



Green Public Procurement of Natural Gas, Cement and Steel

Alan Krupnick, Senior Fellow
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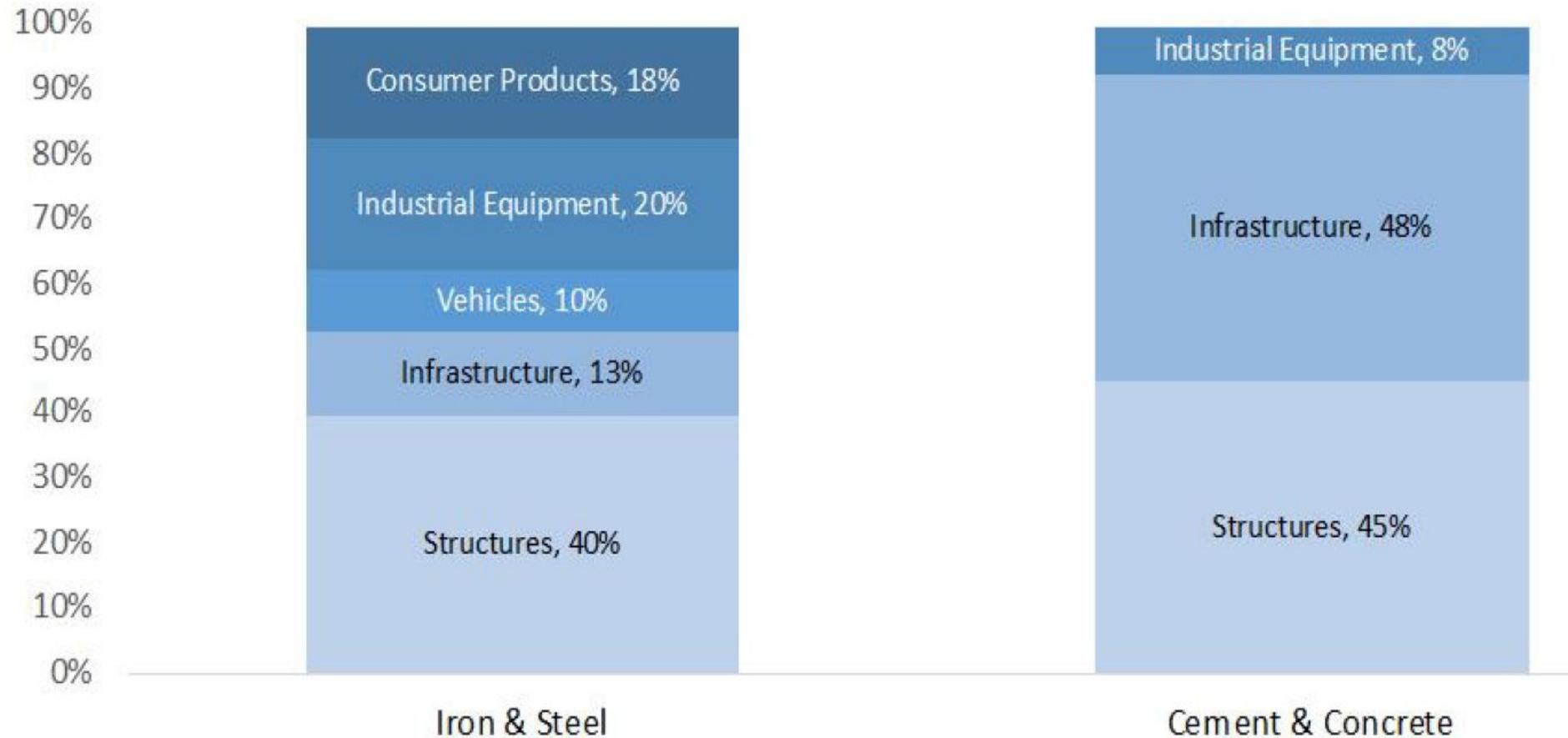


What is Green Government Procurement and why do we care?

- Clauses in RFPs that ask for bids for “green” or sustainable commodities – in this case commodities with low GHGs, probably over lifecycle
- Need performance standards, measurement protocols (Environmental Product Declarations (EPDs)), certification/audit and scoring system that meshes with other attributes of the commodity procured.
- Green cement and steel would be embodied in products the government wants, green (low methane) natural gas could be procured directly or embodied in electricity
- New interest:
 - House Select Committee on Climate Crisis Report
 - House Energy and Commerce’s draft Clean Future Act
 - Biden/Harris platform: using federal GPP “to drive towards 100% clean energy” and harness GPP to drive climate ready innovation in buildings, etc.



Figure 1. End Uses of Iron and Steel, Cement, and Concrete



The Paper

- Motivation: Need carrots as well as sticks to get GHGs down from industry. Some big footprints to reduce are for natural gas (methane), cement, and steel
- Purpose: Develop ideas for design of green procurement programs for these products
- Approach: Review state of play on these programs, characterize goals, develop hypotheses about drivers of success, test against the academic literature and on the ground accounts. Interview industry reps, develop design ideas
- Findings: GPPs for these products can be designed to stimulate innovation, expand markets and reduce GHG footprints, but don't expect miracles.



Goals of GPP

- Greening the government □ Not a lot of tracking/accountability
- Stimulating demand □ government demand only a small slice of market
- Stimulating innovation □ academic studies back this up
- Keep purchase costs “low” ⇒ could be small premium for embodied products
- Move industry □ government imposed process vs. consensus vs. use existing industry process/standards
- Encouraging economic development □ academic studies find positive externalities



Key programs

- Netherlands: monetizes CO2 emissions or can use cutoffs; computer program to calculate emissions.
- US Energy Star: Top 25th percentile plus conditions. What they do for energy use per unit product could be used to calculate CO2; or just take Energy Star certification directly as surrogate.
- EPPP recognizes multi-attributes; works with industry to set and certify standards
- GSA: Embodied GHG in buildings initiative. Look to this group for ideas. Durability vs. CO2
- California Buy Clean: includes steel; cement coming – sensitive to categorization of products, standards at industry average +; exempts small companies



Natural Gas

- Relatively homogeneous product □ one standard of superior performance may be adequate
- Governments can look to the industry to develop superior performance standards and measurement protocol
- Unlike for cement and steel, imports are not a significant issue
- Super emitters are a big problem



Cement

- Superior performance should be defined on a product-specific basis.
- Develop procurement policies and procedures that are applied equally to foreign and domestic manufacturers.
- Use an EPD or life-cycle approach to measure emissions.
- Work with the industry in developing the above.

