COVID-19 AND THE FUTURE OF ENERGY IN THE ASIA-PACIFIC: Building Back Better
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COVID-19 AND THE FUTURE OF ENERGY IN THE ASIA-PACIFIC: Building Back Better

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The COVID-19 pandemic that emerged early in 2020 has led to multiple impacts across societies and economies. Analyzing the impact on the energy sector was equally as critical as analyzing the economic sector, as COVID-19 unleashed major impacts across the energy domain. Among the major energy demand areas, only the residential and building sectors showed an increase in energy consumption across the Asia-Pacific region during COVID-19, mainly due to the imposed lockdowns and work from home strategies. For the industrial, transport, and commercial sectors there was an average decrease in energy demand of around 10 per cent, 8 per cent, and 7 per cent respectively. By contrast, residential energy demand showed an average annual expected increase of 4.5 per cent.

The COVID-19 pandemic has also affected the energy supply sector of each country by halting the upcoming generation plants, which has been modelled separately based on the national capacity building plans of each country and what renewable sources are most suitable depending on their potential in specific country and the associated cost parameters.

Emissions of each country also showed a similar pattern as of energy demand. However, it should be noted that this environmental emission drop as well as the reduction in demand are in no way a sign of green economy but rather pose an opportunity to build back better. Emissions will be lower in the event of a slow recovery, but a weaker economy also drains momentum from the process of change in the energy sector. Hence, a low economic growth of any country is not a low-emissions strategy.

This report seeks to provide useful insights for energy policymakers, to enrich discussions and pave a way forward for the post-COVID-19 energy transition. It presents analysis based on an extensive literature, expert opinions, and energy modeling to examine gaps and further efforts to accelerate the pace of change, and drive the way for equitable, inclusive, and resilient economies the Asia and the Pacific. It models three countries in detail – Pakistan, Fiji and Lao People’s Democratic Republic – to evaluate the potential energy sector response under a range of scenarios during and after recovery from the pandemic and provide an indication of implications across the region.

This study examines three countries in detail – Pakistan, Fiji, and Lao People’s Democratic Republic – through a long term energy alternatives planning (LEAP) model that is based on three different scenarios of economic response to COVID-19. The results obtained from the study indicates that a ‘green’ economic recovery with stimulus targeted toward sustainable energy would save up to 6.25 per cent, 7.06 per cent, and 10 per cent emissions for Pakistan,
Fiji, and Lao People’s Democratic Republic respectively in 2035. This picture provides an insight into the opportunities that economies are facing in the years to come.

Beyond the economics, and considering the Asia-Pacific region’s large contribution to total global GHG emissions, the environmental outlook will be very different depending on the efforts to recover from the crisis using green recovery initiatives and financing.

A sustainable outcome will require a larger investment into the energy sector, both on the demand and supply sides. Initially, investment needs will increase each year due to increases in energy demand and constantly increasing infrastructure cost. Even a post-COVID Business-as-Usual scenario would require investments of $108 billion, $1.72 billion, and $6.7 billion in Pakistan, Fiji, and Lao People’s Democratic Republic respectively in 2030. For achieving targets for a green recovery scenario, these countries would require a total of $120 billion, $2 billion and $7.7 billion respectively.

This additional investment must be provided by the governments in the form of green stimulus or green recovery packages, or by the private sector. For example, in 2030, for a green recovery scenario, Pakistan will require an additional $12 billion, or around 2.4 per cent of GDP.

As we emerge from the pandemic and make plans to “Build Back Better”, this report makes five key recommendations for policymakers to consider in their response:

- Clean infrastructure investment in renewable energy, storage, EVs, grid modernization and cross border interconnection should be enhanced. Other priority areas of investment include:
  - building energy efficiency - renovations and retrofits including improved insulation and efficient heating and cooling;
  - education and training to address immediate unemployment from COVID-19 and structural shifts from decarbonization;
  - natural capital investment for ecosystem resilience and regeneration including restoration of carbon-rich habitats and climate-friendly agriculture;
  - clean cooking and electricity access; and
  - clean R&D spending.
- All offers of access to public funds for the recovery, including through loans, grants or other forms of underwriting, should mandate benchmarks for sustainability. In the energy sector, these criteria should include consideration of social equality (energy access), growth of renewables, improvements in energy efficiency, and reductions in carbon intensity.
• Government stimulus should seek to leverage private sector finance, either through regulation or incentives, to contribute to the energy transition – in particular, the targets of Sustainable Development Goal 7 and the Paris Agreement. For example, the impending phase-out of coal will require investment in renewable generation capacity and grid flexibility; private-public partnerships offer great opportunity for private investment while also delivering enormous public benefit.

• Fossil fuel subsidies should be reduced, taking advantage of low current fuel prices to implement changes with minimal disruption to energy consumers. This will challenge the business case for carbon-intensive sources and allow the fair competition of renewables. As a result, investment will be driven towards modern, cleaner forms of energy, boosting the socio-economic recovery with increased job creation and better health and reducing the economic burden of conventional energy consumption going forward.

• To keep sustainable energy projects on track in the post-COVID-19 world, policymakers should support renewable investment by extending investment and production tax credits.
CHAPTER 1.
BACKGROUND AND CONTEXT

The COVID-19 pandemic as it emerged in 2020 has profoundly impacted societies and economies across the Asia-Pacific region. While it has had impacts on health, livelihoods and economies, its long-term impact on the energy system and its transformation is less clear.

Over the past few years, the development of Asia Pacific’s energy sector has been guided by a series of broader, long-term trends. Prior to the emergence of COVID-19, the Asia Pacific region was already the largest emitter of CO₂ emissions contributing to around 47 per cent of total global emissions (see Figure 1). Even considering the current measures and policy actions, this region is not on-track to meet Sustainable Development Goal 7 on energy (SDG 7) and the objectives of Paris Agreement. [1] Concerted actions by countries of the region are needed to counter the current trends.

**Figure 1: Carbon Emissions of the Asia-Pacific as compared to other global regions (from consumption of oil, gas and coal for combustion-related activities only) [2]**

While most countries are fossil fuel dependent at present, many have begun translating ambitious goals into actions by establishing the national architecture for coordinating and promoting the implementation of the clean energy transition. These include the diffusion of renewable energy technologies, and the growing awareness by governments of the need to manage carbon emissions even as they pursue economic growth.
The region has a leading role in the continued push for renewable energy on the global stage, and several countries have demonstrated considerable progress as well as strong potential for future developments. Modern renewables such as wind and solar (i.e. excluding the use of traditional biomass) accounted for around 6.8 percent of the region’s total energy consumption, a modest but growing share. The challenges of the region to ensure securing clean, affordable, and sustainable energy are to limit the consumption growth through policies and actions on demand side, while meeting additional demand by promoting clean energy investments on the supply side, mitigating the concerns of supply security, curbing growth of CO₂ emissions, and expanding electricity access to millions of people.

The COVID-19 pandemic’s macro-level social, political and economic impacts on the Asia-Pacific and the whole world, has generated abrupt and uncertain effects on key industries in profound ways. Driven by lockdowns, travel bans and social distancing the world witnessed a record decline in energy use and greenhouse gas emissions in the first half of 2020. However, these are expected to rise again as the global economy rebounds, leading to minimal impacts on climate change mitigation unless the COVID-19 crisis also induces a longer-term structural change in the economy.[3]

The challenges posed by COVID-19 are accompanied by potential opportunities to accelerate the transition to sustainable energy. During the crisis, when power demand dropped, coal and gas fired generation were wound back and power systems demonstrated they could cope with higher shares of renewable energy sources.

As per the reports of International Energy Agency (IEA), by almost end of 2020, governments have announced approximately USD 470 billion worth of energy related stimulus that targeted both consumption and production (excl. Next Generation EU stimulus) [4]. The larger share (54 per cent) was targeted towards relief measures such as energy bills, electricity, railways and public transport, and aviation while the remaining 46 per cent targeted clean energy technologies and increasing the energy efficiency in different sectors. Yet an opportunity for placing ‘green recovery’ at the core to allow countries rejuvenate through enabling policies and actions to meet the climate goals spelled out in the Paris Agreement. These fiscal stimulus plans could strategize for creating more long-term jobs, protecting nature and environment, accelerating climate resilience, and catalyzing capital at scale. The World Bank has lent approximately $6.7 billion to Lao People’s Democratic Republic, Cambodia, Indonesia, Myanmar, and Philippines, but the majority of this funding was reserved for addressing health emergencies. While as previously mentioned for Lao People’s Democratic Republic, packages that stimulate economic recovery and sustainability are still in a dismal, especially for Southeast Asian countries. Strong commitments have been demonstrated by EU.[5] France introduced $17 billion assistance through direct government investment, subsidies, loans, and loan guarantees to Air France, Airbus, and the other aviation companies. [6] In exchange for that assistance, companies are required to invest in
low-emission aircraft, powered by electricity, hydrogen, and other forms of renewable energy; Germany allocated a third of its $145 billion recovery budget on climate friendly industries and technologies, particularly subsidizing electric vehicles to reduce carbon emissions. A new temporary recovery instrument called the Next Generation EU25 with a budget of €750 billion ($880 billion) was allocated to greening investments, pushing for digital economic transformation, incentivizing private investments, building employment resilience, improving health security and humanitarian aid.[7]

There are positive, negative and various uncertain impacts of COVID-19 on the energy transition, be it visible manifestations of the reduced global energy demand and consumption or the effects on global efficiency investments. The pandemic and its aftermath offer an opportunity for a giant leap towards clean energy transition through sustainable recovery plans.

**Box 1: Examples of Policy Responses across the World**

On one hand where COVID has disturbed most sectors, it also provides an opportunity to the countries to rebuild their economies with a sustainable approach and hence economies across the globe have taken different measures to promote resilience and sustainability.

**Response of African countries:** In some African countries (e.g. Ghana), the residents have been given reliefs in their electricity bills while in some the governments have also ensured a constant supply of power by placing bans on regular maintenance and power disruptions. Nigeria, Burkina, Faso, and Kenya provided a 10 per cent incentives for renewables while Mali provided a 4 per cent tax exemptions on energy bills.[20] Many African countries (Uganda, Burkina Faso, Ghana, Senegal Equatorial, Egypt, Kingdom of Eswatini) subsidized or reduced electricity prices by 31 per cent. Furthermore, the government of Egypt further announced stimulus package of $6.3 billion to mitigate the impacts of COVID on economic sector.[21] Along with the responses mentioned above, many African countries have responded broadly through aid packages, economic stimuli, and fiscal benefits to cater for the liquidity in the economy.[22]

**Response of South East Asia countries:** Brunel announced financial support of $317 million for deferred loan payments and bank/fee changes. Cambodian government provided incentives of $800 million to $2 billion for its SMEs along with developing a task force to control prices.[23] Indonesia also announced stimulus packages of around $725 million for industries and $325 million for low-income families. Lao People’s Democratic Republic also introduced a response project of $18 million for small scale businesses along with tax breaks and exemptions. Malaysia offered a cumulative support of $9.1 billion to small industries, SMEs, low-income families, and tax exemptions. The Myanmar Government allowed companies to apply for loans at low rates by providing
funds of around $71 million. The Philippines announced a social protection package of almost $4 billion.

