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Chair

Mr. Laurie Hawn

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● (0905)

[*English*]

The Chair (Mr. Laurie Hawn (Edmonton Centre, CPC)): Thank you, ladies and gentlemen. We now have quorum, so we can call this meeting to order.

Welcome to meeting 16 of the legislative committee on Bill C-30.

The topic *de jour* is CO_2 capture. We have some well qualified witnesses: from EPCOR Utilities Inc., David Lewin, senior vice-president of integrated gasification combined cycle development, and Tim Boston, director of public and government affairs; from the Forest Products Association of Canada, Avrim Lazar, president and CEO; from the ICON Group, Stephen Kaufman, with Suncor, and Wishart Robson, with Nexen; and from the University of Calgary, David Keith, Canada Research Chair, Institute for Sustainable Energy, Energy and Environmental Systems Group.

Welcome all. Our usual proceeding is about 10 minutes, less if possible, for each presenter, and then we'll start a round of questioning, varying between opposition and government side, and get all the facts out on the table. I appreciate you all joining us today. It's an important topic that we've been following closely, of course, for a long time.

Without further ado, I would like to call on David Lewin from EPCOR Utilities for up to 10 minutes.

Mr. Lewin, the floor is yours.

Dr. David Lewin (Senior Vice-President, Integrated Gasification Combined Cycle Development, EPCOR Utilities Inc.): Thank you, Mr. Chairman and honourable committee members.

EPCOR commends the efforts of this committee to develop effective environmental legislation addressing greenhouse gases and other emissions. It's clear that the results of your efforts here will have great significance for the future of Canada and the Canadian electrical industry.

For those who are not familiar with EPCOR, I'll just briefly introduce our company. EPCOR Utilities Inc. builds, owns, and operates power plants, electrical transmission distribution networks, water and waste water treatment facilities, and infrastructure in Canada and now in the United States.

Our Canadian operations include facilities in British Columbia, Ontario, and Alberta. EPCOR's generation fleet includes power generation from wind, biomass, run-of-river, small hydro, recycled energy, gas, and coal. EPCOR has been named one of Canada's top 100 employers for seven consecutive years, and it is headquartered in Edmonton, Alberta.

The EPCOR Power LP has the largest market capitalization in its sector and owns plants across Canada and the United States. EPCOR owns 31% of the LP and is the manager of its operations.

In 2000, EPCOR Utilities Inc. and a number of other Canadian companies formed what we refer to as the Canadian Clean Power Coalition, or CCPC. The CCPC was formed to investigate technological developments that could lead to significant reductions in greenhouse gas and other air emissions from the continued use of coal for power generation.

Today we wish to discuss our company's perspectives on the implications of Bill C-30 and the challenges and opportunities for managing air emissions from the electrical industry within Canada. Further, we would like to update you on the progress that the Canadian Clean Power Coalition has made on the development and deployment of new technology. EPCOR strongly believes that a rational regulatory framework has the potential to deliver major reductions in Canada's emissions profile over the long term.

While we are discussing emissions at the national level, electrical generation is regulated by the provincial governments and in some cases owned by those same governments. Not surprisingly, the dominant fuel types used to generate electricity vary quite broadly across the country, largely due to geography and resource availability. For example, Alberta, Saskatchewan, and the Maritimes depend heavily on coal-fired generation. Those regions lack significant hydro opportunities. Alberta in particular has a more than 1,000-year supply of low-sulphur sub-bituminous coal reserves. British Columbia, Quebec, and Manitoba have been blessed with an abundance of hydro, again based on their specific geographies. Ontario has benefited from a diverse fuel mix, including a significant share from nuclear.

Canada's electricity generators are individually and collectively capable of delivering substantial emissions reductions in line with those envisioned by the act and this committee. But the reality is that the reductions will take place in stages over decades, rather than over a few months or years. As you've heard from other presenters to this committee, our industry is highly capital-intensive, with large facilities and significant life spans. In addition, facilities have little ability to switch fuels without complete renewal of the capital asset in place.

In the late 1960s and 1970s, Canada experienced a significant build of power generation that now forms a significant portion of the generation across the country. Much of that generation is fueled by coal and will reach the end of its economic life between now and 2020. As such, the country will require another wave of investment in baseload power generation to replace this aging infrastructure.

EPCOR and others in the industry are strongly advocating an approach that takes advantage of this capital stock turnover and promotes the adoption of what we call best available technology economically achievable, or BATEA, when a plant is retired. Replacing our older power plants with today's best available technology that is economically achievable will lead to a dramatic and immediate reduction in emissions from power generation and is part of the pathway to near-zero-emission power generation. I would never say zero-emission power generation

● (0910)

This approach is already working today. In 2000, EPCOR did an extensive review of the technological developments in coal-fired generation. This review then formed the basis of our technology selection for EPCOR's Genesee Phase 3, or G3, application to the Alberta Energy and Utilities Board. That project was approved in 2001.

G3 employs the best available technology that is economically achievable, and it has been generating 450 megawatts net to the Alberta grid since March 2005. Through the investment of an additional $90 million, EPCOR was able to significantly reduce air emissions from this state-of-the-art facility. In comparison to a number of coal-fired facilities that retired in 2003 and 2004, G3 reduced emissions of NOx and SO_2 by 63% and 80% respectively. In addition, G3's supercritical technology resulted in an 18% reduction in greenhouse gas emissions per megawatt hour, compared to the provincial average for coal-fired generation in the province. So there was a significant reduction in GHG emissions. Such technology substitution has great potential to reduce air emissions in Canada.

Let me return to the Canadian Clean Power Coalition. I'm pleased to be serving as the chairman of this coalition as we work toward the deployment of new technology options for coal-fired generation. Integrated gasification combined cycle, or IGCC, is the technology we are pursuing today, particularly in Alberta.

The coalition recently began a 28-month front-end engineering design effort, or FEED, at EPCOR's Genesee site just west of Edmonton. This project is currently being funded by EPCOR and the Alberta Energy Research Institute. At the completion of the FEED study, coalition members will be able to evaluate the opportunity to build an IGCC plant in Alberta. Indeed, this study could accelerate the ability to deploy such technology.

Our hope is that an IGCC plant will allow us to have a relatively pure CO_2 stream available for enhanced oil recovery, perhaps in the nearby Pembina oil fields. Such a plant would also improve air quality by dramatically reducing key air emissions. Compared to vintage coal-fired facilities, IGCC technology has the potential to lower emissions of NOx by 96%, particulate matter by 98%, and SO_2 by 99%, for significant improvement in air emissions. While this technology is not commercially available at this very moment, we continue to believe it is important for industry and governments to keep investing in its commercialization.

In the context of the Clean Air Act, we believe it is important for government to continue its partnership with industry as we work on technology research and commercialization. It is equally important that the regulatory standards and targets set by government reflect an objective assessment of the best available technology that is economically achievable.

So where do we go now? While there is limited opportunity for companies like ours to make significant changes in the short term, we would support a policy environment that mandated near-term targets, as long as they weren't at the expense of longer-term real reductions. For many generators, the only option to achieve short-term reductions would be through the purchase of reductions from other sectors in the form of offsets. We believe the near-term target should ensure that power generators retain sufficient capital to invest in the commercialization and deployment of new technology like IGCC and carbon capture and storage.

As we mentioned earlier, we support a model for our industry that would require that a plant reaching the end of its economic life be replaced or perform to the same level as the best available technology that is economically achievable of the day. Genesee 3 is a perfect example of how this would work and the potential reductions that could be achieved.

● (0915)

In the short term, EPCOR would support the concept of a technology fund as one compliance mechanism for the electricity sector. You've already heard about this from TransAlta, so I won't spend any time on it, except to agree with TransAlta that this would be an effective way to overcome economic hurdles and accelerate capital stock replacement with new low-emission technologies.

Another compliance mechanism must be a robust domestic offset system and an active national emissions trading regime that allows real and verifiable international credits to be transacted. EPCOR is one of the most active Canadian participants in the offset market. We believe it can result in real and verifiable—third-party verifiable—reductions in greenhouse gas emissions. If it would be helpful, we'd be pleased to provide the committee with information on how we have approached offset trading to meet our Alberta requirements.

With such mechanisms in place, EPCOR could achieve the government's proposed target of a 65% reduction in greenhouse gas levels by 2050. We've already shown with Genesee 3 our ability to reduce NOx, SOx, and greenhouse gas levels significantly.

We are in agreement with TransAlta's estimation of the costs to the sector, so I will not address that further today.

EPCOR has demonstrated its commitment to deployment of new technology and leadership in searching for the next technology leap for our industry. We see tremendous potential for greenhouse gas reductions across the industry in the medium to long term. We are mindful that what could put those reductions at risk is a policy framework that is focused on short-term action in an industry that has a long-term timeframe at play.

We encourage this committee to focus on the medium- to long-term significant reductions that our industry can make. Don't sacrifice the long-term goal for the desire to show immediate action. Targets today must take into account the realities of the different sectors and their respective abilities to make changes in the short, medium, and long term. There is not necessarily one solution that fits all sectors.

Finally, we note that the bill does address provincial and federal equivalency. We applaud this, as it removes an additional source of uncertainty for our industry.

Thanks again for the opportunity to speak to you today. I'd be happy to answer any questions.

[*Translation*]

The Chair: We will now hear from the Forest Products Association of Canada, the President and CEO of which is Mr. Avrim Lazar.

You have 10 minutes.

[*English*]

Mr. Avrim Lazar (President and Chief Executive Officer, Forest Products Association of Canada): Thank you, and I thank the committee for allowing us to speak today. I know that you hear a lot of witnesses and that we must occasionally bore you, but I have to tell you that for us, it is really important to have a chance to be heard.

There's really only one policy issue we're facing, which is how to address climate change and keep jobs in Canada. That's the debate, and no one is saying that we should do one or the other. We all agree that we have to do both. We have to keep jobs in Canada, and we have to face climate change.

I am going to address this from three perspectives, all of which deal with jobs and the environment.

First, in the forest industry we have 900,000 jobs that depend upon healthy forests, so our jobs depend upon a healthy environment. And unless we address climate change in an effective way, those 900,000 jobs are threatened. In fact, they are threatened today by the pine beetle that's moving across Canada, and they are threatened by forest fires. So for the forest industry, this is not a future thing, it's not a theoretical thing. Effective action on climate change is necessary to have healthy forests, and without healthy forests, we don't have jobs.

