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March 3, 2015

MEMORANDUM

TO: Council members

FROM: John Ollis

SUBJECT: Guidance on Demand Response Characteristics Assumptions for use in RPM

BACKGROUND:

Presenter: John Ollis, NWPCC (jollis@nwcouncil.org, 503-222-5161)

Summary The updated Regional Portfolio Model (RPM) explicitly analyzes the need for peak capacity. Therefore, a new resources' capability to provide both system support for peak capacity as well as satisfying energy adequacy requirements can be tested. This enhanced capability is the basis for the proposed methodology to model new Demand Response (DR) resources in the RPM. While DR resources can be characterized by many attributes (e.g., automated vs. price signal driven), for modeling purposes in the RPM the primary attributes are seasonal shaping and pricing. Specifically, the Staff proposes that three types of DR resources, delineated by price bins, should be made available to the RPM to option and build as new resources to supply peak capacity needs.

To develop the inputs necessary for DR analysis using the RPM, Staff commissioned a contractor (Navigant) to complete a regional DR potential study. This study's scope was limited to a review of information from previous potential studies and surveys from Investor Owned Utilities. Staff released the initial results of the study for stakeholder review and integrated the results of the study and stakeholder responses to develop

the cost and potential for new DR for use by the RPM. At Staff's request, Navigant updated its initial study to provide data on the seasonality of DR resources. This data was used to identify DR resources most likely to be selected by the RPM based on regional peak capacity need.

Per the February 2015 Power Committee discussion, Staff's recommendation is that new DR resources be characterized by three price bins of which each is treated as a new supply-side resource. Each of the price bins has a distinct seasonal shape, fixed costs (in dollars per kilowatt-year), associated energy contribution (in megawatt hours) and capacity contribution (in peak megawatts) to regional adequacy.

Relevance Similarly to the discussion on the methodology for capacity and flexibility, Council's resource strategy cannot be considered comprehensive to simply plan to meet the region's energy needs, without also considering capacity needs. Potential new resources and energy efficiency acquisitions must be evaluated by their impacts on the system requirements for both energy and capacity.

