



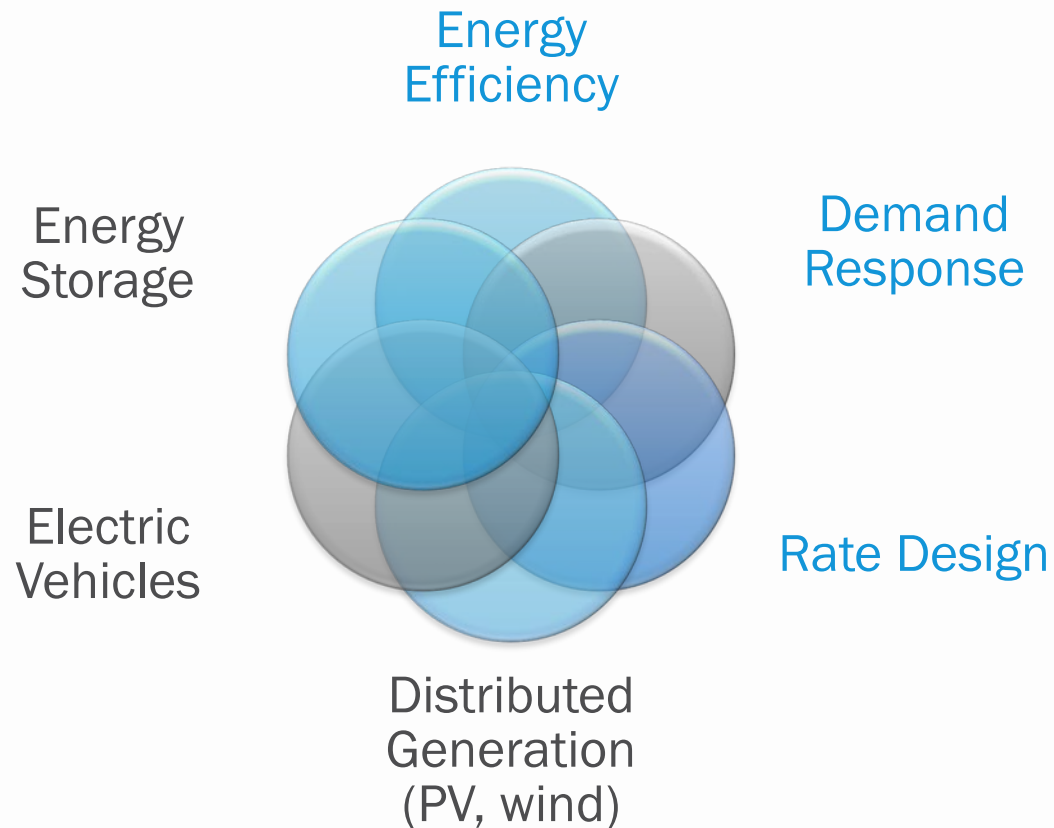
WOULD YOU LIKE A SLICE OF LAYER CAKE?

CONSIDERATIONS FOR DISTRIBUTED ENERGY RESOURCES (DER) EVALUATION SOLUTIONS

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Stefanie Wayland



What are DERs? An evolving definition



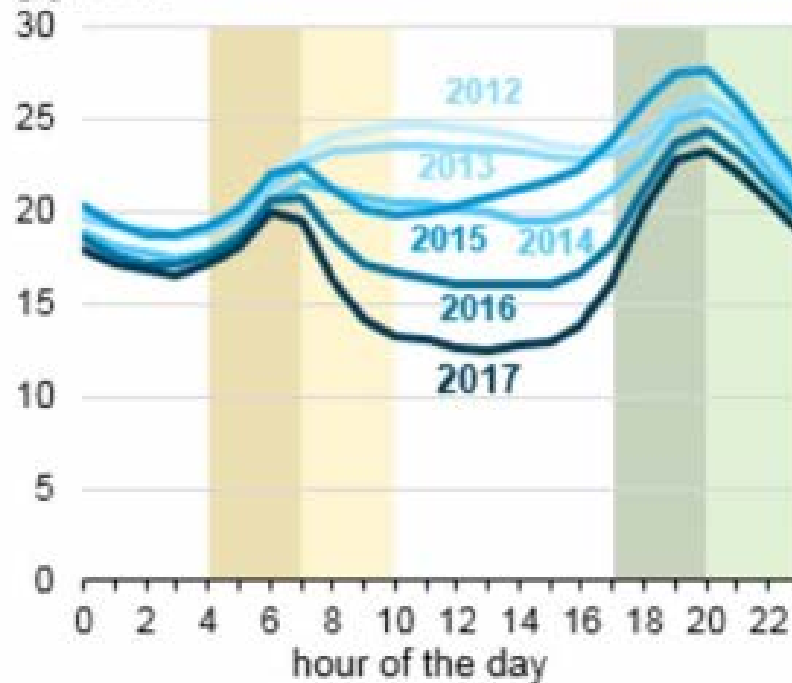
- Resource close to customers that can:
 - provide immediate electric needs
 - reduce demand (such as EE) or provide supply
- to satisfy energy, capacity, or ancillary service needs of the distribution grid