We haven't waited for governments to show the way or to regulate us. Our industry has reduced its greenhouse gas emissions by 44% since 1990, seven times Kyoto, without regulation, and we intend to keep doing more. We've done a similar thing on air quality; we've improved it by 60%. We've moved away from fossil fuels, and now 60% of our energy comes from renewable fuels. We produce enough renewable energy in our mills—just in our factories, in the mills across Canada—to replace three nuclear reactors.

The forest industry, because we recognize how important nature is and how important the environment is, has not waited for regulation. We have moved, and we have moved quickly, and we have done what we had to do to reduce greenhouse gas emissions by 44%—seven times Kyoto. That's the first perspective on jobs and the environment.

The second is that any time we have a law, a regulation, or a penalty that drives production out of Canada, we are not helping the environment; we are merely displacing the gas emissions from Canada to a third country. In the forest industry, every time you close a mill, that slack will be taken up by a country that is not controlled by Kyoto—by Brazil, by China, by Russia—which can emit to its heart's content. We are not helping to address climate change by driving production out. What we have to do is keep production here in a cleaner way, and the only way to keep production here in a cleaner way is to retool industry. That is the policy imperative.

How do you retool industry quickly enough so the jobs stay here and the greenhouse gases go down? In the forest industry we've done the retooling by switching from fossil fuels to renewable fuels. In other industries there will be other solutions. But it's the speed of retooling that is the critical point in keeping jobs here and in addressing climate change.

We have some specific suggestions for speeding up retooling, and none of them is terribly surprising. What do you need to retool? You need mountains of money. You have to buy new equipment, so you need capital, and that's it. If you have access to capital, you can retool. Unfortunately, for manufacturing in general in Canada and for the forest industry, capital is scarce, because we're not making a heck of a lot of money. So any incentives that government can give—tax breaks or any sort of incentive—or any financial signal that makes it easier for us to accelerate buying the new equipment that would reduce greenhouse gases, will keep jobs in Canada and address climate change.

A system that has regulations without any accommodation for the need to retool, the need for capital, won't work. All it will do is drive businesses that are at the edge to China, and the greenhouse gases will come from there and the jobs will stay there. So we need a strong regulatory regime, but we need the regulatory regime together with a tax incentive system or some other incentive system that will make it easier for businesses to buy the equipment necessary to quickly retool.

● (0920)

On a regulatory regime, there are a few things that have to happen. The first is that reductions made since 1990 have to be recognized, and fully recognized. I don't care if the base year is 1990 or 2000, but whatever it is, the calculation has to respect what's already been done. Industries that have not waited for regulation should not be punished by the government by pretending everything we did doesn't count, and industries that have done nothing until government forces them should not be rewarded by having where they are now considered to be the baseline. It is a fundamental question of integrity in government regulation that those who have acted before regulation have their efforts recognized. Otherwise it sends a simple message to industry—don't do anything unless we force you, because if you do, what you've done will turn out to be the floor for further improvements.

Two, a regulatory regime must involve the capacity to trade credits and to offset, because without market mechanisms we won't find least-cost solutions. If it's detailed regulation, if it's the heavy hand of officials and bureaucrats, doing their best, trying to figure out how to regulate, finding the solutions, it will never work as well as having market mechanisms. We need a trading and an offset regime that allows us to find least-cost solutions. I promise you that industry will find the best and smartest way of doing it if there is an economic incentive, which trading gives us.

Finally, on equivalency, we don't care who sets the standard if it's an intelligent standard, and we don't care who enforces it, but we don't want the province and the federal government coming and tromping all over our mills doing the same thing. So set a strong, intelligent federal regulatory machine and let the provinces enforce it. Let the provinces set the regime and the feds enforce it. We don't care, but let's not have both orders of government doing the same thing. When we say “equivalency”, we don't mean that you recognize every single standard set by a province. If it's a federal standard, everybody has to meet it, but it doesn't have to be enforced by federal regulators. It can be. We don't care who enforces it, but we don't want two sets of regulators tromping through our mills. One is quite enough. We'll meet the standards without having all those guests.

I want to draw the committee's attention to a submission from the environmental groups. This is a strange document because it is agreed to by the Sierra Club—I can list who's on here—Greenpeace, Nature Canada, World Wildlife Fund, and Ecojeunesse. They've all agreed for the first time, so this is an amazing document. I want to tell you that the Forest Products Association of Canada agrees with it too. It might be possible, actually, to take it seriously and do it.

I also want to draw your attention to our annual report. In the back flap you'll find our sustainability report, which gives all the details of the forest industry's environmental performance—the pretty, the less pretty. We're holding ourselves accountable. We're being transparent. It talks not just about our 44% reduction in greenhouse gases, our 60% improvement in air quality, our 40% reduction in what goes to landfill, but it talks about all our environmental measures, and we're pretty proud of it.

Chairman, members of the committee, thank you.

● (0925)

The Chair: Thank you very much, Mr. Lazar. I will remind folks that the topic for today is “Tools: CO_2 Capture”. But it was an interesting presentation.

I'd like to turn to the ICON Group and Mr. Kaufman or Mr. Robson.

Mr. Kaufman for 10 minutes.

Mr. Stephen Kaufman (Suncor, ICON Group): Thank you, Mr. Chairman. Good morning, honourable members, and thank you for the opportunity that you've given Mr. Wishart Robson, from Nexen, and myself, to speak to the community on behalf of the ICON Group.

[*Translation*]

Since this is a complicated subject and my French isn't very good, my comments and my answers to your questions will be in English.

[*English*]

We've provided you in advance with a slide deck that you may want to follow through as I give my initial remarks, and you might refer to it in questions.

The ICON group is comprised of 14 companies whose names appear in slide 2 in your package. We are in the electricity generation, oil sands, industrial, and chemical sectors. These companies have a strong interest in carbon capture and storage, or CCS, as we refer to it. We're working towards creating a functioning, long-term, integrated carbon dioxide network—hence our name, ICON. That network would be able to handle large volumes of carbon dioxide at minimum overall cost.

ICON is not a single project. It is a set of policies, regulations, and ultimately private and public sector investments to make large-scale carbon capture and storage a reality.

CCS presents a tremendous opportunity for Canada, and we're here today to highlight the key considerations with respect to CCS as your committee considers modifications to the proposed Clean Air Act.

Slide 3 describes, in a very simple way, how carbon capture and storage works. Carbon dioxide from large industrial sources of any variety can be separated from the flue gas and compressed and dried for transportation. You can use a conventional high-pressure pipeline system to deliver that carbon dioxide hundreds or conceivably even thousands of kilometres. Then the carbon dioxide is injected into rock formations two to three kilometres underground where it will remain for thousands of years. We can also inject carbon dioxide into older, declining oil fields, and this technique, which would improve oil recovery and reduce the need for water injection, is called “enhanced oil recovery”, or EOR.

The IPCC from the United Nations has said, in a big report that was published in May 2006, I believe, that carbon capture and storage can be a safe, long-term, and cost-effective way to reduce carbon dioxide emissions.

CCS is very important for Canada as it's potentially the most substantive way for Canada to directly reduce greenhouse gas emissions within a five- to ten-year timeframe. This was indicated by the National Round Table on the Environment and the Economy in a report that was done last summer. Some of their analysis is shown in slide 4 of your deck.

CCS will assist with the transformation of our economy to a lower carbon energy economy. It's necessary to realize clean coal as a low environmental impact energy source, as Mr. Lewin referred to. It will allow for more sustainable growth of Canada's oil sands resources, and it will allow for the use of coal, coke, or bitumen, when gasified, to replace the limited sources of natural gas we have and to free those up for other uses in the economy.

In short, carbon capture and storage is a made-in-Canada solution. The investment will occur here, the carbon dioxide reductions will occur here, and the technology development can occur here. Canada can fulfill its potential as an energy superpower and lower its GHG emissions at the same time by deploying technologies like carbon capture and storage. Canada could become a world leader in this approach to GHG reduction.

Slide 5 shows a breakdown of the carbon dioxide emission sources in Canada. What we'd like to point out is that of the total commissioned sources in Canada, nominally half of them would have the potential to use carbon capture and storage as a technique. The other sources of emissions, which tend to be more widely distributed from residences and small commercial activities, as well as transportation, really aren't suited to carbon capture and storage. For those types of emissions, we look for energy conservation, for switching to lower carbon fuels, and other means to reduce carbon dioxide.

With carbon capture and storage, companies can achieve carbon dioxide reductions that are greater than their reasonable share of national targets, but we need a mechanism to reward and incent this behaviour. This will lessen the burdens for other sectors of the economy that don't have CCS available while ensuring that Canada can achieve meaningful reductions.

Adoption of CCS must also be balanced with Canadian competitiveness to ensure that investment remains in Canada. This is particularly true with respect to oil sands upgrading, which needs to be competitive with locations in the U.S., where this activity could alternatively take place.

The ICON study showed that there are benefits in planning a large-scale system for carbon dioxide capture and storage from the beginning and building it in phases. This is shown on slide 6. We estimate that up to 20 megatonnes, or 20 million tonnes, per year could be captured and stored by around the year 2015. This is equivalent to removing from million vehicles from the road, or about 25% of our light vehicle fleet in Canada.

● (0930)

ICON envisions an open access pipeline system that would connect multiple capture and storage locations. The map you see on slide 6 shows a conceptual routing—this certainly hasn't been decided—from source to end-use for the Alberta portion of the ICON network.

While carbon capture and storage will likely start in western Canada, including B.C. and Saskatchewan, we also think that our system approach is well designed to work anywhere in Canada. In particular, we believe there's potential to extend the concept to Ontario and the Maritimes, where you have similar large point-source emitters and suitable geology.

A network like this will be the key to the success of carbon capture and storage. When you compare it to individual projects, a network approach allows for economies of scale and optimized long-term efficiency, and, most importantly, it minimizes the environmental footprint of the pipelines and the other infrastructure that you would build.

However, such a scheme does require participation by various industry sectors and coordinated input from governments. Specifically, Canada's overall GHG reduction plan must work to encourage CCS.

Slide 7 talks about shared responsibility. A successful integrated system will include three elements: the large-scale capture of CO_2 from industrial point sources; a pipeline system to connect those sources to end uses; and the storage infrastructure, and there are really two pieces to that. There are EOR fields that can be used as a customer base and to support some of the costs in the short term, but more importantly, direct storage that provides no revenue source to the system is going to be essential to achieving large-scale volumes of CO_2 reductions.

