Emissions Considerations for the 2022 IRP- Technical Working Group

Emissions Considerations TWG
December 9, 2021

NW Natural®

Forward Looking Statement

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All forward-looking statements made in this presentation and all subsequent forward-looking statements, whether written or oral and whether made by or on behalf of the Company, are expressly qualified by these cautionary statements. Any forward-looking statement speaks only as of the date on which such statement is made, and we undertake no obligation to publicly update any forward-looking statement, whether as a result of new information, future developments or otherwise, except as may be required by law.

Today's Agenda

- Office Hours
  - Feedback and questions on OPUC Natural Gas Fact Finding presentations and materials
- Lunch Break (12pm-1pm)
- Procedures and Introductions
- Modeling Challenges and Discussion

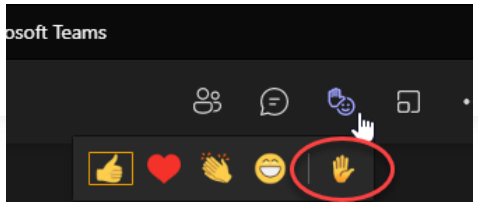
Procedures for Participation

- Please mute your microphones during the presentation, except when commenting and or asking a question
- All participants are muted upon entry into the meeting

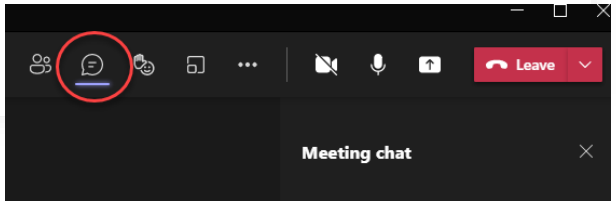
- Cameras are optional and up to each participant to use
- All participant cameras are set to off upon entry into the meeting

- Add a comment or question at any time using the “raised hand” or the chat box

Raised hand function is found in the reactions

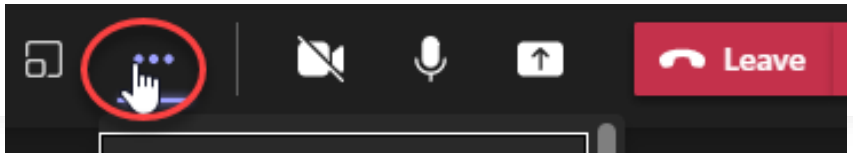


Chat box will open when you click on the conversation bubble



- Microsoft Teams has a live caption function for any participant to use

Click the ellipses, then chose “turn on live captions”



Take 2 Minutes for Safety:

Distracted Walking

While distracted driving is a well-known safety issue, distracted walking is increasingly becoming a safety topic of concern.

Types of distractions include:

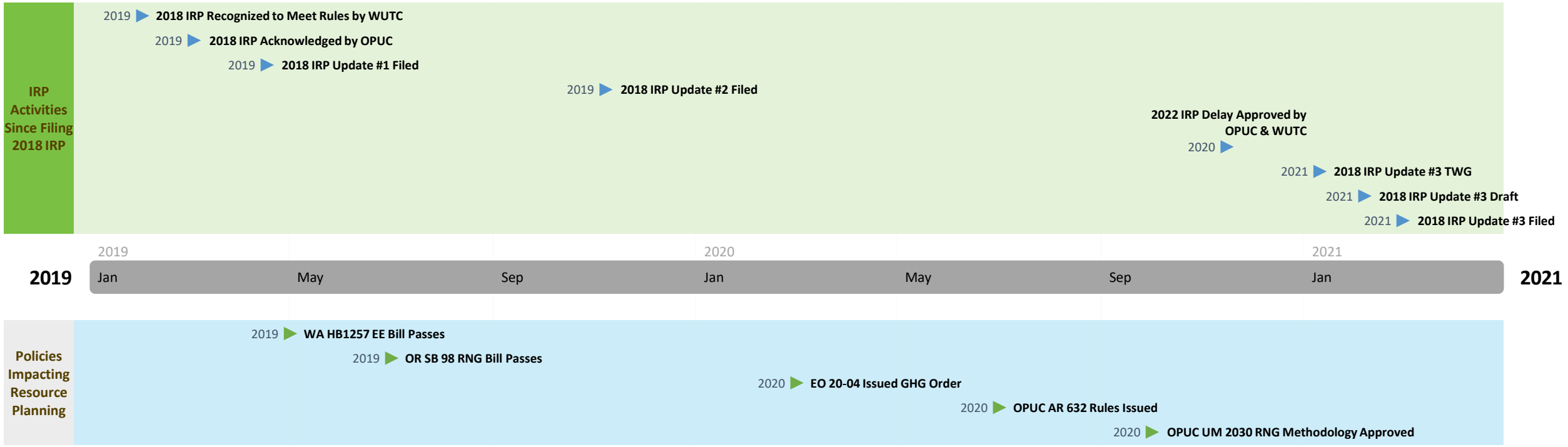
- Mental
- Visual
- Manual

Safety Tips:

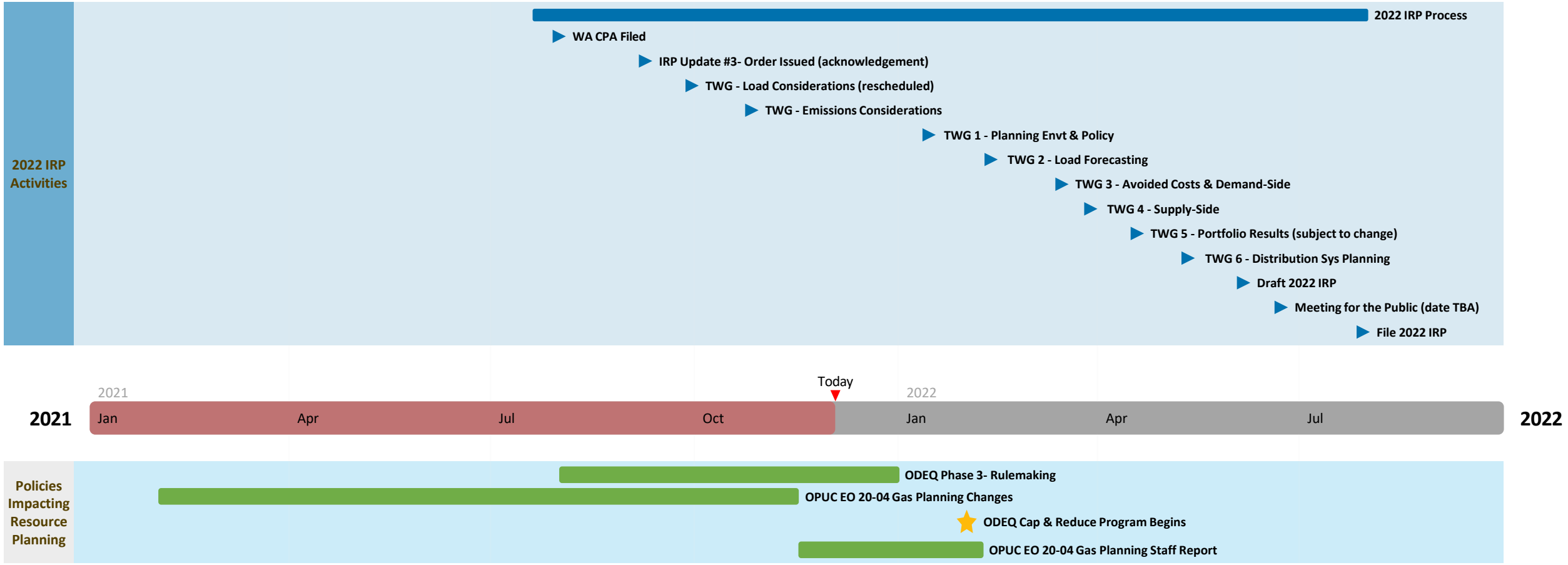
- Phone down, head up!
- Plan your path
- Look for obstacles- fixed and moving
- Continually monitor your surroundings
- Keep your eyes moving

