Input by the International Renewable Energy Agency (IRENA) to the 2023 High-level Political Forum on Sustainable Development (HLPF)

"Building back better from the coronavirus disease (COVID-19) while advancing the full implementation of the 2030 Agenda for Sustainable Development"

(a) Progress, experience, lessons learned, challenges and impacts of the COVID-19 pandemic on the implementation of SDGs 6, 7, 9, 11 and 17 from the vantage point of your intergovernmental body, bearing in mind the three dimensions of sustainable development and the interlinkages across the SDGs and targets, including policy implications of their synergies and trade-offs.

Although renewable energy demonstrated remarkable resilience during the pandemic, the pace of electrification slowed in recent years.[1] In addition, the pandemic's impact on household incomes made basic energy services unaffordable for around 90 million people in Asia and Africa who had previously enjoyed access. The COVID-19 crisis and another year of extreme weather events and climate change were projected to exacerbate the stark worldwide inequalities in access to reliable energy and health care, especially in rural and peri-urban areas, and highlighted the importance of expanding access to clean, efficient energy to help populations mitigate the effects of both the health and environmental crises.

The International Renewable Energy Agency (IRENA) together with four other international organizations – the International Energy Agency (IEA), the United Nations Statistical Department (UNSD), the World Bank (WB) and the World Health Organisation (WHO) annually track the progress towards achieving SDG 7 along its different indicators and targets.[2] Below the latest progress.

Access to electricity. SDG target 7.1 is universal access to affordable, reliable, sustainable, and modern energy services; indicator 7.1.1 focuses on access to electricity. Recent progress in access to electricity was mixed. The global electricity access rate rose markedly between 2010 and 2020, from 83 percent to 91 percent. The number of unserved people fell from 1.2 billion in 2010 to 733 million in 2020. The pace of annual access growth was faster than in previous years, as access infrastructure projects were finalized, but the annual rate of growth in access slowed from 0.8 percentage points in 2010–18 to 0.5 percentage points in 2018–20, because of the complexity of reaching the remaining unserved populations and the potential impacts of COVID-19.

Clean cooking solutions. Universal access to clean cooking is the goal for SDG 7.1.2. On a global scale, the number of people gaining access to clean cooking increased significantly. However, as in previous years, population growth outpaced these improvements, particularly in Sub-Saharan Africa. As a result, the total number of people lacking access to clean cooking in some regions has stagnated for decades. In 2000–10, this number was close to 3 billion people. It dropped to 2.4 billion people in 2020.

Renewable energy. Ensuring access to affordable, reliable, sustainable, and modern energy for all implies an accelerated deployment of renewable energy sources in electricity, heat, and transport. Although there is no quantitative milestone for SDG 7.2, the current pace of renewable energy uptake needs to rise significantly, to increase the share of renewable energy in total final energy consumption (TFEC), the primary indicator for SDG 7.2. Despite continued disruptions in economic activity and supply chains, renewable energy consumption grew through the pandemic, in contrast with other energy sources.

[1] IEA, IRENA, UNSD, World Bank, WHO. 2022. Tracking SDG 7: The Energy Progress Report. World Bank, Washington DC

[2] Please note that the 2023 Tracking SDG 7 Report will be released in May 2023 and will include updated information and numbers on SDG 7 progress

Electricity saw record shares of renewables in new capacity additions in 2021. The positive global and regional trajectories mask the fact that the countries, most in need of increased access lag others, however, including in terms of installed capacity to generate renewable electricity. Moreover, rising commodity, energy, and shipping prices, as well as restrictive trade measures, have increased the cost of producing and transporting solar PV modules, wind turbines, and biofuels worldwide, adding uncertainties for future renewable energy projects.

Renewable shares would need to reach well over 30 percent of TFEC by 2030 to be on track for reaching net-zero energy emissions by 2050. Achieving this milestone would require strengthening policy support in all sectors and implementing effective tools to further mobilize private capital, especially in least developed countries, landlocked developing countries, and small island developing states.

Energy efficiency. SDG target 7.3 aims to double the annual global rate of improvement in primary energy intensity in 2010–30 versus 1990–2010 to 2.6 percent. In 2010–19, global annual improvements in energy intensity averaged around 1.9 percent, well below the levels needed. To make up for lost ground, the average annual rate of improvement now must reach 3.2 percent to reach SDG 7.3's target. Early estimates for 2020 point to a substantial decrease in intensity because of the COVID-19 crisis, partly as a result in the slowdown in real energy efficiency. The outlook for 2021 suggests a return to a 1.9 percent rate of improvement, a return to the average rate during the previous decade, thanks to a sharper focus on energy efficiency policies, particularly in COVID-19 recovery packages.

However, to bring the SDG 7.3 target within reach, energy efficiency policies and investment need to be scaled up significantly.

