

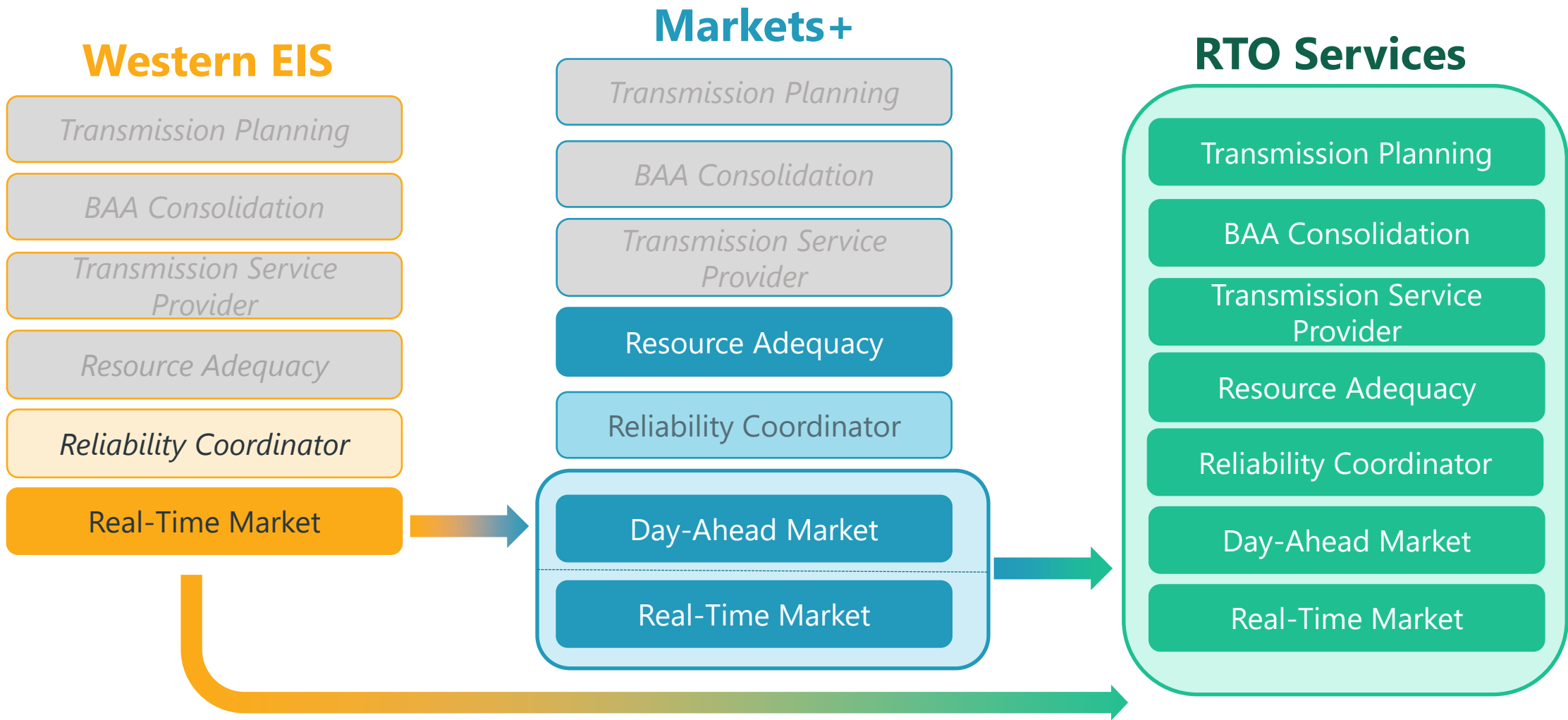
GREENHOUSE GAS DESIGN CARBON TRACKING & TRANSPARENCY

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TECHNICAL DIRECTOR MARKET POLICY & OPERATIONS

SUMMARY OF SPP SERVICES



SPP GREENHOUSE GAS DESIGNS

SPP RTO

- ✓ GHG Tracking and Reporting Services *for both Eastern and Western Interconnections*

