GVEA Board of Directors
Special Meeting Agenda
June 27, 2022
Location: GVEA's Employee/Board Meeting Room (Operations Bldg.)
758 Illinois Street, Fairbanks, Alaska

*NOTE: Items formatted in **bold and underline** will be taken up exactly at that time, whether or not they interrupt pending business. Other times are approximate.*

MISSION

Recognizing GVEA's importance to the economic, environmental and social viability of our communities, the Cooperative's mission is to safely provide its member-owners with reliable electric service, quality customer service and innovative energy solutions at fair and reasonable prices.

Time	Item	Subject	Page	Info	Action
6 p.m.	1.	Call to Order			X
	2.	Safety Moment (Tom DeLong)		X	
	3.	Approval of the Agenda			X
	4.	Strategic Generation Discussion • Presentation (Mike Hubbard)		X	
	5.	Member Comments		X	
	6.	Strategic Generation Direction/Decision • Adopt a Strategic Generation Plan • Decision on Healy Unit 1- Installation of SCR or Retirement			X X
	7.	Director Comments		X	
	8.	Adjournment			X

At the Crossroads in GVEA Generation

the Financial Engineering Company

June 27, 2022

Where We Are

- Over the past year, GVEA has initiated a series of investigations into its power supply
- These investigations were initially commenced due to decisions that must be made regarding Healy 1 and GVEA's Battery Energy Storage System (BESS)
- As worked progressed, it became apparent that recent advancements in renewable energy technologies could offer both short- and long-term benefits
- Tonight's presentation summarizes these investigations and findings

Methodology - General

- Key to this analysis has been the use of GenTrader, a computer program that simulates the GVEA generation system
  - Hourly basis
  - 2023 – 2044 study period
- Approximately 120 scenarios have been evaluated using various assumptions regarding fuel prices, loads, unit availabilities and additional potential resources
- Economics and emissions of these scenarios have been projected while taking into account risk and opportunities

Resources Investigated

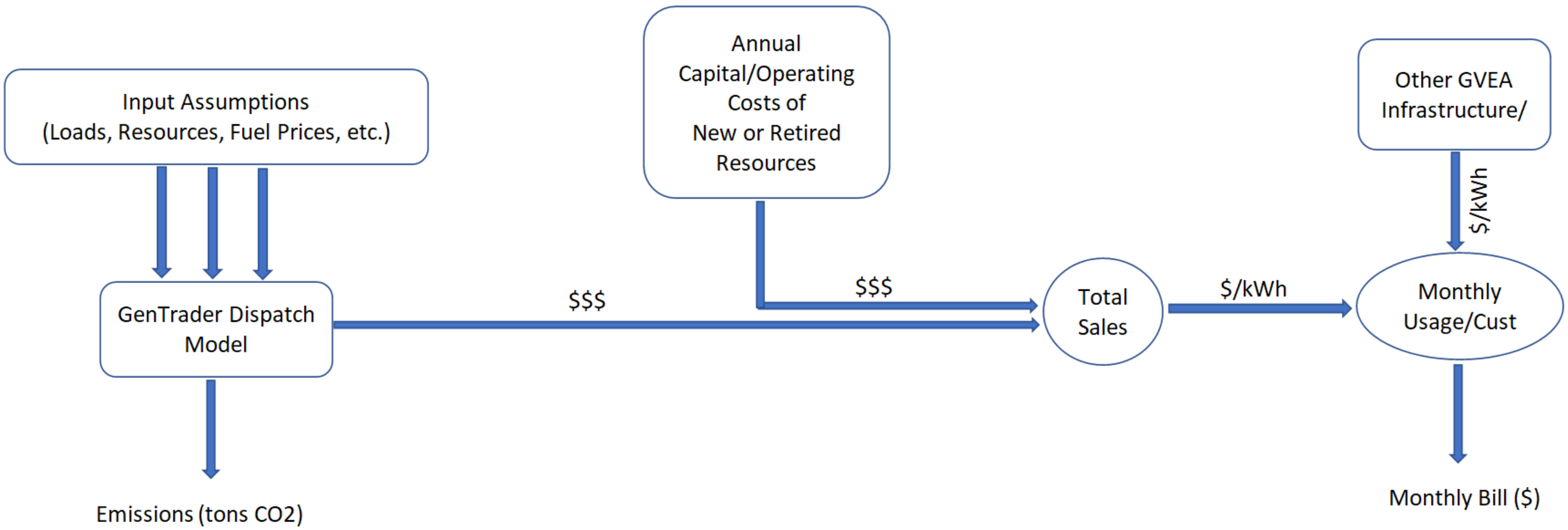
- Adding a new gas turbine to double the capacity of the existing combined cycle resource
- New solar installations of 15 and 30 MW
- New wind installations of 15 – 260 MW
- Six separate BESS configurations
- Upgrade to the Anchorage – Healy Intertie
- Purchase of gas-fired generation from the South
- Retirement of:
  - Healy 1
  - Healy 2

