Renewable energy and sustainable development

Historically, economic development has been strongly correlated with increasing energy use and growth of GHG emissions.

Renewable Energy can help decouple that correlation, contributing to sustainable development (SD)

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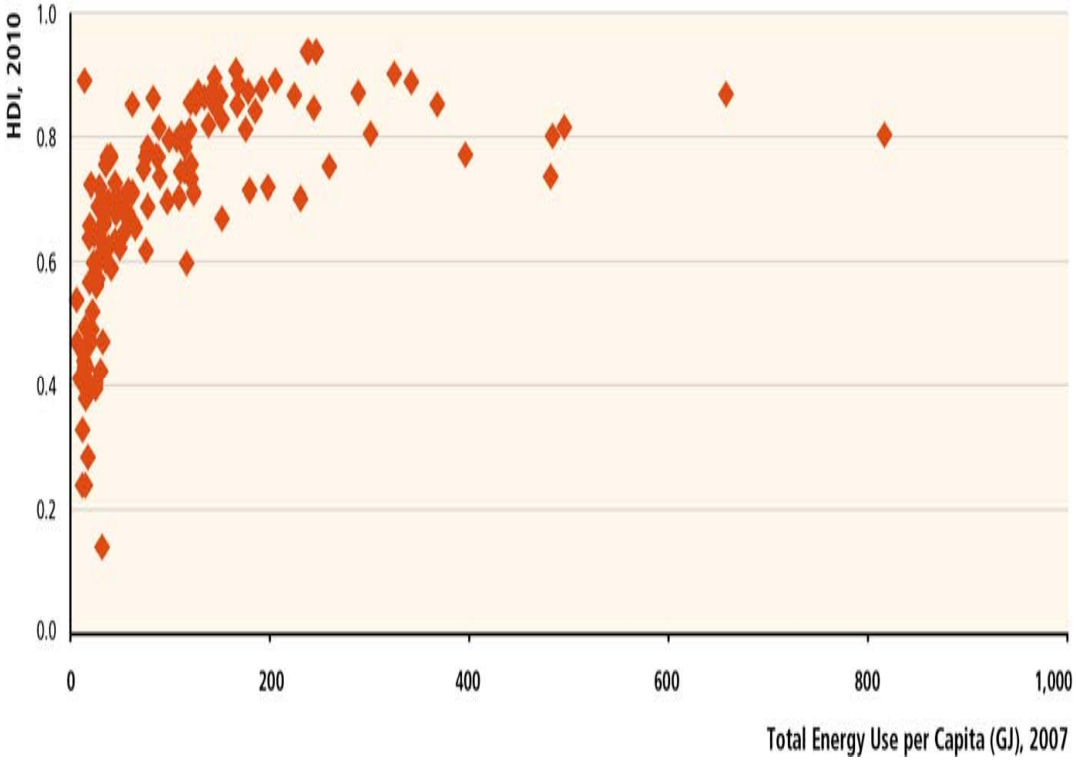

