Consultative Group on Climate Innovation

A PROPOSED COMPLEMENTARY TECHNOLOGY TRACK FOR THE POST-2012 PERIOD

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SUMMARY

Global climate change demands a new geometry of low carbon, technology strategies to complement cap and trade. Cap and trade alone will not stabilize carbon emissions. A new complementary technology innovation track must be initiated now to serve as a twin pillar of the post-2012 climate framework. This track must include complementary policies, innovation strategies, and finance mechanisms that support the rapid development and deployment of low carbon technologies, all within new forms of global infrastructure. [1]/

With regard to a dedicated climate technology track, we welcome the proposal from the Club of Madrid and the United Nations Foundation, acting through the Global Leadership for Climate Action (GLCA), to create a Consultative Group on Clean Energy Research (CGCER). The CGCER would "facilitate international collaboration on the development of low-cost, zero-carbon technologies and the exchange of information about clean energy technologies." [2]/ This idea is based on existing programs such as the Consultative Group on International Agricultural Research (CGIAR), a consortium of donor funded centers around the world (www.cgiar.org).

But in order to create an effective technology strategy for climate stabilization, it is essential to develop a more comprehensive and updated focus for a CGCER-like effort. It should reflect how the CGIAR strategy has evolved into a "distributed innovation" framework for change in other areas.

The consultative group concept has its origins in the 1960s. While it started as a "big science" effort, it has evolved considerably. It now relies increasingly on a more distributed and decentralized approach among donors in areas such as agricultural productivity and natural resource protection. [3]/ This new approach goes beyond research; the evolving distributed innovation approaches focus on product development, targeted analysis, finance, and cooperative policy development. An international framework and strategy supports the work on the complex global public goods involved in these fields, whereas no such cooperative architecture exists today for innovation in climate technology.

Building on the GLCA idea, we propose a more expansive ***"Consultative Group on Climate Innovation"*** *or* ***CGCI****, a new global architecture and strategy for climate technology innovation in the post-2012 framework to achieve the following goals*:

- *Cover multiple areas, including technology innovation for mitigation (and perhaps adaptation), as well as related finance initiatives.*
- *Create a decentralized and cooperative global structure around climate technology innovation, based on proven models of "distributed innovation" from other public goods fields where the international community is already working.*
- *Address many issues that go well beyond research—to climate technology product development, finance, business models, policy analysis, and related strategies needed to scale up existing technologies and create new breakthrough innovations.*
- *Link technology initiatives between developed and developing countries, and provide for the involvement of the private and public sectors and civil society.*

A new architecture of participation and action in climate technology innovation is needed in the post-2012 framework. CGCI could help fill that gap. The current research, development and deployment system in the energy field will not be enough to address the ever increasing global demand for energy that must be supplied while dramatically reducing greenhouse gas (GHG) emissions. The international community should dedicate as much intellectual and financial capital to developing these technology approaches as it does to cap and trade systems.

In particular, this new CGCI "distributed innovation" approach would rely on recent thinking from many market disciplines to spur technology innovation. Other industries facing technology challenges have developed dynamic approaches to technology innovation that have not been applied to energy. Indeed, we need to rethink the energy research, development and deployment process itself to create a new geometry of technology innovation and product development strategies to meet the climate challenges of the 21st century.

A new complementary technology-innovation process through CGCI would require three interrelated components—consistent with the GLCA report—as outlined in this paper:

1. Technology policies, agreements, and other mandatory approaches that complement cap and trade, commercialize new technologies, and include, but go far beyond, voluntary technology strategies.
2. Distributed innovation strategies that purposely and proactively link together people across the product development continuum, from the upstream research community

to downstream finance and commercialization experts, in order to accelerate low carbon technology market penetration and adoption.

3. New finance strategies that move emerging technologies from pilot projects to commercial scale deployment.

Through this new CGCI approach, we address two pivotal questions for the international community as it embarks on constructing a post-2012 climate stabilization framework with a greater focus on technology innovation:

1. What technology-based policies can be adopted to drive massive technology innovation?
2. How can a new technology innovation approach be structured—what is the most effective international architecture to advance global climate technology innovation and involve other players from the private and public sector and civil society?