A 2018 study published in Transfers Magazine indicated that **5.7%** of observed pedestrians texted, **3.7 %** wore headphones and **2.9%** talked on the phone **while crossing the street.**

IRP Activities Since Filing 2018 IRP



2022 IRP Timeline



Community & Equity Advisory Group

Background & Development Status Update

- NW Natural has a long history of community involvement throughout its service territory & has a commitment to diversity, equity, and inclusion.
- The Company is working to formulate a Community & Equity Advisory Group (CEAG) to advise on system planning processes, & other key company programs and initiatives.
- Broad panel of representatives from Community Based Organizations (CBOs)
  - Representatives from WA & OR
  - 10-15 representatives; compensated

NW Natural Commitments:

- Approach from a place of learning
  - Broaden perspective through partnership
  - CBOs are experts in/knowledge of the experiences of underrepresented communities
- Intentional, Iterative, Non-Extractive
  - Use of a third-party facilitator
  - Build upon best practices & experiences from peer utilities
  - Development timing determined, in part, by needs of CBOs
- Accountability & Expectations

Community & Equity Advisory Group

Role of the CEAG & Relationship to the IRP

Will serve 3 primary functions

Discussion

- Participate in (facilitated) discussions regarding NW Natural's energy system planning, programs, investments, and other topics related to the operations of the Company

Perspective

- Provide advice, experience, and perspectives on social, economic, racial, tribal, and environmental equity, and assist in identifying best practices/ solutions for improving and expanding equity

Learning

- Understand (at a high level) the environment in which NW Natural operates, programs and other topics brought forward for discussion.

- Impetus for advisory group arose from previous IRP processes and conversations with stakeholders
- IRP will be one touch point for CEAG
- 2022 IRP timing will not align with timing for inaugural CEAG utilization
  - Opportunity for CEAG to evaluate 2022 IRP process and provide feedback for future

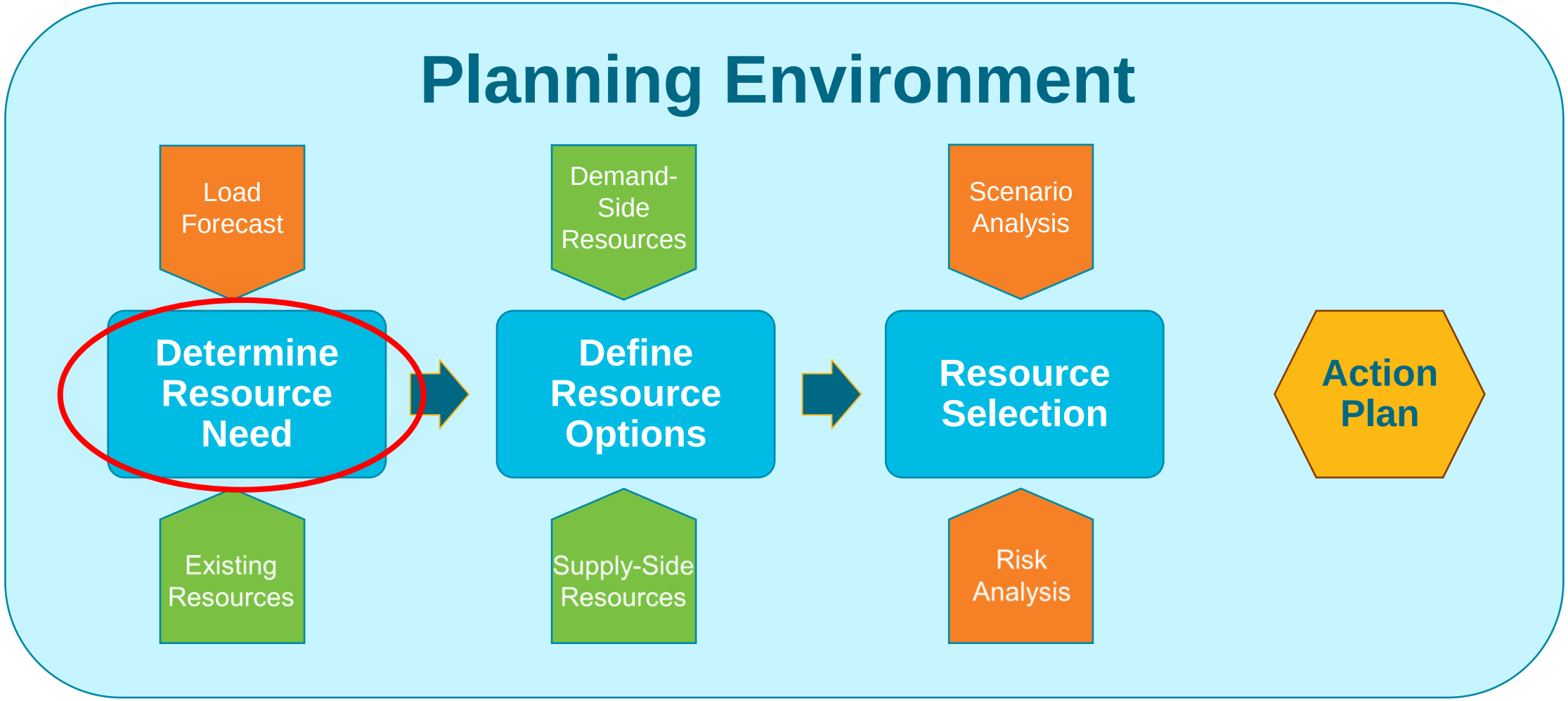
Community & Equity Advisory Group

Development Phase: Recruitment

- In formal recruitment process
- Outreach to 30+ organizations
- Scheduled meetings throughout December 2021
- Anticipate group to start meeting Q1 2022
- Initial commitments from 7 CBOs
- Open to further suggestions of organizations

