Discussion for "The Economic Impacts of Clean Power"

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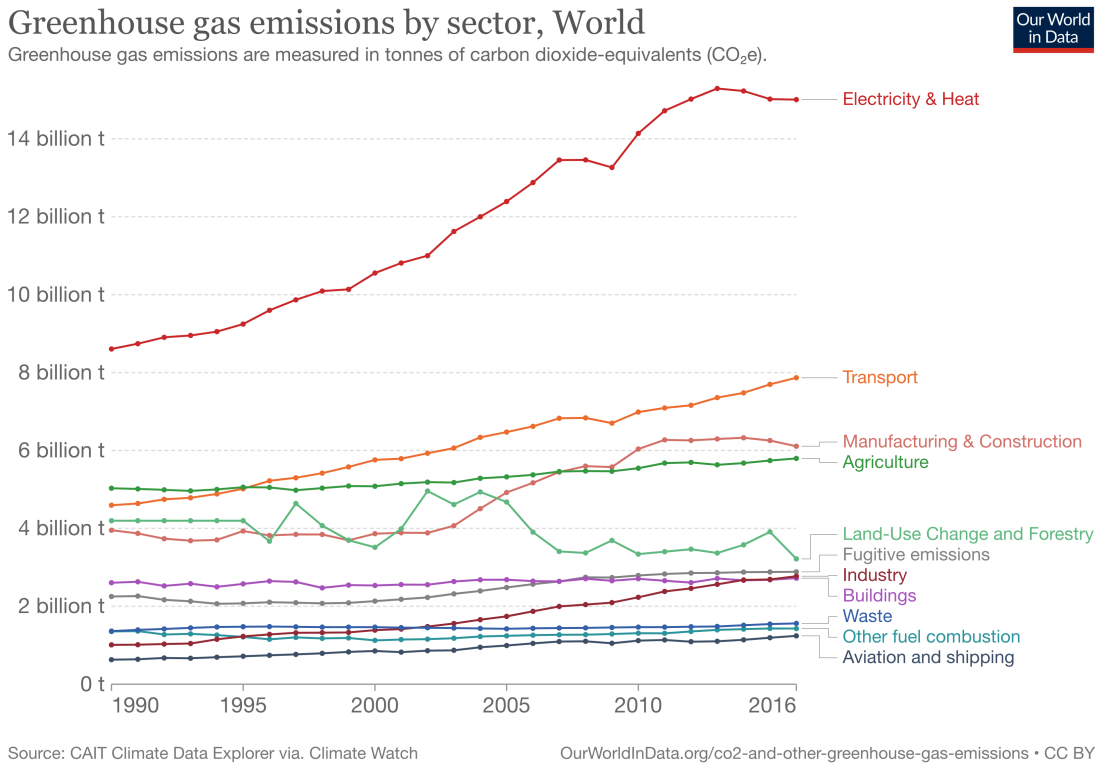
