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Innovating Utility and Regulatory Processes to Improve Distribution Resilience

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RAP

Resilience

- Capability to keep a system running when faced with natural- or human-caused insults
 - Or limit the effects on people and places
- Capability to recover fast if the system is brought down

Outcome Considerations for Resilience

- 24x7 resilience **exposure**
- **Social** priorities – what needs to be protected most, next
 - **Critical services** for public health and safety need more “9s”?
 - Awareness of **vulnerable people**, protection before a disruption and during
- **Scenarios** (still) important, new ones address emergent resilience threats
- All **options**: Continuous improvement in the operator playbook, cost control
 - Connect planning and investment; address capital bias
- **Return on performance** compensates utility for most important outcomes
- **Customer** options
 - E.g. Microgrid as a service, a tariff option from utility or enabled

Resilience

- Capability to keep a system running when faced with natural- or human-caused insults
 - Or limit the effects on people and places
- Capability to recover fast if the system is brought down
- Resilience is a scenario-driven assessment
 - From the grid perspective, the focus is on the grid
 - From the societal perspective, the focus is on people and public safety; the grid is one among an array of critical infrastructure

What everyplace with high% of renewable power will need: a flexibility reservoir

- Unlike a water reservoir, where the contents are uniform
- A flexibility reservoir holds an array of flexibility capabilities and sources
 - **Many are DERs**, hosted and in some cases controlled by customers
 - Minimum of cycling fossil fuel generating units if climate is important
- An early effort (20 years ago) to show graphically an array of grid responsive resources in the hands of customers:

