



Impacts on the Sustainable Development Goals of Offshore Wind Energy

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The goals and targets will stimulate action in areas of critical importance for humanity and the planet

- Peace - peaceful, just and inclusive societies
- Prosperity - all human beings can enjoy prosperous and fulfilling lives
- People - end poverty and hunger, fulfil dignity and equality
- Planet - protect the planet, so that it can support the needs of the present and future generations.
- Partnership - Global Partnership for Sustainable Development, focussed in particular on the needs of the poorest and most vulnerable and with the participation of everyone



The goals and targets will stimulate action in areas of critical importance for humanity and the planet

SUSTAINABLE DEVELOPMENT GOALS

- Peace
- Prosperity
- People
- Planet
- Partnership



<https://sdgs.un.org/2030agenda>



SDGs and the energy transition

- Ambitious emission reduction targets → Energy transition
- Large investments in renewable energy technologies
- Positive for climate change mitigation, and healthy and clean energy, but also positive and negative effects on other sustainability indicators



Ref: Eurostat. *The interlinked nature of the SDGs*.
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7 AFFORDABLE AND
CLEAN ENERGY





The Sustainable Development Goals

Economy – Society – Environment



17 goals, 169 targets, 232 indicators, covering **different sustainability pillars** that should **ALL** be addressed to achieve sustainability

Impacts of transition to low-carbon economy often focuses on environmental and economic impacts, not taking into account the direct and indirect social effects of this transition.

Interlinked



The goals and indicators are interlinked. Effects in one goal can have positive or negative effects on other goals.

Policies, technology use, strategies, etc can have **synergies or trade-offs** in different goals.

Effects in global value chains



Many of these indicators can be **directly or indirectly affected by global value chains**.

The production and use of technologies, changes in production systems, changes in consumption, etc lead to changes in demand for different industries in different countries. That can have positive or negative impacts on the environment, workers, or the economy that contributes to accelerating or slowing the SDGs.



