



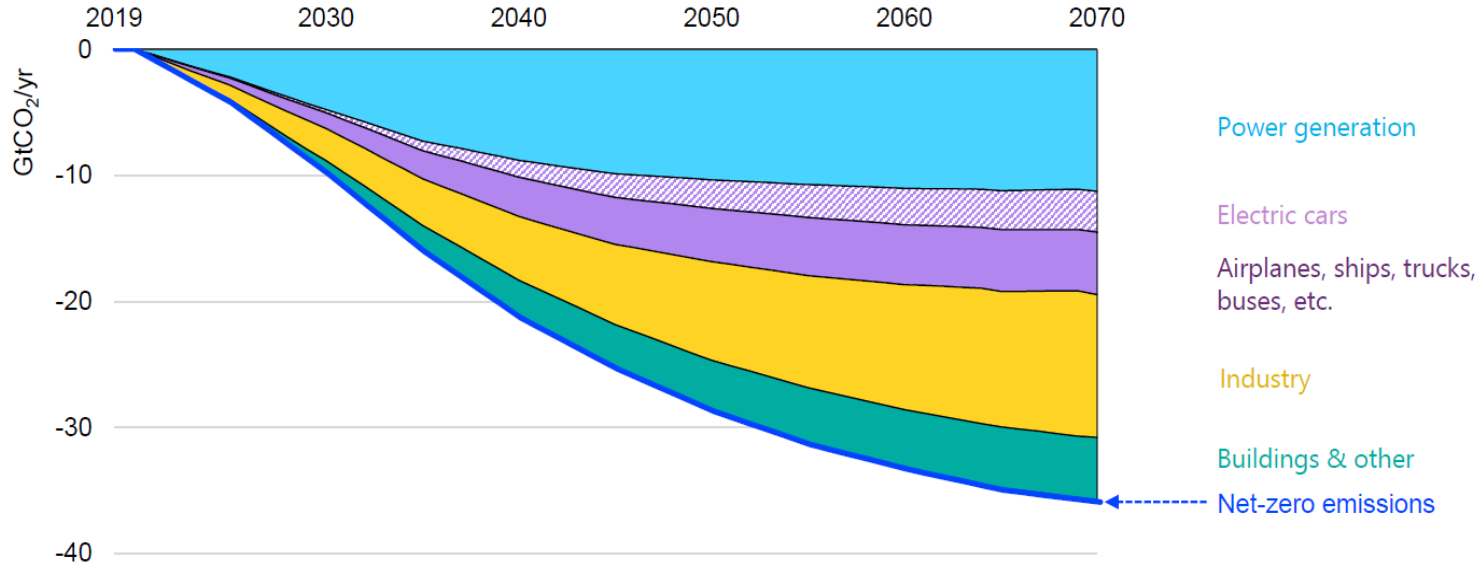
The role of Biomass in Industry in IEA SDS scenarios

Dr. Paolo Frankl, Head Renewable Energy Division

Contribution of sustainable biomass and bioenergy in industry transitions towards a circular economy, e-Workshop, 19 October 2020

Focusing on the power sector is not enough to reach climate goals

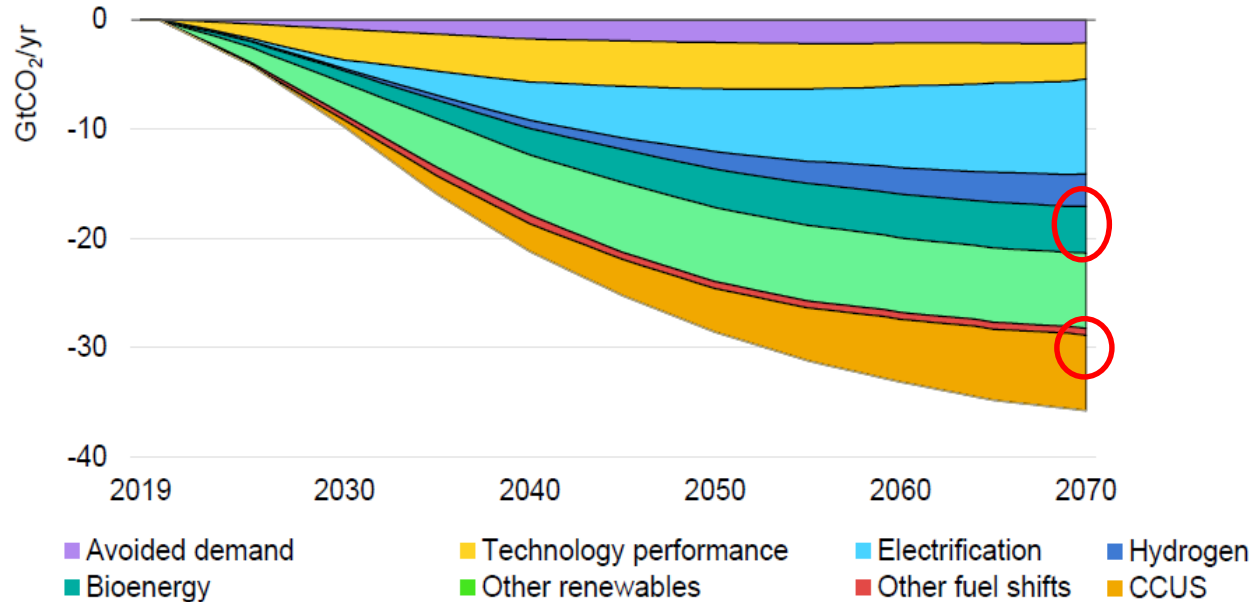
Global CO₂ emission reductions in the Sustainable Development Scenario, relative to baseline trends