Resources Not Included

- Gas line, nuclear, and hydro units such as Susitna were not included due to the uncertainty and long lead time

Evaluation

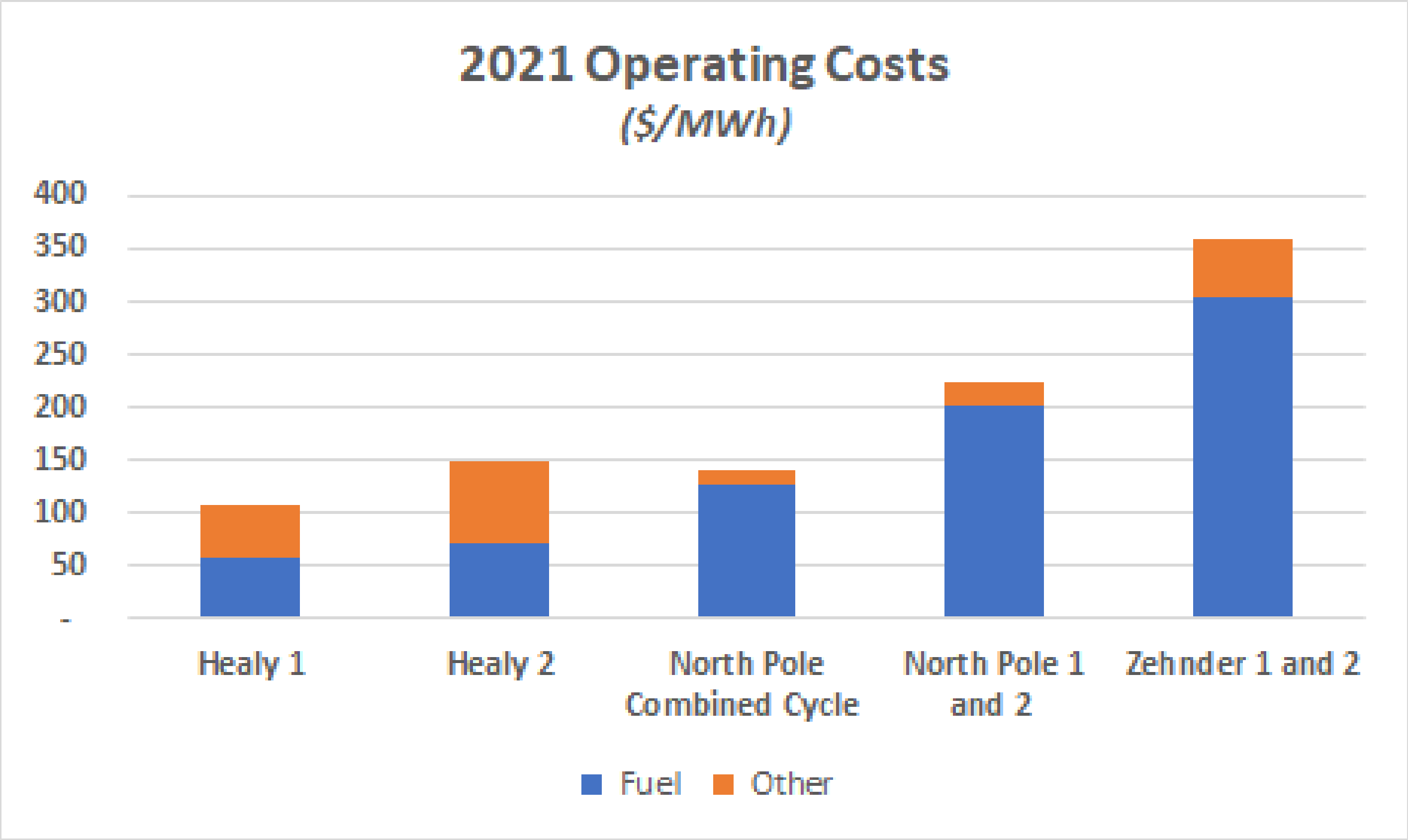
- Economic
  - Monthly bill to the average Residential user was projected and comprised of:
    - Fuel costs
    - Purchased power costs
    - Capital and operating costs of the new resources being evaluated
    - Other GVEA system costs (admin, distribution, transmission, other production, etc.)
- Emissions
  - Total CO_2 emissions over the study period