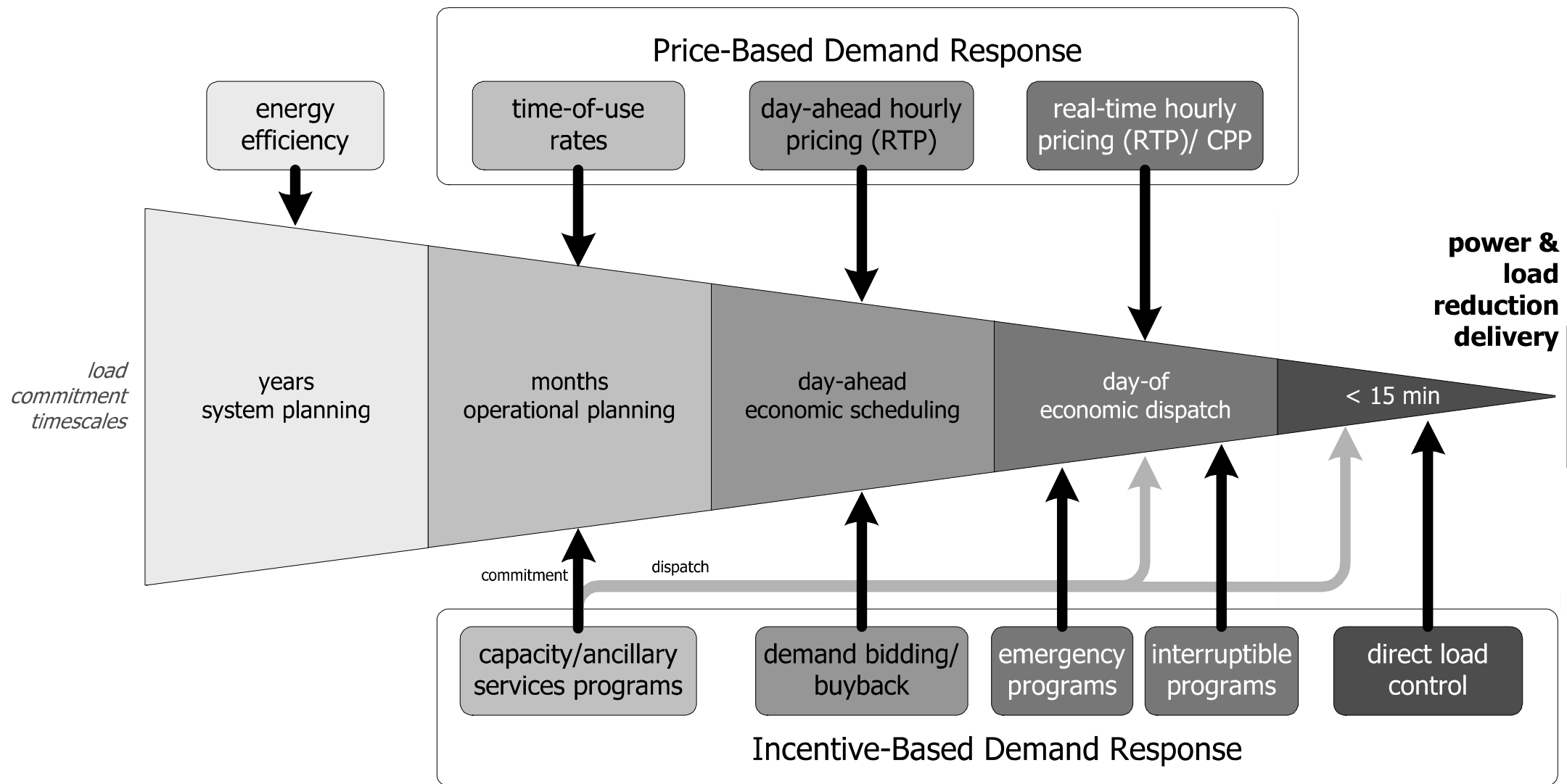


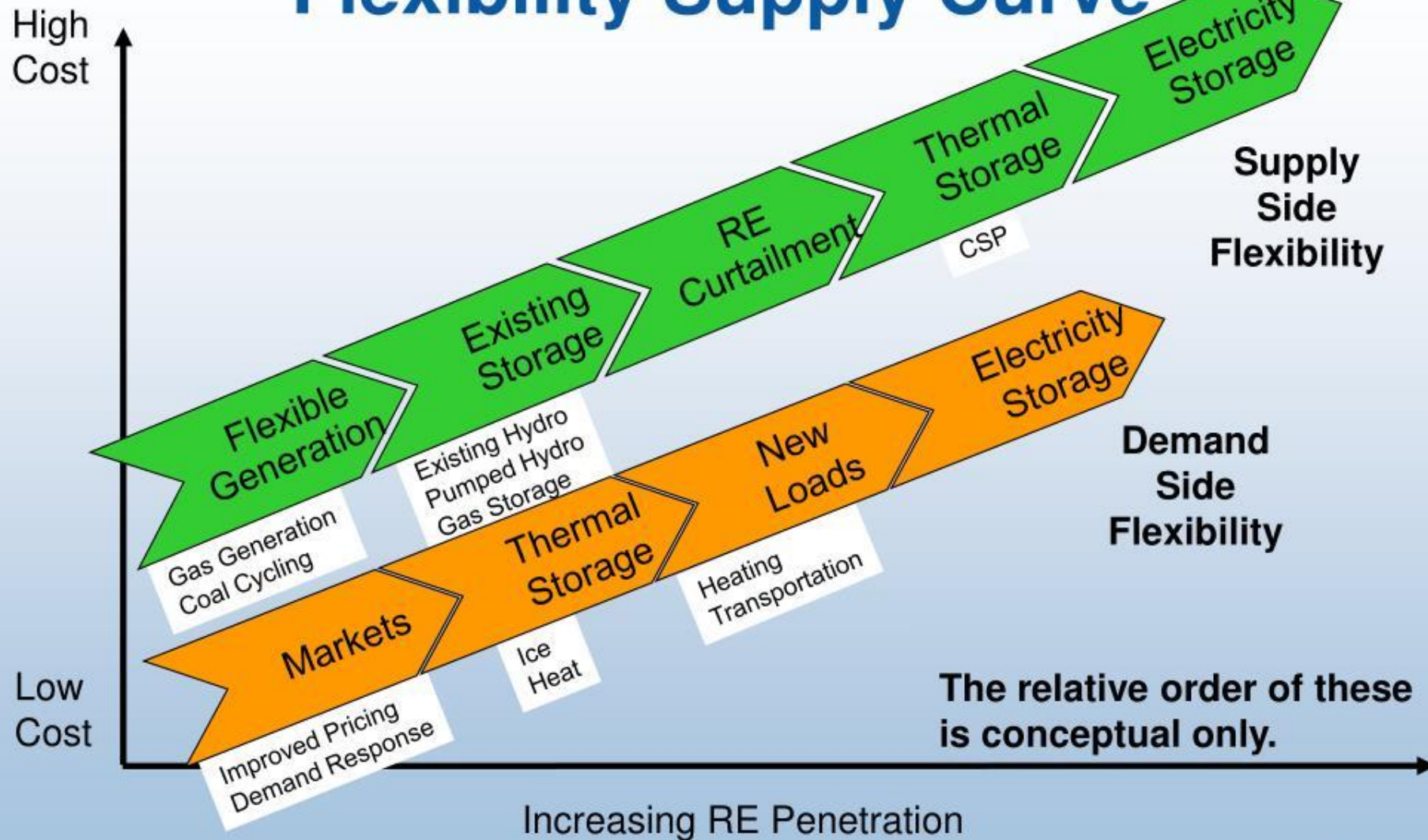
Figure 2-3. Role of Demand Response in Electric System Planning and Operations