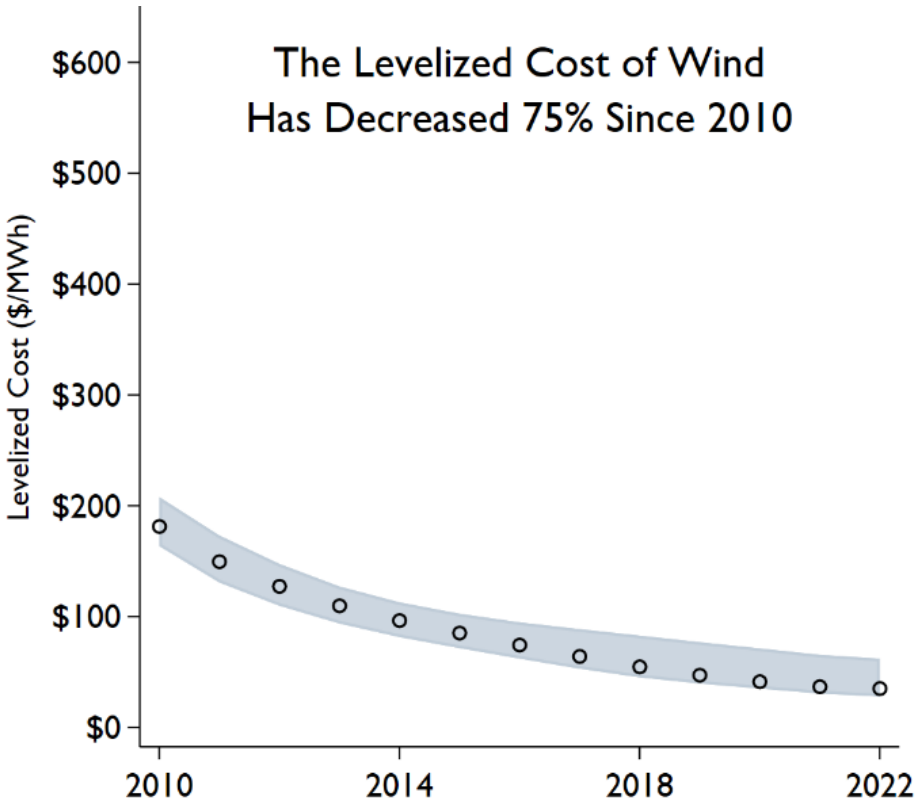
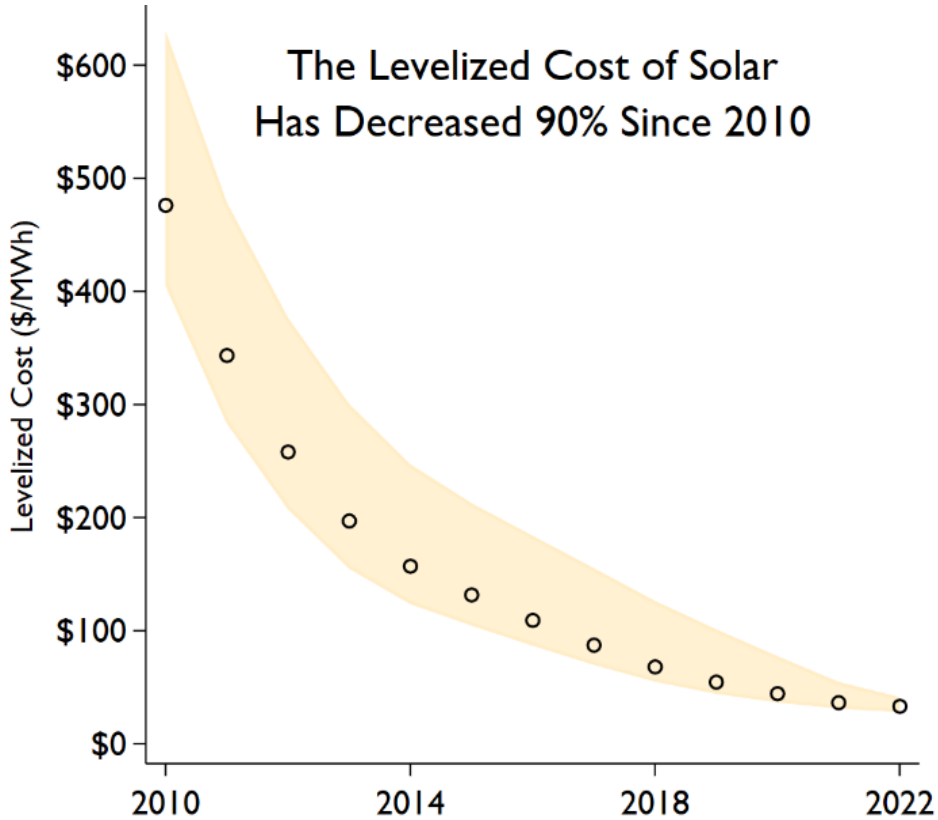
Renewable expansion is key to mitigating climate change