Offshore Wind and Sustainable Development



SUSTAINABLE DEVELOPMENT GOALS



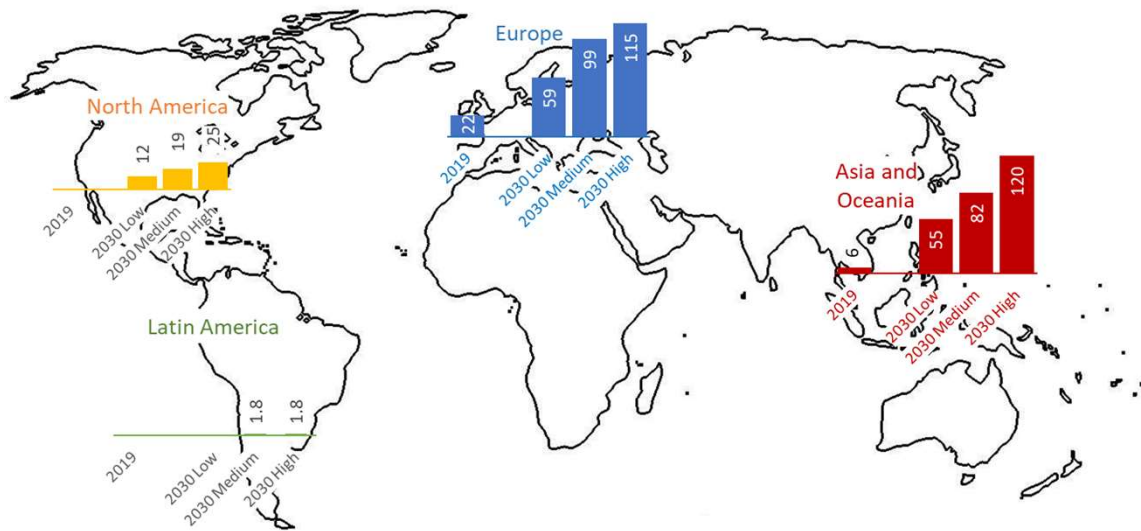


Relevant targets and indicators

SDG	Target	Indicator	Type of effects and how to assess
Goal 1. End poverty in all its forms everywhere	1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than \$1.25 a day	1.1.1 Proportion of the population living below the international poverty line by sex, age, employment status and geographic location (urban/rural)	Based on jobs by skill and gender (value chains), quantitative
.....
Goal 3. Ensure healthy lives and promote well-being for all at all ages	3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease	Based on local emissions that can be approximated by CO2 emissions (value chains), qualitative
.....
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption	Input assumption
.....
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead	8.1.1 Annual growth rate of real GDP per capita	Value added per country compared to original (value chains), quantitative
		8.4.1 Material footprint, material footprint per capita, and material footprint per GDP	Material use, direct effects
.....
Goal 12. Ensure sustainable consumption and production patterns	12.2 By 2030, achieve the sustainable management and efficient use of natural resources	12.2.1 Material footprint, material footprint per capita, and material footprint per GDP
.....
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	14.1.1 (a) Index of coastal eutrophication; and (b) plastic debris density	Direct effects, assess through marine and pollution expertise
.....



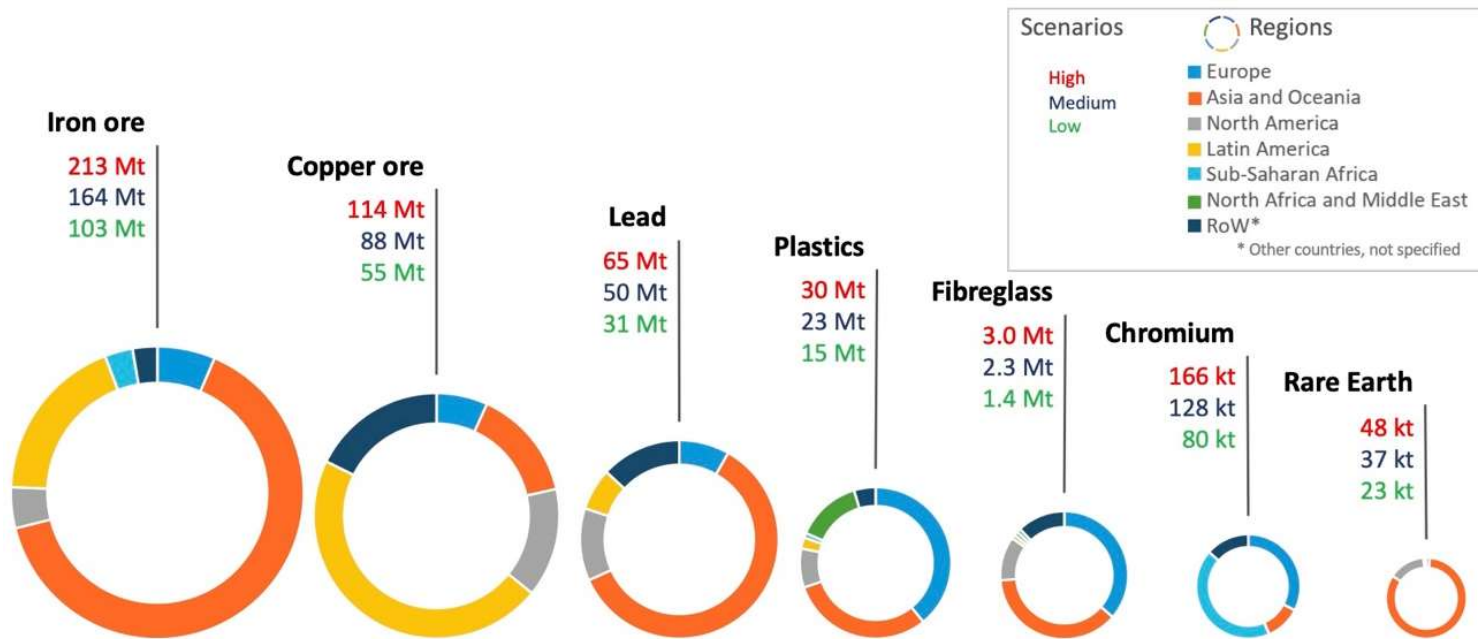
Offshore wind power installation scenarios