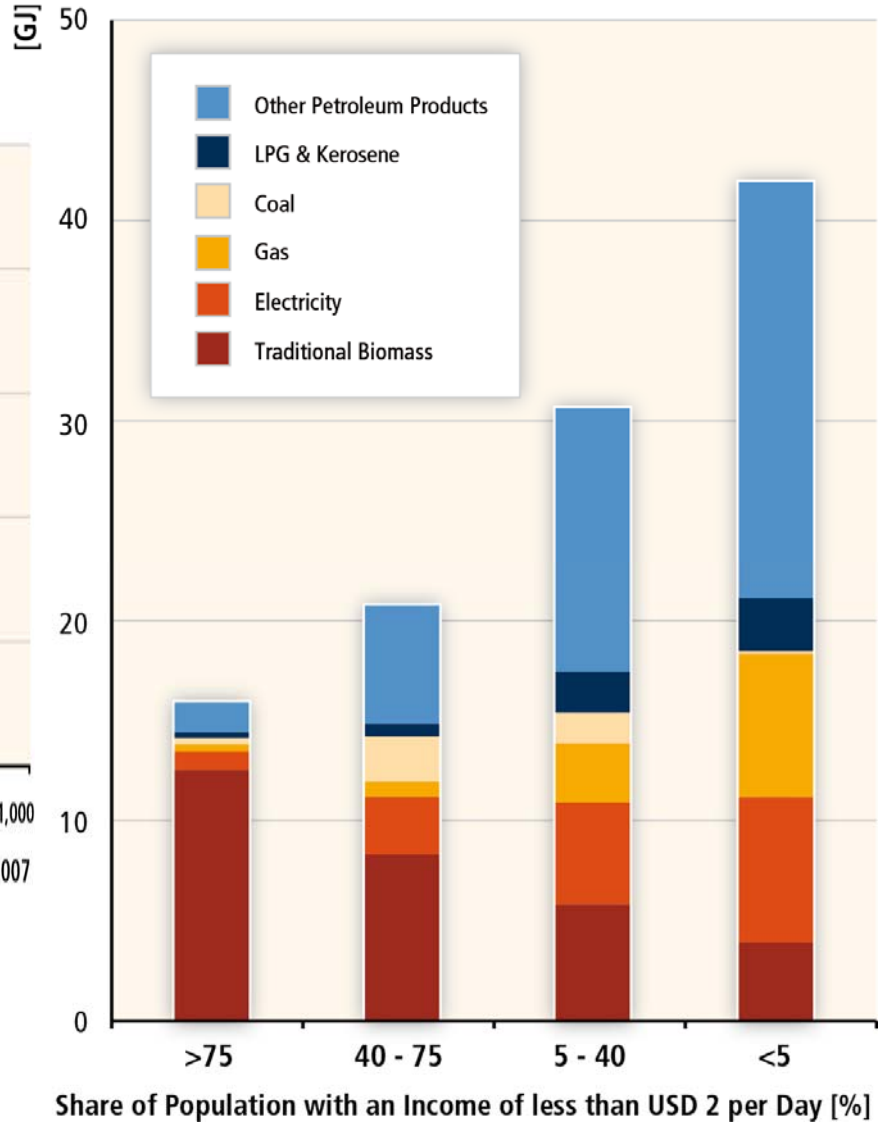

Indicators of links between energy use and economic development

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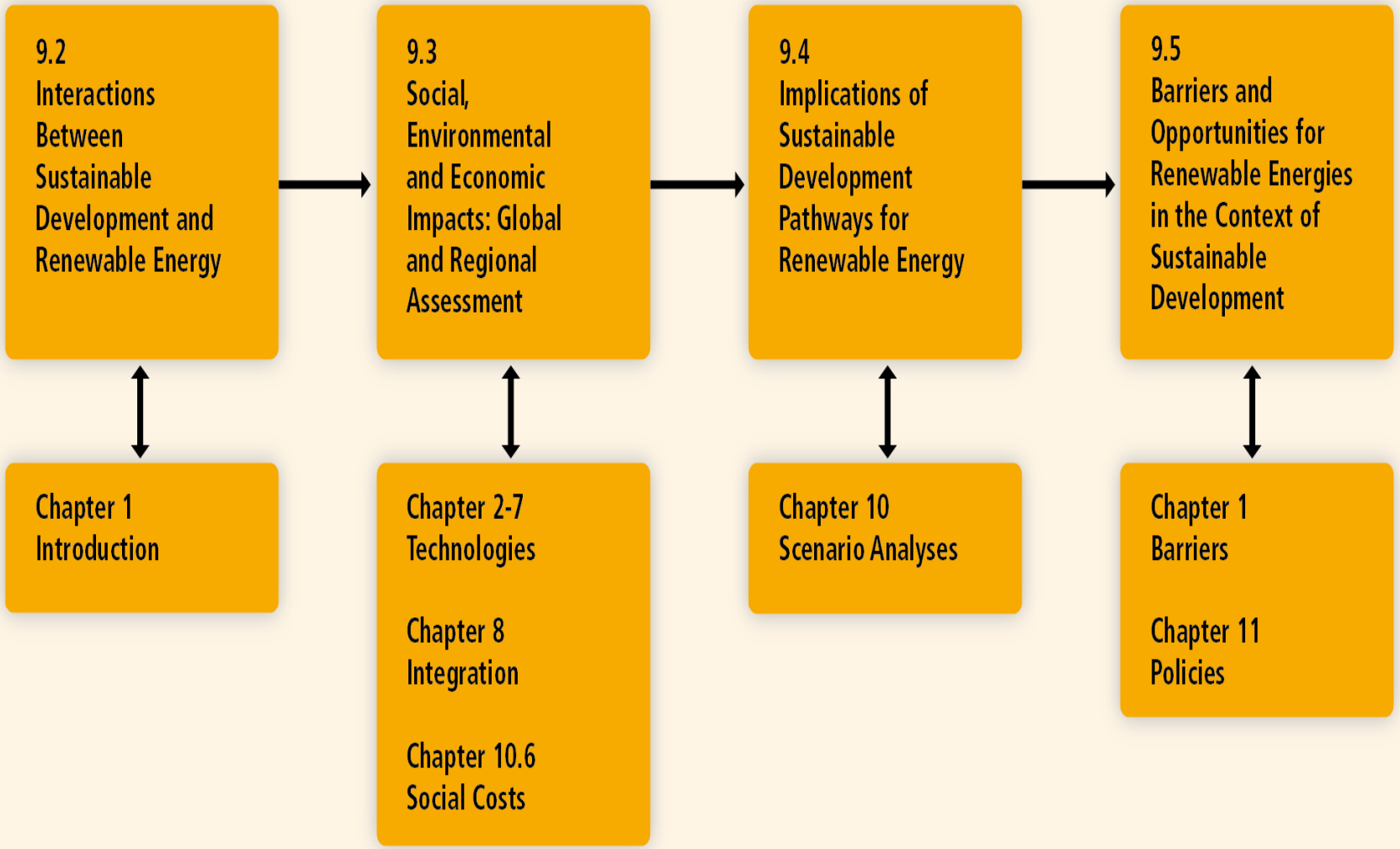

