

# Central European Leaders of Bioeconomy Network



## CELEBio

*FOSTERING BIOECONOMY IN CENTRAL, EAST AND SOUTH-EAST EUROPE. THE EXPERIENCE OF CELEBIO PROJECT IN THE CZECH REPUBLIC, SLOVAKIA, HUNGARY, SLOVENIA, CROATIA AND BULGARIA*

# Project CELEBIO – Assessment of the biomass potential in Czech Republic

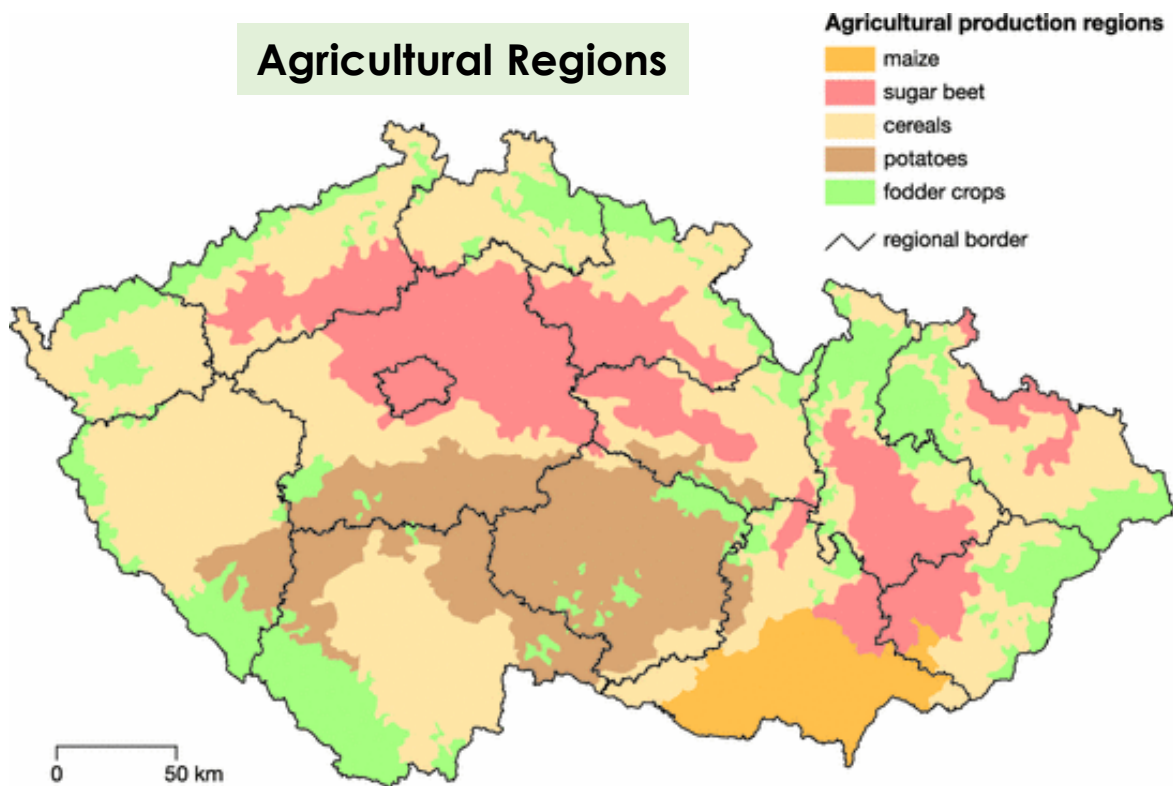
## Markus Dettenhofer PhD

30 November 2020

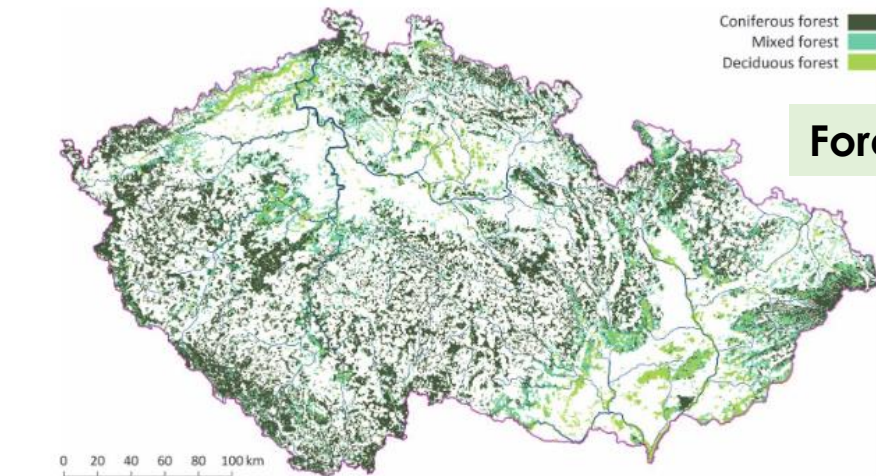


Category	Czech Republic	Unit
Population	10.6	million (2018)
Area (total)	8	million ha (2018)
% population in urban areas	25.0	% of total population (2018)
% territory predominantly rural	36.8	% of total territory (2018)
% territory predominantly urban	14.5	% of total territory (2018)
Agricultural Area	3.5	million ha (2016)
Forest area	2.67	million ha (2016)
Population density	135	n°/km <sup>2</sup> (2018)
Agricultural Area per capita	0.33	ha/capita(2016)
Forest area per capita	0.27	ha/capita(2016)
GDP/capita	19397	at current prices in 2018
	27483	GDP at purchasing power in 2018
GVA by Agriculture, forestry and fishing	2.2	% of total GVA (2018)

