



RAP

Energy solutions
for a changing world

Response is Vital in a Grid with Growing Variable Resources

A Report on a recent RAP paper:
What Lies Beyond Capacity Markets? for the
Pacific Northwest Demand Response Project

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How do we plan power markets to ensure reliability ...

- without undermining markets
- without locking in resources incompatible with reliability
- without excessive renewable energy integration costs

Reminder

Reliability has two dimensions

Resource Adequacy – enough firm resources to meet system peak

System Security – the right resources deployed/operated to balance supply and demand at least cost

Timescales: resource adequacy: investment scale; system security at operational scale

Capacity markets: The temptation of the familiar

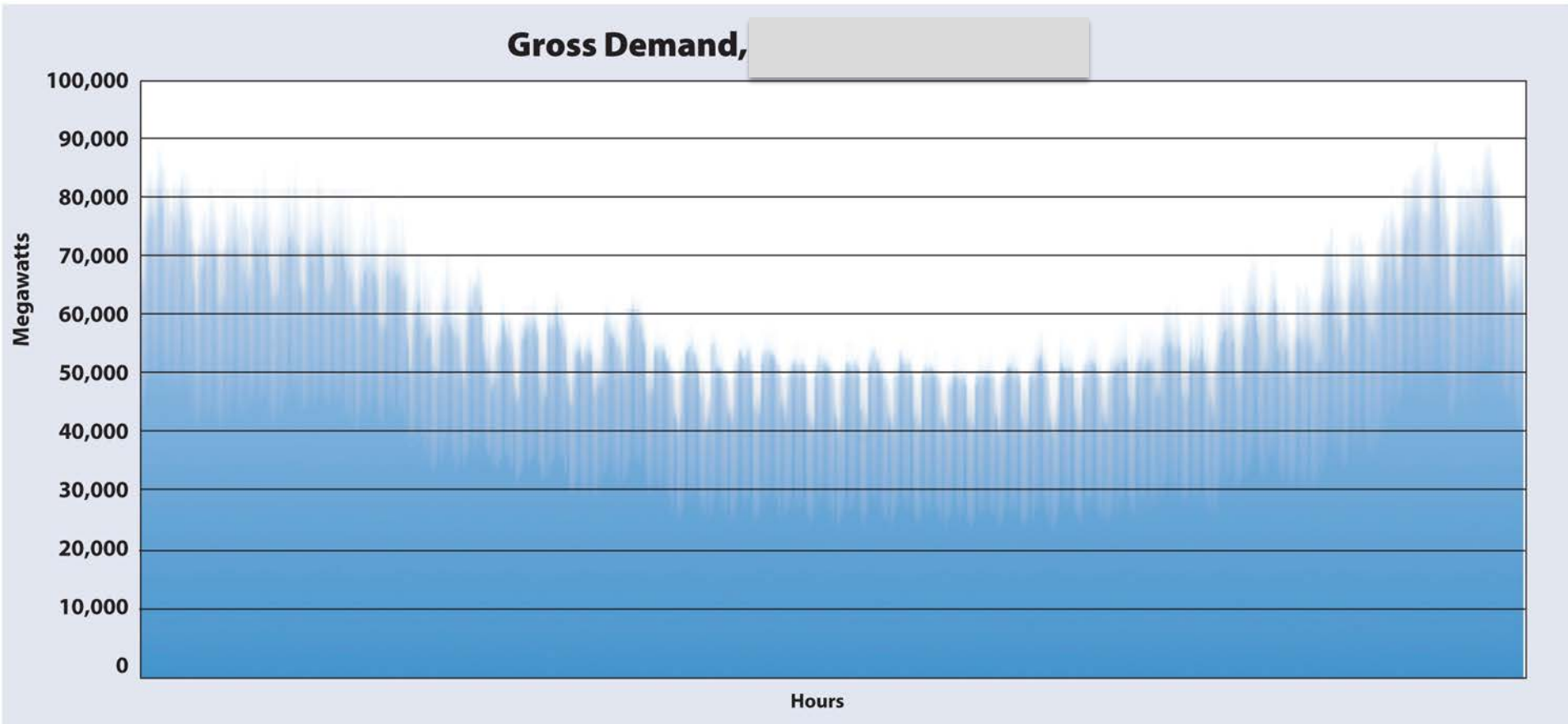
Capacity markets: investment incentives designed to address resource adequacy

