

THE
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THE FORUM

Resolved: Using Nuclear and Coal Power in an Environmentally Friendly Manner Is the Path Forward in Controlling Climate Change

An all-star lineup debated the future of the electric power sector at the annual ELI–Miriam Hamilton Keare Policy Forum, addressing the above question posed by moderator Matthew Wald, the *New York Times's* energy beat reporter. He had representatives of the coal and nuclear power industries, proponents of greater use of those sources, face off with skeptics ranging from environmental interests to federal and state regulatory agencies who need to meet the demands of energy consumers in homes and industry.

Although the panelists split on advocating greater use of these power sources in the future, and as to whether some development is inevitable and desirable — as one energy form among many that need to gain wider acceptance and deployment if humanity is to make the cuts needed to stabilize the climate — they agreed that technology will spell the difference as to which sources come out on top.

The Environmental Forum acknowledges the assistance of E&ETV in providing a transcript of the event, which was edited for space reasons. Readers can see a video of the Policy Forum at www.eenews.net/tv/video_guide/1054.



Matthew Wald

Energy Reporter
NEW YORK TIMES
Moderator

“If we’re going to cut carbon emissions 80 percent by 2050, we’ve got to have a market that allocates risks and benefits differently.”



Garry Brown

Chairman
NEW YORK STATE PUBLIC SERVICE
COMMISSION

“When it comes to cutting carbon, we as a nation haven’t come to grips with what it will take. We need to do so quickly.”



Mike Morris

President and Chief Executive Officer
AMERICAN ELECTRIC POWER

“This is a technological problem that has answers. The air has gotten cleaner in every decade. That will continue.”



Peter Bradford

Vice Chairman
UNION OF CONCERNED SCIENTISTS

“Prove that these advanced reactor designs work in five or six plants with federal help, and then we can talk about an expansion.”



Alex Flint

Senior Vice President of Governmental Affairs
NUCLEAR ENERGY INSTITUTE

“We cannot address climate change without building a lot of new nuclear reactors. We have a demonstrated ability to do it.”



Jon Wellinghoff

Chairman
FEDERAL ENERGY REGULATORY
COMMISSION

“We need to make sure that wholesale electric markets are competitive and that all forms of supply compete equally and have equal access.”

Matthew Wald, *Energy Reporter, New York Times*: For an event that was scheduled many months in advance, it's truly astounding that we are hitting right on target as the national debate shifts from health care to energy and the environment. Who would have thought that a new medical insurance system would take longer to build than a nuclear power plant?

Our panel is going to consider this statement pro and con: "The best path to stabilizing global climate and meeting the world's energy needs includes building new reactors and using coal in an environmentally friendly manner."

Our panelists will get five minutes each and then we'll go for a round of three-minute rebuttals.

Garry Brown, *Chairman, New York State Public Service Commission*: On August 14, 2003, there was a huge blackout in the northeastern United States. Since I have been on the commission, for the past two years, I have had advocates come in and tell me, "If you had just upgraded your bulk power system, if you had spent money on transmission, you could have avoided that blackout." And I hear other people say, "If you had distributed generation and photovoltaics you would have avoided that blackout." And others tell me, "If you had remote sensing equipment you could have avoided the blackout." I started to realize it wasn't really about the blackout, it was about their causes. Frankly, if you had people just trim their trees, we could have avoided the blackout.

If you want to cut carbon by 80 percent by 2050, and you assume that developing countries will grow and their people will eat more beef and drive more cars, then there is no carbon left over for the utility sector. If that's true, then we need to think of what we are going to do. It's going to take all the energy efficiency and demand response we can muster. It's going to take all the renewable resources we can provide. But that's not enough. It will take a renaissance

of nuclear power. It will take carbon sequestration.

Coal remains an abundant resource in the United States. We're going to have to figure out a way to use it in a more carbon-friendly way. At this point, we can't reject anything. We have to look at every technology and make the needed investments. Those investments will be huge.

In New York, we are collecting half a billion dollars a year for efficiency and renewables. It's going to cost several billion more for us to get to our goal of meeting 30 percent of our electricity needs through renewables and energy efficiency by 2015. To do that next 70 percent for the state will take tens of billions of dollars. At a national level, it may be hundreds of billions, it may be trillions.

