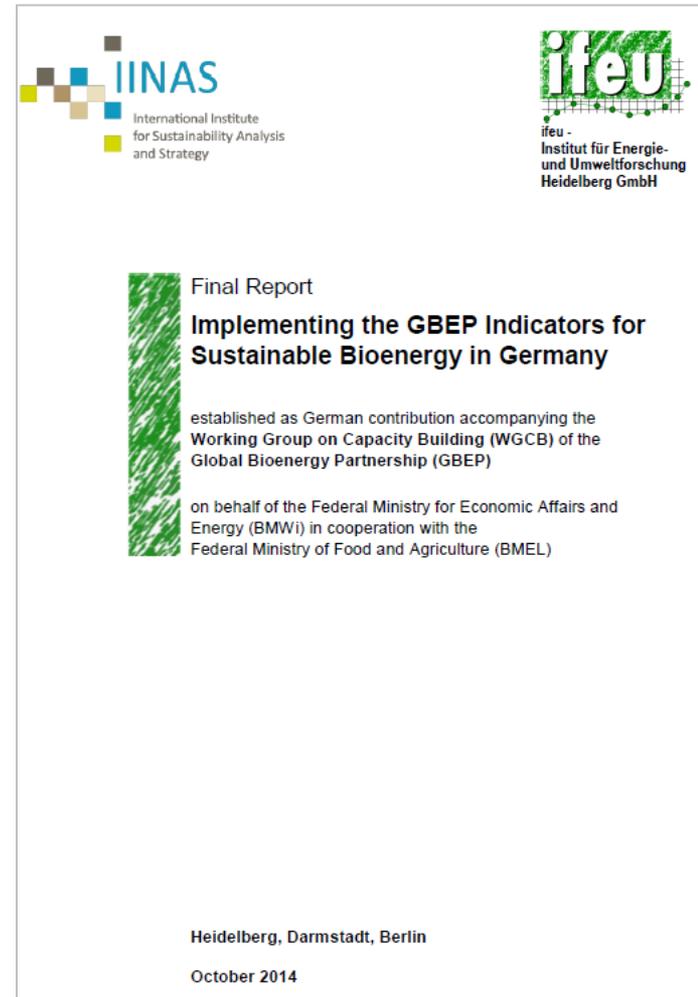


Application of GBEP indicators for sustainable bioenergy in Germany

**10th meeting of the GBEP WGCB Activity group 2
Rome 27 November 2018**

- In 2014 the GBEP Sustainability Indicators have been assessed in Germany for the first time.



Objectives of the current assessment:

1. to enable **monitoring** of the impacts of bioenergy production and use at the national level.
2. to **deepen the lessons learned** from the first application, as well as to incorporate experiences shared with other GBEP partners through the work in Activity Group 2 of the WGCB and the Task Force on Sustainability.
3. to identify options to **connect** a periodic assessment of the GSI with other reporting and data collecting schemes