**Response of the European (EU) countries:** To repair the economic and social damage caused by COVID, the governments have laid out recovery plans for ensuring a more sustainable outlook. Its “long term budget” and “NextGenerationEU” are the largest stimulus packages that sums up to be around €1.8 trillion. The larger portion of this budget will support research and innovations, digital transitions, health programs, and building resilience. The remaining part is allocated to improve the traditional practices fighting climate, and biodiversity protection. For promoting the research on treatment and development of vaccines €220 million have been allocated while further €164 million have been provided to SMEs and innovative solutions. Moreover, the emergency response of Europe to this pandemic includes supporting jobs and businesses, ensuring provision of medical support, promoting research for treatment and vaccines and providing fiscal reliefs to the residents.

1.1 Scope and Objectives

COVID-19 has prompted governments to make extraordinary commitments to lead the economic recovery. There is thus an opportunity for a strategic vision to catalyze actions and spur innovation through incentives, stronger policy and fiscal responses to ‘build back better’ towards low carbon, resilient and inclusive economies, and to deliver a sustainable energy future. This study examines the potential for the economic recovery packages of the Asia-Pacific to be focused on ‘Green Recovery’ stimulus and measures which foster an accelerated transition towards clean energy, simultaneously spurring economic recovery and growth, creating millions of jobs, and putting emissions into structural decline.

The objective of this report is to provide useful insights for energy policymakers, to enrich discussions and pave a way forward for the post-COVID-19 energy transition. A deep analysis based on an extensive literature, expert opinions, and energy modeling has been provided to understand the gaps that member States must explore for furthering their efforts to accelerate the pace of change, and drive the way for equitable, inclusive, and resilient economies of Asia Pacific region.

Broadly, the report seeks to:

- help countries of Asia Pacific build back better by aligning between the energy transition and COVID19; and
- lead policies to synergize the energy transition with clean energy sources (avoid fossil fuel-based recovery) and fight climate change.
1.2 Conceptual Framework of the Study

The work assesses the long-term impacts of green energy stimulus policies against the dimensions of energy, environment and socio-economics. With a 15-year horizon, modelling is used to forecast the energy supply, demand and emissions under four scenarios:

- No-COVID – business-as-usual in the absence of the pandemic;
- COVID_BAU – control of the pandemic within one year (i.e. within 2020-21) with return of economic activity to the pre-crisis level and implementation of the same policies as in business-as-usual;
- COVID_SR (slow recovery) – represents the prolonged effects of COVID-19 and the outlook of a slow economic recovery;
- COVID_GR (green recovery) – similar to COVID_BAU, with additional policies for accelerated investment in renewable energy and the introduction of green stimulus.

The results will provide insights into the evolution of the Asia-Pacific energy sector in the coming years and the potential challenges, costs and opportunities of the COVID-19 recovery.

An overview of the studies’ conceptual framework is provided in Figure 2.

1.3 Structure of the Report

The following section provides a background to the Asia-Pacific region’s energy sector, its ongoing transition towards environmental sustainability, and policy responses to the COVID-19 pandemic to date. Section 3 outlines the methodology of the analysis, and Section 4 provides a discussion of the results. Section 5 presents a qualitative analysis of policy options, and conclusions are drawn in Section 6.
Figure 2: Conceptual framework of the study

Asia Pacific Energy Scenario

Megatrends
- Growing RE Market
- Access and Decentralized Systems
- Role of Policies
- Energy Sector Investments
- Measures for demand side management

Energy Transition Patterns
- Technology Standards
- Energy Efficiency
- Digital Economy
- RE Promotion

Challenges
- Off Track SDGs
- High carbon energy
- Fossil fuel subsidies
- Energy Access
- Rural Empowerment
- Energy intensive demand sectors

COVID 19 Pandemic

Short Term
- Slowed Energy transition
- GDP Downfall
- Tightening finances
- Supply chain disruptions

Long Term
- Diminishing coal viability
- Clean Energy Stimulus
- Digital Economies
- Energy Efficiency buildup

Post COVID 19 Transitions

Modeling Post COVID 19 Scenario
- Post COVID Energy Outlook
- Consumption Patterns
- Environmental Outlook
- Impacts of Policies

Assessment of Economic and Green Energy Stimulus
- Focus of Asia Pacific on energy and green energy stimulus packages
- Energy Dimensions
- Environment Dimensions
- Socio-Economic Dimensions

Building Back Better

The Green Stimulus
- Stimuli Packages
- Environment Stability
- Boosting jobs and economic recovery
- Power sector policies for clean energy development

Social and Institutional behavior
- Adapting Information behaviors
- Developing a digital workplace
- Social Distancing
- Secure Digitalization
- Challenges and Barriers
CHAPTER 2.
COVID-19 IMPACTS IN ASIA AND THE PACIFIC

2.1 Economic Outlook

COVID-19 has negatively impacted the global economic growth since the time it was first diagnosed. By the end of 2020, the virus had already reduced the global economic growth to an annualized rate of -4.5 to -6 per cent.[8] Even the major economies that control the larger portion of GDP growth are expected to operate below their potential level till at least 2020. The start of 2021 had although shown some positive indicators with a partial recovery expected to be at around 2.5 per cent to 5.2 per cent projected for 2021.[8] Analysts also anticipate a sharp decrease in the Asia Pacific region’s rate of GDP growth, from 4.4 per cent in 2019 to -2.7 per cent in 2020. The International Labour Organization (ILO) reported that 1.3 billion people work informally in Asia and the Pacific—65 per cent of the world’s informal employment, with around 7 in 10 workers in developing Asia working in the informal economy.[9] Informal employment accounts for the highest share of total employment in South Asia (89 per cent), followed by Southeast Asia (76 per cent) and Central Asia (70 per cent).[10] Similarly, ADB forecast that economic growth in developing Asia will be only 0.1 per cent in 2020, its lowest since 1961, with this projection dashing earlier hopes for a V-shaped recovery.[11]

Figure 3: Impact of COVID-19 on: a) Economic growth, b) Unemployment in the Asia-Pacific [12]
Dynamic fuel pricing, supply chain disruptions and other impacts were found to have wide variations in the industry mix and uneven results. Markets such as Singapore, Japan, Thailand, Korea (for example) all import LNG and will benefit (or offset some of their pain) via lower imported fuel costs, which may to some extent be reflected in the advantaged position of those countries as presented in Figure 4, whereas Malaysia and Vietnam – significant importers of coal (and in Malaysia’s case a major exporter of oil and gas) – were unable to benefit from this windfall.

**Figure 4: Year-on-Year real GDP growth rates of various countries**

![Figure 4](image)


**Figure 5: Share of energy sources across different states [13]–[17]**

![Figure 5](image)
2.2 Energy and the Power Sector

The COVID-19 pandemic has had repercussions on energy that will influence the sector for many years to come. An assessment by the IEA estimates that global energy demand in 2020 will be five per cent lower than in 2019, and global carbon emissions to reduce by 7 per cent. Energy development has also been affected, with an 18 per cent decrease in the energy investment sector having major repercussions for energy markets, strategic orientation of investors and companies, as well as in consumer behavior in years to come.[18] More broadly, the pandemic has impacted the world in several contexts:

Negative impacts

- The pandemic-induced global economic recession delivered an economic impact of around $1 trillion in 2020.[19]
- Global stock markets crashed by more than 25 per cent in March 2020.
- Strict lockdowns, travel bans and related uncertainty produced massive fluctuations in oil prices which, along with lower power demand and payment delays by end-consumers, had detrimental effects on the energy supply chain.
- Travel restrictions further contributed to project delays and increasing the operational and maintenance costs associated with project activities, further compounding the supply disruptions and uncertainty discussed previously.

Positive impacts

- Renewable energy penetration has grown and coal has been further diminished, largely driven by demand reductions – the low marginal cost of renewable energy pushes conventional sources toward the end of the merit order, meaning the conventional supplies are curtailed before renewables.
- Energy demand reductions have not been matched by the reduction in economic activity. For example, lockdowns which saw millions of people working from home, undertaking distance education and a reducing air travel resulted in reduced transport energy demand, delivering greater energy efficiency and productivity across the economy.
- Governments now seeking to reinvigorate their economies are finding substantial benefit in green stimulus. Clean energy investments have been shown to create 7.5 jobs for every million dollars invested in renewable energy and 7.7 jobs for every million dollars invested in energy efficiency, compared to 2.7 jobs for the same investment in fossil fuel projects. These investments will drive the energy transition faster and further.

Table 1 considers the COVID-19 pandemic’s impacts on the energy sector.
### Table 1: Impact matrix of COVID-19 on Demand and supply sides of Energy and Power sector

<table>
<thead>
<tr>
<th>IMPACT</th>
<th>Short/medium term</th>
<th>Long term</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply Side</strong></td>
<td>i. A drop in energy demand has put electricity generators under a constantly increasing financial burden.</td>
<td>i. A sharp decline in GDP growth is expected to be reflected in reduced demand for energy, with an uncertain rate of recovery.</td>
</tr>
<tr>
<td></td>
<td>ii. Financial instability during the pandemic has rendered many consumers unable to pay their electricity dues, thus endangering livelihoods.</td>
<td>ii. Long-term revenue loss may risk the financial sustainability of many electricity generators, distributors and utilities, including off-grid providers.</td>
</tr>
<tr>
<td></td>
<td>iii. A combined effect of reduced travelling demand due to COVID-19 and tensions between OPEC countries has resulted in an enormous reduction in oil prices, increasing the competitiveness of fossil fuels in these contexts.</td>
<td>iii. A lack of long-term financial stability will raise the cost of finance and challenge the recovery.</td>
</tr>
<tr>
<td></td>
<td>iv. Limited manufacturing due to less demand and import reliance has left countries and parent organizations in a bad position.</td>
<td>iv. Reduced oil prices will provide a pathway for a fossil fuel-led recovery, further challenging the sustainable energy transition.</td>
</tr>
<tr>
<td></td>
<td>v. Renewables have appeared to be more energy resilient technologies as compared to fossil fuels as a result of the low marginal cost and the merit order effect.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vi. The pandemic has resulted in a global decline in investments, include those in the clean energy transition.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vii. Sales of electric vehicles and solar rooftops, while almost meeting or slightly increasing their 2019 levels, were far below the levels expected under business-as-usual.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>viii. Construction delays and supply chain disruptions will result in industrial closure and delays in new power generation.</td>
<td></td>
</tr>
<tr>
<td><strong>Demand Side</strong></td>
<td>i. Lack of access to electricity in remote areas has significantly affected the response of healthcare systems in those places.</td>
<td>i. Most of the short term impacts on livelihood due to energy insufficiency could extend thus leading us back by undoing the recent progress made in these sectors.</td>
</tr>
<tr>
<td></td>
<td>ii. Lack of access to electricity has also further impacted the livelihoods and access to information.</td>
<td>ii. A decline in emission has shown economies the long-term advantages of investing clean energy use and power systems.</td>
</tr>
<tr>
<td></td>
<td>iii. Most small and medium enterprises (SMEs) have been hit hard, resulting in closure of many during the pandemic.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>iv. A decrease in emissions has to led to environmental sustainability for the time being thus leading to relaxed environmental protection control measures by the governments.</td>
<td></td>
</tr>
</tbody>
</table>
2.3 Energy Demand and Access

Fossil fuel markets
Global oil markets exhibited the most rapid and marked impacts at the outset of the pandemic. Concerns about the short-term future of road and air transport led to a dramatic oil price crash (see Figure 6), with prices reducing below zero in March 2020 before recovering through the remainder of the year.