Linking the SD assessment with the technical and policy chapters

Renewable Energy contributing to Sustainable Development.

- RE can accelerate access to energy, particularly for the 1.4 billion people without access to electricity and the additional 1.3 billion people using traditional biomass.
- RE deployment can reduce vulnerability to supply disruptions and market volatility.
- Low risk of severe accidents
- Environmental and health benefits

Renewable energy contributions to increasing energy access

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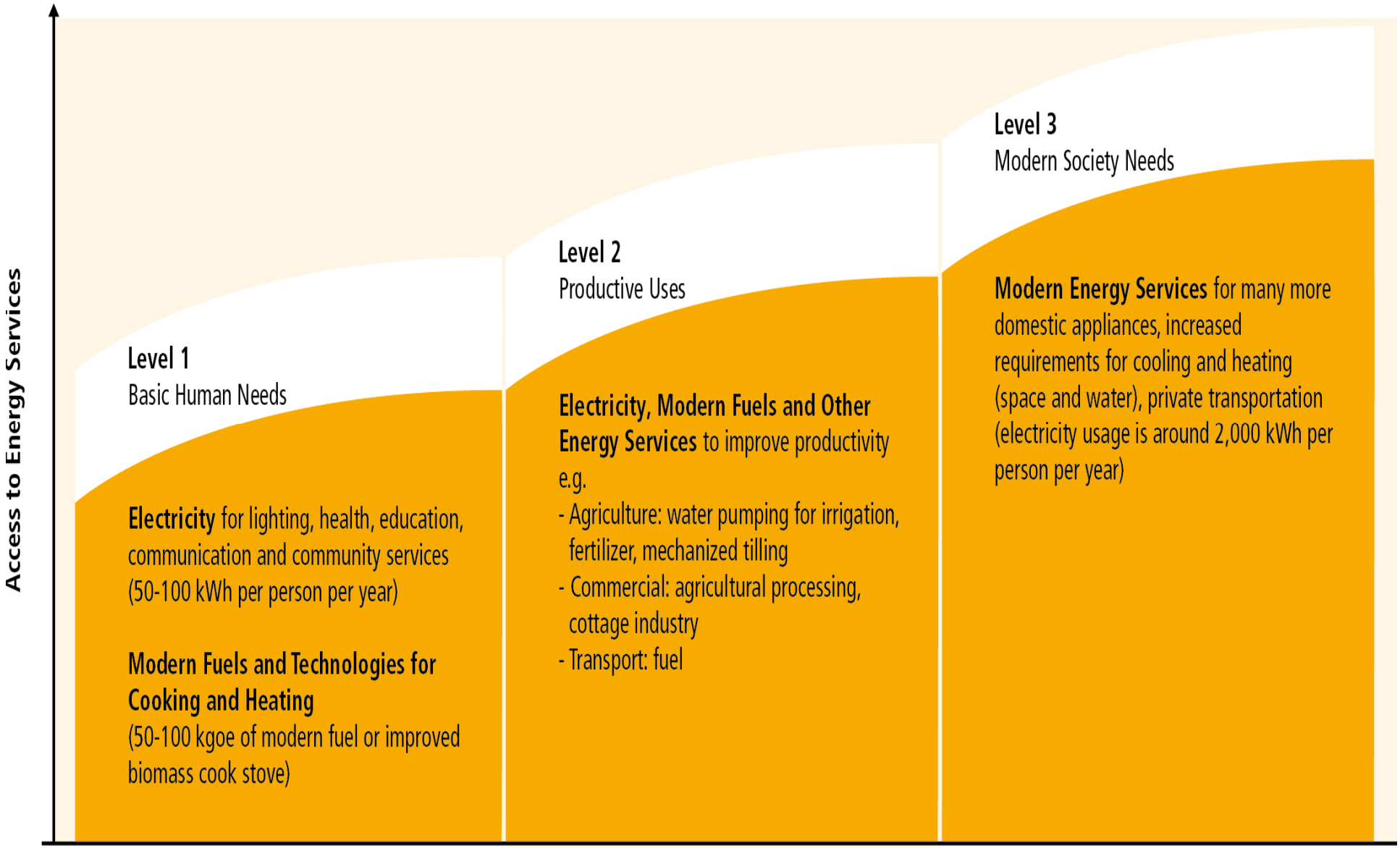
Table 9.1 Millions of people without access to electricity in 2009 by region; projections to 2015 and 2030 under the IEA World Energy Outlook 2010, New Policies Scenario; and percentage of total populations with future access as a result of anticipated electrification rates (IEA, 2010b). * Includes Middle East countries, ** includes OECD and transition economies

