

Definition:

Aboveground Biomass
Energy

Description

Benefit: This impact area refers to the total weight of all aboveground, harvestable parts of cultivated plants. It is suitable, where production is to be used for energy and other non-food purposes that can utilize the whole plant. Woody crops and forage crops will show high efficiencies in this impact area.

Resource: The use of energy usually refers to inputs of fuel or electricity. Solar irradiation is not considered because it is not a stressed resource, but also because the amount of this natural input would dwarf out all other energy inputs. Furthermore, energy from human or animal labour is usually not considered, although some studies explicitly include it (Arodudu et al., 2017).

Strength & weaknesses pertaining to measurement of this impact area

Biomass: Total amount aboveground biomass (production is generally easy to measure. However, the informative value is limited where they do not account for qualitative differences between types of biomass and are not accompanied by information on site conditions such as local climate or soil fertility. Therefore, comparisons between efficiencies of different production processes with regard to yields should only be made where products and site conditions are similar. In some cases, it may be advisable to select alternative indicators where the type of benefit is more clearly defined (e.g., energetic value, financial benefit).

Energy: For this indicator, a number of standard values for agricultural management are readily available. LCA inventories even provide standard values for energy used in precursory processes.

If the (fossil) energy input is used as a proxy for greenhouse gas emission, it is necessary to also consider the share of non-energy related GHG emission sources like drained soils or nitrous oxide from fertilizers.

Can be measured as

Biomass:

- yield, fresh weight [t]
- yield, dry matter weight [t]

Energy:

- total energy use [J]
- energy use from non-renewable sources [J]

Sample Indicators










Indicator values from		Survey	
Experiment or direct measurement		Statistical- or census data	
Expert assessment		Literature values	
Model		Maps or GIS	
Stakeholder participation		Not provided	

Table 1: Field Scale




Indicator	Unit	Indicator values from
^[275] Biomass/Energy	g * MJ ⁻¹	

Table 2: Regional Scale

Indicator	Unit	Indicator values from
^[190] Aboveground biomass/Absorbed photosynthetic active radiation	g * MJ ⁻¹	 , 



References

ID	Citation	¹ Soil type/ texture
190	Pan, G., et al. (2009). "Using QuickBird imagery and a production efficiency model to improve crop yield estimation in the semi-arid hilly Loess Plateau, China." <u>Environmental Modelling & Software</u> 24 (4): 510-516.	n/a
275	Yang, Z., et al. (2016). "Leveraging abscisic acid receptors for efficient water use in Arabidopsis." <u>Proceedings of the National Academy of Sciences of the United States of America</u> 113 (24): 6791-6796.	n/a

¹Soil type/ texture: If provided, what are type and texture of the soils studied in the paper?