



The growing role of clean energy portfolios

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THE GROWING MARKET FOR CLEAN ENERGY PORTFOLIOS

ECONOMIC OPPORTUNITIES FOR A SHIFT FROM NEW GAS-FIRED GENERATION TO CLEAN ENERGY
ACROSS THE UNITED STATES ELECTRICITY INDUSTRY



[RMI.ORG/CEP-REPORTS](https://rmi.org/cep-reports)

Clean energy portfolios can provide the same services as gas & usually at lower cost. The case for CEPs will continue to grow.

We ask “What is the cost for clean energy to mimic gas?”

We find that Clean Energy Portfolios are now cheaper than new gas

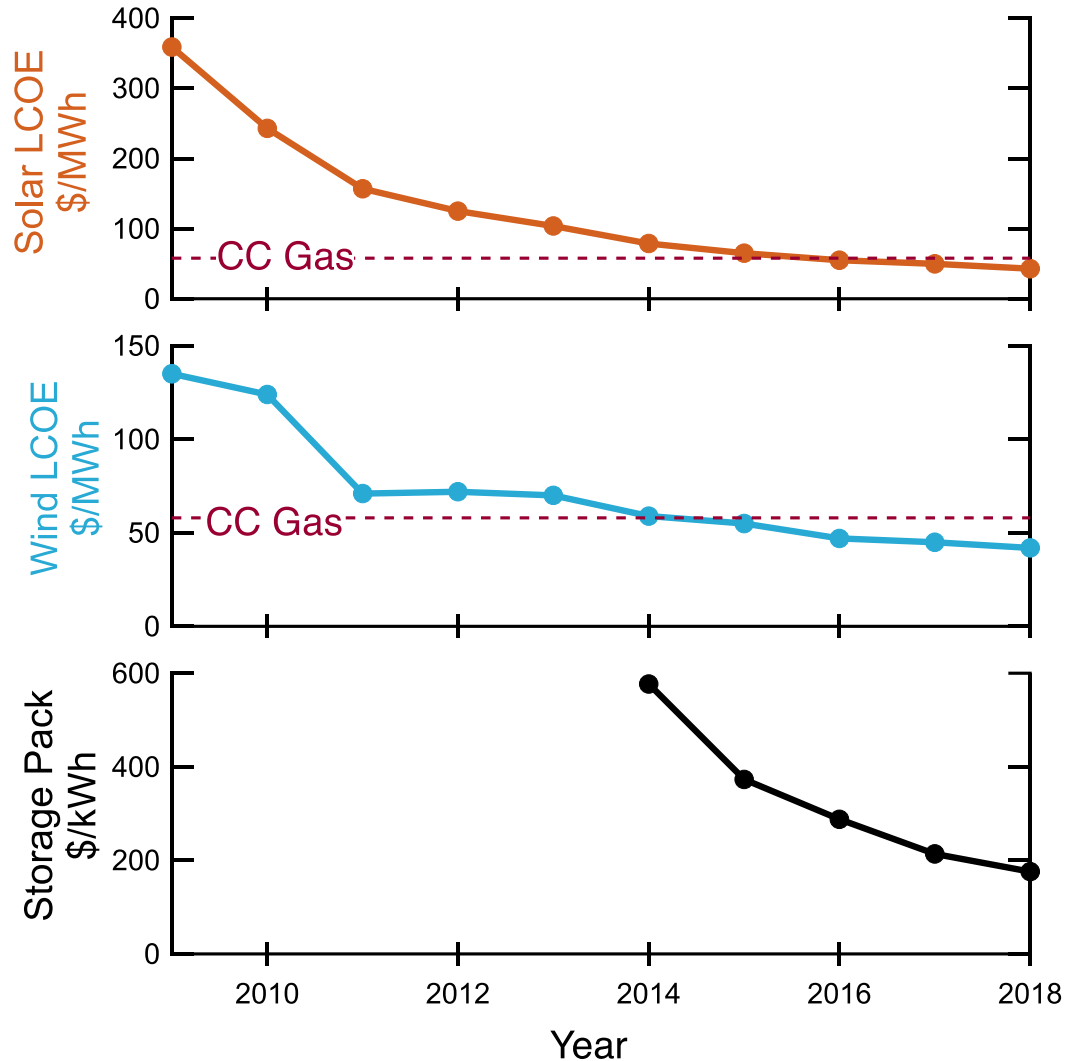
The economic case for CEPs will continue to grow.

