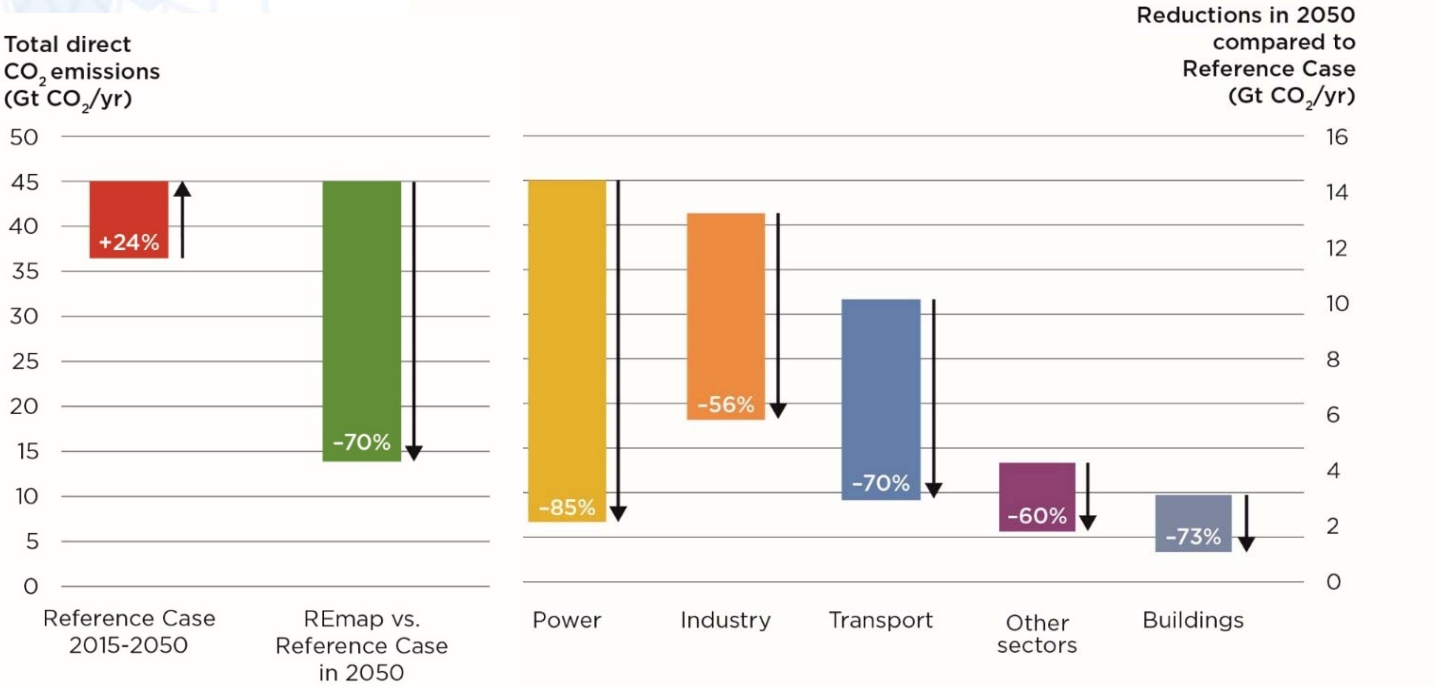
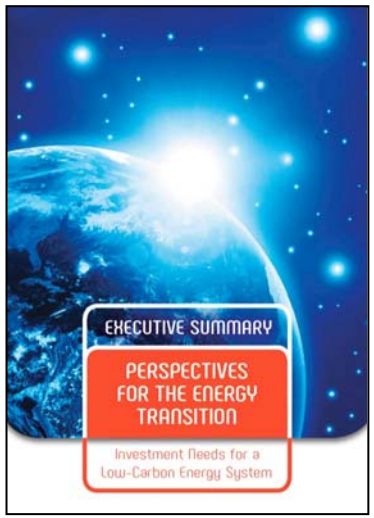
Industry sector emissions - 2015

- Importance is often underestimated for statistical reasons:
  - Process emissions
  - Part in transformation sector (steel, petrochemicals, refineries)
  - Non-energy use (feedstock) and related emissions
- ¾ of industry emissions come from materials commodity production, ¼ from other industry
- There are currently few or no economically viable emission reduction solutions at scale available for sectors such as iron and steel making, cement production, chemicals and petrochemicals production
- These sectors require new technology solutions to be developed and commercialised quickly

