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The Relationship Between Clean Energy/Climate Policy and Expanding Corporate Markets

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The research project

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An in-depth research project to provide a timely, accurate and nuanced understanding of the perspectives of key leaders in the U.S. and foreign-based corporate and private equity sectors (doing significant business in the U.S.) toward energy and climate change policies in the face of an increasingly carbon-constrained world.

What we set out to learn

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What do corporate leaders and investors need, in terms of adjustments/additions to policies, programs, finance mechanisms, public-private partnerships and other tools, to pursue business strategies that advance a low-carbon economy while also expanding profits, creating jobs, and producing shareholder value and investor return?

An inflection point

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- The private sector has made striking progress over the past decade in demonstrating that the path to decarbonize may be less costly than feared while providing new economic benefits.
- Robust investment in innovation, smartly-crafted public policies, and leadership at the government and corporate levels have produced sharply reduced costs of clean energy technologies and sharply increased deployment of clean and efficient energy.

Utility scale and distributed wind

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- 2008: 25 gigawatts nationally
- Today: More than 82 gigawatts
- Cost of land-based wind has fallen 41% since 2008
- First offshore wind farm in 2016 (Block Island) and more to come.

Utility scale and residential solar

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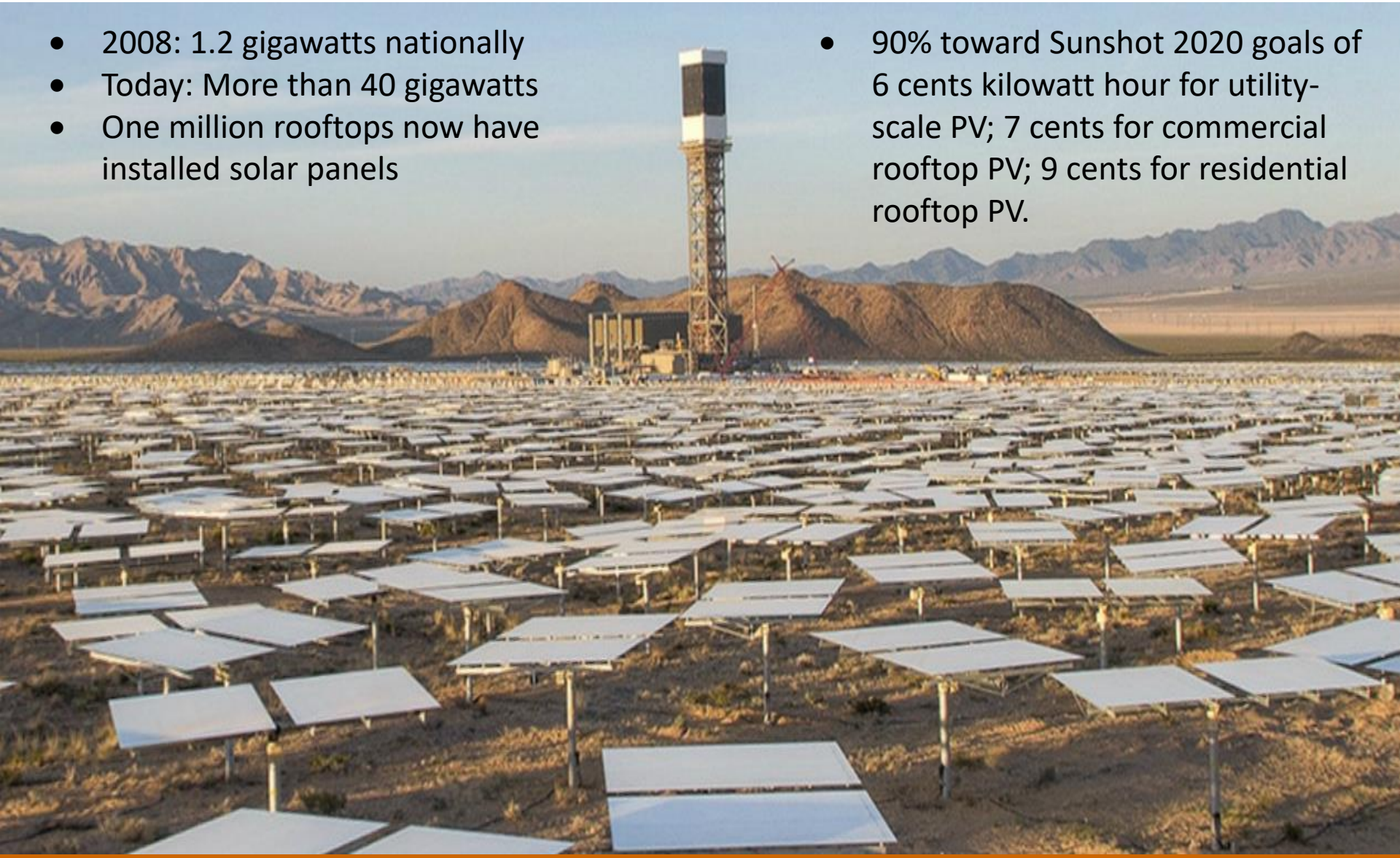
- 2008: 1.2 gigawatts nationally
- Today: More than 40 gigawatts
- One million rooftops now have installed solar panels

- 90% toward Sunshot 2020 goals of 6 cents kilowatt hour for utility-scale PV; 7 cents for commercial rooftop PV; 9 cents for residential rooftop PV.