Input Assumptions
(Loads, Resources, Fuel Prices, etc.)
Annual
Capital/Operating
Costs of
New or Retired
Resources
Other GVEA
Infrastructure/
$/kWh
GenTrader Dispatch
Model
$$$
$$$
Total
Sales
$/kWh
Monthly
Usage/Cust
Emissions (tons CO2)
Monthly Bill ($)

Immediate Decisions

- Air Quality Operating Permit for Healy 1 requires pollution control equipment to be installed by 1/1/2025
  - Should an SCR be installed at a cost of approximately $25 million or should the unit be retired?
- The existing Battery Energy Storage System (BESS) is aging and requires upgrades
  - Should the existing BESS be abandoned, upgraded, or replaced with newer technololgy that can be used for regulation of renewable resources?

A Snapshot of GVEA’s Thermal Resources



Healy Units

Annual Availability Factor

	Healy 1	Healy 2
2021	89%	68%
2020	96%	65%
2019	85%	72%
2018	93%	31%

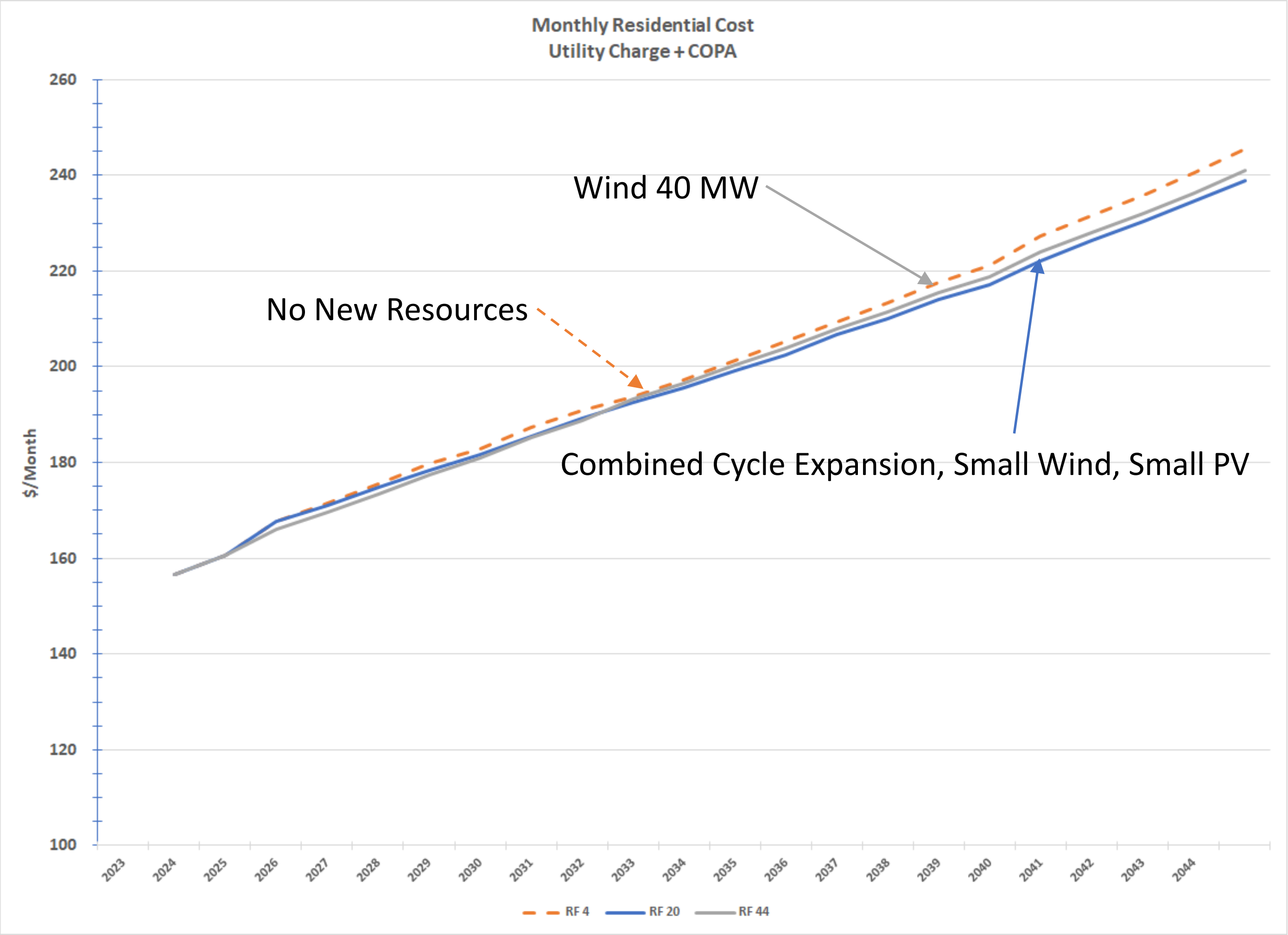
- Healy 1
  - “Workhorse” of GVEA’s fleet
  - Very high reliability and proven track record
- Healy 2
  - Has not lived up to its expected reliability even with capital improvements
  - High operating costs and not expected to decrease
  - Implications must be worked through regarding GVEA equity if retired

