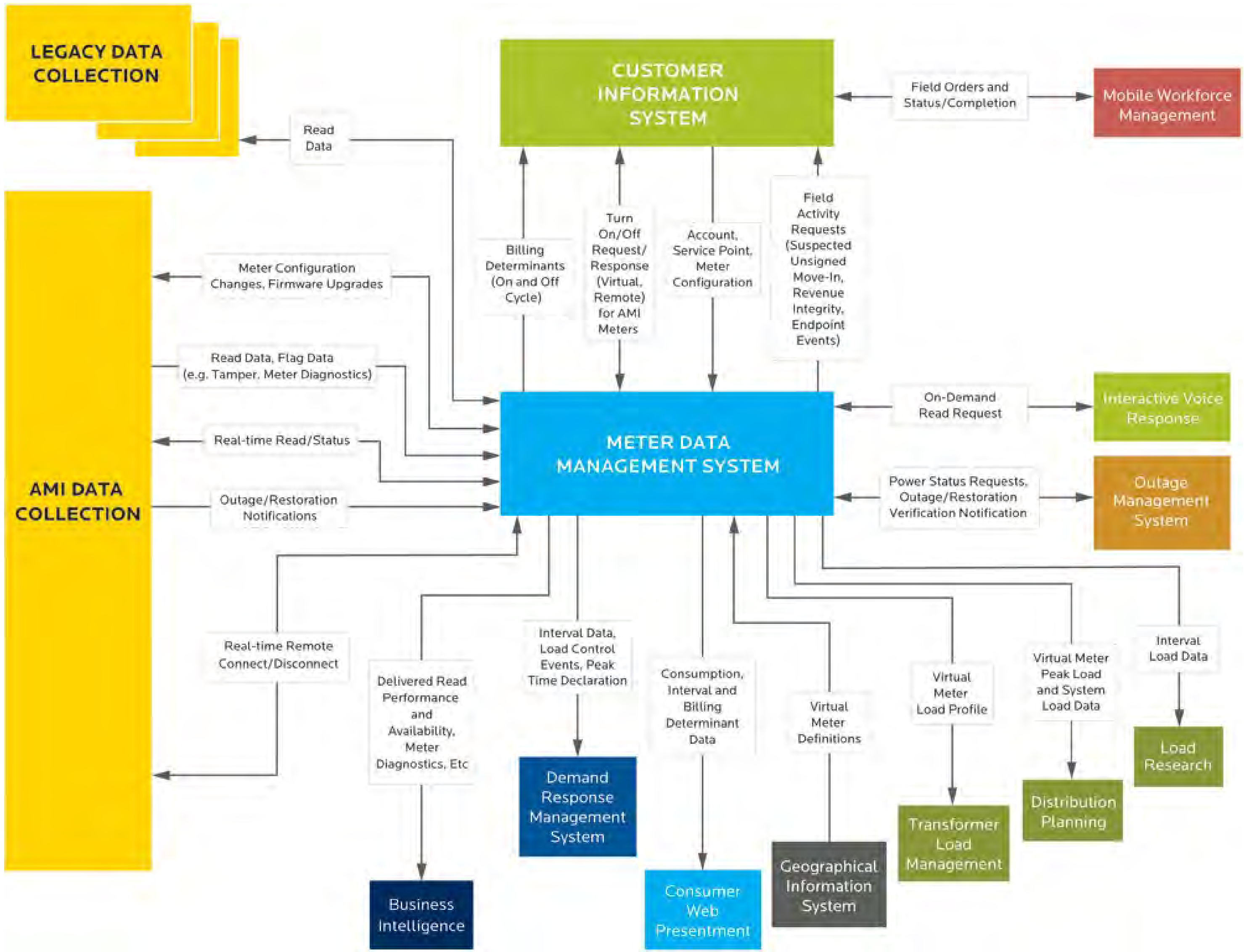
Assess effectiveness of marketing channels, touches, and enrollment process

Develop end-of-pilot marketing campaign to support transition of participants

Cautionary Tale: Marketing and Enrollment Gone Bad

- Utility developed its marketing strategy, enrollment process, and communications plan with a large industry consultant for a TOU pricing pilot
- After recruitment campaign encompassing ~10,000 customers ended, utility was only able to recruit 182 customers (1.8% enrollment rate) out of the planned 850 customers (~20% of target pilot sample) ➔ Forced to "cancel" pilot
- Ex-post evaluation effort revealed several deficiencies
  - A complicated and lengthy 10 step online enrollment process was used with no opportunity to enroll via phone or business reply card
  - Several areas for improvement in communications material were identified (e.g., initially focused on usage management instead of highlighting that a lower rate would be in effect 94% of hours)
- Revised communications plan and implemented simpler and more varied enrollment options for an unplanned Phase 2 of the pilot and in so doing lost a year

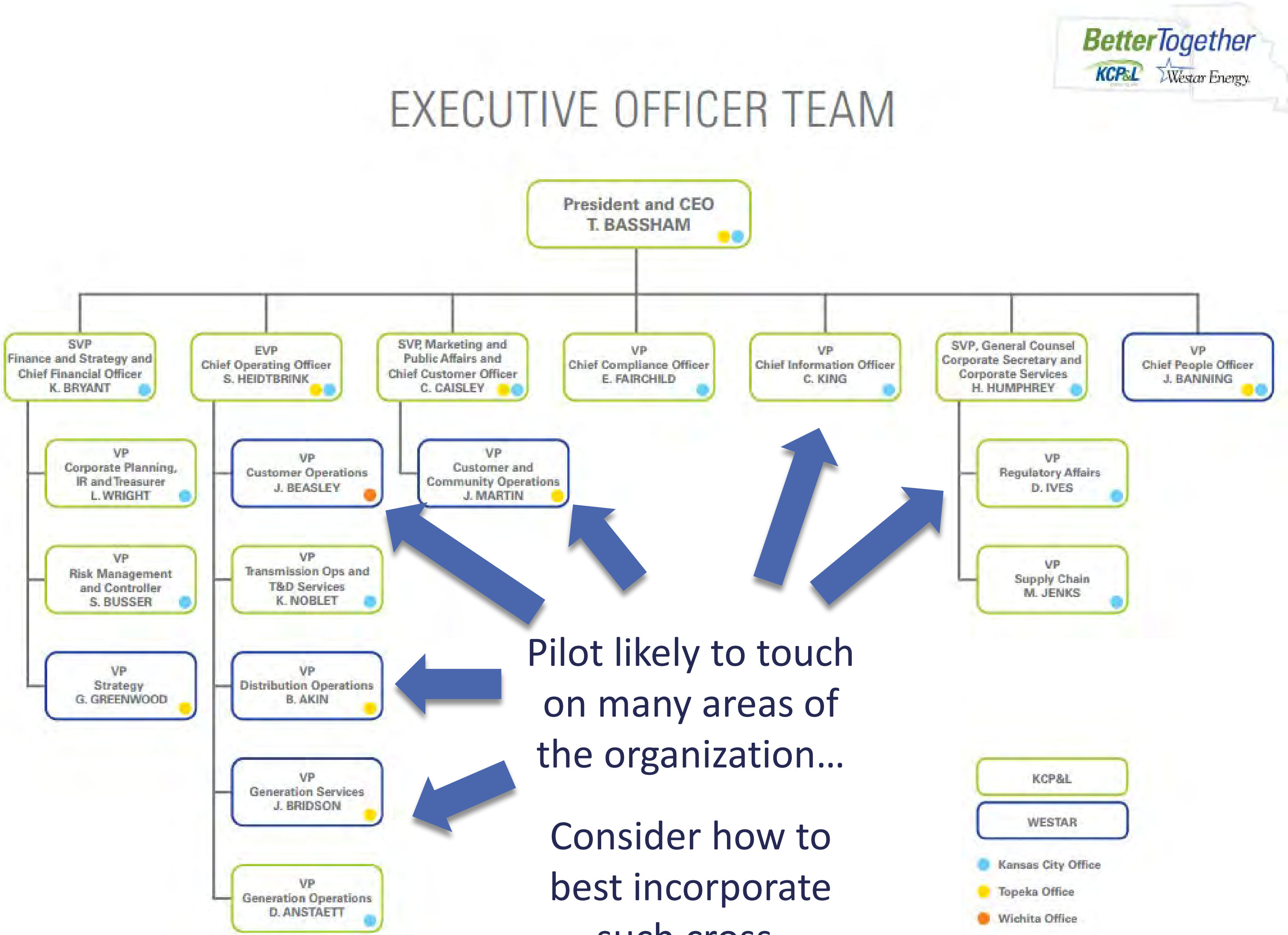
Information Technology and Data Management Plan



Cautionary Tale: Utility Communication with Customer Tech

- Utility pricing pilot included customer-controlled PCTs that were able to receive price signals and execute cooling strategy according to pre-programmed settings
- Utility had major problems reliably sending prices to PCTs that were correctly received and acted upon
  - Utility initially sent out the wrong price to PCTs
  - Then realized the error and corrected the problem by sending out the right (higher) price
  - PCT did not acknowledge the price increase and failed to execute the appropriate control strategy
  - At least 39,000 customers faced the higher price but whose PCTs failed to take the appropriate action in response
  - Utility provided these customers with ~$200K in total bill credits

Internal (Re)Organization



Pilot likely to touch on many areas of the organization…

Consider how to best incorporate such cross-functional staffing requirements

Cautionary Tale: Stress Testing Under Expected Conditions

- Utility pricing pilot included CPP with tariff language requiring day-ahead notification by a certain time for a critical event the following day
- Utility tested the event notification process prior to going live for ~100 people
- Early in the first summer of the pilot, utility declared an event for the following day, but system bogged down such that notifications for majority of several thousand customers arrived after the deadline, if at all
  - Identified the problem, canceled the event, and notified customers accordingly
- Billing system ran later that month charging customers for higher CPP rates during the cancelled event
  - Billing system process did not account for cancelling a called event so billing system automatically charged customers
- Utility was not legally allowed to charge customers the higher CPP rate during this event based on tariff language
  - Utility had to manually issue credits for every participating customer