Region	2009			2015	2030	2009	2015	2030
	Rural	Urban	Total	Total	Total	%	%	%
Africa	466	121	587	636	654	42	45	57
Sub-Saharan Africa	465	120	585	635	652	31	35	50
Developing Asia	716	82	799	725	545	78	81	88
China	8	0	8	5	0	99	100	100
India	380	23	404	389	293	66	70	80
Other Asia	328	59	387	331	252	65	72	82
Latin America	27	4	31	25	10	93	95	98
Developing Country*	1229	210	1438	1404	1213	73	75	81
World**	**1232**	**210**	**1441**	**1406**	**1213**	**79**	**81**	**85**



RE has strong potential to contribute to increasing access

Stand alone – mini grid – grid extension

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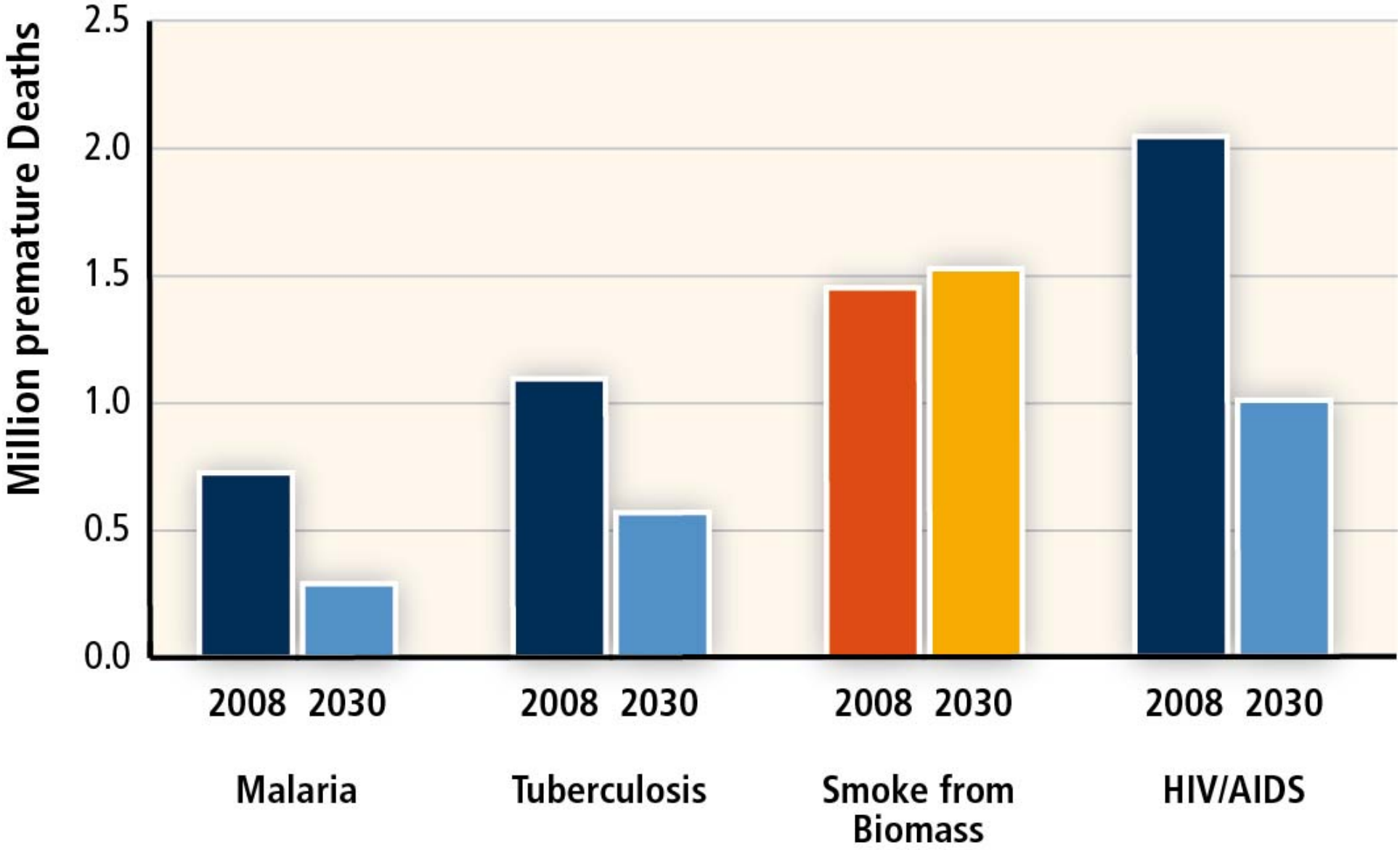

