# False Promises and Major Risks

## Enchant Energy's Proposal to Retrofit San Juan Generating Station with Carbon Capture

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Institute for Energy Economics and Financial Analysis
IEEFA.org

# Enchant Energy's Proposal is Based on a Set of False Promises

- Enchant and its allies repeatedly claim that retrofitting San Juan will be a win for ratepayers, a win for the community and a win for the environment.
- This is not true. Enchant's promises are based on a number incorrect facts, misleading statements, and the dismissal or failure to acknowledge the major risks that the project entails.
- Among Enchant's most critical assumptions are that:
  - San Juan will capture 6 million metric tons of $CO_2$ each year
  - Doing so will require that the plant will operate at an 85% capacity factor and that the new $CO_2$ capture facility will capture 90% of the $CO_2$ the plant produces for at least 85% of the hours each year over a 12-year period.

    A plant's capacity factor compares how much power it generates in a month or a year with how much power it would have generated if it had run at full power for the entire period. The higher the capacity factor the better.


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- It will cost only $1.3 billion to retrofit San Juan for $CO_2$ capture and that the retrofitted San Juan will be online in the 4th Quarter of 2023.
- There will be a market in the Permian Basin for selling the $CO_2$ from San Juan for use in Enhanced Oil Recovery (EOR), at a price that would produce a positive revenue stream for the plant's owners and investors.
- San Juan will be a low-cost generator and, therefore, that the power produced at the plant could be sold at a competitive price.
- Using the $CO_2$ captured at San Juan will reduce the overall $CO_2$ emissions into the atmosphere by 6 million metric tons per year.


