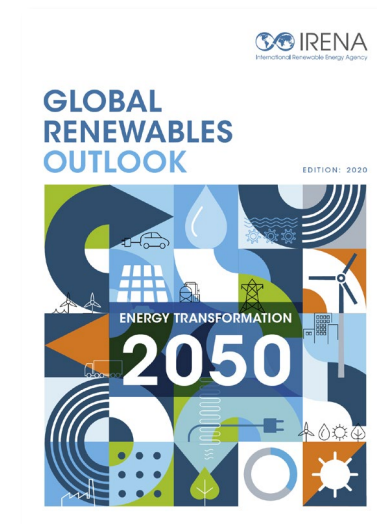
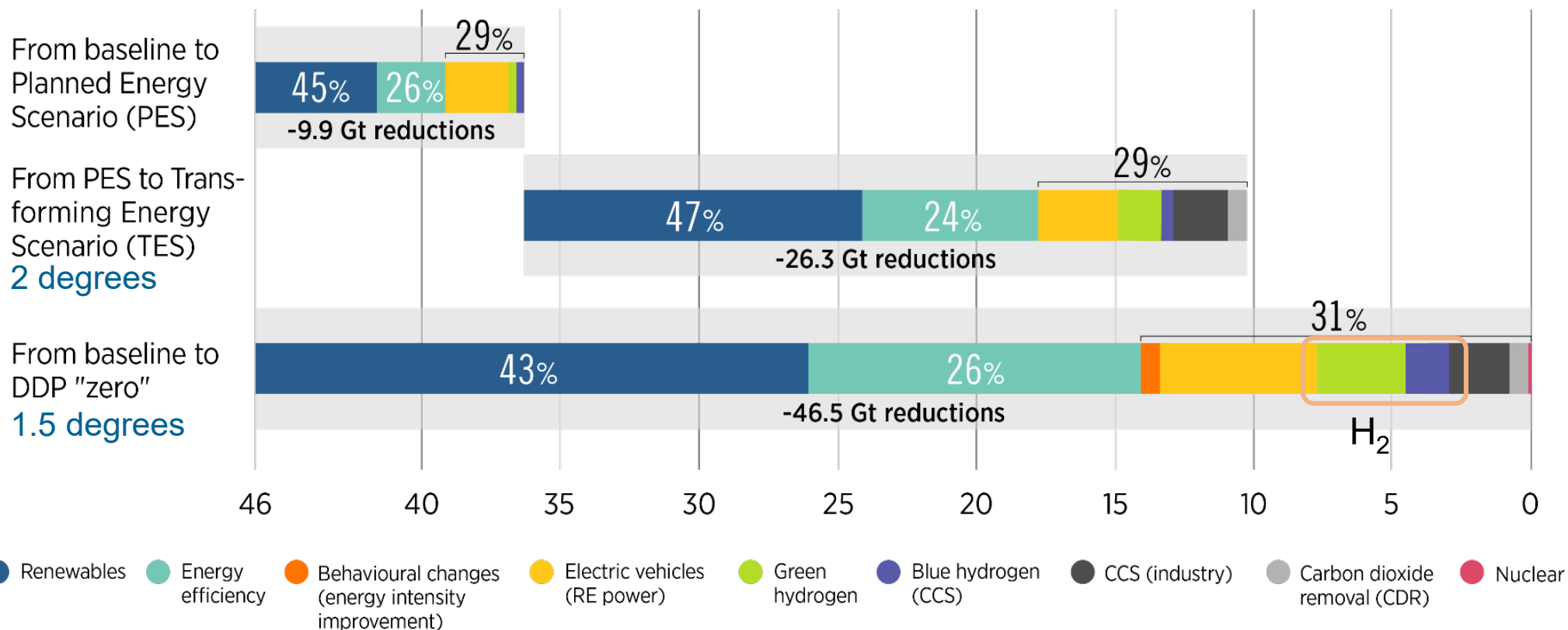


# **Transforming the Energy System**

## **A Roadmap to 2050**

**Francesco La Camera**  
**IRENA Director-General**

## Energy and industrial process-related CO<sub>2</sub> emission reductions (Gt CO<sub>2</sub>/y by 2050)



Source: IRENA

Energy efficiency, renewables, end-use electrification, green hydrogen and synthetic fuels will play a crucial role in global decarbonisation.

