

# Learning How to Build Back Better: The Role and Potential of Clean Energy Policy Evaluation

Joseph E. Aldy  
Harvard Kennedy School

University of Houston Law Center  
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# Policy Context:

## Major Clean Energy Spending Proposals

- 2020: Stimulus
  - Environmental advocates' proposal for green stimulus
  - Fatih Birol, IEA – “clean energy at the heart of stimulus plans”
  - Kristalina Georgieva, IMF – “we are about to deploy enormous, gigantic fiscal stimulus and we can do it in a way that we tackle both crises at the same time”

# Policy Context: Major Clean Energy Spending Proposals

- 2021: Build Back Better / Infrastructure
  - Biden American Jobs Plan / reconciliation
  - European Green Deal
  - UK Build Back Better
- 2°C goal may require ~\$2 trillion/year by 2030
  - Hundreds of billions of dollars in reconciliation (maybe)
- How do we know if we are building back better?

# Learning How to Build Back Better

- Benefits of Clean Energy Program Evaluation
- Lessons from Regulatory Review
- Lessons from the 2009 Recovery Act
- Lessons from the Causal Inference Literature
- Planning for Clean Energy Program Evaluations
- Policy Implications

# The Benefits of Evaluating Clean Energy Policy Performance

- Demonstrate policy efficacy
  - Progress towards emission goals
  - Distribution of benefits, costs, impacts, etc.
  - Policy cost-effectiveness

# The Benefits of Evaluating Clean Energy Policy Performance

- Enable policy updating
  - Evidence to inform policy improvement
  - Exploit iterative nature of clean energy policy

# The Benefits of Evaluating Clean Energy Policy Performance

- Advance learning agenda for climate
  - Implement Foundations for Evidence-Based Policymaking Act of 2018
  - Institutionalize learning agenda for climate
  - Inform strategic and budget planning for climate

# Lessons from Regulatory Review

- “Compelling need” standard for regulatory review applies equally to clean energy spending
- Institutionalize evaluation methods and processes
- Support iterative policy and retrospective analysis



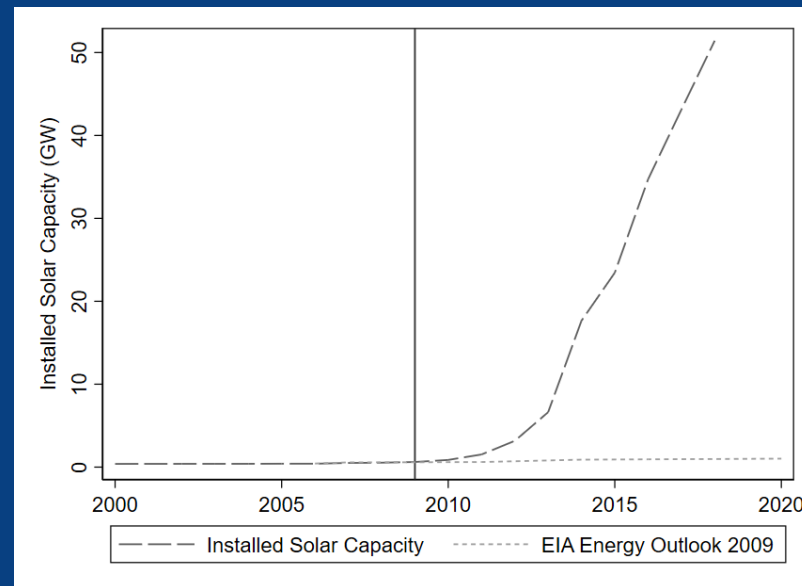
# Lessons from Recovery Act

- Generating data through reporting and transparency
- Failing to evaluate the causal impacts of clean energy programs

# Solar Power Capacity Investment

## Attributing growth to policy?

- 2008 ITC extension
- 2009 §1603 grants
- 1986 accelerated depreciation
- 2009 §1705 loan guarantees
- State RPS or CO2 cap-and-trade programs
- Net metering
- Federal R&D spending
- German demand or Chinese supply subsidies



Notes: The forecast reflects the non-ARRA reference case in the EIA Annual Energy Outlook 2009. Realized utility-scale installed capacity data sourced from the EIA Electricity Data Browser.