LED lights

- Cost of LED lights has dropped 94% since 2008
- > 450 million installed in US through 2016
- In some stores, 60 watt equivalent selling for $2 unit

Electric vehicle batteries

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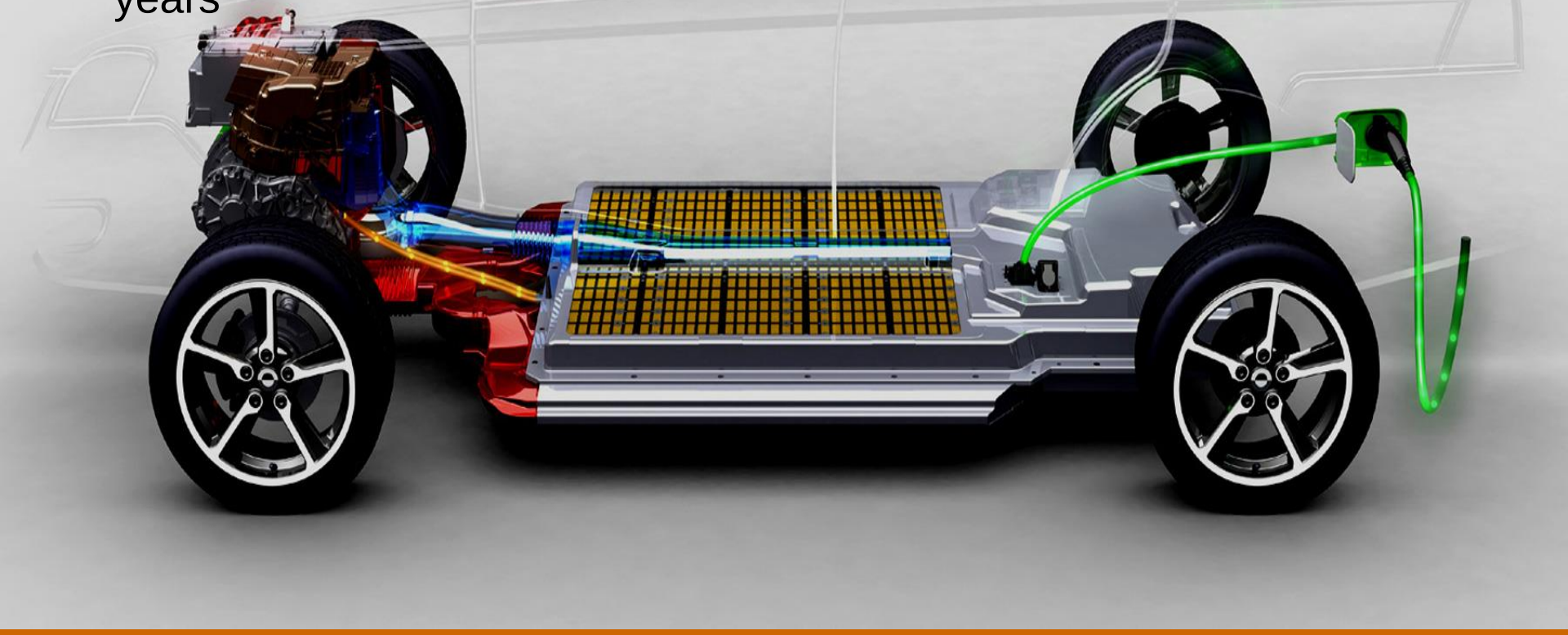
- The cost of battery storage has dropped 70% since 2008
- Some 45 choices of battery electric vehicles and plug-in hybrids EV models, vs. only one in 2008
- Total EVs in U.S. now more than 765,000; 3 million internationally
- 127 battery-electric models will be introduced worldwide in the next five years



Nuclear energy capacity shifts

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- Five nuclear reactors have been retired in last five years, bringing total # of operating reactors down from a peak of 104 to 99 (at 61 plant sites)

- Nuclear plant operators have announced planned retirement of an additional seven reactors at five plants in the coming years

- The Watts Bar 2 reactor came on line in October 2016, and Vogtle Units 1 and 2 are under construction in Georgia

Coal-fired plants closing at brisk pace

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- Between 2007-2016, 531 coal-fired generation units, representing 55.6 GW of capacity, were retired across the country
- Last year, utilities announced planned closure or conversion of another 27 coal-fired power plants totaling 22 GW