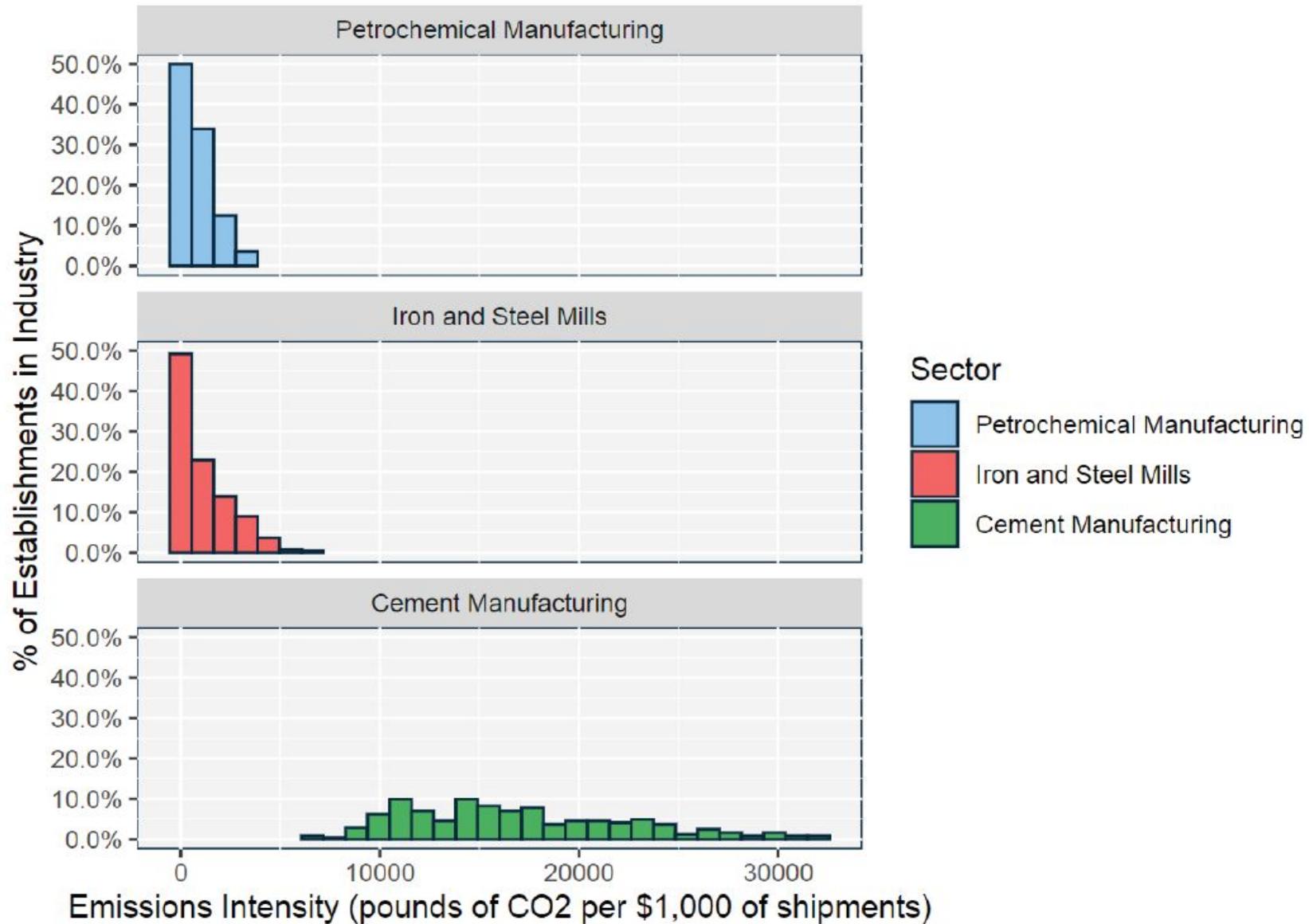


Iron and Steel

- The standards should be highly product specific. Likes Buy Clean classifications
- Performance measurements and performance standards would be developed by working in partnership with the industry. Not easy because of different interests (EAF vs. BF)
- Life-cycle analysis would be required because steel doesn't degrade and is recycled, unlike substitutes like cement and wood, particularly the latter.



Figure 15. Emissions Intensity Distributions for Iron and Steel, Petrochemicals, and Cement Manufacturing



Key issues in GPP Design

- Defining green; internal vs external standards; tiering; monetization
- Scope: procure products directly vs embodied; substitute products; imports
- Choosing winners: multi-attribute, ratings, pricing; thresholds, Energy Star certification
- Helping industry bid – tools/databases
- Enhancing industry participation and innovation: working with industry to set standards (internally), appropriate categorization, clear certification requirements.



Thank You

For comments and questions, email Krupnick@rff.org

For the paper see RFF website.



Reactions to House SCCC Report on Procurement

- Federal Buy Clean program to reduce embodied CO2 emissions – cement, steel
 - Don't forget natural gas
 - GSA completing theirs; Energy Star could be a model; EPP could jump into this at any time. Don't necessarily need a new program; consolidation?
- Also address job creation, fair labor practices, EJ, etc.
 - *A lot to ask, need to sharpen and streamline; design for industry enthusiasm*
- EPA to partner with DOE and NIST to set intensity benchmarks
 - *What about DOD?*
- EPA to certify
 - *Now EPP works with industry to develop standards and approves*



House SCCC Report #2

- Set so “most” companies can meet with available technologies.

Cut out dirtier part of market

- *Could take position that the standard is the median company or other percentile*

- Use new EPD database (lifecycle)

- *There are already EPD databases*

- Tighten over time Yes

- Give point awards *Or shadow price of CO2; deal with other attributes?*

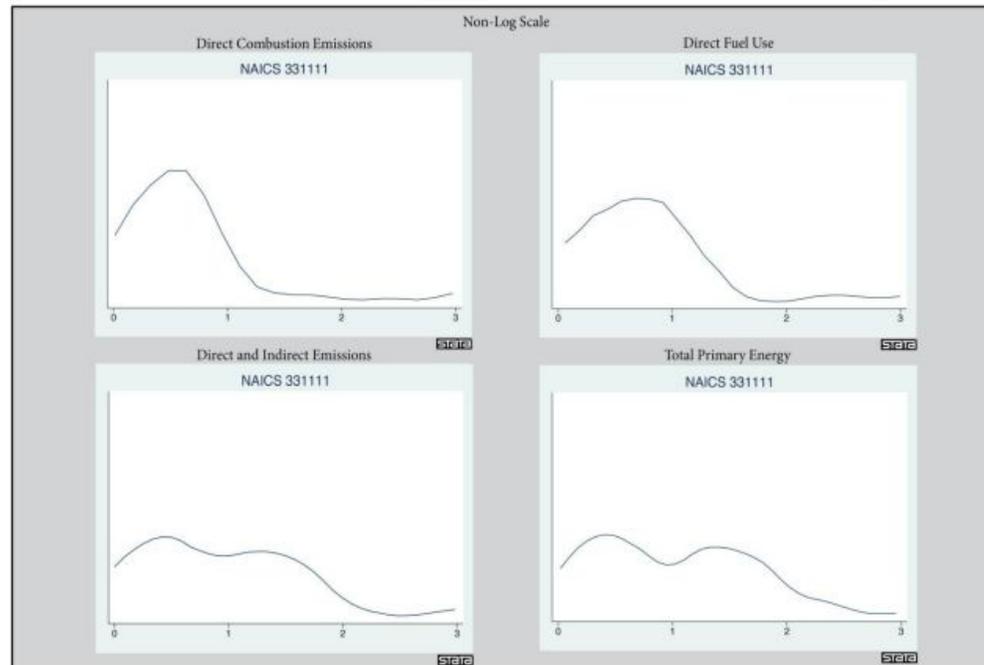
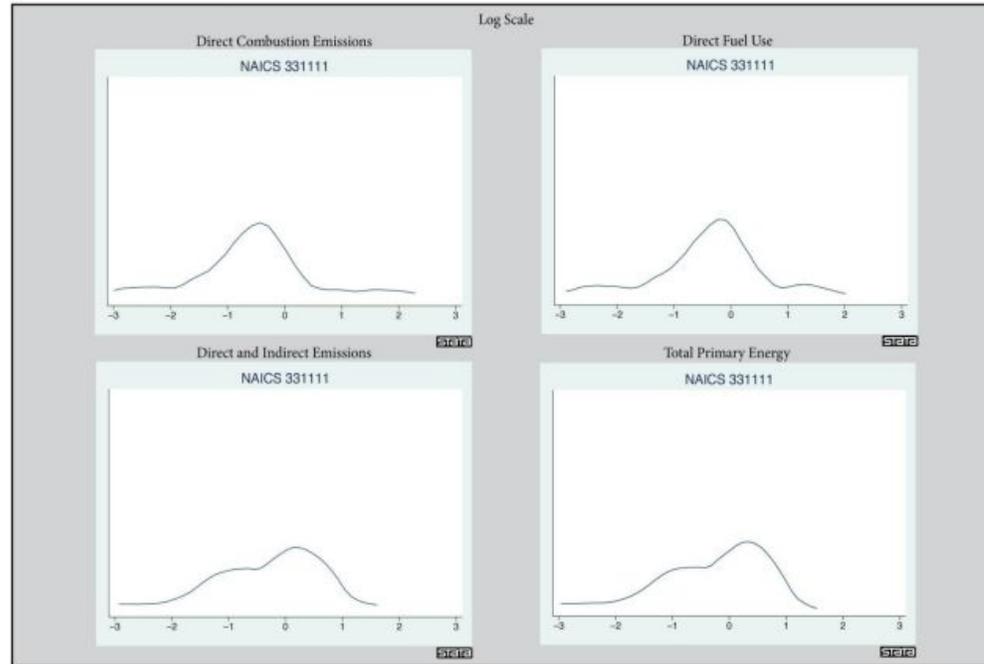


- *Formark “innovative low emissions materials” seems redundant*

Procurement metrics in 2019 by agency (#, \$million)



Energy and Carbon Intensity: NAICS 331111 (Iron and Steel Mills)



Why these commodities?

