



# A New Geometry of Complementary Climate Technology Solutions

WHAT THE HEILIGENDAMM G8 SUMMIT COULD  
MEAN FOR A POST-2012 CLIMATE FRAMEWORK

A Discussion Paper by  
Lewis Milford, President  
Clean Energy Group

---

JULY 2007



**“Heiligendamm has turned out to be a highly successful Summit and could even be an historic one.”<sup>1</sup>**

---

## **INTRODUCTION**

The June 2007 G8 climate summit at Heiligendamm, Germany ended with a historic breakthrough: developed and developing countries will create a post-Kyoto structure for long-term greenhouse gas (GHG) emissions reductions through the UN framework. This year’s follow-up will culminate with the UNFCCC Bali meetings in December, and discussions will continue through the next several G8 presidencies.

Many environmental advocates understandably criticized what is not in the Heiligendamm G8 agreement—a consensus on long-term targets. But critics overlook what has materialized in a G8 summit agreement for the first time: a new commitment to develop climate technology agreements and initiatives that will complement cap and trade.

This result is surprising and unprecedented. It means that Europe, the United States, as well as China and India, will start a multi-year process this year to create a new post-2012 climate framework that will include a portfolio of measures, including cap and trade as well as new climate technology agreements and policies.

For a number of years, Clean Energy Group (CEG), with the support of key foundations,<sup>2</sup> has championed the need for complementary technology agreements in any long-term climate strategy. Complementary technology agreements can accelerate the development and deployment of existing and breakthrough clean energy technologies beyond the least-cost approach of cap and trade systems. In addition, technology-based agreements will increase the ability of countries or regions to meet more stringent emissions caps. CEG has worked on a complementary technology approach most recently through our network, the International Initiative on Climate Technology Policy (IICTP).

We are pleased to see that the importance of complementary climate technology agreements is beginning to win some recognition in global climate policy. In this memorandum, we describe our early sense of the significance (and limits) of the Heiligendamm summit agreement on technology and cap and trade. We thought it important to share these ideas now, especially since few of them have made it into the conventional press coverage. We also describe the challenges of building a complementary technology structure into the global dialogue on climate and energy.

---

## **THE 2007 AGREEMENT AND COMPLEMENTARY TECHNOLOGY POLICY**

If one reads the U.S. press coverage regarding the June 2007 G8 meetings, the top story on the G8 Summit Declaration is the lack of support by the United States (as well as China and India) for any hard global caps on emissions reductions. That is an important omission. Nevertheless, key European climate leaders have

called the Heiligendamm meeting a “breakthrough” in global climate discussions and have hailed the agreement as the start of a new, meaningful climate strategy.

- Germany’s Angela Merkel said the Heiligendamm meeting was a “huge success.”
- Britain’s Prime Minister said it was a “major, major step forward.”
- And Yvo de Boer, the head of the UN Climate Change Secretariat said that the declaration is “everything I had hoped for.” He added, “It very clearly calls for a launch of negotiations in Bali in December of this year, it calls for conclusion of negotiations in 2009 in order to have a post-2012 climate change regime in place under the auspices of the UN.”

Given these somewhat contrasting views, it is fair to ask what is so important about the Declaration, so unique, that pre-summit fears of catastrophic failure instead turned into this unexpected praise. Perhaps it was simply resignation, putting the best face on what the leaders could have received from the Bush Administration. But we think there is more to the story.

First, all G8 countries (as well as China, India, Brazil, Mexico and South Africa) are now committed to developing a post-2012 climate agreement through the UN and related frameworks. In effect, the G8 Summit Declaration does represent a general consensus on a 50% reduction of GHG emissions by 2050—a key demand of all European countries before the summit (although the strength of U.S. support is not clear). These developments mean there will be an extension of the cap-and-trade system beyond 2012, in one form or another. The need to work internationally toward long-term climate and energy stability has now been recognized by all G8 members.

