

The role of biomass for the Belgian energy transition. Focus on lignocellulosic feedstock.

2nd BERA Workshop on Bioenergy
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Short introduction to BEST study

The development of an holistic model will provide a deep insight in the role of these carriers in the energy system, as well as their energy and economic costs.

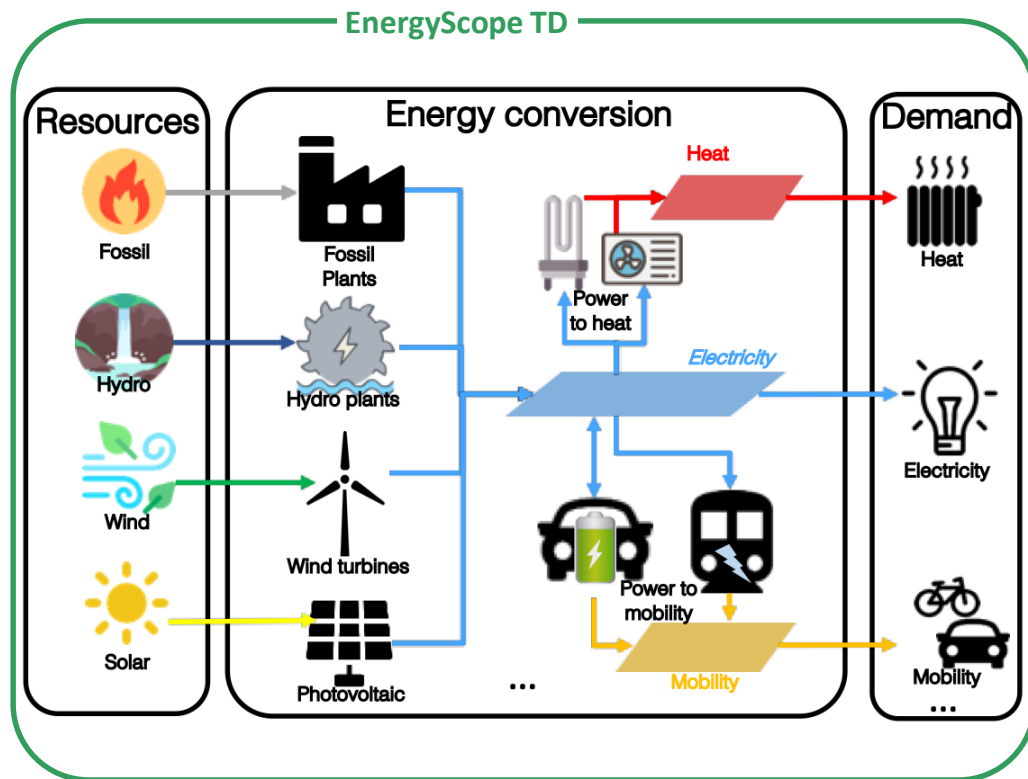
The key issues of the uncertainties on the current state and the future of the system will be analyzed through a robust optimization approach.

The impact of the integration of these carriers on the electricity grid is included in the study as well as several ways to improve the total efficiency of the use of these renewable fuels for different applications.

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EnergyScope TD: a whole-energy system model to minimize the total cost



**Multi-sector
and multi-carrier**

**Optimization of investment
& operation strategies**

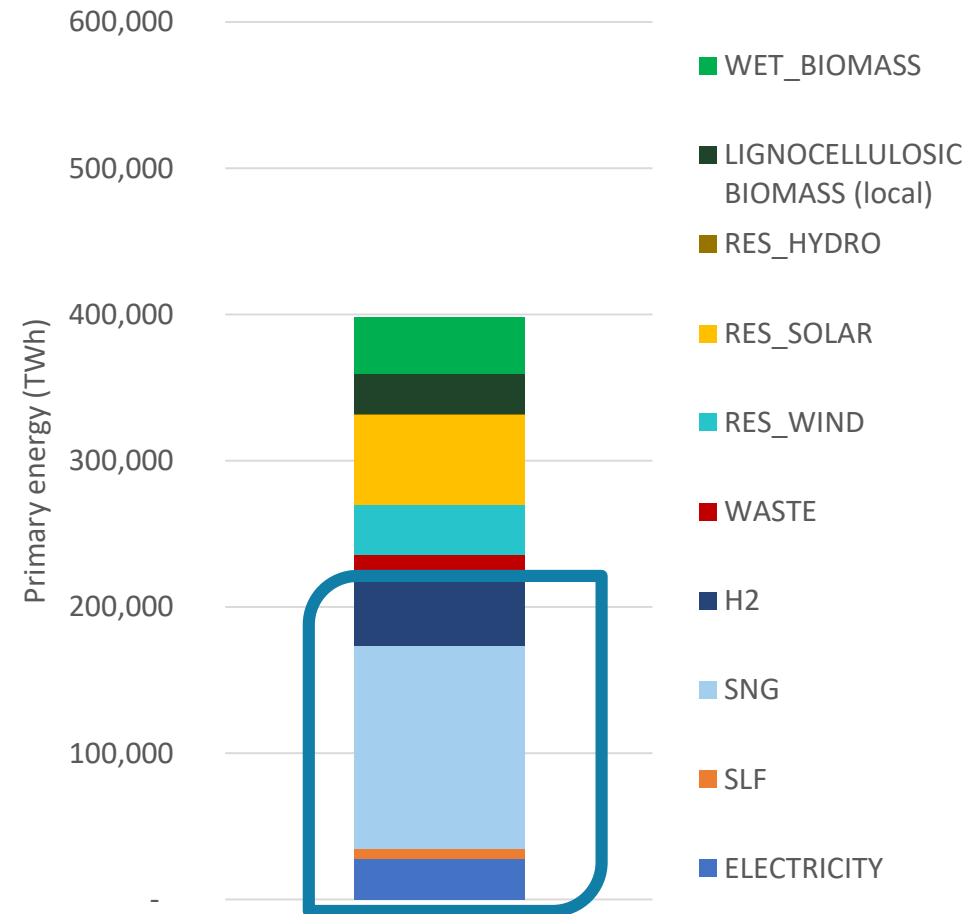
Snapshot modeling approach
optimization of a target future year

