

*Economic Instruments for Long-term  
Carbon Emission Reductions*

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**Ecological Fiscal Reform & Energy Program  
National Round Table on the Environment and the Economy**

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**Multistakeholder Workshop  
Old Ottawa City Hall, 111 Sussex Drive, Ottawa  
October 12-13, 2004  
Meeting Notes**

**Day 1: October 12**

Harvey Mead, Chair of the NRTEE, welcomed participants. George Greene, President of Stratos Inc. and Facilitator for the workshop, made introductions and presented the flow of the workshop agenda. Stephanie Cairns of Wrangellia Consulting, the author of the State of the Debate (SoD) Report, provided a description and explanation of the document. Jean Bélanger, Chair of the EFR & Energy Program, presented an overview of the Program and described the process of work. He set the workshop objectives in the context of broader policy objectives and the use of an array of policy tools and technologies for carbon reduction. Notably, he introduced definitions for Ecological Fiscal Reform (EFR) and decarbonisation. Ecological Fiscal Reform is defined by the NRTEE as: “a strategy that redirects a government's taxation and expenditure programs to create an integrated set of incentives to support the shift to sustainable development”. Decarbonisation is defined as “the long-term reduction of energy-based carbon emissions in Canada, both in absolute terms and as a ratio of GDP, without increasing other pollutants”. He pointed out that the selection of case studies for this work suggests no particular implication of importance or preference regarding the technologies chosen; rather, the case studies were selected for the agreed-upon purposes and scope of the SoD Report.

Discussion followed on the scope of the project and program. Some participants voiced concerns about the scope and suggested that an energy strategy should include forms of energy other than the three technologies chosen, since carbon fuels are still playing a major role. The NRTEE was advised to make sure that issues outside of the boundary of this work are clearly identified as important components of an energy strategy that should be developed at a future date. It was noted that in the SoD document, there is a lack of clarity between decarbonisation of *energy* and of *emissions*. A challenge will be how to fit this work into a larger global context. A participant questioned why the objectives were not framed in this way (i.e. carbon reductions within an economic context). Jean Bélanger responded by explaining that the project was designed to learn about the role of EFR, in the climate change/ carbon reduction context, but as the program moves forward, it will be important to ensure the consideration of economic benefits of industrial development when examining the integration of decarbonisation within Canada's economic framework. A participant brought forward the concern that an emphasis on

EFR risks sidelining other instruments and policies, and suggested earlier and clearer mention of other types of policies in the Report.

### **Policy Conclusions from the Case Studies**

Alex Wood, Policy Advisor for the EFR & Energy Program, presented the three case studies (industrial energy efficiency, emerging renewable power technologies and hydrogen). Some discussion for clarification followed.

#### *Industrial Energy Efficiency (EE)*

The selection of a narrow instrument (ACCA), rather than a general instrument, was made because the ACCA model is technology prescriptive/ specific. It would be challenging to do this for all technologies, since under the current ACCA definitions, some may be missed. The criteria must be modified for each technology; the limitation could be a construct of the instrument. For the purposes of the study, generic technologies were preferred, but it is recognized that in certain incidences, there might not be a proper incentive built in.

#### *Emerging Renewable Power Technologies (ERPT)*

Thermal renewables were excluded because the NRTEE needed to make choices in order to scope the study. Furthermore, more information is available on grid-connected technologies. A participant wondered whether it might be better to present costs as per greenhouse gas (GHG) emissions reduction. Since each achieves a different percentage reduction of carbon emissions, perhaps the interpretation of costs should be examined. Since the NRTEE had defined costs in different ways across the three case studies, it was therefore decided not to use costs as a comparison. Participants asked for clarification on the demand effect of instruments and the encouragement of renewables. It was noted that this sort of study is problematic; an integrated analysis is required because it cannot simply be assumed that demand is still. A participant wondered how it was that (according to the case study), a 12% reduction could be achieved with just a 24% Renewable Portfolio Standard (RPS) or a 0.6 cent Renewable Generation Subsidy (RGS), but the combination would require a larger RPS? Does this imply a discrepancy? One of the case study's authors was able to clarify how the RPS would drive the policy lever and baseline demand. A RGS helps to redistribute some of the distributional impacts.