Left to market forces, very little CCS will proceed, even with tightening CO_2 emission constraints. The risk profile and economics of large-scale CCS are simply unfavourable. There's a transition role for governments to help enable this to take place in the future, and a true three-way private-public partnership with two levels of government is essential.

Slide 8 refers to some of the policies that you might want to consider as you're looking at Bill C-30. It's important that innovation be considered by both industry and governments when constructing the CCS infrastructure, and using both existing and new technology at a large scale while we wait for market mechanisms related to CO_2 to develop.

The full range of policies and mechanisms should be considered to deploy this technology. Companies should retain the option to undertake CCS along with other compliant strategies. We don't want to see CCS mandated, and we don't want regulations that would discriminate based on technology sector or geography.

Companies that can embrace CCS should have no greater compliance burden than other sectors of the economy, and the policy must work to incent direct storage and CO_2 capture. It's in these areas that we face significant hurdles.

Continuing on slide 9 with policy principles, companies that elect to use carbon capture and storage may be able to achieve reductions greater than their reasonable share of national targets. So a mechanism to reward and incent this behaviour is needed. Any trading or offset system that's designed needs to work to support this idea.

I'd also like to make the point that we're at the stage of deployment. Significant research has already occurred on some of this technology, and some of it is well understood. We believe any technology fund mechanisms that are proposed should be focused on large-scale deployment and not on direct research.

The government has a transitional role to help CCS right now. At these early stages, the risk is the highest and our understanding of the scale, technology, costs, and timing is the lowest.

Just in closing, then, the ICON Group has done a substantial analysis of how a carbon capture and storage network could function. We encourage the federal government to confirm CCS as a key part of Canada's environmental strategy and to make the ICON concept a priority.

I'd also like to make it clear that capture companies are willing to pay their fair share of the costs of CO_2 reductions. We do not expect to profit from CCS if that is the chosen compliance mechanism for any company.

● (0935)

Developing an integrated CO_2 network will be a transformative environmental step, one that can be most effectively taken as a private–public partnership. We would like the federal government to work with us and the provincial governments to develop the scope, size, and policy options that will enable ICON. Collaboration is essential, and the ICON companies are ready to engage the government in substantive discussions.

[*Translation*]

Thank you for your attention. I eagerly await your questions.

[*English*]

The Chair: Thank you, Mr. Kaufman.

Our final presenter today is Mr. David Keith from the University of Calgary.

Mr. Keith, for ten minutes.

Dr. David Keith (Canada Research Chair in Energy and the Environment, Department of Chemical and Petroleum Engineering and Department of Economics, Institute for Sustainable Energy, Environment and Economy, University of Calgary): Thank you very much for giving me the opportunity to talk to you today. It's really a pleasure.

I'm going to start by giving you some general background on CO_2 capture and storage. I'll give you a sense of what's changed, what's happened, and why people are talking about this seriously.

First of all, at the very top level, I see CO_2 capture and storage not as a means to enhance oil recovery, although that is a perfectly useful thing to do, but principally as a way to manage the CO_2 emissions from fossil energy, as part of a global climate strategy. The fact is that we have to essentially eliminate global CO_2 emissions over the lifetime of my children if we're to avoid really dramatic climate change. It is simply not plausible that we can switch away from fossil energy at the pace we would need to, so the ability to manage the CO_2 emissions from fossil energy systems while we also build non-fossil energy systems is a crucial component of our ability to cut emissions very quickly in the face of the climate challenge. That's the top-level view.

Fifteen, or now almost twenty, years ago, when I first encountered this topic in my days as a grad student at MIT, there were just a handful of papers and a few academics interested, and nobody took it seriously. Now we have a large amount of R and D and many serious projects. We have the IPCC “Special Report on Carbon dioxide Capture and Storage”—for which I was the most senior Canadian lead author—and a whole series of other reports.

But more than all that talk, we have two major projects that operate today that are putting CO_2 underground beyond the business as usual. These have nothing to do with enhanced recovery. In both these projects, money was spent for the sole purpose of avoiding atmospheric emissions. There will be one more such project on line by the end of this calendar year, and there are a host of serious projects starting up around the world. In a meeting in the next month, it looks like the European leaders will commit to something like six of them. These are power-plant scale projects.

So a lot is happening on this topic. Why has it moved so fast? The answer is not innovation. We did not get from where we were fifteen years ago on this topic to where we are today by innovation. The reason we moved so quickly is that we realized that in fact CO_2 capture and storage consists of an assemblage out of a toolbox of pre-existing technologies that already exist at the billion-dollar commercial scale. It's a new way to do the plumbing, a new way to think about fossil energy.

Let me tell you about some of the pieces that already exist in that toolbox. They existed fifteen years ago and they exist today, and they are the underlying reason why we can say with some confidence that we are ready to deploy this technology. It's not that we know everything, it's not that there are no risks, and it's not that the costs won't be big; it's that we're ready to go.

The reasons are the following. These are a list of the component technologies that already exist.

Gasification is not an experimental technology. There are 60 gigawatts—the equivalent of 60 king-sized coal-fired power plants—of gasification technology worldwide. A significant fraction of that is coal, and the rest is asphaltenes, petroleum coke, and other things.

There is hydrogen production from natural gas. It's roughly more than 1% of the global primary energy use, and the technology for capturing from modern plants is well understood and costed at the industrial scale. I'm not saying it's cheap, but the point is that you can build these things with industrial performance guarantees today.

The long-range transport of carbon dioxide over thousand-kilometre distances and its injection kilometres underground are things that already exist courtesy of the enhanced oil recovery world. This means you can go to many well-developed petroleum provinces in the world and get contractors to actually build you pipelines, build you injection systems, and deliver them at a cost that's well understood. This isn't theory.

What is theory is connecting all those components up in a new configuration, to enable use of fossil energy with minimal CO_2 emissions. That's new, and there certainly are uncertainties, but the reason to take it seriously is that we're assembling this out of a toolbox of things that already exist at full and proven commercial scale.

The conclusion is that CCS in broad terms around the world is ready for large-scale deployment. There's certainly more R and D to do. R and D could reduce costs and reduce risks, but the best way to make progress in understanding this technology at this point is to cut some metal, to actually build some projects.

That's not to say there aren't real uncertainties. For example, while I say gasification is widely deployed, issues about gasifying the particular coals we have in Canada that have some particularities of, say, high sodium content mean there really are challenges—challenges like the folks at EPCOR would have to face—and uncertainties about how to manage projects. That said, this still is not fundamentally an R and D venture at this point. This is a venture of actually building real hardware.

That's the very top-level overview. What does it cost? In the electric sector in the centre of the big economies, based on costs of about five years ago and for large plants, a very rough answer is that if you compare a new coal-fired power plant with CCS to a new power plant without, you are looking at a cost differential of something like 2¢ U.S. per kilowatt hour. Those were the costs of five years ago, and they amount to about a 20% cost increase for consumers buying the electricity. That's quite a statement. That's saying that for the electric power sector, which, after all, is more than 40% of global CO_2 emissions—it's the same number in the U.S., although less in Canada because we have so much hydro and nuclear—you could take a major bite out of emissions, going a long way to matching the climate problem for costs of that order. Those, as costs, we can really afford to pay as a society. In the U.S., that comes out to 0.75% of the GDP. That's a good news story.

● (0940)

The bad news story about these costs is that the costs of building large industrial have increased everywhere in the world, driven most of all by Chinese growth and growth elsewhere. Both the costs for steel and concrete and the cost for what we call EPC, or “ensuring procurement contracts”, have all gone up. I gather that the costs of EPCOR's new plant, which is basically a copy of their old plant that you heard about, are almost double what the previous costs were. The costs of CCS will similarly be higher if executed right now.

On the other hand, nobody knows what costs will do in the future. My guess is that we're not going to see that doubling go on forever. The Chinese economy will stumble, and we'll see those costs go down again or more EPC companies will enter the market.

One thing you have to distinguish here—and it's a challenge for policy-makers—is that you're going to get one answer from academics and another from industry guys, when the answer is that they're both right. The industry guys are telling you the correct numbers right now in Alberta, and they're very high. I'm telling you some longer-term, average numbers for larger plants in the U.S. Those are also pretty reasonable, and they're different for reasons that we understand.

It's important to say that the cost increases for things like this apply to a bunch of the competing technologies that we would install to reduce CO_2 emissions as well. The costs of wind power installations, the costs of nuclear power plants, and the costs of a bunch of other large capital technologies that would have low CO_2 emissions, have all increased in ways that are roughly proportional. That is a challenge for regulators who wish to move forward, but we must move forward if we're going to deal with the climate problem in a serious way.

I can say a little bit about risks and capacity. I think I'll just say the following things, and then I'm happy to take more questions.

Capacity for CO_2 storage is not the issue. We have tons of capacity. There are legitimate and serious concerns about costs and risks, but I do not think they're legitimate concerns about capacity.

On local risk, the IPCC report said that with appropriate site selection, blah, blah, blah, the local health, safety, and environmental risks of geological storage would be comparable to the risks of current activities, such as natural gas storage—which is widely used around the world and has been for about a hundred years—enhanced oil recovery, deep underground disposal of acid gas, etc. The point is that this is a lot like other industrial things—and there's more to that statement than you might think. The risks of those activities are very small in well-regulated countries where there are effective environmental intervenors and the effective rule of law, like Canada.

It's quite surprising when you look at the actual fatality rates in this industry. The numbers are actually low compared to many other industries. The risks of those things in Russia or Nigeria are very big. What that tells you is that the risks are not directly related to the hardware but are related to the management systems around the hardware. That's an important lesson.

So if you ask me, as an academic, what the risks of CO_2 storage are, my only honest answer is that it's up to you, the regulators, and it's up to us, the society. There's no closed open-and-shut academic answer. It depends on how and where you do it.

Let me make a few last comments on CCS in Canada. Canada had an early lead in the science and some of the technology around CO_2 capture and storage. In my judgment, we have lost that lead. Without decisive government action, we will soon lose any chance to regain it. Around the world, I travel to visit companies and occasionally am asked to consult for companies and governments around the world. I see people getting ready to cut metal. In Canada, I don't, and that really is depressing. We've had a lot of talk. In some ways, I think the Kyoto process has stood in the way of Canadians thinking clearly about what to do.