Numbers based on:
IRENA. Future of Wind: Deployment, investment, technology, grid integration and socio-economic aspects.
International Renewable Energy Agency (IRENA) www.irena.org/publications (2019);
WindEurope - the voice of the wind energy industry. <https://windeurope.org/>;
IEA. World Energy Outlook 2020. (2020).



Material demand

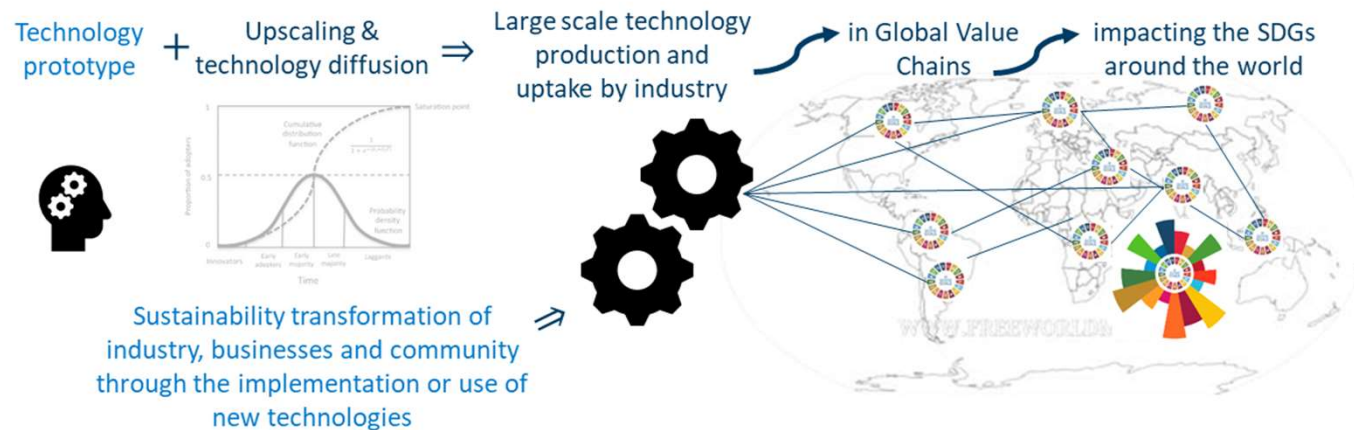


Numbers based on IRENA. Future of Wind: Deployment, investment, technology, grid integration and socio-economic aspects. International Renewable Energy Agency (IRENA) www.irena.org/publications (2019).

