



## Workshop Agenda

# Sustainable Negative Emissions: A Climate Risk Management Option?

<b>Date:</b>	6-7 December 2013
<b>Location:</b>	<a href="http://www.tokyo-bigsight.co.jp/english/time/index.html">http://www.tokyo-bigsight.co.jp/english/time/index.html</a>
<b>Co-organizers:</b>	Global Carbon Project (GCP) International Institute for Applied Systems Analysis (IIASA), Mercator Research Institute on Global Commons and Climate Change (MCC), National Institute for Environmental Studies (NIES)
<b>Organizing Committee:</b>	Nebojsa Nakicenovic (GCP-SSC, IIASA Dpt. Director, TU Vienna), Florian Kraxner (IIASA), Sabine Fuss (MCC), Yoshiki Yamagata (Head of GCP International Office, NIES), Ayyoob Sharifi (GCP, Executive Director, NIES) and Josep Canadell (GCP, Executive Director, CSIRO)

*This workshop is organized as a back-to-back event to the following international workshop during 4-6 Dec, ICA-RUS International Workshop 2013 -Now and Future of Global Climate Risk Management-  
<http://www.nies.go.jp/ica-rus/workshop/index.html>*

*Because of the overlapping thematic context, the last day of the ICA-RUS workshop will be jointly held as the 1<sup>st</sup> day of the NE workshop.*

*The ICA-RUS project will develop and propose strategies for the global-scale management of climate change risks; specifically, the project will consider constraints, uncertainties, risk management options and societal value judgments through studies including (1) "analysis of critical climate change risks," (2) "analysis of strategies for optimal use of land, water and ecosystems for climate change risk management," (3) "evaluation of options for climate change risk management" and (4) "application of science and technology studies to issues of climate change risk management."*

*All GCP-IIASA-NIES NE workshop participants are also invited to participate to the ICA-RUS workshop.*

## **Workshop Motivation & Objectives:**

In the first half of this year Earth's CO<sub>2</sub> level has surpassed 400ppm, which is the highest level in our history since the Pliocene. It thus appears that we are indeed steering towards an **overshoot** by which the new IPCC Report's climate change mitigation scenarios are characterized, before stabilizing at ppm levels allowing us to restrict global warming to 2 degree C above pre-industrial levels. How can this stabilization still be achieved? One core ingredient in the mitigation mix are negative emissions, mostly based on carbon-neutral bioenergy (due to the same amount being sequestered by feedstock growth as being emitted when combusting biomass for energy generation) combined with



carbon capture and storage (**BECCS**), which in addition captures CO<sub>2</sub> during the energy production phase. Yet, while having long appeared to be an attractive option for **climate risk management**, many uncertainties remain – both socio-economically/technologically and on part of the climate science. In a series of workshops, both dimensions have been explored by experts with backgrounds as diverse as geology, climatology, economics, engineering, policy, physics, etc. (see below for references to these workshops and associated material). While those workshops partially targeted the **incentivization** of BECCS diffusion in specified countries, the GCP workshop at IIASA highlighted in a much more explicit way also the uncertainties on the **climate side**:

- What are the effects on and interaction with the albedo?
- Do negative emissions decrease the airborne fraction and is the functional relationship between emissions and climate symmetric?
- What happens to other GHGs and radiatively active substances, don't we need a radical decline of those, too, to make negative emissions work?

In this workshop, we would like to come back to these questions, but also add **technology and economic perspectives** again. One important aspect which will be discussed is whether negative emissions technologies – by acting as an “insurance” mechanism against severe climate change and its impacts – will create a situation of moral hazard, where costly transitions to carbon-free technologies are postponed in expectation of future cost reductions in abatement costs and containment of climate risks through BECCS. Whether further lock-in will lead to costly investments in carbon-intensive technologies, which will be a disincentive for later transitions, is one obvious question. The International Energy Agency's latest update of the CCS roadmap<sup>[1]</sup> also emphasizes that CCS is not on track and that substantially more efforts are needed in order to have CCS ready to generate the carbon savings needed to stabilize the climate. Concerning the latter, we will also explore the question how negative emissions would be coordinated globally in the face of the **climate agreement impasse** we are currently experiencing. Which countries would agree to be providers of **public goods** enabling others to maintain industrialized patterns of production and what are their incentives? Can **co-benefits**<sup>[2]</sup> provide sufficient grounds for the development of BECCS? Is bioenergy the most promising entry point?

At the end of the workshop, we will close the loop and re-visit the notion of BECCS as a climate risk management tool:

- What assumptions does effective risk management on the basis of BECCS rely on? And can we do without BECCS?
- What are the costs of not having the BECCS option – both in terms of actual cost and risk?
- How does the availability of BECCS alter expectations and thus potentially near-term investment?
- Can we realistically assume that BECCS will be “ready” on time, given the current status?

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<sup>[1]</sup> Scott Vivian, Gilfillan Stuart, Markusson Nils, Chalmers Hannah, Haszeldine R Stuart (2012) [Last chance for Carbon Capture and Storage](#). Nature Climate Change 3, 105-111 doi:10.1038/nclimate1695.

<sup>[2]</sup> „For GHG mitigation policies, co-benefits can best be defined as effects that are additional to direct reductions of GHG and impacts of climate change” [www.oecd.org/fr/env/cc/benefitsofclimatechangepolicies.htm]



## **NE workshop Program**

### **Friday, 6 December, Day 1**

09:00-09:45 Objectives of the NE workshop by co-organizers (GCP, IIASA, MCC, NIES)

***This Day 1 program is co-organized as part of the ICA-RUS workshop***

9:45-12:00 **Session 1** (Chair Yoshiki Yamagata, Rapporteur Tokuta Yokohata)

1. **Yoshiki Yamagata, Tokuta Yokohata** (NIES) “Land, water and ecosystem nexus for climate risk management” (Synthesis report of latest ICA-RUS Theme 2 project research results)
2. **Etsushi Kato** (NIES) “Ecosystem sustainability of 2°C scenario using BECCS”  
**Coffee Break**
3. **Atsushi Kurosawa** (IAE) “BECCS in integrated assessment models - road to the negative emissions based on Japanese experiences”
4. **Kunio Yoshikawa** (TITECH) “Innovative Japanese Waste-to-Green Product Technologies: Economically Viable BECCS”

12:00-12:30 **Discussion and Summary**

**Lunch Break**

13:30-15:00 **Session 2** (Chair Volker Krey, Rapporteur Sabine Fuss)

1. **Nebojsa Nakicenovic** (GCP, IIASA, TU Vienna) “Carbon fluxes in scenarios with significant NE based on GEA, RCPs and CMIP5”
2. **Michael Obersteiner** (IIASA) “Climate risk management using BECCS - revisited”
3. **Florian Kraxner** (IIASA) “Multiple objectives and interaction with other (land-based) emission reduction options”

**Coffee Break** (call in Massimo at 15:00=07:00 CET)

15:30-17:00 **Session 3** (Chair Nebojsa Nakicenovic, Rapporteur Florian Kraxner)

1. **Massimo Tavoni** (FEEM, CMCC) “Negative emissions in the transitional pathways to climate stabilization: role and challenges” (remote presentation by Skype from 15:30 = 07:30 CET)
2. **Daniel Johansson** (Chalmers University of Technology) “The role of BECCS in meeting global temperature targets”
3. **Sabine Fuss** (MCC) “BECCS as a climate risk management tool: opportunity, uncertainty and pitfalls”

17:00-17:45 **Discussion and Wrap-Up (Summary by Chairs and ICA-RUS leaders)**

18:00 **Dinner and discussions**



## Saturday, 7 December, Day 2

9:00- 17:00 **Session 4** (Co-chairs: Florian Kraxner, Yoshiki Yamagata, Sabine Fuss)

09:00-09:30 Introduction by co-chairs

09:30-16:30 Roundtable discussion

- 1 **What** do we define as climate risk?
- 2 **How** do we manage climate risk with negative emissions/BECCS?
- 3 **Where** will sustainable BECCS potentials come from?
- 4 **Who** manages climate risk, i.e. what is the climate risk management regime for BECCS?

### ***Lunch Break***

Roundtable discussion continued

16:30-17:00 Wrap-up

- Suggestion for research plan/paper outline
- Assignment of outstanding tasks
- Agreement on timeline

17:00 Closing of the Meeting (all co-organizers)

18:00 ***Dinner and discussions***



## Previous Workshops & Material:

First IEA-IIASA BECCS Experts Workshop November 2011 at IIASA, Laxenburg, Austria:

<http://www.iea.org/media/workshops/2012/bioenergyccsandbeccs/workshopreport.pdf>

Second IEA-IIASA-UKP4 BECCS Experts Workshop, "Bioenergy, CCS and BECCS: Options for Indonesia", September 2012, Jakarta, Indonesia:

<http://www.iea.org/newsroomandevents/workshops/workshop/bioenergyccsandbeccsoptionsforindonesia-21-22912.html>

Third IEA-IIASA-UNIDO BECCS Experts Workshop, "Bioenergy, CCS and BECCS: Options for Indonesia", June 2013, Sao Paulo, Brazil:

<http://www.iiasa.ac.at/web/home/research/researchPrograms/EcosystemsServicesandManagement/BECCS.html> [workshop report under preparation]

Second UKP4-MEMR Workshop on Bioenergy, CCS and BECCS, "Enhancing Carbon Emission Reduction Through Bioenergy and Carbon Capture and Storage", Jakarta, 23 August 2013

<http://www.bioenergi-ebtke-esdm.or.id/presentation-download-19.html> [workshop report under preparation]

"Negative emissions and the carbon cycle", workshop co-organized by IIASA and GCP, April 2013, IIASA, Laxenburg, Austria:

<http://www.iiasa.ac.at/web/home/about/news/Negative-emissions-and-the-carbon-cycle.en.html>