- Natural gas : 22% methane inventory; 2.3% of GHG inventory.
 - Market: \$80B/yr
- Industry: 22% GHG inventory; 29% counting electricity. Cement and steel biggest within non-energy industrial emissions ~11% each

Overall:

- Cement: 1% of CO2 inventory; global inventory: 6%
 - Market: \$12.5B/yr
- Steel: 1% of CO2 inventory; global inventory: 8%
 - Domestic market: \$92B/yr



Why cement, steel, and natural gas?

- Cement and steel emissions of GHGs relatively high for industrial sectors. Fit in well with plans for green infrastructure (roads, vehicles, buildings, bridges) ⇒ RFPs would probably be more for these products
- For natural gas, methane emissions of concern as well as CO₂ when burned. RFPs could be directly for gas purchased, but could be for future operations or embodied in directly procured products



Figure 23: Stages of the procurement cycle at which it is most effective to implement SP considerations.

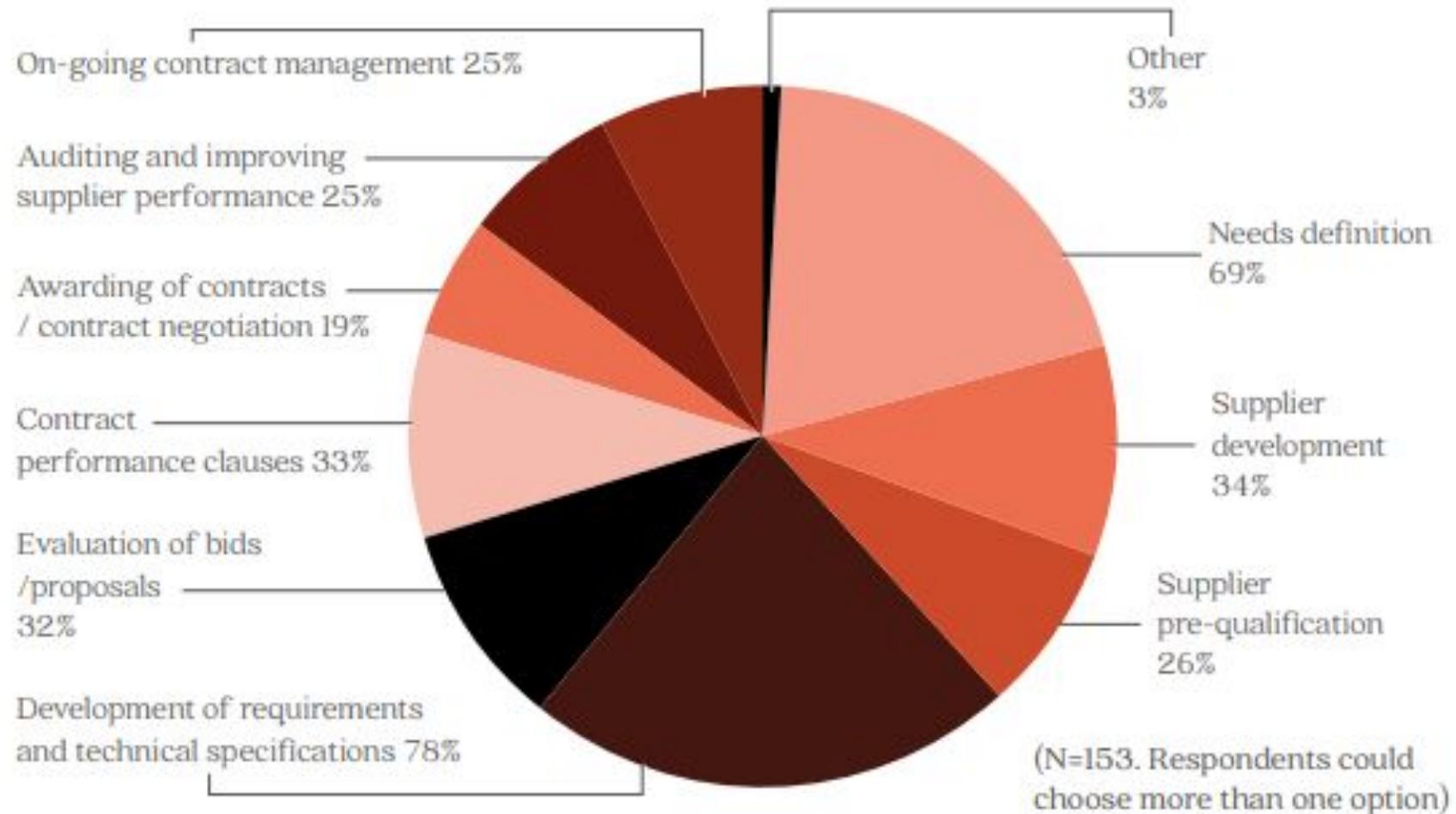


Figure 29: Strongest drivers for the implementation of SP in survey participants' organizations

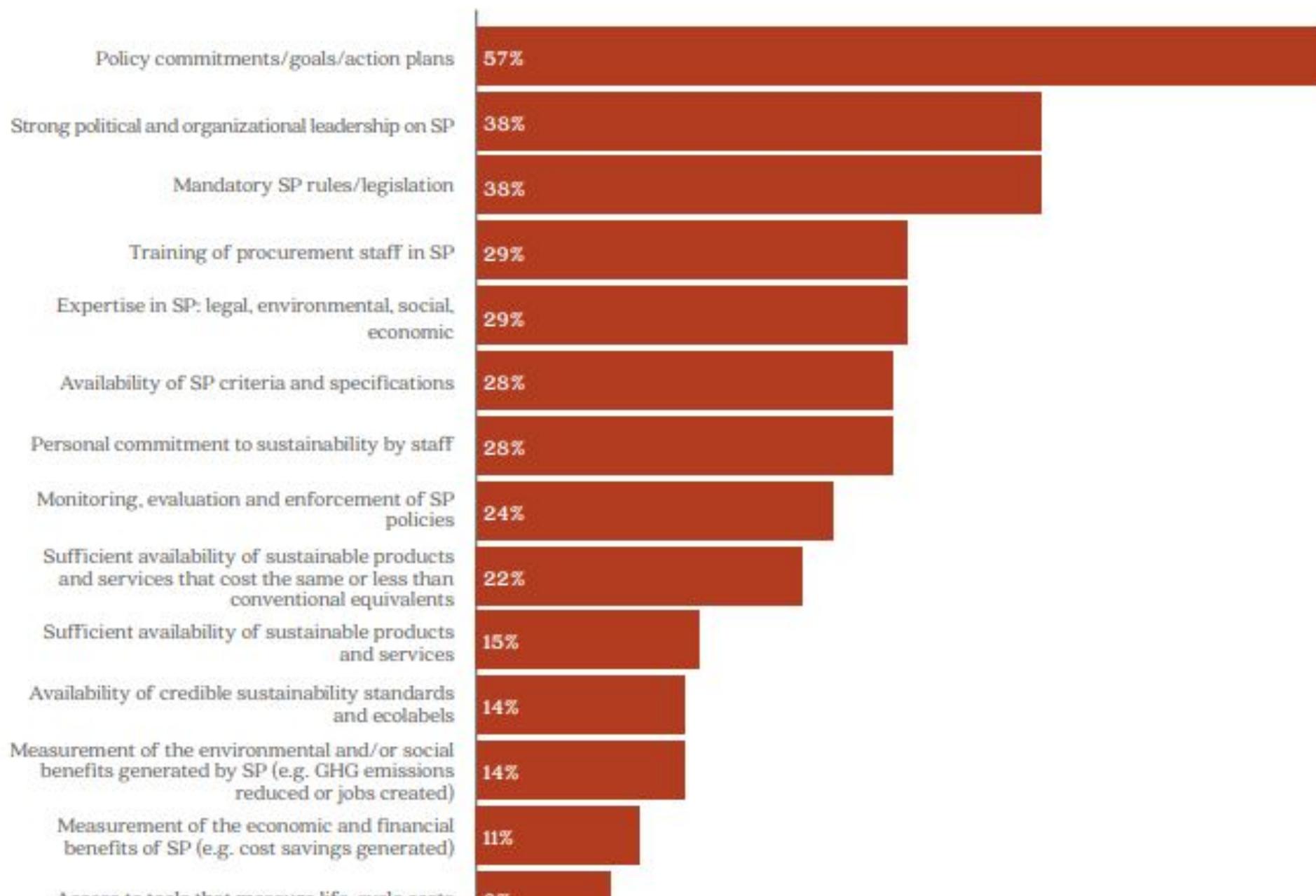


Figure 30: Largest barriers to SP implementation in survey participants' organizations