In the U.S., there is a real sense that we are moving toward regulating CO_2 emissions in a serious way. There is a real chance the bill will get through this session of Congress and be signed. In Canada, we're stuck with this bipolar argument. On the one hand, there seem to be people who really think we could meet something like Kyoto, which would need a 35% cut that would have to be executed in three years, because it's only three years until the 2010 midpoint. That would be essentially impossible in the modern developed economy. And then there are other people, like some of my neighbours in Calgary, who deny that we have a problem at all and don't believe the science. With that level of polarization, it's very hard to make sensible policy. Meanwhile, in some cases, the rest of the world is actually moving closer to doing it.

● (0945)

A few last comments. On policy mechanisms, my view is that the central policy mechanism must be something that leaves people free to innovate, and that means a strong price signal. I personally favour a carbon tax, but cap and trade mechanisms and many other mechanisms are appropriate things to do. That has to be the number one thing to do.

Fundamentally, individuals in their homes and companies know better how to cut emissions than you folks around the table do. The role of government is to set the targets in the form of cap and trade, or taxes, not to tell people precisely how to do it. Nevertheless, for large, lumpy capital cost technologies like this, you will need specific incentives. They may not be specific monetary incentives, but some combination of monetary and regulatory incentives to make them happen.

Finally, I have one comment in thinking about the people on my right and left here, in thinking about the Alberta carbon dioxide capture and storage story. The overwhelming political focus right now is on oil sands. Nevertheless, most of the emissions from Alberta's electricity sector are still much bigger than the emissions from the oil sands. The cost of squeezing those emissions out by CCS is lower for electric power companies in the Edmonton area than it is for oil sands companies, and that's a real challenge for policy-makers.

Thank you.

● (0950)

The Chair: Thank you very much.

It's going to be tight to get everybody in on our 68 minutes' worth of questioning, so we'll be tight on the individual times.

We'll start the seven-minute round with Mr. McGuinty, please.

Mr. David McGuinty (Ottawa South, Lib.): Thanks, Mr. Chair.

Thank you very much, gentlemen, for showing up today. Time is very short, so I'll ask a couple of pointed questions to most of you.

First to our colleagues from ICON, can you tell me *grosso modo*, as they say in Latin, what are the gross revenues of your member companies?

Mr. Stephen Kaufman: We haven't done that assessment, so I can't answer that question.

Mr. David McGuinty: Can you give us an idea of the net profits?

Mr. Stephen Kaufman: No, I haven't looked at all the companies recently.

Mr. David McGuinty: You'll forgive me for reacting perhaps immediately to a number of comments you made, sir, about a public-private partnership. For most Canadians right now, when they look at energy prices, energy performance, profitability of companies, and the overall success of these 18 companies, it's hard for them to envision public money being invested unless they see some fairly dramatic reductions in greenhouse gases. I'm trying to reconcile your call, on the one hand, for a public-private partnership and participation in this process, while at the same time in your deck you are suggesting that there really shouldn't be any regulations and that CCS shouldn't be mandated. I know you're not saying we shouldn't be regulating for greenhouse gas reductions, right?

Mr. Stephen Kaufman: In answer to the second part of your question, we believe companies should be given the opportunity to comply with whatever mechanisms they choose. For some companies carbon capture and storage may be the right approach; for other companies they may be able to achieve compliance through energy efficiency, through investment in renewables, which a number of the companies in our group are doing, or through fuel switching and other choices. We don't want the policy to be prescriptive and choose a technology. However, we're not suggesting that the policy shouldn't provide guidance in terms of the level of carbon dioxide reductions.

Mr. David McGuinty: Dr. Keith, you're a Canada research chair. Out of curiosity, when was the Canada research chairs program created?

Dr. David Keith: I have no idea, sorry.

Mr. David McGuinty: When were you named a Canada research chair?

Dr. David Keith: About two and a half years ago.

Mr. David McGuinty: That's a process, Dr. Keith, that the former opposition opposed, by the way. You should know they actually opposed the creation of research chairs.

Dr. David Keith: This really sounds like a pretty political comment, and it's off topic. Sorry to be blunt, but let's get to it.

Mr. David McGuinty: Just so you know that your work and Dr. David Boyd's work, and others.... But let me get to the point here—

Dr. David Keith: I'm well aware of that. This is the kind of grandstanding that is the reason we're not having policy in Canada. I'm sorry to be that blunt.

Mr. David McGuinty: Well, you're actually being a little too forward, sir.

Let me get to the question for you. You said a carbon tax was preferred. Can you help us understand why a carbon tax is preferred, rather than a cap and trade system? Can you please weave into your answer your reaction to the government's announcement that there will be no participation, by this country, in the international carbon markets? Not hot air, and not the fallacious, distorted misinformation going out about hot air, but there will be no participation under the CDM or JI, according to the government. There will be no carbon tax in this country.

So you want to talk about policy-making; you want to talk about what would be realistic policy-making. Give us an understanding, as an economist, of what you know now. Can you help us understand why the government would say this?

Dr. David Keith: I'll answer your first question first.

The reason why I and I think many policy-makers in the U.S. now are rethinking taxes seriously is that when you look at what happened with the European emissions trading system, it certainly hasn't been a total failure, but even the people who are in the middle of creating it, folks like Michael Grubb, agree that it actually has been very ineffective in incenting real emissions reductions.

There are some real advantages to taxation because it is so simple. The objective here is, after all, not to beat people up; it's to actually help the environment, to reduce emissions. Taxes are a very administratively efficient way to put in even pricing all across the whole economy for carbon emissions to the atmosphere, to tell people they can't use the atmosphere as a free dumping ground, and to do that in a way that's stable.

Part of the problem with the European system is extreme instability in prices, and there are a bunch of political reasons for that, as you may know. For instance, the German government has suddenly backed out of really clamping down on emissions.

So I think there's no question that a cap and trade system can work, and a bunch of these things could work. The devil's in the details. We could make a cap and trade system that would work, but I think there are a lot of reasons to think a tax system might work. My sense of the people in Washington right now is that taxes used to be completely off the table, and now people are scratching their heads and saying, “Well, if we're actually going to swallow this bullet, there might be better ways to do it than cap and trade, and tax might be it.”

Remember, it could be revenue-neutral. A government could introduce a tax and, say, eliminate the GST, so on the day it was done it was revenue-neutral.

So I don't know exactly what this government will do in two days or two weeks, whenever it finally announces its policy, and I really don't care to speculate. I think the bottom line is that Canada has spent something like 10 years grandstanding about this with very little to show for it.

I'm not blaming the former government or the previous government; it really doesn't matter to me. My job is to help people make decisions that actually cut emissions.

● (0955)

Mr. David McGuinty: So if I were to line up in this room 40 economists, Mr. Keith, how many of them would agree with your assessment? Would Dr. Jaccard agree with your assessment? Would Nancy Olewiler agree with your assessment?

Dr. David Keith: Dr. Jaccard would precisely agree with my assessment. I think the issue, though, is that in a theoretical sense you can prove at the level of a textbook economics paper that taxes and cap and trade can look almost the same; the issue is the details and political issues of real implementation. So, yes, Jaccard favours a tax, just as I do, but there's no question you could make cap and trade work.

Now, you also asked about international markets. I think there are really quite deep flaws in some of the international markets, especially the CDM market. I think there are reasons why we should focus particularly on cutting emissions at home in the developed countries. Only after we do that does it make sense to seriously think about, say, engaging China or India.

Essentially, we can go to all the international meetings we like, but until the rich world begins to actually cut emissions, the Chinese will just see us moving our lips. Only once we've really begun to cut emissions domestically does it make any sense to try to have a larger engagement.

Kyoto, in many senses, was an attempt to run before we were walking.

Mr. David McGuinty: Let me go to the science, then, of carbon capture and sequestration. David Suzuki said the other day in a speech that I attended that the proponents of carbon capture and sequestration don't have the scientific basis to guarantee or to warrant....

Help Canadians understand now. I know it's always hard when one is supportive of a particular technology, but what are the real risks here? You said we have to put the steel in the ground, we're losing ground, we're behind the United States. Despite all the research we've been funding, we're falling behind.

Are Canadians supposed to believe that carbon capture and sequestration is safe?

The Chair: A short answer, please.

Dr. David Keith: The short answer is exactly the answer I gave. This is essentially an issue of how well you do the regulation. I think it is the clear consensus of the scientific and technical community that if you want to do this safely, you can do it extraordinarily safely at the level of other large industrial processes.

I don't think there's very much dispute about it. I don't recall.... To be clear, the IPCC process had many senior leaders from the global environmental community deeply involved in it. Not Suzuki, but many of the top people in the global environmental world were centrally involved in that report, and they signed on.

The Chair: Thank you very much.

We move on to Monsieur Bigras *pour sept minutes, s'il vous plaît*.

[*Translation*]

Mr. Bernard Bigras (Rosemont—La Petite-Patrie, BQ): Thank you, Mr. Chairman.

With regard to today's subject, I think that we need to recognize that CO2 capture may very well be a solution. I think the 2005 IPCC report, the Intergovernment Panel on Climate Change, which states that it is possible to capture 85% to 95% of CO2 using this technology, should give us food for thought. I understand that there are three techniques: a post-combustion capture, a precombustion capture and an oxycombustion process, which have not yet been perfected and are not at the same level of development either.

I am concerned about the long-term safety and effectiveness of CO2 capture. Do we have any information on the ability to store CO2 in geological formations and ensure that there will be no CO2 losses over the long-term?

I have no doubt as to the short-term and the ability of this technology to capture CO2, but my concern, given the little information we have, is determining to what extent this is a long-term solution that will enable us to stabilize stored CO2.

● (1000)

[*English*]

Dr. David Keith: We have, actually, a lot of information. I recommend to you table 5.5 of the IPCC report, which summarizes the key lines of argument we have for understanding the long-term stability of storage. Let me just give you two of them: one engineered and one natural.

There are CO_2 accumulations underground that have been there in excess of a hundred million years. We know for certain there are—in fact, they're ubiquitous—cap rock formations that are capable of holding gases underground for in the order of a hundred million years or longer, essentially infinity on any time scale that matters to the climate problem.

