

The EFI Foundation is a Washington-based 501(c)(3) nonprofit organization dedicated to educating the public on ways to harness the power of technology and policy innovation to accelerate the clean energy transition.

Under the leadership of Ernest J. Moniz, the 13th U.S. Secretary of Energy, the EFI Foundation builds on the legacy work of the Energy Futures Initiative, a nonprofit organization co-founded by former Secretary Moniz in 2017.

www.efifoundation.org



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### To Our Funders and Supporters

am pleased to present this impact report that looks back upon the EFI Foundation's history, our major activities in 2023, and the impact of our work.

Since its inception, the EFI Foundation (EFIF) has become a preeminent thought leader on clean energy. Through our reports, convenings, and thought leadership, we have offered science-based, actionable, and regionally appropriate solutions to advance the clean energy transition. I'm pleased to note that the body of our work—which I summarized a few years ago as the Green Real Deal—has informed more than 10 federal initiatives, including the creation of the U.S. Department of Energy's (DOE's) Office of Clean Energy Demonstrations and a portfolio of negative-carbon investments.

Our dialogues and analyses have included such topics as the role of natural gas in the transition to a low-carbon global economy, carbon management, nuclear energy, and energy finance.

It's a remarkable achievement for a small and nimble organization that we called the Energy Futures Initiative (EFI), established with my former DOE colleagues Melanie Kenderdine and Joe Hezir, and ably assisted by a dedicated team of researchers, policy analysts, and communications experts.

In 2023, we produced work that advanced energy technology innovation, nuclear security and strategic stability, cuttingedge capabilities for the American scientific research community, and environmental stewardship.

The year began with the publication of **The U.S. Hydrogen Demand Action Plan**—which kicked off a series of hydrogen market analyses—and the introduction of the Energy Futures

Finance Forum (EF³), a program offering recommendations for policymakers to help make clean energy a high-quality investment. Later in the year, we published *Transforming the Energy Innovation Enterprise*, the result of a yearlong analysis of opportunities to enhance DOE's organizational structure in





ABOVE: From left, David Ellis, Melanie A. Kenderdine, Joe Biden, Ernest J. Moniz, and Joseph S. Hezir.

TOP: Behind the scenes at the BBC during a live broadcast featuring Moniz.

RIGHT: Moniz speaks with CNBC correspondents in Dubai on oil and gas company participation at COP28.



# Since its inception, the EFI Foundation has become a preeminent thought leader on clean energy.

the face of expanded clean energy responsibilities. This is a pivotal time for DOE as it faces new challenges in implementing legislative directives that are expanding its responsibilities for clean energy demonstration and deployment.

We also saw the introduction of two pieces of legislation directly inspired by our 2019 report, Clearing the Air: A Federal RD&D Initiative and Management Plan for Carbon Dioxide Removal Technologies. They were the bipartisan Carbon Removal, Efficient Agencies, Technology Expertise (CREATE) Act of 2023 and the Carbon Dioxide Removal Research and Development Act of 2023.

We ended the year with a series of important events at COP28 in Dubai. In partnership with the Nuclear Threat Initiative and the Clean Air Task Force, we published *A Global Playbook for Nuclear Energy Development in Embarking Countries*, which outlines pathways for the responsible, sustainable, and effective development of new nuclear energy projects and industries. It garnered much favorable attention and will provide a foundation for 2024 efforts in the nuclear energy domain. At COP28 we also released *A New Industrial Backbone: Exploring Regional CCUS Hubs for Small-to-Midsize Industrial Emitters*. Both nuclear power and CCUS were noted for the first time in a final COP communique as potentially important decarbonization pathways.

Last year also heralded a change in our organizational structure, as we became the EFI Foundation, a 501(c)(3), to carry on the legacy work of the Energy Futures Initiative and expand our access to funding sources. We welcome your feedback and continued support of our work. •

Ernest J. Moniz

Chief Executive Officer and President EFI Foundation



# Driving Energy Innovation

The EFI Foundation is dedicated to informing the public on science-based, actionable pathways to address the climate crisis by accelerating the transition to a low-carbon economy.

ince its founding in 2017, the EFI Foundation (EFIF) has played a pivotal role in informing global policymakers, stakeholders across energy and finance, and the public at large about the best ways to navigate—and shape—the new energy landscape.

These efforts are led by CEO and President Ernest J. Moniz and Executive Vice Presidents Melanie A. Kenderdine and Joseph S. Hezir. From 2013–2017, Moniz served as the 13th U.S. Energy Secretary, with Hezir as the U.S. Department of Energy's (DOE's) Chief Financial Officer and Kenderdine leading the Office of Energy Policy and Systems Analysis. In office, Moniz was a key architect of the Paris Agreement and put science at the forefront of actionable energy policy.

The trio left government resolved to continue their work of confronting the climate crisis through energy innovation. They envisioned a small organization dedicated to accelerating the energy transition—the Energy Futures Initiative. Early work included the groundbreaking report, *Advancing the Landscape of Clean Energy Innovation*, which analyzed the opportunities and challenges of developing the U.S. clean energy ecosystem, as well as the *U.S. Energy and Employment Report* (USEER). This in-depth survey



From left, Alex Kizer, Joseph S. Hezir, Melanie A. Kenderdine, Ernest J. Moniz, Naomi Moniz, and David Ellis.

of the U.S. labor force and skills trends was established at DOE under Moniz and taken over by EFI after the Trump administration abandoned the report. That reporting project, a joint effort of EFI and the National Association of State Energy Officials (NASEO), was handed back to DOE in 2021.