Mike Morris, *President and Chief Executive Officer, American Electric Power*: Stabilizing the global climate and meeting the world's energy needs means additional nuclear plants and a better approach to coal utilization.

Countries like India, China, and Russia intend to advance their economies and they are going to use the energy resources that they have. The challenge is doing that in a more carbon-controlled manner. The answer is technology. There is no question about our ability to move technology forward.

Matt has had an opportunity to visit our station in New Haven, West Virginia, where our Mountaineer coal-based power plant has been capturing and storing carbon for about a month. It's working very well. The capture technology can be in the 90 percent range. The issue of storing underground is something that's common to the energy industry throughout the world. We, as a nation, have been storing natural gas under ground and the Strategic Petroleum Reserve is nothing more than an underground storage application.

It is to your point, Mr. Chairman, not an inexpensive proposition. We're doing a 20-megawatt slipstream off

of a 1300-megawatt power production facility. When we scale that up it appears as if it is going to cost about \$400 million to go to a 250-megawatt power plant.

To Matt's point, American Electric Power is a 40,000-megawatt generating company, 70 percent of which is coal-fired. Much of it has been retrofitted in compliance with the Clean Air Act. It makes great sense to retrofit it for carbon. We really do want to get to the answer. We are one of the few utilities inside of the Edison Electric Institute, the association of publicly held power companies, that actually supports the Waxman-Markey bill. I'd like to see the bill improved in the Senate.

Retrofitting the fleet, if we're going to meet the energy needs of the world and of our country, is essential. You cannot simply take coal off of the horizon in any short-term timeline and replace it with anything that can match what coal-based electricity does for the U.S. economy today.

Matthew Wald: Mountaineer is a lovely plant. It's based on an ammonia technology. What I remember most about it is the whole place was spanking clean and smelled slightly of Windex.

Peter Bradford, *Vice Chairman, Union of Concerned Scientists*: Suppose that a colleague at a dinner party confided to me that the best path to stabilizing the global climate and meeting the world's energy needs includes building new reactors and using coal in an environmentally friendly manner. My reaction would be, "Well, maybe, but it starts somewhere else. It starts with cap and trade. It starts with aggressive pursuit of energy efficiency."

Maybe there's a place for a program for a few first-mover plants to demonstrate advanced reactor technologies. But it certainly does not start with a massive attempt to scale up nuclear energy, as in current legislation. Whether other countries, especially those with much higher rates of demand growth and central-

ized, nontransparent, and noncompetitive power procurement processes will reach different conclusions is, of course, for them to decide. However, studies have established that we need not rely heavily on an expansion of new nuclear reactors to meet climate goals, at least not an immediate expansion.

Reputable studies make the point emphatically that a strong emphasis on nuclear power in the short run is a very cost-ineffective approach to climate change. Indeed, these studies go further, indicating that major near-term reliance on new reactors in the United States will retard climate progress by diverting huge sums of money that could provide relatively inexpensive climate relief relatively quickly into a very expensive and controversial resource that provides the same relief slowly.

A cap-and-trade regime will support many low-carbon energy sources equally. Once that's in place the case for special subsidies for new nuclear is particularly weak, in part, because this is the most supported energy source in U.S. history. It can't justify a new Manhattan Project because it had the first one.

Today, again, efforts to rush a false nuclear renaissance have already done considerable harm, undermining the Nuclear Regulatory Commission's revised licensing process, sparking customer backlashes in Florida, Missouri, and Texas, and creating a situation in which half of the 28 so-called renaissance plants have already, in 2009, experienced either a major delay, a major cost overrun, or outright cancellation.

Combating climate change requires substantial greenhouse gas reductions to start immediately. New U.S. reactors can't come online quickly. If Finland's recent experience with an advanced reactor is any guide, 2020 is more likely for the first unit. Nothing short of ridiculous assumptions about subsidies, infrastructure, and licensing produces a hundred new U.S. reactors in 20 years, a path

that would increase the cost of climate mitigation by between \$1.9 and \$4.4 trillion.