Linking technology investment and use to global value chains



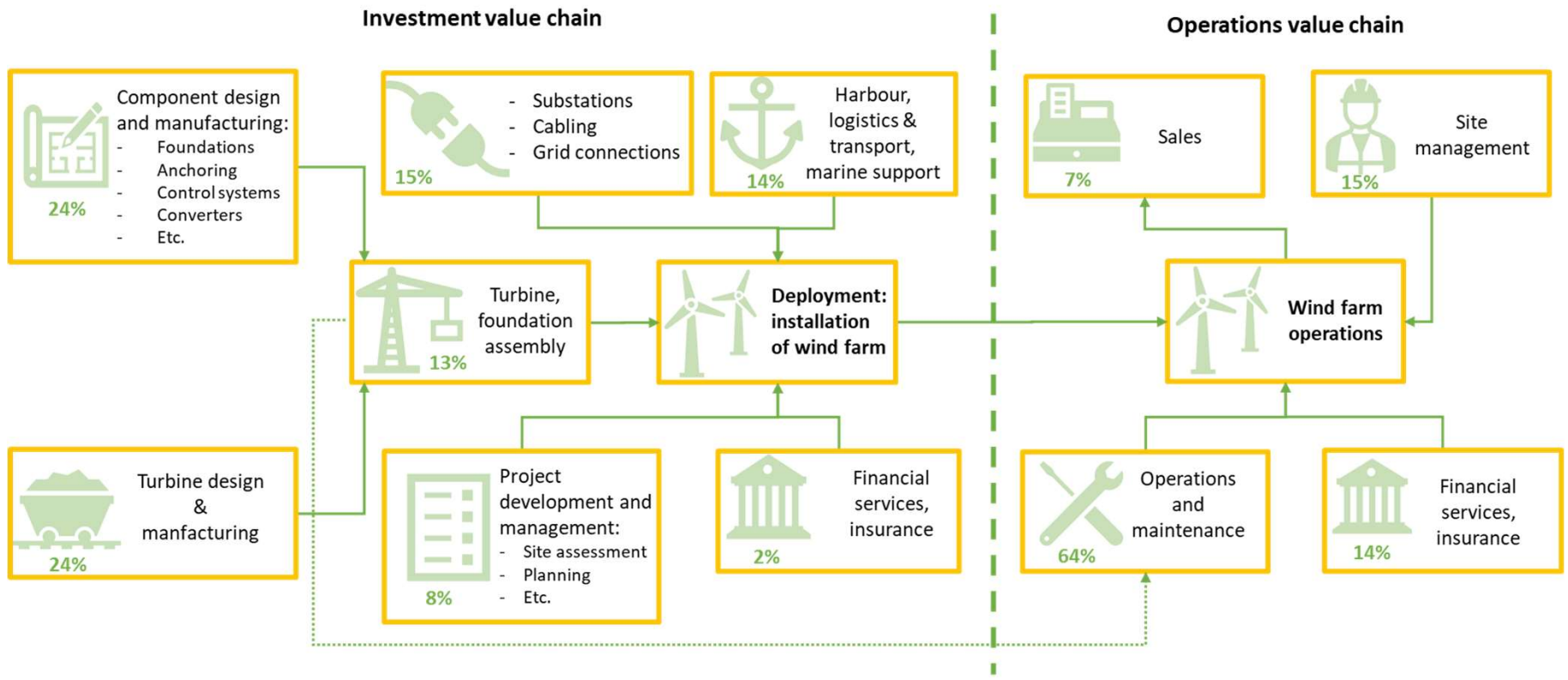
- Global Value Chain analysis based on the OECD's inter-country input-output (ICIO) database, covering 65 countries



eaSi-system framework (<https://www.sintef.no/en/projects/2020/easi-system-framework-for-systematic-sdg-impacts-assessment/>)



Offshore wind power





Investment value chain

Manufacture and building of infrastructure leads to increased combustion of fossil fuels

Mining industry and material consumption increase for building offshore wind farms, especially in regions where raw material comes from

Manufacturing employment and value added grows in places where equipment is being produced.

