How to measure the development and/or success of Bioeconomy?

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Bioeconomy Innovation Week

Braunschweig
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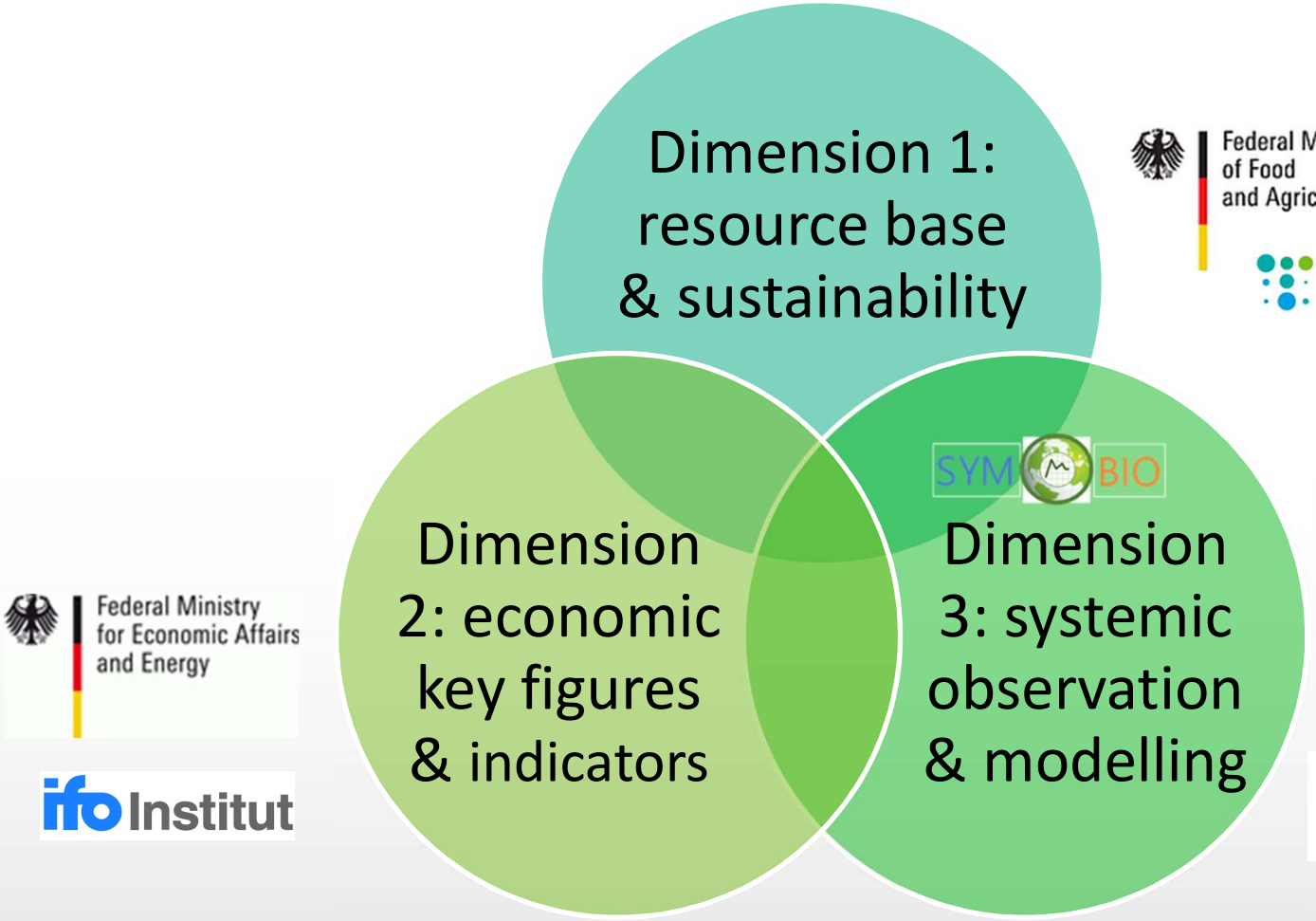
Monitoring the bioeconomy – set-up



Federal Ministry of Food and Agriculture

THÜNEN

Federal Ministry for Economic Affairs and Energy

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SYM BIO

Federal Ministry of Education and Research

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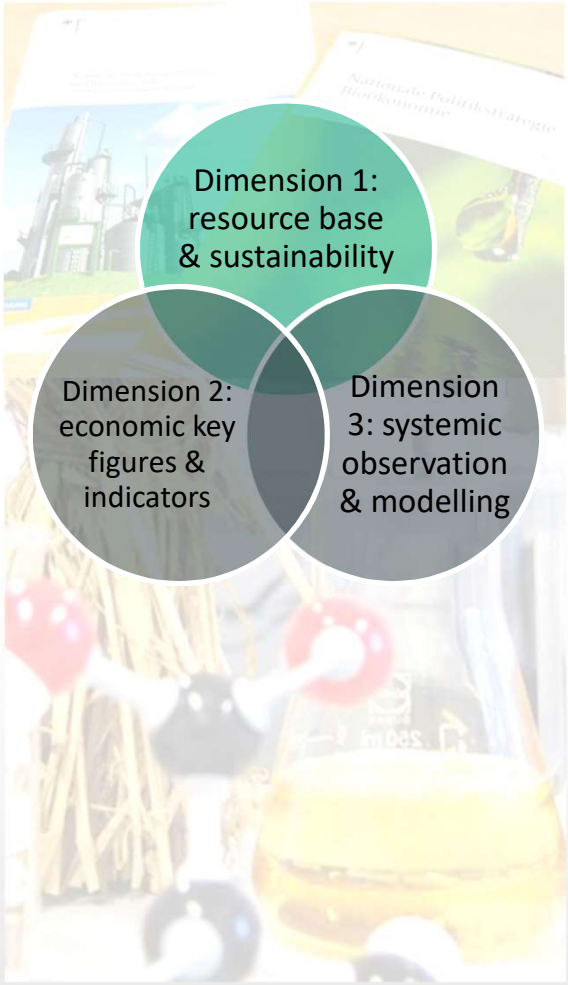
CESR Center for Environmental Systems Research