We suggest that development of such a complementary CGCI strategy should be pursued through the G8 Gleneagles Dialogue process with the support of multilateral organizations such as the World Bank. This new process could then feed into the post-2012 framework under the UNFCCC.

REASONS FOR A COMPLEMENTARY TECHNOLOGY INNOVATION TRACK

> *The Earth's climate is nearing, but has not passed, a tipping point beyond which it will be impossible to avoid climate change with far-ranging undesirable consequences. . . This grim scenario can be halted if the growth of greenhouse gas emissions is slowed in the first quarter of this century.*
>
> Dr. James E. Hansen, Director, NASA Goddard Institute for Space Studies (December 6, 2005)

- We must closely match the enormous scale of the climate problem with the urgent need for large-scale commercial-ready energy technological solutions.
- We have very little time—about 10 to 15 years—to put global emissions on a path toward stabilization. Limiting warming to 2 degrees Celsius means stopping CO_2 emissions growth in the next decade with a rapid emissions descent to around half of current levels by 2050—while projected global energy capacity is expected to grow three-fold. If we are to meet world energy demands and stabilize climate change, we must triple the

planet's current energy-producing capacity by 2050, with all new additions to be carbon-neutral.

- To achieve that unprecedented energy future, simply scaling up energy efficiency, renewables and other existing technologies alone will not offset the expected exponential increase in emissions from global energy growth. While we must scale up these readily available technologies, we also need to develop and demonstrate new technologies that can be rapidly deployed and serve as powerful new breakthroughs in the next two decades; developing new carbon-free coal technologies is critical to long-term stabilization.
- Cap and trade price incentives alone will not call forth essential game changing technology innovation; cap and trade incentives are likely to only bring forward "on the shelf" least-cost technologies. To create massive innovation for more expensive "breakthrough" technologies on the scale required, a portfolio of new and complementary technology polices and financing mechanisms will be needed.
- The optimal climate approach is to integrate complementary technology innovation strategies with emission caps; this is the most cost-effective path to climate stabilization because innovation can reduce the future costs of expensive "breakthrough" technologies, making future, tougher emissions caps easier to impose.

NEW TECHNOLOGY POLICY AND COMMERCIALIZATION STRATEGIES

- Despite the urgent need for this low carbon technological transition, not nearly enough is being done to develop complementary technology strategies. Academic discussions about technology innovation have not been translated into a practical climate strategy needed for the post-2012 framework.
- Many technology innovation strategies and approaches are emerging around the globe and must be incorporated into this post-2012 climate framework. These include short- and long-term no carbon emitting technology goals and targets, specific technology commercialization agreements, sectoral no-emissions goals, CO_2 and energy efficiency performance standards, niche market strategies, technology prizes, advanced purchase commitments, government procurement, new strategies to address intellectual property rights (IPRs), transition management polices, entrepreneurship activities, policies that bolster public and private research and development, and many other new and aggressive climate and energy strategies that require collective commitment. (We are

developing a suggested portfolio of technology-innovation policies, distributed innovation strategies, and finance mechanisms.)