#### *Hydrogen*

The main conclusion of the study was that the instrument modelled did not achieve expected carbon reductions. Participants commented that the study should be clearer in describing that effects depend on the feedstock for hydrogen generation. The case study presents a challenge for the long term – a major transformation of the energy system would be required. One concern is that this study takes an assumption on cost reduction, then an assumption on the deployment of hydrogen technology. While modelling provides the effect of the assumption in the model, more needs to be said about the limitations of the policy instrument.

In small groups, participants discussed policy conclusions from the case studies. The groups then reported back to plenary. Below are the main summary points of the groups' presentations.

### Double Red Group

#### Energy Efficiency:

- The Report fails to recognize command and control measures needed to supplement fiscal measures
- A carbon tax can be a price driver; it has had a dramatic influence on EE in other regions where it has been introduced
- Competitive pressures drive the bottom line and therefore an incentive to improve EE, to reduce operating costs, is a key driver
- ACCA does have a place but it is limited in what can be accomplished
- EE improvements in industry will continue incrementally but hurdle rates will differ by sector and company
- Supply chain in theory vs. in practice: challenge supply chain to reduce energy in the overall system used to manufacture products

#### Renewables:

- Use the demand side to build the market; need to allow for on all sources/technologies
- Subsidies do have a role in building that market
- While the earliest improvements will come from a focus on near market-ready technologies, there is still a need to promote less mature technologies
- Use other country experience

#### Hydrogen:

- This needs to be coupled with other technologies (carbon sequestration and renewables) in a long-term strategic way, to ensure appropriate sources for hydrogen generation that result in net reductions in carbon emissions in the life cycle

### Blue Group

#### Hydrogen:

- The approach should not consist of grand random blueprints, but rather of incremental stages in the direction of environmental improvements
- Don't pick winners yet; look at areas with most potential and move towards them
- Consider cost of infrastructure, Co2 emissions on the pathways, and energy conversion losses at each significant stage of the energy cycle
- The potential for hydrogen vehicles may be understated; consider a zero emissions vehicle mandate with an initial focus on fleets and off-road industrial applications for transportation
- An earlier application may be stationary sources, especially stationary industrial co-generation

- Fuel cells can be used as a battery to store energy from renewables
- Need to use renewables rather than fuel cells to displace coal
- R&D money could be used to boost public support for decarbonisation
- The taxation system currently does not provide the right incentives for hydrogen investment
- In examining a full hydrogen scenario, the most fundamental issue is where the primary energy comes from - most applications are now depending on fossil fuel
- This group presented a “Full Hydrogen Scenario” schematic (see attached)

Renewables:

- Ensure a suite of renewable technologies
- Do not incent only large-scale centralized renewables production; also incent smaller-scale distributed energy (including thermal)

EE:

- Look at barriers beyond financial or technological

### Double Yellow Group

EE:

- Energy pricing will overwhelm policy signals and drive choices
- EE can deliver early and significant results (GHG reductions) with low risk
- EE changes costs but it does not drive behaviour; therefore, it reaches a point of diminishing returns
- Investing R&D into the highest GHG-emitting technologies could yield the highest returns in decarbonisation
- Incent accelerated capital stock turnover in the short and medium terms to ensure the most efficient technologies are being employed
- Do not introduce policies that move the industry out of Canada

Renewables:

- This approach will achieve results if renewables can significantly replace thermal electricity generation
- This is an effective long-term incremental approach with medium-level risk
- If you select the technology, you may pick the losers - the toolkit must be technology-neutral

Hydrogen:

- This approach has the highest potential in the long term but the highest risk
- This technology will provide the smallest up-front delivery of GHG reductions
- It would be platform-building – at least in transport
- Selecting hydrogen is picking a technology, but it remains to be decided how to make the hydrogen electricity

### Double Green Group

- Integrate the case studies to reflect synergies and feedback
- Consider following a staged approach according to the maturity of the technologies and the ability of the technologies to feed one another
- Policy can enable the phasing in and timing of impacts

- Be aware of the technical barriers for renewables
- The program design matters; flexibility in program and policy design is needed
- In designing instruments, look at other possible (unintended) effects
- Decarbonisation must be positioned within a broader scope, viewing the objective as a process not an end goal
- Reflect regional issues and opportunities while pursuing a national strategy
- Some instruments affect a broad range of fuel/technology choice, whereas others are more targeted, with a narrower impact
- Tools should be designed to reflect a specific technology
- The level and nature of investments in Canada should take into account international nature and levels of R&D to allow Canada to make the right choices
- Canada should leverage the private sector industry's investment in R&D – it may pay to be internationally cooperative on R&D
- Both short and long-term instruments are needed

