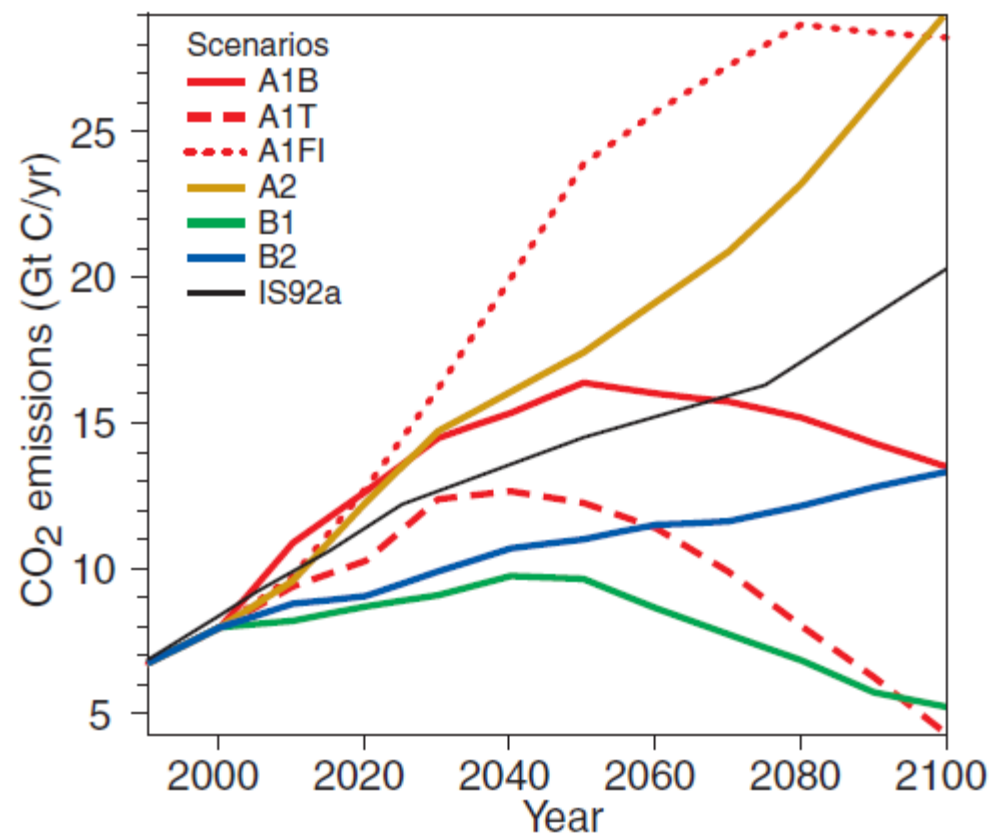
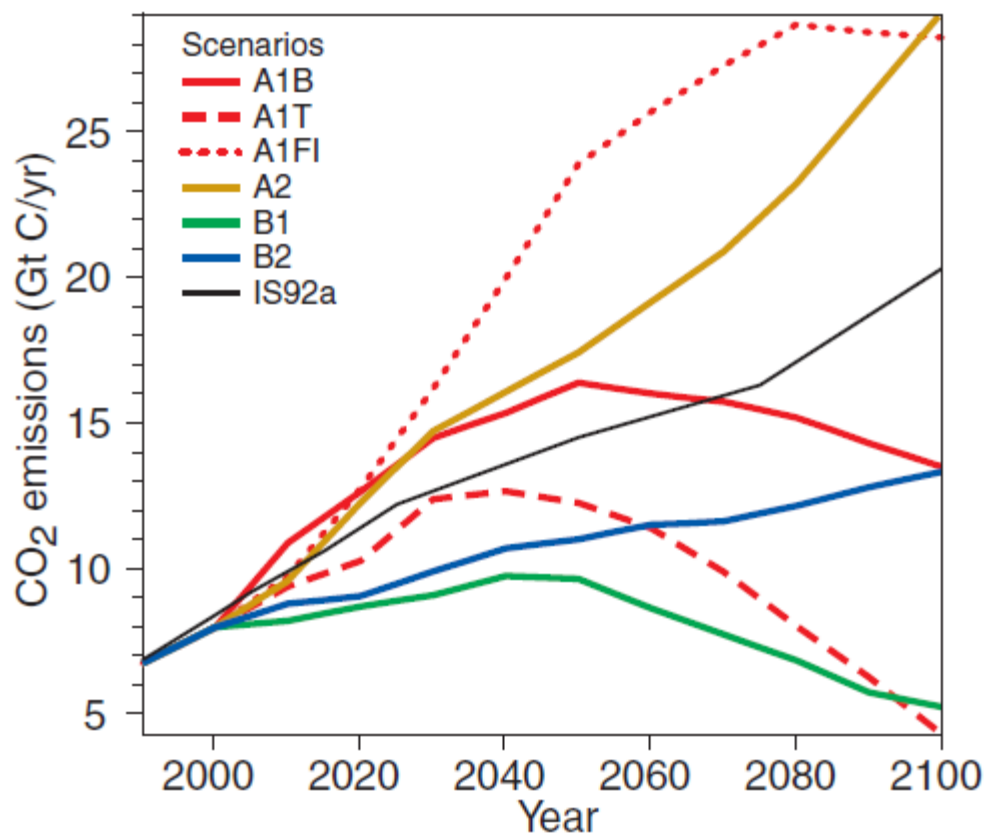