Hourly resolution
necessary for high integration
of renewables and storage

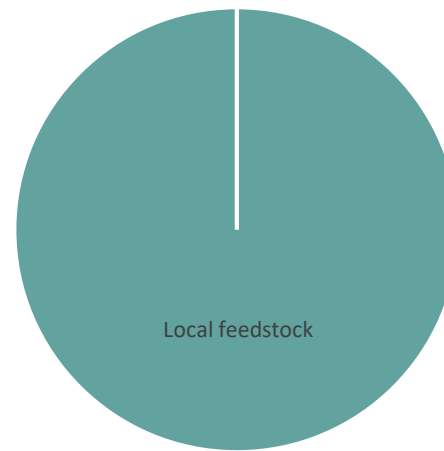
The Belgian case – carbon neutrality

Standard case
No import of biomass considered

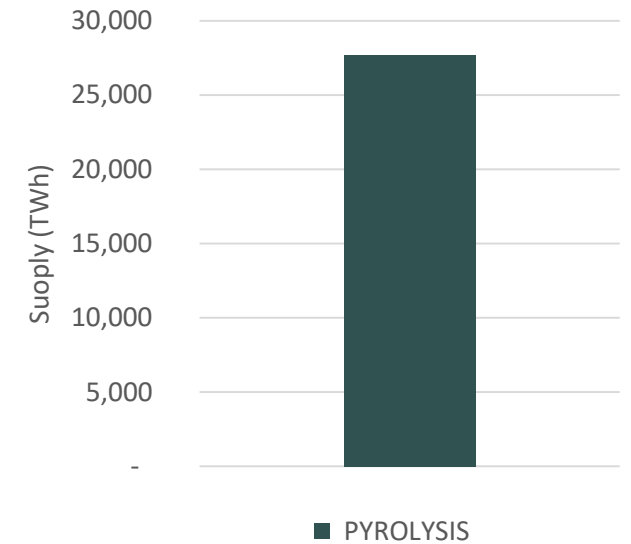
Primary energy of the system



Lignocellulosic biomass repartition



Lignocellulosic biomass uses



→ What quantity of imported biomass could be available for Belgium? At what prices ?

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→ How the biomass will be used by the Belgian energy system, for which final uses (and thus with what technologies)?

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→ What would be the Energy Returned On Investment (EROI) of this imported biomass ?

