Post-Covid recovery and renewable energy – a model based agenda

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Overview

» Established in 2011

» Headquarters in Masdar City, Abu Dhabi, UAE

» IRENA Innovation and Technology Centre – Bonn, Germany

» Permanent Observer to the United Nations – New York, USA

Mandate

To promote the widespread adoption and sustainable use of
all forms of renewable energy worldwide

Bioenergy   **Geothermal Energy**   **Hydropower**   **Ocean Energy**   **Solar Energy**   **Wind Energy**

IRENA Building

- **50% less water** is used than typical buildings in Abu Dhabi

- **75% of hot water** demand is supplied by solar water heaters

- **75% of the energy** released is recovered by the air conditioning system

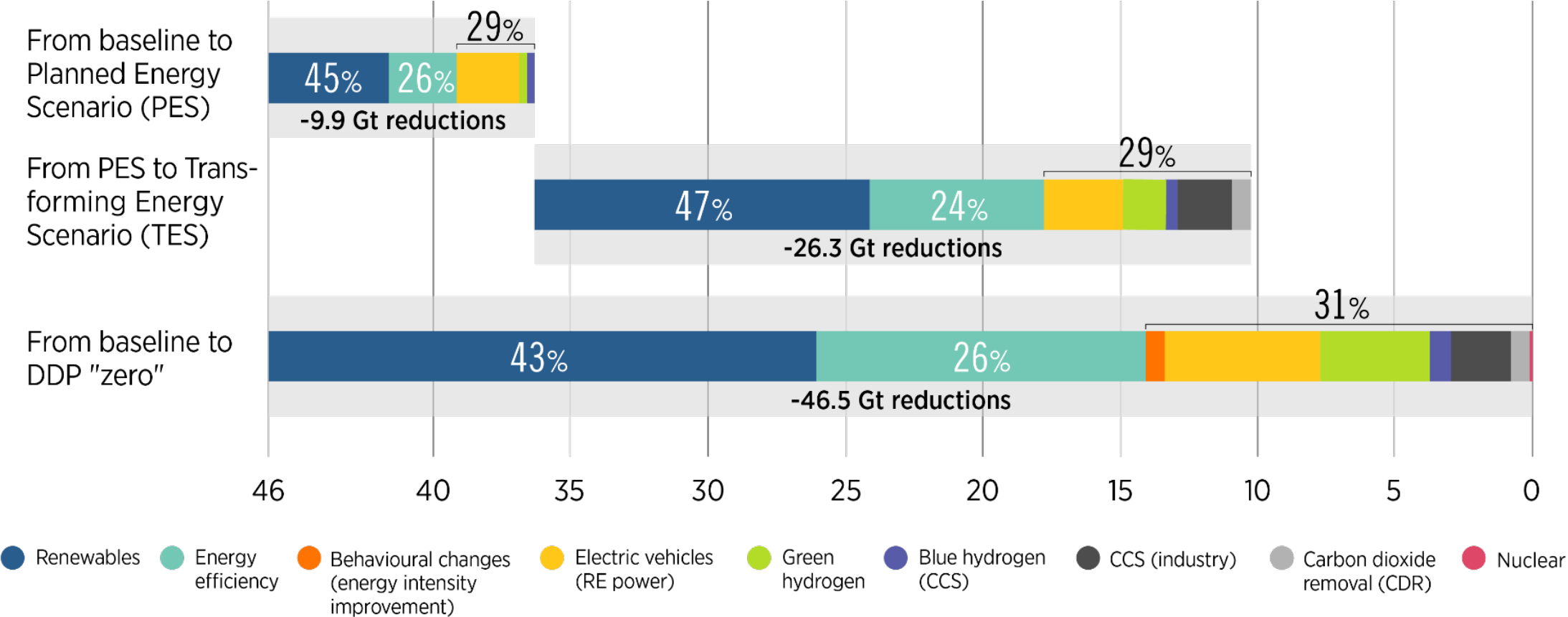- **Up to 95% of energy** generated from lowering elevators is harnessed and reused
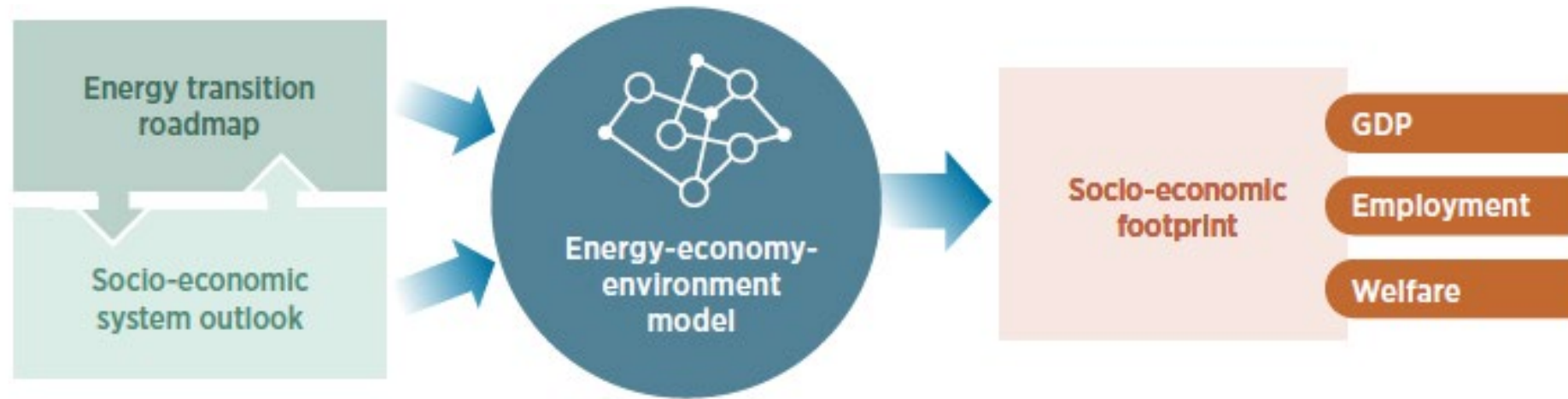
Acknowledgements

- This presentation draws heavily from two IRENA reports:
    - The Post Covid Recovery – an Agenda for resilience, development and equality
    - Global renewable energy outlook

- The lists of acknowledgments in these publications apply.

- Special thanks for this contribution goes to my co-authors and the team with Hector Pollitt at Cambridge Econometrics, UK, for letting me use their results.

Global Renewables Outlook outlines options to cut energy-related CO2 emissions to 2050


Energy and industrial process-related CO_2 emission reductions (Gt CO_2)

From baseline to Planned Energy Scenario (PES)
45% | 26% | 29%
-9.9 Gt reductions

From PES to Transforming Energy Scenario (TES)
47% | 24% | 29%
-26.3 Gt reductions

From baseline to DDP "zero"
43% | 26% | 31%
-46.5 Gt reductions

46 40 35 30 25 20 15 10 5 0

Legend:
- Renewables
- Energy efficiency
- Behavioural changes (energy intensity improvement)
- Electric vehicles (RE power)
- Green hydrogen
- Blue hydrogen (CCS)
- CCS (industry)
- Carbon dioxide removal (CDR)
- Nuclear

# Informed decision making for resilient economies and societies

- A true and complete assessment of the transition includes both the energy sector and the socioeconomic system, and their interlinkages.