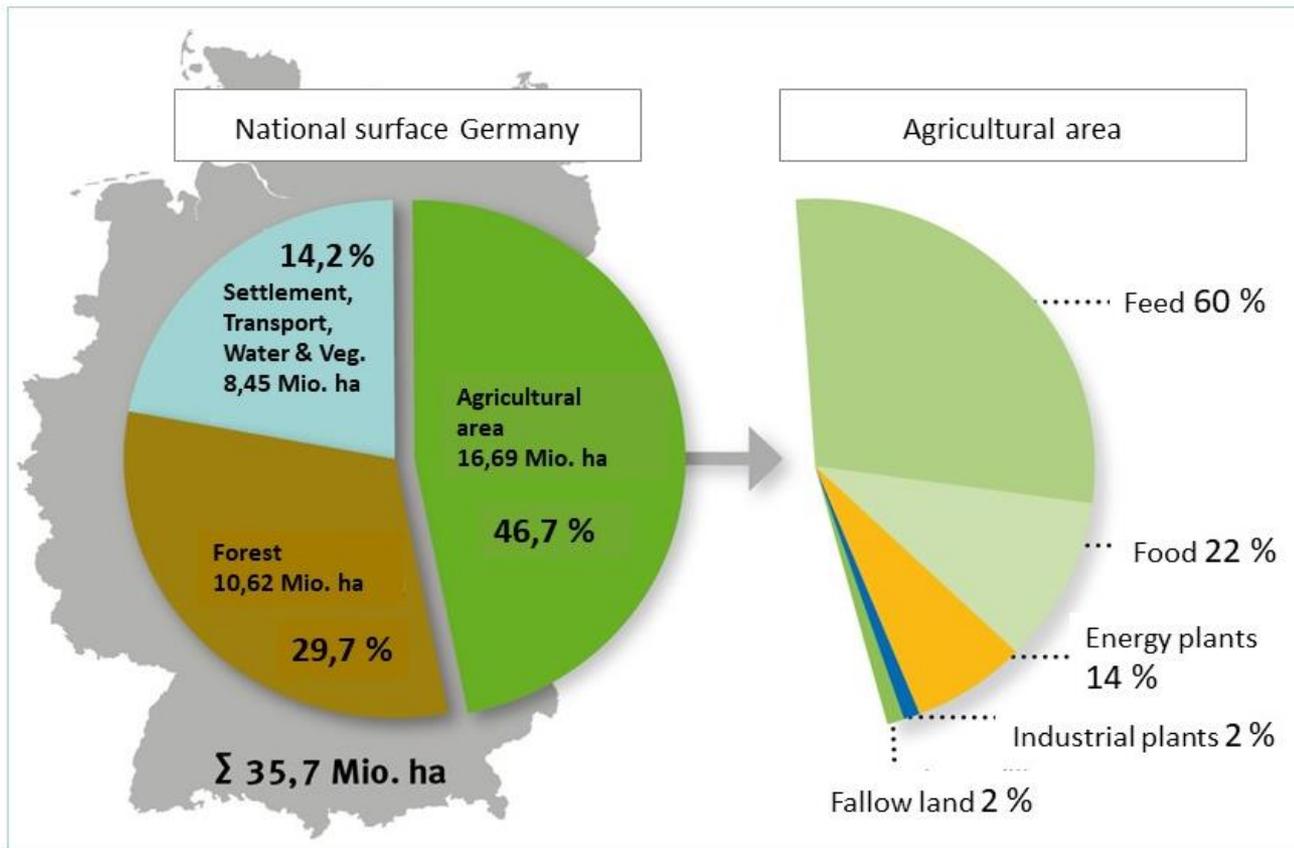
Key questions

- Are we able to identify and to interpret **developments** of the GSI results?
- Is the second application **more efficient** in terms of effort compared to the first time, in order to facilitate repeated assessments?
- Have we **learned** from the analysis regarding difficult application during the first application?
- Has the **data base improved** where we identified gap or quality sufficiency before?
- Will a periodic assessment of the GSI be feasible and how can it be **connected** with other established reporting schemes?

Approach

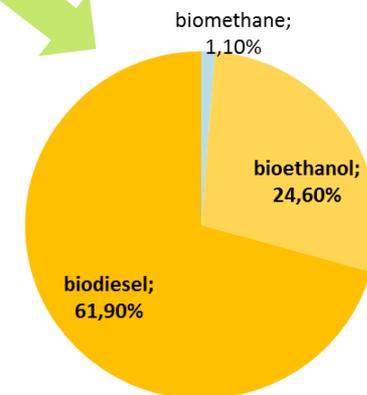
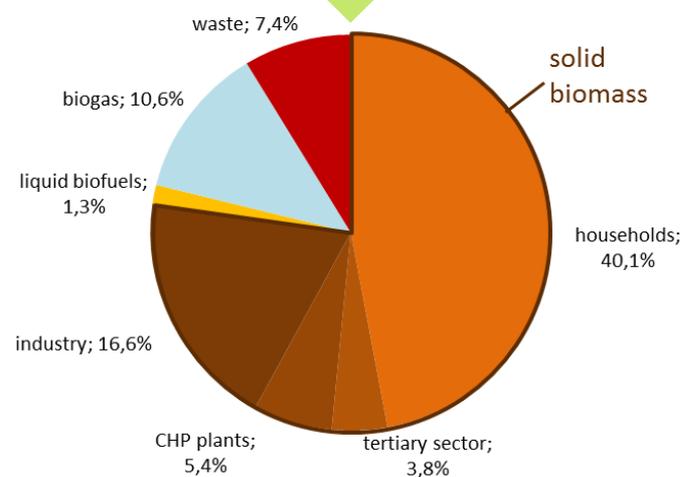
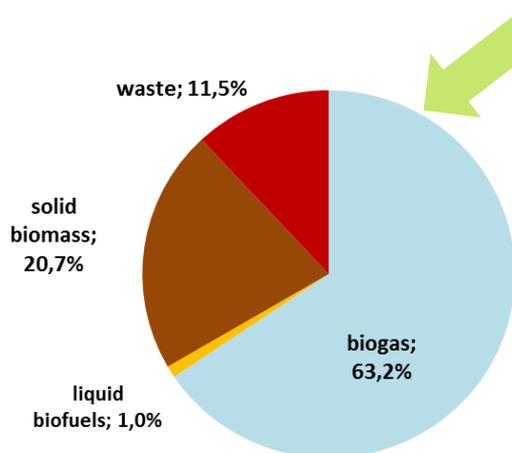
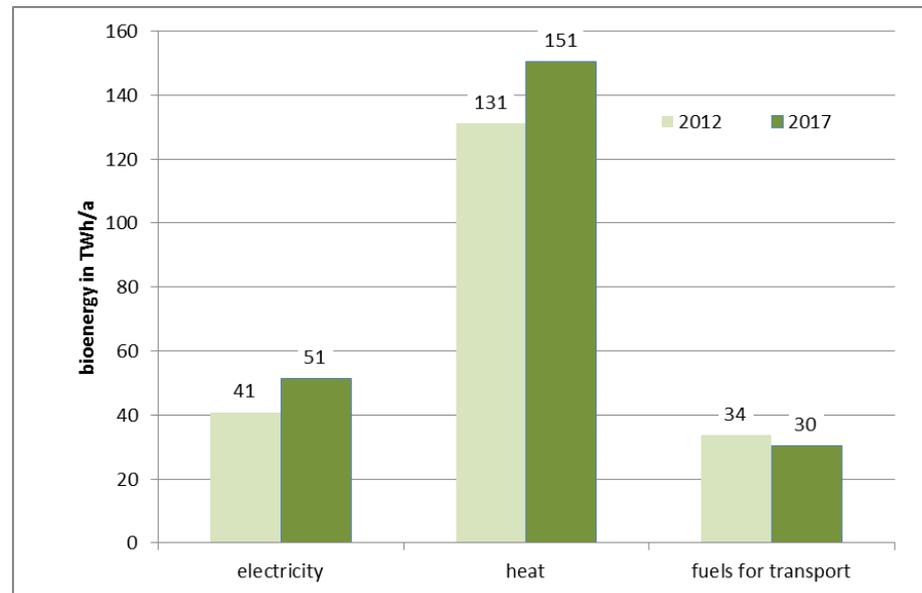
- Desktop research: existing data bases (BMWi, BMU, UBA, FNR, national statistics etc.)
- Bilateral working meetings with experts responsible for official data on the environmental indicators concerned, e.g. BfN, FNR, Thünen, UBA...
- Research of new, project-related data and current research results