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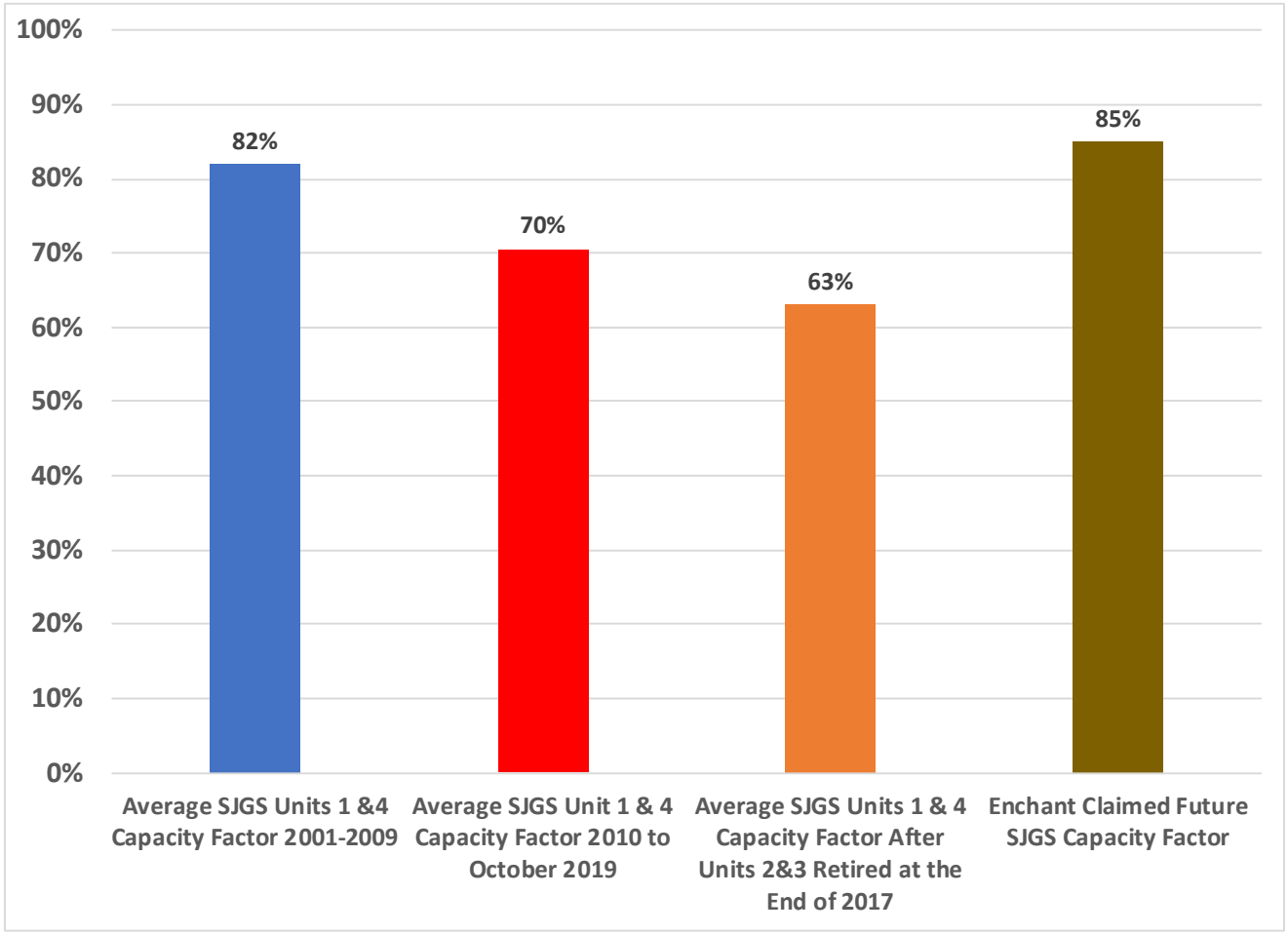
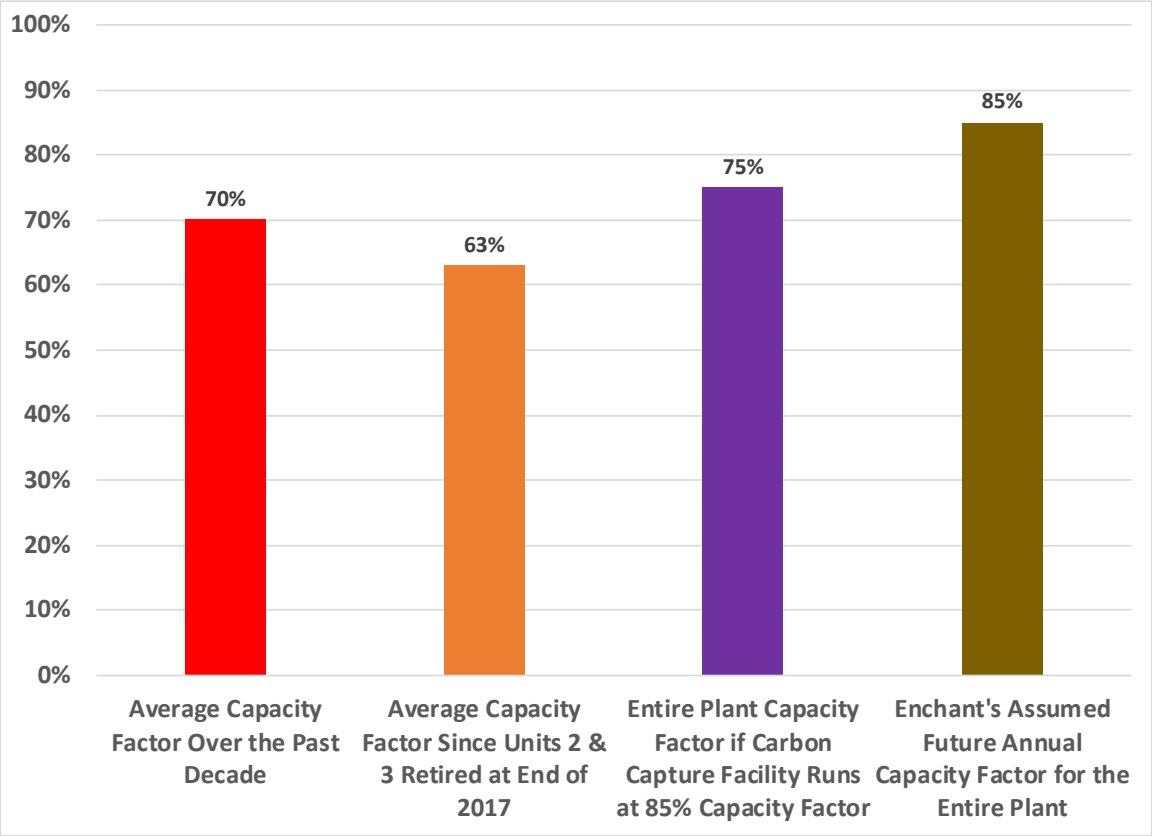
# The Operating Performance of San Juan Units 1 and 4 Has Declined Significantly Over Past Decade




But, other than claim, without any evidence that the new CO2 capture facility will run at an average 85% capacity factor, Enchant hasn't shown how it will turn around San Juan's declining performance or how much It will cost to do so.