SD benefits include health improvement, local employment and reduced energy imports

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Renewable energy – GHG emissions and local airpollution

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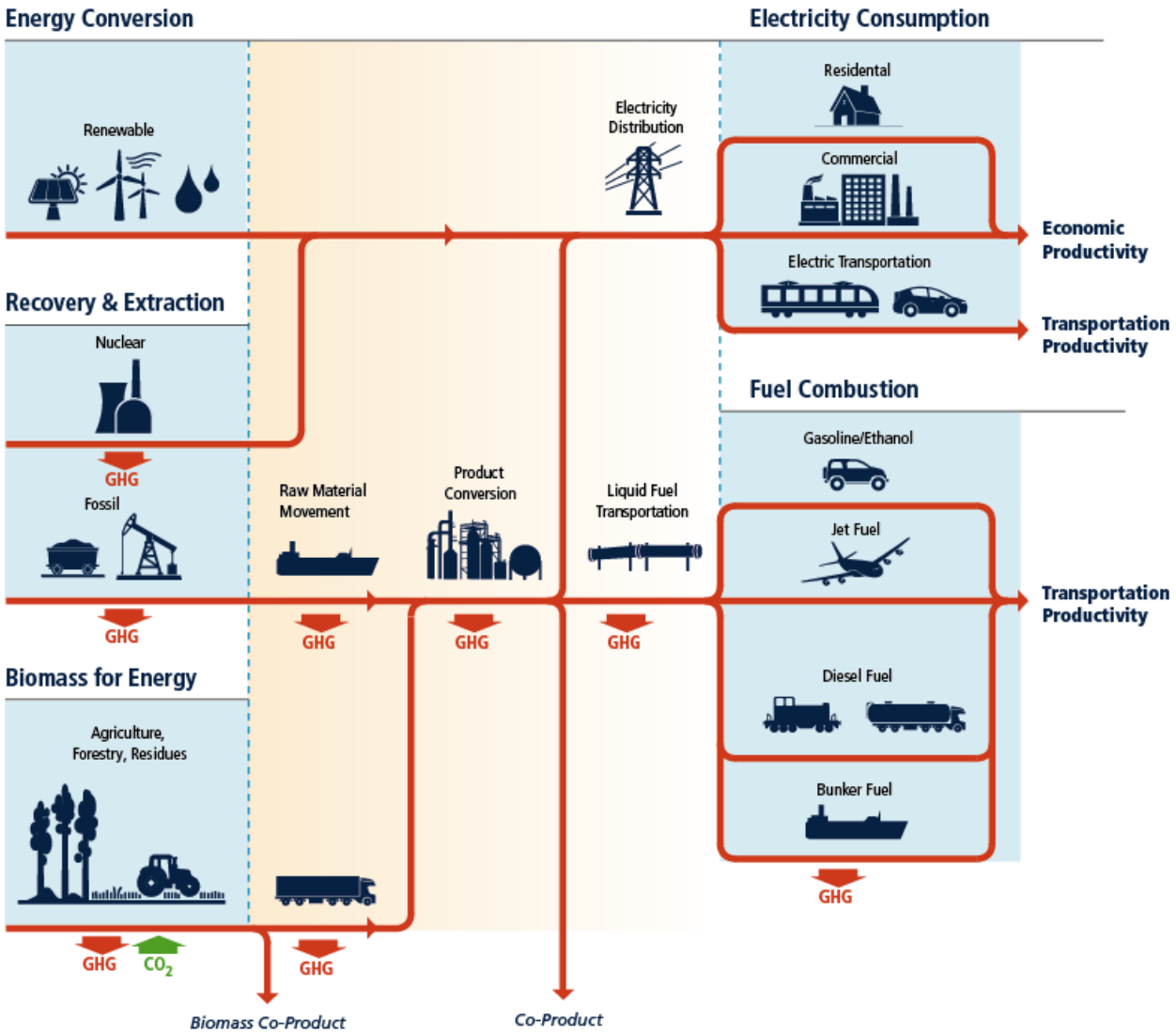
