



Chris Busch

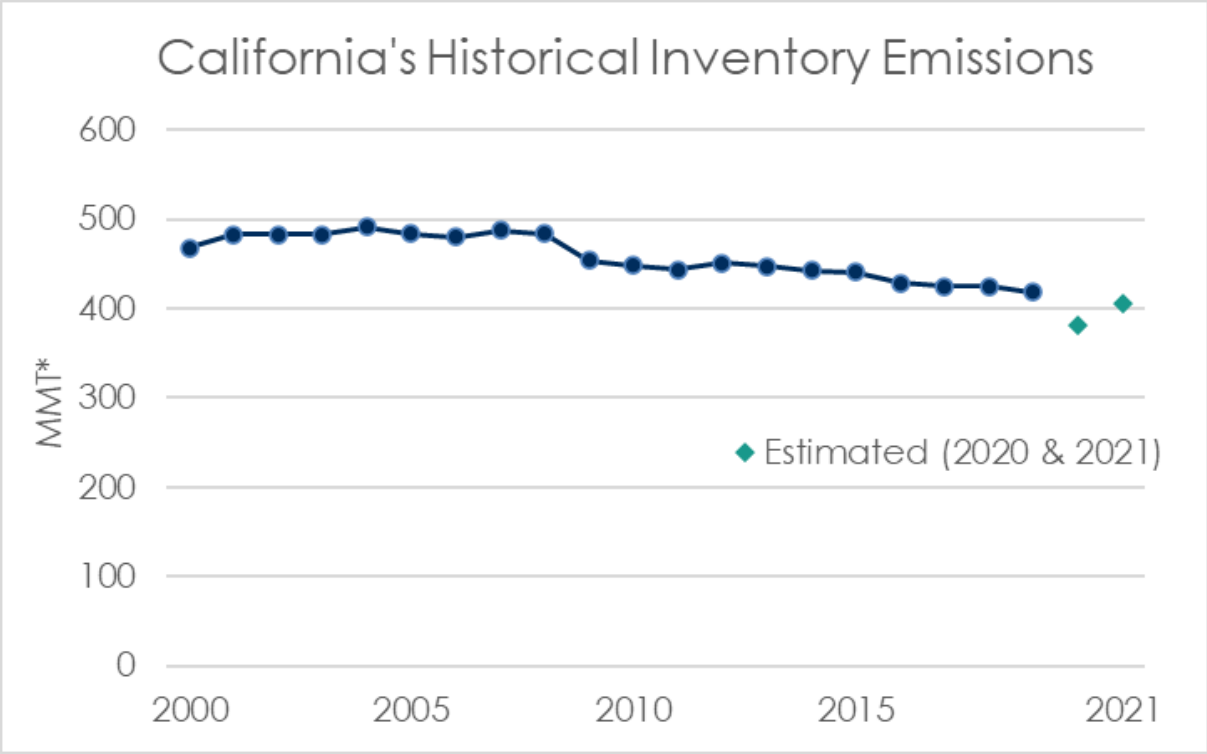
March 10, 2022

Joint Legislative Committee on
Climate Change Policy

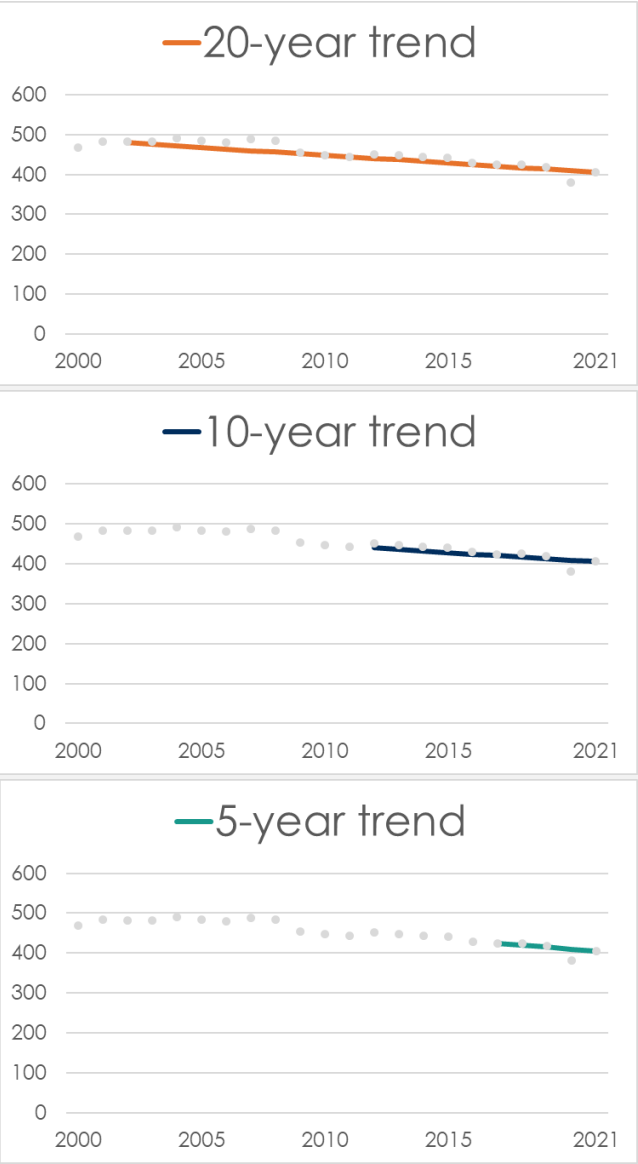
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Where California Stands



