MARKETS+ GREENHOUSE GAS DESIGN

AUGUST 28TH, 2023

DREW MCGILVRAY

SPP *Southwest Power Pool*

- Regional Transmission Organization (RTO)
- Western Energy Imbalance Service (WEIS) (inc. Xcel Energy-Colorado, joining April 2023)
- Western Reliability Coordinator (RC)
- Generation-only Western RC Participant
- Western Resource Adequacy Program
- Markets+ Phase One

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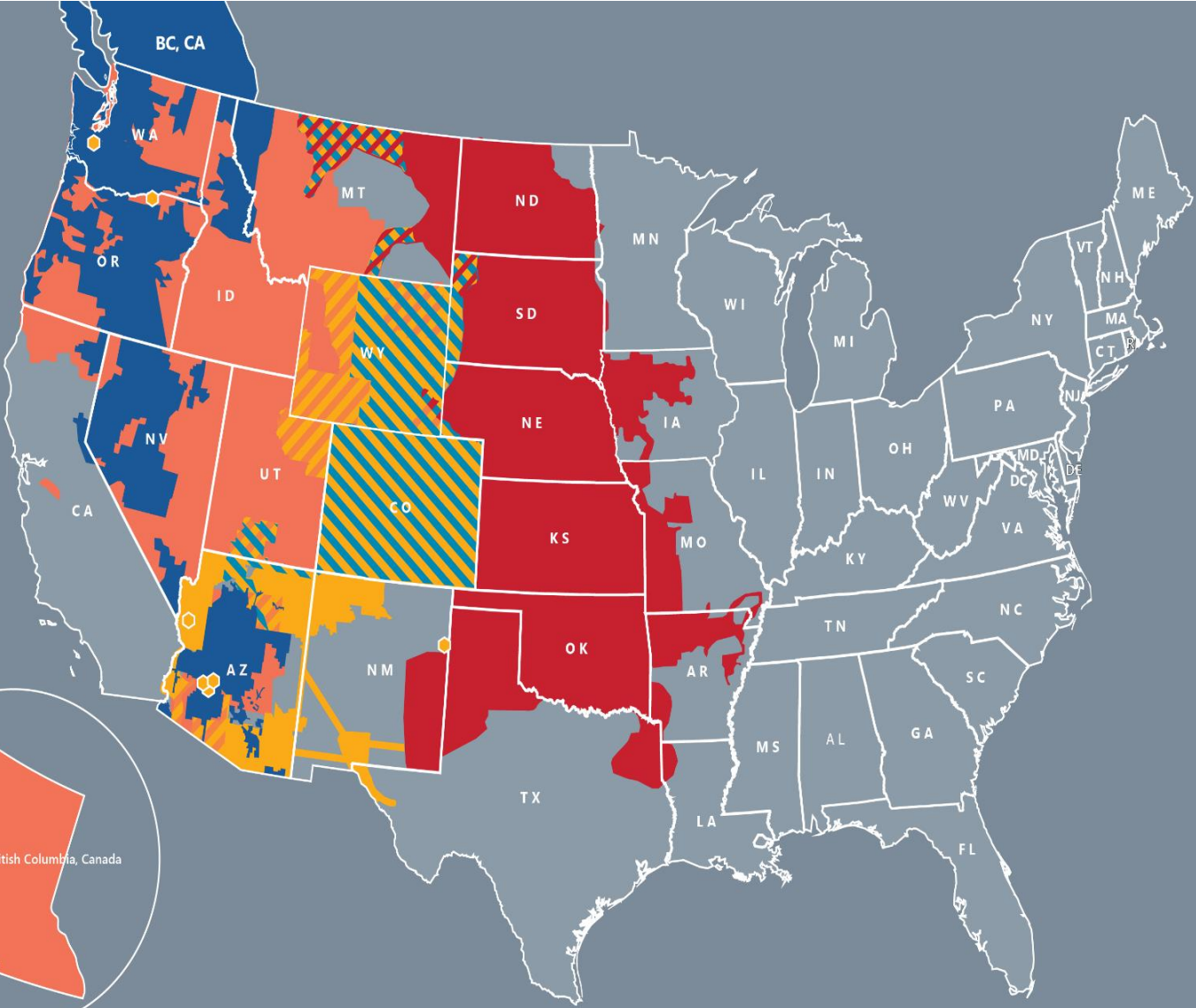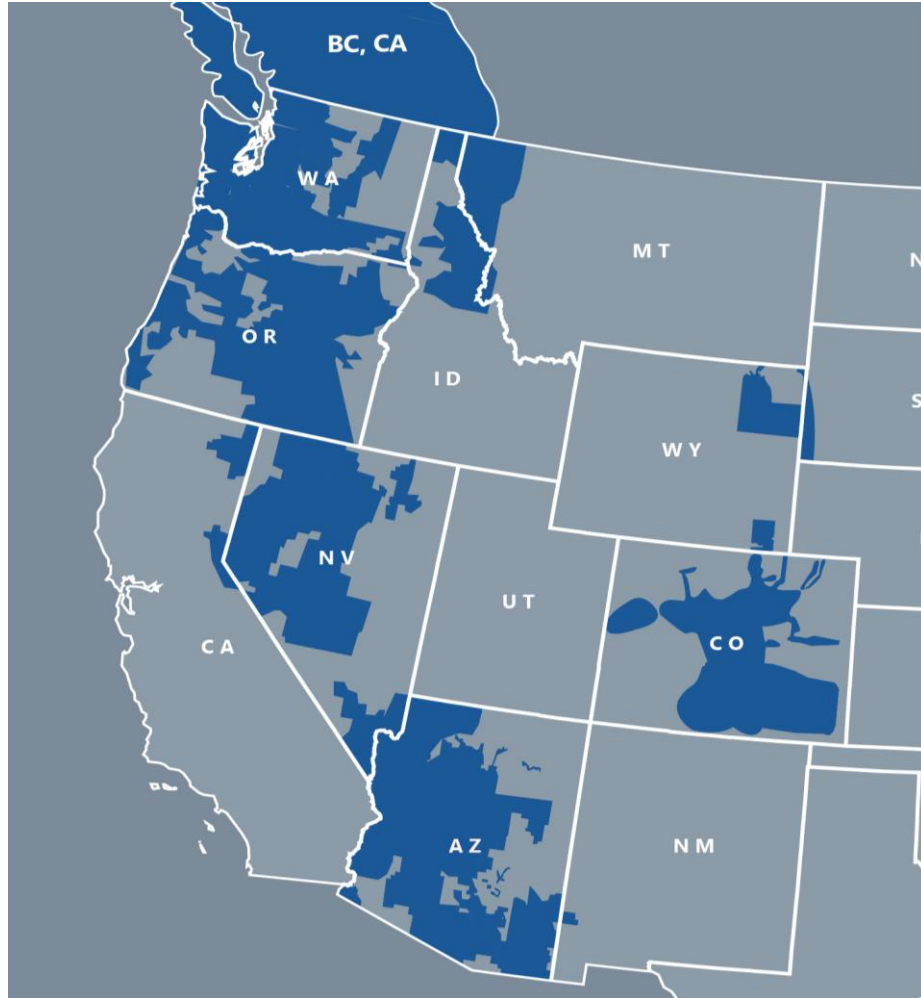
- Advanced Power Alliance
- American Clean Power Association
- Arizona Electric Power Cooperative, Inc.
- Arizona Public Service
- Basin Electric Power Cooperative
- Black Hills Colorado Electric, LLC
- Black Hills Power, Inc.
- Bonneville Power Administration
- Calpeco Electric Liberty Utilities
- Chelan (PUD No. 1 of Chelan County)
- Cheyenne Light, Fuel and Power Company
- Clean Energy Buyers Association
- Colorado Independent Energy Association
- Interwest Energy Alliance
- Municipal Energy Agency of Nebraska
- Natural resources Defense Council
- Northwest & Intermountain Power Producers Coalition
- NV Energy, Inc.
- NW Energy Coalition