Figure 6: Dated Brent Price Outlook Real (2010-2019 are actuals, forecast thereafter)

Korea’s cost-based electricity pool market is a useful lens through which to view the fuel market disruption: the oil price drop in Q1 2020 realized in reduced marginal electricity prices in Q3 2020, [27] where the associated price drop in oil-linked gas volume improves the competitiveness of LNG-driven power plants and resulting in a reversal of coal and gas in the merit order.
Asia-Pacific coal markets are strongly influenced by China. China’s thermal generation (primarily coal) was down 10 per cent in January-March, although sharply-reduced hydro availability – largely due to environmental and other external challenges – softened the pandemic’s impact on the sector. Coal prices, already trending downward due to reduced industrial activity resulting from trade tensions, were less immediately responsive but subsequently reacted to downward demand pressure. By April 2020, the coal price had fallen 32 per cent year-on-year (see Figure 8) with trade volumes also significantly reduced.

Figure 8 Price outlook and projection of Coal - Coal price dynamics and response to downward demand pressure (2010-2019 are actuals, forecast thereafter)
Electricity markets
The region’s electricity sectors experienced a diverse range of impacts in 2020. Lockdown measures had by far the largest impact on demand. The effects of these were first seen in China, where the first three months of the year showing marked declines. In April to May, as demand was already recovering in China, the largest decreases in electricity demand were seen in other countries such as India, Japan and Australia. While the extent of the crisis has varied greatly between countries, and differing degrees of containment measure have remained in effect at national and local levels, all countries saw demand recover as economic activity resumed following strict confinement periods.

However, most countries saw overall demand decline in 2020 relative to 2019, with some exceptions such as China and Viet Nam. Average electricity demand in many countries declined in April 2020 but showed an improvement later (Figure 9).

As always, demand was also heavily influenced by other factors. For example, an exceptional heat wave in the Philippines helped to recover much of the lost demand (see Figure 10).

Figure 9 a) Reduced electricity demand of Asia Pacific countries in April 2020, b) improved demand due to adaptation and movement

An indicative analysis of cost impacts of the pandemic (Figure 10) highlights that the short-term loss of sales from reduced demand is likely to be more than offset by a longer-term fall in fuel prices.
Utility costs
For utilities, COVID-19 has brought challenges on many fronts. With energy consumption reduced due to in the energy operations of commercial and industrial consumers, educational institutes, public and private sector buildings etc., the revenues of most utilities have significantly fallen.

While residential demand has increased due to stay-at home working, residential customers may experience disproportionate bill shock. The cross-subsidizing structure of tariffs in many locations, where large users would normally subsidize low-consumption (typically lower income) residential consumers,[28] will compound these losses. There is limited scope for to increase commercial and industrial tariffs disproportionately without damaging recovery prospects.

Thus, utilities can be expected to lose revenue relative to costs, with the effect of rolling forward financial losses to be recovered in the future. Tariff reforms may well be needed as ongoing COVID-19 impacts result in unrecovered costs or accrued losses for utilities. Smoothing mechanisms could spread tariff “pain” over time, but some regulatory arrangements that exist currently have no formal longer-term cost-recovery mechanism for non-capex factors to cater for COVID-19 related demand reduction.
This will significantly damage the utility sector’s financial performance, increasing investment risk and thus the cost of finance. Despite the credit support measures attempted by many countries, there is high degree of uncertainty as to their effectiveness. Many countries have tried to counter these impacts through deferral of debt, payment agreements, mitigation of bills, regulatory recovery and options. However, while these options were available for developed economies, underdeveloped nations face greater challenges of fiscal prioritization.

**Hospitality and tourism**

Travel and tourism are among the most affected sectors globally, with a massive fall of international demand amid global travel restrictions in attempts to contain the virus. According to the latest issue of the UNWTO World Tourism Barometer, International tourist arrivals (overnight visitors) across the Asia Pacific fell by 82 per cent in January-October 2020.[29]

The anticipated impact of COVID-19 has placed the aviation industry on an emission trajectory that is (temporarily) consistent with the Paris Agreement goal of limiting temperature rise to less than 1.5 degrees Celsius.

It will be some time before the indirect economic impacts are fully understood. For example in Thailand, hospitality is a significant driver of electricity demand. Tourism is expected to be impacted more deeply and for longer than most other sectors due to public fear and because of reduced discretionary income in the case of a prolonged recession.
Logistics, supply chains and the essential nature of energy services

The COVID-19 pandemic is applying great stress on the world’s logistical systems. The vital function of energy is apparent in its role in enabling the delivery of services through healthcare centers, hospitals, and logistical systems for the development and delivery of vaccines.

Amidst the uncertainty surrounding the pandemic, there comes a strong need to strengthen the nexus between SDG7 (clean energy) and SDG3 (health) by rapidly electrifying hospitals and healthcare systems. Clean energy alternatives such as distributed solar PV with battery storage can offer solutions for uninterrupted electricity supply, powering critical equipment from ventilators to factories for the local production of PPE. Similarly, the daunting challenge of sustainable cold chains for COVID-19 vaccines will require cost-effective solutions: again, technologies such as off-grid solar products and associated solar stationary refrigeration can provide viable, proven and potentially low-cost options for distribution hubs, health facilities, and storage facilities.
One certainty is that the pandemic is putting countries further away from reaching universal access to clean cooking. Pre-crisis statistics identified that 450 million people in India and China had gained access to clean cooking since 2010. However, the challenge remains for more than 2.6 billion worldwide who do not have access to clean cooking, resulting in premature deaths and air pollution related diseases. A failure to make the connection between clean cooking solutions, energy access, climate change and healthcare will lead to a deeper crisis amplified by pre-existing inequalities in the COVID-19 era.

### 2.4 The Renewable Energy Transition

The question of how COVID-19 will affect some of the longer-term aspects of the Asia-Pacific energy future requires us to look deeper at the scope and extent of the renewable energy transition and development across the region.

Prior to the pandemic, the transition to renewable and sustainable energy was underway in many countries. The affordability of renewables has improved significantly due to considerable innovation, both in the technology and in deployment practices, along with forward-thinking policy frameworks and a downturn in technology cost. Solar and wind power have reduced in cost to the point that they now compete – and in many cases outperform – conventional sources on a cost-per-unit energy basis alone.

According to the International Renewable Energy Agency’s (IRENA) Renewable Capacity Statistics 2020,[30] global renewable energy capacity reached 2,537 GW at the end of 2019, illustrating a 176 GW increase compared to 2018. The statistics indicate that 72 per cent of all growth in electricity generating capacity in 2019 was due to renewables, with wind and solar energies, at 60 GW and 90 GW (respectively), making up 90 per cent of renewable additions.

However, disruptions to worldwide supply chains due to COVID-19 have influenced the implementation of energy projects throughout 2020. For example, projections for 129.5 GW of solar power installation for 2020 have been cut down by 18 per cent to 106.4 GW.
2.5 Economic Recovery and Stimulus Packages

The stimulus packages of Asia and the Pacific have been estimated to be approximately 10.6 percent of the economy, at a total value is $5.4 trillion, compared to an estimate of the global total of $11 trillion.[31] The estimation includes both ‘above the line’ revenue and expenditure as well as ‘below the line’ measures such as loans and equity injections. Figure 12 shows the fiscal stimulus packages by Asia Pacific countries.

**Figure 12: Fiscal stimulus by Asia Pacific countries as a per cent GDP.** [32]

![Fiscal stimulus by Asia Pacific countries as a per cent GDP](image)

The context of sustainability and climate resilience and a focus on inclusive economic growth requires critical placement of “green recovery” at the core of all economic recovery strategies. A pre-COVID study estimated that strong climate action has the potential to generate over 65 million new low-carbon jobs by 2030, deliver at least $26 trillion in net global economic benefits, and avoid 700,000 premature deaths from air pollution.[33] Another report has suggested that every $1 million in green projects and spending generates 7.49 full-time jobs in renewable infrastructure, 7.72 in energy efficiency, but only 2.65 in fossil fuels, harness high returns by driving down costs of the clean energy transition. [34] A recent McKinsey report provides an analysis of the impact of stimulus on a European country. It suggests that mobilizing €75 billion to €150 billion in capital for an economic stimulus package focused on a low-carbon recovery could yield €180 billion to €350 billion of gross value added. Such a package could generate up to 3 million new jobs, while also enabling carbon emission reductions of 15 per cent to 30 per cent by 2030.[35] In Southeast Asia, the “green finance opportunity” across ASEAN States before COVID-19 was estimated to be $3 trillion (2016–2030) from four sectors: infrastructure; renewable energy; energy efficiency; and food, agriculture, and land use.[36]
Countries have deployed and diverted significant capital in response to the pandemic, with an initial focus on protecting lives and livelihoods. Meanwhile, a study estimated a financing gap of $102 billion per year in green infrastructure and investment for selected vulnerable countries of Southeast Asia,[37] which would add further to the fiscal challenges caused by the pandemic. Governments have shown a tendency to reallocate green infrastructure development funds to the COVID-19 response: for instance, Indonesia is exploring the reallocation of $3.9 billion from the 2020 budget for COVID-19 related measures.[38]

Conversely, there is now a critical window of opportunity to catalyze green finance to achieve the set targets of Asia-Pacific countries in the clean energy transition. For example, the ASEAN countries target of generating 23 per cent of primary energy from renewable sources by 2025 will require large capital flows of finance to support its delivery.

In response to the revenue challenges faced by utilities, countries have also provided power tariff relief measures: For example, Brunei Darussalam applied a 15 per cent discount to electricity bills of businesses in the targeted, pandemic-affected sectors of tourism, hospitality, restaurant and cafe, air transport and water transport; Thailand has offered a 3 per cent discount on electricity bills, a cancellation of the minimum electricity charge, and refunded electricity meter deposits for 3.8 mil users totaling 13 billion baht (approximately $430 million); Vietnam has applied a 10 per cent discount on tariffs, saving VND 2.9 trillion ($126 million) for households and VND6 trillion ($260 million) for businesses.

Demonstrating the potential impact of current stimulus for a low-carbon energy transition, strong policy measures and liquidity support are being put forward to catalyze a climate-positive recovery. Several examples from Asia-Pacific and EU countries are attached in Appendix 1.
CHAPTER 3.
METHODOLOGY

This section provides a detailed analysis on how energy sector of the Asia-Pacific region can evolve in the coming 15 years with the major focus on the effects of COVID-19, and how the economies are expected to evolve.

Long term forecasting using leap model is used to analyze the energy sector response of different countries after and during recovery from a global pandemic. Base year statistics of each country are initially reviewed from their national and international reports. This includes their energy supplies, energy demand sectors, economic considerations and the associated emissions. Further based on the historical data and policies of each country, their energy, economic, and environmental profiles are forecasted to 2035. This provides an overview of how the sector would have evolved in absence of COVID-19. Following this, an evaluation of COVID-19 impacts on different supply chains, demand sectors and energy resources is made along with an assessment of how different rates of recovery and allocation of green stimulus packages will evolve the energy sector. The results obtained from the model can then be interpreted to understand the required investment to bring an outlook that is on-track to fulfil the SDGs, including the total investment for each sector, the environmental benefit resulting from each action and its economic costs and benefits.