Matthew Wald: The renaissance is over? Alex, I can hear your teeth grinding from here.

Alex Flint, Senior Vice President of Governmental Affairs, Nuclear Energy Institute: By 2050 there will be over 9 billion people. Of the 6.2 billion people on the planet today, 2 billion of them have no access to electricity and they strive every day to have the standard of living of the developed world. That creates an insatiable demand for increased energy. There's a direct correlation between energy and life expectancy, children's health, and productivity. It is a moral obligation that we satisfy that demand in a way that protects our planet.

By 2050, 70 percent of the global population will live in cities. Those cities are going to be larger than the cities you see today. What we have to do as a global community is find ways to power the planet in 2030 and 2050, recognizing what the demands of the people who live on that planet are going to be. We have to find some way of powering megacities. We need dense sources of electricity that can provide the standards of living we have become accustomed to and the world demands.

When you look at credible analyses, it is clear that we have to deploy all environmentally friendly technologies. We have to deploy carbon capture and storage as quickly as possible. We have to deploy as much wind, as much renewables, as much efficiency as we possibly can. Just for the United States, if we deploy all available technologies as rapidly as we can, we will still see electricity prices going up 80 percent. If you instead limit to available technologies, if you assume that carbon capture and storage for coal is unavailable and we do not deploy nuclear power at the rate we can, then that price increase is 210 percent.

The U.S. nuclear fleet of 104 plants has operated very well in recent years. The capacity factor is up;

the price of electricity is down. For the last seven years electricity from a nuclear plant has been the lowest cost of baseload electricity in this country, even cheaper than natural gas and coal. It's a tremendous track record.

There are people who argue that future plants are going to be too expensive, but when you look at the detailed analyses that have been done on new plants by the public utilities commissions in Florida, Georgia, Texas, Virginia, and Maryland, they come to the conclusion that building new nuclear plants is the cost-effective way of producing electricity that they need. The economics of individual plants is very attractive. By about 2016 or 2017 we'll have real-world examples of what the United States can do. Meanwhile, I'm a little worried about the United States falling behind.

Matthew Wald: Jon, we will leave it for you to bat last.

Jon Wellinghoff, Chairman, Federal Energy Regulatory Commission: The commission's new strategic plan highlights our primary congressional responsibility to ensure that rates are just and reasonable. If we emphasize fair, transparent, open, and efficient, competitive markets in a comprehensive way a lot of these problems will take care of themselves.

In that context, we're doing everything we can to improve efficiency. When you talk about raising costs by 80 percent, that certainly will raise rates. However, to the extent that we can put efficiency in place it may lower bills. We need to do that both on the consumer side, but also on the side that FERC has jurisdiction over — the wholesale electric markets in the interstate transmission system.

We need to make sure that those markets are as competitive as possible and that all forms of supply compete equally and have equal access. We have done what we can to ensure that renewables have access to the market and ensure that those renewables are part of the market mix, because they can lower cost. A recent study looked

at delivering large amounts of wind energy from the Midwest to the East Coast. The study concluded that rates could be reduced by 20 percent if market mechanisms could deliver large amounts of renewable resources.

What are we seeing in the supply side of the market right now? In the last 10 years we've seen 30 gigawatts of wind come into the market. We have 300 gigawatts of wind in the queue.

The other side of markets is the demand side. With demand response, consumers can respond by modifying their loads. Industrial and commercial customers like Wal-Mart and Safeway are very interested in bidding into wholesale markets with their demand response, which will stabilize their bills. Meanwhile they reduce the need for putting in very expensive, polluting, peaking generation units and make the whole system work much more efficiently. One system operator, with about 133 gigawatts under its control, had an auction last March that brought in 10,000 megawatts of bids from demand response.

FERC just did a study looking at the possibility of further reductions in demand response across the entire country. We estimate that there is as much as 188 gigawatts of demand response that could be put into these markets and ultimately stabilize costs for consumers.

The bottom line is that markets will decide which of these resources are going to win out. But to do that we need to get prices right. We need to put a price on carbon.