*Note: DER now includes traditional DSM interventions

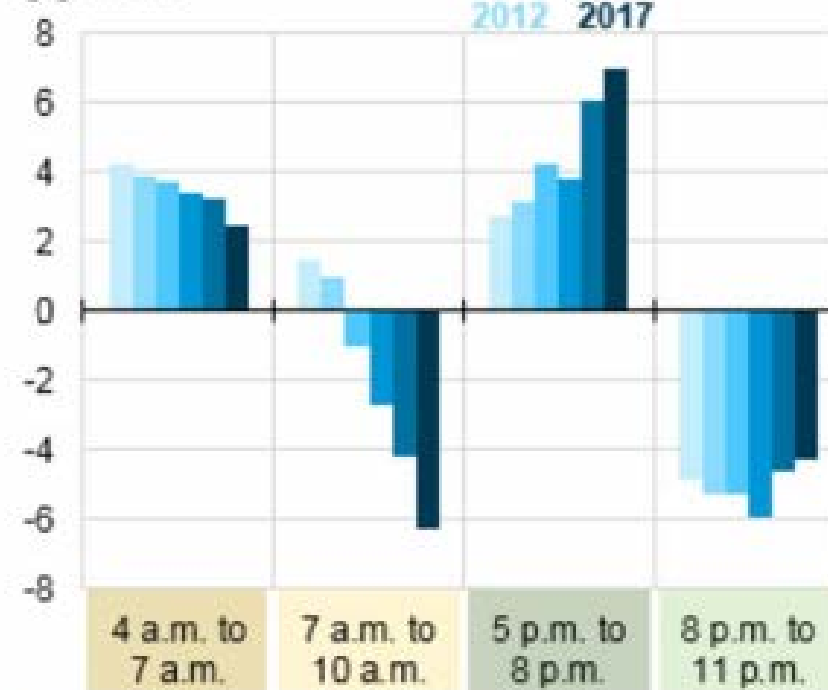
FERC, 2018

What are implications of DER technologies on energy markets and DSM portfolios?

California ISO average net electric load last week of March
gigawatts



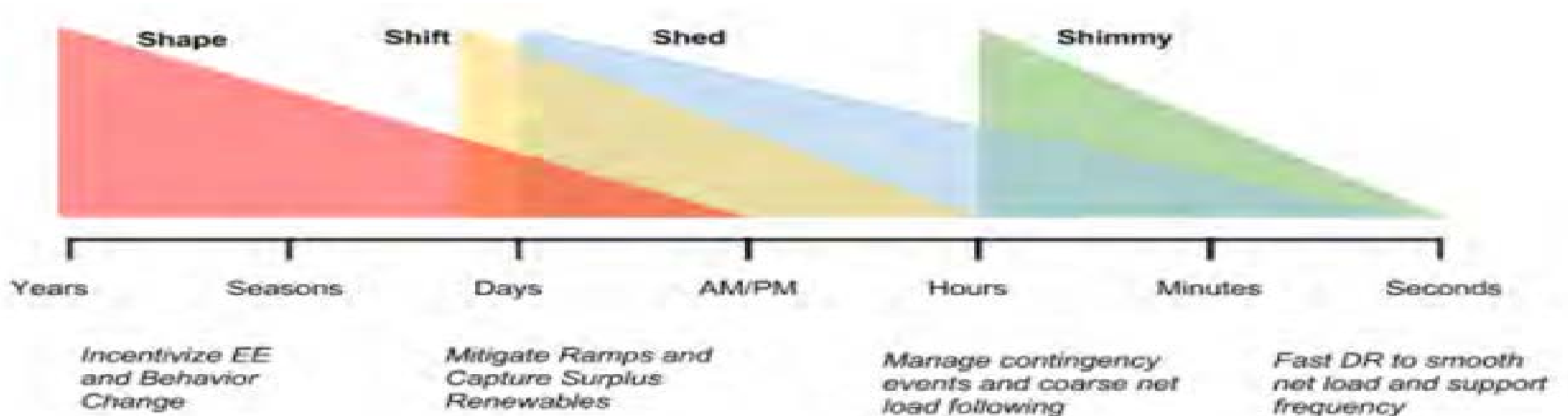
Net load change during ramping periods last week of March
gigawatts



