



Natural Gas Fact Finding: Initial Model Results

September 14, 2021

Agenda

- EO 20-04 Compliance Assumptions
- Methodology
- EO 20-04 Compliance Model Scenario Results
- OPUC Requested Sensitivities

Avista

Oregon Customer by type	# of Customers	% of Load
Residential	89,000	39%
Commercial	11,700	26%
Industrial	25	8%
Transport	30	27%

Avista Natural Gas Service Areas, Gas Fields, Trading Hubs and Major Pipelines



- Avista Service Territory ●
- Williams – Northwest Pipeline ■
- Enbridge – Westcoast ■
- TC Energy – GTN ■
- TC Energy – Foothills ■
- TC Energy – Nova ■
- Kinder Morgan – Ruby ■
- Jackson Prairie Storage Project ▲
- Trading Hubs



*362,000+ customers system wide



EO 20-04 Compliance Model Assumptions

IRP Baseline Assumptions

- Results are for the State of Oregon only
- Demand from all Avista customer classes considered
- Avista 2021 Natural Gas IRP (LC-75) used as inputs and updated as available:
 - Customers (IRP, 2022 – 2045, estimated from 2046-2050)
 - Use per customer (3-year coefficients 2018-2020)
 - Weather (2001 through 2020)
 - Natural gas prices
 - Oregon's ownership of Jackson Prairie Storage (costs and benefits)
 - Transportation costs
 - Price Elasticity 0.81%

New Baseline Assumptions

- Policy scenario #4
 - 20% Community Climate Investments (CCI)
 - CCI offsets emissions to create a 0 emission product
 - 10% (2022-2024), 15% (2025-2027), 20% (2028+)
 - Cap reductions/trajectory:
 - goal of 45% by 2035 and 80% by 2050
- Supply types:
 - RNG (all types)
 - Supply and Cost estimates from AGF/ICF study, December 2019
 - Energy is excluded from emissions calculation
 - H2 (green)
 - Estimated at 20% of supply blend potential
 - Costs from multiple industry studies (Lazard’s, S&P Global)
 - Energy is excluded from emissions calculation

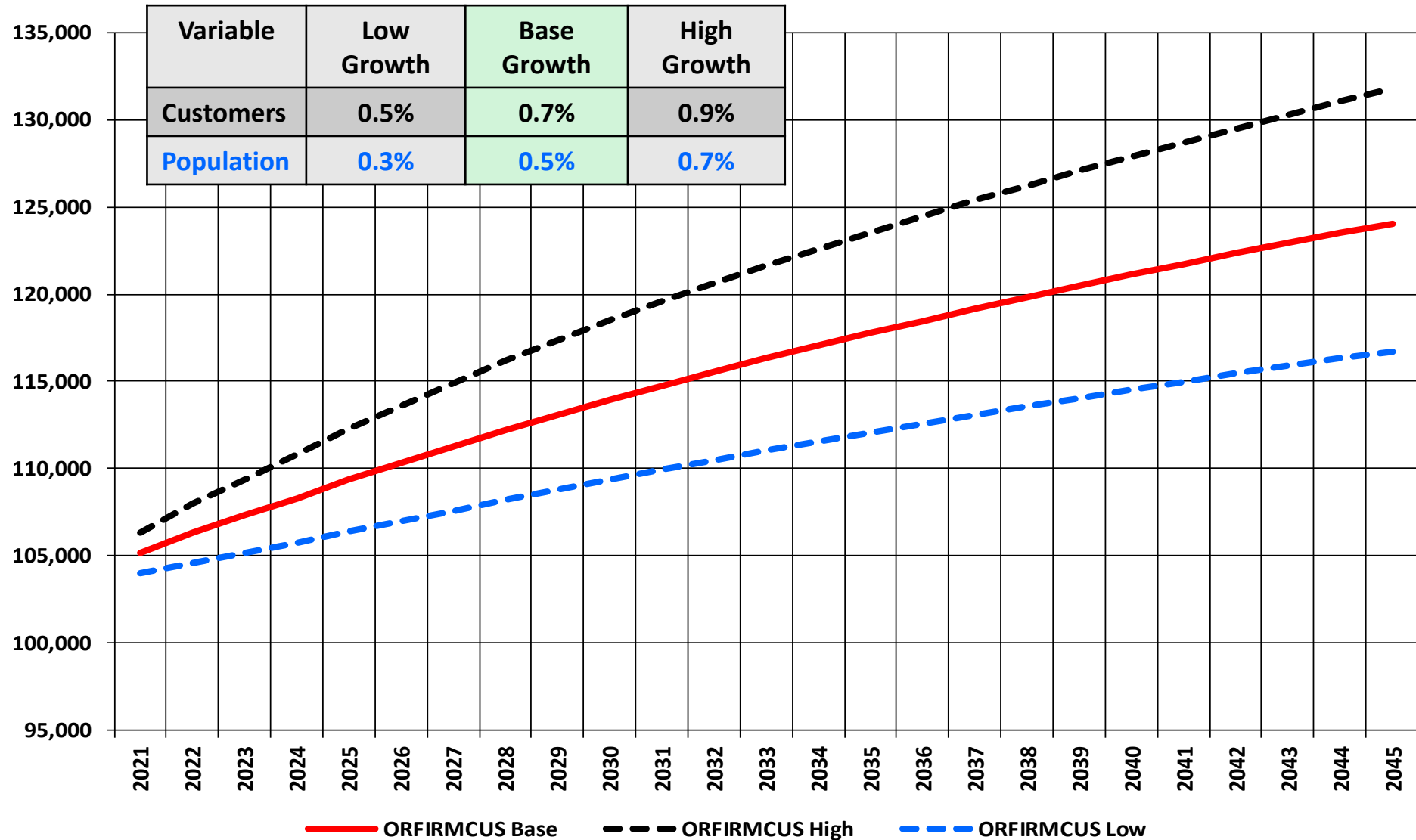
Policy Scenario Differing Assumptions				
Key Topic	Policy Scenario 1	Policy Scenario 2	Policy Scenario 3	Policy Scenario 4
Cap and Trajectory	Straight line to 80% by 2050	45% by 2035 80% by 2050	50% by 2035 90% by 2050	45% by 2035 80% by 2050
Trading Allowed?	Yes	Yes, excluding stationary sources	Yes	Yes
Regulated Sectors under the Cap	<ul style="list-style-type: none"> - Natural gas utilities - Non-natural gas fossil fuel suppliers - Large stationary sources with process emissions \geq 25,000 	<ul style="list-style-type: none"> - Natural gas utilities - Non-natural gas fossil fuel suppliers - Large stationary sources with process emissions plus natural gas emissions \geq 25,000 (includes gas supplied by interstate pipeline companies to those above threshold) 	<ul style="list-style-type: none"> - Natural gas utilities - Non-natural gas fuel suppliers with emissions \geq 300,000 - Large stationary sources with process emissions \geq 25,000 	<ul style="list-style-type: none"> - Natural gas utilities - Non-natural gas fossil fuel suppliers
Emissions not included under the Cap	<ul style="list-style-type: none"> - Fuels used for aviation - Process emissions below threshold 	<ul style="list-style-type: none"> - Fuels used for aviation - Process emissions below threshold 	<ul style="list-style-type: none"> - Fuels used for aviation; - Emissions from fuel suppliers below threshold - Process emissions below threshold 	<ul style="list-style-type: none"> - Fuels used for aviation - Large stationary sources assumed to be regulated under a separate best available emissions reduction approach
Natural Gas Point of Regulation	All natural gas regulated at utility, not at stationary source.	Natural gas regulated at stationary sources if emissions are above threshold. Otherwise, natural gas regulated at utility.	All natural gas regulated at utility, not at stationary source.	All natural gas regulated at utility, not at stationary source.
Use of CCIs	Up to 25% of compliance per year	Up to 5% of compliance per year	Up to 25% of compliance per year	Up to 20% of compliance per year

Oregon Department of Environmental Quality

13



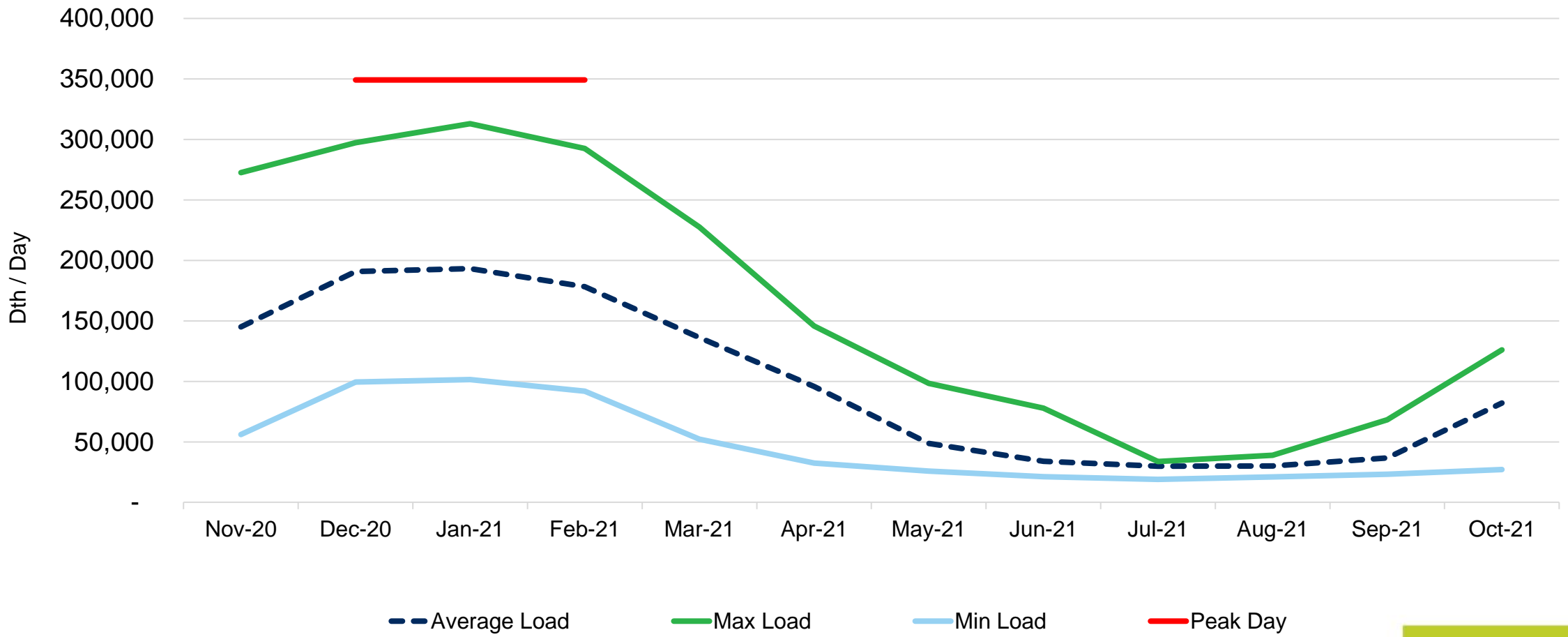
OR Region Firm Customer Range, 2021-2045



Source: 2021 IRP Customer Forecast



Total System Average Daily Load



Weather

- Most recent 20 calendar years of daily average weather for each Planning Area
- Peak day methodology - Utilize coldest day for each of the past 30 years with a 99% probability supply can be fulfilled

Planning Area	99% Probability Avg. Temp
Klamath Falls	-9
La Grande	-11
Medford	11
Roseburg	14

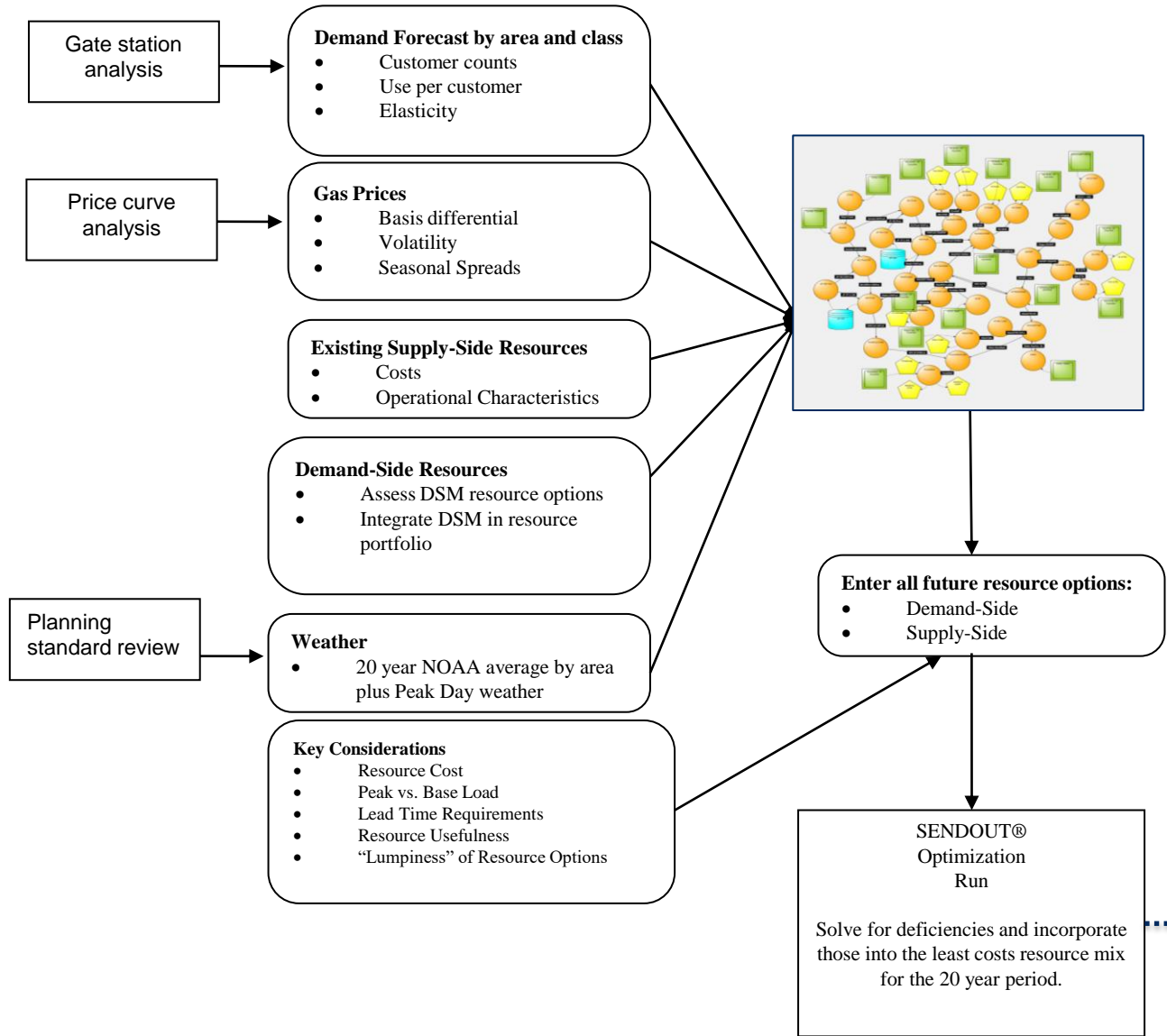
Risks to Model and Costs

- New Policy/guidance
- Unknown amount of CCI's available
- RNG Potential/Costs
- H2 Potential/Costs/Green Power Availability
 - Water Availability/Rights
- Electrification
- Lost Industry in Oregon
- CPP rules are not complete