- These new strategies go beyond conventional approaches such as information networks, research, or demonstration projects that lack deadlines for commercial readiness and a clear support framework.
- The international community needs an aggressive, complementary technology innovation approach now.
  - — The Heiligendamm Declaration of June 2007 at the G8 Summit in Germany recognized the need for "an expanded approach to collaboratively accelerate the widespread adoption of clean energy and climate friendly technologies."
  - — The Chair's Summary of the High-Level Event on Climate Change that took place at United Nations Headquarters in September 2007 states that existing and new technology solutions require "policy frameworks and cooperation mechanisms."
  - — Following the October 2007 climate meeting in Berlin of representatives of the G8 +5 countries and the European Commission, the Chair concluded that "market instruments that set a price on carbon emissions . . . should be complemented by an adequate set of policies including clear regulatory frameworks."
  - — In its Framework for a Post-2012 Agreement on Climate Change, the Global Leadership for Climate Action (GLCA) includes "technology development and cooperation" in its four-pronged global climate strategy.
  - — Increasingly, researchers from academia, government agencies, and NGOs are recognizing the need to complement cap and trade systems with technology innovation strategies.
- These technology strategies can be developed nationally, bilaterally, or multilaterally, with new forms of linkages in a post-2012 framework. They can inform international climate regimes, but need not be controlled by them. Rather the foundation of a post-2012 framework should be policies, strategies and financing mechanisms that focus on "product-driven" and "distributed" models of innovation now common in other fields to accelerate commercialization of new technologies and scale-up of existing technologies in the next two to three decades. Applying alternative research and development models that are succeeding in other disciplines to climate technology will create new opportunities to increase market competition and address market failures.

- The purpose of a complementary technology policy and innovation strategy is to align emission limitation and reduction needs with the incentives to catalyze the delivery of scalable, commercial-ready products. Climate technology programs must be comprehensive with deadlines for market readiness and flexible benchmarks for rapid program change if long-range plans fail. Market competition must be encouraged and market failures must also be addressed. The overarching goal of overcoming key barriers to greater scale and innovation for select technologies cannot be lost in rigid program structures unable to respond nimbly to market needs and unexpected technological or institutional bottlenecks or opportunities.
- The post-2012 process must adopt a full range of short- and long-term commercial strategies for a selective group of market-ready technologies. To be most effective, this technology track must focus on massive scale-up and commercialization of certain technology sectors that require significant technological breakthroughs; these high-impact technologies would include the following five technology sectors: (1) CO_2 capture and storage (CCS), (2) biomass and biotechnology to improve the quality of biomass, (3) hydrogen systems, (4) renewables, including wind and solar power next generation systems and (5) end use energy technologies. (Emerging areas of research such as nanotechnology may also offer as yet unrecognized opportunities.) [4/]

A NEW "DISTRIBUTED INNOVATION" STRATEGY FOR CLIMATE

- Public interventions in the low carbon energy sector often have focused only on supporting information sharing networks that lack the incentives or infrastructure to drive massive innovation and then product development and deployment. To the extent public investments have extended beyond information sharing, they have largely supported long-term demonstration projects or prototype development. The current surge in venture capital is largely directed towards a relatively small number of sectors (e.g., solar); these investments are helpful but are insufficient to drive large-scale technology development in multiple energy sectors.
- The consequences of climate change are distributed globally; there is a global market failure to develop technologies at sufficient scale for a transition to a low carbon economy in the time required for stabilization.
- A new global climate technology innovation initiative—a "distributed" model of climate innovation and commercialization—can overcome these failures. Building

on the CGCER suggestion, we propose a new *Consultative Group on Climate Innovation* or *CGCI*. The CGCI will rely on distributed innovation strategies that have emerged from the most daunting innovation challenges.

- Distributed innovation strategies bring together the international expertise needed to develop and deploy new technologies. Teams include project leaders with business expertise to ensure that research and development are linked to viable commercialization strategies. Robust information technology tools support these teams, enabling people throughout the globe to collaborate together; the distributed innovation approach assembles the best people for a task regardless of their location. These strategies enable teams to tap innovative thinking from unexpected places; these tools could "open" the climate innovation process in the same way that a growing number of companies now supplement their own in-house research and development capacity in other areas.
- Given the capital intensive and competitive nature of the energy sector as well as the cross-border effects of climate change, innovative strategies for managing intellectual property rights (IPRs) are needed to ensure strong participation of the private sector, while also ensuring that the benefits of innovation and carbon reduction are widespread.
- The initiative should include strong financial incentives that drive and accelerate product development and widespread deployment.
- Elements of this distributed innovation approach can be found in the information technology, industrial, agriculture and health sectors. This approach is increasingly favored by donors, foundations, companies and multilateral institutions. The distributed innovation strategy has been used to support the development of both new private and "public goods" areas involving massive market failures, such as agriculture in developing countries and HIV containment and prevention. (See CGIAR and its various distributed approaches found, for example, in the Generation Challenge Programme *(www.generationcp.org/comm/AR_CP_06_internet.pdf)*, and in world health and immunizations areas such as the International Aids Vaccine Initiative *(www.iavi.org)* and the GAVI Alliance *(www.gavi.org)*, a international consortium funded by the Bill and Melinda Gates Foundation and other donors to accelerate deployment of vaccinations and public health delivery services.)
- Through these efforts, NGOs, companies, universities, philanthropies and governments—working across sectors and transcending political boundaries—are solving

