Symposium Research and Sustainability

Obstacles to the clean energy transition

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Remarkable era...

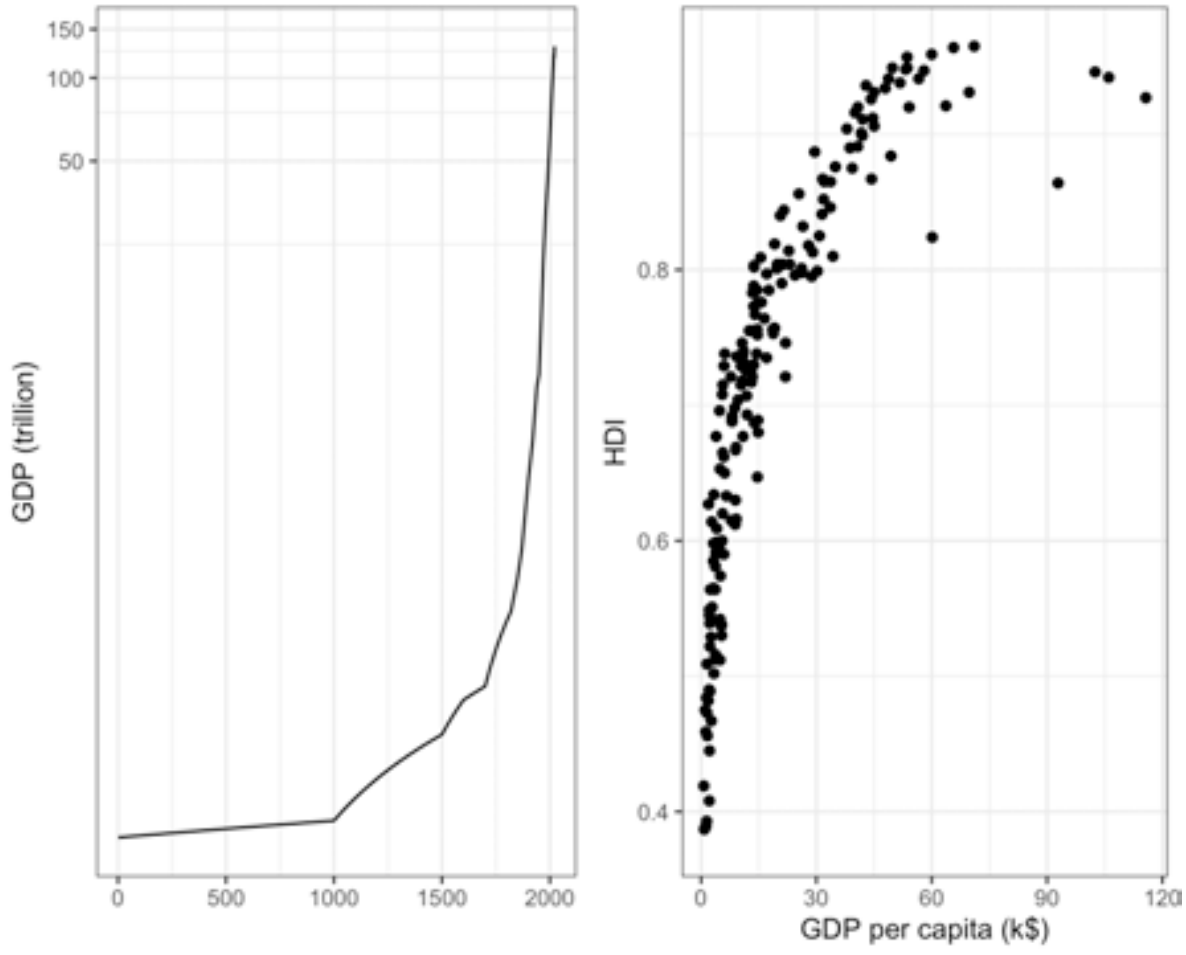


Figure 1: Data: World Bank.