Monitoring the bioeconomy – Dimension 1



Set up a scientific based methodological concept for a monitoring of the bioeconomy

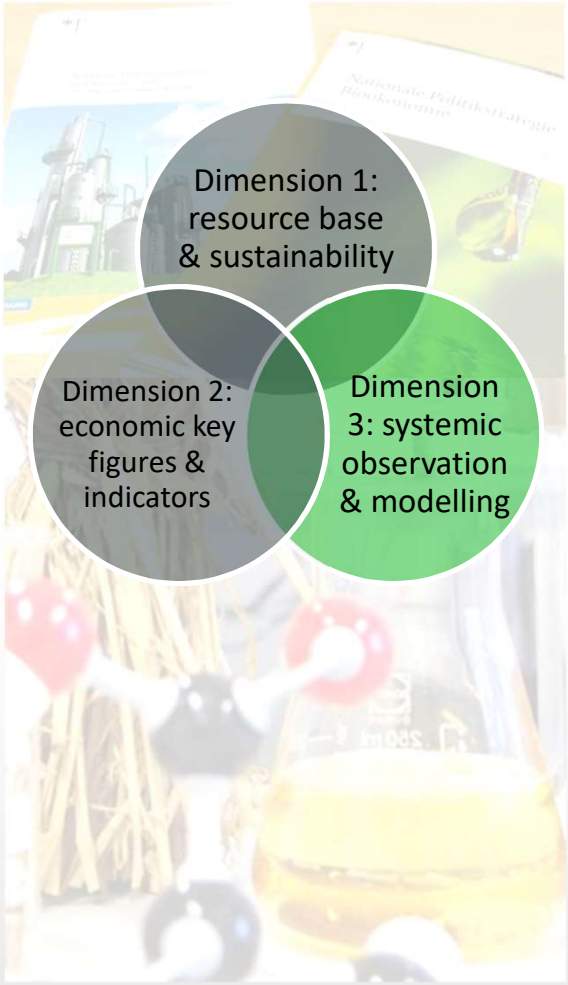
→ Definition and estimation of material flows of biotic resources from Agriculture, Forestry, and Fisheries

