State Indicators for Advancing Demand Flexibility and Energy Efficiency in Buildings

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Agenda

Project purpose and focus

Objectives for state actions

Typology of state demand flexibility indicators

Example state actions illustrating progress to date for two indicator categories:

- Utility programs
- State programs

Trends and gaps in state actions on demand flexibility

Resources for More Information

*Get the complete slide-deck report, a complementary report on **Traditional Energy Efficiency Indicators for Electricity and Gas,** and an **infographic for both reports** at:*
https://emp.lbl.gov/publications/state-indicators-advancing-demand

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Project Purpose and Focus

- Identify objectives and key indicators for state activities that advance demand flexibility (DF) in buildings — legislation, utility regulatory proceedings, executive orders, and programs
- Illustrate progress to date
  - Illustrative examples, not an all-inclusive list
- Identify trends, gaps, and opportunities
- Focus on two types of distributed energy resources

Today's focus

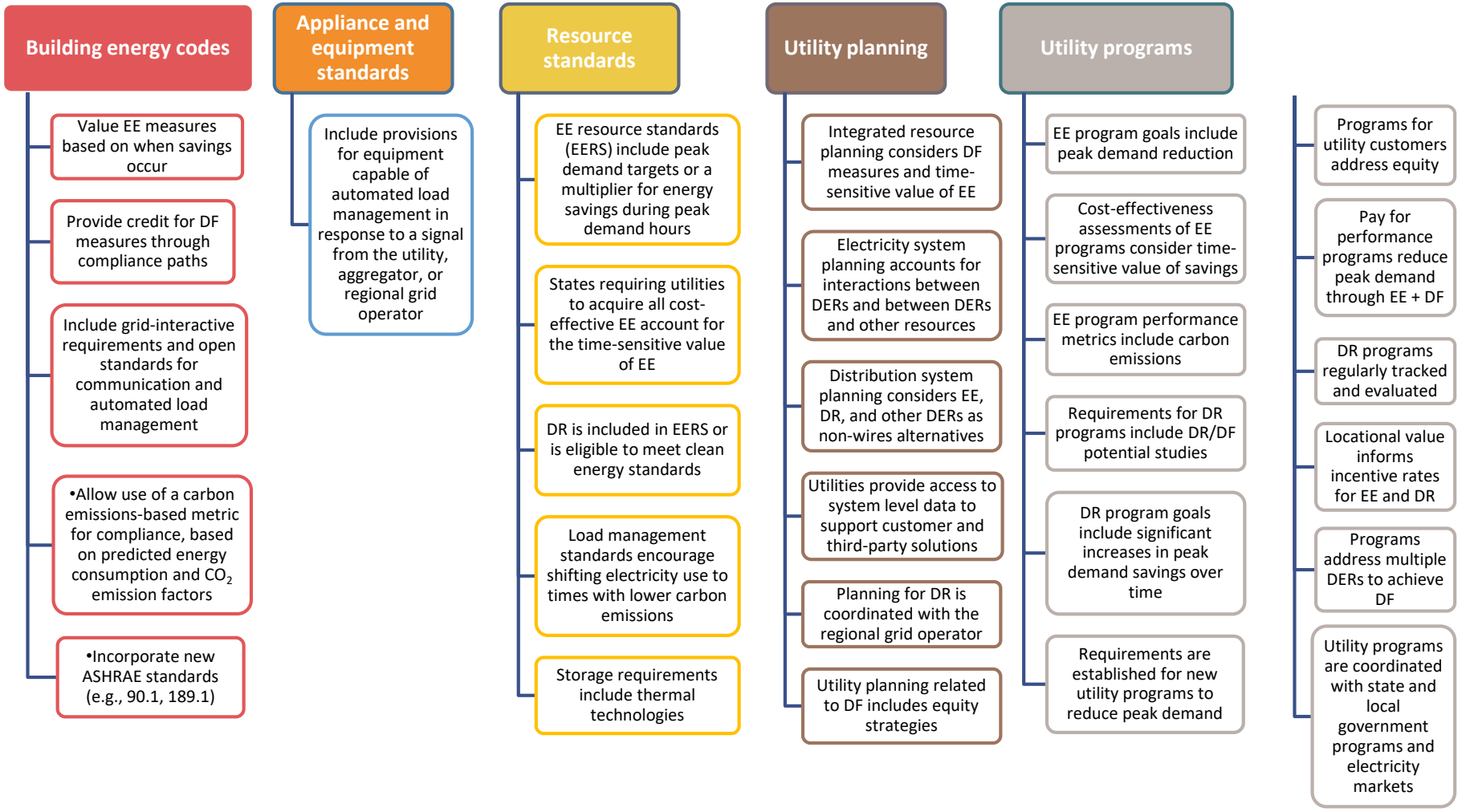
  - *Demand response (DR)* — primarily incentive-based, dispatchable programs (e.g., direct load control, interruptible, demand bidding/buyback) with some indicators for time-based rates **(Part I of the report)**
  - *Energy efficiency (EE)*
    - Targeted to reduce peak demand or integrate with demand response **(Part I)**
    - Traditional EE — annual reductions in electricity and natural gas consumption **(Part II)**
- States can use the indicators to assess the status of their policies, regulations, and programs and consider paths to enable greater building DF and EE to meet their own energy and other goals.