1. Electricity is a major source of GHG emissions (e.g., 25% in the US)
2. Another large source is transportation, which can be electrified soon
3. AI is poised to skyrocket electricity demand from data centers



Good news: Grid-scale renewables are getting inexpensive





Source: Davis, Hausman, and Rose (2023)

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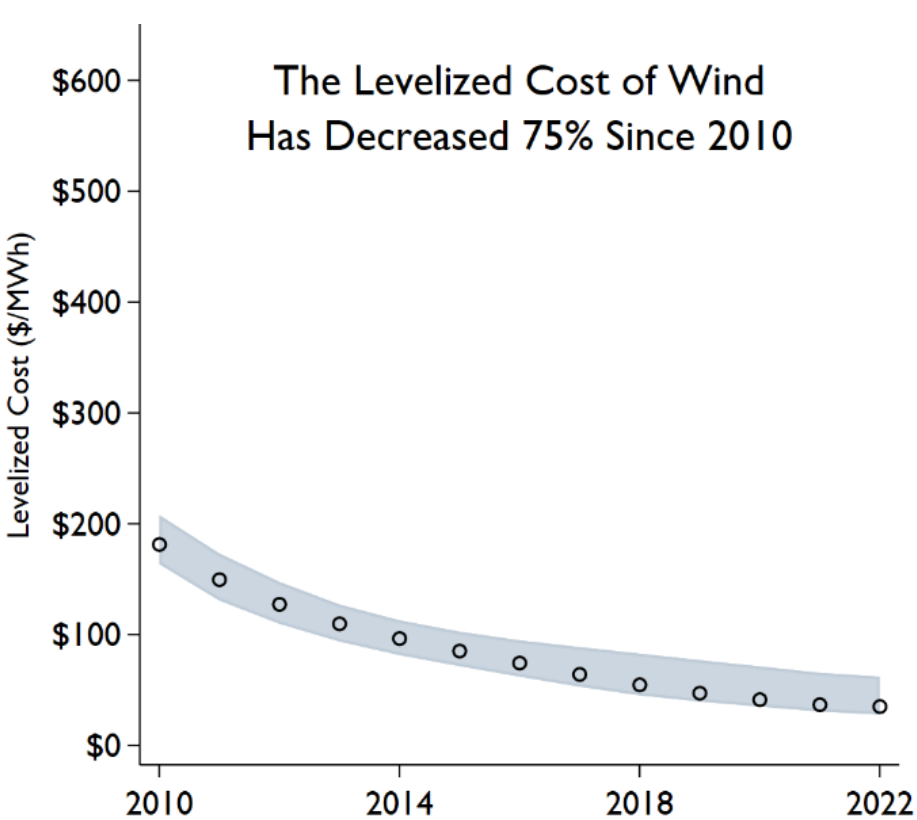

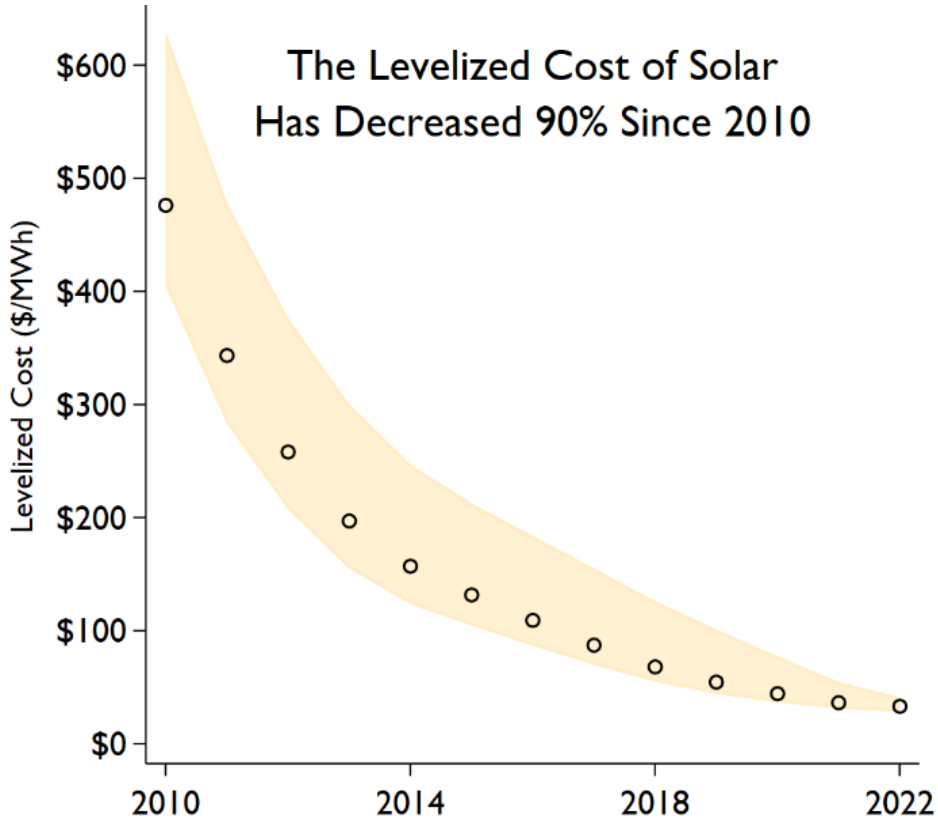

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- What is the future prospect of renewable energy and its implications to electricity prices and the economy? $\rightarrow$ Arkolakis and Walsh (2024)