Natural gas continues to grow

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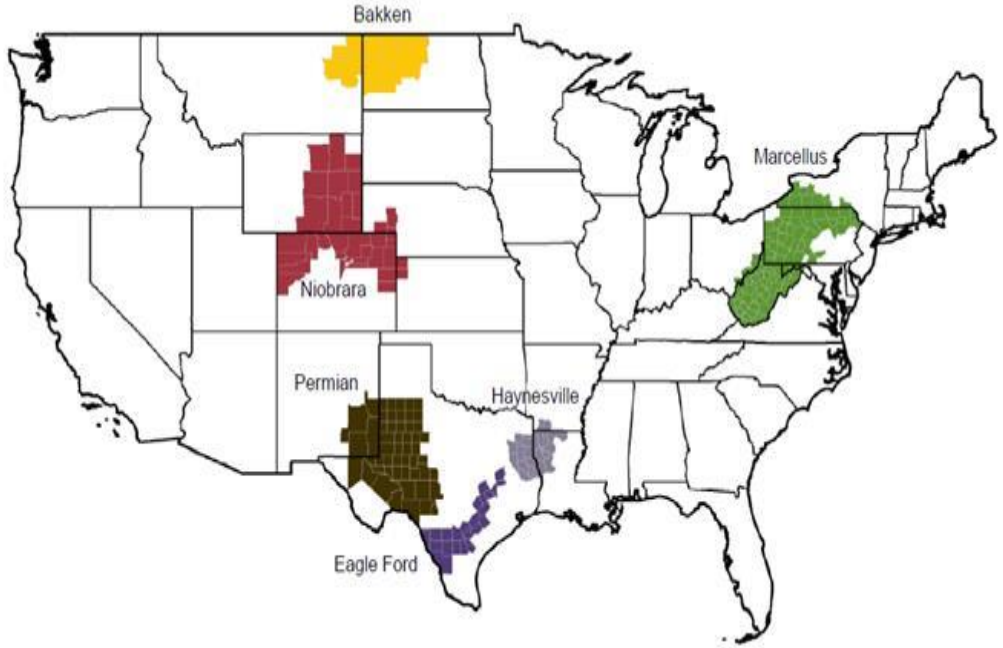
Much of that lost capacity replaced with the growth of natural gas units, as natural gas (34 %) in 2016 surpassed coal (30 %) as the dominant national energy source for electricity generation.

Electricity industry added 11.2 GW from natural gas units in 2017 and will add another 25.4 GW in 2018.

Domestic oil on the rise

Increased domestic production of shale oil spurred the U.S. to surpass Saudi Arabia in November 2017 in daily production of crude oil, at 10 million barrels per day (BPD).



That increased production in recent years has combined with declining domestic gasoline demand from improved passenger vehicle fuel efficiency to reduce U.S. imports of crude oil from a peak of 10.1 million BPD in 2005 to 7.85 million BPD in 2016.

Approach

The research team conducted 53 interviews with leaders at the CEO and Vice President levels across the major sectors that produce energy and/or use energy intensively.

Who we engaged – by sector

- Motor vehicle manufacturers
- Electric utilities
- Oil, gas and coal extraction
- Renewable energy developers
- Transmission developers
- Energy management services
- Industrial, IT and consumer corporations
- Investors
- Organized labor
- Corporate alliances
- Industry trade groups

Who we engaged – by the numbers

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- Motor vehicle manufacturers (and related labor union) (4)
- Electric utilities (and related industry trade groups and labor unions) (11)
- Renewable energy developers and producers (4)
- Transmission developers and energy management providers (4)
- Oil, gas and coal companies (and related industry trade groups) (3)
- Industrial corporations (and related industry trade groups and labor unions) (8)
- Information technology and consumer corporations (3)
- Organized labor (AFL-CIO) (1)
- Corporate alliances (7)
- Investment firms (8)

Who we engaged - a partial list

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Duke Energy
Clean Line Energy
DTE Energy
PG&E
PSEG
Cummins
Ford Motor Co.
Altus Power America
Cloud Peak Energy
Google
Intel
Schneider Electric
Goldman Sachs

Broadscale Group
Clean Energy Venture Group
United Auto Workers
Utility Workers of America
International Brotherhood of Electrical Workers
American Petroleum Institute
American Gas Association
American Wind Energy Association
Nuclear Energy Institute
Advanced Energy Economy
Renewable Energy Buyers Alliance

Approach

Analysis of the information and data gleaned from the interviews inform Primary Policy Findings, along with recommendations on what changes or additions to government policies and initiatives might enhance each sector's efforts to flourish in a carbon-constrained world.