Objectives for State Actions*

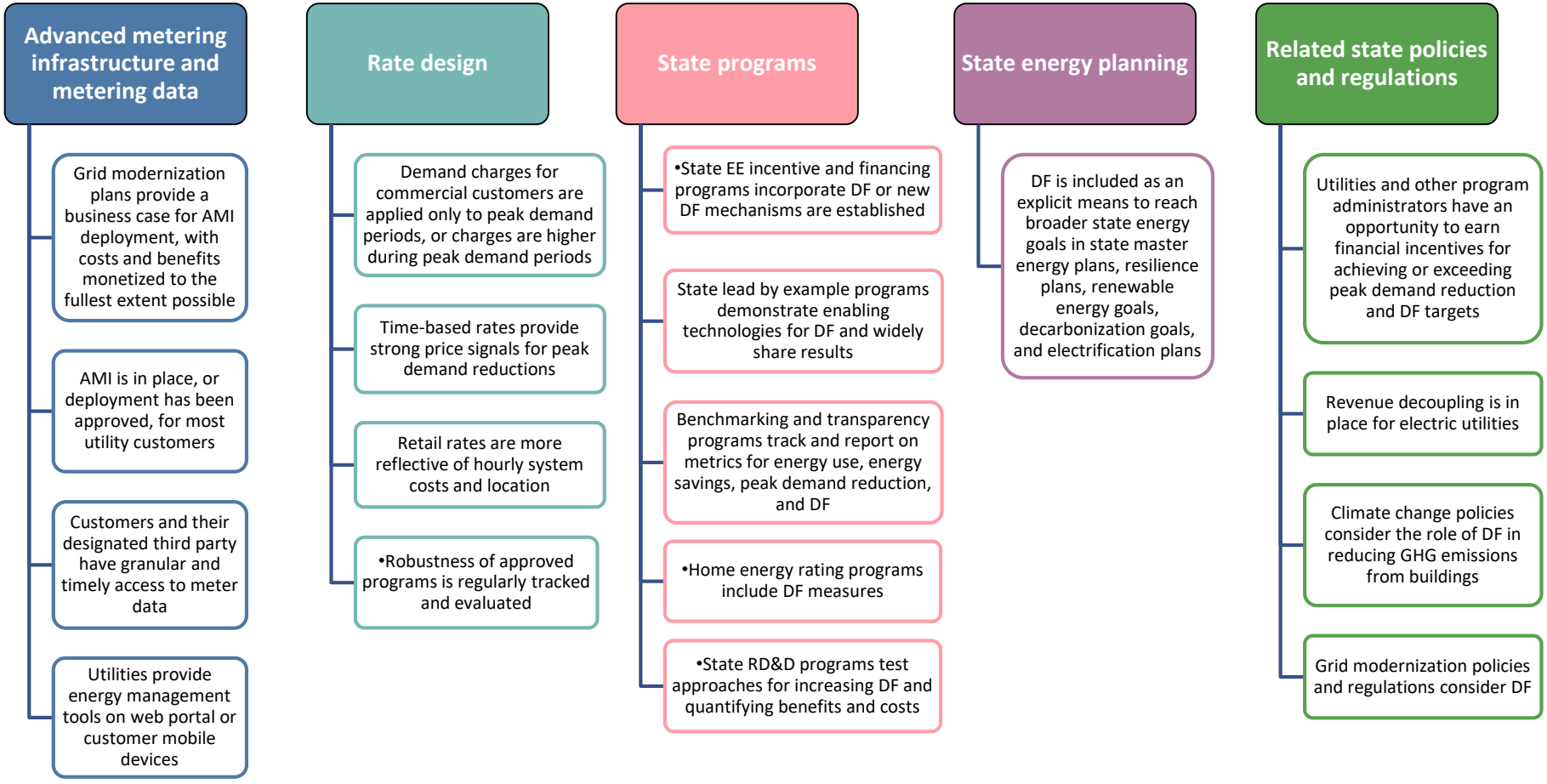
- Environmental
  - Reduce energy waste
  - Meet clean energy, climate, and electrification goals
  - Improve integration of variable renewable energy
- Reliability/resilience
  - Reduce peak demand
  - Modernize electricity systems to enable DERs, grid flexibility
- Economic
  - Keep electricity costs down
  - Reduce utility disincentives to EE and DF adoption by decoupling utility revenue from utility retail sales
  - Encourage utility investments in EE, DF, and electrification through alternate cost recovery methods and performance-based incentives
  - Improve performance of existing EE and DR programs and rate designs and test new ones
  - Facilitate participation of DER aggregators
  - Improve DER consideration in utility system planning
- Other objectives
  - Improve building energy performance
  - Provide DF incentives to consumers through programs and rate designs
  - Accelerate adoption and use of technologies that enable DF, EE, and electrification
  - Integrate EE and DR goals with other state policies (e.g., jobs)

**Reasons expressed in legislation, regulatory proceedings, and executive orders*

Typology of State Demand Flexibility Indicators (1)



Typology of State Demand Flexibility Indicators (2)