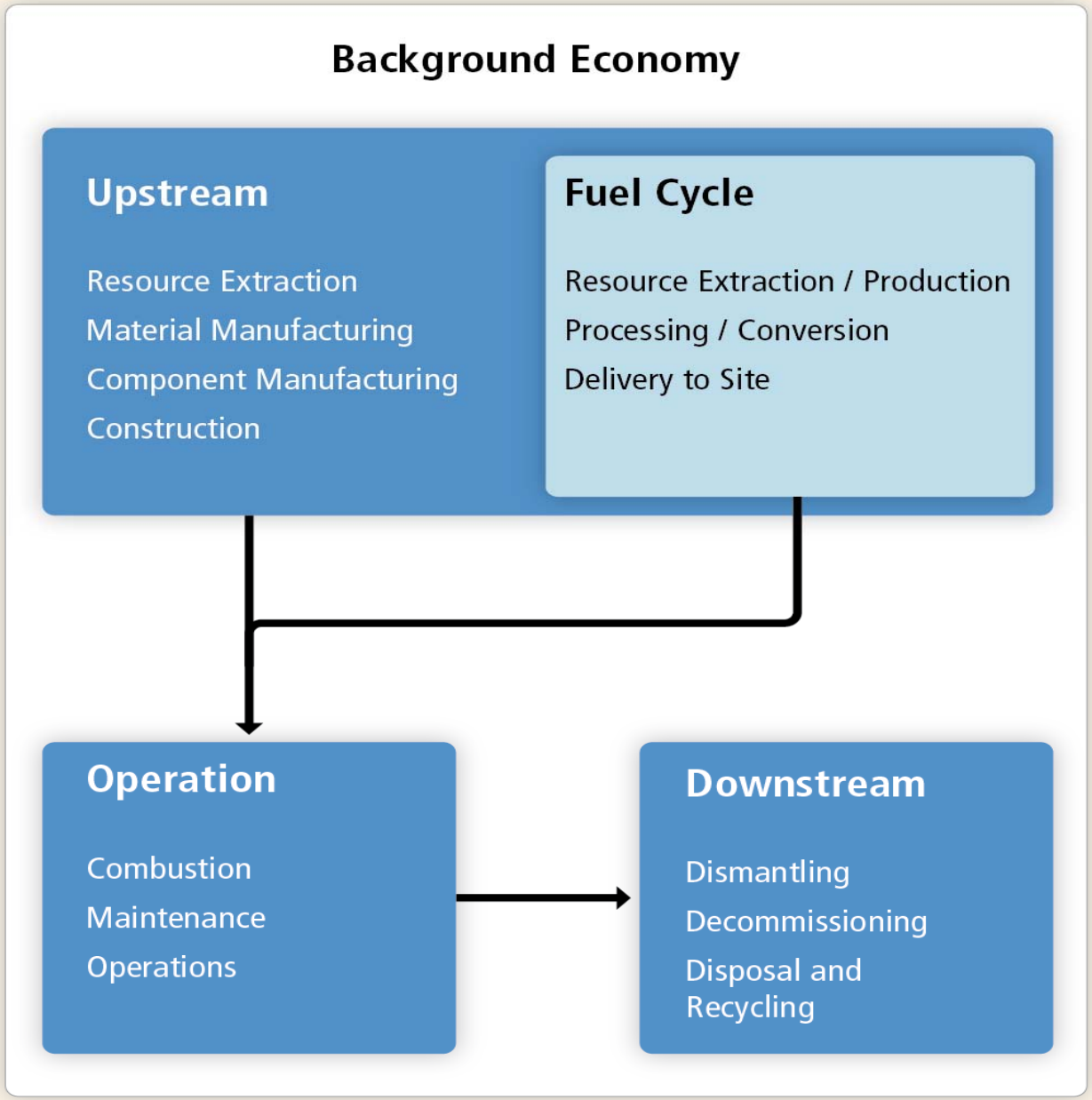
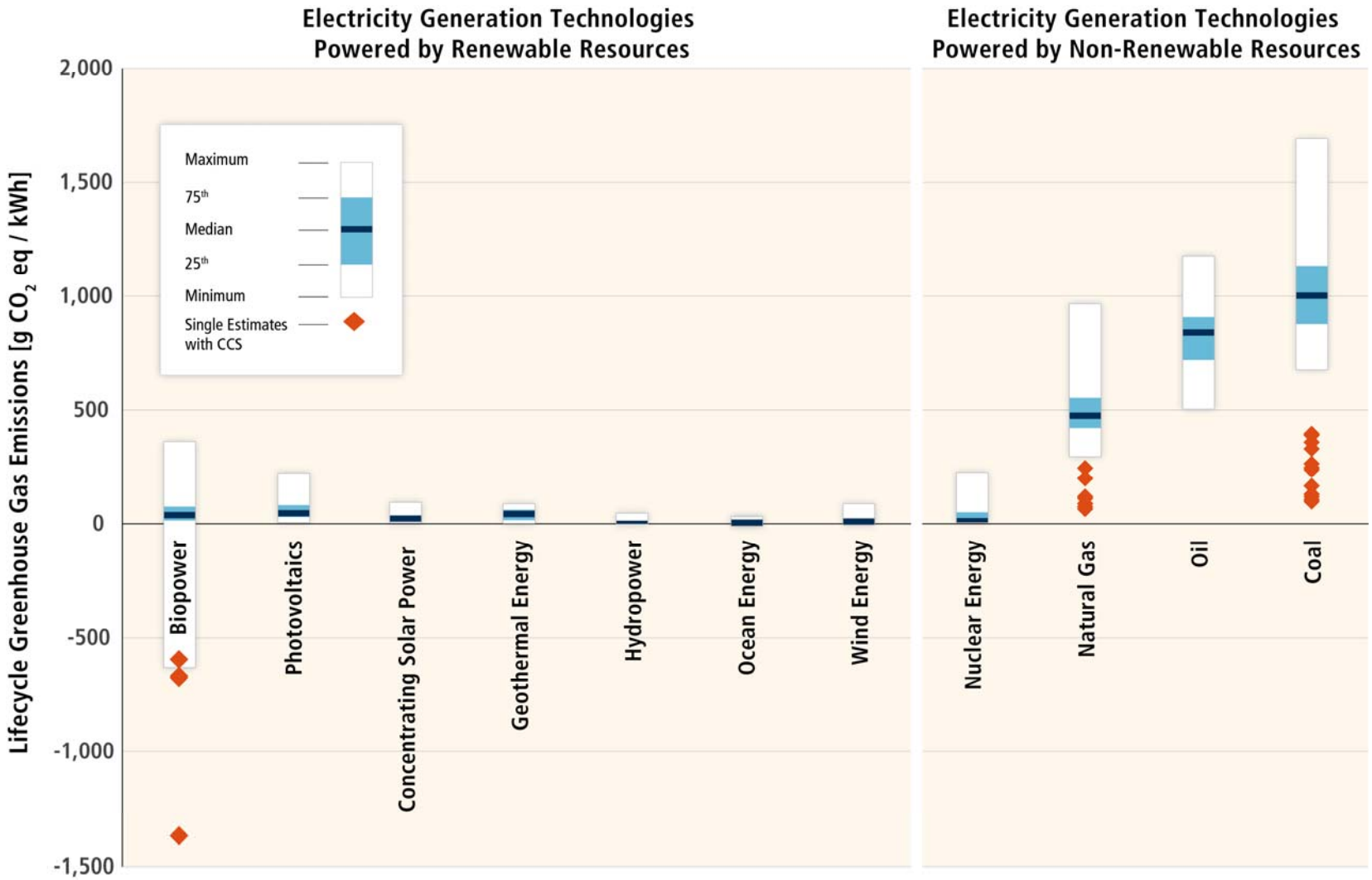
A systemic approach is needed for a comparison of "cradle to grave" emissions.





