

# Scaling up renewable energy in line with the 2C target

## The role of renewable energy in Sustainable Energy Pathways

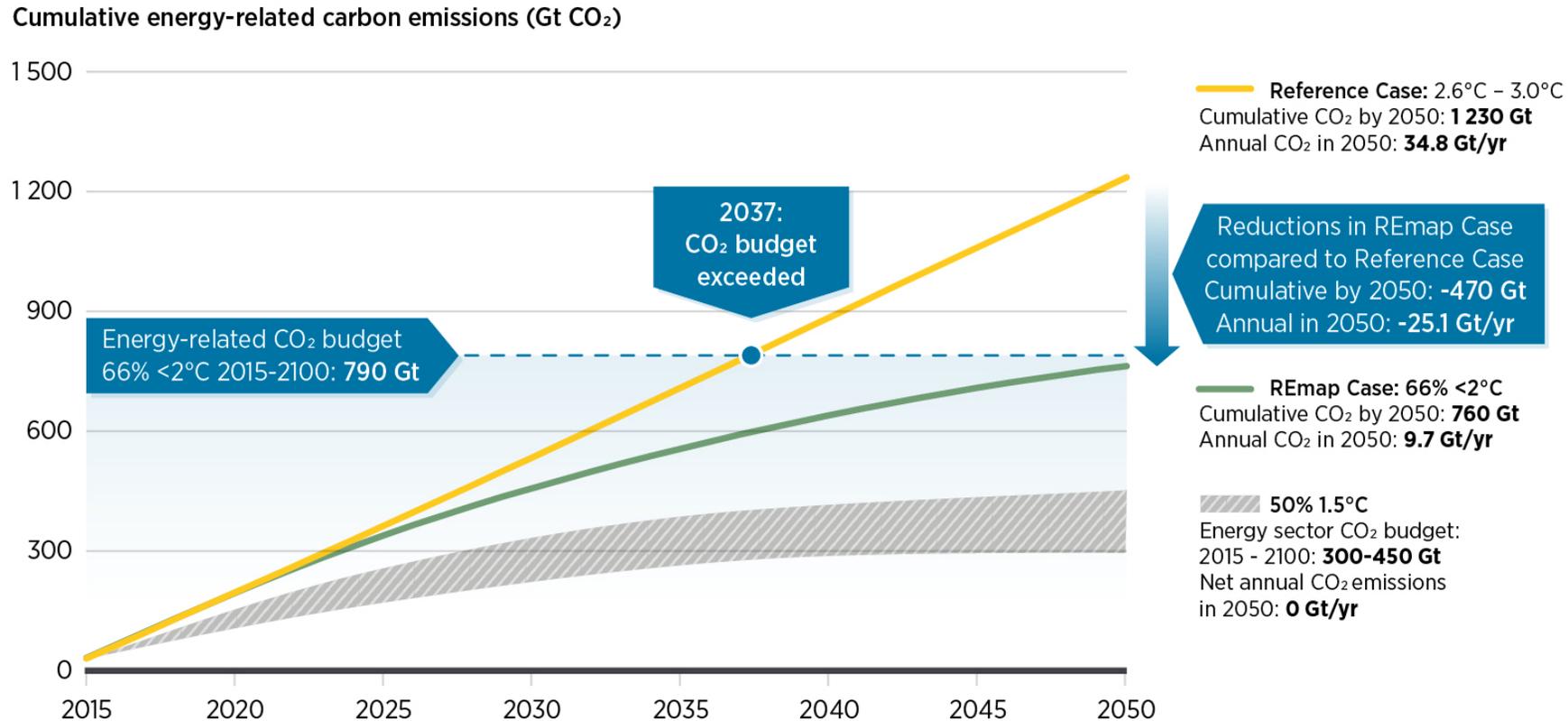
9th International Forum on Energy for Sustainable Development  
Kiev, November 14, 2018