From “Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them, A Report to the United States Congress Pursuant to Section 1252 of the Energy Policy Act of 2005” by the US DOE, February 2006.

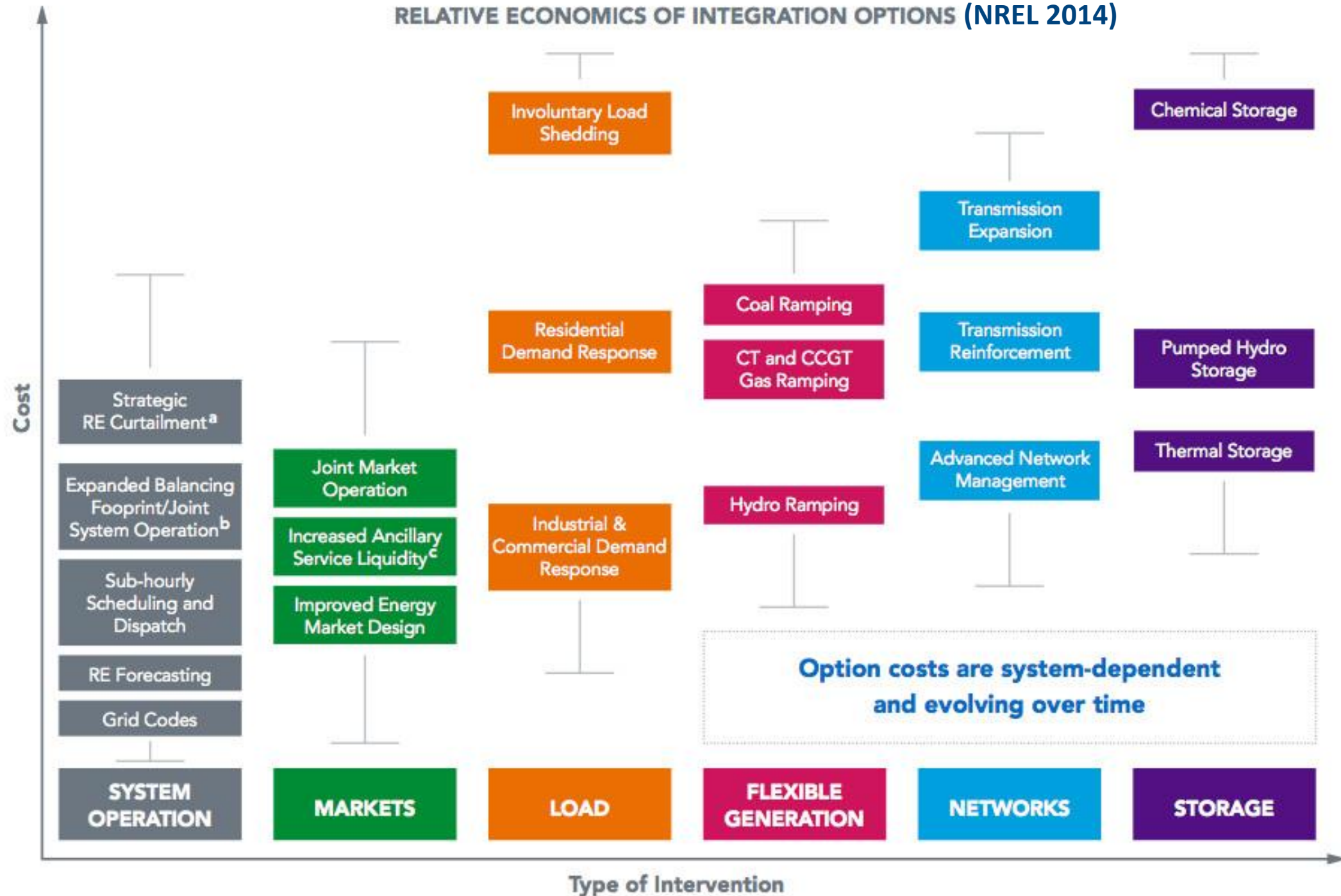
What every place with high% of renewable power will need: a flexibility reservoir