# Emission reductions from baseline emissions in 2050 to ZERO

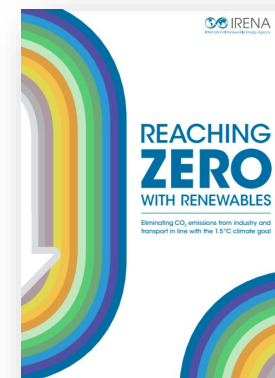
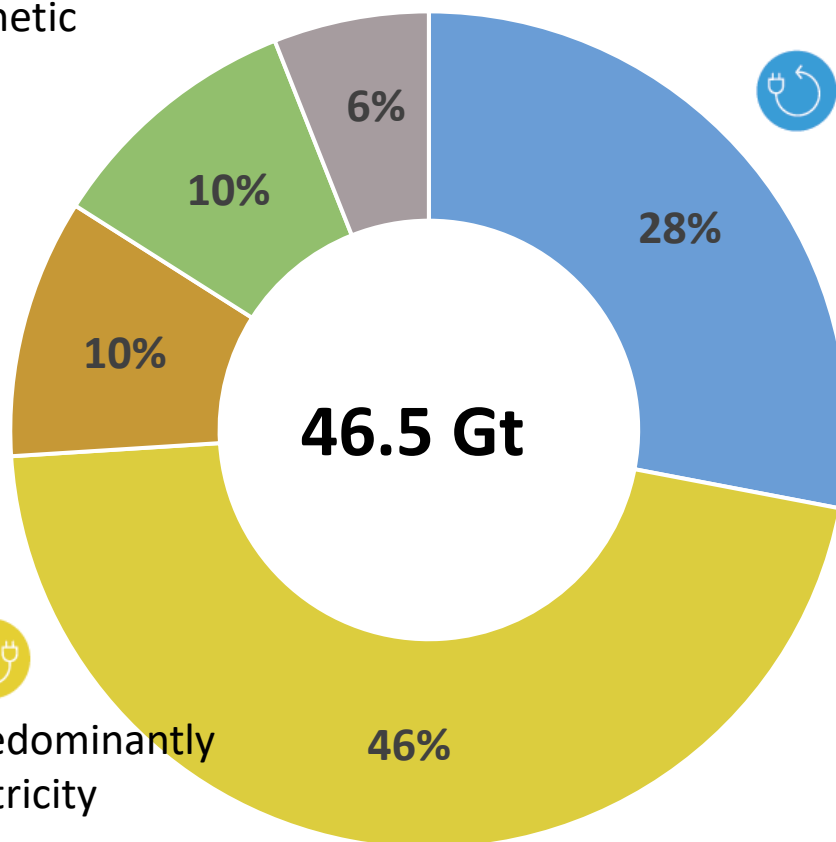
## Total emissions

Use of carbon dioxide  
removal measures

Green hydrogen  
and synthetic  
fuels

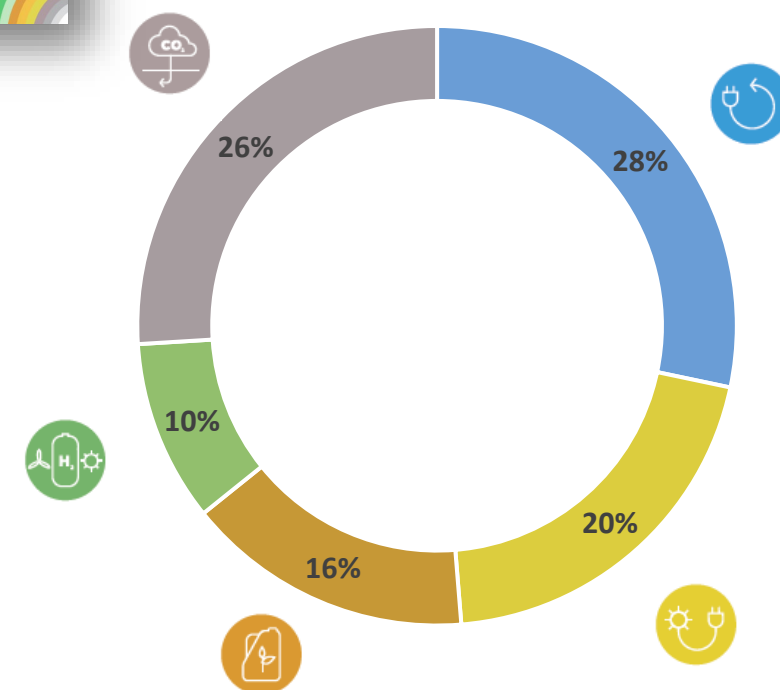
Direct use of  
renewable heat  
and biomass