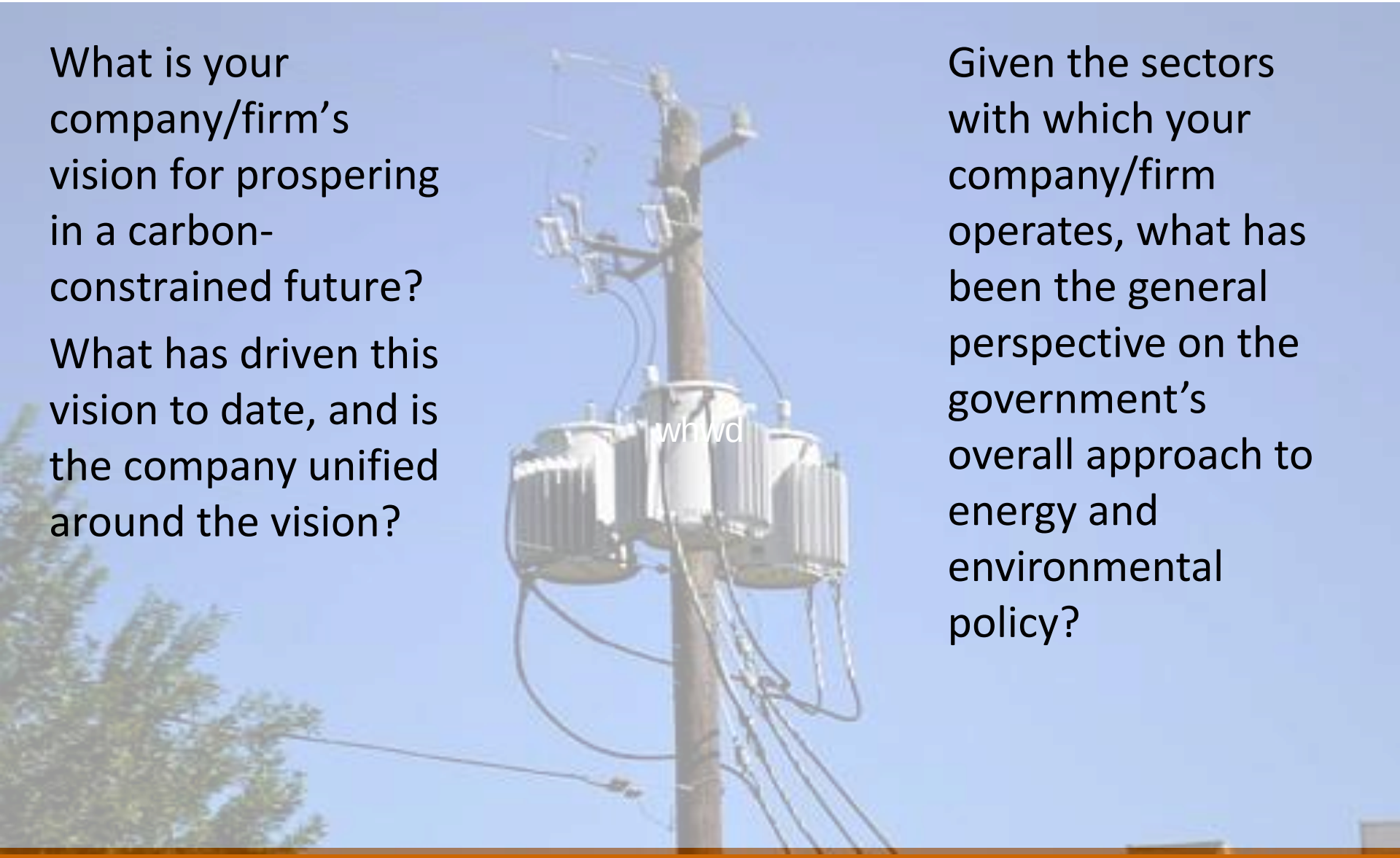
Protocol

- The project's approach and protocol have been approved by the the Tufts University Social, Behavioral & Educational Research Institutional Review Board
- Interviews are 60 or so minutes, in person or on the phone; core questions are shared in advance
- Interviewees could elect to participate on the record or to have their interview be treated confidentially
- Participants are provided opportunity to review and approve any direct quote we will use in our final paper

Core questions

What is your company/firm's vision for prospering in a carbon-constrained future?

What has driven this vision to date, and is the company unified around the vision?



Given the sectors with which your company/firm operates, what has been the general perspective on the government's overall approach to energy and environmental policy?

Core questions

Which of the existing government policies, programs, financial tools, public-private partnerships and innovation (R&D) investments in the energy/climate domain do you see as beneficial to maintaining or expanding markets for your company or firm?

Which are viewed as impediments to company/firm performance and bottom lines?

Core questions

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How would you adjust any of the above policies and programs to maximize financial return while keeping true to the objective of reducing climate change and environmental impact?

What additional policies, incentives and programs would you like to see in the future in the energy/climate domain, and why?

Core questions

How are you viewing the proposed policy shifts on energy and climate change at the federal level?

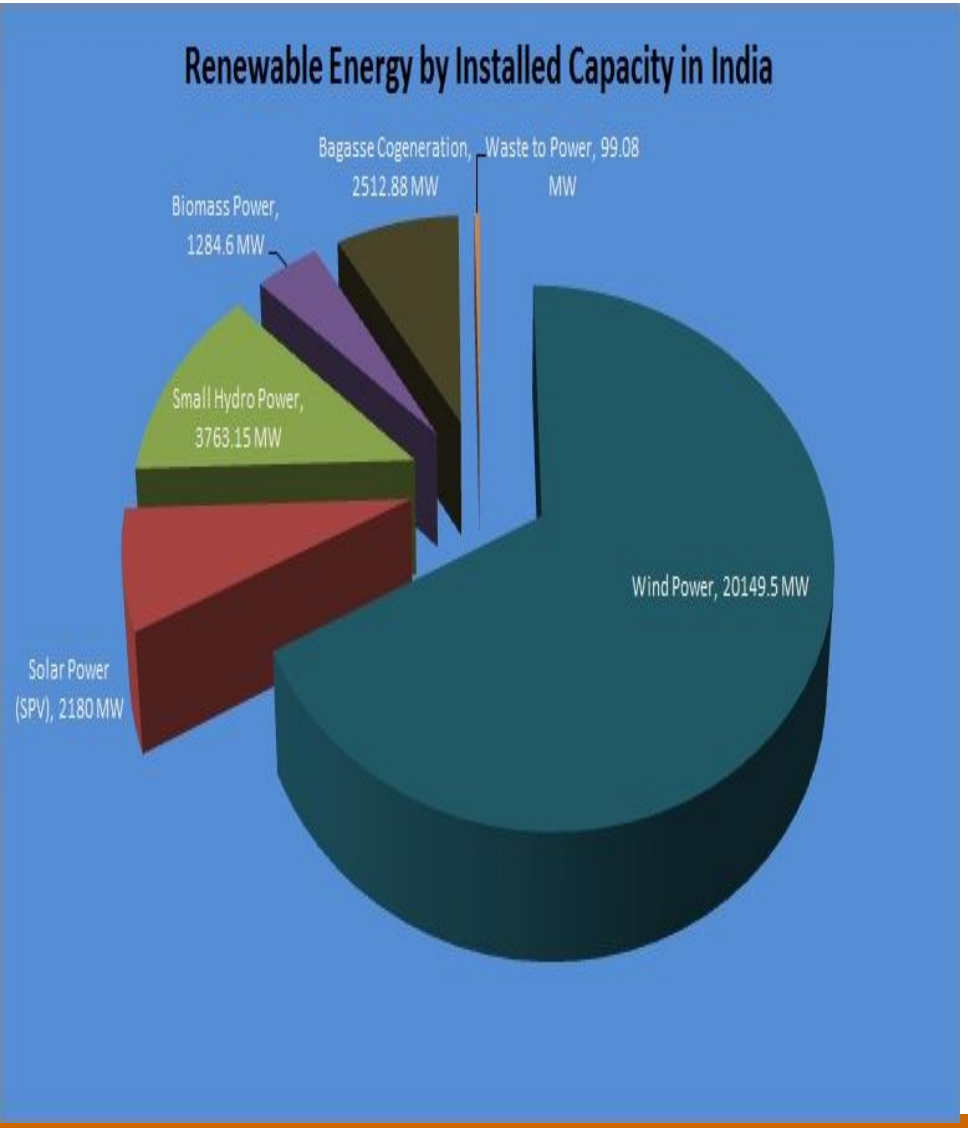
Do you see them as having an impact – positive or negative – on your image, business plans, shareholder value, investor returns, and profits?

