IAM COMPACT

Expanding Integrated Assessment Modelling:
Comprehensive and Comprehensible Science
for Sustainable, Co-Created Climate Action

IAM COMPACT Modelling Seminars

Model Presentation: CLEWs

Division of Energy Systems, Department of Energy Technology, KTH Royal Institute of Technology

The IAM COMPACT project has received funding from the European Union's Horizon Europe Research and Innovation Programme under grant agreement No 101056306.

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- Applied from 2012 (a case of Mauritius)
- Climate, Land, Energy, Water systems framework
- A way to quantitatively assess links between the above
- Several tools can be used (**OSeMOSYS**, LEAP, WEAP, GAEZ most commonly)
- Used by, among others, UNDESA and UNDP
- Several interfaces available

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Applied at global, regional, national and sub-national scale.

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CLEWs categorised as a **Water-Energy-Food nexus** methodology.

Tool for **simultaneous consideration** of food, energy and water security questions from a sectoral and inter-sectoral perspective.

It fosters policy coherence by:

- Creating awareness of undesired impacts and co-benefits of sectoral policies
- Designing coherent national development policies that maximise benefits across energy, water and land use sectors while minimizing costs and adapting to climate change
- Devising strategies for using scarce resources efficiently
- Facilitating inter-institutional communications and even the adoption of common jargon

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- Techno-economic representations of real-world systems
- Designed to assess the role of technology change and technology choice
- Enables scenario-based analysis to evaluate risks and uncertainties
- Intended for long-term analysis of sustainable development issues (e.g. one or more decades)
- Highly customizable/flexible with respect to system boundaries, geographical coverage, level of detail and economic characteristics

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Different ways of creating a CLEWs model. Here two outstanding examples:

- All in OSeMOSYS: least-cost investments in and operation of water, energy and land use sectors to meet commodity demands; climate modelled exogenously; land system parameters exogenous;

- OSeMOSYS + WEAP: hydrological system simulated, water system variables fed to OSeMOSYS model, where the rest is optimised

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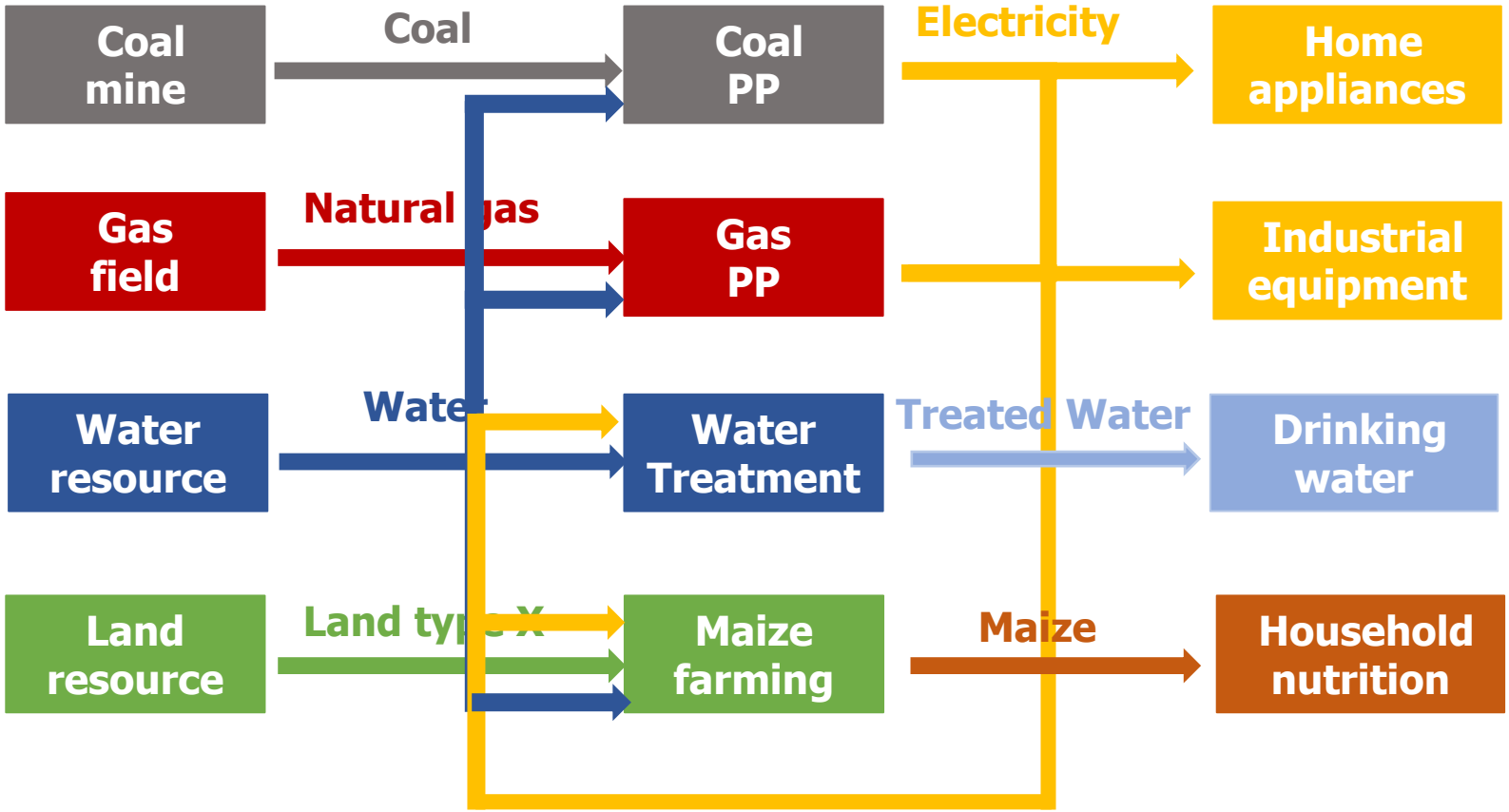

