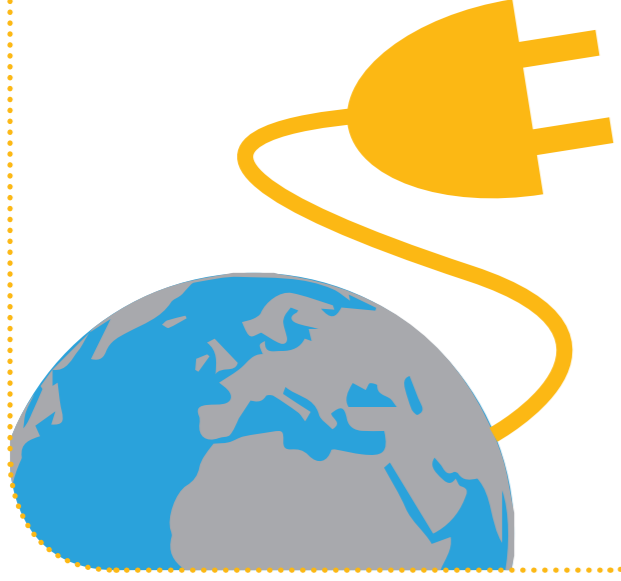


# How energy choices influence the human future

## DEMAND FOR ENERGY

### Increasing energy demand

World **energy demand** is expected to **double** by 2050.



### Drivers for energy demand



**Growing population** from 7 billion today to 9 billion by 2050.



**Industrialization**, especially in emerging markets.



Globalization and **increasing global trade** (including transportation).



Growing middle class with **changing consumption patterns**.

### Results of energy demand



Electricity production is responsible for 25% of total anthropogenic **greenhouse gas emissions**.