Through this work, EFI established a reputation as the preeminent thought leader on science-based, actionable pathways to reduce carbon-intensive activities. A series of reports on carbon dioxide removal, the future role of natural gas in the global energy transition, and a roadmap to develop a U.S. market for hydrogen have informed more than a dozen federal initiatives, including the 2022 Inflation Reduction Act. In all, EFI analysts have published more than 30 opinion pieces in major publications, testified

"With EFI, we have our best minds on the case—whether that's tracking our biggest energy challenges, tackling the climate crisis, or identifying game-changing energy opportunities for our communities."

— U.S. Rep. Melanie Stansbury (D-NM-1) at a dozen congressional hearings, and conducted 50 briefings and workshops for members of Congress on a variety of decarbonization pathways.

Since 2023, the nonprofit EFI Foundation has built on the legacy work of EFI and carries on its mission. We will continue to bring together policymakers, scientists, communities, and financial experts to identify ways to fast-track the move to a low-carbon economy.

The following pages provide snapshots of our accomplishments and impact from 2017 to early 2024. We believe this work is more essential than ever to address climate change—and we invite you to learn more about EFIF's lead role in the energy transition. •

 David Ellis, Senior Vice President of Policy Strategy & Outreach

### A Trusted Voice on Clean Energy

The Energy Futures Initiative quickly established a reputation for science-based, actionable policy solutions to advance the clean energy transition in the United States and globally.



### 2017

#### JUNE

Ernest J. Moniz, the 13th U.S. Energy Secretary, creates a new research organization called the Energy Futures Initiative (EFI) "dedicated to science based, actionable solutions to the existential threat of climate change." Moniz, a key architect of the Paris Agreement on climate change, formulates EFI at a time when the incoming Trump administration is preparing to roll back U.S. leadership on energy issues.



Moniz, center, founds the Energy Futures Initiative in June 2017. Kenderdine, left, and Hezir, right, join him as principals.

#### JUNE

The day after Donald Trump announces the U.S. pullout from the Paris Agreement, The Boston Globe publishes the opinion article "Trump Abdicates U.S. Leadership on Climate Change." In it, Moniz says that the exit "effectively denies science, diminishes U.S. competitiveness in developing the multi trillion-dollar clean energy global marketplace, abdicates U.S. leadership on an urgent issue of global concern, and again shakes the confidence of allies ... history will judge the president harshly."



At a Newsmaker event at the National Press Club in Washington, D.C., Moniz introduces EFI two weeks after the Paris Agreement decision. The press announcement attracts favorable press coverage including the headline "Ernest Moniz is Back."

The Boston Blobe Trump abdicates US leadership on climate change By Ernest J. Moniz , June 1, 2017, 7:14 p.m.

### AUGUST

EFI publishes its first report, The U.S. Nuclear Energy Enterprise:

A Key National Security

Enabler. The report team raises the alarm about the evaporating U.S. advantage

in nuclear technology and its possible

negative impact on zero-carbon electricity and national security. At the same time, nuclear programs are contracting in domestic universities, and China, South Korea, and Russia are increasing their reach and influence as suppliers of nuclear energy, especially in the developing world.

### 2018

In Rome, EFI's Moniz co-moderates the Vatican's Dicastery for Promoting Integral Human Development's dialogue, "The Energy Transition and Care for Our Common Home." The conference, attended by executives from the oil and gas industries and international financiers, acknowledges the need to be concerned with the welfare of communities most vulnerable to climate change.

JUNE



Moniz meets with Pope Francis at a Vatican summit on an equitable energy transition.



Moniz and Richard Bruton, Ireland's then-Minister for Communications. Climate Action, and Environment.

#### NOVEMBER

Moniz delivers a lecture at the Irish Institute of International Affairs on an action plan to combat climate change. The trip includes interviews on Irish state radio and television, meetings with Ireland's climate minister and the head of the country's Environmental Protection Agency, and dinners with former policymakers and members of the United Nations' Intergovernmental Panel on Climate Change.

#### FEBRUARY

2019

EFI releases Advancing the Landscape of Clean Energy Innovation in partnership with IHS Markit to provide a thorough review of the U.S. clean energy ecosystem. Bill Gates's organization, Breakthrough Energy, commissions the study to assess the clean energy innovation ecosystem and options to modernize it.



#### AUGUST

In response to the Green New Deal proposal in the U.S. Congress, EFI develops the Green Real Deal framework with key principles and realistic strategies for achieving economywide decarbonization.

#### MAY

The report Optionality,

Flexibility & Innovation: Pathways for Deep **Decarbonization in California** analyzes ways the state can meet its aggressive 2030 low-carbon energy goals and outlines the innovation agenda needed for deep decarbonization by midcentury.





#### SEPTEMBER

EFI publishes a landmark report— Clearing the Air. The report outlines the need for a multi billion-dollar federal research, development, and demonstration (RD&D) initiative to achieve large-scale carbon removal. Moniz delivers a keynote at Climate Week NYC, titled "Step Up: The Business Case for Climate Action."

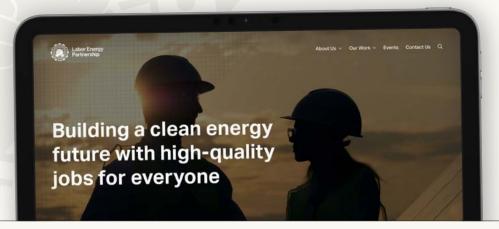
### A Trusted Voice on Clean Energy

2020



#### APRIL

EFI partners with the American
Federation of Labor and Congress of
Industrial Organizations (AFL-CIO) to
form the Labor Energy Partnership (LEP),
which conducts policy-relevant research
and makes policy recommendations to
build a clean energy future.