SPP Markets+

- ✓ GHG Pricing Design
- ✓ GHG Tracking and Reporting Services

SPP GHG DESIGNS

GHG Pricing

- For states and zones with carbon pricing programs
- Cost of emissions will be part of the economic assessment of resource dispatch
- Attribution to the zone is necessary for market settlement

GHG Non-Pricing – GHG Tracking and Reporting

- For states without a carbon pricing program but have GHG reduction targets.
- GHG attributes do not impact economics or dispatch inside the zone
- After-the-fact tracking and reporting the emission of energy consumed by the zone is in development

GHG INFORMED MARKET DESIGN

GHG PRICING PROGRAM

GHG STATE PROGRAMS

A Cap-and-invest or cap-and-trade program is a market driven solution that sets a limit on overall carbon emissions on covered sources

Entities subject to the program must obtain allowances equal to their covered greenhouse gas emissions

Allowances are purchased through quarterly auctions hosted by a state regulatory program - can also be bought and sold in a secondary market

DESIGN APPROACH CONSIDERATIONS

Alternative Approach

Include GHG Costs in the generation's resource offers

Initiate Self-commitment when necessary

Emissions Constraint *

Introduce CO2 constraint In the Market Clearing Engine

Define Appropriate Demand Curves and Violation Relaxation Limits

Zonal GHG Marginal GHG Pricing *

Set a Zonal \$/Carbon Rate → \$/MWh

Define GHG Pricing Zones boundaries and assess Import GHG Rates

GHG PRICING PROGRAM 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

- Represents the states with a GHG pricing program that requires collecting and paying GHG costs associated with carbon emission

Supply Attribution

- Any resource can participate in serving load in a GHG zone
 - Resources internal to the GHG zone, specified imports
- Unspecified imports

GHG PRICING PARAMETERS AND ATTRIBUTION

GHG Zone Internal Generation

Is subject to GHG costs

Dispatched Gen within the zone Satisfies GHG zone load first.

GHG Rates

resources within GHG zone resources

source for Specified-source resources

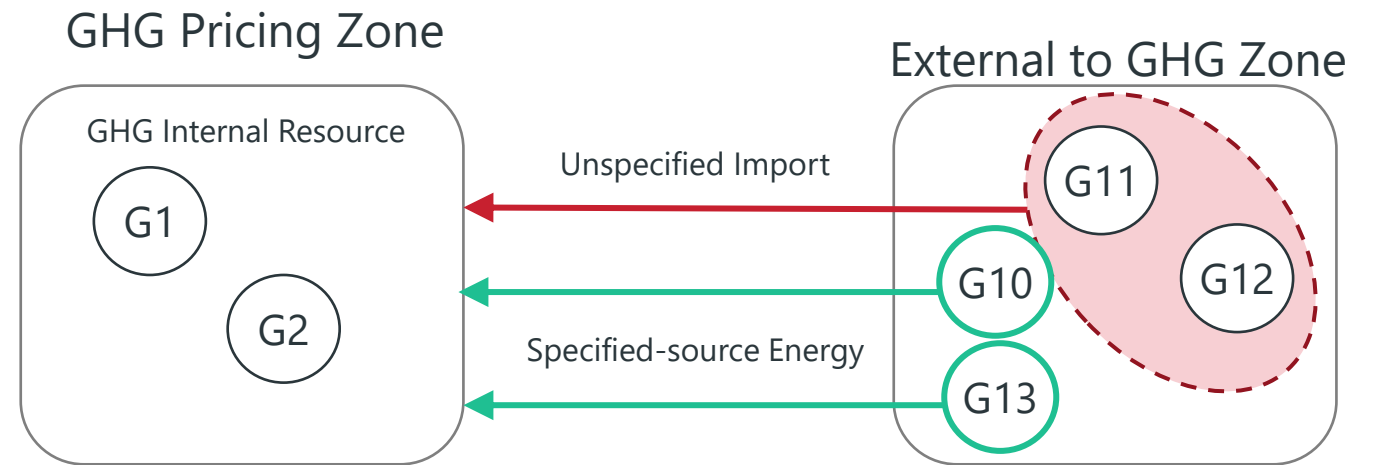
A pre-determined rate for unspecified-source imports