Primary feedstock - Imports are key

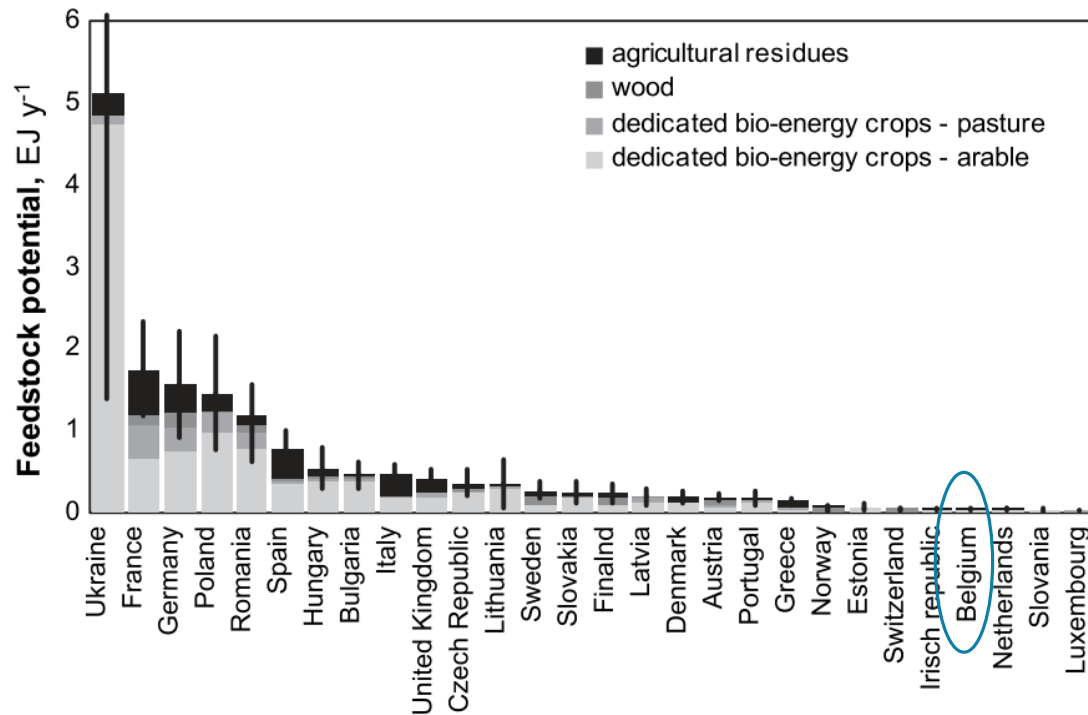
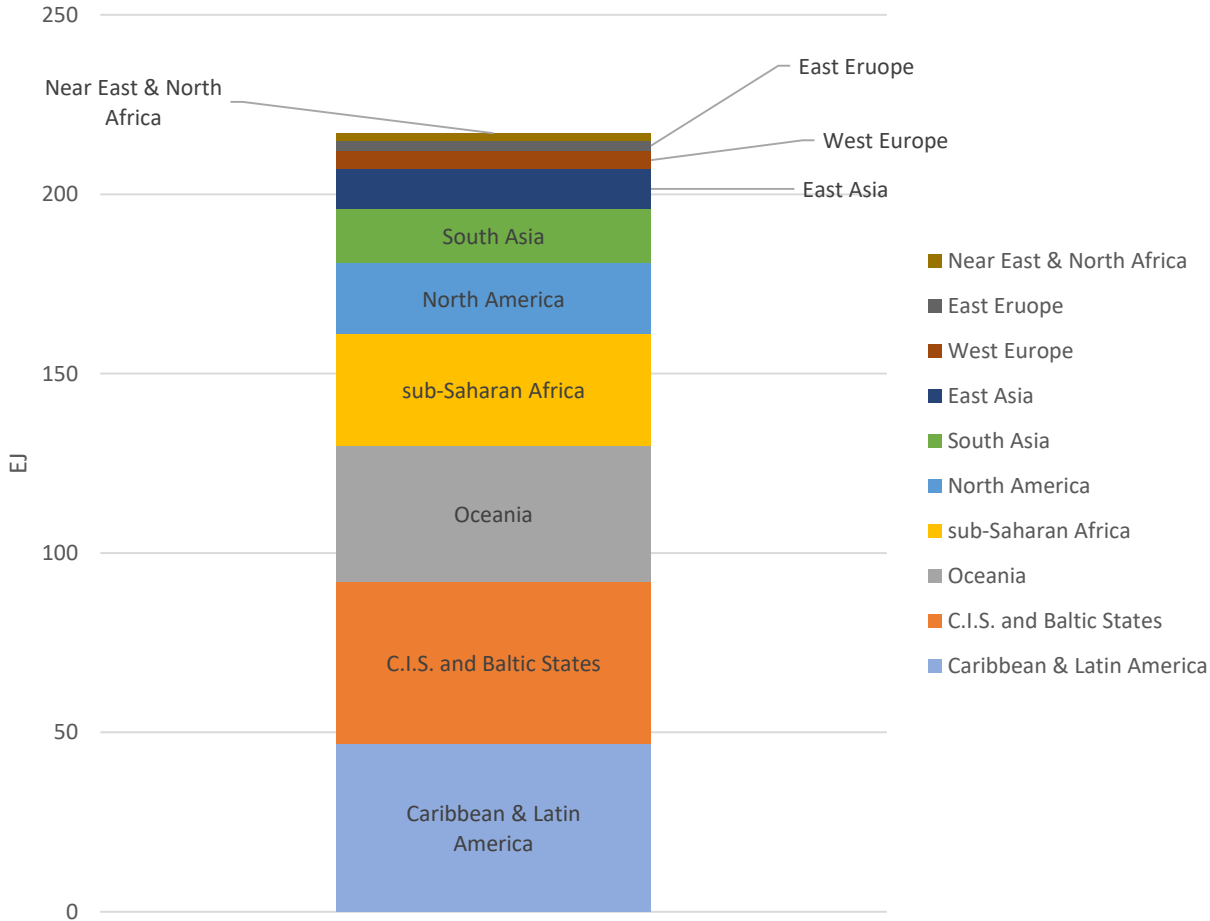


Fig. 6 - Country-specific annual biomass feedstock supply potential by 2030.