- Pattern Energy
- Powerex Corp.
- Public Generating Pool
- Public Power Council
- Xcel Energy Colorado (PSCo)
- PUD No. 2 of Grant County
- Puget Sound Energy
- Renewable Northwest
- Salt River Project
- Sierra Club
- Snohomish Pubic Utility District
- Tacoma Power (City of Tacoma)
- The Energy Authority
- Tri-State
- Tucson Electric Power Company
- WAPA Desert Southwest
- Western Energy Freedom Action
- Western Power Trading Forum
- Western Resource Advocates

Reflects agreements executed by May 1st.

DESIGN OVERVIEW

GHG modeling

- The cost of GHG programs translate to $/MWh
- Settle in the market at a marginal GHG price

Market Optimization

- The cost to serve load in states w/ GHG programs will be modeled in the market's optimization

Zonal GHG Pricing

- A zonal approach will be used that represents the states with a GHG pricing program that requires collecting and paying GHG costs associated with carbon emission

Resource Participation

- Any M+ resource can participate in serving load in a GHG zone
- Resources internal to the GHG zone, specified imports, and unspecified imports

Tracking and Reporting

- SPP will facilitate the necessary data and stakeholder coordination to develop tracking and reporting requirements for states with and without a Carbon pricing program

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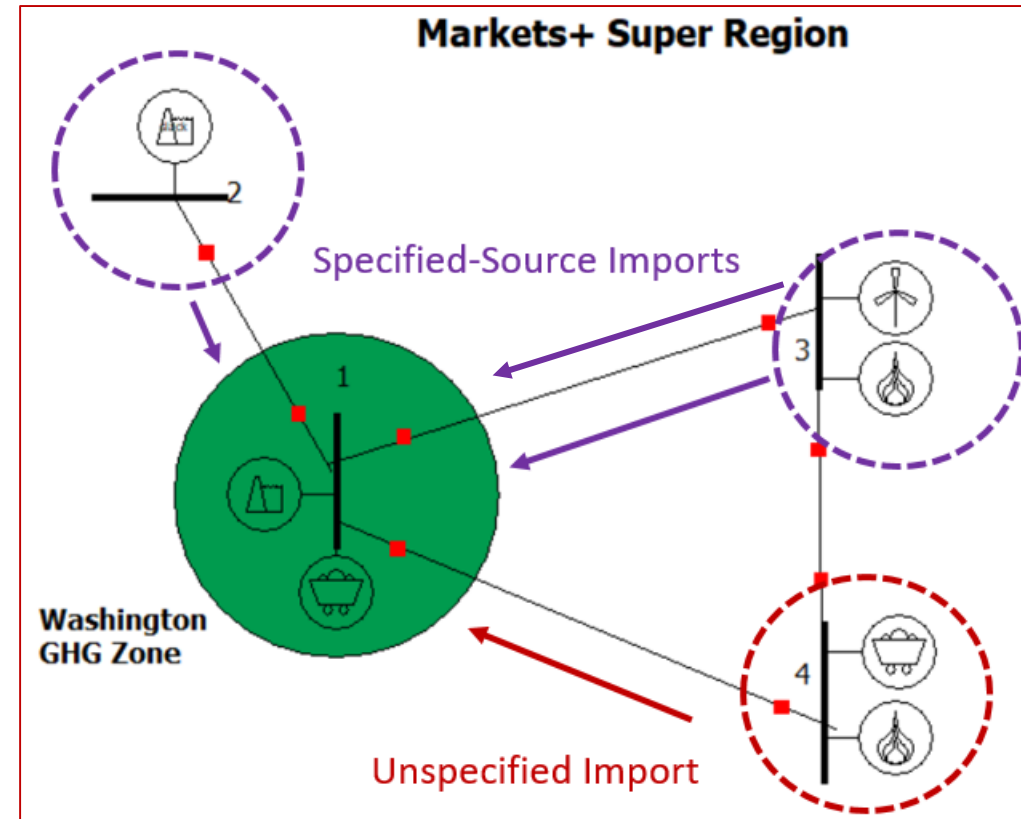## Tracking and Reporting

- SPP will facilitate the necessary data and stakeholder coordination to develop tracking and reporting requirements for states with and without a Carbon pricing program

> Because this is a state program, non-participating Market Resources are not required to register with Washington's Department of Ecology. This creates a need to categorize resources serving the GHG Zone

- Typically, a state-bordered region that has applied a GHG pricing program, Cap and Trade, or Cap-and-Invest program

- The zone would consist of resources and loads that reside within the boundary of the GHG zone with a pricing program

- Two or more states could have "linked" programs with a single GHG zone acting in unison

Markets+ Super Region

Specified-Source Imports

Washington GHG Zone

Unspecified Import

- The 3 types of resources are:

  ✓ *GHG Internal Resources*

WA GHG Zone

G1

G2

External to GHG Zone

A GHG Internal Resource has a known GHG Cost that is added to the resource's offer when considered in the dispatch solution.
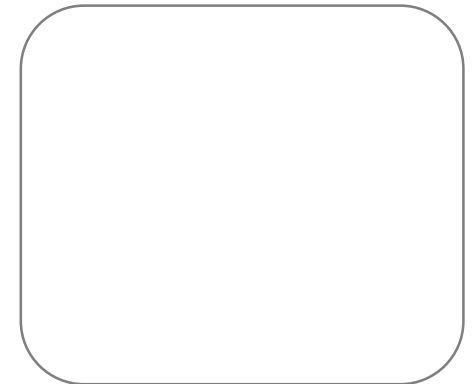
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- The 3 types of resources are:

  ✓ *GHG Internal Resources*

WA GHG Zone

External to GHG Zone

G1

G2

Unlike resources outside of the GHG zone, GHG Internal Resources will always have offer + GHG cost consideration in the dispatch, and the resource must purchase Allowances for any emissions no matter what load it serves.

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3 TYPES OF RESOURCES FOR A GHG PRICING ZONE

- The 3 types of resources are:

  ✓ *GHG Internal Resources*

  ✓ *Specified-source Imports*

WA GHG Zone

External to GHG Zone

G1

G2

G10

G13

Specified-source Import
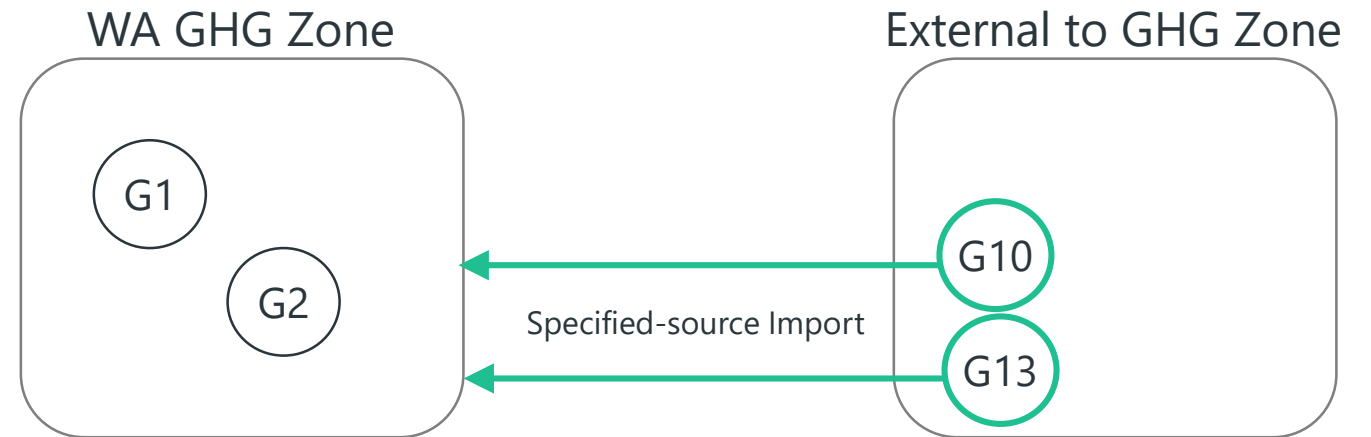
A Specified Source Import has a known resource specific GHG Cost that is added to the resource's offer when serving load in the GHG Zone. Eligibility conditions will be established for these resources.

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3 TYPES OF RESOURCES FOR A GHG PRICING ZONE

- The 3 types of resources are:
  - ✓ *GHG Internal Resources*
  - ✓ *Specified-source Imports*

WA GHG Zone

External to GHG Zone

G1

G2

G10

Specified-source Import

G13
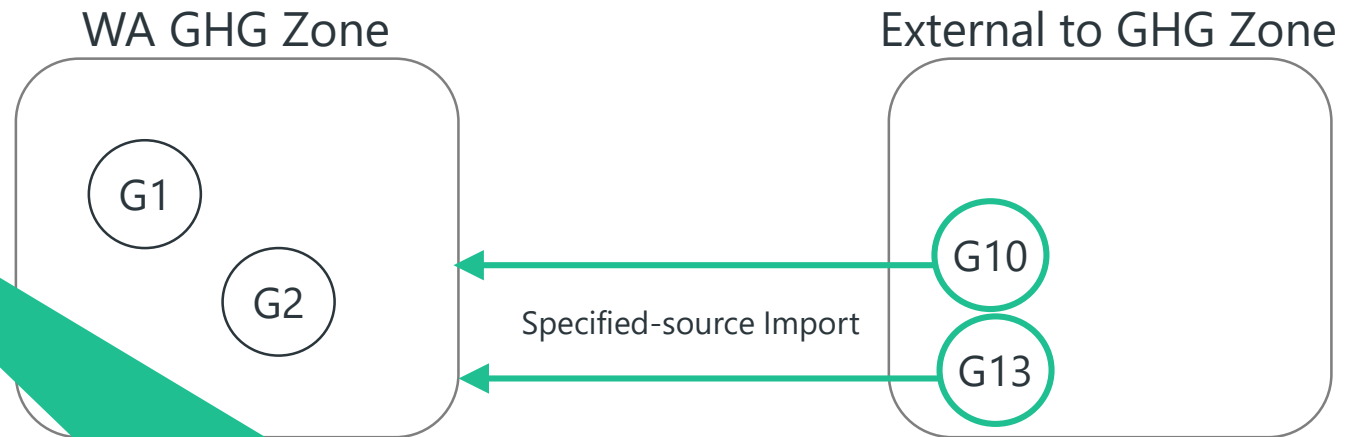
Specified Source Import resources may have offer and offer + GHG cost consideration in the dispatch. The resource must purchase Allowances for the load it serves in the GHG Zone.

3 TYPES OF RESOURCES FOR A GHG PRICING ZONE

- The 3 types of resources are:
  - ✓ *GHG Internal Resources*
  - ✓ *Specified-source Imports*
  - ✓ *Unspecified Imports*

WA GHG Zone

External to GHG Zone

G1

G2

Unspecified Import

Specified-source Import

G11

G10

G12

G13
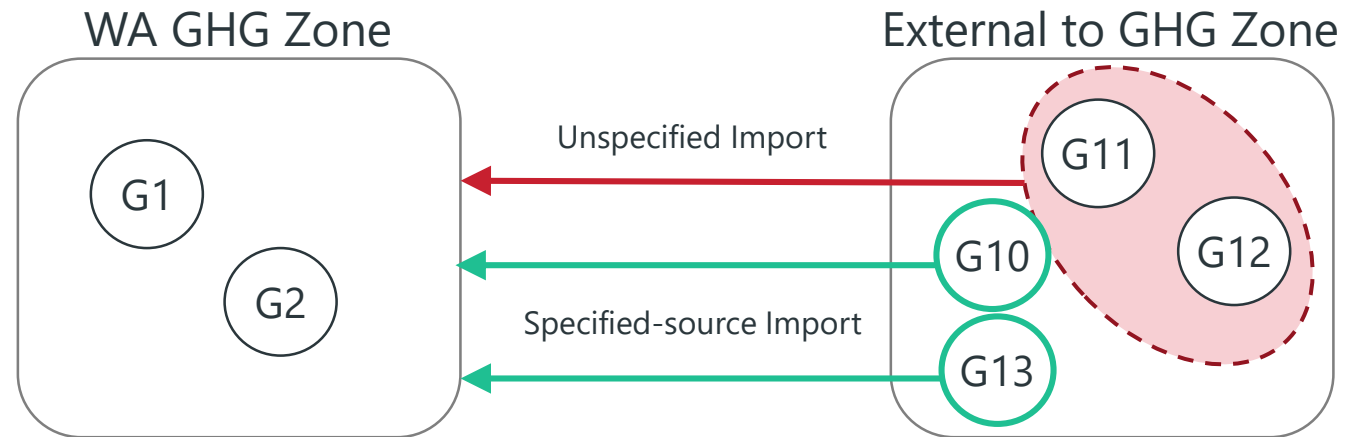
An Unspecified Source Import is supported by resources that are ineligible or unwilling to be Specified Imports. It has an a program determined GHG Cost that is added to the resource's offer when serving load in the GHG Zone.