- Unlike a water reservoir, where the contents are uniform
- A flexibility reservoir holds an array of flexibility capabilities and sources
 - **Many are DERs**, minimum of cycling fossil fuel gen units if climate matters
- Good news: technology is advancing, firms are innovating,
 - We are advised to pay attention that these businesses are succeeding and benefits are extending to all
 - Expressing all this graphically and clearly remains a challenge
- More recent images of grid flexibility from NREL:

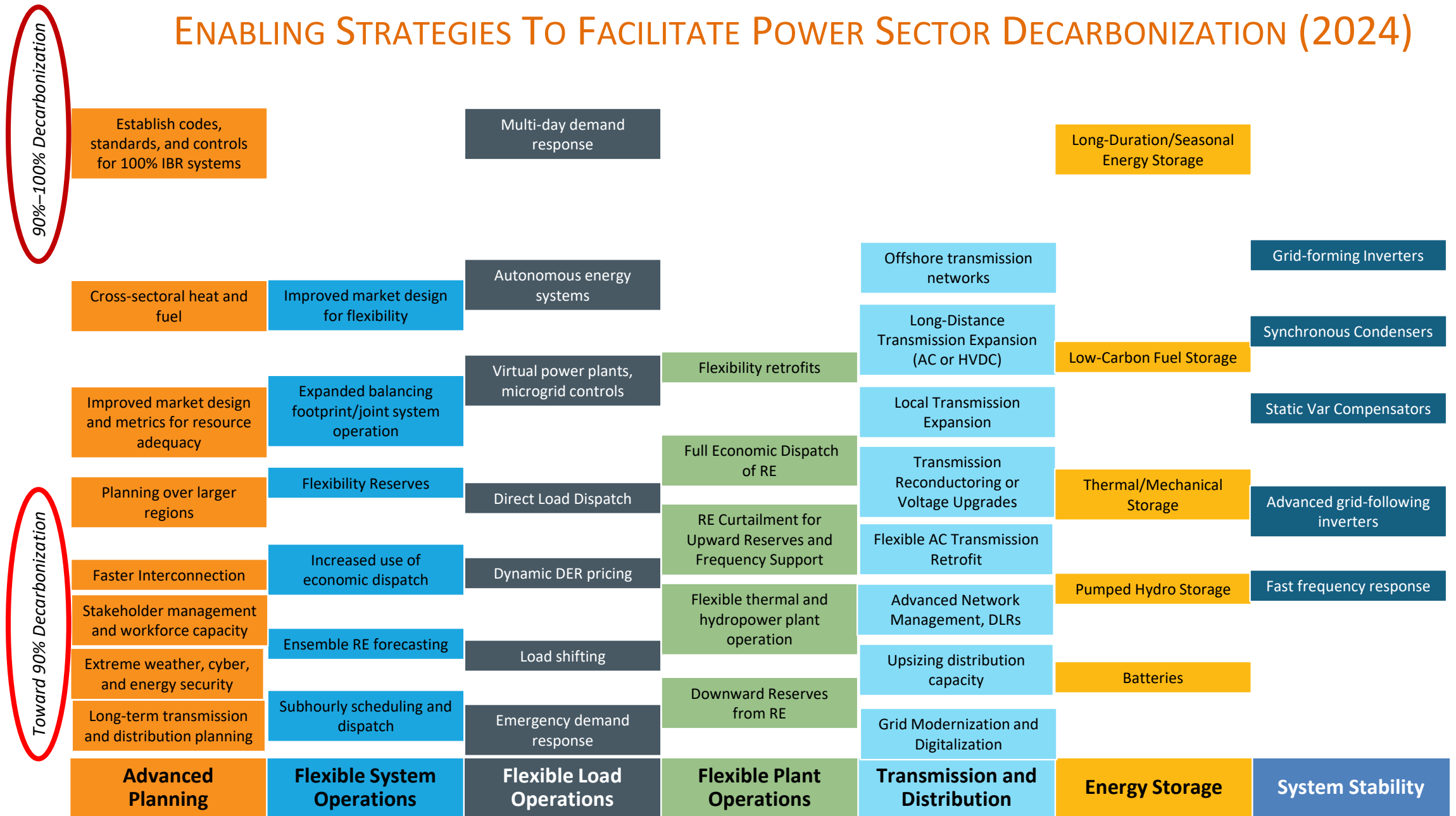
Flexibility Supply Curve



RELATIVE ECONOMICS OF INTEGRATION OPTIONS (NREL 2014)



ENABLING STRATEGIES TO FACILITATE POWER SECTOR DECARBONIZATION (2024)