De Wit & Faaij, 2010

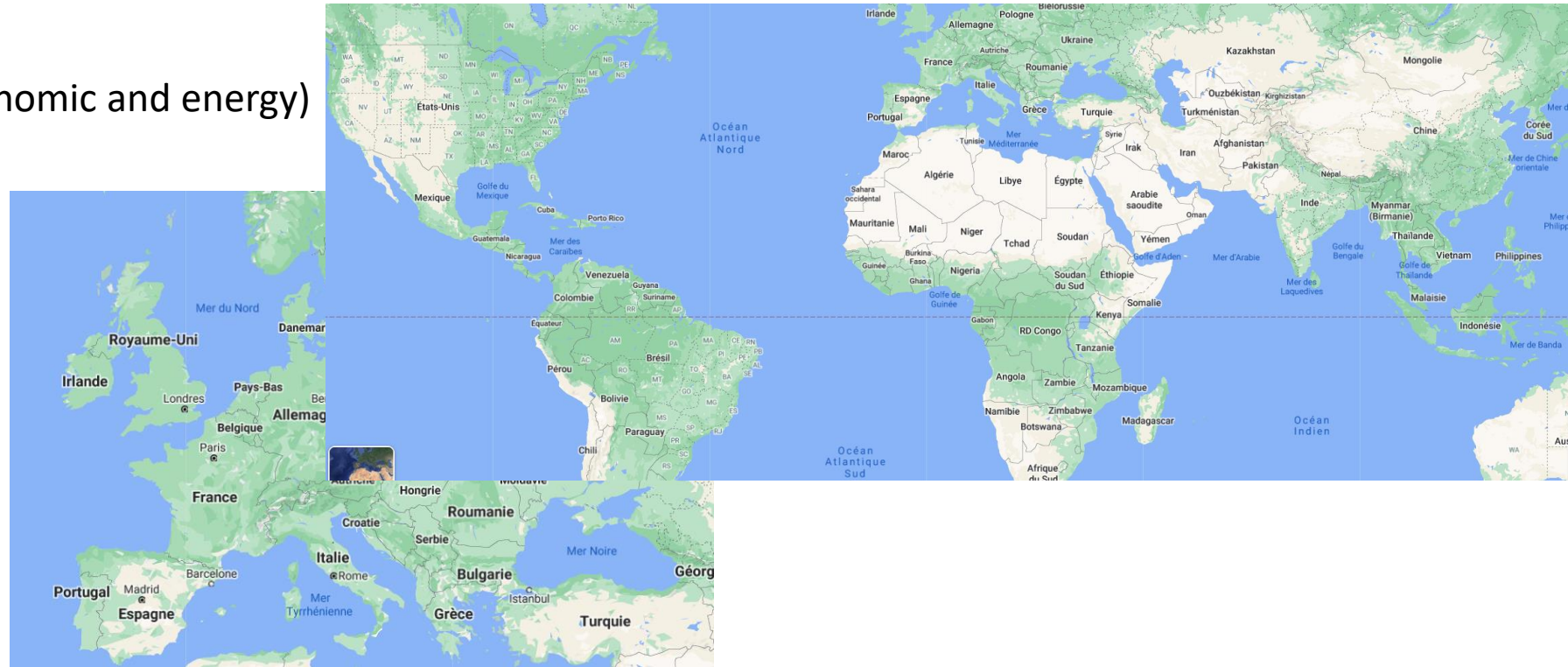
Primary feedstock - Imports are key



Adapted from data of Scenario 1 from Smeets E, Faaij A, Lewandowski I. A quickscan of global bio-energy potentials to 2050: An analysis of the regional availability of biomass resources for export in relation to the underlying factors. vol. Report NWS. 2004.

Primary feedstock - Imports are key

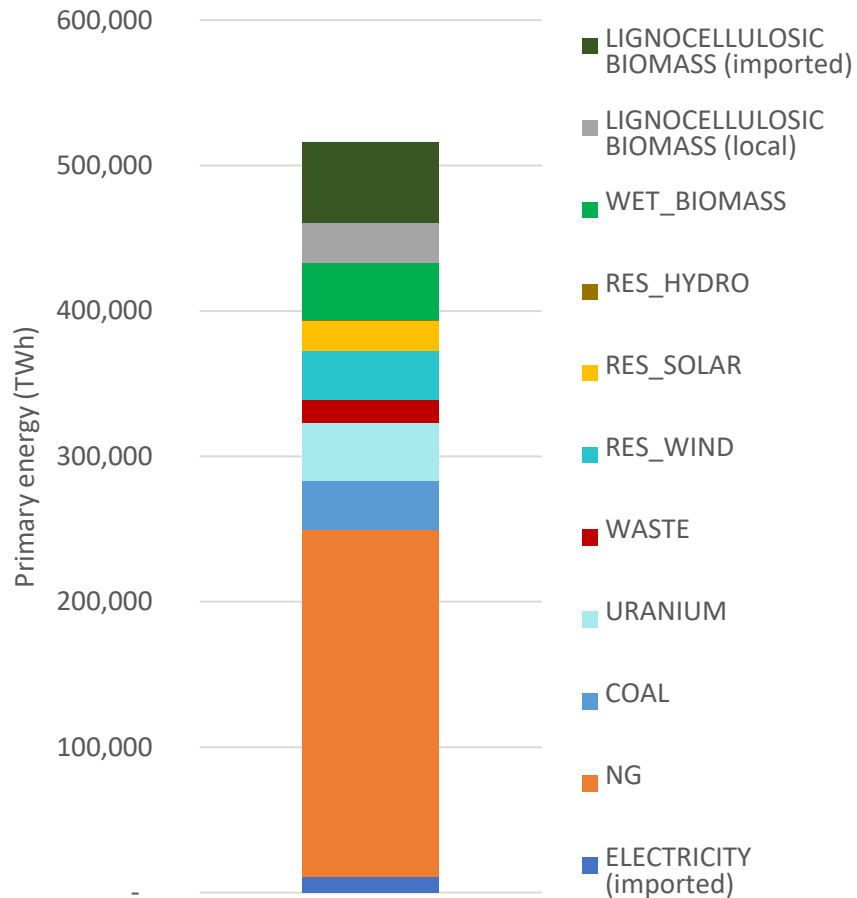
- ➔ Different categories of import
- ➔ Different potential & prices (economic and energy)