- IRENA has undertaken a holistic approach that links the energy system and the economies within a single and consistent quantitative framework, and analyses variables such as GDP, employment and welfare.
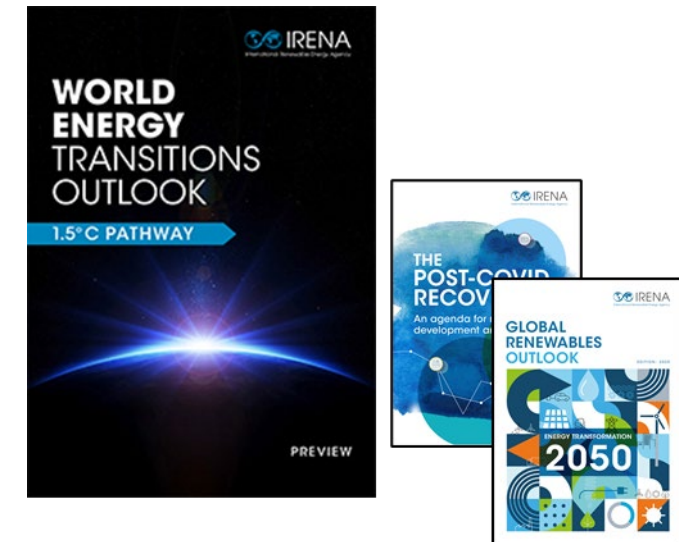
Combination of IRENA scenarios and economic modeling
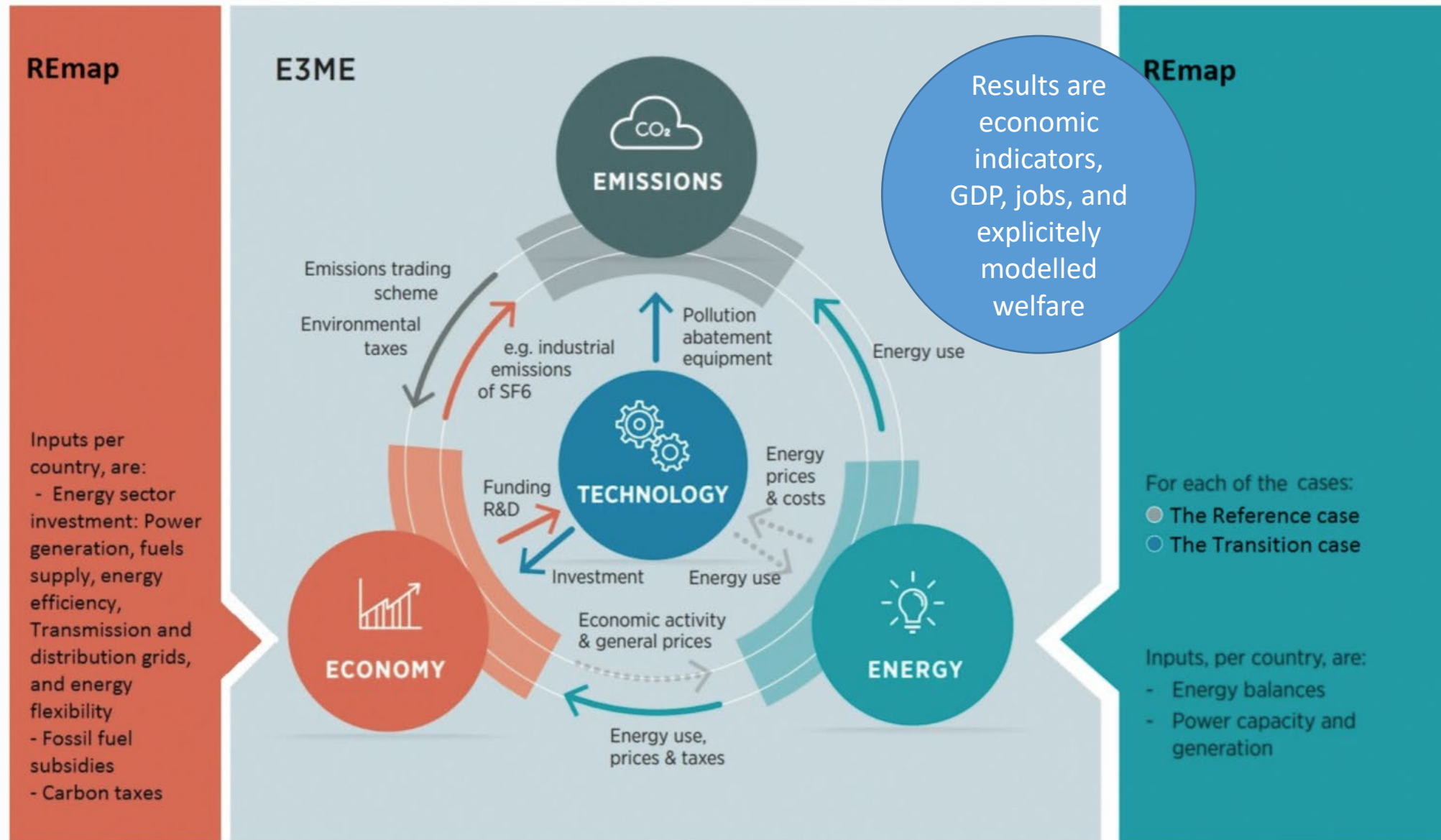
Our approach

» **Econometric Energy-Environment-Economy Model**

- **E3ME is at the core of the macroeconometric modelling framework**
  - Global in scope, with 53 countries/regions defined explicitly and linked by trade equations
  - 'Post-Keynesian' in approach
  - Time series of historical data
  - Behavioural equations econometrically estimated
  - SNAB as accounting schemes

- **Input-output core**
  - 43 sectors
  - IO tables for all regions that are single countries (that's 59 out of 70 regions)

» **IRENA's input:**

- Policy baskets
- Technical information on input coefficients
- Welfare index
- Trade aspects (forthcoming)

References:
- European Commission Impact Assessments of the 2030 climate and energy framework and the Energy Efficiency Directives
- an economic and employment evaluation of the EU's Energy Roadmap 2050
- macroeconomic modelling for the Roadmap to a Resource Efficient Europe
- development of a state level or regional macroeconomic models to assess renewables policy (e.g., Latin America and India)
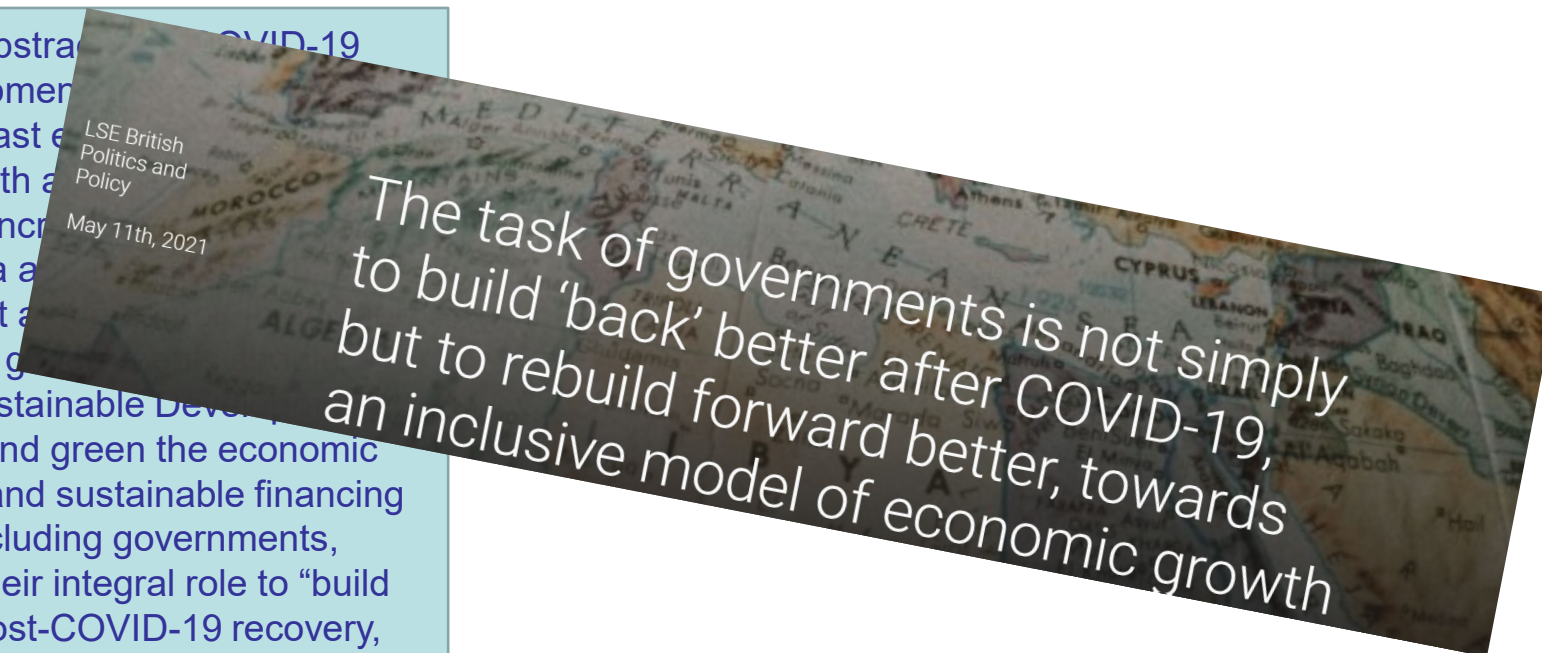
Benefits of the selected modeling approach