#### JUNE

Moniz testifies as a key witness before the U.S. House Energy and Commerce Subcomittee on Energy about how to revive our economy given the impact of COVID-19 on the energy sector. He details EFI's Green Real Deal, an actionable framework for meeting deep decarbonization of energy and associated systems by midcentury in ways that minimize costs, maximize economic opportunities, accelerate solutions, and promote social equity.

RIGHT: Moniz testifies before Sens. Joe Manchin (D-WV) and Lisa Murkowski (R-AK) during a 2019 hearing of the U.S. Senate Committee on Energy & Natural Resources on energy innovation in the United States.



#### DECEMBER

EFI releases the three reports in its "Frontiers of CDR" series in December. The series builds on the 2019 *Clearing the Air* report to examine critical but underexplored pathways for carbon dioxide removal (CDR). The reports feature key findings and policy recommendations related to natural and technological pathways for enhancing CDR from terrestrial and biological sources, oceans, and enhanced carbon mineralization.







### 2021

#### JUNE

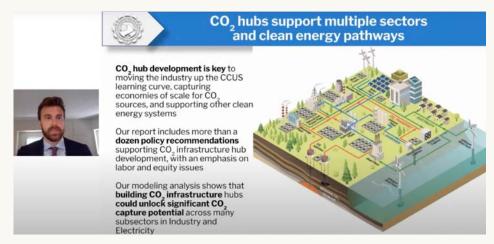
EFI publishes *Building to Net-Zero:*A U.S. Policy Blueprint for Gigaton-Scale CO<sub>2</sub> Transport and Storage
Infrastructure, a report produced as part of the LEP. It outlines a policy blueprint for large-scale carbon dioxide transport and storage infrastructure to support rapid and deep decarbonization. This study follows a December 2020 workshop held with key stakeholders from industry, academia, and labor.

Throughout 2021, EFI experts speak at five virtual congressional testimonies, pen six influential opinion pieces in major publications, and strengthen the LEP, including by launching a website for the partnership.



#### JULY

The LEP holds a virtual workshop on hydrogen and carbon capture and storage in the Ohio River Valley. Speakers include U.S. Sens. Joe Manchin (D-WV) and Sherrod Brown (D-OH); Gina McCarthy (then-White House National Climate Advisor); Carol Battershell (Distinguished Associate, EFI); Elizabeth Shuler (then-Secretary-Treasurer, AFL-CIO); Richard Trumka (then-President, AFL-CIO); and Moniz, Kenderdine, and Kizer from EFI's leadership.



Kizer introduces a portion of the webinar for the Ohio River Valley workshop.

### 2022

### MARCH Russia's invasio

In the wake of Russia's invasion of Ukraine and the subsequent major disruption of global energy markets, Moniz discusses energy security and the climate crisis during numerous media appearances on live news programs. He is a guest on Real Time with Bill Maher, Meet the Press Daily with Chuck Todd (April), and The Late Show with Stephen Colbert (October).



Moniz talks climate, energy security, and geopolitics with Stephen Colbert.



Moniz and U.S. Rep. Melanie Stansbury (D-NM-1)

#### SEPTEMBER

EFI celebrates its fifth anniversary with more than 300 supporters. Attendees and speakers include U.S. Sen. Sheldon Whitehouse (D-RI); U.S. Reps. Melanie Stansbury (D-NM-1) and Paul Tonko (D-NY-20); Varun Sivaram (then-senior adviser to U.S. Special Presidential Envoy for Climate John Kerry); and Sally Benson (then-Energy Division Director and Chief Strategist for the Energy Transition at the White House Office of Science and Technology Policy).

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# Change Makers

Through our reports, convenings, stakeholder briefings, and public events, EFI Foundation thought leaders have delivered actionable decarbonization pathways and helped shape groundbreaking energy legislation.

his decade is shaping up to be the most transformative period in history for innovation in energy technologies, business models, and policies. The EFI Foundation (EFIF) has played a key role in informing policymakers and helping unleash an unprecedented wave of investment in energy.

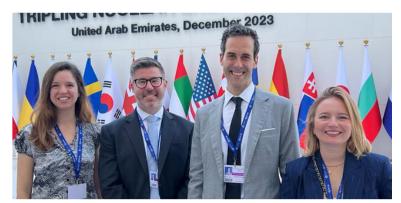
Since the Energy Futures Initiative (EFI) was founded in 2017, EFI and EFIF staff have conducted issue briefings for more than 60 members of the U.S. House of Representatives and some 40 U.S. senators. Our senior leadership, including Executive Vice Presidents Melanie A. Kenderdine and Joseph S. Hezir, have testified before Congress 11 times.

The ability of founder and CEO Ernest J. Moniz to explain complicated global security and energy challenges—particularly during the COVID-19 economic crisis and following Russia's invasion of Ukraine—has made him a go-to guest on major broadcast networks including CNN, BBC, CNBC, and NPR as well as programs such as The Late Show with Stephen Colbert and Real Time with Bill Maher.

EFIF thought leaders have published more than 30 opinion pieces in top-tier publications. Topics have included the impact of COVID-19 on the energy sector and ways to jumpstart an economic recovery, energy security and access in Africa, and realistic ways to meet emissions goals. These pieces reached influential audiences in The Wall Street Journal, The Boston Globe, Politico, and The Economist.