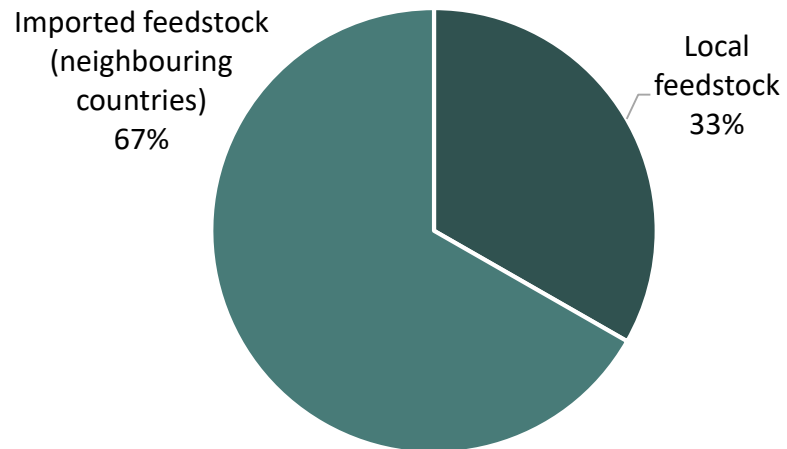
What final use, what technology ?

For GHG reduction of 40% - Belgian case
With import of lignocellulosic biomass allowed