» Data driven, empirically supported, international data sources, but when possible national sources

» Data are
- informing the model of the base starting position
- informing the model's behavioural parameters

» E3ME uses time series over 1970-2020/2019
- National Accounts variables, disaggregated by sector, in constant and current price base
- bilateral trade between each region (by sector)
- energy balances (24 fuels, 23 sectors)
- emissions (GHGs, other local pollutants)

» No enforced equilibrium

» Allows for inefficiency, lock-in technology and rigidities

RESULTS - SHORT TERM
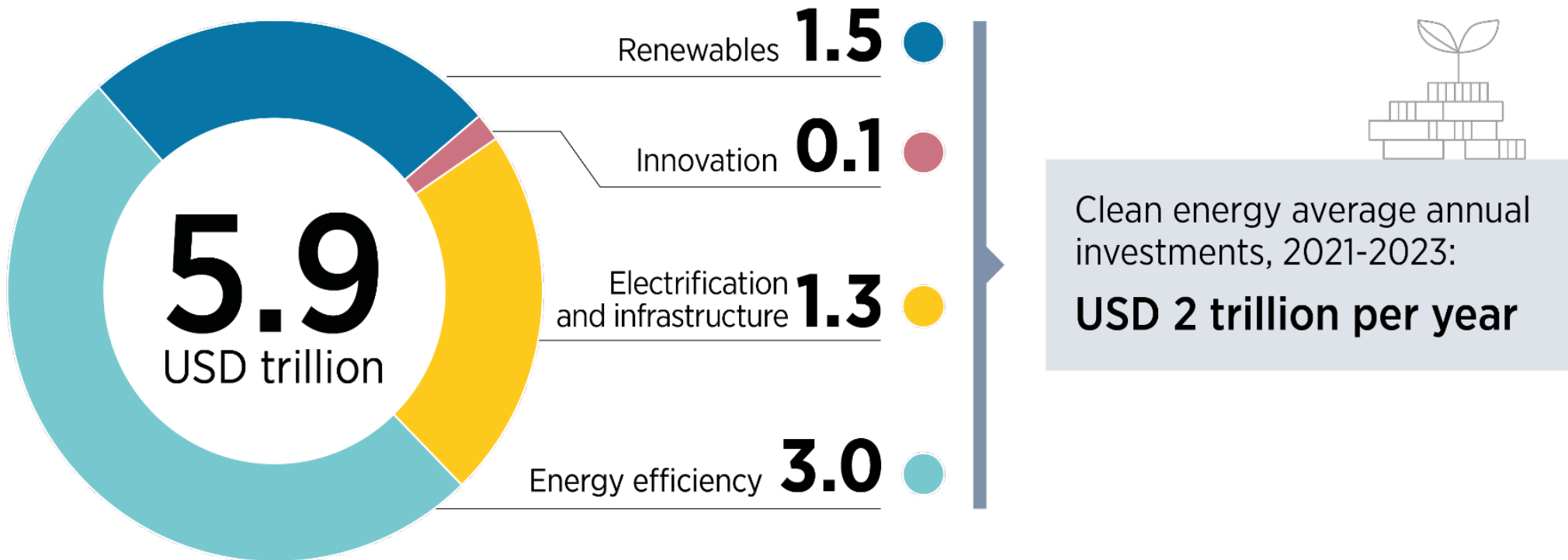
The global pandemic – the need to build forward better

ADBI Working Paper 1239 Huang and Saxena Abstract COVID-19 pandemic is imposing economic and broader development before. Policy lessons from Asia and the Pacific's past with shocks show that focusing on economic growth Rising inequality and environmental challenges incr vulnerabilities. The post-pandemic recovery in Asia place the 2030 Agenda for Sustainable Development to using the traditional macroeconomic policies, deliberately increase public investments in the Sustainable Deve Goals, reduce inequalities, provide decent work, and green the economic activities and financial systems. New technologies and sustainable financing could facilitate the process. All stakeholders, including governments, businesses, and the general public, need to play their integral role to "build forward better". Keywords: economic resilience, post-COVID-19 recovery, sustainable d

LSE British Politics and Policy
May 11th, 2021

The task of governments is not simply to build 'back' better after COVID-19, but to rebuild forward better, towards an inclusive model of economic growth
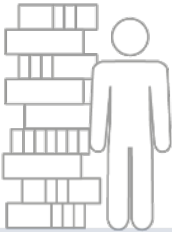
"The world is facing a development emergency. The COVID-19 pandemic is the latest crisis facing the world, but it won't be the last, unless we choose to do things differently." said Achim Steiner, Administrator of UNDP. "We are grateful to the Kuwait Fund for their partnership and we look forward to working together to support countries to develop the capacities needed to build forward better towards a more inclusive, sustainable and peaceful future."

Short term investment needs

Cumulative clean energy investments between 2021 and 2023 in the Transforming Energy Scenario (USD_{2019} trillion)

5.9 USD trillion

Renewables **1.5**

Innovation **0.1**

Electrification and infrastructure **1.3**

Energy efficiency **3.0**

Clean energy average annual investments, 2021-2023:

USD 2 trillion per year

Short-term employment and GDP benefits

Difference in energy sector jobs from PES,
million jobs

+5.49 million jobs

-1.07 million jobs
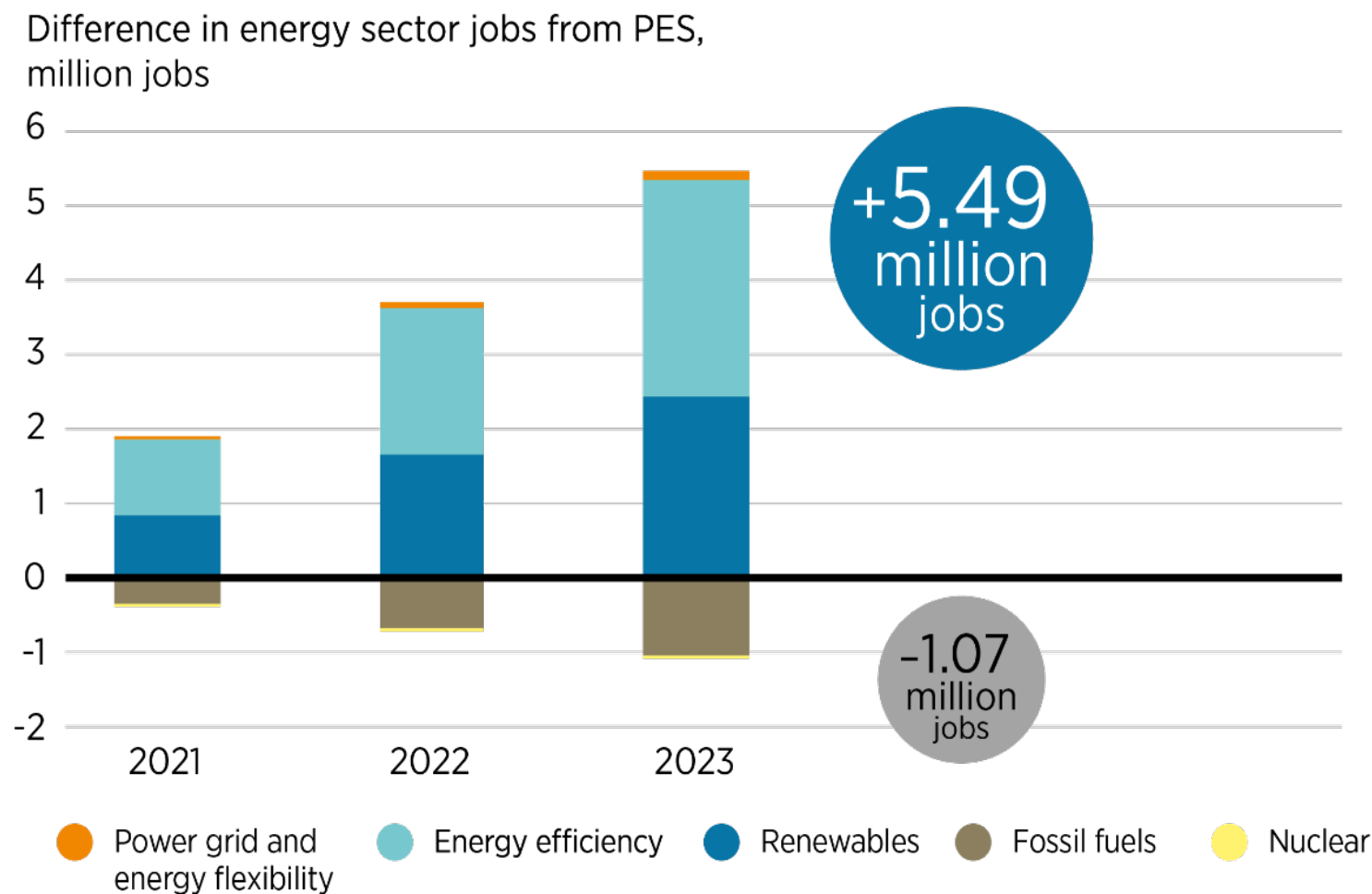
+ 1.0% GDP on average between 2020 – 2023 compared to PES

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

Investment needs and socio-economic gains 2020-2030

Cumulative clean energy investments between 2019-2030 in the TES (USD$_{2019}$ trillion)
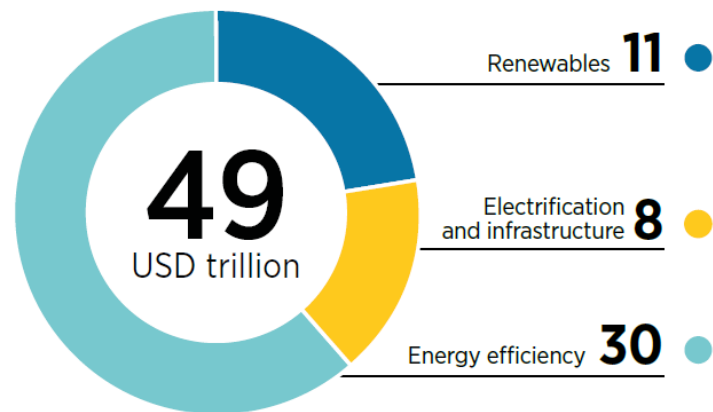
An additional 19 million energy transition-related jobs in 2030 globally

Renewables **11**

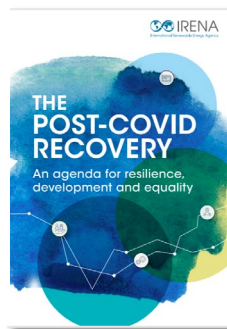Electrification and infrastructure **8**

Energy efficiency **30**
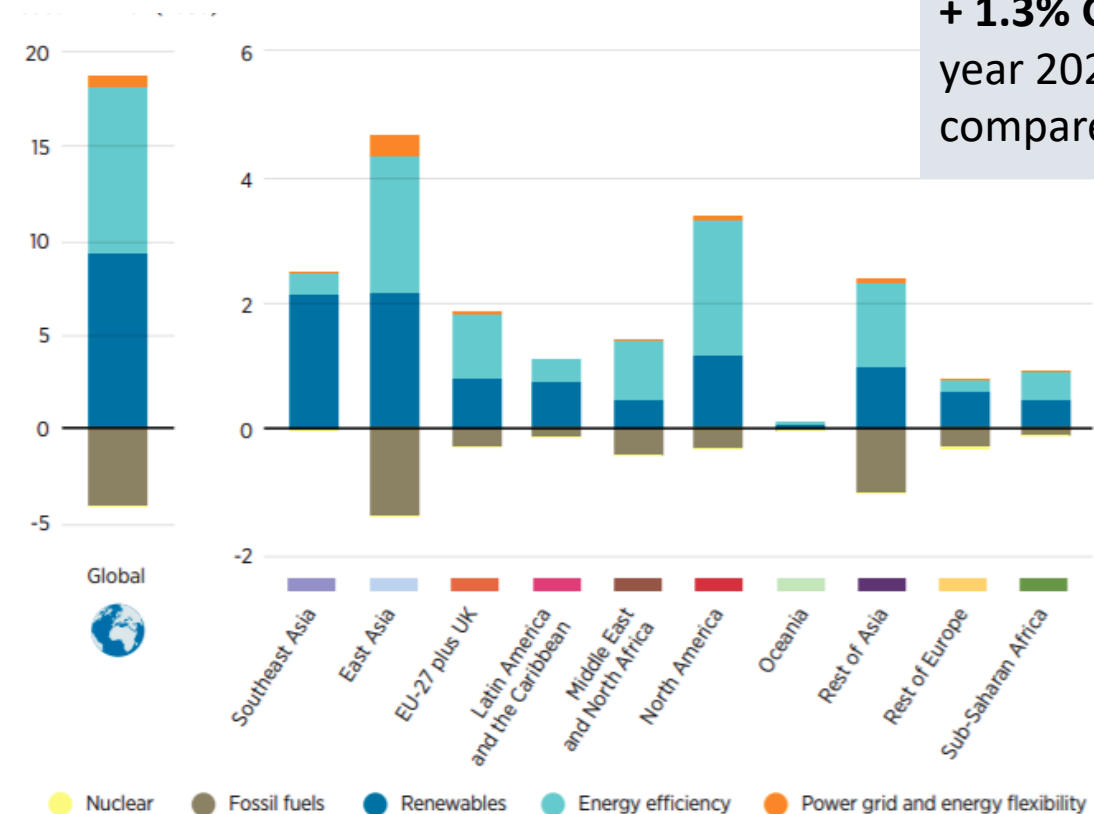
49 USD trillion

