



Selected data from

Sustainable energy options and implications for land use - Working Paper for the Global Land Outlook

Uwe R. Fritsche (lead author) et al. – June 2017

Linkages between the SDGs and the GBEP Sustainability Indicators for Bioenergy - Technical Paper for the GBEP Task Force on Sustainability

Uwe R. Fritsche et al. – June 2017

Compiled for WG 3 of the Global Soil Week 2017

Table 1 Role of the SDGs for energy supply/use and land

SDG	Key wording	Driver	Safe-guard	Land relevance
	End poverty in all its forms everywhere	(✓)	(✓)	moderate
	End hunger, achieve food security and improved nutrition and promote sustainable agriculture	✓	✓	high
	Ensure healthy lives and promote well-being for all at all ages	(✓)	(✓)	low
	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all			
	Achieve gender equality and empower all women and girls			moderate
	Ensure availability and sustainable management of water and sanitation for all	(✓)	(✓)	low
	Ensure access to affordable, reliable, sustainable and modern energy for all	✓	(✓)	high
	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	(✓)	(✓)	moderate
	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	(✓)		moderate
	Reduce inequality within and among countries			
	Make cities and human settlements inclusive, safe, resilient and sustainable	✓	(✓)	high
	Ensure sustainable consumption and production patterns	✓	(✓)	high
	Take urgent action to combat climate change and its impacts	✓	✓	high
	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	(✓)	(✓)	low
	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	✓	✓	high
	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels		(✓)	low
	Strengthen the means of implementation and revitalise the global partnership for sustainable development	(✓)	(✓)	moderate

Source: IINAS compilation based on UN SDG web page www.un.org/sustainabledevelopment/news/communications-material/

Notes: **Bold text:** SDG directly related to energy, high land relevance; (✓) = partially relevant.

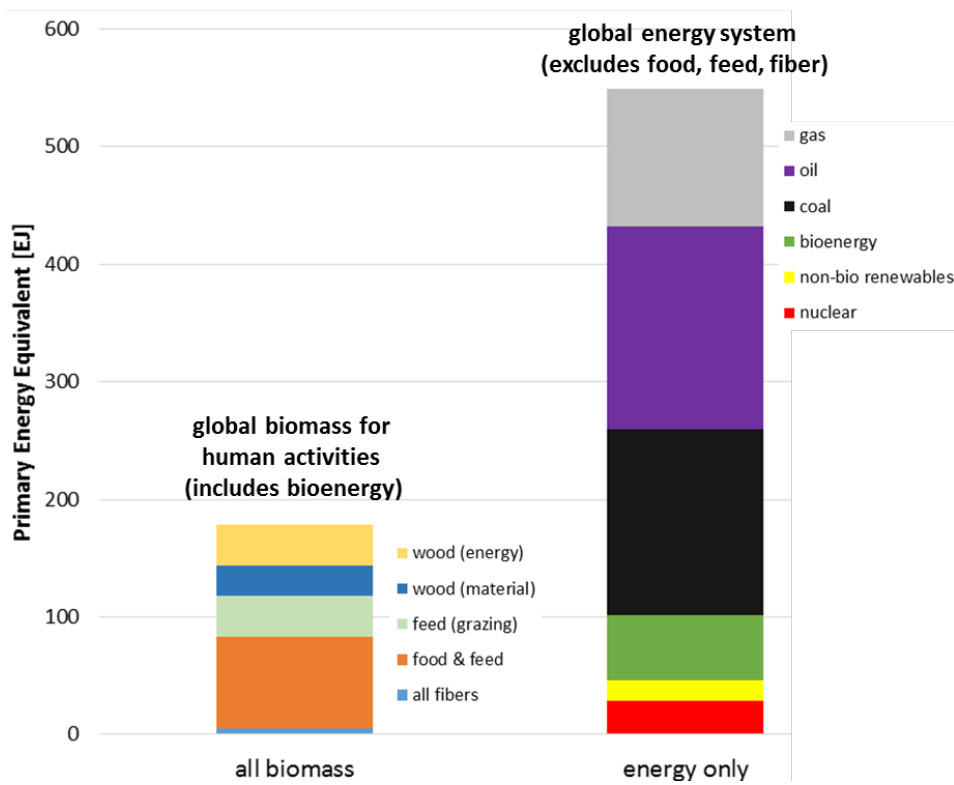
Table 2 Overview of land use intensity relating to energy systems