Luis Janeiro – Programme Officer Renewable Energy Roadmaps



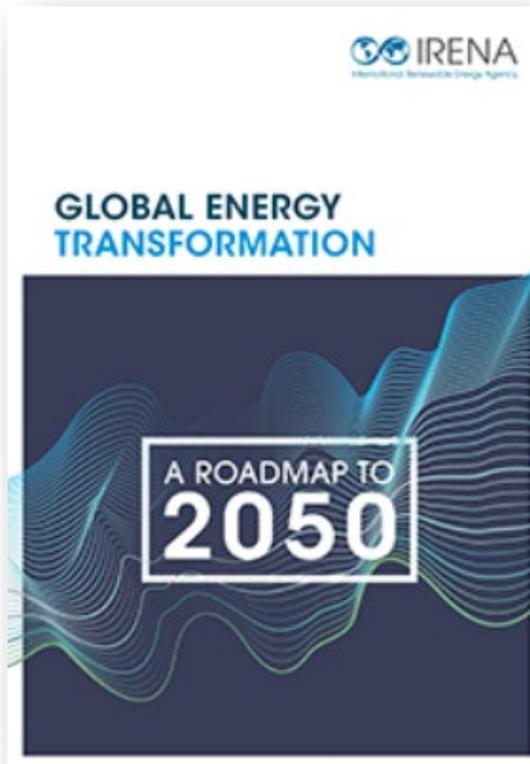
# Energy-related CO<sub>2</sub> emissions: Bridging the gap with IRENA's REmap Case