Progress with renewables in the power sector and with electric cars is encouraging, but alone not sufficient to reach climate goals. About half of all CO₂ emissions today are from industry, transport & buildings

A large portfolio of clean energy technologies is needed

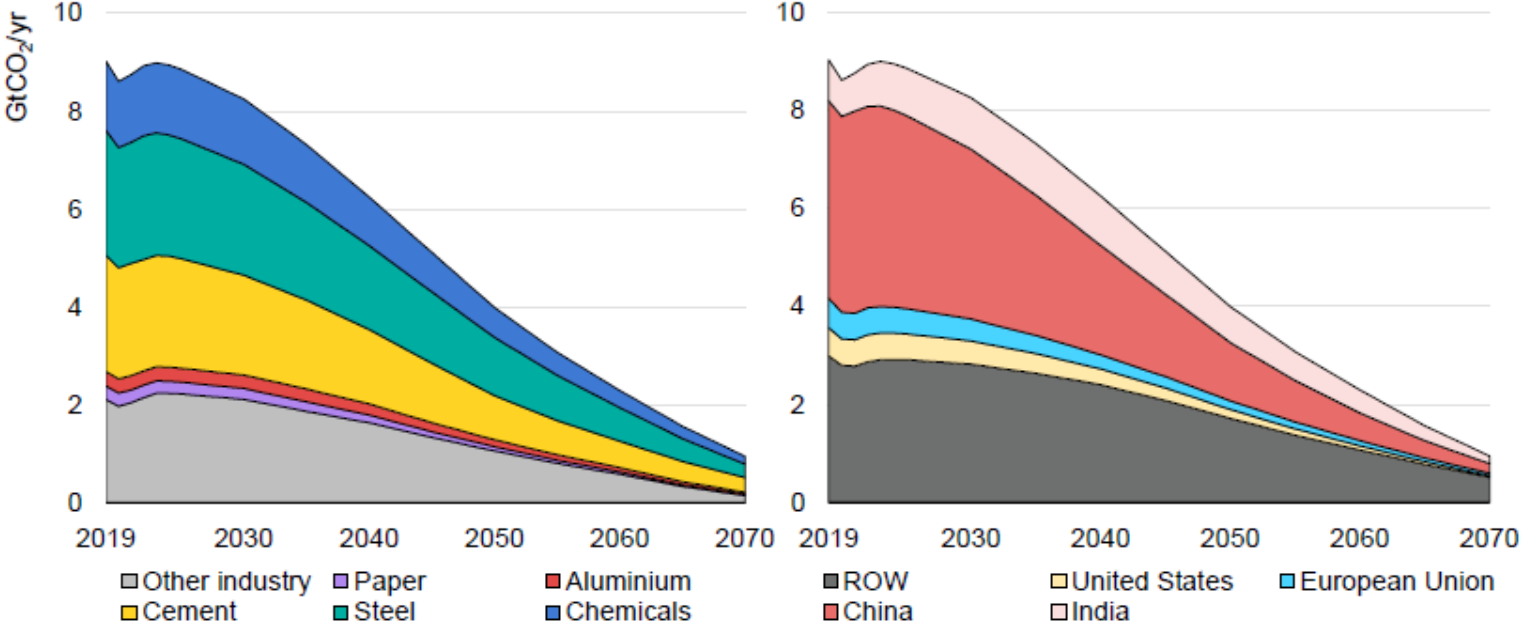
Global annual energy sector CO₂ emissions reductions by measure in the SDS relative to the Stated Policies Scenario