- Gas generation has been the ‘default’ answer for new generation – but that is changing quickly
- There is still ~\$100B proposed new gas in the US

- CEPs are optimized combinations of wind, solar, storage, efficiency, and demand response that mimic a new gas plant.
- CEP are cheaper than all combined cycles and ~half of peakers

- Clean technology costs will only continue to decline

Our analysis asks: “What is the cost for clean technologies to mimic gas?”



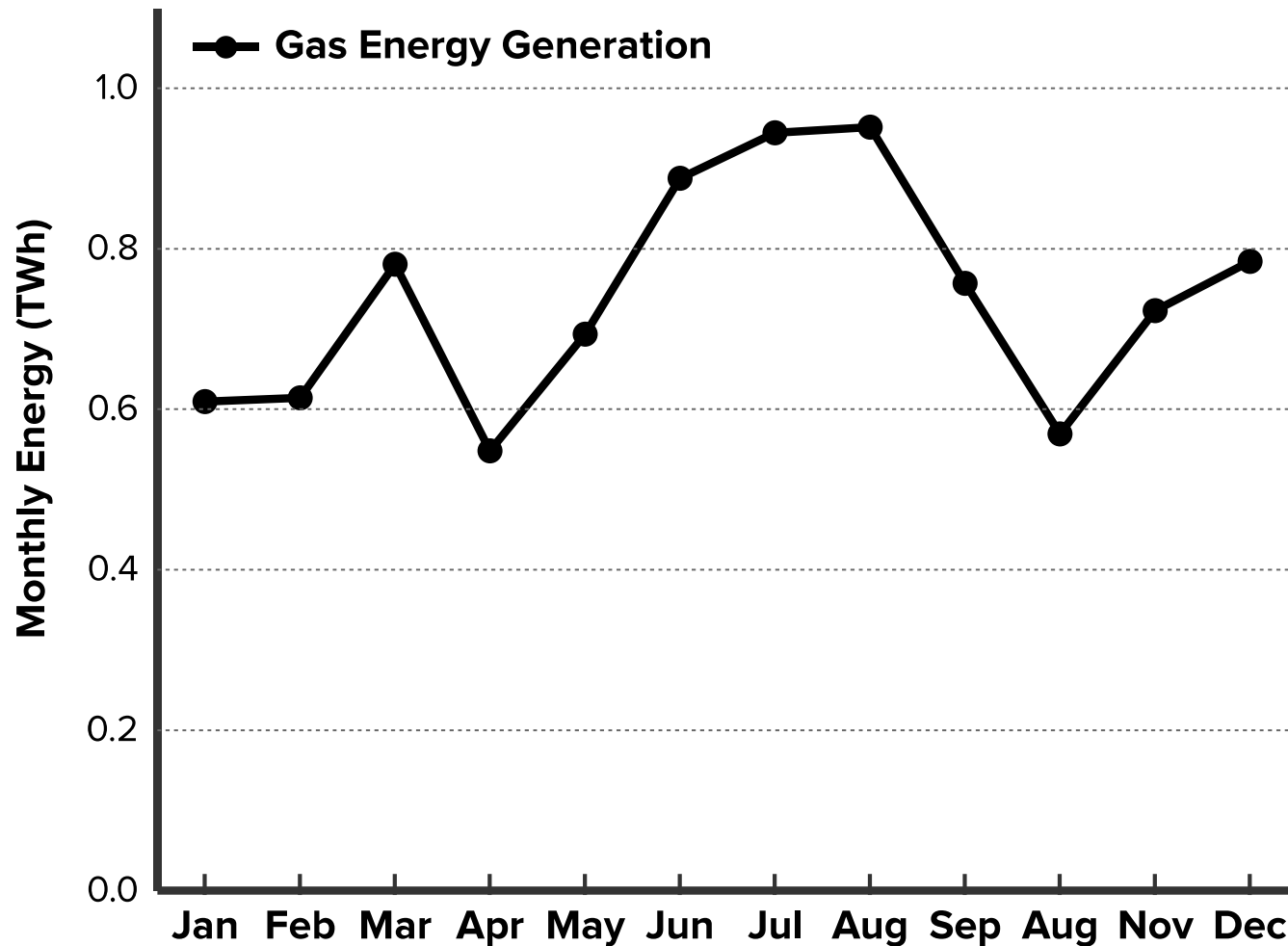
Energy from solar and wind are now cheaper than from gas (by \$/MWh)

...but gas is more valuable because it can be dispatched when needed.