3.1 Scenario Development

The model proposed in this study is designed to analyze energy prospects of Asia-Pacific countries as they battle a global pandemic. Different policy scenarios have been created to visualize the effect of policy actions and technological changes. Hence, this section provides a detailed analysis on how energy sector of Asia Pacific can evolve in the coming 15 years, with the major focus on the effects of COVID-19 and how the economies are expected to evolve. Insights obtained from the model will provide future pathways for both demand and supply sides, indicating how much time Asia-Pacific countries will take to recover their economies to pre-pandemic levels, and more importantly the level of investment, subsidies, and stimulus required to previous the previous rate of progress.

Four scenarios have been created that are benched with the IEA modeling technique,[39] with details as outlined in Table 2:
Table 2: A summary of model parameters under the four scenarios used in the study

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No_COVID Scenario</td>
<td>Introduced to provide a comparison, that how energy sector would have looked like under Business as Usual if COVID-19 had not happened.</td>
</tr>
<tr>
<td>COVID_BAU (Business as usual)</td>
<td>depicts the situation of countries if the pandemic is controlled within 1 year (i.e. within 2020-21) and the economies return to the pre-crisis level, and then follow the same policies as in BAU. This scenario is based on the same approach as use by IEA in Global Energy Outlook of 2020 [39].</td>
</tr>
<tr>
<td>COVID_SR (Slow recovery)</td>
<td>represents the prolonged effects of COVID-19 and the outlook that would appear if Countries could not recover from COVID-19 impacts in a reasonable short period of time.</td>
</tr>
<tr>
<td>COVID_GR (Green recovery)</td>
<td>Similar to the COVID_BAU scenario, but the countries are expected to recover with a comparatively more sustainable approach with accelerated investments for renewables and presence of green stimulus packages.</td>
</tr>
</tbody>
</table>

3.2 Model Development

The analysis performs scenario-based modeling to analyze the energy consumption patterns of the Asia-Pacific in quantifiable terms for the post COVID-19 period. An optimized LEAP model employs 2015 data for the base year to provide a projection of a scenario without COVID-19. Four different scenarios will be developed to assess the impacts of COVID-19 on the energy sector. The modeling results will provide a clear indication of impacts to help guide the data-driven development of policies and roadmaps to assist the economic recovery. The results may also be used to track the energy sector’s recovery towards its pre-pandemic trajectory.

The results obtained of the modeling must be carefully interpreted to understand the factors and drivers of change. For example, behaviour change is a key factor that will describe the response of citizens, but cannot be directly measured for integration into the model. Hence only indirect measures such as travel demand, technology adoption and home size can be implemented as ‘behaviour’ variables in each scenario.

The LEAP model that forms the basis of the energy modeling was developed by the Stockholm Environment Institute to analyze and assist in an integrated policy making process.[40] LEAP is used to track generation, consumption, emissions, and cost of both energy and non-energy sectors for different countries and jurisdictions, taking input in the form of base or historical data and providing foresight into the future according to the
provided model drivers. Both medium- and long-term modeling can be performed under different sets of scenarios.

The modeling framework for this activity is as shown in Figure 2 and Figure 13. LEAP has been used to create 3 different models, one for each country, where 2015 is used as the base year while 2035 is used as the end year. The model performs all energy, economic, and environmental analysis based on datasets and drivers that are mainly derived through reports and government action plans to counter COVID-19. The detailed datasets used within the model and their brief explanation is attached in Appendix 1.

Population and Macroeconomic assumptions

As per the IEA, average population of Asia Pacific countries is expected to grow by 0.7 per cent between 2019-25 and by 0.5 per cent between 2025-35. However, the major portion of this is contributed by South each Asian countries which grew at a much higher rate (0.7 per cent throughout).[39] Assessment and calculations of GDP are consistent with assessments made by IMF (for COVID-19 cases) and national/international reports of each country for the No_COVID scenario. While the analysis in this study is only applied to a sample of three countries from the Asia-Pacific region (Pakistan, Fiji, and Lao People’s Democratic Republic), it is intended to provide an indication of implications across the region.

2020 saw a sharp economic recession, with global GDP dropping by around 4.6 per cent (World Bank estimates it to be 5.2 per cent). Governments, central banks, and development agencies quickly introduced fiscal stimulus programs to counter the effect and constrain the negative spillovers. Other measures were taken to counter the spread of COVID-19, including social distancing and full-, smart-, and partial-lockdowns. The rollout of vaccines, commencing in 2021, is expected to initiate a recovery period across most sectors, but the trajectory of the recovery is uncertain. For Asia and the Pacific, GDP is expected to grow at a rate of 4 per cent between 2019 and 2040 under an optimistic (fast) fast recovery scenario, and around 3.5 per cent for slow recovery scenario.[41] A detail of GDP growths for different countries is provided in Appendix 1.
### 3.3 Country case studies

Of the three countries chosen for analysis in this study – Pakistan, Fiji, and Lao People’s Democratic Republic – Pakistan is a comparatively larger economy with a significantly greater population. Its economy is highly dependent on industry and agriculture.[42] In the year before COVID-19, the GDP of Pakistan hit a record low value due to the closure of industries, devaluation of currency, tax theft, and other geo-political issues.[43]

In contrast, the GDP of Fiji and Lao People’s Democratic Republic are very highly dependent on services, primarily tourism. Under the lockdowns and travel bans of 2020, they experienced a high decline of 25 per cent share of GDP for Fiji [44], and 1-1.8 per cent for Lao People’s Democratic Republic.[45] These downturns may well reverse recent progress towards the SDGs.

The base case has been projected from values provided in the average economy growth of IGCEP 2047 for Pakistan,[46] Energy Outlook 2020 of Lao People’s Democratic Republic,[47] and 2019 annual Energy Report of Fiji,[48] COVID_BAU and COVID_GR represent the case of recovery to the base case value within a year, while COVID_SR represents prolonged COVID-19 impacts with recovery to the base year in 2024-2025. As noted previously, the impact of COVID-19 has been integrated through a decline in cumulative GDP growth rate as benchmarked by the International Energy Agency (IEA).

The 2015 populations of Pakistan, Fiji and Lao People's Democratic Republic were approximately 200 million, 868 thousand, and 6.74 million respectively.[49] While Pakistan is relatively large, with higher population and thus a very high GDP, the value and growth
of GDP does not effectively represent its economic stability. On a per-capita basis, GDP is $2134/person for Lao People’s Democratic Republic, $5390/person for Fiji, and $1356/person for Pakistan. The energy consumption of Pakistan, Fiji, and Lao People’s Democratic Republic was 426 kWh/person, 955 kWh/person, and 763 kWh/person respectively, depicting a similar trend.

Table 4: Gross GDP growth of selected countries under different scenario

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Base Year (2015)</th>
<th>Year (2020)</th>
<th>Year 2025</th>
<th>Year 2030</th>
<th>Year 2035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Accounts</td>
<td>270.6 Billion $( as of 2015) for Pakistan, 4.683 Billion $( as of 2015) for Fiji, 14.39 Billion $( as of 2015) for Pakistan</td>
<td>GDP growth rate gradually increases from 4 per cent to 5.5 per cent from 2020 to 2025 and it remains constant at 5.5 per cent from 2025 onwards</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
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<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
</tr>
<tr>
<td>No COVID</td>
<td>GDP growth rate gradually increases from 4 per cent to 5.5 per cent from 2020 to 2025 and it remains constant at 5.5 per cent from 2025 onwards</td>
<td>GDP grows at an Annual compound growth rate of 3.6 per cent from 2020-2040</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
</tr>
<tr>
<td>COVID_BAU</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
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<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
</tr>
<tr>
<td>COVID_SR</td>
<td>GDP grows at an Annual compound growth rate of 3.6 per cent from 2020-2040</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
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</tr>
<tr>
<td>COVID_GR</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
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<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
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</tbody>
</table>
CHAPTER 4.
POST-COVID-19 OUTLOOK

4.1 Projections of Economic Growth

As noted previously, the No_COVID scenario was projected according to the economic growth reported in the Indicative Generation Capacity Expansion Plan 2047 for Pakistan,[46] Energy Outlook 2020 of Lao People’s Democratic Republic,[47] and 2019 annual Energy Report of Fiji.[48] The COVID_BAU and COVID_GR scenarios represent control of the pandemic within a year, while COVID_SR represents prolonged COVID-19 impacts, with recovery to 2019 levels of activity in 2024-2025.

Figure 14 presents the impact of COVID-19 on cumulative GDP growth rate of Pakistan, Fiji, and Lao People’s Democratic Republic under the four modelled scenarios. Clearly, the pandemic is expected to create a recession with lasting damage.
Figure 14: Cumulative effect of COVID-19 on Real GDP ($ Billion) of countries under different scenarios

Lao PDR

Fiji

Pakistan

Real GDP ($ Billion)

Real GDP ($ Billion)

Real GDP (Billion $)

2015  2020  2025  2030  2035

2015  2020  2025  2030  2035

2015  2017  2019  2021  2023  2025  2027  2029  2031  2033  2035
GDP and other economic indicators indicate that the decline in GDP for Fiji and Lao People’s Democratic Republic is greater as compared to Pakistan due to the high dependence of GDP on tourism. 38 per cent of Fiji’s GDP is sourced from tourism. Although Fiji showed a comparatively better response in terms of limiting the spread of COVID-19, the knock-on effects have caused a severe contraction of the economy. To counter the widening in fiscal deficits, Fiji has implemented a number of stimulus measures,[50][51] including loan payment holidays for SMEs worth approximately $200 million, subsidies of $50 million for unemployment assistance, and $30 million to airlines.

Lao People’s Democratic Republic has also experienced a negative GDP growth for the first time in past 25 years. The measures taken by this country present a slow economic recovery as the pandemic outbreak subsides. Agriculture and industry, initially projected to grow at higher rates in 2020, have dropped to 1.9 per cent and 1.4 per cent respectively. The services sector is projected to decline by 5.5 per cent as tourism activities are halted. Like Fiji, Lao People’s Democratic Republic also showed a good response to limiting the spread of COVID-19, but unlike Fiji the country has been unable to implement any substantial relief packages due to limited fiscal space.

Pakistan has also implemented relief measures to mitigate the economic effects of the pandemic, including a relief package of approximately $7.6 billion, with cash transfers to daily wage workers ($475 million), cash transfers to 12 million low-income families ($1 billion), accelerated tax refunds ($635 million) and support of SMEs and agriculture sector ($635 million).