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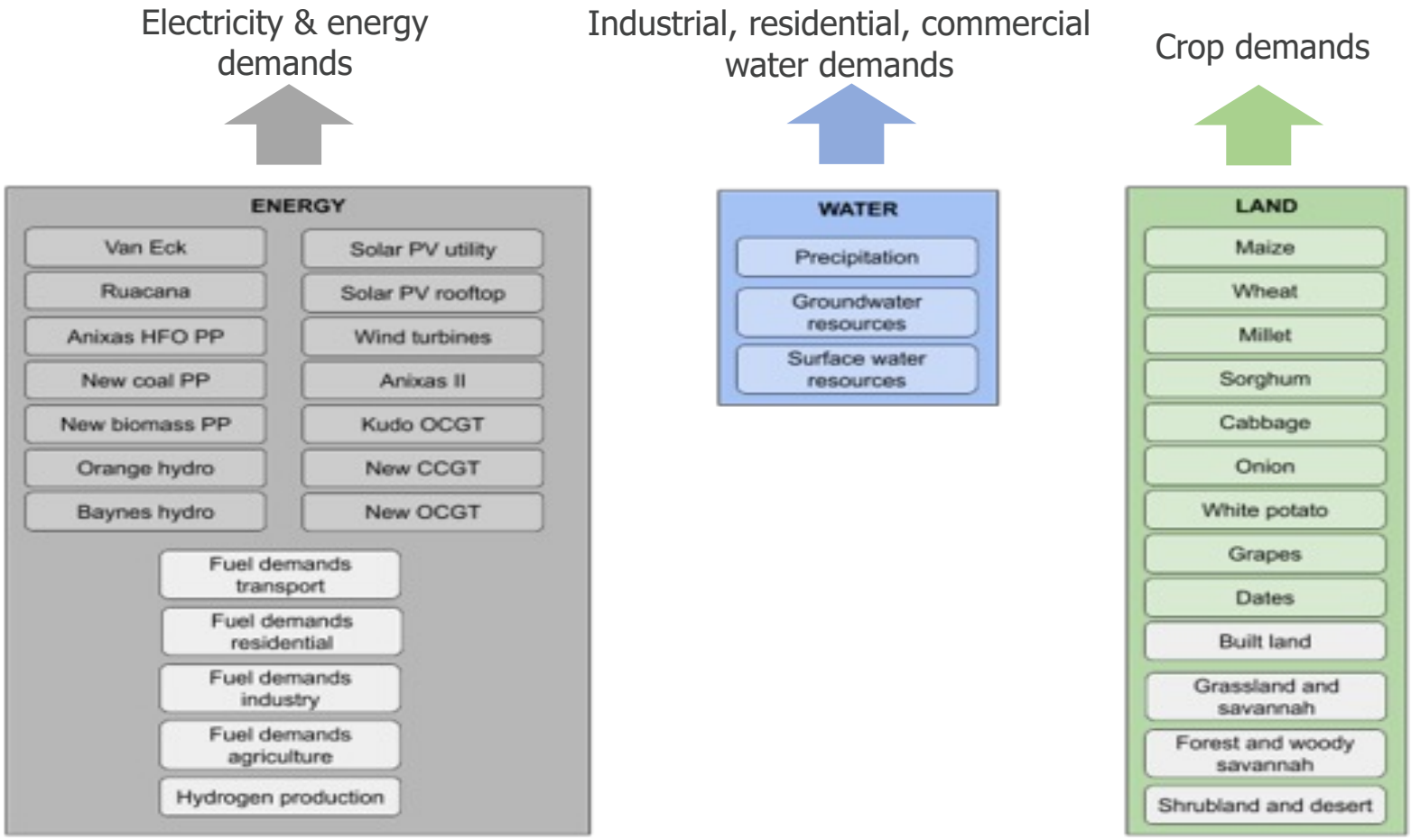
What are CLEWs models?