International public financial flows. Although the private sector finances most renewable energy investments, the public sector remains a critical source of finance, particularly for many developing countries. Tracking of SDG 7.a.1 indicator shows that international public financial flows to developing countries in support of clean energy decreased for the second year in a row, falling to USD 10.9 billion in 2019. This level represents a 23 percent decrease from the USD 14.2 billion provided in 2018, a 25 percent decline from the 2010–19 average, and a more than 50 percent drop from the peak of USD 24.7 billion in 2017. Although there is no quantitative target for international public financial flows to developing countries under indicator 7.a.1, the overarching target of SDG 7.a points to the continued importance of enhancing international cooperation.

Flows need to be increased to realize SDG 7 as well as enable the achievement of related SDGs including SDG 13, especially in light of the reduced fiscal space in many developing countries and the imperatives to ensure a rapid and sustainable recovery from the COVID-19 pandemic.

(b) Three key areas where transformative actions for accelerated progress have been successful, and three key areas where support is most urgently needed, with regard to the cluster of SDGs under review in July 2023.

b.1 Successful key areas

b.1.1 Renewable energy capacity growth

Renewable energy has made impressive progress in the power sector.[3] Over the past decade, renewables capacity increased by 130%, while non-renewables only grew by 24%. Among renewable technologies, solar PV installations have seen the fastest growth, with a 21-fold increase in the 2010-21 period, because of major cost reductions backed by technological advancements, high learning rates, policy support and innovative financing models. By the end of 2021, the cumulative installed capacity of solar PV reached

[3] https://www.irena.org/publications/2022/Apr/Renewable-Capacity-Statistics-2022

843 GW globally; 133 GW of capacity was commissioned in 2021 alone, with 57% of the installations in Asia.

Wind power also experienced significant growth and wind installations increased by over four-fold between 2010 and 2021. In 2021, the cumulative installed capacity of onshore wind power reached about 769 GW across the globe. As with solar PV, Asia leads the market with 358 GW of cumulative installed capacity and was home to more than 48% of installations in 2021. The offshore wind market remains small compared to onshore wind, with 56 GW of cumulative installed capacity by the end of 2021. Asia and Europe each contributed equally 50% (28 GW) to this total capacity.

Hydropower continues to be the largest renewable power source in terms of installed capacity. In 2021, global hydropower installed capacity (excluding pumped hydro) reached 1 230 GW, 40% of total renewables capacity. Other renewable power technologies such as bioenergy, geothermal, solar thermal and ocean power also grew rapidly during the past decade, albeit from a small base. The combined installed capacity of these renewables reached 166 GW in 2021, 86% of which was bioenergy power.

b.1.2 Decrease in renewable energy costs

Costs for renewables continued to fall in 2021 as supply chain challenges and rising commodity prices have yet to show their full impact on project costs.[4] The cost of electricity from onshore wind fell by 15%, offshore wind by 13% and solar PV by 13% compared to 2020. Almost two-thirds or 163 gigawatts (GW) of newly installed renewable power in 2021 had lower costs than the world's cheapest coal-fired option in the G20. IRENA estimates that, given the current high fossil fuel prices, the renewable power added in 2021 saves around USD 55 billion from global energy generation costs in 2022.

b.1.3 Increasing net zero commitments

Countries are increasingly making net zero commitments by 2050.[5] Together with the new and updated Nationally Determine Contributions (NDCs), current and announced net zero pledges are projected to reduce emissions by approximately 20% by 2030 compared to the business as usual before the first NDCs, with the potential to limit warming to 2.1°C. However, this is still well above the 1.5 °C goal. Another positive trend is that more than 100 countries are promising to cut emissions of methane by 30% by 2030. These pledges, combined with the NDCs and net zero targets, have been found by the International Energy Agency to be sufficient to hold the rise in global temperatures to 1.8°C by the end of the century.

b.2 Key areas where support is required

b.2.1 Challenge in closing the electricity access gap

The COVID-19 crisis continues to slow global progress on reaching universal access to electricity, reversing years of steady progress, particularly in Sub-Saharan Africa. The pandemic has slowed the rate of new access, particularly for stand-alone systems. As a result, the number of people without access to electricity is likely to have increased by 2 percent in 2021, almost entirely in Sub-Saharan Africa, where more than four in five people without access now live. Swift actions by governments to provide lifeline tariffs during the pandemic helped improve outcomes in 2020 compared with projections. However, governments without strong access policy frameworks in place had little ability to quickly mobilize supports. Many of these supports are set to expire as the immediate pandemic situation comes under control, but the impact on household income will linger, especially for people on the lowest rungs of the economic ladder.