Now, you might say, “Oh, that's true, but the problem is going to be that they will have leaking wells or leaking engineered structures.” We have now almost a hundred years of cumulative experience with natural gas storage, and for the IPCC report we tried to estimate what the total leakage rate was. To be clear, there have been leaks, and there have been people killed by natural gas storage accidents. None of this is zero-risk. But the overall leakage rate from natural gas storage is something less than one part in one hundred thousand a year, and that number is about one hundred times better than what you would need to have in order to do a sufficient job of managing the climate problem.

In my view, the big issue is actually local risk, not the long-term leakage.

[*Translation*]

Mr. Bernard Bigras: I have another question, and time is short. In the Dion plan or the green plan that had been proposed, it was estimated that a portion of the target could be achieved thanks to carbon sinks in our forests.

My question is for Mr. Lazar. Could you tell us whether, with regard to carbon sinks, Canadian forests are net emitters of carbon or whether they absorb instead carbon sinks? In other words, what is the current state of Canadian forests with regard to CO2 absorption?

[*English*]

Mr. Avrim Lazar: That's a good question. Thank you.

The Canadian forest is mature. It's extremely mature. In fact, most of Canada's forests are older than nature would let them be because of fire suppression. A mature forest tends to be a net emitter rather than an absorber of carbon dioxide.

That being said, to the extent that we can create new forests, for example, through aforestation of areas that are marginal agriculturally or that are otherwise being used for less valuable purposes, the creation of new forests would sequester more carbon.

The other way we could sequester more carbon would be to manage our forests in a more intensive way to grow more volume, which of course the foresters have always wanted to do. In Canada, we've been a bit reluctant because we like to sustain the natural ecosystems rather than maximize carbon storage in the forest.

A third way of sequestering is sequestering in product. When a tree grows and we process it into paper, all the carbon is still in the paper, and at the same time a second tree is growing. So through a natural process of harvesting, regeneration of the forest, and product creation, you get sequestration.

That being said, Kyoto does not recognize sequestration in products, only in living material.

In the forest industry, our basic job is carbon management. We live inside the carbon cycle. We harvest, regrow, harvest, regrow. So for us, carbon cycle management is part of life.

The bottom line is, can we reach our Kyoto targets by depending on sequestration in the forest? The answer is no. We can reach our Kyoto targets by emitting less carbon dioxide, which requires massive retooling of industry.

● (1005)

[*Translation*]

Mr. Bernard Bigras: I think my question is clear: Do you have an inventory? Are you able to tell us today whether the Canadian forest cover is a CO2 emitter or a carbon sink? We both know the process. It is often said that forests can be carbon sinks. Given that forest cover, its age... It's important because any future plan could consider this aspect to reach Kyoto targets.

In passing, this was what the Dion plan proposed. Some of the Kyoto targets could be reached using carbon sinks in forests; not most of them, naturally, but a small portion. If you're telling us that Canadian forests are net emitters, and not carbon sinks, it's clear that, in a future climate change action plan, we will not be able to count on carbon captured by forests to reduce greenhouse gas emissions.

I am not trying to trick you.

Mr. Avrim Lazar: I think my answer was clear: our forests are mature, and mature forests are CO2 emitters. It is not rocket science. However, there is another option. If we plant new forests, we plant trees on land that is unsuitable for agriculture, we can capture CO2.

[*English*]

The Chair: Thank you very much.

We'll move on to Mr. Cullen for seven minutes, please.

Mr. Nathan Cullen (Skeena—Bulkley Valley, NDP): Thank you, Chair.

I'll just quickly thank you, Mr. Lazar, for your refreshing presentation about the need to get on with it and what your industry has done to this point.

I don't have any questions for you this morning. It's always good to have a forester around.

Mr. Avrim Lazar: You haven't said that to me before.

Mr. Nathan Cullen: Yes.

To Mr. Lewin, what's the cost of CO_2 emissions to the industry right now? How does it factor into your bottom line, into your budgets?

Dr. David Lewin: The way we reduce CO_2 emissions right now is purely through offsets.

Mr. Nathan Cullen: This is voluntary, though, isn't it?

Dr. David Lewin: No, actually it is not.

In the province of Alberta, we have a regulation on our Genesee 3 unit that requires us to go beyond purely the technological improvements we made by building the supercritical unit. We do that through acquiring offsets from various participants. There isn't really a mature market out there for trading, so we do bilateral arrangements, usually.

Mr. Nathan Cullen: Mr. Keith has brought to the table the point that electricity generation is so much more part of the overall emissions compared with the tar sands, which get a lot of lightning rod attention.

What's the cost per tonne right now, without any enhanced oil recovery, for sequestering carbon emissions?

Dr. David Lewin: There's quite a wide range. I have to hesitate in mentioning a number, because that's proprietary. We have agreements with various companies that sequester carbon or destroy some of the other six.... There are six GHGs, for example.

Mr. Nathan Cullen: What's your range right now, if you had to ballpark it? I know you don't want to give away company secrets.

Dr. David Lewin: Well, if I mention it, then I will; that's the problem.

Mr. Nathan Cullen: Maybe I'll go to somebody not in the business.

Mr. Keith, what's the average cost of carbon sequestration right now for a company in Canada?

Dr. David Keith: The problem is, the people in the business are the ones who know the real costs.

Mr. Nathan Cullen: So does nobody know? We must know this.

Dr. David Keith: No, there are some answers, because there are things being built. For example, there are gasification plants that are going forward in the U.S.—two of them—and there's BP's Carson City plant.

Let me say it this way. I think that at the prices we had a few years ago, a carbon price of $30 a tonne of CO_2 would really make people move in the electrical power centre. But I think the actual cost for a relatively small facility in Edmonton right now—because 450 megawatts is small on the global scale—and given the high cost, would be substantially higher than $30 a tonne—

Mr. Nathan Cullen: So it's somewhere in that neighbourhood.

This is a question for Mr. Lewin. Does your company factor in what it costs per tonne when you make efficiency improvements, if you have a coal-fired plant that's producing electricity—how much it costs you per tonne in making an efficiency modification rather than going out and producing it and then trying to recapture it?

● (1010)

Dr. David Lewin: One thing I should explain about a coal-fired generating plant is that over its life it's a real challenge to maintain the actual efficiency of the plant from when it was built, from its design criteria, so you're continuing to do that anyway. We're not basing the CO_2 cost on any of those marginal improvements.

I would say the efficiency improvements in coal-fired power plants, generally, are extremely small. If we can get a 0.1% improvement, we're doing well.

Mr. Nathan Cullen: Do you have an industry breakdown between all your emissions, fugitive versus the emissions done through combustion?

Dr. David Lewin: Certainly, the CEA, the Canadian Electricity Association, would have all that broken down.

Mr. Nathan Cullen: But you, yourselves, don't keep that?

Dr. David Lewin: We do, yes, for ourselves. Yes, we do.

Mr. Nathan Cullen: Can you present that to the committee?

Dr. David Lewin: We could make that available, yes.

Mr. Nathan Cullen: That would be helpful.

Mr. Keith, you had a comment you wanted to throw in?

Dr. David Keith: Yes. People are now building coal-fired power plants in Europe, and some recently in China, that are exceeding 42% to 43% efficiency, which is much better than the fleet average in North America. But if you ask about the cost-effectiveness of pushing beyond that number, it's very cost-ineffective, many hundreds of dollars a tonne of CO_2 to push to ultra-supercritical with double reheat, which would be the latest thing.

Mr. Nathan Cullen: Right, which brings an interesting question as to the marketability of it, because we're often given these examples. ICON and others bring forward technological examples and say this is the absolute gold standard, with the exception of mentioning what that gold standard costs and will the market figure it out. This comes back to my question.

The industry has asked for a technology fund to be able to, so-called, offset some of their emissions. How useful a tool is the technology fund in terms of lowering Canada's overall emissions, specifically when you talk about carbon capture and sequestration? Is it an effective tool? Is it money well spent?

Dr. David Keith: A lot of that depends on the real details of administration, but the overall evidence from the previous experience in the electric power sector is that regulation is the most important tool to make private money do research. When we regulated sulphur emissions in the U.S. electric power sector, a huge business was created building sulphur scrubbers, and they drove the cost of scrubbers down 50% over about 10 years.

Mr. Nathan Cullen: And the economy didn't collapse—

Dr. David Keith: The economy didn't collapse. And that wasn't mostly to do with any technology fund; it was just that we passed a law that said you must have the right number of permits at the end of the year or we lock your plant.

Mr. Nathan Cullen: That brings me to the question of investor certainty, the ability to make these massive investments that we've heard about from many witnesses.

There's an intensity regime putting out its so-called intensity targets, which I think is almost a misnomer. Does that allow that investor confidence for the companies to go out and attract the capital and to make those type of investments if there's an intensity formula being constructed by government? Is that the hard cap? Is that the certainty that worked in other areas like sulphur?

Dr. David Keith: This is going to sound very evasive and academic—

Mr. Nathan Cullen: Oh no, don't do that. We're looking for direct answers.

Dr. David Keith: But the answer is that the devil really is in the details. You could design an intensity-based system that achieved real reductions and did the job. The issue is where you set the intensity knob. So if you set a very long-run, clear target and really ground intensity down, you could do the job with intensity.

So the problem isn't intrinsically intensity; the issue is actually doing something, providing a real, clear carbon price. Whether it's through intensity or total caps is almost a sideshow.

Mr. Nathan Cullen: It's interesting, when you talk about a carbon price, speaking with some of the exchange groups within the country and Europe and others, some of the businesses trying to do this have said it's very difficult because it's a backcasting. To work off an intensity model, you must know and be able to predict what the overall unit production is in the forthcoming year.

Dr. David Keith: That's why a tax is so simple. Intensity gives governments a lot of room to hide, because they can overestimate the current emissions, and it gives industries some room to hide. That's what happened in Europe; people overestimated. But a cap and trade too. The reason the European carbon price collapsed is people had the estimates set too high, and then when the real estimates became clear, the price collapsed. That's what's neat about a tax. There's no mystery.

The Chair: Okay.

We have to move on to Mr. Warawa for seven minutes, please.

Mr. Mark Warawa (Langley, CPC): Thank you to each of the witnesses for being here today. We've really appreciated the frank discussion.