Product	Primary energy source		Land use intensity [m ² /MWh]				
			U.S. data ^{a)}	U.S. data ^{b)}	EU data ^{c)}	UNEP ^{d)}	Typical ^{e)}
Electricity	Nuclear		0.1	0.1	1.0		0.1
	Natural gas		1.0	0.3	0.1	0.2	0.2
	Coal	Underground	0.6	0.2	0.2		0.2
		Surface ("open-cast")	8.2	0.2	0.4	15.0	5.0
	Renewables	Wind	1.3	1.0	0.7	0.3	1.0
		Geothermal	5.1		2.5	0.3	2.5
		Hydropower (large dams)	16.9	4.1	3.5	3.3	10
		Solar photovoltaic	15.0	0.3	8.7	13.0	10
		Solar – concentrated solar power	19.3		7.8	14.0	15
		Biomass (from crops)	810	13	450		500
Liquid Fuel	Fossil oil		0.6		0.1		0.4
	Biofuels	Corn (maize)	237		220		230
		Sugarcane (from juice)	274		239		250
		Sugarcane (residue)					0.1
		Soybean	296		479		400
		Cellulose, short rotation coppice	565		410		500
		Cellulose, residue			0.10		0.1

Source: own compilation. Note that data include land use for spacing and from upstream life cycles (e.g., mining).

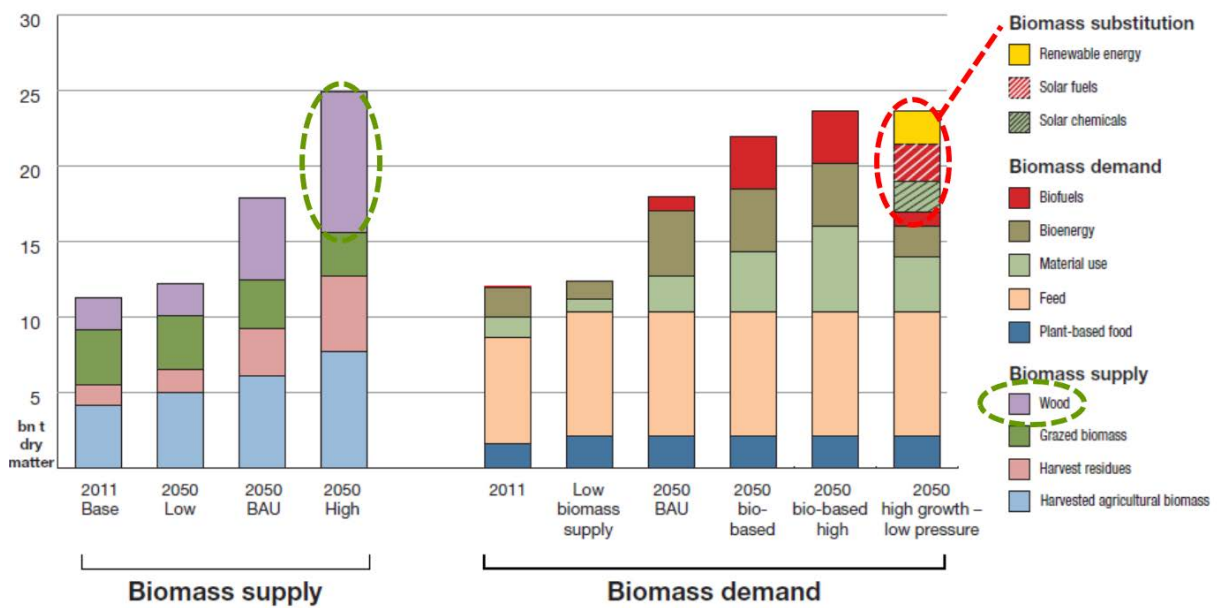
a) Trainor et al. (2016); b) Fthenakis and Kim (2009); c) IINAS (2017); d) UNEP (2016); e) own estimate for unspecified region (i.e., generic).

Figure 1 Biomass and the global energy system



Source: IINAS calculation for 2010 based on IEA and nova-institute data

Figure 2 Bioeconomic scenarios for global biomass supply and use up to 2050



Source: Nova (2015): Global bioeconomy in the conflict between biomass supply and demand. nova paper #7.

Hürth www.bio-based.eu/nova-papers