



Results on Bioenergy in the IPCC Special Report on Renewable Energy Sources & Climate Change Mitigation

Ethanol Summit

Land use, food security and the future of biofuels

Sao Paulo - Brazil, 6-7th June 2011

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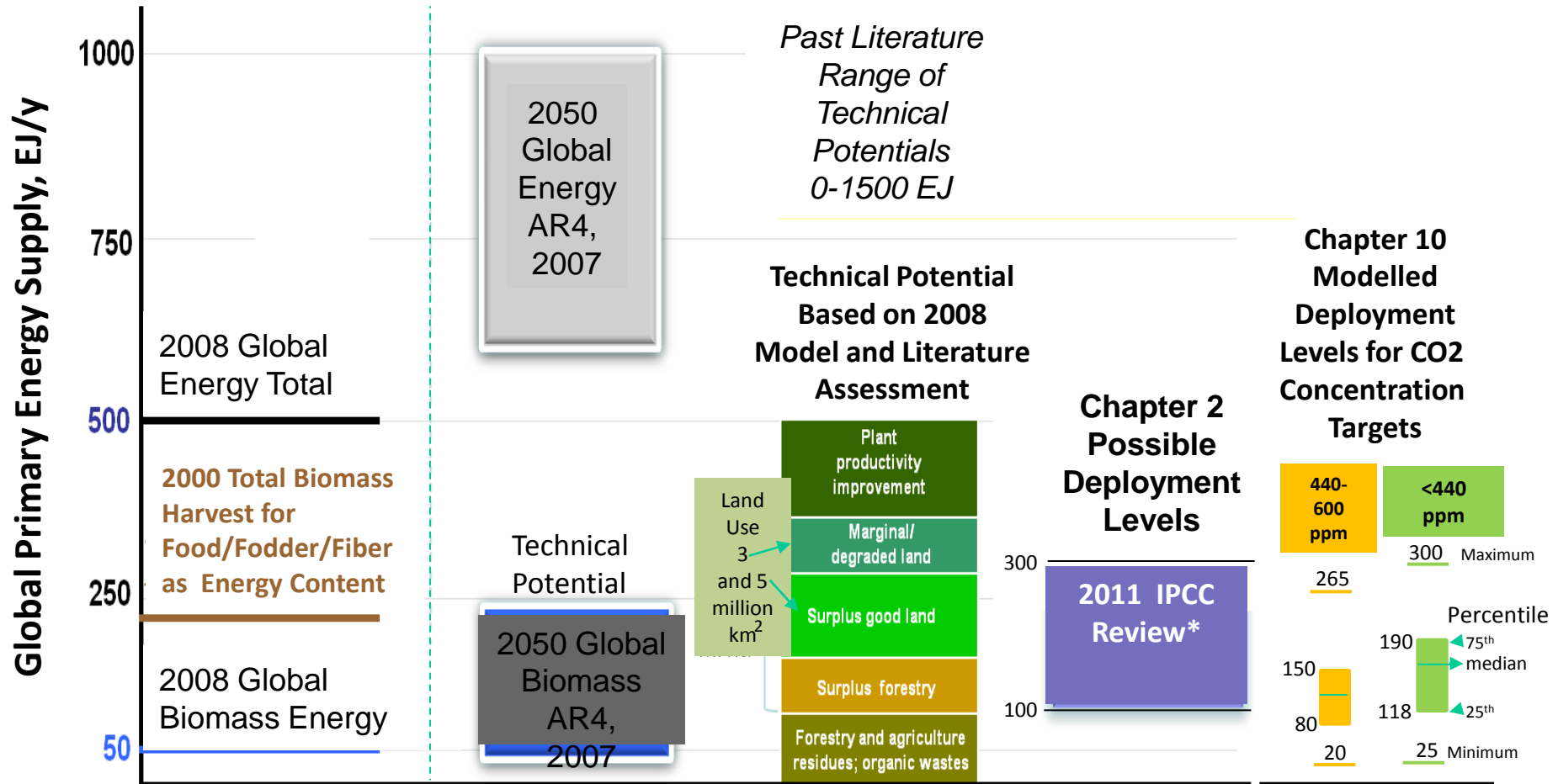
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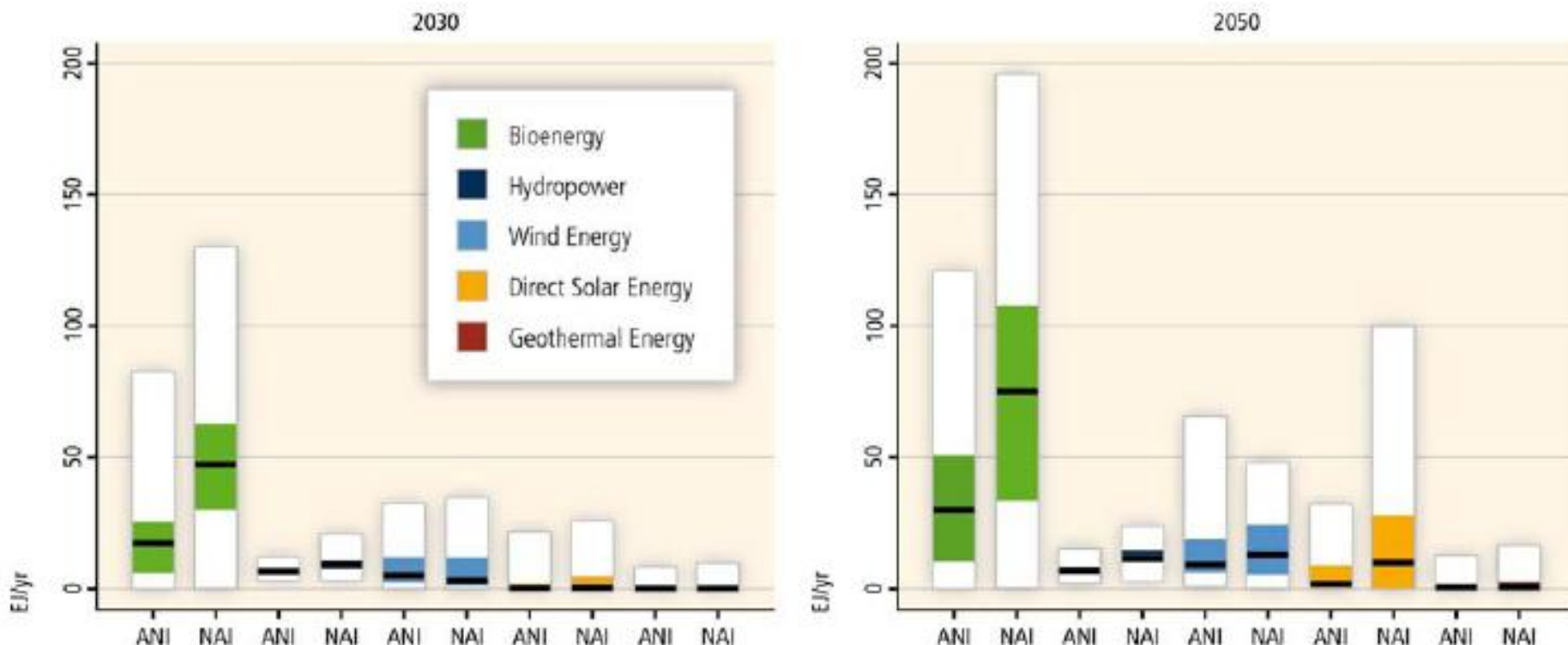
CLA Bioenergy IPCC - SRREN