... but an unsustainable one

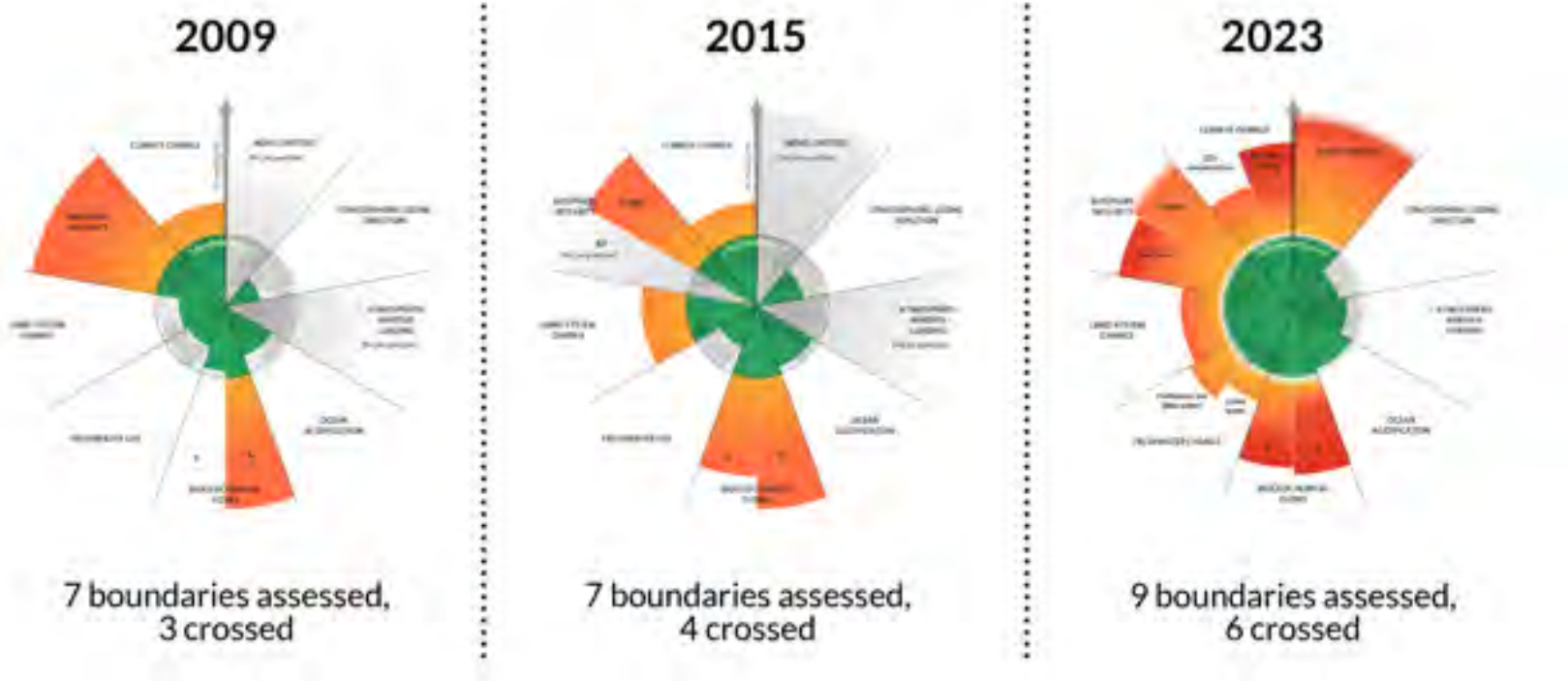
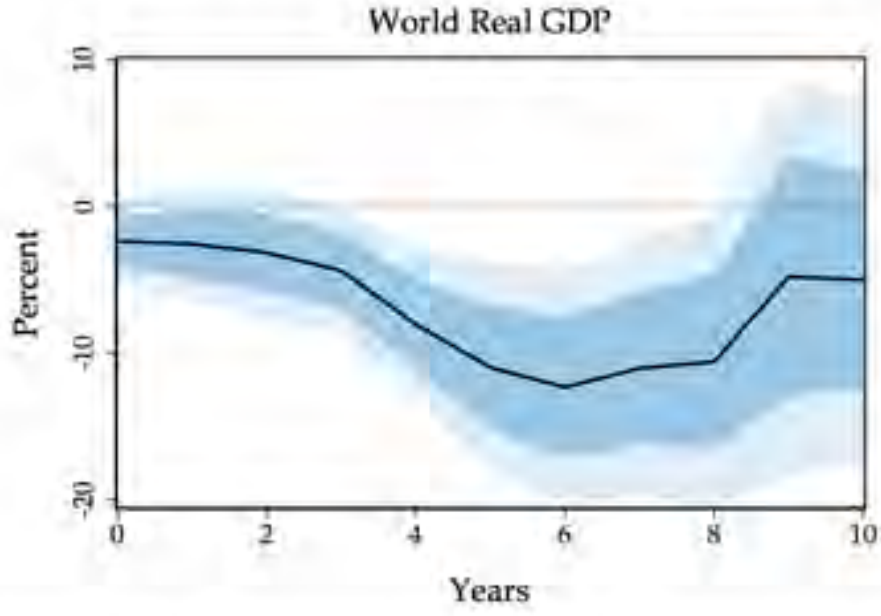