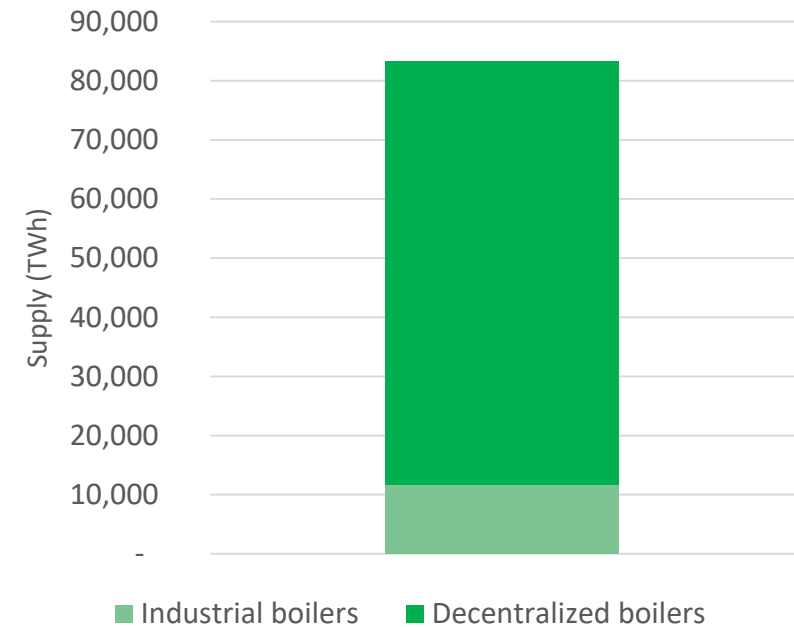
Primary energy of the system



Lignocellulosic biomass repartition



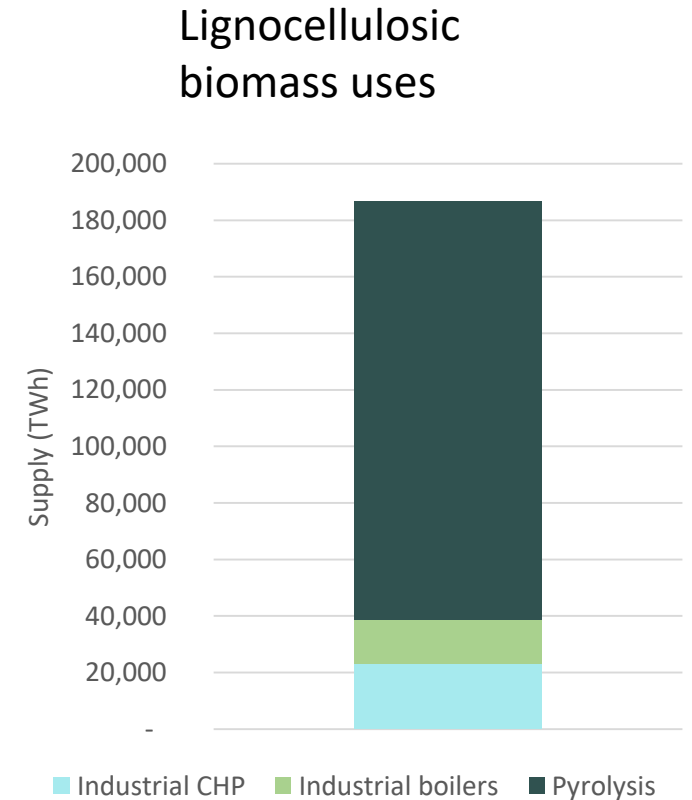
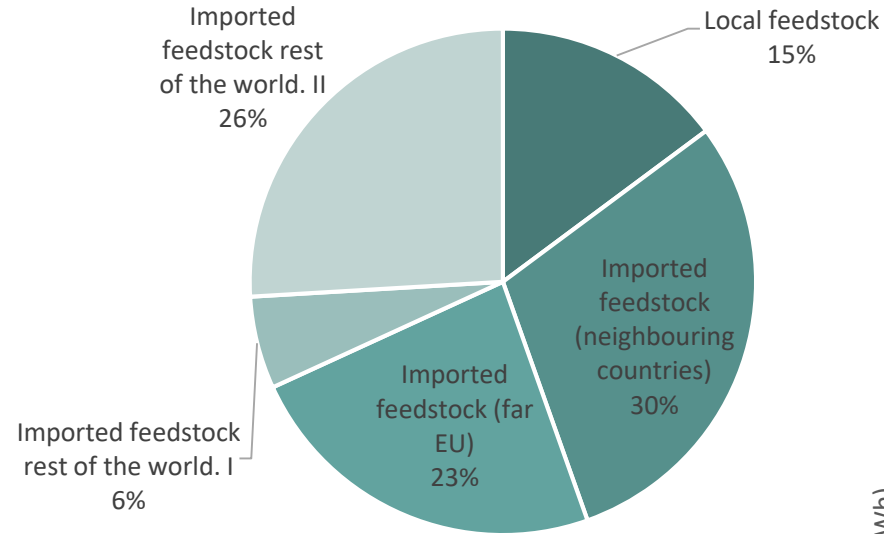
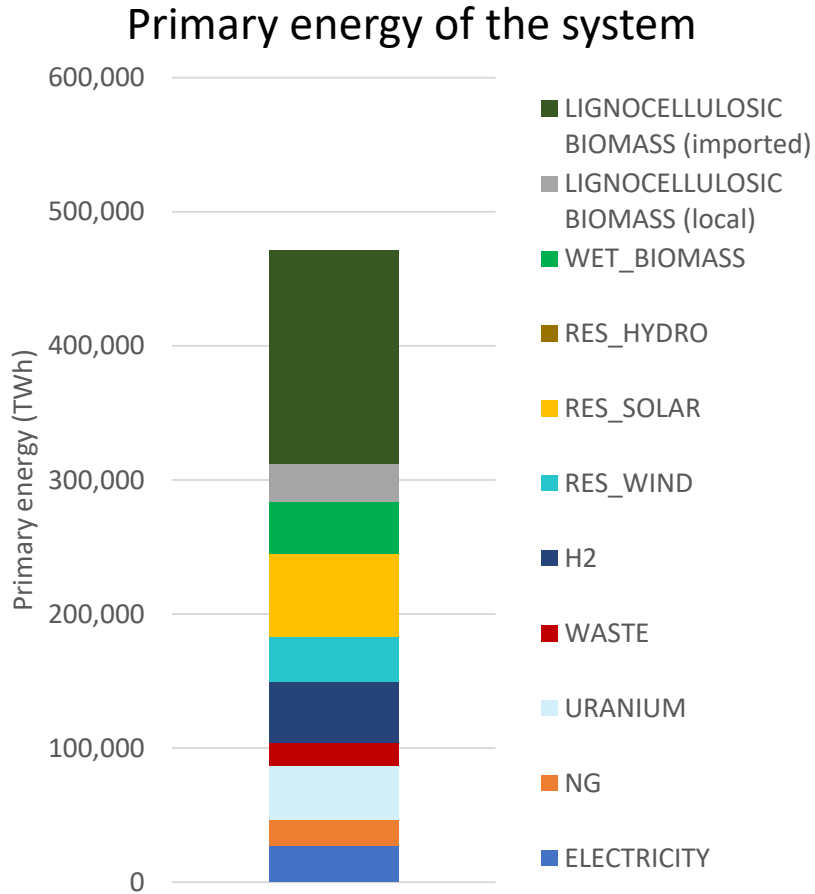
Lignocellulosic biomass uses



What final use, what technology ?