Basic data (land use)



Source: compilation by IINAS based on FNR & BMEL (2018) & DESTATIS (2017)

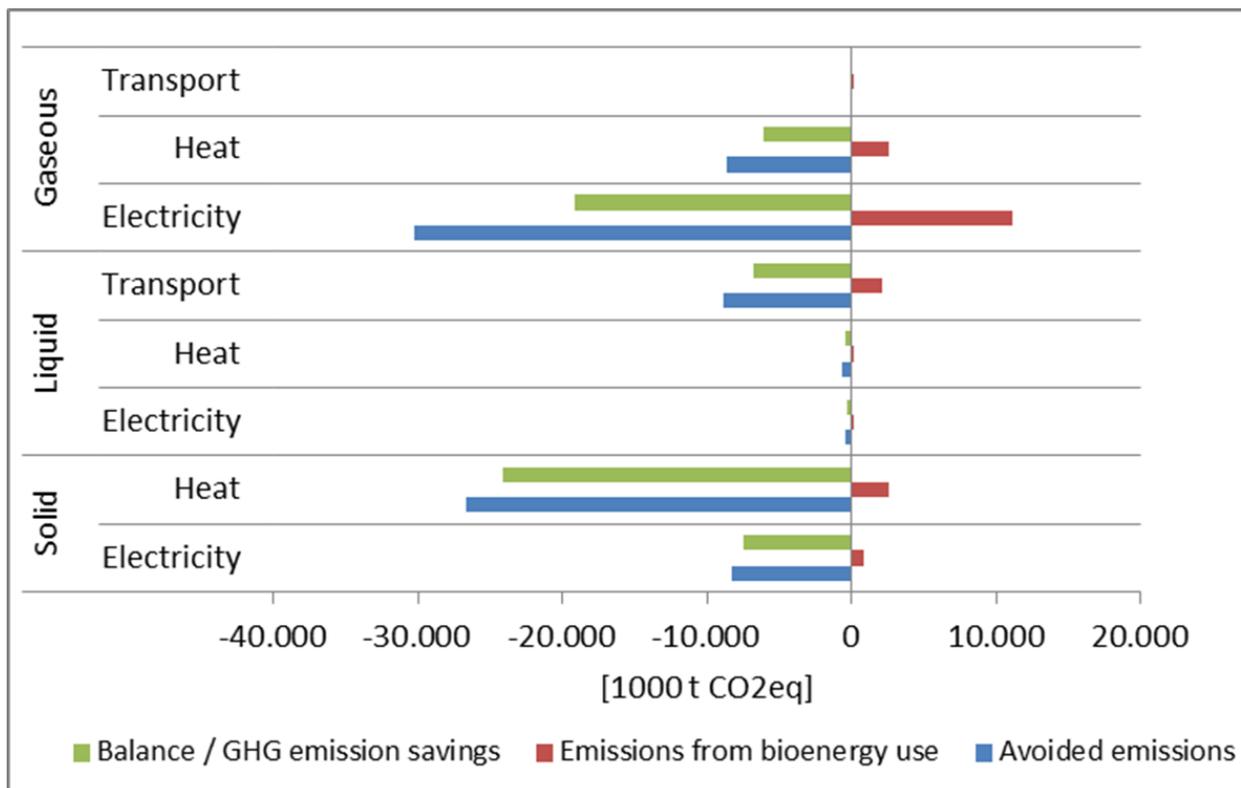
Basic data (bioenergy)



ENVIRONMENTAL PILLAR	SOCIAL PILLAR	ECONOMIC PILLAR
1. Lifecycle greenhouse gas (GHG) emissions	9. Allocation and tenure of land for new bioenergy production	17. Productivity
2. Soil quality	10. Price and supply of national food basket	18. Net energy balance
3. Harvest levels of wood resources	11. Change in income	19. Gross value added
4) Emissions of non-GHG, air pollutants, including air toxics (NO _x , SO ₂ , ...)	12. Jobs in the bioenergy sector	20. Change in the consumption of fossil fuels and traditional use of biomass
5. Water use and efficiency	13. Change in unpaid time spent by women and children collecting biomass	21. Training and re-qualification of the workforce
6. Water quality	14. Bioenergy used to expand access to modern energy services	22. Energy diversity
7. Biological diversity in the landscape	15. Change in mortality and burden of disease attributable to indoor smoke	23. Infrastructure and logistics for distribution of bioenergy
8. Land use and land-use change related to bioenergy feed stock production	16. Incidence of occupational injury, illness and fatalities	24. Capacity and flexibility of use of bioenergy