Second, G8 nations have made new global commitments to complementary climate technology policies, innovation, and investment—in addition to cap-and-trade measures for the first time. This point should not be ignored. These commitments could become dramatic new initiatives if they are implemented effectively. The 2007 G8 agreement concretely expanded the range of policy measures needed to achieve long-term reductions by stressing the need for these complementary climate technology agreements and initiatives on a global scale. The G8’s recognition of this approach could prove to be a watershed in the history of climate policy.

Third, and perhaps most important, these commitments will only be as effective as the complementary technology development process put into the long-term post-2012 framework. We understand this work will proceed through the Gleneagles dialogue during the next several months, and the product of that work will lead up to the negotiations at the Bali conference at the end of this year. Structuring a process for including complementary technology initiatives into these international energy negotiations will be a real and difficult challenge for the next few years of climate policy making.

---

## SPECIFIC COMPLEMENTARY TECHNOLOGY MEASURES

Some potentially transformational elements of the 2007 G8 agreement could reshape and strengthen global climate policy:

- The 2007 G8 deal contains explicit agreements that commit the G8 member countries, in principle, to technology innovation, deployment, and finance as a portfolio of measures to complement cap and trade.
- The 2007 G8 deal calls for coordinated technology strategies that will take a disaggregated approach to technology innovation, with new collaborations at the international, multilateral, and sub-national levels—perhaps a new “geometry of solutions” as we have discussed with our European colleagues.
- On technology, the G8 member countries call for “unprecedented international cooperation”<sup>3</sup> beyond the conventional measures of the past.
- On the time scale, the Heiligendamm agreement calls for technology-based “frameworks that accelerate action in the next decade.”<sup>4</sup>
- The Heiligendamm agreement calls for an “expanded approach to collaboratively accelerate the widespread adoption” of low carbon technologies, including “strategic planning and...technology roadmaps to strengthen the role of advanced technology...”<sup>5</sup>
- In particular, this complementary technology agreement approach to climate is expressed in a series of relatively detailed commitments that, among other things, would create “complementary national, regional and global policy frameworks...”<sup>6</sup>

---

## THE SUMMIT AGREEMENT AND ITS TECHNOLOGY COMMITMENT

In particular, this complementary technology agreement approach to climate is expressed in a series of relatively detailed commitments in the 2007 Summit:

We recognise the important opportunities offered by effective action addressing climate change, in particular for innovation, technological development as well as poverty reduction. Strong economies together with a wide range of policy instruments such as market-based mechanisms, including emissions-trading, tax incentives, and regulatory measures as well as technology cooperation and a shared long-term vision, are key to guide investment decisions, to generate technology commercialisation, to enhance energy security, to promote sustainable development and to slow, stabilize and then significantly cut global emissions of greenhouse gases.<sup>7</sup>

Addressing the challenge of energy security will require unprecedented international cooperation in several areas, including market transparency, enhancing energy efficiency, diversifying energy supplies and developing and deploying new and transformational technologies.<sup>8</sup>

We share a long-term vision and agree on the need for frameworks that will accelerate action over the next decade. Complementary national, regional and global policy frameworks that co-ordinate rather than compete with each other will strengthen the effectiveness of the measures.<sup>9</sup>

In line with much of our thinking over the last few years, the G8 agreement contains a clear statement in support of constructing detailed, cooperative technology agreements and initiatives on development, commercialization, and innovation through new planning and technology roadmaps:

Technology is a key to mastering climate change as well as enhancing energy security. We have urgently to develop, deploy and foster the use of sustainable, less carbon intensive, clean energy and climate-friendly technologies in all areas of energy production and use. We have to develop and create supportive market conditions for accelerating commercialisation of new less carbon intensive, clean-energy and climate-friendly technologies. Furthermore, to ensure sustainable investment decisions worldwide, we need an expanded approach to collaboratively accelerate the widespread adoption of clean-energy and climate-friendly technologies in emerging and developing economies. Therefore, we will

- stimulate global development, commercialisation, deployment and access to technologies,
- promote major emerging and developing economies' participation in international technology partnerships and collaborations,
- scale up national, regional and international research and innovation activities
- and undertake strategic planning and develop technology roadmaps to strengthen the role of advanced technology in addressing climate change.<sup>10</sup>