From Pilot to Program
Viewpoints on Utility Pilot Design

Nekabari L. Goka
Manager | Regulatory Affairs and Market Development
Oracle Utilities

February 27, 2020

ORACLE

Safe Harbor Statement

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Oracle Utilities Solutions

Asset Operations	Network Operations	Meter Operations	Customer Operations	Customer Experience
Work and Asset Management	Outage Management	Meter Data Management	Customer Care & Billing	Digital Self Service
Mobile Workforce Management	Distribution Management	Load Profiling & Settlement	Customer Service Interface	Demand Side Management

Analytics

ORACLE

Oracle Utilities: Opower Highlights

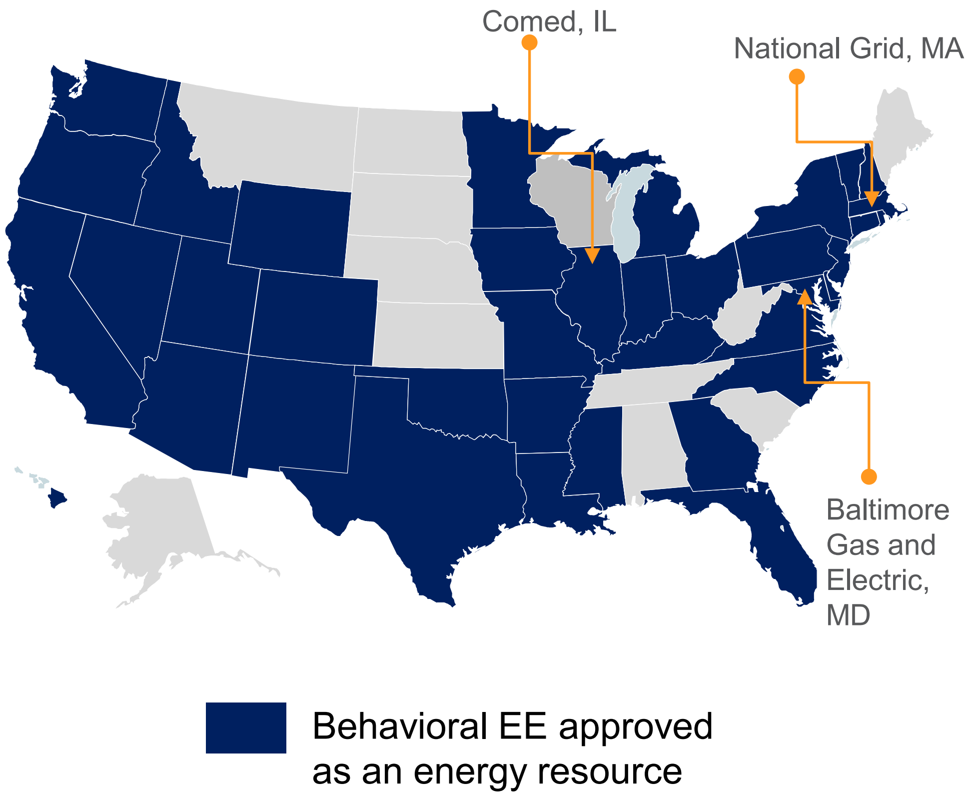
- Touched over 60M households
- Over 10 years of proven and reliable DSM programs
- 25+ TWh and $2B+ generated in customer savings
- 120 million annual customer communications across channels
- 1.6 trillion meter reads, representing over 50% of US residential energy data

Public Policy and Pilots

Public policy risk appetite

The necessary condition for pilot and product innovation

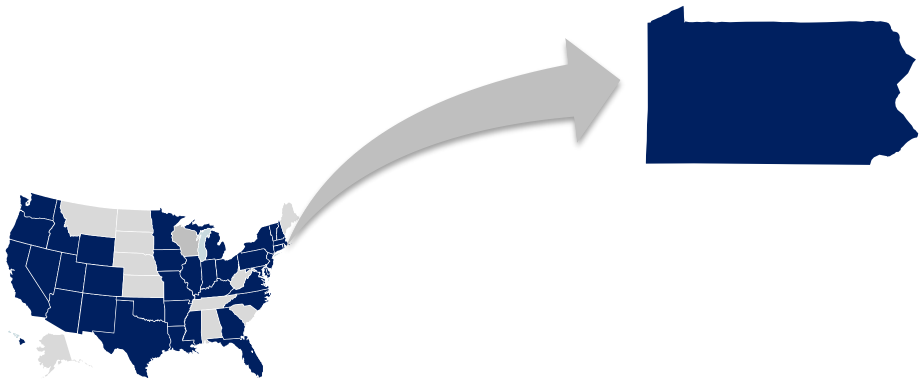
- Innovation in the utility industry is driven by clearly established public policy objectives
  - Renewable Portfolio Standards
  - Energy Efficiency Resource Standards
  - Clean Peak Standard
- Oracle/Opower's behavioral energy efficiency product wouldn't have taken hold without the appetite from policy makers to try something new
- Part of that appetite involves recognition of value without being able to fully quantify all of the benefits…*in the beginning*



Public policy risk appetite (continued)

The necessary condition for pilot and product innovation

- Massachusetts regulators were among the first to approve Opower DSM programs in 2009
- Approval required public policy leadership and sufficient risk appetite
- Regulators did not want to arbitrarily limit potential future value without any hard evidence to do so



"The Department agrees with those commenters who assert that including hard-to-measure energy efficiency programs within other programs would mask the true costs and benefits of both programs….allocating hard-to-measure energy efficiency programs to existing programs would result in arbitrary assignments that could limit the effectiveness of both the hard-to-measure, and measurable programs. Given that the benefits of hard-to-measure energy efficiency programs are difficult to quantify using traditional methods, yet recognizing their potential value, the Department finds it appropriate to evaluate their cost-effectiveness as follows…"

DPU 08-50-A, Guidance on addressing of pilot programs, Filed March 2009

ORACLE

Pilot program ‘Is’s and ‘Isn’t’s

Pilot Program ‘is’s and ‘isn’t’s

Determining objectives and limitations in pilot design

What a pilot *isn’t*

- A customer initiative that has been done before
- Reiterations of similar programs in different states
- Programs specifically designed to achieve most favorable outcomes (i.e. opt-in design)
- Naturally occurring product enhancements

What a pilot *is*

- Scalable with the ability to leverage learnings from *all* customers
- Innovative and designed to add something new to the body of industry knowledge
- A test in which the utility (i.e. use of rate payer dollars) would be the most efficient way to bring the solution to the market
- ***Defines failure as something that does not contribute to new learnings***

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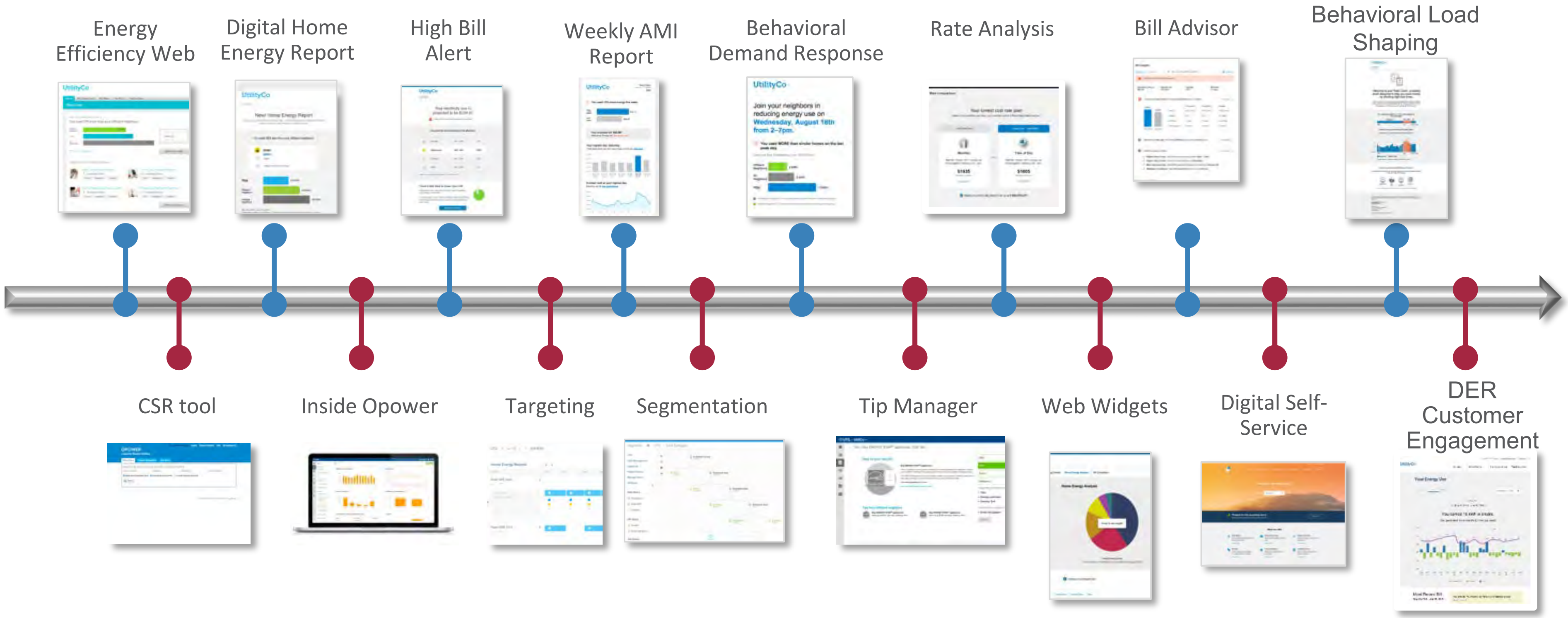
Pilot Program ‘is’s and ‘isn’t’s (continued)