For GHG reduction of >95% - Belgian case
With import of lignocellulosic biomass allowed

Lignocellulosic biomass repartition

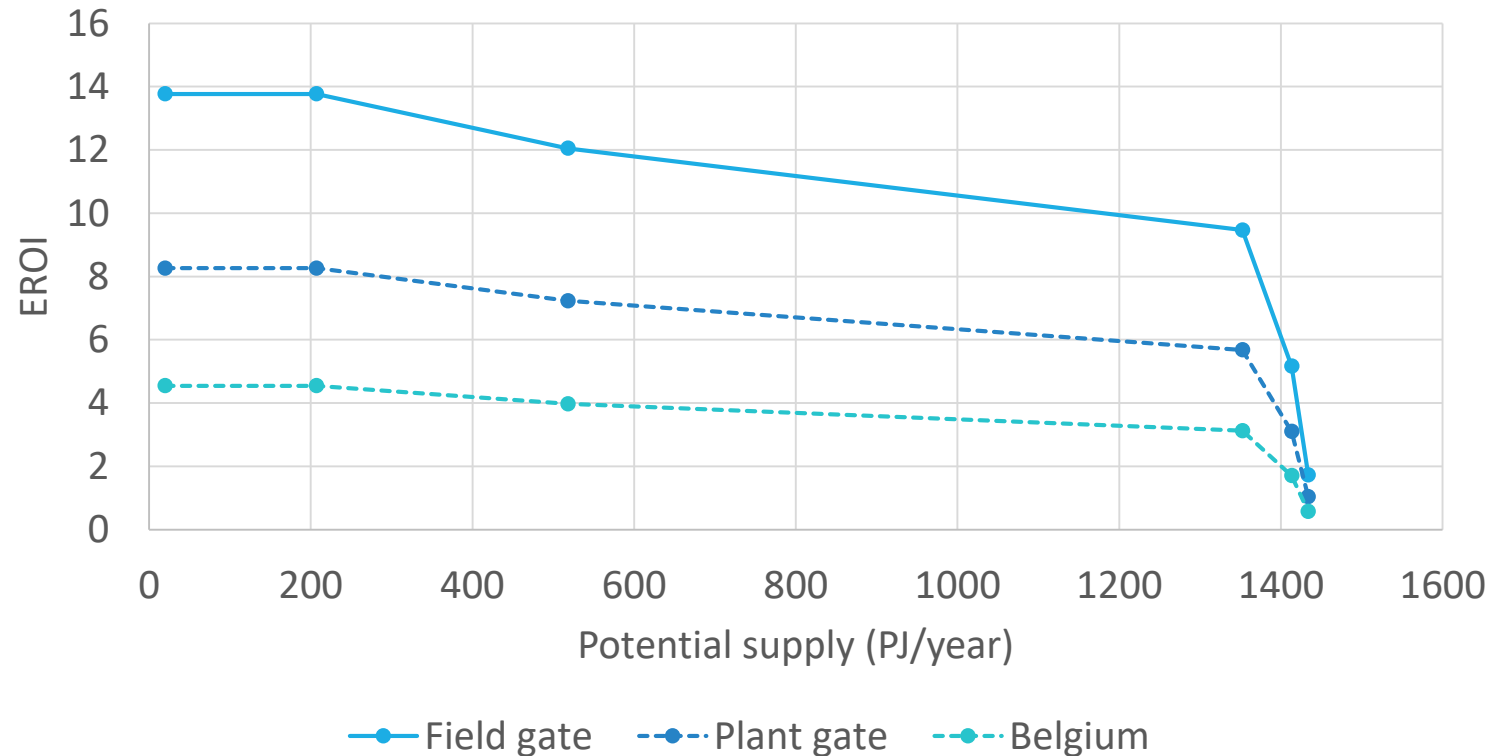


Illustrative estimations of the distribution of EROI Poplar in Ukraine

$$EROI = \frac{\text{Gross Energy Produced}}{\text{Local Energy Inputs} + \text{Upstream Energy Inputs}}$$

Based on assumptions (yield and land distribution) given in the article Smeets , Faaij & Lewandowski I. (2005).