Example State Actions Illustrating Progress to Date for Two Indicator Categories: *Utility Programs and State Programs*

Thanks to Natalie Mims Frick for help with some of these examples.

Utility Programs (1)*

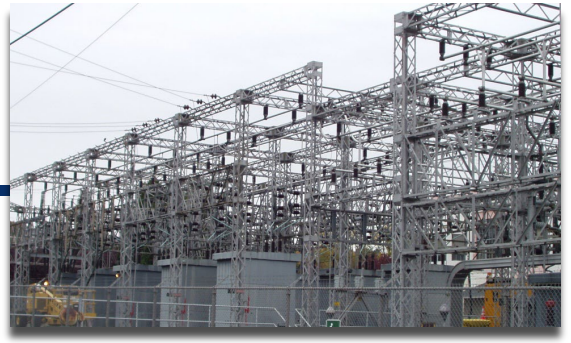
- EE program goals include peak demand reduction
  - CA's Database for Energy Efficient Resources defines peak period for EE savings calculations (see current definition)
  - Connecticut 2022-2024 Conservation Load Management Plans include peak demand reduction goals and Active DR programs for all market sectors
- Assessments of EE programs consider time-sensitive value of savings**
  - CA PUC Avoided Cost Calculator and MA Benefit-Cost Ratio Models
- EE program metrics include carbon emissions
  - CPUC's Total System Benefit metric optimizes energy and peak demand savings goals, plus greenhouse gas (GHG) benefits of EE, in a single metric
  - Several other states include avoided carbon emissions in avoided costs and cost-benefit analysis — e.g., New England states (Avoided Energy Supply Costs)
- Requirements for DR programs include potential studies
  - Load flexibility study for Xcel Energy's service area in MN
  - MI DR potential studies
  - Dominion Energy South Carolina DSM potential study
  - CA DR potential study phase 3 focused on potential for dispatchable load-shifting DR