# Multiple Subsidies per Investment: §1705 Loan Guarantee Program

Project	Description	LG	Accelerated Dep	160.	48C	State RPS	Stat Tax Credit	Cap and Trade	Mile.
Abengoa Bioenergy Biomass of Kansas	1 of first commercial-scale biofuel plants in US	X	X						X
Abound Solar	Manufacture thin-film solar panels	X	X		X	X			
Agua Caliente (PV)	290-MW PV solar generation project	X	X		X	X		X	
Alamosa Solar Generating Project (HCPV)	29.3 MW HCPV solar generation project	X	X	X		X			
Antelope Valley Solar Ranch (PV)	230-MW project featuring utility scale deployment of innovative inverters with voltage regulation	X	X		X	X		X	
Beacon Power	Construction of 20 MW flywheel energy storage plant	X	X			X			X
Blue Mountain*	Harness renewable energy by tapping into underground geothermal reservoir	X	X			X			
California Valley Solar Ranch (PV)	250-MW PV solar generation project	X	X	X		X		X	
Crescent Dunes (CSP)	110-MW CSP plant (largest molten salt power tower in the world)	X	X		X	X	X		
Desert Sunlight (PV)* -	550-MW PV solar generation plant, 1 of largest PV solar plants in world	X	X	X		X		X	
Desert Sunlight 250/300									
Genesis Solar (CSP)*	250-MW parabolic trough CSP plant	X	X	X		X		X	
Granite Reliable*	99-MW wind power generation	X	X	X		X			
Ivanpah (CSP)	World's largest CSP facility upon completion	X	X	X		X		X	
Kahuku	30-MW wind power generation project	X	X	X		X			
Mesquite Solar 1(PV)	170-MW PV solar generation project	X	X	X		X		X	
Mojave Solar (CSP)	250-MW parabolic trough CSP plant	X	X	X		X		X	
One Nevada Transmission Line (ON Line)	235 mile AC transmission line capable of carrying 600 MW of power at the grid	X	X			X			
Ormat Nevada*	3 geothermal plants across northern Nevada	X	X	X		X			X
Project Amp (PV)*	Installation of 733 MW of PV solar panels on industrial buildings across country	X	X						
Project Liberty	Nation's first commercial scale cellulosic ethanol plant	X	X			X			
Record Hill	51-MW wind power generation, 8 mile transmission line	X	X	X		X			
Shepherds Flat*	845-MW wind power generation project	X	X	X		X	X		
Solan (Solyndra)	Construction of commercial-scale plant for proprietary cylindrical solar PV panels	X	X			X		X	
Solana (CSP)	250-MW parabolic trough CSP plant w/innovative thermal energy storage system	X	X	X		X			
SoloPower	Thin-film solar panel manufacturing facility	X	X			X	X		
USG Oregon	Uses more efficient method of extracting thermal energy from subterranean hot water	X	X	X		X			

# Lessons from Causal Inference Literature

- “Natural experiments help answer important questions for society.”
  - announcement of the 2021 Nobel Prize in Economic Sciences
- Evaluate policies by using variation that effectively mimics a randomized control trial
  - Like clinical trials in medicine
- Learn how a policy causes an outcome

# Lessons from Causal Inference Literature

- Weatherization Assistance Program
  - Randomized encouragement
- Small Business Innovation Research Grants
  - Regression Discontinuity
- State Energy-Efficient Appliance Rebate Program
  - Difference-in-Differences

# Planning for Clean Energy Program Evaluations

- Develop guidance and resources for evaluations
- Identify priority outcomes to evaluate
- Identify policies/programs with learning potential
- Develop evaluation plans and data protocols
- Ensure evaluation plan transparency
- Integrate in each agency's learning agenda

# Policy Implications

- Evidence as the foundation for more effective clean energy and climate policy
- Inform design of a carbon border adjustment
- Input to Paris Agreement's Article 13 transparency
- Export policy successes to other countries

# Thank You!

Joseph E. Aldy

Professor of the Practice of Public Policy

Harvard Kennedy School

79 John F. Kennedy Street

Cambridge, MA 02138

V: 617-496-7213

E: [joseph\\_aldy@hks.harvard.edu](mailto:joseph_aldy@hks.harvard.edu)

I: [scholar.harvard.edu/jaldy](http://scholar.harvard.edu/jaldy)

T: @josephaldy