*MMT = million metric tons of carbon dioxide equivalent



Average annual change

-3.9 MMT

-0.83%

Average annual change

-3.8 MMT

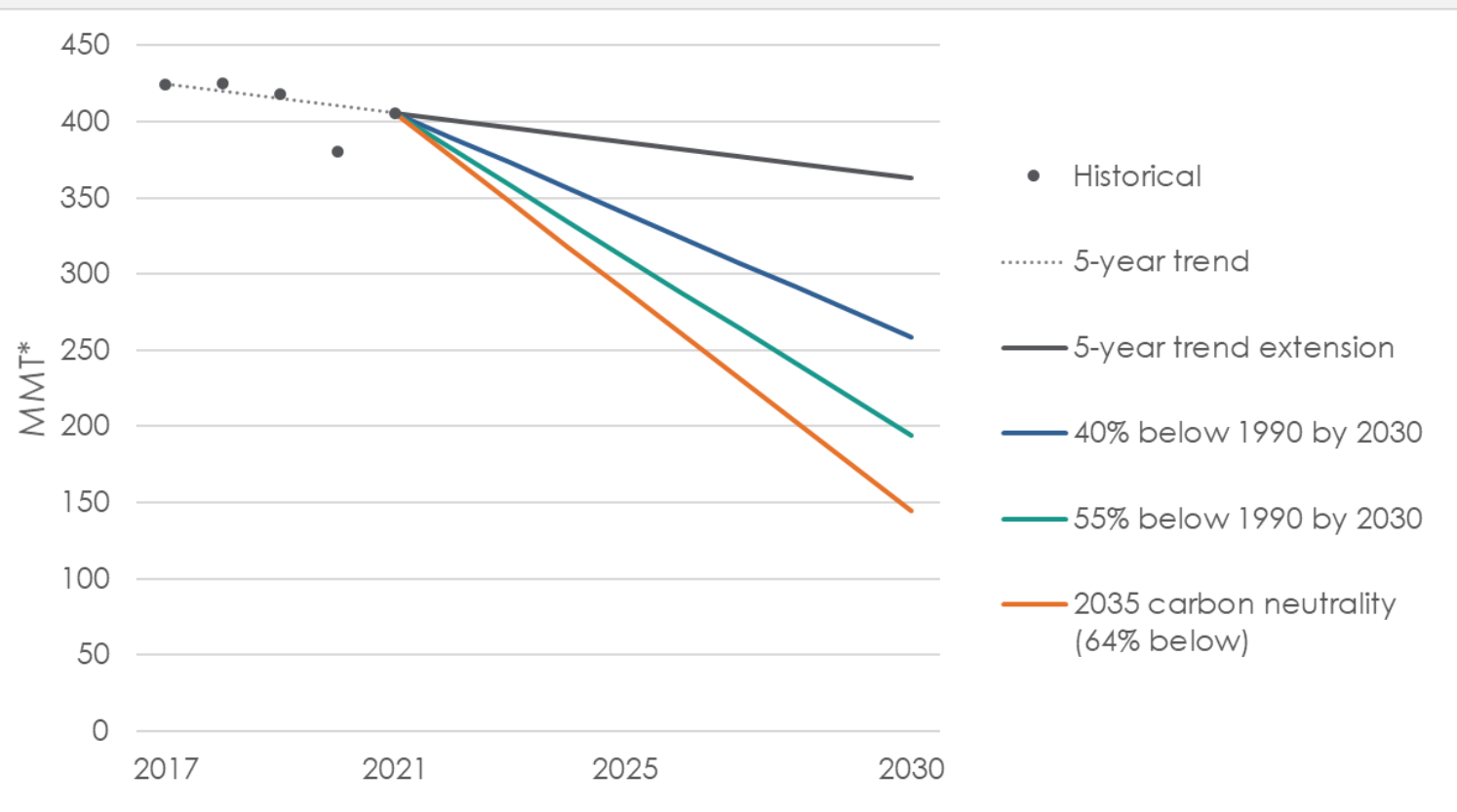
-0.89%

Average annual change

-4.7 MMT

-1.0%

Looking Forward: Not on Track



*MMT = million metric tons of carbon dioxide equivalent

Annual reductions through 2030

5-year trend	5 MMT/year
40% below 1990	16 MMT/year
55% below 1990	24 MMT/year
64% below 1990	29 MMT/year

The California Energy Policy Simulator

Initial release January 2020

ENERGY POLICY SOLUTIONS

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What Are the Best Policies to Solve Climate Change?