The 2007 G8 agreement includes strong support for greater collaboration among member nations in the use of both policy and market mechanisms to advance technology development through the private investment community:

Private sector investment is and will remain the primary means of technology deployment and diffusion. Strong economies and a wide range of policy instruments are required to develop, deploy and foster climate-friendly technologies. Market mechanisms, such as emissions-trading within and between countries, tax incentives, performance-based regulation, fees or taxes, and consumer labeling can provide pricing signals and have the potential to deliver economic incentives to the private sector. Fostering the use of clean technologies, setting up emissions-trading systems and, as many of us are doing, linking them are complementary and mutually reinforcing approaches.

Therefore, we will share experience on the effectiveness of the different policy instruments in order to

- better provide the international business community with a predictable and long-term perspective, and

- strengthen and extend market mechanisms by, inter alia, developing and extending existing programmes, taking into account the appropriate metrics for such systems.<sup>11</sup>

Finally, in an accompanying document, Brazil, India, China, Mexico and South Africa lent their support to the G8 agreement to support technology innovation for developing countries:

- In order for developing countries to contribute to the efforts to address climate change, access to adequate technology is a key enabling condition. We need an agreement on transfer of technologies at affordable cost . . . .<sup>12</sup>
- Many needed technologies based on resource endowments of developing countries...do not exist or are too expensive. Collaborative R&D between developing and developed country R&D institutions can address this gap. <sup>13</sup>

---

## **A POSSIBLE TURNING POINT ON CLIMATE TECHNOLOGY POLICY**

This new (or renewed) G8 emphasis on accelerated technology development—along with cap and trade—should not be underestimated. These statements could be just more rhetoric, or they could become bold global commitments to a new focus on climate technology innovation and commercialization. At this time, their shape and direction are not clear.

We believe that the 2007 G8 Summit Declaration could represent a turning point in climate policy—that it could presage a more dynamic approach to climate technology development.

So far, the conventional technology approaches do not go beyond the current Bush Administration’s voluntary agreements, such as the Asian Pacific Partnership. To date, addressing climate technology has meant information sharing, cooperative research and development, or voluntary agreements.

While these traditional measures can be effective in limited ways, the 2007 G8 agreement suggests that alone such measures are insufficient to the future task of accelerating technology development and commercialization. The 2007 G8 agreement could mean we are entering into an era where more aggressive technology policy will be a more important part of the long-term climate framework.

Indeed, it is difficult to imagine rapid progress within the “decade to act” timeframe set out in the 2007 G8 agreement without more aggressive cooperative technology policy measures.

Starting now, and moving beyond the Bali meeting in December 2007, the international community will negotiate a long-term cap and trade system, as well as a new complementary technology development process for the post-2012 framework. The opportunity to affect long-term climate change policy is now more critical than ever.

---

## **CEG'S IICTP NETWORK**

Several foundations helped CEG start a new network we call the International Initiative on Climate Technology Policy or IICTP. The group includes climate officials from the UK, Germany and Canada, as well as nonprofits, diplomats, and academic experts.

The overall goal of the IICTP is to:

Develop strategies for a new parallel and complementary “climate technology policy approach” to climate stabilization and energy security. The group has agreed to explore and pursue policy and investment strategies at the international, national, and sub-national levels to support radical technology innovation.

With this group of experts, CEG began a series of meetings in late 2005 in Montreal, Canada to start a discussion about complementary technology policies as part of a new post-2012 climate framework. We continued those efforts with meetings in Berlin, Germany with the Heinrich Böll Foundation in the fall of 2006. We then met with European climate officials in March of 2007 in Berlin and London, during the run up to the Heiligendamm Summit, to discuss how we might work together to support these efforts.

Members of the IICTP identified a short-term objective of moving these policy ideas on to the agenda of the G8 Dialogue and long-term objective of developing a robust set of technology policy initiatives that would address climate stabilization and energy security.

We are extremely pleased to report that the 2007 G8 agreement now contains a global commitment to develop new complementary technology agreements and strategies through the UN framework. As a result, of these new directions, any long-term, post-2012 climate framework is more likely to include complementary initiatives and agreements on technology innovation, deployment, and investment.