An innovative, rigorous, and policy-relevant paper

- Use the medium-run equilibrium condition for marginal investment costs to forecast future wholesale prices in US regions
  - Advantage: It does not require detailed wholesale market data

- The findings suggest that our future is bright
  - By 2040, power prices will fall anywhere between 20% and 80%
  - Driven by market forces, rather than government interventions
  - Leading to an aggregate real wage gain of 2-3%

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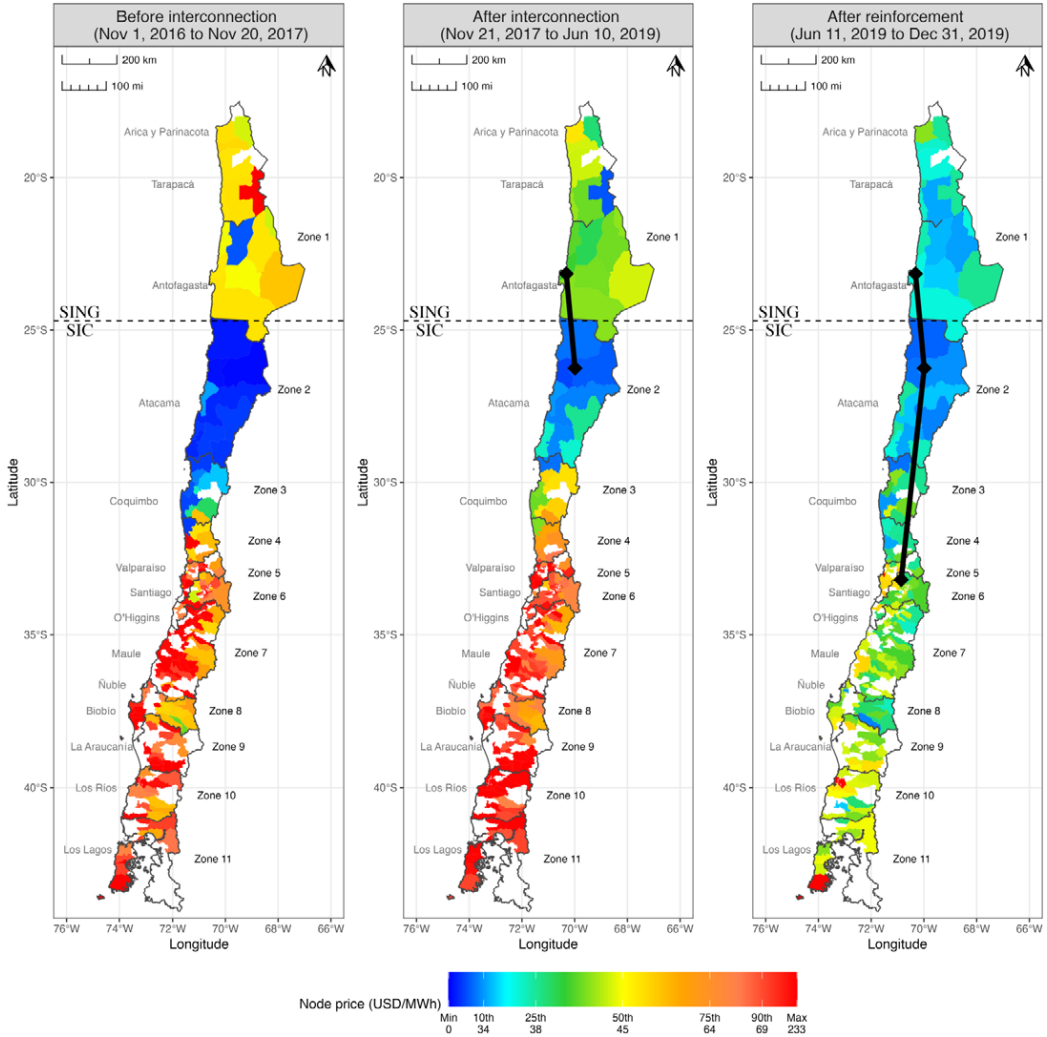
  - Leading to an aggregate real wage gain of 2-3%
- Is this a too-good-to-be-true futuristic scenario?