Direct use of clean, predominantly  
renewable, electricity



Reduced demand  
and improved  
energy efficiency

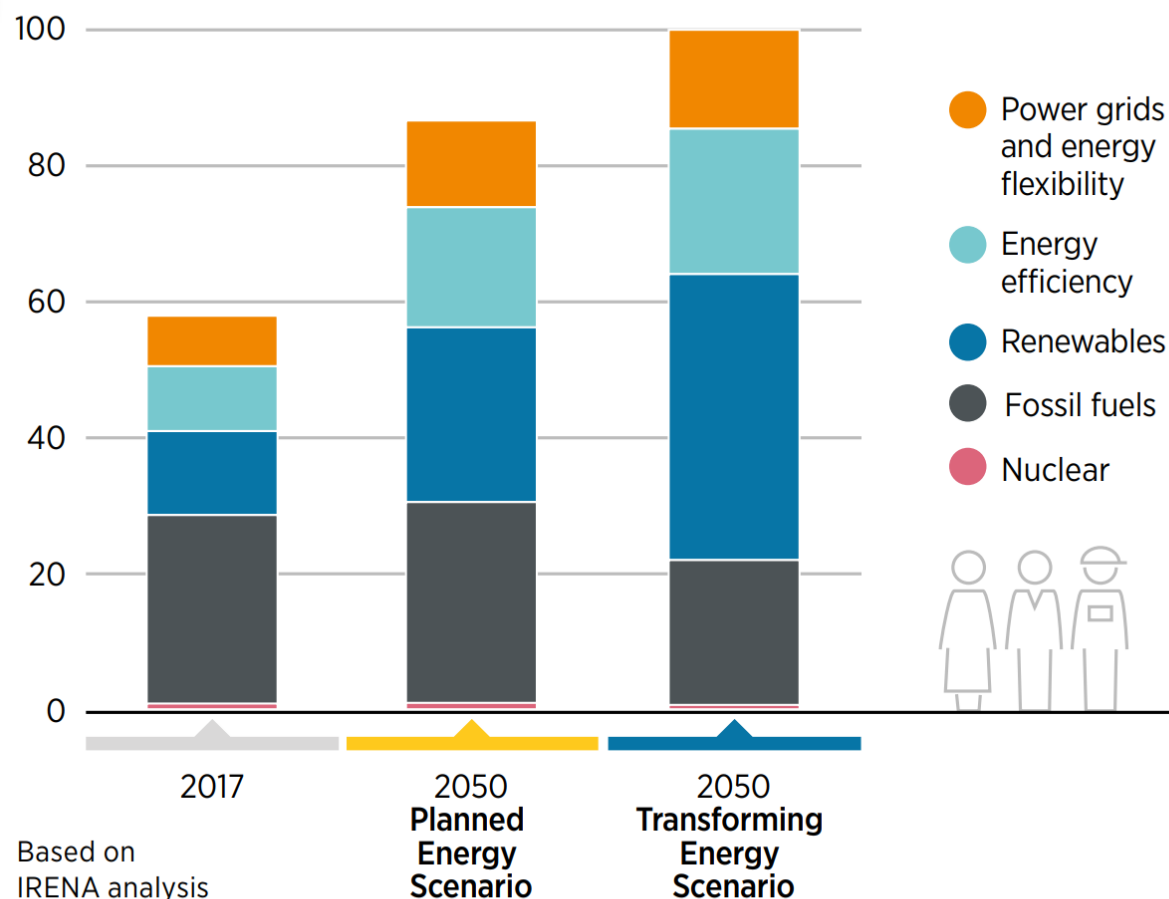
## Industry



# IRENA pathways generate employment, welfare and growth benefits to 2050

+ 13.3  
Million  
jobs

Jobs (million)