[4] IRENA (2022), Renewable Power Generation Costs in 2021, International Renewable Energy Agency, Abu Dhabi

[5] IRENA (2022), NDCs and renewable energy targets in 2021: Are we on the right path to a climate-safe future?, International Renewable Energy Agency, Abu Dhabi

Meeting the 2030 target requires increasing the number of new connections to 100 million a year. At current rates of progress, the world will reach only 92 percent electrification by 2030.

b.2.2 Lack of progress in access to clean cooking

Unless clean cooking finds a lasting place on the global political agenda, more than 2.1 billion people will continue to rely on traditional uses of biomass, kerosene, or coal for cooking in 2030. This will have dramatic consequences for the environment, economic development, and health, particularly of women and children. As global fuel prices spiked during the recovery period, many governments intervened to maintain affordability of liquefied petroleum gas (LPG), but mounting subsidy burdens from before the pandemic are driving countries to phase out LPG fuel subsidies and contemplate fuel taxes to shore up accounts.

Without increased effort, 2.1 billion people will still lack access to clean cooking in 2030. Learning from the successes and challenges faced by countries that have attempted to design and implement clean household energy policies is critical.

b.2.3 Challenge in closing the financing gap

The level of international public financing available for energy projects supporting the realisation of SDG 7 in developing countries is still insufficient to mobilize the larger volumes of investment needed to reach the target. Enhancing international flows, leveraging public funds strategically, using concessional finance to de-risk investments and mobilize more private capital into climate solutions are key area for action. Clean energy investment worldwide will need to ramp up significantly, with much of the investment being directed to renewables and efficiency.

(c) Examples of specific actions taken to recover from the COVID-19 pandemic that also accelerate progress towards multiple SDG targets, including actions identified by your intergovernmental body, building on interlinkages and transformative pathways for achieving SDGs.

IRENA continues to capture an increasingly comprehensive picture of the socio-economic impacts of the energy transition, demonstrating how steps towards a decarbonised energy future will positively affect economic activity, jobs - outweighing losses in the fossil fuel industries- and welfare, provided a holistic policy framework is in place. Below some highlights of the recent work and recommendations.

c.1 Renewable energy and overall socio-economic development

Access to modern energy is a pre-requisite for socio-economic development.[6] Yet, over 750 million people continued to live without electricity access in 2019 and many more had to contend with unreliable supply. The consequent economic and social cost is significant and a key argument for mobilising urgent action and investments to reach universal access by 2030. An integral part of achieving the 2030 Agenda and building back better from the COVID-19 pandemic will be steps to catalyse rural economies, create local jobs and ensure resilient public infrastructure. **Access to modern energy should be a central pillar of such recovery and will contribute to a more inclusive and just energy system in the long-term.**

Decentralised renewable energy solutions promise to play an essential role in reaching universal energy access in a timely manner. Linking decentralised renewables with livelihoods is an important step. It offers the opportunity to translate investments in electricity connections and kilowatt-hours into higher incomes for communities and enterprises, local livelihood opportunities and well-being for large populations in rural and peri-urban areas.

However, it is not the only pre-requisite. Achieving this transformative change requires greater efforts than simply deploying decentralised systems or delivering units of electricity. It requires investing in an

[6] IRENA and SELCO Foundation (2022), Fostering Livelihoods with Decentralised Renewable Energy: An Ecosystems Approach, International Renewable Energy Agency, Abu Dhabi

ecosystem that positions the diversity of people's livelihoods (rather than technological solutions) at the centre of energy access efforts, and delivers tailored energy solutions, the financing, capacity and skills, market access and policy support to realise the full benefits of decentralised renewable energy.

IRENA, together with the SELCO Foundation discusses in its brief *"Fostering Livelihoods With Decentralised Renewable Energy An Ecosystems Approach"* the 'ecosystem' necessary for linking electricity services through decentralised renewable energy with people's livelihoods. The ecosystem's critical components are as follows:

- **Technology innovation:** deliver tailored energy solutions to meet energy needs for livelihoods; development, availability and accessibility of efficient appliances; supply chains via manufacturers and enterprises to provide solutions, operation and maintenance services till the last mile.
- **Financing solutions:** facilitate access to cashflow-based financial products; targeted public financing support for end-users and enterprises; appropriate delivery models for financing, including engagement of intermediaries; and technical assistance funds for market development.
- **Backward and forward linkages (market access)**: establish stable supply chains of inputs/raw materials; strengthen market access for increased output and new goods and services; increased awareness and partnerships for demand generation, including through aggregation.
- **Training and capacity building:** support business and skills development; training modules on technology use and operation and maintenance, demonstration labs; mentorship and increased awareness among end-users on technology and financing available.
- **Policies:** advance cross-sector planning and policy making; standards and quality assurance; promotion of enterprise development; financing targets for renewables for livelihoods promotion and incentives to develop energy-efficient machinery and delivery channels to rural areas.

The absence of any one of the above components of the ecosystem compromises the sustainability of the whole.

c.2 Renewable energy and agri food systems

The transformation pathways of the food and energy systems are deeply entwined: Agri-food systems consume about 30% of the world's energy, and a third of agri-food systems' emissions of greenhouse gases stem from energy use.[7] The energy transition will directly affect the food system, and vice versa. Food and energy systems also have a profound impact on society, economies and the environment, making them central to meeting multiple SDGs.