+ 1.3% GDP per year 2020 – 2030 compared to PES

Global

Southeast Asia · East Asia · EU-27 plus UK · Latin America and the Caribbean · Middle East and North Africa · North America · Oceania · Rest of Asia · Rest of Europe · Sub-Saharan Africa

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

THE POST-COVID RECOVERY
An agenda for resilience, development and equality
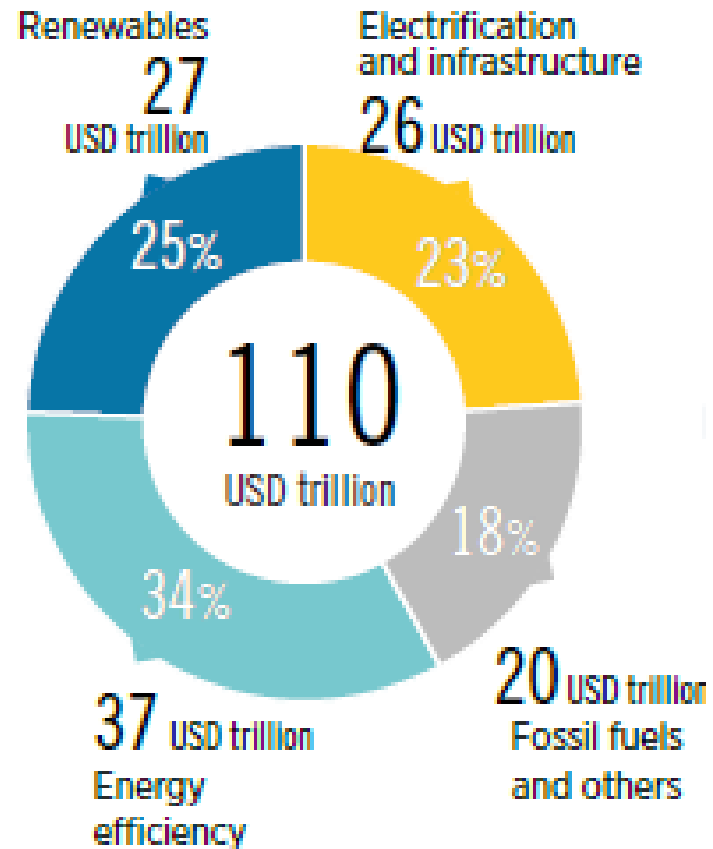
Long term investment needs

Planned Energy Scenario cumulative investments between 2016 and 2050 (USD trillion)

Renewables 13 USD trillion — 13%
Electrification and infrastructure 13 USD trillion — 14%
Energy efficiency 29 USD trillion — 31%
Fossil fuels and others 40 USD trillion — 42%
95 USD trillion
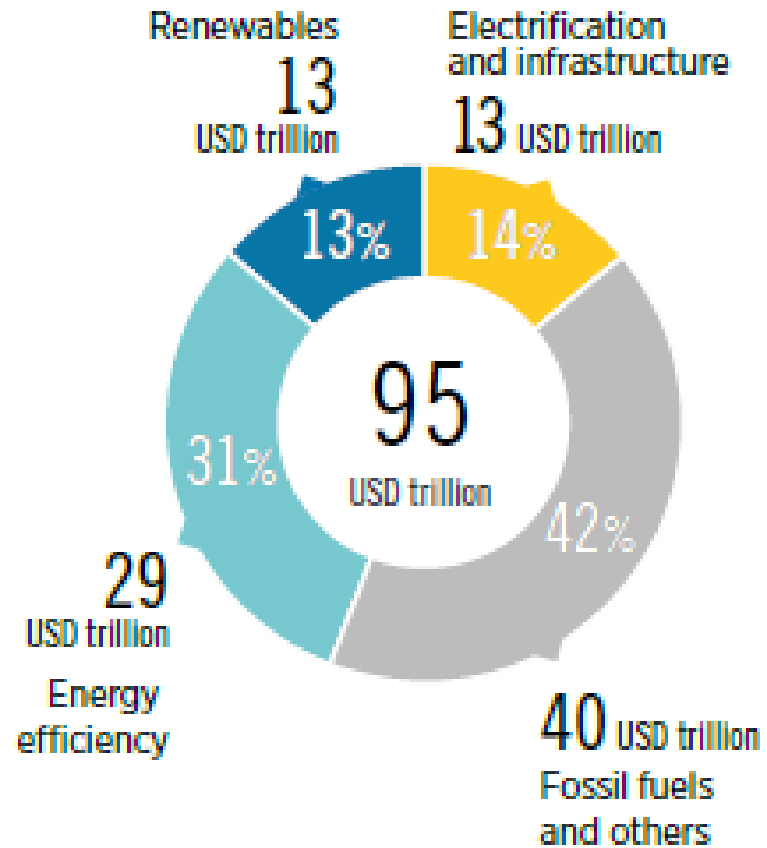
Transforming Energy Scenario (TES) cumulative investments between 2016 and 2050 (USD trillion)

Renewables 27 USD trillion — 25%
Electrification and infrastructure 26 USD trillion — 23%
Energy efficiency 37 USD trillion — 34%
Fossil fuels and others 20 USD trillion — 18%
110 USD trillion

More investment now!

- Investment needs to start immediately

- More front-loaded scenario

- International cooperation should be strengthened - in the model leads to a better distribution of gains and more equity

- International climate funds should address just transition.

- First implementations of of these suggestions in the forthcoming report

Globally higher economic performance, but countries and regions differ

IRENA — International Renewable Energy Agency

Difference in employment by 2050 between the Transforming Energy and Planned Energy scenarios, by region and sector (in millions)
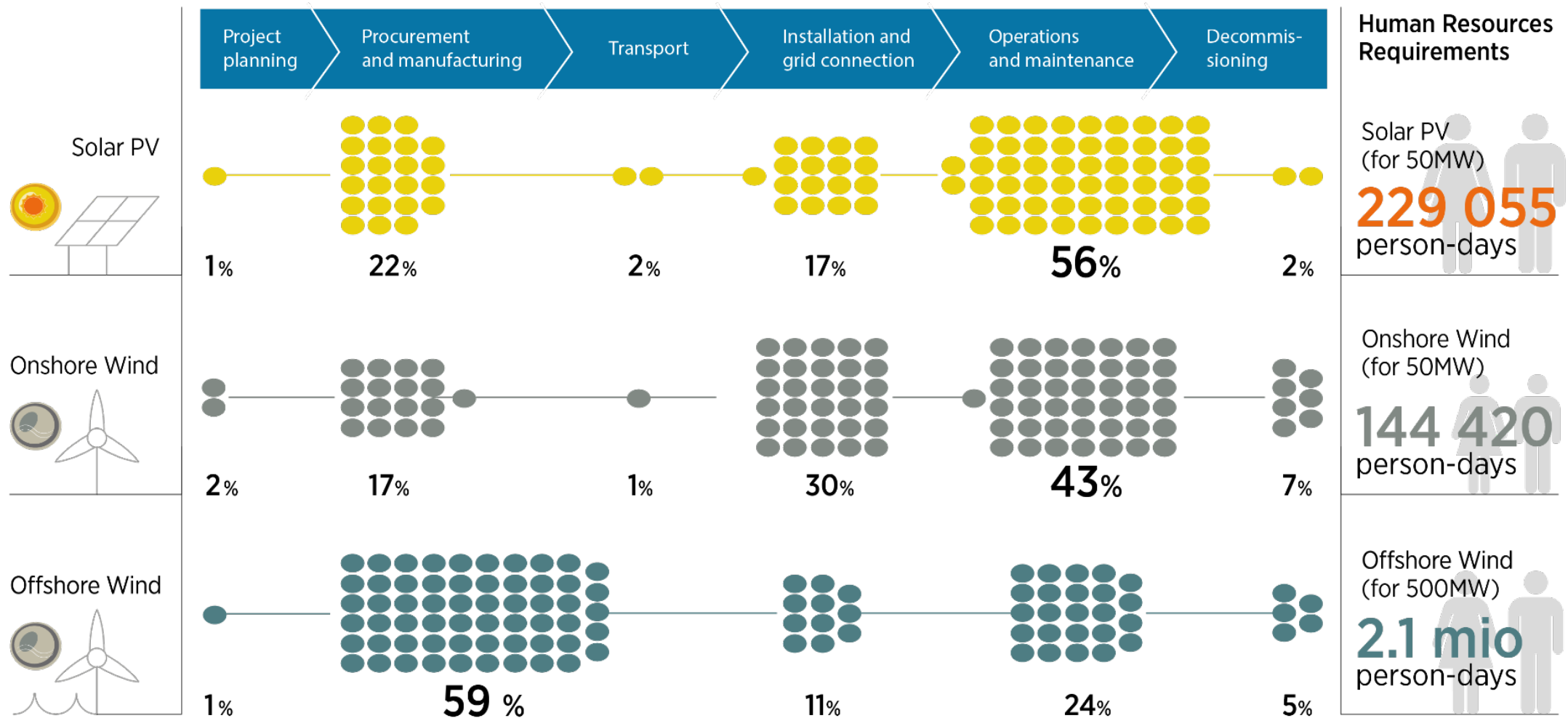