In 2023, we premiered several impactful reports and programs. We published The U.S. Hydrogen Demand Action Plan, which outlined strategies to kickstart offtake of clean hydrogen.













We launched the Energy Futures Finance Forum (EF3), a multiyear effort to boost the "investability" of decarbonization projects. And we published Transforming the Energy Innovation Enterprise, a roadmap to enhance the U.S. Department of Energy's (DOE's) management structure to build on current initiatives from major legislation and accelerate the energy innovation process.

Our researchers have presented at public events hosted by EFIF and across the energy sector. Research Specialist Sam Savitz detailed our work on bioenergy with carbon capture and storage. Project Manager and Senior Analyst Tatiana Bruce da Silva outlined key takeaways of the DOE innovation study. Director of Research Madeline Schomburg addressed a conference on our work to build stronger community engagement for new hydrogen projects. And Alex Kizer, Managing Director of the Hydrogen Demand Initiative (H2DI), is a leading voice in major media on market innovations.

Continued on page 13



















#### Change Makers, from page 11

EFIF's convening power attracted participation in our public events by senior policymakers, including 16th U.S. Energy Secretary Jennifer Granholm, former and current White House National Climate Advisors Gina McCarthy and Ali Zaidi, former National Economic Council Director Brian Deese, and U.S. Agriculture Secretary Tom Vilsack. Our events have also featured participation by prominent U.S. senators and representatives, including Sen. Joe Manchin (D-WV), Sen. Lisa Murkowski (R-AK), Rep. Kathy Castor (D-FL-14), Sen. Martin Heinrich (D-NM), Sen. Bill Cassidy (R-LA), Sen. Chris Coons (D-DE), Rep. Troy Carter (D-LA-2), and Sen. Tina Smith (D-MN).

Also in 2023, Moniz was a featured speaker at CERAWeek in Houston, the largest energy industry gathering in the United States. He touched on the global energy security landscape and the power of innovation to transform energy systems. He also led a panel on financing the energy future by unlocking private capital that featured the work of  $\rm EF^3$ .

Later in the year, EFIF had a robust presence at COP28, the United Nations' annual climate change conference that was held in Dubai, United Arab Emirates. Together with the Clean Air Task Force and the Nuclear Threat Initiative, EFIF introduced *A Global Playbook for Nuclear Energy Development in Embarking Countries*, which outlines pathways for the responsible, sustainable, and effective development of new nuclear energy projects and industries. Moniz joined EF3's Jeff Brown to present *A New U.S. Industrial Backbone: Exploring Regional CCUS Hubs for Small-to-Midsize Industrial Emitters*. Moniz also moderated a panel on nuclear fusion that followed a keynote speech by U.S. Special Presidential Envoy for Climate John Kerry.

The EFI Foundation's sweep and scope has had a profound impact on policy outcomes. Our analysis has shaped federal actions, including targeted and time-limited tax incentive provisions in the Inflation Reduction Act and investment in technology innovation pathways to decarbonize industry and transport. Our research has also informed federal policy for cutting-edge carbon dioxide removal technologies and their research, development, and commercial deployment. Our work tracking energy jobs and workforce development has influenced the continuation of these efforts at the federal level. And our recommendations for DOE have helped to inform the creation of the Office of Clean Energy Demonstrations and other updates to meet the challenges of the energy transition.

More than \$1.4 trillion in federal investment has been directed to move the energy transition forward. Through its thought leadership efforts, EFIF has displayed a measurable impact on navigating the path forward. •

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### Accelerating a U.S. Hydrogen Market

Our research focuses on demand-side dynamics, impacts on communities, and how regional hubs can become economic growth engines.

Unprecedented policy momentum exists for developing clean hydrogen markets in the United States. The EFI Foundation's (EFIF's) body of work on hydrogen continues to help inform federal policy and private-sector investments.

A major challenge to building a national market for clean hydrogen is establishing sufficient demand, but new federal funding and incentives are expected to drive down production costs significantly. The Bipartisan Infrastructure Law authorized \$9.5 billion for clean hydrogen initiatives, including \$8 billion for the Regional Clean Hydrogen Hubs (H2Hubs) demonstration program. The Inflation Reduction Act (IRA) offers a new production tax credit, known as 45V, for clean hydrogen over a 10-year period.

Our February 2023 report, *The U.S. Hydrogen Demand Action Plan*, presented recommendations to support clean hydrogen market formation, with a focus on how regional hubs could foster demand and drive economic development. The report was informed by EFIF analysis, insights from EFIF workshops hosted for hydrogen hub stakeholders across the United States, and hundreds of interviews with industry, government, and academic leaders.

Regional hydrogen hubs could help in the creation of a national market. In October 2023, the U.S. Department of Energy (DOE) announced seven regions selected to receive up to \$7 billion for hydrogen hub project development.

### Hydrogen Demand Initiative (H<sub>2</sub>DI)

In January 2024, the U.S. Department of Energy selected EFIF to lead a consortium charged with helping to accelerate the commercial adoption of clean hydrogen.

This partnership—
The Hydrogen
Demand Initiative



(H<sub>2</sub>DI)—includes commodity markets information firm S&P Global; financial exchange operator Intercontinental Exchange (ICE); the MIT Energy Initiative; and Dentons, the world's largest law firm. "We see the regional hubs as the engines for clean hydrogen market formation in the United States," said Alex Kizer, Managing Director of H<sub>2</sub>DI. "EFIF and its terrific team of partners will target these federal resources to support clean hydrogen offtake and lasting cost curve reductions."