---

## **WORK REQUIRED FOR THE POST-2012 FRAMEWORK**

The next challenge is twofold: The first task is to help ensure that the G8's commitment to accelerating clean energy innovation is adopted by the larger community in post-Kyoto climate negotiations. The second part is to help structure an international agreement that will accelerate the development and deployment of clean energy technologies on a scale fitting the twin challenges of global climate change and energy security.

We see the latter task (structuring an international agreement) as involving at least two additional elements; in both cases, the purpose is to inform technology development discussions and decision-making at various levels (international, national, and sub-national):

- 1) We need a discussion of new *substantive technology policies* emerging around the globe that could inform the UN complementary technology development process, that go beyond information sharing, to real technology development opportunities, to give more content to these technology policy discussions, and
- 2) We need to consider how to develop a *sound complementary technology development process* that the international community can include in the post-2012 architecture to guide long-term technology development, innovation, and commercialization.

Toward these ends, CEG is now in discussions with various European governments about ways for us to help ensure that the post-2012 framework contains the needed process for technology development over the longer term. This is a rather exciting and challenging opportunity. We are looking forward to working with our foundation supporters, and these governments, to develop this process over the next few years.

To give a sense of the work going forward, we have prepared two draft documents that address ideas about a processes that could help inform the post-2012 climate framework:

- 1) *Emerging Complementary Climate Technology Policies and Approaches: An Initial Summary*. This is a tentative list of possible policy options that might populate a new G8 discussion about a complementary technology track. These are tentative and incomplete and open for discussion.
- 2) *A Process for Including Complementary Technology Policies in the Post-2012 Climate Framework: Some Initial Thoughts*. This is a set of ideas about how a new complementary technology development process could be incorporated into the post-2012 framework. Again, these ideas are tentative and provisional at best, and need to be informed by much interaction and review.

These two documents are attached as appendices to this report.

Appendix A  
Emerging Complementary Climate  
Technology Policies and Approaches: An Initial Summary

A Working Paper by Clean Energy Group  
July 2007

This summary is intended to capture the set of climate policies related to technology development and innovation that are now emerging across the globe. This list is not all-inclusive, but it does begin to describe the complementary regime of technology-based policies that deserve serious attention and dialog at sub-national, national, and international levels.

Technology-based policies addressing global climate change can be viewed as two interrelated parts, worth separating for future discussion: 1) standards that mandate or prohibit energy technologies or environmental effects and 2) technological innovation, finance, and commercialization. These policies can play a key role in structuring future technology agreements for the post-2012 climate framework.

---

## **TECHNOLOGY STANDARDS, INITIATIVES, AND COMMITMENTS**

### **Technology Bans or Phase-outs**

Policies that ban or phase out obsolescent products and processes can accelerate the deployment of climate friendly policies. Australia, for example, has announced plans to phase out incandescent light bulbs, which will be banned from sale in Australia beginning in 2009. The United States Congress is considering similar legislation.

### **Technology Mandates**

As with banning climate-warming technologies, mandating no-carbon or low carbon technologies can work faster than market-based cap-and-trade systems to effectuate certain targeted approaches to climate stabilization. Numerous technology mandates are already in place or under consideration around the world. For example, the EU plans to mandate universal carbon capture storage for new power plants by 2020, and British Columbia has proposed a similar mandate to take effect by 2016. Spain requires solar energy in new commercial and residential buildings. Germany is working on a regenerative heat law that would require new and renovated buildings to source certain percentages of their heat requirements from renewable energy. European countries have adopted feed-in tariffs requiring utilities to finance independent alternative energy production systems. A recently enacted law in Morocco aims to increase renewable energy consumption from two to ten percent of total consumption by 2010. In the US, the State of Connecticut is considering requiring the use of fuel cells for emergency power in public-safety buildings. The American Institute of Architects is proposing a strategy to design only no-carbon homes and offices by a date certain. In addition, many US states have enacted renewable portfolio standards for their electrical energy requirements.