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- The 3 types of resources are:
  - ✓ *GHG Internal Resources*
  - ✓ *Specified-source Imports*
  - ✓ *Unspecified Imports*

WA GHG Zone

External to GHG Zone

Unspecified Import

Specified-source Import

G1

G2

G11

G10

G12

G13

Unspecified Source Import resources have offer and offer + GHG cost consideration in the dispatch.

3 TYPES OF RESOURCES FOR A GHG PRICING ZONE
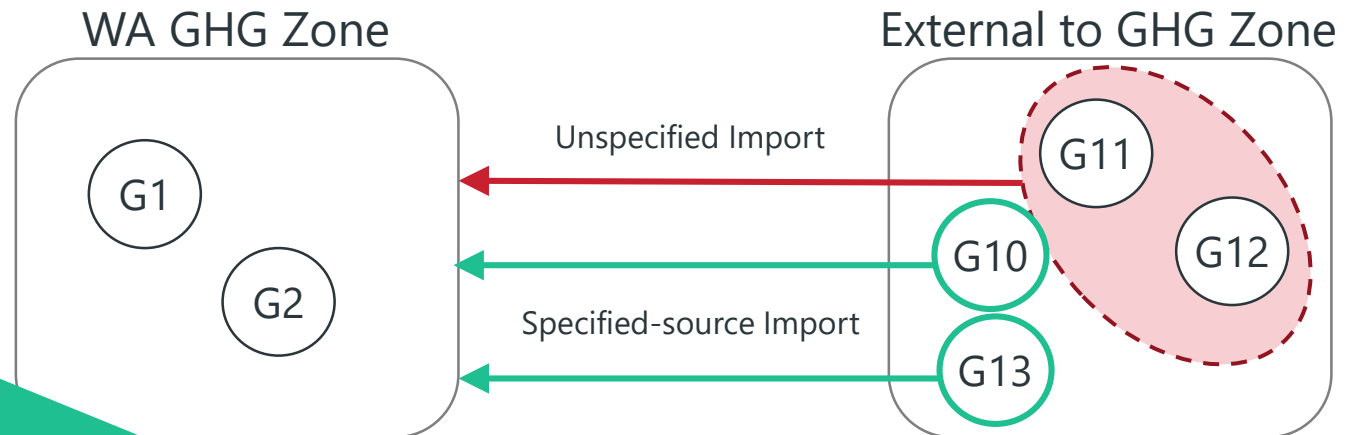
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WA GHG Zone

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Unspecified Import

Specified-source Import
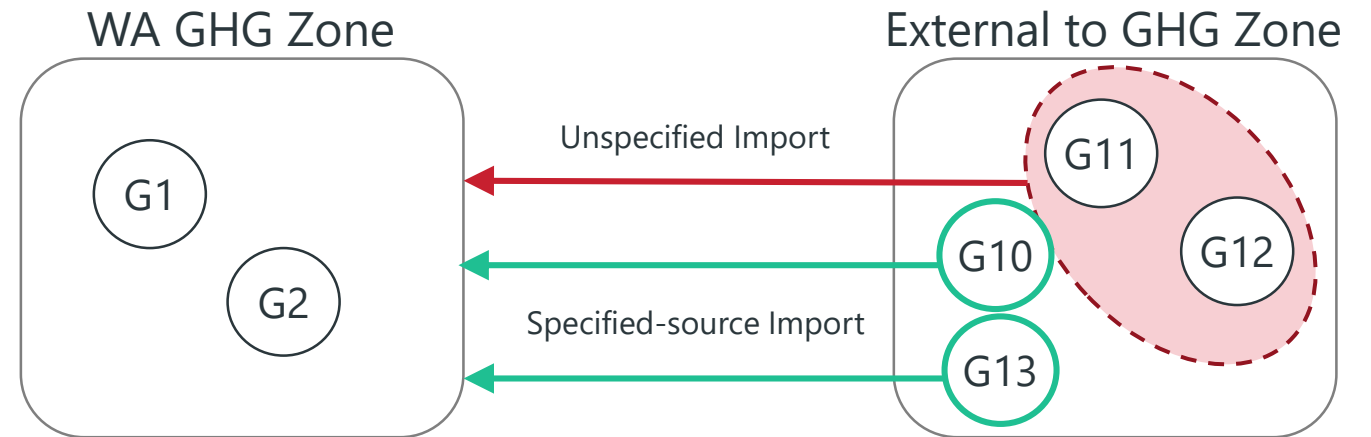
Unspecified Source Import resources do not need to purchase allowances, and cannot benefit from collecting a GHG payment if the resource's GHG cost is below the marginal GHG cost.