Mr. Lazar, you said to meet the Kyoto target would require massive retooling of industry to reduce greenhouse gas emissions. I'm going to replace Kyoto and say that to meet the target of a dramatic reduction of greenhouse gas emissions will still require a massive—

Mr. Avrim Lazar: Absolutely. Kyoto is an international agreement that is an instrument to address climate change, a profoundly flawed instrument, the only international instrument we have. So Kyoto was shorthand for addressing climate change.

I know you guys have greater sensitivities to the word than the rest of the world, but generally in a public debate, when you say Kyoto, you're really talking not to details of an international agreement but to climate change.

● (1015)

Mr. Mark Warawa: Okay. Thank you.

Dr. Keith, you mentioned also that “Kyoto” stood in the way. Again, without dealing with the word “Kyoto”, but with achieving the objective of dramatic reductions of greenhouses gas emissions, you've said that success depends on how well we regulate, how well it's managed.

We're on Bill C-30, Canada's piece of legislation, and we want to know how to make it better. Do you have any specific recommendations on improving the wording and regulations? Bill C-30 includes a legislative framework, but also a notice of intent to regulate. So do you have any specific recommendations on how it can be strengthened?

Dr. David Keith: I think the crucial thing, and the lesson from other regulatory regimes, is you need a regulation simple enough that it gets through to the engineers in a company, not the lawyers—and no offence to lawyers, as I love them. But the advantage of something that sets a clear carbon price—a tax, or a really unequivocal cap and trade—is that people stop lawyering and the engineers in the company actually start thinking about how to reduce their operating costs, which is what they're trained to do, and they do that under a carbon price.

There's enormous evidence from the U.S. NOx market of that success. We previously had a command and control regulation, and after the NOx price mechanism was introduced, people found all of these other reductions they had never looked for before, because the guy in the central office would phone up the power plant manager and say, this NOx is costing us, and people would actually think about how to do adjustments to reduce it.

So my overwhelming thing is that we must set a real price.

I guess the other issue is to set a target. We need to set a target that begins to bend the curve of emissions growth down pretty dramatically, because I think the rest of the world will, and should, move quite quickly towards managing this problem. Canada needs to do its part, and in some ways more than its part, to really manage the climate problem.

But I think the issue with Kyoto is that it involves grandstanding on the television everyday, which goes on here and everywhere else. We need to get beyond arguing about Kyoto in this country and argue about what we're actually going to do to cut emissions.

Mr. Mark Warawa: Great. Thank you.

Mr. Kaufman, to move forward with carbon capture and storage, we're looking at existing infrastructure and also at new infrastructure as technology.... Well, Dr. Keith has said we already have the technology, and he's encouraged us by saying let's start cutting metal and building it.

What's the cost of building new infrastructure, as opposed to retrofitting existing infrastructure? What are the dynamics here, particularly in getting investors to invest in existing infrastructure, not in creating it?

Mr. Stephen Kaufman: It's an excellent question.

In theory, going at some of the existing facilities could conceivably be cheaper, because we have some hydrogen production areas where we have relatively pure CO_2, and you may have heard that capturing CO_2 from hydrogen plants already there is easy to do. Well, it's easy to do, but it's not easy to send a bunch of welders into a 30-year-old plant you're trying to keep operating. So the costs of retrofitting, in fact, in our estimation, are dramatically higher than the costs of doing it in a new facility.

A large part of the ongoing operating costs of CO_2 capture and storage involve energy use. We have to apply a calculation that says if we reduce 100 tonnes of CO_2, we can only really count for, let's say, 85 tonnes of reduction, because we have to buy some more electricity from TransAlta or EPCOR, and that puts CO_2 in the air. So it's a very energy-intensive process.

If you design it into a new facility that's being built, whether an oil sands upgrader or a coal gasification plant or a refinery, then you have an opportunity to do a much better job on energy efficiency and an opportunity to use a better scale of technology that's less expensive.

Mr. Mark Warawa: Thank you very much.

That's it.

The Chair: Okay. We'll move on to the five-minute round.

Mr. Godfrey for five minutes, please.

Hon. John Godfrey (Don Valley West, Lib.): I want to pick up on a point that David Keith made, the fact that we used to be in the lead on carbon capture and storage and now we're not. The question is, how do we get there again?

The challenge I'm hearing from the witnesses—unless I'm missing something—is that this is such a crucial technology, an enabling technology unlike like any other. We find ourselves almost in the same situation we were during World War II, when there was a shortage of natural rubber. We just said, we've got to build an artificial rubber plant in Sarnia, we're going to call it Polysar, and it's going to take us 18 months. Or we needed a breakout technology in the destructive world, and we did the Manhattan Project. I mean, we just got on with it.

I'm trying to reconcile what seems to be an extraordinary opportunity here with the attitude, don't mandate, don't specify; just put in the signals and the best technology will emerge.

So I'm asking, Dr. Keith, if we're going to do the Manhattan Project on CCS without telling anybody what to do, how do we privilege the choice?

● (1020)

Dr. David Keith: That's a great question, and I wish I had a really great answer.

I think if you'd asked me a few years ago, I would have stuck to the idea that you just have to put in a price or a regulatory cap and trade. I have no big opinion between them. I think the reality in a relatively small country is that we do need to do some level of picking technologies. But we need to be very careful about how we do it.

One of the reasons I said the Australians and the Norwegians are essentially ahead of us in this technology now—and the Australians have actually had auctions for pore space—is because they're smaller countries and they just freely picked winners.

We have to be very careful about that. I certainly wouldn't advocate picking CCS as the overall winner, because I don't think it is. I think the potential for wind power, say in Quebec, is just huge. And there are many other ways throughout the economy that we can squeeze carbon out. CCS is by no means a magic bullet.

What I think we need to do is this. On the one hand, we ought not to pick winners, but on the other hand, we really do need to get over the hump and incent a couple of projects. I think we need to get industry to be the principal agent on those projects so an individual industry player really feels it has its survival, or at least the economic viability of that project, at stake.

There is a problem with government demonstrations. They sometimes demonstrate that technology is more complex than it really is. If industry really is doing something, they do it in a simple way, if they're watching their costs.

I think we should look at mechanisms that don't choose an individual winner such as ICON—not that I have anything against it, I think it's a great project—but that provide a prize for the first major projects to actually begin putting CO_2 in the ground for storage.

For example, I've had conversations with some senior people at NRCan suggesting that we not have a reverse auction, but we actually say there is going to be a certain number of dollars per tonne for the first *x* million tonnes you put in the ground through storage. Then that number goes down. That automatically gives an incentive to first movers. The first movers get the high price and the later movers get the lower prices.

You also have to think about oil prices. There was a comment about the very large profits the oil companies are making. That depends on a fluctuating oil price. If you want to craft a policy that provides a prize for CO_2 storage, you might want to have that prize go down as oil prices go up.

At this point we could see oil prices go back to $30 a barrel and the oil companies could have a much less profitable year. On the other hand, we could see nuclear weapons used at a Saudi terminal and we'd have a price of $200 a barrel. Nobody knows what is going to happen.

You need to put a policy in place that doesn't bind you, and the policy should essentially give less incentive at higher oil prices.

Hon. John Godfrey: Are you sufficiently convinced about the maturity of the technologies that we could put a regulation in tomorrow—or at some point—that all new major carbon-emitting facilities be built, not with a facility to capture it, but capture-ready? In other words, you just set aside enough land and you make sure the pipes line up. It's a whole lot cheaper than actually putting in the rest of the system, but at least it's also a lot cheaper than having to do it later.

Dr. David Keith: It's tempting. There has been a lot of talk about capture-ready in the last five years. But after our first few years of being excited, when you really talk to the leading industry consultants there is less there than meets the eye. Capture-ready is pretty fuzzy when you get down to what you'd actually do in the prices.

I'm skeptical about a hard command and control regulation because things are so heterogeneous, particularly in the oil sands where each project is really different in various ways. I think a command and control for some parts of electricity might be more plausible, but I think we have to be very careful.

My instinct is that we need strong regulation and some incentives to get individual technologies going—not just CCS, but other technologies as well—but probably not something that is a one-size-fits-all regulation. I think there's a lot of evidence that this doesn't work that well.

Hon. John Godfrey: Thanks.

The Chair: Thank you very much.

Mr. Jean for five minutes, please.

Mr. Brian Jean (Fort McMurray—Athabasca, CPC): Thank you very much, Mr. Chair.

I'm actually going to take up the same topic, in essence.

Mr. Kaufman, I understand, of course, that most of your costs are proprietary, but I'm wondering, you're the only person at the table who didn't answer what the cost of carbon sequestration would be. We heard last week from the Pembina Institute that it would be around 70¢ to $1.20. In essence, it's a dollar range per barrel to sequester carbon.

But after doing some research, I also discovered that it seems to depend a lot on how much you sequester, how efficient it is, as Mr. Keith said, and other issues.

Quite frankly, we've heard evidence that oil sands cost recovery is about $25 to $30 per barrel, compared to the Saudis, whose cost is about $1.50 to $3 per barrel. I have heard and seen other things in my research that indicate carbon sequestration could actually cost about $8 to $10 a barrel.

I'm not asking for specific proprietary information, but I'd like a range. I'm sure you have 5 or 10 or 50 or 100 engineers who go through and cost this out. Could you give us a range as to what it would cost?

● (1025)

Mr. Wishart Robson (Nexen Inc., ICON Group): Thank you. You're right that an awful lot of numbers are being thrown around lately on what the cost of carbon sequestration would be. I was here last week when the Pembina Institute gave out those numbers, which I believe were not for sequestration but for buying your way into compliance through the use of offsets. I wouldn't want to confuse numbers presented as offsets and carbon sequestration numbers.

Because we represent a number of companies that produce different industrial products, ICON has tended to use the common denominator of dollars per tonne of CO_2. That's because we have people who produce electricity, bitumen, synthetic crude, different minerals, and hydrogen, and we need a common denominator to do that. It is up to individual companies to do their project-specific work on the cost of carbon capture and storage for their operations. Particularly with reference to the oil sands, as Dr. Keith has said, each of the projects is very different, whether you're in mining or SAGD, or whether you're doing gasification, a minimal amount of upgrading, or a significant amount of upgrading. That all enters into the calculation of what your sequestration costs will be.

As a group, ICON has not gone into differentiating that because we wanted to present a common front. But I understand the interest in having a number like that. Some of those discussions have taken place within the industry association on a very informal basis, quite apart from the association of companies known as ICON.

