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

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1. Overview

The COVID 19 pandemic overshadowed the global economy in 2020 and continues to do so in most regions in 2021. It has claimed lives and livelihoods. It also has affected and will affect the energy transition. IRENA (2020) analyses the effects of multiple lockdowns, social distancing and tightening public and private budgets on renewable energy deployment in its proposal for a post-Covid recovery strategy, but also outlines the energy transition as an opportunity for a green recovery.

For 2020, global GDP shrank by 3.4% (OECD 2021) with regional losses varying between 11% for Spain, 3.2% on G20 average RE effects and small gains for Turkey (1.8%) or China (2.3%). Though the global outlook for this year looks better (a global 5.6% growth), it still depends on vaccination rollout and effectiveness. Altogether, the renewables sector has resisted the pandemic better than the fossil fuel sector, with investment in decarbonizing technologies reaching a record level of $501.3 billion despite the disruption caused by Covid-19. Renewable energy investment was up 2% compared to last year (Bloomberg 2021).

The claim for green recovery is shared among several international institutions (e.g. Worldbank 2021), and researchers (e.g. Lutz,Wolter, Lehr 2020). Gusheva and Gooyert (2021) give an overview of the most prominent standpoints. One hope is that the current period may contribute to a heightened understanding of what needs to be done next, underlining the urgency of creating resilient economies and societies. It builds on the Covid-19 response having shown the feasibility of designing and implementing, within a few weeks and at a global scale, decisive interventions to safeguard the public interest. Armed with this experience, short-term investments, regulations, and policies can be aligned with the long-term need for decarbonised economies and societies. IRENA's analysis indicates substantial socio-economic benefits (in terms of GDP and employment) already in the first three years of a recovery programme suggested by the agency.

Based on its body of socioeconomic analyses (GRO, Measuring, others) IRENA has been contributing to a better model-based and data driven understanding of the economic effects of the energy transition. The analysis shows value creation from the energy transition, in terms of jobs, GDP and a welfare indicator comprising economic, ecological and social aspects.

2. Methodology

IRENA's socioeconomic scenario analyses are combining energy balances and deployment pathways, developed after discussions with its Member States, and the resulting investment with a macroeconomic model. It allows for results on the global scale, but also on the regional and country level. The macroeconomic model consistently describes the annual inter-industry flows between economic sectors, their contributions to personal consumption, government, equipment investment, construction, inventory investment, exports as well as prices, wages, output, imports, employment, labor compensation, profits, taxes, etc. for each sector as well as for the total economy. In the behavioral equations, decision routines are modeled that are not explicitly based on optimization behavior of agents but are founded on bounded rationality. The parameters are estimated econometrically from time series data. Producer prices are the result of mark-up calculations of firms. Output decisions do not stem from an optimization process but follow observable historic developments, including observed inefficiencies. The economic simulation gives results for economic indicators such as employment, GDP or production under the new circumstances of the scenario. The differences of these indicators for different simulation runs can be attributed to the differences between the pathways outlined in the transition scenarios.

The Planned Energy Scenario (PES) is the reference case in IRENA (2020b). It is based on governments' energy plans and other planned targets and policies as of 2019 and reflects NDCs. For the analysis of economic effects, this is contrasted by a more ambitious view on the future energy mix, the Transforming Energy Scenario (TES). The pathway is based largely on renewable energy sources and sets the energy system on the path needed to keep the rise in global temperatures to well below 2 degree Celsius (°C) and towards 1.5°C (IRENA 2020b).