### Agricultural Regions



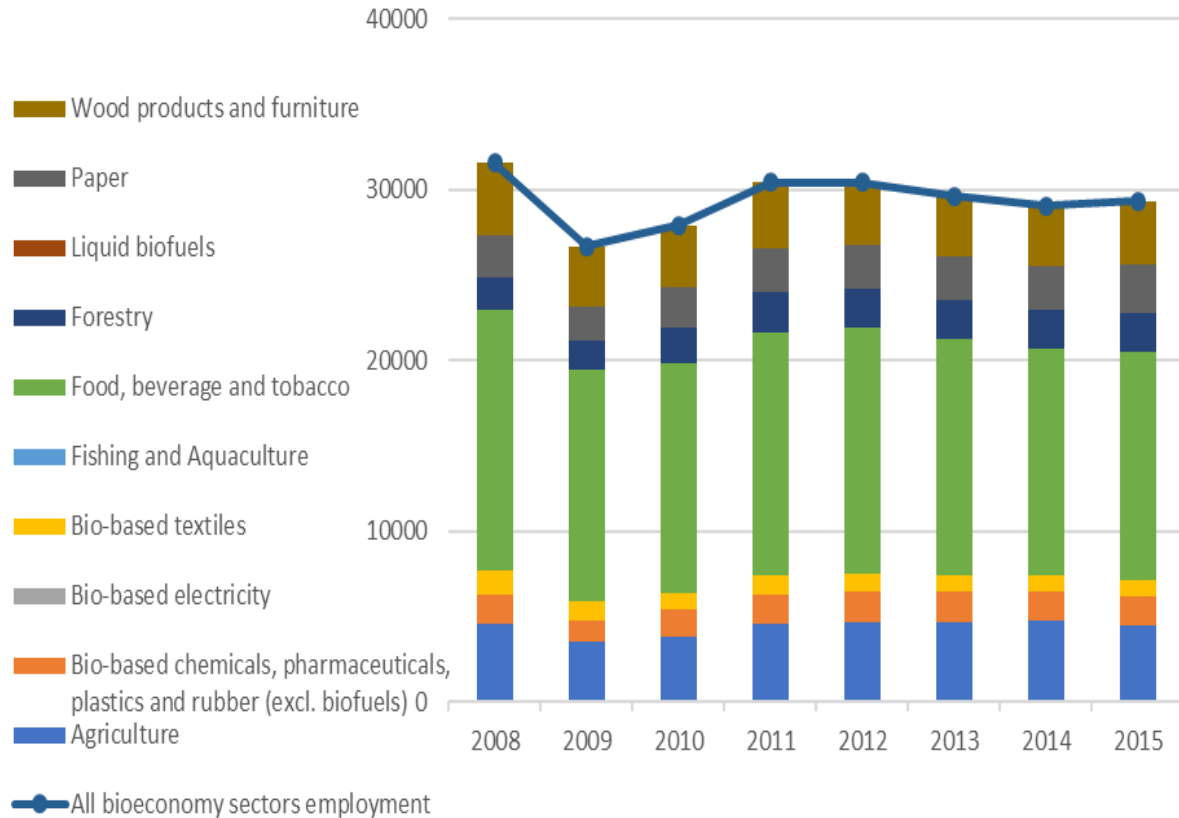
### Forested Regions



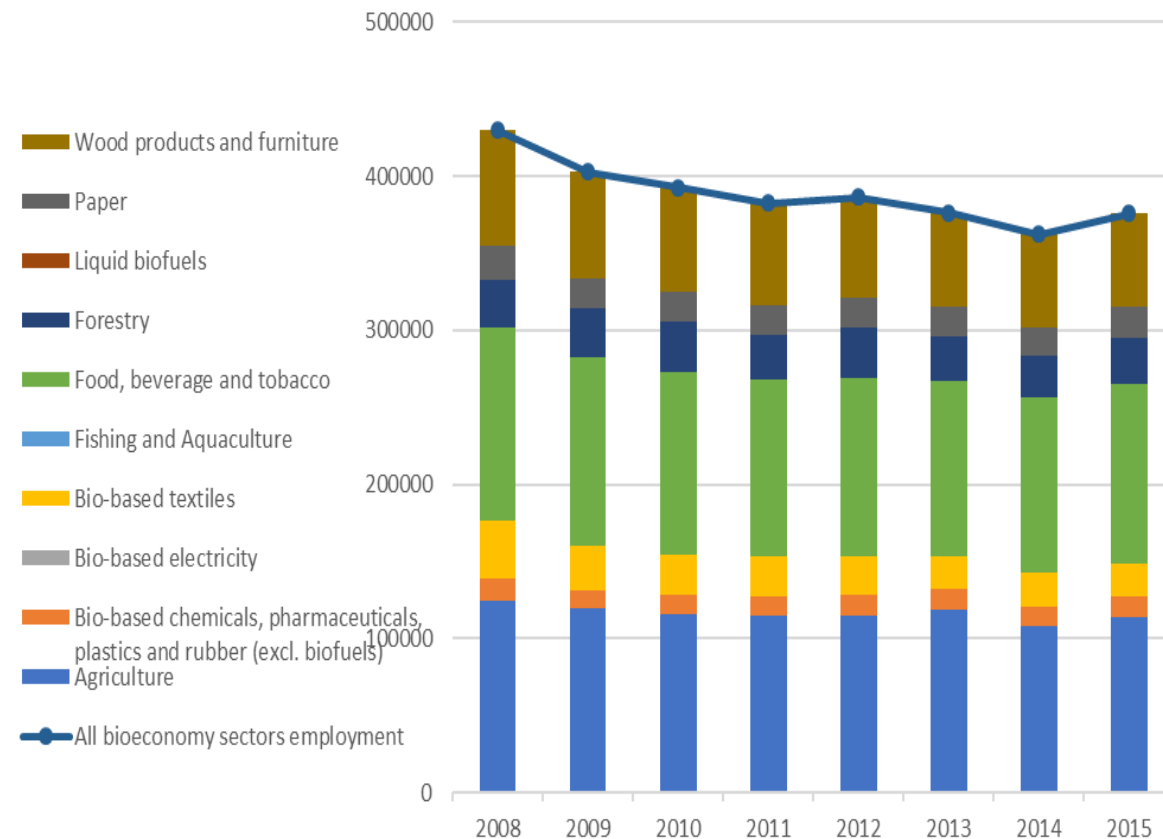
### Mountainous Regions

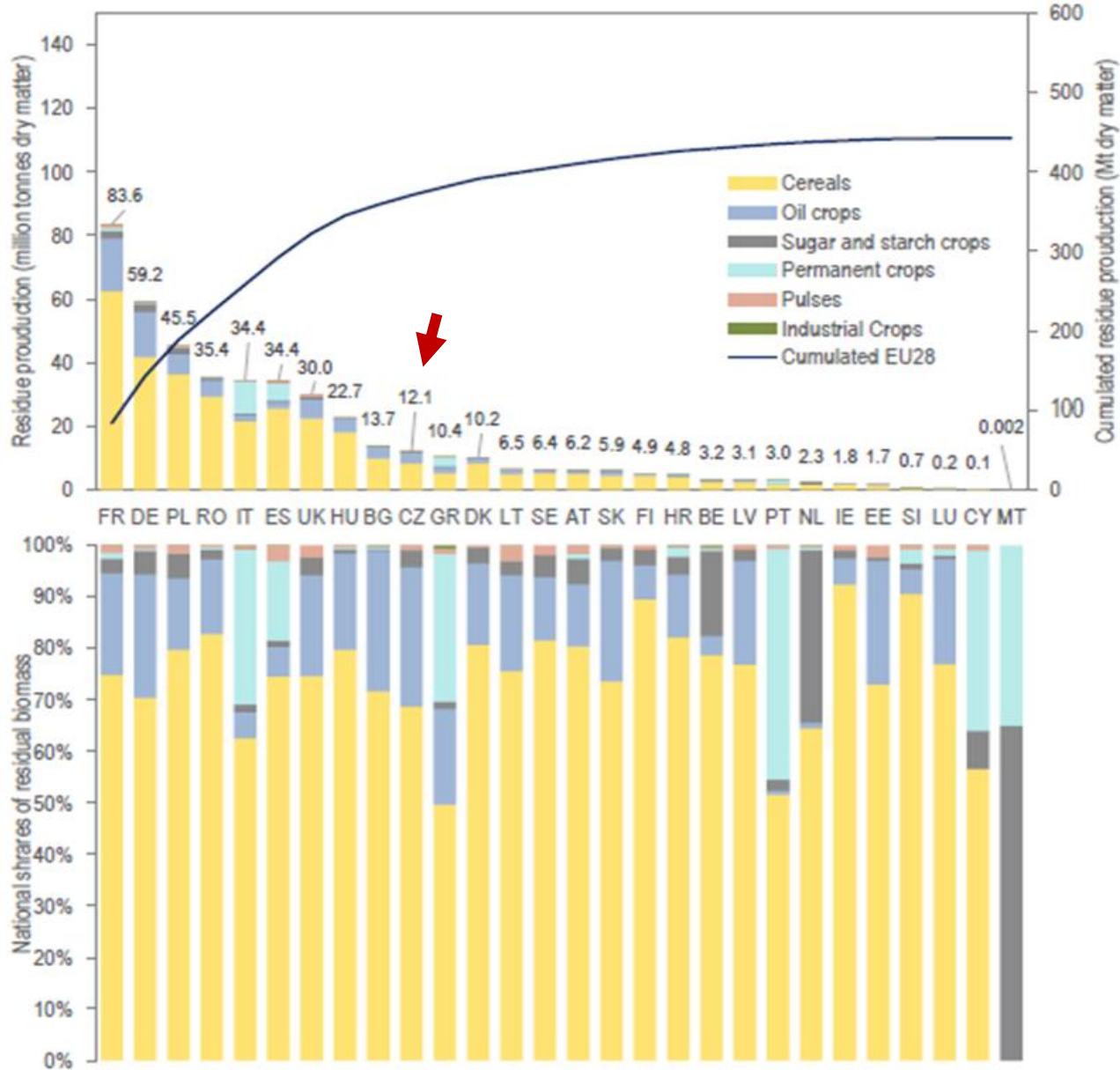


Turnover of all bioeconomy sectors in Czech Republic from 2008-2015 in Million EUR



No. of people employed in all bioeconomy sectors in Czech Republic from 2008-2015



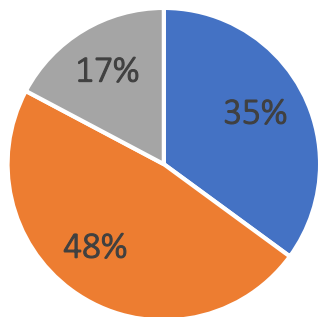