Core questions

Have you found that business activities that reduce greenhouse gas emissions and energy use have been beneficial in terms of profits, jobs and economic growth?

If yes, do these positive financial results resonate with your internal leadership, Board of Directors, shareholders, customers, investors, regulators and other stakeholders?

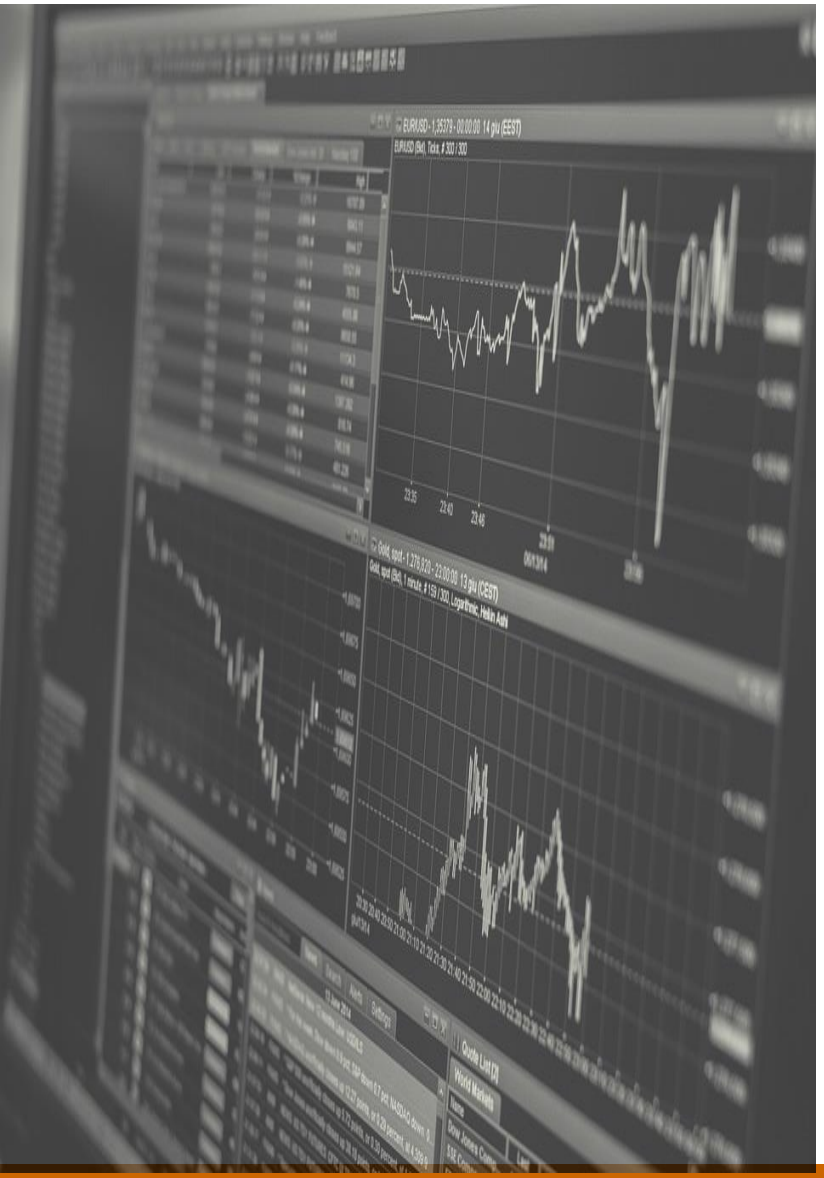
Core questions



How are you viewing the distinctions – and opportunities/challenges – between domestic versus foreign markets in the clean and efficient energy domain?