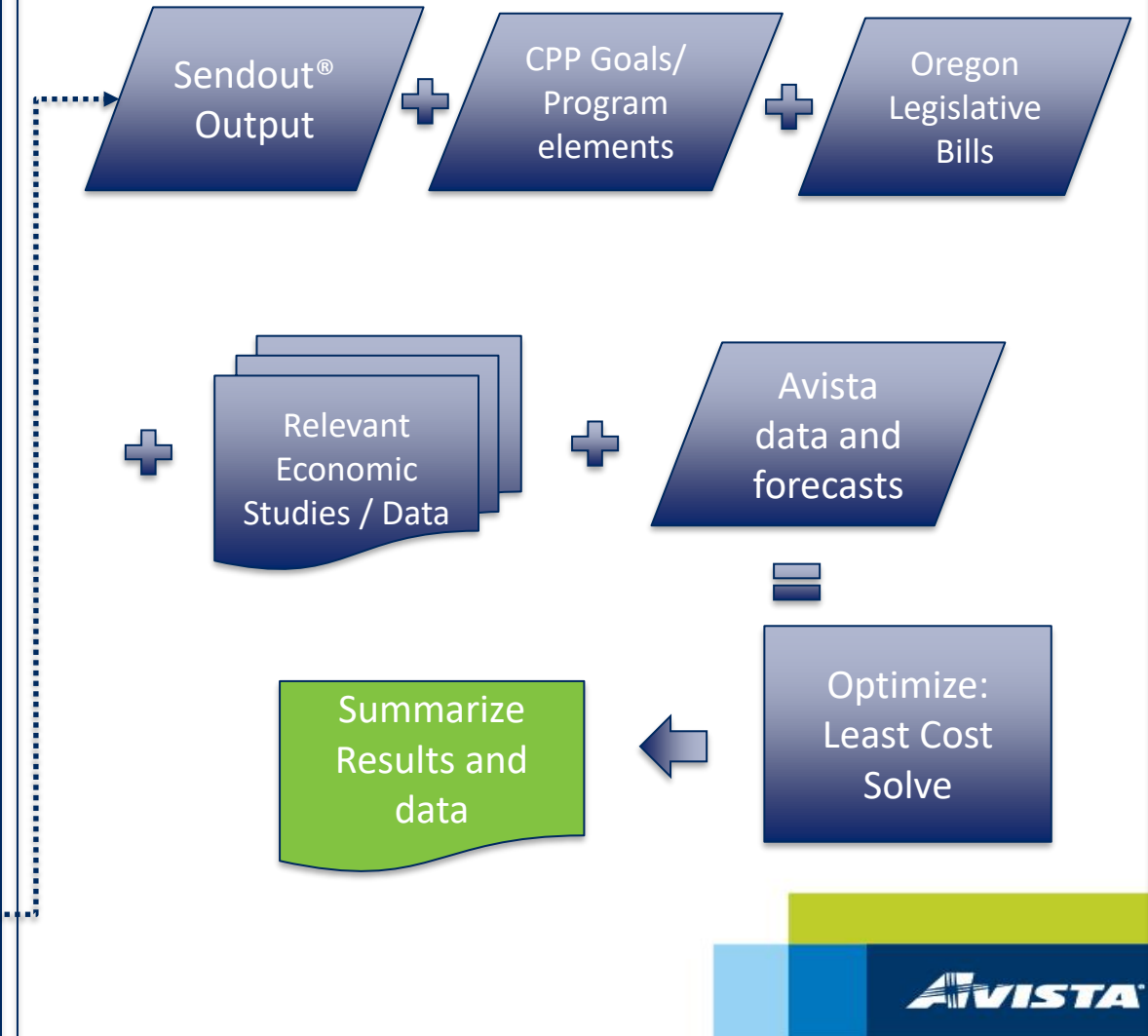


Methodology

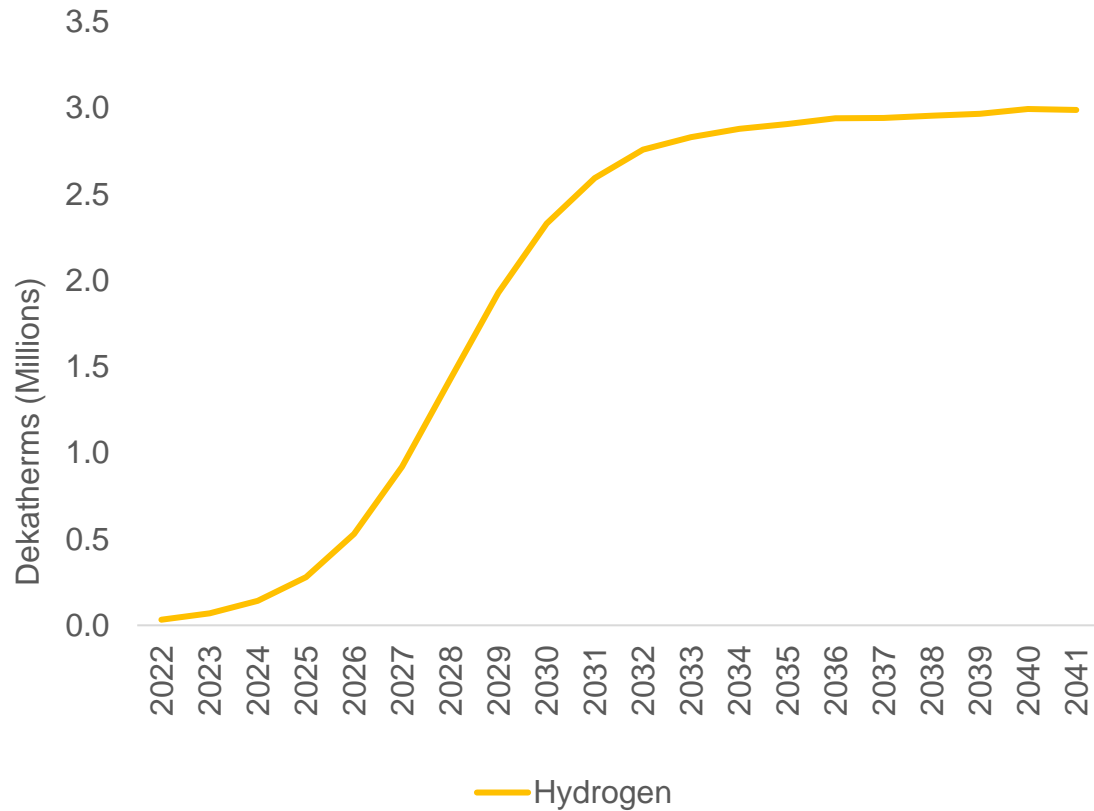
Sendout® Model



Excel Solver Model



Hydrogen - Green (Available to Avista)

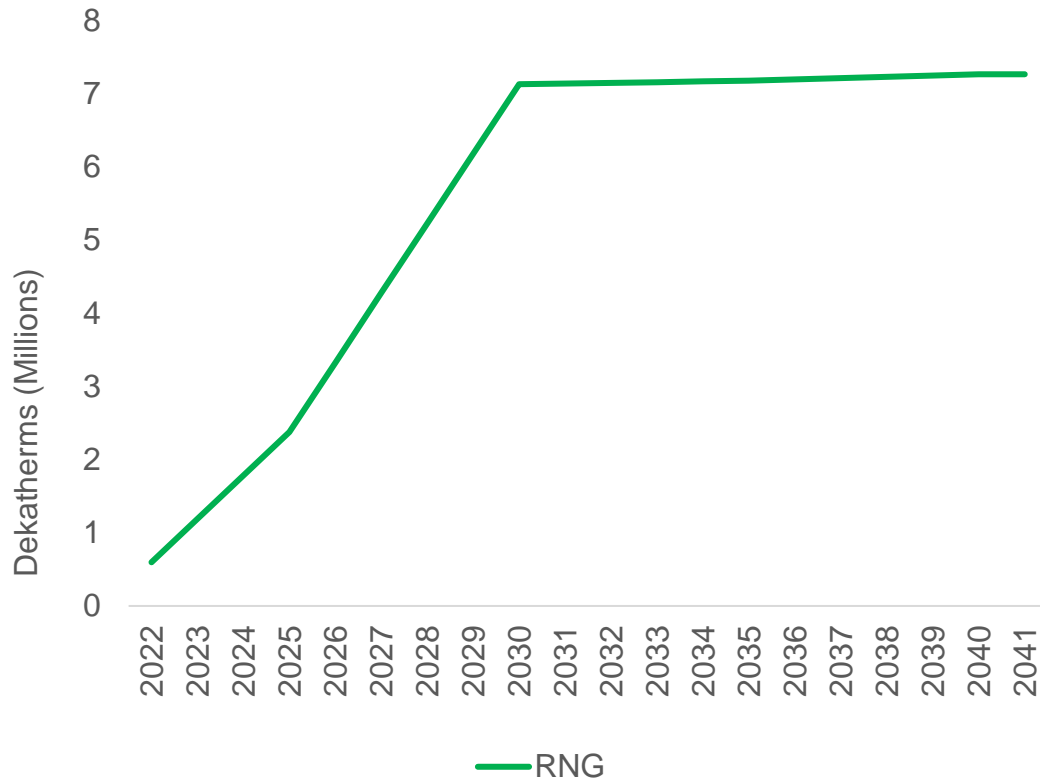


The time to saturation of the five classes of technology depends on technology, industry, and external factors.

Characteristics	A	B	C	D	E
Time to Saturation (t_s)	5 years	10 years	20 years	40 years	>40 years
Technology Factors					
Equipment Life	< 5 years	5–15 years	15–25 years	25–45 years	>40 years
Equipment Replacement	None	Minor	Unit operation	Plant section	Entire plant
Technology Experience	New to U.S. only	New to U.S. only	New to U.S. only	New	New
Industry Factors					
Growth (% per year)	>5%	>5%	2~5%	1–2%	<1%
Attitude to Risk	Open	Open	Cautious	Conservative	Adverse
External Factors					
Government Regulation	Forcing	Forcing	Driving	None	None

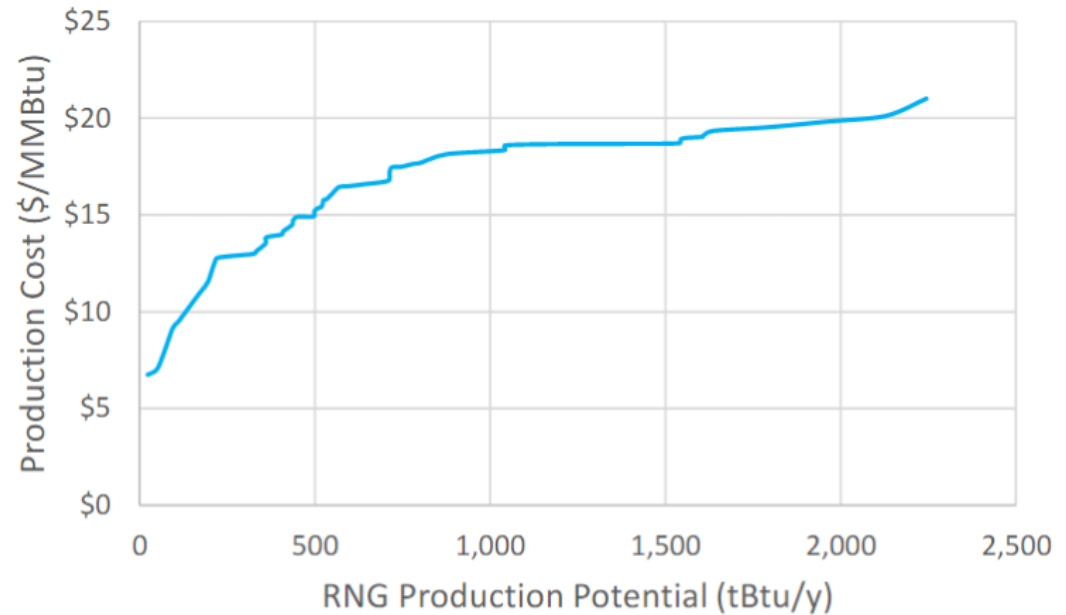
Source: Fisher-Pry Model of Technological Substitution

RNG Supply Curve (Available to Avista)