The furnaces of the world are now burning about 2,000,000,000 tons of coal a year. When this is burned, uniting with oxygen, it adds about 7,000,000,000 tons of carbon dioxide to the atmosphere yearly. This tends to make the air a more effective blanket for the earth and to raise its temperature. The effect may be considerable in a few centuries.

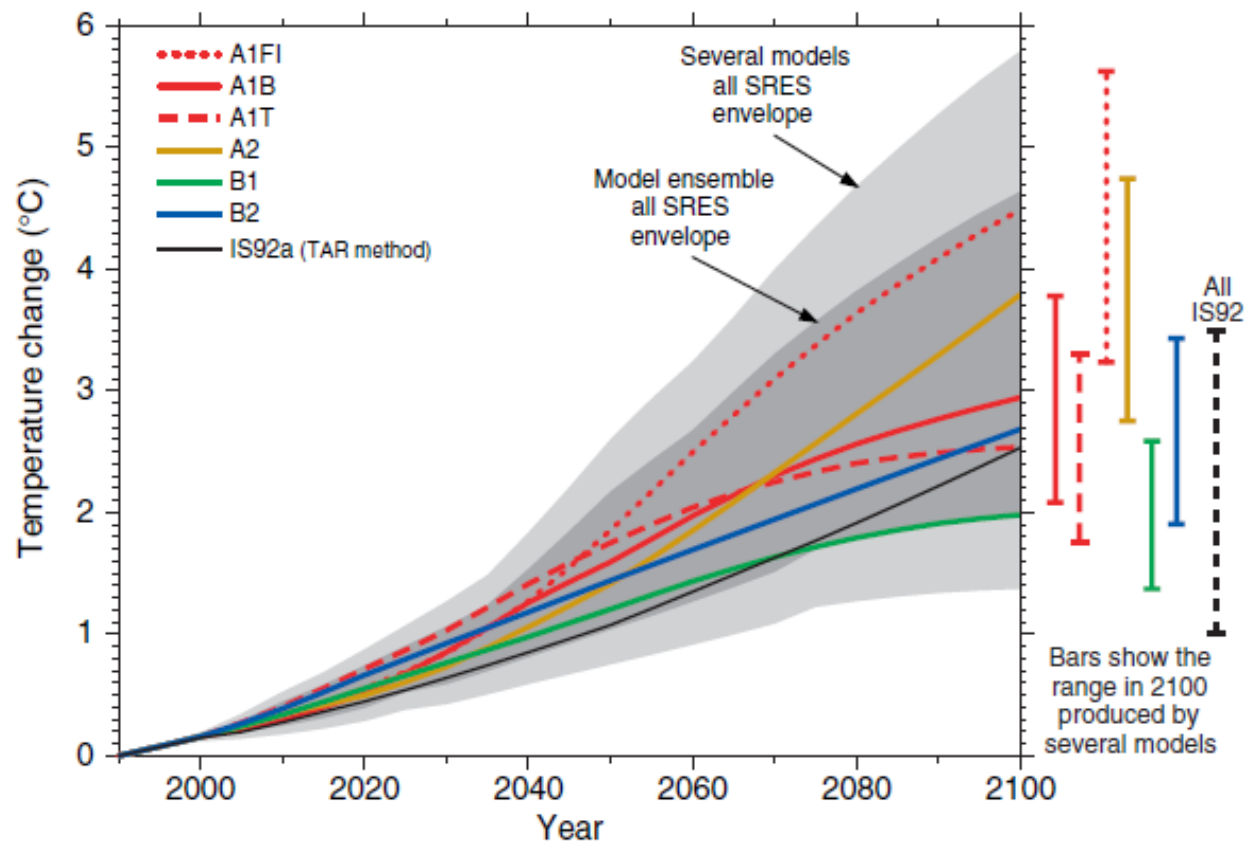
(a) CO₂ emissions



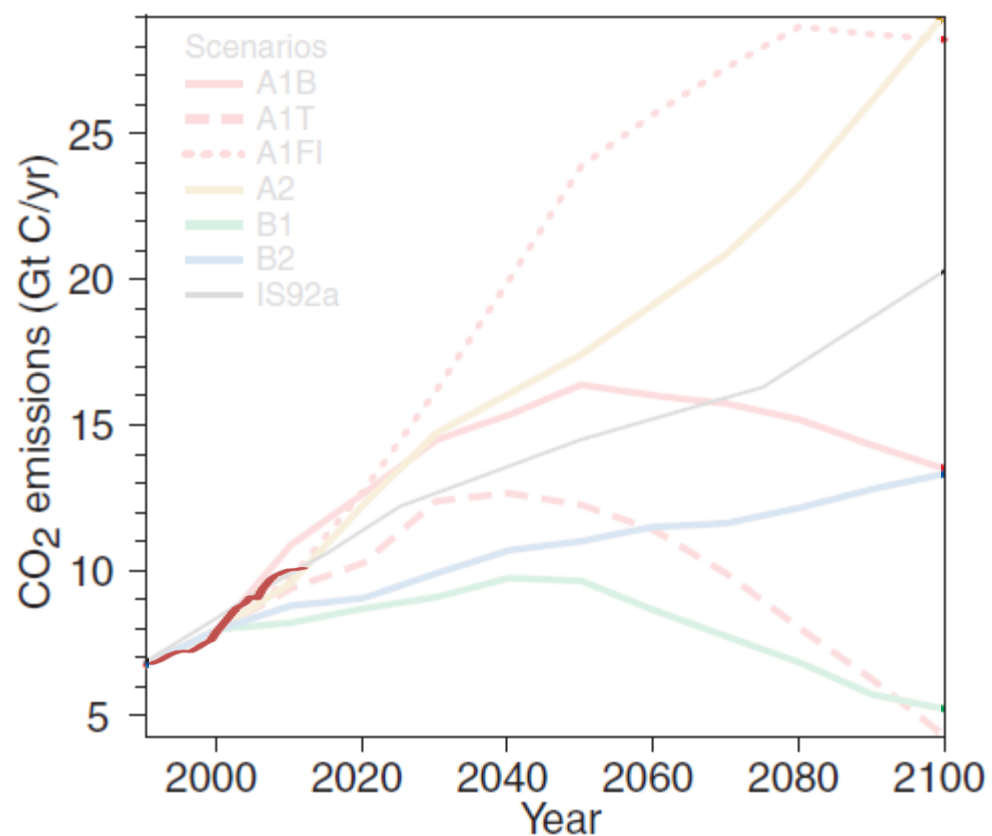
(a) CO₂ emissions