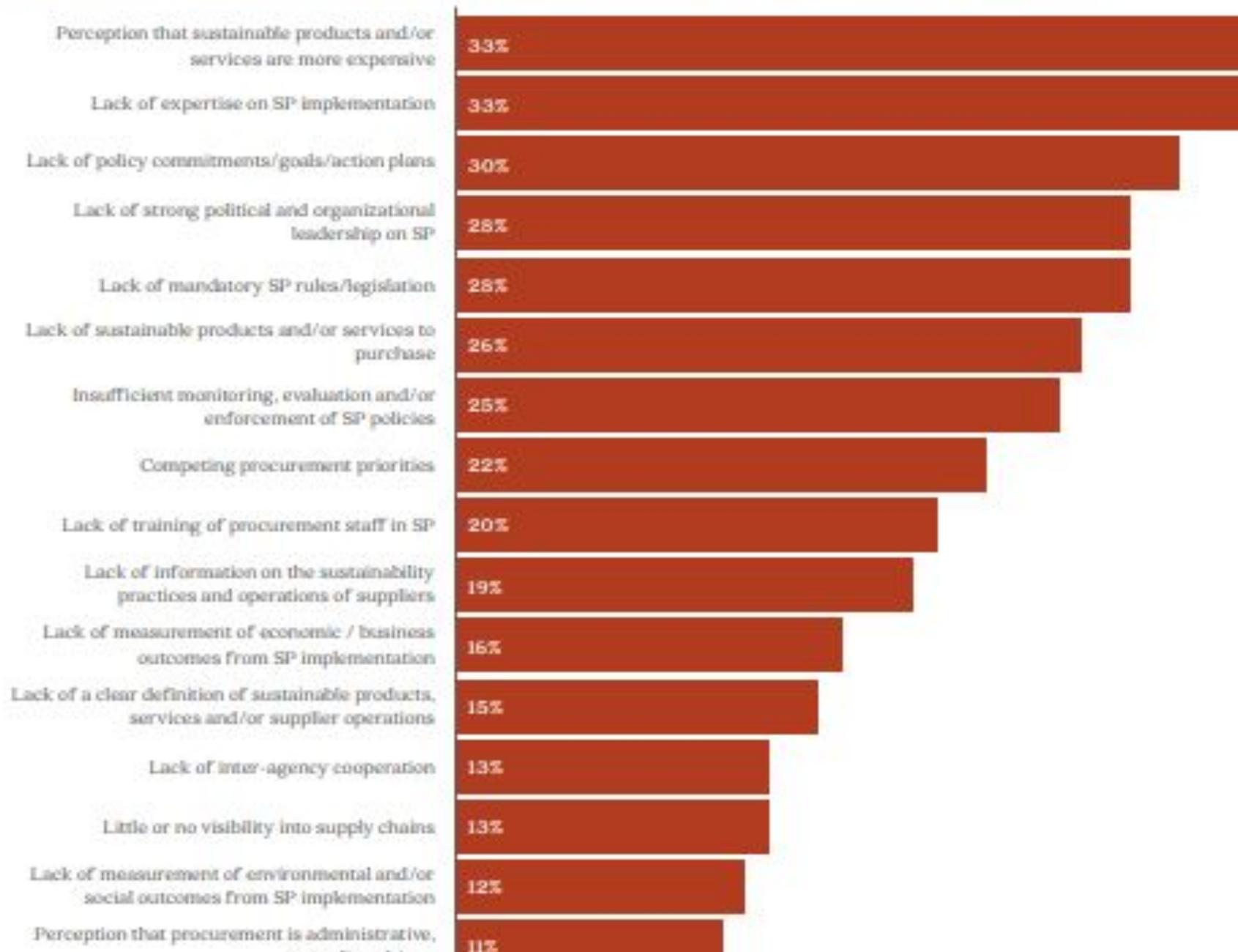


Table 3. Voluntary Green Power Participation and Sales in 2017

| Green Power Option | Sales (MWh) | Participants |
|-----------------------------|--------------------|---------------------|
| Utility green pricing | 8,850,000 | 885,000 |
| Utility renewable contracts | 2,788,000 | 15 |
| Competitive suppliers | 18,133,000 | 1,691,000 |
| Unbundled RECs | 51,744,000 | 192,000 |
| CCAs | 8,882,000 | 2,726,000 |
| PPAs | 21,271,000 | 273 |
| Community solar | 80,400 | 4,700 |
| Total | 111,748,000 | 5,499,000 |