**Residue production** (top panel) from the main crop groups per member state, expressed in Mton of dry matter per year; and the shares at national level (bottom panel).

*Average values over the reference period 2006-2015. Extracted from Camia et al. 2018.*

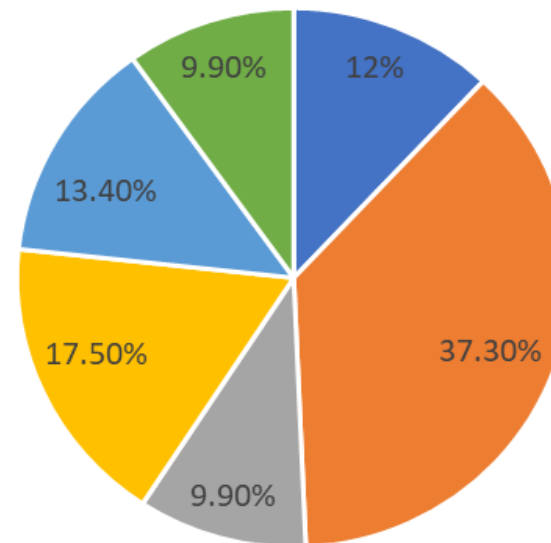
**Cereals straw is the most abundant agriculture residue in EU countries**

What is the size of your farm?