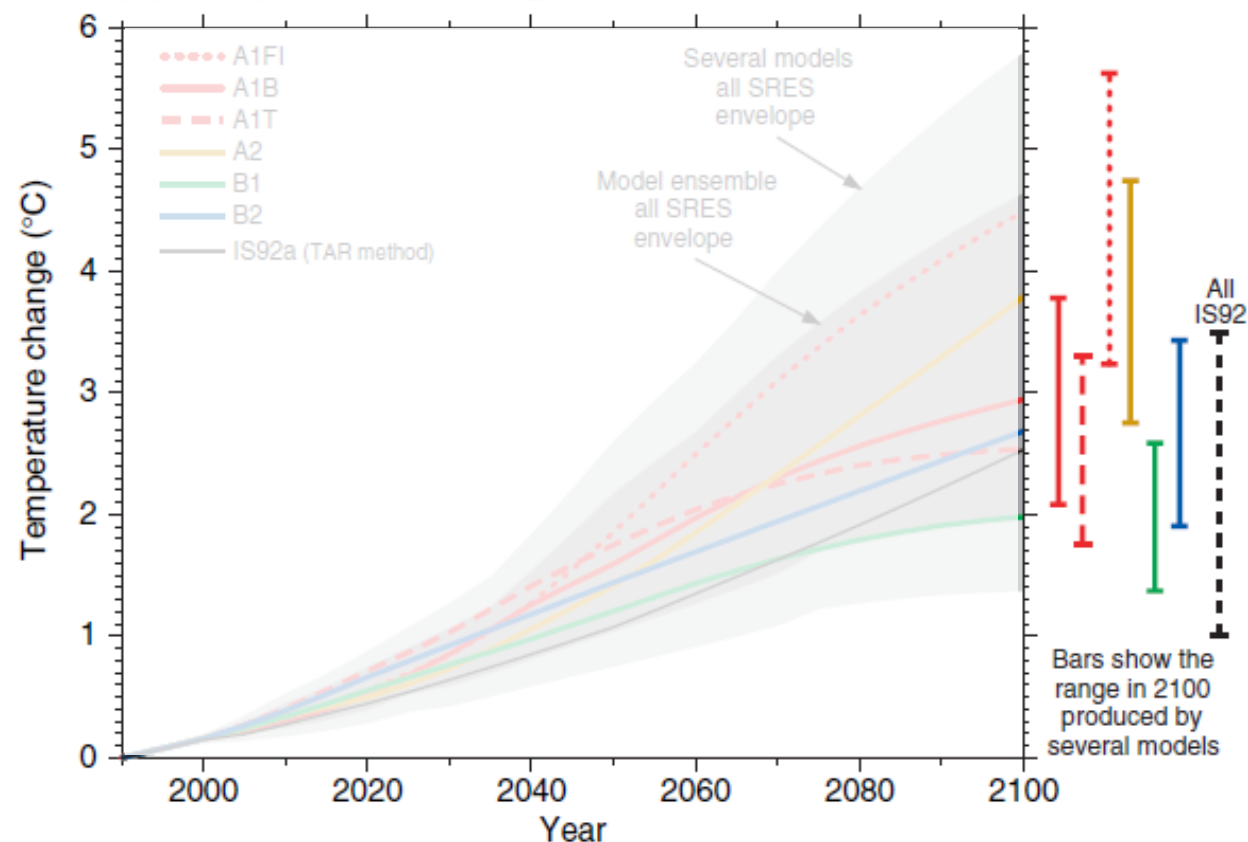
(d) Temperature change



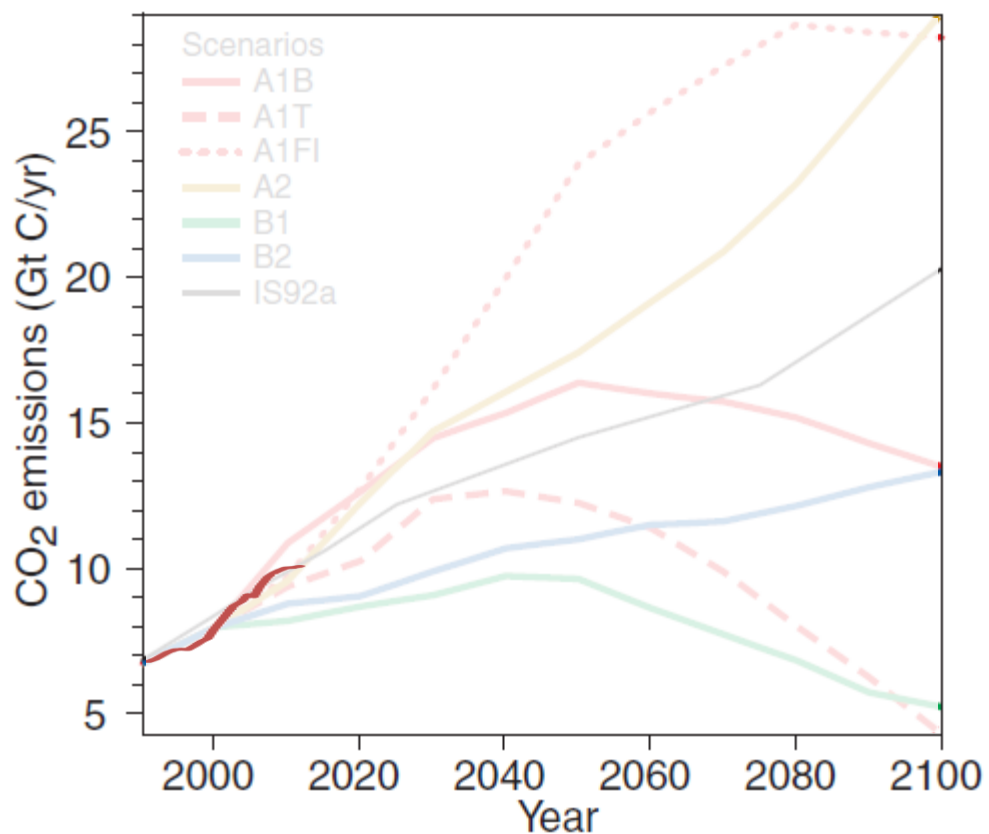
(a) CO₂ emissions



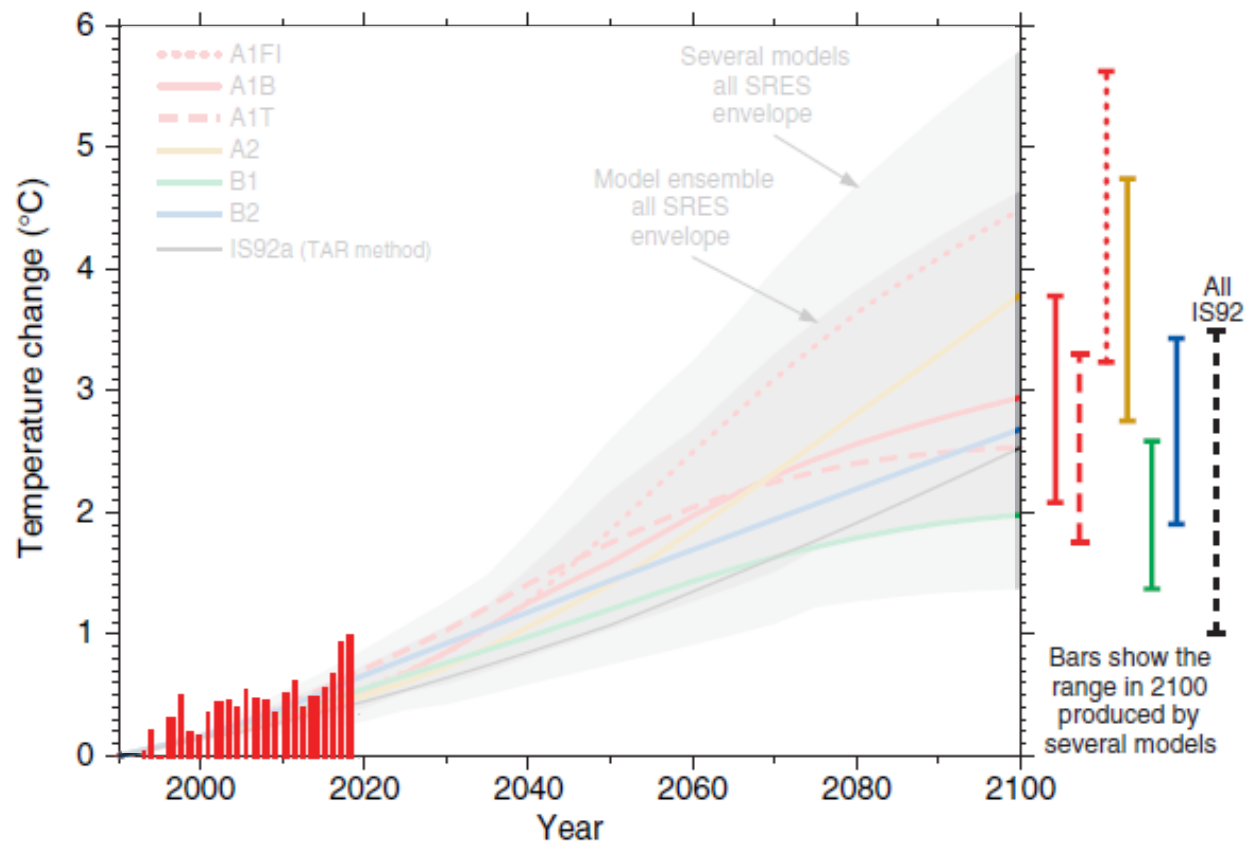
(d) Temperature change



(a) CO₂ emissions



(d) Temperature change

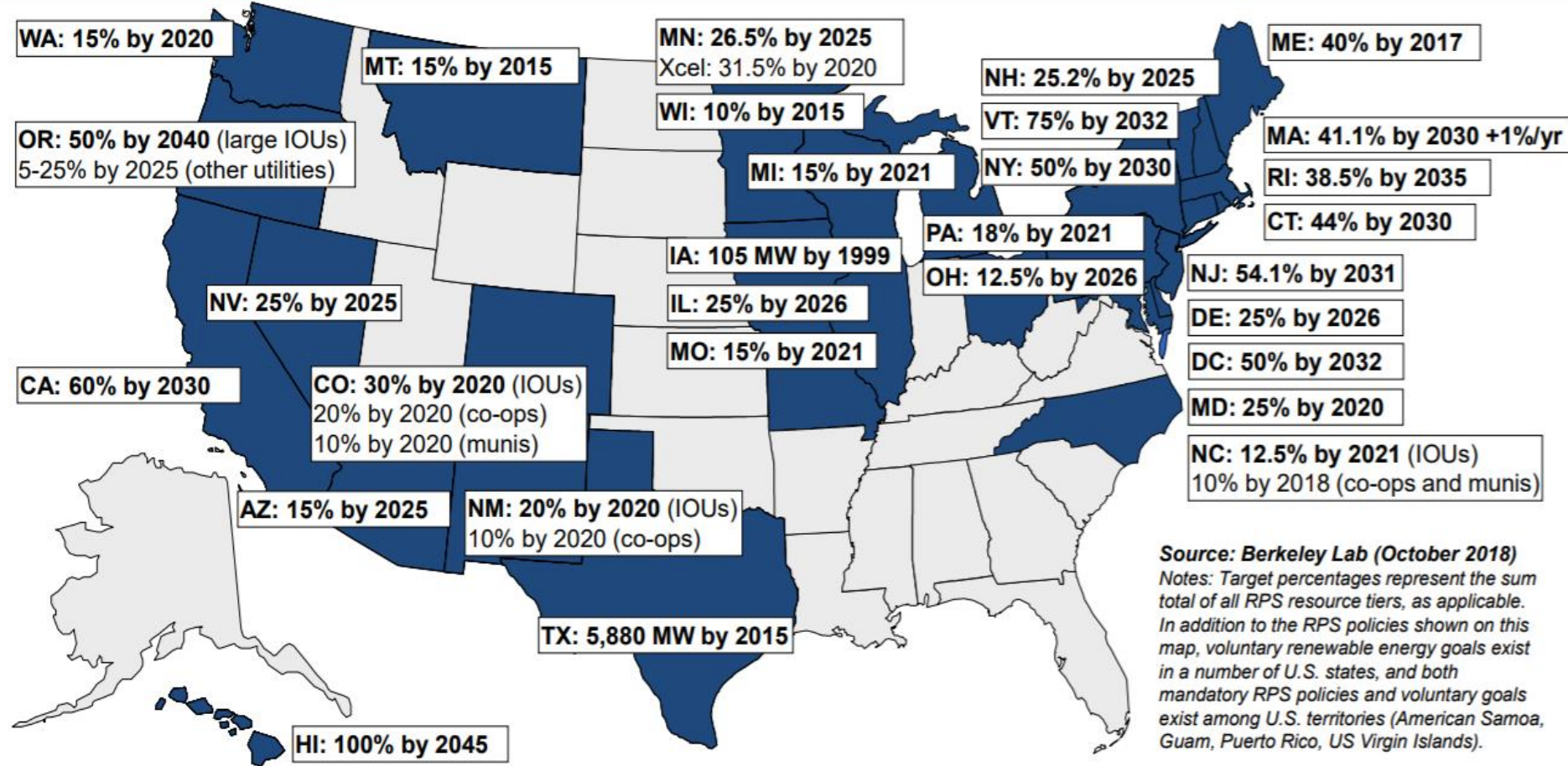


1. Electrify everything

2. Decarbonize electricity

RPS Policies Exist in 29 States and DC

Apply to 55% of Total U.S. Retail Electricity Sales



Source: Berkeley Lab (October 2018)