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GHG PRICING ZONE RESOURCE PARTICIPATION MODEL

- The Markets + participation model allows for the inclusion of prearranged Specified Source Imports
  - Gives participants the ability to continue to meet contractual obligations of serving load in the GHG zone

Resource Type	Participation	Assigned to GHG Zone?
GHG Internal	Internal	Always if dispatched
Specified Import Type 1A	Prearranged	Always if dispatched
Specified Import Type 1B	Prearranged	If deemed
Specified Import Type 2	Surplus	If deemed
Unspecified	N/A	If deemed

THE MW RE-DESIGNATION ISSUE

Energy from a non-emitting resource external to a GHG pricing zone is assigned to serve load in the GHG Zone as a specified source import

- An emitting resources inside the zone is displaced
- An emitting resource outside the zone is dispatches to replace the MW displaced

This results in an apparent reduction in emissions associated with serving load in the GHG Zone without a reduction in overall system GHGs

GHG SOLUTIONS UNDER CONSIDERATION

Washington Department of Ecology is currently developing rules to address participation in Markets+

Focusing on the founding principles of what the program is trying to achieve

- What should be considered as re-designation and how much is acceptable given program objectives?
- Program rules that enable Markets+ approach to address MW re-designation

This provides insight into the task force's recommended method for:

- Surplus
- Granularity
- Optimization

- First, quantify an available surplus for resources in the Non-GHG Zone above load and other commitments by setting a threshold. This could come from:

  - A) **Resource operator** determined GHG MW bid range

    - Granularity on an individual resource basis

  - B) **Merit Order** by ascending order of offer price

    - By entity

The chosen method affects how wide this bar is

0 MW   100 MW

| Non-GHG MW | Surplus GHG MWs |

WHAT ARE THE METHODS TO DEFINE SURPLUS

- First, quantify an available surplus for resources in the Non-GHG Zone above load and other commitments by setting a threshold. This could come from:

  - A) **Resource operator** determined GHG MW bid range
    - Granularity on an individual resource basis
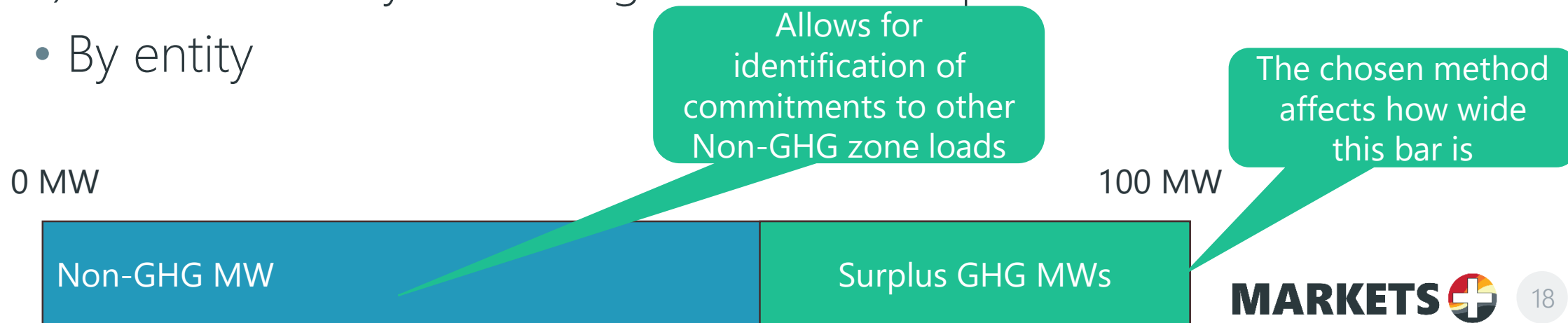 - B) **Merit Order** by ascending order of offer price
    - By entity

Allows for identification of commitments to other Non-GHG zone loads

The chosen method affects how wide this bar is

0 MW

100 MW

Non-GHG MW

Surplus GHG MWs

THRESHOLD ENHANCED FLOATING SURPLUS

- Second, apply the Resource Operator/Merit Order threshold to a two step optimization method
  - Step 1: GHG Threshold Optimization
  - Step 2: Floating Surplus Optimization

The optimization method determines how the surplus is applied in the market optimization

0 MW   100 MW

Non-GHG MW	Surplus GHG MWs

THRESHOLD ENHANCED FLOATING SURPLUS: STEP 1

- A GHG Threshold Optimization is run to forecast the surplus energy that is available to the GHG Zone