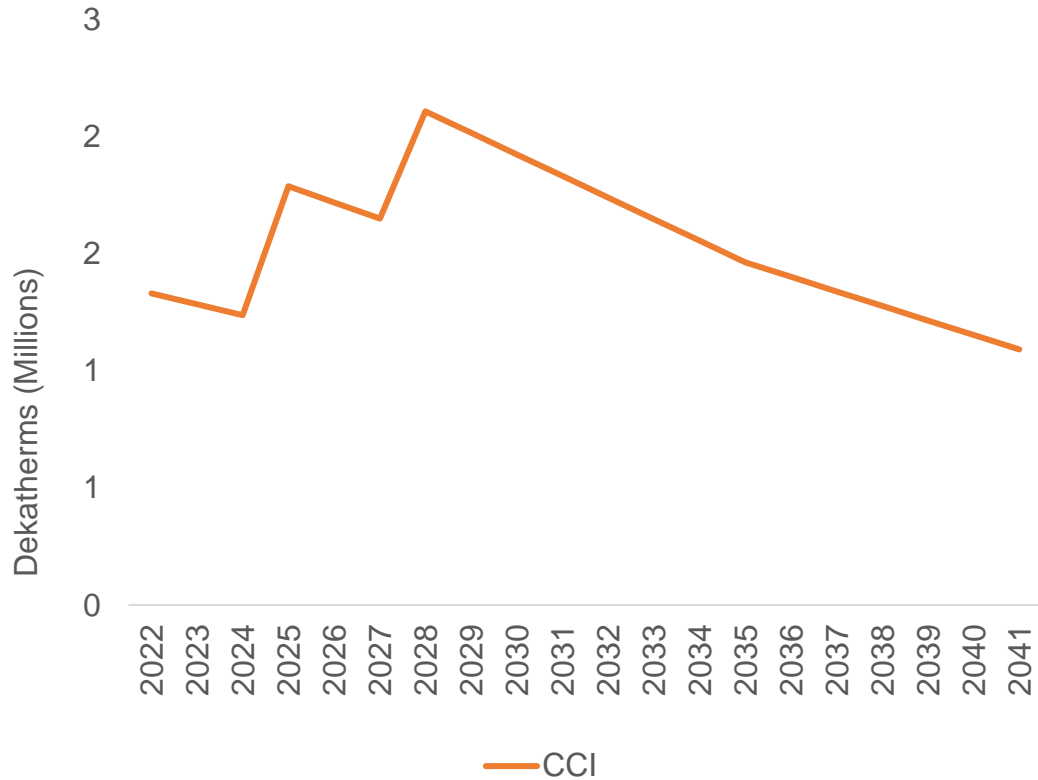
- Population: United States, Oregon
- Avista share of natural gas load

Figure 34. Combined RNG Supply-Cost Curve, less than \$20/MMBtu in 2040

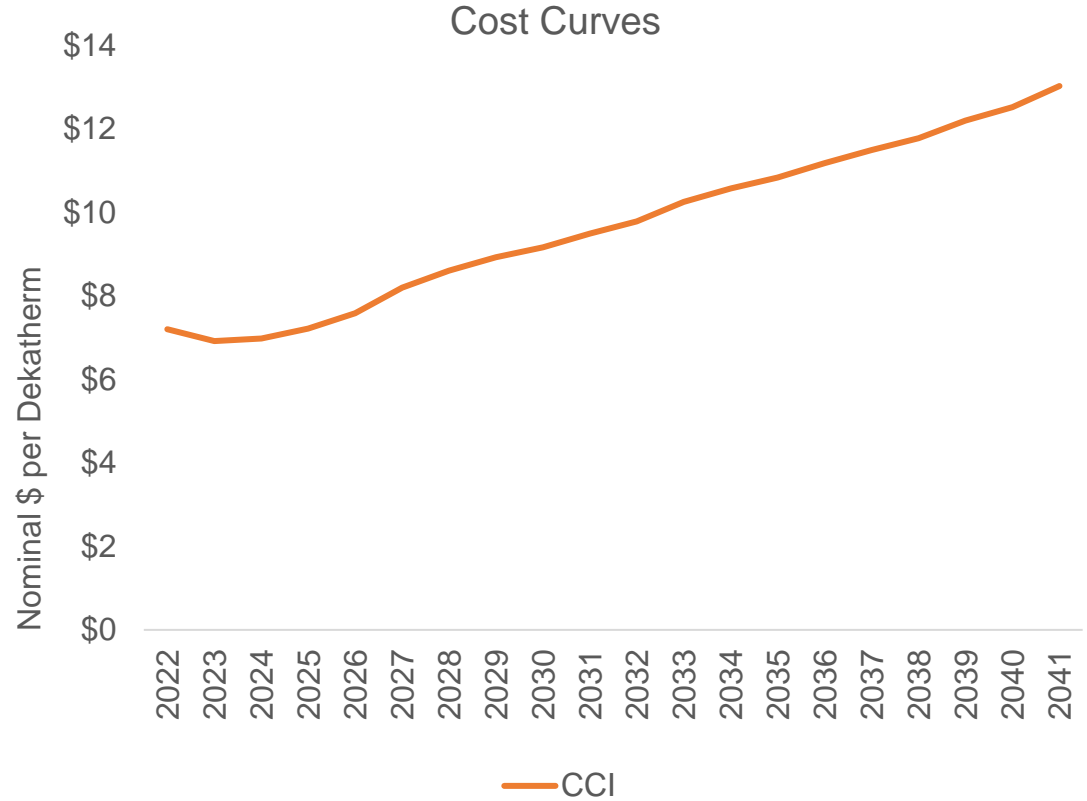


CCI*

(Available to Avista)



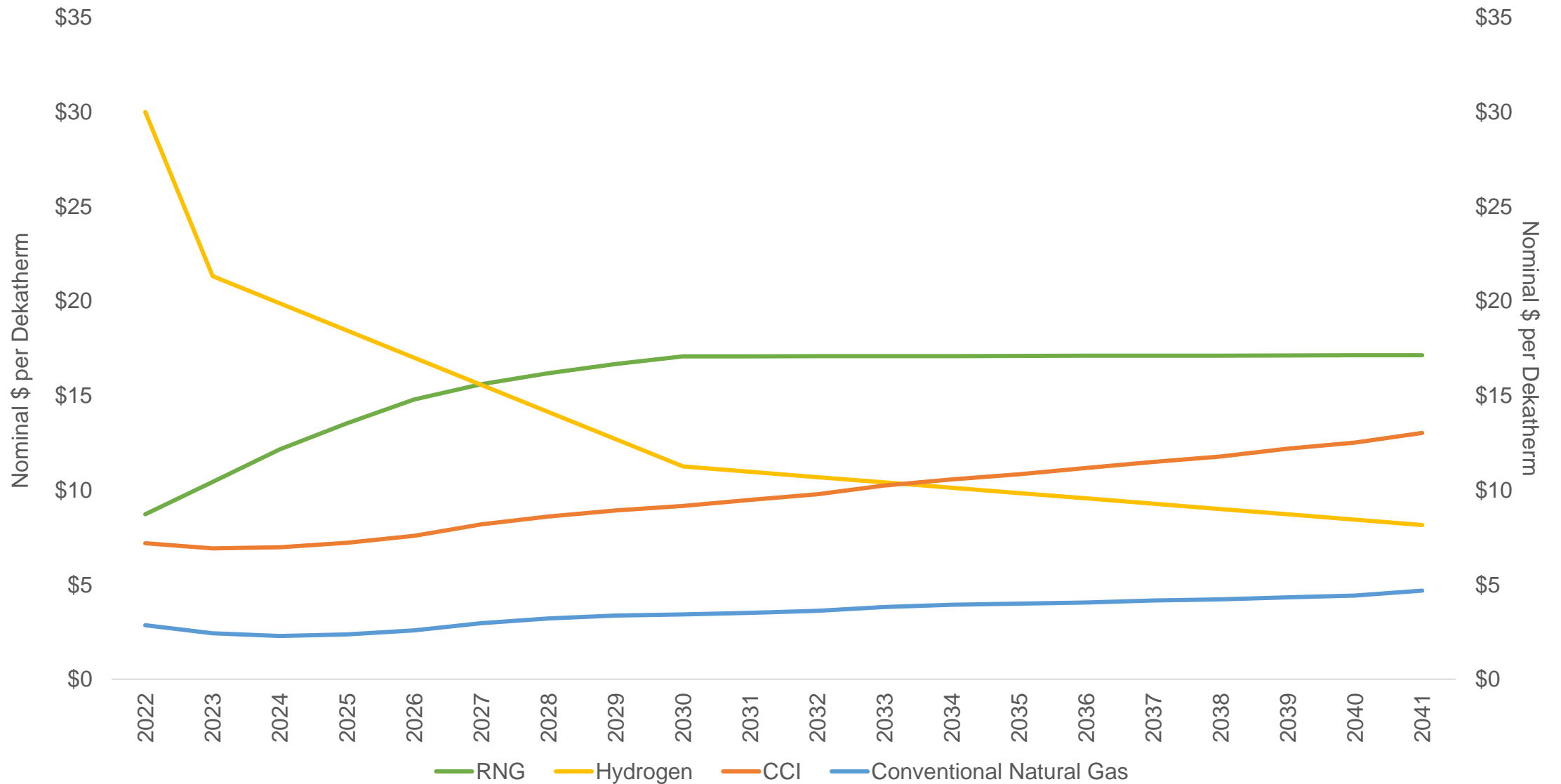
CCIs per MTCO₂e: 1
 Pounds per MTCO₂e: 2204.623
 CO₂e pounds per dekatherm: 116.55*



$$1 \text{ CCI} = 2204.623 = 116.55 * X$$

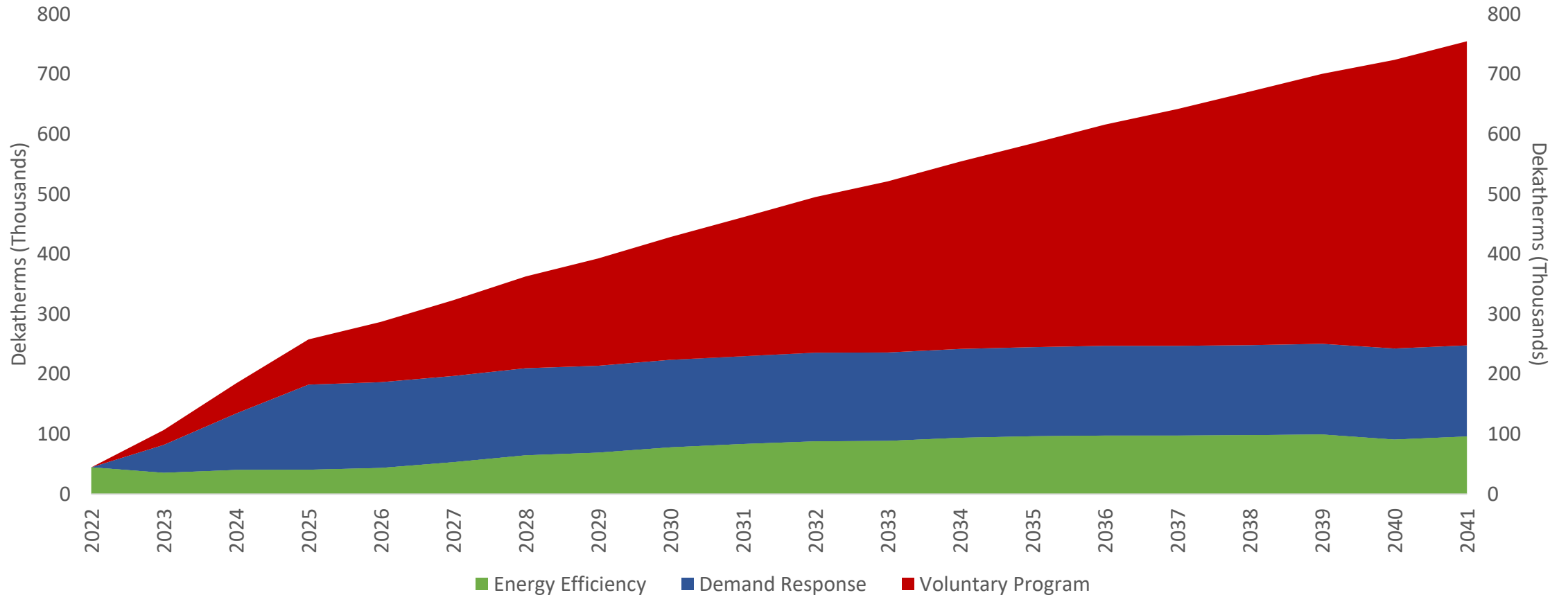
$$X = \frac{2204.623}{116.55} = 18.9 \text{ dekatherms} = 1 \text{ CCI}$$

Cost Curves



RNG is a combined cost curve for all project types
RNG is assumed to have a population weighted based supply availability

Avoided Demand by Program



2021 Expected Case EE

- Does not include Interruptible customers or transport customers (No current tariff rider)
- Voluntary Program and DR are estimates

Least-Cost Resource Selection Methodology

MTCO ₂ e emissions allowance	687,249
CO ₂ e pounds per dekatherm of conventional natural gas	116.55
Dekatherms of conventional natural gas equivalent	13,000,000

	Available Supply	Price
Conventional natural gas	15,000,000	\$3
RNG	2,000,000	\$13
Hydrogen	500,000	\$20
CCI offset + Commodity	1,200,000	\$4 + \$3 = \$7

	Example 1	Example 2	Example 3	Example 4
Load	13,000,000	14,000,000	15,000,000	16,500,000
Served with conventional natural gas	13,000,000	14,000,000	14,200,000	14,200,000
Served with RNG	0	0	800,000	2,000,000
Served with hydrogen	0	0	0	300,000
<i>CCI offset</i>	<i>0</i>	<i>1,000,000</i>	<i>1,200,000</i>	<i>1,200,000</i>
MTCO ₂ e emissions	687,249	687,249	687,249	687,249

Allocating Revenue Requirement – Senate Bill 98

- Senate Bill 98 Section 5 (5):

"If the large natural gas utility's total incremental annual cost to meet the targets of the large renewable natural gas program exceeds five percent of the large natural gas utility's total revenue requirement for an individual year, the large natural gas utility may no longer be authorized to make additional qualified investments under the large renewable natural gas program for that year without approval from the commission."