## Cumulative energy-related CO<sub>2</sub> emissions and emissions gap

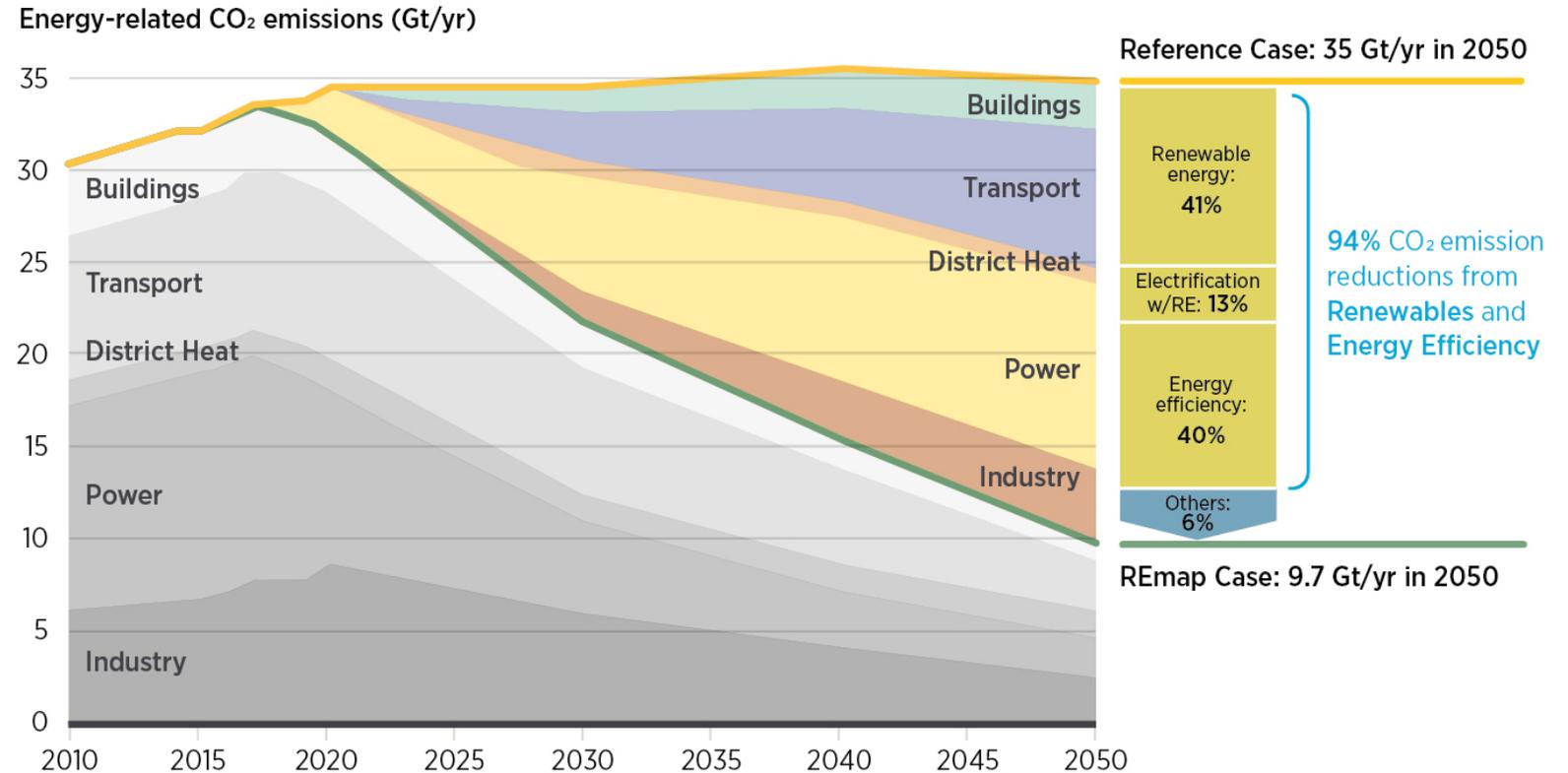


Based on current policies (set out in the Reference Case), in under 20 years, cumulative energy-related emissions will exceed the carbon budget required to hold temperature increases below 2°C. Emission reductions of 470 Gt will be needed by 2050 to reduce warming to 2°C

# Renewable energy and energy efficiency can provide over 90% of the reduction in energy-related CO<sub>2</sub>



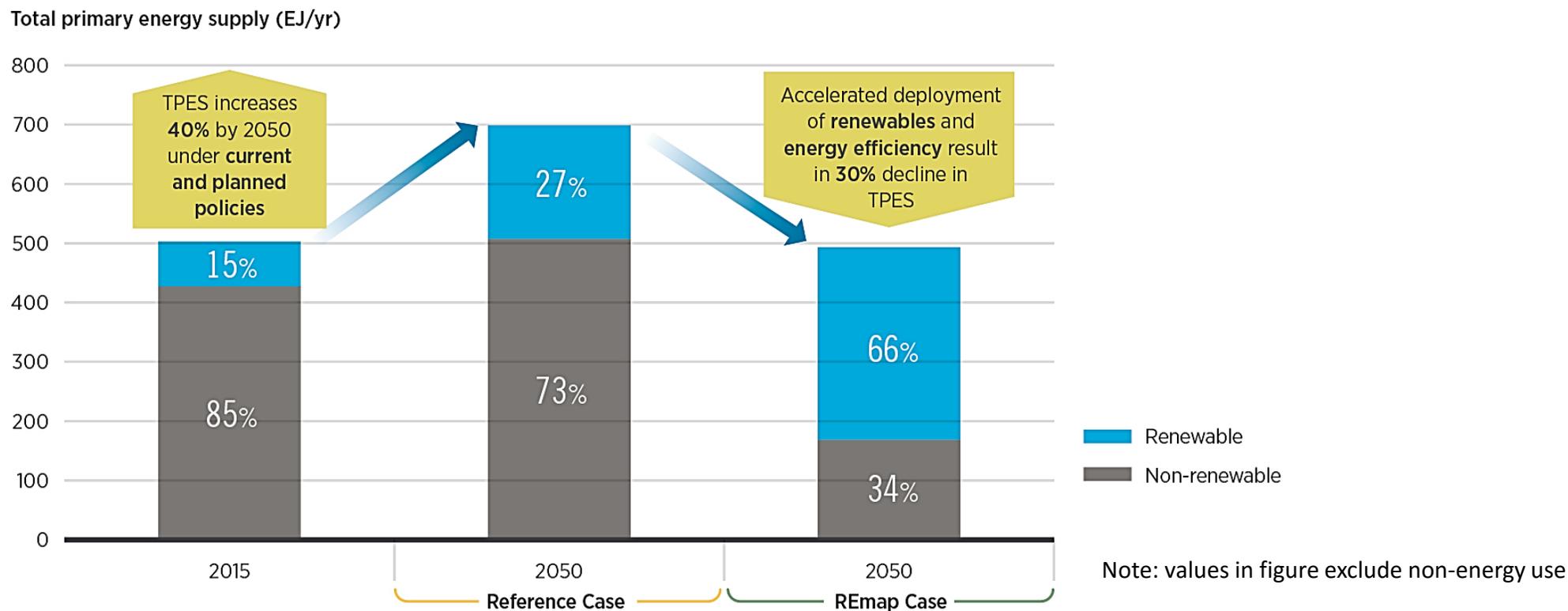
## Annual energy-related CO<sub>2</sub> emissions and reductions, 2015-2050



Annual energy-related emissions are expected to remain flat (under current policies in the Reference Case) but must be reduced by over 70% to bring temperature rise to below the 2°C goal. Renewable energy and energy efficiency measures provide over 90% of the reduction required