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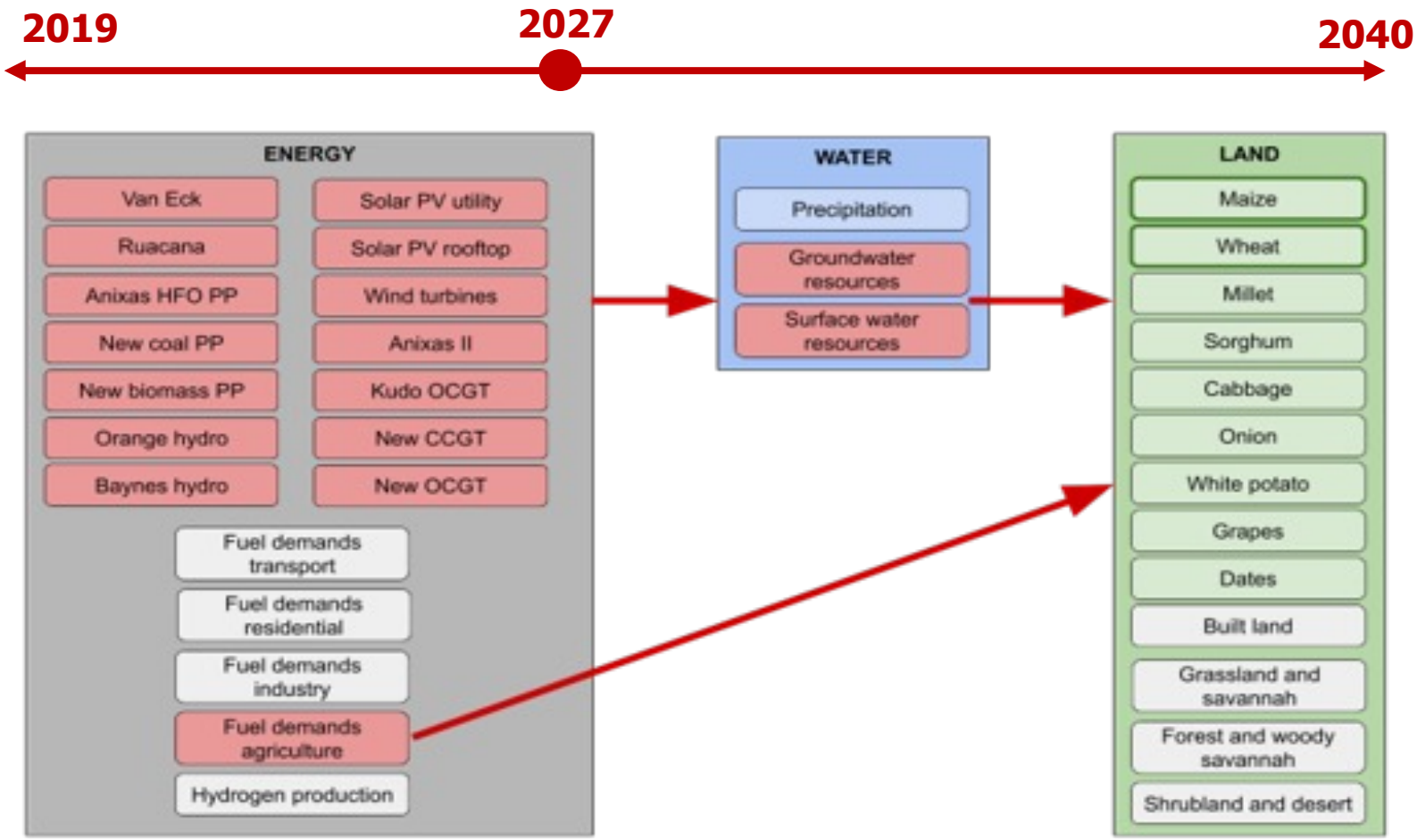