The use of modern bioenergy triples from today's levels. It is used to directly replace fossil fuels or to offset emissions indirectly through its combined use with CCUS, accounting for 1/5 of annual emission reductions

De-carbonising heavy industry is the most difficult challenge

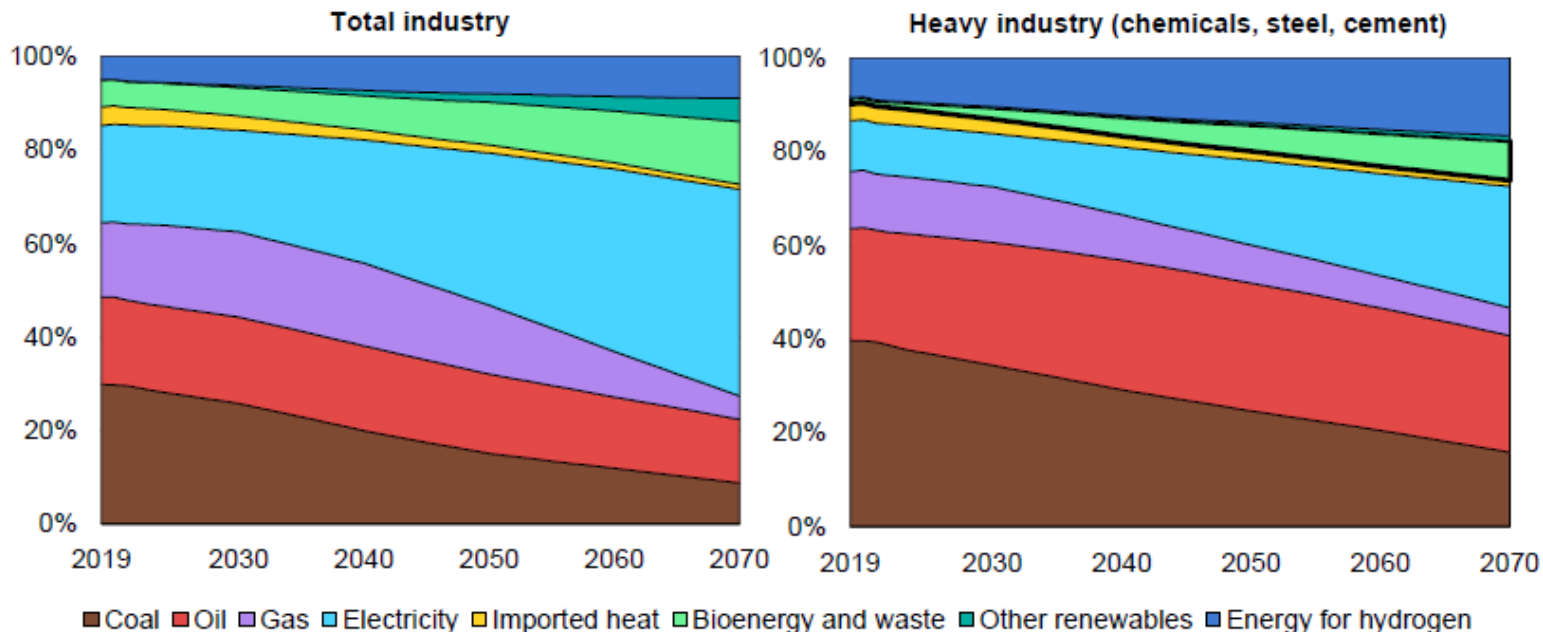
Global direct CO2 emissions in industry by sub-sector and region in the Sustainable Development Scenario



Chemical, steel and cement production increase their share of total industrial emissions to almost 80% by 2070 in the SDS as less energy-intensive industries approach full decarbonisation