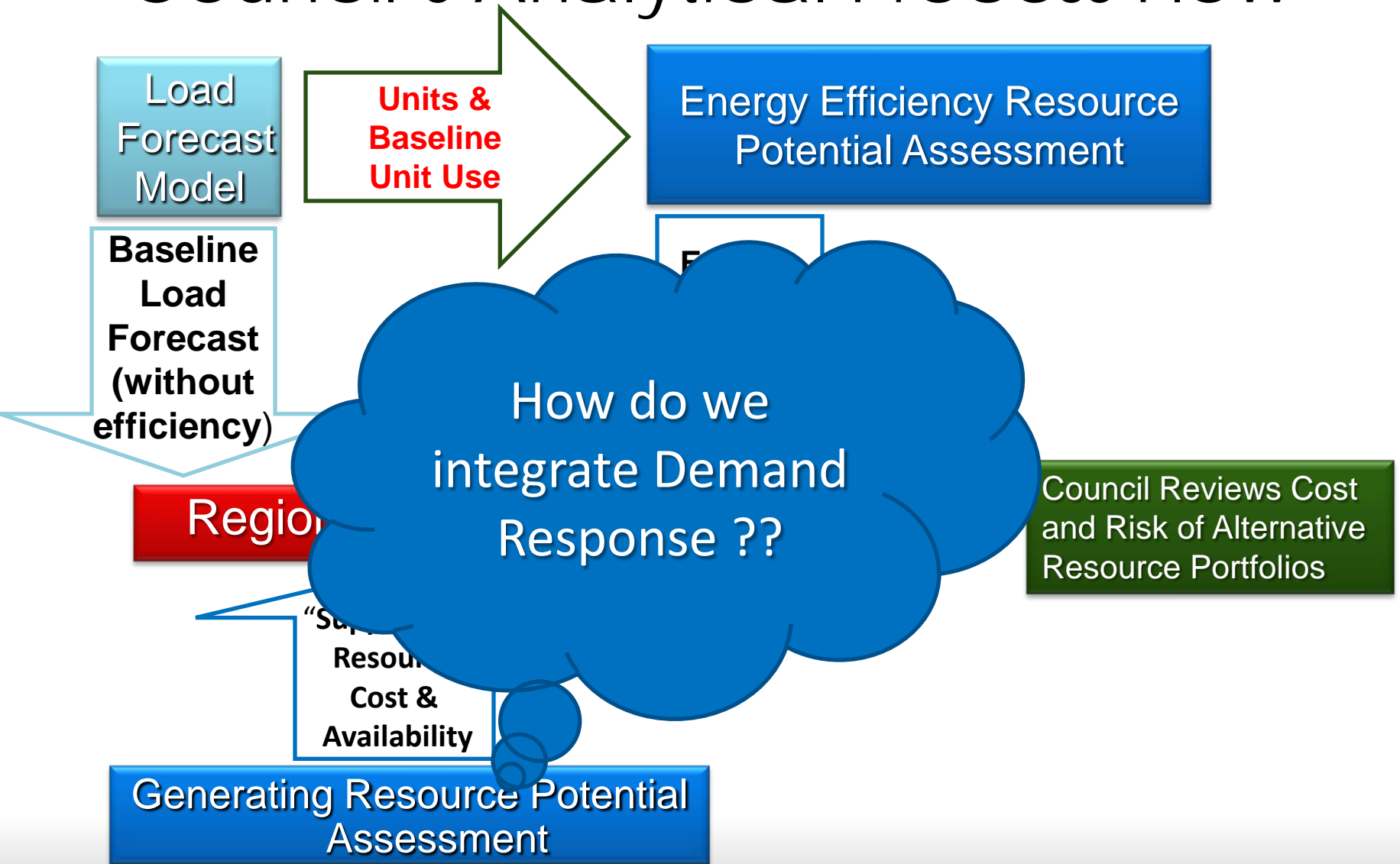
Workplan: 1.D. Prepare for Seventh Plan and Maintain Analytical Capability. Develop Capacity Analysis Method.

Background: In previous Power Plans, the Council included narratives, a cost/benefit analyses, and the results of a more limited capability RPM to acquire DR resources based on the annual energy supplied by the resource. Since DR resources are primarily acquired for peak capacity periods, a methodology targeting peak capacity need would have been necessary to better represent DR resource acquisition. The RPM used in past plans had a simplified assessment of capacity needs, but did not yet have the capability to explicitly identify no peak capacity requirements or value resources that provided primarily peaking capacity. This made a more sophisticated method of modeling DR not feasible within the model structure. However, with the RPM redevelopment in Analytica, a modeling enhancement has allowed peaking capacity adequacy to be recognized as an explicit system need. This new capability has allowed development of a modeling methodology to define new Demand Response resources that the model can acquire to meet peak capacity needs.

Guidance on Demand Response Characteristics Assumptions for use in RPM

Council Meeting
March 10, 2015

Council's Analytical Process Flow



Demand Response Resources Can Be Categorized Many Ways

By Supply Source

- Residential
- Commercial
- Agricultural/Industrial

By Dispatch Method

- Basic
- Automatic (*Smart*)

By Whether they are Firm or Non-Firm

Distinguishing New DR Resources

Main Drivers in RPM for New DR Acquisition

- Summer and Winter Peaking Capability
 - RPM determines Need
- Cost
 - RPM determines Cost-Effectiveness

Development of Demand Response Inputs for RPM

- Leveraged Navigant Demand Response Potential study (commissioned by Council) and stakeholder responses to the study for cost and regional potential
- Developed “Supply Curves” for DR resources that address *peak demand*
 - *Demand response resources can used for other purposes (i.e., flexibility and balancing) but these are not modeled in the RPM*

Demand Response Acquisition Logic Used in the RPM

How will the RPM determine whether to acquire DR?