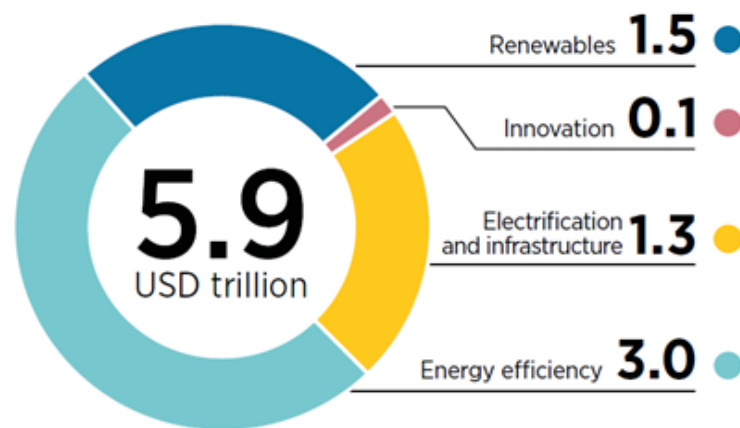
Cumulative GDP gain of  
**USD 98 trillion**

**+2.0% GDP** on average  
between 2020-2050  
compared to PES

**+13.5% Welfare**  
improvement  
compared to PES

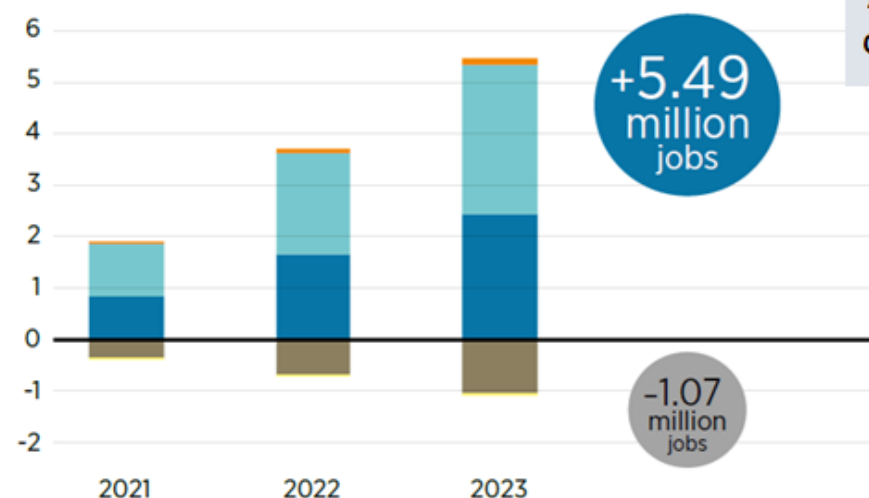
# Short-term benefits from investing in the energy transition

## Cumulative clean energy investments between 2021-2023 in the TES (USD<sub>2019</sub> trillion)



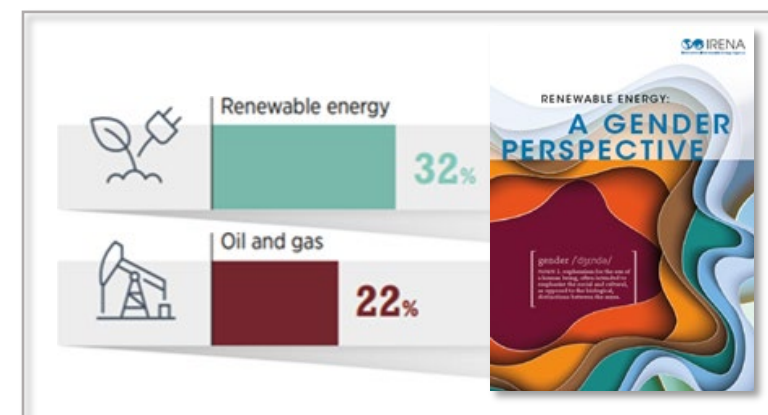
Clean energy average annual investments, 2021-2023:  
**USD 2 trillion per year**