Determining objectives and limitations in pilot design



Pilot to Learn vs Pilot to Win

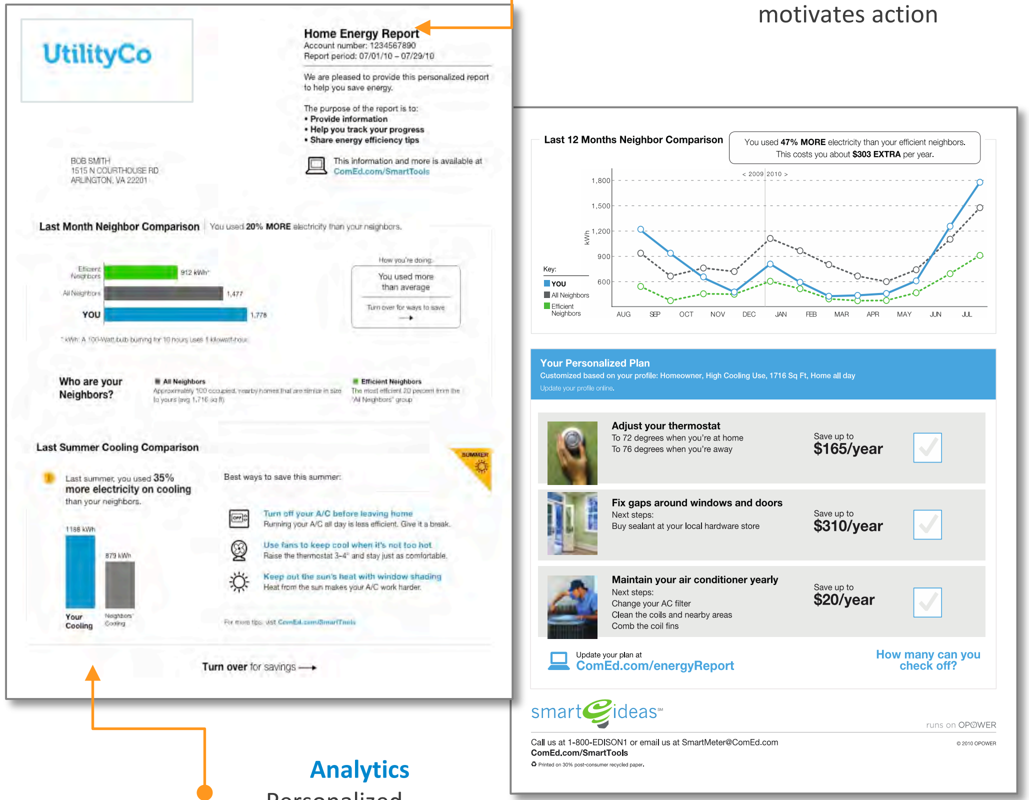
Pilot to Learn vs Pilot to Win

Framing new pilot risks as an opportunity to learn rather than a chance to lose

- An idea or product at the stage of regulatory consideration is usually very well thought through, given the stakes (at risk rate payer dollars)

- While risk is present, the inherent nature of the risk– that the pilot or product will have no impact after implementation– shouldn't be viewed as a failure, but instead, <u>*a learning*</u>

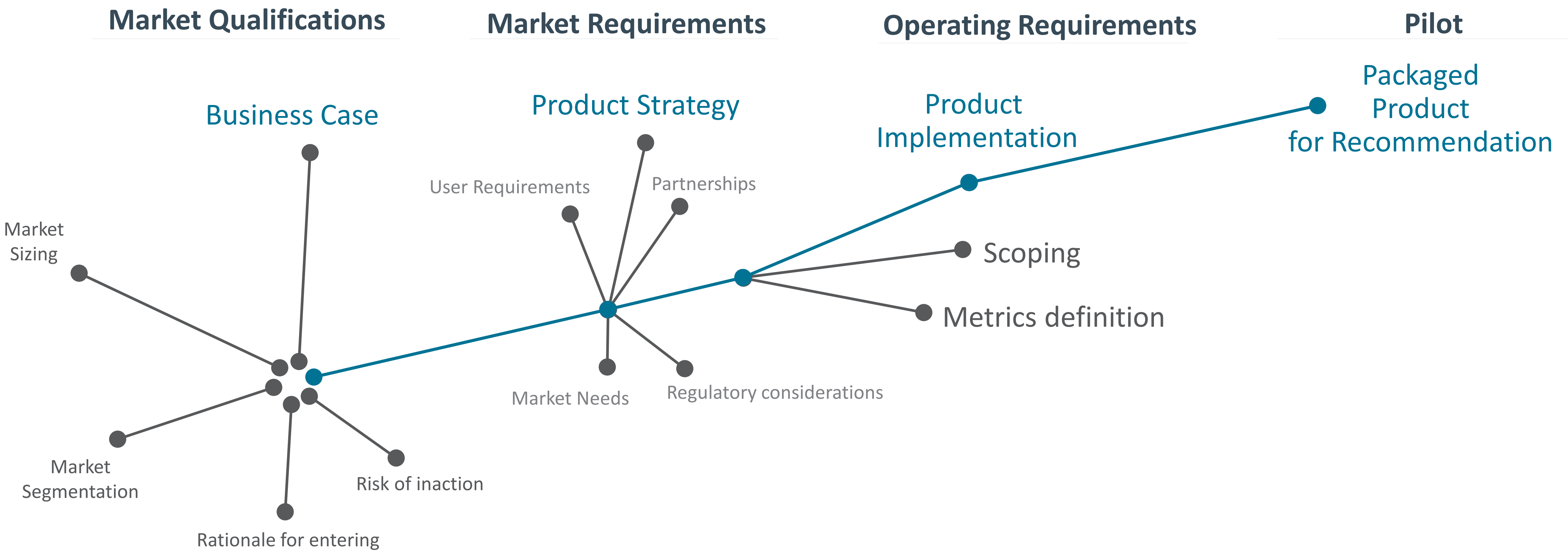
Normative Messaging
Similar house benchmarking clarifies opportunity and motivates action



Analytics
Personalized, actionable insights

Pilot to Learn vs Pilot to Win (continued)

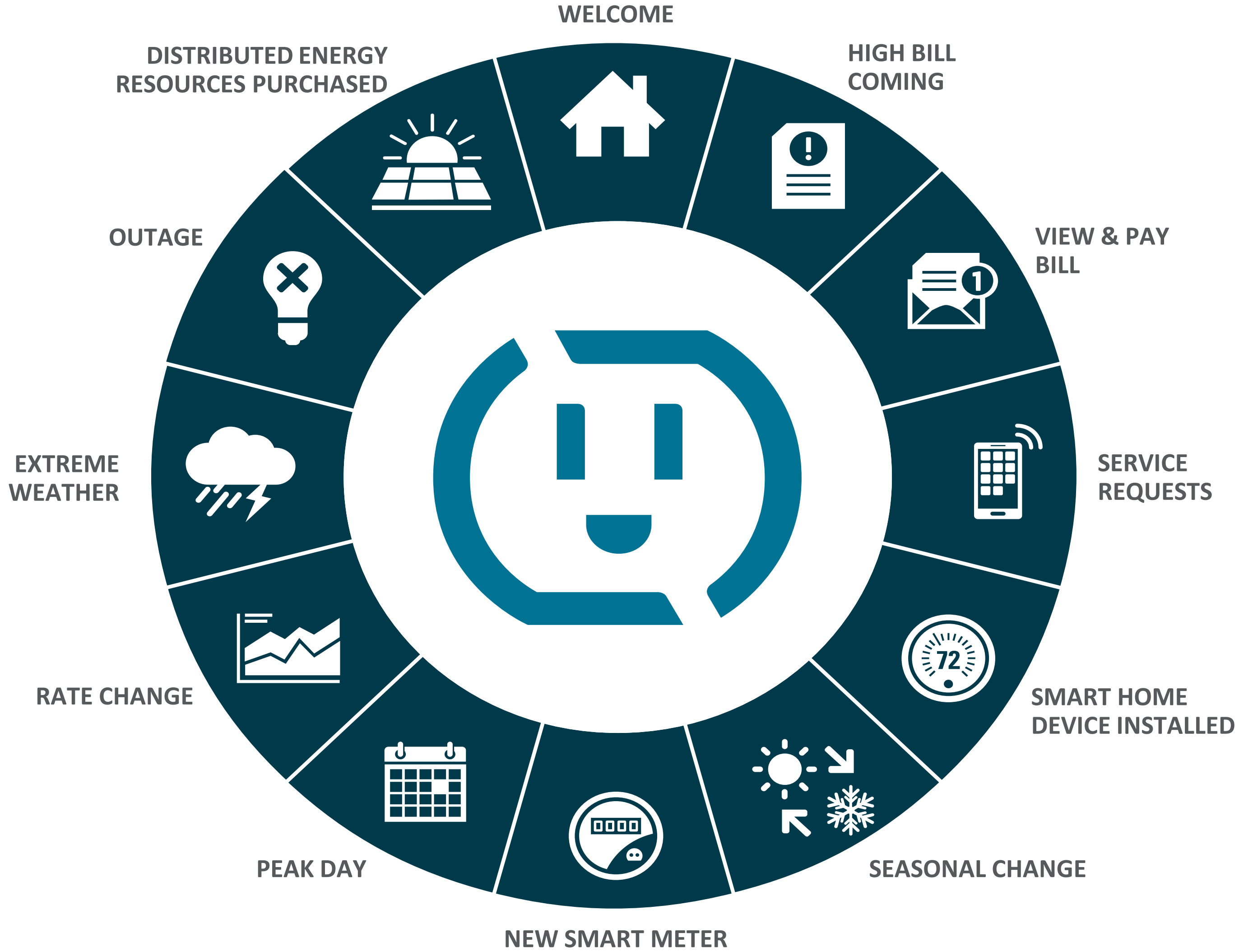
Framing new pilot risks as an opportunity to learn rather than a chance to lose