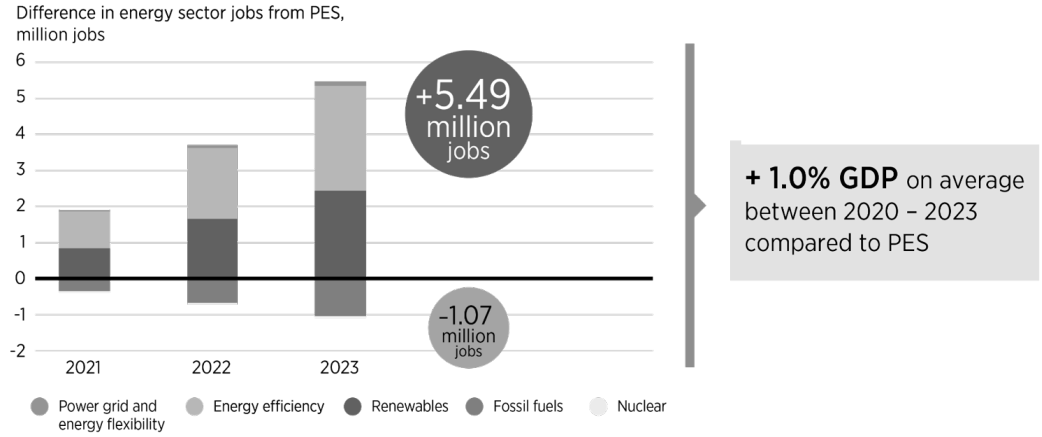
3. Results

What drives economic effects is large investment, shifts in trade, mainly in fossil fuels, and redistributing carbon costs. In the long-term perspective, the energy transition scenario needs a total investment in the energy system of USD 110 trillion by 2050. In terms of global GDP, this amounts to around 2% of average annual GDP over the period. The course toward this spending is set now, avoiding stranded investment in the future. IRENA (2020a) estimates USD 2 trillion of energy transformation investment is needed each year in the recovery phase between 2021 and 2023. For comparison: USD 825 billion were invested in 2019. If this investment is directed in the key areas renewables, notably renewable power, grid infrastructure, the electrification of end use sectors such as electromobility and heat pumps, and energy efficiency, the mitigating impacts to the damages from the pandemic will be largest. Table 1 shows how this is just the start, as annual investments needs meet the path toward the 2030 horizon coming up with USD 4.5 trillion per year for the rest of the decade.

Table 1: Annual investment – long-term and the short-term start (cumulative, trillion USD)

	Planned energy Scenario	Transforming Energy Scenario/ Green recovery
Short-term (2021-2023)	0.825 (in 2019)	5.9
Long-term (2021-2050)	55	90

The focus on easily ramped up investment is paying off in form of additional jobs, and additional growth in the first years. The results are shown in figure 1.