- Small enterprise (0-50 ha)
- Medium enterprise (50-250 ha)
- Large enterprise (>250 ha)

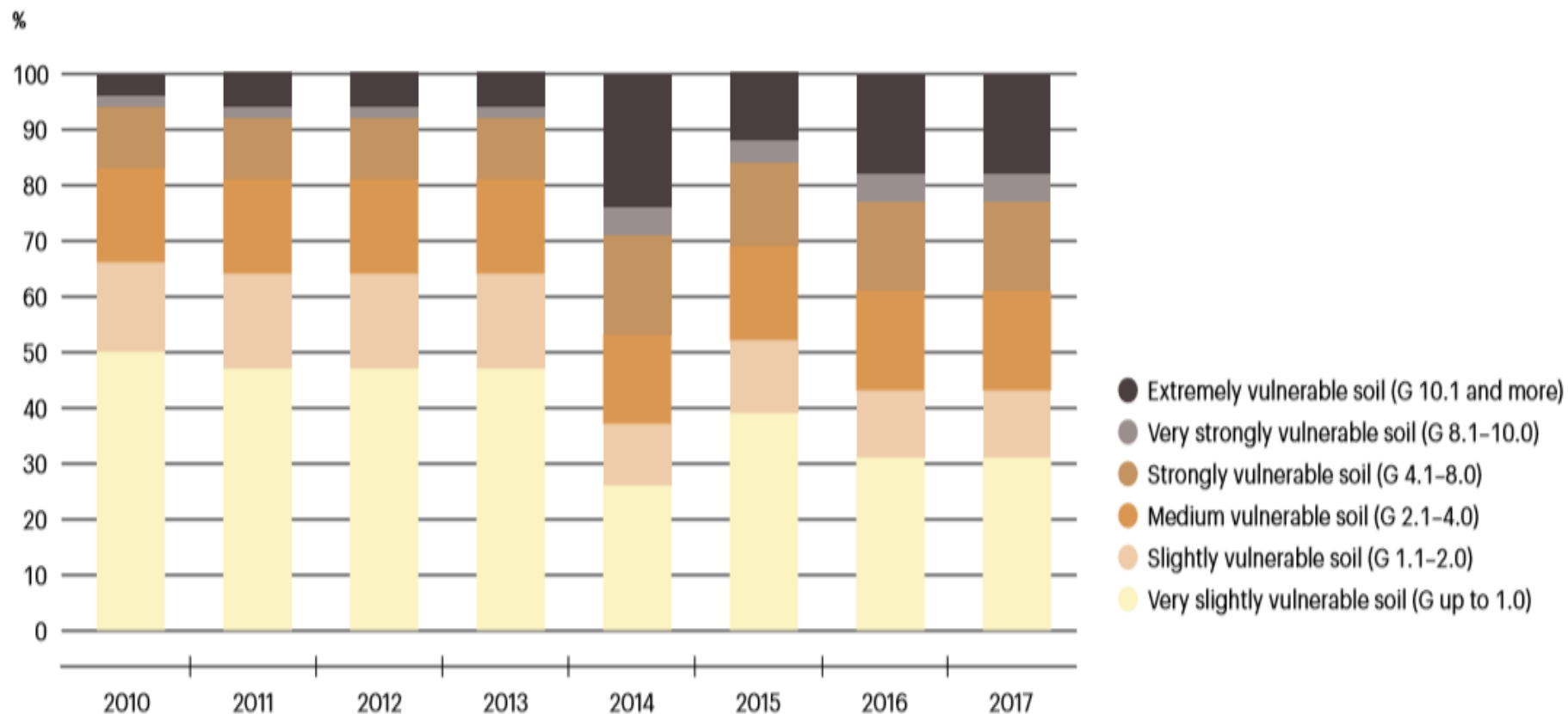
How much straw do you think should be left on the field in order to maintain the soil quality?



- All straw can be removed
- All straw should be left on the field
- At least 25 % of the straw production
- At least 50 % of the straw production
- At least 75 % of the straw production
- I don't know

Source: 350 responses mainly from the Association of Private Farming of the Czech Republic (INCIEN).

# VULNERABILITY OF FARMLAND DUE TO WATER EROSION IN THE CZECH REPUBLIC, EXPRESSED AS SOIL LOSS [%], 2010–2017



Source: Research Institute for Soil and Water Conservation



**Cereals**  
(wheat/barley)

**7 Mton economic yield**

**7,4 Mton residues**



Animal bedding & fertilizer

**Corn** (cob and stalk)



Biogas



**Rapeseed**

**3,5 Mton residues**



Animal feed & glycerine

**0,6 Mton seed**



Biofuel



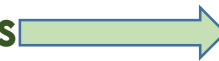
**Sugar crops**

**0,6 Mton potatoes**



Human consumption

**3,7 Mton sugar beets**



0,6 Mton bioethanol &  
sugar process





Czech Republic	Final fellings	Thinnings	Logging residues from final fellings	Logging residues from thinnings	Total
Total	5,788,000	3,596,000	1,418,000	499,000	11,301,000

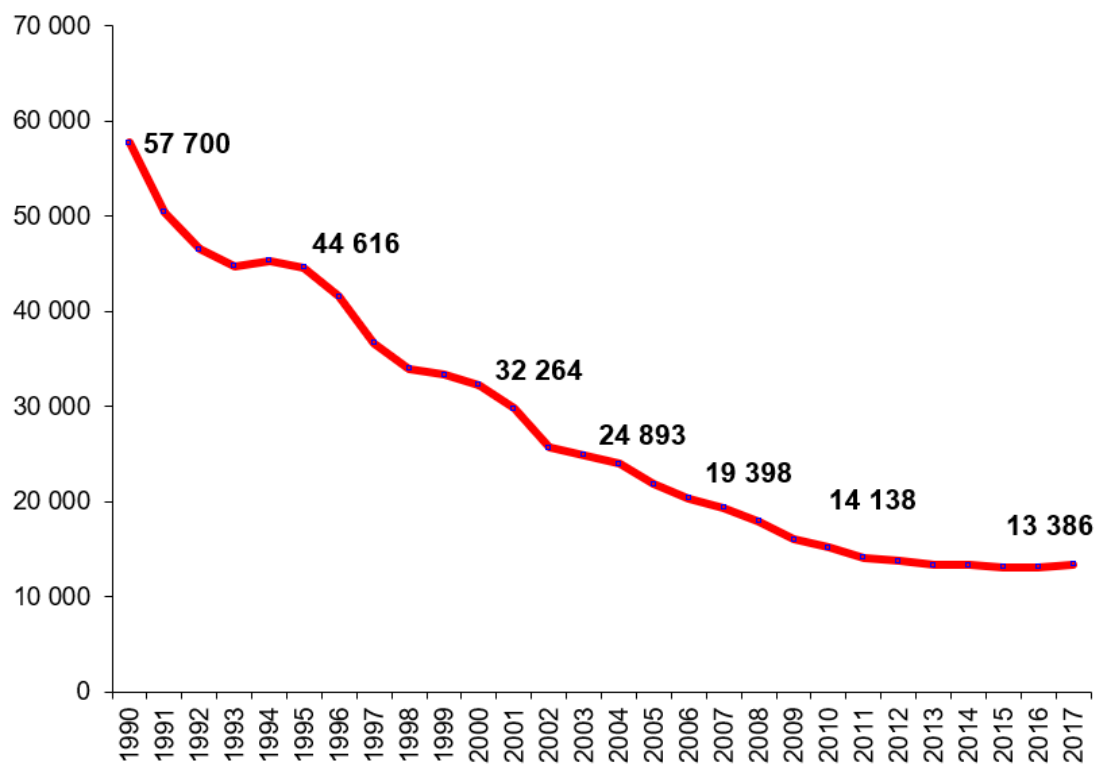
Primary biomass potential from forests ton d.m.