*Including third-party administrators **See Frick and Schwartz (2019)

Utility Programs (2)

- DR goals include significant increases in peak demand savings over time
  - CO PUC established increasing DR goals: 465 MW in 2019, 476 MW in 2020, 489 MW in 2021, 503 MW in 2022, and 520 MW in 2023
- New utility programs required to reduce peak demand
  - HI Commission issued a policy statement and order on DR programs and subsequently approved Hawaiian Electric's new DR programs
  - VA S966 directed utilities to design new programs to shift loads
  - AZ Commission required Arizona Public Service to file an aggregated distributed demand-side resources tariff (EE, DR, and storage) and compensate aggregators for benefits including capacity, demand reduction, load shifting, locational value, voltage support, and ancillary and grid services (see RFP to help inform tariff). The tariff will be filed May 1st.
- Utility customer programs address equity
  - HB 2475 (2021) authorizes the Oregon PUC to consider "differential energy burdens on low-income customers and other … factors that affect affordability for certain classes of customers" when developing rates and programs. The PUC recently opened Docket No. UM 2211 to investigate its new authority. The PUC already requires reporting of equity performance metrics for EE programs.

Utility Programs (3)



- Locational value informs incentive rates for EE and DR
  - Portland General Electric's Smart Grid Testbed is evaluating a wide range of DER technologies and customer value propositions for DF, initially focused on three distribution substations representative of its service area
  - NY cost-effectiveness guidelines for EE programs include locational value and NY dynamic load management programs are designed to maintain distribution system reliability
- Programs address multiple DERs to achieve DF
  - In MA, EE programs include active demand reduction (DR, batteries)
  - In CA, a portion of distributed solar incentives is allocated to heat pump water heaters, including a set-aside for vulnerable households, to shift load to off-peak periods
  - Hawaiian Electric is using Grid Services Purchase Agreements to aggregate, forecast, and coordinate DERs like PV, battery systems, and grid-enabled water heaters for energy, capacity, reserves, and frequency control to keep electric grids stable and reliable
- Utility programs are coordinated with state and local government programs and wholesale electricity markets
  - ComEd provides data for customers to comply with local benchmarking requirements
  - EE and DR program administrators in New England states bid into ISO-NE forward capacity markets and can use revenue for program funding
  - CPUC established a Load Shift Working Group to develop proposals for new models to integrate DR into CAISO markets (see final report)

State Programs (1)

- Lead by example
  - Participation in utility programs and RTO/ISO markets*
    - CA requires state agencies to participate in utility DR programs and recommends that facilities with appropriate energy management systems participate in Automated DR
    - TN Department of General Services, Nashville Electric Service, and Enel X jointly implement DR programs in state office buildings
    - VA state agencies, universities, K-12 schools, local governments, and municipalities can participate in PJM's demand response markets. The Department of Mines, Minerals and Energy selected a state curtailment provider that assists with DR program participation.
    - MA Division of Capital Asset Management and Maintenance contracts with a DER aggregator for three offerings for state, local, or quasi-governmental entities to reduce energy costs:
      - Active demand capacity resources - Electricity reductions bid into ISO-NE forward capacity market (resources also can participate in Day-Ahead and Real-Time markets)
      - On-peak demand resources - Electricity reductions from non-dispatchable sources (e.g., EE, distributed generation) that bid into ISO-NE forward capacity market
      - Capacity tag - Reducing demand on peak days reduces bills for next capacity year (utility product)