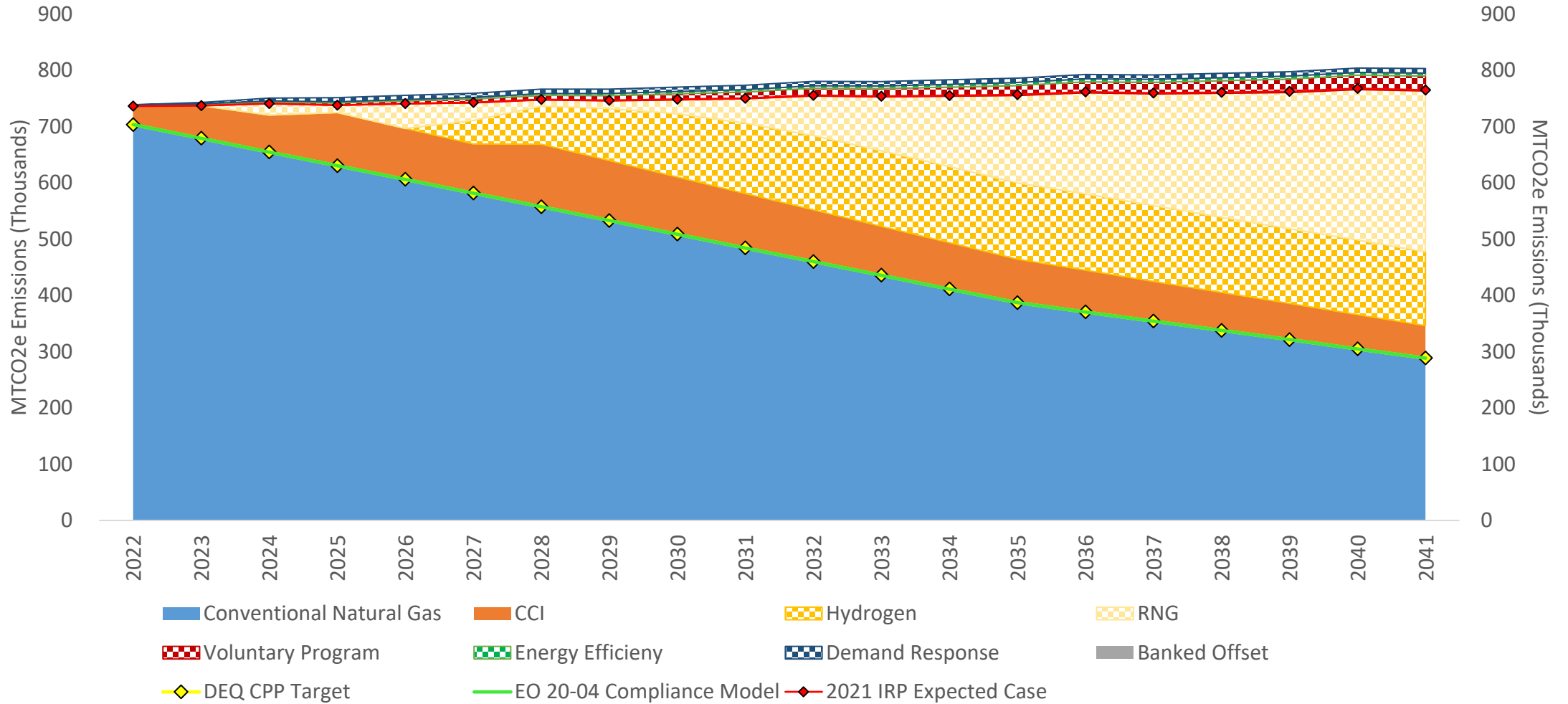
Allocating Revenue Requirement – EO 20-04

	Example Case	EO 20-04 Compliance
Baseline Revenue Requirement	\$ 100,000,000	\$ 100,000,000
Incremental Cost of RNG	\$ 5,000,000	\$ 10,000,000
Incremental Cost of Hydrogen	\$ -	\$ 2,500,000
Incremental Cost of CCIs	\$ -	\$ 2,500,000
Resulting Revenue Requirement	\$ 105,000,000	\$ 115,000,000
Allocation to SB 98	\$ 5,000,000	\$ 5,000,000
Allocation to EO 20-04	\$ -	\$ 10,000,000

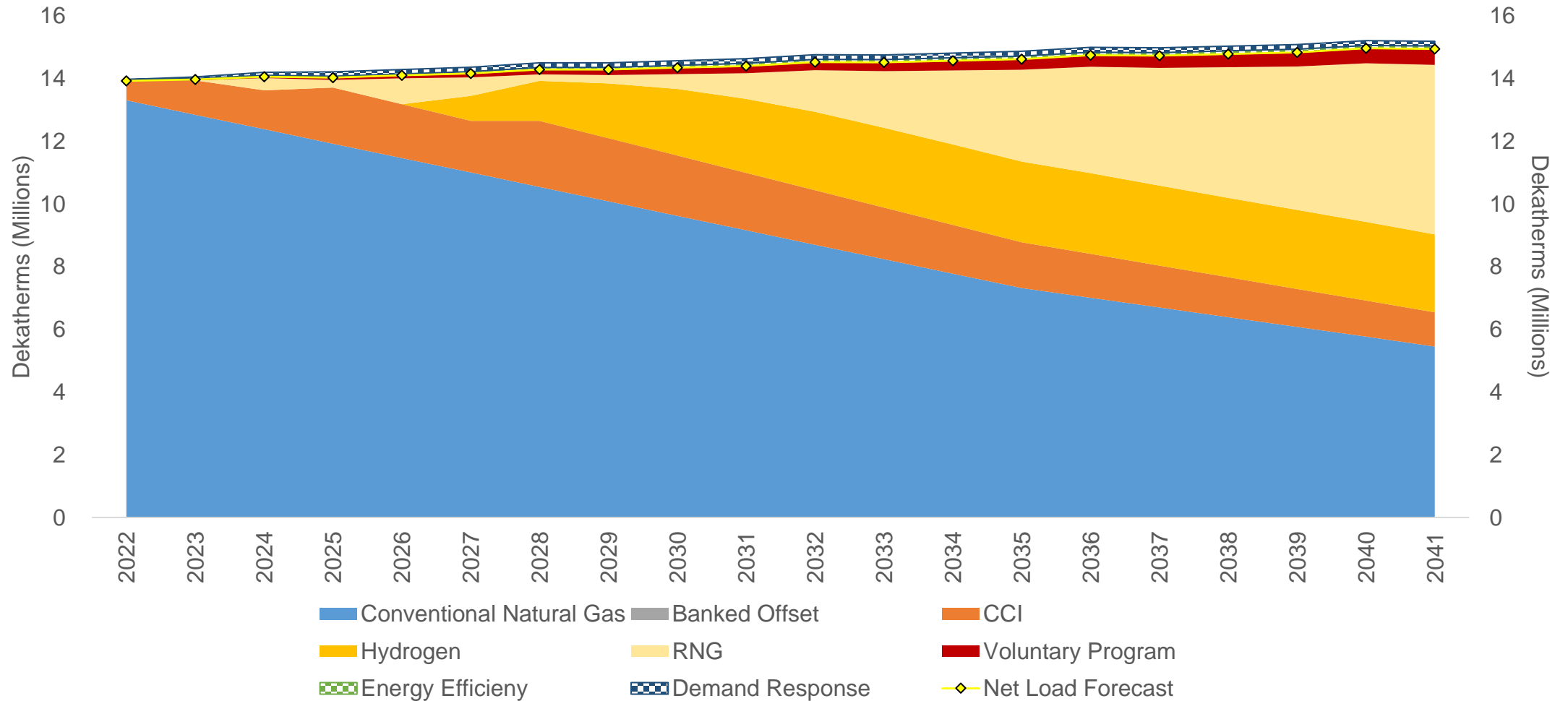


EO 20-04 Compliance Model Scenario Results

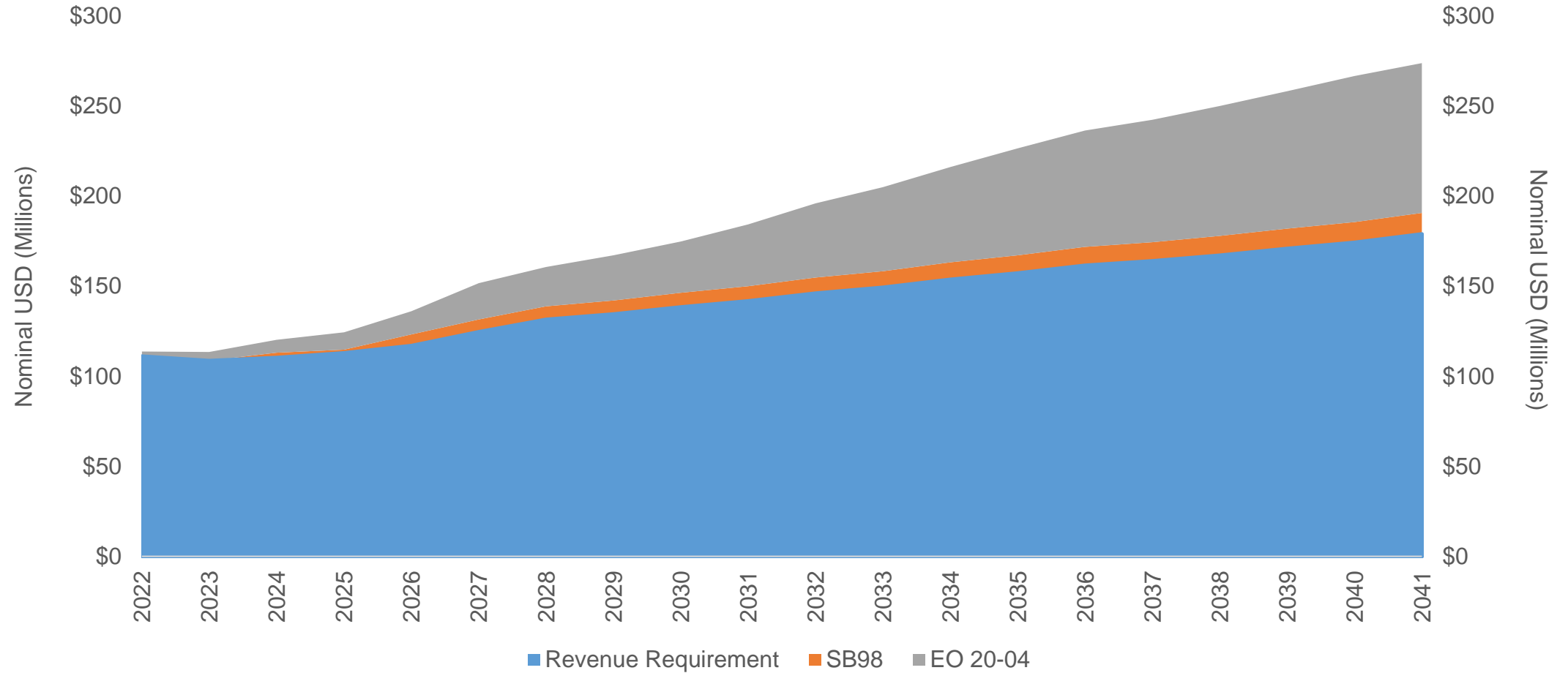
Emissions Forecast (emissions goal met)



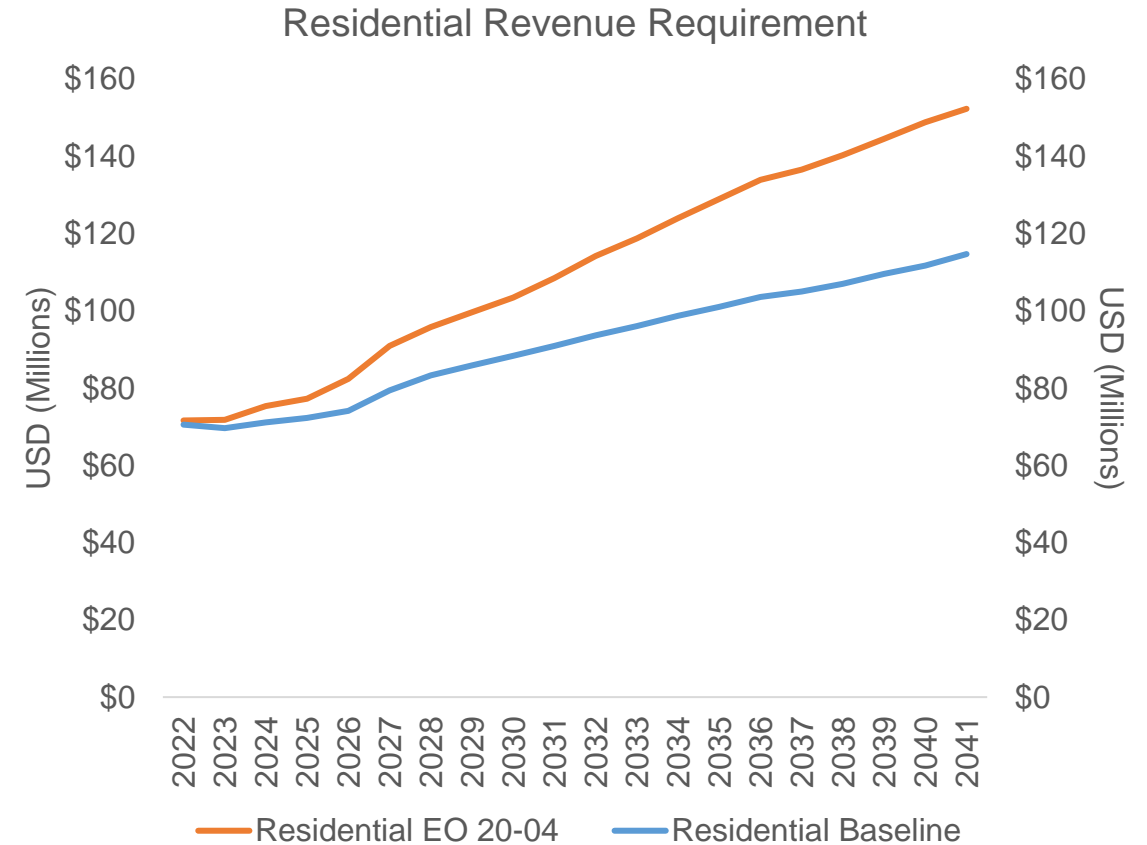
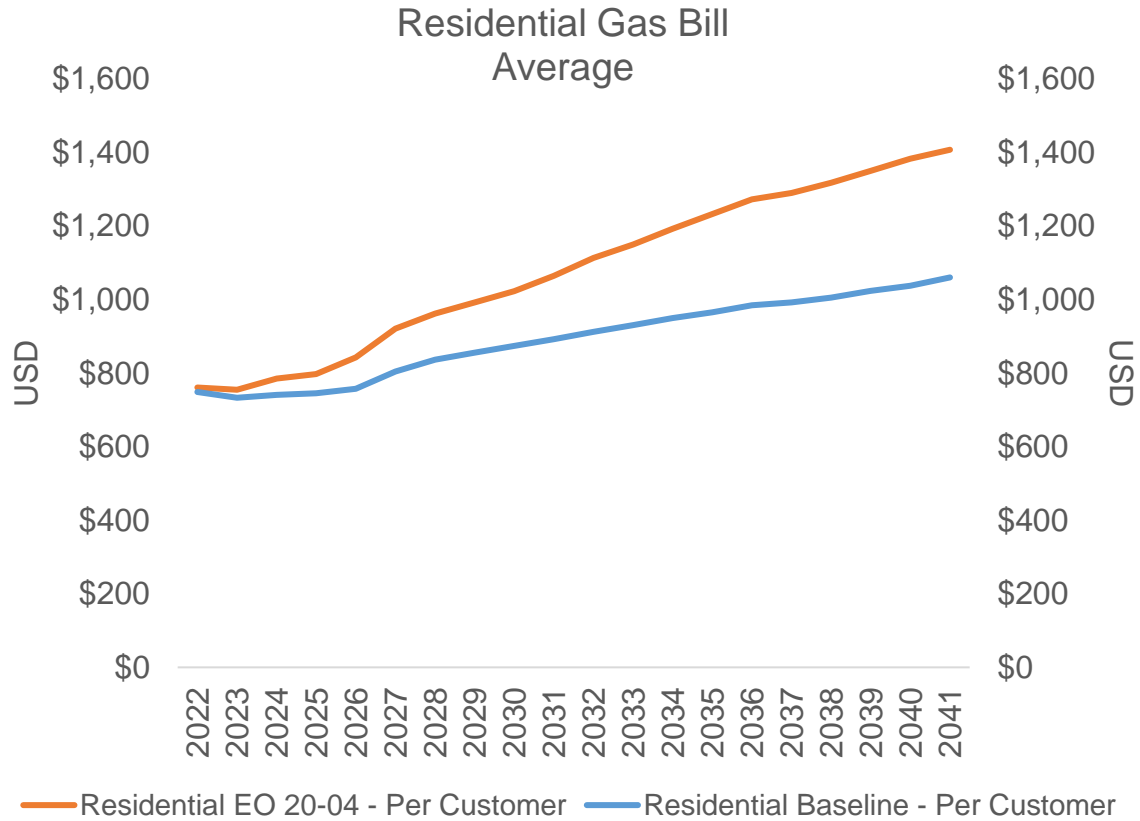
Supply Stack (energy goal met)