Designing energy policy correctly is tough work. Well-designed energy policies reduce pollution, cut consumer costs, and minimize dependence on foreign energy supplies. Done wrong, they can do the reverse, and increase pollution, lock in dirty technologies, or waste money.

Which energy policies can lower greenhouse gas emissions in California, and what will it cost? Discover the effects of various energy policies, build your favorite policy package, and share it with friends using the Energy Policy Simulator. Try it using the button below:

[Enter Simulator](#)

INSIGHTS FROM THE CALIFORNIA ENERGY POLICY SIMULATOR

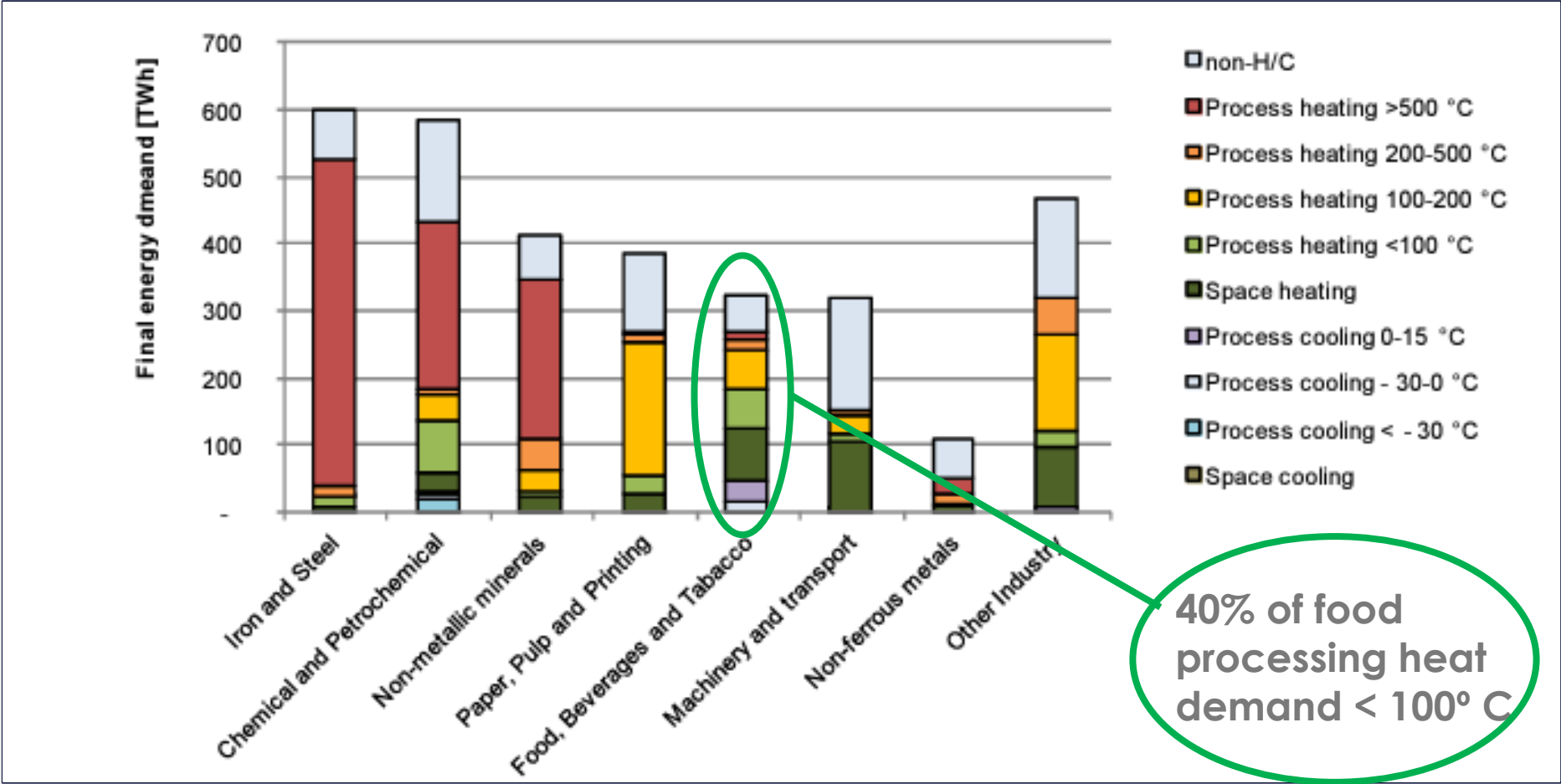
On the state's current greenhouse gas emission trajectory and six policy opportunities for deepening emission reductions