Summary of Findings

Existing Generation – No Retirements

- Increasing the capability of the combined cycle can lower costs but only a small amount
  - Susceptible to fuel price volatility
- Any scenario with no Healy retirements results in high emissions

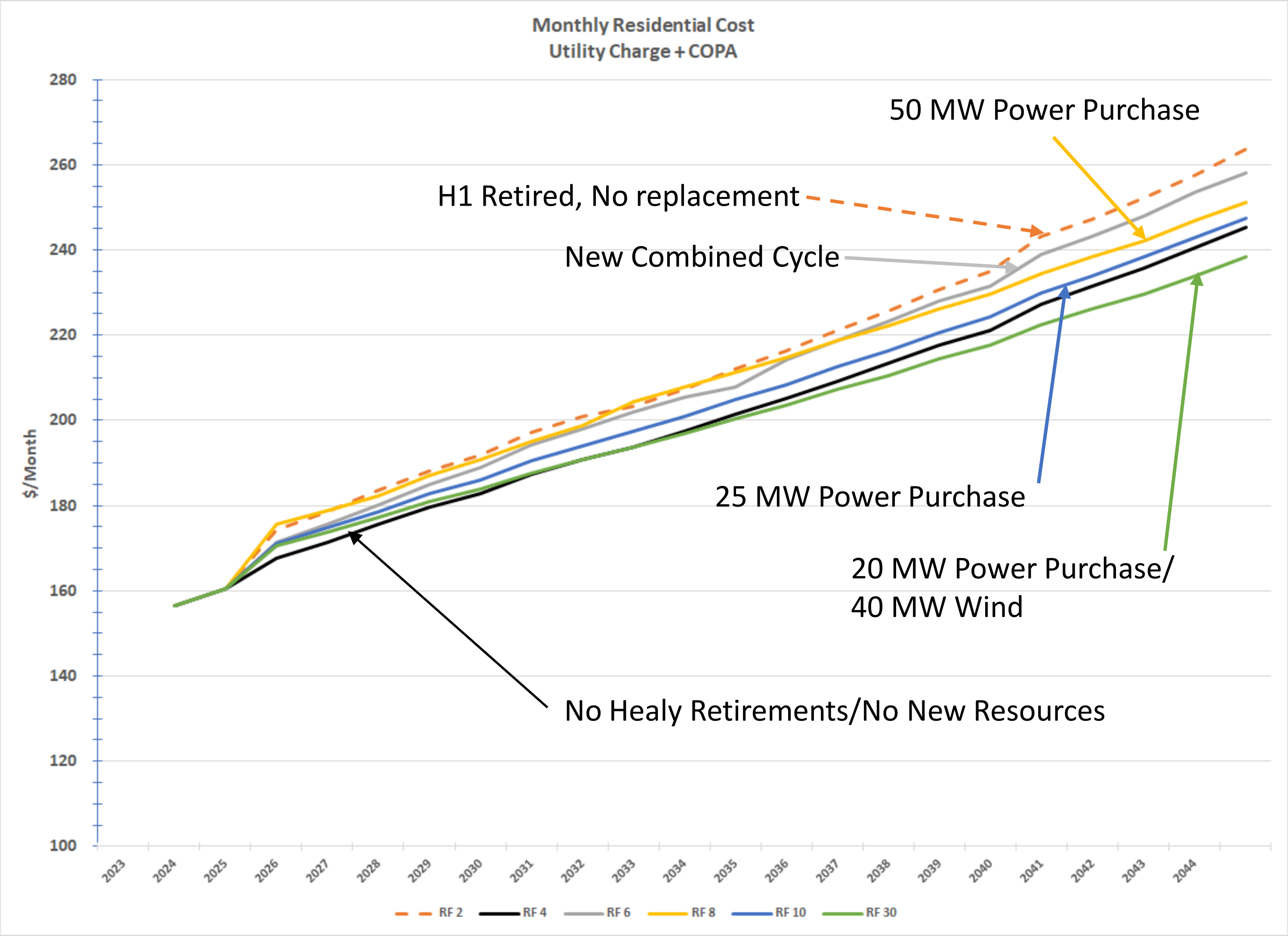
Emissions (10^6 tons)	
RF 4	22.9
RF 20	22.0
RF 44	20.4