Czech Republic	Sawdust, current capacity	Sawdust, potential capacity	Potential increase (%)
Total	7 000 000	11 598 400	65,7

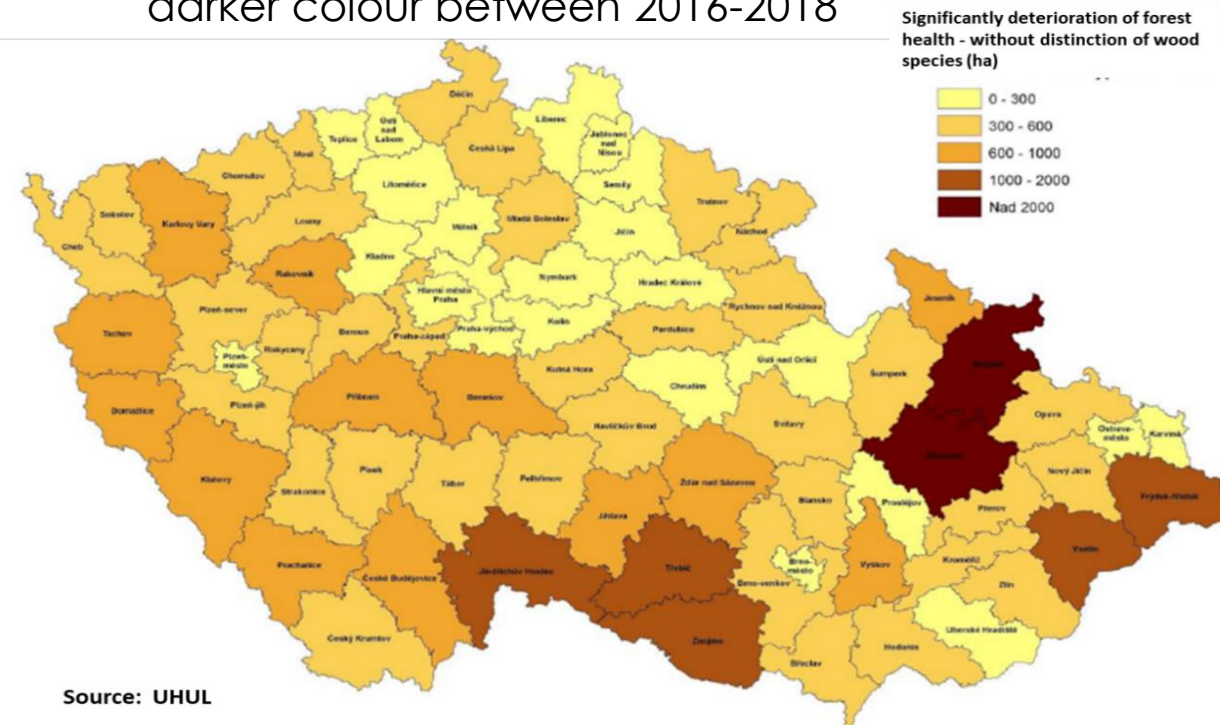
Secondary biomass reported and estimated potential from forests in the form of sawdust (m<sup>3</sup>)

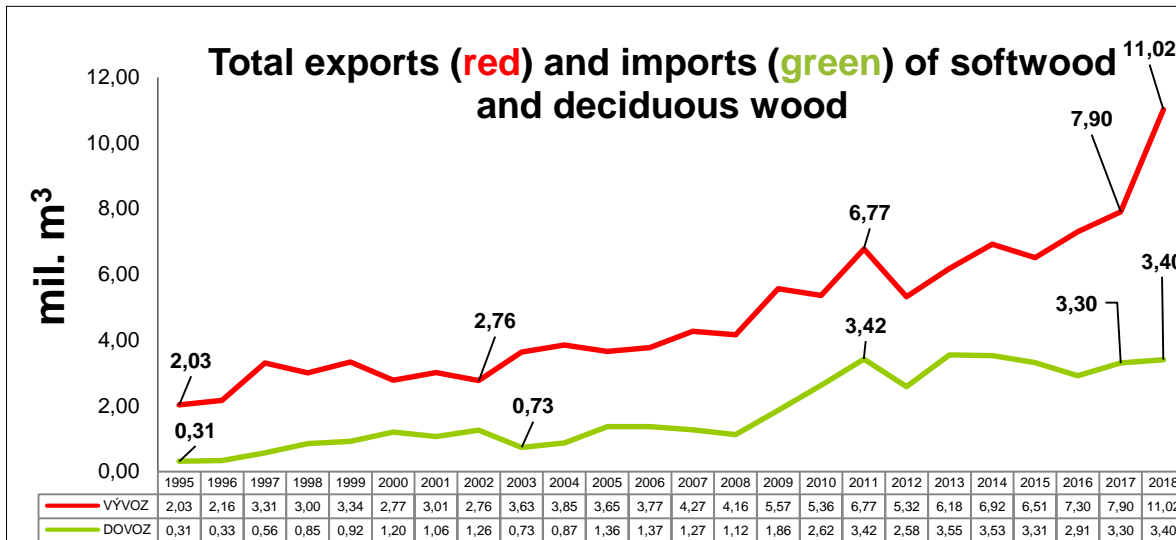
**11 M m<sup>3</sup> Raw uncut timber exported/yr**  
**Challenge: Too few saw mills and technical equipment**