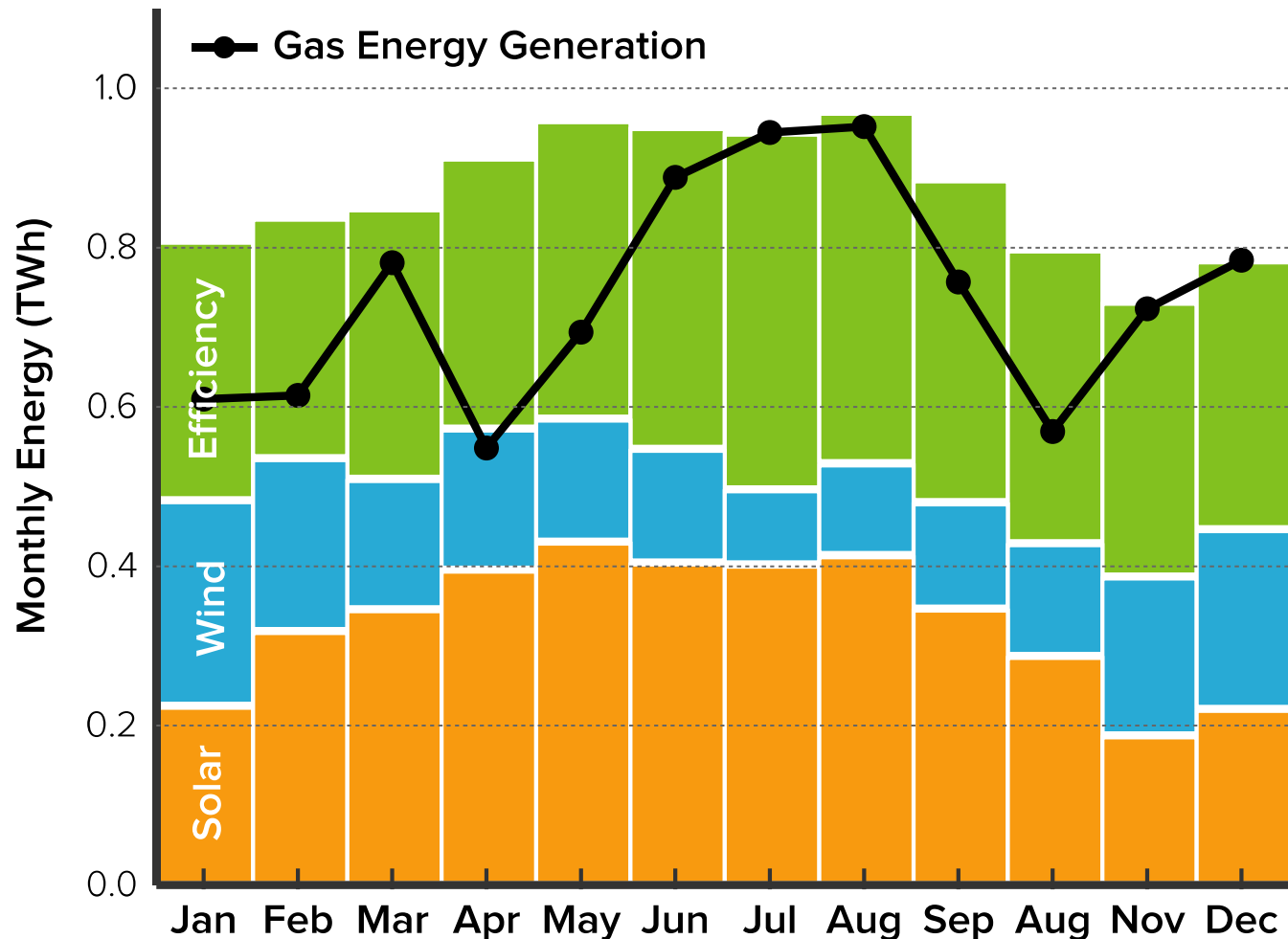
CEP approach to cost comparison

1. Estimate the actual services a new gas plant will provide
2. Build a least-cost portfolio to mimic these services
3. Compare the costs