Over 2.5 billion people worldwide rely on agriculture for their livelihoods making the sector a key driver for development. Energising the agri-food system by ensuring that reliable, affordable and environmentally sustainable energy is available for primary production, post-harvest processing, storage and cooking is a key enabler of higher yields, increased incomes, lower losses and greater climate resilience. However, present patterns of energy use in agri-food systems point to regional disparities, lack of access to modern energy (especially in the developing world) and continuing dependence on fossil fuels.

Worldwide, energy consumption in agri-food systems increased by more than 20% between 2000 and 2018. A key driver of that growth was mechanisation in Asia in the form of irrigation pumps, farm machinery, processing equipment and inputs such as fertilisers. Energy use in Africa, which hosts around 15% of the global population and faces growing food demand, has remained largely constant, accounting for only about 4% of global energy consumption in agri-food systems. Limited access to energy at each

[7] IRENA and FAO. 2021. Renewable energy for agri-food systems – Towards the Sustainable Development Goals and the Paris agreement. Abu Dhabi and Rome

step of the agri-food system limits the ability of farmers and agri-enterprises to raise productivity, cut losses and cope with a changing climate and other shocks.

As agri-food value chains modernise, alternatives to fossil fuel energy sources are needed to ensure that food systems are built on secure, environmentally sustainable and resilient foundations. **Renewable energy can play a critical role in meeting needs for electricity, heating, cooling and transport needs of food systems in both developed and developing countries.** In so doing, it can advance efforts to end hunger, reduce drudgery, lower greenhouse gas emissions, increase the adaptive capacity of farmers and agri-enterprises, raise incomes, and lessen the environmental impact of the food sector. At the same time, it can contribute to gender equality and youth employment. Various renewable energy applications being deployed along agri-food chains are demonstrating the benefits of such solutions. Solar irrigation, among the most mature applications, is being widely adopted to improve access to water, thus enabling multiple cropping cycles and increasing resilience to changing rainfall patterns. The use of solar irrigation pumps has raised farmers' incomes by 50% or more in India compared to rain-fed irrigation.

Improving access to refrigeration could prevent spoilage of up to a quarter of the perishable foods currently produced in countries with less-developed cold storage infrastructure. Further, global cold chain activities already account for around 5 percent of food-system emissions – a figure expected to rise. Renewables-based solutions offer several advantages, including decentralised cold storage capable of reaching smallholder farmers and remote fishing communities, and the power to transition existing infrastructure to more environmentally friendly and affordable energy solutions in developing and developed countries alike.

Sustainable bioenergy is an important renewable energy resource that can meet needs for electricity, heat and transport fuels within the agri-food sector and beyond. Biomass by-products from agri-food activities can be used to produce energy for processing, storage and cooking. Residues generated from crop production and livestock can be an important source of bioenergy while considering the competing end uses (e.g. as animal feed). Manure and agro-processing materials can be utilised to produce biogas at various scales and for different purposes, including for cooking and lighting and in commercial and industrial establishments. Productive end-use technologies could also create about 190 000 jobs by mechanising tasks and expanding production capacity.

Several common challenges exist for scaling up renewable energy applications in food systems. Silo-ed policy making and planning is chief among them. Another common obstacle is a techno-centric approach to the deployment of renewable energy, as opposed to a value-chain approach that considers factors such as forward and backward market linkages, data limitations, lack of access to end-user and enterprise financing, insufficient technical and management capacity among agri-enterprises, poor awareness, and the particular difficulties that women-led enterprises have in accessing solutions.

Scaling up renewable energy use in agri-food systems to jointly advance energy and food security, as well as action towards the SDGs and the Paris Agreement, will require concerted action by decision makers in government, the private sector, international organisations, financing institutions, academia and nongovernmental organisations. The joint IRENA and FAO report *"Renewable energy for agri-food systems – Towards the Sustainable Development Goals and the Paris agreement"* offers a set of recommendations for decision makers, summarised below.

- Improve the data and information base through existing and new tools to guide renewable energy investments in food systems and inform policy makers.
- Improve access to finance both for enterprises (the supply side of the energy equation) and, most importantly, for end users in food systems (the energy demand side).