4.2 Projections on Energy Demand

The COVID-19 pandemic has impacted energy demand across almost all parts of the economy. This study considers four main sectors – residential, transport, industrial and commercial – dividing these into subsectors which are controlled by socio-economic variables such as population and GDP. To analyze the impacts of COVID-19, subsectoral consumption is calculated on the basis of GDP, populations and the adoption of energy-consuming appliances, each of which varies by scenario. Figure 15 provides an example of the penetration of air conditioners in urban areas of Pakistan, demonstrating an assumption that post-COVID-19 technology penetration rates are same across all scenarios (except for initial delays) other than for the green recovery scenario COVID_GR, where accelerated energy access to remote areas is performed at a much faster rate. In a green recovery scenario, full technology penetration is reached in 2030, whereas in other scenarios, the same values are reached in 2032 to 2035. The same rates are also assumed for Fiji and Lao People’s
Democratic Republic, where the difference is only modelled through the base year penetration value\(^1\).

For the residential sector, technology penetration rates of electric fans, air conditioning, washing machines, refrigerators and heaters in the No_COVID scenario are implemented to achieve the same penetration level after 1 year for the COVID_BAU scenario and after 3 years for COVID_SR.

**Figure 15: Penetration of ACs in urban residential sector of Pakistan under different scenarios**

As indicated in Figure 15, a delay of 1 year is observed between No_COVID and COVID_BAU, while a delay of approximately 3 years is observed in the case of slow recovery (COVID_SR). However, it should be noted that for green recovery (COVID_GR), the penetration rates for energy efficient appliances have also been increased as a measure for demand side management. Thus, despite a low penetration rate to 2024, full penetration is achieved under the COVID_GR scenario even before the base case scenario of No_COVID. A similar approach is adopted for appliances in both the rural and urban sectors.

For the phasing out of old technologies, instead of the calculated growth rates, declining rates with same proportions were applied.

In transport, econometric functions are used to account for the decline in car purchases in 2020 and to estimate the future trend, assuming that car sales will revert to the normal trajectory of growth from scenario-specific years (2021 for COVID_BAU and 2024-25 for COVID_SR).

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\(^1\) Technology penetration rates in most modeling activities are obtained through different surveys and statistical reports of that country or mainly for a particular region since particular data value for each country is not available.
Figure 16 presents the demand response of each major sector of these countries in 2020. As apparent from the figure, residential is the only demand sector whose value increased during the year. This is mainly attributed to the increased use of residential appliances and work from home routine.

Overall, the observed short-term demand reduction was more significant for countries that imposed a complete lockdown, and somewhat less for partial lockdowns. Based on GDP, reduced penetration rates and industrial closures, the demand projections of the three countries under different scenarios is depicted in Figure 17 below.
Figure 17: Demand projections: Cumulative effect of COVID-19 on Real GDP ($ Billion) of countries under different scenarios

Figure 17 presents the results of a bottom-up modeling approach which indicates that Pakistan has suffered an approximately 8.67 per cent reduction in total energy demand while Fiji and Lao People’s Democratic Republic have experienced a decline of
approximately 12 per cent and 10 per cent respectively. This is sufficiently close to the global decrease in demand of 8 per cent as predicted by the International Energy Agency.[39] It can also be seen that the demand of these countries under the COVID_BAU and COVID_GR scenarios is at least 1 year behind the pre-crisis level, while under COVID_SR the annual demand will take around 3 years to recover.

Between 2019 and 2020, Pakistan, Fiji, and Lao People’s Democratic Republic observe a demand fall of around 450 million GJ, 5.8 million GJ, and 12 million GJ respectively. Moreover, in the green recovery scenario, we see the demand after 2025 with a somewhat declining rate for all three countries. This is because of the energy demand in action across all sectors and the introduction of energy efficiency technologies that are incorporated in the model.

Although electricity demand and consumption were modelled individually for each subsector for the selected countries, the broader discussion should consider the even greater diversity seen across the Asia-Pacific region. Initially, when the pandemic began with China, we saw an early demand decline. However, with the rapid rebound in China, the later effects were more apparent in India, Pakistan, Japan, and Australia. In Asia and the Pacific, China was the only large economy with positive demand growth (both absolute and relative), with year-on-year change of 2.3 per cent.[52] India, Japan, Korea, and Australia observed a contraction in demand of -2.2 per cent, -3.9 per cent, -3.4 per cent, and -3.6 per cent respectively. Importantly, China’s increase in electricity demand has been attributed to being at the leading edge of the global recovery, and more importantly the Chinese government’s implementation of economic stimulus.

4.3 Carbon Emissions Simulations

Since energy accounts for the major share of total greenhouse gas emissions, an important output of this model is the estimation of the resulting emissions impacts. Across the demand sectors, total emissions are calculated through a bottom-up approach where the energy consumption is multiplied a known emission intensity factor. For the sake of simplicity, no attempt was made to account for the different emissions factors or to estimate the merit order of the various fuel options available – the overall emissions factor for each sector is assumed to be indicative of the marginal emissions factor in each country. Where cumulative values are used (for example for the industrial sector), the emissions factors for the base year are taken from the national reports and IPCC 5th assessment report.

According to a recent IEA report, global energy sector emissions dropped by around 8 per cent in 2020 (almost same as energy demand) or 2.6 Gt as a result of reduced demand.[39] In our model, environmental emissions are set to decline during COVID-19 and will be lower than the No_COVID base case as shown in Figure 18 below. It should be further noted that
for demand sectors, emissions are directly proportional to energy consumption, and hence follow a similar pattern to energy demand in each scenario. The overall emissions for each case were calculated by the model based on emissions from each subsector.

However, it must be highlighted that this environmental emission drop as well as the reduction in demand are in no way a sign of green economy, but rather an indicator of enormous disruption (albeit one that poses an opportunity to build back better). Emissions are lower in the event of COVID_SR, but a weaker economy also drains momentum from the process of change in the energy sector. Lower fuel prices, compared with pre-crisis trajectories, mean that payback periods for efficiency investments are extended, slowing the rate of global efficiency improvement. The pandemic and its aftermath can suppress emissions, but low economic growth is not an accepted emissions reduction strategy. Only an acceleration in structural changes to the way the world produces and consumes energy can break the emissions trend for good.

**Figure 18: Environmental emissions from demand sectors under different scenarios**

![Fiji Emissions Graph](image1)

![Lao PDR Emissions Graph](image2)
Figure 18 (Cont’d): Environmental emissions from demand sectors under different scenarios

The impact of effective policies can be seen in Figure 19, where emissions under the green recovery are lower than all other scenarios for Fiji and Lao People’s Democratic Republic from 2026, and for Pakistan from 2035, despite favourable economic growth. The effect becomes even more pronounced in later years. This drop is not due to an extended pandemic-driven effect, but is the result of energy efficiency policies and clean energy consumption coming into action. For Pakistan, Fiji, and Lao People’s Democratic Republic, green economic recovery scenario can save up to 6.25 per cent, 7.06 per cent, and 10 per cent of energy respectively (compared to COVID_BAU) in 2035. For all three countries, emissions declined in 2020 for the first time in many years. It is expected that the countries will take 1 to 3 years to recover from this pandemic to their former growth trajectories. However, the way in which each country responds will define their future outlook. COVID-19 should act as a wakeup call to build a new economic foundation.

This picture provides us an opportunistic insight into the opportunity that economies face in the years to come. Considering the Asia Pacific region’s significance as a major contributor to total global GHG emissions, the environmental outlook will look very different depending on efforts to recover from the crisis using green recovery initiatives and financing.
4.4 Energy supplies and renewable penetration rates

Figure 19 shows the share of different energy supplies for power generation in COVID_GR scenario for all countries. In COVID_BAU, No_COVID, COVID_SR, the generation mix depends on the balance of NDC commitments and technology costs. However, in COVID_GR a transition pathway for energy resources and supplies have has been provided that could lead towards a green future and adoption of SDGs.

Losses – the difference between total supplied and sectoral consumption – are attributed to transmission and distribution, heat and transport losses that exist in any energy system.

As apparent from Figure 18, Pakistan can be expected to see a comparatively greater uptake of solar, wind and hydro power generation. However, the model still reflects a large input from coal, driven by policies supporting coal use under a national goal of self-reliance. Hence, as also depicted in the figure, although there is a decline in oil and gas, the absolute value as well as percentage share of coal in total energy mix of Pakistan is seen to increase. The renewable deployment for Pakistan is assessed based on the potential and cost of each source, and the total required investment for such penetrations are calculated using levelized cost of energy. However, it should be noted that the results do not assume any technical breakthrough or rapid technology cost decline. Assumptions for technologies that are not available in Pakistan are taken from the international sources.

Unlike Pakistan, Lao People’s Democratic Republic has a major share of hydro power in the power generation mix, while the remainder is mostly shared by renewables. A somewhat similar share of hydro power is seen in Fiji. Furthermore, since the power sectors of Fiji and Lao People’s Democratic Republic are already dominated by hydro, a major shift in those cases is not required.
Demonstrating the impact of policy, Figure 20 presents the share of renewables in the total primary energy supply for each country to 2035 under the COVID_BAU and COVID_GR scenarios.
Figure 20: Share of renewables in total energy mix of different countries.
4.5 Energy Sector investments

A rapid transition would require a comparatively larger upfront investment into the energy sector, on both the demand and supply side (see Figure 21). Demand-side investments include the capital cost of demand side equipment that is more energy efficient, labour costs of installation, auxiliaries, infrastructure buildup for a shift to electric transport, etc. Investments thus differ for each scenario and are highest for the largest change (i.e., the green recovery scenario). On the supply side, the power sector provides the major contribution to meeting a constantly rising electricity demand and the replacement of obsolete infrastructure. It should be noted that the model does not incorporate cost of emissions.

Figure 21 provides a large insight into the energy investments of these countries, presenting the total annual investment required for the power sector under three scenarios. Initially, the investment need is expected to increase each year due to growing in energy demand and constantly increasing infrastructure cost. Even under the No-COVID scenario, Pakistan, Fiji, and Lao People’s Democratic Republic require investments of $108 billion, $1.72 billion, and $6.7 billion respectively in 2030. For achieving the targets of a green recovery, each of these countries would require a total of $120 billion, $2 billion, and $7.7 billion, respectively. For the sake of comparison, Pakistan’s investment requirement of $120 billion for the green recovery in 2030 is around 2.4 per cent of GDP.

The investments required in the green recovery scenario are increasing at a much faster rate than in the other scenarios. This additional investment must be provided by the government in the form of green stimulus or green recovery packages, or by the private sector. The model results identify that in 2030, for a green recovery scenario, Pakistan will require $12 billion in form of green recovery packages, constitutes around 2.4 per cent of its annual GDP. Hence, if a green recovery scenario is to be attained, significant investments would be required around Asia Pacific.
Figure 21: Investments required for the proposed transitions under different scenarios

Fiji

Lao PDR

Pakistan
Figure 22 presents the power sector GHG emissions reductions that are attributed to the investments depicted previously. It should be noted that while emissions are still increasing after 2028, this growth is significantly lower than the base case scenario. Emissions from the power sector are expected to continue growing until 2040 mainly driven by the coal-based power, after which an inflection delivers a decline in the total emissions. The graph is only described for Pakistan, since as previously noted, the high renewable penetrations of the power sectors of Fiji and Lao People’s Democratic Republic do not require a major shift in electricity generation mix to reduce their emissions.