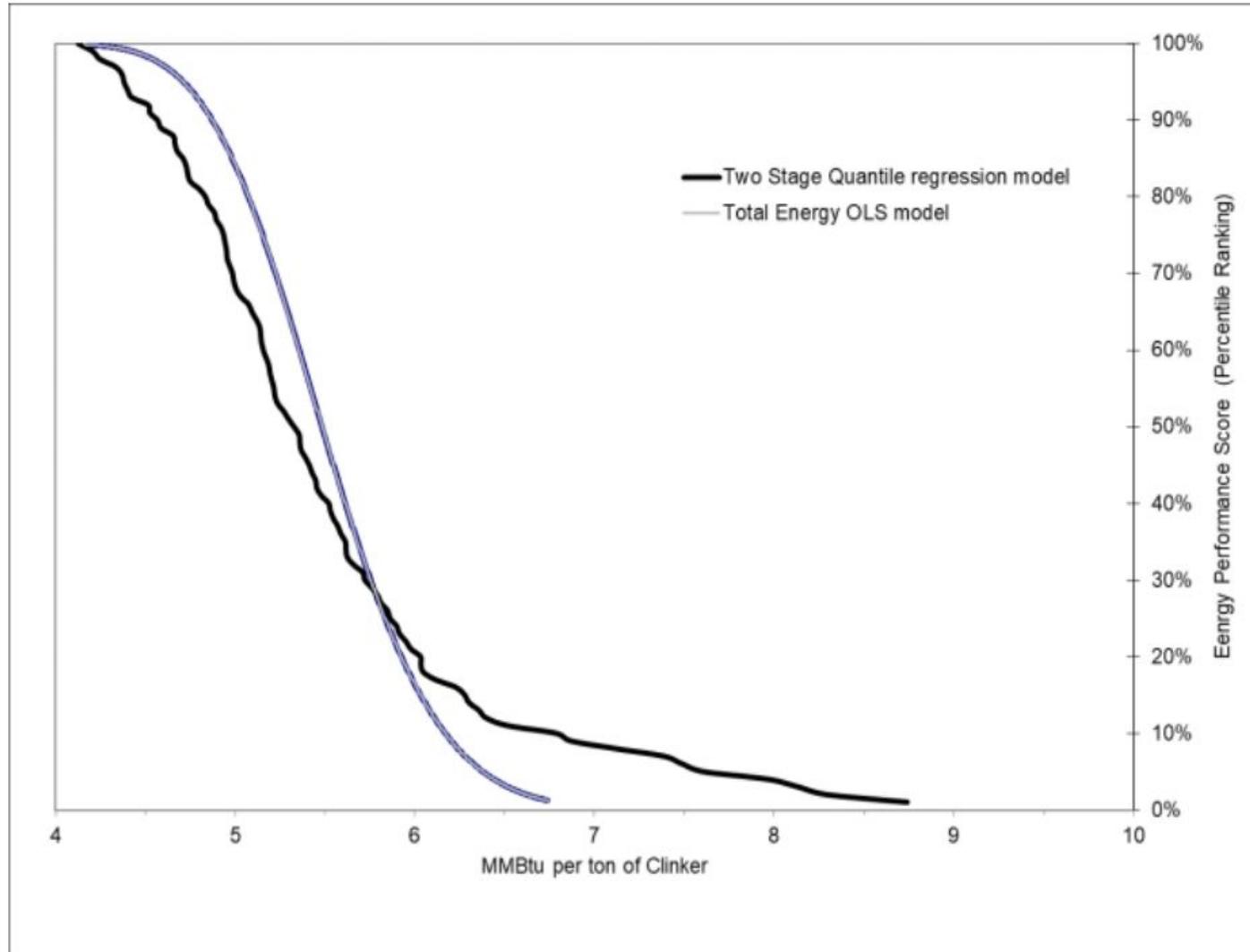


Hypotheses

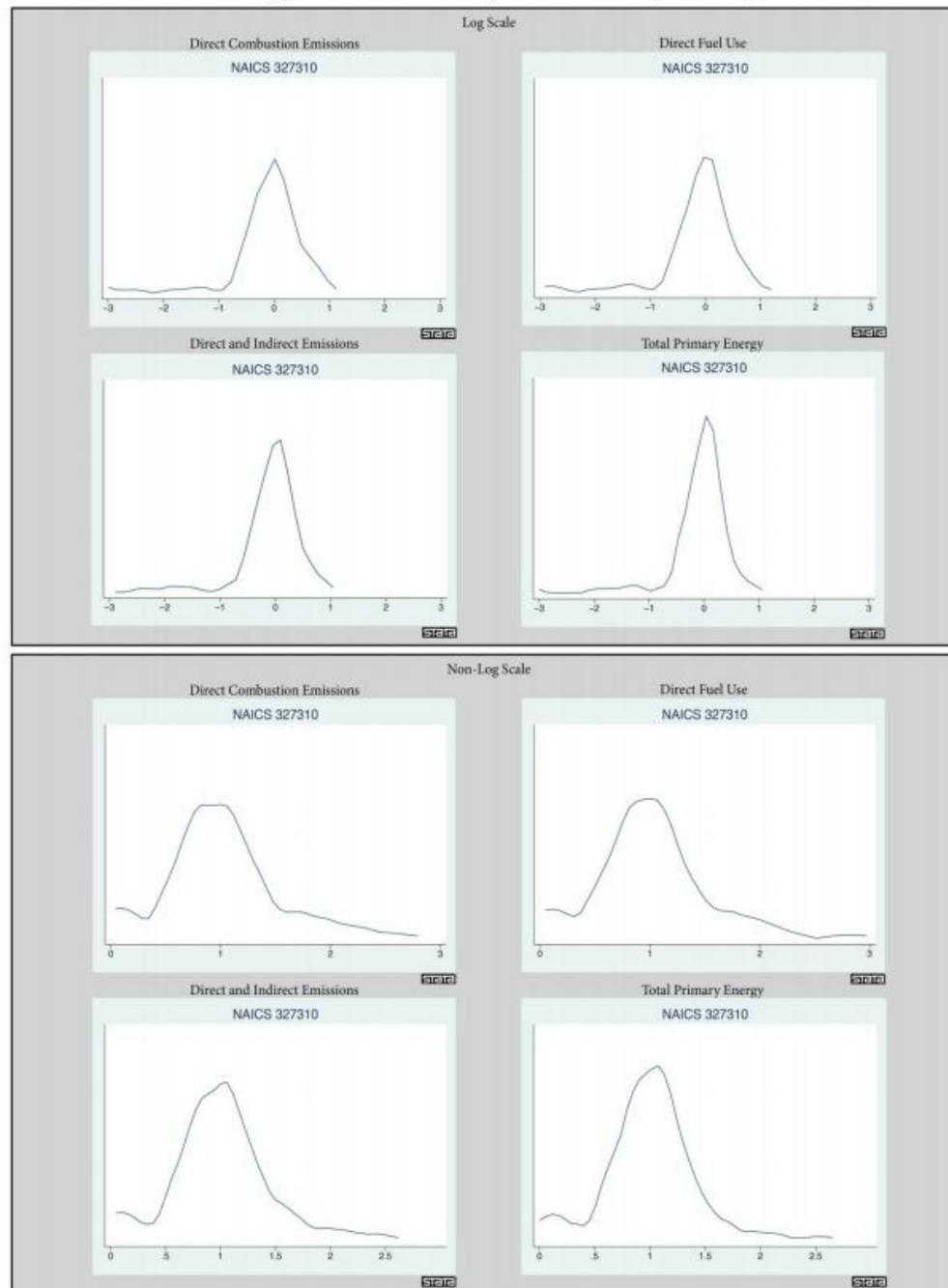
- Programs covering a large share of a market will be more effective than those covering a small share federal level better. Match spatial extent of market
- Programs for green products will be faster/more effective if:
 - Products exist
 - Standards/certification exists; are very specific
 - Measurement protocols exist
- Programs where economic development goals align with environmental goals will be more effective
- Programs setting a high bar on greenness (with a large gap between superior performance and the baseline, as well as capturing the life-cycle emissions) will be more effective in meeting those goals
- Programs with active information and communication campaigns will be more effective



Figure 7 Comparison of QR and OLS Cement Benchmarks



Energy and Carbon Intensity: NAICS 327310 (Cements)



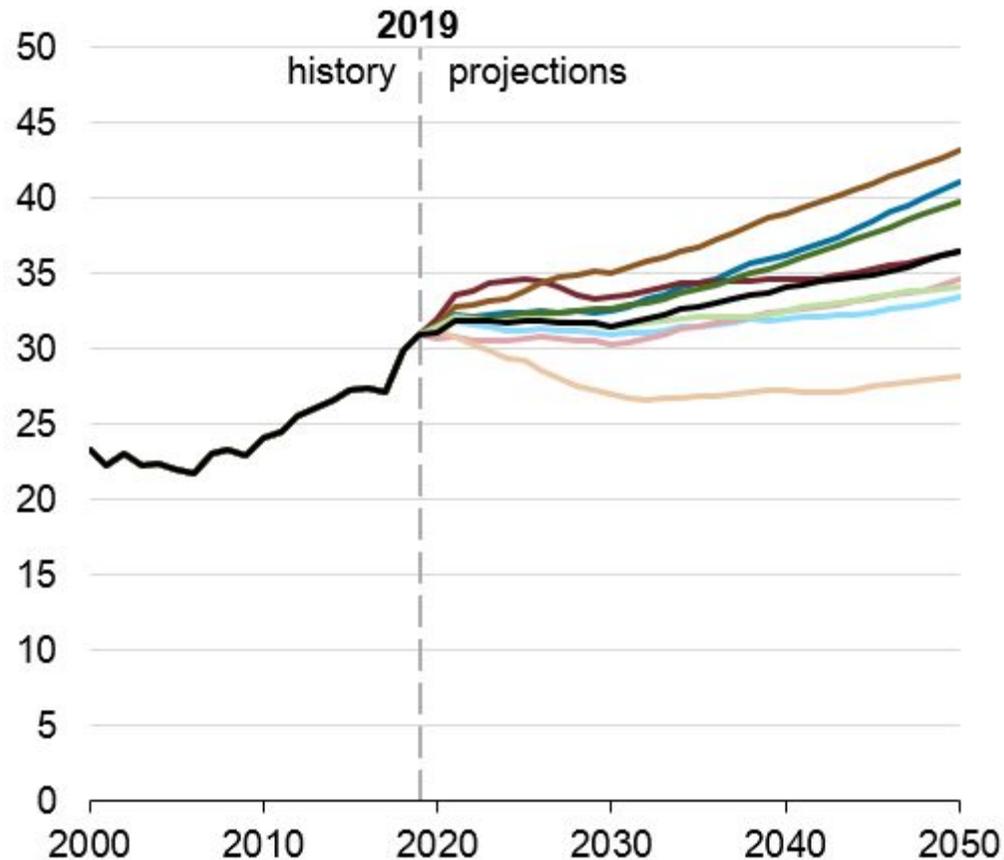
Source: Boyd et al. (2011, Figure 30).



Motivation

Projections of economic activity feature continued heavy reliance on natural gas over the next several decades.

AEO2020 U.S. natural gas consumption
trillion cubic feet



Motivation #2

- Methane emitted throughout the natural gas lifecycle is a major component of natural gas CO₂e emissions because methane is such a powerful greenhouse gas.
- We import very little; so the U.S. lifecycle is responsible for emissions
- So, to decarbonize the economy in the short-medium term, methane emissions need to come down
- Provide incentives throughout the lifecycle to do that, particularly in a policy environment that lacks a carbon (or CO₂e) tax to comprehensively and efficiently address methane emissions (see Munnings and Krupnick 2016)



What kind of incentives?