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The following policy instruments can be implemented, for one country/region or global, *on top of those for energy*:

- Water sharing / import agreements;
- Domestic food production / food imports limits / targets;
- Deforestation limits / afforestation policies;
- Land use change emission limits;
- Land use limits (e.g. limits for agricultural land uses);
- Land and water body restoration targets;
- Land conversion interventions (e.g. cleared land re-used for certain crops);

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- What co-benefits do renewables bring in terms of reduced water uses for the energy sector?
- What are the land use implications of investments in energy infrastructure?
- What are the water consumption implications of food security targets and how can these be mitigated by modernisation of agricultural practices?
- What are the implications of water supply investments for energy uses? (e.g. for pumping, or for desalination)
- What are the implications of agricultural developments for energy uses (e.g. for pumping irrigation water, for production of fertilisers and chemicals, for agricultural activities)

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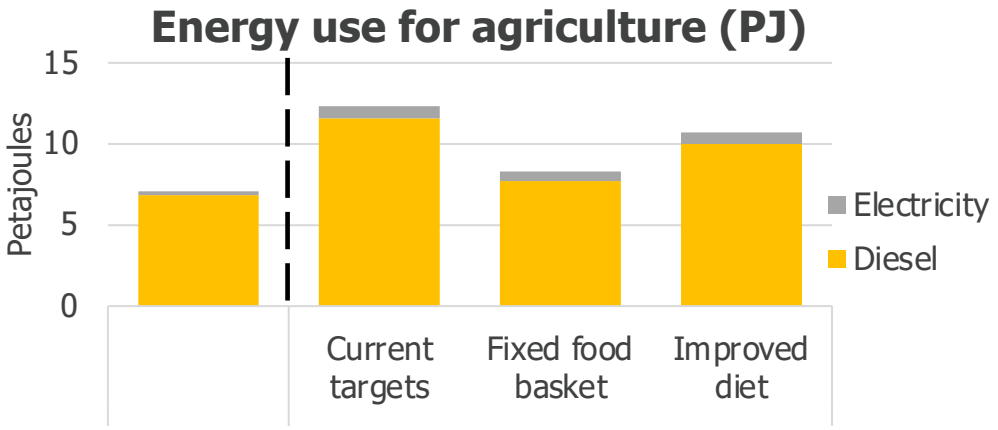