**Figure 22 Emission reductions due to investments in the COVID_GR scenario of Pakistan**
CHAPTER 5.
RETHINKING TOMORROW’S ENERGY PORTFOLIOS

5.1 Transitioning to a renewable world

Since the start of the pandemic, electricity generation from renewable sources has been resilient to the COVID-19 confinement measures imposed by countries. According to IRENA,[30] to reduce global fossil fuel use by 75 percent and energy related carbon emissions by 70 per cent by midcentury, over half of the necessary reductions in emissions will need to come from renewable energy and around one-fourth from increasing energy efficiency.[53] The IEA expects that investments of $1 trillion per year are needed for the next three years in the global energy system.[54] In the long run, the IRENA estimates an investment need of $3.2 trillion annually each year till 2050 or a total investment of $110 trillion by 2050 to raise the share of renewables from 26 per cent currently to 57 per cent by 2030 and 86 per cent by 2050 [30]. Of this investment, 25 per cent would need to be in renewable energy, 23 per cent in electrification and infrastructure and 34 per cent in improving energy efficiency18. The total investment required is twice as high as the historical investment in the energy sector of $1.8 trillion per year (IRENA 2020) (ibid). Transformation of the energy sector would lead to not only benefits in the long run, in the form of reduced externalities from indoor and outdoor air pollution and climate change but also be complementary with immediate goals of increasing job opportunities.

The results of this report highlight that, even in the absence of the pandemic, Pakistan, Fiji, and Lao People’s Democratic Republic would require energy investments of $108 billion, $1.72 billion, and $6.7 billion respectively in 2030. The achieve targets for a green recovery, these countries would require energy investments of $120 billion, $2 billion and $7.7 billion respectively.

The green recovery requires investments to increase at a much faster rate than in other scenarios, and this additional investment must be provided by the governments in the form of green stimulus or green recovery packages, or by the private sector. For example, a green recovery in Pakistan will require an additional $12 billion in investment, or around 2.4 per cent of GDP.

In addition to solar and wind, a mix of renewable and clean energy technologies including hydrogen (and in some cases advanced nuclear energy or carbon capture and sequestration, if it becomes viable) may be needed. The transition to renewable energy technologies will be aided by recognizing the environmental benefits they provide, such as improving air and water quality and mitigating carbon emissions. These benefits are often unpriced due to the absence of government policies. Incorporating a monetary credit for these external benefits
in the pricing of renewable energy can improve their competitiveness relative to fossil fuels and aid the process of transition. Low fossil fuel prices due to the pandemic present an opportunity to internalize these costs through mechanisms such as the imposition of carbon taxes, further increasing the appeal of renewable energy without raising costs for energy consumers.

5.2 The role of carbon offsets

Measures available before the pandemic, such as carbon offsetting and reduction, continue to be available and now offer a significant opportunity to increase, driven by green recovery policies. Across all sectors there are opportunities to generate financial inflows from the sale of carbon credits. If hypothecated, these funds can provide a credible means to achieving carbon neutrality by supporting climate-friendly investments while stimulating technology transfer and creating green jobs.

The transition to a low-carbon economy in the post-COVID world demands that policymakers focus on ensuring policy coherence and providing mechanisms to deliver the achievement of NDC targets. International cooperation under the Paris Agreement enables mechanisms such as carbon offsets, which will be key components of the environmental impact reduction strategy. Developing countries may encounter challenges related to lack of access to desired mechanisms for generating offsets alongside a lack of demand for offsets in COVID-19 times. Policymakers must explore and manage their appetite to reduce underperformance risks and create demand. One option is for policymakers to recognize legal and administrative approaches country-level voluntary offsetting arrangements for consumer sectors. Private companies and asset owners can allocate their capital for a balanced approach in the interest of the transition to low-carbon business models. Corporate regulators and shareholders alike can urge transparent reporting on emissions, exposure to coal, and environmental and social indicators that will becomes key considerations in the design of decision-making processes.

5.3 Role of Electricity sector in post COVID-19 transition

The COVID-19 pandemic has highlighted the importance of investing in sustainable, resilient energy infrastructure based on a balanced combination of appropriate technologies and operational practices. Renewables, storage, smart networks and demand-response services all have significant positive roles to play, both in the immediate- and long term.

In the short-term, the reduction in cost for electricity generation from renewable sources such as solar and wind, as well as the reduced cost of batteries and storage technologies, contributes to enabling better access to electricity and access to clean cooking technologies, improving equity and reducing energy poverty.
5.4 Behavioral change and the new normal

The emergence of COVID-19 has triggered a tremendous shift in the daily behaviors of society, with manifestations seen in activities relating to transport, the work environment, education, community living, health norms and climate action.

Many of these behavioral changes have a strong correlation with the achievement of the Sustainable Development Goals, and thus provide an opportunity to adapt to a ‘new normal’ and support achievement of the 2030 Agenda.

Effective interventions may be required to lock-in the habitual behaviors of households and communities. This will require establishing a strong narrative on priorities, drivers, decision makers and enablers of the energy transition

5.5 Leveraging Green Stimulus for Post COVID-19 Recovery

Governments across the world are considering options to support investment and to stimulate their economies in the emergence from the pandemic. The opportunity for green stimulus to Build Back Better and by driving a sustainable recovery cannot be overstated. Policymakers recognize that, alongside the short- and medium-term challenges of Building Back Better from the COVID-19 pandemic, there remains the long-term challenge of addressing climate change and its related impacts. Green stimulus interventions present a substantial opportunity to address these challenges, with outcomes that can be classified into four main domains: Short-term stimulus, long term growth, resilience and decarbonization.

Table 4 summarizes the ‘green’ component of stimulus response in a number of countries.[55] India and China are among the bigger economies that have emphasized green initiatives to date, while the recovery plan of Pakistan has reserved funding for a multi-sectoral relief package with components in agriculture and SME support ($635 million), fuel price relief $445 million, electricity bill payments ($700 million), emergency energy provisions ($635 million). Apart from these packages, significant other green energy recovery processes are also present in Pakistan. The billion tree tsunami project has employed around 65,000 people, while The World Bank has allowed repurposing of $180 million for nature conservation. Further, Pakistan recently has also signed a $188 million commitment to the Pakistan Hydromet and Ecosystem Restoration Services Project.

However, the data indicates that many countries across Asia and the Pacific have largely missed the opportunity to adopt a greener route for their COVID-19 stimulus. This is mainly due to enhanced weight given to economic growth and wealth creation than on environment sustainability, and a misplaced expectation that investment in incumbent industries will produce more rapid outcomes.
The COVID_GR scenario presented in this paper suggests that green stimuli can deliver a much stronger boost to the economy than other policies. Modeling results show that a green economic recovery for Pakistan, Fiji, and Lao People’s Democratic Republic will require additional investments of approximately $32 billion, $313 million, and $800 million respectively by 2035. While these will deliver positive returns on investment, the scale of the investment needed, and the public nature of benefits returned, dictate that much of the investment must come in the form of green stimulus packages from government.

Table 3 Green Recovery spending of different countries as a per cent of total spending and GDP [55]

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Spending ($ billions)</th>
<th>Green recovery spending as a percentage of total Spending</th>
<th>Green recovery spending as a percentage of total GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turkey</td>
<td>3</td>
<td>100</td>
<td>0.36</td>
</tr>
<tr>
<td>Canada</td>
<td>3</td>
<td>78</td>
<td>0.18</td>
</tr>
<tr>
<td>Norway</td>
<td>6</td>
<td>71</td>
<td>1.54</td>
</tr>
<tr>
<td>Denmark</td>
<td>12</td>
<td>65</td>
<td>3.59</td>
</tr>
<tr>
<td>Finland</td>
<td>5</td>
<td>58</td>
<td>1.76</td>
</tr>
<tr>
<td>Switzerland</td>
<td>3</td>
<td>53</td>
<td>0.40</td>
</tr>
<tr>
<td>Germany</td>
<td>98</td>
<td>47</td>
<td>2.55</td>
</tr>
<tr>
<td>Poland</td>
<td>13</td>
<td>40</td>
<td>2.13</td>
</tr>
<tr>
<td>France</td>
<td>123</td>
<td>35</td>
<td>4.52</td>
</tr>
<tr>
<td>United States</td>
<td>38</td>
<td>25</td>
<td>0.18</td>
</tr>
<tr>
<td>Austria</td>
<td>2</td>
<td>23</td>
<td>0.35</td>
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<tr>
<td>Sweden</td>
<td>4</td>
<td>24</td>
<td>0.81</td>
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<tr>
<td>China</td>
<td>419</td>
<td>12</td>
<td>2.92</td>
</tr>
<tr>
<td>India</td>
<td>16</td>
<td>5</td>
<td>0.56</td>
</tr>
<tr>
<td>Australia</td>
<td>131</td>
<td>2</td>
<td>9.40</td>
</tr>
<tr>
<td>Italy</td>
<td>57</td>
<td>2</td>
<td>2.87</td>
</tr>
</tbody>
</table>

There are mixed signals in the trend underpinning China’s green policies, strategies, and yearly plans. China has set a target of net-zero emissions by 2060, using offset mechanisms and other policy interventions to reflect a commitment to the Paris agreement. China’s post-COVID recovery targets include seeking “…to ensure employment, basic livelihood, market entities, food and energy security, stability of the supply chain, and the ‘functioning of grassroots institutions.’” A new infrastructure stimulus plan targets seven new areas – 5G networks, data centres, AI, the industrial Internet of Things, UHV transmission lines, high-speed rail, and EV charging infrastructure – with an allocation of $1.5 billion, 2.5 times larger than the stimulus funding allocated after the global financial crisis. RE investment will be exposed more to falling fuel costs and will depend more on falling technology costs or perhaps more corporate support. A detailed list of Green stimulus packages across Asia Pacific are also given in Appendix 4.
CHAPTER 6.
CONCLUSIONS AND RECOMMENDATIONS

This report seeks to provide useful insights for energy policymakers, to enrich discussions and pave a way forward for the post-COVID-19 energy transition. It presents analysis based on an extensive literature, expert opinions, and energy modeling to examine gaps and further efforts to accelerate the pace of change, and drive the way for equitable, inclusive, and resilient economies the Asia and the Pacific.

The global economy has suffered trillions of dollars in losses due to COVID-19. A sharp contraction in the rate of growth, supply chain disruptions and labour market impacts are likely to affect the world for many years to come.

While global energy demand was driven downward alongside the economy, the immediate effects were particularly felt in the conventional energy sectors. Renewable electricity generation actually grew in 2020 – albeit at a far slower rate than in previous years. Significant gains were also seen in energy productivity, as behavioural shifts such as reduced commuting and air travel came into play.

Pandemic-driven disruptions continue to challenge fossil fuel markets, with reduced demand for fossil fuels (and thus lower prices) bringing an opportunity for implementing subsidy reforms – that is, the potential to reduce subsidies for fossils fuels without exposing consumers to prices rises.

The full effect of the pandemic on the renewable energy sector is not yet clear. Moving forward, supply chain disruptions and ongoing reduced energy demand will undoubtedly impact the renewable energy transition in the long term. Financiers, averse to risks of future disruptions and lower energy prices, may raise the cost of finance and thus deliver further challenges to the business case for new renewable energy developments.

Thus, stimulus will play a key role in the economic recovery, and the role of policymakers in the energy transition becomes once again more pronounced.