Piloting for Behavior Change

Piloting for behavior change

Customer centric design principles always win



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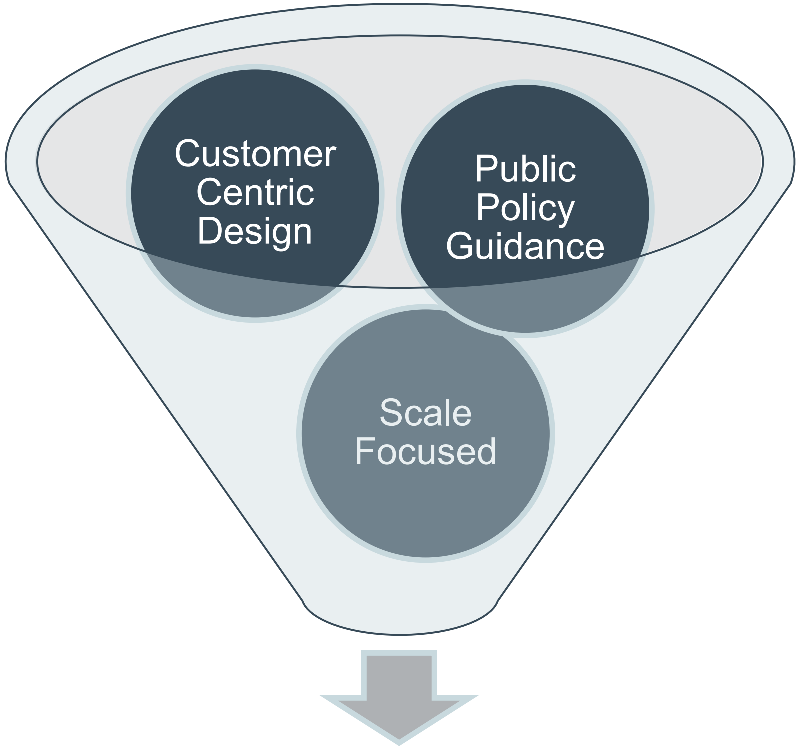
Piloting for behavior change (continued)

Customer centric design principles always win

Our design principles keep the customer first

- Designed to account for customer behavior
- Assumes most people aren't the 1% engaged
- Always drive to an action
- Built for everyone who gets a utility bill
- Responsive to an established performance metric or stated public policy goal
- Sized appropriately to obtain statistically significant results
- Has a defined time frame that allows for sufficient learning
- Test variations on a single concept



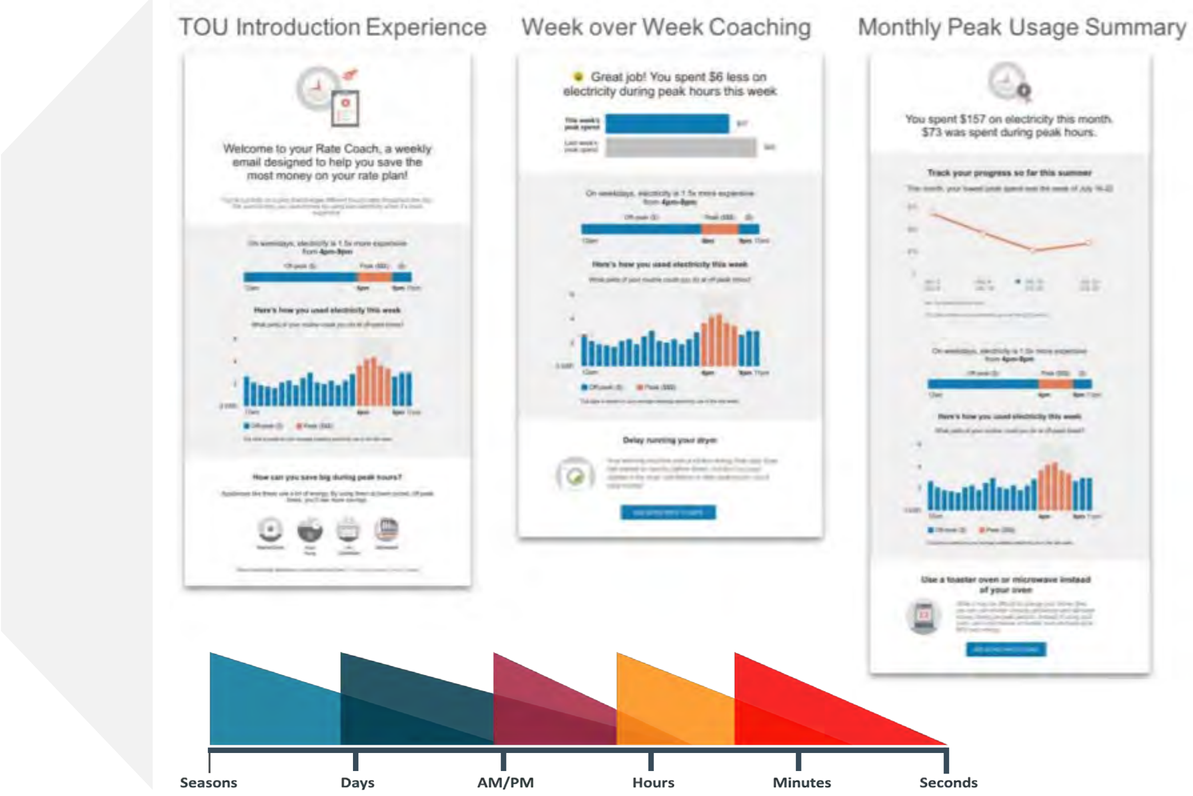
Pilot Program

Piloting for behavior change (continued)

Customer centric design principles always win

Opower Pilot Examples

- Home energy reports (HERs) programs
- Peak Time Rebates (PTR) Program – BGE, PGE
- Behavioral Load Shaping (BLS) – BGE, Pepco MD, Delmarva MD
- Disaggregated Energy Insights to Drive Uplift - BGE, SMECO



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Defining the
Leading**Edge**
of Innovation

ORACLE

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Utility/Stakeholder Input on Process and Content

February 27, 2020

9 AM – 4 PM

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

Pilot Process Input

MI Power Grid – Energy Programs and Technology Pilots Collaborative

February 27, 2020

Advancing Ideas into Programs

DOE Technology Readiness Level

Basic/Applied Research | Prototype Development | Demonstration | Deployment

Utility Program Readiness Level©

Assessment | Readiness Treatments | Program Launch/ Integration

- Leverages US DOE's Technology Readiness Models
- Uses a Program Readiness Level Model
- Prepares ideas for programs through assessment, treatment and launch
- Allows for idea advancement at scale
- Allows ideas to advance through an expedited track

Program Readiness Activities

Assessment

- Ideation through: Stakeholder engagement, peer-to-peer exchange, community, organizational, industry and manufacturer inputs
- Inputs are synthesized
- Scoring and prioritization

Readiness Treatments

- Technical and market viability assessment
- Modeling and scenario building
- Pilots
- Evaluation and Measurement criteria
- Business case development

Program Launch/Integration

- Procurement phase
- Rapid prototyping and experimentation
- Commercialization

INDIANA MICHIGAN POWER
An AEP Company
BOUNDLESS ENERGY

I&M –Energy Programs & Technology Pilots

Michigan Public Service Commission

MI Power Grid Energy Programs and Technology Pilots Stakeholder Meeting

February 27, 2020

Lessons from eco+

A thermostat optimization pilot using 250,000 customers

February 27, 2020

ecobee

Agenda

1. What is eco+?
2. How did we design the pilot?
3. What did we learn?

ecobee

eco+ is a **free software upgrade** being rolled out to **all ecobee devices** that includes five features that lets the customer personalize their comfort and savings preferences
for maximum efficiency with minimal effort.


