Deploying Policy Exercises and the C-ROADS Simulation to Facilitate and Support Long-Term Climate Policy Development

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The Climate Action Initiative
The Heinz Center
Sustainability Institute
Ventana Systems
MIT
Active Philanthropy
Executive Learning Partners
European Environment Agency

11 March 2009
Long-term climate goals

How close do policy choices get us toward climate goals?

350 – 450 ppm
2 °C
Emission peaking in 2015

How close?

Emissions reduction proposals under consideration

Challenges:
• Adding up diverse proposals
• Dynamics of accumulation feedback, and delay
C-ROADS

Specific country emissions
(3, 7, or 15 blocs)
Total fossil fuel CO₂ emissions
CO₂ net emissions from forests
Forests
Afforestation
Deforestation

Carbon cycle
GHGs in atm
Climate Temp
Sea Level rise

Other GHGs
• **Education**
  - Mock negotiations
  - Online-version

• **Decision Support**
  - Policy makers and other non-experts
  - Business leaders
  - Climate communicators
• **Fast**
  - Simulates 500 years in <1 second

• **Accessible**
  - Used easily on a laptop by non-modelers
  - Flexible, intuitive interface

• **Transparent**
  - Open-box; all assumptions easily examined
  - Causal tracing permits auditing of behavior

• **Grounded in and consistent with accepted climate science**
  - Calibrated to and tested against AR4, other models and data
• Dr. Robert Watson, Chair, Department for Environment, Food and Rural Affairs (DEFRA)

• Dr. Eric Beinhocker, McKinsey Global Institute

• Dr. Bert de Vries, Netherlands Environmental Assessment Agency

• Dr. Klaus Hasselmann, Max-Planck Institut für Meteorologie

• Dr. David Lane, London School of Economics & Political Science

• Dr. Jørgen Randers, Norwegian School of Management BI

• Dr. Stephen Schneider, Stanford University
Carbon Cycle Projections vs. MAGICC
Temperature Projections vs. AR4 Ensemble

MULTI-MODEL AVERAGES AND ASSESSED RANGES FOR SURFACE WARMING

IPCC AR4 Fig. SPM.5
What Might We Expect From “Current Proposals”

Global CO₂ Emissions

Billion tons C/yr

2000 2020 2040 2060 2080 2100

BAU

?
### SI’s simplified estimates of “current proposals”

<table>
<thead>
<tr>
<th>Region</th>
<th>Proposal Details</th>
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<tbody>
<tr>
<td>Brazil</td>
<td>Eliminate deforestation by 2050</td>
</tr>
<tr>
<td>Canada</td>
<td>70% below 2006 by 2050</td>
</tr>
<tr>
<td>China</td>
<td>80% below 1990 levels by 2050</td>
</tr>
<tr>
<td>Europe</td>
<td>80% below 1990 levels by 2050</td>
</tr>
<tr>
<td>India</td>
<td>BAU rate until 2035 and then constant emissions</td>
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<tr>
<td>Middle East</td>
<td>Mexico 50% below 2002 levels by 2050</td>
</tr>
<tr>
<td>OECD Pacific</td>
<td>60% below 2000 by 2050</td>
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<td>Other Africa</td>
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<td>Other Large Asia</td>
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<td>Other Latin Am.</td>
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<td>Other Small Asia</td>
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<tr>
<td>Russia/FSU</td>
<td>1990 levels by 2012</td>
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<tr>
<td>South Africa</td>
<td>BAU until 2022; emissions constant until 2032, then 1% per year annual decline</td>
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<td>US</td>
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How Big Is The Gap?

BAU – A1FI

Global CO₂ Emissions

Billion tons C/yr

2000 2020 2040 2060 2080 2100

BAU

?
How Big Is The Gap?

CO2 Fossil Fuel Emissions

Global CO₂ Emissions

Billion tons C/yr

2000 2020 2040 2060 2080 2100

BAU

Current Proposals
How Big Is The Gap?