JANUARY 2020 (UPDATED MAY 2020)

BY CHRIS BUSCH AND ROBBIE ORVIS

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Electrification Opportunity in Food Processing



	Natural gas use 2020 (Mtherms)
Oil and Gas Extraction	3051
Petroleum Refining	864
Food Processing	684
Chemicals	662
Glass	536

(2017 California Pathways model)

Figure 29: Final energy demand for EU28 by temperature and sub-sector for heating and cooling in industry (2012) from Mapping and analyses of the current and future (2020-2030) heating/cooling fuel deployment (fossil/renewable), European Commission

Accelerating the EV transition

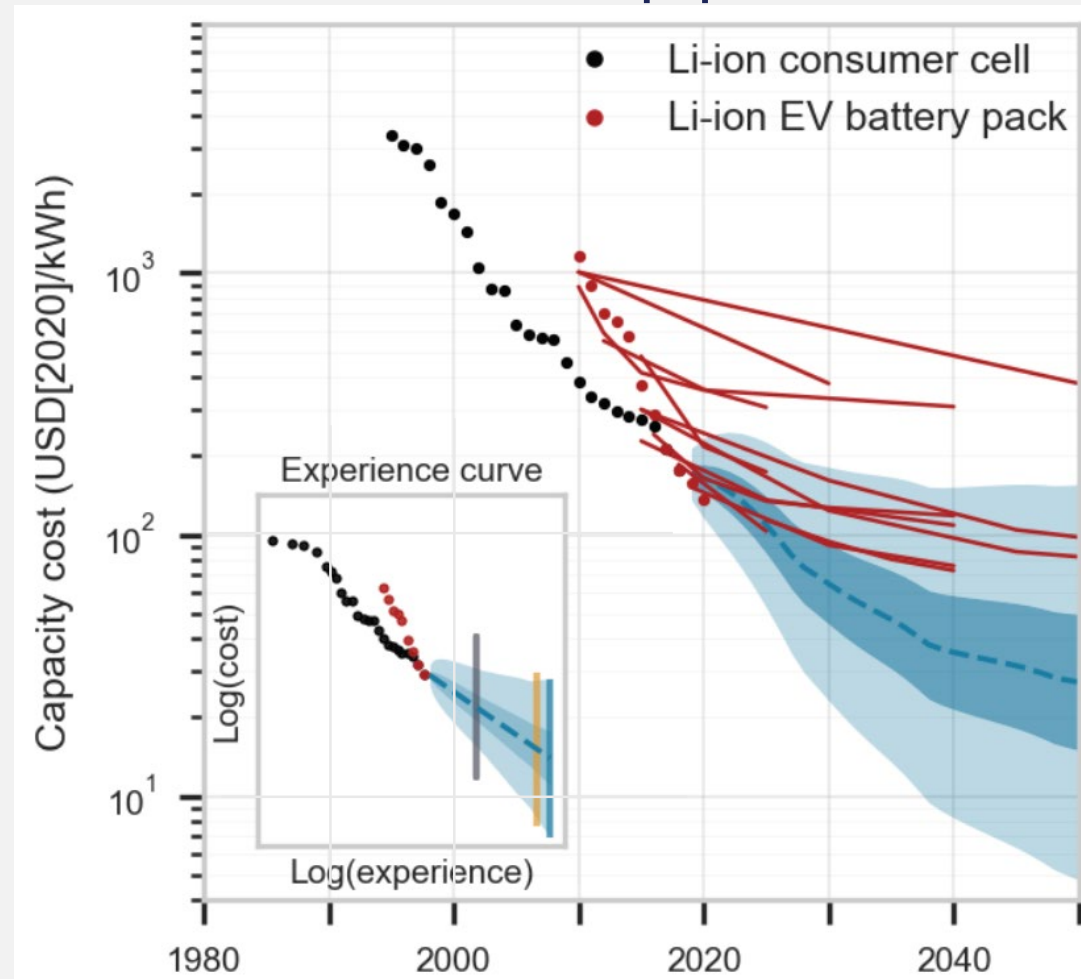
It is essential for policy to leverage new investment momentum.

Otherwise, slow capital stock turnover creates energy system inertia.