Matthew Wald: Having followed this issue for years, one of the ideas I come away with is that a new round of nuclear plants faces a fundamentally different challenge because we are now in a market environment and a market may or may not be the best approach to what is essentially a policy-directed field. If we're going to have a policy to cut carbon dioxide emissions by 80 percent by 2050, we've got to have a market that allocates risks and benefits differ-

ently than the old regulated system did. The old regulated system chose reactors. What will the new system choose?

Garry Brown: I agree with 99.7 percent of Chairman Wellinghoff's comments, right until the end. Markets do work and they have positive aspects, but we have to make sure that public policies and the markets work together. In the 1980s, one of my predecessors, Mr. Bradford, introduced a very vibrant demand-side program in New York. He had all of the utilities tuned up and ready to go and we were really making progress in New York. At that point natural gas prices tumbled and we dropped all those programs. So we're right where we were almost 30 years ago in terms of fuel mix and energy efficiency programs. We have a new natural gas supply bubble that may last for two or three decades, with shale development. What are we going to do with this gas in terms of the carbon debate? Are we just going to use it up and be in the same place as we were 20 years ago? Do we just let the markets decide? Do we want to use it as a transportation transitional fuel? Do we want to use it to cut whole usage? We need a public policy on a national level.

Our priority needs to be energy efficiency, energy efficiency, and demand response energy efficiency. It's the cleanest, safest supply that we have right now.

Matthew Wald: Mike, your company is 70 percent coal; a good chunk of the rest is gas. You operate in places that do not reward efficiency as much as some other states do, such as California and New York. What is your perspective on the role of the market, the role of efficiency in choosing where your next megawatt is either coming from or being saved from?

Mike Morris: There is no question that energy efficiency is the easiest and most appropriate place to start. But to your point, our average customer's bill is about \$55 to \$65 a month. It's very difficult to get them

excited about buying a \$15 light bulb to save two kilowatt hours a month.

Demand response is an excellent way to go, as are renewables. But there, and I know Jon you've heard me say this far too many times, we have to have plenary FERC authority to build out a transmission grid that is more energy efficient than the existing grid, that would allow renewables to progress across the country, that really would allow demand response.

What good does it do to me if one of my huge metal melting facilities in the upper Midwest decides to do a demand response and I can't move that power to Chicago, where the market demand could be? We will have not accomplished what we wanted to do.

Matthew Wald: Peter, is it our moral imperative to build lots of reactors for the rest of the world?

Peter Bradford: First of all, I want to answer your other question. Namely, what will the system choose? We went to competitive power procurement largely as a result of the Public Utility Regulatory Policies Act, which passed in 1978. And that, much more than Three Mile Island, was the event that put an end to ordering new nuclear units in this country, because you could not raise private capital for a new nuclear plant once you were in a world in which you had to sell the power at competitive rates. You had to be sure that the plant would come online at a cost that would allow you to make money. In the 30 years since PURPA, no one has ordered a new nuclear unit, so we know what the system will choose. We don't know what it will choose if we get a carbon price into the mixture because it will change the relative position of nuclear and other generating sources.

But it will also make nuclear compete with all the other ways of lowering our carbon emissions, not just renewables but also efficiency in all sectors and forestry and agriculture practices. It's an odd world: the Democratic appointees on this panel are sounding like right wing Republican

market advocates, while the Republicans in the Senate are sounding, for all the world, like corporate socialists, calling for 100 reactors by 2030. The Central Committee of the Chinese Communist Party can do no better than that.

I want also to say a word about a proposition I've heard on both sides today, that the climate change problem is so urgent we have to do everything at once. But we can't afford to do everything at once. Some solutions foreclose others. If you had a house with a leaky roof one approach to that would be fix the roof. Another, the more nuclear approach, would be put in a second furnace. The one thing no sensible person would try is doing both of those things at the same time.

Matthew Wald: Well, let's ask Alex, are you in competition with these light bulbs that look like custard cones? Are you in competition with wind? Is the market set up in a way that helps society choose appropriately?

Alex Flint: There is no case in which nuclear plants have been competing with efficient light bulbs, to continue your question.