Atmospheric CO$_2$ levels

CO$_2$ in the Atmosphere

ppm

2000 2020 2040 2060 2080 2100

BAU
How Big Is The Gap?

Temperature Increase

Temperature Change Over Pre-industrial

Degrees C

- BAU
- Current Proposals

2000  2050  2100
Long-term climate goals

How close do policy choices get us toward climate goals?

350 – 450 ppm
2 °C
Emission peaking in 2015

How close?

Emissions reduction proposals under consideration
Under current proposals emissions would exceed removals.

![Graph showing emissions and removals over time.](image)
How Big Is The Gap?

- CO2 Fossil Fuel Emissions

<table>
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<tr>
<th>Year</th>
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<th>Current</th>
<th>Proposed</th>
<th>WEO</th>
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<tbody>
<tr>
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<td>30</td>
<td>25</td>
<td>15</td>
<td>5</td>
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<td>2020</td>
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<td>2100</td>
<td>55</td>
<td>50</td>
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80% Global Leveling of CO2 emissions 29% below 2009 levels by 2040, starting now.
How Big Is The Gap?

Atmospheric CO$_2$ levels

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How Big Is The Gap?

Temperature Increase

Temperature Change Over Pre-industrial

Degrees C

BAU

Current Proposals

WEO

80% Global

2000  2050  2100
• We’re not on track to achieve well recognized climate goals, but we could be.

• Getting on track will require many kinds of change,
  – in mobilization, in politics, in global co-operation, in technological innovation and, most of all, in how we think about ourselves and this moment in time
Implications

Through the Climate Action Initiative we are using C-ROADS and other approaches to help spark these understandings in places of leadership and influence:

- Heads of state and their advisors
- Business leaders
- Those helping mobilize and educate civil society
- Media
- Scientists and modelers
Contact

— bethsawin@sustainer.org
— apjones@sustainer.org

— www.climateinteractive.org
It is difficult for decision makers to

• a) aggregate diverse emissions reductions proposals into a single global emissions projection and

• b) mentally simulate from that emissions projection the resulting atmospheric CO$_2$ level or temperature increase
Tools are needed to help decision makers assess whether policy options are sufficient to achieve goals for stabilizing CO$_2$ levels and limiting global temperature increase to within a safe range.
Our analysis suggests that the sum of current, publicly available emissions reductions proposals are likely to be insufficient to achieve widely accepted goals such as stabilizing atmospheric CO$_2$ levels between 350 and 450 ppm or limiting temperature increase to less than 2°C.
Conclusions

A set of proposals that together add up to a global reduction of around 80% of 1990 emissions by 2050 combined with concerted reductions in deforestation would be in the range to achieve this essential goal.
C-ROADS lacks Key Positive Feedbacks

- Specific country emissions
- Full fossil fuel CO$_2$ emissions
- CO$_2$ net emissions from forests
- Other GHGs
  - GHGs in atm
- Climate
  - Temperature
  - Sea level rise

Afforestation
Deforestation

(3, 7, or 15 blocs)
Eliminate deforestation by 2050 (12% of global total)

70% below 2006 by 2050

80% below 1990 levels by 2050

Interpretation (and simplification) of GHG emissions reduction proposals in the public domain, by Sustainability Institute, as of 1 March 2009
Interpretation (and simplification) of GHG emissions reduction proposals in the public domain, by Sustainability Institute, as of 1 March 2009

- India: BAU rate until 2035 and then constant emissions
- Middle East
- Mexico
- OECD Pacific
- Other Africa
- Other Large Asia

50% below 2002 levels by 2050

60% below 2000 by 2050

1 billion tons C/yr
Other Latin Am.

Other Small Asia

Russia/E. Europe

South Africa

US

1990 levels by 2012

BAU until 2022; emissions constant until 2032, then 1% per year annual decline

80% below 1990 by 2050

1 billion tons C/yr

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