The CEP model builds portfolios that provide the same monthly energy and the same peak capacity as a gas plant

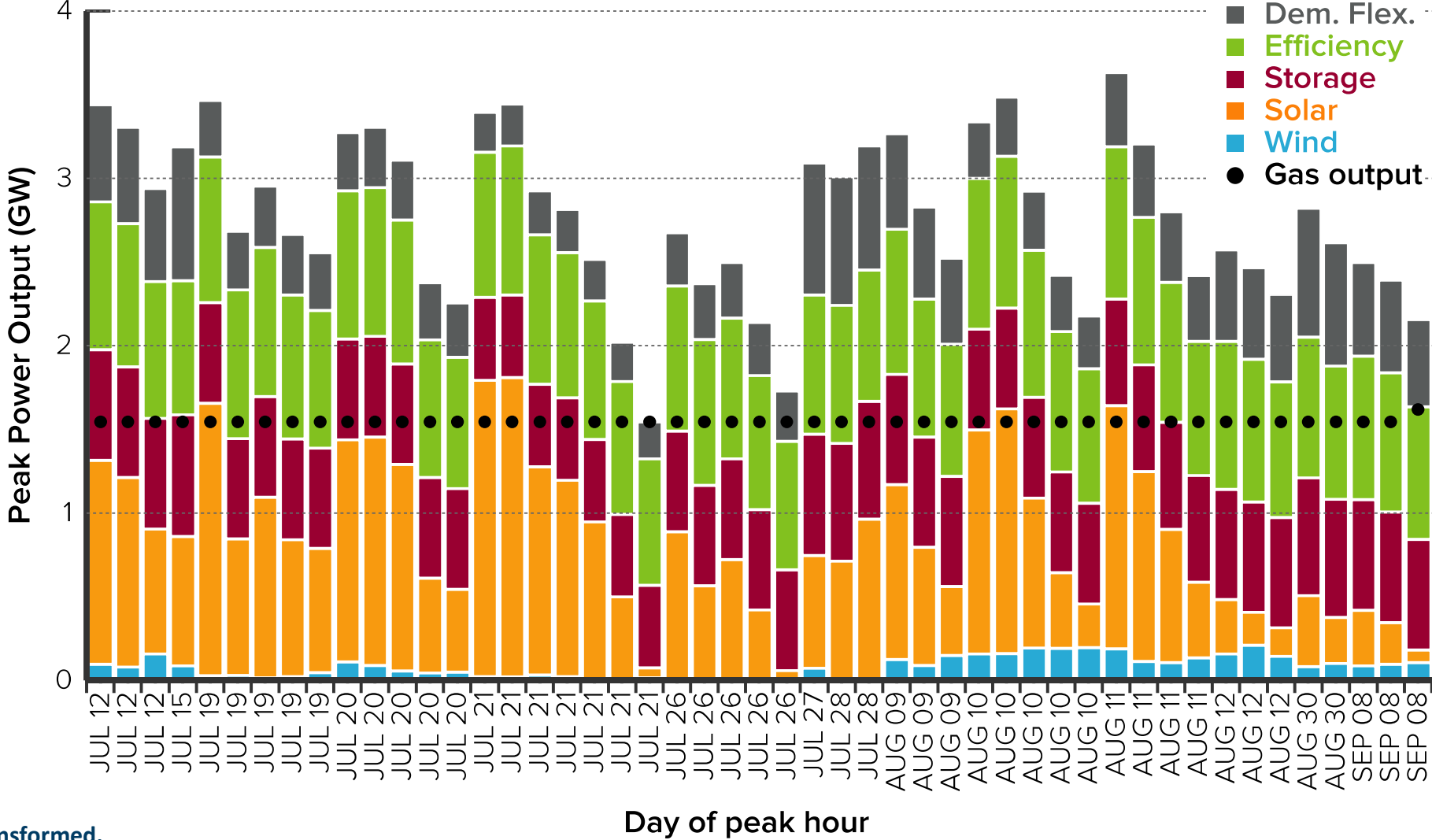