#### Red Group

- Look at policy measures in a broader policy context
- The Report should recommend an integrated strategic plan linking fiscal tools with other instruments
- Consider political acceptability – all approaches must be sellable
- The Report does not present clear priorities among the various options

#### Hydrogen:

- The Report needs a better story line for hydrogen

#### EE:

- Market regulation will be the most effective – larger users will change behaviour based on price changes, but smaller users may not respond

#### Renewables:

- The demand side must be modelled
- R&D tools for renewables seem to be out of step with what industry needs—industry wants an emphasis on deployment, not development

#### Purple/Green Group

- Policy objectives need to be clearly articulated
- Emphasize decarbonising *emissions*, not technologies or fuels
- Demand is an integral part of the equation, and must be addressed as a key component of the study

#### EE:

- EE is a good choice for fiscal instruments, but there can be problems with risk management and the capital cycle
- Unless they are energy intensive, industries do not make decisions based on energy – fiscal instruments could help incent behaviour
- Demand is a key component
- Use economic instruments to minimize the environmental footprint

- EE should be coupled with energy audit, with R&D and with policies to support process efficiencies

#### Hydrogen:

- Final conclusions on hydrogen should recognize the large benefits that can result from demand management
- Fiscal instruments are a cost-effective way to achieve climate change mitigation but hydrogen technology is very expensive
- Canada may have an advantage in hydrogen technology but if the driver is carbon emission reductions, then this technology is outside the time horizon for fiscal instruments; fiscal instruments are not optimal
- Hydrogen technology is better supported in the short-medium term through R&D; support R&D to build on current Canadian expertise
- There is a sequential time frame for technologies, in replacing current infrastructure – this may change the study parameters
- Fiscal instruments are not likely to be *the* answer but they should be integrated with other technologies
- Some hydrogen applications could be ready in 10-15 years, but in the near term, natural gas will likely be a source

#### ERPT:

- ERPT technology has the most potential for specific economic application and lends itself well to fiscal instruments
- Don't marginalize other non-renewable sources or clean technologies (e.g. sequestration)
- Be sure not to mask the price signal from renewables
- Tie in support for RPS with demand-side initiatives: on the price side, governments have varying capacity to set prices
- In the transition, do not create undue socio-economic dislocation; do not send a perverse market signal that increases demand and ultimately emissions

#### Yellow Group

- The group made a suggestion for an objective statement: “a competitive energy supply for domestic supply and export at the lowest environmental footprint”

#### EE:

- EE buys time for the development of new renewable technologies
- This approach may be used to persuade people, using the moral high ground
- Focus on full life cycle costs of energy (i.e. include price externalities)
- If the result is exporting fossil fuel not used in Canada, then perhaps decarbonisation will not happen
- Instruments should acknowledge regional differences in existing renewable supply sources in Canada; this will require transition measures
- A generic energy mix target needs to be set so that the best of the existing technologies emerge, then target these with technology-specific incentives
- Set an ideal portfolio of renewables and then let regions adapt this to their own circumstances

- A reform of energy transmission is needed; capitalize on sizeable local demands and/or isolated communities
- Ultimately, hydrogen can also feed in to those niche applications

### *Discussion*

Participants had several comments and questions about the scope and potential for the hydrogen approach. It was noted that other countries, such as Japan, are looking at a hydrogen economy in the near term. One participant referenced a report by MIT, commissioned by the U.S. government, suggests that hydrogen technology will require major breakthroughs and is decades away. There are many aspects that have to be solved; it is not sufficient to look at the manufactured costs only. The Americans have done an analysis of money spent on hydrogen technologies, and on what the learnings have been, but Canada has not. Another participant proposed a proactive approach to introduction of hydrogen technology where it is feasible.

## **Day 2: October 13**

George Greene presented a summary of key messages from Day 1:

1. It is important to recognize regional differences for energy sources. Renewables, for example, may offer very different solutions for different regions.
2. Do not pick individual technologies. Rather, choose policies that allow efficient development and commercialization of effective technologies; allow the technology to select itself by performing well under the right stimulus.
3. Pricing may trump policy and determine behaviour. Therefore the interplay between the price signal and the chosen policy needs to be analyzed with respect to specific effects and specific instruments.
4. Fiscal policy has a role in the policy mix for reducing carbon emissions. But it must not sideline other economic and broader policy instruments.
5. Look internationally for lessons. Where is R&D spending going? Where is the Canadian competitive advantage regarding hydrogen?
6. Demand must be more clearly considered. What analytical assumptions on demand are being made in policy choice?
7. All forms of energy must be examined and technologies must be analyzed in an integrated way.