### **Sectoral No-Net-Carbon-Emission Technology Commitments**

Carbon-neutral sectors represent the first pieces of a carbon-neutral or low-carbon jigsaw puzzle that will eventually encompass the planet. The prime minister of British Columbia announced plans for a no-net-carbon energy system, with a requirement for carbon capture and sequestration by 2016. The Danish island of Samsø is energy self-sufficient and carbon neutral.

### Technology Performance Standards

Technology performance standards, while different from technology mandates, can serve the same purpose, if implemented properly and at sufficiently rigorous levels. Performance standards may be attained through existing technologies or through new technologies developed to comply with the performance standard more efficiently. California has adopted a greenhouse-gas-emissions performance standard for certain power plants. Performance standards include energy efficiency standards for appliances and vehicles. The International Energy Agency (IEA) has recommended improving energy efficiency through the Gleneagles G8 dialog. These recommendations include energy efficiency standards for new buildings, fuel-efficiency standards for vehicles, and mandatory appliance standards. In a recent communiqué, the ministers of IEA member countries called on the IEA to promote efficiency goals at all levels of government and to establish sector-specific benchmarks to spread efficiency best practices across the globe. New industrial facilities may also be subject to efficiency standards.

### Government Procurement

Various low carbon technology purchasing commitments could be made on a national and multilateral basis. Hybrid or electric government vehicles, for instance, would be practical for many applications.

---

## INNOVATION, FINANCE, AND COMMERCIALIZATION

### Transition Management and Niche Management

Transition management both pushes clean-technology supply and pulls clean-technology demand. Niche management applies globally developed technologies to local or national conditions where the technology's advantages are strongest. The Netherlands is pursuing technology-transition management strategies—with different transition plans for different technologies—that will help move the nation from a carbon-dependent to low-carbon economy.

### Distributed Innovation

Distributed innovation, open innovation, and open source strategies to accelerate the development of socially desirable technologies have been used in IT, agriculture, health, and industry, but similar strategies have not been applied to climate technology. These strategies take advantage of the rapid increases in knowledge and advances in electronic communication that characterize modern business and recognize that companies can no longer afford to rely entirely on their own research to acquire the best innovative ideas for product development. There are many new models of foundations and governments (such as the Rockefeller Foundation and Gates Foundation) advancing distributed innovation approaches to solve technological problems facing poor and vulnerable people in developing countries, on issues ranging from HIV vaccines to malaria drugs. All involve new private and public partnerships targeted at product development to overcome persistent market barriers. One such example is BIOS (Biological Innovation for Open Society) that works to develop new crop varieties for humanitarian and commercial purposes.

## Prizes

Numerous efforts are underway to reward the achievement of carbon related performance goals with financial incentives. Utilities, for example, offer “golden carrot” financial awards to manufacturers of high-efficiency refrigerators.

## Advanced Research

Many proposals for innovative research could be coordinated or implemented on a multilateral basis. Advanced research to support clean technology could include advanced training and fellowships for researchers working on low-carbon energy technologies. Also, new clean-energy research initiatives to build global innovation capacity and new low carbon technologies could be modeled after the new Challenge Programs emerging in public agriculture and health sectors (e.g., HarvestPlus and Generation Challenge). These programs have multilateral support, use distributed innovation, and employ public and private partnerships to address agricultural productivity, food security, and health problems in developing countries.

## Pilot Test Beds for Clean-Energy Projects

Emerging low carbon technologies need more pilot testing on a coordinated basis to demonstrate proof of concept and to attract investment capital. A greater global role for such incubator-type pilot programs, working cooperatively, could accelerate technology improvement and adoption.

## Multilateral Funds

Additional multilateral funds are needed to encourage international collaboration on low-carbon research and development, with an aim toward accelerated product development of commercially viable projects.

## Public-Private Partnerships

More targeted public-private partnerships are needed to link high-risk research to potential commercial developers.

## Environmental Competition Statutes

This is a new idea to require polluters with high-carbon emissions to compensate competitors who achieve lower emission levels for the costs of meeting those limits.