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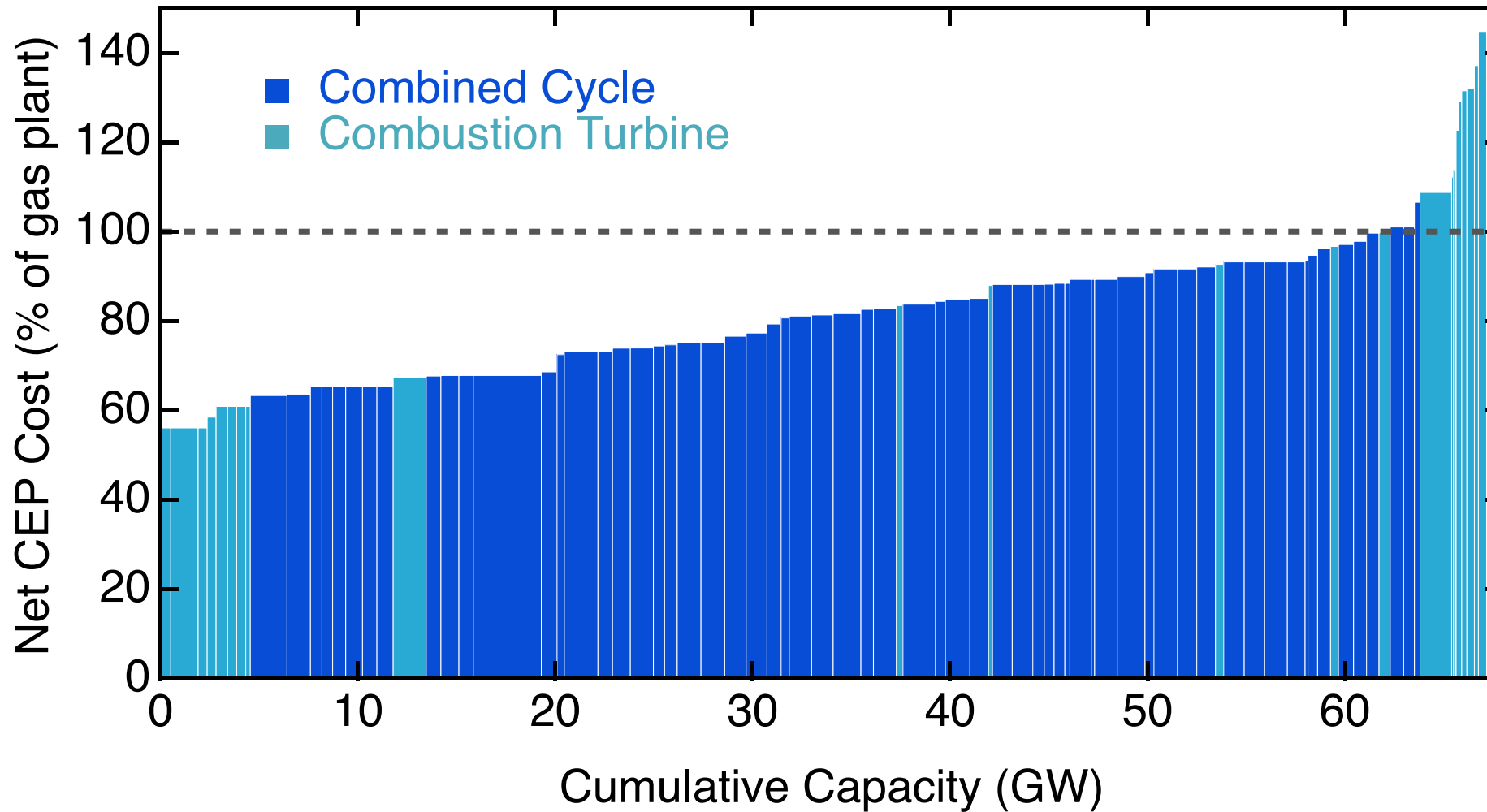


For this example Northeast combined cycle, the toughest months are July, August, November and December