What's happening in Chile could make us feel optimistic

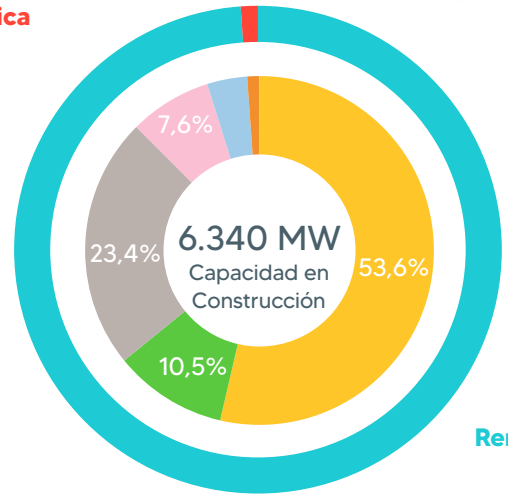


Source: Gonzales, Ito, and Reguant (2023)

- Solar expansion & market integration led to nationwide price declines

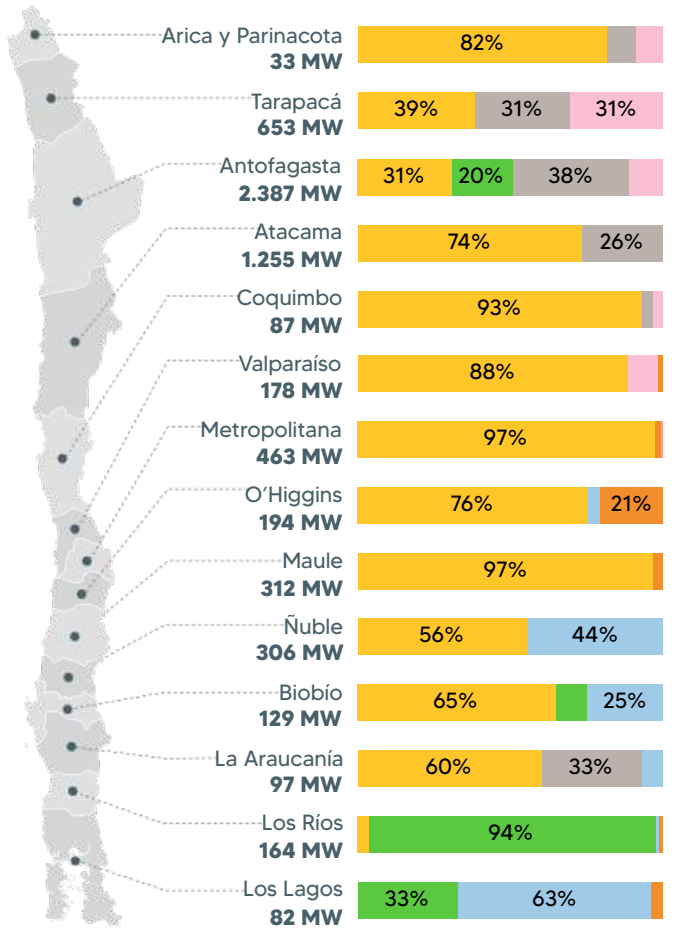
What's happening in Chile could make us feel optimistic

CAPACIDAD **SEN** | CAPACIDAD **REGIONAL**



Tecnología	Potencia (MW)	N° proyectos	% Total
Fotovoltaico (FV)	3.400	262	53,6%
Eólico	666	11	10,5%
BESS	1.483	16	23,4%
FV + BESS	485	6	7,6%
Hidro pasada	236	12	3,7%
Total	**6.269**	**307**	**98,9%**
Deriv. petróleo	68	10	1,1%
Gas natural	3	1	0,0%
Total	**71**	**11**	**1,1%**
Total	**6.340**	**318**	**100,0%**

*FV: Solar fotovoltaico.
*BESS: Baterías. BESS puros + componente BESS de proyectos híbridos.
*FV+BESS: Componente solar de los proyectos.



*Sección de Chile con presencia del SEN.

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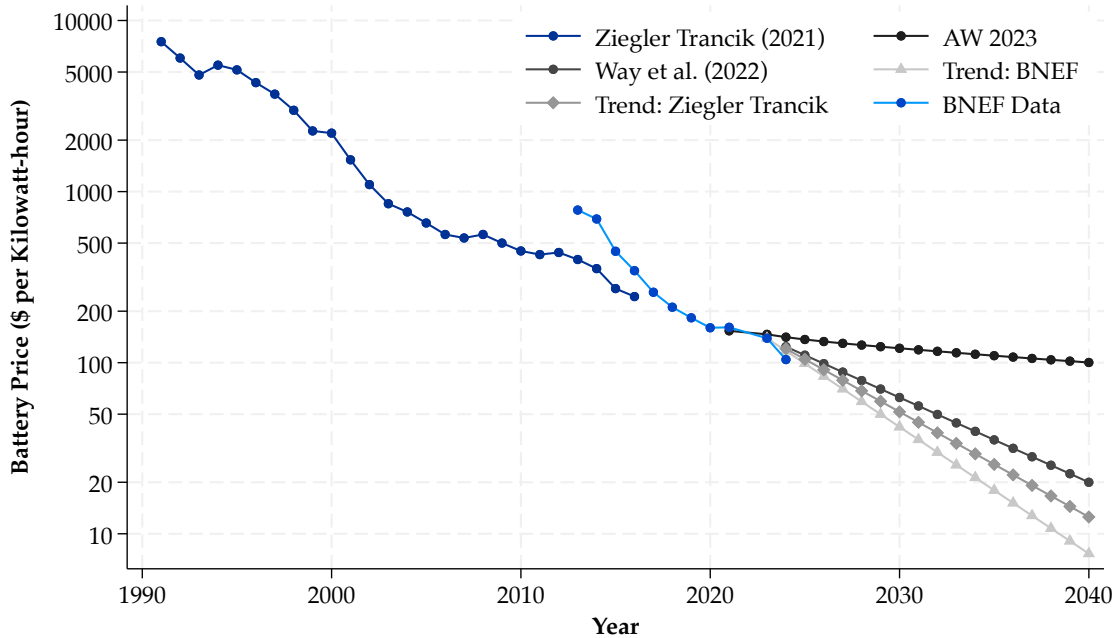
Source: Generadoras de Chile (August 2024)

- Plants under construction: Solar, Wind, Storage, Solar + Storage

Comments and Suggestions

1) The future decline in battery cost might be uncertain

Figure 4: Battery Pack Prices and Projections

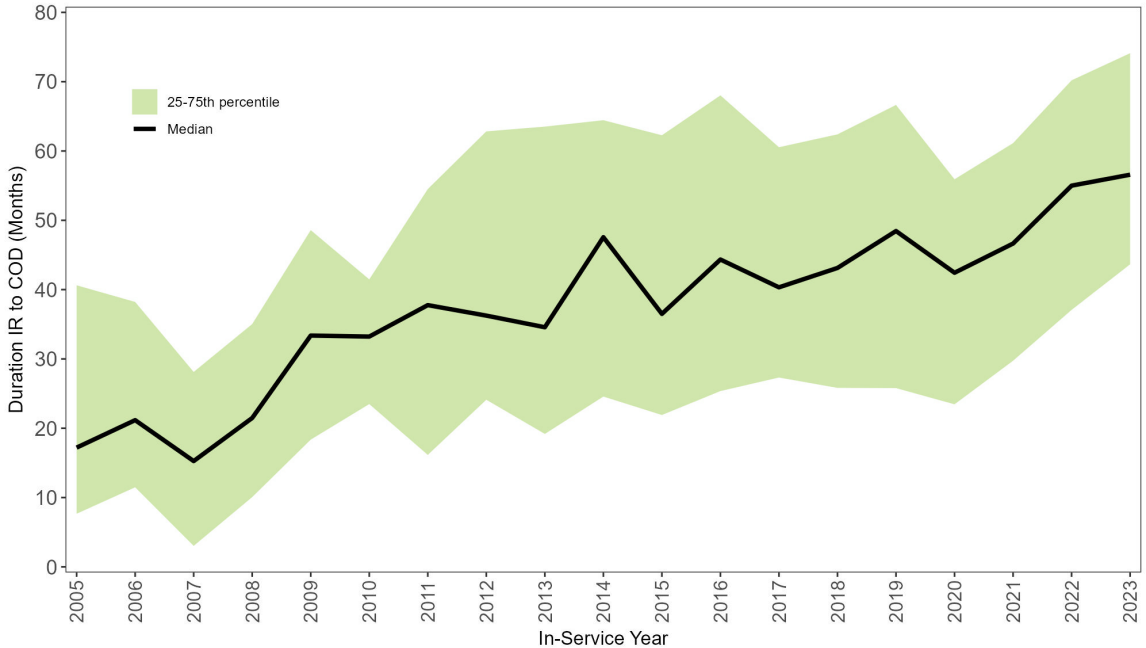


Source: Rand et al. at Lawrence Berkeley National Lab (2024)

- A key assumption in the model is the affordability of large-scale battery
  - Most people in the industry agree that solar module prices keep declining
  - However, the long-run forecasts of large-scale battery cost is controversial
  - Recent increases in EV demand will probably increase R&D on batteries

2) "Interconnection queue" adds delays and uncertainty

Average wait time is now approaching 5 years and getting worse



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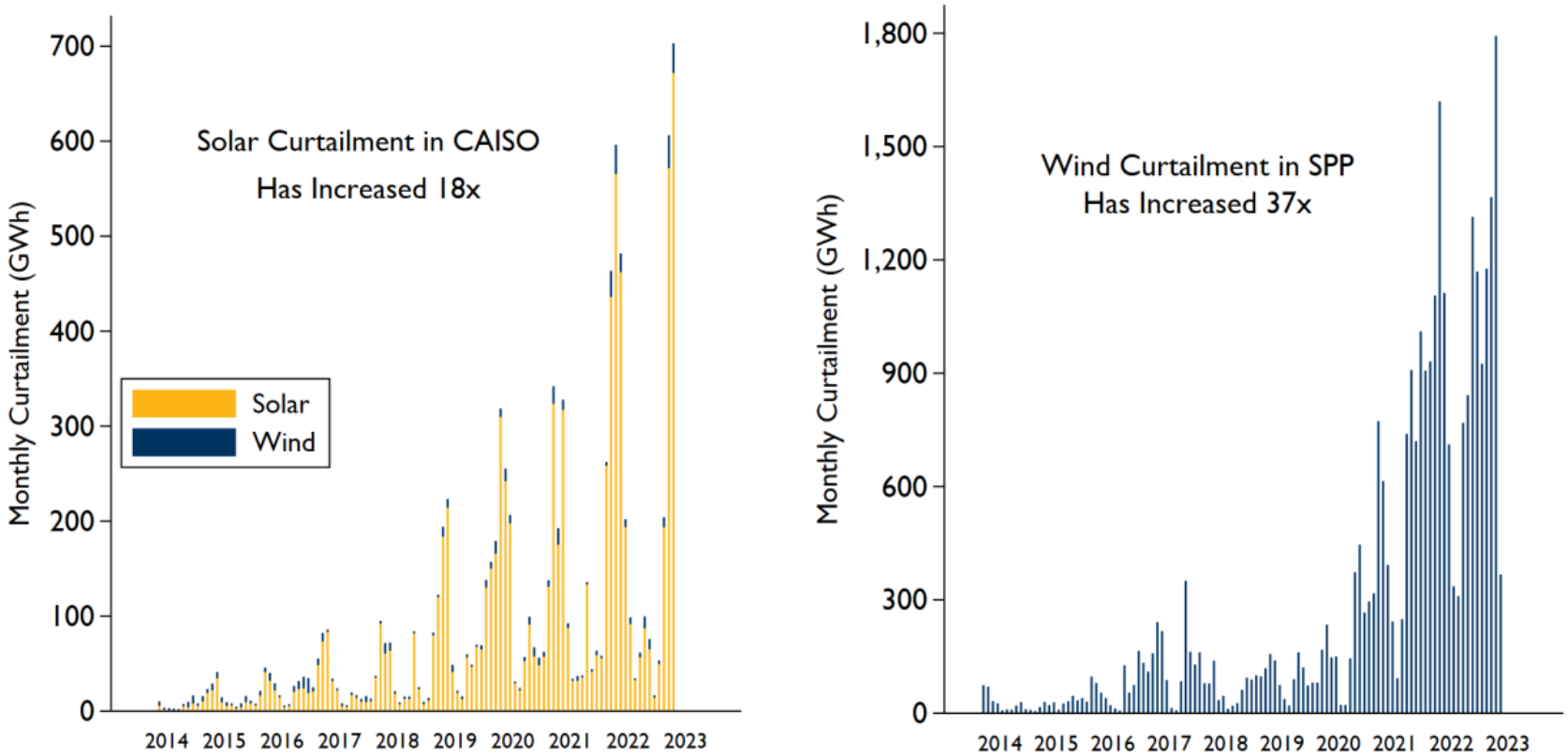
- Interconnection queue problem in the United States
  - New power plants need to complete a "study" before connecting to grid
  - Many solar and wind projects are stuck in the queue
  - Currently, 2600 GW capacity ($= 2 \times$ all US power plant fleet) is waiting
  - This problem adds delays and uncertainty to renewable investments

3) Curtailment due to limited transmission capacity

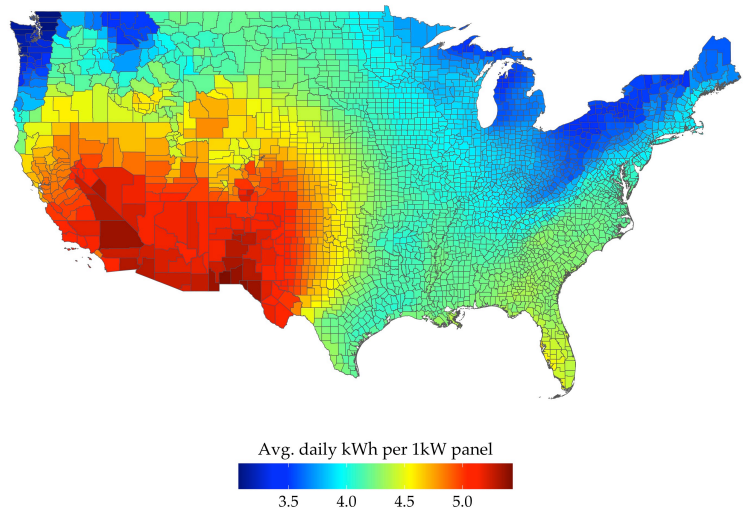


Source: Davis, Hausman, and Rose (2023)

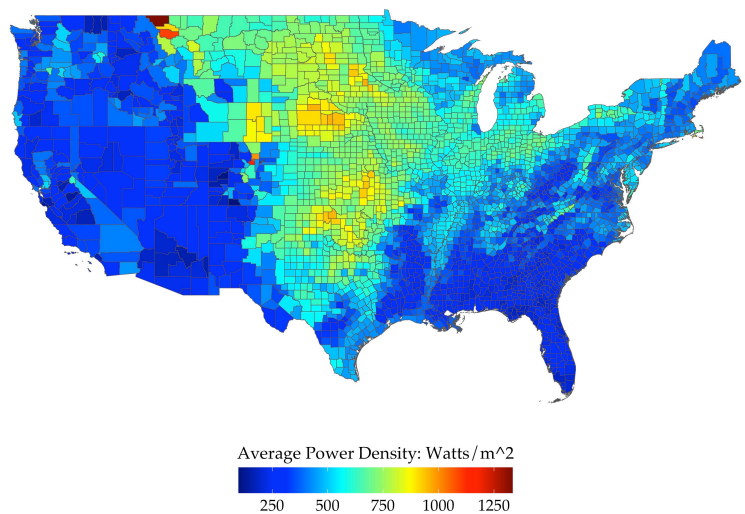
- Left: Solar and wind curtailment in California
- Right: Wind curtailment in the Southwest Power Pool (SPP)
- Will this be solved by 2040 by batteries and transmission investment?

4) Valuable to see the implications of wind expansion

- Solar and wind potentials have very different (almost opposite) geographical variation in the US
- This implies that the regional & sectoral macroeconomic impacts of wind expansion can be (interestingly) different from those of solar expansion



(a) Solar Potential



(b) Wind Potential