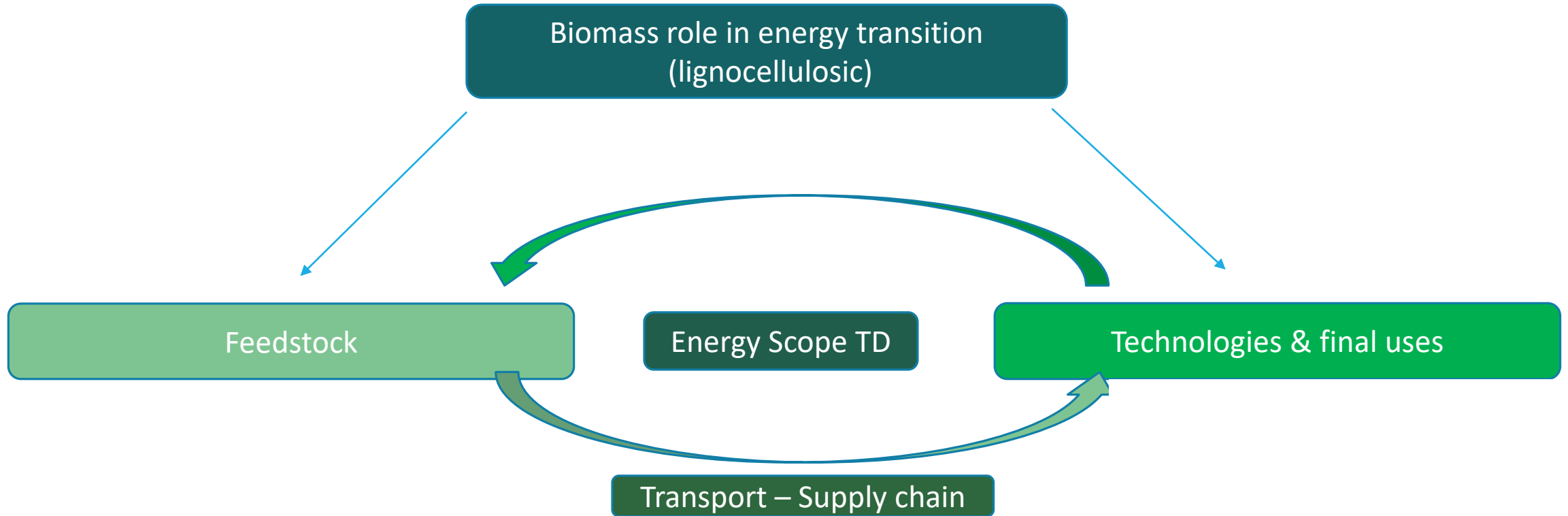
& based on assumptions given in the article Fazio & Barbanti (2014) for energy inputs (rough estimations)



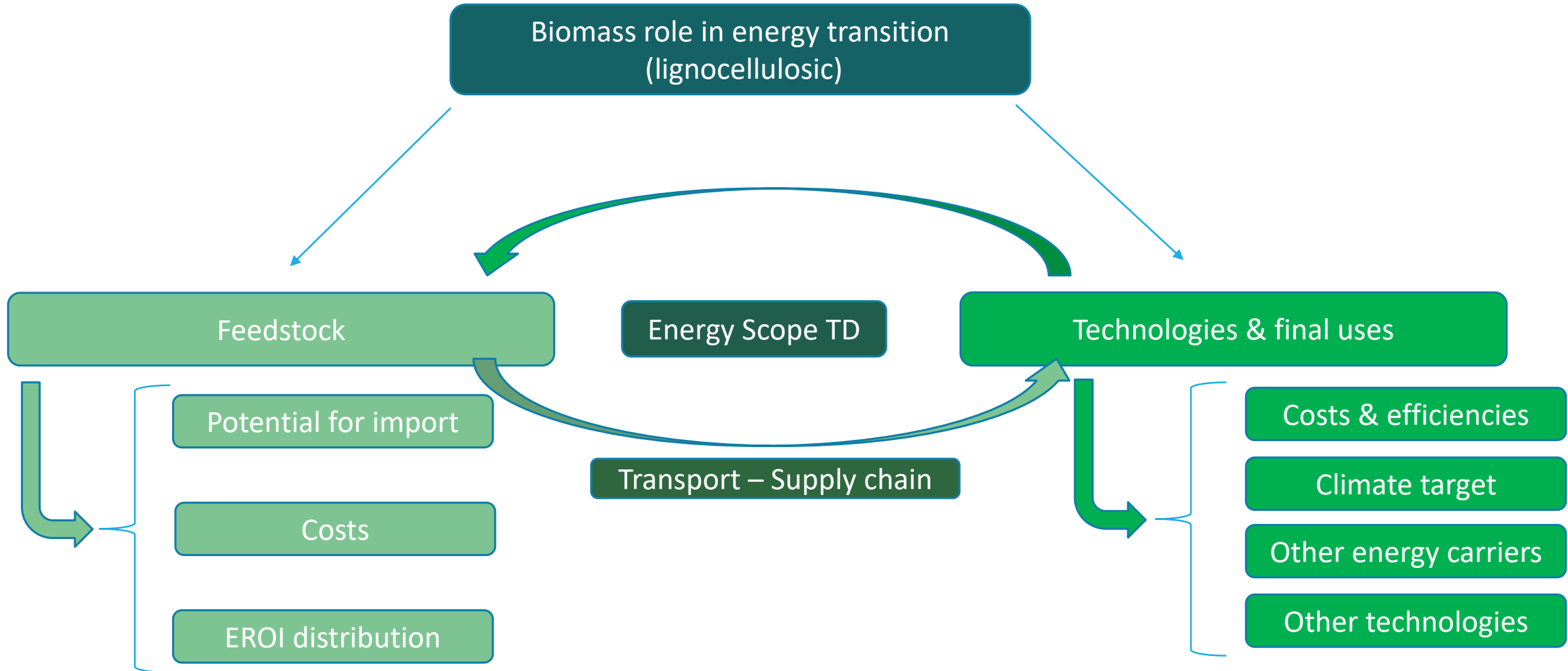
Summary

Biomass role in energy transition
(lignocellulosic)

Summary



Summary



Thank you for your attention

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