- Legislation – Rep. Diana DeGette (D-CO) Clean Energy Standard bill; EC guidance
- Regulations: New Mexico the latest entrant after federal backoff – but regulation can reduce the case for a market
- Voluntary emissions reductions -- with recognition: One Future, OGCI, EPA's voluntary programs (e.g., Methane Challenge)
- EPA reporting requirement and Industry-led reporting requirements – Methane intensity standards in the Natural Gas Sustainability Initiative (EEI and AGA)
- Investors and rating companies: e.g., Trustwell
- Activities from buyers for low methane-intensity gas
 - One-off transactions – NJ Natural Gas and Southwestern Energy
 - Buyer programs: e.g., LNG exporters
- Trading platforms: Platt's? Digital data-heavy, multiple green commodities: e.g., Quantigy
- Third party efforts: RMI effort; our paper



Figure 10. Emissions from Cement, as Reported in Environmental Product Declarations Source: Anderson and Moncaster (2020)

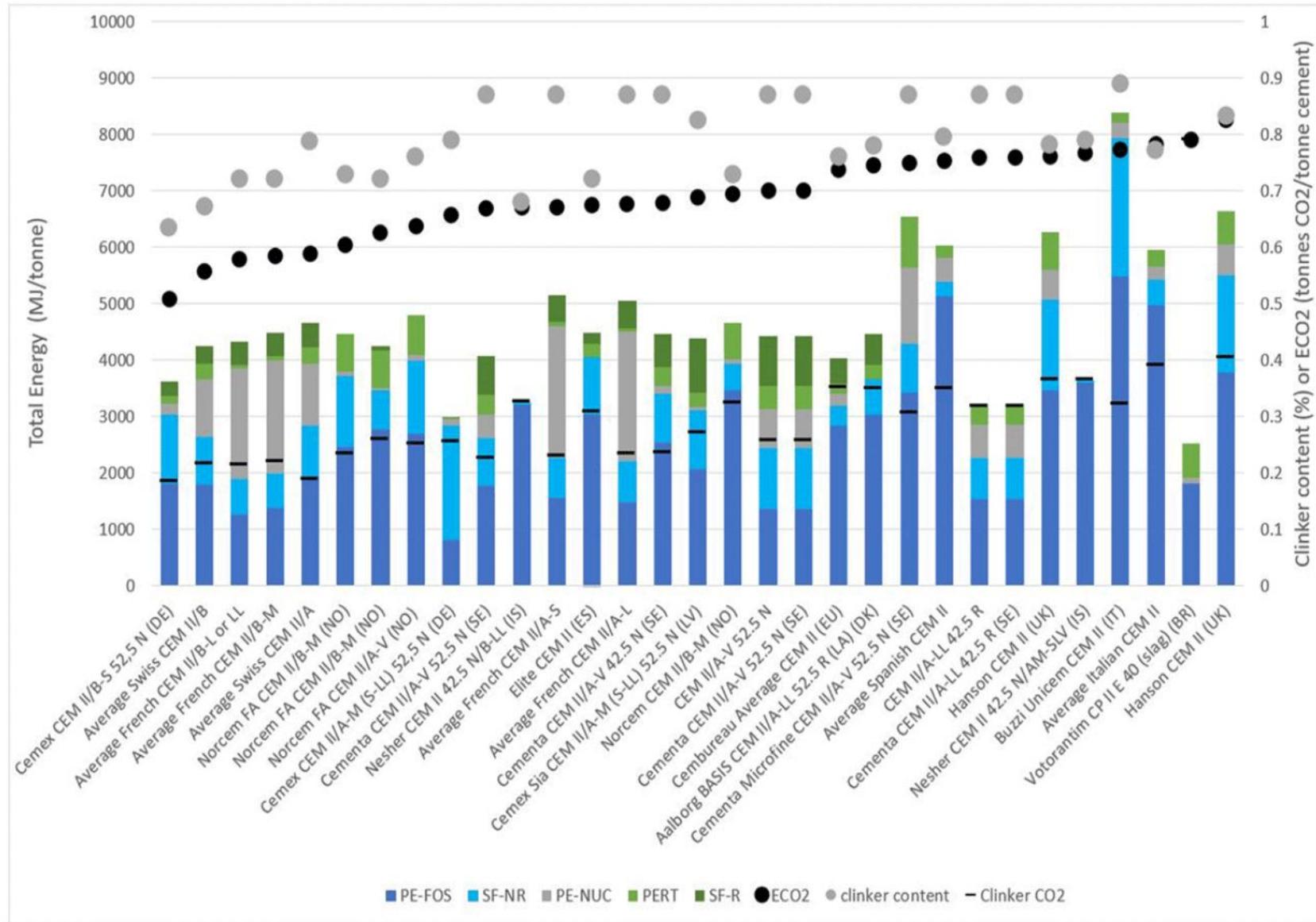


Figure 11. Global Warming Potentials for Cement, as Reported in Environmental Product Declarations. Source: Anderson and Moncaster (2020)

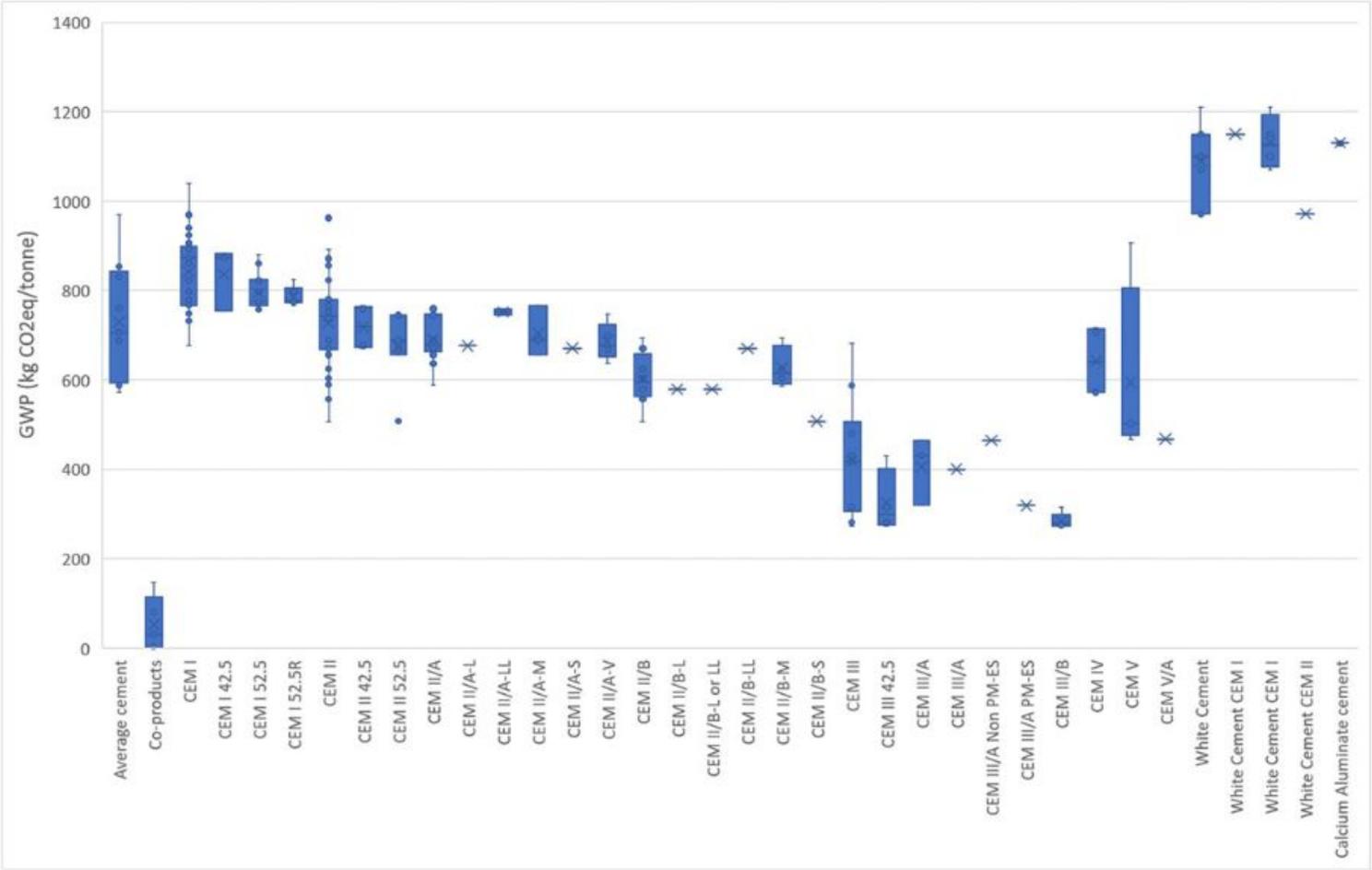


Figure 3

Global warming potential (GWP) range for cementitious Environmental Product Declarations (EPD) by