Corollary: System security will be handled by flexibility inherent to resources acquired to meet resource adequacy

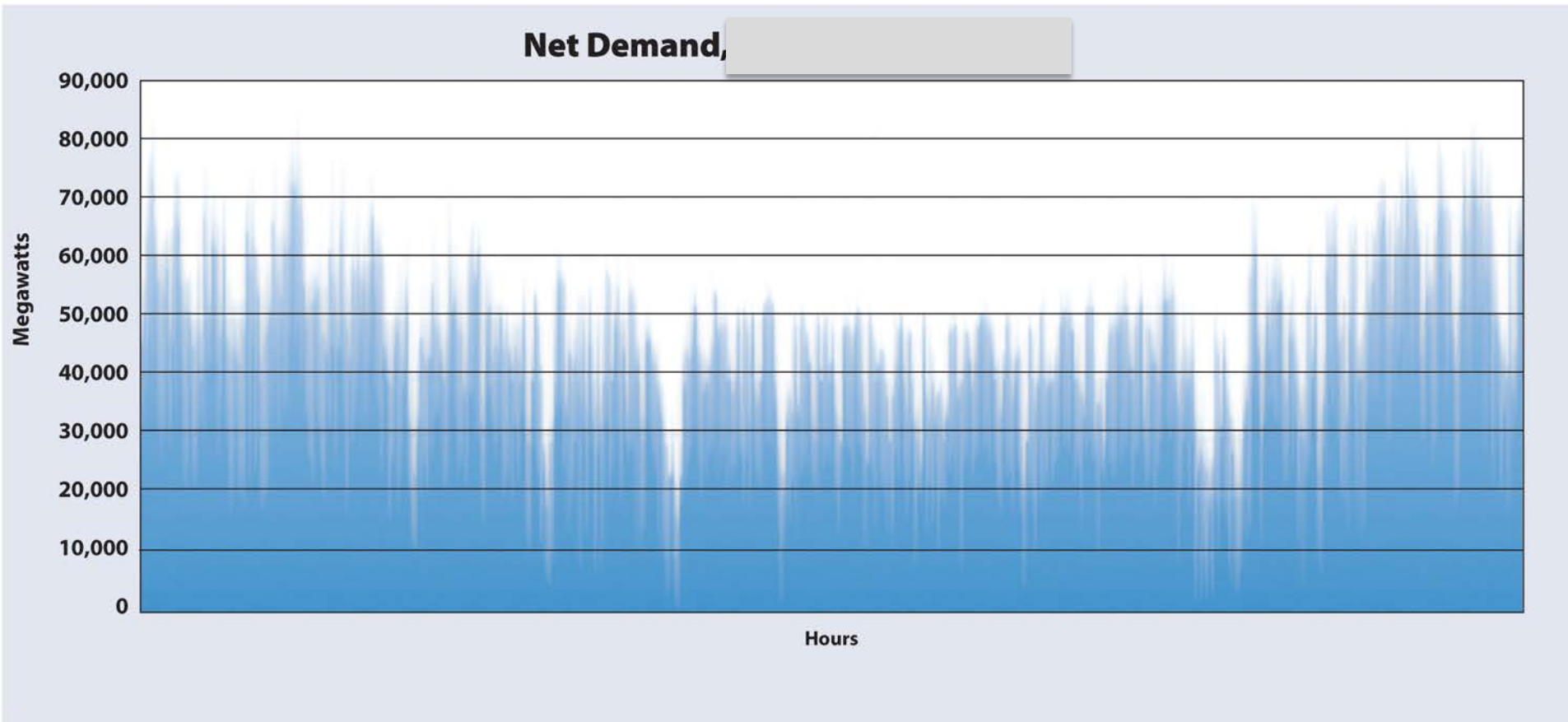
What happens when flex in the system is insufficient?

When system stability needs “more?”

Resource Adequacy Objective



Objective with High Flexible Resources



Ramping and cycling value is revealed by prioritizing variable resources

Fixing one problem can create others

Capacity markets can work at cross purposes with a market that needs system flexibility

All capacity is not the same

Least cost capacity may be least flexible

Energy only markets can also undervalue flexibility – is waiting for a crisis a biz model?