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Indicator 1: Lifecycle greenhouse gas (GHG) emissions GHG emissions from bioenergy in Germany in 2016

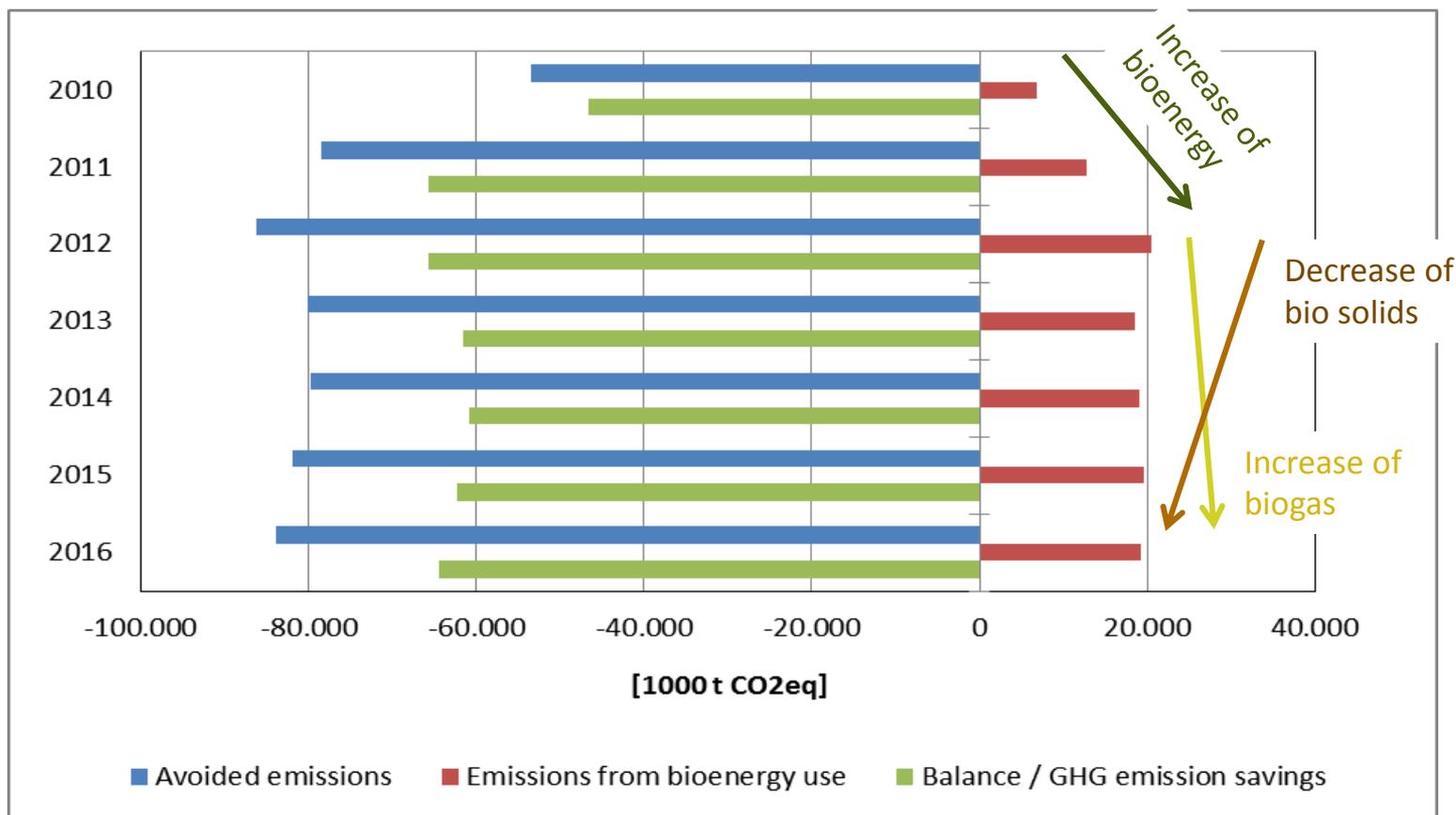


19 350 000 t CO₂eq
emitted throughout the
life cycle of bioenergy

863 873 000 t CO₂eq
replaced

64 523 000 t CO₂eq
total savings

Indicator 1: Lifecycle greenhouse gas (GHG) emissions GHG emissions from bioenergy in Germany in development 2010 - 2016