Healy 1 Retirement

- Retirement with no replacement power adds significant costs to system
- New combined cycle higher than no retirement
- With just replacement power from south, a smaller purchase amount results in lower cost of power – difficult to fit 50 MW in with loss of only 25 MW (Healy 1)
- Replacement power commensurate with loss of Healy 1 and wind is most economic of scenarios options investigated
- Wind scenario includes the capital and operating costs of a BESS sufficient in capacity (MW) and energy (MWh) to regulate the wind resource

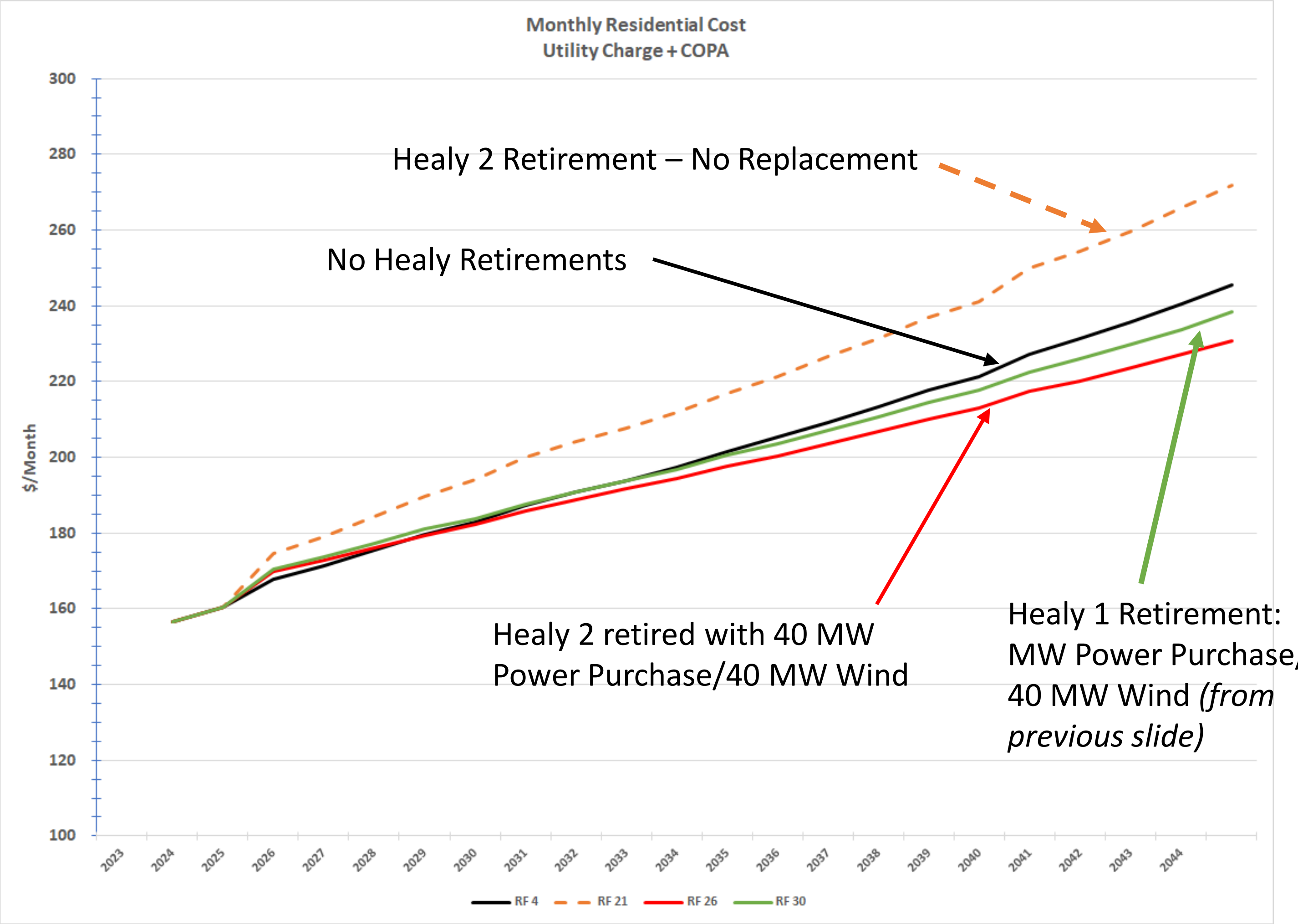
Emissions (10^6 tons)	
RF 2	20.9
RF 4	22.9
RF 6	20.0
RF 8	17.5
RF 10	19.3
RF 30	17.8