### Number of Forestry Employees

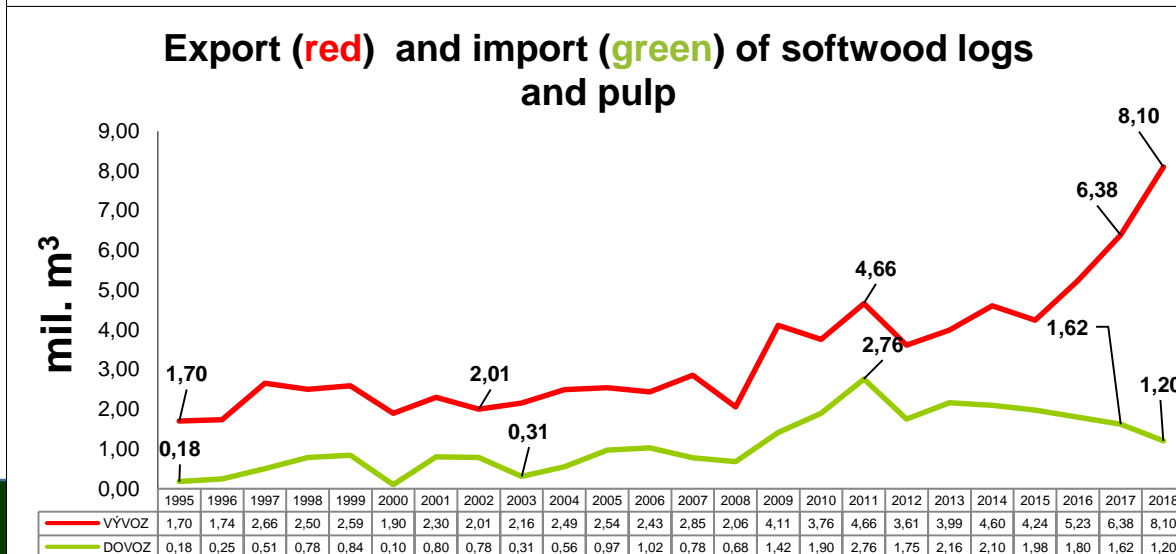
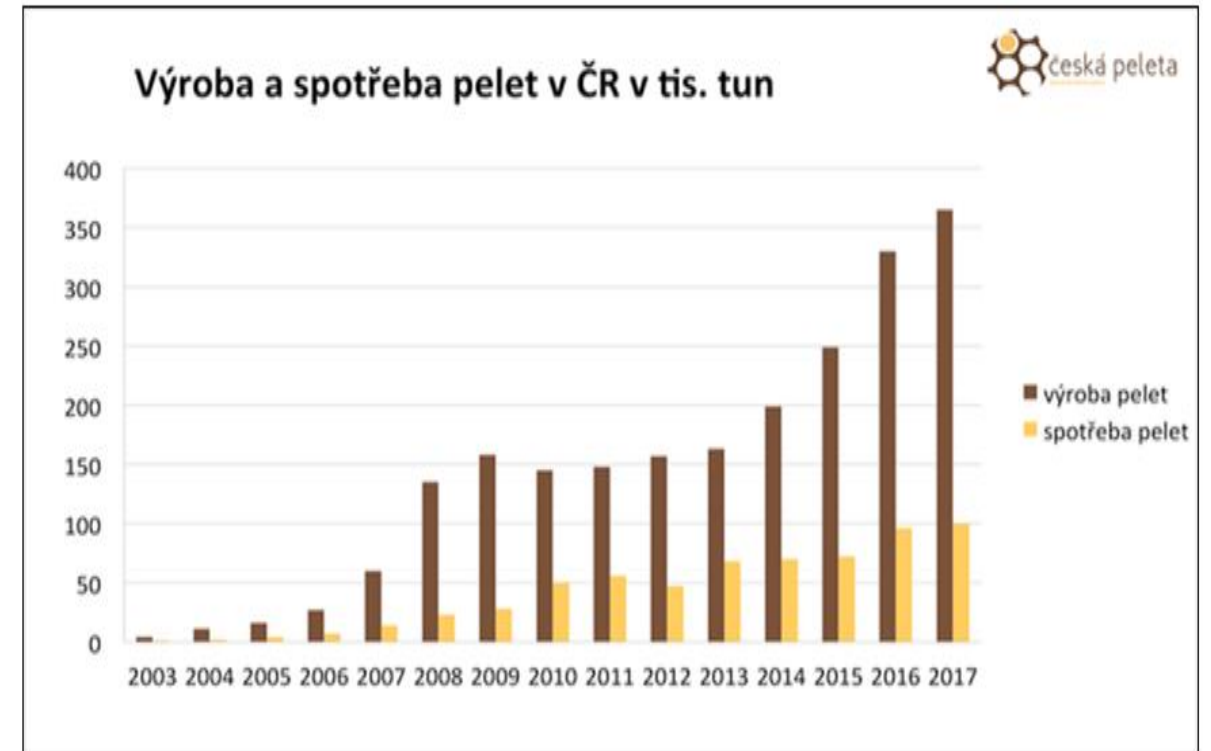