Feels Like


Schedule Assistant

Smart Home & Away

Energy Efficiency


Time of Use

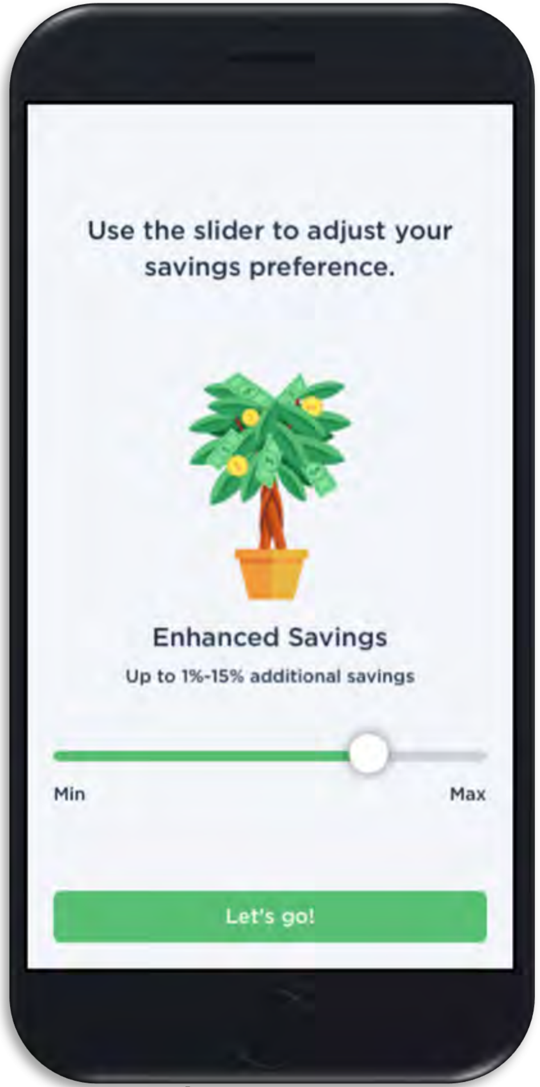
Time of Use

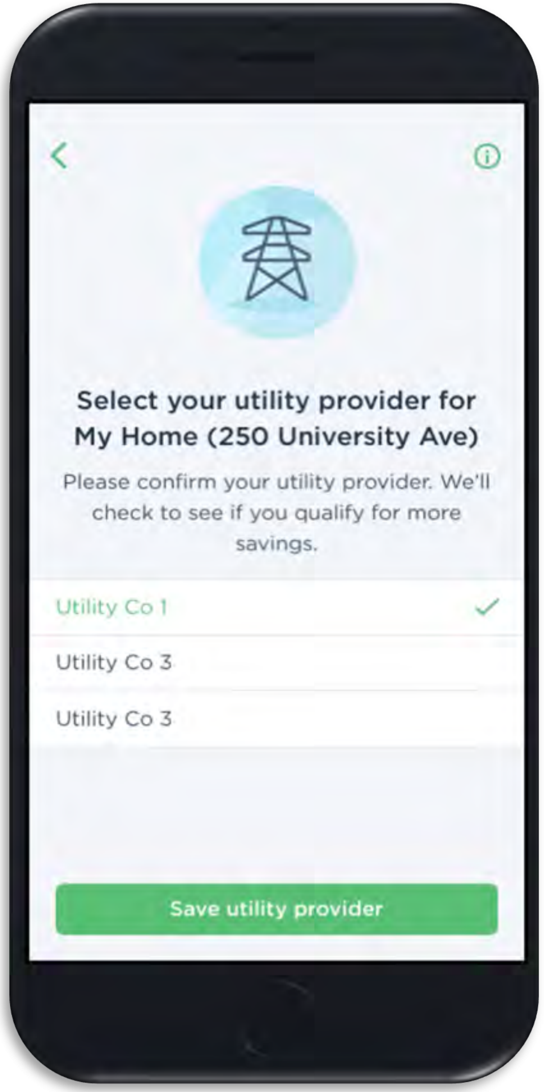
Community Energy Savings

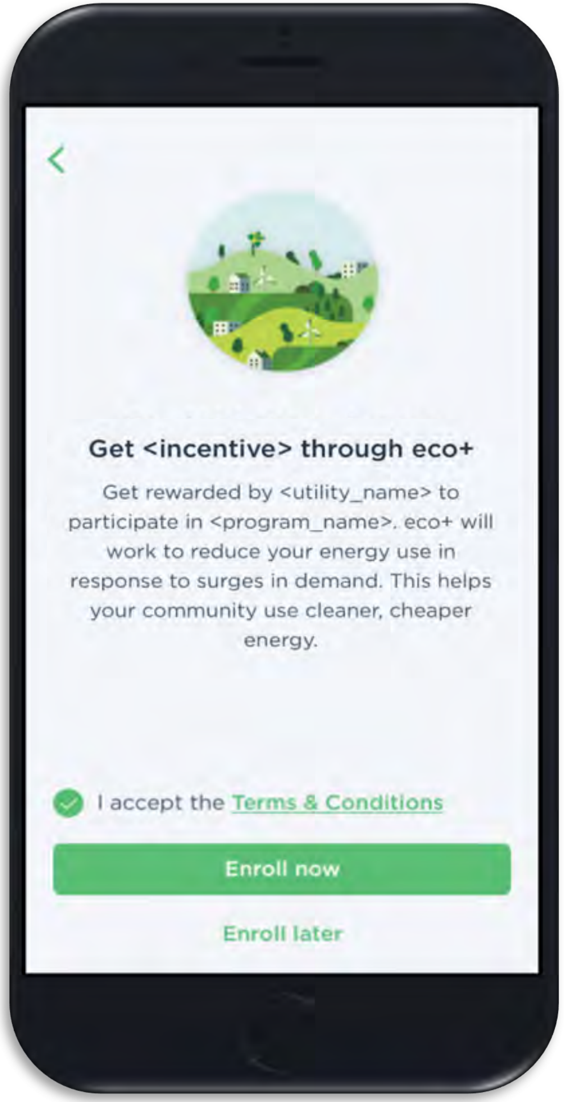
Demand Response

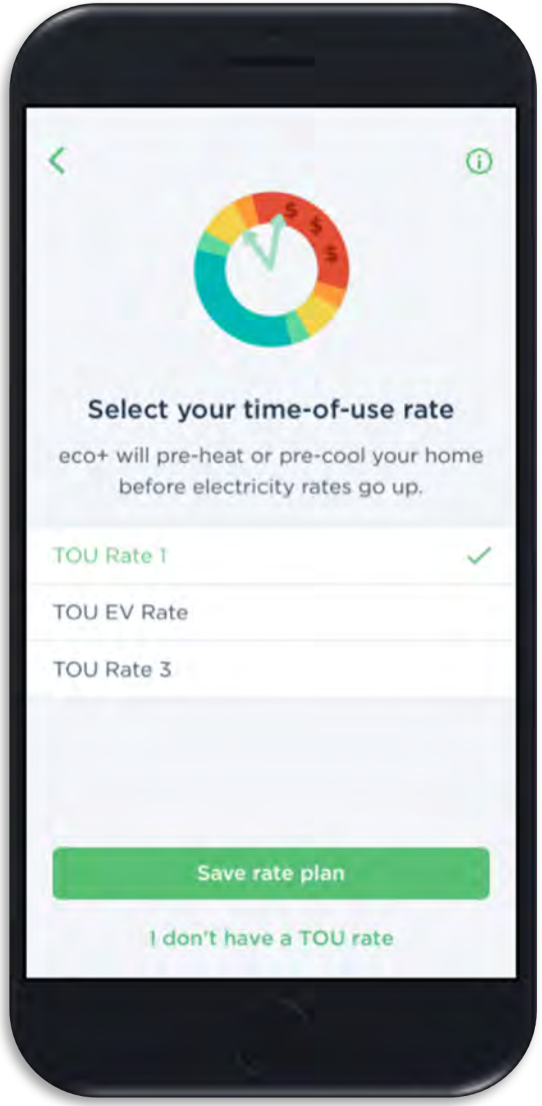
ecobee

Mobile Enrollment Wizard







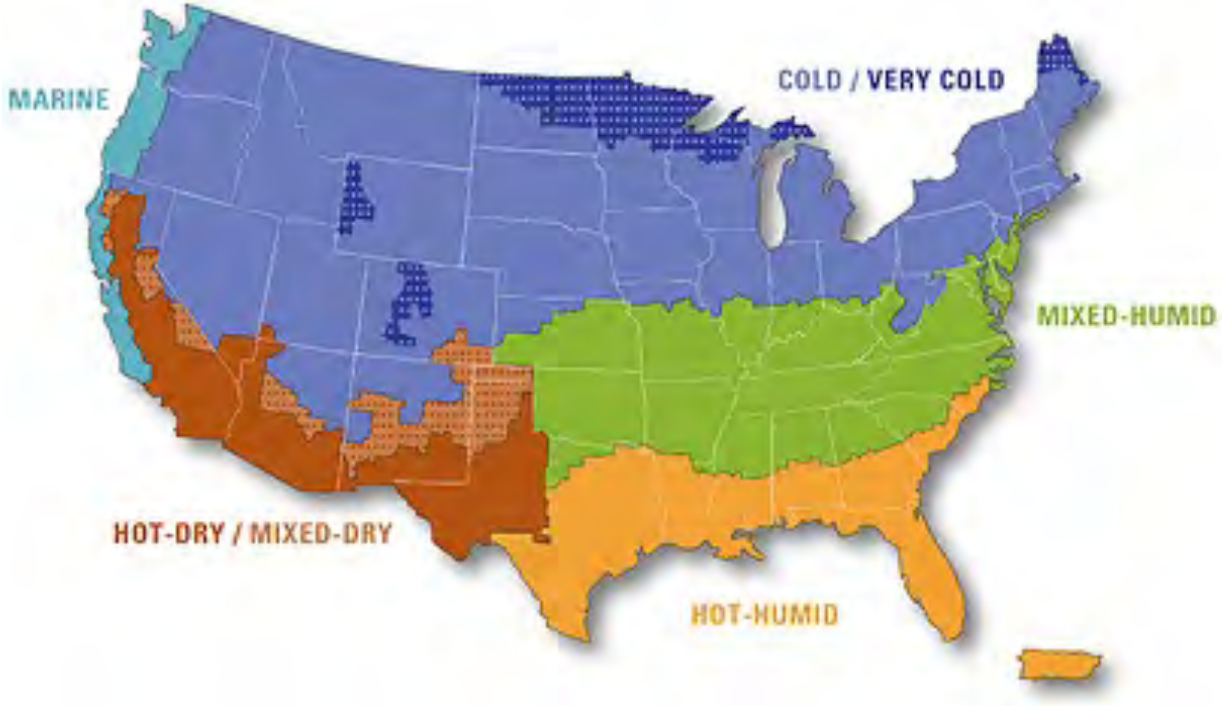


ecobee

ecobee contracted 3rd party M&V experts to measure the impacts of eco+ using the largest Randomized Encouragement Design ever conducted for smart thermostat optimization.