CO2 emissions per value added increase due to use of energy-intensive materials

Higher emissions lead to ocean acidification

Job opportunities for low-skilled workers, both male and females

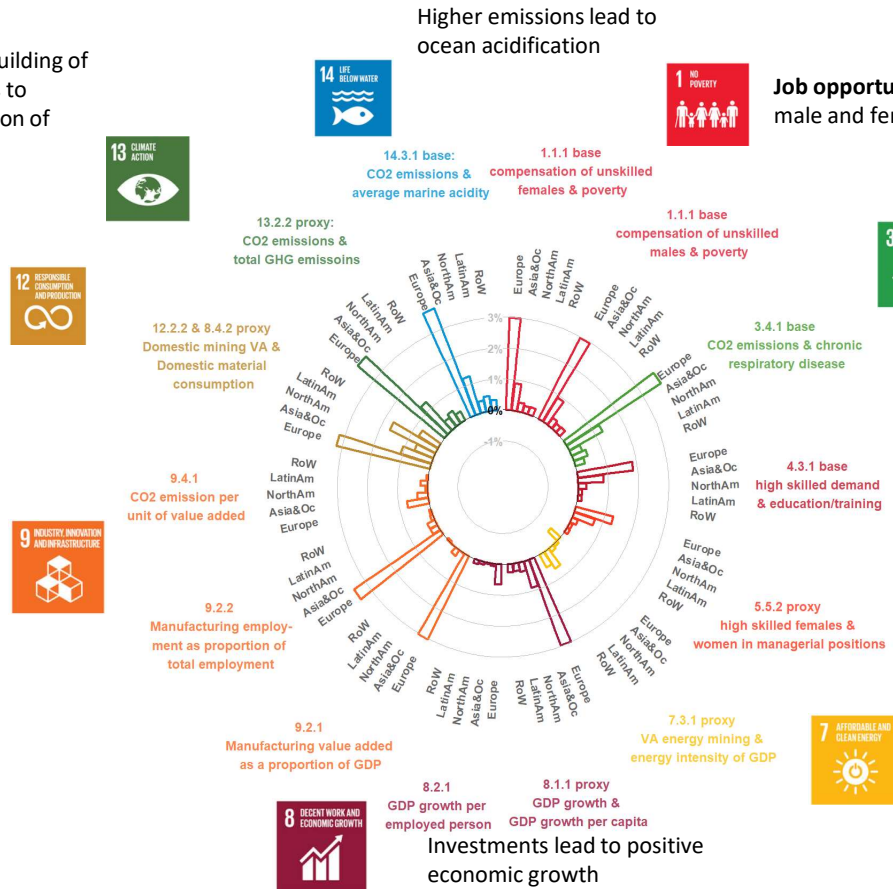
Manufacture and building of infrastructure leads to increased combustion of fossil fuels, especially in Europe and Asia. Assumes current energy mix.

Increased demand for high-skilled workers

Increased demand for high-skilled women, especially in Asia.