Inflexibility can lead to higher operating costs, investment in avoidable back up and threaten reliability

Beyond Energy/Capacity Markets

Modify energy-only market with enhanced forward services

add ramping and cycling

forward contract ancillary services

Modify traditional capacity market designs with a apportioned forward capacity system

Elevate “Net Demand” objective

Fully value 24x7 flexibility in power markets

Apportioned forward capacity

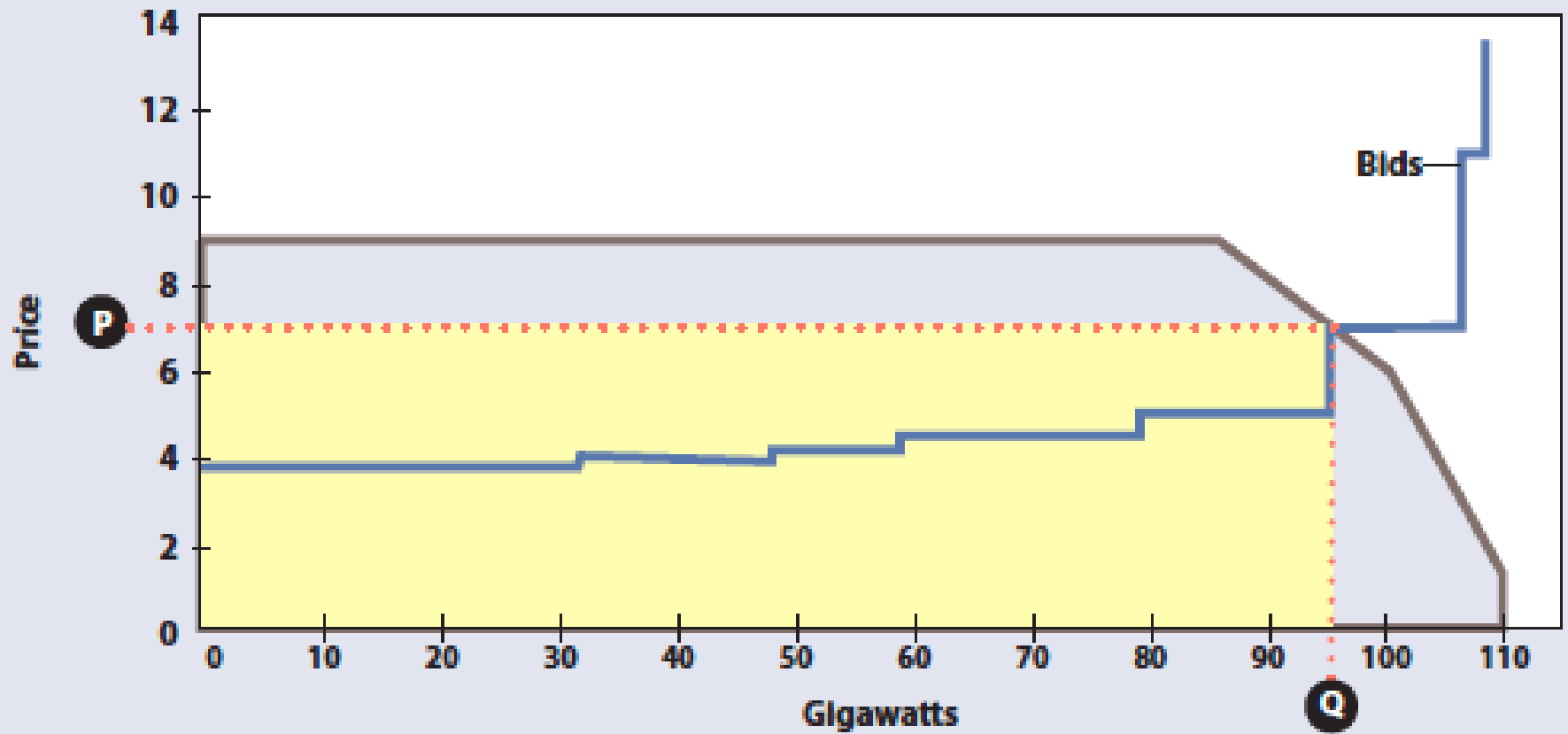
Tranches based on resource capabilities
supply, demand, storage, **functional**