# The global share of renewable energy in energy supply would need to increase to two-thirds

## TPES and the share of renewable and non-renewable energy under the Reference and REmap cases

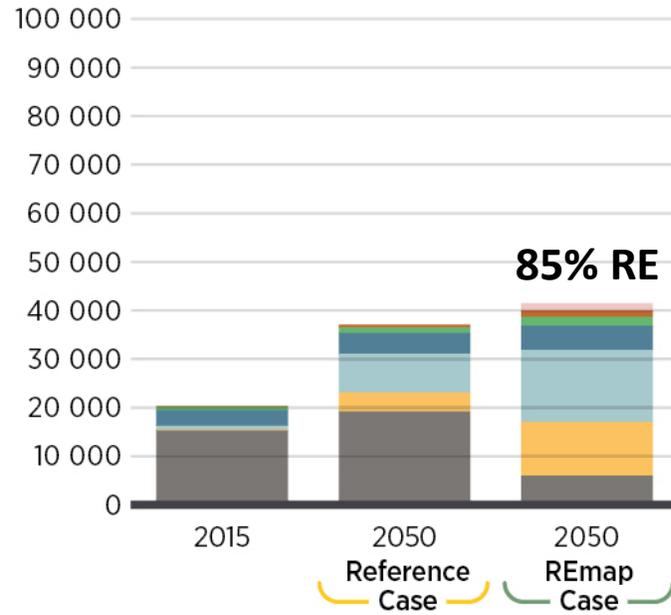


*Under current and planned policies (the Reference Case) TPES is expected to increase almost 40% by 2050. To achieve a pathway to energy transition (the REmap Case), energy efficiency would need to reduce TPES slightly below 2015 levels, and renewable energy would need to provide two-thirds of the energy supply.*

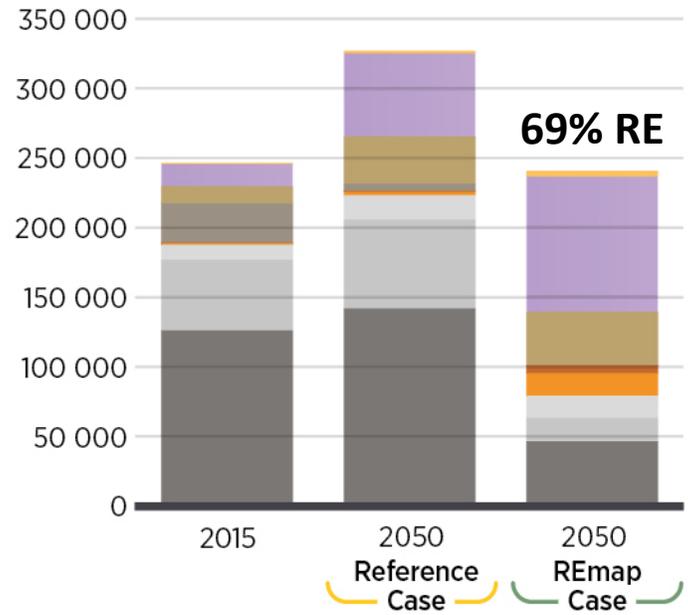
# RE should scale up to meet power, heat and transport needs

## 40% electrification of end use

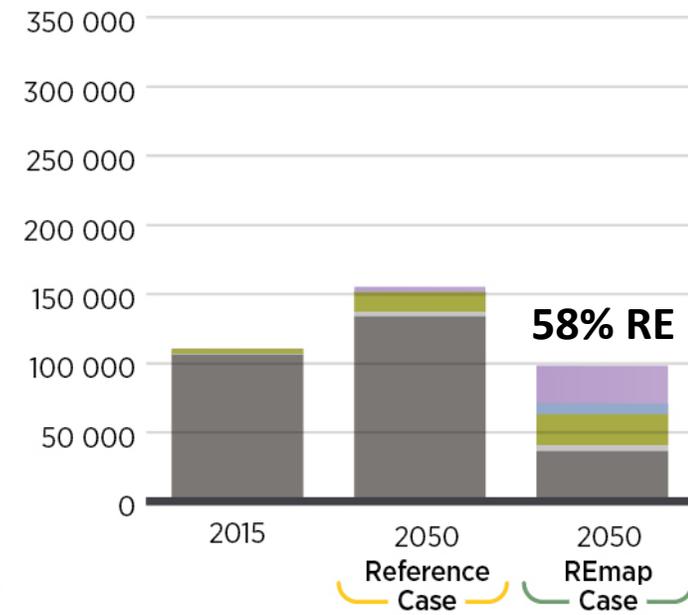
Electricity consumption (TWh)