What do you see as the biggest challenges and needs that must be overcome in the current political and policy climate for the clean energy/tech/efficiency sector to expand?

Primary policy finding #1



An accelerated transition to a low-carbon economy would create welcome economic opportunity.

The challenge of addressing climate change is a clear economic opportunity for many companies, and a significant risk if companies fail to act.

The clean energy transition is happening despite Trump Administration efforts of Washington, with some actors “doubling down”.

Maximizing jobs and job quality is key to an effective transition to a low-carbon economy.

Significant capital is looking at clean tech from the sidelines but not yet flowing at scale.

Primary policy finding #2

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Overwhelming support for clear Federal policy on energy and carbon to provide long-term certainty and allow business to invest with confidence.

Government can create economic opportunity, help U.S. companies capture first-mover advantage, and allow business to invest with confidence with a more comprehensive, stable and urgent approach.

Companies prize policy predictability – and a holistic, coherent and consistent national policy over a state and local patchwork.

The current fragmented state of U.S. energy policy is costly and not good for business.

Outcome-based policies are more effective than technology mandates.

Concern that policy is increasingly being driven by ideology and not analysis and economics.

Primary policy finding #3

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Consistent economy-wide carbon price widely seen as an essential policy step; design preferences differ.

Carbon pricing legislation would provide the most comprehensive basis for sustained scale up of business investment.

Disagreement on the best form: tax, cap-and-trade, sectoral approaches, regional efforts.

Border-adjustment fees are complex but worth considering for energy-intensive trade-exposed (EITE) industries as part of future carbon legislation.

Primary policy finding #4

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Climate change is an issue of global economic competitiveness for U.S. companies.

U.S. companies are competing in a highly competitive international market.

In a carbon-constrained world, trade rules matter.

Poorly-crafted policies can make U.S. companies less competitive globally.

Concern about Trump Administration polices leading to loss of our global standing and competitive technological edge to China, India and the European Union.

Primary policy finding #5

Near universal support from the private sector for staying in the Paris Climate Accord.

Global economic competitiveness; clean tech markets growing; convergence of global policy with global market share; need a seat at the table to influence results; didn't solve U.S. manufacturing problems and challenges.

US should stay in and engage with the long-term goal of encouraging consistent international standards and policies.

Primary policy finding #6

Change in the electricity sector is happening fast and policy must keep pace.

Change is coming fast; utilities need to catch up and keep pace.

For utilities, the expectation that they provide for reliability, security, safety, resilience and affordability compete with GHG reduction.

The Clean Power Plan provided a focusing mechanism to think about a carbon-constrained future, and many utilities will meet or exceed its requirements.

Beware policies that have low- to moderate-income people subsidizing the affluent (i.e. cross subsidization).

Primary policy finding #6 (cont.)

Regulatory fragmentation inhibits change in the utility sector. State PSCs, RTOs have the ability to step up to address fragmented policy across their regions.

DOE Reliability NOPR was seen as wrong-headed, with a couple of exceptions.

Federal energy efficiency standards are welcome; concern voiced that it will take years to deploy more efficient appliances and equipment without additional incentives.

Competitive electricity markets are more attractive to direct power purchasers, renewable developers and investors.

Utility pricing reforms will be a game changer.

Primary policy finding #7

Federal tax and technology policies and programs that support private sector development and deployment of clean technology have strong fans.

Broad support exists for time-limited incentives for emerging technologies that enable innovation, demonstration and early deployment – and also certainty.

Many say they want a level playing field for renewables, nuclear, vehicles and fossil fuels, but perspectives vary.

Investors prefer that companies and technologies not be reliant on public policy for financial success, but value government's investments in discovery science to help young technologies.

Making energy tax policy more technology neutral – such as expanding Master Limited Partnerships to renewables and 45Q to CCUS – would be more fair.

Support remains strong for federal (and California) vehicle fuel economy standards, but some will press for more flexibility in the mid-term review.

Fund and support existing government programs that assist U.S. companies.

Primary policy finding #8

Corporate policies and strategies are moving the clean energy economy forward, often dramatically.

Direct purchase of renewables by large companies is having a dramatic impact on emissions and influencing overall economic development planning at the state level.

Companies that set ambitious GHG-reduction targets improve their company environmental performance, often irrespective of policy.

Energy intensive industries have a built-in incentive to reduce energy use.

Climate-related financial disclosure, assessment of climate risk and data tracking are helping change company cultures.

Corporate and investor stakeholders want action on climate change.

Primary policy finding #9

State policies create economic opportunity but can be hard to navigate without clear Federal policy.

State renewable electricity and energy efficiency standards have had a positive economic impact while also creating challenges.

State energy efficiency standards allow utilities to offer consumers incentives.

Streamlining permitting and environmental review sought by both wind developers and coal miners.

