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
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 CO₂ emission reductions (Gt CO₂)

From baseline to Planned Energy Scenario (PES)
- 45%
- 26%
- 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
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

Results are economic indicators, GDP, jobs, and explicitly modelled welfare.
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 The COVID-19 pandemic is imposing economic and broader development challenges as never before. Policy lessons from Asia and the Pacific's past experience with shocks show that focusing on economic growth alone is not enough.

Rising inequality and environmental challenges increased the region’s vulnerabilities. The post-pandemic recovery in Asia and the Pacific should place the 2030 Agenda for Sustainable Development at the center.

In addition to using the traditional macroeconomic policies, governments should deliberately increase public investments to the Sustainable Development Goals, reduce inequalities, provide decent work, and green the economy 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 development, green recovery, macroeconomics.

JEL Classification: E3, E61, E70, H5, N15, O11, O15, O20, P46, Q48
Short term investment needs

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

- Renewables: 1.5 USD trillion
- Electrification and infrastructure: 1.3 USD trillion
- Energy efficiency: 3.0 USD trillion

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

-1.07 million jobs

+5.49 million jobs

2021 2022 2023

Power grid and energy flexibility
Energy efficiency
Renewables
Fossil fuels
Nuclear

+1.0% GDP on average between 2020 – 2023 compared to PES
Investment needs and socio-economic gains 2020-2030

Cumulative clean energy investments between 2019-2030 in the TES (USD\textsubscript{2019} trillion)

- **Renewables**: 11 USD trillion
- **Electrification and infrastructure**: 8 USD trillion
- **Energy efficiency**: 30 USD trillion

An additional 19 million energy transition-related jobs in 2030 globally

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

THE POST-COVID RECOVERY: An agenda for sustainable, resilient and inclusive recovery
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%)

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%)
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 these suggestions in the forthcoming report
Globally higher economic performance, but countries and regions differ

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

Source: IRENA analysis
Employment along several important renewable value chains

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
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
Solar PV and wind will lead the way in the power sector
Renewable energy jobs in 2050, and by segment of the value chains

Jobs (million)

Based on IRENA analysis

Ocean
Geothermal
Wind
Hydro
Solar
Bioenergy

2017
2050 Planned Energy Scenario
2050 Transforming Energy Scenario

Jobs by technology

Geothermal
Wind offshore
Wind onshore
Solar water heater
Solar photovoltaic

Operation and maintenance
Manufacturing
Construction and installation

Marketing and administrative personnel
Engineers and higher degrees
Experts
Workers and technicians

Jobs by segment of the value chain

Jobs by occupational requirements
Long term employment and growth benefits, 2050

+ 13.3 Million jobs

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