global problems that have resisted market interventions for decades. These strategies also are being used by Fortune 500 companies to develop new products and increase revenues. Groundbreaking work is being done in these areas by foundations such as The Rockefeller Foundation and the Gates Foundation. [5]/

- *These new approaches have never been applied to climate.* We need to borrow best lessons and promising new distributed innovation strategies from other fields and apply them to this climate technology innovation challenge; the complexity of global climate change and the urgency of rapid mitigation call for new technology innovation approaches.
- The need for innovation is great—most current climate-related technology research programs involve long-term basic research not connected directly enough to commercialization pathways. The purpose of a new distributed innovation approach is to go beyond ubiquitous information sharing networks and conventional technology support mechanisms that have more often been ineffective: incremental, stove-piped, stymied by competing constituencies, and geared to single-point demonstration projects.
- In contrast, the driving objective for "distributed innovation" is to accelerate the widespread development and deployment of a specific technology; to identify barriers to those technology goals; to identify investment needs; and to create sustainable public and private models for rapid technology commercialization. This complementary "distributed" technology initiative would enable people to attack the problem from multiple intervention points including, but not necessarily limited to, technical, market and financial, policy, regulatory, legal, institutional, and intellectual property issues.
- Through the design of its infrastructure and incentive systems, the initiative would focus on product development and deployment by linking key players in the low carbon technology RD&D process; this will proactively connect the upstream research community (e.g. universities) with the downstream finance and deployment community (e.g., companies, investors, foundations, financial institutions and governments). Participants in these distributed innovation projects would come from across the globe; teams of experts would be assembled around specific technologies and supported by a global innovation community.
- The initiative would include a diverse portfolio of technology strategies on different time scales—from short-term solutions to reduce emissions almost immediately to mid-range commercial opportunities in the next 5-10 years, to longer term, disruptive (or radical) innovations not yet imagined for energy—all designed to create the framework for a 50-year transitional plan to stabilize GHG concentrations in the atmosphere.

A NEW FINANCE STRATEGY TO FUND BREAKTHROUGH TECHNOLOGIES

- A complementary technology strategy requires an equally ambitious finance strategy.
  - — The Chair's Conclusions from the October 2007 climate meeting in Berlin of representatives of the G8 +5 countries and the European Commission, and the Chair's Summary of the High-Level Event on Climate Change that took place at United Nations Headquarters in September 2007, cite financing (along with mitigation, adaptation, and technology) as a key element of a future climate agreement.
  - — At the September 2007 meeting of major emitters in Washington, President Bush called for a new international fund to finance clean energy projects in the developing world, although it is not yet clear how such a fund would be structured.
- Moving promising new low carbon technologies from successful venture roll-out to large-scale deployment is a daunting challenge—and a critical need, if climate change is to be successfully addressed. While other industrial sectors face similar challenges, the energy sector has a unique and entrenched "locked-in" carbon infrastructure, requiring a massive investment to overcome technical and institutional inertia and shift to new low carbon energy solutions.
- Typically, professional project finance providers require new generating systems to have established 2–3 successfully operating commercial-scale installations before they can be considered for routine (and relatively attractive) project finance terms. From the viewpoint of a start-up clean energy enterprise seeking to deploy its first commercial installation, reaching this level of operational maturity can be an insurmountable challenge. This financing dilemma is problematic if we are to support the billions (if not trillions) of dollars of new technological investment needed for a successful global low carbon energy transition.
- In its *Global Clean Energy Investment Overview*, prepared for the Clinton Global Initiative in September of 2006, New Energy Finance (NEF) highlighted the need to "develop mechanisms to support pilot projects which require (financing) but still have technology risk." And in his recent U.S. Senate testimony, NEF founder Michael Liebreich noted the "role for loan guarantees, or for other sorts of pooled technology insurance mechanisms or long-term state or federal purchase guarantees" to help close this commercialization gap.
- New finance tools will be needed for technologies from energy mitigation options, including carbon capture and sequestration, to second- and third-generation solar