- Resources are only eligible for assignment as an import to the GHG zone if they are incrementally dispatched above their defined threshold amount

- 100MW resource example

Surplus eligibility only available above 75 MW

0 MW   75 MW   100 MW

Flexible Non-GHG Dispatch Range | Fixed Surplus GHG Eligible MW Range
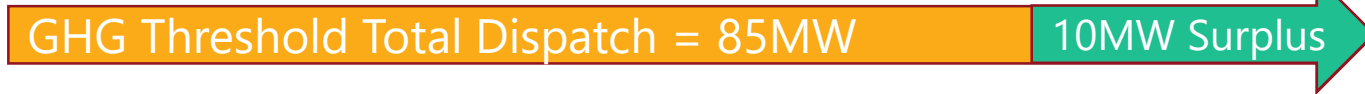
THRESHOLD ENHANCED FLOATING SURPLUS - ILLUSTRATION OF POSSIBLE DISTINCT SCENARIOS

0 MW — 75 MW — 100 MW

Flexible Non-GHG Dispatch Range | Fixed Surplus GHG Eligible MW Range

GHG Threshold Total Dispatch = 85MW | 10MW Surplus →

Least cost optimization solution determined the 10MW is economical to serve GHG Zone

0 MW — 75 MW — 100 MW

Flexible Non-GHG Dispatch Range | Fixed Surplus GHG Eligible MW Range

GHG Threshold Total Dispatch = 85MW | **10MW to Non-GHG System** →
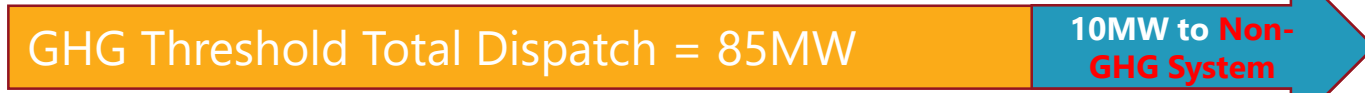
Least cost optimization solution determined the 10MW is economical to serve non-GHG Zone

0 MW — 75 MW — 100 MW

Flexible Non-GHG Dispatch Range | Fixed Surplus GHG Eligible MW Range

GHG Threshold Total Dispatch = 70MW → 0MW to GHG Zone
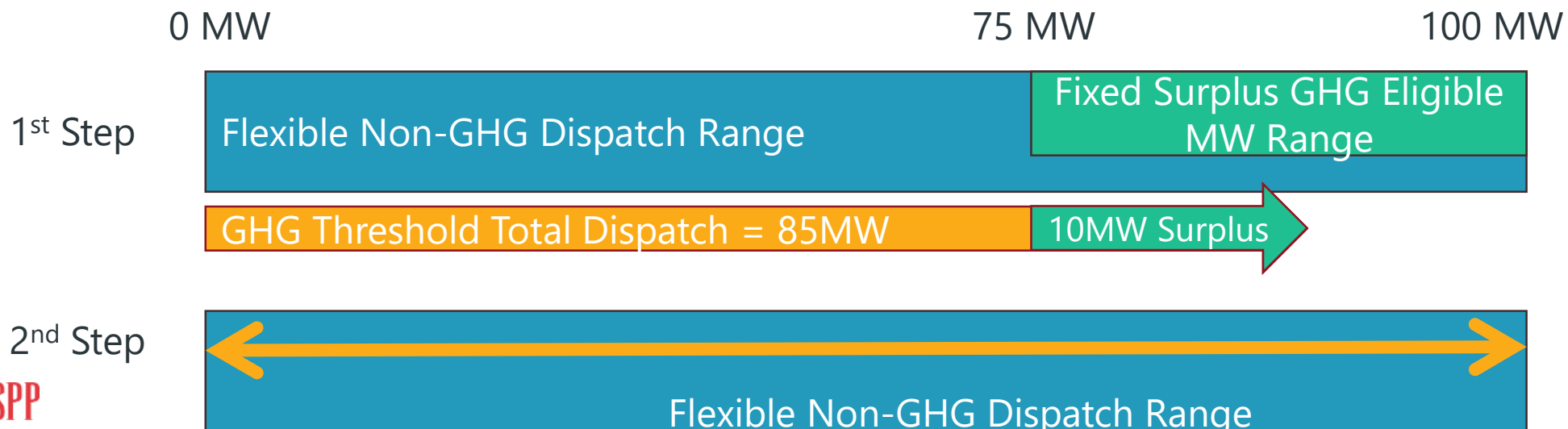
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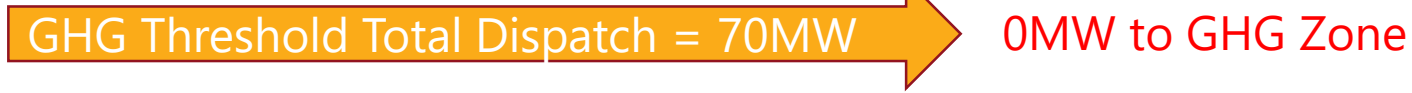
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- Results of the first step's optimization feed into the second step