- DR resources will be acquired using logic similar to that used for acquiring a supply-side resource in the RPM

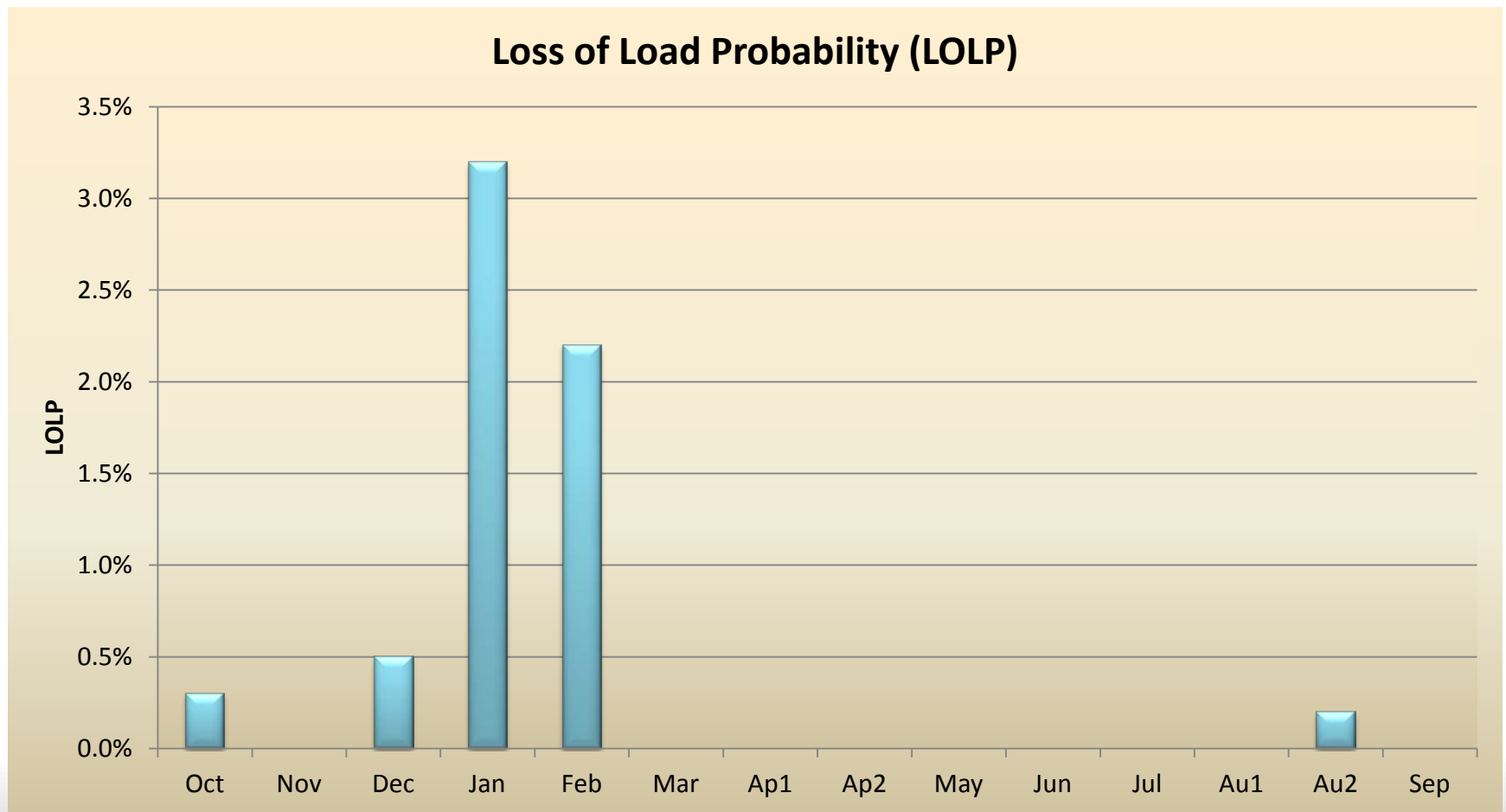
When will the RPM likely acquire DR?

- When it is economic and least cost

But more likely...

- When there is insufficient peak capacity to meet system peak demand, i.e., to maintain resource adequacy

Resource Adequacy Assessment Reveals the Need for Additional Capacity in the Winter



Seasonality Matters

Reliability Assessment tells us...