→ Estimation of bio-based shares of economic activities and products

→ Differentiation of conventional and bio-based value-chains

→ Sustainability assessment of bio-based value-chains

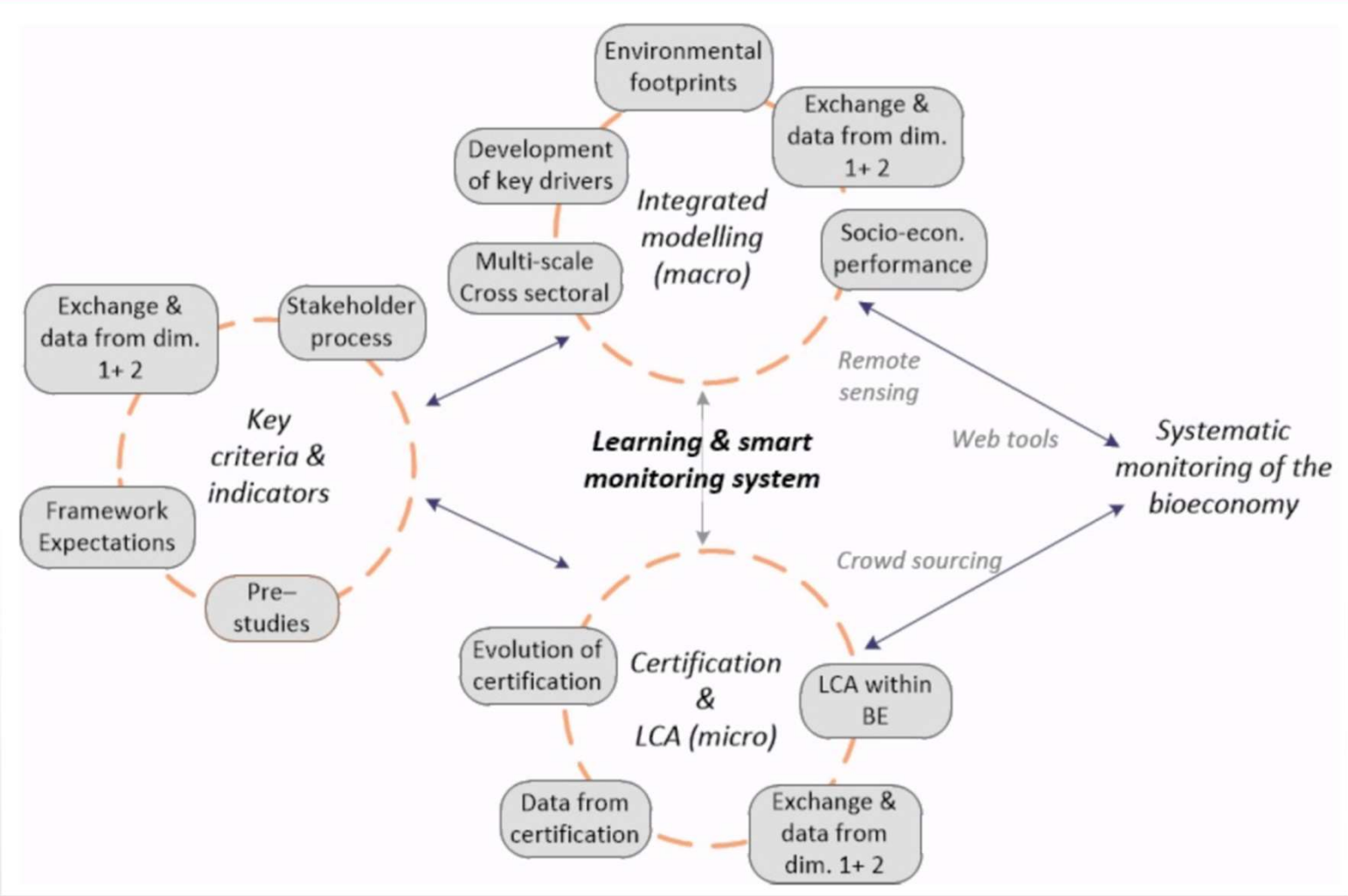
Monitoring the bioeconomy – Dimension 3



Comprehensive Systems Analysis and Modelling Approach

→ Selection of aspects to considered in the monitoring
→ Quantification of the sustainability of bioeconomy
→ Development of drivers
→ Modelling of the development of bioeconomy
→ Integration of certification and LCA to support monitoring
→ Concept for providing a regular monitoring

Monitoring the bioeconomy – Dimension 3



Economic quantification - method

definition

- biotic material flows
- production, processing, (end)uses

operationalisation

- selection of economic activities (NACE)
- selection of related statistical data

calculation

- calculation of bio-based shares
- application of shares to economic indicators

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Economic quantification - bio-based shares

NACE Code	Description	Bio-based share	Data Source
A (01, 02, 03)	Agriculture, Forestry, Fisheries	100%	
C	Manufacturing	Bio-based inputs of economic activities	Material and Goods Received Enquiry; Production Statistics
D	Electricity, gas, steam and air conditioning supply	Use of biomass related to all energy sources	Official data from environmental accounting
F	Construction		
41.20.1 & 41.20.2	Construction of residential and non-residential buildings	7,8% (Wood construction share)	Official data on construction permits
43.32.0 & 43.91.2	Joinery installation & Roofing activities	100%	
I (56.1 – 3)	Accommodation and food service activities	100%	
M	Professional, scientific and technical activities		
72.11.0	Research & experimental development on biotechnology	100%	
72.19.0	Other Research & experimental development on natural sciences and engineering	57% (Expenses for natural and agricultural sciences)	Official data on public sector expenses

Economic quantification - bio-based share of section C

Economic activity	Inputs (Prodcom)			Acquisition costs in 1.000 €
1610	Raw materials & auxiliary supplies	022	Round wood	2,517,109
		161	Sawn wood	806,552
		25	Fabricated metal products	4,037
		20	Chemicals and chemical products	20,380
			…	
			Sum of all received materials	3,727,936
	Operating supplies incl. Packing materials, kitchen and canteen supplies		…	…
	Fuels & combustibles		…	…
	Total material and goods received			4,008,517

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$$bbshare\_NACE = \frac{acquisition\ cost\_biobased}{acquisition\ cost\_total}$$