- Facilitate the development of holistic approaches such as integrated food-energy systems (e.g. agri-voltaic systems) and the water-energy-food nexus to minimise competition and leverage synergies in water and land use.
- More broadly, mainstream cross-sector perspectives into national and regional strategies for transforming the energy and food systems through a stable and supportive enabling environment. That environment must include 1) dedicated policies and plans; 2) cross-sectoral co-ordination that includes government, the private sector civil society and end-users, both nationally and subnationally.
- Prioritise low-risk, high-impact action in the near term. Examples include reducing food losses, enhancing circular economy effects, and strengthening the links between energy for food and energy for health as part of the green recovery.
- Promote innovation in the development of technologies and energy efficient appliances through dedicated high-risk innovation funds and multi-stakeholder partnerships between energy supply and demand actors to develop or repurpose existing technologies, pilot them for operational viability, and establish supply chains to deliver solutions.

c.3 Renewable energy and health

Reliable electricity in health-care facilities is essential to save lives.[8] Electricity is critical to effective health-care provision, from managing childbirth and emergencies to immunization – without reliable electricity in all health-care facilities, universal health coverage cannot be reached. Yet this aspect of health infrastructure is still neglected, and urgently needs more attention by all, from governments to donors and development partners, from philanthropic institutions to international organizations. In low- and lower-middle-income countries of South Asia and sub-Saharan Africa, approximately 12% and 15% of health-care facilities, respectively, have no access to electricity whatsoever.

IRENA, together with WHO, the World Bank and SEforAll identified and its report *"Energizing health: accelerating electricity access in health-care facilities"* the following key priority actions for the health care:

- Electrification of health-care facilities must be considered a development priority. Support, financing and investments must be scaled up accordingly. Health is a human right and a public good. Increased support, financing and investments from governments, development partners, philanthropic institutions, and financing and development organizations are necessary to accelerate health-care facility electrification.
- Powering health-care facilities through decentralized renewable energy is a concrete action to build climate resilience.
- The "install and forget" approach to electrification needs to be transformed into "install and maintain".
- Building the capacity of local stakeholders is key to the long-term functionality of energy systems.
- Precise and holistic health–energy needs assessments are critical for effective electrification plans.
- Electricity access initiatives need to be complemented by investments in medical devices and equipment.
- Improved coordination is needed between relevant stakeholders at the global and local levels.
- Data collection, analysis, accessibility and sharing need to be improved.
- Political commitment, awareness and advocacy are critical to generating local action.

c.4 Renewable energy and jobs

[8] IRENA, WHO, World Bank, SEforAll (2022), Energizing health: accelerating electricity access in health-care facilities, Abu Dhabi

The ninth edition of IRENA's series, "*Renewable energy and jobs: Annual review 2022*", produced in collaboration with the International Labour Organization (ILO), provides the latest estimates of renewable energy employment globally.[9]

Worldwide employment in renewable energy in 2021 reached 12.7 million, up from 12 million in 2020. Jobs in solar photovoltaic (PV) in 2021 accounted to 4.3 million, the fastest-growing sector, accounting for more than a third of the total renewable energy workforce. Jobs in wind power in 2021 was 1.3 million. Countries are building the industrial base and infrastructure needed to support growing offshore installations. There were 2.4 million direct jobs in hydropower in 2021. Two-thirds of these jobs were in manufacturing, 30% related to construction and installation and about 6% to operation and maintenance. Worldwide employment in renewable energy in 2030 will reach 38.2 million under an ambitious IRENA energy transition scenario with front-loaded investments. The number of jobs in the energy sector could rise to 139 million, including more than 74 million in energy efficiency, electric vehicles, power systems/flexibility and hydrogen.

c.5 Renewable energy and gender

Climate change and gender equality are inextricably linked. Strategies and programmes addressing the effects of climate change must include the participation, experiences and voices of women – not only because they are disproportionately impacted by climate change but also because they have valuable points of view, experience and knowledge to contribute to building community and national resilience.

The solar PV sector is the largest employer within the renewable energy sector.[10] The solar PV sub-sector will remain the largest source of employment in an energy transition pathway consistent with the Paris Climate Agreement, accounting for almost 14 million jobs by 2030 – 37% of the total for the renewable energy sector. The share of women working in full-time positions in the solar PV industry is 40%. This is almost double the share in the wind industry (21%) and the oil and gas sector (22%). The solar PV industry also compares well with the 32% share across the entire renewable energy landscape.

c.6 Critical materials

To ensure an orderly energy transition, governments have become focusing on safeguarding critical materials and fostering long-term solutions. The use of critical materials should be considered early on, and governments should plan ahead to avoid potential delays to energy transition due to critical materials shortfalls, avoid emerging geopolitical challenges related to critical materials supply as well as price increases caused by scarcity. Several strategies can be deployed to avoid major supply challenges in the period leading up to 2050, but particularly in this decade. These strategies include increased mining, product design to avoid or minimise critical materials use, and reuse and recycling of products to recover scarce materials. Recent trends suggest that, for example, battery producers are already reducing their exposure to critical materials supply risks.

