How to Bring A New Technology to Market:

What Works in Government Policy

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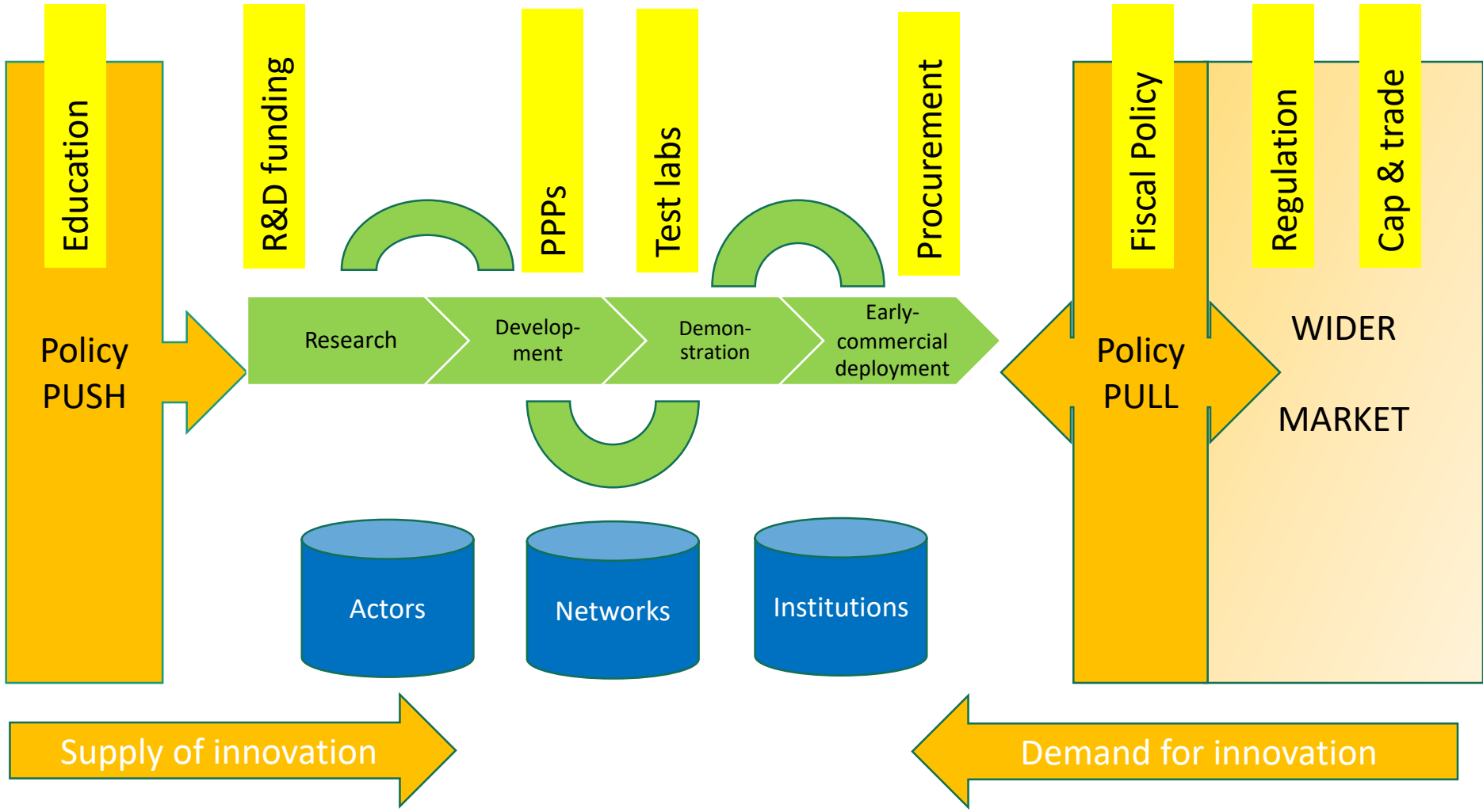
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CIERP
Center for International Environment & Resource Policy

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Energy Innovation System



Adapted from Wilson & Grubler 2012. *Energy Technology Innovation*. Cambridge University Press, Cambridge UK