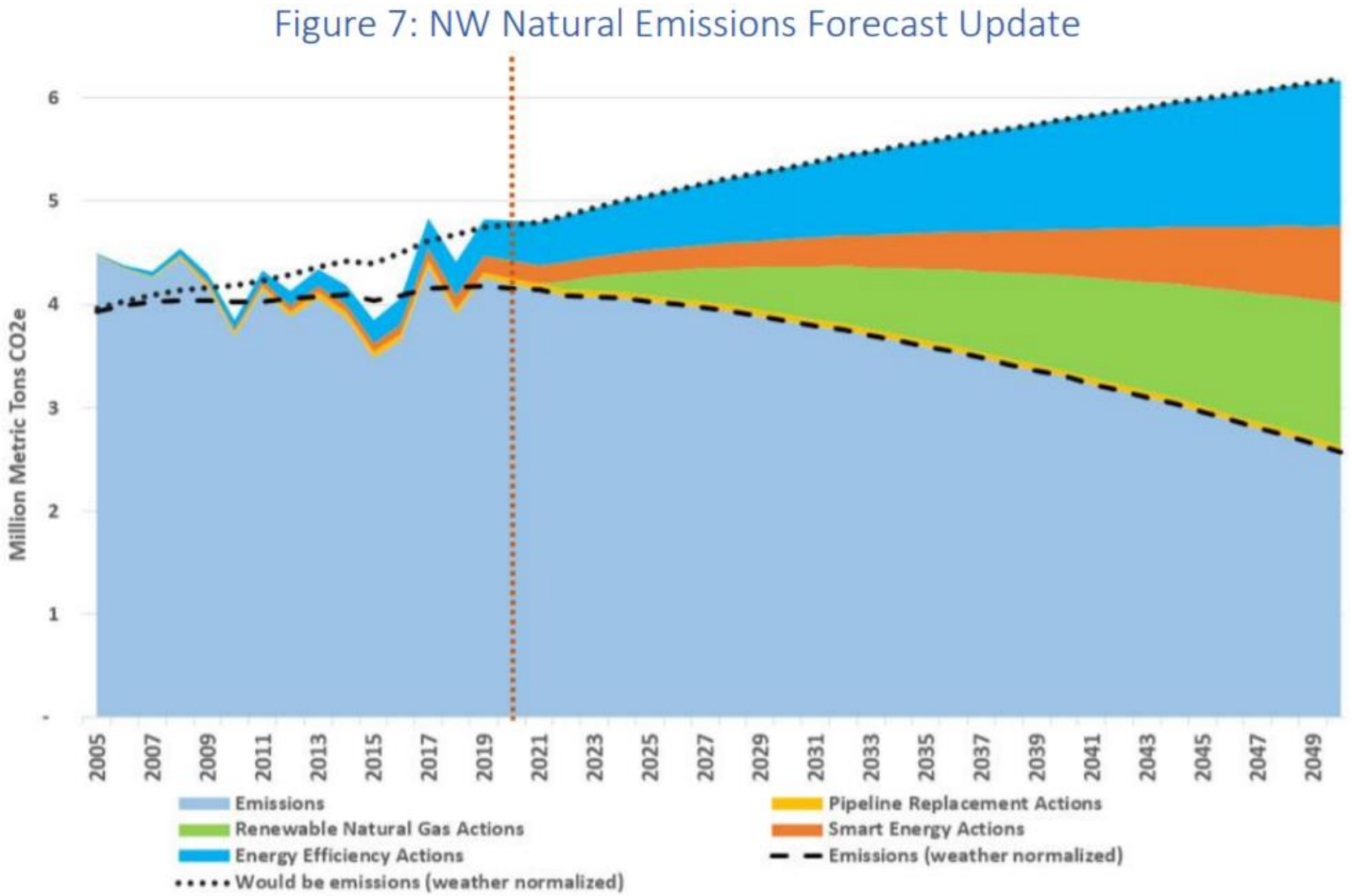
Change on the Horizon- Complying with New GHG Emissions Reduction Policies

Integrated Resources Planning (IRP) Process Review



Green = Resources Orange = Tools

Emissions Forecast- 2018 IRP Update #3



- Shows Emissions from Sales Customers Only
- Includes NW Natural's Oregon and Washington Service Territory

Oregon and Washington Have Different Policies

- Planning our system across states lowers costs for all customers and continues to make sense
- Both states are implementing emissions cap systems, though they are quite different
- There will need to be more distinction between states in the 2022 IRP as NW Natural will have GHG emissions compliance obligations in different systems in each state
  - The options for compliance are not the same in the two states

Climate Protection Program Overview

- Cap and reduce program
- Covered entities include: fuels for transportation (e.g., cars and trucks), natural gas utilities, and large industrial emissions
- LDCs are responsible for emissions from all customers, excluding a few large stationary sources, but including transport customers
- Cap trajectory and emission reduction limits. LDC annual compliance instrument distribution is written into the rules:
  - 2022: 5,759,972 compliance instruments
  - 2035: 2,879,986 compliance instruments (50% reduction)
  - 2050: 575,997 compliance instruments (90% reduction)
- Banking and trading of compliance instruments is allowed, but there is no state sanctioned auctioning of compliance instruments