Source: U.S. Energy Information Administration, based on [ABB Energy Velocity](#)

Figure 1. California ISO "Duck Curve" Documented by U.S. EIA, Spring 2017. Source: U.S. EIA, 2017.

New technologies and grid planning needs create new research opportunities



DR service types presented over timescale for grid service dispatch frequency and/or response.

Source: Lawrence Berkeley National Laboratory, 2017.

How does DER penetration affect evaluation?

- Will there be evaluation for DERs?
 - No public benefit charge to cover DER evaluations in siloed framework
 - However, DER penetration affects traditional public benefit funded DSM evaluations
- There is a case for evaluation services in an **Integrated** DER world...
 - Evaluating DER interventions will lead to optimal allocation of ratepayer funds and DSM/DER intervention resource planning





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What should evaluators do?

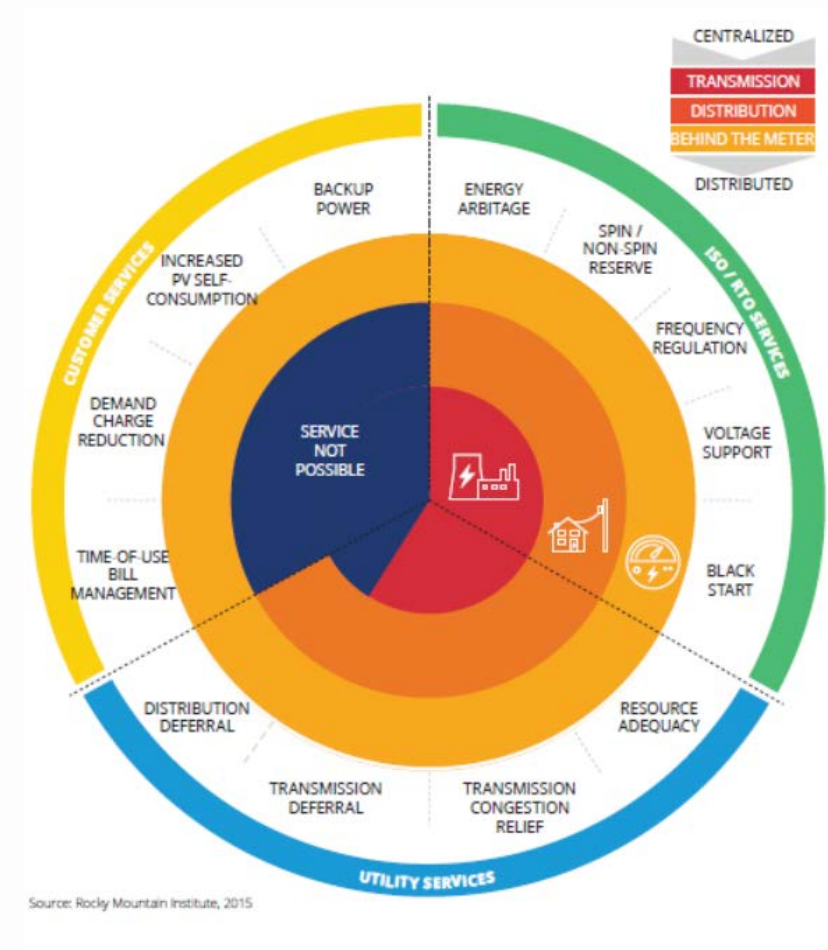
Opportunities to support DER evaluation

1. Develop an operable and standardized definition of DERs
2. Leverage existing evaluation tools
3. Establish **integrated** evaluation framework
4. Develop time-location based energy modeling



1. Develop an operable and standardized definition of DERs

- Explicate DER objectives across common metrics to make comparable assessments:
 - operationalize measurement strategies
 - break siloes of supply and demand, EE and DR, and the customer and the grid
 - define DERs as time- and location-dependent services, which seek to modify load shapes
- DERs can become a layered set of all interventions to support flexible grid management



Battery Storage Services.