Study designed to measure impacts across five US climate zones and Canada.

Impacts are measured against a control group of ecobee customers who did not receive the eco+ offer.



BUILDING AMERICA CLIMATE ZONES USED TO MAP PARTICIPANTS IN THE M&V STUDY

ecobee

How should pilot implementation and design specifications be decided?

Include a control group buffer to anticipate unforeseen circumstances.

Can planning implementation and evaluation occur concurrently?

Think through implementation in order to be able to measure the impacts.

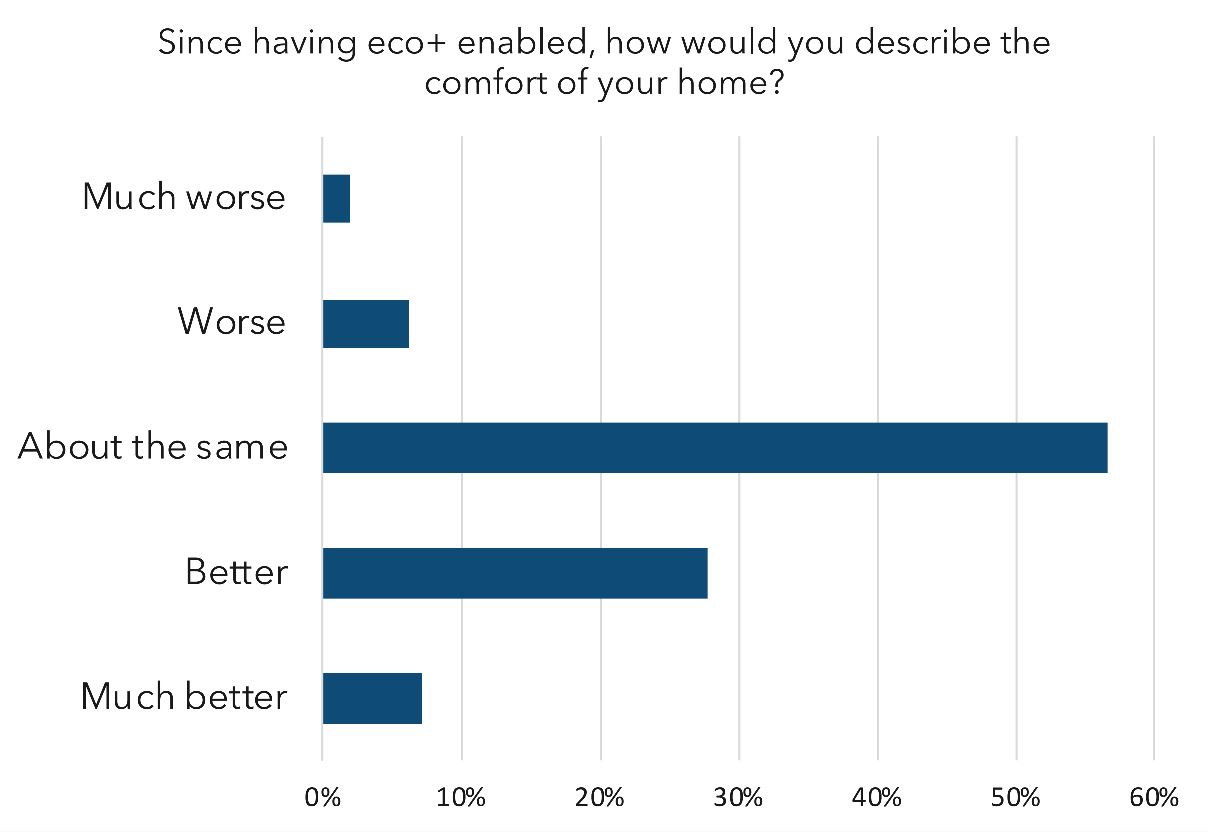
Table 4: Thermostat Count by Region and Experimental Cell

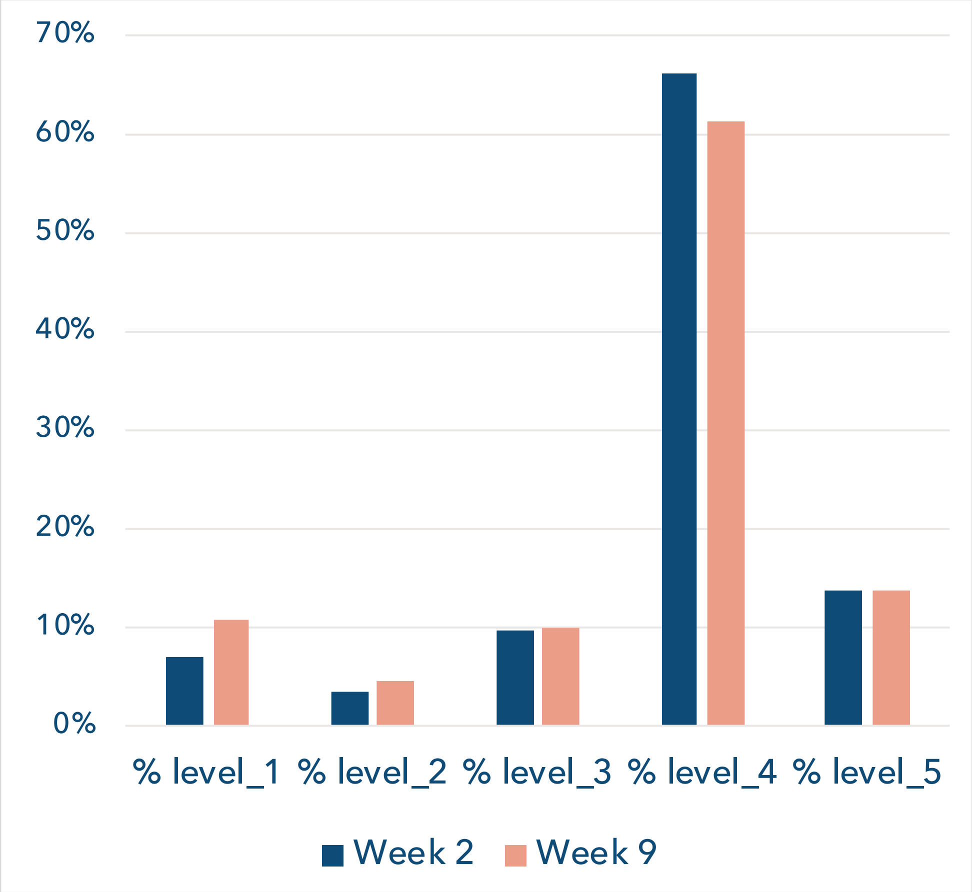
Region	Experimental	Control	Buffer	Total
01 Canada	10,062	10,026	1,001	21,089
02 Cold/Very Cold	30,001	30,000	3,000	63,001
03 Hot-Dry/Mixed-Dry	5,579	5,570	557	11,706
04 Hot Humid	15,000	15,000	1,500	31,500
05 Mixed Humid	30,000	30,000	3,000	63,000
06 Marine	5,069	5,085	510	10,664
07 Canada TOU (Hydro One)	1,927	1,932	195	4,054
08 Cold TOU (Fort Collins)	140	139	13	292
09 Dry TOU (PG&E)	8,156	8,150	815	17,121
10 Dry TOU (SMUD)	2,800	2,800	280	5,880
11 Marine TOU (PG&E)	9,473	9,461	945	19,879
Total	**118,207**	**118,163**	**11,816**	**248,186**

ecobee

What metrics and data are needed to determine pilot success?

Energy savings, demand savings, customer bill savings and **qualitative and quantitative measures of customer satisfaction.**





ecobee

How should pilot learnings be used?

To iterate quickly to improve the next phase of the pilot and/or future program design to maximize the impact of the program and improve the customer experience.

Rate	Price Ratio (Peak:Off-Peak)	Climate Region	Average kW Savings During Peak Period	Peak Duration (hours)	Average On-Peak Percent Savings (kWh)	Average Total Energy Savings (kWh)	Percent Savings On Cooling Energy ($)
Hydro One Res TOU	2.0	Canada	0.18	6	36%	3.4%	8%
FPL RTR-1	5.8	Hot Humid	0.22	9	13%	5.0%	10%
SMUD Res TOD	2.4	Hot Dry	0.25	3	23%	3.5%	8%
PG&E EV-A	3.7	Mixed Dry	0.18	6	28%	8.8%	19%
PG&E EV-A	3.7	Marine	0.10	6	20%	4.0%	11%

Tamara Dzubay
Regulatory Affairs Manager
tamara.d@ecobee.com

For more information:

ecobee.com/ecoplusEMV

ecobee

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Break

2:30 – 2:45 PM

Stakeholder Meeting 1

February 27, 2020

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

AGENDA

9:00 am	Welcome & Introduction	Anne Armstrong-Cusack, Director, Customer Service Tremaine Phillips, Commissioner, MPSC
9:20 am	Summary of Grid Mod Programs Nationally	Tom Stanton, NRRI
9:40 am	MI Power Grid Summary, Tasks, & Timeline	Kayla Fox, MPSC Staff
9:50 am	MPSC Case Review & Utility Survey Results	Joy Wang, MPSC Staff
10:05 am	Break	
10:15 am	Current Pilot Processes	Consumers, DTE, & I&M (25 min each)
11:30 am	Utility Pilots: Issues and Best Practices Part 1	Annika Todd-Blick, LBNL
12:00 pm	Lunch on Your Own (Shove It Pizza Truck onsite)	
1:00 pm	Utility Pilots: Issues and Best Practices Part 2	Annika Todd-Blick, LBNL
1:30 pm	From Pilot to Product: Viewpoints on Utility Pilot Design	Nekabari Goka, Oracle
2:00 pm	Utility/Stakeholder Input on Process and Content	Utility/Stakeholder Presentations (10 min each)
2:30 pm	Break	
2:45 pm	Utility/Stakeholder Input on Process and Content	Tamara Dzubay, Ecobee Jeremy Kraft, EMI Consulting Amy Ellsworth, Cadmus
3:25 pm	Discussion: Workgroup Process and Content	Moderated by MPSC Staff
3:55 p.m.	Closing Comments	Joy Wang, MPSC Staff
4:00 p.m.	Adjourn	

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Utility/Stakeholder Input on Process and Content

February 27, 2020

9 AM – 4 PM

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

DEVELOPING AND EVALUATING ENERGY WASTE REDUCTION (EWR) PILOTS

February 27, 2020

Joe Wadel

Nationally Recognized Excellence

Consumers Energy's Commercial and Industrial (C&I) EWR pilots are consistently recognized for their innovative design and performance. Since 2009, nine programs have been recognized through 12 presentations at industry conferences and twelve awards in excellence.