### **Integrated Policy Conclusions**

Stephanie Cairns delivered a presentation on the integrated policy conclusions/storyline as presented in the Report.

A participant from an Alberta First Nation presented some considerations about aboriginal issues of possible relevance to the discussions at this workshop. She set a context of land issues, and noted that Aboriginal communities have limited capacity to participate due to limited community outreach and communication. She further noted

that there are technology and economic development challenges and that there will be a difficult transition. She also pointed out that in order for Aboriginal communities to accept outcomes, they would rather have participation that is meaningful and reflects the state that the community is in. It is a challenge to include Aboriginal people in this process in a meaningful way. First Nations communities need improved capacity to partner, and need early engagement.

In small groups, participants discussed and tested the integrated policy conclusions. The groups then reported back to plenary. Below are the main summary points of the groups' presentations.

### Yellow Group

- This group provided proposed revised recommendations to emphasize the need for an integrated, national energy strategy that can be translated to an implementation plan, with mechanisms for evaluation and monitoring; their comments in support of the revised recommendations (see below) are as follows
- The element of economic growth needs to be included in the analysis; decarbonisation cannot be a single focus strategy
- There are competing objectives; what sort of criteria can be used for decision-making?
- Energy demand needs to be included alongside all mentions of energy supply in revisions to the recommendations
- Develop and implement a total lifecycle energy strategy policy impact modelling tool to guide and support integrated national policy decision making, inform quantifiable goals and targets, and support policy performance measurement and evaluation

### IEE:

- Consider a broad-based emission charge (carbon tax) with possible credits available to companies that meet certain performance targets
- Connect the tax to the investment/ consumer that will change GHG emissions, and make it revenue-neutral
- Target technologies that will advance the climate change agenda and create a market demand for solutions and innovations

### Renewables and hydrogen:

- R&D subsidies could provide a catalyst for solutions
- The portfolio approach is one for the long term, given capital turnover considerations
- A technology transformative blueprint needs to be developed

### *Recommended Revised Recommendations*

1. In support of the Government's Speech from the Throne, issue a statement of long-term commitment to decarbonisation of emissions and support this with confirmation of Canada's general policy on climate change for the second commitment period and beyond. Decarbonisation of emissions should be established as a policy priority within an integrated national energy strategy that includes technology development and industrial, regional and export policy.



2. To provide the most overall advantages to Canadian society, decarbonisation priorities should be pursued within a fully integrated national policy framework for competitive energy supply with the lowest environmental footprint.
3. The decarbonisation agenda should be pursued through an integrated national (coordinated) energy strategy that combines energy efficiency, emerging renewables, and carbon efficient technologies (including hydrogen).
4. The Government should put in place mechanisms to continuously evaluate and monitor progress to achieving the goals on a full life-cycle basis.

### Blue Group

- “Decarbonisation” is a confusing term to describe the objective of reducing GHG emissions, since CO<sub>2</sub> capture and storage from centralized use of coal and oil (as primary energy sources ) is likely to be a key transitional technology of the 21<sup>st</sup> century
- Avoid, or at least minimize wealth transfers in the design of instruments
- Energy prices and market forces are key to stimulating energy conservation and encouraging renewables
- The current price is too low to stimulate major efficiency improvements, but how much is Canada able to influence these prices?
- A “fully integrated policy framework” is not realistic – even energy policy may be too ambitious
- There are many nuances in the full Report that do not come out in the recommendations
- Energy policy has to be a national strategy
- Timing is an essential component of the recommendations: a time chart could be presented
- There are different levels of uncertainty for the three strategies

### Hydrogen:

- The only pathway to produce hydrogen should be from zero emission sources/ e.g. electrolysis production
- If decarbonisation is a national policy, nuclear is unavoidable in the long term – but many implications on other policies must be addressed
- (Response from floor): Most commercially viable hydrogen will likely be produced with carbon fuels, with emissions captured/ sequestered, over the next few decades
- Subsidies for demonstration and pilot projects should be made only when there is clear leadership in Canada (the risk is too great for private industry)
- Recommendations should refer to the carbon intensity of all generation (not just fossil fuel)
- A carbon tax may be acceptable if revenue is recycled, but would it be effectively recycled?