Source: Smart Electric Power Alliance, 2017.

2. Leverage existing evaluation tools

- Our existing evaluation tools support framework development, including:
 - *developmental evaluation* to ensure high degrees of optimal customer adoption and continuous engagement
 - *granular energy modeling tools* to ensure that ratepayer funds are appropriately allocated to support policy and grid goals
 - *customer research* that measures not only the “what” but the “why” of DER adoption



3. Integrate evaluation frameworks to optimally value integrated impacts

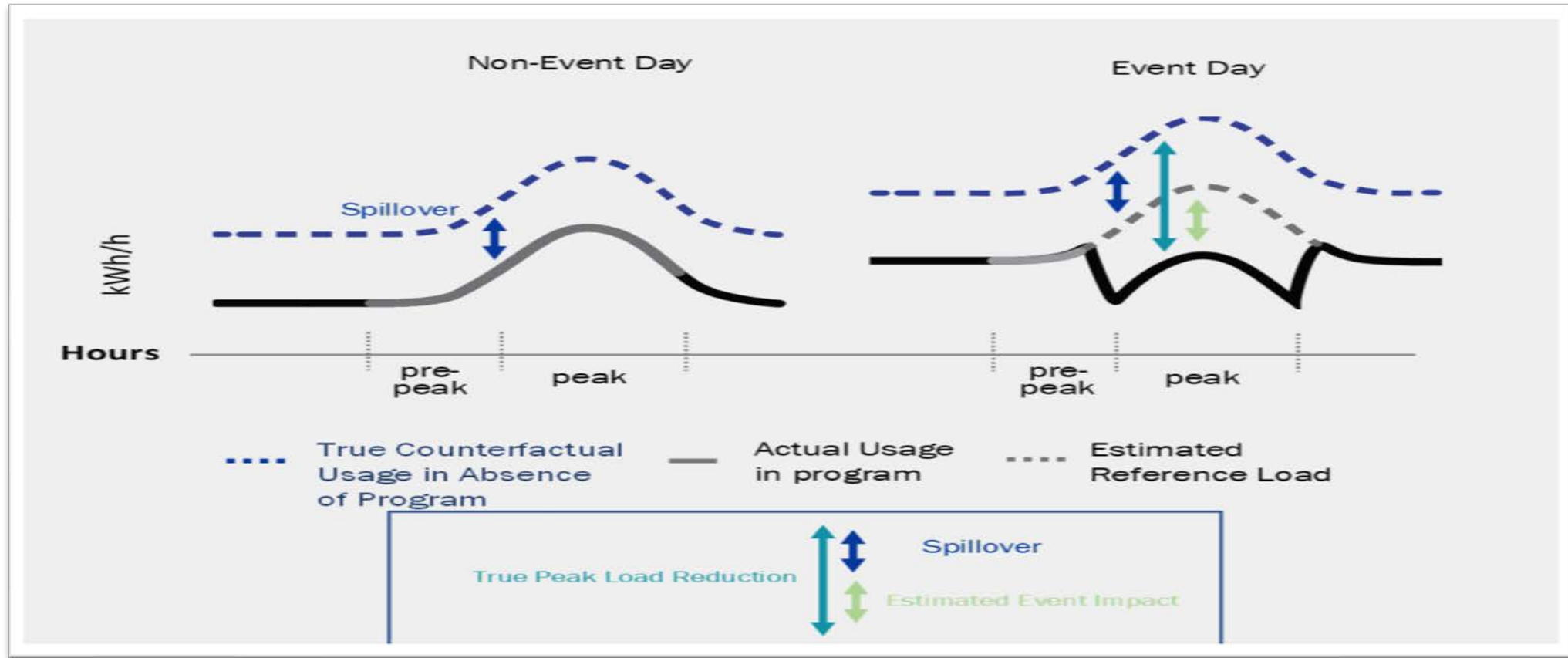
- Quantify multiple value streams across simultaneous interventions
- Establish **integrated** evaluation framework that values the effect of DERs and supports integrated DSM interventions:
 - shift from energy reductions to multi-directional and time-dependent changes in consumption
 - support integrated interventions
 - consider multi-directional power flows
 - assess attribution (where relevant)
 - minimize double counting