# Even if the New $CO_2$ Capture Facility Ran at an 85% Capacity Factor, the Total Plant Capacity Factor Would be Only 75%

**The entire San Juan plant is 914 MW. The new carbon capture facility will require 246 MW of this to operate. So, even if the $CO_2$ facility ran at 85%, but not the rest of the plant, San Juan's annual capacity factors would still be far below Enchant's assumed 85%.**



# Enchant's Assumed 85% Capacity Factor Flies in Face of Industry-Wide Experience

1. In 2018, only 13 of the 390 operating coal-fired units in US ran at an 85% capacity factor or higher – barely 3% of the entire fleet – while 57 units, or four times as many, failed to achieve even a 30% capacity factor in the same year.
2. Only four of the 390 coal-fired units operating in 2018 – just 1% of the total—posted an average capacity factor of 85% or higher during the four-year period from 2015-2018. Only 10 units had average capacity factors of 80% or higher. At the same time, 36 units had average capacity factors of 30% or lower during the same 4-year period.
3. W.A. Parish Unit 8 in Texas, which hosts the Petra Nova $CO_2$ capture facility, only had a 72% capacity factor between January 2017, when Petra Nova went into service, and November 2019.

# Electricity Market Forces and Other Factors Are Likely to Drive Down San Juan's Future Capacity Factors

- Projected availability of low-cost natural gas
- Growing competition from declining cost renewable resources and energy storage
- Increased integration of the Western power grid
- The impact of plant aging
- The impact of reduced spending on maintenance by the current owners
- San Juan will be a much more complicated plant to operate with carbon capture

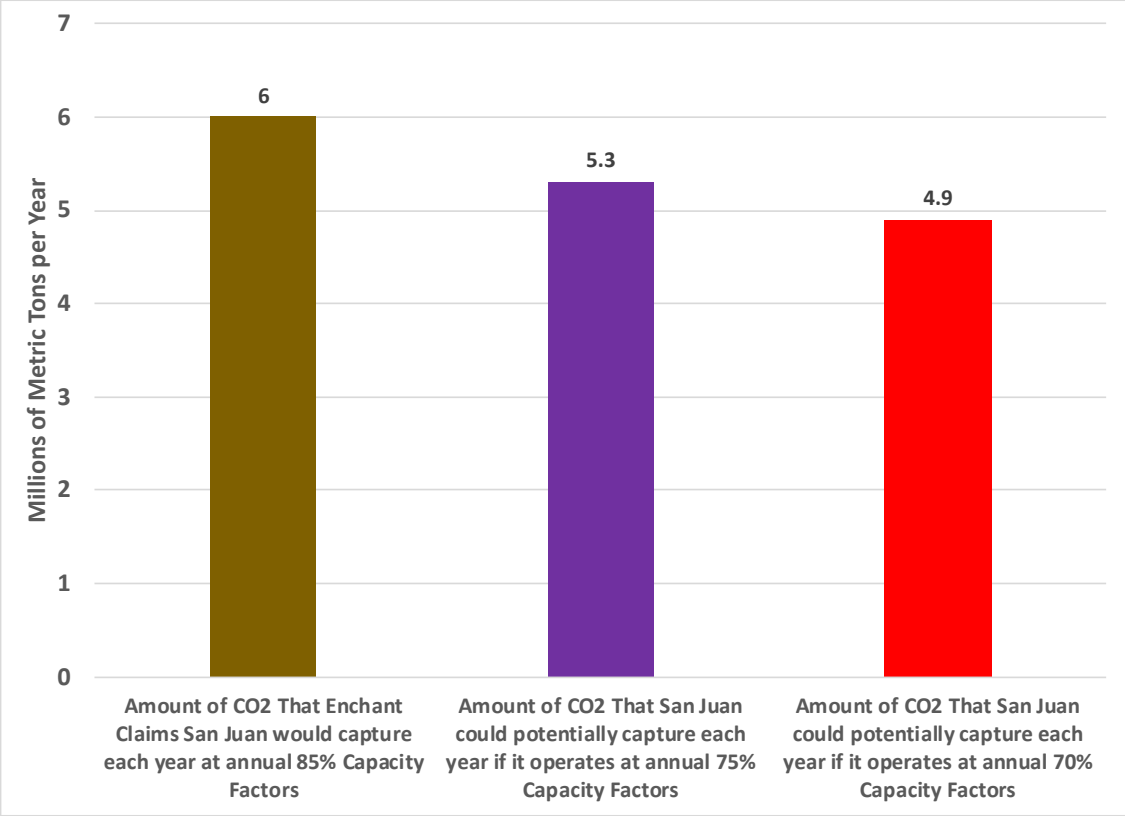
# 90% $CO_2$ Capture Has Not Been Proven Over a Number of Years