Gasification is a very topical issue in the oil sands. There was an article in the paper this morning about the amount of natural gas from the Mackenzie delta that could be diverted to the oil sands. There is also the fact that the Alberta government sees value in the petroleum coke and asphaltenes that are byproducts of the oil sands operations. There is interest in that gasification process.

We looked at gasification for a new facility, and costs would be in the range of $4.50 to $7.50 per barrel for a complete system. I don't know if any one company has done those calculations, but my company has started to look at those for our subsequent phases. We believe the cost for a new generation project with collection of CO_2 from gasification would be in that range. I do not want to leave you with the impression that that would involve 100% capture, because there are other sources of energy, including some natural gas.

Mr. Brian Jean: Is it fair to say that to retrofit an existing plant would be much more expensive than that?

Mr. Wishart Robson: Yes, and if you went after post-combustion, it would be significantly more expensive.

Mr. Brian Jean: Are you talking about it costing twice as much for a retrofit?

Mr. Wishart Robson: I haven't looked at the retrofit numbers myself, but for the work we've looked at, both in ICON and out, it would be more than double for the post-combustion capture than the numbers I just gave you.

Mr. Brian Jean: Looking at both ends of the equation, you talked about natural gas coming from the Northwest Territories. Wouldn't it make more sense to have an integrated approach with provision of energy such as nuclear or some other form for SAGD, and save natural gas to be used as clean-burning energy in homes and other things? We've heard nuclear battered around, and I know this is about tools, but I think saving on the front end can be just as good as saving on the back end. I"m curious as to ICON's interest in that particular method.

● (1030)

Mr. Wishart Robson: That has not been the point of the group getting together in ICON. We've been looking strictly at the carbon capture and storage issue, the infrastructure in place, and the infrastructure that's planned over the next 15 or 20 years. We haven't discussed other forms of energy for the oil sands.

Mr. Brian Jean: Has your corporation looked at nuclear as a possible form?

Mr. Wishart Robson: I'm not aware that we have.

The Chair: Monsieur Lussier.

[*Translation*]

Mr. Marcel Lussier (Brossard—La Prairie, BQ): Thank you, Mr. Chairman.

Mr. Kaufman, in your brief, you mentioned that Bill C-30 must seek to encourage CCS, or CO2 capture and storage.

Could you tell us how?

[*English*]

Mr. Stephen Kaufman: Thank you for the question. On some of the specific challenges in developing Bill C-30 into regulations, the government has asked for responses on it, and we provided a letter to the Minister of the Environment in December regarding the new Clean Air Act. It outlines some of the areas that we felt needed to be addressed.

In particular, we don't believe the targets should be prescriptive in choosing one technology over another. Companies need to be allowed to have flexibility and choose the right way for them to achieve reduction targets. We also believe that an offset system is an important element, because it could be a less expensive tool for companies to use in achieving their targets.

[*Translation*]

Mr. Marcel Lussier: But my question was more specific. Who has to build the pipeline network in Alberta and who has to pay for this network?

[*English*]

Mr. Stephen Kaufman: Our view is that the entire system for carbon capture and storage, which we call ICON, is not commercial right now. We believe that both the federal and provincial governments, along with industrial companies that would use the system, need to collaborate on having it built.

On who would physically own and operate the pipeline, we haven't come up with any recommendations on that. We emphasize that an entire system like this won't be funded through direct market actions in the foreseeable future, so the government needs to play a role in coming up with some incentives or funding to assist in getting it started.

[*Translation*]

Mr. Marcel Lussier: Are you talking about the federal government, or the provincial government?

[*English*]

Mr. Stephen Kaufman: We're talking about both governments, and we have had ongoing discussions with both the federal government and the provincial government in Alberta on this subject.

[*Translation*]

Mr. Marcel Lussier: Thank you.

Mr. Lewin, you referred to a 65% target by 2050. This is a long-term target.

First, is this percentage based on data from 1990 or 2003?

[*English*]

Dr. David Lewin: We use the base year 2003.

[*Translation*]

Mr. Marcel Lussier: The year 2003. Do you also have short- and medium-term targets?

[*English*]

Dr. David Lewin: Yes, as an industry we've been looking at the short- and mid-term targets. The short-term target, starting around 2010, would be 5%. It would run to 10% by 2020, and then drop dramatically, because that's when our industry capital stock turnover would really begin to take place. There would be a dramatic drop then to probably around 20% or 25%. Then it would decline over the remaining period until 2050 to between 50% and 65%.

[*Translation*]

Mr. Marcel Lussier: Mr. Lazar, I listened carefully when you talked about the role of forests, but I question part of this role.

In addition to ensuring the modification, planting or reforestation of the forests that are harvested, will the forestry industry also consider the possibility of encouraging individuals and municipalities to take part in a tree-planting program? Have you already considered contributing by providing plants to communities to increase the forest cover in Canada?

[*English*]

Mr. Avrim Lazar: The overall forest cover in Canada is now 91%, or what it was at the time of Champlain. We've lost 9% because of cities and farming. The rate of deforestation in Canada, according to the latest UN figures, is zero because we replant for everything we take out—usually two or three seedlings. Sometimes it's natural. But we've managed to sustain Canada's forests.

When you talk about the forestation of urban areas, it's never been our preoccupation. We provide trees here and there in our community building and social relations, but I suppose if the cities wanted us to plant and harvest, we might come.

● (1035)

The Chair: Your time is up.

I'm going to ask Mr. Jean to take the chair for a couple of minutes.

We'll move on to Mr. Paradis.

[*Translation*]

Hon. Christian Paradis (Mégantic—L'Érable, CPC): Thank you, Mr. Chairman.

My first question is for the ICON Group representative or Mr. Keith. In ICON's presentation I see on page 5 of the slides, the potential role of electricity, of hydrocarbon production, and of the mining and manufacturing sectors with regard to CCS.

First, are there any other possible uses with regard to CO2 capture than enhanced oil recovery or storage in deep saline aquiferes or depleted reservoirs? Ultimately, I want to know whether there are any other potential industrial opportunities. I am referring, in particular, to the Eastern region, namely Ontario and Quebec. For example, there is the entire issue of clean CO2, which we are talking about with the power plants.

We see that the targeted infrastructure is mainly located in Alberta but is research being done elsewhere? Are other solutions being considered, elsewhere in Canada, to develop these technologies?

[*English*]

Mr. Stephen Kaufman: There are maybe two answers to your question. First, the companies that are involved in ICON certainly are not all just pursuing carbon capture and storage alone. All of us are very interested in our own energy costs, so we're working on energy conservation and on new technology for extracting oil and gas that's less energy-intensive, and in some cases on renewables. My company, for example, is involved in wind power, as well as in ethanol and biodiesel. Those are alternatives that are all important parts of "wedges" in what's called a wedge concept for addressing climate change. That will continue.

With respect to your question on the possibility of other ways to do CO_2 reductions in Ontario, we certainly believe there may be some potential to use carbon capture and storage on the large coal-fired power stations in Ontario. They're nearing the end of their life, so you get to the similar debate about whether you would spend a lot of money to retrofit something that's near the end of its life or essentially build brand new facilities, which could be gasification plants, along with carbon capture and storage. That would address the air pollution issue from older-style coal-fired stations as well as make it possible to capture that CO_2 and move it to a secure geologic location.

Dr. David Keith: There are many technologies used for reducing CO_2 emissions—efficiency improvements, wind power, and what have you—but on CO_2 storage I want to add two things. One is that it is in principle—and there are some facilities moving towards this in the world—possible to capture CO_2 from a facility that uses biomass, say from a facility that's burning forest waste. Then you've essentially made negative emissions, because in the net, you're taking carbon out of the atmosphere forestry system and putting it deep underground.

That will be done in Berlin quite soon, and I forget the exact start date. There's an IGCC power plant facility in the Netherlands that's now burning a substantial fraction—more than 30% of its fuel is biomass—and they will likely do capture. That will be a negative emissions facility, essentially—directly, not in an economic sense, but directly, physically—offsetting other emissions by being negative.

That's another opportunity in general. It's a higher-cost opportunity, partly because most of the forest resources are smaller, but it's something to think about for the future.

Mr. Avrim Lazar: Let me add one quick word. In terms of volume, the availability of biomass as a renewable fuel is massively larger than all the others, such as wind or solar. Right now we're six times all the others combined, and we could probably double our capacity. In terms of renewable possibilities, the energy that can come out of biomass is huge for Canada, and under-exploited.

● (1040)

[*Translation*]

Hon. Christian Paradis: Thank you very much.

Mr. Keith, earlier, you were asked a question about the safety of CO2 capture and storage technology, particularly with regard to leaks. At the end of your answer, you mentioned that the technology itself seemed safe but that it was rather at the local level that problems may occur. Some experts will say that leaks could occur.

So, what kinds of technologies exist to fix any leaks, should any occur? What are the challenges? What do we need to focus on to improve the effectiveness of this technology, if necessary?

[*English*]

Dr. David Keith: First of all, I think all responsible experts will agree that there's risk of leakage and local risk—health hazards—for humans. There's no question. That's true of essentially any large-scale energy technology.

The comment about regulation is that a well-regulated system can have very low local risks and a poorly regulated system can have big risks, just as with any other technology.

The Chair: Thank you very much.

We'll move on to Mr. Holland for five minutes, please.

Mr. Mark Holland (Ajax—Pickering, Lib.): Thank you, Mr. Chair.

Let me begin with a discussion of Kyoto.

Mr. Keith, you were saying that Kyoto stood in the way. I agree that we have to move to action, and that's certainly where the committee has to go. I think it's important as well that we acknowledge in this process that where we are today, in terms of the international debate on climate change, is in no small part thanks to Kyoto, to the fact that there are international standards by which all of us are now being measured, including ourselves, and that we're in a situation where if we're behind, we have something to be measured against and something to strive towards.

I completely agree with your conclusion that we have to move towards action. I don't dispute that at all. But I think at the same time we need to acknowledge that Kyoto and hopefully its successor agreements—and indeed international agreements—to reduce climate change and benchmarks are incredibly critical.

I'm sure you agree with me on that. I just wanted to make sure we were speaking the same language in that regard.

Dr. David Keith: Absolutely. The overarching agreement is the Framework Convention on Climate Change, not Kyoto. That entered into force and was ratified essentially globally. Kyoto is a particular protocol that sets out a particular numerical target under the framework convention.