2050 Bioenergy Potentials & Deployment Levels



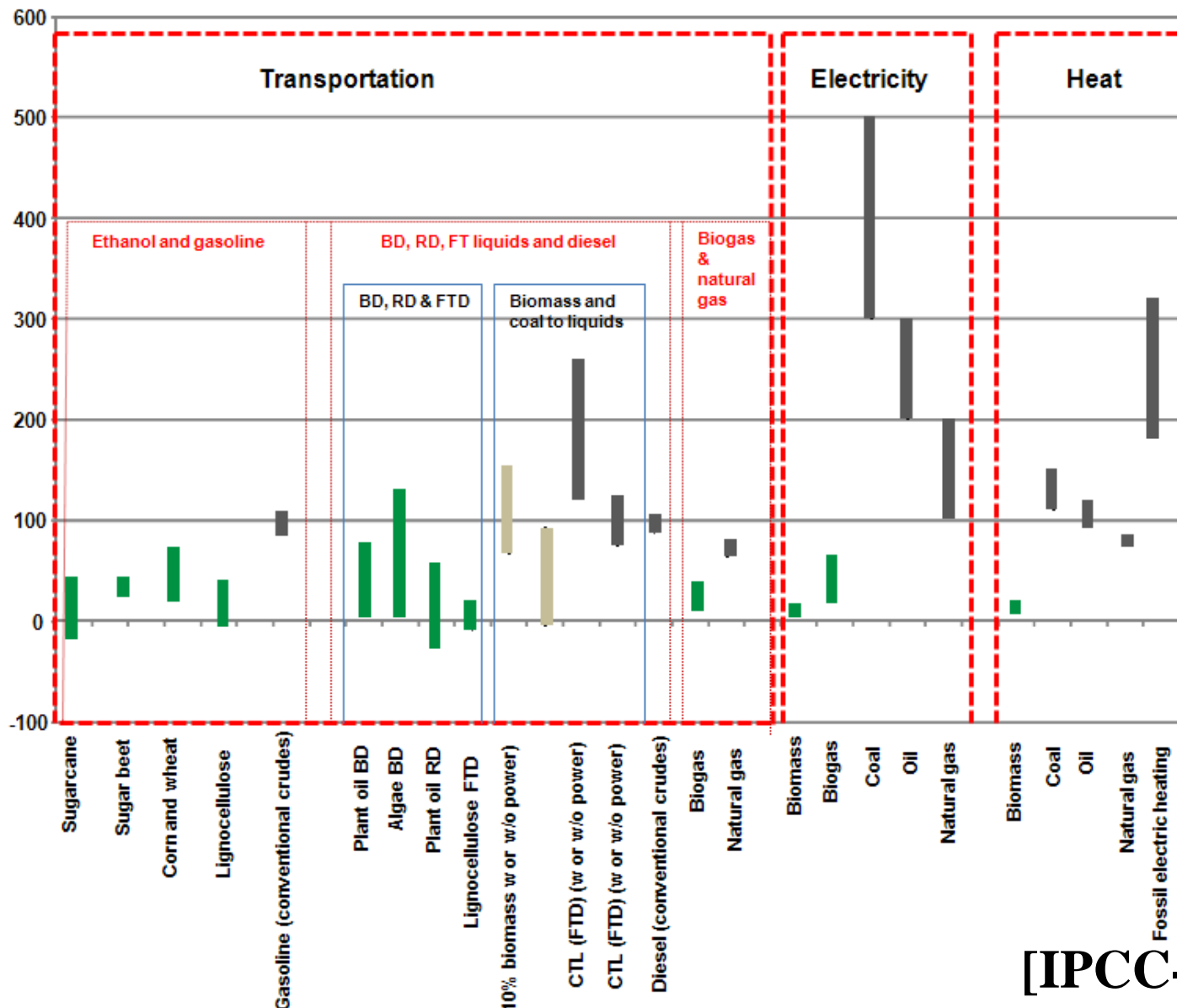
Global RE supply by source in Annex I (ANI) and Non-Annex I (NAI) countries in 164 long-term scenarios (2030 and 2050).



Thick black line = median,
Coloured box = 25th-75th percentile,
Whiskers = total range across all reviewed scenarios.



GHG/MJ of major modern bioenergy chains vs. conventional fossil fuel options



**Excluding
(i)LUC
effects;
these can
have
strong
impacts**



Status iLUC (an opinion)

- Diverging outcomes; more sophisticated approaches; from 0.8 to later analyses: 0.3 -> 0.2.
- More detailed regional studies: depends highly (Fully...) on rate of improvement in agricultural and livestock management.
- CGE: extrapolates past developments, very sensitive to input data, poor in tackling technological change...
- iLUC is a **reactive** concept while we actually want to be **proactive** in avoiding it altogether...
- Why 2 dozen studies on defining iLUC factors and (almost) none on mitigation of iLUC? [Faaij, 2011]





Biomass & climate change.