*Source: Frick (2020)

State Programs (2)

- Track and report on metrics for energy use, energy savings, peak demand reduction, and DF
  - MA's Energy Savings Optimization Program tracks and records electricity data, allows performance of assets to be reviewed in real time, and assists facility managers with making improvements before the end of a billing cycle.
  - VA's Lead by Example Energy Dashboard compiles, tracks, measures, and displays state agencies' energy use to highlight EE champions and best practices and pinpoint areas for needed EE measures toward achieving the state's energy goals.

- **Benchmarking and transparency programs track and report on metrics for energy use, energy savings, peak demand reduction, and DF**
  - For large buildings (≥50,000 sq ft), CO (HB 1286, 2021) requires reporting of annual maximum electricity demand and, if available through the benchmarking tool, monthly peak electricity demand — in addition to energy use and intensity and GHG emissions (direct and indirect)

Trends and Gaps in State Actions on Demand Flexibility for Utility and State Programs

Trends in State Actions on Demand Flexibility Related to Utility and State Programs*

- Formal **coordination of utility DR planning and programs with regional grid operators** remains nascent in most areas; however, CA PUC and regional PUC organizations (e.g., NECPUC, OMS) regularly engage in RTO/ISO meetings and proceedings.
- A number of states recently adopted **equity policies** affecting state decision-making. These policies are an important step toward ensuring equitable distribution of the benefits of DF programs.
- **Integration of utility programs for EE and DR** is increasing in tandem with peak demand reduction goals, but at a slow pace.
- Improvements are underway in a number of states related to **assessing the cost-effectiveness, potential, tracking, and performance of EE and DF, reflecting enhanced methodologies and additional metrics**, such as time and locational value and GHG emissions.
- A growing number of states are refining **EE and DR performance incentives for utilities** to target demand reduction when and where it is most valuable.

*a prevailing tendency or inclination

Gaps in State Actions on Demand Flexibility Related to Utility and State Programs*

- **Utility programs**
  - EE program goals often do not include peak demand reduction, EE and DR utility programs remain largely siloed, and multi-DER programs are rare.
  - Customer value proposition for DF is not well understood.
  - Cost-effectiveness for EE programs and portfolios don't fully account for all potential benefits or account for time and locational value.
  - Potential assessments for DR are not regularly performed.
  - DR programs typically are targeted to a narrow set of potential grid services.
  - Most DR programs are for load shedding, not load shifting — important to integrate variable renewable energy resources and manage increased electrification.
  - Equitable distribution of program benefits often is not considered in program design, evaluation, and reporting.
- **State programs**
  - EE incentive and financing programs typically do not include a full range of potential DR measures or use metrics that encourage DR/DF measures.
  - Most state lead-by-example programs focus on annual energy savings rather than peak demand reduction or load-shifting.
  - Energy-saving performance contracting generally does not incorporate demand savings.

*an incomplete or deficient area

Discussion Questions

- How could you use this work in your state to advance demand flexibility and consider new pilots, new programs, or improvements to existing programs?

- If your state has demand flexibility pilots and perhaps ongoing programs, how did you get those going? For example, did you need legislation, executive order, or utility commission order?
  - What were some of the challenges, and how did you overcome them? And what did you learn that would be helpful for other states to know?

- If you've had demand flexibility pilots or have programs, can you share with us some initial results? And are there plans to build upon these initial efforts?

Contact

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For more information

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- SEE Action Network (2020). Performance Assessments of Demand Flexibility from Grid-Interactive Efficient Buildings: Issues and Considerations.

Also see the library for the NARUC-NASEO Task Force on Comprehensive Electricity Planning: https://www.naruc.org/taskforce/comprehensive-electricity-planning-library/