Electrification, bioenergy, hydrogen & CCUS all play a role in industry

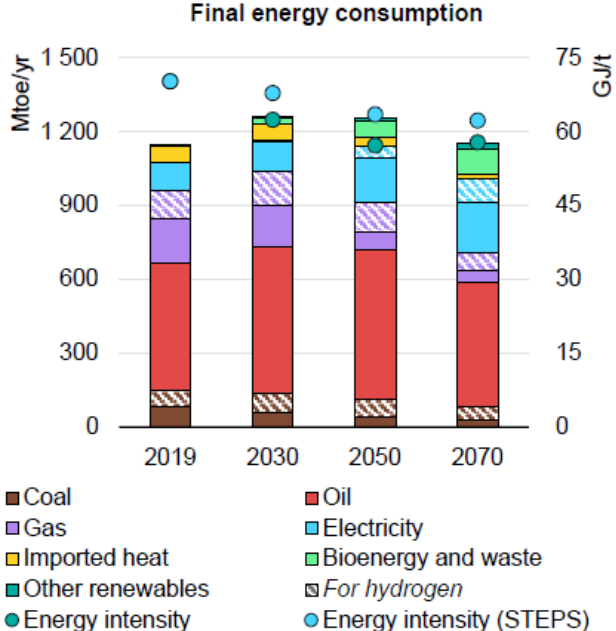
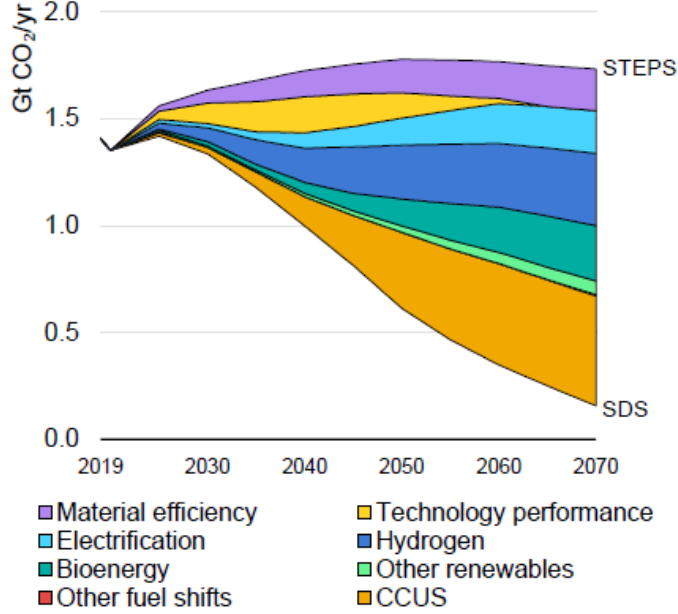
Final energy demand by fuel shares for total industry and selected sub-sectors in the Sustainable Development Scenario



Fossil fuel use in industry is cut by over 60% in the SDS by 2070 and replaced primarily by electricity and bioenergy. Just over 3/4 of the remaining CO₂ emissions are captured and permanently stored

Example: Chemical sector

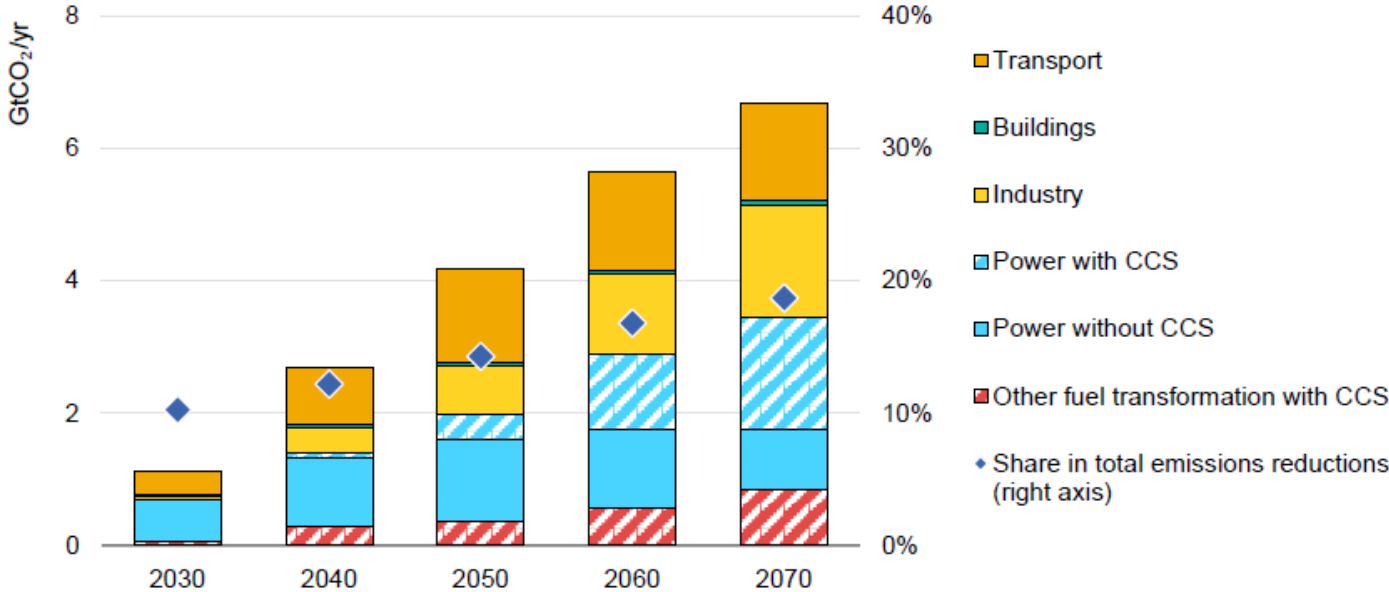
Global chemical sector direct CO2 emissions and energy consumption in the Sustainable Development Scenario