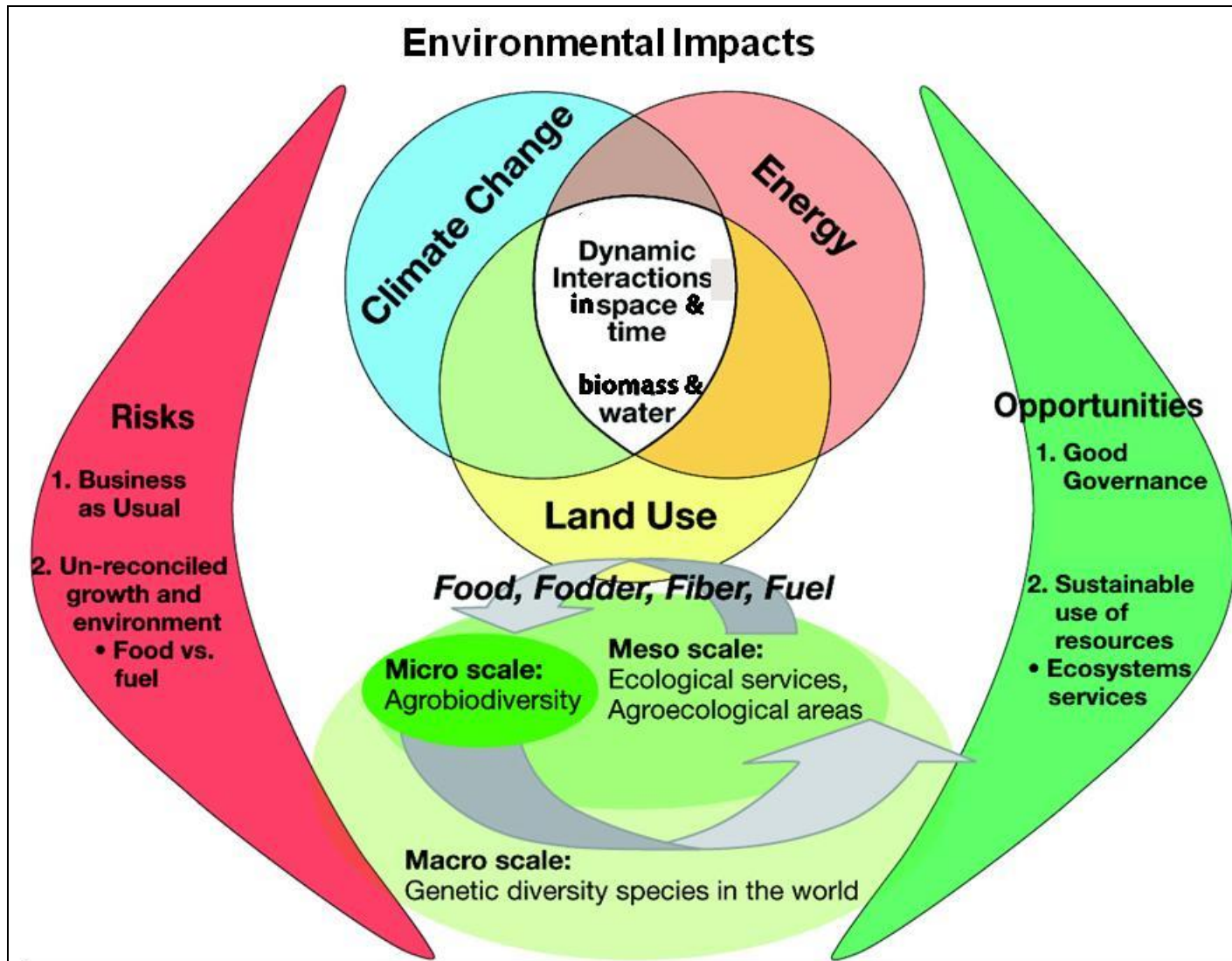
The technical potential for bioenergy is influenced by climate change through impacts on biomass production (via altered soil conditions, precipitation, crop productivity and other factors), but details remain poorly understood.