### **Hydrogen Transition Framework**

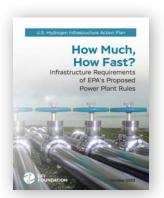
The Hydrogen Transition Framework (HyTF, pronounced "high-tiff") is an analytical tool developed by EFIF researchers to assess the near-term potential for clean hydrogen market development.

The framework's data inputs and elements can be used by policymakers and project developers to consider market-enabling conditions at the regional level. The tool guides EFIF's internal analysis in areas including job transition and environmental justice.

Alex Kizer, Managing Director of H<sub>2</sub>DI, told **CNBC** that "[Not] all pathways are created equal, but having the hubs with these regional components with these different technologies, exploring these various configurations is so important for us to move up the learning curve on what our clean energy future is."

Experts at EFIF continue to explore the conditions around the cross-cutting dynamics of clean hydrogen market formation in the

United States. Our
October 2023 report,
How Much, How
Fast: Infrastructure Requirements
of EPA's Proposed
Power Plant Rules,
analyzed the possible
infrastructure require
ments and potential
outcomes of the U.S.



Environmental Protection Agency's proposed rules for emissions reductions from fossil-fueled power plants.

In February 2024, we released a Factbook for H2Hubs Stakeholders: Building Stronger Community Engagement in Hydrogen Hubs.

The factbook presents the results of a large survey of community stakeholders in the

The factbook presents the results of a large survey of community stakeholders in the H2Hubs regions and contributes to ongoing efforts by communities, hydrogen hub developers, and DOE to align on community engagement approaches and best practices. ©

"Dentons is deeply honored to support former Energy Secretary Dr. Ernest Moniz and the groundbreaking Hydrogen Demand Initiative in one of the most consequential aspects of DOE's national approach to designing and developing realistic demand-side hydrogen markets across the United States."

— Clinton A. Vince, Chair, Energy Practice, Dentons

### 2023 review

# Exploring the Role of Natural Gas Globally

Our multi-year efforts explore the role of natural gas in global decarbonization and energy security.

The EFI Foundation's (EFIF's) multi-year studies on natural gas highlight our power to convene a wide range of stakeholders, experts, and policymakers from around the world. Following the COVID-19 pandemic and Russia's invasion of Ukraine, this work expanded to include energy security and to assess the greater role of U.S. exports in global supply chains as nations look to secure reliable energy and meet climate goals.

The role of U.S. liquefied natural gas (LNG) in global energy markets has become a central part of pragmatic conversations about how to decarbonize industries and economies as well as improve energy security and supply chain hygiene. During a February 2023 webinar hosted by S&P Global Market Intelligence, EFIF Executive Vice President Melanie A. Kenderdine underscored the importance of LNG for decarbonization, noting that 61% of U.S. carbon dioxide emissions reductions in the power sector since 2005 are the result of shifting from coal to natural gas.

The current phase of EFIF's global gas work kicked off in January 2023, with a stakeholder workshop on how natural gas plays into current and future regional and global energy systems. We brought together more than 75 senior executives and experts from the natural gas industry, U.S. government, consulting firms,



law firms, financial institutions, nongovernmental organizations, think tanks, and foreign governments. We published key takeaways in an April 2023 report, *The Role of U.S. Natural Gas Exports in a Low-Carbon World*.

The **rollout event** held on Capitol Hill featured bipartisan representation with remarks from U.S. Sen. Lisa Murkowski (R-AK) and Rep. Troy Carter (D-LA-2). "I am really glad to see a holistic, fact-based report that speaks to everyone, because that's exactly what we need as we try to move past our current divisions and form a lasting consensus on this critical issue," said Murkowski.

EFIF's work on natural gas continued throughout the year with a series of roundtable discussions hosted across Europe and Asia that

### Key Findings from U.S. Natural Gas Exports in a Low-Carbon World

Participants at a 2023 workshop clearly articulated that U.S. natural gas exports play a central role in achieving global energy security and climate goals. The **summary report** details some of the following major takeaways from the workshop:



Climate goals and energy security—both affordability and availability of supply—need to be addressed in the same conversation.



Natural gas will continue to be crucial for fulfilling global goals for decarbonization, energy security, and food security.



The timelines for financing and building energy infrastructure may not be sufficient to meet global energy security and decarbonization needs.



Federal, state, and local government permitting issues are a major challenge to meeting deep decarbonization and energy security goals.



The deployment of technologies and additional regulations are needed for the natural gas industry to address its greenhouse gas emissions, including methane.



Natural gas prices in the United States are affected by the dynamics of global energy markets, as well as domestic politics and concerns.



Although Europe needs gas in the near term, it may not be a long-term market for U.S. exports.



In Asia, developing nations are primarily concerned about the affordability of natural gas, while developed nations worry more about the reliability of supply.



Rick Westerdale, left, moderates a panel on energy security and geopolitics during Gastech 2023 in Singapore.

brought together a diverse range of regional and global energy stakeholders, experts, and policymakers. In Europe, views varied widely by region, with Eastern European stakeholders expressing the importance of natural gas as a fuel source for energy security and decarbonization, and Western European stakeholders saying they were eager to transition away from natural gas as quickly as possible in favor of zero-carbon technologies. At a roundtable held in Singapore, many stakeholders said it is important for advanced economies to understand that economic development is paramount for much of Asia when considering energy needs.