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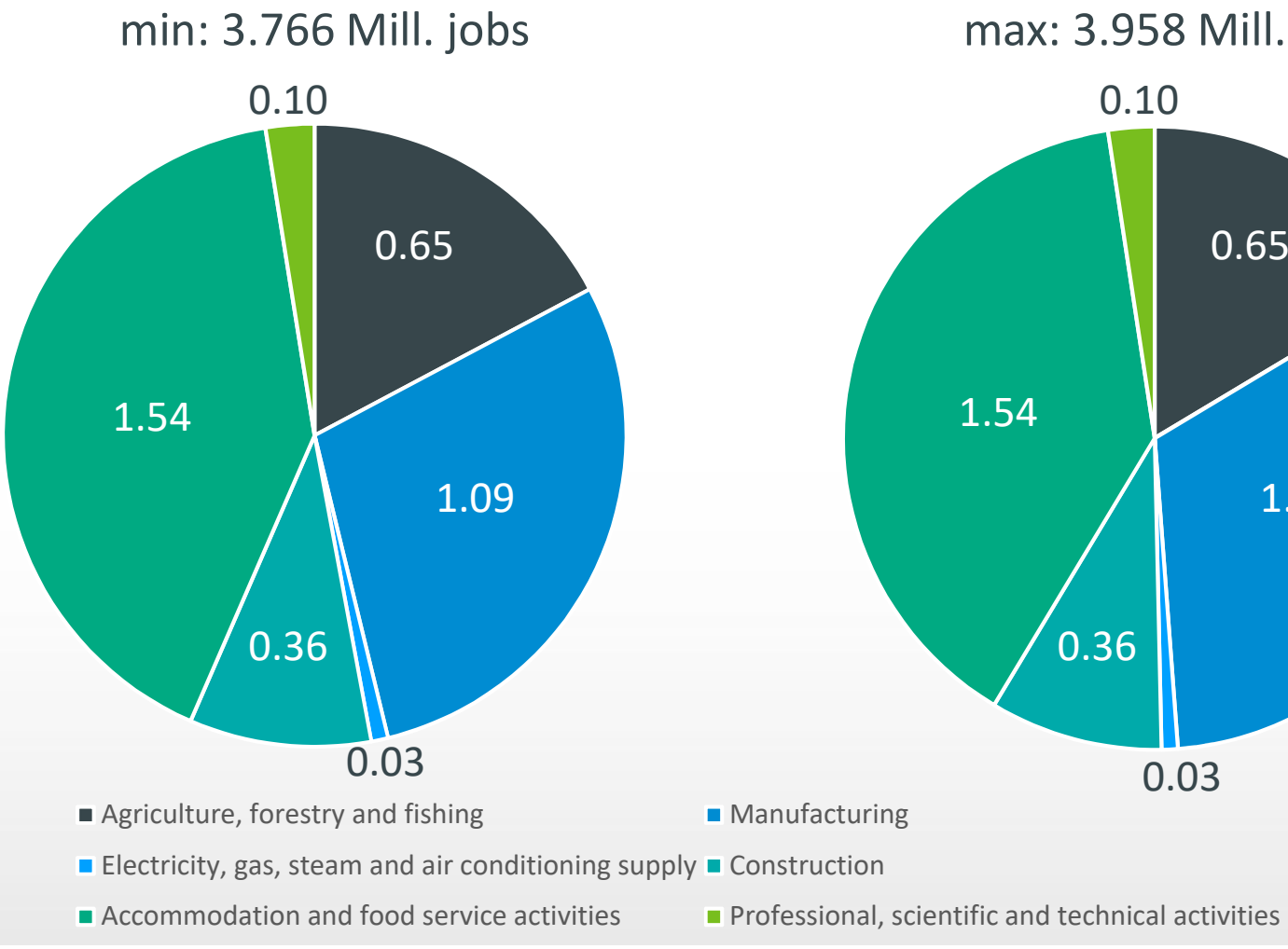
$$bbshare\_input = \frac{production\ value\_biobased}{production\ value\_total}$$