IRENA supports countries in defining strategies for effective management of critical materials supply at the global level. As a contribution to technical discussions and to disseminate new findings on critical materials, a series of technical papers on the topic has been published.[11]

c.6 Renewable energy and finance

In November 2021, IRENA and the UAE launched the **Energy Transition Accelerator Financing (ETAF) Platform**, a new global climate finance facility to accelerate the transition to renewable energy in developing countries.[12] The UAE committed USD 400 million in funding provided by the Abu Dhabi

[9] IRENA and ILO (2022), Renewable energy and jobs: Annual review 2022, International Renewable Energy Agency, Abu Dhabi and International Labour Organization, Geneva.
[10] IRENA (2022), Solar PV: A gender perspective, International Renewable Energy Agency, Abu Dhabi.
[11] https://www.irena.org/Education#technical-papers
[12] https://etafplatform.org/

Fund for Development (ADFD) toward the platform's goal of securing a minimum of USD 1 billion in total funding. ETAF targets the total deployment of 1.5 GW of renewables by 2030. IRENA will offer technical assistance and project facilitation support.

IRENA further supports the acceleration of renewable energy deployment through the **Climate Investment Platform (CIP)**.[13] To date, CIP has 320 registered partners, and 36 projects were supported, resulting in projected total capital mobilisation of 1.1 USD billion and a total projected installed capacity of 470 MW.

c.7 Collaborative partnerships

In response to the Members' request, IRENA has established **Collaborative Frameworks on Hydropower, Green Hydrogen, Geopolitics, Offshore Renewables/Oceans, Enhancing Dialogue on High Shares of Renewables in Energy Systems and Just and Inclusive Energy Transitions**, which are serving as effective vehicles for dialogue, peer-to-peer collaboration and exchange of knowledge.[14] In March 2022, IRENA Members launched a new **Collaborative Framework on Critical Materials**. The **Collaborative Framework on Project Facilitation** to support on-the-ground energy transition was launched in May 2022.

(d) Assessment of the situation in the mid-point of the implementation of the 2030 Agenda and the SDGs, against the background of the COVID-19 pandemic and within the respective areas addressed by your intergovernmental body, and policy recommendations, commitments and cooperation measures for promoting a sustainable, resilient and inclusive recovery from the pandemic while advancing the full implementation of the 2030 Agenda.

IRENA's annual World Energy Transitions Outlook (WETO) outlines a pathway for the world to achieve the Paris Agreement goals and halt the pace of climate change by transforming the global energy landscape. The report outlines to roadmap to 2030 and presents the options to bring CO2 emissions to net zero by 2050, offering high-level insights on technology choices, investment needs, policy framework and the socio-economic impacts of achieving a sustainable, resilient and inclusive energy future. High fossil fuel prices, energy security concerns and the urgency of climate change underscore the pressing need to move faster to a clean energy system.[15]

2030 progress will depend on political will, well-targeted investments, and a mix of technologies, accompanied by policy packages to put them in place and optimise their economic and social impact. The top priorities are discussed below; they will have to be pursued simultaneously to put the energy transition on track to the 1.5°C goal.

- **Resolutely replacing coal power with clean alternatives, notably renewables, is vital.** In recent months, gas scarcity and high prices have resulted in a slowdown of the global coal phase out, making an even stronger case for more aggressive deployment of renewables. It is evident that phase out is a complex task for countries heavily reliant on coal, especially given the imperative of a just and fair transition for affected workers and communities. Concerted action and international co-operation are therefore essential for timely progress. Replacing coal in industry must be tackled as well, as almost 30% of all coal is used in iron and steel, cement, and other industries. The coming years will be decisive for innovation, industry action, and international co-operation in these sectors.
- **Phasing out fossil fuels assets should be done in tandem with measures to eliminate market distortions and incentivise energy-transition solutions.** This will involve phasing out fossil fuel

[13] https://www.irena.org/irenaforcip
[14] https://www.irena.org/collaborativeframeworks
[15] IRENA (2022), World Energy Transitions Outlook 2022: 1.5°C Pathway, International Renewable Energy Agency, Abu Dhabi.

subsidies and ensuring that the full costs (environmental, health and social) of burning fossil fuels are reflected in their prices, thereby eliminating existing market distortions. Fiscal policies, including carbon pricing, should be implemented and adjusted to enhance the competitiveness of transition related solutions. Such interventions should be accompanied by a careful assessment of their social and equity impact, particularly on low-income populations, to ensure that they do not exacerbate energy poverty or have other socially regressive effects.

- **Ramping up renewables, together with an aggressive energy efficiency strategy, is the most realistic path towards halving emissions by 2030, as recommended by the IPCC.** In the power sector, renewables are faster and cheaper to deploy than the alternatives. But to meet the IPCC goal, annual additions of renewable power capacity will have to be three times the current rate of deployment. Such an increase is possible if the right conditions are in place. Technology specific targets and policies are especially needed to support less mature technologies, such as ocean energy and CSP.

