

Innovations in Decarbonization

A joint UC Berkeley/MINES ParisTech event exploring the pathways and actions needed to prevent climate change

Organised by Nadia MAÏZI (CMA/MINES ParisTech and Chair Modeling for Sustainable Development) and Paul WRIGHT (BECI/UC Berkeley)

- Fresh perspectives: Contributions from MINES ParisTech students
- Carbon Removal Solutions: Discussion on Research Development
- Advances in multi-scale models to shed light on the plausibility of long-term scenarios

Friday July 10th, 2015 ~ 9:00 am - 5:00 pm
MINES ParisTech, 60 Boulevard Saint Michel, 75006 Paris
Rooms V115-V119

Innovations in Decarbonization

Fresh perspectives: Contributions from MINES ParisTech students

Over the last 20 years, successive COPs have highlighted the need for urgent action in reducing greenhouse gas emissions to avoid the global mean temperature exceeding a 2°C increase. In the meantime, agreements discussed in the course of negotiations are extremely complex, mainly focused on legal terms. Discussions about the kind of decisions to implement, which rely on scientific contribution, seem to be on the back burner. Several reasons explain this: the climate change timeframe is much longer than a political mandate and does not put across the urgency of the situation. Implementing long-term strategies relevant to climate issues is often difficult and the measures unpopular. For example, in France transport sector lobbies recently put up barriers to stop a new pollution tax. Moreover, the decisions taken need to shake up a very inert system. To deal with climate urgency, new planning paths must be accepted. For all of these reasons, the discussion process at climate negotiations is extremely slow and a range of approaches and measures at different levels should be envisaged. This was the framework for the research conducted by the 2014 class of the Master of Advanced Studies 'Energy System Optimization', whose 8 proposals address climate change issues from a different perspective: they suggest that tackling the challenge at regional, sectorial, and individual levels can bring relevant and quicker results. Even if they come across as fanciful policies or overly naive, we hope that these ideas will enlighten negotiators and extend policy choices in an interesting way.

Carbon Removal Solutions: Discussion on Research and Development

Scientists increasingly agree that carbon removal solutions -- i.e. those systems and process capable of net-negative carbon emissions -- are critical for fighting climate change. At the same time, many carbon removal solutions are less developed technically and scientifically than other GHG mitigation technologies such as renewable energy and energy efficiency. This panel discussion explores the state of carbon removal research and development, the key questions surrounding various carbon removal approaches, and the development activities needed to answer key technical and scientific questions. The panel will discuss options for coordinating carbon removal research efforts across the international community, as well as options for engaging governments, industry, and NGOs in funding and executing carbon removal research and development activities. After a moderated panel discussion, questions from the audience and interested participants across the globe will be addressed

Advances in multi-scale models to shed light on the plausibility of long-term scenarios

Given the complex international situation, strategies to tackle energy-related issues need effective normative tools to deal with the different types of constraint (e.g. climate-related, financial, legal, political, technical). Various scenarios are now available to provide an insight into the challenges of energy transition under environmental constraint. However, the regional, technological and social conditions that trigger this transition require developing tools to identify the policy mixes needed for new directions in technical systems and modes of development. In particular, the aim is to reconcile and connect different scales (temporal, spatial, social) in order to understand:

- The political implications that necessarily take place at several levels, from global to local,
- The impact of phenomena with different dynamics (several decades versus seconds), and
- The central role of people (for whom the future must be acceptable and desirable, i.e. compatible with aspirations and behavior).

This multi-scale integration brings up significant methodological obstacles that we propose to examine in three sessions. During the events, international scientists involved in the strategy of major groups and academic organizations will present the reconciliation of long-term approaches employed in prospective exercises at different scales:

Short-term/long-term temporal scales

Reconciliation involves examining the "inertia" of systems, e.g. urbanization or the composition of current mixes, versus the "instantaneousness" of usage (e.g. mobility using electric vehicles or smart grid solutions, energy efficiency) as well as the technical conditions for operating systems (i.e. network reliability, availability and stability).

Spatial scales

Different levels of spatial issues will be tackled such as top-down versus bottom-up pledges for emerging countries, centralized versus decentralized networks, managing intermittent electricity production sources and integration into the network.

Societal scales

This will involve discussing the assessment of different development paradigms (degrowth/growth) and the integration of behavior as relevant modeling characteristics.

PROGRAM

8:30 am - 9:15 am **Welcome coffee**

9:15 am - 9:30 am **Welcome address by Nadia MAÏZI**

9:30 am - 11:00am **Fresh perspectives: Contributions from MINES ParisTech students**

Coal power plants: How to encourage banks to finance virtuous projects - Odile FONKAM

Uranium: Towards better use of a sensitive resource - Rémi LAFOND

Steel recycling, an opportunity for CO₂ emissions reduction - Mélissa DAUDE

Minimizing adverse impacts of climate change policies on OPEC by economic diversification - Katharina DEFUNG

Ways to deal with urban traffic congestion - Rémy DOUDARD

Water crisis: could an international market help reduce local stresses - Aurélien HAVEL

Discussion with Elizabeth J. WILSON, Professor, Humphrey School of Public Affairs, University of Minnesota

11:00 - 11:30 am ~ *Coffee break* ~

11:30 am - 1:00 pm **Carbon Removal Solutions: Discussion on Research and Development**

Chairs: Noah DEICH (UC Berkeley) and Nadia MAÏZI (MINES ParisTech)

Panel discussion:

- Daniel KAMMEN (UC Berkeley)
- Sabine FUSS (Mercator Research Institute, Berlin)
- Ken CALDEIRA (Carnegie Institute, Stanford)
- Joseph CANADELL (Commonwealth Scientific and Industrial Research Organisation (CSIRO), Melbourne, Australia)
- Florian KRAXNER (International Institute for Applied Systems Analysis (IIASA))

1:00 pm - 2:00 pm ~ *Lunch break* ~

2:00 pm - 5:00 pm **Advances in multi-scale models to shed light on the plausibility of long-term scenarios**

Chair: Nadia MAÏZI (MINES ParisTech)

Short-term/long-term temporal scales

Space aggregation and time reconciliation: The Lessons learnt from thermodynamics - Vincent MAZAURIC, Schneider Electric

Renewable energy to support global energy transition -- important time scale issues - Asami MIKETA, IRENA

Optimal charging of electric vehicles and its impact on the load curve - Edi ASSOUMOU, MINES ParisTech

Spatial scales

Science and policy innovations for decarbonized energy systems - Daniel KAMMEN, University of California, Berkeley

From Nations to regional integration - Ana RANKOVIC, South East Europe (SEE) Change Net

Long term technological modelling - Markus BLESL, IER Stuttgart

Societal scales

Importance of household behavior in long term planning models and CO₂ emissions reduction scenarios - Jean-Michel CAYLA, EDF

Investigating Pathways to Post-Growth Economies Through Prospective Macroeconomic Modeling : Visions and Scenarios for France
François BRIENS, MINES ParisTech

Accounting for consumer diversity in emissions reductions policy: evaluating the effectiveness of policy on consumer choices for private road passenger vehicles - Jean-François MERCURE, Cambridge University