Oregon Total Revenue Requirement

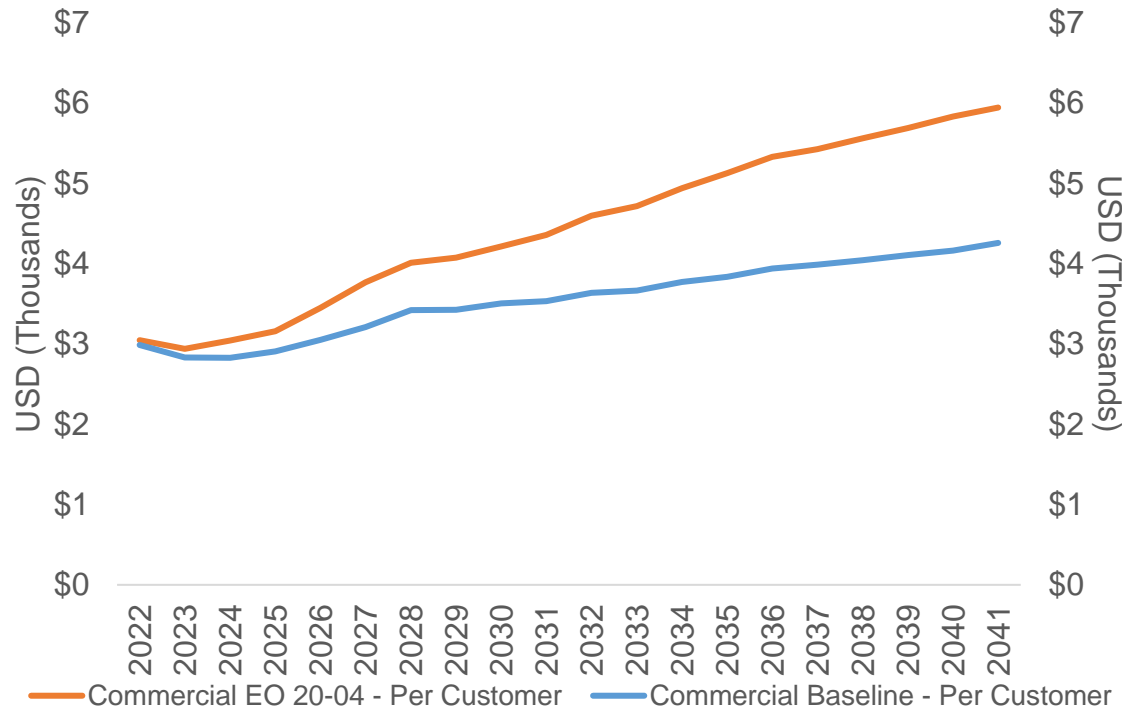


Residential Customer Bill Impact

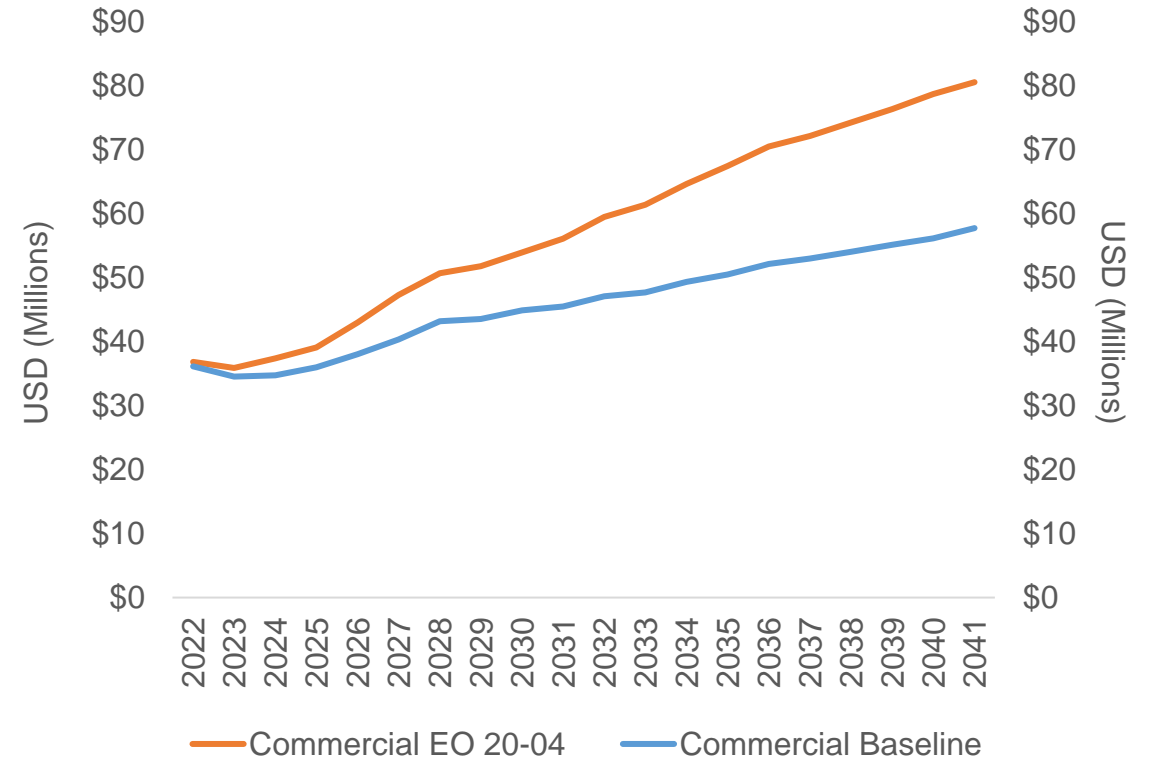


Commercial Customer Bill Impact

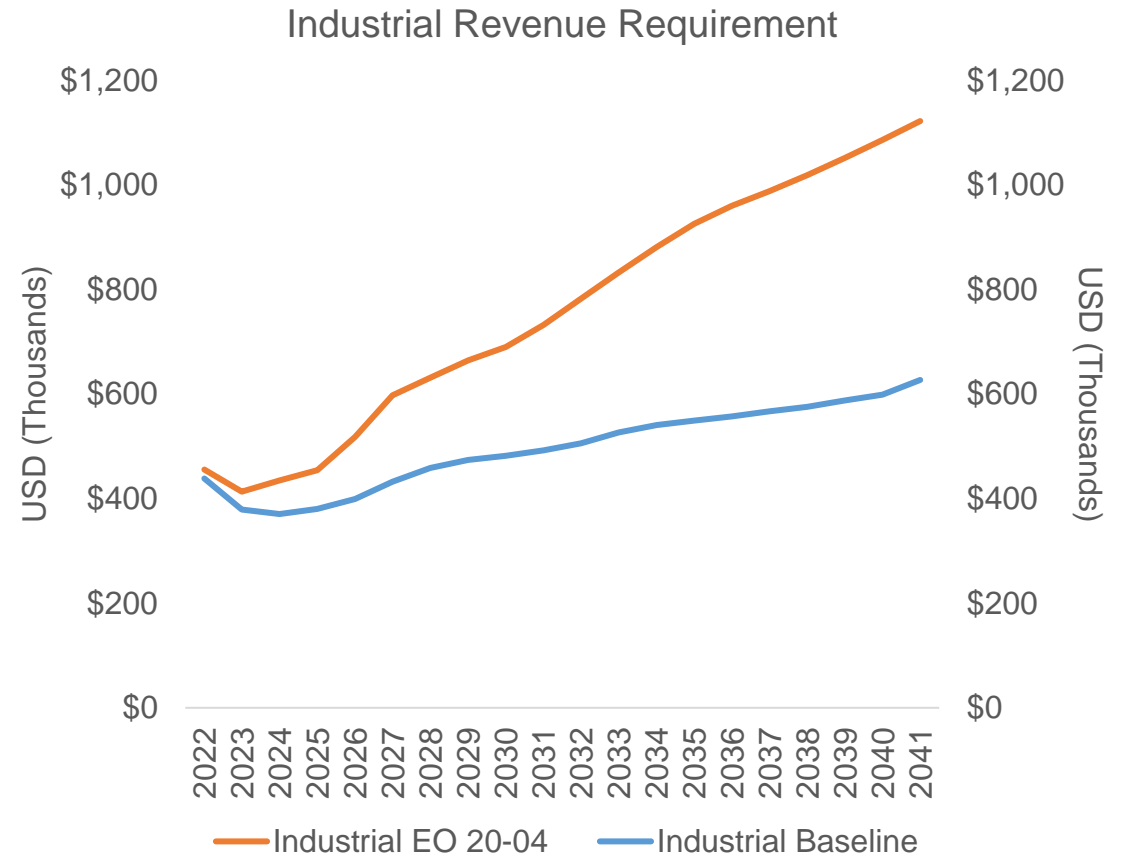
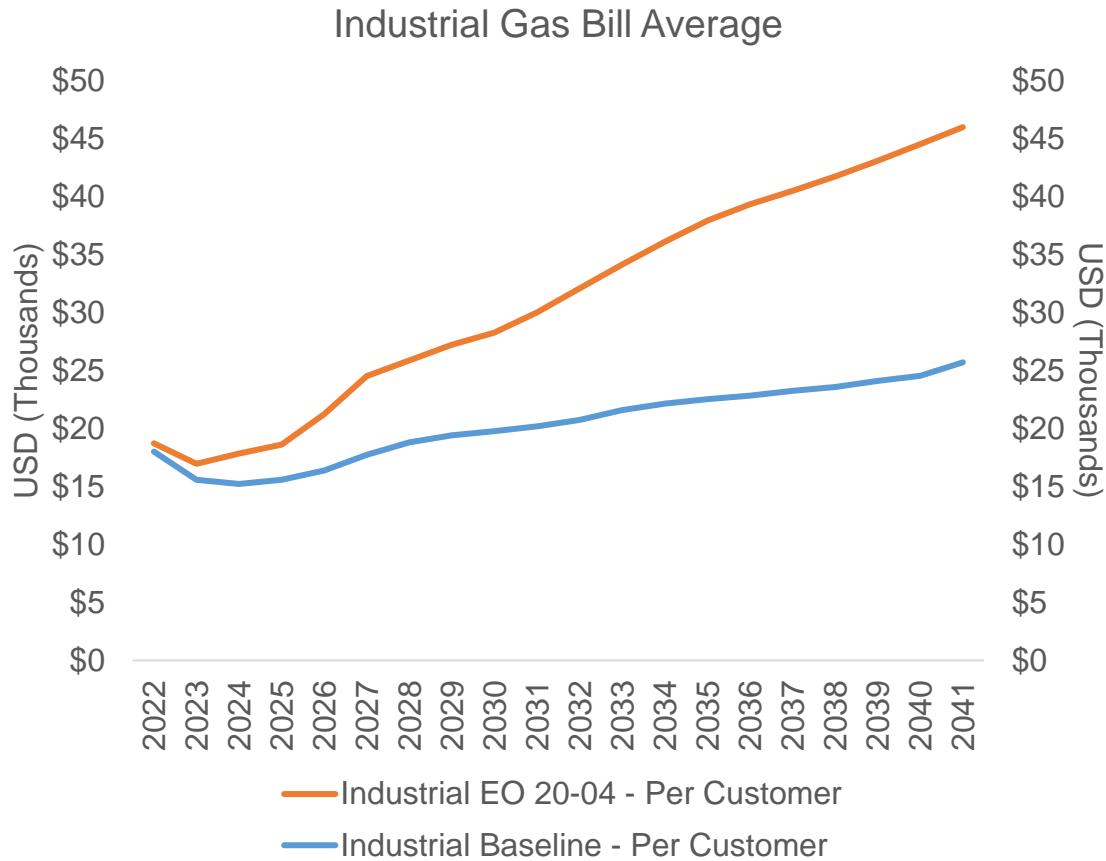
Commercial Gas Bill Average