Typical lifetime	
Passenger cars	13+ years
Freight trucks	14+ years
Water heaters	14+ years
Heaters-air conditioners	16+ years
Buildings	50+ years
Industrial equipment	12 – 50+ years

Learning Curves and Innovation Opportunities

- Energy policy models consistently underpredict innovation.
- The future promises continued technological progress.

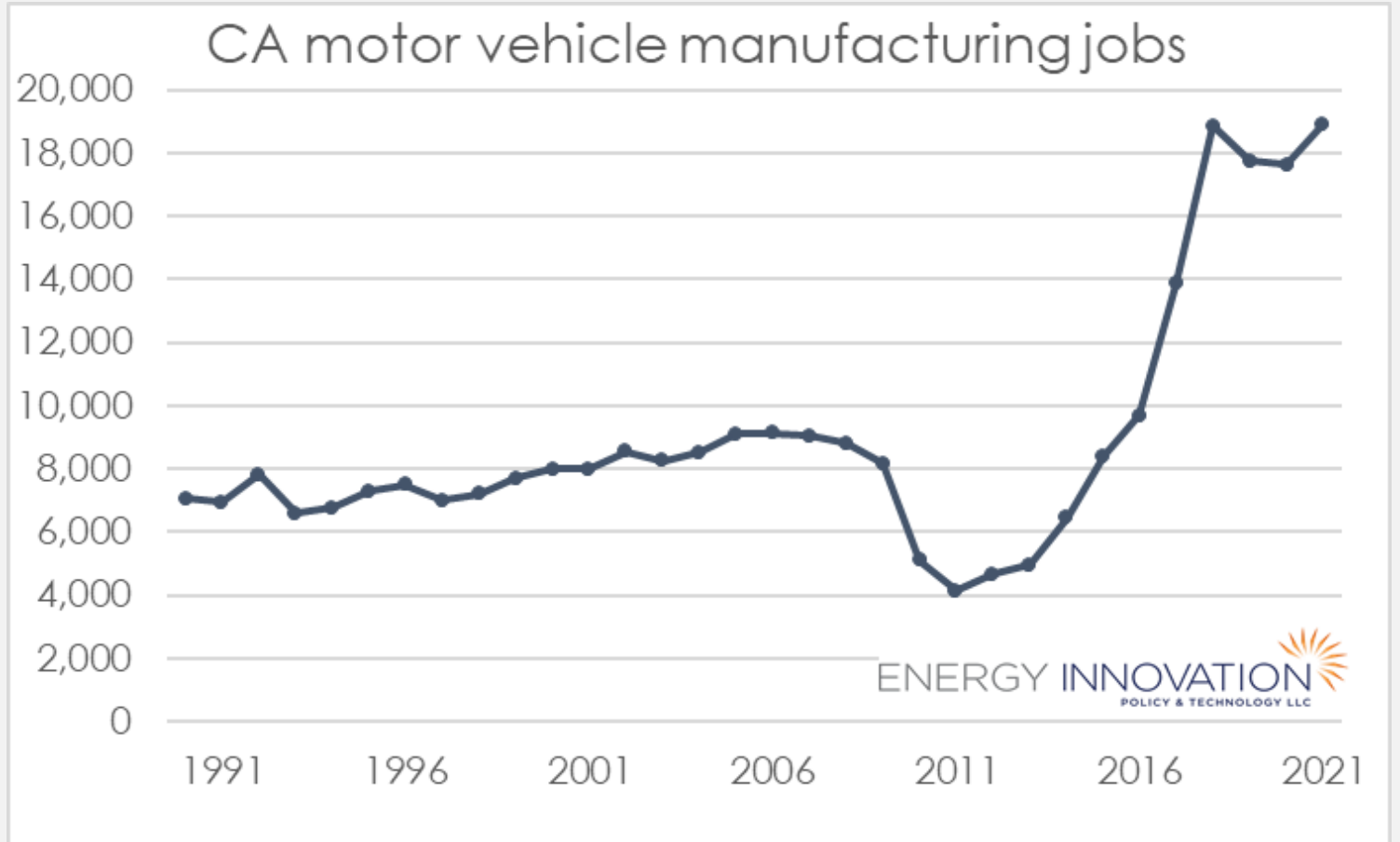


“Empirically grounded
technology forecasts and
the energy transition”
Institute for New Economic
Thinking, Oxford University,
INET Working Paper No.
2021-01, Sept. 14, 2021

EV Industry: A Case Study in the Economic Upsides

California jobs

- 19,000 motor vehicle manufacturing jobs, 2x pre-EV levels
- 275,000 direct EV industry jobs @ \$91,000 per year on average.