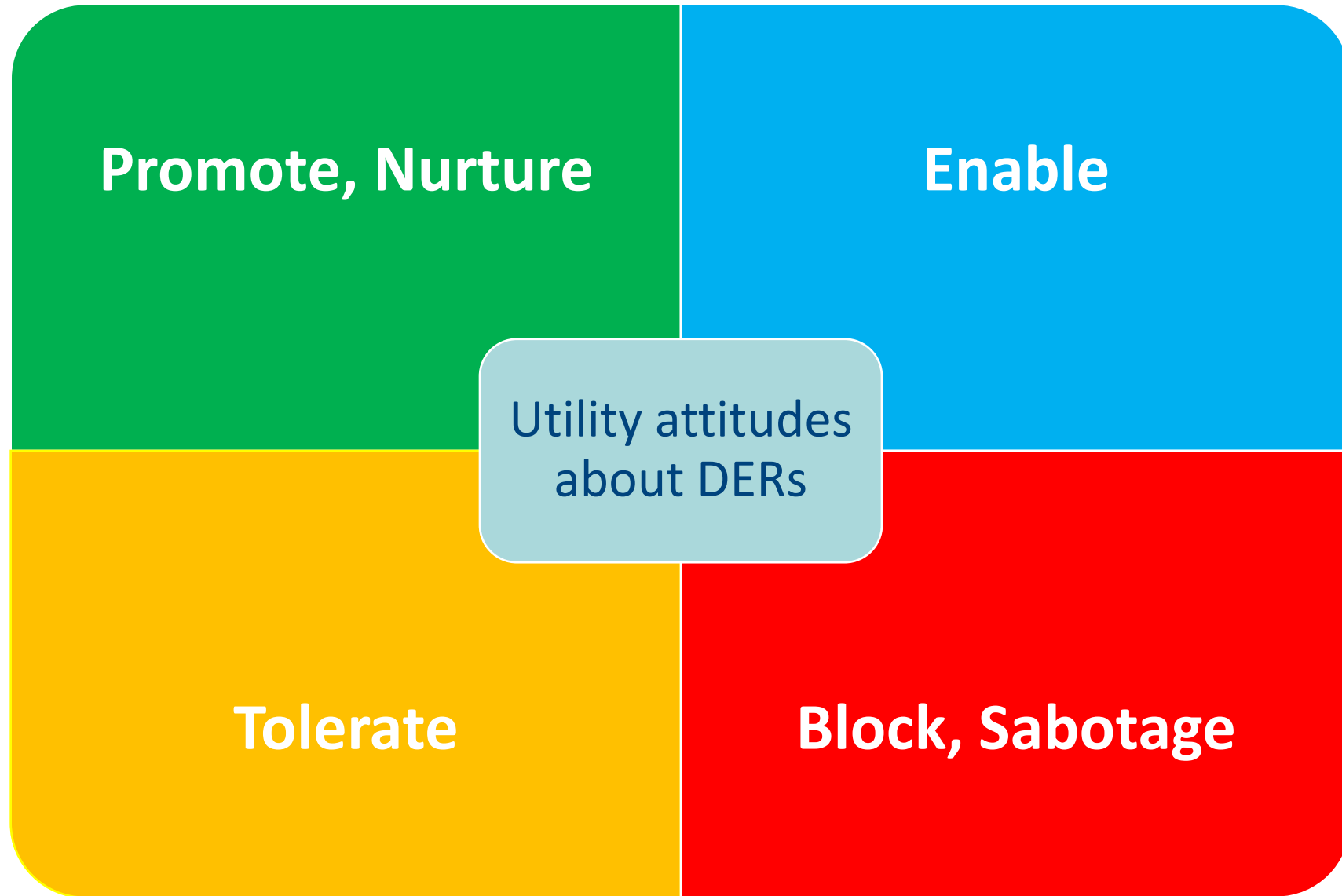


DERs seem (are?) critical for resilience

- DER is a resource – are you taking it seriously, respecting its potential? accepting that diminished control of a small set of assets is replaced by accurate predictability of a population of assets?
- We are all on a learning curve
 - Approaching it from our roles
 - Operating a grid
 - Overseeing a utility
 - Managing a business or household
 - Innovating DERs to be fit for purposes

**Utility: a pivotal institution;
where it serves it governs pace and purpose of
DERs deployment**

So how might a utility respond to DER potential?



Manifestations

Resilience can be integrated into a DER-focused procurement

- Grid integration of Existing pieces
 - Thermal storage, Grid-integrated efficient buildings
- New pieces
 - Managed charging for EVs, new intermittent electric loads
- New systems
 - DER aggregated systems operated as a unit (VPPs)
 - Microgrids as a service
- New resource procurement methods

Economic efficiency would align decision-maker incentives with societal priorities

- Pricing (rates) is fair, just and reasonable
- Social equity is a priority, vulnerable people are prioritized
 - DERs benefits are not just for those who can afford them (or the grid is lost)
- Regulated company earnings produces necessary capital
- Planning connects directly with investment
- Policy strikes optimal balance between regulation and markets
- Policy connecting wholesale and retail markets (cooperative federalism)
 - Resource adequacy is redefined to reflect capabilities in distinct time blocks

Utility as provider or facilitator of services

- Microgrid as a service
- Resilience as a service
- Premise energy systems as a service
- Consider the NY REV concept (not adopted – yet) of the utility as a **platform** connecting service innovators with customers
 - Fees for making these connections – platform service revenues

Bringing it back to Resilience and regulatory process

- Regulated companies and their regulators will need to engage more and with **forward leaning** intent with the **public safety** apparatus
 - What are the threats?
 - What are the vulnerabilities?
 - What can be hardened?
 - What threats can be diminished through decentralization, diversification, etc?
- How shall this be **integrated into grid planning and investment**?
- How does electrification of critical societal functions change the challenge?
- How will customer capabilities to self-supply be captured, directed and used?



Key Takeaway

Distributed Energy Resources are a principal instrument for grid resilience, and thus, societal resilience. Public Service companies can lead in their efficient deployment with guidance from government.

About RAP

Regulatory Assistance Project (RAP)[®] is an independent, global NGO advancing policy innovation and thought leadership within the energy community.

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