Figure 2: Source: Richardson et al. (2023)

... with real costs

Figure 3: The Effect of Global Temperature Shocks on World Output



Notes: The figure shows the impulse responses of world real GDP per capita to a global temperature shock, estimated based on (2). The solid line is the point estimate and the dark and light shaded areas are 68 and 90% confidence bands, respectively.

Figure 3: Source: Bilal and Känzig (2024)

Why is the system not self-correcting?

Politics and sustainability

In the clean energy transition...

1. State involvement is necessary
2. State involvement is unavoidable

Necessary

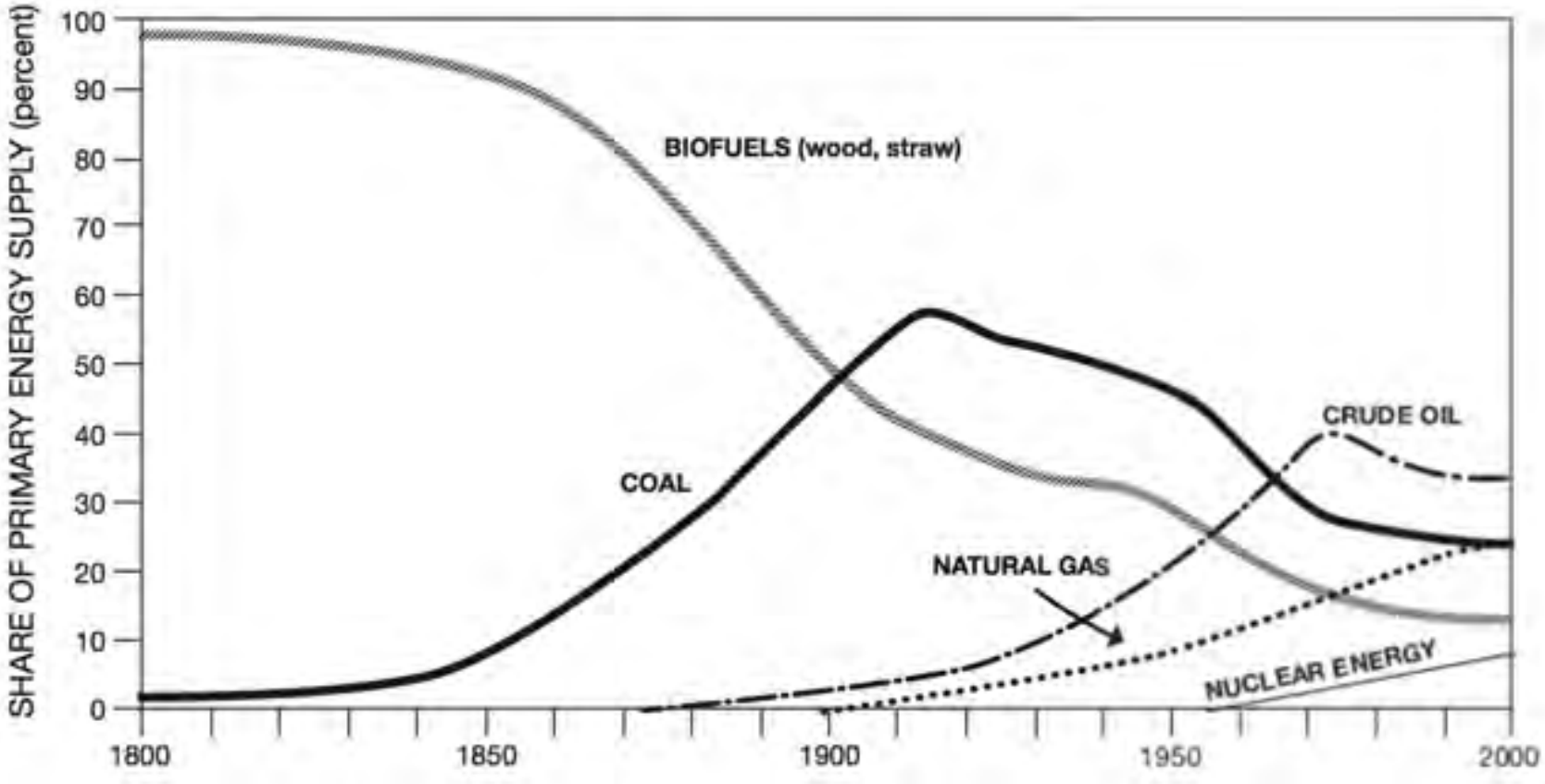
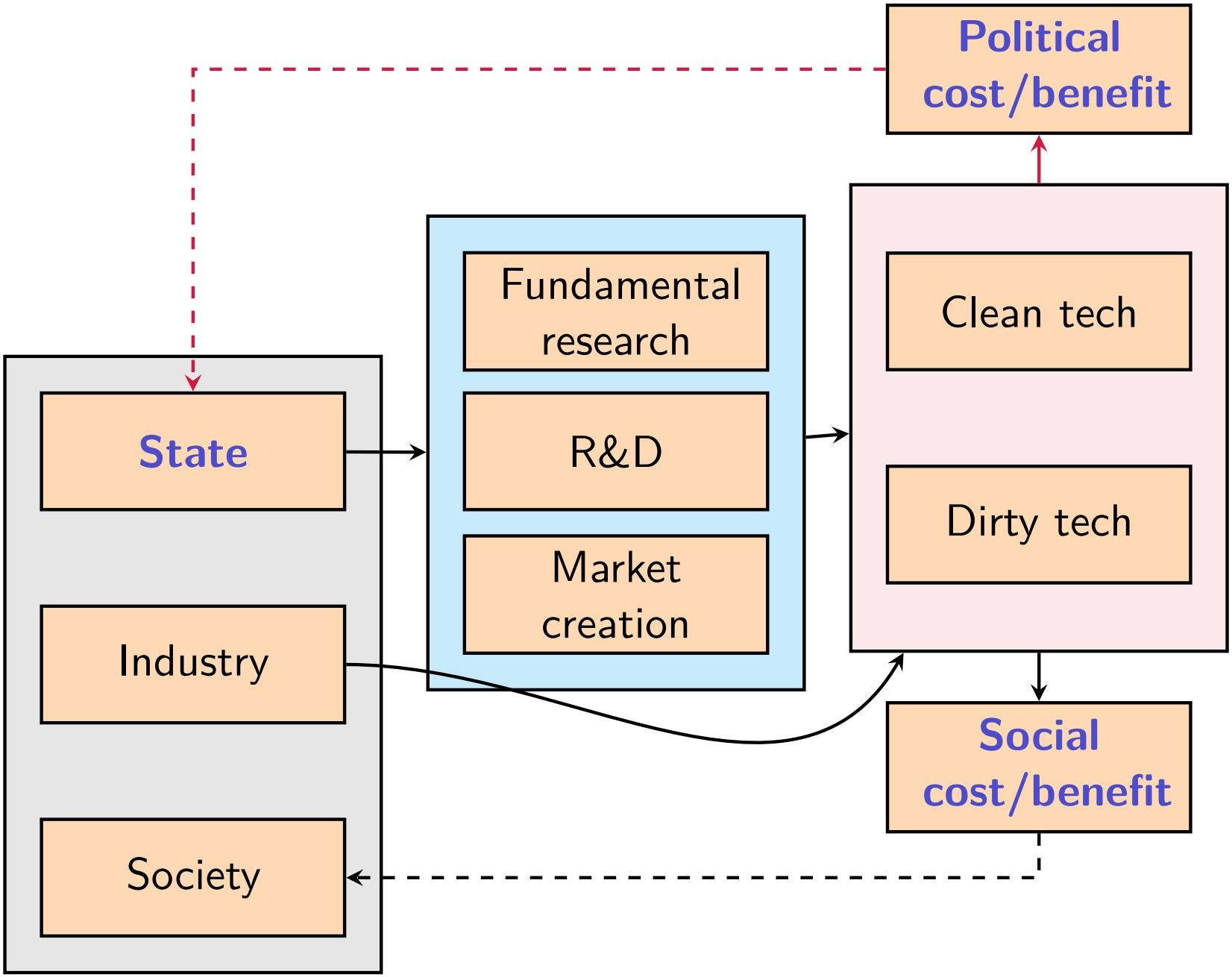


Figure 4: Energy transitions are slow. Source: Smil (2018)

Unavoidable



Implication

To be scaled up and crowd out "dirty" tech, clean tech must generate sufficient political and social payoffs

Two illustrations: energy poverty and fossil phaseout

Case I: Solving energy poverty

Solutions exist

700m people w/o electricity

3b people w/o modern cooking tech $\rightarrow$ large welfare losses

Solar microgrids as a solution?