Thank you

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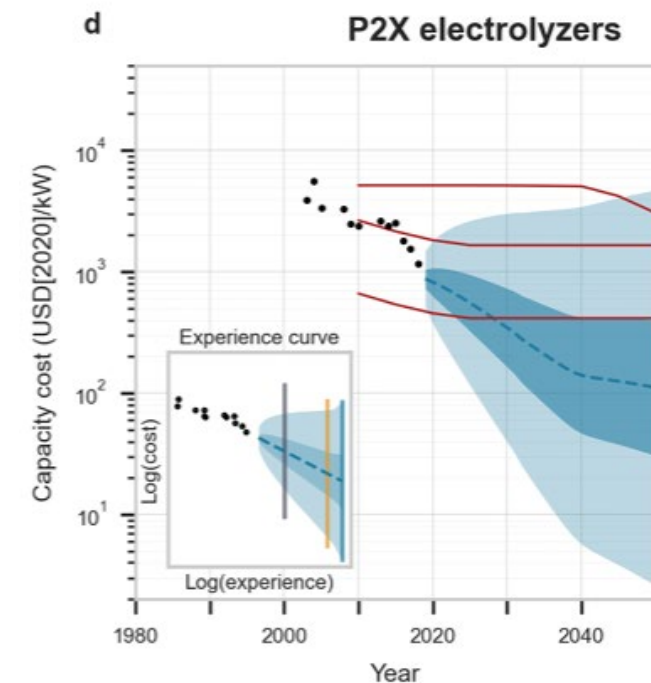
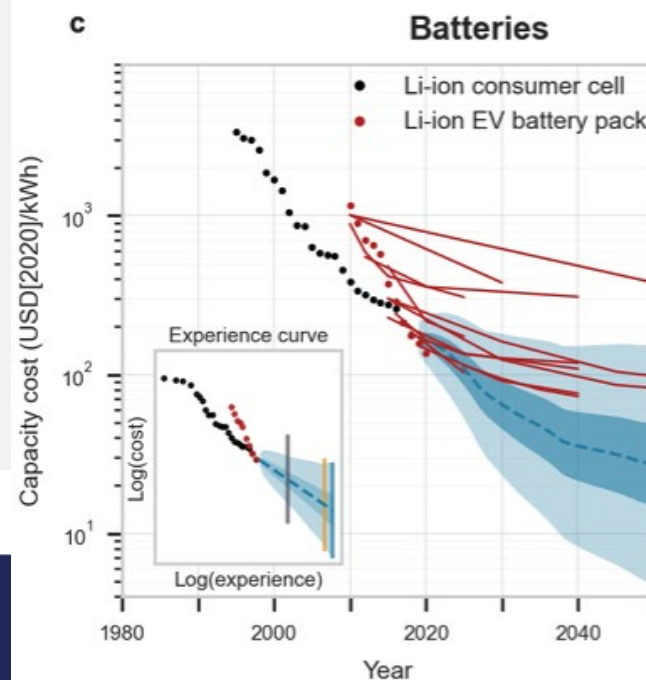
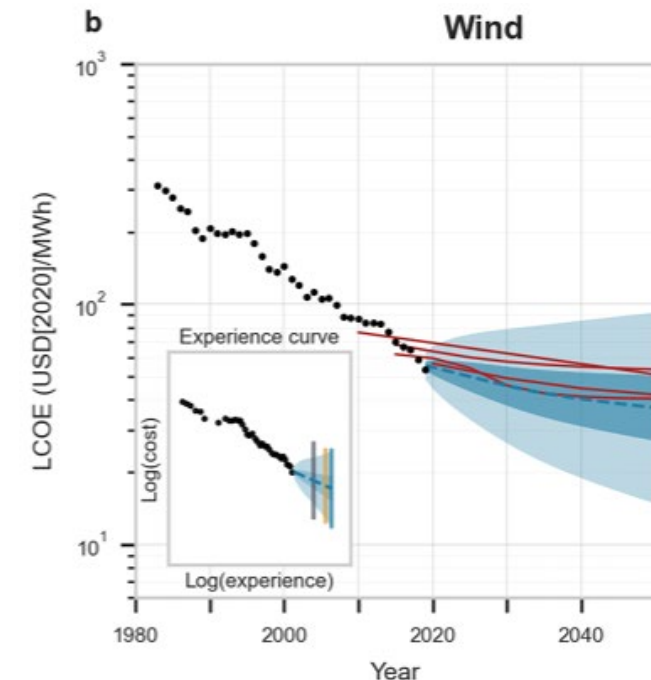
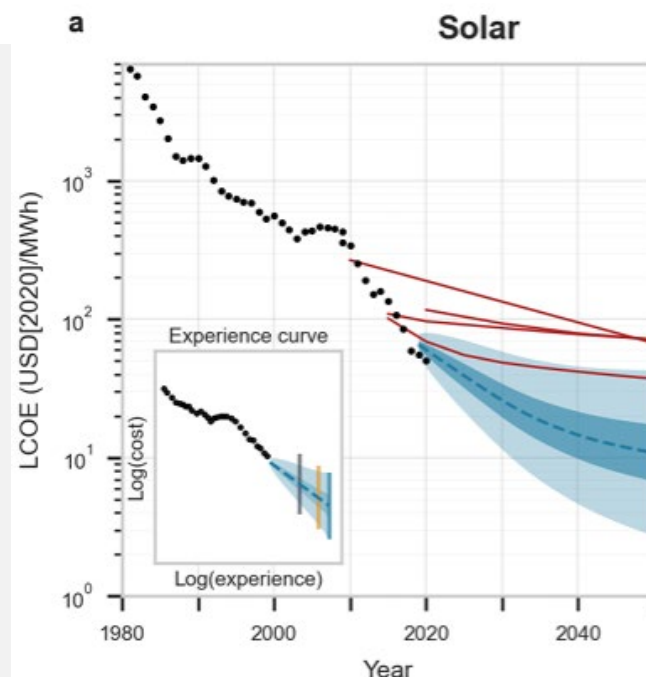