- Enchant assumes that San Juan would capture 90% of the $CO_2$ it produces and that the capture facility would operate at an 85% capacity factor for a period of 12 years.
- This is extremely optimistic given the lack of supporting operational experience at Petra Nova and Boundary Dam 3, the only two operating coal plants in the world with $CO_2$ capture.
- Petra Nova's owners have not provided any evidence to support the claim that it is capturing 90% or more of the $CO_2$ it processes from W. A. Parish Unit 8 coal plant near Houston.
  - However, even without any supporting evidence, proponents of CCS continue to claim that Petra Nova is achieving a 90% capture rate.
- IEEFA has analyzed the hourly $CO_2$ emissions data that NRG, the owner of Parish Unit 8 and half owner of Petra Nova, is required to file with the EPA. This analysis shows that Petra Nova is capturing 80%-82% of the $CO_2$ it processes, not 90%.

# 90% $CO_2$ Capture Has Not Been Proven Over a Number of Years

- Petra Nova only operated for an average of 73% of the hours in its first 2¾ years of operation (January 2017-September 2019). This is significantly lower than the 85% (or more) of the hours in each year that Enchant assumes that San Juan's carbon capture facility will operate.

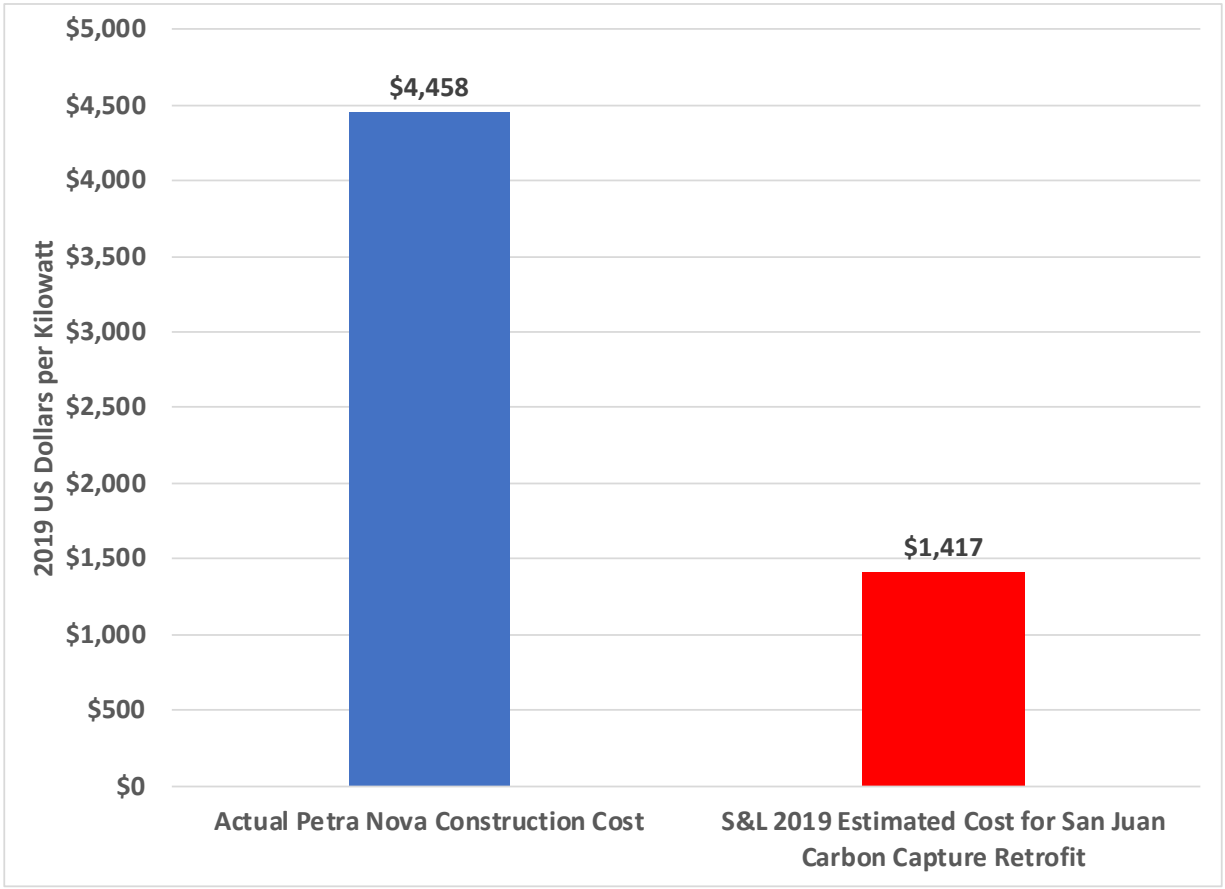
# San Juan Would Not Capture 6 Million Metric Tons of $CO_2$/Year Even at a 90% Capture Rate