Industry and buildings final energy consumption (PJ/yr)



Transport final energy consumption (PJ/yr)



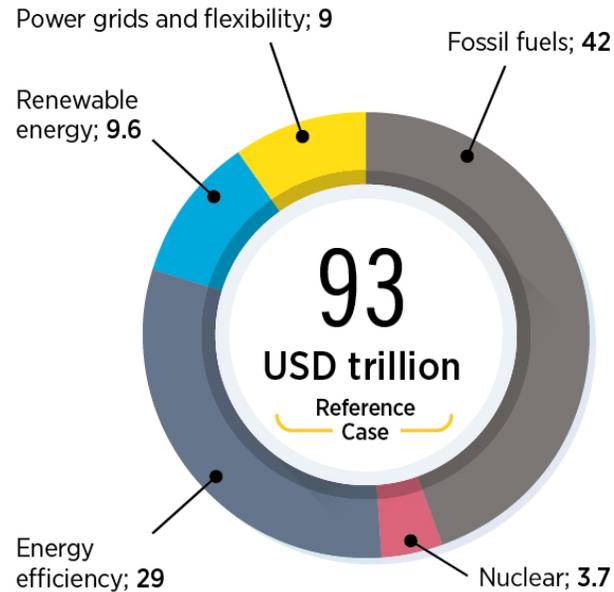
- Others (incl. marine and hybrid)
- Geothermal
- Bioenergy
- Hydro power
- Wind
- Solar PV (incl. CSP)
- Non-Renewables

- District heat: Renewables
- Electricity: Renewables
- Modern biomass
- Traditional biomass
- Geothermal heat
- Solar thermal
- Hydrogen
- Liquid biofuels/biogas
- Non-Renewables
- District heat: Non-Renewables
- Electricity: Non-Renewables

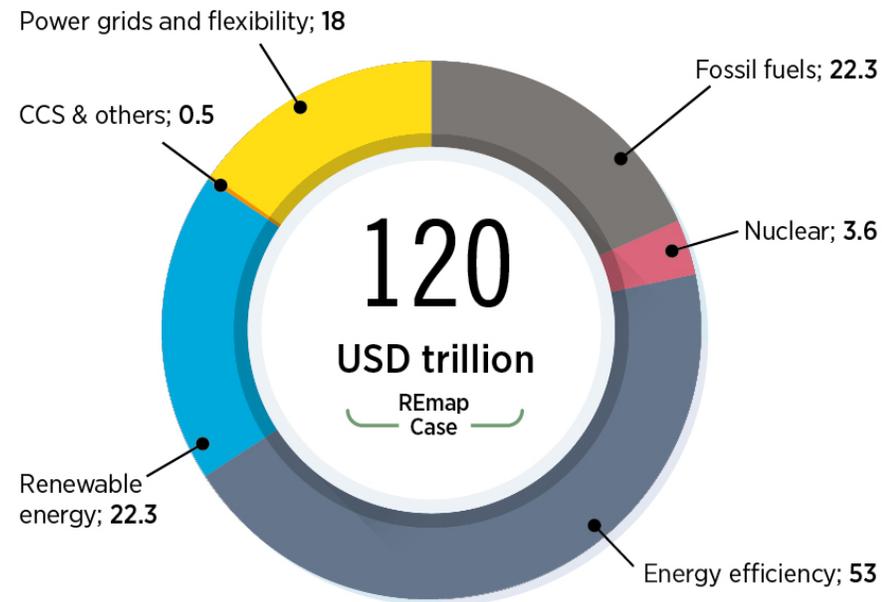
# Investment will need to shift to renewable energy and energy efficiency

## Cumulative investment - Reference and REmap cases, 2015-2050

Reference Case energy sector investments between 2015-50 (USD trillion)