Learning Curves and Innovation Opportunities

Energy policy models consistently underpredict innovation

- Observed global average technology costs
- Probabilistic Wright's law forecast under Fast
- High progress IAM or IEA cost projections

“Empirically grounded technology forecasts and the energy transition” Institute for New Economic Thinking, Oxford University, INET Working Paper No. 2021-01, Sept. 14, 2021



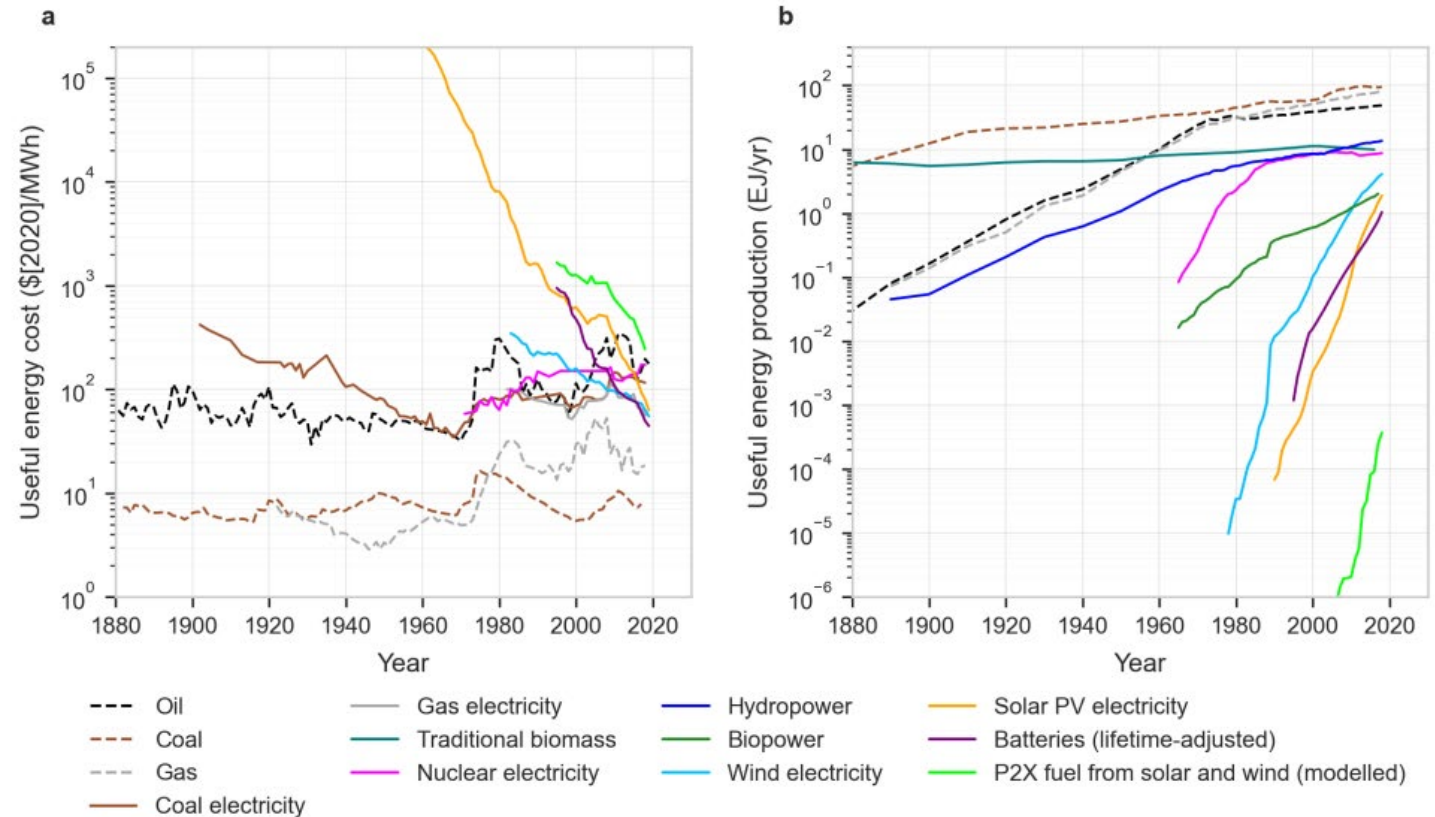
Learning Curves and Innovation Opportunities