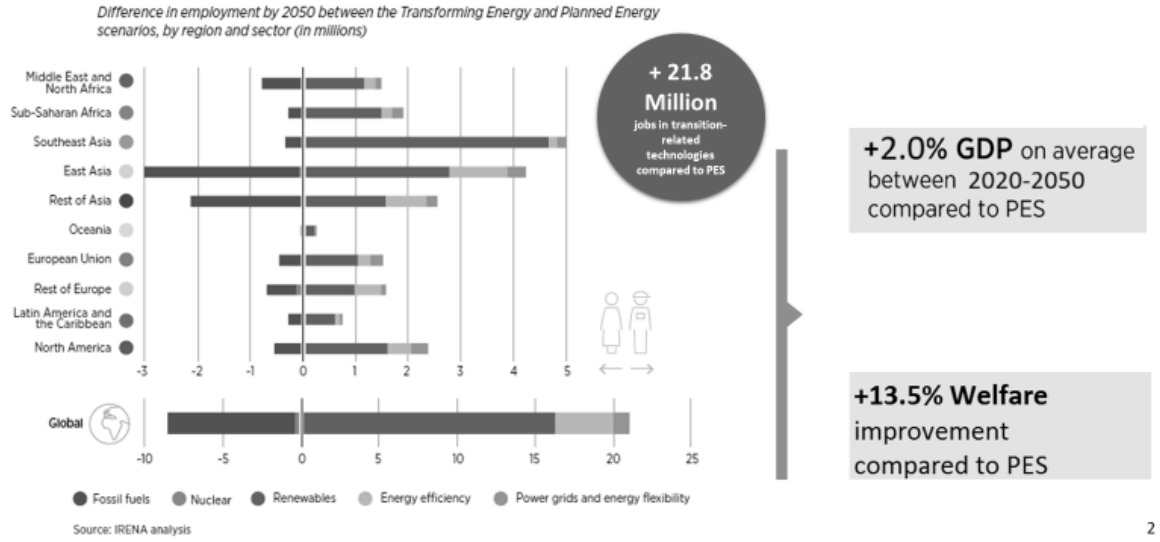


Source: IRENA own analysis.

Globally, almost 5.5 million additional jobs can be attributed to renewable energy deployment, activities to enhance the power grids and provide flexibility, and energy efficiency. Fossil fuels, however,

loose employment from disinvestment and retiring, but mostly from lack of demand. GDP is on average 1% higher under the assumptions in the energy transition scenario

In the long-term perspective, average GDP gain is even higher at 2% and employment will be up to 22 million people higher compared to the reference case. The largest gains in employment will be seen in Asia, followed by North America. Asia also experiences the largest losses in the fossil fuel sector. Overall, however, job gains exceed losses. IRENA (2020a ,b, c) also includes a welfare indicator, which maps health benefits from less emissions and pollution, social benefits from additional spending on education and health and economic benefits from investment in the future and today's consumption. Overall, this indicator is clearly higher under the energy transformation.



4. Conclusions

In the financial crisis, however different the causes and sectors affected, the hope for green recovery, i.e. the adjustment of public and private spending to the long-term goal of climate change mitigation and other environmentally safe pathways, was born. However, it was not underpinned with consistent demands, scenarios or actions. The analysis above tries to fill this gap for the aftermath of the pandemic and support the momentum from global governments with data. Leaving the worst economic recession due to the pandemic can go hand in hand with moving towards a safer pathway to reaching the goals of the Paris Agreement.

5. Acknowledgement

The results referred to have been obtained from modelling results with the E3ME model, hosted by Cambridge Econometrics. We would like to thank our colleagues at CE.

6. References

Bloomberg NEF (2021): Energy Transition Investment Trends, 2021

IRENA (2020a), The post-COVID recovery: An agenda for resilience, development and equality, International Renewable Energy Agency, Abu Dhabi

IRENA (2020b), Global renewables outlook: Energy transformation 2050 https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020

IRENA (2020c), Measuring the socioeconomics of transition: Focus on jobs https://www.irena.org/publications/2020/Feb/Measuring-the-socioeconomics-of-transition-Focus-on-jobs

IRENA (2021), World energy transition outlook: 1.5°C Pathway (Preview) https://www.irena.org/publications/2021/March/World-Energy-Transitions-Outlook

Lutz, C., Wolter, M. I. & Lehr, U. (2020): Die Post-Corona-Welt – Investitionen für Wirtschaft und Umwelt. GWS Kurzmitteilung 2020/04, Osnabrück.

OECD (2021), OECD Economic Outlook, Interim Report March 2021, OECD Publishing, Paris, https://doi.org/10.1787/34bfd999-en.

OECD. Building Back Better: A Sustainable Resilient Recovery after COVID-19. Available online: http://www.oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/ (accessed on).

PBL Netherlands Environmental Assessment Agency. Exploring the Impact of the COVID-19 Pandemic on Global Emission Projections: Assessment of Green Versus Non-Green Recovery. Available online: https://www.pbl.nl/sites/default/files/downloads/pbl-new-climate-institute-2020-exploring-the-impact-of-covid-19-pandemic-on-global-emission-projections_4231.pdf (accessed on March 30, 2021)

World Bank (2021): Tackling the COVID-19 Pandemic of Inequality to Build a Green, Inclusive, & Resilient Recovery