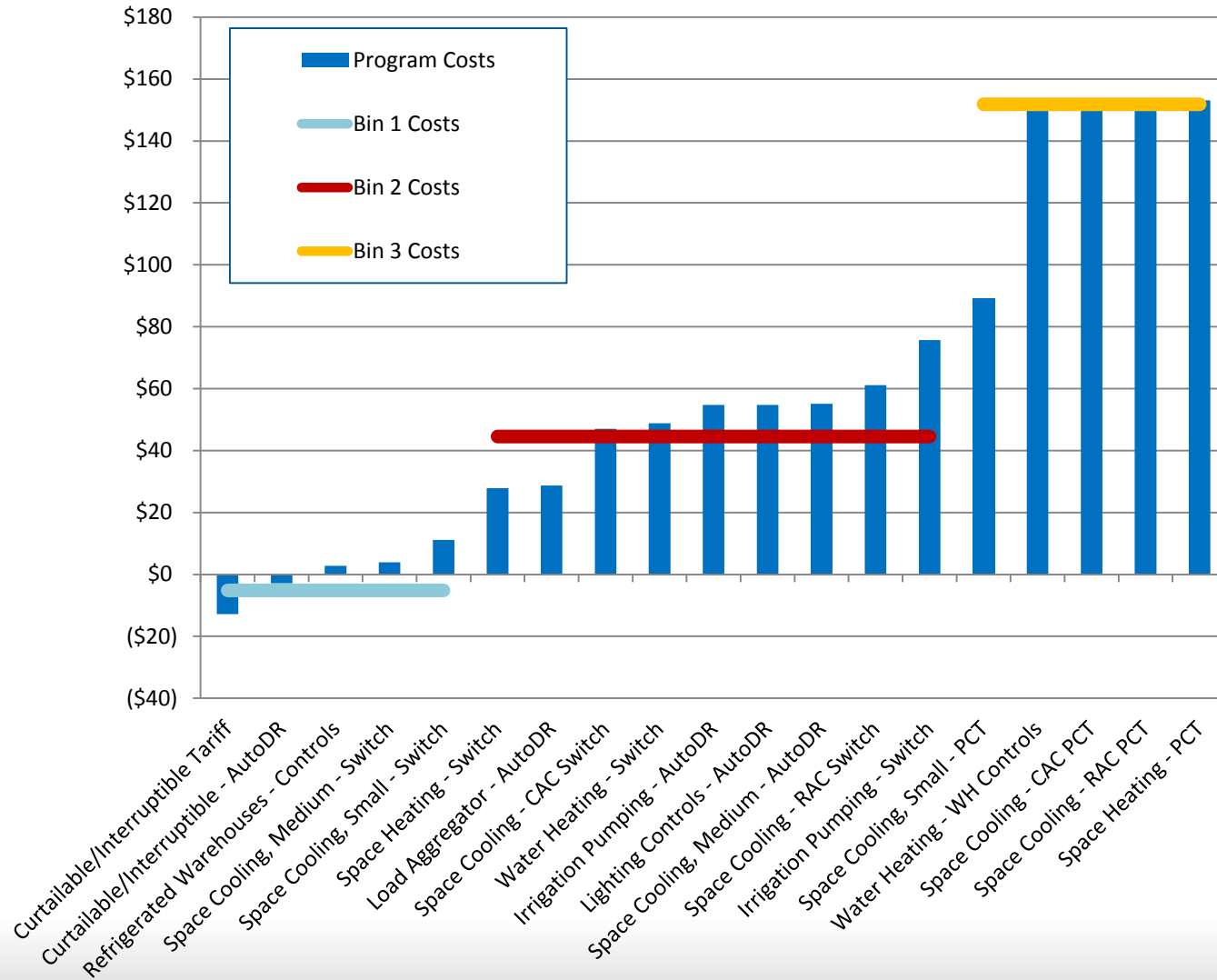
- Additional winter peak capacity will address a majority of the resource adequacy issues in 2019.

Should new DR resources classified by their seasonal impacts?