***We need an integrated,
flexible and agile framework
that reflects nuances of DER
environment***

4. Develop time-location based energy modeling

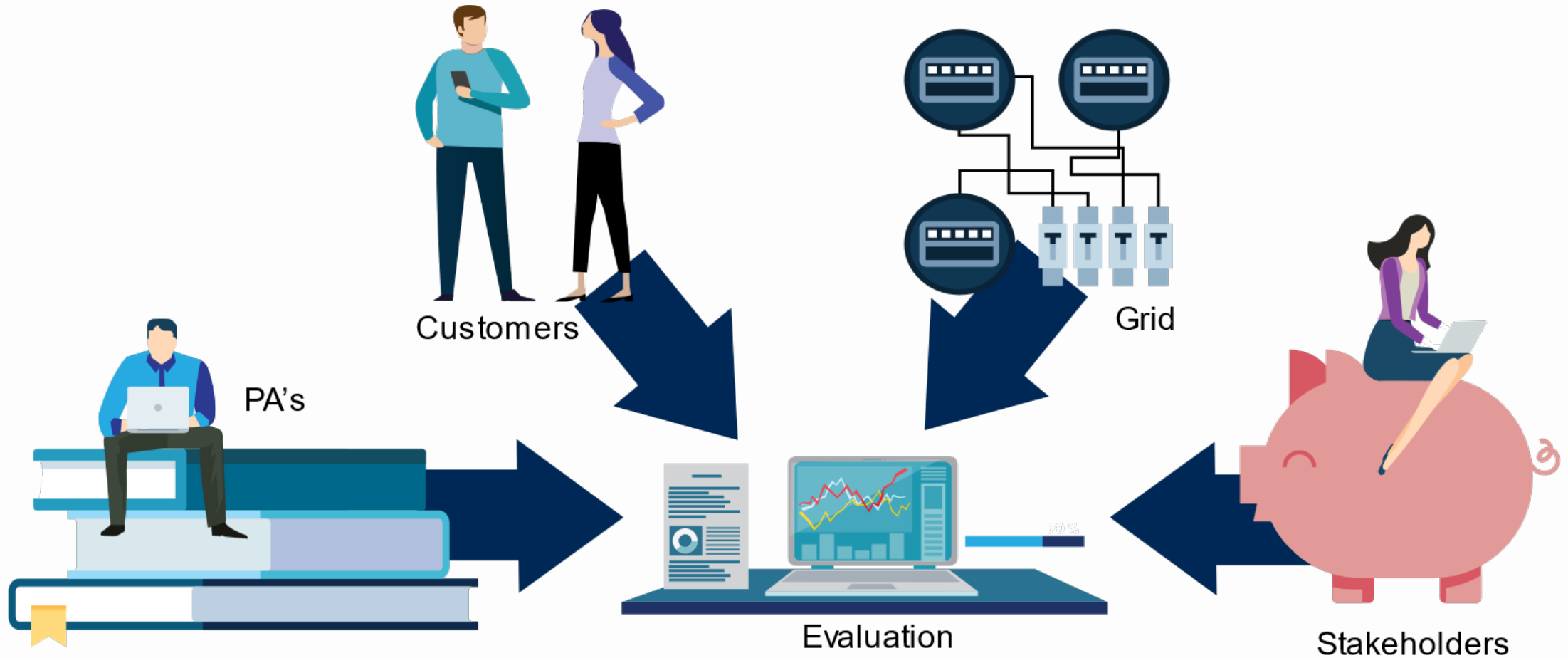
- Existing baseline frameworks do not support integrated and continuous interventions
 - These tools will need to become flexible to support time and locational values, as well as integrated interventions
- Develop a tried and tested time- and location-based measurement approach that measures ‘layered’ increases and decreases in energy consumption
 - Value DERs in terms of time- and location-dependent load modification
- We have precedent and should take steps to support its development

Unintended Consequences of Siloed Frameworks



Result: underestimated or misallocated estimates of program impacts from outdated frameworks

(e)valuate? The evaluation of today will not be the evaluation of tomorrow





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