Notes: Target percentages represent the sum total of all RPS resource tiers, as applicable. In addition to the RPS policies shown on this map, voluntary renewable energy goals exist in a number of U.S. states, and both mandatory RPS policies and voluntary goals exist among U.S. territories (American Samoa, Guam, Puerto Rico, US Virgin Islands).

2009

2019

Total PJM RE Req'd (MWh)
 PJM Load (GWh)
 PJM Load
 Percent of PJM Load
 Capacity Equivlt (MW)

11,998,390.86	19,256,398.24	26,580,640.14	31,855,073.62	37,191,318.11	42,275,433.71	46,270,886.53	52,637,205.26	58,416,870.61	65,358,849.37	72,735,133.66	81,576,309.26	87,149,718.17
557,816.31	602,468.83	738,984.50	791,018.00	810,868.15	795,236.68	804,121.68	811,335.00	814,838.00	806,725.00	809,000.00	808,638.00	808,882.00
557,816,309.33	602,468,828.17	738,984,500.00	791,018,000.00	810,868,148.92	795,236,683.96	804,121,682.84	811,335,000.00	814,838,000.00	806,725,000.00	809,000,000.00	808,638,000.00	808,882,000.00
2.15%	3.20%	3.60%	4.03%	4.59%	5.32%	5.75%	6.49%	7.17%	8.10%	8.99%	10.09%	10.77%