Presented at: ACEEE, AESP (Association of Energy Services Professionals), WEEC (World Energy Engineering Congress), Learning Solutions Conference & Expo

Awards:

Governor's Award (2, Small Business)

Energy Awards Winner (Marketplace)

Partner of the Year (5yrs.)

ENERGY STAR Cities – Jackson (2yrs.)

ACEEE Exemplary Programs (3 - Agriculture, Small Business, ALC)

Foundational Success Factors for EWR Pilots

- **Speed –** Ability to address customer needs and market conditions in real time
- **Flexibility –** Ability to iterate on problem definition and solution tests multiple times without slowing down
- **Funding –** Dedicated pilot funding levels agreed upon in advance has encouraged rapid deployments
- **Connection to a Viable Business Model –** There is a clear incentive for development of pilots

Impact of Successful Pilots for Customers

Since 2009, our programs have...

Helped thousands of hard-to-reach customers

11,231

total pilot and specialties customer touches

Saved customers energy (both gas and electric)

393,968 MWh

pilot electric savings from 2009 to 2018

1,479,303 MCF

pilot gas savings from 2009 to 2018

Provided excellent customer experiences

90 (out of -100 to 100)

recent Forrester Customer Experience Score for the Marketplace program

Impact of Successful Pilots for the Utility

Ultimately, one goal of pilot programs is to provide energy savings for Consumers Energy, which are tied to a financial incentive.

The combination of pre-funded pilots and a portfolio incentive for hitting energy targets means:

Pilots have flexibility to test new approaches (due to pre-funding)

Clear motivation exists to develop pilots to assist in achieving future verifiable energy savings (due to portfolio incentive)

example:

29% of 2018 C&I electric savings attributable to pilots.

23% of 2018 C&I gas savings attributable to pilots.

Conclusion

Since 2009, this process has helped us establish **more than 20 new pilots**, with **83%** transitioning to full programs.

Thank You!

INTRODUCTION TO PILOT PROGRAM EVALUATIONS

Presented for:
MI Power Grid Energy Programs and Technology Pilots Stakeholder Meeting

Presented by: Jeremy Kraft

February 27, 2020

EMI CONSULTING

Consumers Energy
Count on Us®

An introduction to EMI Consulting.

200+

CLIENT ENGAGEMENTS

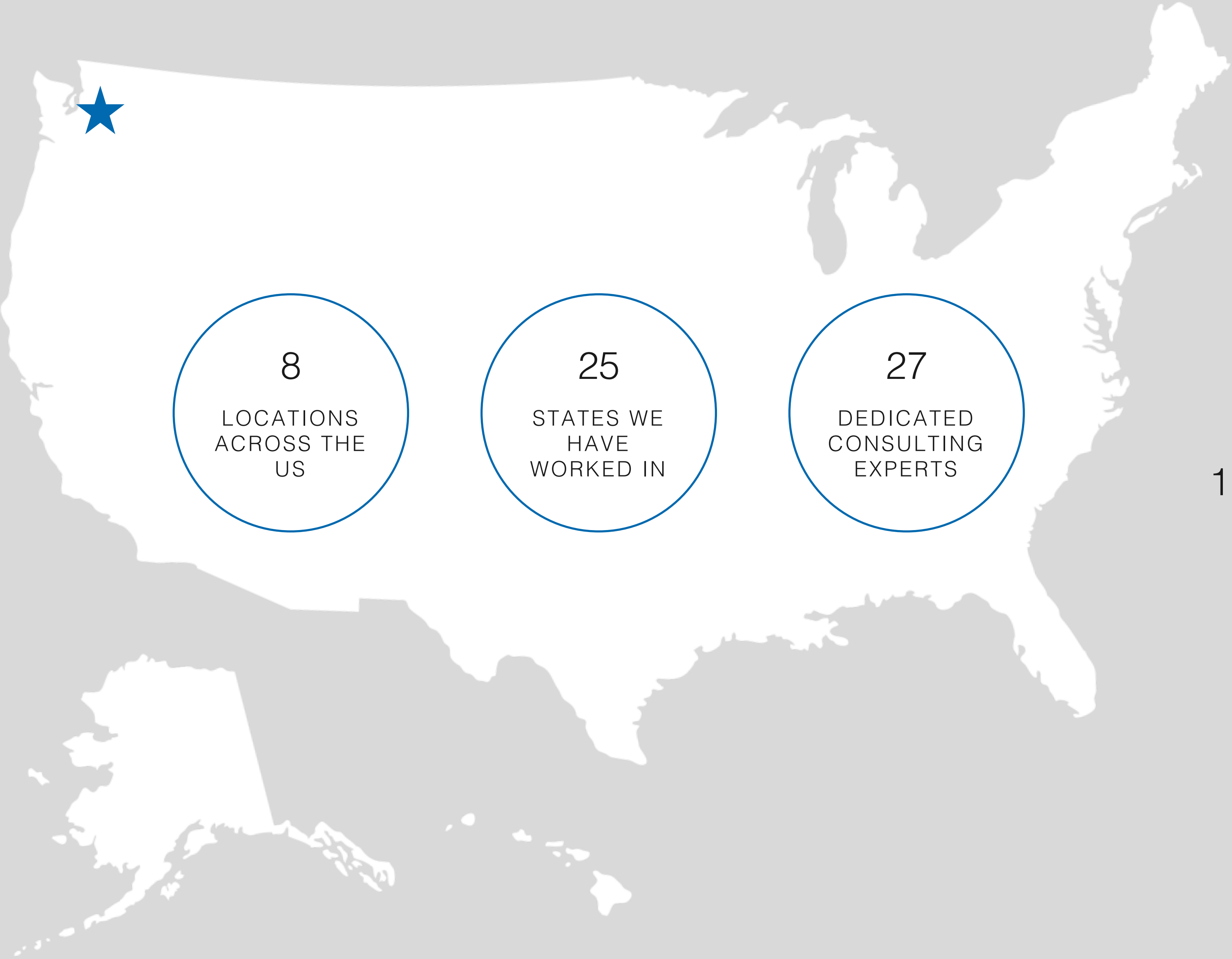
33+

UTILITY & MUNICIPAL CLIENTS

CLIENTS INCLUDE

7

TOP ACEEE UTILITIES



FOUNDED IN
1995

13+ STRATEGIC PARTNERS

21 ADVANCED DEGREES

EMI CONSULTING

PILOT EVALUATION APPROACH

EMI Consulting conducts evaluations for pilots across the country using a developmental evaluation approach, which allows for more agility and fast feedback for program administrators.

In this approach, evaluators:

- Engage with the program early, with involvement from concept of pilot, to identify any potential barriers to scaling early
- Provide rapid feedback throughout the piloting period, so new ideas can be tested and evaluated quickly
- Provide flexible and iterative evaluation, in which evaluation activities and changes to the program lead to new research questions and design

CONSUMERS ENERGY PILOT PROGRAM EVALUATIONS

When evaluating pilots, EMI Consulting uses the following approach in each program phase:

DESIGN — IMPLEMENTATION — SCALE

CONSUMERS ENERGY PILOT PROGRAM EVALUATIONS

When evaluating pilots, EMI Consulting uses the following approach in each program phase:

DESIGN — IMPLEMENTATION — SCALE

EMI Consulting **involved early**, from first program concept

Early evaluation focused on **understanding initial program design** & identifying potential barriers to pilot success

CONSUMERS ENERGY PILOT PROGRAM EVALUATIONS

When evaluating pilots, EMI Consulting uses the following approach in each program phase:

DESIGN IMPLEMENTATION SCALE

EMI Consulting **designs iterative evaluation** throughout pilot phase

Learnings from evaluation lead to **adaptive changes**
to pilot design, additional research, or no-go decision
on scaled program

EMI CONSULTING

CONSUMERS ENERGY PILOT PROGRAM EVALUATIONS

When evaluating pilots, EMI Consulting uses the following approach in each program phase:

DESIGN

IMPLEMENTATION

SCALE

EMI Consulting helps program team **decide if pilot will continue** as a fully-scaled program

Key metrics include: savings attributed to the program, ability to cost-effectively scale, and demonstrated success with customers