### Forest Health Deterioration depicted by darker colour between 2016-2018





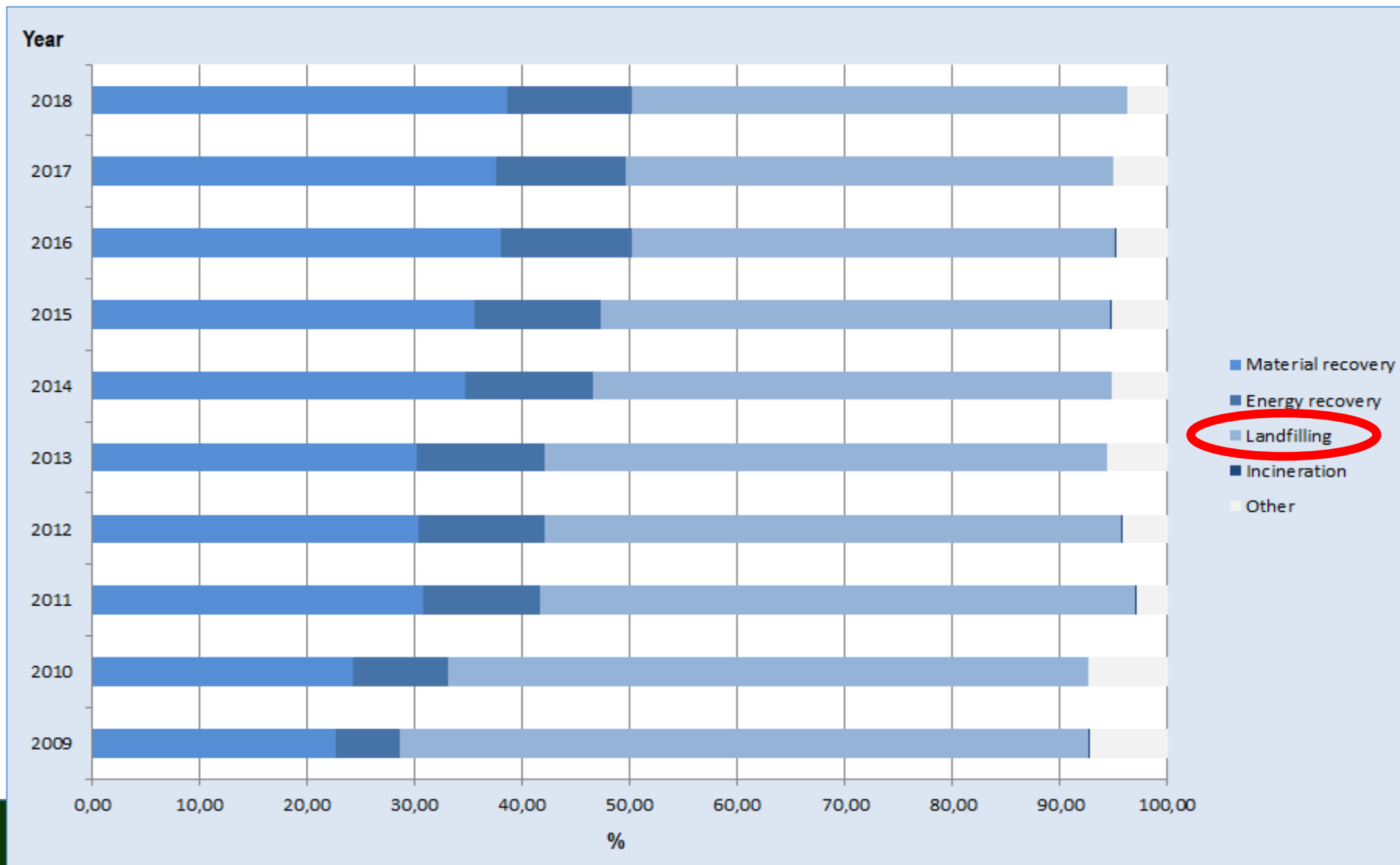
### Production (brown) and consumption (yellow) of pellets in Czech Republic (in thousand ton)





Czech Republic	Biowaste unseparately collected	Biowaste separately collected	Total
<b>Total (Tonnes d.m.)</b>	<b>554 000</b>	<b>298 000</b>	<b>852 000</b>

Czech Republic	Total sludge production	Agricultural use	Composting	Landfilling	Incinerating	Other
<b>Sewage Sludge Disposal and Use</b>						
<b>Total (Tonnes d.m.)</b>	<b>202 358</b>	<b>88 883</b>	<b>64 515</b>	<b>17 728</b>	<b>19 440</b>	<b>11 792</b>



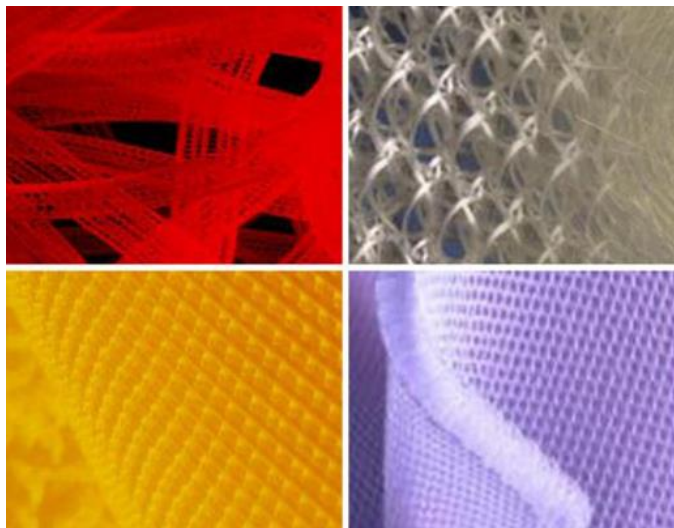


### Beer sector

76,000 jobs

Market size in Cz 2,4 B € (1% GDP)

Breweries prod. 20,5 M hectolitres/yr



### Industrial Textile sector

33,000 jobs

Market size 2,0 B € (0,84% GDP)