Important Definitions

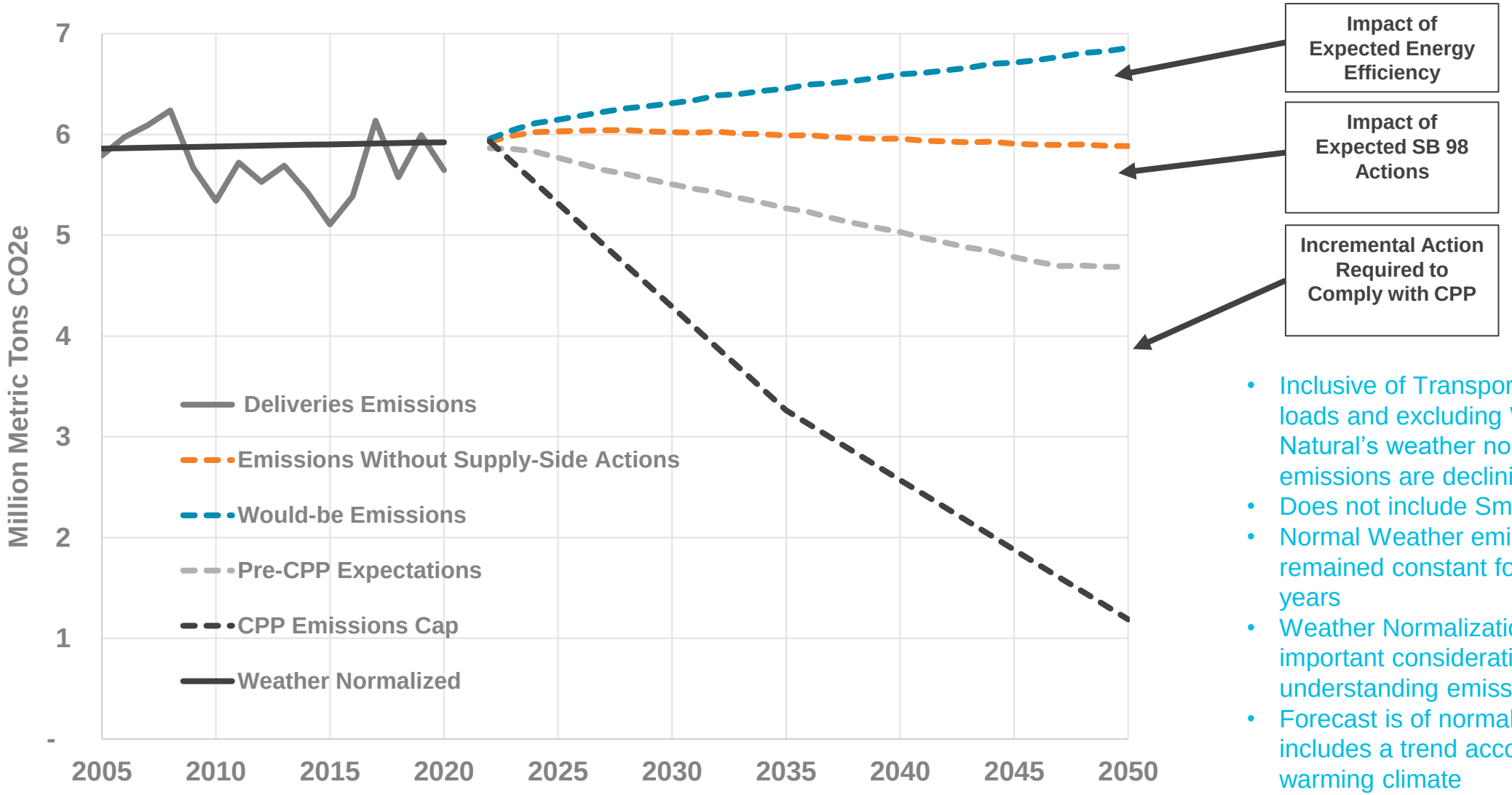
"**Cap**" means the total number of compliance instruments generated by DEQ for each calendar year.

"**Community climate investment credit**" or "**CCI credit**" or "**credit**" means an instrument issued by DEQ to track a covered fuel supplier's payment of community climate investment funds, and which may be used in lieu of a compliance instrument, as further provided and limited in this division.

"**Compliance instrument**" means an instrument issued by DEQ that authorizes the emission of one MT CO2e of greenhouse gases. Compliance instruments may not be divided into fractions.

"**Compliance obligation**" means the quantity of covered emissions from a covered fuel supplier rounded to the nearest metric ton.

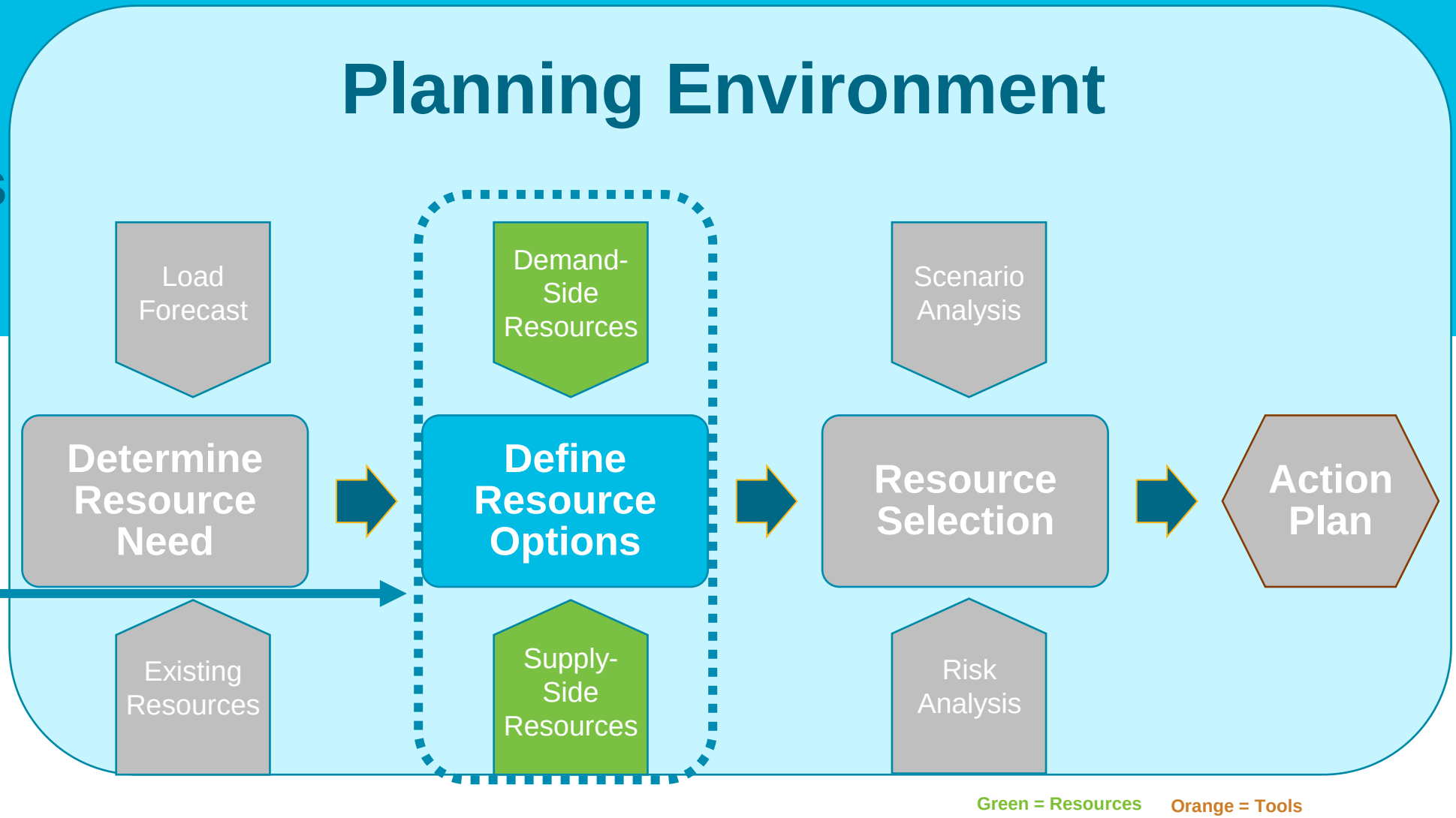
NW Natural's CCP Compliance Needs



- Inclusive of Transportation Schedule loads and excluding Washington, NW Natural's weather normalized emissions are declining
- Does not include Smart Energy
- Normal Weather emissions have remained constant for the last 15 years
- Weather Normalization is an important consideration in understanding emissions
- Forecast is of normal weather, which includes a trend accounting for our warming climate

Emission Reduction Opportunities

What emissions reduction options are available?



