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International Renewable Energy Agency

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Abu Dhabi, 14-15 January 2023

ANNUAL REPORT OF THE DIRECTOR-GENERAL

on the implementation
of the Work Programme
and Budget for **2022-2023**

About IRENA

The International Renewable Energy Agency (IRENA) serves as the principal platform for international co-operation, a centre of excellence, a repository of policy, technology, resource and financial knowledge, and a driver of action on the ground to advance the transformation of the global energy system. An intergovernmental organisation established in 2011, IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low carbon economic growth and prosperity.

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The lingering effects of the COVID-19 pandemic, compounded by the global energy crisis in 2022, have accentuated global socio-economic and political challenges and intensified the urgency of efforts to transform economic and energy systems the world over. The need to accelerate the renewable-based energy transition must no longer be regarded as simply a means to solve the climate crisis; a just and equitable transition delivers economic stability and resilience, improved livelihoods and enhanced energy security and access.

IRENA continues to drive the energy transition forward, delivering on the goals and objectives of the Work Programme and Budget for 2022–2023.

Through its timely reports, virtual and in-person events, and various tools and platforms, the Agency remains focussed on serving the global community by providing insightful knowledge to power the transition, acting as a key forum for dialogue on effective pathways to achieve the 1.5°C target of the Paris Agreement and the UN Sustainable Development Goals.

By facilitating robust partnerships that bring together stakeholders from the energy, industry, finance and policy communities, IRENA is delivering key actions on the ground to advance the transition through multi-sector engagement and collaboration.

Engagement with youth, civil society and the private sector is equally important in creating a unified voice to advance renewable energy as a central aspect of the solution to the climate and energy security crises.

This Annual Report presents an overview of the programmatic activities IRENA has undertaken since January 2022, reaffirming the Agency's position as a centre of excellence, a repository of policy, technology and financial knowledge, and the principal platform for international co-operation on renewable energy.

The Agency's achievements in 2022 serve to reaffirm its steadfast commitment to delivering high-quality work to support Members in their pursuit of a just and inclusive energy transition that leaves no one behind.

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IRENA AT A GLANCE

DIRECTOR GENERAL

Francesco La Camera
Director-General
since 4 April 2019

DEPUTY DIRECTOR GENERAL

Gauri Singh
Deputy Director-General
since 8 January 2020

Year of establishment

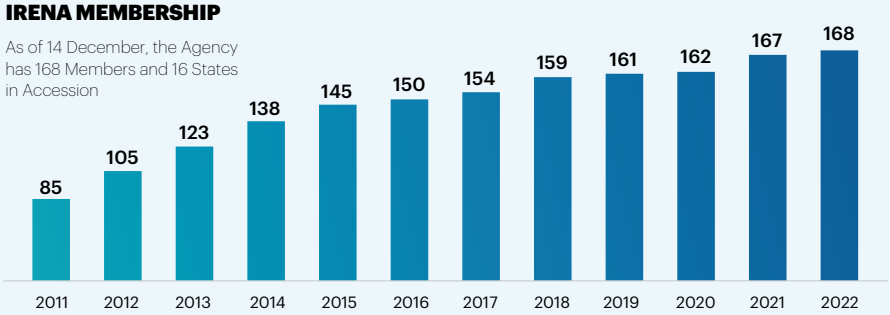
2011

Offices

Headquarters in Abu Dhabi
Offices in Bonn
UN liaison office in New York

IRENA MEMBERSHIP

As of 14 December, the Agency has 168 Members and 16 States in Accession



13TH ASSEMBLY BUREAU

President: India

Vice-Presidents:

Belgium

Indonesia

Saint Vincent & the Grenadines

Zimbabwe

COUNCIL

21 Members

25TH Council
Chair: TBC
Vice-Chair: TBC

26TH Council
Chair: TBC
Vice-Chair: TBC

Committees

Administration & Finance

Chair: Maldives
Vice-Chair: Germany

Programme & Strategy

Chair: United States
Vice-Chair: Algeria

ENERGY TRANSITION AT A GLANCE

ON TRACK

- Renewables in electricity generation
- Modern bioenergy consumption
- Direct electricity in final energy consumption

Tracking PROGRESS to the 1.5°C TARGET

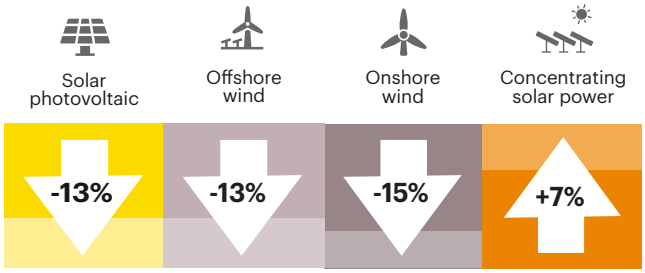
OFF TRACK

- Direct renewables in end uses
- Energy efficiency investment
- Electric cars in operation/infrastructure investment

- H_2 Green hydrogen - consumption in industry
- H_2 Green hydrogen - investment needs
- CO_2 CCS & BECCS to abate emissions in industry

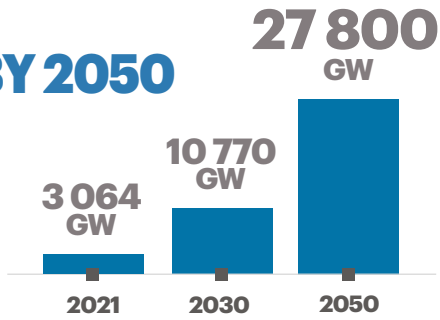
Renewable power generation COSTS are falling