Nor do I believe there is a case in the policy space where there are trade-offs being proposed between building nuclear plants and doing efficiency and renewable and other programs like that. To the contrary, what I'm finding is that increasingly the advocates of nuclear energy are working comfortably with the advocates of other environmentally friendly technologies. The notion that there's a competition where nuclear generation will preclude efficiency and renewable programs is simply false. I also think that the demand to reduce carbon is so large that it exceeds all possible abilities for technologies or approaches to supersede one another. To reduce carbon emissions by 80 percent by 2050 doesn't leave a lot of room for people to argue about which path is best.

Jon Wellinghoff: I want to make a quick comment on Garry's point,

policy overlay. I agree with you completely and we're working on a federal policy that I testified about recently before the Senate Environment Committee. There are 31 states that have renewable portfolio standards, which is why we have 30 gigawatts of wind coming into the system in the last decade and 300 gigawatts waiting to be interconnected into the system.

States have the right to put in place policies for their priorities. The federal government should step into that sector as well and we're certainly working on that very heavily in the Senate and House as we speak. And with respect to Peter's point, absolutely, we need to prioritize, but I'd say the markets should prioritize. Once we set the policy and we ensure we get the prices right, and we ensure that consumers see the prices, that will prioritize what gets into the market.

Matthew Wald: I'll turn to the audience now.

Bill Butler: There has been a good deal of discussion on competition and letting the market decide, but I can think of few areas in which there have been greater subsidies, greater tax benefits, and a range of other things that the government has done to benefit one way or another of generating electricity. Is there any possibility that subsidies will be reduced or is the answer just to increase everybody's subsidy? And if that's the case, how can we possibly pay for it?

Garry Brown: That's our job at the state regulatory commissions. We have to approve the rates and get the nasty letters from the local assemblymen and mayors about the rates. We're talking about all these expenditures, whether it's efficiency, renewables, nuclear, or wherever, if we collect the money from the ratepayers their rates go up. But people can't pay the bills that they have now. So it becomes difficult for us at the public service commission to say, "Let's collect hundreds of millions more," whether it's a nuclear plant that needs some money up front or whether it's an efficiency program.

Renewables, by themselves, are not making it in the market except in some very small niches where the market price works. Most of the time it requires some sort of subsidy. What we're doing on renewables at the state level, and hopefully soon at the federal level, is trying to level that subsidy playing field.

Jon Wellinghoff: It would be ideal if you removed subsidies and allowed the market to dictate the answers. We are required by state legislation in two or three of our jurisdictions to add a certain amount of solar power. Solar power, with subsidies, is 20 cents a kilowatt hour. It would never make it in the marketplace today, but will in the future. What is aggravating for us and probably a mistake is that the subsidy typically goes to the developer, not the customer. In the future, our plan would be to develop the renewable portfolio standard as an equity investment at the utility. Rather than take the subsidy to my shareholders, I'd take the subsidy to my customers, if I could make that arrangement with the regulator. I would love to see it all equalized and see what happens.

Peter Bradford: The biggest single subsidy is the fact that there is no price on carbon. A cap-and-trade system that puts a price on carbon eliminates the need for a lot of subsidies. Except for addressing market failures or research needs, the wholesale picking and choosing by regulators, by congressmen, by state legislators will be hugely diminished if we can just get rid of the subsidy conveyed on the fossil fuel industry by the fact that carbon discharge is free.

Matthew Wald: Alex, would you settle for a carbon market and in exchange, like arms reduction talks, we'd have subsidy reduction talks?

Alex Flint: The question is how do we adjust the current system to better optimize it for climate considerations. The discussions between cap and trade and a direct carbon tax are going to play out over time. It's very interesting to wonder if the political will

exists to impose those sorts of costs on the energy sector. Right now it appears there are not the votes necessary to pass cap-and-trade legislation in the Senate, but it's a fascinating and dynamic time and maybe those votes can be cobbled together.

Matthew Wald: Jon, this doesn't sound like a market solution.

Jon Wellinghoff: We do have energy subsidies and have for a long time. We wouldn't have as many coal plants as we have now if we didn't give the railroads every other square of land in the West. And we wouldn't have the gas combustion turbines that GE sells if the Defense Department hadn't put billions of dollars into jet engines. What we have to do is make the current markets work as well as they can under the circumstances and then hopefully not escalate the subsidy war.