Perhaps, But in the RPM, Cost Matters More...

- In new resource selection in the RPM, cost matters more than summer and winter shape.
- Therefore, DR resources were sorted into “Resource Blocks” by cost
 - Cost variation within each block or “bin” was minimized to make them more representative.
 - The amount of DR in each block or “bin” was made comparable to make them more representative

Demand Response Resource Programs by Cost Bin (2012\$ per kW-year)



What's In Each Bin?

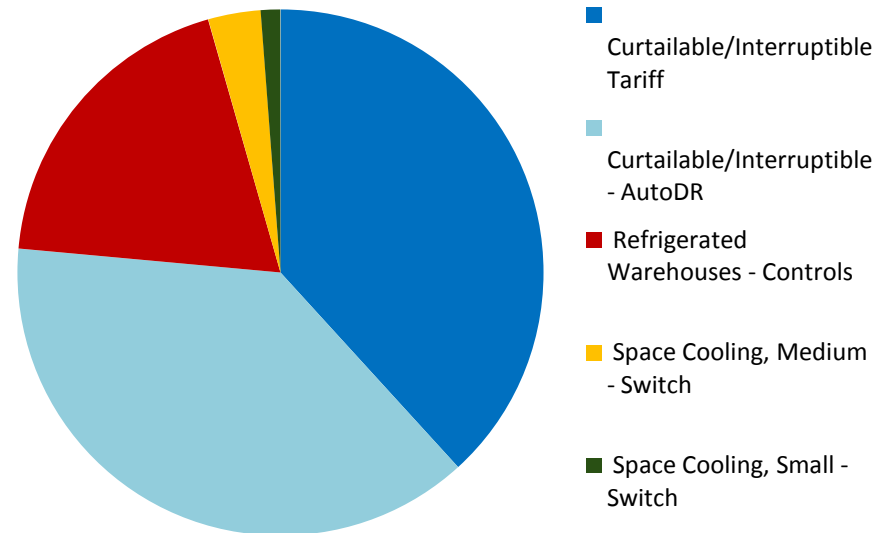
Bin 1

The RPM can purchase up to
1689 MW (Summer Peak) and
1595 MW (Winter Peak) at
-\$5.20 (in 2012\$/kW-yr) over the
course of the study.

Over 76% of the bin is made up of
Curtable/Interruptible Tariff : **-\$13**
Curtable/Interruptible Tariff (ADR): **-\$3**

Less than 24% is made up of
Refrigerated Warehouses: **\$3**
Space Cooling, Medium - Switch: **\$4**
Space Cooling, Small - Switch: **\$11**

Bin 1 in 2021



What's In Each Bin?