Primary policy finding #10

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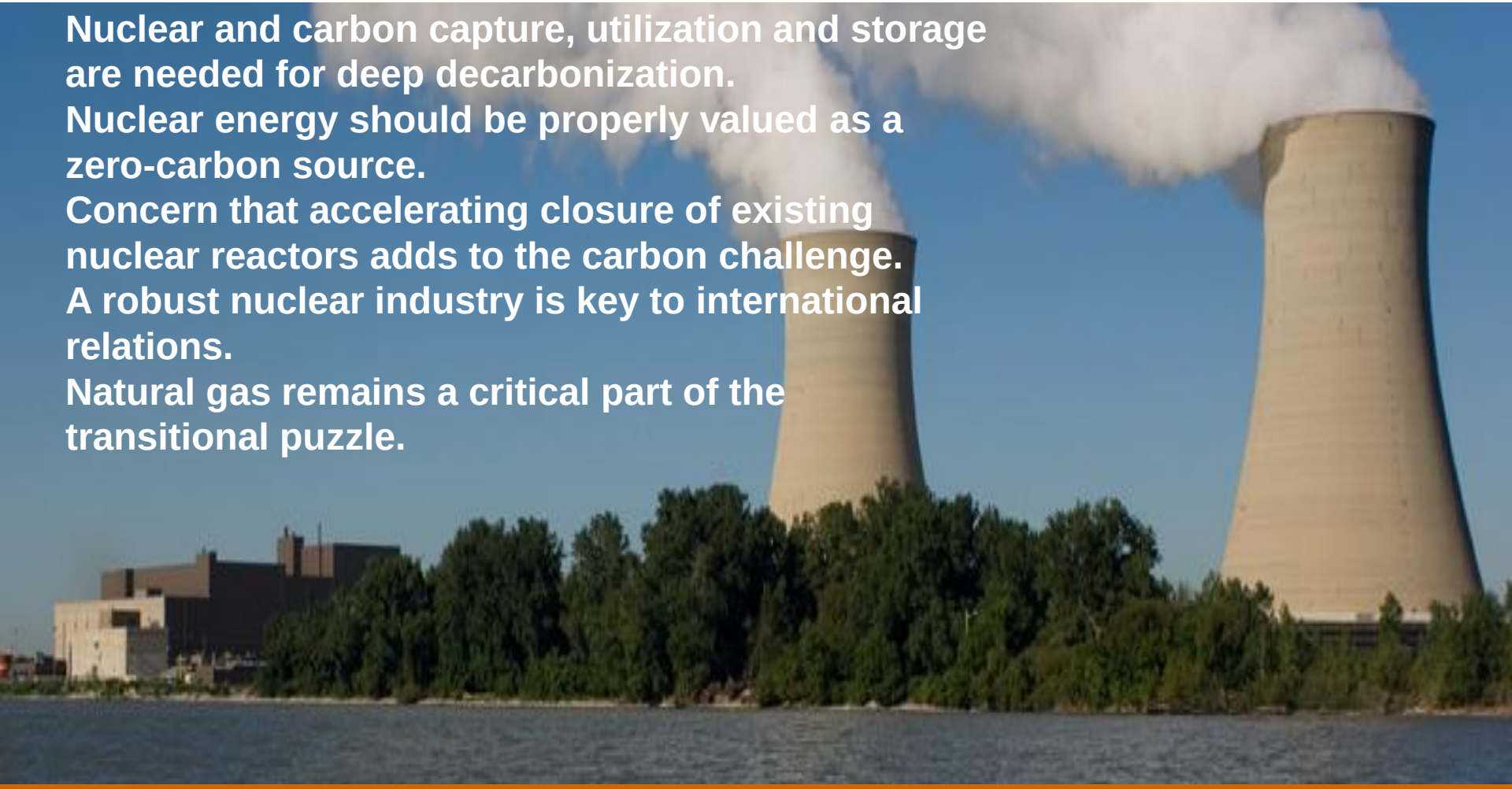
Nuclear energy, natural gas, and carbon capture and storage are essential pieces of the carbon reduction puzzle.



Nuclear and carbon capture, utilization and storage are needed for deep decarbonization.

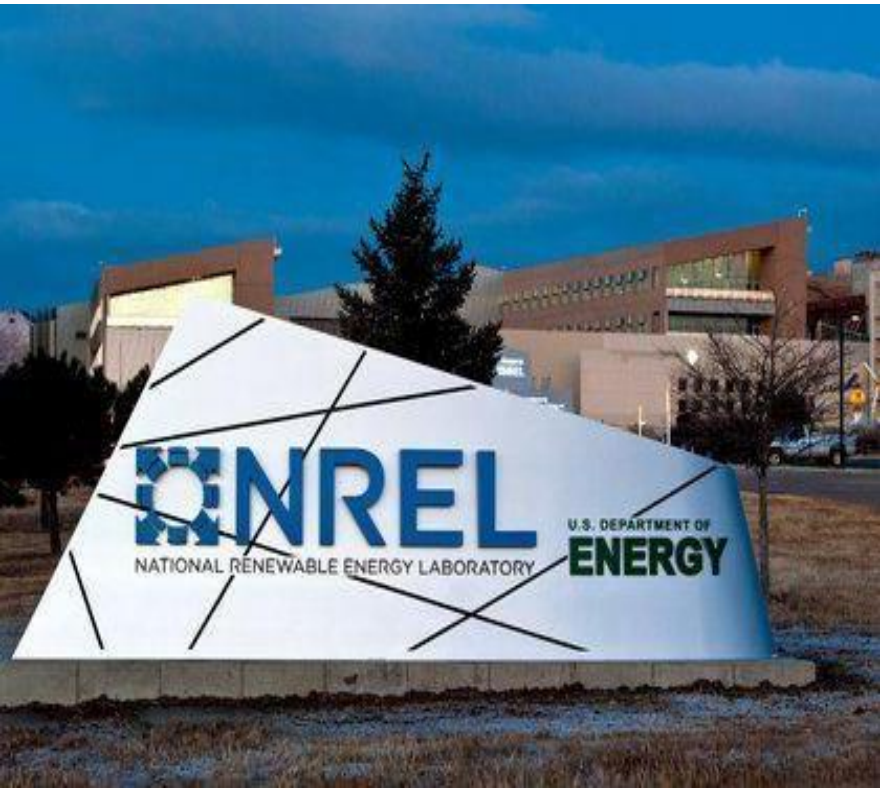
Nuclear energy should be properly valued as a zero-carbon source.