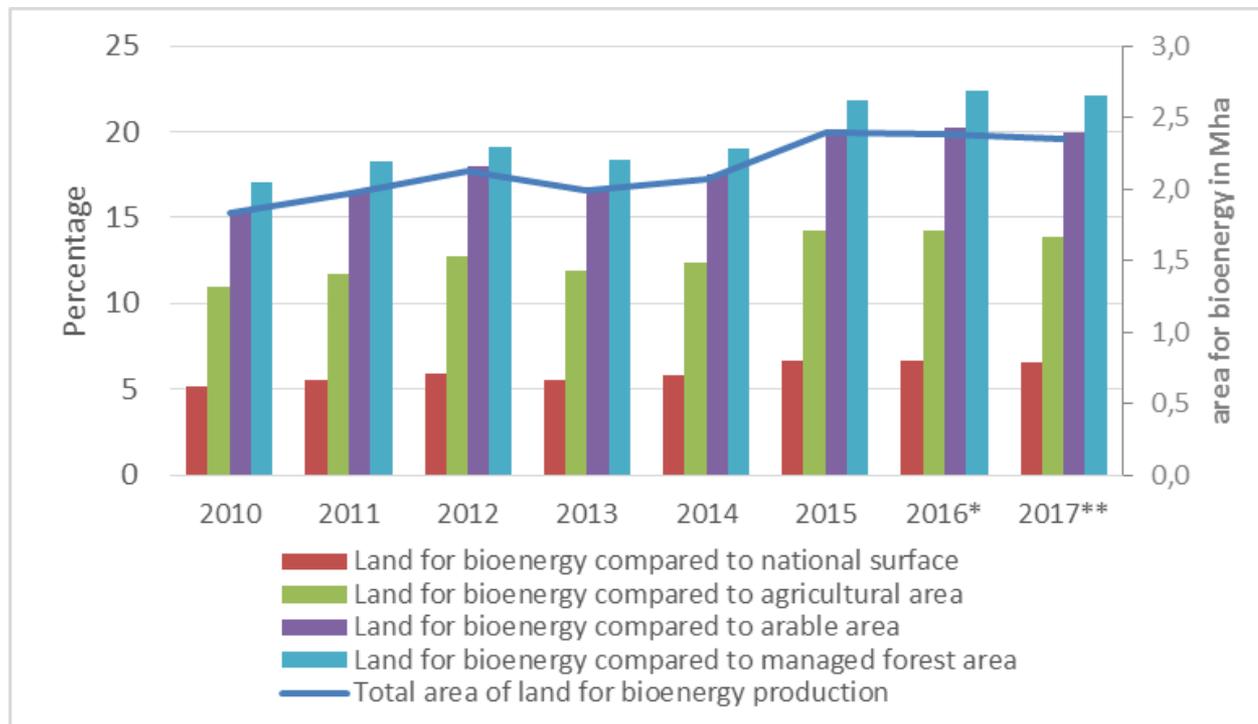


Indicator 8: land use & land-use change

Sub-Indicators:

(8.1) Total area of land for bioenergy feedstock production, and as compared to total national surface and

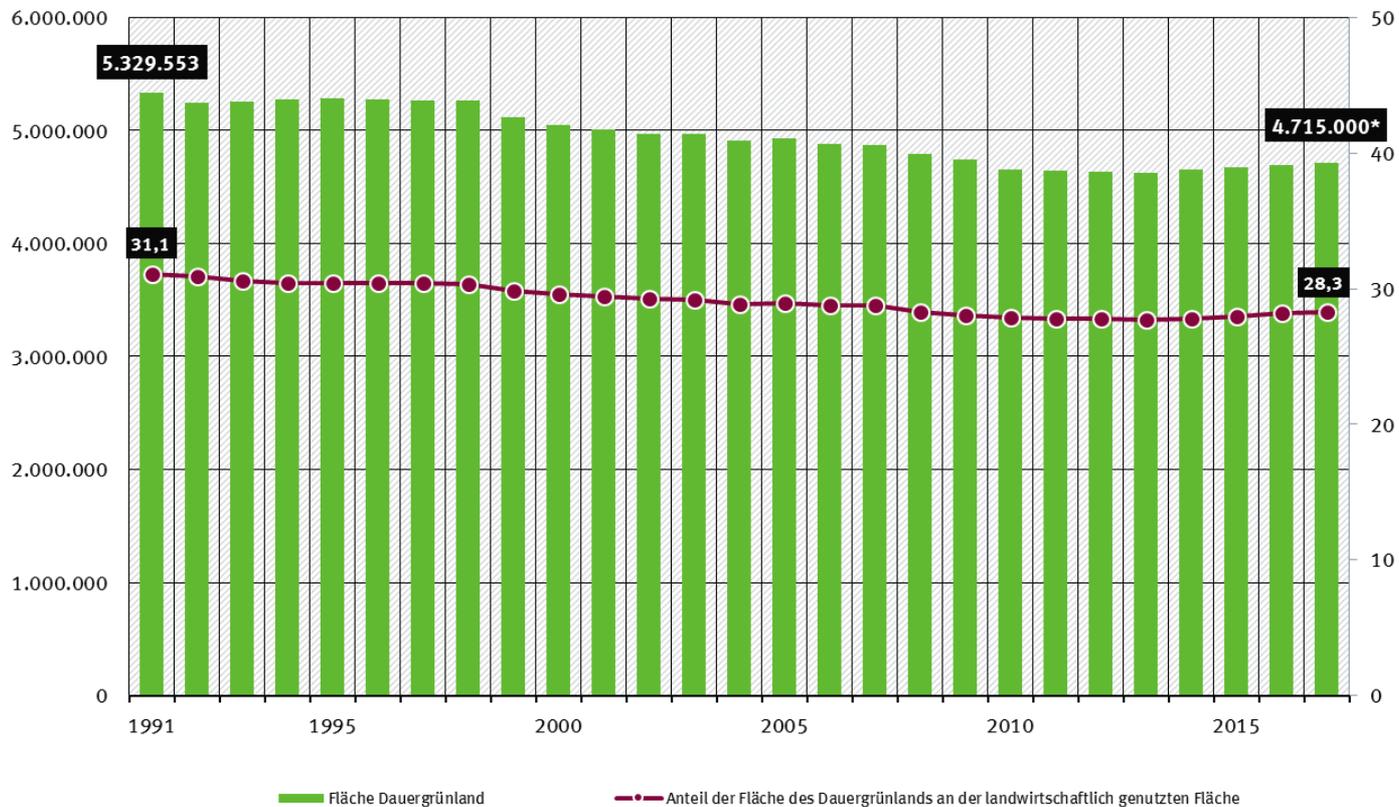
(8.2) as compared to agricultural land and managed forest area