### Red Group

This group was divided in opinion, and therefore presented two different views:

- 1) Decarbonisation is complementary with other objectives, to a point, then there are tradeoffs/ budget constraints
  - 2) Decarbonisation is an important objective and can be framed as a driver for other objectives for Canada (e.g. regional development, R&D, employment, air quality and health, new exports, cities agenda)
- There was a concern about what was dropped in this study (i.e. thermal and sequestration); is this picking winners and losers?
  - Fiscal and regulatory tools should be used to shift our focus to reducing demand
  - This should be brought beyond the large final emitter (LFE) process
  - Various barriers and constraints – for small business, government and industry - need to be overcome to address demand
  - How will hydrogen be created? The group had 2 positions:
    - 1) A hydrogen system that is not fossil fuel dependent should be encouraged
    - 2) By sequestering CO<sub>2</sub> hydrogen can be produced in a CO<sub>2</sub> neutral way, even if it is fossil-fuel based

### Purple/ Green Group

- Decarbonisation of emissions is just one element of a long term commitment to sustainability; avoidance of climate change is an important element
- Policy objectives can be complementary or can involve tradeoffs
- Policy objectives need to consider regional dynamics
- There are opportunities in Canada's North for niche markets for new technologies; they can be showcased even if they are not cost-effective in other regions
- What is needed is a coherent policy framework that integrates health, finance, energy and environment goals with consistent signals
- The approach should not be exclusively technology supply-side focused; it should be broadened with demand
- Choose characteristics of a desired outcome and let technologies come out of that
- The scope should not be limited to the central generation paradigm—the distributed generation paradigm is important
- Renewables can be stored through hydrogen as an intermittency buffer
- For smaller amounts of renewables in appropriate locations, large scale hydro can act as a buffer, at a much cheaper cost than hydrogen
- Efficiency savings on the demand side are amplified on the supply side
- An adaptive framework for policies is recommended
- R&D investments are appropriate for reducing costs but some type of criteria are needed to determine which strategies to invest in; should criteria (such as cost/benefit analysis) be used for investment decisions? Would hydrogen pass such criteria?

### Double Yellow Group

- The term “decarbonisation” is inaccurate in this context because it relates to supply and not to demand. Further, energy efficiency is not decarbonisation
- Use the term “GHG mitigation” and rephrase the recommendations accordingly

- A fully integrated policy framework should be integrated with an energy policy framework that is national, not federal
- These three case studies are not about “technologies” exclusively
- The international context will determine how far and how fast Canada should be going in GHG mitigation
- The ability to pay must be recognized, particularly regarding investing in technologies
- How can the federal government mobilize private sector investment?

#### Double Green Group

- The term “decarbonisation” needs to be clarified
- The reference to a “statement” in the recommendations does not carry sufficient weight – it should be stronger. Should this include targets?
- A focus on technologies is too narrow - there is a need to look at energy policy
- The decarbonisation objective currently does not fit with other policy objectives because there could be adverse consequences (for example, EE may not lead to decarbonisation)
- But adverse outcomes can be mitigated with policy, and there are complementary objectives such as social objectives and Aboriginal capacity-building
- Trade obligations/considerations must be included
- The three technologies complement each other in timing, and in short and long term decision making
- The group suggested the phrase: “The decarbonisation agenda must be pursued through a coordinated energy and environment technology strategy, which includes, among other things, energy efficiency, renewables, and hydrogen.”
- Linkages between the technologies can be looked at as a hierarchy of technologies in terms of maturity, and therefore a staging of fiscal policies
- Policy-makers should avoid lock in effects and penalizing early adopters; this can be addressed by using flexible performance-based policies
- Offer industry the right fiscal environment with flexibility for achieving decarbonisation
- Minimize distributional impacts with policy

#### Double Red Group

- Climate change priorities are often usurped by economic and policy priorities; these multiple policy objectives can be dovetailed more effectively
- A domestic agenda has to be sensitive to the international agenda
  - Energy-intensive industries exist around the world; the question is how to use carbon resources in a more climate-friendly manner
- Public health priorities should be prominent in the Report