Year-on-year percentage reduction 2020-2021

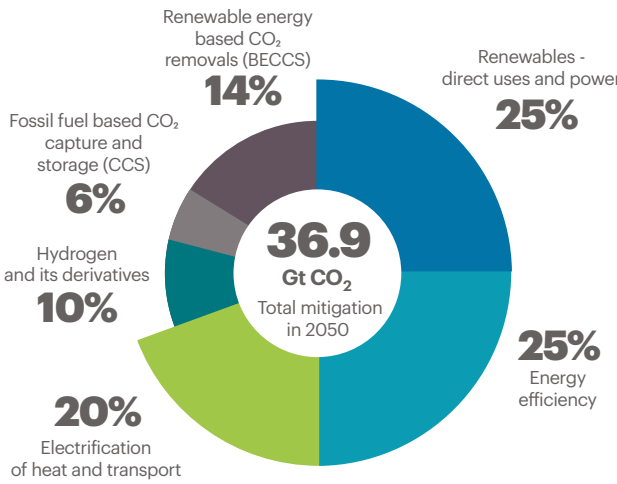


More ACTION is needed to HALVE EMISSIONS BY 2050

Installed renewable capacity will have to **more than triple by 2030**



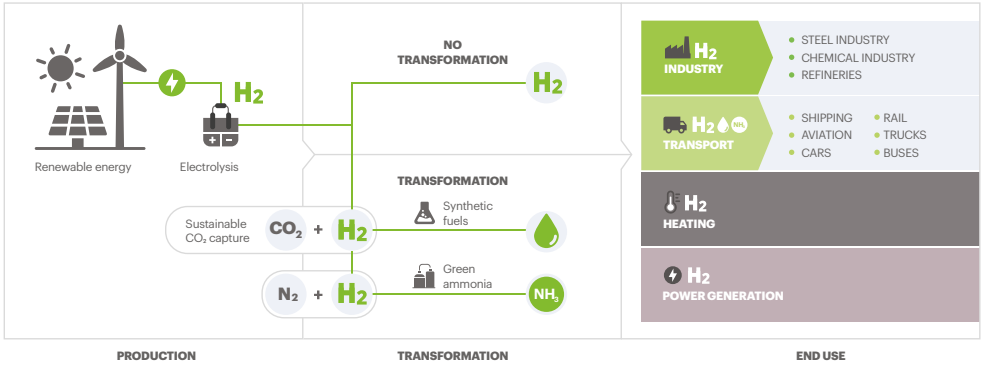
Technological **SOLUTIONS** are readily available



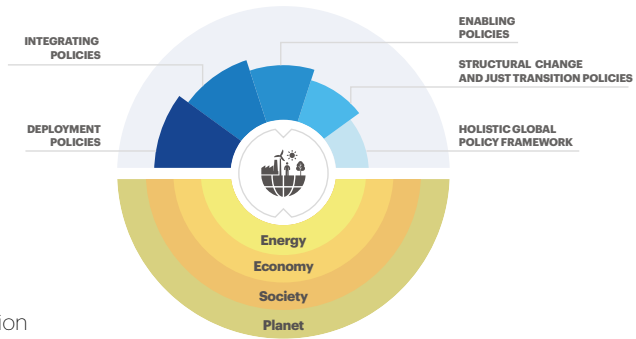
Reducing emissions by 2050 through six technological avenues

GREEN HYDROGEN Role in reducing emissions in hard to abate sectors

Conversion and end uses across energy systems



POLICY is crucial



An enabling policy framework
for a just and inclusive energy transition

Energy transition has positive **IMPACTS** on people, climate and communities

JOBS IN RENEWABLES

12.7 million — 2021

38 million — 2030

50 million — 2050

ACCESS TO ELECTRICITY

1.2 billion people without access — 2010

733 million people without access — 2020

CLEAN COOKING

3 billion people without access — 2010

2.4 million people without access — 2020

Energy transition should **LEAVE NO ONE BEHIND**

GLOBAL INVESTMENT

$2 254 billion 2010 - 2020

AFRICA INVESTMENT

$55 billion 2010 - 2020

70% of the world's population receive less than **2%** of investment

CHANGE requires action NOW

SECRETARIAT AT A GLANCE

3.5 million
downloads of IRENA publications

56 publications released

- World Energy Transitions Outlook 2022
- Geopolitics of the Energy Transformation: The Hydrogen Factor
- Renewable Capacity Statistics 2022
- Renewable Power Generation Costs in 2021
- Renewable Energy and Jobs: Annual Review 2022

27 publications translated into nine languages

AR ZH FR ES RU DE JP IT PT

11 400 applications received for 78 vacancies

209 events organised/ co-organised by IRENA

136 virtual events + 73 hybrid events

IRENA employs a talented and diverse workforce

179 posts filled

74 nationalities

stationed in Abu Dhabi, Bonn and New York; 47% are women and 53% are men

Senior Management Team gender balance

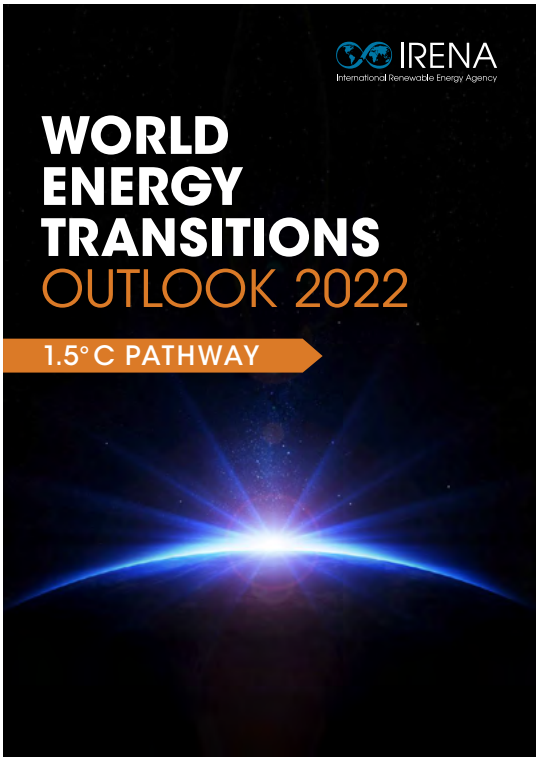
50/50

10 loaned or seconded officers

MEDIA COVERAGE

49 200 media articles in **49** languages across **161** countries

PROGRESS TO DATE



IRENA's flagship **World energy transitions outlook (WETO)**[1] report – the executive summary of which was released at the Berlin Energy Transition Dialogue (BETD) in March 2022 – presents the steps needed by 2030 to deliver climate and near-term energy solutions urgently and simultaneously (Figure 1). This year's report includes a detailed perspective on the near-term requirements for the transition, as the period to 2030 will be critical. IRENA's 1.5°C pathway positions electrification and efficiency as key drivers of the energy transition, enabled by renewables, hydrogen and sustainable biomass. This pathway, which entails considerable changes in how societies produce and consume energy, would result in a cut of nearly 37 gigatonnes of annual CO_2 emissions by 2050 (Table 2).