As we emerge from the pandemic and make plans to Build Back Better, this report makes four key recommendations for policymakers to consider in their response:

- Clean infrastructure investment in renewable energy, storage, EVs, grid modernization and cross border interconnection should be enhanced. Other priority areas of investment include:
  - building energy efficiency - renovations and retrofits including improved insulation and efficient heating and cooling;
  - education and training to address immediate unemployment from COVID-19 and structural shifts from decarbonization;
o natural capital investment for ecosystem resilience and regeneration including restoration of carbon-rich habitats and climate-friendly agriculture;  
o clean cooking and electricity access; and  
o clean R&D spending.

- All offers of access to public funds for the recovery, including through loans, grants or other forms of underwriting, should mandate benchmarks for sustainability. In the energy sector, these criteria should include consideration of social equality (energy access), growth of renewables, improvements in energy efficiency, and reductions in carbon intensity.

- Government stimulus should seek to leverage private sector finance, either through regulation or incentives, to contribute to the energy transition – in particular, the targets of Sustainable Development Goal 7 and the Paris Agreement. For example, the impending phase-out of coal will require investment in renewable generation capacity and grid flexibility; private-public partnerships offer great opportunity for private investment while also delivering enormous public benefit.

- Fossil fuel subsidies should be reduced, taking advantage of low current fuel prices to implement changes with minimal disruption to energy consumers. This will challenge the business case for carbon-intensive sources and allow the fair competition of renewables. As a result, investment will be driven towards modern, cleaner forms of energy, boosting the socio-economic recovery with increased job creation and better health and reducing the economic burden of conventional energy consumption going forward.

- To keep sustainable energy projects on track in the post-COVID-19 world, policymakers should support renewable investment by extending investment and production tax credits.
REFERENCES


## APPENDIX 1

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Base Year (2015)</th>
<th>Year (2020)</th>
<th>Year 2025</th>
<th>Year 2030</th>
<th>Year 2035</th>
</tr>
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<tr>
<td>Current Accounts</td>
<td>270.6 Billion $($ as of 2015) for Pakistan, 4.683 Billion $($ as of 2015) for Fiji, 14.39 Billion $( as of 2015) for Pakistan</td>
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<tr>
<td>No COVID</td>
<td>GDP growth rate gradually increases from 4 per cent to 5.5 per cent from 2020 to 2025 and it remains constant at 5.5 per cent from 2025 onwards</td>
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<td>COVID_BAU</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
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<td>COVID_SR</td>
<td>GDP grows at an Annual compound growth rate of 3.6 per cent from 2020-2040</td>
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<tr>
<td>COVID_GR</td>
<td>GDP grows at a rate of 4.2 per cent from 2019-2025, and 4.5 per cent from 2025 onwards</td>
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## APPENDIX 2

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Pakistan Baseline Year (2015)</th>
<th>Main modeling Year (2020)</th>
<th>Year 2025</th>
<th>Year 2030</th>
<th>Year 2035</th>
<th>Lao People’s Democratic Republic Baseline Year (2015)</th>
<th>Main modeling Year (2020)</th>
<th>Year 2025</th>
<th>Year 2030</th>
<th>Year 2035</th>
<th>Fiji Baseline Year (2015)</th>
<th>Main modeling Year (2020)</th>
<th>Year 2025</th>
<th>Year 2030</th>
<th>Year 2035</th>
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<tr>
<td>Current Accounts</td>
<td>189.87 Million</td>
<td>Current Accounts</td>
<td>6.74 Million</td>
<td>Current Accounts</td>
<td>0.88 Million</td>
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<tr>
<td>No COVID</td>
<td>189.87</td>
<td>209.3</td>
<td>22 7</td>
<td>24 5.3</td>
<td>26 1.6</td>
<td>No COVID</td>
<td>6.7</td>
<td>4</td>
<td>Growth of 1.5 per cent</td>
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<tr>
<td>COVID BAU</td>
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<td>209.3</td>
<td>22 7</td>
<td>24 5.3</td>
<td>26 1.6</td>
<td>COVID BAU</td>
<td>6.7</td>
<td>4</td>
<td>Growth of 1.5 per cent</td>
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<tr>
<td>COVID SR</td>
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<td>COVID SR</td>
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<td>4</td>
<td>Growth of 1.5 per cent</td>
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### APPENDIX 3

<table>
<thead>
<tr>
<th>Global Green Recovery Packages</th>
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<tr>
<td>Note: Only Asia Pacific Countries are color coded and thus</td>
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<table>
<thead>
<tr>
<th>Study Focus (country/region/local/global)</th>
<th>Study Title</th>
<th>Key Takeaways</th>
</tr>
</thead>
</table>
| Finland                                  | Government reaches agreement on fourth supplementary budget proposal for 2020 | This fourth supplementary Finish budget proposal for 2020 focuses on ensuring an economically, ecologically and socially sustainable emergence from the crisis.  
• The supplementary budget proposal contains a package of measures amounting to EUR 5.5 billion for supporting the recovery and revitalization of the economy.  
• The Government’s stimulus package aims at boosting demand, improving Finland’s long-term growth prospects, combating climate change, promoting biodiversity, and reinforcing the entire country’s capabilities, resilience, self-sufficiency, and skills and competences.  
**The package builds up on the following agendas:**  
1. Helping people cope and recover  
2. Investment in skills and growth  
3. Ecological reconstruction  
4. Continuing the urgent-short term-measures to combat crisis  
5. Supporting local government financing  
6. Sustainability or public financing  
7. Investments for vaccine development |
| UN Global Compact | Executive Update: In a time of global uncertainty, now is the time to invest in a 1.5°C future | A largest UN-backed CEO-led advocacy effort urges 155 CEOs from around the world to demand their governments to focus on the following points:  
- Governments must set ambitious agenda for economic recovery funds  
- There is a dire need to take ambitious climate action  
- High time to divest from fossil fuels and innovate in low-carbon, resilient solutions.  
- Generate green jobs and sustainable growth, protect nature and people  
- Deliver on the 2030 Agenda and the Paris Agreement.  

**UN Secretary proposed six climate actions to shape the green recovery and the work ahead as follows:**  
1. Invest in green jobs and businesses through a clean, green and just transition. Investments must accelerate the decarbonization of all aspects of our economy.  
2. Do not bail out polluting industries unless these industries commit to become Paris aligned. Where taxpayers’ money is needed to rescue businesses, it must be creating green jobs and sustainable and inclusive growth.  
3. End fossil-fuel subsidies. We must shift from a grey to a green economy, public funds should invest in the future. Fossil fuel subsidies must end, carbon must have a price and polluters must pay for their pollution.  
4. Take climate risks and opportunities into account in all financial and policy decisions. Investors cannot continue to ignore the price our planet pays for unsustainable growth.  
5. Work together to recover better. Like the coronavirus, greenhouse gases respect no boundaries. No country, no company can succeed alone.  
6. Leave no one behind. |
The UK committed to up to doubling to £11.6 billion, which is roughly $14 billion. It has also established a Green Recovery Challenge Fund to directly support countries to design their recovery packages in a way that supports a green and resilient recovery. The United Kingdom aims to utilize its presidency of COP26 to take lead in post covid-green recovery packages designing. For this purpose, COP26 has been divided into five key themes as given below:
1. Driving international cooperation on clean energy so the countries realize its potential to create jobs, provide cheaper power and stimulate economic recovery.
2. Making zero emission vehicles cheaper than petrol and diesel and speeding up progress on low-carbon transportation to reduce emissions and improve public health.
3. Harness the power of the markets to deliver a rapid transition and to protect nature.
4. Help the most vulnerable segments of society
5. Ramping up efforts to protect and restore the natural ecosystems.

The Nordics wisely combined higher energy taxes with a drop in income taxes, social security contributions, and pension payments for employers. They also included energy taxation within a package of policies to support clean energy and combat pollution. For example,
1. Finland’s recovery plan includes approximately EUR 500 million for green investments, including public transportation, recapitalizing its climate fund, and phasing out oil heating.
2. Denmark has adopted 13 climate partnerships with the business sector to build a green economy.
3. Similarly, Denmark earmarked electricity taxes to subsidize wind energy.
4. Sweden and Norway put carbon taxes to reduce its emissions and curb the growth in use of fossil fuels.
5. Finland encouraged wood waste for biofuels and biogas for investments in energy sector.
| Low & Middle Income Countries | **Resilient Recovery: Using climate adaptation plans to build back better** | Investments must be identified and deployed quickly—especially in low- and middle-income countries. For a national level implementation National Adaptation Plans (NAP) must take the lead in directing governments to take actions. For example, in Fiji, recommended following solutions for a green recovery focusing on climate change:

1. For its health sector, Fiji’s NAP prioritizes actions to make health infrastructure more disaster resilient, boost diagnostic capacities, and train healthcare workers in disaster medicine.

2. Fiji’s NAP also outlines ways to reinforce its food system.

3. In terms of infrastructure—often a central piece of economic recovery packages—investment priorities were highlighted throughout the NAP across sectors.

Apart from Fiji, other examples can also be seen such as improving health surveillance systems in Saint Lucia, micro-irrigation schemes in Togo, forest restoration in Guatemala, or climate-resilient school retrofits in Kiribati. Moreover, Colombia’s National Climate Change System (SISCLIMA) also provides a useful framework for collaboration across sectors and levels of government for pandemic recovery. |
| Canada-Europe | **Don’t let green recovery become a political hot potato** | 30 per cent of its 1.8-trillion euro multi-year budget and COVID-19 recovery fund would target climate objectives.

- The historic commitment is further supported by national and regional investment, including more than 40 billion euros in green stimulus in France and Germany, respectively.
- In Canadian context, this amount represents around CAD$2,000 per capita, or a total expenditure of CAD$75 billion for our nation.
- UK banned future sales of gasoline and diesel-fueled passenger cars – a decision the Conservative government accelerated last year, moving its implementation from 2040 to 2035
- Germany announced a $7-billion Euro Hydrogen Strategy, which aims to use hydrogen as a storage medium for renewable energies. |
<table>
<thead>
<tr>
<th><strong>Reuters</strong></th>
<th><strong>Green or Brown? As lockdowns lift, governments face a recovery climate choice</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. G20 countries have so far committed at least $151 billion to support fossil fuel.</td>
<td></td>
</tr>
<tr>
<td>2. By contrast, $89 billion had been committed to green energy.</td>
<td></td>
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<tr>
<td>3. EU states have so far devoted 0.31 per cent of the bloc’s GDP to some form of green spending, relative to an average of 0.01 per cent of GDP in Asia and North America.</td>
<td></td>
</tr>
<tr>
<td>4. A 130-billion-euro package unveiled by Germany aims to boost electric vehicles and the use of clean hydrogen fuel.</td>
<td></td>
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<tr>
<td>5. France has pledged 15 billion euros in near-term climate spending plus 8 billion euros to help electrify its automotive industry.</td>
<td></td>
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<tr>
<td>6. China has approved five new coal plants and is expected to rely on energy-intensive infrastructure and heavy industry to reboot its economy, although officials also extended subsidies for electric cars.</td>
<td></td>
</tr>
<tr>
<td>7. In the United States, the Trump administration has handed relief to oil and gas companies and curtailed environmental regulations.</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th><strong>Energy Policy Tracker</strong></th>
<th><strong>G20</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Since the beginning of the COVID19 pandemic in early 2020, G20 has committed at least $381.28 billion to supporting different energy types:</td>
<td></td>
</tr>
<tr>
<td>• At least $178.51 billion for unconditional fossil fuels through 154 policies (64 quantified and 90 unquantified)</td>
<td></td>
</tr>
<tr>
<td>• At least $27.09 billion for conditional fossil fuels through 23 policies (14 quantified and 9 unquantified)</td>
<td></td>
</tr>
<tr>
<td>• At least $47.32 billion for unconditional clean energy through 89 policies (60 quantified and 29 unquantified)</td>
<td></td>
</tr>
<tr>
<td>• At least $88.62 billion for conditional clean energy through 56 policies (43 quantified and 13 unquantified)</td>
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</tr>
<tr>
<td>• At least $39.74 billion for other energy through 50 policies (21 quantified and 29 unquantified)</td>
<td></td>
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<tr>
<th><strong>WEF</strong></th>
<th><strong>This is how we can make a global green recovery – that also boosts the economy</strong></th>
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<tr>
<td>• Targeted policies and investment in renewables and energy efficiency could boost the global economy by 1.1 per cent, according to a report from the IEA.</td>
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<td>• Its Sustainable Recovery Plan would also save 9 million jobs a year and reduce energy-related greenhouse gas emissions by 4.5 billion tonnes.</td>
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<td>• Achieving this requires a global investment of $1 trillion annually over the next three years.</td>
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**WEF (PAKISTAN)**