Energy cost (left) and deployment (right)

Way et al., “Empirically grounded technology forecasts and the energy transition” INET Oxford Working Paper No. 2021-01, Sept. 14, 2021

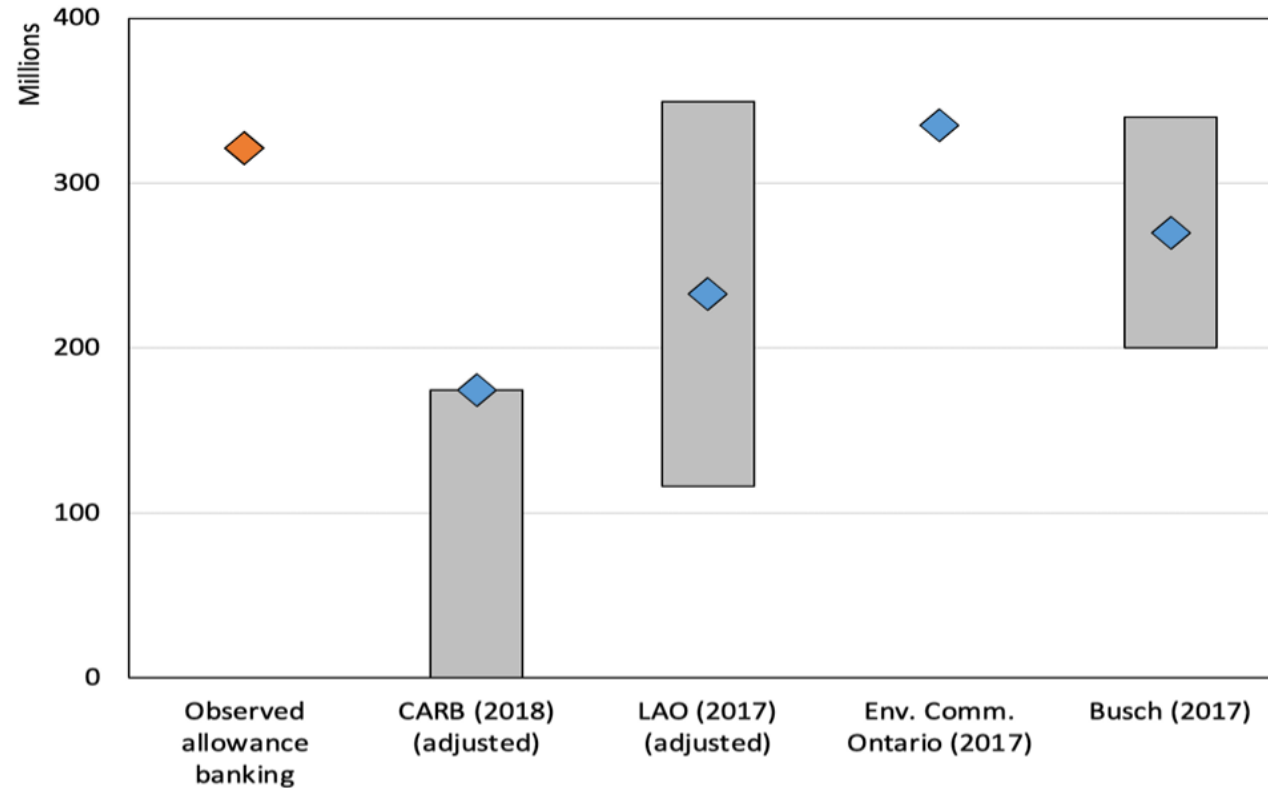


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AT THE OXFORD MARTIN SCHOOL



Allowances banked compared to earlier forecasts

Figure 1: Comparing Allowance Banking Scenarios ¹¹



Independent Emissions Market Advisory Committee, Annual Report 2021