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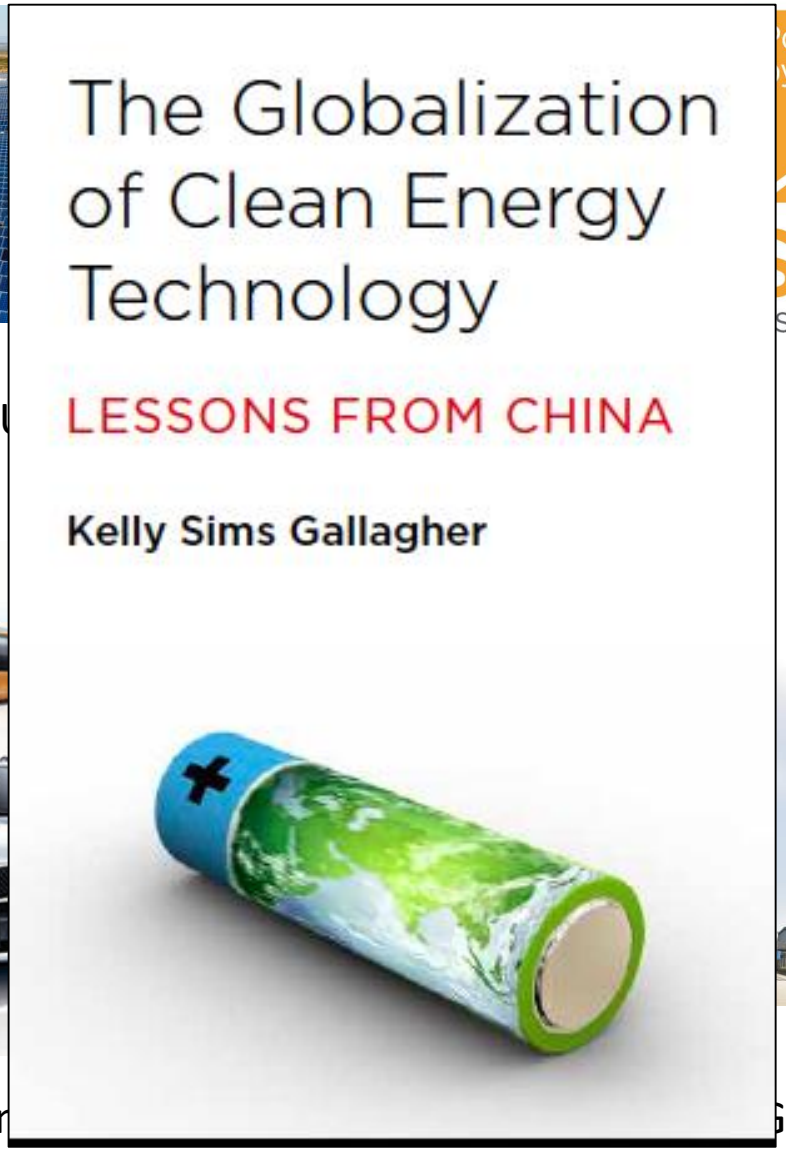
Clarify Policy Goals

- Reduce costs
- Improve performance
- Overcome resistance from incumbents
- Create niche markets
- Correct for structural market deficiencies or failures
- Create co-benefits (e.g. job creation, synergies between mitigation and adaptation, air pollution control)
- Mobilize financial resources