Sequenced procurement

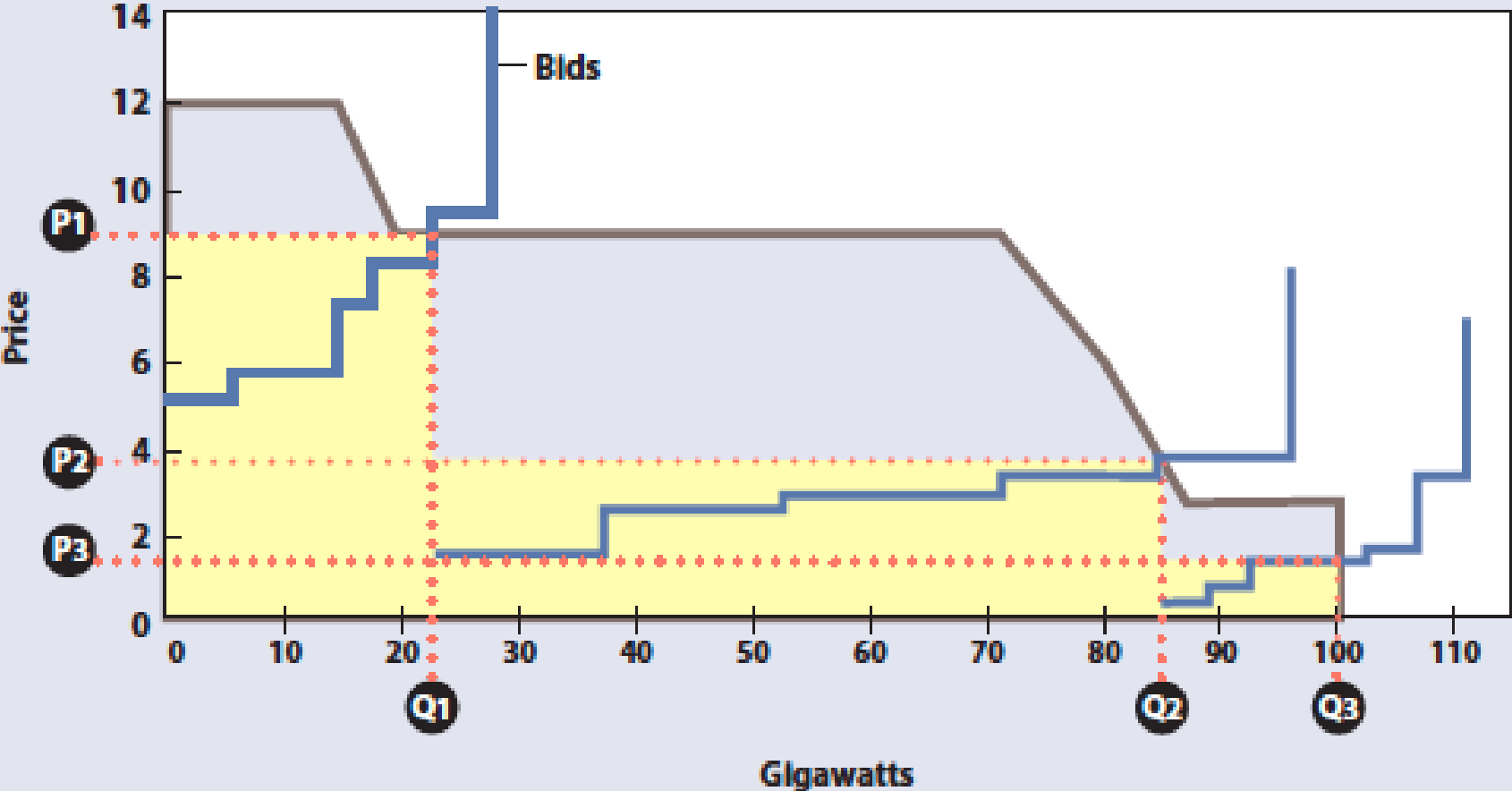
most flexible (i.e. cycling, ramping) first

Pay all firm resource for market value of
firm capacity, but pays more for resources
that possess other reliability attributes