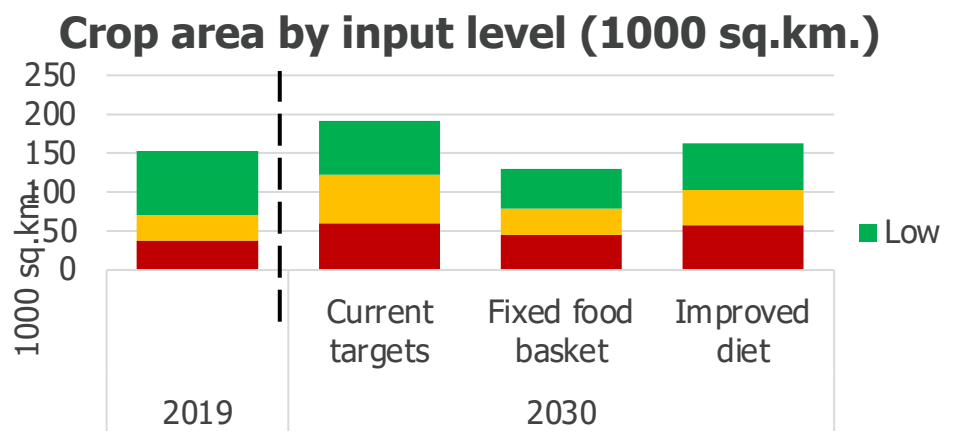

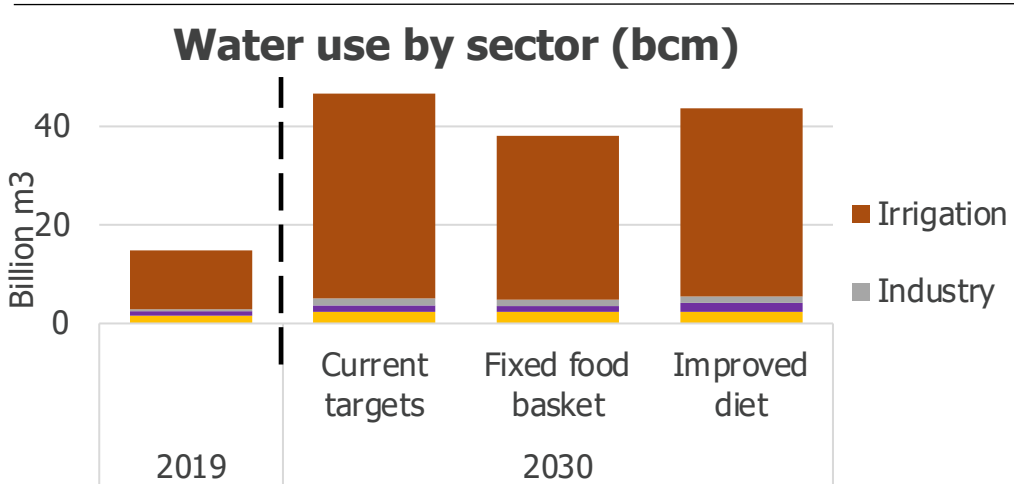

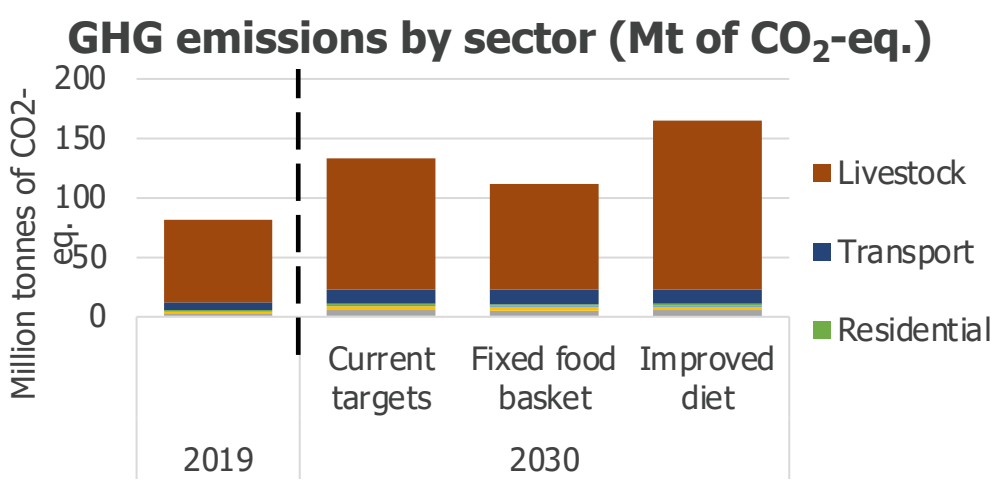

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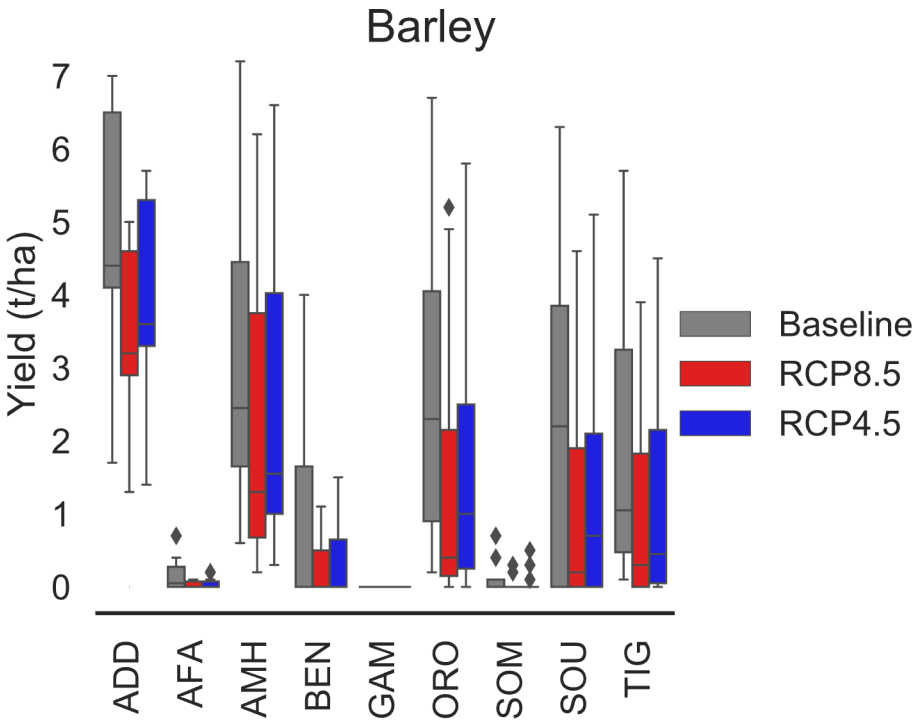

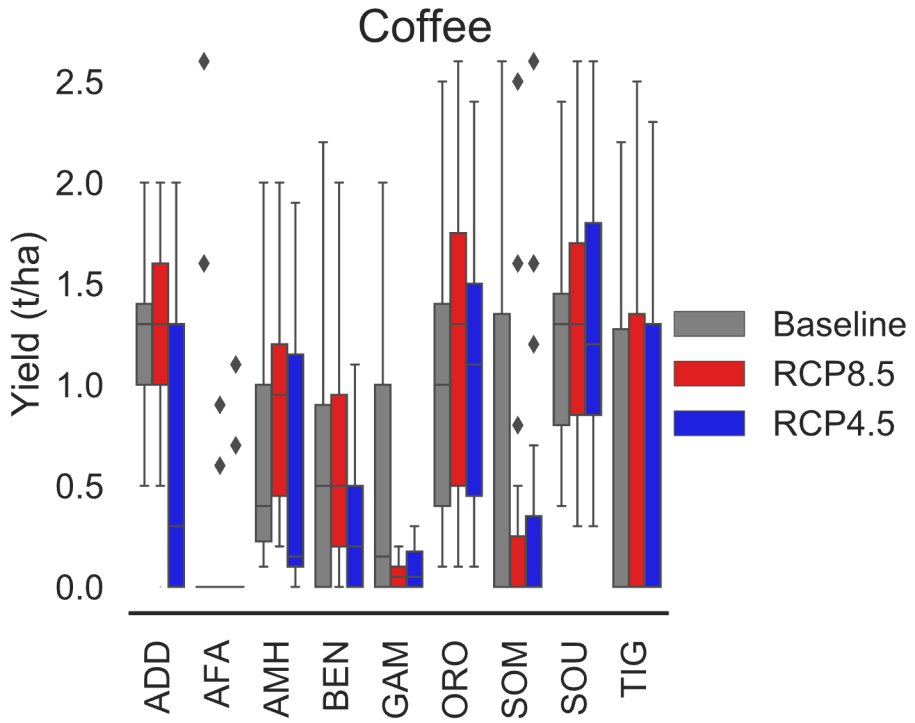

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SDG	Details
§3. Health (e.g., air-pollution related mortality)	Same as for OSeMOSYS
§6. Clean water and sanitation	Calculation of investment and operation of water supply solutions to meet water demands; use of water by land uses and energy system that meets demands, constraints, and least cost criteria
§7. Affordable and clean energy	Same as for OSeMOSYS
§8. Decent work & economic growth	Same as for OSeMOSYS
§13. Climate action	Effects of climate changes on energy, water and land uses (e.g. less water availability, lower crop yields, higher evapotranspiration, etc.); energy and land use/change emissions
§15. Life on land	Optimisation of land uses

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Thank you!

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