[Original](#) | [PPT](#)



Issues for Green Gas Market

- Economic considerations
- Certification
- Technical Design
- Governance



Certification

- Makes the market work
- Certification can also incentivize improved monitoring, repair and verification (MRV)
- From the literature: multi-tiered pricing best – premium depends on degree of methane intensity □ more expensive certification process than one tier, but....
 - A more expensive certification process can increase social welfare by screening out “brown” sellers (lowering their price) and raising “green” seller profits (raising their price). (Mason)



Technical Design Issues

- Defining superior performance: benchmark rate or multi-tiered? How many tiers at what cutoffs? industry practice (top 10% according to GHGRP?) vs. organization recommendations (One Future, OGCI)
- Measuring performance: defaults (widely suspected underestimates in the GHGRP), defaults with measurement updating, embed or not in digital platforms for continuous updating; frequency? Catching super emissions.
 - EDF study (*Science Advances*, 2020): Much more than expected emissions come from venting and incomplete combustion at flaring stack.
- Scope of the market:
 - Just producers or more of the value chain □ progression down the chain over time;
 - Geographic: national market, play by play; state by state (regulations differ); firm, facility, well-specific
- Addressing non-participants: ignore; offer higher premiums; buyer mandates/requirements; poor ratings given



Governance

- Who creates market? Fastest is industry and voluntary; government justified to boost social value through defining benchmarks, certifying certifiers/auditors
- Who makes design decisions? Broad participation better in the long-run, but not for speed and simplicity
- Who certifies/audits? Research suggests that market participants should not self-certify or even directly pay certifiers/auditors pooled funds? Trump administration going the other way – eliminating government's role in certifying the certifiers
- How frequently? Need to provide assurance that super emitters are identified



Percentage change in metrics by year and agency

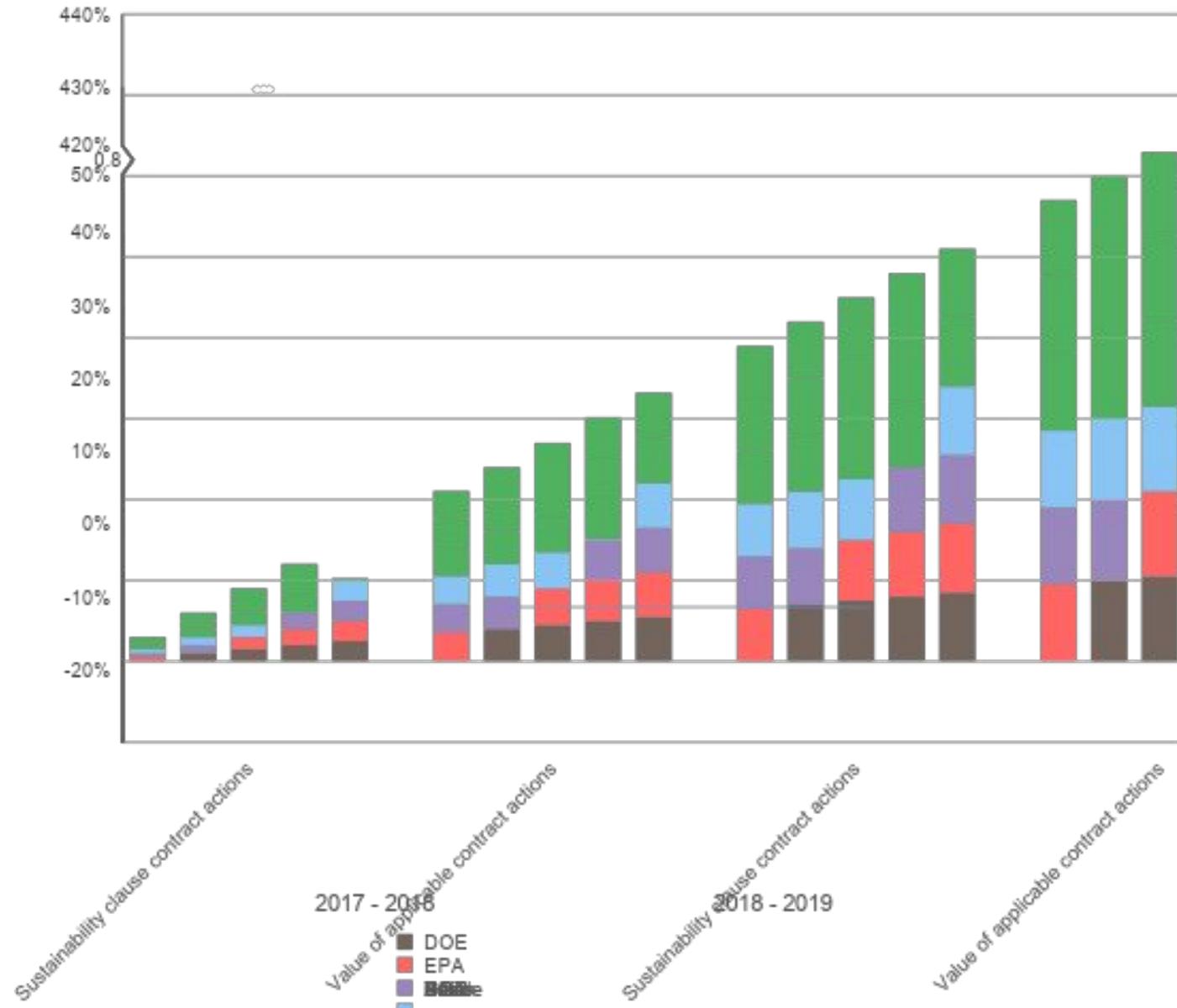
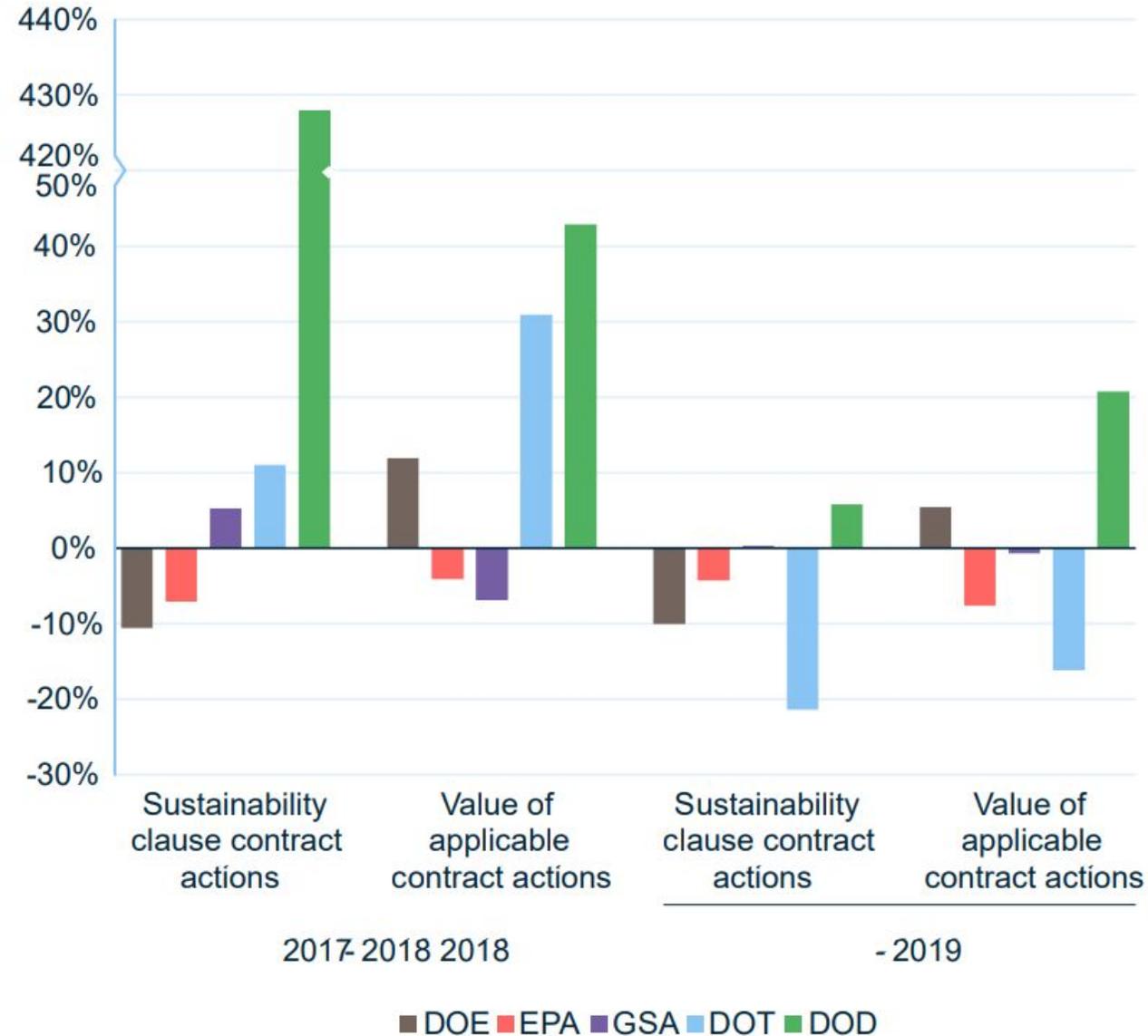
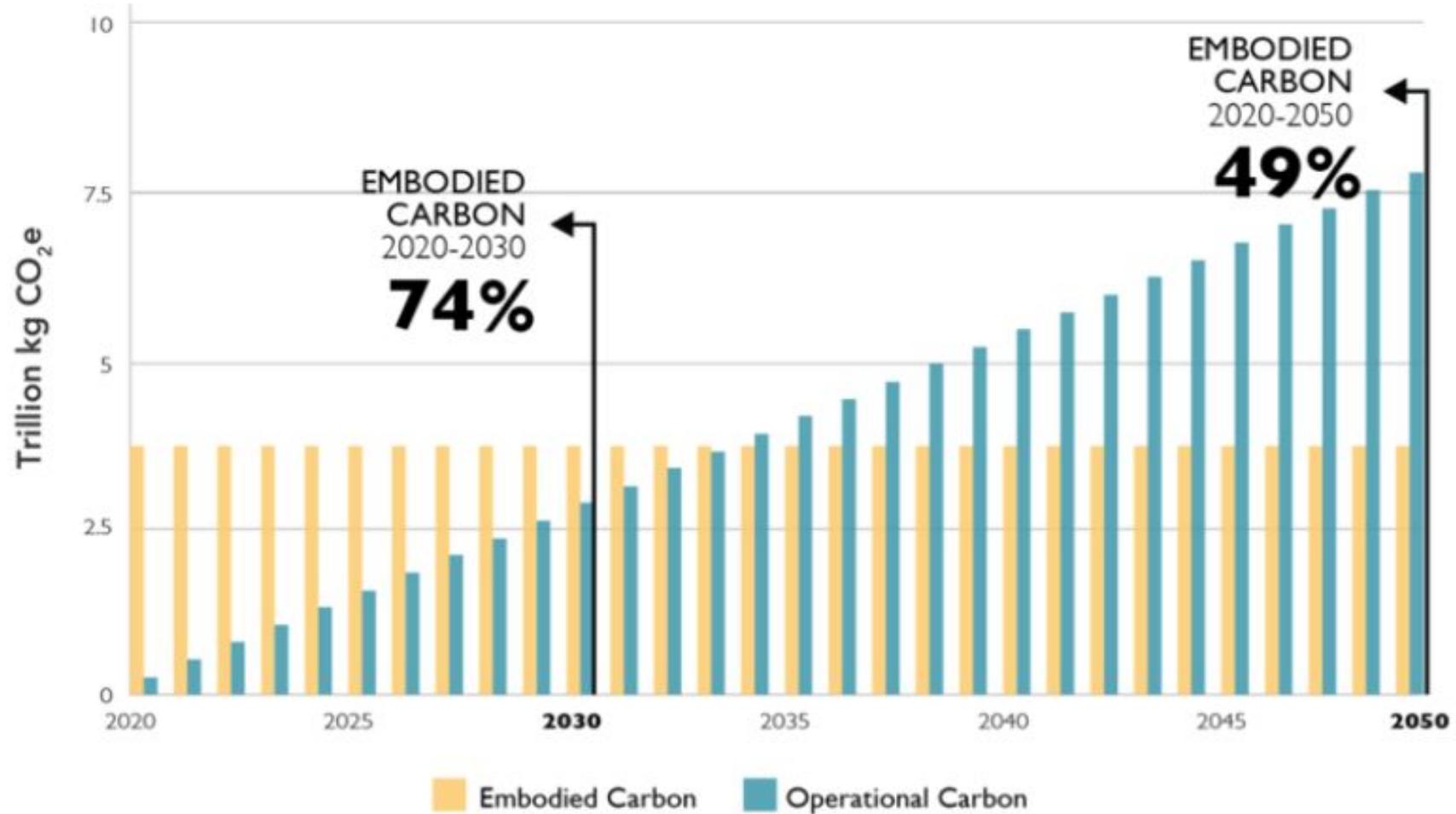