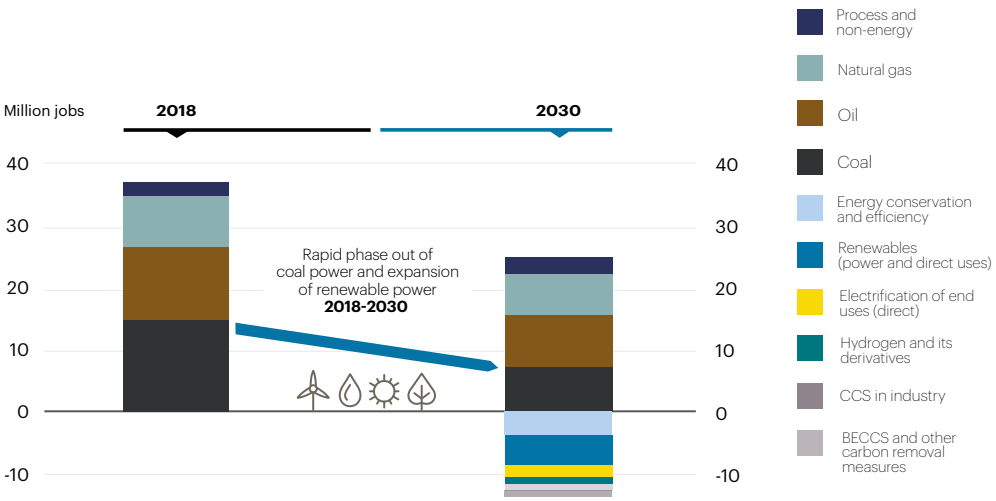
Crucially, WETO 2022 positions justice and fairness at the heart of planning and action to ensure the positive impacts of the energy transition. The report also details the key macro-economic implications of the energy transition on GDP, jobs and welfare, demonstrating that even in the short period from 2019 to 2030, this course of action will boost global GDP

[1] Available here.

and create 85 million energy transition-related jobs. In addition, the report includes deep dives into key topics, such as material requirements for the transition, the level and kind of investment needed, key policies and measures that can enable the transition, as well as how to sustainably scale up bioenergy and promote system flexibility.

WETO has established itself as a key document outlining the Agency's larger energy transition vision and charts a path towards limiting temperature rise in alignment with the 1.5°C aim of the Paris Agreement.

FIGURE 1 **Key milestones and action for rapid emission reductions**



Notes: BECCS = bioenergy with carbon capture and storage.

Source: *IRENA, World Energy Transitions Outlook, 2022.*

Renewable energy share in electricity generation must increase to 65% by 2030.

- An additional 8 000 GW of renewable capacity in this decade.
- Installed onshore wind capacity must grow to 3 000 GW - four times that of 2020.
- Offshore wind should be scaled up to 380 GW - 11 times that of 2020.
- Installed capacity of solar PV to reach 5 200 GW, more than seven times that of 2020.
- Hydropower capacity to increase to 1 500 GW - 30% more than in 2020.
- Other renewable technologies to reach 750 GW, up six-fold from 2020.

The share of direct electricity in total final energy consumption (TFEC) must rise from 21% to 30%; deployment of energy efficiency measures must increase 2.5 times.

- A drop in TFEC from c. 390 EJ today to 370 EJ.
- Expanded electrification of energy services, especially in the transport sector.
- Improved energy effciency standards and retrofitting of existing buildings.
- Process changes in industry, relocation of industries, and circular economy practices.

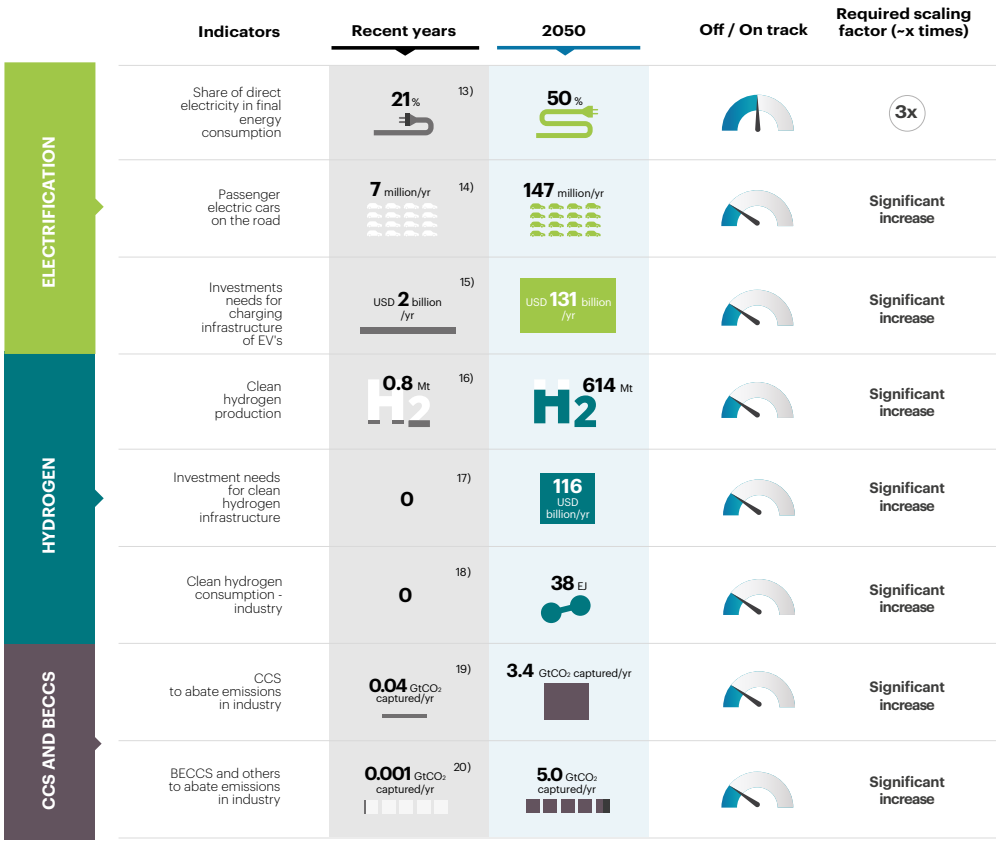
Direct renewables in end use sectors must grow from 12% in 2019 to 19% by 2030.