## Innovative Financing

Many new technologies will need innovative financing to become commercially viable. For example, some emerging technologies will need pre-commercialization financing to overcome the technology risk associated with initial prototypes that conventional investors typically avoid. In addition, many variants on existing or new tax and subsidy programs can be explored in the effort to accelerate clean energy technology. Financing cuts across all of these policy measures.

Appendix B  
A Process for Including Complementary Technology  
Policies in the Post-2012 Climate Framework:  
Some Initial Thoughts

A Working Paper by Clean Energy Group  
July 2007

One of the key challenges for G8 governments following the 2007 climate summit in Heiligendamm is the development of a post-2012 (post-Kyoto) climate stabilization architecture. Among other things, an effective architecture will need to include not only an extended and strengthened cap and trade system, but also new complementary climate technology measures.

Creating complementary technology measures presents a set of challenging policy questions:

- What process is optimal to capture the best minds to work on these technology questions, while recognizing that many national, local, and other technology policy initiatives are already underway?
- Is this process one of creating new institutions, new policy frameworks, new agreements, new initiatives, and new and more effective networks that will be more widely distributed?
- Or, might this new process simply be a new way to more effectively link existing activities to accelerate technology innovation globally and nationally—but to do so in new, distributed ways that take advantage of cutting edge information technology?

In the end, an effective process for bringing complementary climate technology-based strategies into the post-2012 climate framework is probably all of these and more.

The laundry list of desirable technological and financial energy policies will continue to grow, but the missing link between current clean energy systems and a sustainable energy future *is an implementation process for bringing these policies up to scale.*

Simply put, we do not yet know how to bring about the massive technology changes that will be needed to address global climate change and energy security issues within critical timeframes (such as the next decade, as noted in the Heiligendamm agreement).

At this juncture, there is not even an organized process in place at any level to discuss how to approach the problem of creating a realistic commercialization structure. The current structure for implementing the market-system approach to climate change is cap and trade. What will the implementing structure for the complementary technology track look like? And what will the international community consider as it approaches this question?

Interestingly, the Heiligendamm Summit Declaration contains some suggestions for new ways to structure this complementary technology development process. Rather than a purely top down approach, it suggests the need for more of a disaggregated approach, involving sub-national and other players:

We share a long-term vision and agree on the need for frameworks that will accelerate action over the next decade. Complementary national, regional and global policy frameworks that co-ordinate rather than compete with each other will strengthen the effectiveness of the measures.<sup>14</sup>

Furthermore, to ensure sustainable investment decisions worldwide, we need an expanded approach to collaboratively accelerate the widespread adoption of clean energy and climate-friendly technologies in emerging and developing economies.<sup>15</sup>

So what would a new geometry of technology solutions look like—what kind of process could capture the means to implement the menu of technology options outlined in the Heiligendamm Summit Declaration?

First, a solid foundation could be established at Bali if the countries simply committed to establishing a complementary technology-development process through a statement such as the following:

The parties agree to explore consideration of various climate technology innovation strategies to complement the cap and trade system, which could include cooperative measures such as CO<sub>2</sub> performance standards, technology mandates and bans, transition and niche management strategies, and various network approaches such as distributed innovation.

Second, to give some content to that general statement, a host of complementary technology initiatives and approaches could be referenced and put in place under this process. Some of these initiatives could involve subsets of parties, working on specific technologies or sectors—in effect, a disaggregated and manageable processes that could create partial solutions to key technology deployment problems. The Heiligendamm Summit seems to contemplate these differentiated activities, in both the developed and developing countries. A more adaptive, bottom up process, linking many disparate efforts, might have a good chance of advancing progress.

In turn, this combination of specific solutions—that would be linked together—could then be fed back into a broader approach that would be consistent with various cap and trade measures.

For the sake of early discussion, some, but certainly not all, of these activities could include:

- A global distributed research and development platform to accelerate research and development into commercialization of breakthrough low carbon technologies, which could link university innovation centers and incubators to expand market opportunities.
- Multilateral technology-based agreements where countries, states or other entities, public and private, agree to explore more rapid deployment of low carbon technologies, such as carbon capture and sequestration in a time frame that goes beyond demonstration projects.
- A collaborative, multilateral process to reach consensus on progressive introduction of lower carbon emissions standards for various sectors, such as power, automobiles, buildings, and similar sources.
- A joint examination of how to better apply known technology innovation principles to the challenge of massive low carbon technology turnover.