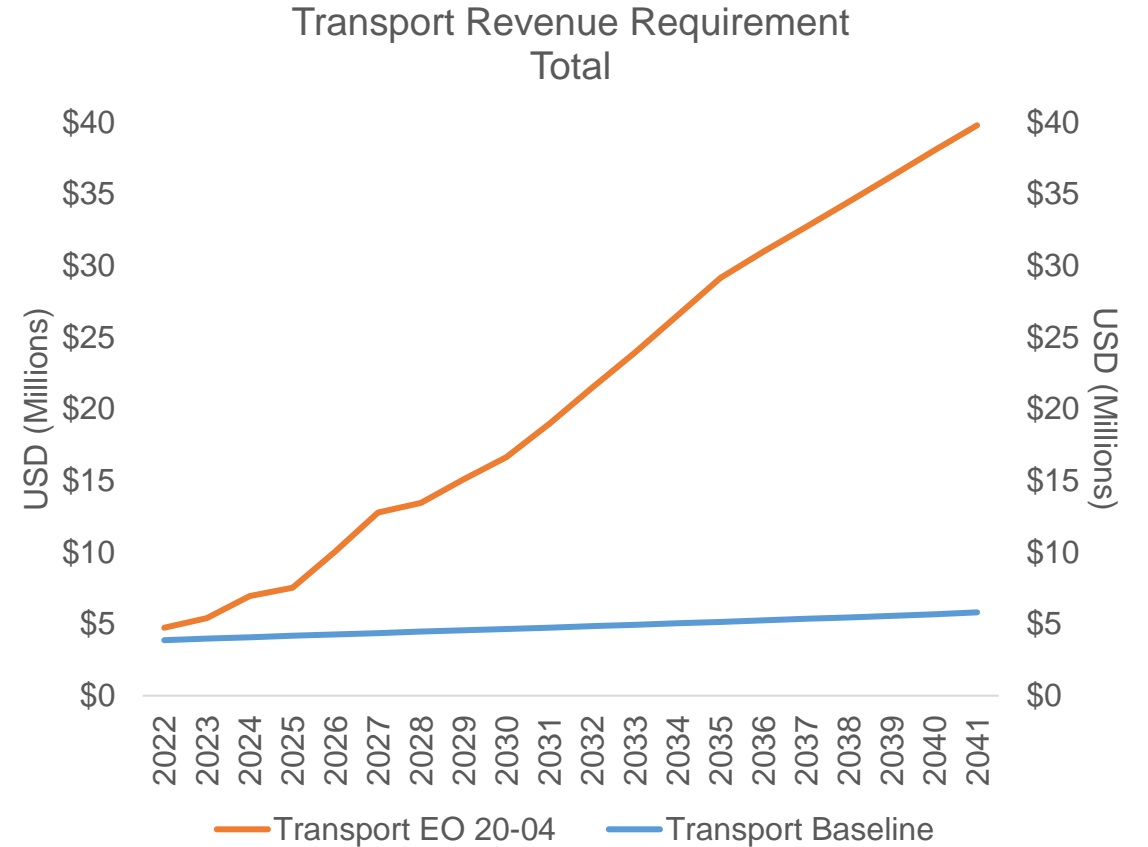
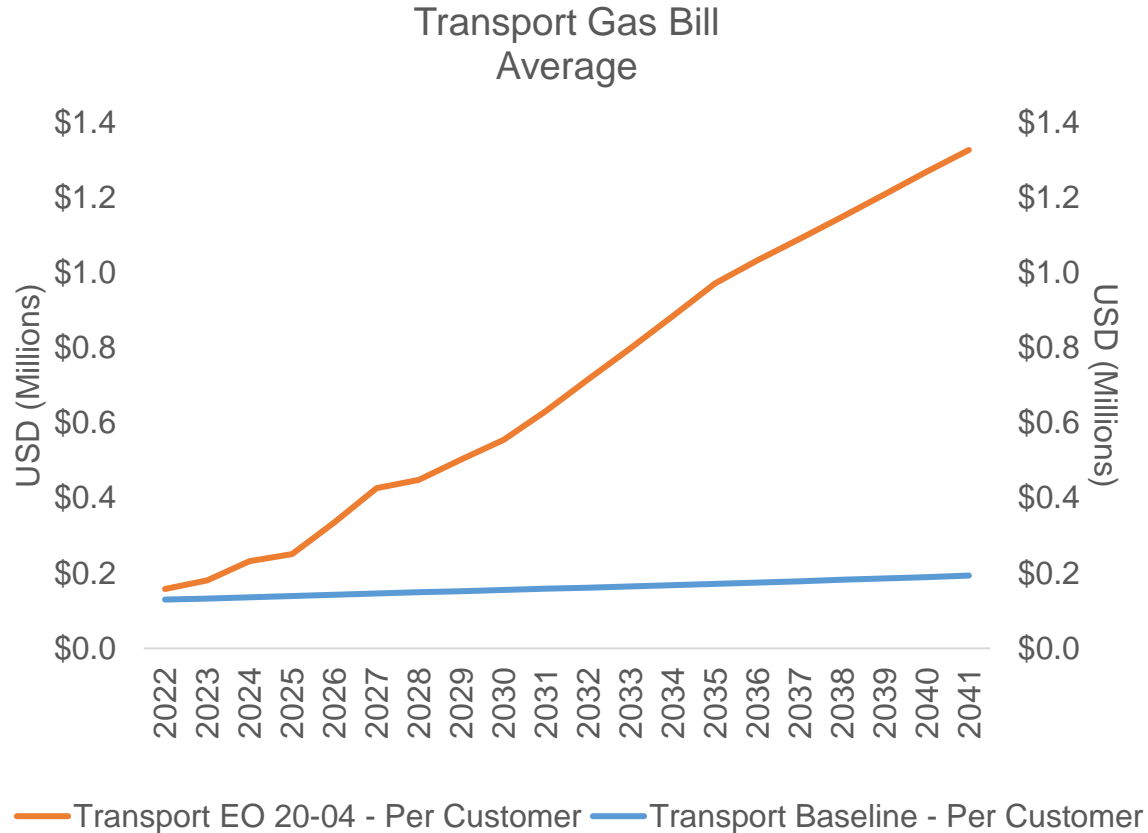
Commercial Revenue Requirement



Industrial Customer Bill Impact



Transportation Customer Bill Impact*



*Excludes external costs from agent



OPUC Requested Sensitivities

Natural Gas Fact Finding Compliance Modeling Proposed Sensitivities

1 - Customer Growth

Sensitivity: Current IRP forecasted load growth through 2025; no new customers beginning from 2025 through 2030; -0.75% customer growth beginning in 2031 through the end of model's time horizon

Growth is something we'll need to calculate from Sendout customers by area and class at a detailed level

2 - RNG Availability

Sensitivity: Limit RNG availability to the annual percentages set by SB 98 and found in ORS 757.396(1).

3 - More Aggressive Timeline on Climate Policy

Sensitivity: CPP targets of 45% below baseline by 2030, 80% below baseline by 2040

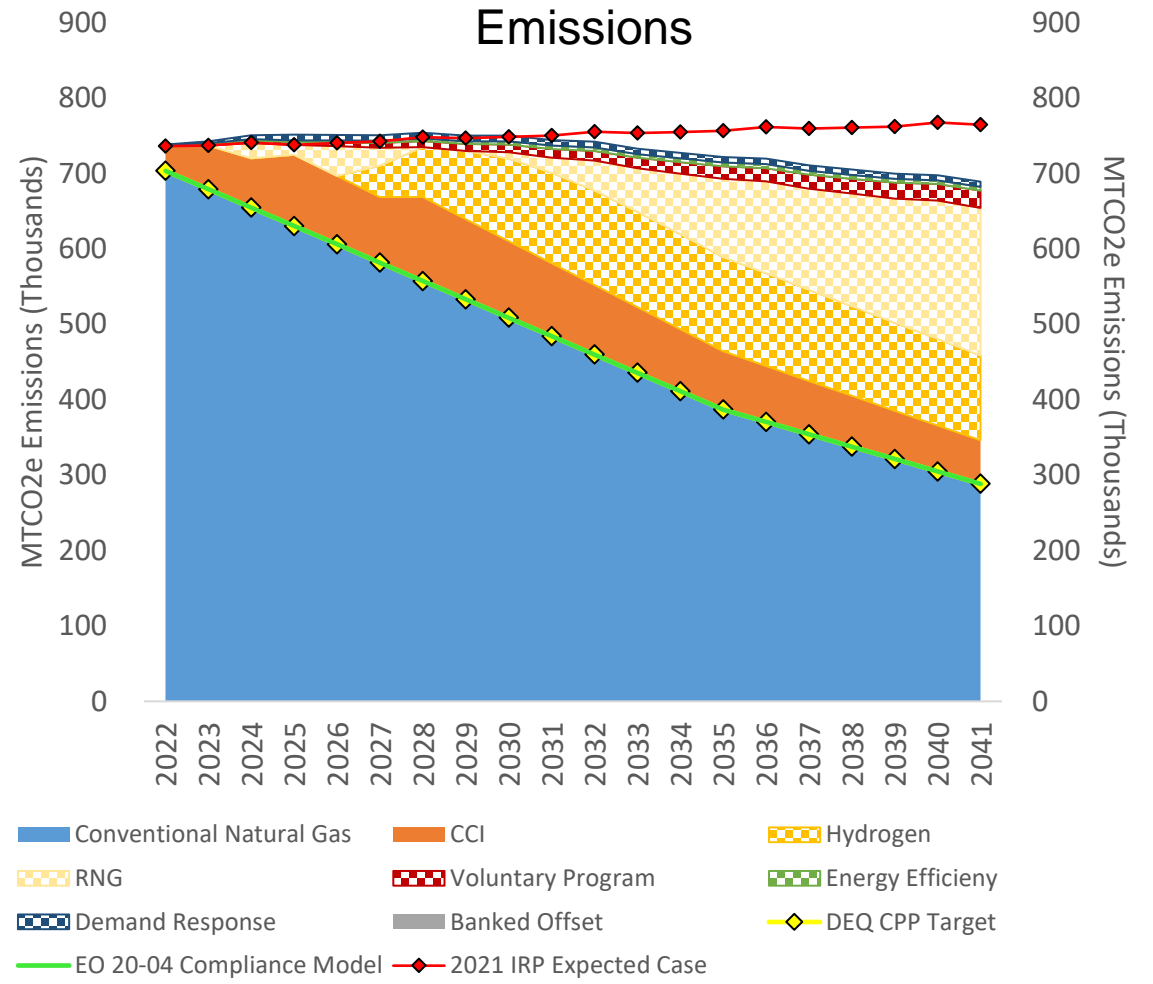
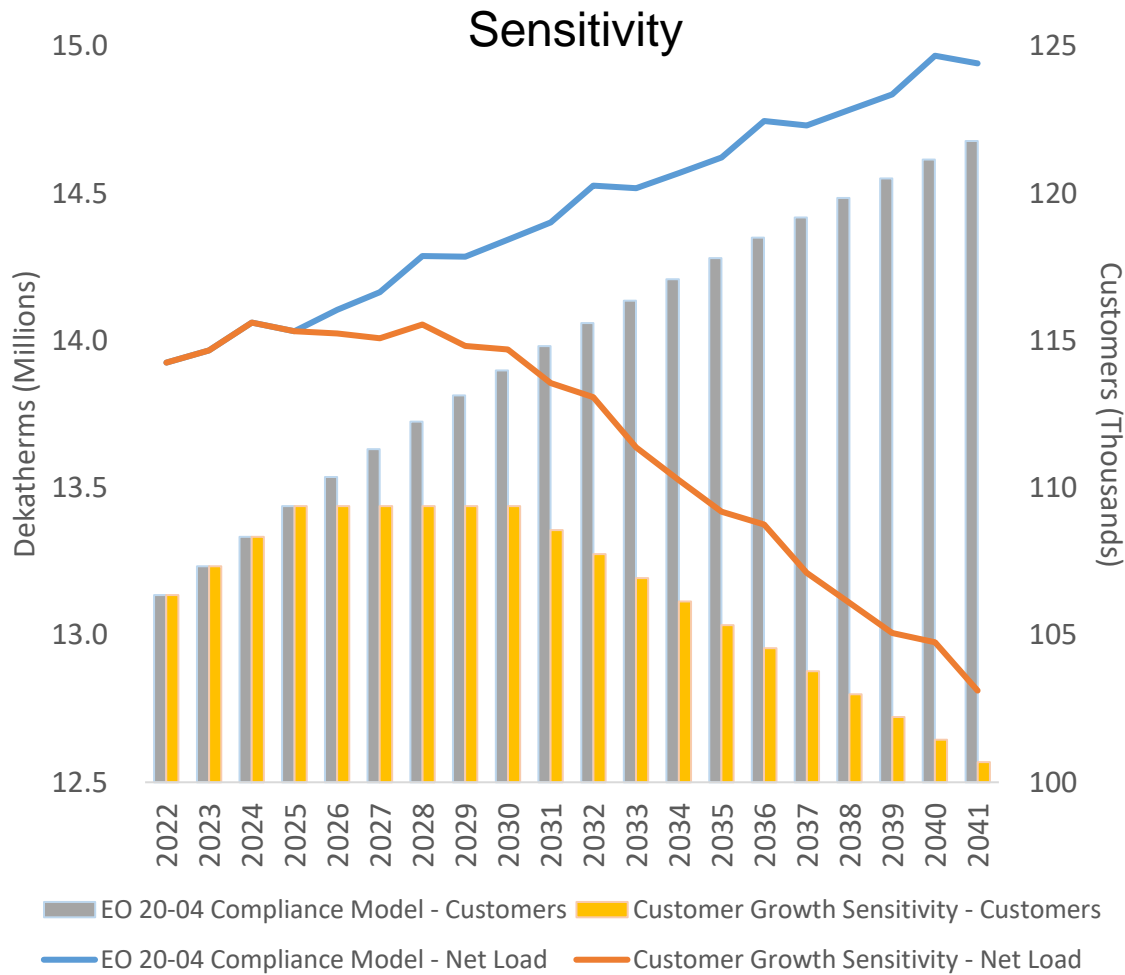
4 - No CCI