● 12 Source: compilation by IINAS based on FNR (2013, 2014), FNR & BMEL (2018), DESTATIS (2016), BLE (2018); Data based on *preliminary values & ** estimated values

Indikator 8.4: land-use change

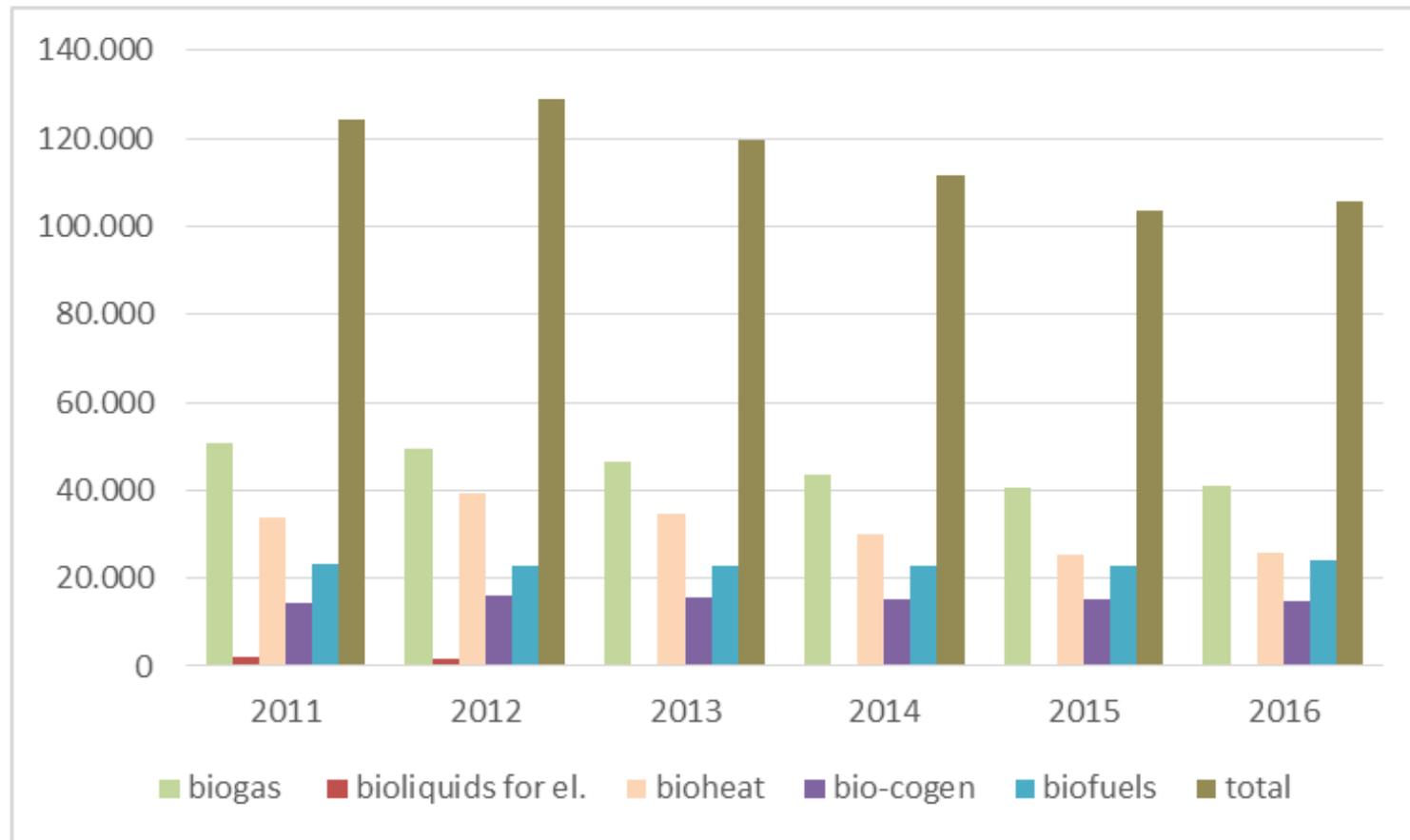
Permanent grassland and share of agricultural land in Germany