Emissions Reduction Options Differ in OR and WA

Resource Option	Long-term Compliance Option	Short-term Compliance Flexibility
Energy Efficiency	✓	
Development RNG	✓	
RNG offtake from existing project	✓	✓
Development Hydrogen	✓	
Development Synthetic Gas	✓	
Community Climate Investements**	✓	?
Banking	✓	✓
Allowance Trading at Auction*	✓	✓
Bilateral Allowance Trading**	✓	?
Offsets*	✓	?

* Only an option under Washington Cap-and-Invest

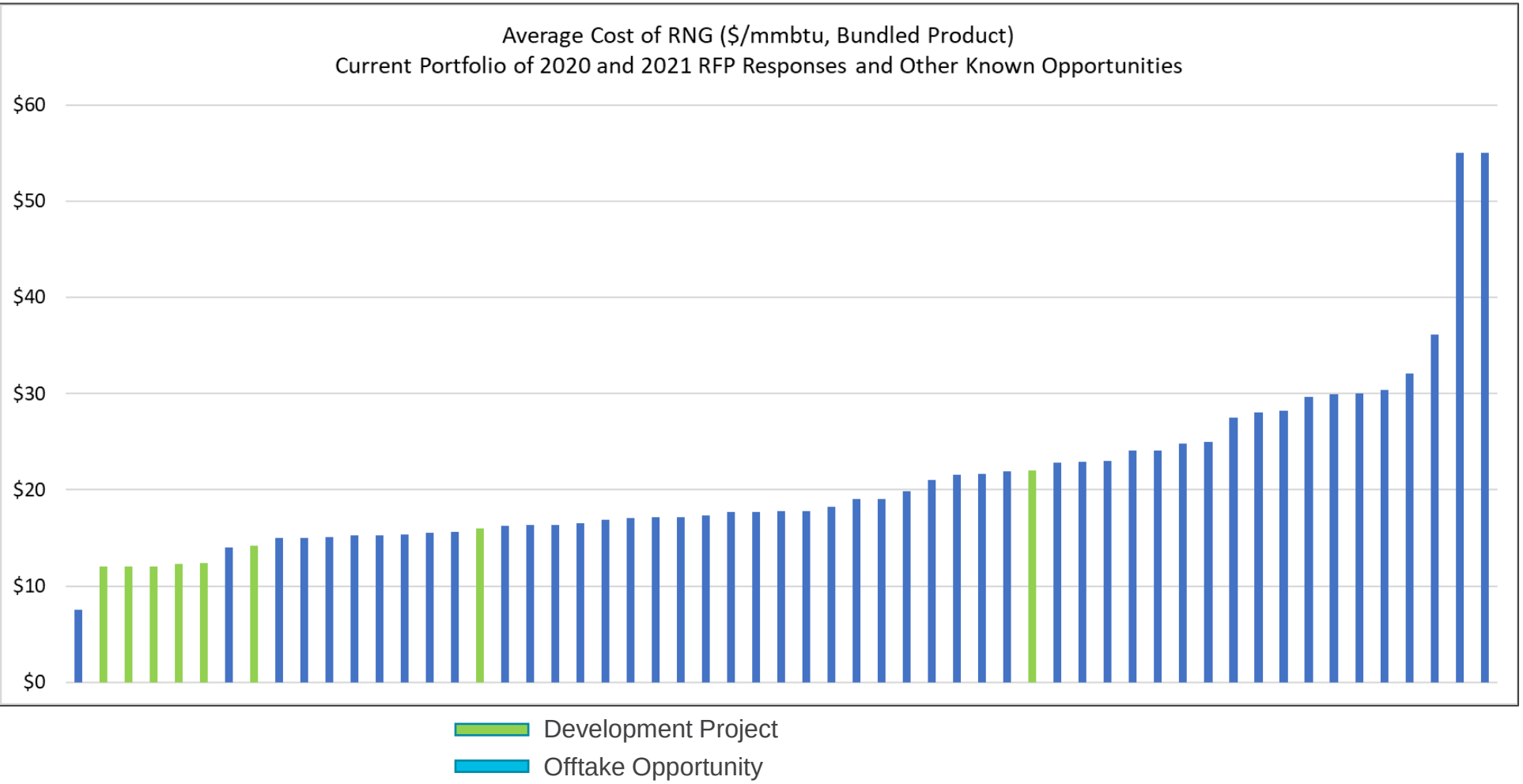
** Only an option under Oregon Climate Protection Program

- Given that emissions in a given year are uncertain due to factors outside of NW Natural's control, maintaining flexibility to adjust to changing conditions within a compliance period is required
- Program sponsored auctions of allowances, like is expected in Washington, provide this flexibility in many trading programs
- There is less flexibility in Oregon's Climate Protection Program (CPP)
  - The role of CCIs and bilateral trading as flexible short-term compliance options is uncertain
  - The only known flexible short-term CPP options are banking of excess early emissions reduction or purchasing RNG from existing projects

NW Natural's RNG Market Activity

- **2020: began issuing annual RFPs for RNG Supply – first gas utility in the country to issue RFPs seeking RNG for all customers**
  - 2021 RFP yielded a "short list" of RNG resources available in the near term totaling 11% of our Oregon sales volume; currently conducting additional diligence on short list opportunities
  - 26 individual proposals received in 2021 process
  - High interest from developers and RNG project owners in long-term fixed price contracts
  - Regularly contacted in between RFP cycles with offers of RNG to meet S.B. 98 targets
- **Project development team working to develop low-cost RNG resources**
  - Development projects consistently evaluated as lower incremental cost than offtakes available through RFP processes and market outreach
  - Tyson, Lexington RNG project: began construction earlier this month; expected to be operational by early 2022
  - Project team continues to evaluate additional project opportunities that yield projected incremental costs of less than offtake-only opportunities
- **Executing first offtake contracts for RTCs as a result of 2020 RFP**
  - Executed contract with Element Markets for RNG from two facilities
  - Second contract currently being finalized