technologies, and extending to various innovation challenges required for agricultural adaptation and new technologies for resilient buildings and structures.

- There has not been sufficient coordinated and systematic thinking on how to address these larger scale-up finance problems, especially given the urgency of the low carbon energy access need. The low carbon technology deployment financing gap represents a critical issue in the effort to effectively address climate change and energy security. This issue calls for urgent, creative, and long-term work to develop consensus proposals addressing these barriers to commercialization finance of low carbon technologies on a scale fitting the scope of this global challenge.

A COMPLEMENTARY TECHNOLOGY PROCESS: A "CONSULTATIVE GROUP ON CLIMATE INNOVATION" IN THE POST-2012 FRAMEWORK

So now we come to perhaps the most challenging question: assuming the need for these new substantive policy and innovation approaches, how can the international community through the post-2012 process organize itself to produce new "distributed innovation" approaches to climate stabilization?

- The GLCA suggestion for a CGCER "consultative group" approach is a good starting point, but to be effective, it must be updated and expanded to reflect how this approach has evolved over the last several years in agricultural productivity, HIV vaccine development, and other "market failure" areas.
- It has evolved to a "distributed innovation" decentralized global approach that has been embraced generally by major governments, donors, foundations, and other experts from around the world. In fact, the process is evolving rapidly in all of these and other innovation areas, as it would most definitely in climate.
- To capture the most current thinking in this area, we suggest taking the CGCER proposal and expand and modify it to reflect a broader mandate and a more "distributed innovation" approach.
- To capture the most current thinking on technology innovation for climate, we propose a "*Consultative Group on Climate Innovation*" or *CGCI*. This would enable donors and other partners to create a new global architecture to focus on climate technology innovation and finance from a "bottom up" product orientation, with the same kind of new approaches now in use in agricultural productivity and HIV vaccine development efforts.

- *The question is: How can this new decentralized and distributed innovation structure be adapted for the climate stabilization problem in the post-2012 framework—what do governments have to do to put this process in motion? We suggest a four-pronged approach to this question:*

    1. *First, the governments at Bali should recognize the need for a "complementary technology innovation" track as part of the 2012 framework—we propose specific adoption of a Consultative Group on Climate Innovation (CGCI) to be that track. The governments should instruct its members and cooperative institutions to undertake the development of a new complementary technology initiative through a public-private partnership involving the G8 Gleneagles Dialogue and other multilateral forums—in particular, it should recommend creation of a CGCI "distributed innovation" strategy toward climate technology commercialization.*

    2. *Second, the G8 countries and other multilateral entities should undertake a rapid fire process to develop a CGCI "distributed innovation" approach to climate technologies in preparation for the G20 Ministerial level dialogue on Climate Change, Energy and Sustainable Development (Gleneagles Dialogue) scheduled for March 14-16, 2008 in Chiba, Japan, and for the later G8 meetings in Japan in July 2008. During that time, a series of expert meetings should be held to further refine the concept. Among other issues would be the question of the scope of the process (policy, technology focus, finance elements, and related issues) as well as administration, funding and structure for this initiative, including its relationship to the UNFCCC process.*

    3. *At the G8 meeting in mid-2008, the members should consider the results of this CGCI process and recommend its adoption, if appropriate, for further consideration as part of the post-2012 framework.*

    4. *All the while, actual implementation and experimentation must occur. During this time and continuing through the next several years, the members as well as the multilateral institutions should "prototype" this CGCI distributed innovation approach through creation of various technology innovation global projects with certain select low carbon technologies. This process would develop necessary information for use in the negotiations over the final framework put in place in the 2009 time period.*