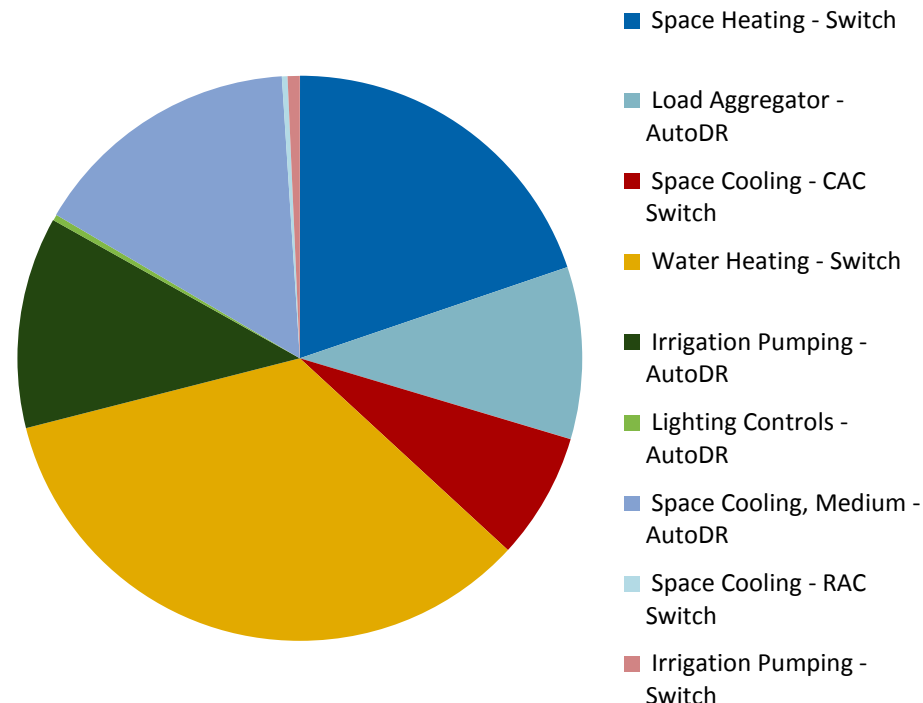
Bin 2

The RPM can purchase up to **1299 MW (Summer Peak)** and **1312 MW (Winter Peak)** at **\$44.53** (in 2012\$/kW-yr) over the course of the study.

Over 54% of the bin is made up of Residential Water Heating: \$49
Space Heating- Switch: **\$28**

Less than 46% is made up of
Space Cooling, Medium (ADR): **\$55**
Irrigation Pumping (ADR): **\$55**
Load Aggregator (ADR): **\$29**
Space Cooling, CAC Switch: **\$47**
Irrigation Pumping - Switch: **\$76**
Lighting Controls (ADR): **\$55**
Space Cooling, RAC Switch: **\$61**

Bin 2 in 2021



What's In Each Bin?

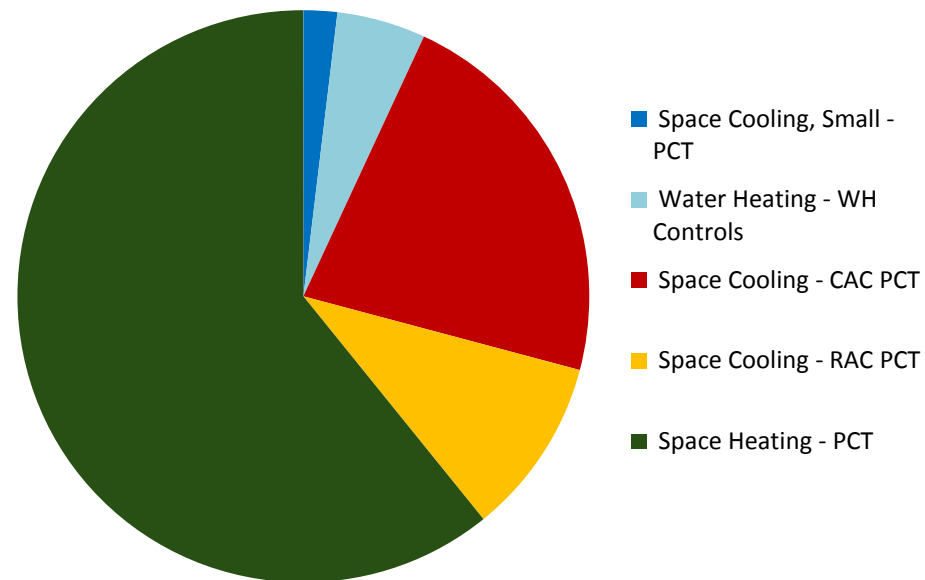
Bin 3

The RPM can purchase up to **827 MW (Summer Peak)** and **489 MW (Winter Peak)** at **\$151.81** (in 2012\$/kW-yr) over the course of the study.

*Over 60% of the bin is made up of Space Heating – PCT: **\$153***

Less than 44% is made up of
Space Cooling, CAC PCT – Switch: **\$153**
Space Cooling, RAC PCT- Switch: **\$153**
Water Heating (ADR): **\$152**
Space Cooling, Small – PCT: **\$89**

Bin 3 in 2021



Are the DR Resources Selected by the RPM “the Plan”?

- The RPM DR resource acquisition results *will* guide parts of the narrative in the Plan.
- The RPM DR resource acquisition results *are NOT necessarily* the same as the resource strategy recommendations for the Plan.

Questions?