In Germany grassland has diminished by 12% 1991 - 2017

Indicator 12: Jobs in the bioenergy sector

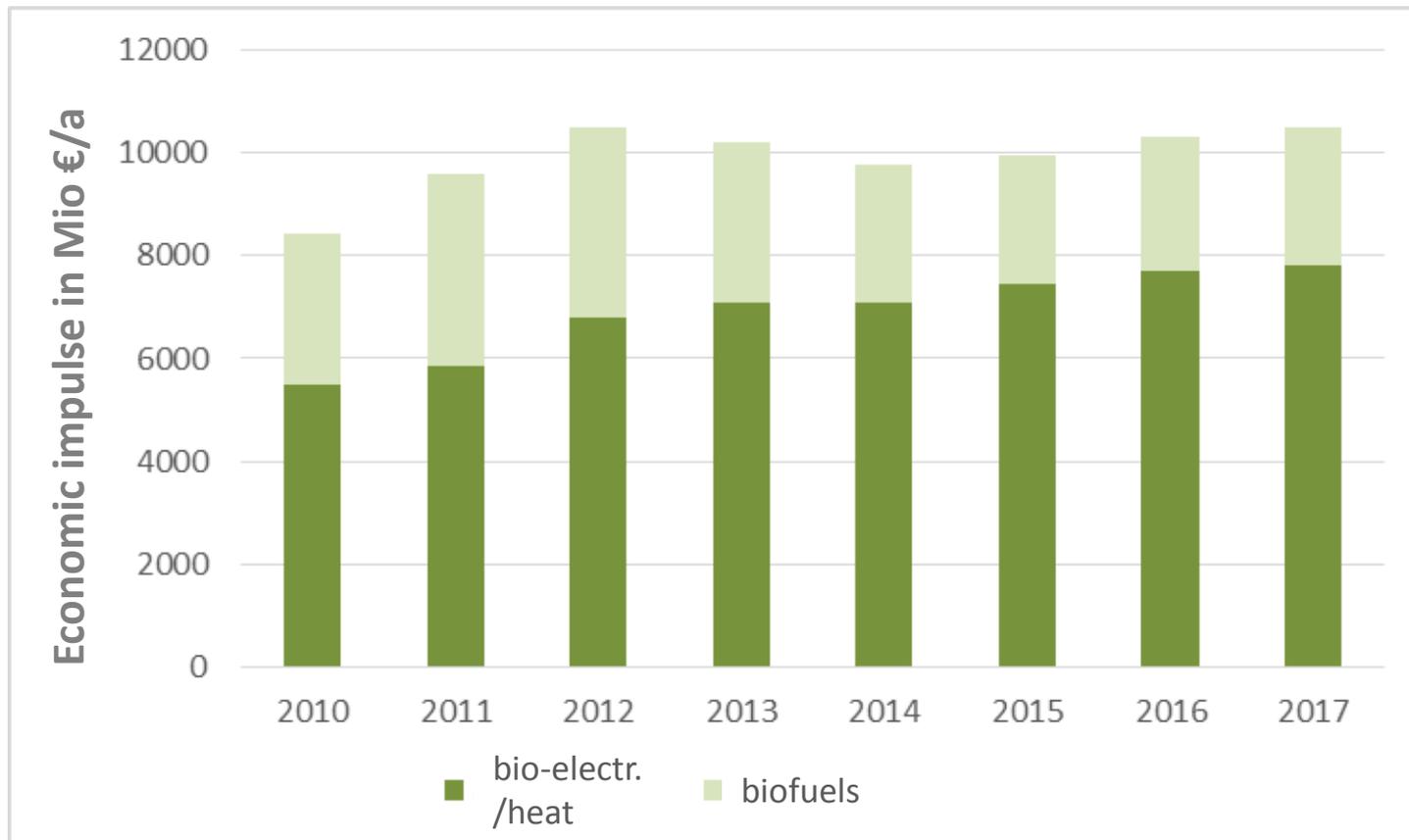
Gross employment by bioenergy in Germany (full-time equivalents) 2011 - 2016)