Sensitivity toggle: No use of CCIs

*In a Scenario, alternative supplies would be considered to fully meet energy and emissions goals

Customer Growth

(emissions goals/energy demand met)

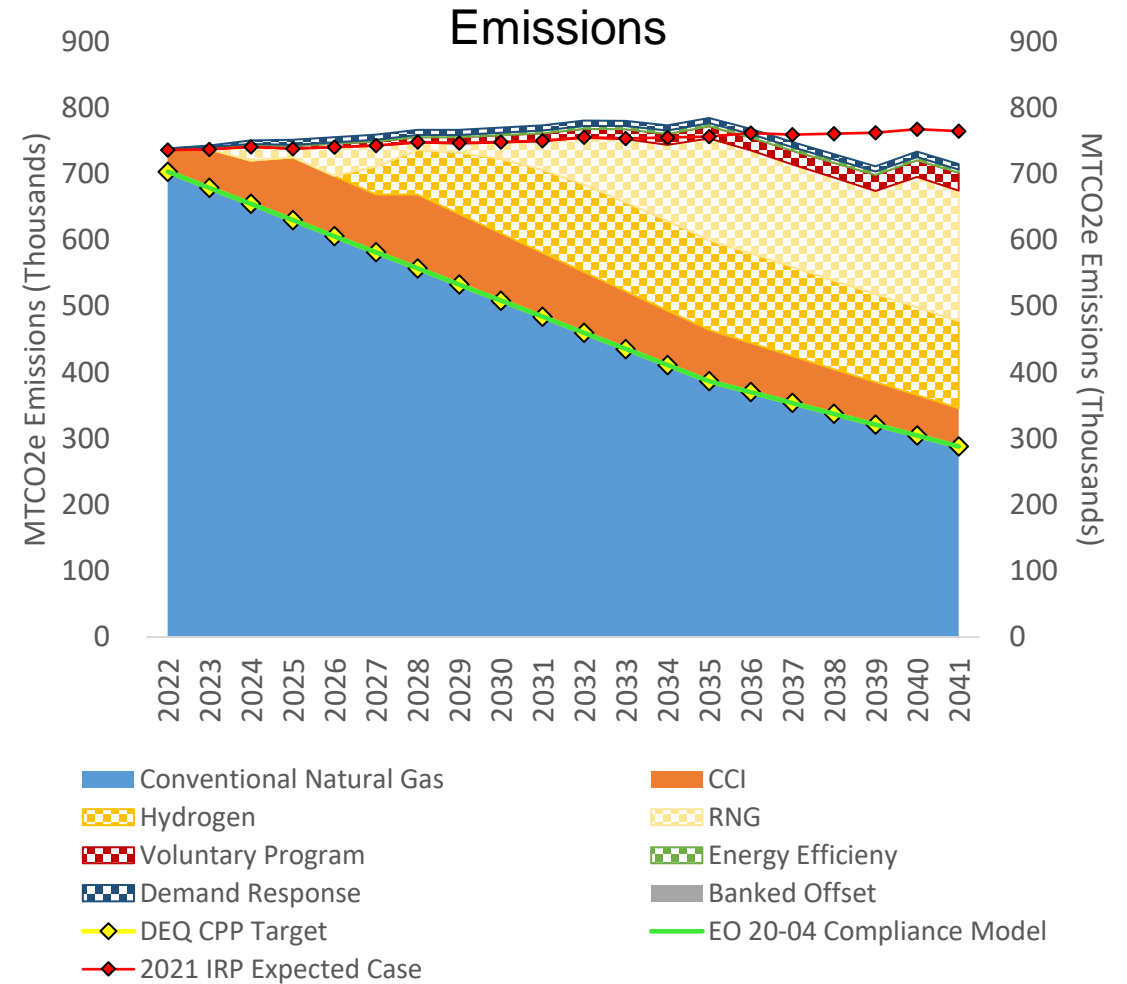
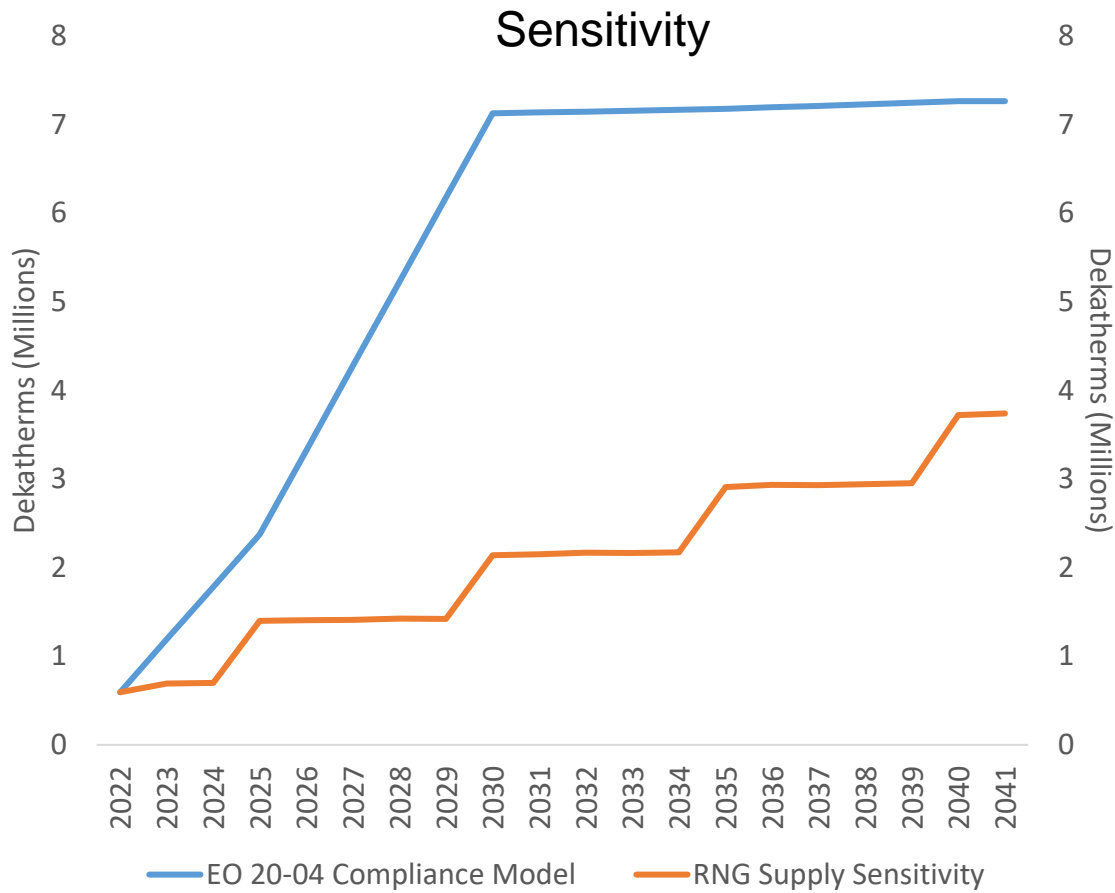


*Energy and emissions for lost customers is not quantified nor are the costs of the new source



RNG Availability*

(emissions goal/energy demand short in 2034)



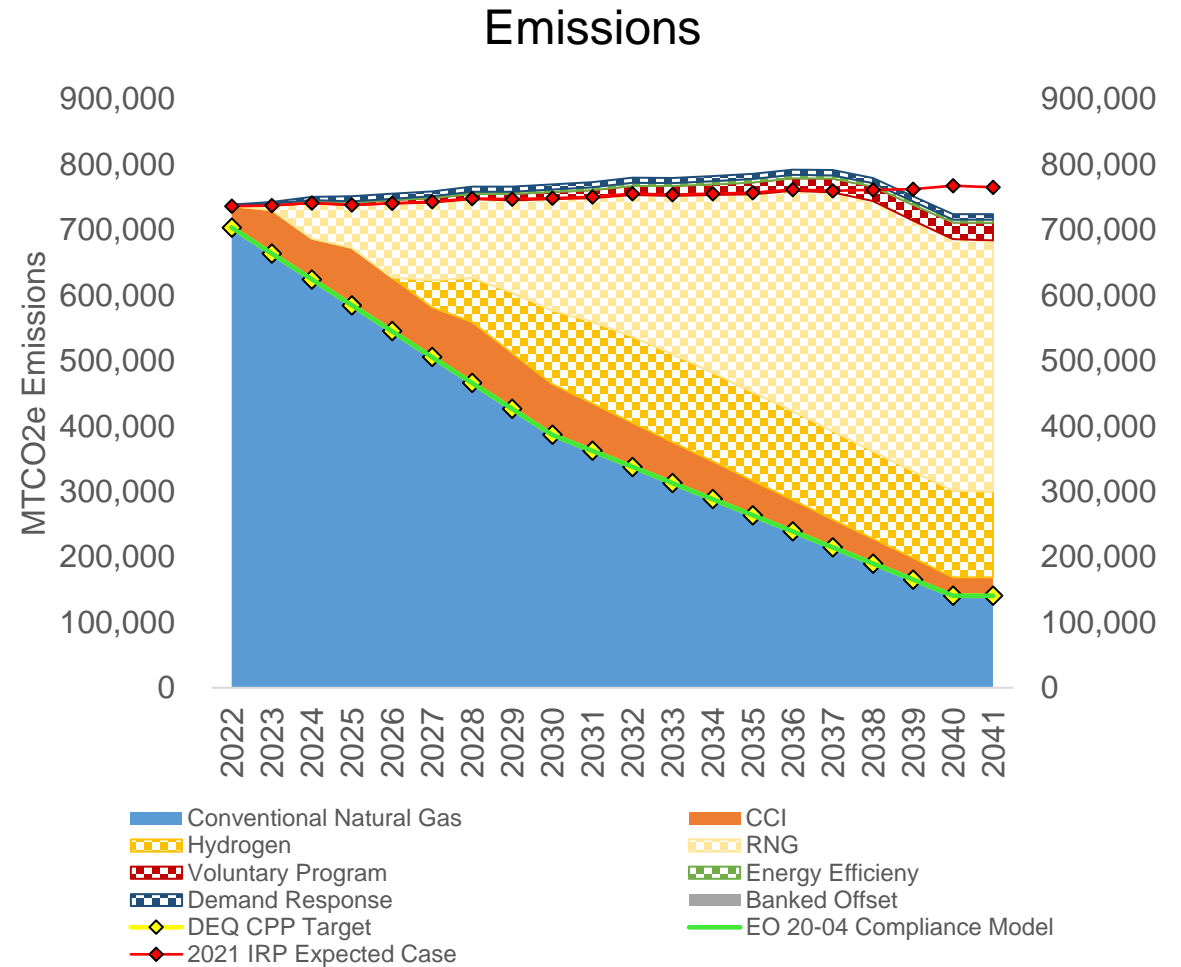
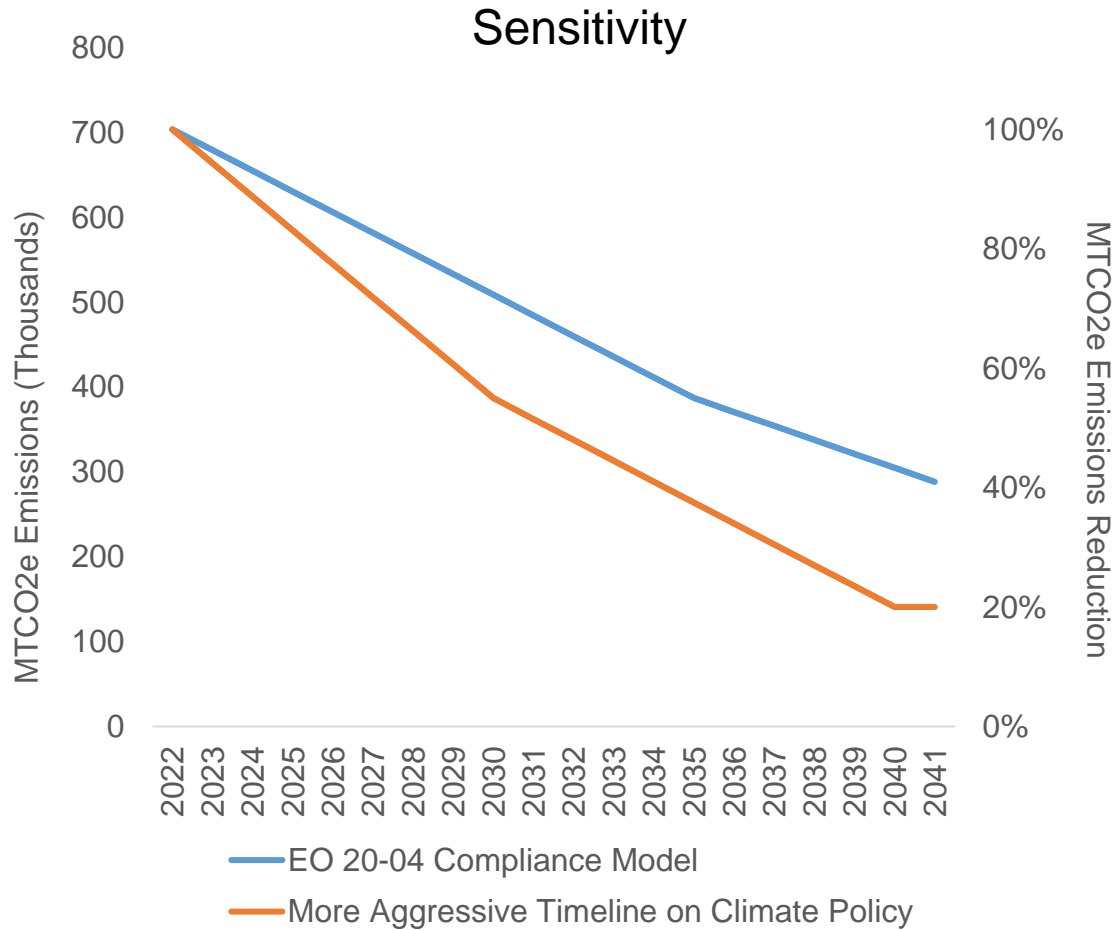
*We assume SB 98 to allow any renewable fuel