Energy Attribution to GHG Zone

Energy serving load in the zone from external or internal resource/fleet are attributed

3 TYPES OF RESOURCES FOR A GHG PRICING ZONE

- The 3 types are defined in the
 - ✓ *GHG Internal Resources*
 - ✓ *Specified-source Imports*
 - ✓ *Unspecified Imports*
- GHG zone imports allow resources outside the zone to participate in supplying the GHG zone. These MWs are tracked and are subject to GHG costs.



Specified-source Import is further categorized to Type 1A, Type 1B and Type 2.

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 designated
Specified Import Type 2	Surplus	If designated
Unspecified	N/A	If designated

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

ADDRESSING MW RE-DESIGNATION CONCERNS

Threshold Enhanced Floating Surplus Method

- Assesses available energy to determine qualified surplus amount that can participate in serving a GHG Pricing Zone
- Addresses mixed integer and uneconomical challenges
- Limits re-designation challenges introduced by a GHG Pricing design



A threshold is determined by the Resource Operator or via a merit order calculation



Run the GHG Threshold solution: Results of the GHG Threshold solution determine the amount of GHG surplus that is available in the Floating Surplus solution

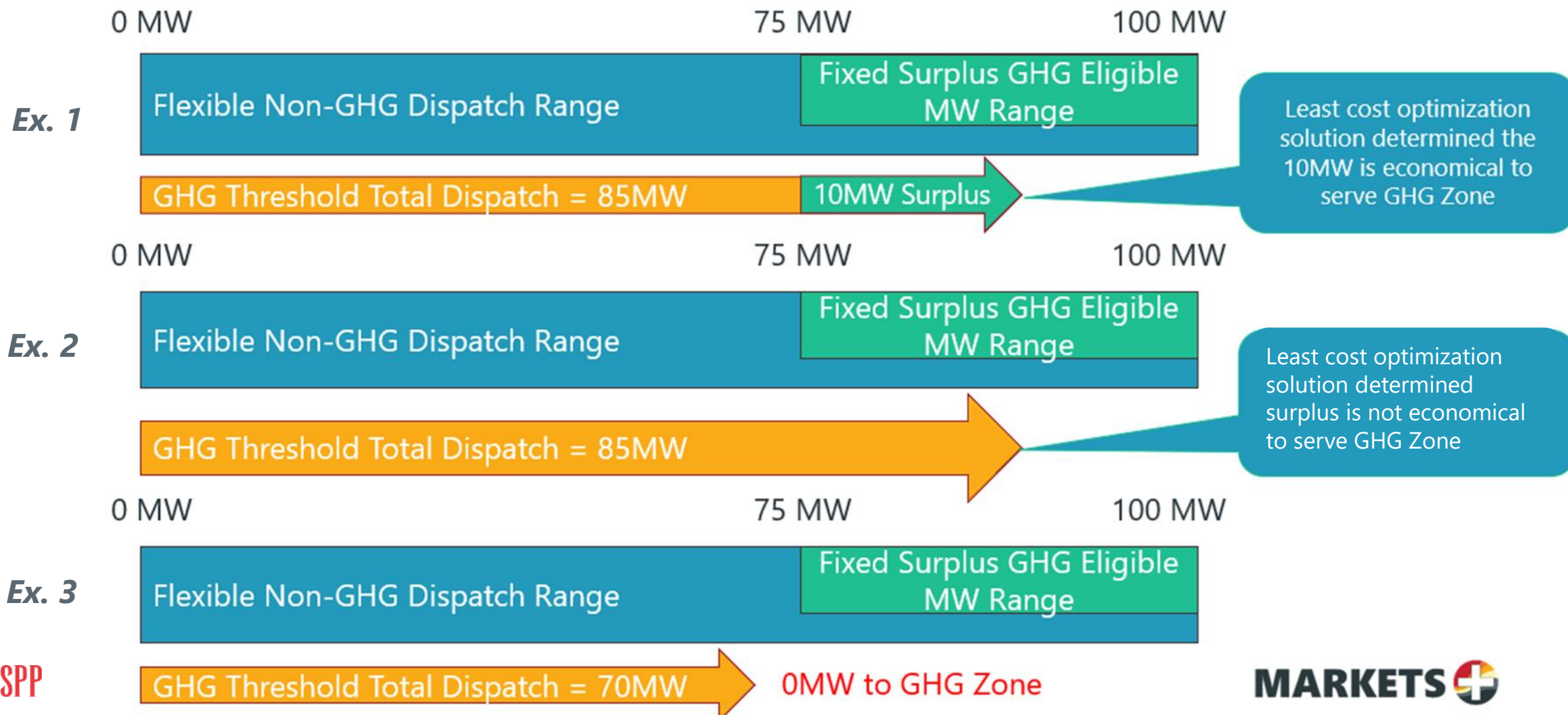


Apply the attributed surplus from the GHG Threshold solution as surplus available in the Floating Surplus solution



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

THRESHOLD ENHANCED FLOATING SURPLUS METHOD – EXAMPLES



TRACKING AND REPORTING

FOR ANY STATES AND ZONES WITH
REDUCTION GOALS

*Design is in progress; it is not final and not approved by
the stakeholders yet*

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)



GHG TRACKING AND REPORTING TIMELINE

Pre-DAMKT

Entities communicate with SPP via the METra Portal, providing Resource mapping information, contract details, and emission factors for their Resource Portfolios.

 **Real-Time**

GHG Report

 Near real-time aggregate data will be accessible via the Public METra Portal.

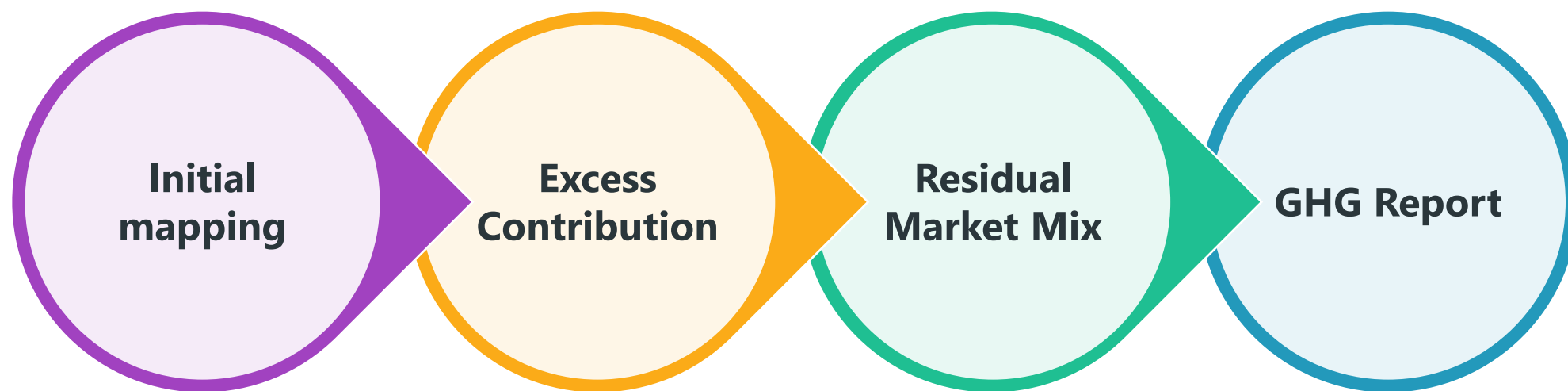
 On the 7th business day of the month, SPP will publish the entity-specific GHG Reports to the portal.