Case studies



U.S. utility-scale solar in U





U.S. solar target

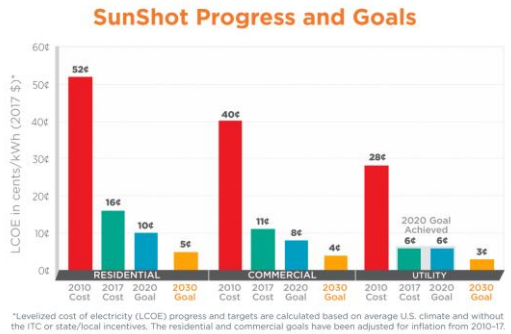


BYD and EV's in



reenGen IGCC Plant

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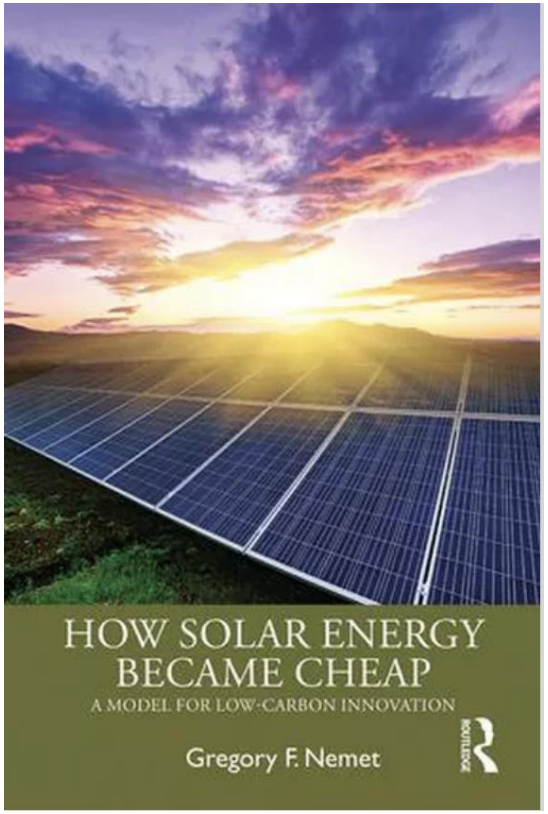


Now 4.9 cents

Table 1a. Estimated levelized cost of electricity (capacity-weighted average[1]) for new generation resources entering service in 2023 (2018 $/MWh)

Plant type	Capacity factor (%)	Levelized capital cost	Levelized fixed O&M	Levelized variable O&M	Levelized transmission cost	Total system LCOE	Levelized tax credit[2]	Total LCOE including tax credit
Dispatchable technologies								
Coal with 30% CCS[3]	NB	NB	NB	NB	NB	NB	NB	NB
Coal with 90% CCS[3]	NB	NB	NB	NB	NB	NB	NB	NB
Conventional CC	87	8.1	1.5	32.3	0.9	42.8	NA	42.8
Advanced CC	87	7.1	1.4	30.7	1.0	40.2	NA	40.2
Advanced CC with CCS	NB	NB	NB	NB	NB	NB	NB	NB
Conventional CT	NB	NB	NB	NB	NB	NB	NB	NB
Advanced CT	30	17.2	2.7	54.6	3.0	77.5	NA	77.5
Advanced nuclear	NB	NB	NB	NB	NB	NB	NB	NB
Geothermal	90	24.6	13.3	0.0	1.4	39.4	-2.5	36.9
Biomass	83	37.3	15.7	37.5	1.5	92.1	NA	92.1
Non-dispatchable technologies								
Wind, onshore	44	27.8	12.6	0.0	2.4	42.8	-6.1	36.6
Wind, offshore	45	95.5	20.4	0.0	2.1	117.9	-11.5	106.5
Solar PV[4]	29	37.1	8.8	0.0	2.9	48.8	-11.1	37.6
Solar thermal	NB	NB	NB	NB		NB	NB	NB
Hydroelectric[5]	75	29.9	6.2	1.4		39.1	NA	39.1

[1]The capacity-weighted average is the average levelized cost per technology weighted by the new capacity coming online in each region. The capacity additions for each region are based on projections from 2021–2023. Technologies for which capacity additions are not expected do not have a capacity-weighted average and are marked as *NB* or not built.
[2]The tax credit component is based on targeted federal tax credits such as the PTC or ITC available for some technologies. It reflects tax credits available only for plants entering service in 2023 and the substantial phase out of both the PTC and ITC as scheduled under current law. Technologies not eligible for PTC or ITC are indicated as *NA* or not available. The results are based on a regional model. State or local incentives are not included in LCOE calculations. See text box on page 2 for details on how the tax credits are represented in the model.
[3]Because the New Source Performance Standard (NSPS) under Section 111(b) of the Clean Air Act requires conventional coal plants to be built with CCS to meet specific CO2 emission standards, EIA modeled two levels of CCS removal: 30%, which meets the NSPS, and 90%, which exceeds the NSPS but may be seen as a build option in some scenarios. The coal plant with 30% CCS is assumed to incur a three-percentage-point increase to its cost of capital to represent the risk associated with higher emissions.
[4]Costs are expressed in terms of net AC power available to the grid for the installed capacity.
[5]As modeled, EIA assumes that hydroelectric generation has seasonal storage so that it can be dispatched within a season, but overall operation is limited by resources available by site and season.
CCS=carbon capture and sequestration. CC=combined-cycle (natural gas). CT=combustion turbine. PV=photovoltaic.
Source: U.S. Energy Information Administration, *Annual Energy Outlook 2019*



Sunshot Progress

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Policy Tools That Work