- Initial analyses investigated whether to implement the SCR on Healy 1
    - Should Healy 1 be retired?
- But, all options should be on the table
- What about retirement of other GVEA resources?
    - North Pole 1 and 2 and Zehnder units expensive to operate but are there only to fill in the peaks
    - North Pole Combined Cycle is very efficient, can fluctuate with load, and can provide regulation for Eva Creek
- Would retiring Healy 2 provide benefits to GVEA?

What if Healy 2 was retired instead of Healy 1?

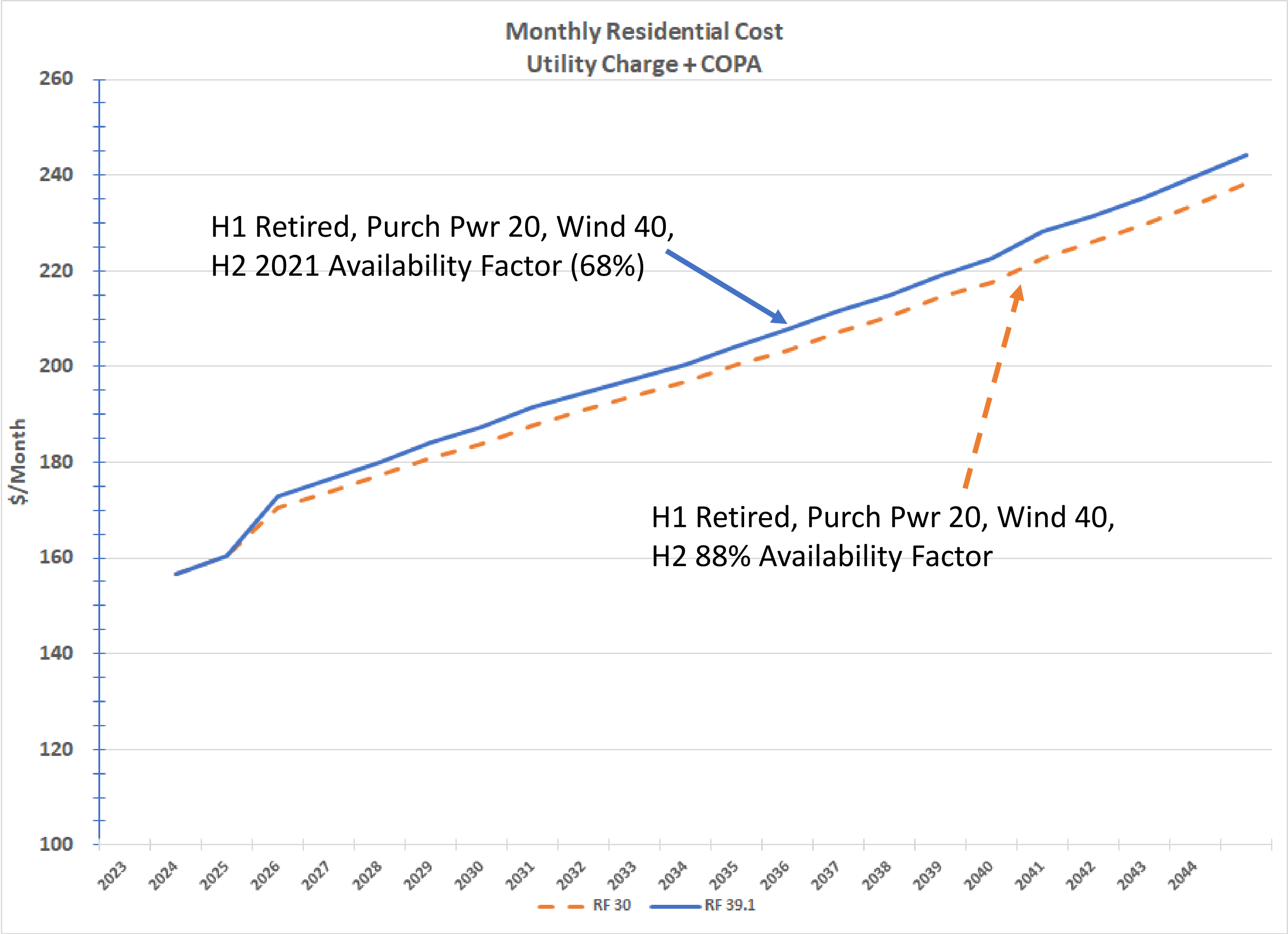
- With no replacement power, retirement of Healy 2 results in very high cost of power
- Retirement of Healy 2 instead of Healy 1 results in lower costs