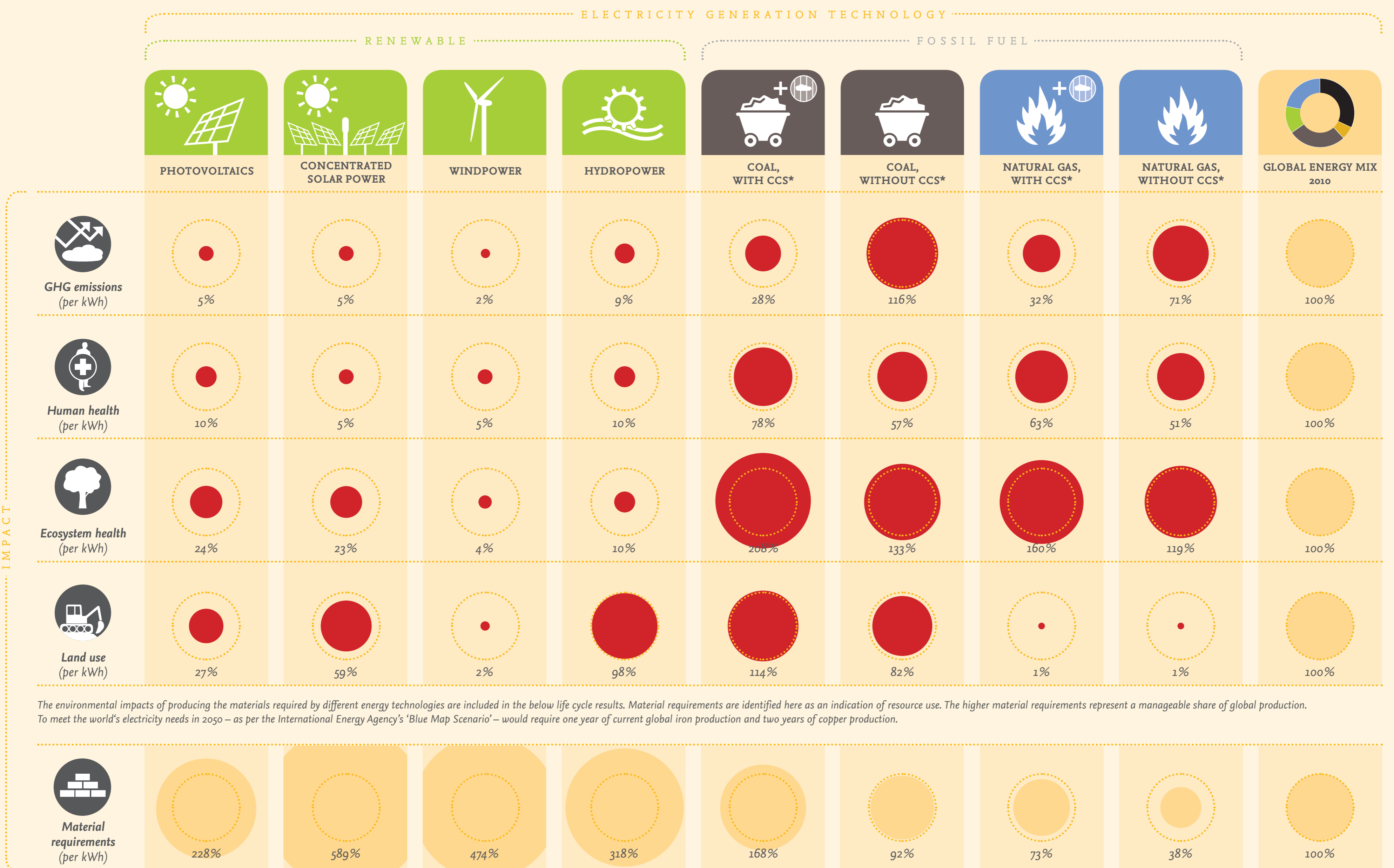


**Massive investment** will be needed to meet the energy needs of 9 billion people and at the same time reduce greenhouse emissions, air pollution, toxicity, impacts on land, water and other parts of ecosystems.

The key to sound future energy decisions lies in being able to determine the right mix of technologies for local or regional situations, as well as the best policy objectives.

This infographic compares electricity generation technologies and highlights the environmental benefits, and trade-offs of each technology. The assessment is based on a comparison of clean technologies with conventional fossil fuel power plants. The graphic presents an overview over the life cycle impacts of different technology groups compared to the global electricity generation mix in the year 2010.

## COMPARISON OF TECHNOLOGIES AND IMPACTS



\* Carbon capture storage (CCS) technology entails the capture of CO<sub>2</sub> from large anthropogenic sources, transport of the CO<sub>2</sub> to an underground storage reservoir and long-term isolation from the atmosphere.

## SUMMARY



Throughout the life cycle the **GHG emissions** of renewable energy sources are 5-6% those of coal or 8-10% those of natural gas.



Damage to the **environment** from renewable energy technologies is 3 to 10 times lower than from fossil fuel based systems.



**Site-specific environmental concerns** include the ecological impacts of coal mines, hydropower dams and wind power. Impacts vary greatly depending on the significance of the habitat affected and its species, and can sometimes be reduced by mitigation, proper site selection or offsets.



**Policy** can minimize the ecological impacts of power generation through the proper selection, design and operation of mines, wells and power plants.



Coal- or gas-fired systems with **carbon capture and storage (CCS)** are a promising way to reduce greenhouse emissions, but have other impacts that need to be considered, such as their additional energy demand, lifetime security and environmental impacts.



The **human health** impacts from renewable energy are only 10-30% those from state-of-the art fossil fuel power.



Natural gas combined cycle plants, wind power, and roof-mounted solar power have low **land use** requirements, while coal-fired power plants and ground-mounted solar power require larger areas of land.

### SOURCES & CONTACT

This document highlights findings from the report on green energy and should be read in conjunction with the full report. References to research on which this infographic is based are listed in the full report:

► UNEP (2015): Green Energy Choices: the Benefits, Risks and Trade-Offs of Low Carbon Technologies for Electricity Production.

The International Resource Panel was established in 2007 to provide independent, scientific assessment on the sustainable use of natural resources and the impacts of resource use over the full life cycle.

[www.unep.org/resourcepanel](http://www.unep.org/resourcepanel)