- Hydrogen consumption to reach a minimum of 19 EJ by 2030.
- Total consumption of bioenergy and feedstock in industry to increase to 25 EJ, 2.5 times more than in 2019.
- Solar thermal, geothermal and district heating solutions to be scaled up to 60 EJ - 1.3 times 2019 levels.
- Biofuels' share in energy consumption in transport to increase from 3% in 2019 to 13%.
- Increase ambition for biojet fuels to reach 20% of total fuel consumption by 2030.

TABLE 1 **A roadmap to 2050: Tracking progress of key energy system components to achieve the 1.5ºC target**

	Indicators	Recent years	2050	Off / On track	Required scaling factor (~x times)
RENEWABLES	**ELECTRIFICATION WITH RENEWABLES**				
	Share of renewables in electricity generation	1) 26%	90%		3x
	Addition of renewable energy technologies	2) 264 GW/yr	836 GW/yr		3x
	Annual solar PV additions	3) 126 GW/yr	444 GW/yr		4x
	Annual wind energy additions	4) 115 GW/yr	248 GW/yr		2x
	Investment needs for RE generation	5) USD 0.3 trillion /yr	USD 1 trillion /yr		3x
	DIRECT RENEWABLES IN END USES				
	Share of renewables in final energy consumption	6) 16%	79%		5x
	Solar thermal collector area	7) 25 million m²/yr	165 million m²/yr		6x
	23) Modern bioenergy consumption	8) 18 EJ	58 EJ		3x
	Geothermal consumption	9) 0.9 EJ	4 EJ		4x
	District heat generation - buildings	10) 0.4 EJ	7.3 EJ		Significant increase
ENERGY EFFICIENCY	Energy intensity improvement rate	11) 1.2 %/yr	2.9 %/yr		2x
	Investment needs for energy efficiency	12) USD 0.3 trillion /yr	USD 1.5 trillion /yr		5x

▶continued

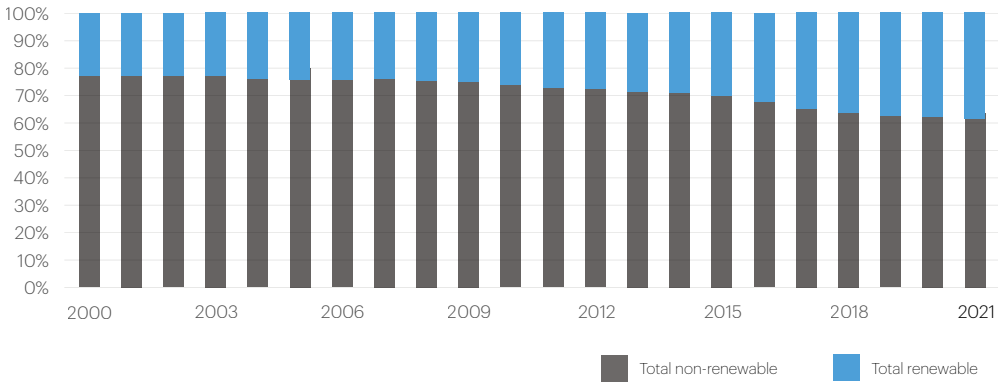


Notes: BECCS = bioenergy with carbon capture and storage.

Source: *IRENA, World Energy Transitions Outlook, 2022.*

Current global crises have impacted renewable generation. IRENA's **Renewable capacity statistics 2022**[2] showed that more than 257 gigawatts (GW) of renewables were added in 2021 - slightly less than in 2020 - while staying well above the long-term trend. Specifically, total renewable generation capacity reached 3 064 GW, which is a 9.1% increase compared to 2020. Asia accounted for 60% of new capacity in 2021, increasing its renewable capacity by 154.7 GW to reach 1.46 TW (48% of the global total). Much of this increase occurred in China (+121 GW). Capacity in Europe and North America expanded by 39 GW (+6.4%) and 38 GW (+9.0%), respectively, with a notably large expansion in the United States (+32 GW). Africa continued to expand steadily with an increase of 2.1 GW (+3.9%), slightly less than in 2020. Oceania is no longer the fastest growing region (+5.2%), although its share of global capacity is small and almost all of this expansion occurred in Australia. Asia and North America saw the fastest growth, at +11.9% and +9.0%, respectively (Tables 2 and 3). In terms of capacity and production, the expansion of wind and solar jointly accounted for 88% of all net renewable additions in 2021, whereas hydropower remained the highest source of renewable energy for electricity generation globally.

FIGURE 2 **Installed electricity generation capacity (%)**



Source: *IRENA, Renewable Capacity Statistics 2022.*

[2] Available here.

TABLE 2 Renewable generation capacity and change by region (GW)