GDP is on a higher trajectory under an ambitious energy transition

Globally, more jobs across all sectors of the economy

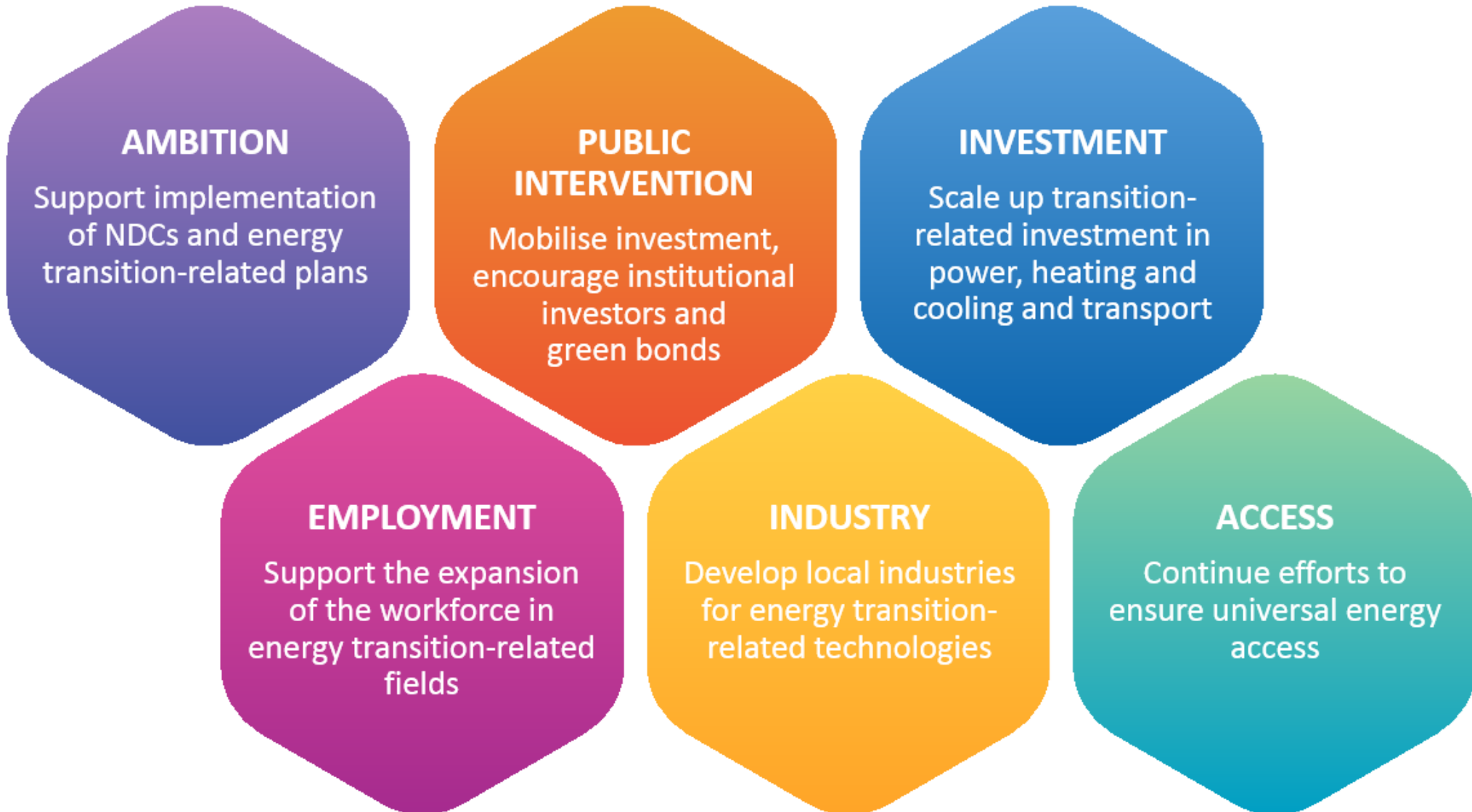**Welfare** is on a higher level, reflecting better health and more equity

● Fossil fuels   ● Nuclear   ● Renewables   ● Energy efficiency   ● Power grids and energy flexibility

Source: IRENA analysis

Employment along several important renewable value chains

Project planning	Procurement and manufacturing	Transport	Installation and grid connection	Operations and maintenance	Decommis-sioning	Human Resources Requirements