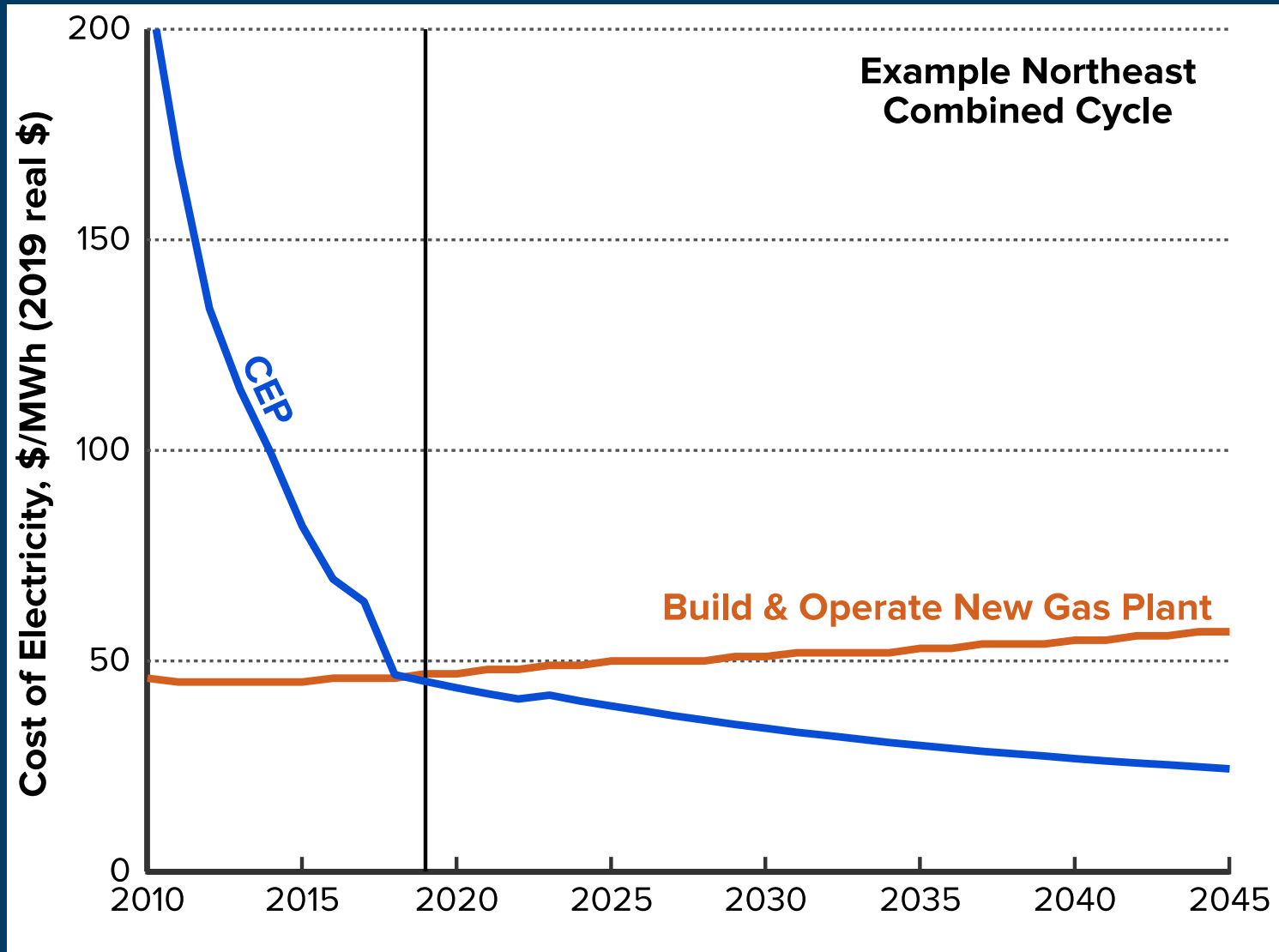
The CEP must also meet the top 50 hours of peak demand