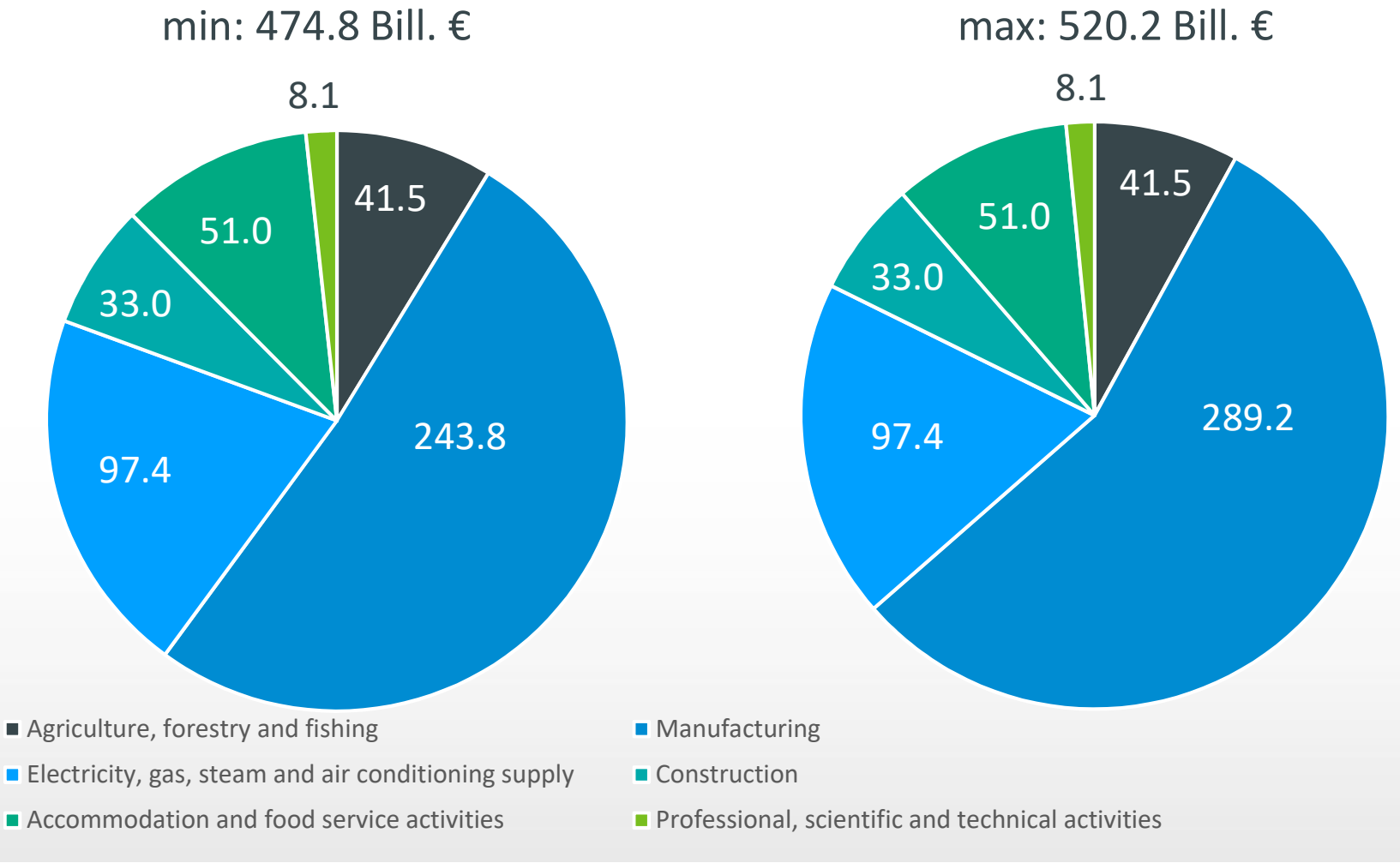
bbmin = ∑ biobased products

bbmax = ∑ biobased products + ∑ partially biobased products

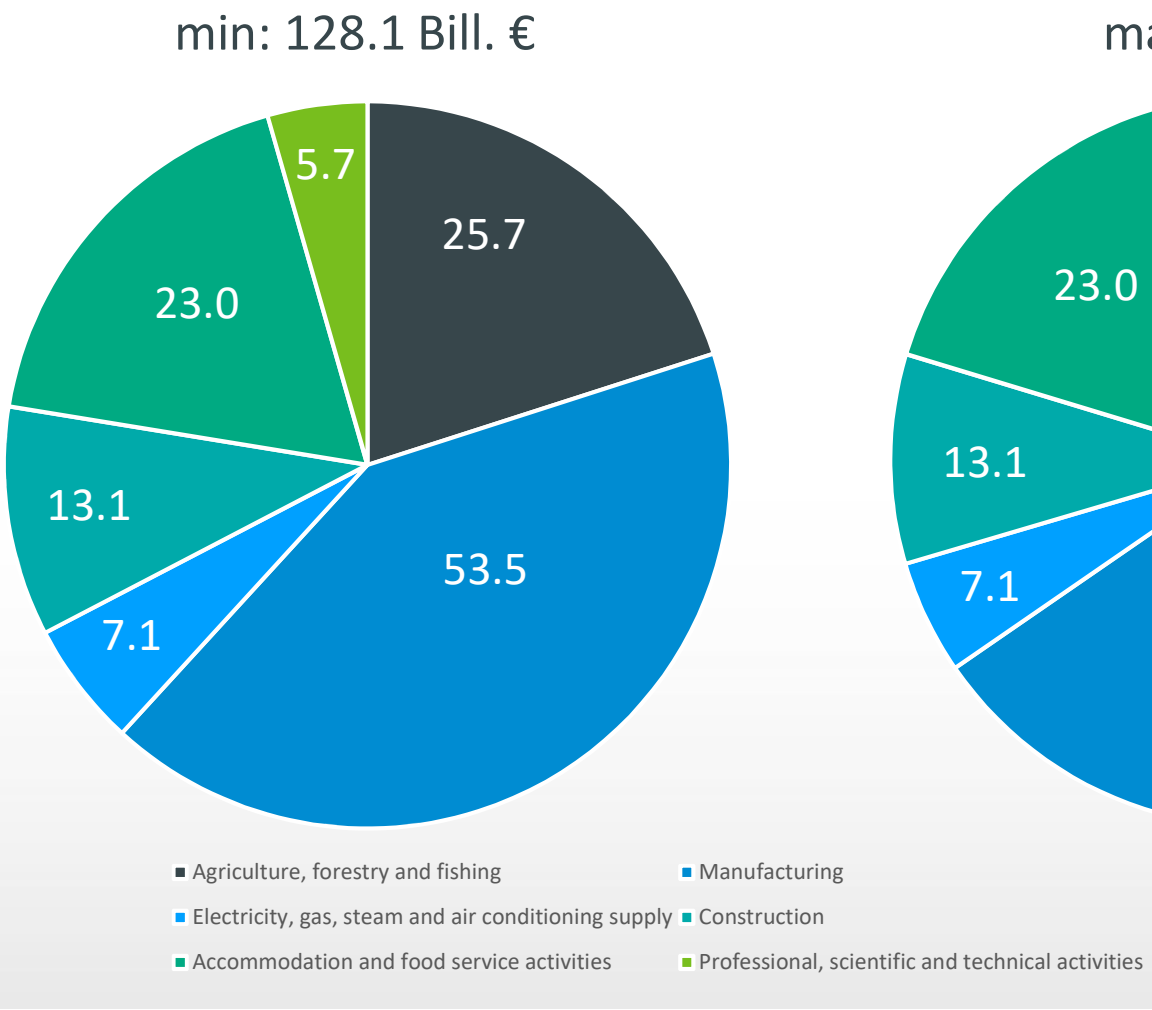
Economic quantification: Jobs



Economic quantification: Turnover



Economic quantification: Gross Value Added



Sustainability assessment

Sustainability assessment

Challenges & goals

Challenges ➔ developing a concept for material flow based as well as cross-sectoral sustainability assessment of the bioeconomy