- A distributed innovation process where parties along a value chain for select technologies collaboratively identify problems and solutions, with governments and other parties providing new financial incentives to speed technology commercialization into the marketplace (using new company platforms such as Innocentiv as an example).
- A process dedicated to transfer of technologies into developing countries that targets intellectual property (IP) barriers and explores new forms of public patents and other means to deliver products into underserved markets.
- Common examination with private and public parties of new commercialization vehicles to speed introduction of breakthrough technologies into traditional finance structures—what some have called the continuing “first commercialization challenge” for emerging technologies.
- An investigation of how government-procurement policies that leverage the buying power of governments can be used to create market stimulus for technological innovation.

Any number of processes may be suitable for establishing complementary climate technology policies, and a broad panoply of processes merits consideration. However, it is not clear what this complementary track will look like. It is that question that we hope to explore over the coming year, with the help of our partners and the support of participating governments.

As a first impression and, as noted here, we think the challenge before us is to marry a cap and trade system with global characteristics with a technology process that might well involve more diversity among nations, with a wide breadth of solutions.

As we do know, modern innovation arises not so much from top-down linear processes as from bottom-up, complex, adaptive, iterative, and interconnected systems. The challenge of organizing democratic systems to accelerate clean energy technology should be one of many issues discussed by the international community as it begins its work on developing a complementary clean energy technology strategy this year.

## ENDNOTES

- 1 Professor John Kirton, University of Toronto, Director of the G8 Research Group. *Toronto Globe and Mail*. June 9, 2007 at A15. Professor Kirton added, "On climate, there are five firsts and they are all big ones." The article explains Professor Kirton's superlatives:  
  
Prof. Kirton was impressed that in addition to agreeing to work toward cutting 1990-level emissions in half by 2050, creating a post-Kyoto framework with an actual deadline and getting the United States "in the game" as a carbon-constraining member, the "plus 5" nations invited to the summit—Brazil, China, India, Mexico and South Africa—also "agreed for the first time to be in as carbon-constraining states."
- 2 The Oak Foundation, Rockefeller Brothers Fund, Surdna Foundation, Heinrich Böll Foundation and other supporters have encouraged us in support of this technology initiative.
- 3 Heiligendamm Summit Declaration, June 7, 2007, at Para. 43.
- 4 Id. at Para. 50.
- 5 Id. at Para. 54.
- 6 Id. at Para. 50.
- 7 Id. at Para. 41.
- 8 Id. at Para. 43.
- 9 Id. at Para. 50.
- 10 Id. at Para. 54.
- 11 Id. at Para. 55.
- 12 Joint Position Paper of Brazil, China, India, Mexico and South Africa participating in the G8 Summit, June 8, 2007, at Par. 22.
- 13 Id. at Para. 23.
- 14 Heiligendamm Summit Declaration at Para. 50.
- 15 Id. at Para. 54.



Clean Energy Group (CEG) is a nonprofit organization established in January 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 new nonprofit organization assisting these funds in multi-state strategies. CEG also works with public officials in Europe interested in transatlantic efforts to build clean energy markets.

CEG, including its related work through CESA, is supported by the state funds, and by major foundations including Oak Foundation, Surdna Foundation, Rockefeller Brothers Fund and others.

[www.cleanegroup.org](http://www.cleanegroup.org)  
[www.cleanenergystates.org](http://www.cleanenergystates.org)

© Clean Energy Group 2007



 **CleanEnergyGroup**  
Innovation in Finance, Technology & Policy

50 State Street, Suite 1  
Montpelier, VT 05602  
Phone 1.802.223.2554  
Fax 1.802.223.4967  
Email: [ceg@cleanegroup.org](mailto:ceg@cleanegroup.org)  
Web: [www.cleanegroup.org](http://www.cleanegroup.org)