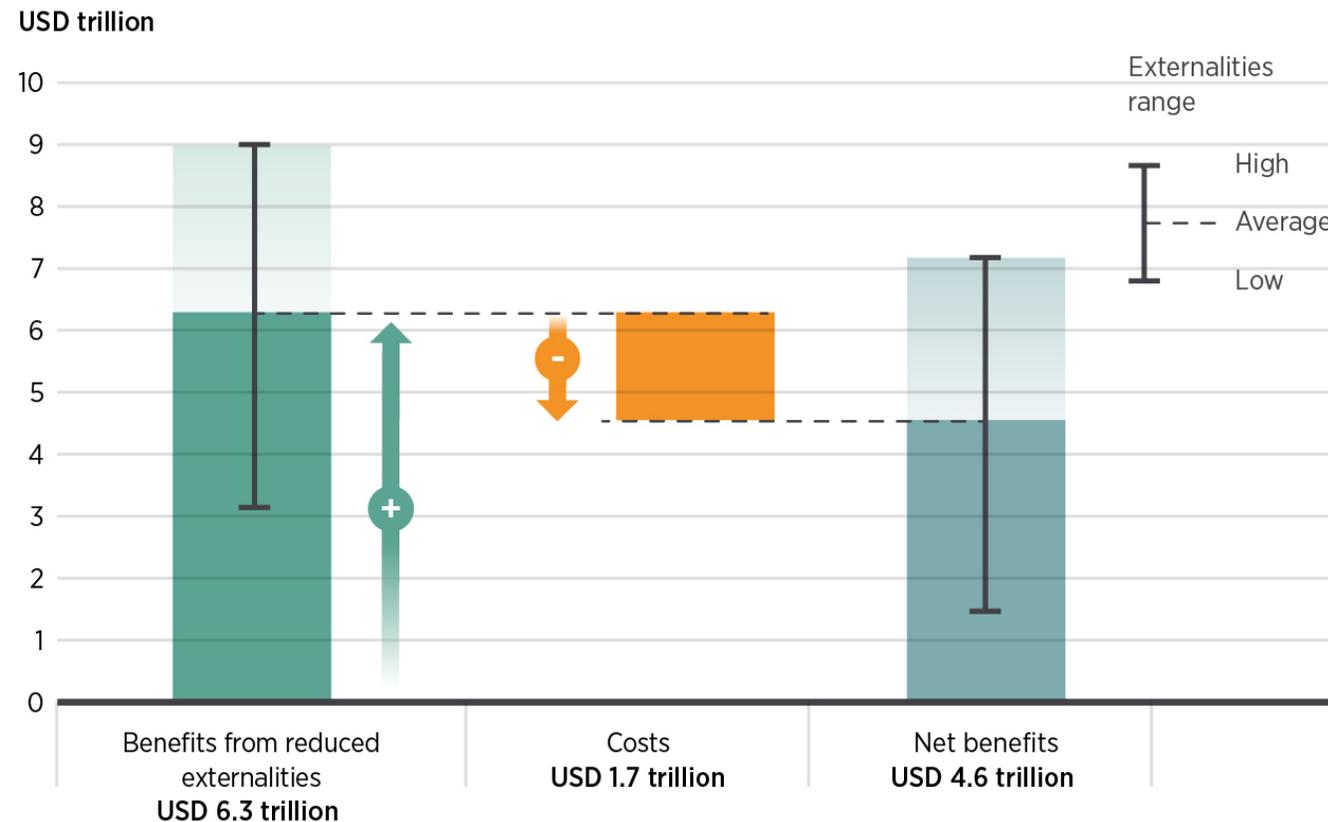
REmap Case energy sector investments between 2015-50 (USD trillion)



*Under the REmap Case, cumulative investment of USD 120 trillion must be made between 2015 and 2050 in low-carbon technologies, averaging around 2% of the period average global GDP per year. This is USD 27 trillion more than the Reference Case.*

# Reduced negative externalities far outweigh the costs needed to achieve a global energy transformation

## Annual costs of the energy transition set against reduced externalities (air pollution and CO<sub>2</sub> damages) - REmap Case compared to the Reference Case in 2050



Under the REmap Case, annual health and CO<sub>2</sub> benefits associated with the energy transition outweigh incremental costs by a factor of 2 to 5 in 2050.



To know more about the Global Energy Transformation, this and other IRENA publications are available for download from [www.irena.org/publications](http://www.irena.org/publications)

For further information or to provide feedback, please contact IRENA at [info@irena.org](mailto:info@irena.org)

For further information or to provide feedback on the socio-economic analysis please contact the Policy team at [policy@irena.org](mailto:policy@irena.org), on the REmap analysis please contact the REmap team at [remap@irena.org](mailto:remap@irena.org).



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# Key focus areas to foster the Global Energy Transformation

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1. Tap into the strong synergies between energy efficiency and renewables
2. Plan a power system with high shares of renewable energy
3. Increase the use of electricity in transport, buildings and industry
4. Foster system-wide innovation
5. Align socio-economic structures and investment with the transition
6. Ensure that transition costs and benefits are fairly distributed