Challenge 1:
Material flow based sustainability assessment

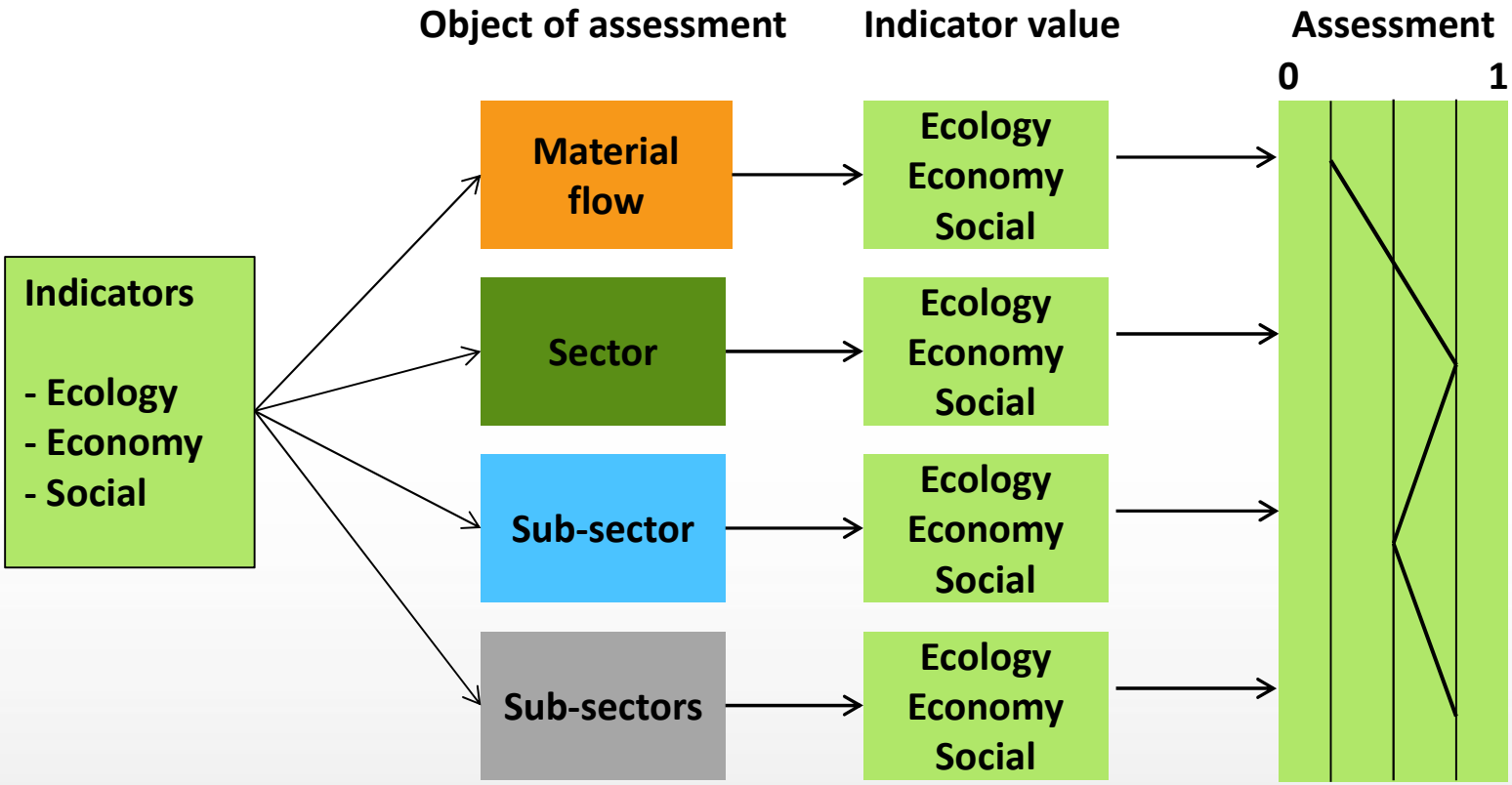
Goal of the assessment:
Assessment of completely covered bio-based material flows from ‘cradle to grave’

Challenge 2:
Cross-sectoral sustainability assessment

Goal of the assessment:
Comparison between bioeconomy, national economy other branches based on indicators of the German sustainability strategy.