Solar PV

1%   22%   2%   17%   **56%**   2%

Solar PV (for 50MW)
229 055 person-days

Onshore Wind

2%   17%   1%   30%   **43%**   7%

Onshore Wind (for 50MW)
144 420 person-days

Offshore Wind

1%   **59 %**   11%   24%   5%

Offshore Wind (for 500MW)
2.1 mio person-days

Policy makers need to recognise how many renewable energy jobs can be created along each segment of the value chain, so they can design green recovery programmes that maximise regional and national value creation.
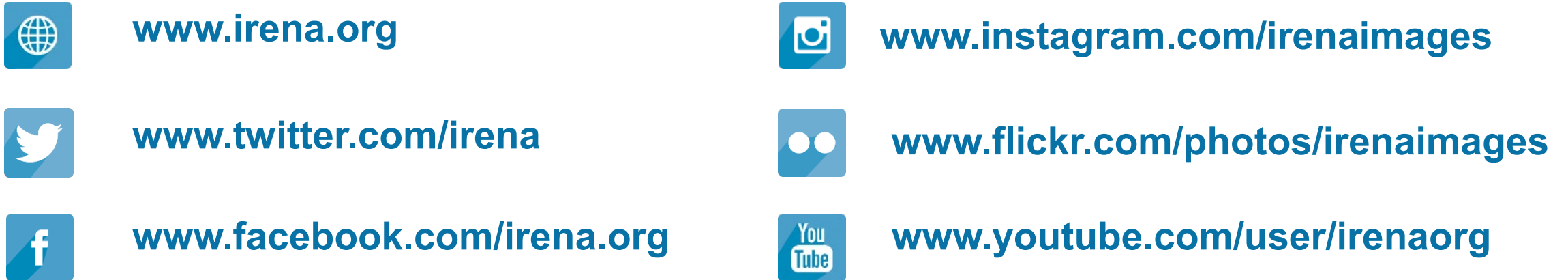
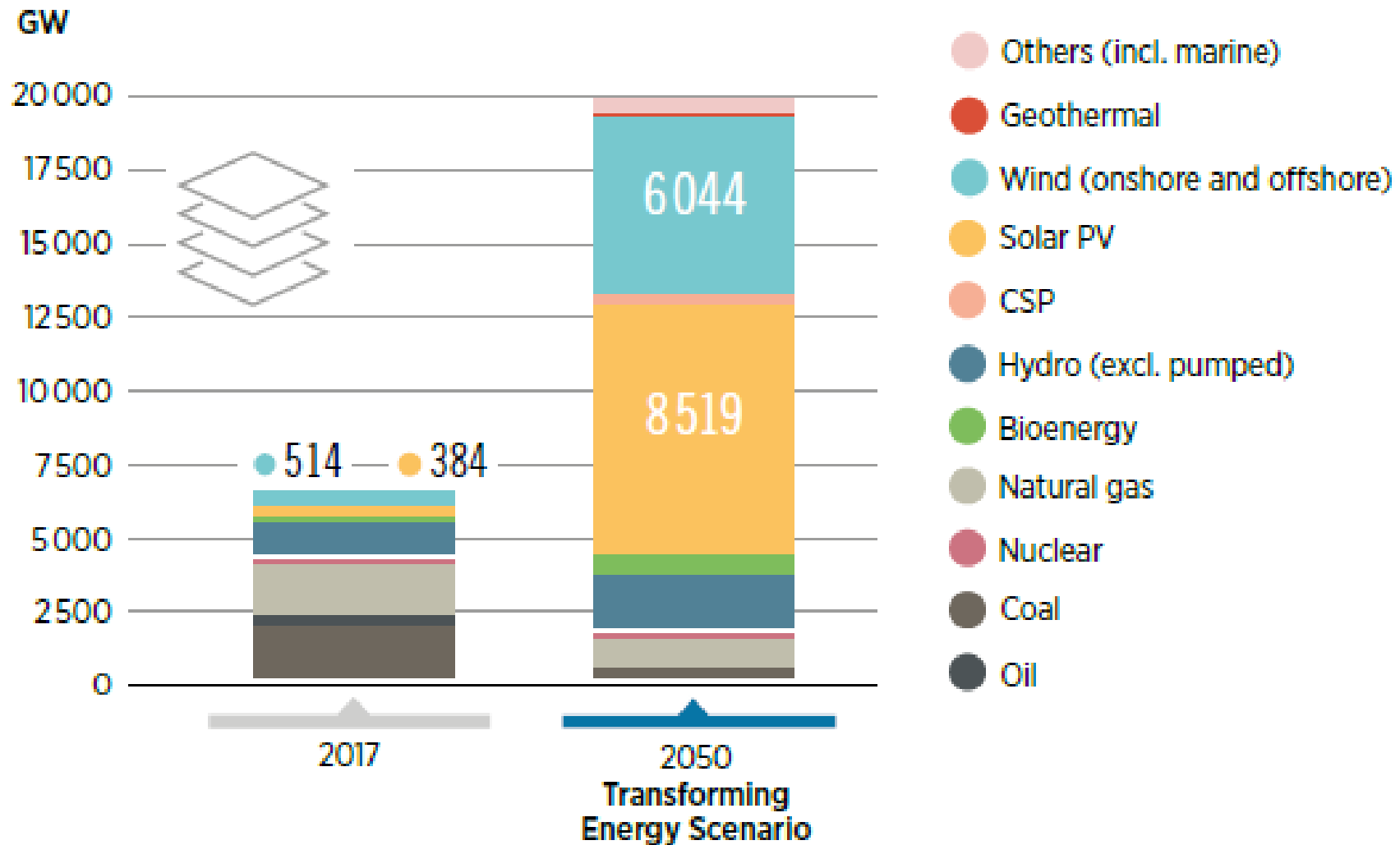# Key policy measures needed to support a just and resilient transition

AMBITION

Support implementation of NDCs and energy transition-related plans

PUBLIC INTERVENTION

Mobilise investment, encourage institutional investors and green bonds

INVESTMENT

Scale up transition-related investment in power, heating and cooling and transport

EMPLOYMENT

Support the expansion of the workforce in energy transition-related fields

INDUSTRY

Develop local industries for energy transition-related technologies

ACCESS

Continue efforts to ensure universal energy access

19

IRENA
International Renewable Energy Agency

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

For further information or to provide feedback, please contact IRENA at info@irena.org

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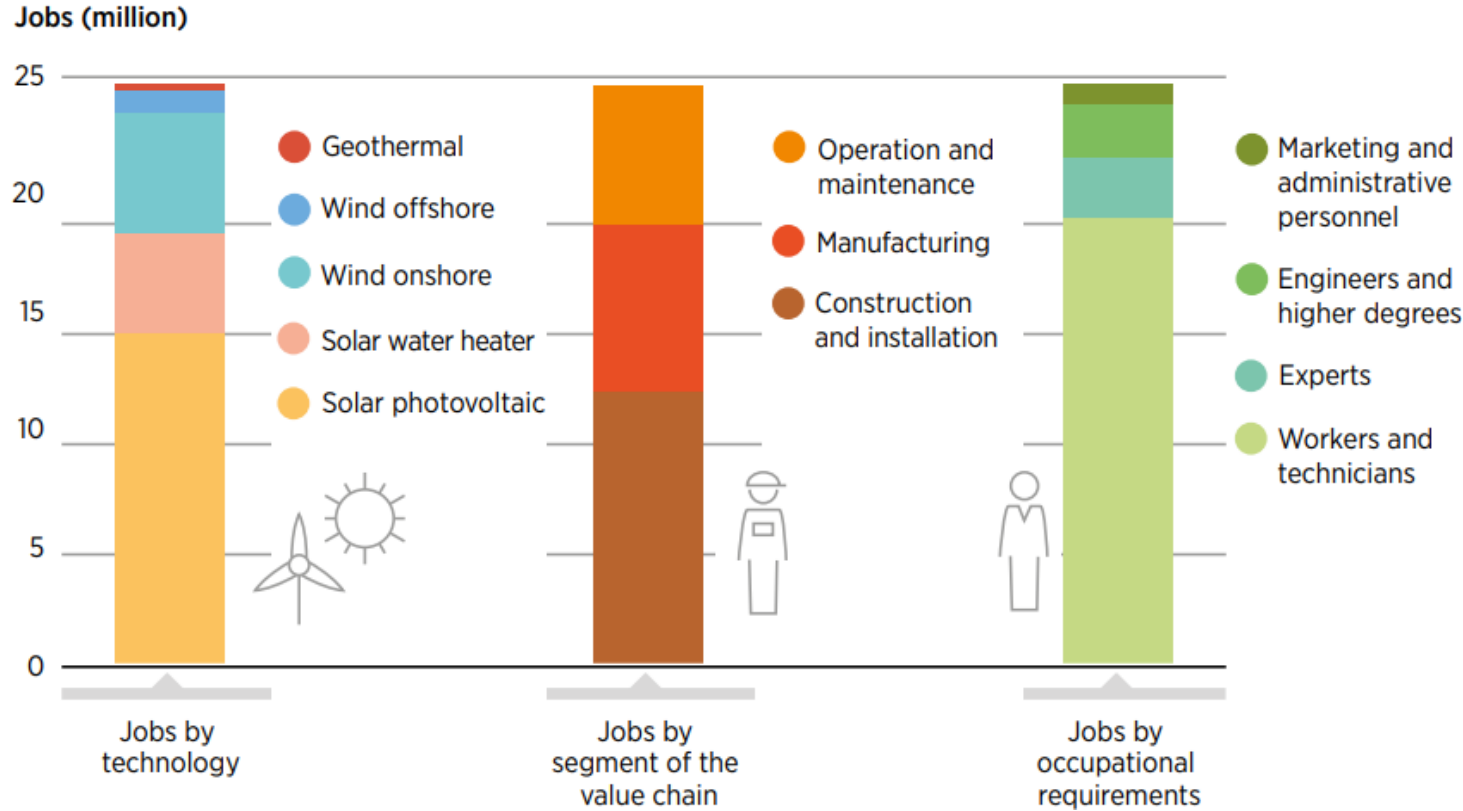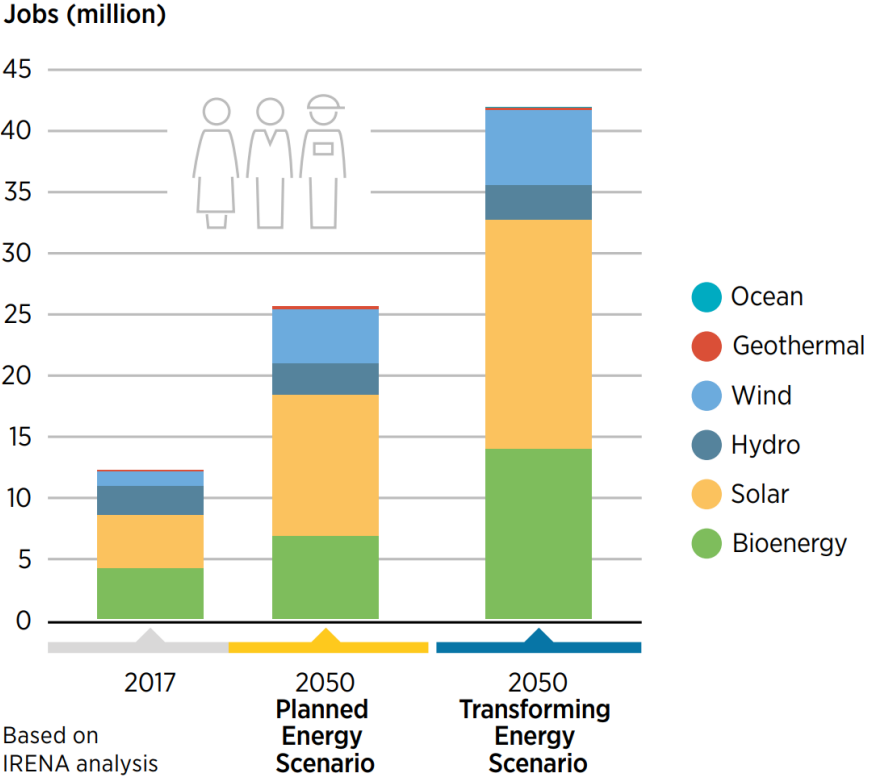
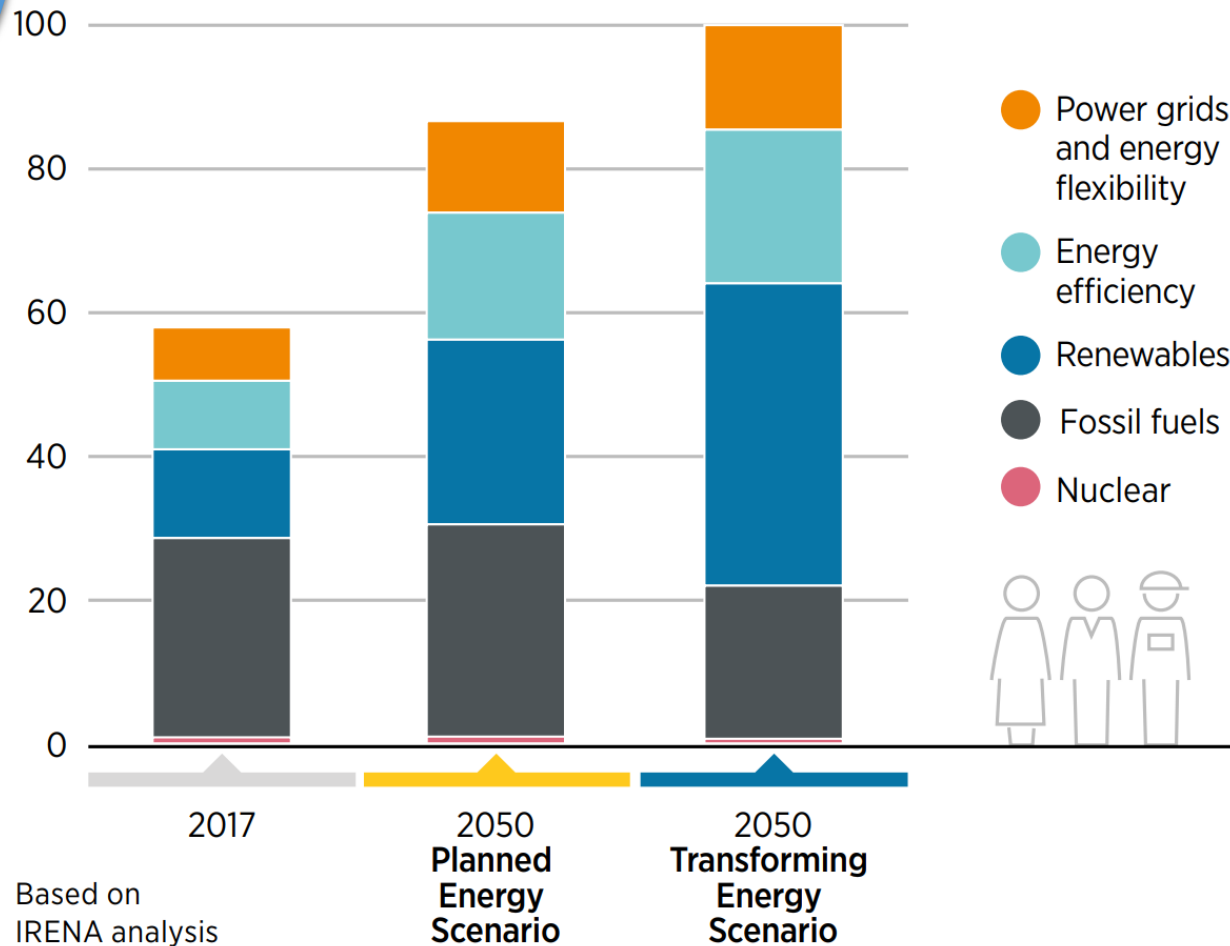www.youtube.com/user/irenaorg

Solar PV and wind will lead the way in the power sector

Renewable energy jobs in 2050, and by segment of the value chains

Long term employment and growth benefits, 2050

IRENA — International Renewable Energy Agency

+ 13.3 Million jobs

Jobs (million)

Legend:
- Power grids and energy flexibility
- Energy efficiency
- Renewables
- Fossil fuels
- Nuclear

2017

2050 Planned Energy Scenario

2050 Transforming Energy Scenario

Based on IRENA analysis

Culmulative GDP gain of USD 98 trillion

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

+13.5% Welfare improvement compared to PES