- The emissions charge in the case studies only focuses on carbon and fails to consider other criteria air contaminants. What about other emissions, and linking to prevention? A full spectrum charge could be introduced into the Canadian economy
- Consider behavioural change and bending demand with an integrated technology strategy
- Consider hydrogen distribution not just production
- What is the contribution hydrogen can make versus other technologies?
- Timing is a critical consideration in determining how efficiency/ renewables/ hydrogen can be deployed to meet growing demand
- These three selected technologies will not be able to deliver on a coordinated strategy in the same way as others would be able to
- Federal-provincial jurisdictional issues can hamper economic, environmental, and health optimization, and inter-provincial barriers lead to inefficiencies
  - There is a need for much greater federal/provincial collaboration
- Instruments must be designed to shape the entire system, not to address specific technologies

George Greene presented participants with a summary of areas for further discussion:

- An appropriate question might be “How big is your carbon policy objective?”
- Can you have complementarity and consistency of policy objectives, or will there inherently be trade offs?
- How to produce hydrogen?
- Do you want to focus policy objectives on technology, or take broader policy objectives and allow technologies to emerge?

### *Discussion*

A participant made the observation that if it is not known now what decarbonisation means, then why has Canada signed on to Kyoto? There are real impacts from many of the technologies/proposals. If decarbonisation is the only emphasis, what about other environmental impacts? Is it just a simple matter of terming “GHG mitigation” as decarbonisation? This is a long-term commitment so the focus should move off of the first commitment period. Participants were encouraged to frame the discussion in terms of “Kyoto and beyond”.

It was noted that since energy efficiency, by definition, does not change the ratio of carbon, decarbonisation is an inaccurate term.

In discussion, participants emphasized the need for policy consistency and long term policy certainty.

Participants discussed how hydrogen will fit into the global energy system. Hydrocarbon and coal will become the marginal energy sources, especially as developing countries’ demand for energy rises. Hydrogen would be able to transform the marginal coal source to a lower carbon fuel, and should produce energy as cleanly as the consumer is willing

to pay for it. But with carbon dioxide capture and storage, the energy requirements for coal could be large.

### **Fiscal/ Economic Instruments for Decarbonisation**

Stephanie Cairns delivered a presentation describing fiscal/ economic instruments for decarbonisation, as presented in the draft SoD Report.

An Aboriginal representative from the Northwest Territories spoke on concerns from his community, including those regarding development projects such as the Mackenzie gas project and oilsands expansions. He expressed concern with fiscal policy and its possible impacts on Aboriginal governments and people, and requested consideration of this perspective in any fiscal policy process.

Jean Bélanger requested, on behalf of the NRTEE, a discussion on the pros and cons of the use of price signal instruments, such as taxes or emissions trading, versus incentives.

In small groups, participants discussed fiscal/ economic instruments for decarbonisation. The groups then reported back to plenary. Below are the main summary points of the groups' presentations.

#### **Double Green Group**

- Regarding hydrogen, is the approach centred on energy policy or decarbonisation?
- At the firm level, decisions are made on a private cost basis
  - Still, there is a need to be clear on life cycle costs
- In examining focused vs. broad instruments, a clear timeframe element needs to be included
- Broad-based instruments can help bring industry to BAT (best available technology) but poor design can be disastrous
- A suite of instruments is required, and the choice of instrument used must match the stage of maturity of the technology
- Though it would be unpalatable, the consumers of fuel should be taxed
- Better federal/provincial harmonization is needed
- Will revenue recycling in fact create a perverse incentive for heavy polluters?

#### **Yellow Group**

- Try to be as revenue-neutral as possible
- A transformative staged strategy should be created
  - Design a long term blueprint for energy flow and contrast it against the current blueprint
  - Employ instruments to create commercial currency to pull demand and stimulate creation and deployment of alternative solutions
  - Broad-based incentives (e.g. carbon tax) can create the quantifiable target/need
  - Use R&D and incentives to make the strategy happen

- RPS and/or subsidies motivate adoption of alternatives
- If informed by a long-term vision, the mix will be defined by achieving the stages