- **Infrastructure upgrades, modernisation, and expansion are needed to increase system resilience and build flexibility for a diversified and interconnected system capable of accommodating high shares of variable renewable energy.** The idea that fossil gas alone will be required to integrate higher shares of variable solar and wind is being fast overtaken by the improved economics of alternative sources of flexibility. But in addition to many technological solutions, markets will need to be adapted, both in liberalised and regulated systems. The current structure was developed during the fossil fuel era, to reduce operational costs of large, centralised power plants with differing fuel and opportunity costs. In the age of variable renewable energy, electricity should be procured considering the characteristics of decentralised generation technologies, with no fuel or opportunity cost.

- **Green hydrogen should move from niche to mainstream by 2030.** In 2021, only 0.5 GW of electrolysers were installed; cumulative installed capacity needs to grow to some 350 GW by 2030. Hydrogen commands a great deal of policy attention, so the coming years should bring concrete actions to develop the global market and reduce costs. In this regard, the development of standards and guarantees of origin, along with support schemes to cover the cost gap for green solutions, will ensure that hydrogen offers a meaningful contribution to climate efforts in the long term.

- **Modern bioenergy's contribution to meeting energy demand, including demand for feedstock, will have to triple by 2030.** At the same time, the traditional use of biomass (such as firewood) needs to be replaced by clean cooking solutions. There is scope for biomass supply to expand, but the expansion will need to be managed carefully to ensure sustainability and minimise adverse outcomes. Policies that promote the wider use of bioenergy need to be coupled with strong, evidence-based sustainability procedures and regulations.

- **The majority of car sales by 2030 should be electric.** Electromobility is a bright light of the energy transition progress, with EVs already at 8.3% of global car sales in 2021 (EV-Volumes, 2022). This share will rise rapidly in the coming years. Annual battery manufacturing capacity is set to quadruple between 2021 and 2025, to approximately 2 500 GWh. However, EV growth ultimately depends on a massive ramp-up of recharging infrastructure in the coming decade, as well as financial and fiscal incentives to promote the uptake of EVs, charger mandates, and bans on combustion engine vehicles. In addition, greater efforts should be made to reduce travel demand and to promote a switch to public transport and cycling where possible.

- **All new buildings must be energy efficient, and renovation rates should be significantly increased.** Improving the measures and regulations for buildings can make an immense difference in the near term. Decarbonising heating and cooling will require changes to building codes, energy performance standards for appliances, and mandates for renewables-based heating and cooling technologies, including solar water heaters, renewables-based heat pumps and geothermal heating.

The effort to decarbonise heating and cooling will have to be sustained over the coming decades, but the measures just mentioned should be put in place without delay.

- **Demand-side management would help alleviate multiple challenges in the short term while contributing to the long-term security of energy and materials supply.** Transforming the energy system is not simply about switching energy sources; it extends to ensuring the efficient use of energy across sectors. Innovation, recycling, and the circular economy will play significant roles in the pursuit of efficiency over the medium and long term. The coming years should see increased investment in research and development (R&D) and pilot projects along the value chains of all six of the technological avenues described above. This should be accompanied by efforts to cut unnecessary consumption and to move away from a system based on continuously increasing consumption.
- **Increasing ambition in national energy plans and in the Nationally Determined Contributions made under the 2015 Paris Climate Agreement must be firm enough to provide certainty of direction and guide investment strategies.** The agreement on the Glasgow Climate Pact requested that parties revisit and strengthen the 2030 targets in their NDCs by the end of 2022 in line with the 1.5°C goal set out in the Paris Agreement. In addition to increasing ambition in their revised NDCs, Parties need to develop national implementation plans that include clearly defined targets, including efficiency, renewables and end uses.
- **A comprehensive set of policies covering all technological avenues is needed to achieve the necessary levels of deployment by 2030.** Deployment policies should support market creation, thus facilitating reductions in technology costs and their scale up and increases in investment levels aligned with energy transition needs. Strong institutions will be needed to co-ordinate structural and just transition policies and manage potential misalignments. Only a holistic global policy framework can bring countries together to orchestrate a just transition that leaves no one behind and strengthens the international flow of finance, capacity and technologies.
- **Achieving universal access to modern energy is a key pillar of a just and inclusive energy transition aligned with the 1.5°C climate goal.** Ensuring access to reliable, affordable and sufficient energy has historically been a key enabler of countries' industrialisation goals and will continue being so for many emerging economies looking to mechanise farms, build local industries and create jobs in pursuit of socio-economic development objectives.
- **Decentralised renewable energy solutions can play a key role in expanding access to electricity and clean cooking in a rapid and environmentally sustainable manner.** IRENA finds that nearly 180 million people globally received electricity services through standalone systems and mini grids in 2020. Scaling up renewables-based clean cooking solutions can help mitigate the significant social, economic and environmental costs of traditional fuels.
- **Decentralised renewables can also support public service delivery and income-generating activities across sectors.** Such linkages are crucial to stimulate job creation, build local supply chains and maximise the socio-economic benefits of energy access across multiple SDGs.
- **Investments in energy access, including decentralised renewable electricity and clean cooking solutions, must be urgently scaled up** to ensure sufficient, affordable and reliable energy services for all. This requires co-ordinated planning, dedicated policies, tailored end-user and enterprise financing, technology innovation and skills development. Gender aspects must be integrated across each element.

