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## Biomass in the time of climate change

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## Propositions

Belonging to the dissertation:

### **Biomass in the time of climate change**

An integrated modeling framework to capture the spatiotemporal complexity of bio-based value chains and other low-carbon options demonstrated for the Colombian energy system.

Ahmed Younis

1. The longer it takes to mitigate absolute GHG emissions, the higher the need for negative emission technologies – including BECCS – to meet the Paris agreement goal. Bringing these technologies up to scale over the coming decades will require immediate action.
2. Bioenergy lies in the nexus between the energy and land-use sectors. Addressing climate change mitigation in each of these sectors separately dismisses opportunities for synergies and could lead to lower achievements or a higher cost for the economy.
3. Putting all bets on electrification and variable renewable electricity and taking hydropower for granted can be a risky gamble for countries where hydroclimatic phenomena like El Niño oscillations shake electricity markets. Diversifying the energy mix and integrating advanced bioenergy could be part of adapting to erratic climate patterns.
4. Colombia possesses favorable socioeconomic and geopolitical conditions to demonstrate the potential of the bioeconomy and its contribution to sustainable development.
5. Bioenergy crops cannot deliver their promised benefits while deforestation is still happening. Eliminating deforestation in Colombia is not only a matter of changing agricultural production but also consumption patterns, both domestic and exports. Responsible land zoning and certification of sustainable biomass use should be in place.
6. The oil sector has the knowledge, infrastructure, and – under the right conditions – the incentive to be an ally in the energy transition. Cancel culture can be counterproductive.
7. Quantitative models can provide useful input to designing bioeconomy roadmaps. Tailored bottom-up tools can provide more detailed insights to national economies than global models.
8. Regionalized national energy system models can identify potential sub-national contributions to national goals, as a step towards detailed analysis and cross-validation at sub-national scale.
9. The transition towards a more sustainable society requires multidisciplinary collaboration.
10. “Consistency is the playground of dull minds” (Yuval Noah Harari). Breaking old patterns takes stepping out of the comfort zone, exploring uncharted territories, and learning from mistakes.