CO_2 emissions by sector in REmap relative to the Reference Case





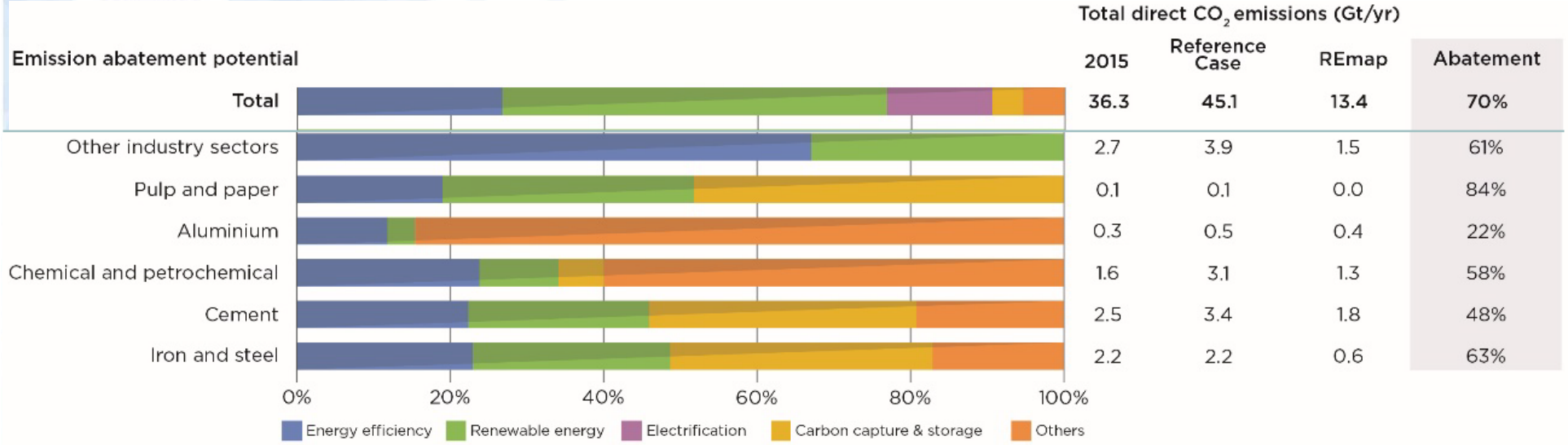
IRENA/IEA, 2017

By **2050**, total energy-related **CO_2 emissions** will need to decrease to **below 10 Gt**

- CO_2 emissions from the power and buildings sectors will be almost eliminated
- **Industry and transport** would be the **main sources of emissions** in **2050**

- CO_2 mitigation potential for Industry = 9.5 Gt CO_2/yr in 2050 (energy + process)
- Average CO_2 mitigation cost for Industry = 81.7 USD/t CO_2 in 2050

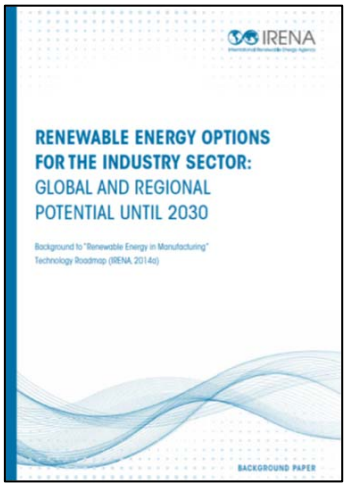
CO_2 emissions reductions in REmap compared to Reference Case by technology, 2050



A mix of technology options is needed in Industry, including renewable energy

Strategies to deal with industrial emissions and their potential

IRENA
International Renewable Energy Agency



- Energy efficiency – important but limited potential
- Recycling/cascading – important but limited potential (waste availability in growing markets)
- New types of materials and products (limited by standards, consumer acceptance, cost)
- Carbon capture and storage (especially for cement and iron making, some petrochemical/refinery processes)
- Renewables (biomass feedstock, electrification with RE electricity, solar thermal)

- Corporate sourcing – eg Norsk Hydro recent contract for Swedish wind farm
- Industry can relocate to facilitate RE deployment (e.g. aluminum smelters next to remote hydro plants, bioethylene plants in Brazil etc.)
- Industry and demand-side management (example primary aluminum smelter acting as a virtual battery)

- Policy issues: policy uncertainty, competitiveness, carbon leakage. A global sectoral approach is needed