Alex Flint: We are talking about carbon, but already sulfur oxides and nitrogen oxides have been internalized in some parts of the nation and not others. In the Northeast we have a carbon cap-and-trade system that already exists. We've ratcheted down air emissions on our power plants and, frankly, it's a little frustrating to hear about the Midwest not wanting to do energy efficiency because their prices are so cheap, because one of the reasons our prices are so expensive is we've done the environmental policies that, frankly, raised our rates.

Mike Morris: I agree with Chairman Wellinghoff's comment that we should put a price on carbon and it ought to be part of the overall equation of what coal generation costs. If that causes coal generation to be shuttered because it can't clear the market, so be it. Then we'll move to some other source of supply.

As I said, we're regulated in every state. Before I retrofit any of my facilities I'll go to the state commission, I'll ask that commission, does this make sense to you? Here's our price profile. Here's what we think it will be. Here's a 20-year look at what the cost of this retrofitted plant looks like. Is that a

good decision?

Doug Keare: It's nice that the country is able to pronounce "nuclear" again and that people can talk about energy efficiency without being dismissed as wimps. That's background to saying that I'm mystified how in this country we can't talk about France when we're talking about nuclear power. My understanding is that the French nuclear industry has had no Three Mile Islands. Their safety features are excellent as is their processing of nuclear waste so that it can be stored in one warehouse in Cherbourg. The French don't seem to be complaining about that, whereas we go round and round about putting it under the ground in Nevada.

Peter Bradford: The French nuclear situation is either different from the way you described it or to the extent it's consistent, it's consistent for reasons that aren't compatible with anything we could change in the U.S. system. France historically had one reactor builder owned by the government; we had four, all private. France has one utility, *Électricité de France*, again owned by the government; we have 150 good sized ones and any number of smaller ones. And the French system is regulated both in safety and in economic terms at the national level; ours is regulated economically among the 50 states.

Their system is much less transparent than ours. It's very hard to do cost comparisons because within the French government — since everything involved is government-owned — the possibility of subsidy has always been present. As to the waste situation, the French do reprocess their fuel; we do not. But after you've reprocessed, you've increased the cost of the fuel cycle greatly. U.S. utilities are in no hurry to reprocess because they don't want to pay that cost. What the French have done substantively is taken out the plutonium and uranium. The rest of the waste stream, all the nasty radioisotopes, remain. Neither country is anywhere near having a permanent disposal site

for its nuclear waste.

In a world in which reprocessing becomes an integral part of the fuel cycle, the International Atomic Energy Agency's proliferation safeguard system would face challenges that it is not capable of dealing with because separated plutonium is so much easier and quicker to transfer into a weapon than the storage and fuel rods that are in a reactor pool.

One final point, the French have not been building new plants either. The only one that's far enough along to draw any conclusions about is the one that they started four years ago in Finland, their advanced design of the same type that they proposed to build here in Maryland. That one is about 60 percent over budget and two to three years behind schedule.

Alex Flint: The challenge to doubters about the potential role that nuclear energy can play in producing electricity is the French example. The French system is a proof of principle. A country can generate 80 percent of its power using a technology that emits very little carbon and they can do it in a manner that produces low, stable electricity prices. And there is a political consensus in France that has lasted since the early 1970s that the way in which they handle their used fuel is acceptable.

I believe that many different aspects of the French system can be adjusted. You can use more than one reactor technology. You can use a slightly different fuel cycle. These are variables that can be changed, so you can create a nuclear energy system like the French have that responds to national requirements to produce large amounts of electricity at acceptably low prices with very acceptable environmental consequences.

Jeff Holmstead: So far, the general consensus has been we need to have a price on carbon and then we'll let the markets work to choose the best solution. But all of that assumes that whatever we do, we'll significantly increase costs over where we are today. As long as poorer countries can

produce power at three or four or five cents, why should we believe that they will voluntarily choose to produce power at nine or ten cents?