- In this example, the 100 MW resource was dispatched to 85 MW, and 10 MW of surplus was forecasted to the GHG Zone
  - 10 MW of forecasted surplus available in second step
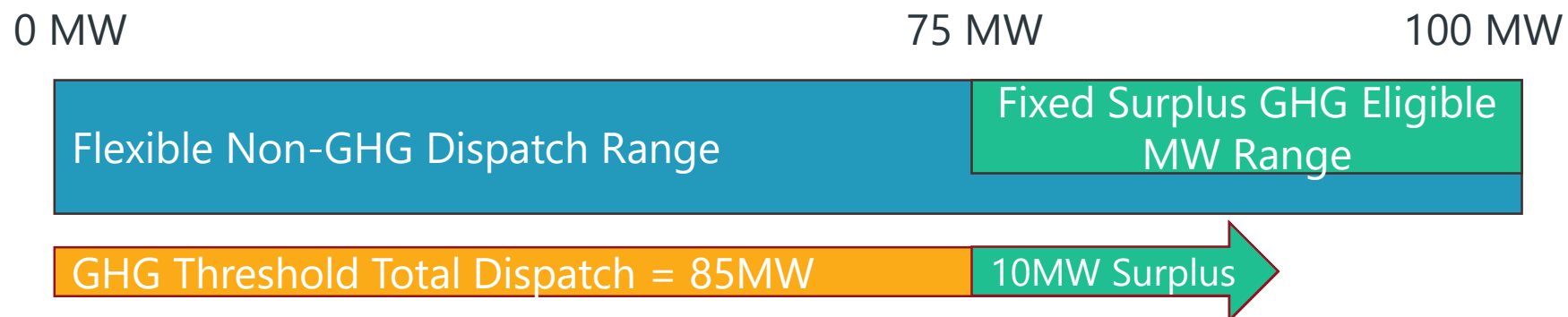
THRESHOLD ENHANCED FLOATING SURPLUS: STEP 2

- Apply the forecasted surplus from the first step to the Floating Surplus Optimization

  10 MW of forecasted surplus available in second step

| 0 MW | 75 MW | 100 MW |

1st Step
Flexible Non-GHG Dispatch Range | Fixed Surplus GHG Eligible MW Range

GHG Threshold Total Dispatch = 85MW | 10MW Surplus

2nd Step
Flexible Non-GHG Dispatch Range

THRESHOLD ENHANCED FLOATING SURPLUS: STEP 2

- Economically Dispatch all Resources considering forecasted quantity of Energy from Surplus Specified Source Resources that is available to supply the GHG Zone

  - Up to 10 MW of GHG Import is eligible at any point in the dispatch
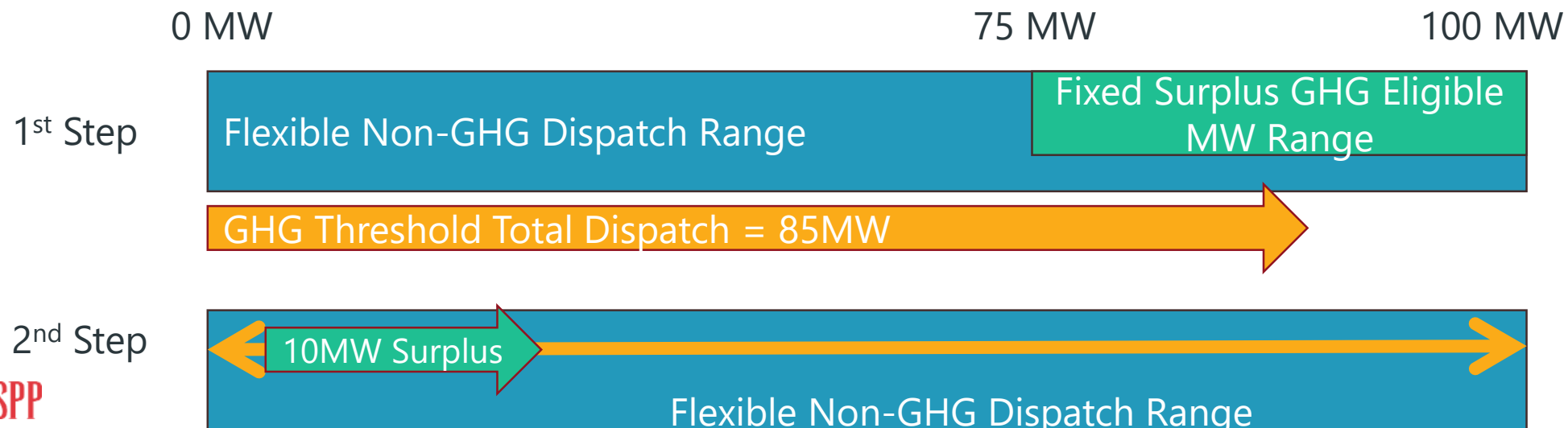
GHG TRACKING AND REPORTING

- The Market Operator will provide relevant data to support tracking and reporting for State-Determined Pricing Programs (GHG zone) and GHG Reduction Programs (Non-GHG Zone)

QUESTIONS?