1,369.68	2,198.22	3,034.32	3,636.42	4,245.58	4,825.96	5,282.06	6,008.81	6,668.59	7,461.06	8,303.10	9,312.36	9,948.60

2.13%

8.99%

1369 MW

8303 MW

2025

Total PJM RE Req'd (MWh)
 PJM Load (GWh)
 PJM Load
 Percent of PJM Load
 Capacity Equivlt (MW)

93,118,966.53	96,849,640.16	101,108,146.36	106,352,554.35	110,588,768.67	111,471,481.77	112,701,050.29	113,344,023.31	114,037,974.48	114,983,722.47	116,283,757.99	116,619,489.59
812,908.00	816,817.00	822,364.00	824,140.00	828,788.00	833,712.00	841,506.00	845,058.00	848,237.00	853,245.00	861,074.00	864,236.00
812,908,000.00	816,817,000.00	822,364,000.00	824,140,000.00	828,788,000.00	833,712,000.00	841,506,000.00	845,058,000.00	848,237,000.00	853,245,000.00	861,074,000.00	864,236,000.00
11.46%	11.86%	12.29%	12.90%	13.34%	13.37%	13.39%	13.41%	13.44%	13.48%	13.50%	13.49%
10,630.02	11,055.89	11,542.03	12,140.70	12,624.29	12,725.05	12,865.42	12,938.82	13,018.03	13,126.00	13,274.40	13,312.73