I think Canada has a moral and legal obligation under the framework convention to begin to make serious efforts to reduce emissions. I think it's not plausible that we're going to actually hit our Kyoto target without buying a lot of offsets, and we have to have a real conversation about whether that makes sense.

Mr. Mark Holland: Okay, fair enough.

Mr. Lazar, this is a hard question to put to you, but you're the only person who's come in front of us who has really a responsibility for forests. If you can't answer the question, I understand. First of all, I commend you and your members on the actions you've taken to reduce greenhouse gas emissions.

But I want to talk specifically about urban forestry. Again, I don't know whether you can speak to this, but it's something the committee hasn't heard, to this point. There have been a lot of discussions about what could be done in urban areas with trees, and specifically how they could help reduce carbon dioxide, but also in urban areas reduce heating costs or stop erosion.

I don't know whether you're aware of what's been going on in that regard, or of organizations such as Tree Canada that have been promoting an urban forestry agenda. Could you speak to it, given that you're one of the only people we've had in front of us who deals with trees?

Mr. Avrim Lazar: Sure. Planting urban trees is like any other climate change measure. You get two types of benefits: you get the greenhouse gas reduction—in this case, very modest storage, because there are only so many trees you can fit in a city—but you get the co-benefits of green spaces, erosion control, a bit of nature, a bit of habitat. If meeting our climate change aspirations inspires us to use all the space we can in cities to plant trees and related pieces of nature, it's the right thing to do.

I will comment on Tree Canada, because it's a superb organization that has been encouraging the planting of trees in urban areas. They call them the lungs of the cities, and anything any parliamentarians can do to encourage their continued funding I think would be a very positive move. It's a great organization and it's going in the right direction.

As a solution for our gazillion megatonnes of carbon dioxide? No.

● (1045)

Mr. Mark Holland: No, and I wouldn't hold it out as that. I just think this is the only opportunity I've had to get on the record that this is something we should be looking at.

Mr. Avrim Lazar: Tree Canada is great. We should all support it, from both sides.

Mr. Mark Holland: And again, you would agree also, because of the ability to actually reduce heating costs by means of the shade the trees provide.

This is again to Mr. Keith, and I appreciate the comments about 100 years and talking about the stability of this technology over that period of time. I haven't heard a lot of discussion about the much longer time horizon—I mean 500 years or 1,000 years.

Obviously, there are deep concerns that at some point this could find ways of releasing itself into the atmosphere. What are the longer-term risks, beyond, say, the 100 years we've looked at, where the technology may be able to hold up? Where are we 500 or 1,000 years out from now in the sense that that carbon is still being stored and not finding ways to release itself into the atmosphere?

Dr. David Keith: There are two answers, similar to what I said before. One is that we have knowledge from natural systems that CO_2 is stored underground for time scales of, say, 100 million years, and there are many such deposits. Both that and the finding of oil and gas indicates that there are caprocks—formations that prevent the upward movement of CO_2—that are widely found around sedimentary basins around the world, and they're capable of being secure enough for 100-million-year time scales.

That doesn't tell you anything about the engineered risks from the wells. The reason I told you about natural gas storage is that it bears on the engineered risk.

There's one more really important thing to say, which is that if you put CO_2 in a deep saline formation underground, the CO_2 dissolves in that “pore water”. At that point, instead of trying to work its way up, it's actually negatively buoyant, trying to go down. At that point, most people would say the risk is effectively zero. So after you put CO_2 underground it actually gets safer with time, because the original pressure you put it under gradually dissipates and the CO_2 gradually dissolves in the water, which means it's trying to go down and not up.

An important thing to say about this technology, unlike some of the other underground storage technologies, is that in general nature works for you, so that as time goes on beyond the initial period, it gets safer, not less safe. That's not to say that if we do this all over the world we're not going to have accidents; we will.

The Chair: Thank you very much.

We'll move on to Mr. Watson for five minutes, please.

Mr. Jeff Watson (Essex, CPC): Thank you, Mr. Chair, and thank you to our witnesses here today.

I think most of my questions have been answered through the course of both the presentations and the discussion. There are a couple of things, though, that came up in the presentation that I'd like to probe a little bit more.

I believe, Mr. Lewin, it was you who said that much of our country's power-generating infrastructure is retiring between now and 2020. What percentage of our facilities would you say that would be? Just give me a bit of a sense of the magnitude or how much has to be replaced and the potential cost to replace it. What are we talking about in terms of capital investment?

Dr. David Lewin: First, as to the retirement of an older plant, I'm really referring to thermal generating plants as well, particularly coal-fired plants. Probably around 20% of that stock would be available for retirement around the 2020 period. It does vary across Canada. It depends on the vintage of the stock. But it's something of that order. We're looking at substantial billions of dollars of reinvestment as an industry to replace that capital stock.

Of course, the idea is to replace that capital stock with the best available technology of the time. That's one reason that we as an industry and as a company are working on IGCC as being that next technology, including carbon capture, not carbon-capture-ready but including carbon capture. I'd be happy to come back in 2009 and tell you the results of our feed work for that project and the likelihood of that project then being constructed. That's why we're very interested in participating with ICON in the carbon capture and storage piece, because without that carbon capture and storage piece, the IGCC is just not as effective.

Mr. Jeff Watson: I want to come to the short-term window here.

I know, Mr. Keith, you said Kyoto is a bit of a stumbling block or kind of gets in the way of thinking about long-term change. There is a political dialogue going on in terms of us needing to make the Kyoto target and the timeline. That is a very real discussion and one that could potentially end up legislated within Bill C-30 here, at the amendment stage. We can't entirely ignore that reality.

So I want to come to the short-term window for a moment. Mr. Lazar, I believe it was you who said what we really need is that transformative change in the way we do business. But it requires lots of capital to retool, and that is scarce in the manufacturing sector currently. I'd like some discussion about that short-term window of the next three, four, or five years. If we go, for example, to the purchase of credits, is there not some concern about the outflow of capital at a time when we should be investing it here domestically for transformative change? That may not necessarily include early actors, because you might be in a position of selling credit, but I want to talk about manufacturing in the broader sense.

● (1050)

Mr. Avrim Lazar: As concerns manufacturing, let me start.

The advantage to respecting Kyoto as an international agreement is that it sends a signal of earnestness and good faith to the rest of the world. If the rest of the world doesn't reduce their emissions, there's no point in reducing ours. Whether we can meet the Kyoto targets as we negotiated them, I think there's broad consensus to that. The only way we can do it is to buy offsets offshore. The advantages of buying offsets offshore is that you would get some reductions in the emissions going into the environment, and of course it's a global thing. It would speed up the adoption of environmentally preferable technology in developing countries.

The disadvantage is that you don't get any co-benefits for Canada. When you reduce emissions in Canada, you also reduce air pollution and you increase efficiency. In our industry, we reduce what goes to landfill. So maximizing our efforts in Canada makes sense not just because of its climate change impact, but it makes sense because Canadians get the benefits of everything that comes with addressing greenhouse gas emissions, cleaner air, less stuffed landfill, more efficiency, less water pollution. It's an overall package.

If you think in terms of the longer-term sustainability of the political will to deal with it, we have to accept that Canada has less than 2% of the emissions and is a major recipient of the impacts of climate change. So giving Canadians the immediate benefit of the co-benefits while we are making our contribution to the global thing makes sense.

Dr. David Keith: The crucial thing is that we act and be seen to be acting and be seen to be part of the framework convention process, and that will make other countries listen to us and hopefully incent other countries to do things.

I'm happy to see some international credits go, but I think if we actually did the full Kyoto compliance, that would probably be more credits than really make sense in terms of the actual benefits, for the reasons you just heard.

The Chair: We'll have to make that the final word, Professor Keith.

Thank you very much. It was a good final word.

I want to thank the witnesses for coming today and sharing your expertise and knowledge. It was educational and very helpful.

We have a little bit more committee business to attend to, so we'll carry on with that for a few minutes. But again, thank you very much, we appreciate it, and I'm sure we'll see you all again or hear from you.

We have a little bit of committee business to move on to. First, one announcement I know you've all been waiting on the edge of your seats for: our budget for the committee was approved, so that's fine.

Now, we have one motion to deal with. If committee members could re-take their seats, I'd appreciate it.

Mr. Cullen, would you please read your motion?

Mr. Jean and Mr. McGuinty, please, would you pay attention?

Mr. Nathan Cullen: We have to allow them time for socialization, Chair, after such a long absence from handshaking.

The Chair: It's been gruelling, I know.

Mr. Nathan Cullen: Yes, it's been gruelling. I know Mr. Jean is keen for this.

Taking off from Mr. Keith's last word before us in testimony today, and much of the testimony we've been hearing, the call for action has to be now.

I'll ask if we could have witnesses move their conversations outside.

The Chair: I can think of better places than this.

Mr. Nathan Cullen: I thought the reception circuit was for this, but that's all right.

The motion you see before you, I'll read it out, with some brief explanation.

> That the C-30 Committee meet as necessary during the Parliamentary recess between March 3 and March 18, 2007 to review the bill clause-by-clause and report it back to the House no later than March 19, 2007.

The reason—if I can speak to the motion, Chair—is that this is meeting number 16. We have two more, I believe, to go. If members of the committee are not preparing amendments that witnesses have been asking us for over the last number of weeks, there's nothing that focuses one's attention like a hanging, they used to say.

● (1055)

Mr. Brian Jean: Long term.

Mr. Nathan Cullen: No, not a bit.

I don't think that on the issue of the environment I'm the one headed to the gallows.

But on the issue of urgency, in actually coming forward with amendments that are required to make the changes that witnesses have been telling us about, it has to be now.

As everybody on the committee knows, the current process timeline that was agreed to by the majority of the committee was unacceptable to us and was too delayed and wrapped into the budget. We thought that was an unfortunate congruence of stars and will dilute the efforts of this committee to get our work done.

So I put this motion forward. I know we all have schedules. I'm prepared to move my schedule around to be here. I'm furthest away, I believe, than anybody here, but I'm willing to do it and get the work done, get the substantive work done, which is around the amendments and making this flawed bill better.

The Chair: Okay. Does anybody else want to speak to the motion?

Then we will go straight to the question.

Mr. Nathan Cullen: A recorded vote, please.

The Chair: Sure.

(Motion negatived: nays 10; yeas 1)

The Chair: See you this afternoon.

This meeting is adjourned.

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