**COVID-19: Pakistan's 'green stimulus' scheme is a win-win for the environment and the unemployed**

With 7.5 billion rupees ($46 million) in funding, the 10 Billion Trees project aims to scale up the plantation process to fight climate change. In this regard:
- Pakistan's government are offering labourers, who are out of work due to the coronavirus lockdown, a chance to earn money by planting trees.
- The project is part of Pakistan's existing initiative to plant billions of trees to counter the effects of climate change.
- Pakistan is badly affected by climate change, experiencing more than 150 extreme weather events between 1999 and 2018.

**OECD Countries**

**Making the green recovery work for jobs, income and growth**

**OECD:**

According to preliminary analysis conducted by the OECD Secretariat in August 2020, at least 30 OECD and Key Partner countries have included measures directed at supporting the transition to greener economies as part of their recovery programmes or strategies (see box on p.6). Such measures include:
- grants, loans and tax relief directed towards green transport, circular economy and clean energy research, development and deployment;
- financial support to households and businesses for energy efficiency improvements and renewable energy installations;
- new funding and programmes to create jobs and stimulate economic activity through ecosystem restoration;
- control of invasive alien species and forest conservation.

**European Union Green Deal:**

Reaching the targets of the European Green Deal will require action across all sectors of the economy, including:
- Decarbonizing the energy sector through renewable energy projects, especially wind and solar, and kick-starting a clean hydrogen economy.
- Investing in environmentally-friendly technologies.
- Supporting industry to innovate.
- Rolling out cleaner, cheaper and healthier forms of private and public transport.
- Ensuring buildings are more energy efficient and supporting the circular economy.
- Working with international partners to improve global environmental standards.

**South Korea’s Green New Deal:**
• South Korea’s green recovery includes national strategy to create 6,59,000 jobs and help the country overcome the economic crisis while addressing climate and environmental challenges.
• Approximately $61 billion in five years (2020-25) will be committed to boost renewable energy capacity to 42.7 GW by 2025 from 12.7 GW in 2019 and expand the green mobility fleet to 1.33 million electric and hydrogen-powered vehicles.

<table>
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<th>Spain</th>
<th>Coronavirus: Tracking how the world’s ‘green recovery’ plans aim to cut emissions</th>
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<td>• The Spanish government announced a €3.75bn recovery package to “promote the value chain” of its automotive industry</td>
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<td>• Besides supporting measures such as a “green strings”, recharging infrastructure and hydrogen research, the strategy also attached green conditions to its company bailouts.</td>
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<td>• Spain will bail out national airlines Iberia and Vueling with a total of €1bn in state-backed loans with any green conditions attached.</td>
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<tr>
<td>Country</td>
<td>Coronavirus: Tracking how the world’s ‘green recovery’ plans aim to cut emissions</td>
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| Italy     | • The recovery strategy includes a generous “ecobonus” scheme of tax deductions for energy efficiency, heat pumps, solar power and electric car charging points in people’s homes.  
  • The Italian government has also announced plans for an injection of at least €3bn ($3.5bn) to nationalize Alitalia airline.  
  • A proposed strategy to reinvigorate the nation’s automotive sector has also faced criticism from Italian environmental groups for subsidizing new petrol and diesel cars as well as electric models. |
| New Zealand | • A significant proportion of the NZD$50bn ($33.4bn) package that has been announced is devoted to job creation, support for businesses and health services.  
  • The NZD$667m ($444.7m) that went to railways was dwarfed by transport funding from the $12bn “upgrade programme”  
  • There is also a large “nature-based jobs package”, which primarily focuses on jobs with biodiversity benefits. |
| Nigeria   | • Nigeria has announced a post-coronavirus economic plan titled “bouncing back”, which includes a focus on expanding the nation’s solar infrastructure.  
  • the most significant “green” decision by Africa’s largest oil producer may be the scrapping of gasoline subsidies following the collapse of global oil prices.  
  • Although, there are concerns the reforms may lead to a backlash when oil prices rise again and fuel costs for Nigerians increase from their current low levels. |
| China     | • The government has pledged an extra 3.6tn yuan ($500bn) in stimulus to help the coronavirus recovery.  
  • The recovery is to be made by a particular focus on supporting “new infrastructure”, such as 5G and ultra-high voltage electricity transmission.  
  • However, China is still on a coal spree. Its local governments approved large numbers of new coal plants in the first half of the year 2020.  
  • China’s coal power, cement and other heavy industries are bouncing back even faster now. |
<table>
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<tr>
<th>Country</th>
<th>Coronavirus: Tracking how the world’s ‘green recovery’ plans aim to cut emissions</th>
<th>Details</th>
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<td>India</td>
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<td>• India pledged $266bn stimulus package for a post COVID green recovery.</td>
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<td>• This includes $6.6bn for coal infrastructure, promoting coal gasification with tax incentives and fast-tracking.</td>
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<td>• But, The government’s decision to open up 41 coal mining blocks to private investors with the goal of creating jobs has drawn criticism.</td>
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<td>• Another relevant post-coronavirus initiative that could help cut emissions is the government’s decision to hike excise duty on petrol and diesel as oil prices decline internationally.</td>
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<td>Denmark</td>
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<td>• In their green stimulus package, Danish government has the strategy with six components, including the construction of 4 gigawatts (GW) of offshore wind power, investing in “green technologies of the future”, such as carbon capture and storage (CCS), and improving the energy efficiency of Danish homes.</td>
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<td>European Union</td>
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<td>• EU council has proposed €750bn ($848bn) “Next Generation EU” recovery fund, which is split into €500bn ($565bn) of grants for member states and €250bn ($283bn) of loans. All of this money is supposed to be spent “consistent” with the Paris Agreement and according to the “do no harm” principle of the European “green deal”.</td>
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<td>• The deal also earmarks 30 per cent for climate action – up from 25 per cent – which would be equivalent to roughly €550bn.</td>
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<td>• The deal was nevertheless described by Bloomberg as the “biggest green stimulus in history”.</td>
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<td>South Korea</td>
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<td>• The Korean deal includes two key components – “green” and “digital”.</td>
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<td>• In total, the green spending being proposed amounts to 12.9tn won ($10.6bn) by 2022 and is intended to create 133,000 jobs.</td>
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<td>• But the government also granted a 1tn won ($800m) emergency loan to leading coal plant manufacturer.</td>
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<tr>
<td>Germany</td>
<td><strong>Coronavirus: Tracking how the world’s ‘green recovery’ plans aim to cut emissions</strong></td>
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<td>• Germany agreed to a stimulus package worth €130bn ($146bn) and Bloomberg called the package “the world’s greenest stimulus plan”</td>
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<td>• The package is divided into three pillars, one of which is called “invest in a future-friendly Germany” and is allocated €50bn ($56bn), or some 38 per cent of the total. This pillar has a strong – but not exclusive – focus on the “energy transition” and “sustainable mobility”.</td>
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<td>• A major €9bn package of support for the development of hydrogen, particularly renewable hydrogen.</td>
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## APPENDIX 4

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<tr>
<th>Country</th>
<th>Green Stimulus</th>
<th>per cent Green Spending</th>
<th>Energy related subsidies</th>
<th>Energy and Environment Investment</th>
<th>RE investment portfolios</th>
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<tbody>
<tr>
<td>Afghanistan</td>
<td></td>
<td>0.8</td>
<td>The government waived electricity bills of less than Af 1,000 ($13) for a family residence in Kabul for two months and paid utility bills of the past two months for 50 percent of households in Kabul. The decision benefited more than 1.5 million Kabul residents</td>
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<td>Australia</td>
<td>Funding for small businesses to improve energy efficiency, reduce costs and lower energy consumption. The total budget for this scheme is only AU$9.06m.</td>
<td>0.14</td>
<td>State and Territory governments also announced fiscal stimulus packages, together amounting to A$40 billion (2.1 percent of GDP), including payroll tax relief for businesses and relief for households, such as discount</td>
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<tr>
<td>Country</td>
<td>Description</td>
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<tr>
<td>Bangladesh</td>
<td>utility bills, cash payments to vulnerable households, support for health spending, construction, infrastructure packages, and green investment (renewable energy and technologies).</td>
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<td>Bhutan</td>
<td>A budget of Nu.1.3 billion has been re-appropriated for health, essential food and fuel, quarantine and related initiatives. Deferral of electricity charges payment for industry (till December 2020), free electricity and wi-fi services to hotels serving as quarantine facility (July-September 2020)</td>
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<td>China</td>
<td>Green stimulus within the COVID-19 stimulus package accounts for 0.14 percent of GDP. The commencement of the National Green Development Fund in July 2020 highlights the government’s priority to environmental policies. The Fund started with capital of CNY88.5 billion. Around 32 per</td>
<td>1.7</td>
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<td>RMB 900 billion (0.9 percent of GDP) for usage of such items as roads, ports, and electricity</td>
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<td>Government funding pool of around 1 per cent for renewable energy</td>
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</table>
cent of this capital comes from the
government. Other funding sources
include banks and SOEs operating in
the polluting sectors. Apart from this
Fund, there is also an increase in the
size of the government funding pool of
around 1 per cent or renewable energy
in 2020 from the 2019 fiscal budget.
There are increases in export tax
rebates to fight against the economic
damage brought by COVID-19 but not
for energy-intensive, polluting and
resource products. This shows that
China’s fiscal stimulus is adopting a
targeted approach and still wants to
protect the environment even though
the economy has been in contraction.
The famous “New Infra” scheme to
support economic growth has aimed
for more electric-car chargers and
high-speed rail lines, paving the way
for more electric vehicles and greener
transportation in the future

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1 Garret-Peltier, H. (2017). Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil