



GCP/MaGNET Workshop, IIASA, March 2-3, 2017

Land use related negative emission technologies (LUNETs) – their implications on food security and relevant SDGs -

Agriculture, forestry and other land use (AFOLU) is responsible for about 25% of global anthropogenic GHG emissions. Part of them, mostly related to land use change, can be eliminated at relatively low cost. However, substantially reducing direct, non-CO₂, emissions from agriculture would require a large re-organization of the whole food system. Still, reaching ambitious stabilization targets such as those stipulated by the *Paris Agreement* will - according to the large majority of currently quantified scenarios - require deployment of negative emissions technologies (NETs) among which afforestation and bioenergy with carbon capture and storage (BECCS) are privileged by the Integrated Assessment Modeling (IAM) community. Another promising NET is carbon sequestration in agricultural soils, 0.7 GtCeq/yr according to Smith et al. (2016), but it has been so far ignored by IAMs.

Afforestation and BECCS will require hundreds of million hectares of land already by mid of century. Depending on the location of the production, this may lead to competition for land and water with food production and hence presenting a threat to food availability. On the other hand, these NETs will represent new revenue opportunities for rural areas where still the large majority of food insecure people live and hence together with increased agricultural income could lead to improved access to food. Afforestation in the particular form of agroforestry is complementary with food and feed production but the feasibility of its upscaling remains to be investigated. Finally, soil organic carbon sequestration in agriculture may also benefit food production through increasing soil productivity, providing better resilience to extreme weather events and hence contributing to adaptation to climate change. However, in some cases, increasing the carbon content may require extensification of agricultural production and hence lead to reduced food availability. All these aspects are critical in particular because most of the projections expect large scale development in LUNETs in developing countries.

Besides their strong link to food security (SDG2) and climate change mitigation (SDG13), LUNETs may play an important role in achieving or not of many others SDGs such as, ending poverty (SDG1), ensuring inclusive education (SDG4), clean water (SDG6), access to energy (SDG7), sustainable economic growth and employment (SDG8), reduce inequality (SDG10), sustainable consumption patterns (SDG12), and sustainable terrestrial ecosystems (SDG15). Therefore, considering food security alone, could result in misleading conclusions.

Finally, the cost of LUNETs in terms of food security and potentially other SDGs needs to be weighed against the cost of alternative options, e.g. stricter mitigation in the agricultural sector itself or more severe climate change impacts because of the lack of mitigation.

Workshop objectives

1. Review the role and the land use implications of LUNETs deployment in deep decarbonization scenarios
2. Review the way how IAMs currently represent the link between land use and food security and the implications for conclusions on LUNETs
3. A roadmap for LUNETs deployment promoting food security and other relevant SDGs

Agenda

Day 1, Thursday 2nd March

09:00-09:30 Arrival and registration

09:30-11:00 Session 1: Setting the scene

Session chairs: Yoshiki Yamagata, Florian Kraxner (including brief introduction [5])

Net-Negative Emissions: Challenges and Opportunities – Naki [15+5]

What we know (and don't know) about negative emissions – Sabine Fuss [10+5]

Negative emissions and pressure on land in 1.5°C scenarios– Joeri Rogelj [10+5]

Potential implications of a 1.5deg target on food security – Petr Havlik [15+5]

Discussion [15]

11:00-11:30 Coffee break

11:30-13:00 Session 2: LUNETs and Food Security - Individual IAM presentations (I)

Session chair: Hugo Valin

Deep mitigation scenarios and negative emissions in the GLOBIOM/MESSAGE modeling framework – Stefan Frank [20+5]

MAGPIE – land-based CDR options, potentials and tradeoffs – Alexander Popp [20+5]

Modelling LUNets in IAM, recent developments from the WITCH model – Laurent Drouet [20+5]

Discussion – all [15]

13:00-14:00 Lunch

14:00-15:30 Session 2: LUNETs and Food Security - Individual IAM presentations (II)

Session chair: Joeri Rogelj

Deep mitigation scenarios and negative emissions in the IMAGE model framework – Detlef van Vuuren [20+5]

Trade-off between climate mitigation and food security: the experience of AIM - Tomoko Hasegawa [20+5]

Potential food security implications of biomass electricity expansion in the US - Justin Baker [20+5]

Discussion – all [15]

15:30-16:00 Coffee break

16:00-18:15 Session 3: Complementary Modeling Approaches

Session chair: Yoshiki Yamagata

Spatial explicit BECCS land use scenarios (RCP2.6) and their implication for ecosystem services – Yoshiki Yamagata [15+5]

Feedstock and conversion process of bioenergy system for the anticipated sustainable BECCS – Etsushi Kato [15+5]

Assessing the biophysical impacts of land based mitigation in HadGEM2-ES - Andy Wiltshire [15+5]

Terrestrial carbon dioxide removal and food production: planetary boundaries and opportunities - Vera Heck [15+5]

Climate risk management revisited - Michael Obersteiner [15+5]

Soil organic carbon/4 per mile initiative - Jean-Francois Soussana [15+5] - *REMOTELY*

Discussion – all [15]

19:00-21:00 Dinner hosted IIASA

Day 2, Friday 3rd March

09:15-10:30 Session 4, part I: Improving model relevance: Focus on food security (and other SDGs)

Chair: Petr Havlik

Modeling the various dimensions of food security: applications and lessons from the FOODSECURE project - Hans van Meijl [15+5]

Bioenergy, land use and food security – lessons from recent policy assessments – Hugo Valin [15+5]

Land availability for biofuels – data improvement through citizen science - Ian McCallum [15+5]

Discussion – all [15]

10:30-11:00 Coffee break

11:00-12:15 Session 4, part II: Improving model relevance: Focus on technology

Session chair: Piera Patrizio

Comparative assessment of BECCS and DAC - Niall MacDowell, Mathilde Fajardy [15+5]

The sugar cane industry and BECCS in Brazil - Moreira [15+5]

Bridging technical and economic aspects of BECCS - Florian Kraxner [15+5]

Discussion – all [15]

12:15-13:15 Lunch

13:15-15:00 Session 5: Final discussion on the way forward

Session chair: Florian Kraxner

Four breakout groups, 2 of which address 1 of the below-mentioned questions on the way forward.
TBD: assign moderators who will also be responsible for assigning a rapporteur or report themselves.

- Compatibility LUNETs and FNS
 - Reconciling scales (how much land really is available etc.)
 - Reality check (policy constraints, inertia, other development objectives)
 - Etc.
- Necessary model/scenario development (keeping in mind what's already going on)
 - to provide robust LUNETs assessment (also considering NET potentials in other sectors)?
 - to comprehensively address also FNS (and possibly other SDGs)?

15:00-16:00 Wrap-up and next steps

Session chair: Sabine Fuss

- Four reports from the BOGs (5 minutes each)
- Last round of comments by all participants
- Wrap-up/farewell note by hosts

16:00 End of workshop

Workshop Coordination Team

Yoshiki Yamagata (yamagata@nies.go.jp)

Sabine Fuss (fuss@mcc-berlin.net)

Petr Havlik (havlikpt@iiasa.ac.at)

Florian Kraxner (kraxner@iiasa.ac.at)