Figure 8. Percentage Change in Federal Agencies' Green Procurement, 2017-18 and 2018-19



Total Carbon Emissions of Global New Construction from 2020-2050 Business as Usual Projection



Source: GSA
(2020).



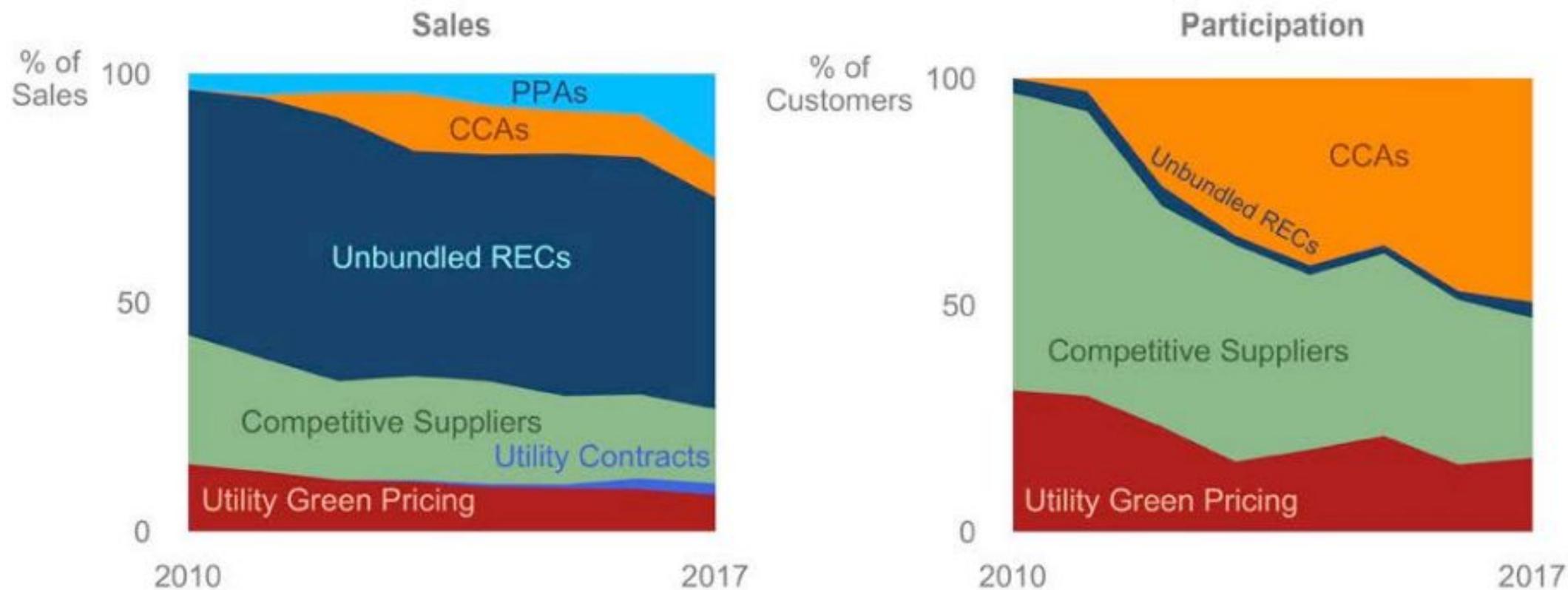


Figure 1. Shares of green power sales (left) and customers (right) over time by product

Community solar, PPAs, and utility contracts collectively account for less than 1% of customers.



Thank you.

- For questions: Krupnick@rff.org
- Paper at <https://www.rff.org/publications/reports/green-public-procurement-natural-gas-cement-and-steel/>