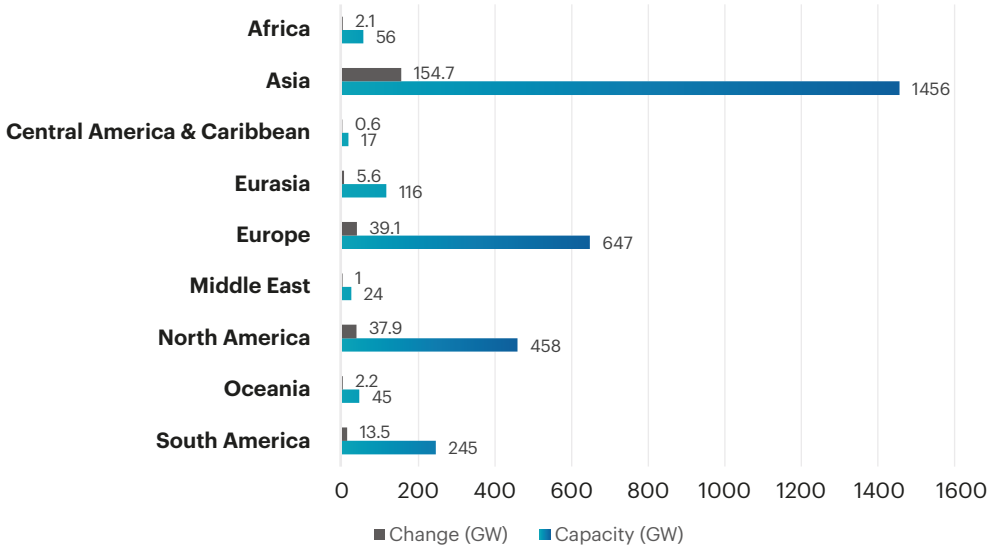
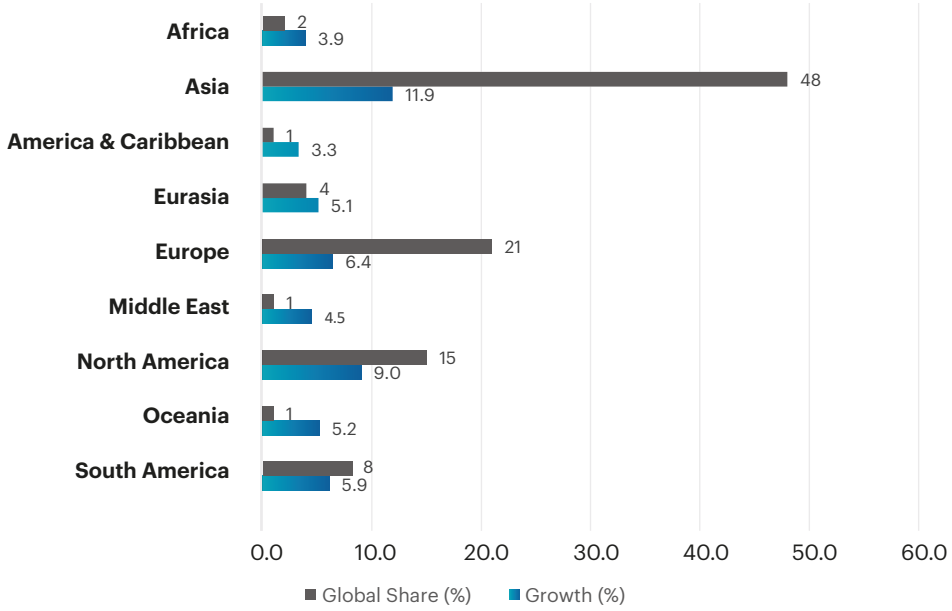


TABLE 3 Global share and growth of renewable generation capacity by region



The positive trend in renewable electricity generation continued in 2020. According to the 2022 edition of IRENA's **Renewable energy statistics**[3] report, a 7.4% increase was registered compared to 2019, with the total amount of electricity generated from renewables reaching 7 468 TWh in 2020. Hydro accounted for about 59% (4 356 TWh), followed by wind (1 589 TWh), solar (844 TWh), bioenergy (584 TWh), geothermal (95 TWh) and marine (1 TWh) (Figure 3). Solar and wind generation experienced an increase of 22% and 12% respectively in 2020, and thus, continued to dominate growth in renewable generation, accounting for 73% of growth since 2019 (Figure 4). Asia remained the region accounting for most growth in renewable electricity generation, with the continent's share of global renewable generation reaching 42%, while Europe and North America had shares of 19% and 18% respectively, followed by South America (11%) and Eurasia (5%). Notably, public investment in renewable energy continued to decline across all technologies in 2020, with a total investment of USD 17 billion compared to USD 18 billion and USD 22 billion in 2019 and 2018 respectively.

FIGURE 3

Cumulative renewable electricity generation

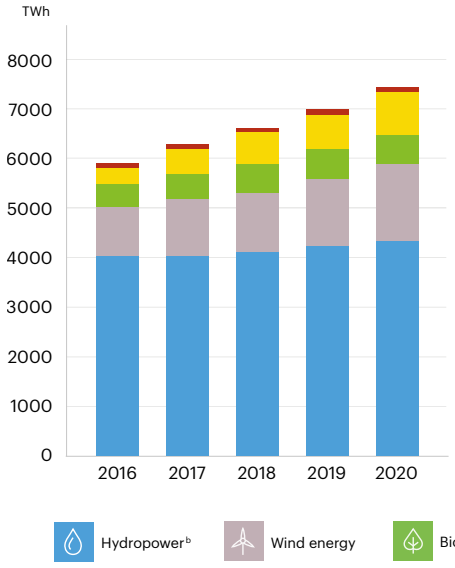
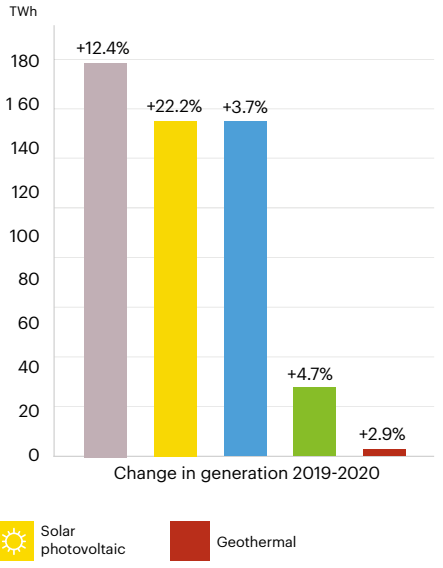


FIGURE 4

Additions in renewable energy generation capacity, 2019-2020



Source: *IRENA, Renewable Energy Statistics 2022.*

[3] Available here.

IN FOCUS
Renewable power generation costs in 2021

The 2022 edition of IRENA's **Renewable power generation costs in 2021**[4] report shows that the global weighted average cost of newly commissioned solar photovoltaics (PV), and onshore and offshore wind power projects, fell in 2021. This was despite rising commodity and renewable equipment costs, given the significant lag in the pass-through to total installed costs. Commodity prices remained elevated in the first quarter of 2022 and equipment prices continued to rise, suggesting costs may increase on average for the full 2022 compared to 2021. The report included several new elements, namely:

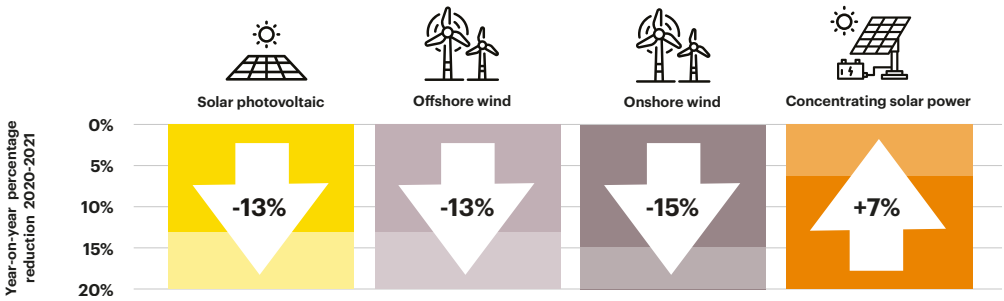
- A detailed review of onshore wind turbine cost drivers considering rising commodity prices, with additional analysis for solar PV.
- Analysis of the recent increases in fossil fuel prices (up to May 2022) and the impact on:
  - wholesale electricity prices;
  - competitiveness of solar PV and wind power;
  - capital returns to solar and wind projects;
  - estimated savings to society of new renewable capacity added in 2021 in the current fossil fuel price shock and of all renewable generation in Germany in the month of March 2022; and
  - estimated avoided fossil fuel imports due to solar and wind generation in Europe.
- Additional country level cost data for onshore wind – with time series data for an additional 30 countries.
- Technology and country-specific weighted-average cost of capital (WACC) assumptions for 100 countries - a benchmark model calibrated from the IRENA/IEA Wind Task 26/ETH Zurich survey of cost of capital in 2021.

The report shows that between 2000 and 2021, renewable power generation capacity worldwide increased just over four-fold, from 754 GW to 3 064 GW, despite the pressure put on utilities and supply chains due to the pandemic. During this period, solar and wind power costs experienced the highest decrease; the cost for electricity produced from utility-scale PV fell 88%, and from both concentrated solar power (CSP) and onshore wind by 68%. The global weighted average levelised cost of electricity (LCOE) of new utility-scale solar PV, as well as offshore projects commissioned in 2021, fell by 13% year-on-year, while that of new onshore wind projects added in 2021 fell by 15%, year-on-year (Figure 5). Onshore wind will be the largest contributor to these savings with an estimated USD 23.4 billion.

IRENA's Data and Statistics Dashboard provides an overview of the latest global trends in renewable energy costs. It displays global weighted average total installed costs, capacity factors and LCOE by technology.

[4] Available here.

FIGURE 5 **Change in global weighted levelised cost of electricity by technology, newly commissioned projects, 2020-2021**



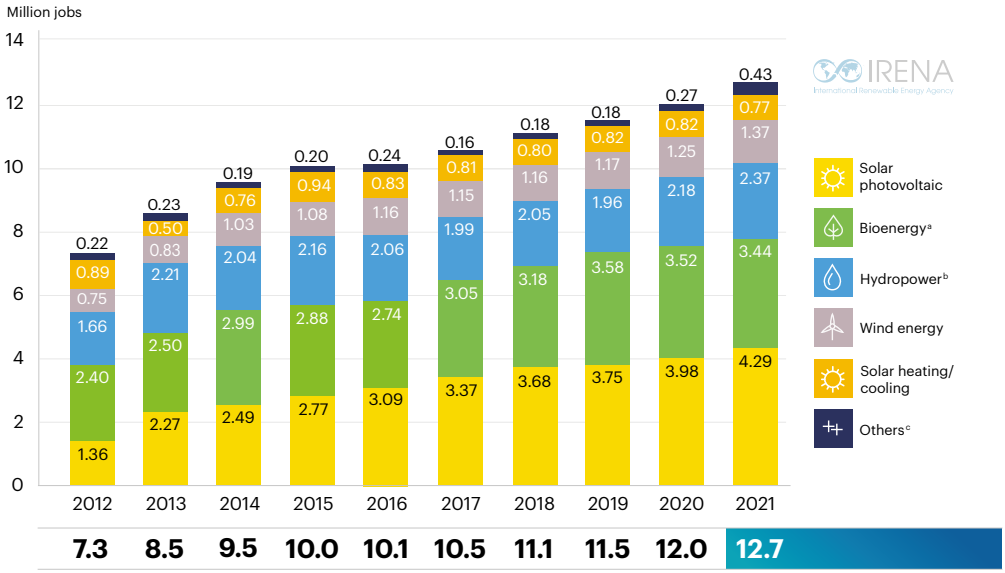
Source: *IRENA 2022, Renewable Power Generation Costs in 2021.*

While the declining cost of technology is very encouraging, it is not sufficient to bring about the necessary change. Market reform, among other things, must also take place. Today's power systems, structured around large centralised and dispatchable power plants, require a holistic approach to address all key aspects – from technology and economy to society and the environment. IRENA's **RE-organising power systems for the transition**[5] aims to inform discussions on the role of power system organisational structures in facilitating and accelerating the energy transition. It discusses enablers and barriers to the transition, including misalignments inside and outside power systems, as well as the role of competition and its balance with regulatory and collaborative components. Moreover, the report proposes a new power system organisational structure, fit for the renewable era, that can support low-cost renewable generation and long-term investments in system adequacy, complemented by diverse and flexible generation options to ensure a reliable power system to support the energy transition.

As with the global economy, the renewable energy sector faces lingering supply chain disruptions from recent health crises, as well as volatile energy prices stemming from trade disputes and geopolitical rivalries; these, in turn, affect global employment. The 2022 edition of **Renewable energy and jobs: Annual review**[6] - prepared in collaboration with the International Labour Organization (ILO) for the second consecutive year - presents job findings in the renewable energy sector in 2021. According to the report, the number of people either directly or indirectly employed in the renewable energy sector has continued to grow, from 12 million in 2020 to 12.7 million in 2021. Accounting for one-third of these jobs, solar photovoltaics remains the most dynamic renewable industry. This marks the continuation of an upward trend in renewable energy employment worldwide since 2012, when IRENA initiated its annual review and estimated that 7.3 million people worked in the sector (Figure 6). Encouraging advances have also been made in workforce gender equity, with women accounting for one-third of all renewable energy jobs. The fastest-growing sector remains solar PV, accounting for more than a third of the total renewable energy workforce with 4.3 million jobs in 2021. The report estimates that approximately 2.36 million people were directly employed in the hydropower sector in 2021, with two-thirds of these jobs being in manufacturing. Moreover, the production of biofuels recovered from the impacts of the COVID-19 crisis; according to IRENA estimates, worldwide biofuel employment in 2021 reached 2.4 million. The report was launched at the Clean Energy Ministerial 13 / Mission Innovation 7 on 22 September 2022.