References: Aklin et al. (2016), Aklin et al. (2017), Aklin et al. (2018), Rosenberg et al. (2020)

Figure 5: Uttar Pradesh, India

... but they don't always work

	Savings		Expenses		Business		Work time		Study		Phone charging	
	(1) ITT	(2) LATE	(3) ITT	(4) LATE	(5) ITT	(6) LATE	(7) ITT	(8) LATE	(9) ITT	(10) LATE	(11) ITT	(12) LATE
Treatment	65.82 (88.96)	224.17 (316.67)	192.81 (174.24)	656.69 (638.43)	−0.01 (0.02)	−0.03 (0.06)	−0.05 (0.21)	−0.18 (0.71)	−0.01 (0.03)	−0.02 (0.10)	0.66 (1.11)	2.55 (4.34)

Figure 6: Effect of solar microgrids. Source: Aklin et al. (2017)

→ Low social acceptance ("fake electricity")

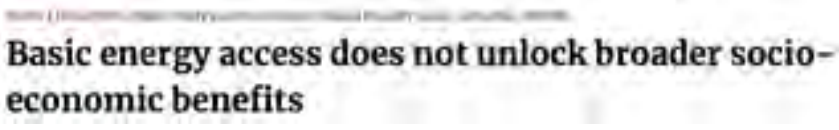

Basic energy access does not unlock broader socio-economic benefits

Figure 7: Hindustan Times

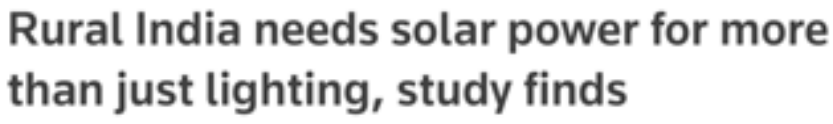

Rural India needs solar power for more than just lighting, study finds

Figure 8: Reuters

Case II: Costly fossil fuel phaseouts

References: Blankenship et al. (2022), Lim, Aklin, and Frank (2023), Aklin (forthcoming)

In the US...

- Energy transition imposes econ costs on fossil regions
- Electoral implications (Egli, Schmid, and Schmidt 2022)

Biden administration: fossil-to-green job pipeline

- *If* effective: would reduce political cost of climate action
- Plausible? Do they live in the right place? Do they have the right skills?