12.9%

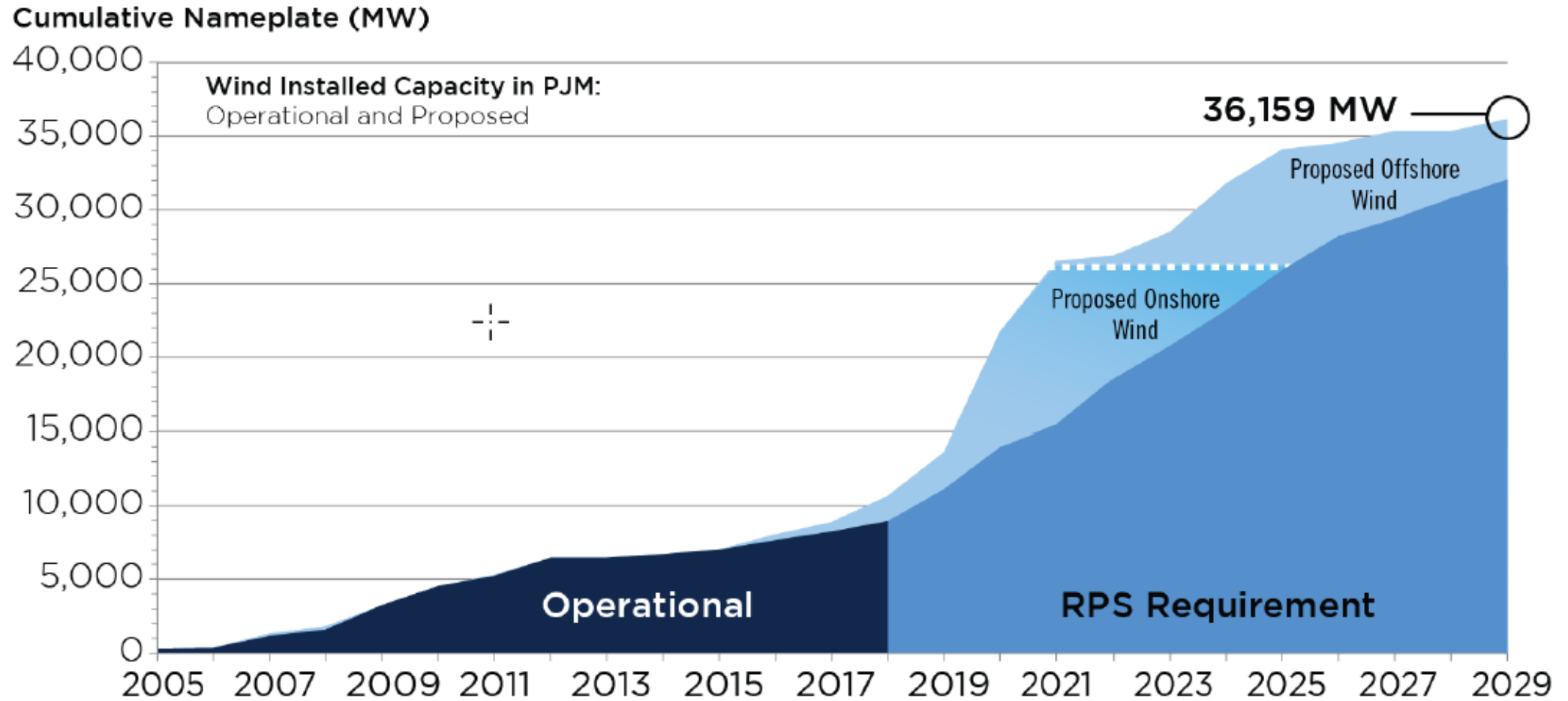
12,140 MW

Giacomoni affidavit, 2018

“[E]ven conservative estimates based mostly on currently enacted mandatory Renewable Portfolio Standards (including minimum solar carve-outs) indicate the PJM Region will see an additional 25,000 MWs of wind and an additional 12,000 MWs of solar resources (with approximately 8,000 MWs of that total behind-the-meter) by 2034.”

PJM, 2018

Figure 2. Projected Growth of Wind Resources in PJM



PJM, 2019

New State Actions (just in PJM states)



100% RPS target by 2040



Bill: 45% by 2030/ 100% by 2050



Pending signature/veto override:
50% RPS target by 2030



Bill: 25% by 2025/ 50% by 2032/ 75% by 2040/ 100% by 2050



Mandated ~5000 MW

Figure 11 – Major disaster events in the United States are getting worse over time

(Source: U.S. NOAA NCEI (2018a))