Significant RNG Resources Available and Currently Under Evaluation



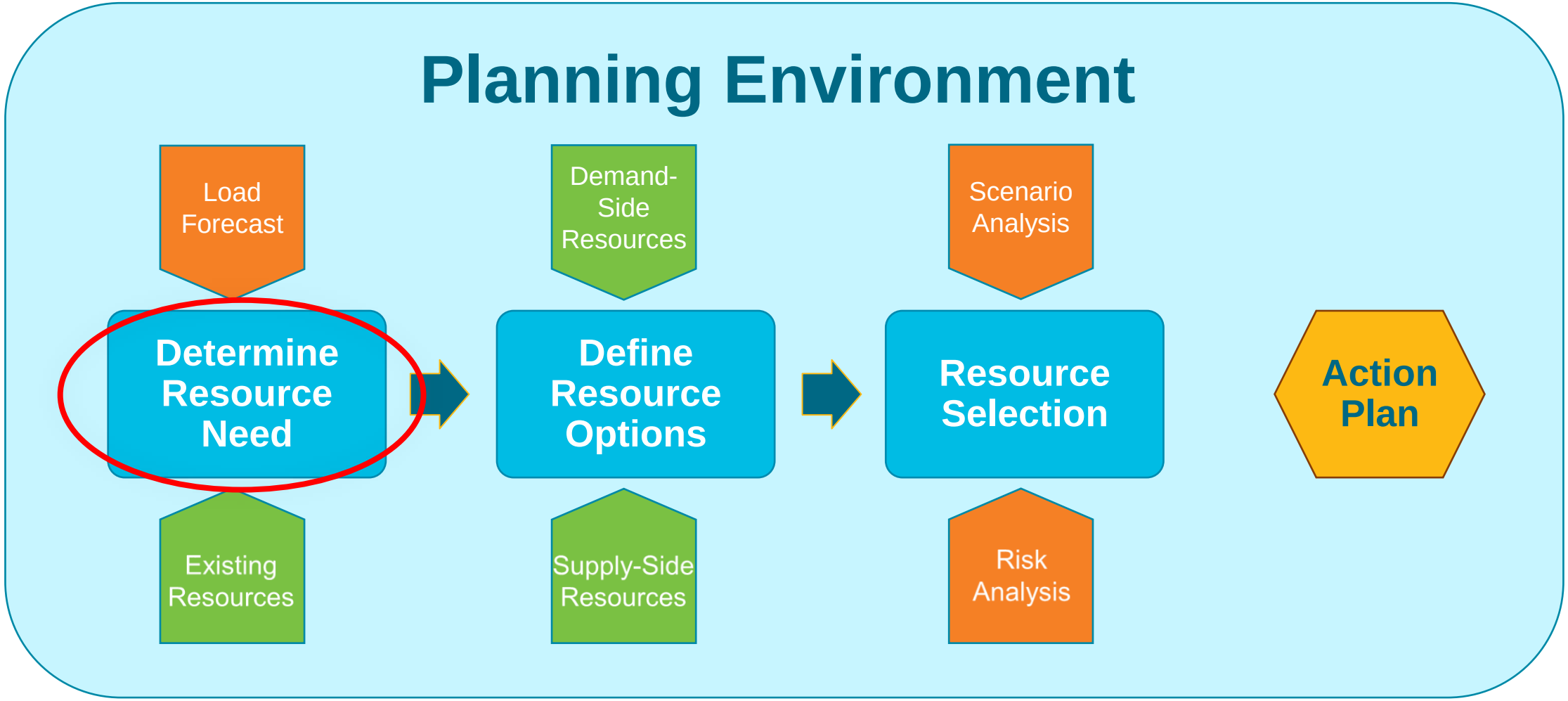
- Chart reflects 2020 and 2021 RFP responses, as well as the development projects NW Natural is currently evaluating
- Total production represented in this chart: 35.3 million mmbtu/year, or about 49% of all of NW Natural's annual sales in Oregon in 2021

Community Climate Investment (CCI) Provisions

- Allowable usage of CCI Credits to demonstrate compliance is limited in the rule language:
  - Compliance period 1 (2022-2024): 10% of Emissions
  - Compliance period 2 (2025-2027): 15% of Emissions
  - All subsequent compliance periods(2028-2050): 20% of Emissions
- Price is fixed in the rule with a starting price of $81 per ton of CO2e
- Paying this price provides covered party with a credit for one metric ton of emissions to deduct from their emissions report
- Availability not guaranteed and there is substantial uncertainty regarding program rollout
- Expire after two compliance periods (6 years)