## An additional 5.49 million energy transition-related jobs in 2023 globally

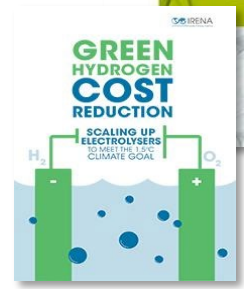
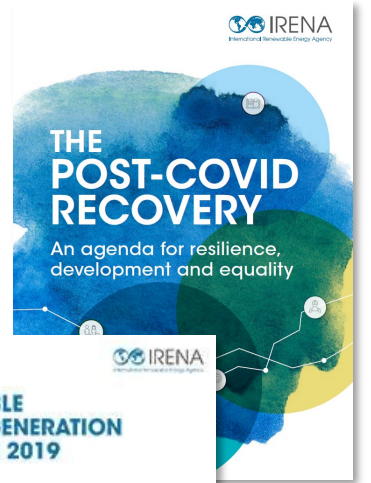
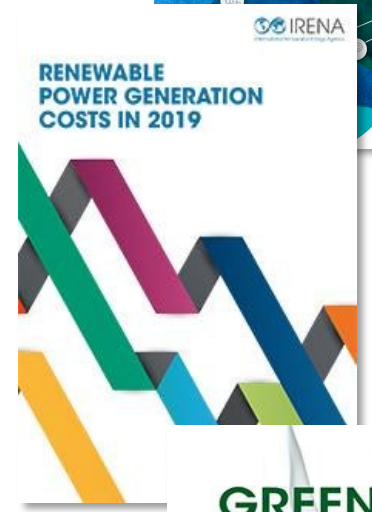
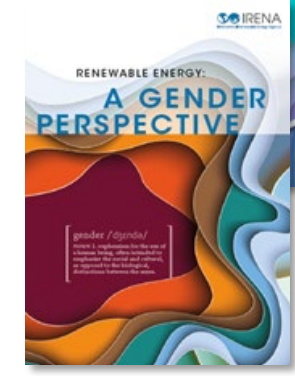
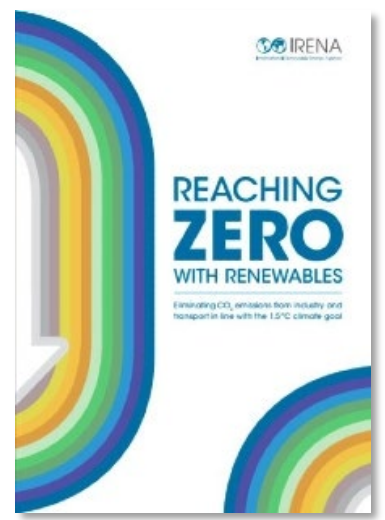
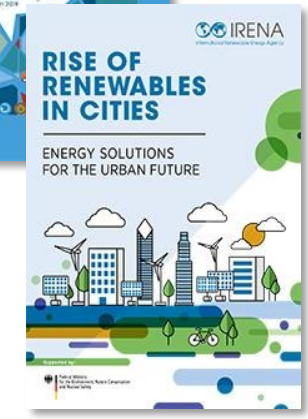
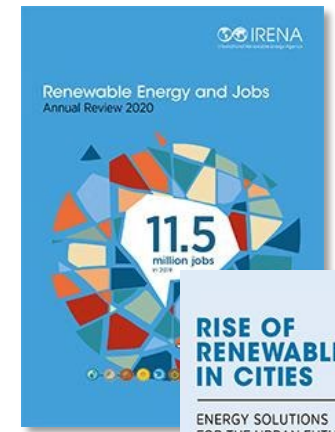
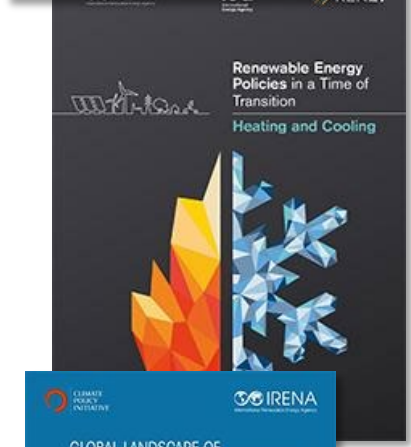
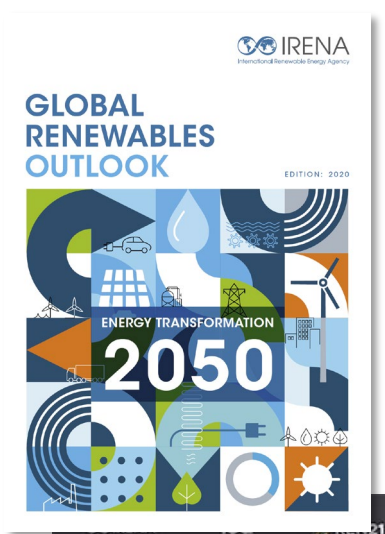


**+ 1.0 % GDP per year 2021 – 2023 compared to PES**

- Power grid and energy flexibility
- Energy efficiency
- Renewables
- Fossil fuels
- Nuclear







Thank you for your attention!

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