### Biogas sector

>550 biogas plants all over Cz

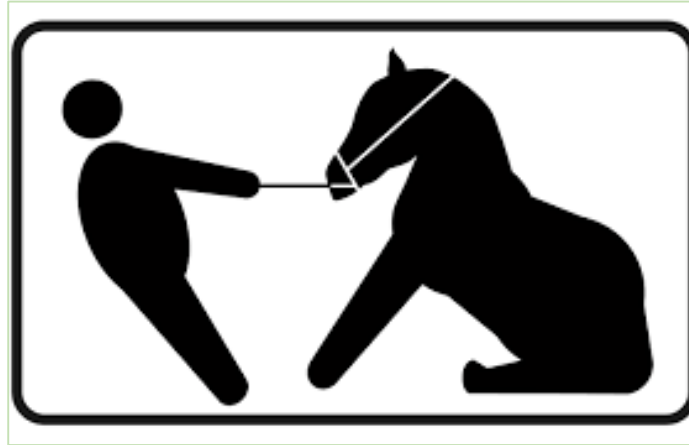
Electricity produced 2 637 GWH/yr

Primary feed stock is corn silage



## Climate Change

Ground water levels low  
Large scale agriculture  
Bark beetle



## Resistance to Change

Strong local culture  
Change is economic driven



## Lock-out competition

Biofuel  
Agri-food  
Nuclear energy

### Strong value chains in Czech Republic

*Energy* – Long-term strategy, dominated by nuclear and natural gas

*Food supply* – Mostly self-sustaining, with exceptions in beef and pork

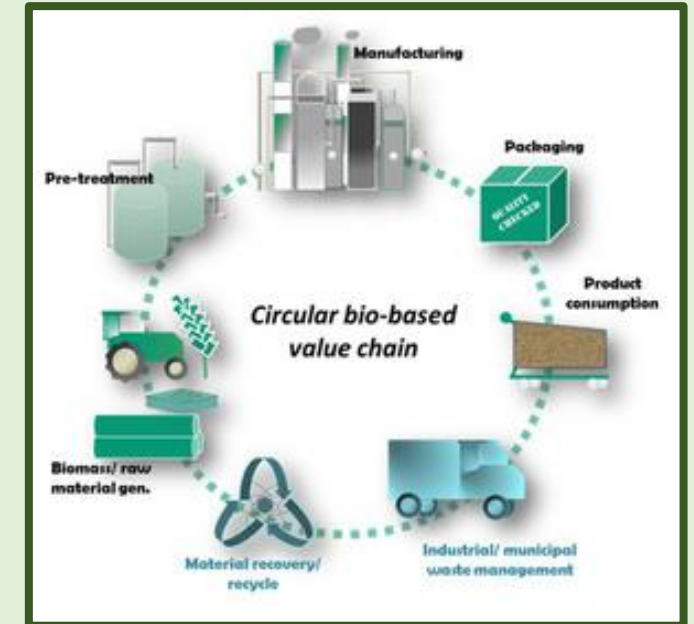
*Transport* – Developed road and rail network

### Value chain gaps:

*Forestry* – Opportunities due to low timber processing capacity

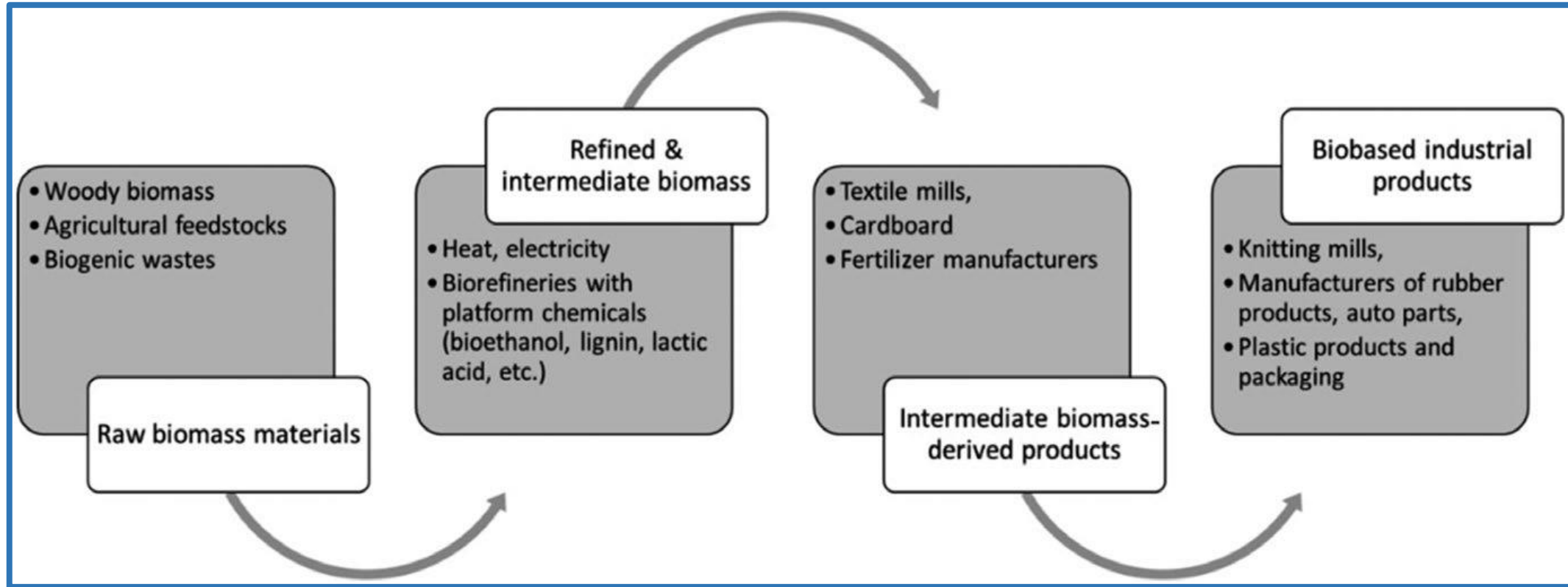
*Waste (food and sludge)* – Food waste not recycled, tendency to incinerate and land-fill

*Novel Engineering (Infrastructure)* – World class engineering looking for problems to address



- **Country bioeconomy strategy – TBD, and under discussion.**





**Are all segments profitable?  
Are subsidies needed?  
Is there competitive lock-out?**

Source: Markets for biomass, adapted from Ruamsook and Market (2014)

**1. Facilitate the conversion of municipal sludge to biogas.** Additionally, enable the collection of food waste through recycling in cities to be an additional source for biogas. This fuel can be utilized by cities for public transit or for sale.

**2. Conversion of excess wood and its residues.**

- Applications for wood construction materials;
- Furniture eco-design with use of renewables;
- Wood residues for production of fertilizers;
- Conversion of wood residues to biodegradable packaging materials, e.g. cellulose packaging, or alternative paper products.

**3. Develop means to support novel engineering of technologies supporting the bioeconomy**

**4. Technical Hemp as a bio-fiber for auto industry, textiles, and land remediation**



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# Thank you



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