Changes in the share of energy mining in value added

Investments lead to positive economic growth



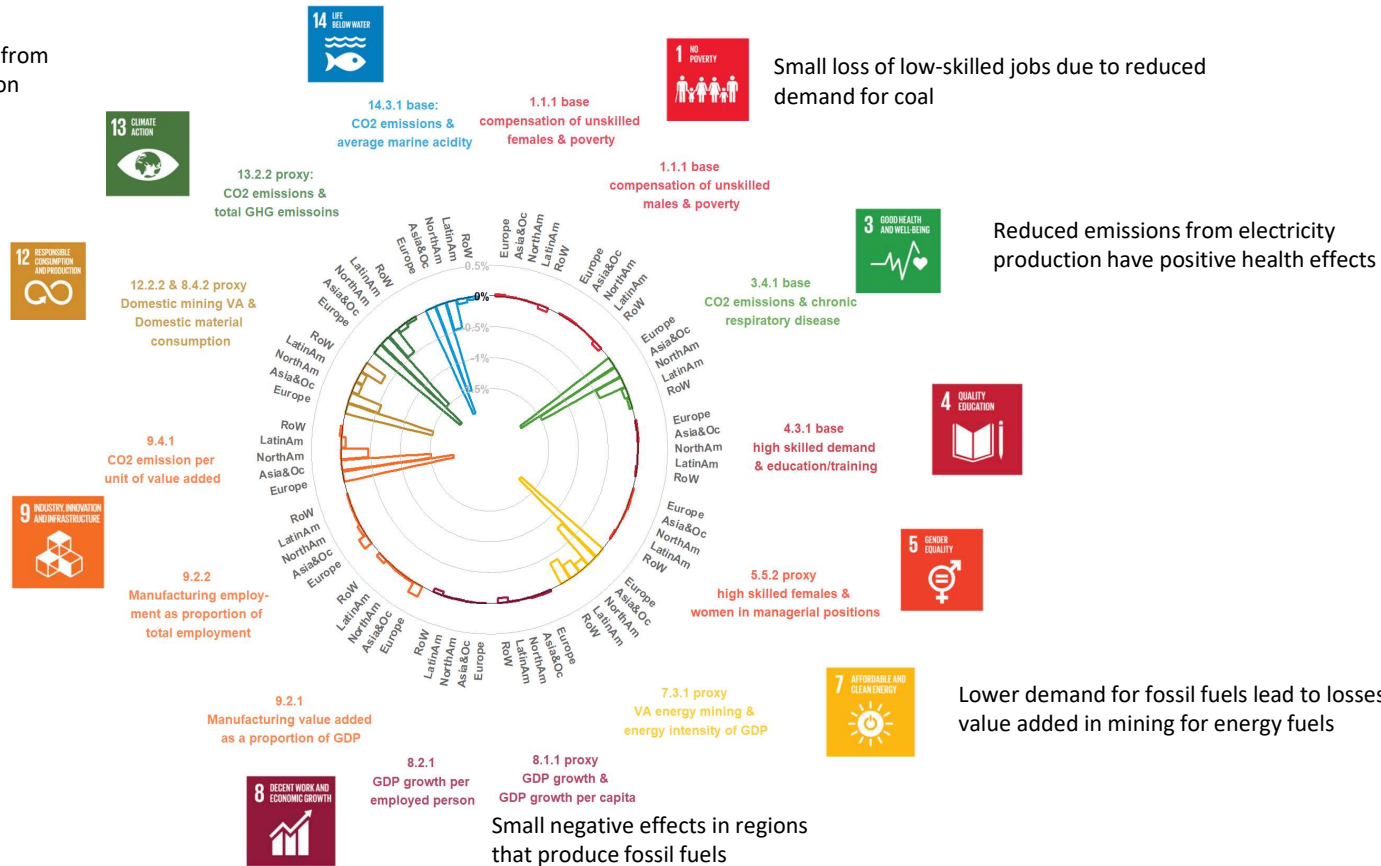


Operations value chain

Reduced emissions from electricity production

Reduced mining activities in all regions due to lower demand for fossil fuels

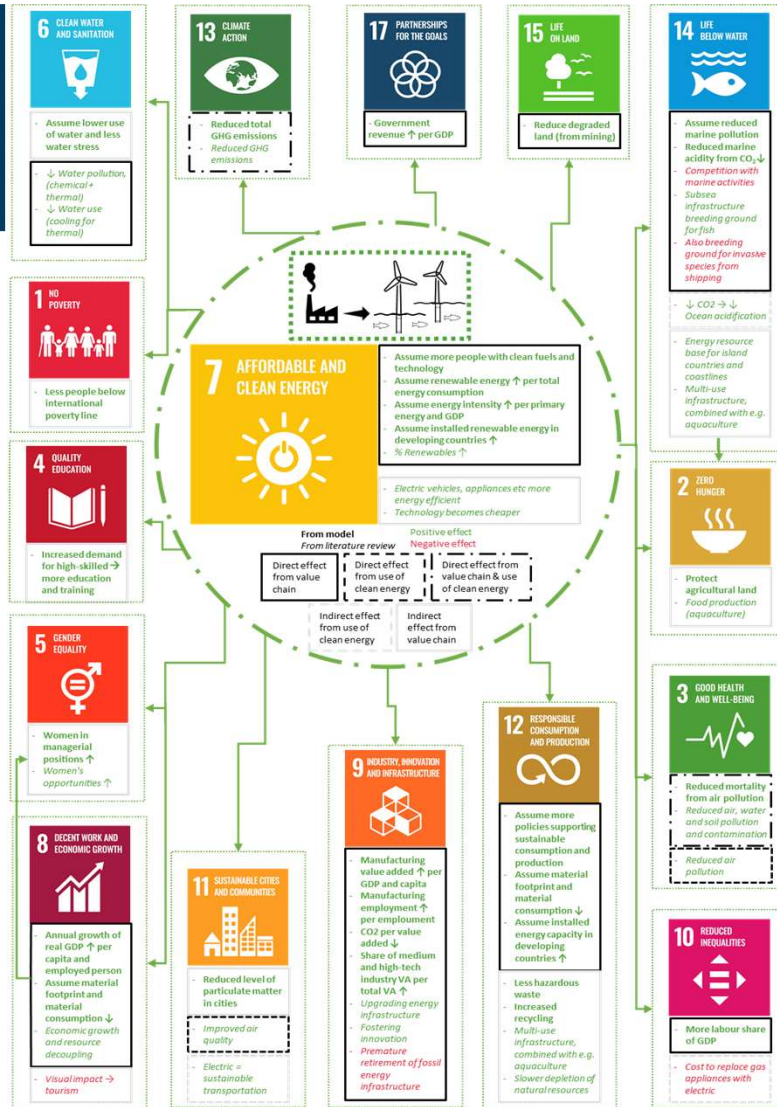
CO2 emissions per value added decrease



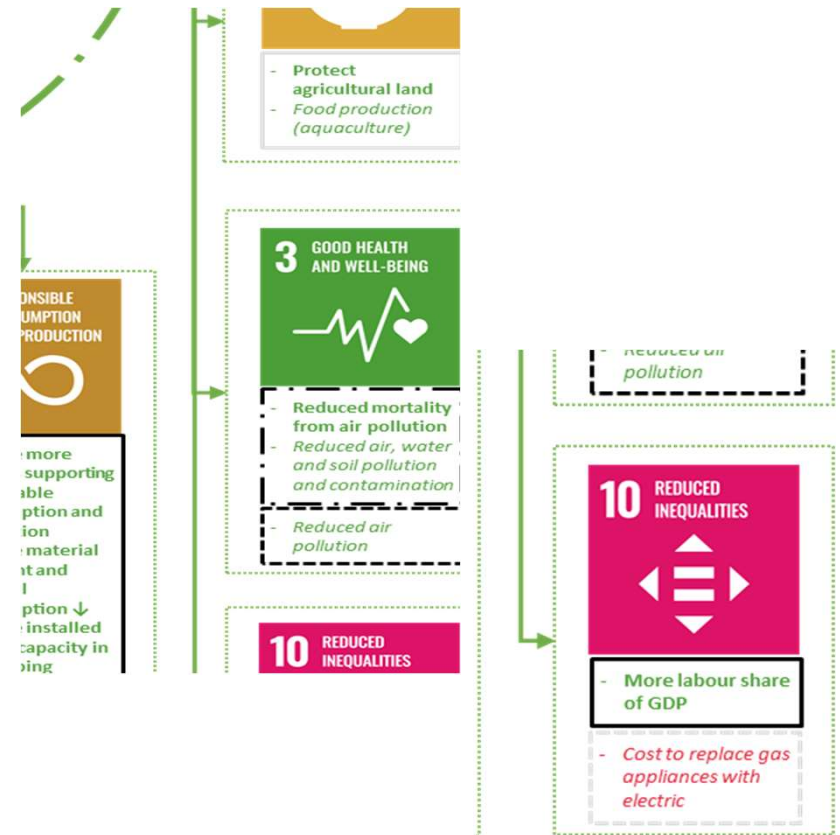
Small loss of low-skilled jobs due to reduced demand for coal

Reduced emissions from electricity production have positive health effects

Lower demand for fossil fuels lead to losses of value added in mining for energy fuels



Impacts on the SDGs and interlinkages





Discussion and conclusion

- Assessing the SDG impacts of new technologies is important for a just transition: maximize positive effects and anticipate and mitigate negative impacts
- There is a need for the assessment of a more sustainable material extraction as well as disposal and recycling of renewable energy technologies

SUSTAINABLE DEVELOPMENT GOALS





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Technology for a better society