Concern that accelerating closure of existing nuclear reactors adds to the carbon challenge.

A robust nuclear industry is key to international relations.

Natural gas remains a critical part of the transitional puzzle.

Primary policy finding #11



Public investment in early stage clean energy technology innovation is crucial to private-sector progress across all economic sectors.

Early stage R&D drives innovation.

The importance of company-funded R&D.

The importance of technology transfer policies.

Dropping technology costs are rapidly causing markets to expand.

Primary policy finding #12

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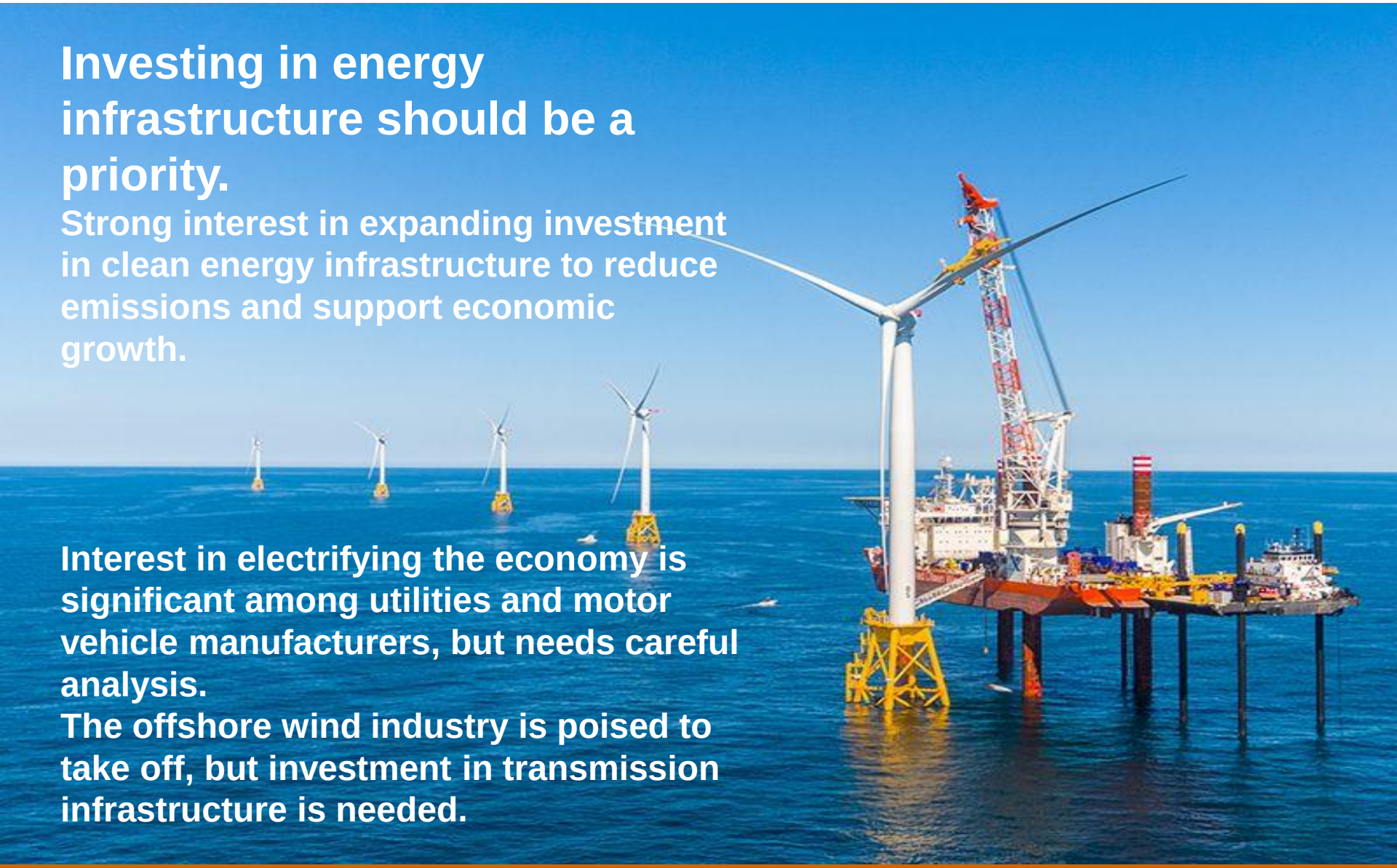

Investing in energy infrastructure should be a priority.

Strong interest in expanding investment in clean energy infrastructure to reduce emissions and support economic growth.

Interest in electrifying the economy is significant among utilities and motor vehicle manufacturers, but needs careful analysis.

The offshore wind industry is poised to take off, but investment in transmission infrastructure is needed.

Research project team

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Thank you

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