Capturing less than 6 million metric tons of $CO_2$ each year would mean that the project would be eligible for far fewer federal 45Q tax credits and that additional funds would have to be borrowed to pay for the retrofit. It also would mean San Juan would generate less revenue from the sale of $CO_2$ for EOR.

# Retrofitting San Juan for $CO_2$ Capture Will be Much More Expensive than Enchant Claims

Enchant claims that San Juan could be retrofitted for a cost 68% lower (on a per-kW basis) than it cost to design and build the Petra Nova $CO_2$ capture facility



# Retrofitting San Juan for $CO_2$ Capture Will be Much More Expensive than Enchant Claims

- This is contrary to industry experience where the costs of adding new technologies are expected to go down *over time* as an increasing number of projects are completed. However, San Juan would be the very next (and just the second) coal plant retrofitted with $CO_2$ capture in the US.
- For example, the cost of installing new utility-scale solar capacity dropped by nearly 70% between 2010 and 2018 as a result of lessons learned in the building and installation of 25 GW of new solar capacity.
- In addition, the San Juan project will be more than 3 times larger than Petra Nova (914 MW vs. 240 MW)
- It is possible that the cost of retrofitting Petra Nova with $CO_2$ capture will achieve some cost savings from (1) lessons learned at Petra Nova, (2) reuse of facilities at San Juan and (3) economies of scale. However, also possible that problems will be experienced in scaling up the technology