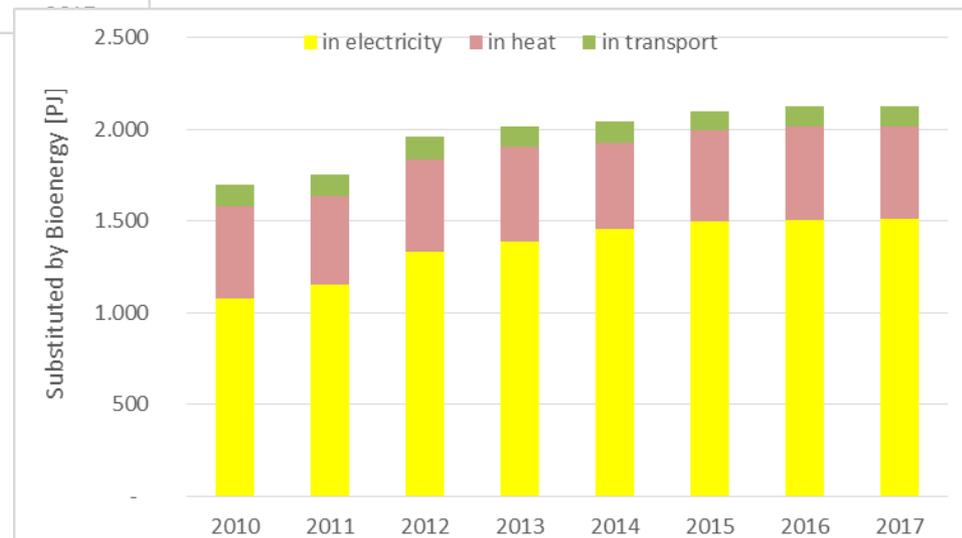
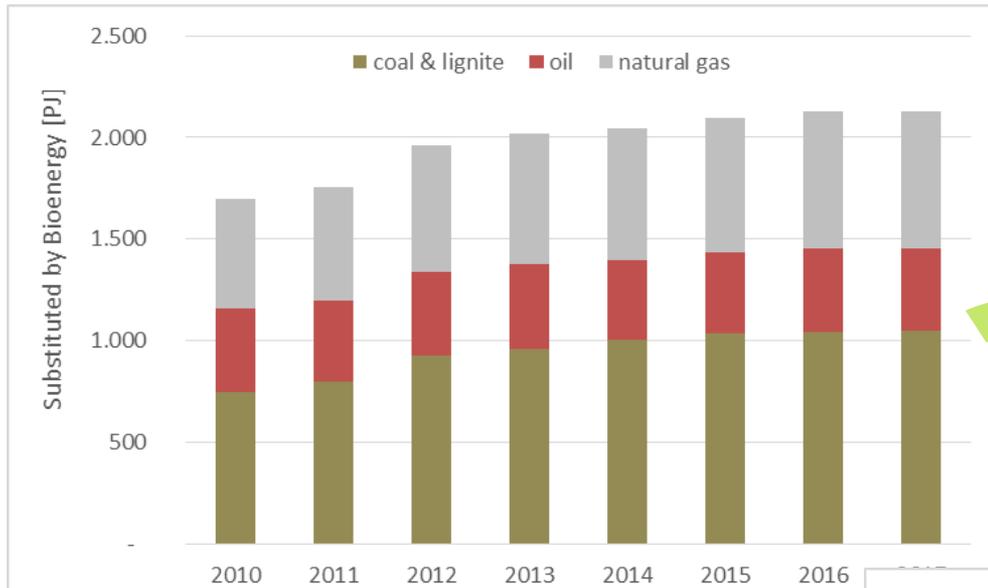
Indicator 19: Gross value added

National statistical data on calculation in Germany only for whole industry sector.

→ **Proxy:** Investments and annual turnover for bioenergy



Indicator 20: Change in consumption of fossil fuels



Trend: still increasing due to biogas
→ electricity (coal etc.)

Conclusions

- The GSI results give a meaningful picture of the development within the bioenergy sector in Germany with regard on sustainability aspects.
- 2nd application = more efficient in terms of effort compared to the first time, in order to facilitate repeated assessments?
- There is progress in terms of filling data gaps or quality
- However, a number of indicators still are complicated to measure, although there are many data and progress in measurements (in particular indicator soil quality (2) and water quality (6)).
- We deem a periodic measuring of the GSI feasible, with a frequency of 4 – 5 years.

In particular, we recognize added value in relation to work on SDG reporting for which the GSIs may prove beneficial, and for the ongoing development of a federal monitoring scheme for the bioeconomy.

Recommendation to visualize the development of the GSI results: Creating synopsis tables

Trend: is there a relevant increase or decrease of the particular GSI result?

↗ increase

→ stable

↘ decrease

State: relevance/contribution:

low

medium: needs observation

high: action needed

Environmental Indicators	Evaluation	Remarks
1. Lifecycle GHG emissions	↘	official data, slight reduction
2. Soil quality	→	data for soil quality exist, but no attribution to measures, insufficient frequency of measurements
3. Harvest levels of wood resources		
3.1 Annual harvest of wood resources by volume	→	More or less stable
3.2 Annual harvest of wood resources as a percentage of net growth or sustained yield	→	Very stable, regulated by law
3.3 Percentage of the annual harvest used for bioenergy	→	
4. Emissions of non-GHG air pollutants, including air toxics, from		
4.1 bioenergy feedstock production	→	varies... liquid and gaseous increasing but solid decreasing
4.2 processing,	→	low share of total
4.3 transport of feedstocks, intermediate products and end products and	→	low share of total

Recommendation
to visualize the
development of
the GSI results:
Synopsis tables

	ENV		SOC		ECO
1	↘	9		17	
2	→	9.1	→	17.1	→
3		9.2	→	17.2	↗
3.1	→	10	→	17.3	↗
3.2	→	11	→	17.4	
3.3	→	11.1	→	18	
4		11.2	→	18.1	↗
4.1	→	12		18.2	↗
4.2	→	12.1	↘	18.3	↗
4.3	→	12.2	→	18.4	↗
4.4	↗	12.3	→	19	→
4.5	↘	12.4	→	20	
5		12.5	→	20.1a	↗
5.1a	→	16	↘	20.1b	
5.1b	→			20.2	
5.2	→			22	→
6				24	
6.1	→			24.1	↗
6.2	→			24.2	↗
7					
7.1	↘				
7.2					
7.3	↗				
8					
8.1	↘				
8.2	↘				
8.3a	→				
8.3b	↗				
8.3c	↗				
8.3d	↗				
8.4	↘				