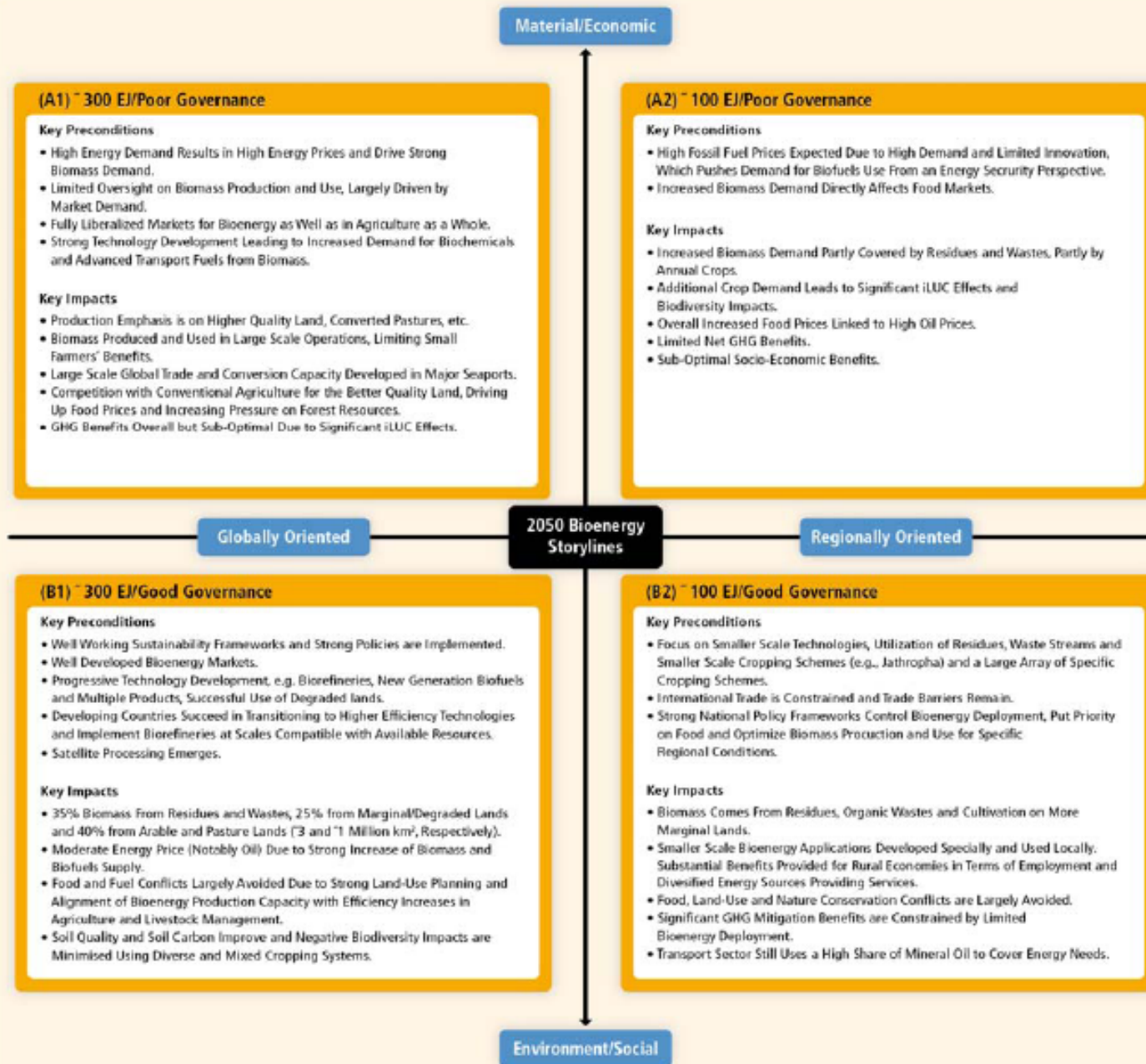
The overall impact of a global mean temperature change of below 2°C on the technical potential of bioenergy is likely to be relatively small on a global basis, but considerable regional differences can be expected.





Driving forces, dimensions, scales...





Opposing sketches for the scenario preconditions, technological challenges, and impacts for bioenergy deployment on long term following Typical IPCC SRES.





Key conclusions (I)

- Technical potential of 500 EJ/year by 2050, with large uncertainty around market and policy conditions that affect this potential.
- 100-300 EJ/year possible deployment levels by 2050. Major challenge but would contribute up to 1/3 to the world's primary energy demand in 2050.
- Bioenergy has significant potential to mitigate greenhouse gases if resources are sustainably developed and efficient technologies are applied.
- “For the increased and sustainable use of bioenergy, proper design, implementation and monitoring of sustainability frameworks can minimize negative impacts and maximize benefits with regard to social, economic and environmental issues.”





Key conclusions (II)

- The impacts and performance of biomass production and use are region- and site-specific.
- Key options:
 - E.g. sugarcane ethanol production, waste to-energy systems, efficient cookstoves, biomass-based CHP are competitive
 - Lignocellulosic-based fuels, advanced bioelectricity options, and biorefinery concepts can offer competitive deployment of bioenergy in 2020 - 2030. Bio-CCS can offer negative carbon emissions.
 - Advanced biomaterials promising but less understood.
 - Potential role aquatic biomass (algae) highly uncertain.
- Rapidly changing policy contexts, recent market activity, increasing support for advanced biorefineries & lignocellulosic biofuel options, and in particular the development of sustainability criteria and frameworks, push bioenergy systems and their deployment in sustainable directions.

[IPCC-SRREN, 2011]





Thank you!

Questions welcome