IRENA provides variety of support to the challenges mentioned above. This support includes:[16]

- **Data and statistics**
  Providing energy data through IRENA's repository of statistics for energy balances, renewable energy capacity and generation, and energy finance and costs.
- **Monitoring, reporting and verification (MRV)**

[16] IRENA (2022), IRENA's Energy Transition Support to Strengthen Climate Action: Insight to impact 2022, International Renewable Energy Agency, Abu Dhabi

Technical assistance and capacity building on energy data collection, analysis, recording and reporting. The support can also cover MRV support on greenhouse gas emission reduction through energy transition.

- **Resource assessment**
  Assisting countries in assessing their renewable energy potential and building their capacities to undertake this analysis. This includes site assessment, suitability assessment, zoning assessment and use of the SolarCity Simulator, a web application to evaluate the prospects for electricity generation using rooftop solar photovoltaic (PV) installations.
- **Policy and finance advice**
  Undertaking technical analysis of the current policies and financial landscape for energy transition. The support can also offer analysis of the existing barriers to renewables deployment and provide policy relevant recommendations to support mobilising investments in energy transition, leading to climate action.
- **Renewables readiness assessment**
  Undertaking comprehensive assessment of the conditions for renewable energy deployment to support decision makers in countries to expand ambitions for renewables deployment. Long-term energy planning Enhancing long-term renewable energy planning and developing the capacity of countries to undertake their energy planning and modelling.
- **Power system flexibility**
  Analysing the flexibility in power systems to identify cost-effective and sound solutions for integrating variable renewable energy. These include demand-side flexibility, energy storage, and sector coupling options, such as electric vehicles, power-to-heat and power-to-hydrogen.
- **Renewable energy roadmap (REmap)**
  Assessing the potential of renewable energy in the power, cooling and heating, and transport sectors. This support also covers analysis on possible technology avenues and assessment of other metrics including technology options, costs, financing and potential externalities, including emissions, air pollution and various economic indicators.
- **Project facilitation services**
  Facilitating the development of project pipelines aligned with the priorities of governments in collaboration with the financial sector, the private sector and project developers, and assisting in the bankability assessment and financial access of projects. The Climate Investment Platform and IRENA's regional Investment Forums are also leveraged to support countries' access to project finance.
- **Technology and infrastructure technical analysis**
  Assessment for the cost effectiveness of mitigation options for the energy sector to support country to priorities mitigation options to serve as an input for the NDC.
- **Technology and infrastructure capacity building**
  Technical capacity building programme on renewable energy technology to facilitate NDC implementation, with a particular focus on performance, cost, and planning requirement to implement renewable energy solutions.
- **Grid assessment and modelling**
  High-level assessment of the grid hosting capacity and distribution to accommodate Variable Renewable Energy (VRE) integration and build countries' capacity on grid assessment studies and to establish a working model of the electricity system through simulation software training.

(e) Key messages for inclusion into the Political Declaration of the September 2023 SDG Summit.

The successful achievement of the objectives set out in the United Nations 2030 Agenda for Sustainable Development and the 2015 Paris Agreement requires a rapid transformation of energy systems across the globe towards high shares and eventually 100% renewable energy. As a growing number of countries announce ambitious pledges and actions to phase out fossil fuels and enact policies in line with achieving net-zero emissions by 2050 or earlier, renewable energy will need to play a dominant role across all sectors.

- Promote investments in access and transition to renewable energy which leaves no one behind
- Strengthen the interlinkages between SDG7 and other SDGs, while defining multi-dimensional advantages of upscaling renewables to strengthen the 2030 Agenda
- Pursue the development path that is most likely to drive down energy emissions in the coming decade and put the world on a 1.5°C trajectory
- Support emerging technologies, such as marine energy, most likely to become competitive in the short-term and most effective in achieving emissions reductions in the long-term
- Limit investments in oil and gas to fast-track the energy transition, which ensures the energy security
- Phase out coal and fossil fuel subsidies
- Invest in a set of policies to promote resilience, inclusion, and equity and protect workers and communities affected by the energy transition
- Ensure all countries, including LDCs, LLDCs and SIDS, have an opportunity to participate in and realise the benefits of the global energy transition, including mobilization of the adequate finance to LDCs, LLDCs, SIDS and African countries to support both the access and transition to affordable, reliable, sustainable and modern energy making it inclusive and just
- Promote the dialogue on critical materials necessary for energy transition, while ensuring that the most vulnerable countries are not left behind