Sustainability assessment

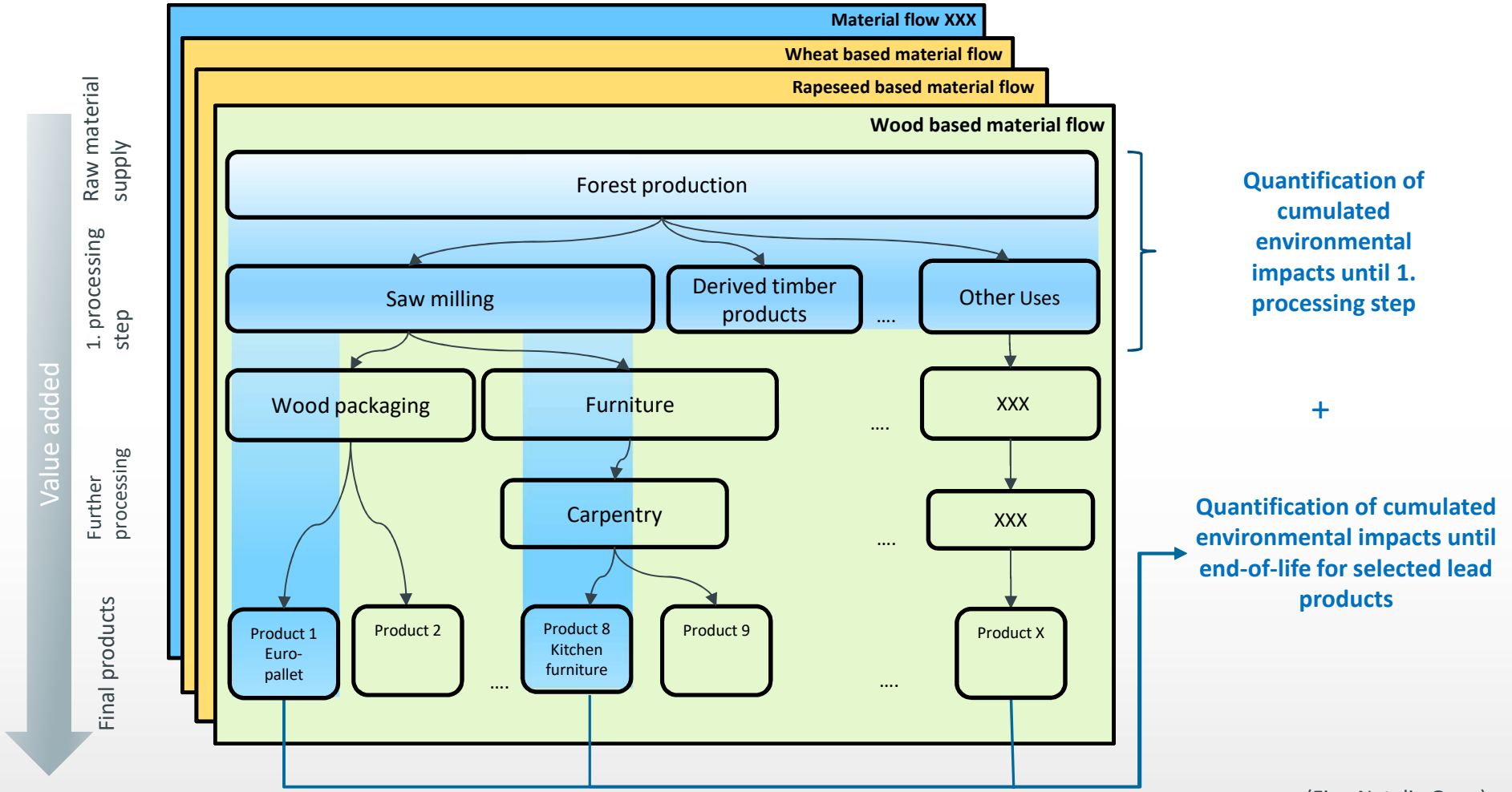
Example: Sustainability assessment



Source: Schweinle/Meier (2012)

Concept for material flow based sustainability asssessment

Environmental dimension



(Fig.: Natalia Geng)

Concept for material flow based sustainability asssessment

Environmental dimension

- Share of bio-based material flows compared to the total national emmissions
- Comparisons between material flows
- Comparisons between bio-based products with fossil or other bio-based reference products
- Estimation of cumulated impacts of lead products representing major volumes of material flows
- Shaping of policy instruments

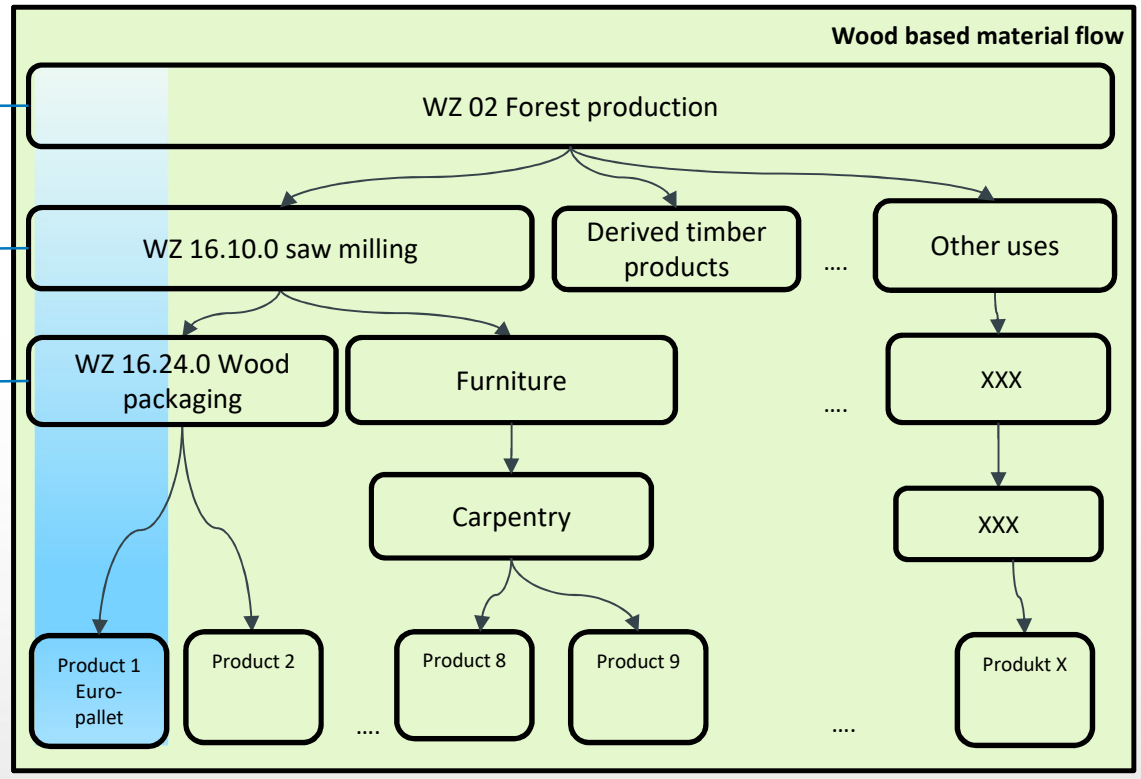
Concept for material flow based sustainability asssessment