Modeling Challenges

Integrated Resources Planning (IRP) Process Review



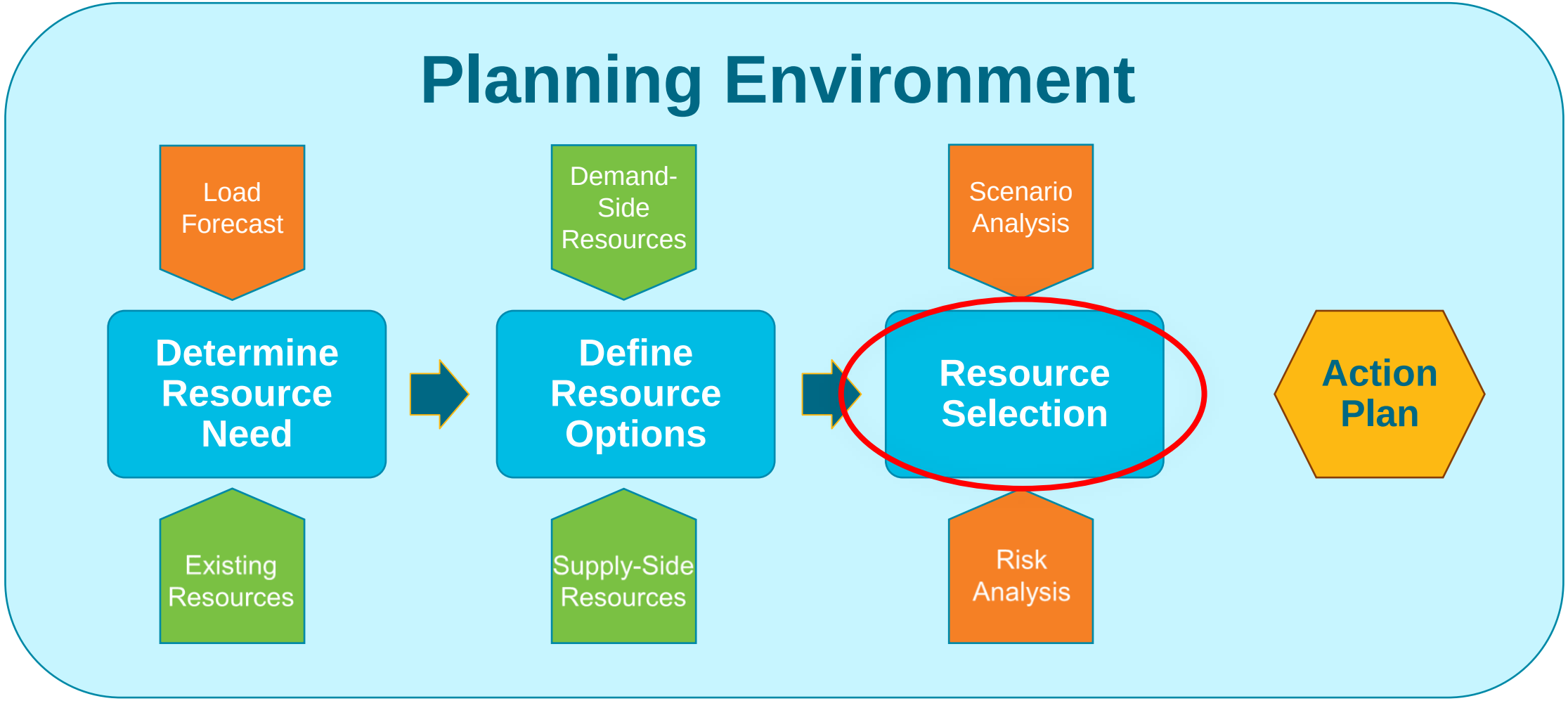
Green = Resources Orange = Tools

Resource Portfolio Planning Review

Goals of Planning Standards

- Planning standards set the threshold level of energy services demanded by customers by which the utility can safely, reliably, and affordably serve customers
- Planning standards balance safety and reliability with affordability
- Natural gas LDC planning standards are typically strict due to the high stakes and consequences of outages which would occur during cold events

Integrated Resources Planning (IRP) Process Review



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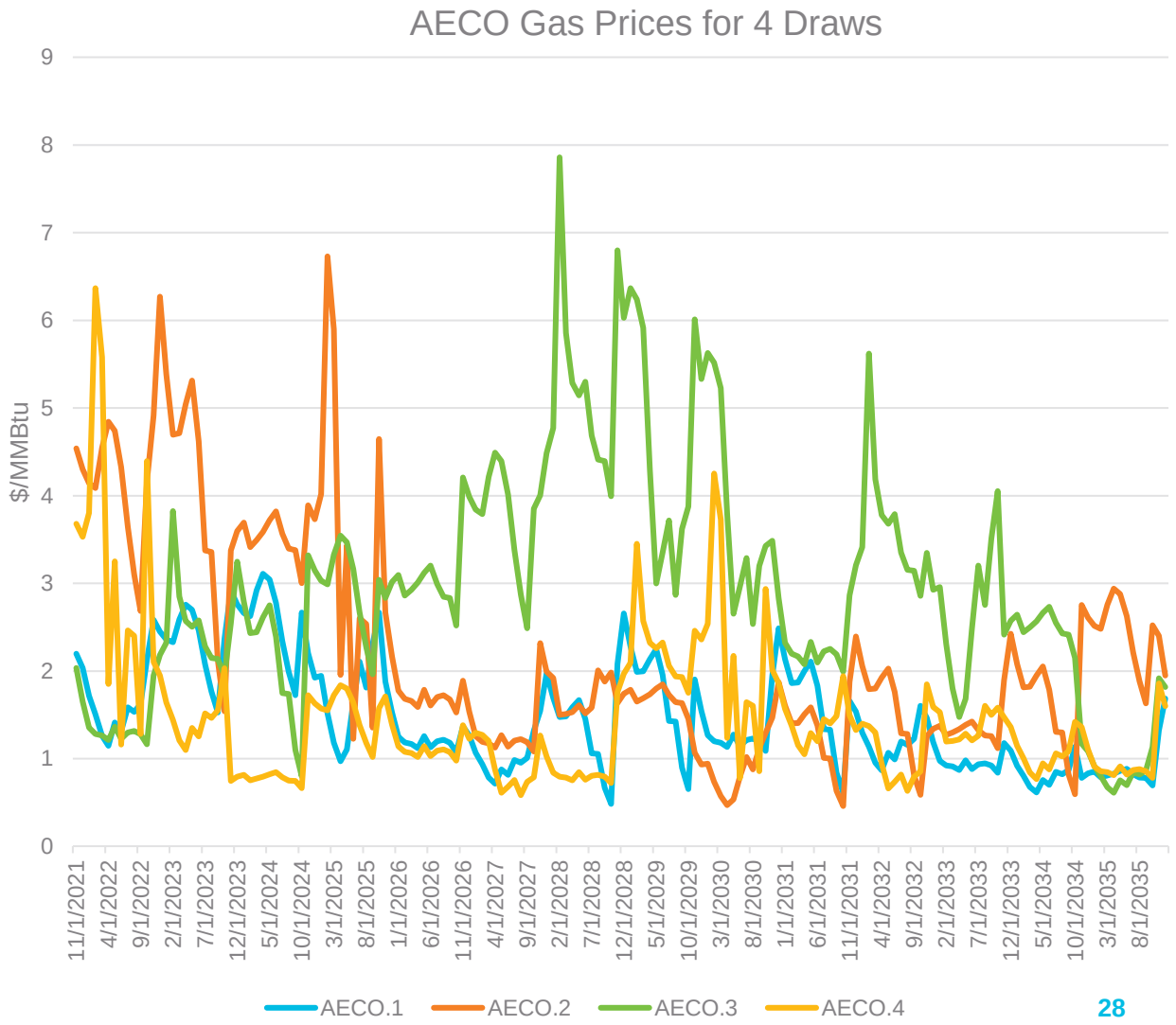
Resource Selection Review

- Given the resource need and resource options we use liner program software and preform constrained optimization to select and dispatch the least cost resources over a planning horizon
  - Objective Function : Minimize the Net Present Value of Total System Costs
  - Subject to: System Constraints
- System costs include:
  - Variable costs (e.g., gas costs, fuel charges, etc..) – anything that would could vary with demand levels
  - Fixed cost (e.g., pipeline charges, storage fixed costs)
- System Constraints include:
  - Infrastructure constraints (e.g., pipeline capacity)
  - Economic constraints (e.g., penalties associated with unserved demand)
- In addition to the base case, we use this software for our risk analysis:
  - Monte Carlo simulations
  - Scenario Analysis

Monte Carlo Simulation Review

- Used to evaluate how a fixed resource portfolio performs under a wide range of potential futures (500 draws)
- In previous IRPs we've included variation in:
  - Gas prices (graph to the right)
  - Demand (generated through a weather simulation)
  - Resource fixed costs
  - Emission compliance costs
- The transition PLEXOS may allow for more uncertainties to be captured in the Monte Carlo simulations