EFIF is continuing this work and will release a scoping report on these global convenings, detailing insights gained from these conversations as the world aims to meet ambitious climate goals, drive economic development, and strengthen energy security. •

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The Role of U.S.

**Natural Gas Exports** 

### **2023** review



U.S. Sen. Chris Coons (D-DE), right, during the launch event for the Energy Futures Finance Forum (EF3).

### Policies to Make Clean Energy Bankable

Our strategy for decarbonization financing aligns policy, deal quality, and investor perspective.

Successfully achieving the global clean energy transition requires more than just technological progress. Massive financing and investment are needed to deploy decarbonization assets at scale. A major obstacle is finding the several trillion dollars per year of financial capital needed to deploy new clean technologies globally, including their upstream supply chains and downstream infrastructure. In February 2023, the EFI Foundation (EFIF) launched the Energy Futures Finance Forum (EF3) to analyze the barriers to large, private capital flows for decarbonization opportunities and to develop policy and financial sector recommendations to help overcome these challenges in the United States and around the world.

### **Financing Zero-Carbon Energy**

Advanced technology for small modular nuclear reactors can help enhance the security, resiliency, and reliability of the U.S. energy supply as well as contribute to decarbonization of the power and industrial sectors. But investors are wary of the economic viability of small modular reactors. In an October 2023 analysis—A Cost Stabilization Facility for Kickstarting the Commercialization of Small Modular Reactors—EF3 outlined an

innovative financing approach and a creative solution to help establish sufficient demand for the U.S. to overcome the cost magnitude and cost uncertainty barriers for first-ofa-kind designs.





EF3's distinct strategy sits at the intersection of policy, deal quality, and the investor perspective. Its policy recommendations reflect an investor's perspective that clean energy projects must be high-quality, blue-chip investments. Improving the investment quality of decarbonization value chains will help industry players access the largest pools of private capital—global, publicly traded debt and equity markets—which are of the same order of magnitude as the expenditures needed to achieve net-zero by midcentury.

Through its research and engagement activities, EF³ is helping to facilitate international, national, and industrywide efforts to scale up investments to decarbonize the economy. Its analytical approach examines investment roadblocks from two perspectives: an industry value chain perspective and a crosscutting perspective focused on barriers common to multiple industries. The EF³ team brings experience and expertise across the energy landscape, including energy finance and project development, macroeconomics, strategic management, policy, regulation, and technology.

At the launch event hosted by the Bipartisan Policy Center, EF³ brought together policymakers and investors to discuss the framing report for the program—Increasing the Quality of Investments for Deep Decarbonization. The speakers discussed the challenges and potential solutions and agreed that the clean energy transition requires global coordination across countries, investors, and sectors. The event also highlighted EF³'s deep-dive analysis into the issues surrounding the commercialization and deployment of carbon capture and sequestration (CCS) technologies at scale. Turning CCS

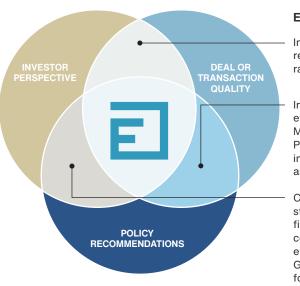
Projects in Heavy Industry and Power into

### **Global Playbook for Nuclear Energy Outlines Pathways to Scale Projects**

Mitigating climate change, improving energy security, and creating the conditions for social progress through sustainable economic growth are interrelated challenges—and nuclear energy can play a pivotal role. Amid unprecedented momentum for nuclear as an essential part of a suite of climate solutions, the EFI Foundation, Clean Air Task Force, and Nuclear Threat Initiative launched a new report in December 2023 at the United Nations annual climate change conference (COP28). The report, *A Global Playbook for Nuclear* 

Energy Development in Embarking Countries: Six Dimensions for Success, outlines pathways for the responsible, sustainable, and effective development of new nuclear energy projects with an options-based approach.





### **Blue Chip Financial Investments** provides targeted policy actions to overcome investment barriers to ensure CCS reaches its potential as a

pollution control mechanism.

### EF<sup>3</sup> Strategies

Investment research and credit rating analysis

Industry-focused efforts (e.g., Mission Possible Partnership, industry associations, etc.)

Climate finance strategies and financial community coalition building efforts (e.g., GFANZ, Network for Greening the Financial System, etc.)

### 2023 review

# Developing a Clean Energy Workforce

Our partnerships and analyses provide insight on U.S. energy jobs and roadmaps for clean energy policy.

Since its founding in 2017, the Energy
Futures Initiative (EFI) has tracked and
analyzed data on the U.S. energy workforce
and labor trends that drive the nation's
economy. In 2016, under the leadership of
then-Energy Secretary Ernest J. Moniz, the
U.S. Department of Energy (DOE) published
the first U.S. Energy and Employment Report
(USEER) to better understand employment
trends in key energy sectors that were difficult
to follow through other publicly available data.

In 2018, EFI took up the USEER after the Trump administration ignored a congressional mandate and declined to continue data collection and production of the report. EFI teamed up with the National Association of State Energy Officials (NASEO) and BW Research to provide continuity with previous editions of the USEER in data collection and accuracy in year-to-year comparisons.

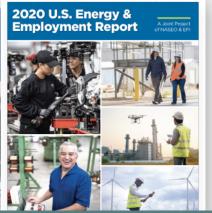


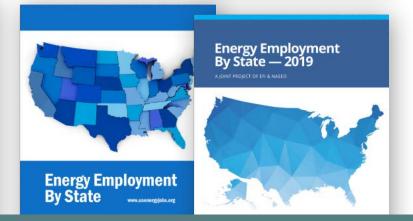
In 2021, the USEER—still produced by EFI, BW Research, and NASEO—moved back to DOE, which released the sixth edition. The USEER continues to serve as an important and consistent tool for policymakers at the state and federal level, trade associations, labor unions, and other stakeholders.