EMI CONSULTING

thank you

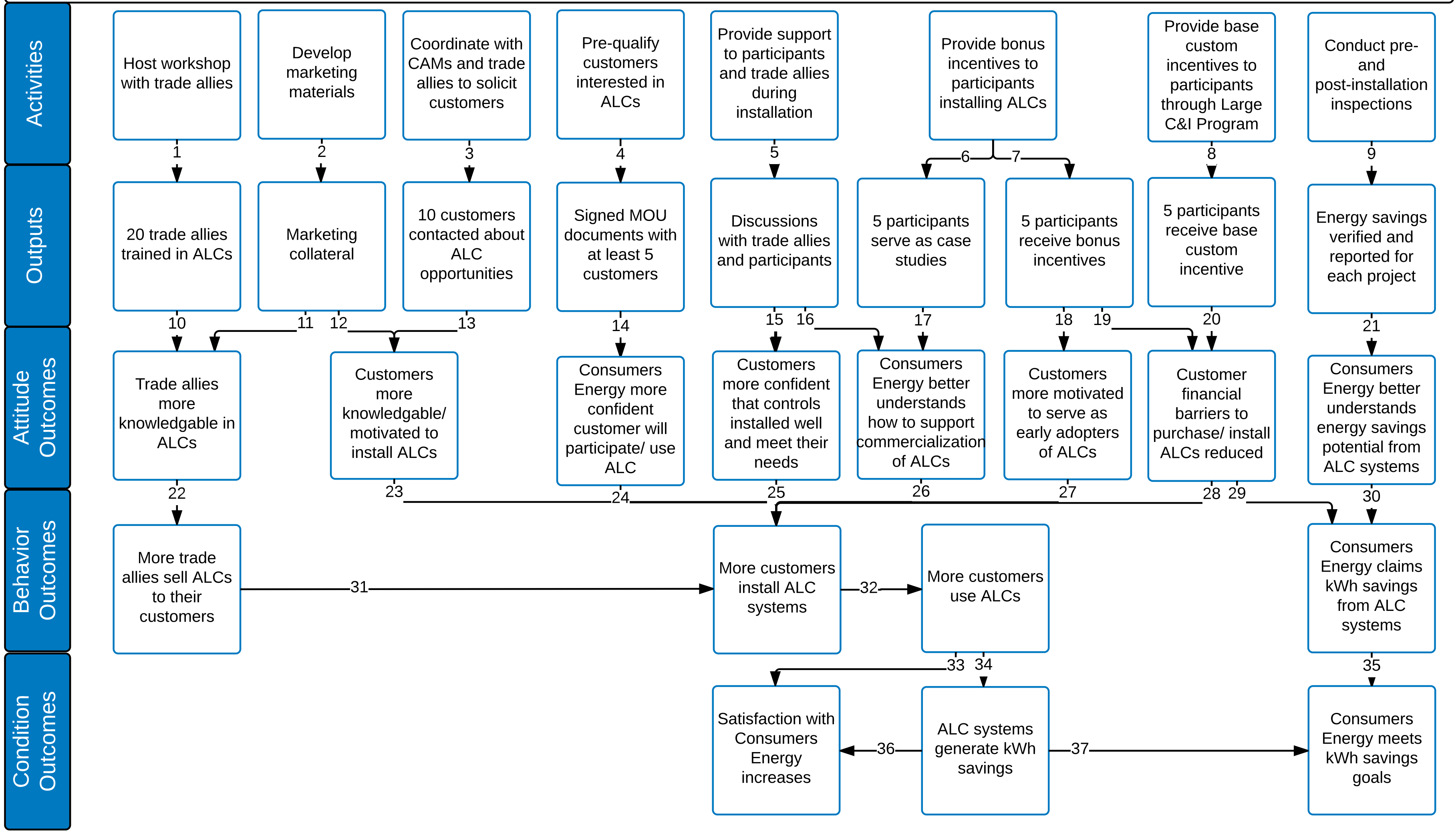
Jeremy Kraft
jkraft@emiconsulting.com

LOGIC MODEL EXAMPLE: ADVANCED LIGHTING CONTROLS PILOT

Consumers Energy, Advanced Lighting Controls (ALC) Pilot Program Logic Model

Commercial and Industrial Customer Barriers to ALCs

- Customers do not know about ALC opportunities
- Customers are not motivated to install ALCs
- Customers view ALCs as too expensive to purchase and install
- Trade allies are not familiar with the technology and installation methods
- Customers uncertain about ALC compatability with their existing lighting equipment



Assumptions:
-ALCs provide more energy savings than traditional lighting controls and enough savings to justify costs.
-There is sufficient program staff and resources to implement Pilot as planned.
-Participants attribute positive experiences with the Pilot to Consumers Energy, leading to increased satisfaction with Consumers Energy.

External Factors:
-Influence of Next Energy grant to support market transformation
-Manufacturer and distributor ability to produce and stock equipment
-Participants use of ALCs
-Factors outside of program impacting customer satisfaction

EMI CONSULTING

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MPSC MiPowerGrid Energy Programs and Technology Pilots Stakeholder Meeting

Pilot Programs in Michigan and Beyond

February 27, 2020

Presented by: Amy Ellsworth, Cadmus

Shaping Our Smarter, Cleaner Energy Future

Client-Centered Responsiveness

91%
Customer Retention
(300+ projects in past 2 years)

Over **150**
Utility, Private Sector, Regional and Federal Government Clients throughout North America

20+ Transformative Planning and Roadmap Initiatives

36 Statewide, cross-state, and cross-jurisdictional clients

Our Services

- Strategic Planning & Design
- Market Research & Economic Analysis
- Customer & Stakeholder Engagement
- Engineering & Technical Assistance
- Evaluation & Performance Analysis

Pilot Design Paves the Way for Program Success

- Plan pilots strategically
- Establish clear objectives
- Ensure sufficient expertise and resources
- Involve key stakeholders early
- Design for experimentation to address challenges
  - Assess market barriers and drivers
  - Determine optimal incentives and levels
  - Identify market trends and target audiences
  - Analyze if pilot can scale cost-effectively

A pilot designed as a series of experiments helps program administrators understand not only, “will the program work?” but “how will the program work best?”

CADMUS

Best Practice Elements for Pilot Evaluation

Pilot evaluation measures what combination of features work best to achieve objectives

Engage evaluators early in pilot ideation and design

- Leverage logic models to align on the pilot's intended actions and outcomes
- Determine data needs up front to ensure pilot can be evaluated

Ensure research aligns with the pilot objectives

- Multidimensional performance assessment: ensure each experiment can be measured effectively

Prioritize evaluation resources where the risks are greatest

Schedule regular communications between evaluators and pilot staff

Share lessons learned from other pilot evaluations

National Pilot Program Trends

Behavioral influence programs

Customer loyalty

Digital Engagement

Market transformation

Midstream

Code compliance

Grid stabilization

Alternative rate design

Non-wires alternative

Decarbonization

Electrification

Distributed Energy Resources (DERs)

Segment-wide strategy

Income qualified

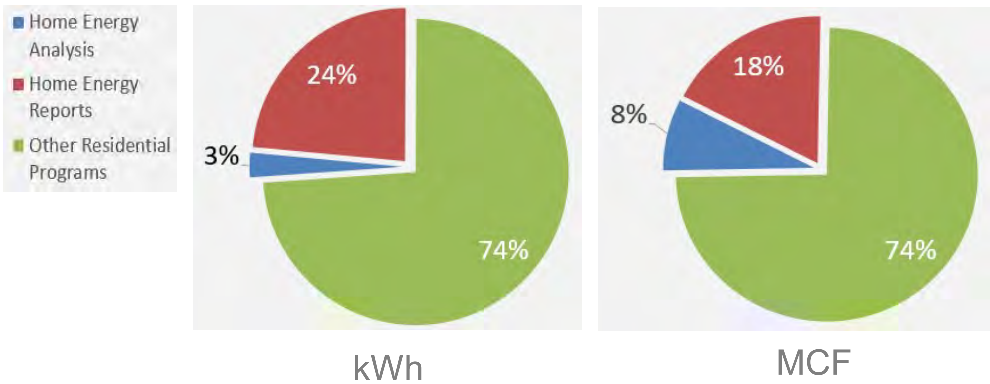
CADMUS

Consumers Energy: Successful Pilots at Scale

Benefits	Home Energy Reports	Home Energy Analysis
CO2 Avoided*	112,625	228,057
SO2 Avoided*	179	441
NOx Avoided*	71	155
Customers Served	367,138	101,686

* US Tons

First Year Savings (2018)



Home Energy Reports Program

2011	2013	2020
Pilot launch	Scale program launch	Program re-design to maximize benefits

Home Energy Analysis Program

2012	2013	2017
Pilot launch	Scale program launch	Added outreach partnerships

CADMUS

Incubation Stage and Next Generation Pilots

Program	Grid Stabilization	Market Transformation	Behavioral Influence	Decarbonization	Segment-Strategy
Midstream HVAC		●			
Online Marketplace			●		
Heat Pump		●		●	
Non-wires Solutions	●		●		
Smart Home	●		●	●	
Electric Only Home Energy Analysis			●		●
All-Electric New Homes		●	●	●	●

CADMUS

Thank You

Amy Ellsworth, Principal
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MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots

Discussion:

Workgroup Process and Content

Stakeholder Meeting 1

February 27, 2020

Lake Michigan Hearing Room

MPSC

Michigan Public Service Commission

MI POWER GRID

Making the Most of Michigan's Energy Future

Energy Programs & Technology Pilots
Closing Comments

Stakeholder Meeting 1

February 27, 2020

Lake Michigan Hearing Room

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
    - March 19, 2020, from 9 AM – 4 PM
      - More from Tom Stanton on grid mod pilots
      - New York's REV Demo & REV Connect
    - April 16, 2020, from 9 AM – 4 PM
      - Annika Todd-Blick: "Going Further with Smart Meter Data and Machine Learning"

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!