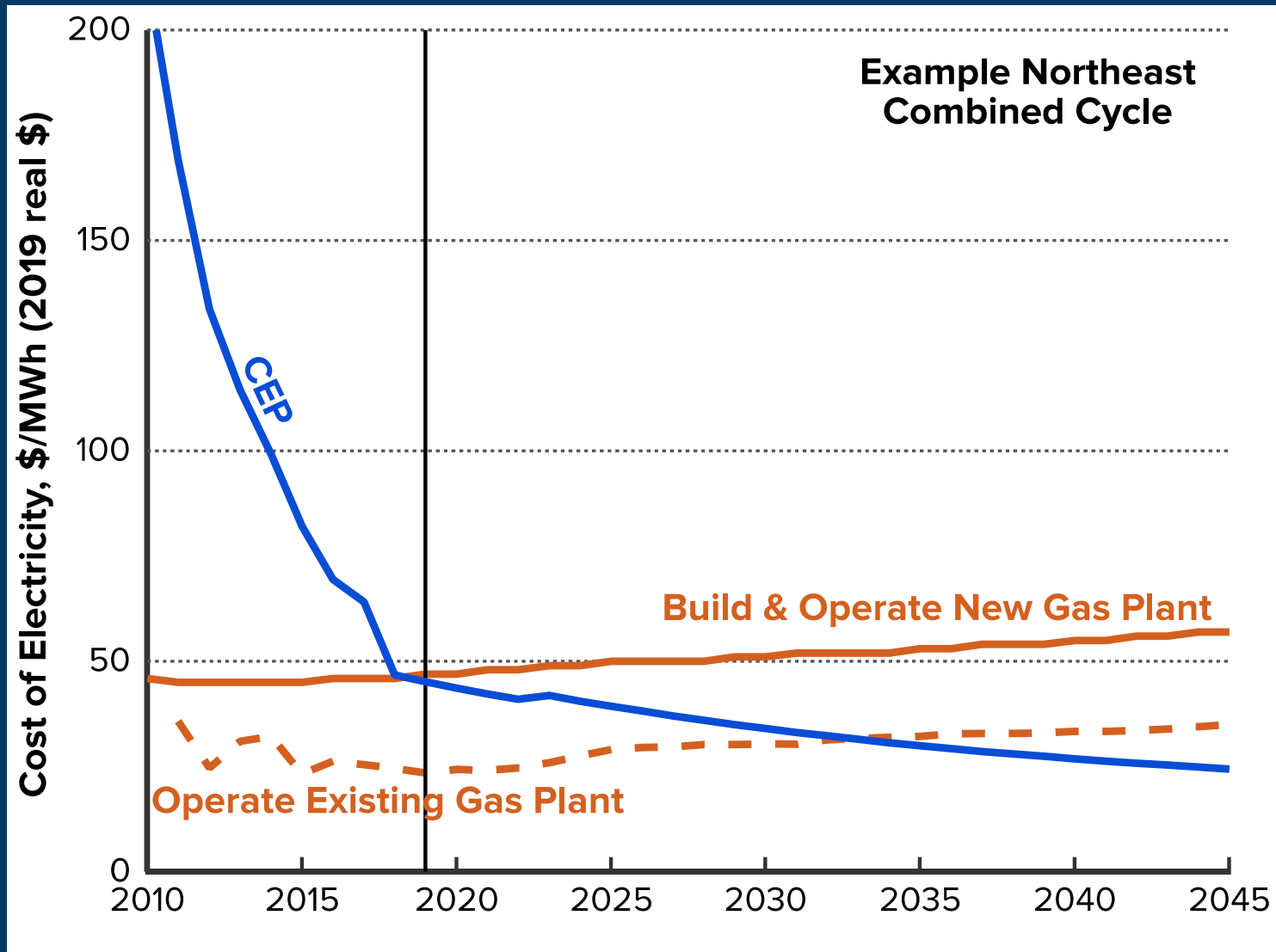
Key result: CEPs are almost always cheaper than new gas