CONCLUSION—CORE PRINCIPLES OF CGCI

In conclusion, we believe a new, complementary technology track in the post-2012 framework—that we frame as CGCI—is critical to long-term stabilization. But that result requires rigorous attention to core principles so that the design and implementation of this effort reflect the most current thinking on technology innovation:

- A CGCI approach to distributed innovation strategies can give an internationally funded consultative group the adaptable structure it will need to tackle the unprecedented twin challenges of accelerating global climate change and energy security. These distributed innovation initiatives should be structured in a very flexible fashion, so they are not constrained by top down control by international institutions.
- Governments and other donors must play a role in funding and providing the framework for action, but their actions should be guided by "bottom up" strategies, which has been the case with the agricultural Challenge Programs and the immunizations and vaccination programs. The role of large institutions is to support and encourage outside groups to create new institutional homes and alliances that might enable "bottom up" innovation.
- CGCI would focus on product commercialization and move beyond conventional, "big science" research and demonstration projects without commercial time lines.
- CGCI would also have a core focus on novel financing mechanisms.
- Structurally, CGCI could operate like the CGIAR as an umbrella that links together institutions across the globe (in the CGIAR context, this would mean centers like IRRI, CIMMYT, IFPRI and others) and specific Challenge Programs such as the Generation Challenge Programme. A CGCI global structure could contain multiple technology nodes, essentially clusters of activity organized around particular types of climate technologies. A core group would guide and provide high level strategy support (such as CGIAR), while technology-specific Challenge Programs or collaborative projects among existing institutions (international agencies, national and sub-national governments, municipalities, private corporations, universities, and NGOs) would perform the "bottom up" substantive work of the initiative. The collaborative projects would devise strategies for accelerating product development of specific low carbon technologies. Some of these node structures obviously would be housed in developing countries, focusing on their special needs and circumstances.

- The strategy is based on providing strong incentives for collaboration and connections among a wide range of public and private experts from existing institutions from a variety of fields both inside and outside of energy. If necessary, new in-country institutions can be created to complement existing institutions.
- The purpose is to create the appropriate conditions for new forms of collaboration, cooperation and support that would enlist new partners in new arrangements that will begin to attack these problems in new ways. The goal is a more deliberate, fact-based, technology-driven, solutions process to lead to more targeted, empirically defined solutions that will be country or regionally specific.
- These approaches also can be applied to technology challenges in adaptation. The technology innovation aspects of adaptation have received too little attention.
- This process should enable all stakeholders—governments, companies, NGOs, academics and others—to work directly together. The process would create space outside the formal UN framework for all players in the value chain on select technologies to work toward accelerated product development, and thereafter feed into the UNFCCC as part of a comprehensive post-2012 agreement. Some of the lessons from the Montreal Protocol, which included the participation of the private sector, should be considered for climate.
- This process also would likely produce entirely new technology implementation policies and strategies for massive technology innovation. Beyond new policies, bold new organizational and institutional mechanisms will be needed. Status quo neworks, voluntary demonstration projects, technology transfer and information sharing, while useful, are insufficient to the task at hand. This process also needs new, nimble and market responsive information technology (IT) systems to support this framework.
- The process should complement cap and trade and be linked to the UNFCCC processes.
- Finally and perhaps most importantly, such a complementary technology innovation process could be an important "bridging" strategy for developed and developing countries to commit seriously to the post-2012 climate framework. The depth of international buy-in to this distributed technology innovation concept could well determine whether the stabilization of GHG emissions actually occurs in this century.

ENDNOTES

1 While the idea of a complementary technology track is not new, the issue of how to structure and implement such a complementary technology-based strategy has received remarkably little attention. The Council of the European Union recently endorsed a proposal that cap and trade be "supplemented" by technology strategies for the upcoming Bali negotiations but offered few details about how the concept could be put in place. Council of the European Union, "Council Conclusions on Climate Change," at 4-5 (October 30, 2007).