Emissions (10^6 tons)	
RF 4	22.9
RF 21	18.3
RF 26	15.1
RF 30	17.8

Healy 2 Availability

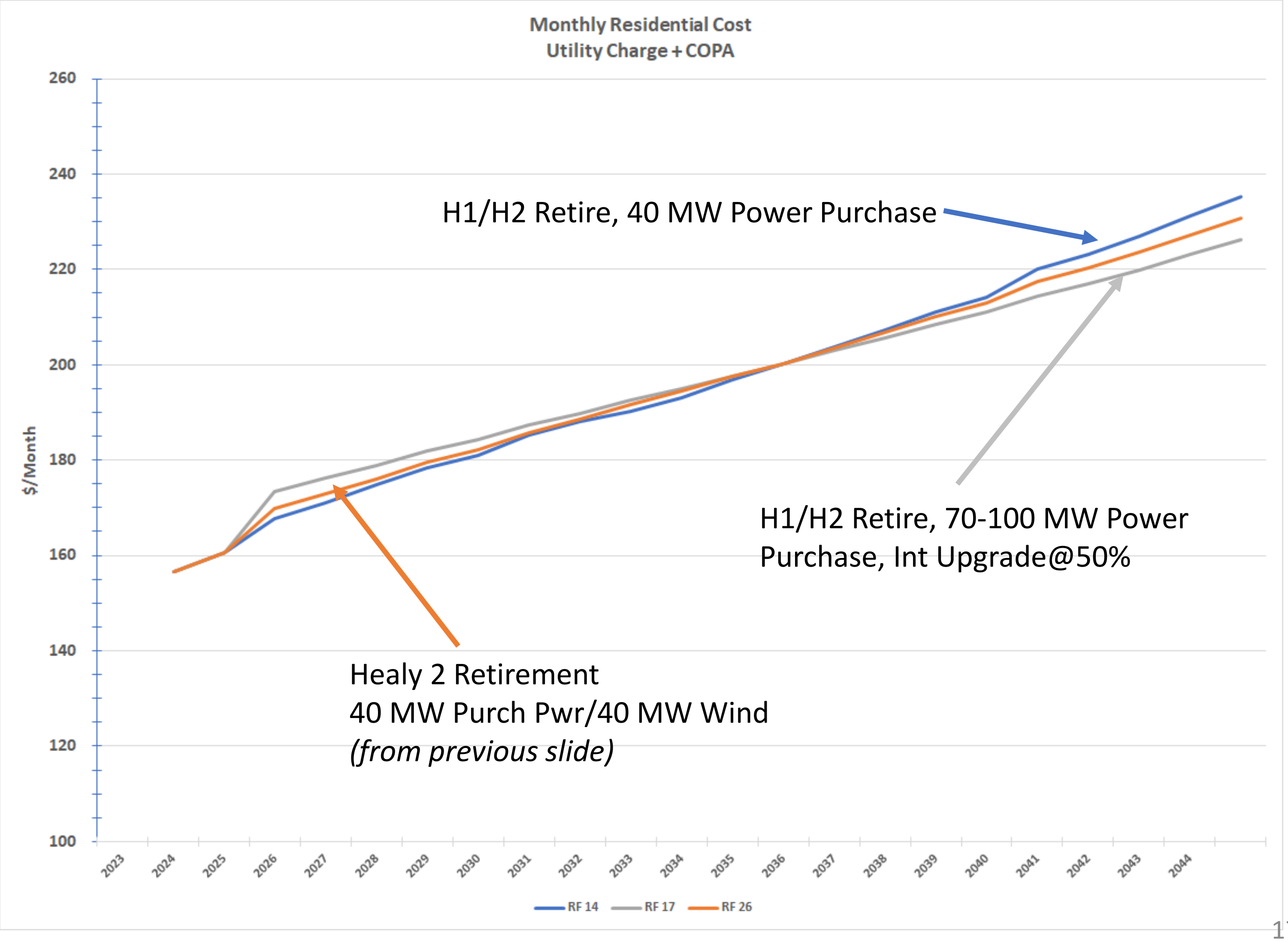
- Maintaining Healy 2 in operating fleet and retiring Healy 1 is based on capital expenditures to Healy 2 improving Availability Factor to approximately 88%
- Even with this high availability factor, retirement of Healy 2 is favored
- If expenditures do not work and Healy 2 has a lower availability factor, retirement of Healy 2 instead of Healy 1 is favored even more



Can both Healy units be retired?

- Retiring both units leads to much higher costs without firm replacement power
- Can lower costs from retiring Healy 2 only, but only small amount
  - Requires intertie upgrade for replacement power
  - Can upgrade be accomplished in 2 ½ years?
- Wind might further lower costs but needs to fit in with power purchase
- Retirement of both Healy units further reduces fuel diversity

Emissions (10^6 tons)	
RF 14	12.8
RF 17	12.7
RF 26	15.1



Summary

- Analysis performed over the past several months indicates that the retirement of a Healy unit can lead to lower costs if sufficient replacement power is available
- Of the two Healy units, it is more economic to retire Healy 2
- Retirement of both Healy units right away provides only a small long-term gain over retiring Healy 2 while imposing certain risk factors
  - Sufficient replacement power from the southern utilities requires the upgrade of the Anchorage – Healy intertie
  - Can this upgrade be accomplished before the Healy units are retired (2 ½ years)?
  - Increases reliance on oil-fired generation during times of intertie outages

Summary *(continued)*

- Adding wind resources to the system can provide both economic and environmental benefits if:
  - Prices are within the range assumed
  - A BESS of sufficient size (capacity and energy) is added to the system for regulation
  - Minimum focusing on a 46 MW / 184 MWh system
  - Should be capable of expansion
- All scenarios run with wind included the capital and operating costs of a BESS

Going Forward

- Continue operation of Healy 1 (implement SCR on Healy 1)
- Initiate steps to retire Healy 2
  - Work with RCA regarding retirement of Healy 2
- Secure firm power replacement / gas commensurate in size with lost power
- Wind
  - Secure wind resource of approximately 40 MW
  - Investigate possibilities to implement interruptible loads (heat/thermal storage, etc.) that could increase the amount of wind that could be accommodated into they system
  - Investigate wind forecasting models
- Install a BESS commensurate in size (MW and MWh) with wind and need to regulate
  - Interruptible loads would reduce need for Regulation Down