Historical Perspective: We are at a **tipping point**

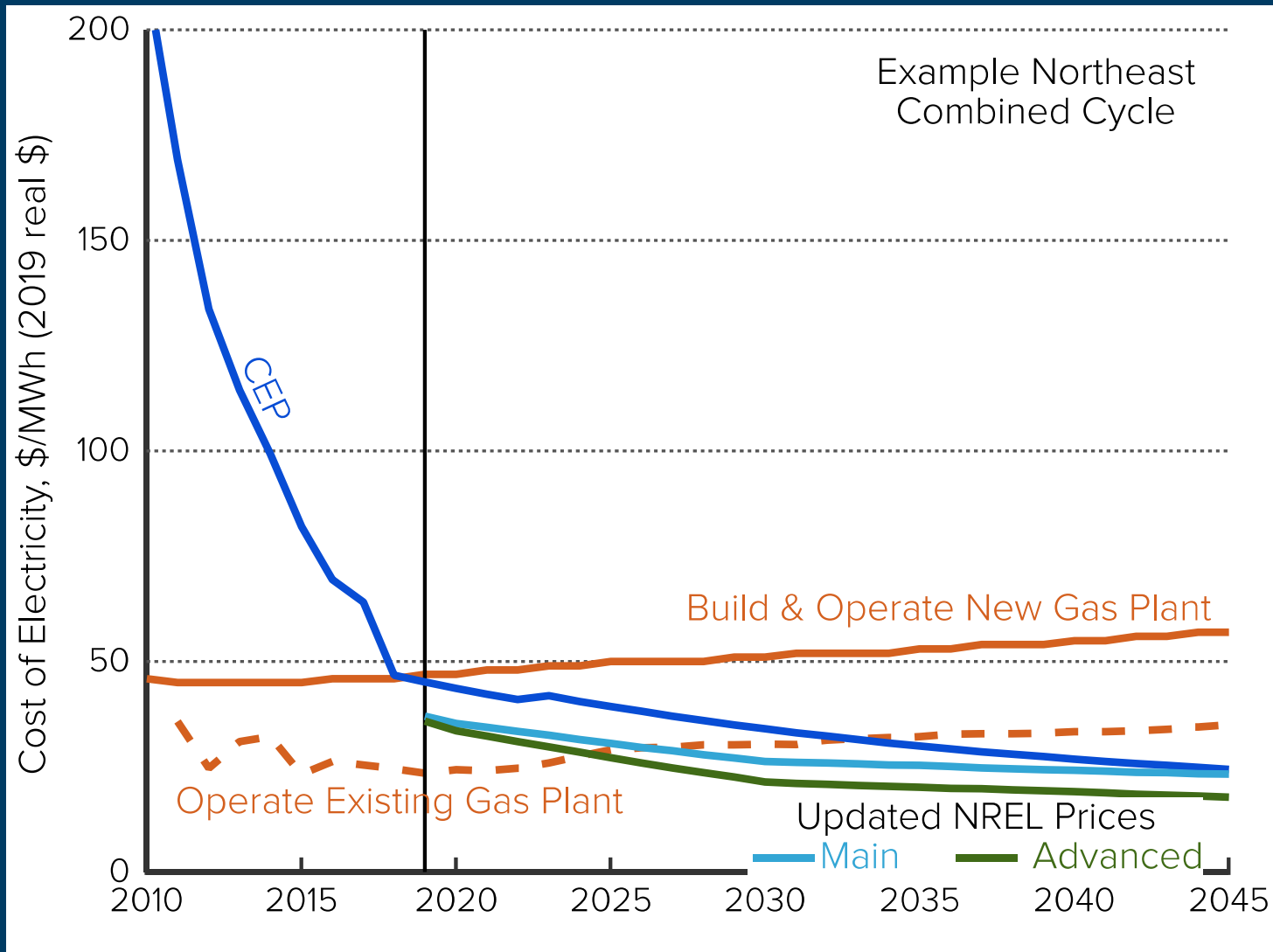


Historical Perspective: We are at a **tipping point**



- **Soon, CEPs will be cheaper than just running many gas plants**
- **There is a real stranded asset risk for new-build gas plants**

Historical Perspective: We are at a **tipping point**



The most recent data
and projections are
even more optimistic
about CEPs

The CEP analysis is most useful for today's grid

Today CEP analysis applies

- CEP analysis accounts for how gas is used today
- CEP analysis applies to investment decisions being made now and into 2020s

Grid where wind and solar contribute large % of MWh

- CEP analysis can be modified for different role of gas generation
- 2035report.com shows that existing gas can support 90% emissions reductions

Decarbonized grid dominated by wind & solar

- CEP analysis not suited this type of grid
- There will remain a need for dispatchable generation for long periods with low wind & solar generation

Implications & Recommendations

Utilities: Use 'all source' procurement

- We find CEPs can be lower cost and add reliability
- Best option: Ask the market what it can provide!
- <http://www.rmi.org/insight/how-to-build-clean-energy-portfolios>

All: Embrace efficiency and demand flexibility

- EE and DR remain the least-cost resources
- EE and DR remain abundant

Investors & Regulators: Consider risk of new gas investments

- Investors should consider implications of clean energy cost declines
- Regulators should capture the benefits for rate payers and realize the risks of new gas investments

Contact Info
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- Let us know if you have questions or are interested in regional CEP analysis
- Also see: 2019 Pembina report on CEPs in Alberta