Beginning in 2020, EFI partnered with the AFL-CIO to unite climate and labor priorities through the Labor Energy Partnership (LEP). LEP conducts policy-relevant research and develops policy recommendations to build a clean energy future with the 7.5 million U.S. energy sector workers at its center.  $\bigcirc$ 









"I want to thank NASEO, the Energy Futures Initiative, and Secretary Moniz, for heroically stepping up when it became clear that the previous administration didn't plan to meet their obligation. ... It's because of you that we know just how much the energy sector, especially clean energy, has grown in recent years." — Jennifer Granholm, U.S. Secretary of Energy

### **Tracking Job Quality and Labor Standards**

Recent federal investments present a historic opportunity to improve the quality of new jobs in the clean energy transition, strengthen labor standards, address rising economic inequality, and speed the adoption of clean energy technologies and as we tackle climate change.

The EFI Foundation's (EFIF's) legacy includes helping to develop innovative, technically sound, place-based solutions to the climate crisis that are rooted in social and economic justice, and that help create and sustain high-quality, union jobs. Building on this history, in a January 2023 report, Jobs. Emissions, and Economic Growth-What the Inflation Reduction Act Means for Working Families, EFIF looked specifically at the impact of the Inflation Reduction Act (IRA) on communities and employment, finding that the IRA will create an additional 1.5 million jobs in the U.S. economy by 2030.

Supporting high-quality job growth and working to avoid stranded workers and communities will be critical to creating a successful low-carbon energy future.

"Social equity concerns and the climate need to be addressed together," said EFIF CEO Ernest J. Moniz.

In August 2023, EFIF released Job Quality—The Keystone of Clean Energy Industrial Policy, a report on opportunities to improve job quality and uplift



communities at the heart of the clean energy transition. It details investments and standards in the Infrastructure Investment and Jobs Act, IRA, and CHIPS and Science Act, and offers recommendations for using related policy tools to strengthen job quality and encourage union representation.

During a **rollout event**, U.S. Sen. Tina Smith (D-MN) applauded the report: "[It] lays out really powerful recommendations for how we can keep people, and opportunity for people, at the center of our work around climate change."

### **Inspiring Leading-Edge Policy Innovations**

Our analysis helped catalyze U.S. bipartisan efforts to support carbon dioxide removal technologies.

RIGHT: U.S. Rep. Paul Tonko (D-NY-20) sponsored legislation inspired by EFIF analysis.

Tackling climate change requires a portfolio approach—including new options for carbon management to reduce emissions. Carbon dioxide removal (CDR) technologies can help remove existing carbon dioxide from the atmosphere. CDR is essential to limit global warming, mitigate the worst effects of climate change, and reach net-zero emissions by midcentury.

The EFI Foundation (EFIF) has built an extensive research suite focused on identifying and analyzing opportunities for large-scale carbon management. These technologies use natural and technological methods: direct air capture, carbon mineralization, coastal- and ocean-based capture, terrestrial and biological capture, geologic storage, and carbon utilization. EFIF's work on carbon management and CDR also includes a series of research on bioenergy with carbon capture and storage (known as BECCS).

Our groundbreaking 2019 report, Clearing the Air: A Federal RD&D Initiative and **Management Plan for Carbon Dioxide** Removal Technologies, outlined a 10-year, \$10.7 billion initiative to bring innovative, large-scale CDR technologies to commercial

"The work being done by the EFI team on deep decarbonization is incredibly important to what we are working on in Congress."

- U.S. Rep. Paul Tonko (D-NY-20)



readiness with technology-specific cost targets and minimal ecological impacts.

The Clearing the Air report inspired two pieces of bipartisan federal legislation introduced in 2023. In September, U.S. Rep. Paul Tonko (D-NY-20) and Sen. Brian Schatz (D-HI) introduced the Carbon Dioxide Removal **Research and Development Act**, crediting Clearing the Air with providing the framework. The bill adopts the report's recommendations for a multi-year program that prioritizes crossagency coordination to move CDR technologies to development and demonstration.

In June, Sen. Lisa Murkowski (R-AK) and Sen. Kyrsten Sinema (I-AZ) introduced the **Carbon Removal, Efficient Agencies, Technology Expertise (CREATE) Act with** Sens. Shelley Moore Capito (R-WV) and Sheldon Whitehouse (D-RI). The bill aims to increase research and development of CDR technologies to reduce net greenhouse gas emissions. Murkowski noted EFI and the report specifically for its direct impact on the proposed legislation.

"After EFI laid down Clearing the Air, I introduced a bill ... taking a page from your report," Sen. Murkowski said. "We call it the CREATE Act. ... An important part of how things happen at the legislative level, is when we rely on experts such as you."

### **Exploring Regional Hubs** for Carbon Capture, **Utilization, and Storage**

In December 2023, EFIF released A New U.S. Industrial Backbone: **Exploring Regional CCUS Hubs for** Small-to-Midsize Industrial Emitters. The report, co-authored by Horizon Climate Group, examines how to reduce industrial emissions of carbon dioxide by grouping small and midsize industrial emitters in regional hubs with access to carbon capture, utilization, and storage (CCUS) infrastructure. CCUS hubs can allow multiple emitters access to shared carbon dioxide transport and storage operations, offering scale at a lower cost. The report identifies four regional clusters that include more than 700 small-to-midsize units with over 70 million metric tons of annual carbon dioxide emissions and outlines a series of next steps in the formation of CCUS hubs.