CCUS and electrolytic hydrogen routes are key in cumulative chemicals sector emissions reductions in the SDS. Electrification and bioenergy for low- to medium-temperature process heat play an important role downstream

Bioenergy contributes to massive CO₂ emission reductions

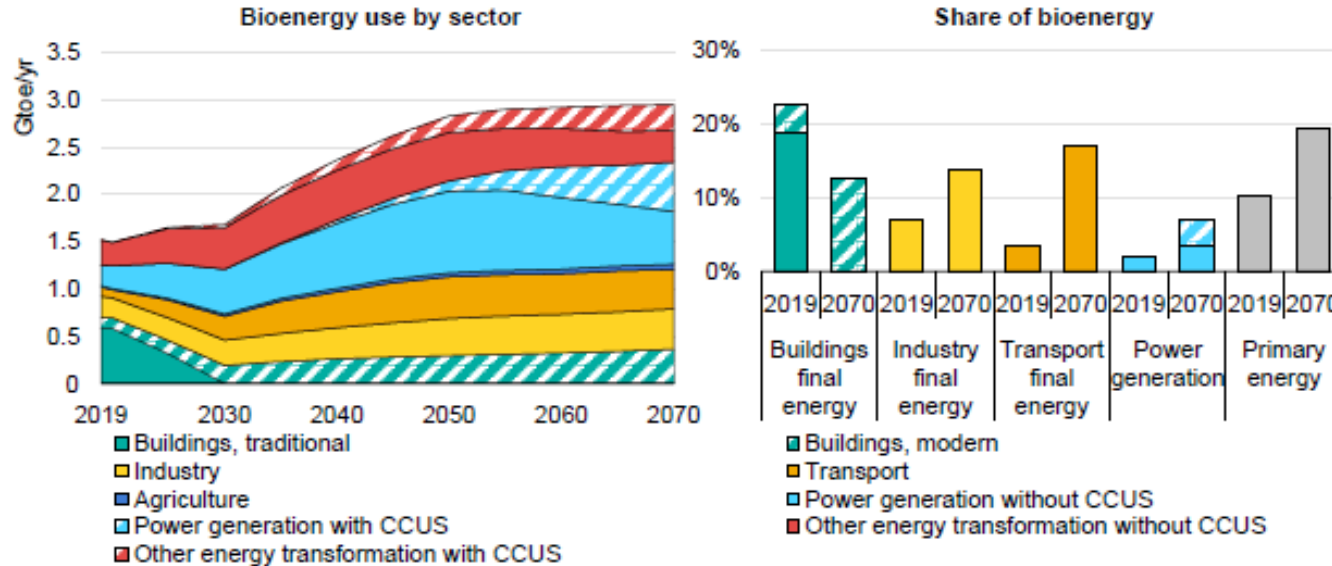
Global CO₂ reductions from bioenergy use in the Sustainable Development Scenario relative to the Stated Policies Scenario



Bioenergy contributes one-fifth of the total annual CO₂ reductions in 2070 in the Sustainable Development Scenario relative to the Stated Policies Scenario

Competing uses and sustainability of bioenergy must be considered

Global bioenergy demand by sector and share of bioenergy use in key sectors in the Sustainable Development Scenario



Maximising the potential of bioenergy depends on mobilising supply chains for abundant and untapped waste and residue resources: the use of energy crops requires careful consideration of land-use competition.

Concluding remarks

- A large portfolio of innovative technologies are needed to achieve SDS targets. Effective policy toolkits needed to foster technologies at different maturity stage
- Renewables primary energy more than quadruples by 2070, reaching almost two thirds of total. Bioenergy triples becoming the second largest supply source
- Bioenergy can play a key role for de-carbonising industry. Competing uses, sustainability of feedstocks and mobilising supply chains are key considerations
- Sustainability of bioenergy and other clean energy options must be measured and rewarded. This helps compensating the cost gap with fossil fuels