Shouldn't our focus be what is the best way to incentivize the development of new power at a price that can compete with what you can do today, because if all we succeeded in doing is increasing the cost of power in the United States, that doesn't do very much to solve the climate change issue. There needs to be a way to incentivize the development of a new technology that will be politically acceptable throughout the world. What is the best mechanism to encourage the development of technologies that actually will be accepted politically?

Garry Brown: We are carbon hogs compared to the rest of the world, when you take a look at the numbers per capita. And it's not just electricity. It's transportation, it's lifestyle. Should we say because the rest of the world won't have the same controls we do, we should give up? I don't think that's a viable solution. There are many things we can do, including carbon sequestration. We have to reduce our footprint before I think we can legitimately look at the rest of the world and say you have got to do your bit. We need a federal energy policy.

Peter Bradford: Over the last decade, I've worked in about 20 different countries. One thing to keep in mind is that there's no uniformity among these nations. Some are using old, inefficient oil-fired systems. In those places, efficiency and renewables are fully competitive right now and large central generating stations probably don't make any sense. You can't force another country, of course, to adopt technologies but we can be supportive in making them available. Integrated resource planning is certainly one possibility. Competitive power procurement works no matter whether you're talking large stations or small, diversified stations.

So there are a number of, call them procedural, for want of a better word, approaches that the United States

pioneered and should be encouraging in other countries. In addition, of course, the development banks are going to support particular technologies.

Alex Flint: Jeff's question is profoundly difficult to answer. The unwillingness of less developed economies to respond to global climate change is going to be a great challenge. In my opening remarks, I referred to increased urbanization. We need to emphasize the development of technologies that are appropriate for urban areas. Think of Rio de Janeiro and Mumbai. We have to develop solutions that will be able to power those cities regardless of the countries in which they exist. And I don't know that there's a very good solution to that right now.

Mike Morris: If we want to address global warming, we've all got to get after it. You can't just do it with a single country and you can't do it with just us and China. It's going to take a tremendous amount of worldwide effort to do that. The idea isn't to punish the other countries. It's to incentivize countries. Tell them that if you're going to make a ton of steel in China and it has a three-ton carbon footprint, you're going to have to buy three tons of carbon credits to import that to our country. Whether you make a ton of steel in Ohio or Indiana or in a plant overseas, you have to address the carbon footprint cost.

China is building new power plants. They can't, as we can, put on a new plant and shut an old plant. They need the new plant and the old plant to satisfy their economic demands.

Matthew Wald: China, a country we are counting on to regulate its carbon, at the moment has trouble regulating antifreeze in baby formula.

Jon Wellinchoff: China can accept power at twice the cost if you can make them twice as efficient. If we can go in and improve their efficiency so they can get the same level of services, they can accept that higher cost. So we have to look at the efficiency side of it as well and people often

forget that. They only think about the supply side.

Matthew Wald: We're going to give each member of the panel 10 seconds for last licks. Jon, you just had yours. Alex?

Alex Flint: We cannot address global climate change without building a lot of new nuclear reactors. We have a demonstrated ability to do it and I believe it is a part of the answer along with every other potential technological solution to climate change.

Peter Bradford: The Nuclear Energy Institute's position paper calls for 45 new reactors and loan guarantees to get those built. That means \$300 billion in loan guarantees. The program I'd like to offer is go back to those few first movers, prove that these advanced reactor designs work in five or six plants with a certain amount of federal help and then we can talk about an expansion on the scale of the one that's in the NEI position paper.

Mike Morris: This is a technological problem that has answers. I've had the opportunity to go to campuses from MIT in the east to Stanford in the west. It's answerable and the young men and women who are there are ready to do it. From the 1960s to the 2000s, this country has produced more electricity and the air has gotten cleaner in every decade. That will continue.

Garry Brown: I'd ask everybody to play the role that I play everyday, of professional cynic, which is what a regulator does. We can't believe everything we hear. We have to weigh all the factors. And just keep in mind sometimes when you hear things cloaked in carbon whether it is an agenda driving the discussion. As a nation, we haven't yet come to grips with what it will take. We need to do so very quickly if we're going to move forward. •