# Retrofitting San Juan for $CO_2$ Capture Will be Much More Expensive than Enchant Claims

- Other generic estimates of the cost of retrofitting coal plants with $CO_2$ capture suggest that retrofitting San Juan could be much more expensive than the $1.3 billion cost Enchant claims, perhaps as high as $3 billion or more.
- Enchant claims it will soon have a fixed-price contract in place for retrofitting San Juan. Although a Memorandum of Understanding (MOU) has been disclosed, all this means is that the parties have agreed to talk about a contract.
- There is no evidence of any fixed-priced agreed upon for the retrofit or what categories of costs would be included in the fixed price, what costs would fall outside of the contract, or any of the purported agreement's other terms.
- Moreover, having a fixed-price contract does not guarantee that the $CO_2$ capture facility would be built at the contracted-for price or that the owners would not bear any of the risks of cost overruns.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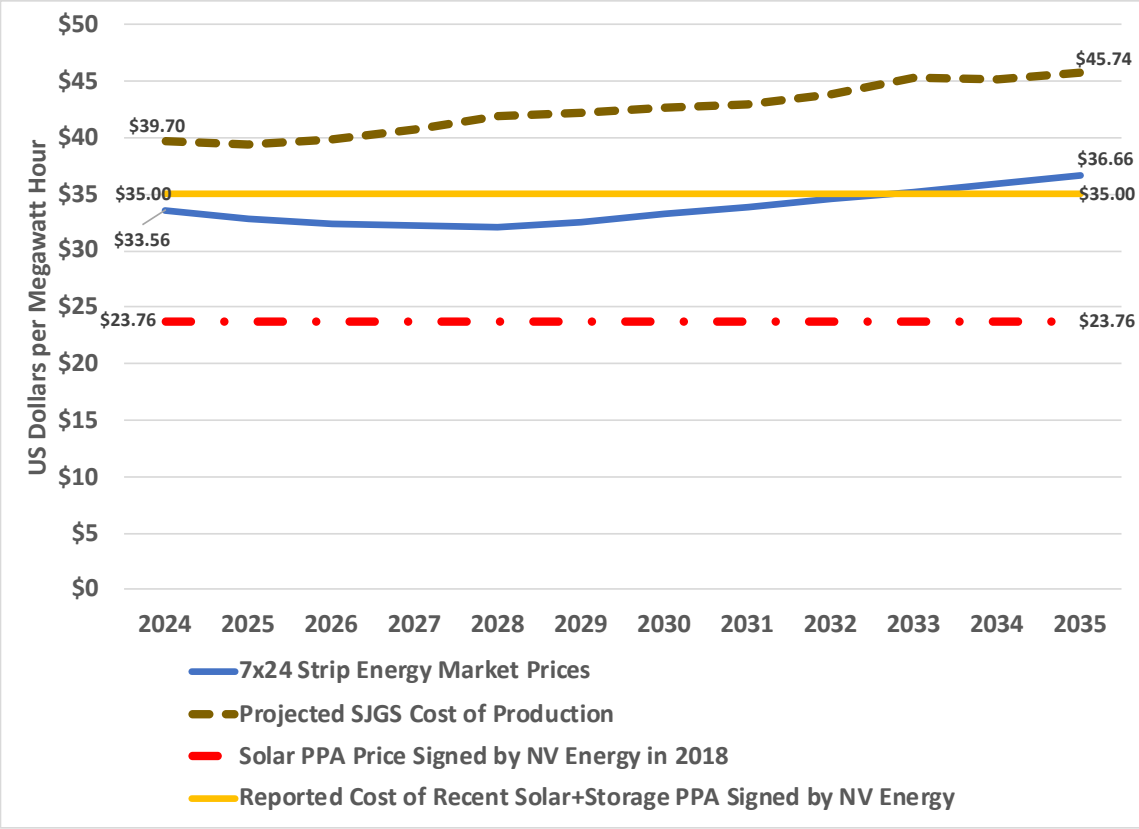
# Capturing $CO_2$ at San Juan Will Be Much More Expensive than Enchant Claims

- Enchant has claimed that the cost of capturing $CO_2$ would be between $39.15 and $43.49 per metric ton.
- The lower end, $39.15 per metric ton is completely unrealistic because it assumes that the $CO_2$ capture facility, indeed the whole plant, would run at full power for every hour in the year.
- Also, the high end of the range, $43.49 per metric ton, is based on the same 3 unrealistic assumptions discussed earlier: (1) 85% capacity factor, (2) 90% $CO_2$ capture rate and (3) a retrofit cost 68% lower than Petra Nova (on a per kW basis).
- Revising the analysis to reflect a more reasonable 75% capacity factor raises the price of capturing $CO_2$ to $51.78 per metric ton, even with 90% $CO_2$ capture.
- The per ton cost would be even higher if lower $CO_2$ capture rates and/or higher retrofit costs were considered.

# San Juan's Owners and Investors Would Be Exposed to Significant Electricity Market Risk




San Juan is not the low-cost generator Enchant claims. IEEFA estimates that plant owners and investors could lose between $300 and $450 million from selling power from San Juan at market prices, including $137 million in fixed costs that would have to be paid in 2022 and 2023 even if San Juan was not generating any power.

# San Juan's Owners and Investors Would Be Exposed to Significant Electricity Market Risk

- The high cost of generating power at San Juan would place the plant's owners and investors in a Catch 22 situation.
- On the one hand, owners would feel pressure to run the plant as much as they could to produce as much capturable $CO_2$ as possible, and thereby secure the largest number of 45Q federal tax credits for their investors.
- On other hand, operating San Juan in this way likely would mean having to sell power from the plant at very low prices – perhaps at below market or renewable PPA prices – or even having to dump some of the electricity altogether.
- This would mean that the owners would not be able to recover all of the more than $1 billion in San Juan's projected fixed O&M.
- Contrary to what Enchant and its allies suggest, selling power from San Juan through a very low cost PPA with a utility would not make the project financially viable.