### Blue Group

- Policy goals should drive instrument choice and design
- Since GHG emissions are a global issue and Canada's GHG efforts alone will have minimal effect on mitigation of global climate change, the Canadian effort should be in line with that of the rest of the world
- *Or* pick the level of effort that represents the level the country is willing to accept (e.g. the price of carbon)
- Avoid/minimize wealth transfer in the design of instruments
- R&D for hydrogen should be driven by a technological roadmap
- Hydrogen should be given no greater priority or emphasis than other energy supply and demand technologies
- Energy efficiency tools should distinguish between:
  - i) Low intensity industrial and non-industrial sectors (use regulation)
  - ii) High intensity large industrial sectors (use LFE stretch targets and then a true-up/contribution to fund)
- Fiscal instruments should be tested against regulatory alternatives for efficiency
- In the U.S., RPS will by design act as trade barriers between states; this should be avoided in Canada (by allowing traded permits)
- A large, broad-based carbon tax could be used if revenue is recycled to affected industries:
  - But there is not a high degree of confidence in government doing this well
  - It is difficult to design revenue recycling to address competitiveness impacts; it may be better to design the instruments to avoid raising the revenue in the first place
- Putting a price on ERPT may be unrealistic
  - It may be more effective to funnel money to technologies
- A politically acceptable instrument would directly support ERPTs, rather than tax fossil fuels
- The government should consider setting up an agency to pursue the various dimensions of support required by ERPT
- Policy should be designed with a system view in mind

### Purple/Green Group

- Take an adaptive management approach to R&D investment in hydrogen
- Incremental investment in R&D should be placed in the international context
  - Focus on where Canada has a competitive advantage and installed knowledge capacity
- The case study in the Report is not convincing of the merit of hydrogen for investment
- The return on investment on ERPT is unclear
  - An instrument can be used to guarantee the price of renewables, making the investment more secure

- Could another fiscal policy be used to lower investment risks/ to underwrite projects?
- Subsidies on renewables may lower the cost of electricity, which in turn increases demand: this would reduce the effect of the policy
- Renewables need a transparent and low-cost certification system
- For non-LFE sectors, legislation needs to be simple
- Disincentives (such as taxes) might be better than incentives due to
  - free-ridership
  - continued incentive for carbon savings
  - expenditure vs. revenue-raising.

#### Double Yellow Group

- Canada is not well-equipped to make decisions on broad-based instruments, so the preference is targeted measures
  - Use incentives, program spending, regulation
- Is there any possibility of increasing certainty post-2012?
- What are the expectations for the use of the money from revenue recycling?
- R&D focus should be on clean energy systems

#### Double Red Group

- The report should refer to “carbon intensity of generation” (not “fossil fuels”)
  - Look at the energy intensity of the product itself
- There needs to be more clarity on the definition of market-based regulation: even technology standards can be made market-based
- A variety of economic instruments with a suite of broader policy tools (e.g. regulation, education, training) should be used
- Without a clear target, it is difficult to choose between instruments
- Exemptions and recycling should be considered on a case-by-case basis
- What is the opportunity cost associated with investments in hydrogen?
- All costs of these instruments, including administration, need to be considered

George Greene presented a few summary points to guide the plenary discussion:

- In considering the application of broad-based instruments vs. incentives, examine the most valuable use of instruments to get things moving towards meeting a target.
- A critical observation: You can commit yourself to a policy but you cannot commit yourself to a result.
- A detailed schematic is required to choose instruments to meet specific objectives.

To wrap up the workshop, Alex Wood presented a summary of key messages from the day. The following were common threads from the morning session:

- Define terms clearly, especially decarbonisation
- Define a timeline: a “roadmap” for technology deployment and the decarbonisation objective

- Energy policy/strategy should be national, but must consider all governments - federal/provincial/ territorial, municipal, Aboriginal
- Recognize the importance of other technologies
- Look at the demand side
- Decarbonisation is only part of the broader sustainability approach
- Enable, don't pick, the technology winners: focus on creating an enabling environment rather than being technology specific in the design of instruments
- Use a life cycle approach to technology: understand the carbon and energy footprints
- Clarify the role of other policy tools

The following were common threads from the afternoon session:

- Consider federal/provincial issues
- Should the discussion of instruments be based on a target, or rather thought of in a transitional sense?
- There is a need to better understand the research needs for hydrogen, and align recommendations with roadmapping and international efforts
- The role of policy design for instruments is critical
- Where should the effort be focussed? On the consumption side? Production?
- Build an adaptive management approach: learn-by-doing for efforts in relation to economic instruments
- Address the role of other instruments, especially regulatory and normative
- Understand the cost of instruments
- There is a need to further examine the issue of broad instruments vs. targeted measures

Jean Bélanger thanked all participants on behalf of the EFR & Energy Program and described the Program's next steps.

Harvey Mead also thanked all participants on behalf of the NRTEE and closed the workshop.