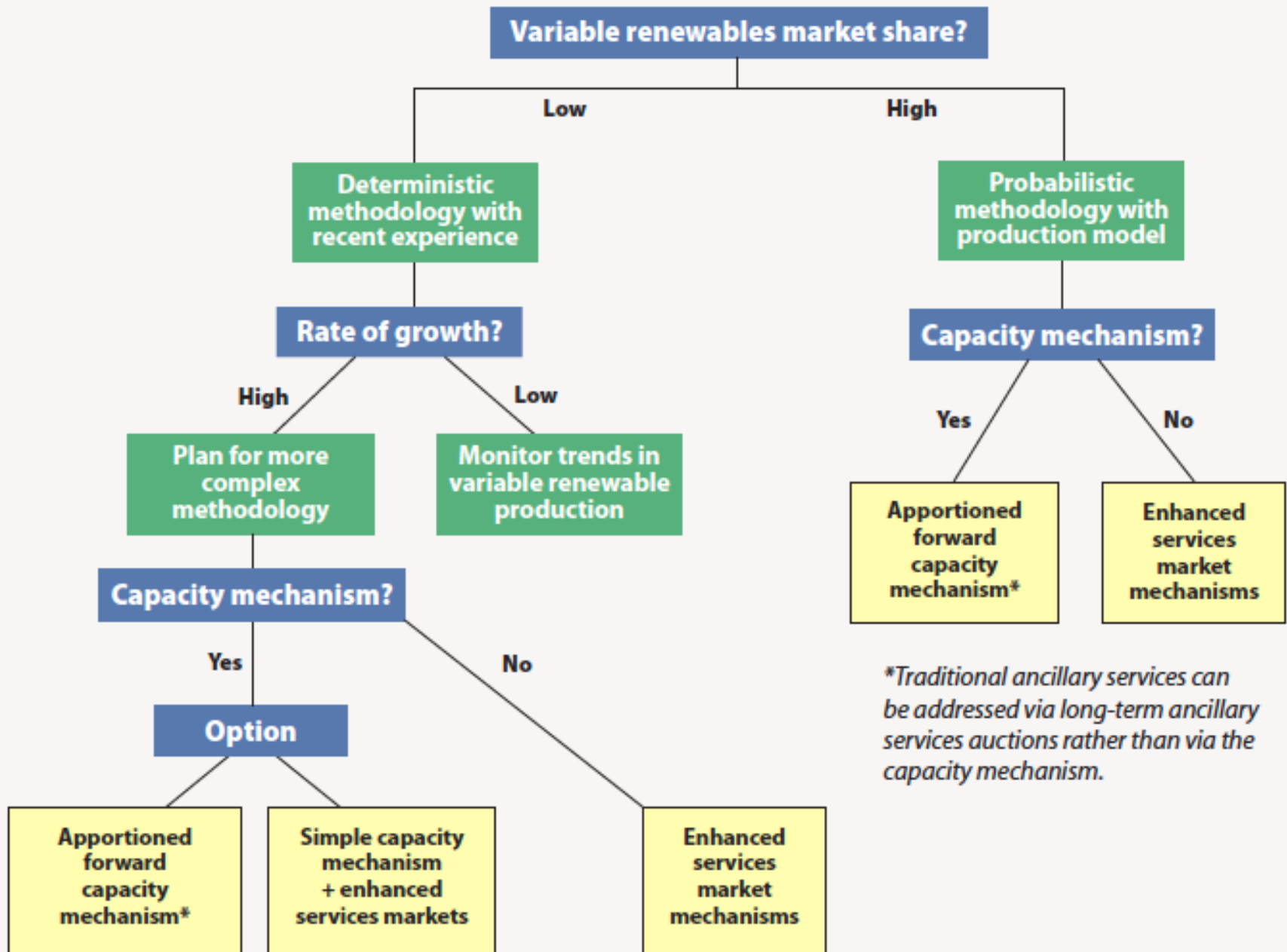
Single Clearing Price Auction



Multiple Clearing Price Auction (c)



Decision Framework



**Traditional ancillary services can be addressed via long-term ancillary services auctions rather than via the capacity mechanism.*

Resources

- What Lies Beyond Capacity Markets?
 - <http://raponline.org/document/download/id/6041>
 - <http://raponline.org/document/download/id/4854>
- Power point
 - <http://raponline.org/document/download/id/6054>

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

- Promote economic efficiency
- Protect the environment
- Ensure system reliability
- Allocate system benefits fairly among all consumers

Learn more about RAP at www.raonline.org

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