[5] Available here.
[6] Available here.

FIGURE 6 **Global renewable energy employment by technology, 2012-2021**



a Includes liquid biofuels, solid biomass and biogas.
b Direct jobs only.
c "Others" includes geothermal energy, concentrated solar power, heat pumps. (ground based), municipal and industrial waste and ocean energy.

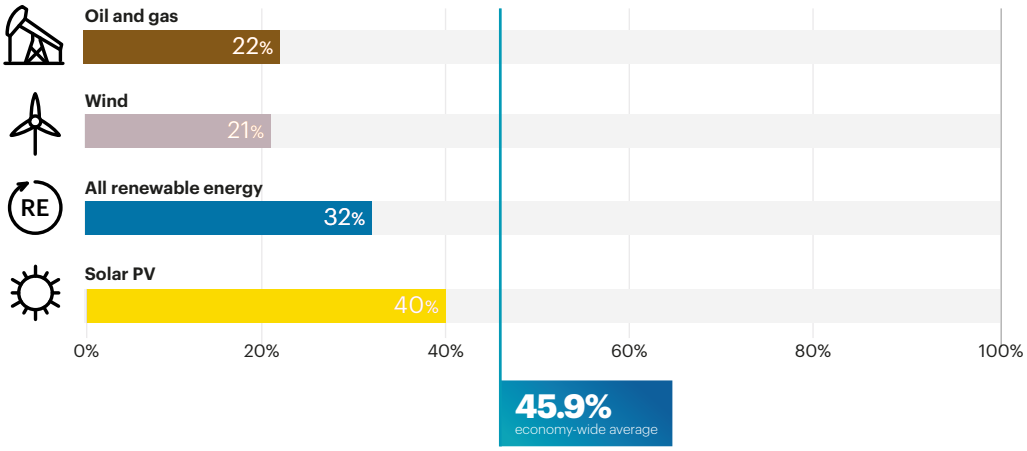
Source: IRENA jobs database.

***Source:** IRENA, Renewable Energy and Jobs - Annual Review, 2022.*

IRENA's report, **Solar PV: A gender perspective**[7], the third in IRENA's gender perspective series, explores the role of women in the solar PV industry using the largest sample of global responses on solar PV energy and gender-gathered data to date. The report highlights the share of women in the industry, discusses the barriers and opportunities within the sector, and identifies similarities and differences between the solar PV workforce and previously analysed sectors (overall renewable energy and wind energy). Based on the analysis, the solar PV sector, the largest employer within the renewable energy sector, accounted for some 4.3 million jobs in 2021 - one-third of all renewable energy jobs – with women holding 40% of full-time positions. This is almost double the share in the wind industry (21% of 1.4 million jobs) and the oil and gas sector (Figure 7). Women's share of solar PV employment is smaller in Europe, North America, and Latin America and the Caribbean than in the Asia-Pacific and Africa regions (Figure 8), but the differences are not significant.

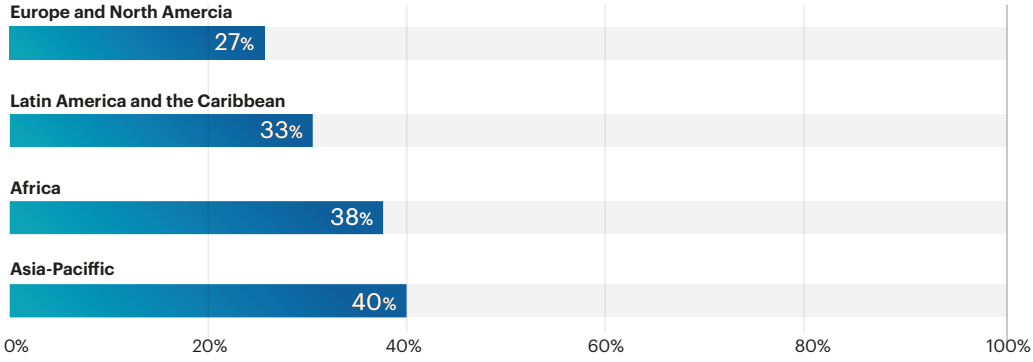
[7] Available here.

FIGURE 7 **Women in oil and gas, renewables overall, wind, solar PV, and economy-wide average**



Source: *IRENA, Solar PV: A Gender Perspective, 2022.*

FIGURE 8 **Women in the solar PV workforce, by region**



Source: *IRENA, Solar PV: A Gender Perspective, 2022.*

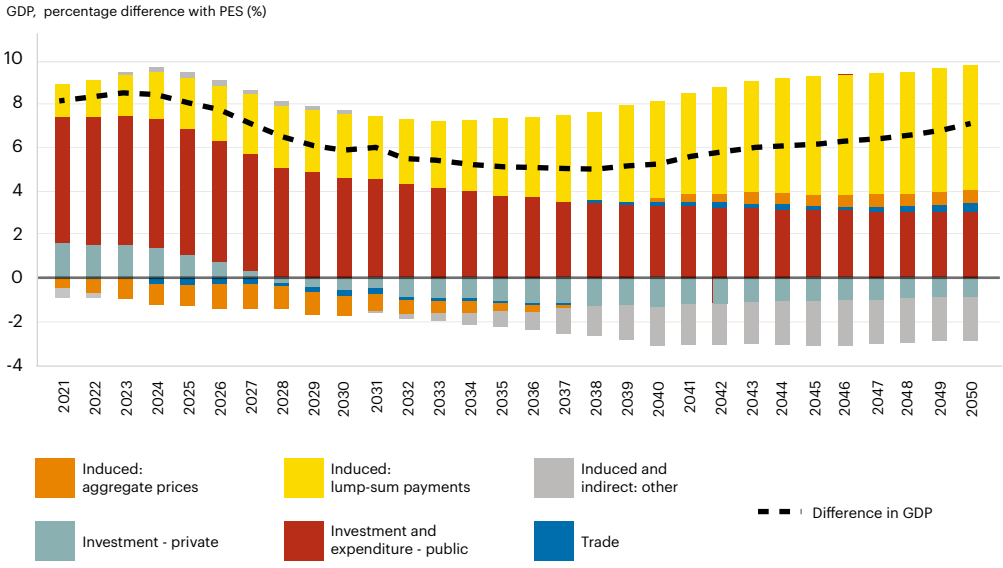
The energy transition will transform the economy, creating millions of new renewable energy jobs, while also requiring the mainstreaming of green skills and competences in many existing occupations. These activities require tremendous efforts to be made in the areas of education and workforce training to produce a new generation of energy professionals, reskill the current workforce and create informed consumers. Acknowledging this, IRENA, with the support of the Government of the United Arab Emirates, established the **Energy Transition Education Network (ETEN)**[8] that was launched at COP27.