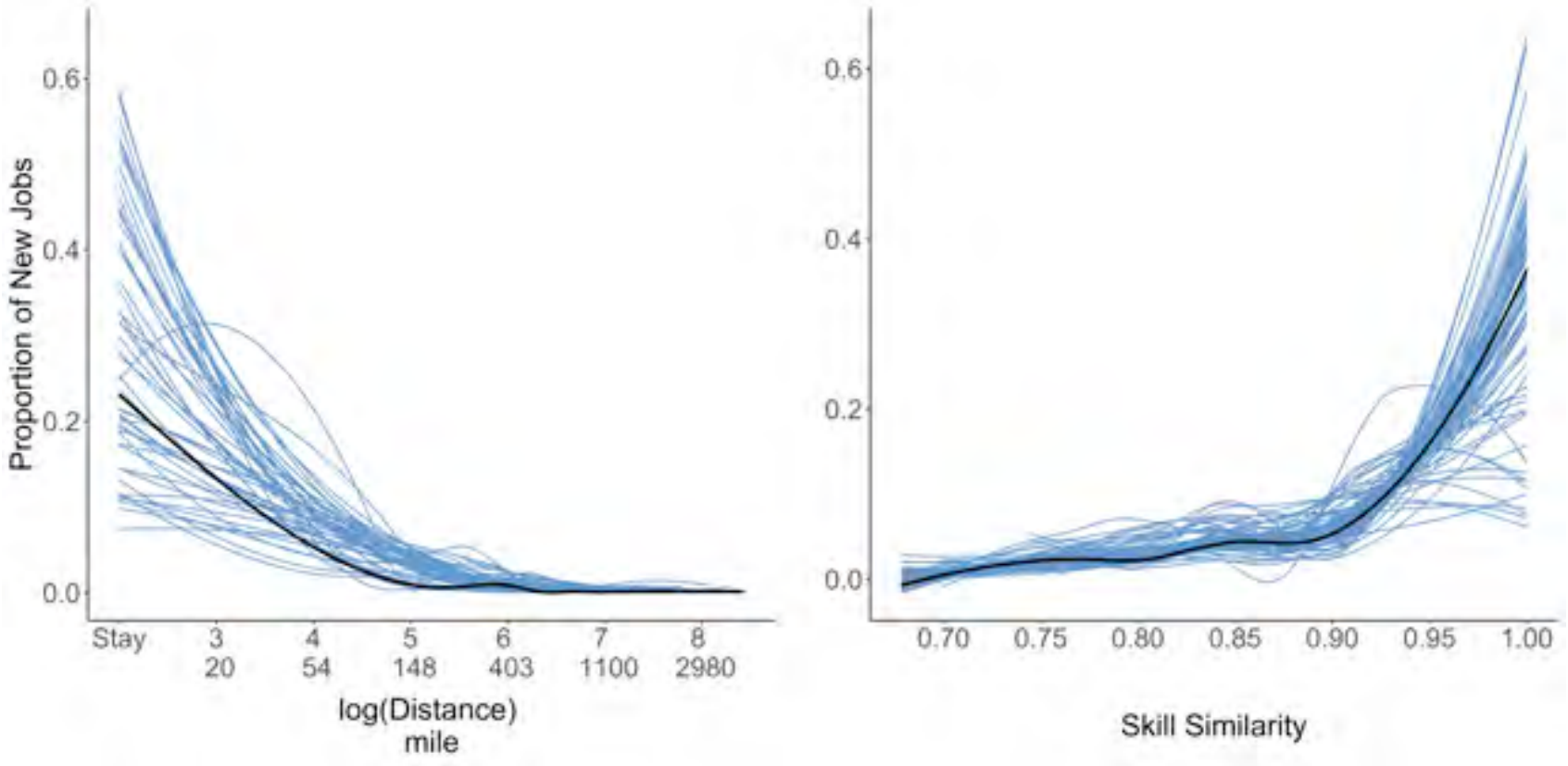
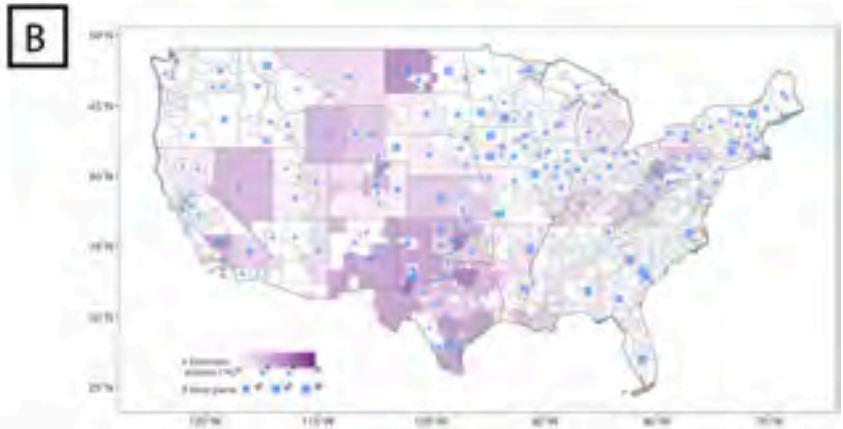
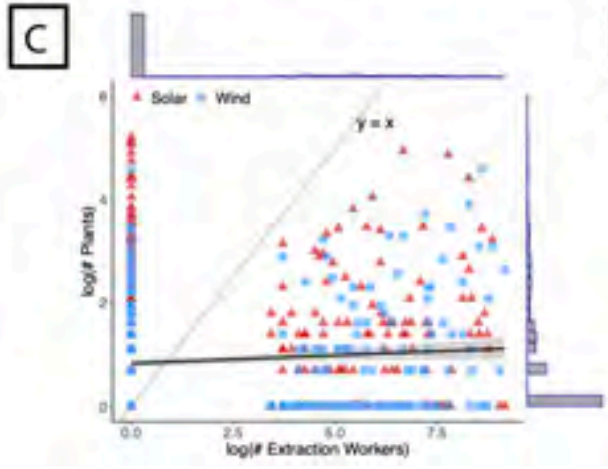


Figure 9: Source: Lim, Aklin, and Frank (2023).