Technological innovation, policy change, and the promise of hubs now offer potential solutions to CCUS development in small-to-midsize industrial units.

### **Redesigning Government for the New Energy Landscape**

Over the past three years, the U.S. Congress has passed legislation to provide significant new authorities, programs, and funding to accelerate the U.S. clean energy transition. Congress did not, however, organize these new authorities and resources into specific structures and programs. Achieving transformative energy innovation in the United States will require enhancing the pace, agility, effectiveness, and efficiency of the U.S. Department of Energy's (DOE's) organization and management.

A November 2023 EFIF report, **Transforming the Energy Innovation** Enterprise, presents the results of a yearlong analysis of opportunities to enhance both DOE's organizational structure and its capacity to encourage new clean energy technologies and provide faster deployment of the department's innovation agenda. The opportunities outlined in the report build on current initiatives and can help provide a pathway to an even more effective future energy innovation enterprise



### Leadership and Staff



The EFI Foundation Global Advisory Committee met in September 2023. Front row, from left: Alain Ebobissé, Colette D. Honorable, Ernest J. Moniz, Lord John Browne of Madingley, Maxine Savitz; back row, from left: Richard Meserve, Franklin Orr Jr., Todd Mitchell, Ana Palacio, Charles B. Curtis, Andy Karsner, Byron Dorgan, Joseph S. Hezir.

### **Global Advisory Committee**

		Advisory Board Chairman of Executive of BP, 1995–200
	,	P28; former Director-Genera vable Energy Agency (IRENA
Energy & Environme	ntal Sciences; Chief Strat	sor, Stanford School of Earth tegist for the Energy Transition echnology Policy, 2021–202
	eritus Board Member; Cl	tiative President Emeritus and hairman of the Federal Energ atory Commission, 1977–198
John M. Doutoh	Emperitus Institute Dr	ofooograf the Massachusett

**John M. Deutch** . . . . . Emeritus Institute Professor at the Massachusetts Institute of Technology (MIT); U.S. Director of Central Intelligence, 1995–1996

**Alain Ebobissé** . . Chief Executive Officer of Africa50; former Global Head for the World Bank Group's Global infrastructure Project Development Fund

**Heidi Heitkamp** . . . Director of the Institute of Politics at the University of Chicago; U.S. Senator, North Dakota, 2013–2019

Colette D. Honorable . . Executive Vice President of Public Policy and Chief External Affairs Officer at Exelon Corp.; Commissioner, Federal Energy Regulatory Commission, 2014–2017

**Andy Karsner** . . Independent Director, Board of Directors at ExxonMobil; Senior Strategist at X (formerly Google X), Alphabet's Moonshot Factory; U.S. Assistant Secretary of Energy for Efficiency and Renewable Energy, 2006–2008

**Todd Mitchell** . . . . . . . Founder and President of Two Seven Ventures;

Director of Mitchell Energy & Development Corporation

Franklin Orr, Jr. . . Chair of the ClimateWorks Foundation Board of Directors; U.S. Under Secretary for Science and Energy, 2014–2017

Ana Palacio . . . . . . . Founder of Palacio y Asociados; Foreign Minister of Spain, 2002–2004

Maxine Savitz . . Former General Manager of Technology/Partnerships at Honeywell; President's Council of Advisors for Science and Technology, 2009–2017

### **Executive Leadership**



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Melanie A. Kenderdine Executive Vice President, Corporate Secretary



Joseph S. Hezir Executive Vice President, Treasurer



**David Ellis**Senior Vice President
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**Alex Kizer**Managing Director,
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### Research Partners

The EFI Foundation would like to thank the organizations that have collaborated on some of our major studies.















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Ray Rothrock

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Utility Workers Union of America

Venture Global LNG

### **EFIF By the Numbers**



### **Energy Reports**

based on our independent analyses identifying actionable ways to decarbonize the global energy economy



### **Opinion Pieces**

published in major media outlets, including The Wall Street Journal, The Economist, The Boston Globe, and Los Angeles Times



### Congressional **Testimonies**

on subjects including global energy security, the critical mineral supply chain, carbon dioxide removal and storage, and the needs of the 21st century energy workforce



### Workshops and **Stakeholder Convenings**

hosted in-person and virtually, many of which are available for the public to view online



### **Energy Experts**

with a network that offers deep experience across a broad range of energy and policy topics

### **Initiatives**

inspired by our work, including the establishment of the U.S. DOE's Office of Clean Energy **Demonstrations** 



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### **Federal**



## Support Our Work

### JOIN THE INNOVATORS CIRCLE

In 2023, we launched the Innovators Circle, a select group of individuals who strongly support the EFI Foundation's (EFIF's) mission and the role EFIF is playing in advancing the clean energy transition. Flexible resources, such as those provided by the Innovators Circle, have great leverage. They give EFIF analytical and convening latitude, enabling it to operate nimbly and seize opportunities to advance the clean energy agenda. Joining the Innovators Circle will enable you to establish or deepen a close and impactful relationship with EFIF. These ties will help EFIF enhance its capacity to drive meaningful change in the areas of clean energy technology, policy, and business model innovation. By becoming part of the Innovators Circle, you both support EFIF and provide it with critical flexibility needed to maximize its impact as a thought leader in helping to shape the clean energy transition.