 **DAMKT Close**

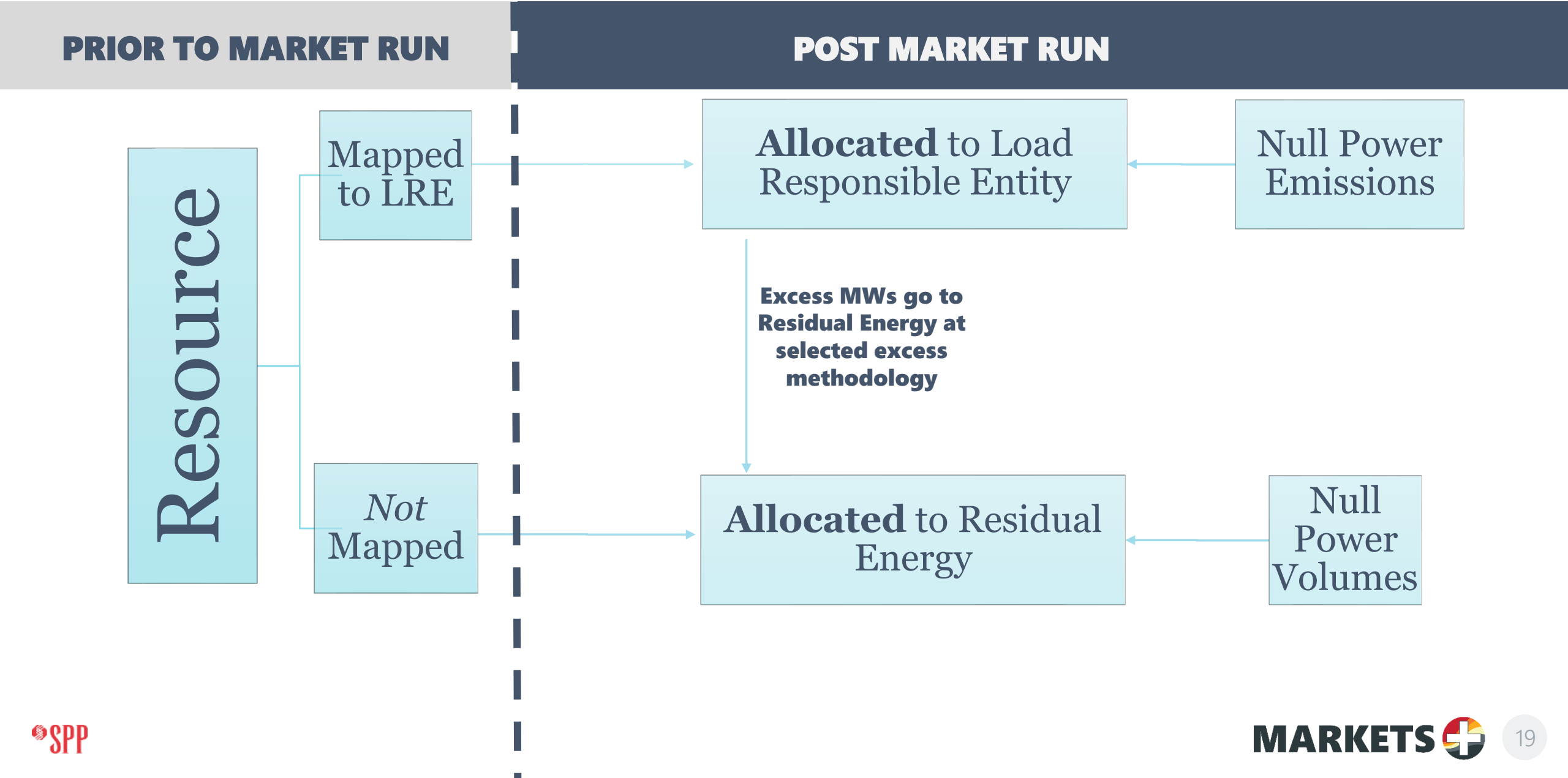
 **Post Operating Day**

MW volumes are known, entity-specific GHG allocations are assigned and excess energy per entity is calculated

GHG TRACKING AND REPORTING



PUTTING IT ALL TOGETHER





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