Economic and social dimension

Example: euro-pallet

Employed*, Tsd.	Value added*, Mio. €
1,6	80
2,2	97
6,5	273
Σ 10,3	Σ 450

* Year 2010

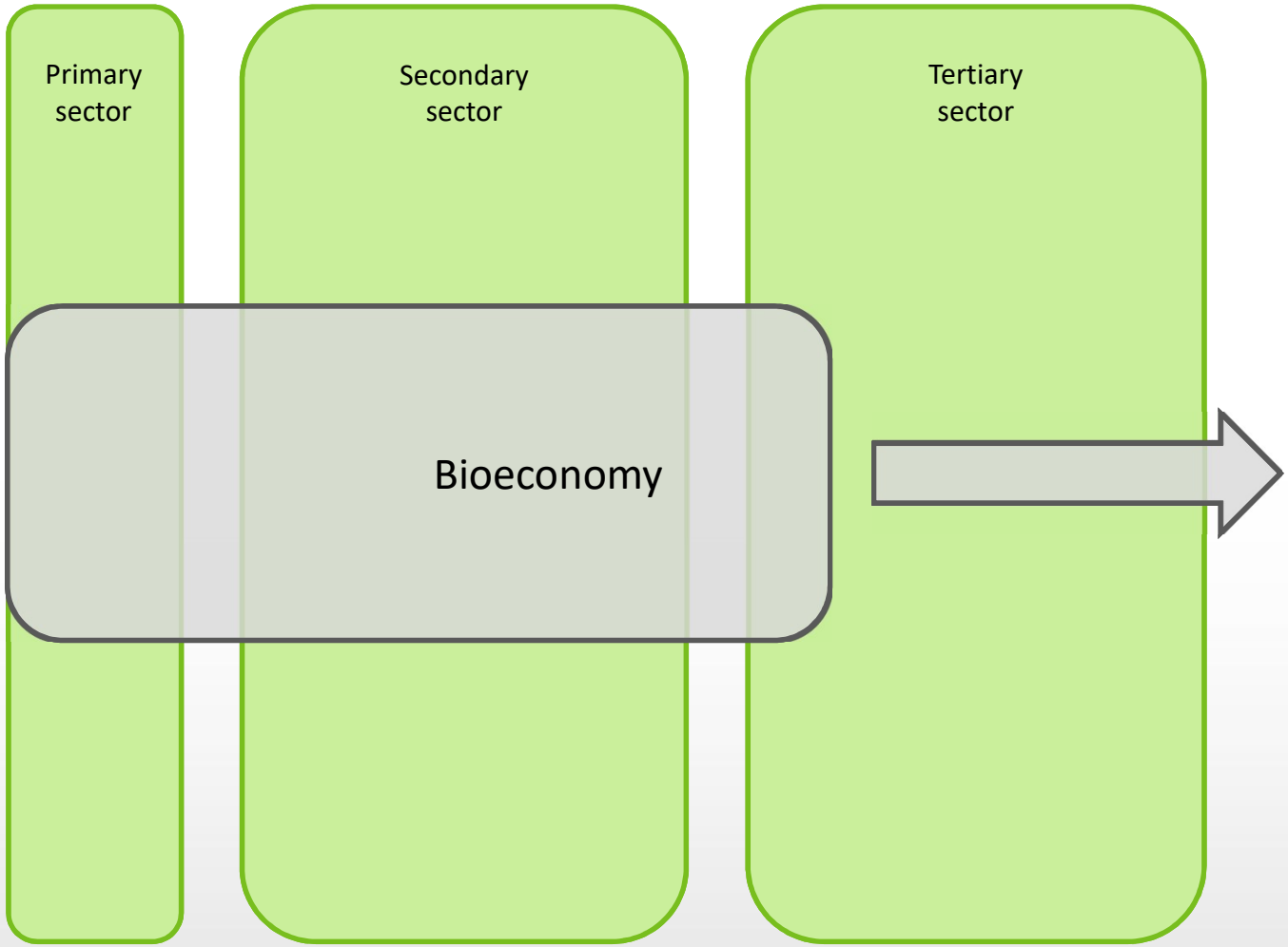


(Fig.: Natalia Geng)

Source: employment statistics (Eurostat), cost structure statistics (StBA), national accounts, own calculations

Sustainability assessment

Cross-sectoral assessment



Indicators of German sustainability strategy

Sustainability assessment

Cross-sectoral assessment

Indicators of German sustainability strategy

61 (sub)indicators have been selected in the German sustainability strategy to monitor progress of the 15 SDGs

23 of the 61 (sub)indicators can be related to bioeconomy and quantified based on available information

Sustainability assessment

Cross-sectoral assessment

- The concept illustrates the contribution of the bioeconomy to the targets of German sustainability strategy
- Delimitation of bioeconomy is based on a combination of official statistics as well as additional sources
- The concept enables comparisons of bioeconomy with other commercial sectors

Monitoring the bioeconomy in Germany

Lessons learned

What have we done?

- Map the flow(s) from resource base to end use…
  - …including use of residuals and recycling
  - …differentiated by various (cascaded) uses (material/energy)
  - …including import and export of goods (and services)
  - …by material and energetic use
- Analyse available (annual) data, align official statistics if necessary/possible – in coop. with statistical bodies
- Development/use existing methodologies/models for data generation
- Development and application of a concept for sustainability assessment

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What is still needed?

- (Further) develop a common understanding of the bioeconomy
- Better visualization of material flows of processing stages and value chains
  - However: Mapping of end use remains problematic
  - Necessary: Interfaces for data exchange between the main and residual material flows.
- Steady monitoring requires close cooperation with official statistics

For further questions please contact:

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