**In a Scenario, a resource would be added to determine least cost/least risk while serving demand



More Aggressive Timeline on Climate Policy

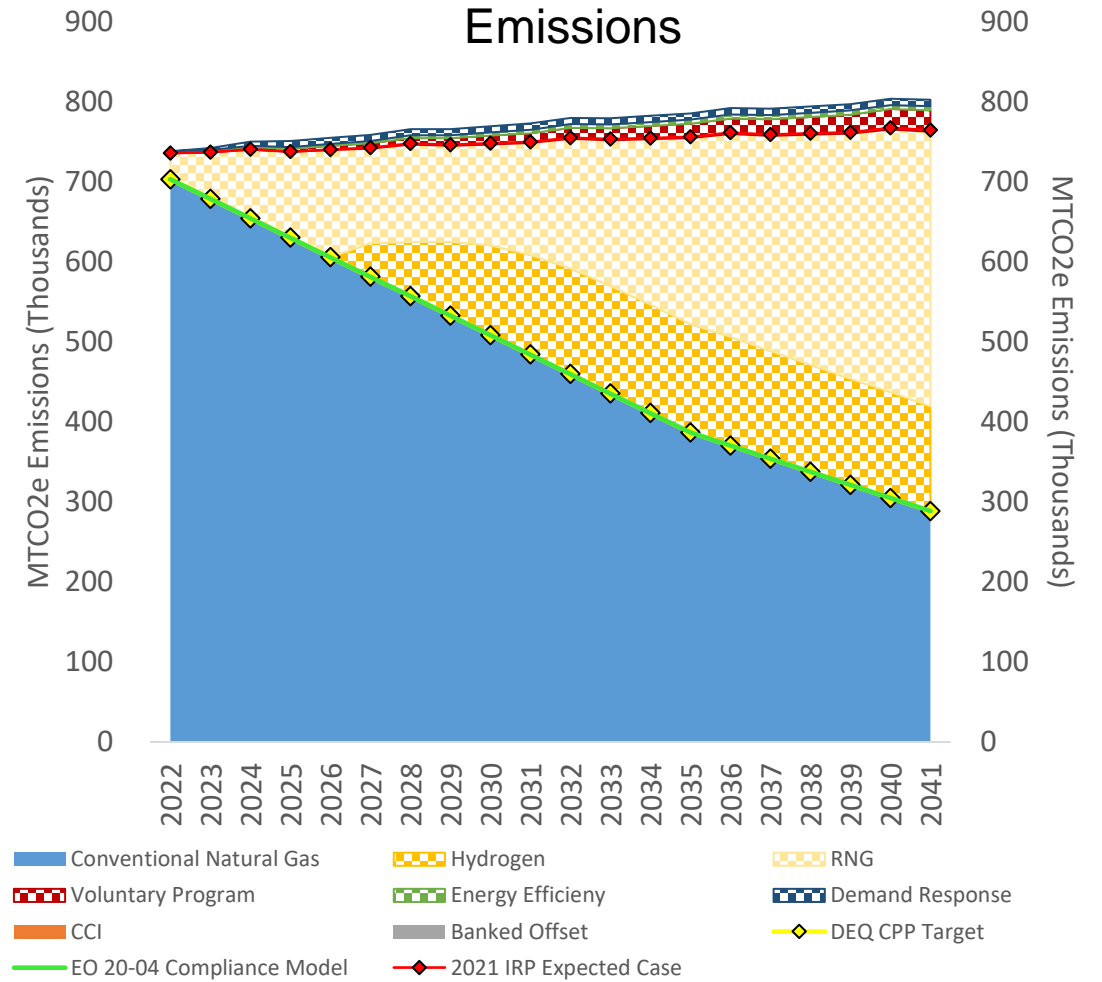
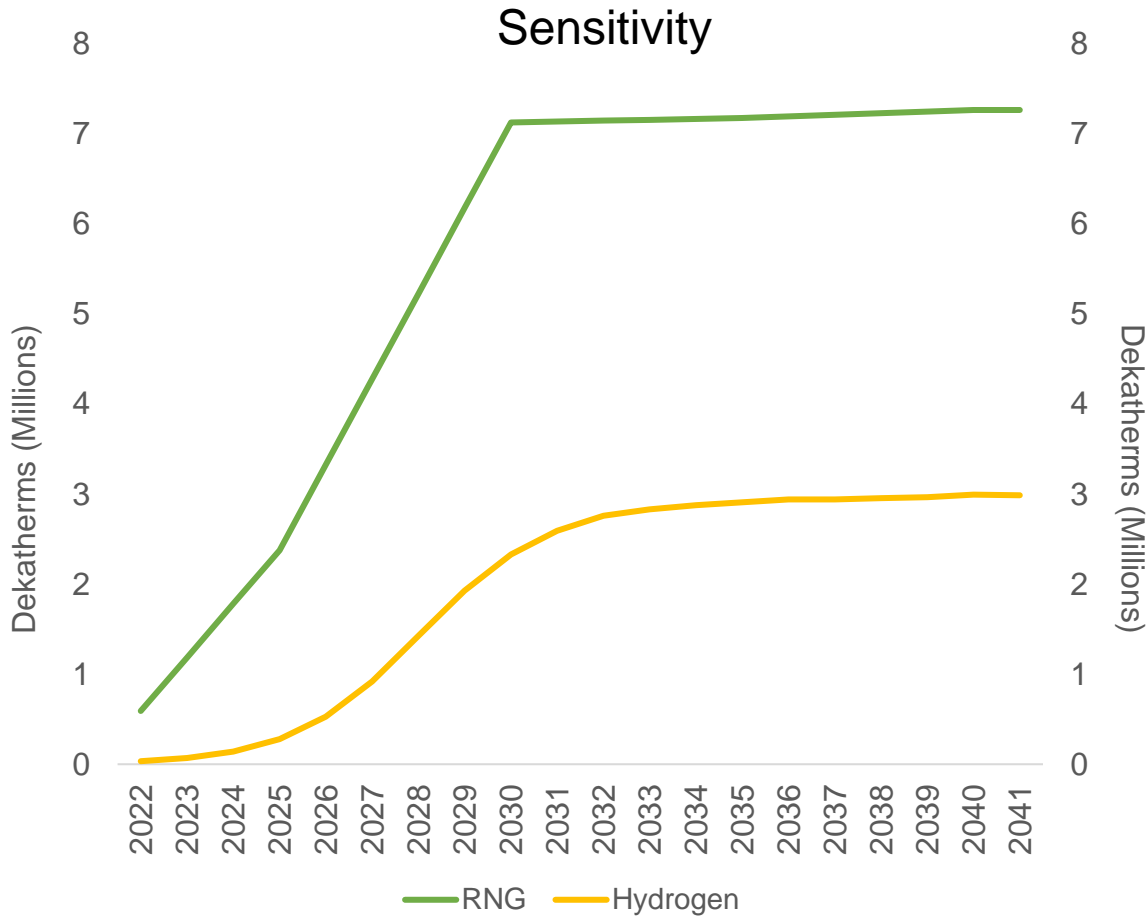
(emissions goals/energy demand short in 2038)



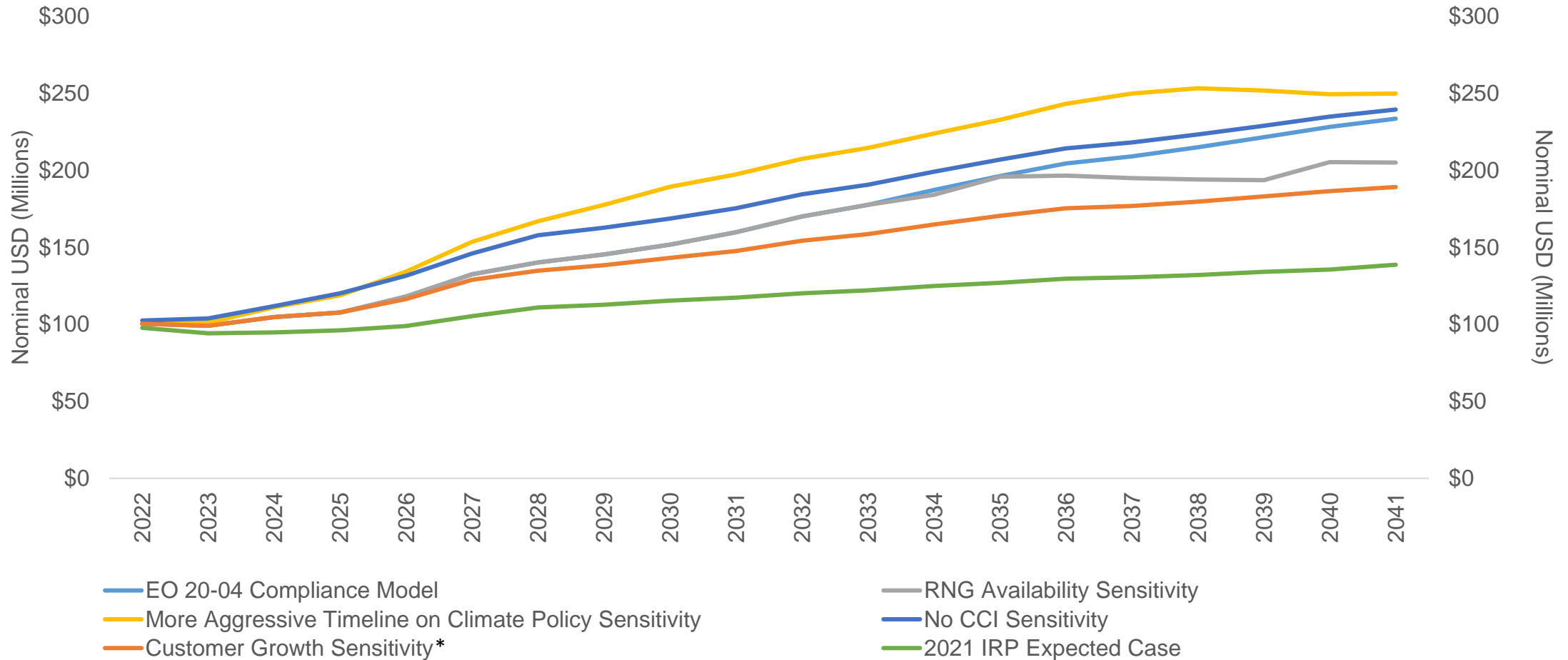
**In a Scenario, a resource would be added to determine least cost/least risk while serving demand

No CCI

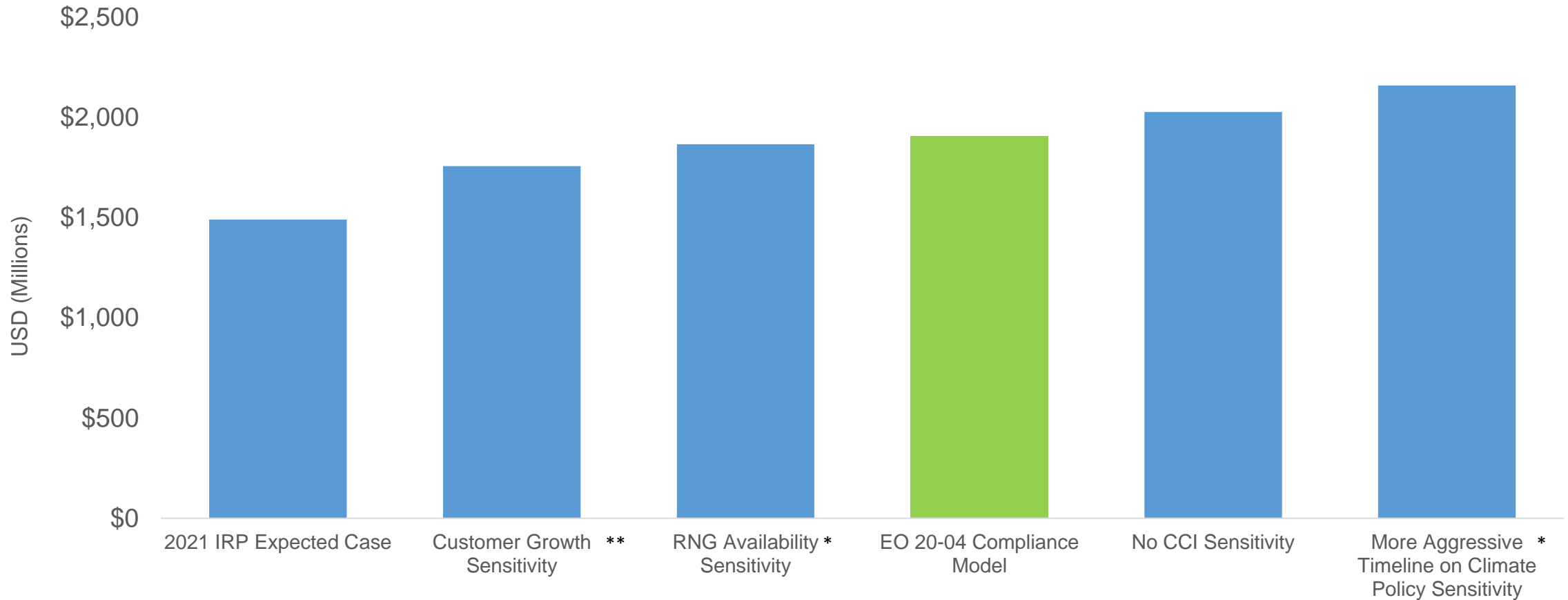
(emissions goals/energy demand met)



Avista Revenue Requirement



NPVRR Comparison



NPVRR (Billions)	\$1.49	\$1.76	\$1.87	\$1.91	\$2.03	\$2.16
------------------	--------	--------	--------	--------	--------	--------

*In a Scenario, a resource would be added to determine least cost/least risk while serving demand

**Alternative energy sources for lost customers and their costs/emissions are not included in the final NPVRR