Scenario vs Monte Carlo Review

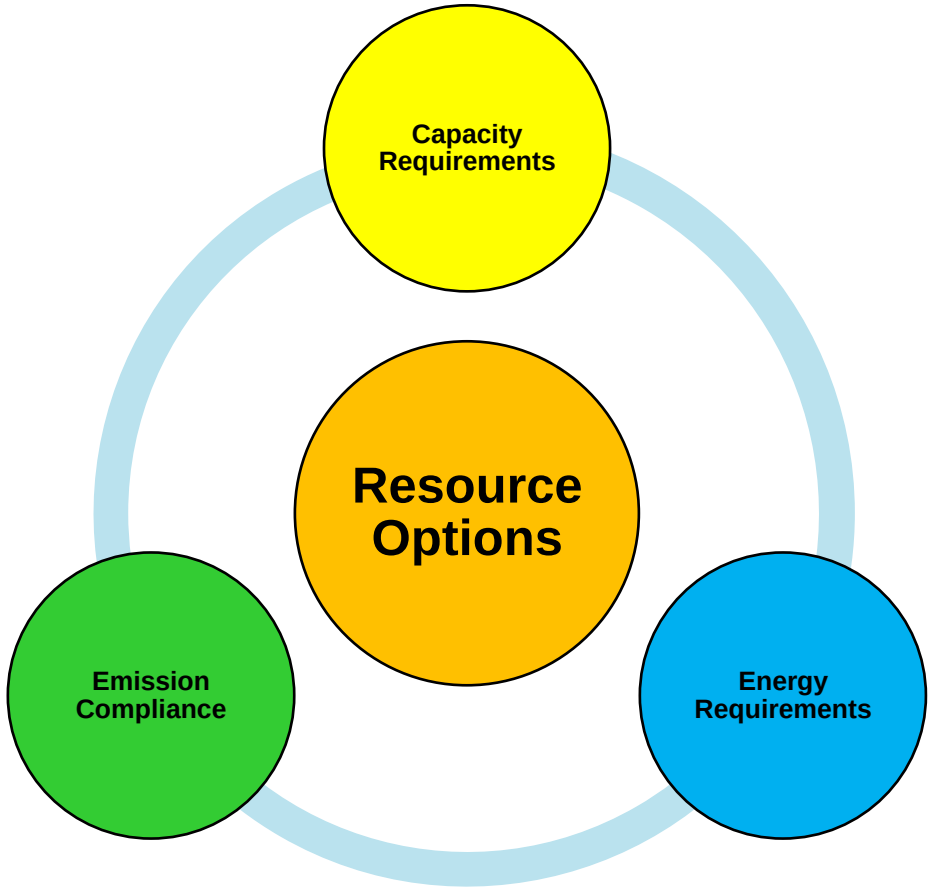
Scenario Analysis

- Change a few assumptions/inputs to see the impact of those changes on resource selection
- Still utilizes the constrained optimization to select the lowest cost resources
- Helpful to understand key uncertainties and how those deviations from the base case could impact resources planning

		Economic Growth Sensitivities	
		4	5
		High Customer Growth	Low Customer Growth
Demand-Side Assumptions	Customer Growth	High 90% Confidence Interval	Low 90% Confidence Interval
	Space Heat Equipment	Expected (Trend Continuation Plus Adjustment for Energy Trust Energy Efficiency Savings Projection)	
	Water Heating Equipment		
	Industrial Load Efficiency		
	Building Shell Improvement	Shell Related Savings in Energy Trust Energy Efficiency Savings Projection	
Supply-Side Assumptions	Regional Interstate Pipeline Expansion	No new regional interstate pipeline in Planning Horizon	
	Renewable Natural Gas	Base Case Assumptions	
	Power-to-Gas Hydrogen		
	Carbon Pricing		

Resource Portfolio Selection Under Emissions Compliance

- In previous IRP's emissions were modeled as a cost (e.g., forecasted compliance cost)
- Now we will need to model emissions as a quantity constraint
- Luckily, PLEXOS does have the ability to include an emissions constraint
  - SENDOUT does not have this capability and we would have needed a separated process to dovetail with SENDOUT to select resources based on a quantity constraint
  - PLEXOS still has limitation on how emissions are model, NW Natural is working with the Energy Exemplar support team to understand these limitations and model emissions appropriately



Resource Portfolio Selection Under Emissions Compliance

Modeling Challenges – State Boundaries?

- Oregon and Washington will have different emissions constraints
  - Where emissions are counted in the model will be important
  - How to calculate the carbon intensity of the gas flowing serving customers in each state
  - Can an RNG/Hydrogen projects in Oregon offset emission in Washington or vice versa
  - How are emissions credits (e.g., CCIs or off-system RTC purchases) incorporated into the cost minimization modeling
  - How are those credits allocated to each state
- In the past we have planned system resources jointly for OR and WA
  - There are significant benefits to both states by planning NW Natures system as a whole
  - Incorporating different emissions constraints presents an additional challenge

Resource Portfolio Selection Under Emissions Compliance

Modeling Challenges – Hard vs Soft Emissions Constraint

- Under DEQ's rules, there will be a penalty associated with non-compliance
- One option would be to model non-compliance as a potential resource in the cost minimization for resource selection
  - This would be a "soft" constraint and incur an economic penalty in the model
- NW Natural intends to comply with the emissions cap and therefore, we think it should be modeled as hard constraint
  - This would require NW Natural have enough emission credits in each compliance window

Resource Portfolio Selection Under Emissions Compliance

Modeling Challenges – Implications of Hard Constraint and Risk Assessment

- If there is a hard constraint, then there must be a resource that can always be available to meet this constraint
  - This should not be an issue in the *base case* model as the modeling has perfect foresight and can make decisions to be in-compliance
- It does present a challenge for the risk assessment (i.e., the Monte Carlo simulation)
  - If demand is much higher than expected the model will become infeasible with a hard constraint, unless there is a short-term resource that is always available to meet be incompliance
  - Do these short-term resources exist, in what quantities, and at what cost?
  - These quantities and costs could also be modelled as uncertain, but what would the distribution look like?
  - May require a planning standard for compliance risk
    - What would be the risk tolerance for non-compliance?

Resource Portfolio Selection Under Emissions Compliance

Modeling Challenges – Risk Tolerance for Non-compliance

- In the 2018 IRP, NW Natural purposed a methodology for evaluating a fixed portfolio of resources base on the risk adjusted present value revenue requirement (rPVRR)
  - rPVRR = 75%*(base case) + 25%*(95th percentile portfolio cost distribution)
  - Straight forward with a cost of compliance included in the Monte Carlo
  - With a soft constraint, we could do a similar process
- With a hard constraint, we may need to think about an additional risk adjusted criteria metric on quantity
  - For example, least cost portfolio must be incompliance in X% of the Monte Carlo draws
  - This might suggest a buffer of emissions compliance credits is necessary
  - This buffer could be based on a risk analysis, but this might cause a chicken or the egg type cycle for resource selection

Resource Portfolio Selection Under Emissions Compliance

Modeling Challenges – 3-year Compliance window and Banking Credits

- Currently the PLEXOS model can incorporate emissions constraints, but is done at an annual level (or more granular)
- DEQ rules specify a 3-year compliance window, which allows for some flexibility
  - This shouldn't be much of a problem for the deterministic case as the compliance constraint
  - Addressed by a linear decline of the constraint for each year in the 3-year window
- Banking credits across windows will be challenging as we have not modelled this before

Questions/Feedback

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