$\rightarrow$ Fossil fuel workers are not particularly mobile





D

	All Plants		Solar Plants		Wind Plants	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
log(Extraction Workers)	-0.01 (0.004) P=0.151		-0.06 (0.01) $P \leq 10^{-3}$		0.18 (0.01) $P \leq 10^{-3}$	
log(FF Workers)		-0.02 (0.01) $P \leq 10^{-3}$		-0.12 (0.01) $P \leq 10^{-3}$		0.19 (0.01) $P \leq 10^{-3}$
log(Labor Force)	0.51 (0.01) $P \leq 10^{-3}$	0.52 (0.01) $P \leq 10^{-3}$	0.70 (0.01) $P \leq 10^{-3}$	0.80 (0.01) $P \leq 10^{-3}$	-0.01 (0.03) P=0.853	-0.06 (0.03) P=0.034
Psuedo R^2	0.26	0.26	0.33	0.35	0.09	0.06
Observations	510	510	510	510	510	510

Figure 10: Source: Lim, Aklin, and Frank (2023).

$\rightarrow$ Fossil fuel workers don't live near emerging clean energy hubs

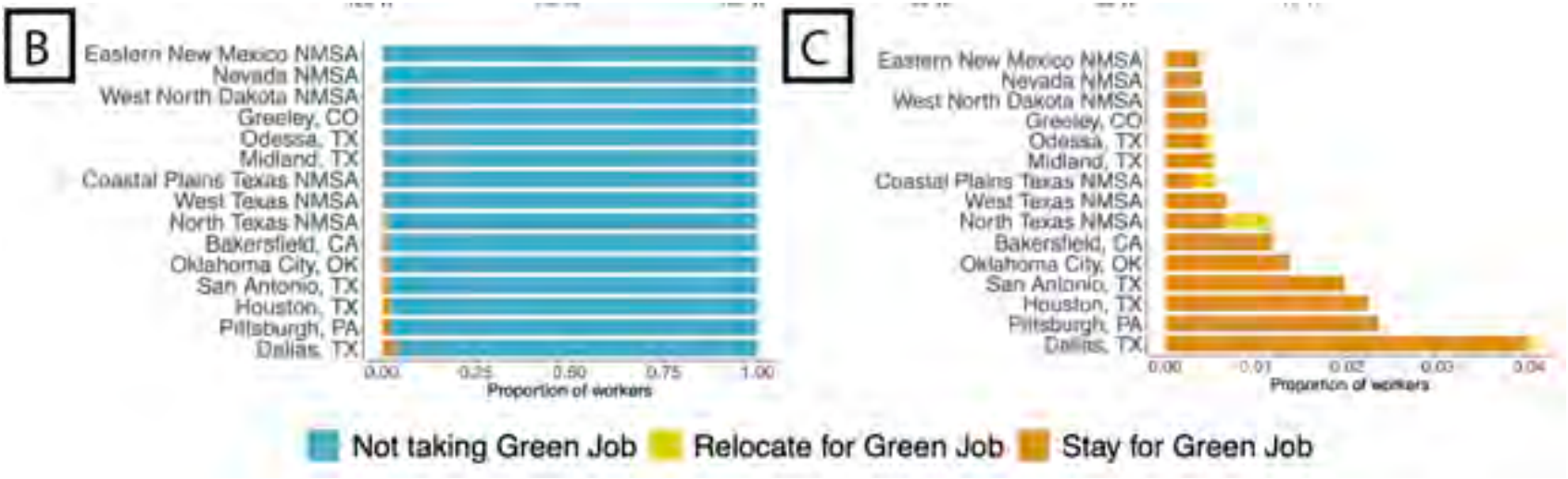


Figure 11: Source: Lim, Aklin, and Frank (2023).

Few fossil fuel workers will take green jobs

$\rightarrow$ Fossil fuel-to-green pipeline: unlikely to reduce political costs

Other policies will be needed to reduce barriers to clean tech

What Europe? India? China?

To conclude

Sustainability: exit and entry of tech is (co)determined by politics

Implications...

Identify policymakers' objective function over new technologies

Increase social acceptance/fairness

From Bavaria to Ohio, build coalitions

Figure 12: Lithium battery plants... Source: NREL

Thank you

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