Life Cycle Analysis approach

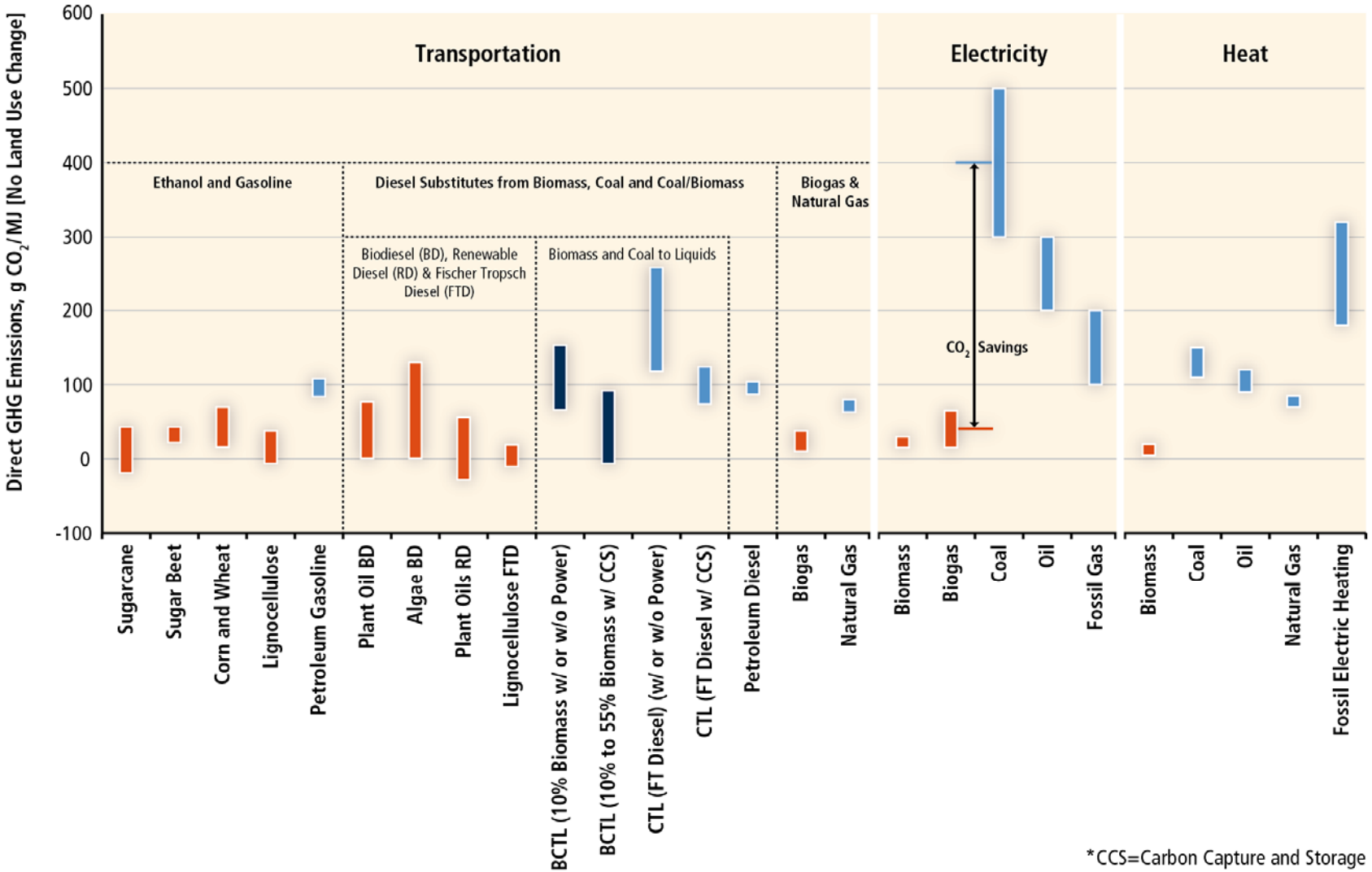
Lifecycle GHG emissions of RE technologies are, in general, considerably lower than those of fossil fuel options, even with CCS in most cases.



Land-use change and bioenergy

- Bioenergy has potential for making significant contributions to SD, BUT if not properly managed activities can lead to negative impacts on SD
- The positive greenhouse gas balance of biofuels can be affected by direct and indirect land-use changes.
- Proper governance of land-use, zoning, and choice of biomass production systems are key challenges for policy makers.

GHG emissions from modern bioenergy chains compared to fossil fuel energy systems, excluding land-use change effects.



Barriers and Opportunities for Implementation of RE - in an enhanced SD context

Barriers

- Socio-cultural
- Information and awareness
- Market and economic

Opportunities

- Integrating SD & RE strategies
- International and national SD strategies
- Internalization of economic and social externalities