# San Juan's Owners and Investors Would Be Exposed to Significant $CO_2$/EOR Market Risks

- Enchant's proposal assumes it will be able to sell all the $CO_2$ from San Juan in the EOR market in the Permian Basin. This assumption is filled with uncertainty that increases the risk to investors.
- These EOR risks include that:
  1. The potential demand for $CO_2$ for use in EOR projected by Enchant may not materialize.
  2. The economics of the $CO_2$ market are worse than Enchant assumes.
  3. There won't be enough available pipeline capacity to bring all the $CO_2$ from San Juan to producers in the Permian Basin.
  4. The new owners of San Juan won't be able to fill their contracted $CO_2$ supply requirements because (a) the plant is not operating as much as Enchant claims it will and, therefore, is not producing as much $CO_2$ and/or (b) the $CO_2$ capture facility does not operate as well as Enchant claims it will.

# San Juan's Owners and Investors Also Would Be Exposed to Significant $CO_2$/EOR Market Risks

- Even if Enchant were to announce it has a customer for the $CO_2$ from San Juan, that would not guarantee that it would have a customer for the entire 12-year period that, according to Enchant, the project would run.
- Oil prices are extremely volatile, so it is likely that both the demand and the price for captured $CO_2$ for use in EOR will fluctuate significantly over time, introducing additional risk for owners and investors.
- It appears that the Petra Nova project has not been nearly as profitable as NRG expected, as the company took an impairment of $140 million in 2016 on its $300 million investment in its subsidiary that owns half of Petra Nova. NRG cited the reason for the impairment as the continued decline in oil prices. NRG then took a second impairment of $69 million in 2017 based on what it described as a revised view of oil production expectations.
- It has similarly been reported that in June 2016, the contract for supplying $CO_2$ from Boundary Dam 3 was renegotiated, reducing the expected annual revenues over the life of the plant by about a third.

# Enchant Has Ignored Significant Risks and Costs in its Proposal

- Prudent resource planning and assessment of the financial viability of proposed projects requires considering ranges of assumptions that reflect all significant anticipated costs and risks. This ensures that the project would remain viable over a range of possible future circumstances.
- Enchant, however, has looked at a single limited set of assumptions about future costs and has dismissed or ignored significant risks that the retrofit would entail.
- It is not surprising that the single set of assumptions used by Enchant were those that made the project look best.

# Enchant Has Ignored Significant Risks and Costs in its Proposal

- The risks not considered by Enchant include that:
  - The cost of retrofitting San Juan would be higher than its $1.3 billion estimate.
  - The $CO_2$ capture facility and/or the balance-of-plant do not achieve an 85% capacity factor.
  - San Juan does not achieve a 90% $CO_2$ capture rate in one or more years.
  - It would be unable to sell all the $CO_2$ captured at San Juan for EOR in the Permian Basin or to permanently sequester that $CO_2$.
  - Tax equity investors would not want to fund 100% of the cost of the retrofit and/or would use higher discount rates to reflect the risks associated with funding the project.
  - There would not be a substantial market for the electricity generated at San Juan or that Enchant would have to sell the plant's electricity at prices below the cost of production.

# Enchant Has Ignored Significant Risks and Costs in its Proposal

- The costs not considered by Enchant include:
  - Escalation, financing, right of way & land purchase and site security for the retrofit.
  - The cost of the 20-mile spur pipeline that would transport the captured $CO_2$ from San Juan to the Cortez pipeline.
  - The cost of transporting the captured $CO_2$ transported to the Permian Basin through the Cortez pipeline.
  - Any annual capital expenditures for the repair or replacement of equipment in the $CO_2$ capture facility.
  - Any maintenance costs that have been deferred or eliminated by the current owners in anticipation of the retirement of San Juan in 2022.
  - The fixed O&M costs that would have to be paid during 2023 regardless of whether San Juan was shut down because it did not meet the state's new emissions standards.
  - The incremental costs of cleaning up San Juan that would be incurred after Enchant took over ownership of the plant in 2022.

# For More Information
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