2 Global Leadership for Climate Action, Club of Madrid, United Nations Foundation, *Framework for a Post-2012 Agreement on Climate Change*, September 10, 2007.

3 The GLCA report derives its recommendation for a CGCER from a 2006 Summary Report of the International Task Force on Public Goods, *Meeting Global Challenges: International Cooperation in the National Interest.*

4 Earlier this year, James A. Edmonds, Laboratory Fellow and Chief Scientist for Battelle's Global Energy Technology Program, with other researchers, released a report, *Global Energy Technology Strategy: Addressing Climate Change (Phase 2 Findings from an International Public-Private Sponsored Research Program)*. The report argues that these five technologies, plus nuclear power, could make a critical contribution to climate stabilization. Given the mature state of that technology, we do not include nuclear power among the new low carbon technologies for inclusion in "distributed innovation" approaches. The Edmonds report (at p. 43) recognizes that "it is impossible to know what technologies will prove to be successful and which will be left behind, and what totally new technologies will be created by the innovative process."

5 See, e.g., Evans, P. and B. Wolf, Collaboration Rules, *Harvard Business Review*, July-August, 2005.

ABOUT THE AUTHOR

Lewis Milford, an attorney, is the founder, president and executive director of two national non-profit clean energy organizations in the United States, Clean Energy Group (CEG) and Clean Energy States Alliance (CESA). Mr. Milford works to increase investment in low carbon technologies and to develop innovative approaches to accelerate commercialization of clean energy. His articles on climate and clean energy have appeared in national publications including the *New York Times* and the *Boston Globe*. He is asked to speak at numerous national and international energy conferences.

CEG works directly with public clean energy fund managers, private investors, business academics, and international experts to develop more effective and transferable models for technology innovation, project finance, and market development in the clean energy sector. CEG is actively engaged in identifying new climate stabilization technology and finance strategies. CEG, with Meridian Institute *(www.merid.org)*—an internationally recognized NGO specializing in helping diverse groups address complex and controversial issues—has been instrumental in forming a new network to develop innovative technology policy tools to address long-term greenhouse gas emissions stabilization, through the International Initiative on Climate Technology Policy (IICTP) *(www.climate-tech-policy.org or www.iictp.org)*. Meridian Institute has worked closely with CEG in developing a distributed innovation approach for the development of climate-friendly technologies.

CEG also manages the Clean Energy States Alliance (CESA), a multi-state, nonprofit coalition of 18 state clean energy funds and programs that finance renewable energy projects. CESA funds include a diverse group of state partners, such as the California Energy Commission, the Energy Trust of Oregon, the New Jersey Board of Public Utilities, and the Massachusetts Renewable Energy Trust. CESA funds will support over $4 billion in projects over the next decade. Through participation in CESA, state clean energy funds have come to recognize the benefits of information sharing, joint action, and collaboration that both advance their individual missions and leverage significant economic advantages. By working closely with CESA members, CEG has learned of the importance of experimentation in the creation of clean energy markets and policy strategies.

CEG is supported by leading foundations such as the Oak Foundation, Rockefeller Brothers Fund, Surdna Foundation, other philanthropies and government agencies.

More information about CEG can be found on our website at *www.cleanegroup.org*.

Clean Energy Group (CEG) is a nonprofit organization established in 1998 to increase the use of cleaner energy technologies in the U.S. and abroad through creative financing, business partnerships, public policy and advocacy.

CEG works with state and nonprofit officials from around the U.S. that are responsible for over $4 billion in new clean energy funds. CEG manages the Clean Energy States Alliance (CESA), a nonprofit organization assisting these funds in multi-state strategies (www.cleanenergystates.org).

CEG also works with public officials in Europe interested in trans-Atlantic efforts to build clean energy markets.

CEG, including its related work through CESA, is supported by the state clean energy funds, and by major foundations including Oak Foundation, Surdna Foundation, Rockefeller Brothers Fund, New York Community Trust, Energy Foundation, Educational Foundation of America and others.

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