[8] More information available here.

IN FOCUS
Renewable energy market analysis: Africa and its regions

Transforming Africa's energy systems to become renewables-based would have profound socio-economic and environmental benefits. IRENA's **Renewable energy market analysis: Africa and its regions**[9] report, developed in collaboration with the African Development Bank (AfDB), presents opportunities and charts a pathway to a renewables-based energy system, while also acknowledging the challenges Africa faces. It demonstrates the urgent need to build modern, resilient and sustainable energy systems to avoid trapping economies and societies in increasingly obsolete energy systems, leading to stranded assets and limited economic prospects. A renewables-centred energy system can bring substantial gains. It is estimated that the energy transition – when accompanied by an appropriate policy basket – may result in a 6.4% growth in GDP, 3.5% more economy-wide jobs and a 25.4% higher welfare index across Africa than would be realised under current plans, on average, throughout the outlook period (Figure 9).

FIGURE 9 **Difference in GDP between 1.5°C Scenario and Planned Energy Scenario, with drivers – Africa 2021-2050**



Source: *IRENA, Renewable Energy Market Analysis: Africa and its Regions, 2022.*

[9] Available here.

The findings of the 2022 edition of the **Tracking SDG 7: Energy Progress Report**[10], published annually by the custodian agencies[11] and showing progress toward achieving the aims of Sustainable Development Goal 7, reveal that the world is not on course to realise any of the associated targets (Figure 10). The most vulnerable countries still lag behind, and it is anticipated that new challenges from evolving COVID variants, extreme weather events and climate change, and the Ukraine crisis have brought new levels of concern and uncertainty that will negatively impact progress. While countries mobilised USD 710 billion to manage the impact of the pandemic in SDG 7 related areas, 90% of this was in advanced economies. Combined with the pandemic's impact on household incomes, access to basic energy services became unaffordable for around 90 million people in Asia and Africa who had previously enjoyed access. In addition, international public financial flows to developing countries in support of clean energy decreased in 2019 for the second year in a row, falling to USD 10.9 billion. Furthermore, while renewable energy demonstrated remarkable resilience during the pandemic, the pace of electrification has slowed in recent years. The UN High-Level Dialogue on Energy, convened in September 2021, served to galvanise action to achieve a sustainable energy future that leaves no one behind.

FIGURE 10 **Key findings of the Tracking SDG 7: The Energy Progress Report 2022**

Indicator	2010	Latest year
7.1.1 **Proportion of population with access to electricity**	**1.2 billion** people without access to electricity	**733 million** people without access to electricity (2020)
7.1.2 **Proportion of population with primary reliance on clean fuels and technology for cooking**	**3 billion** people without access to clean cooking	**2.4 billion** people without access to clean cooking (2020)
7.2.1 **Renewable energy share in total final energy consumption**	**16.1%** share of total final energy consumption from renewables	**17.7%** share of total final energy consumption from renewables (2019)
7.3.1 **Energy intensity measured as a ratio of primary**	**5.6 MJ/USD** primary energy intensity	**4.7 MJ/USD** primary energy intensity (2019)
7.a.1 **International financial flows to developing countries in support of clean energy research and development, and renewable energy**	**11.2 USD billion** international financial flows to developing coutries in support of clean energy	**10.9 USD billion** international financial flows to developing coutries in support of clean energy (2019)

Source: *Tracking SDG 7: The Energy Progress Report, 2022.*

[10] Available here.

[11] IRENA, International Energy Agency (IEA), United Nations Statistics Division (UNSD), World Bank and World Health Organization (WHO).

As one of the custodians of SDG 7, IRENA participated in the **2022 Sustainable Energy for All Forum**[12] that took place on 17-19 of May 2022 in Kigali, Rwanda, to accelerate progress towards the delivery of the goal. IRENA's participation focused on three events on: "Financing Renewable Energy for the Energy Transition" on 18 May - organised by IRENA and the Global Wind Energy Council to explore enabling policy frameworks to develop a pipeline of bankable projects for grid renewables in developing countries; "The Road to Net Zero" on 18 May – organised by IRENA and the IEA to examine near-term opportunities in emerging and developing economies and the role of international collaboration; and "Renewable Energy Opportunities in UN Peacekeeping Settings" on 19 May – co-hosted by the UN Department of Operational Support, IRENA and the UAE to discuss existing challenges and investment opportunities for the transition to renewable energy in the context of UN peacekeeping and the Energy Compact.

The role of technology and innovation

A net-zero future depends not only on the vast expansion of renewables, but also on smarter and more flexible electricity grids, and the electrification of huge numbers of vehicles, and other products and processes that collectively form a "Smart Electrification" strategy. IRENA's report on **Smart electrification with renewables: Driving the transformation of energy services**[13], produced jointly with the State Grid Corporation of China, presents recent trends in relevant technologies and innovations, sets out possible long-term pathways for electrification with renewables, and identifies associated priority actions (Figure 11).

FIGURE 11 Categories of smart electrification strategies

Better matching demand with electricity supply	Expanding grid services	Expanding opportunities for electrification
Renewable electricity generation can change within minutes when wind speeds slow or clouds reduce solar radiation, increasing the challenges of matching supply with demand. If energy production drops when demand is still high, alternative sources may be needed to fill the gap. Or if demand is low when energy production is high, valuable electricity generation will be wasted. An effective strategy would go beyond merely reducing demand peaks to actually shifting demand to match the Variable Renewable Energy (VRE) production. It would also adjust the supply of energy to better match demand by using storage.	Renewable energy generation is far more variable, distributed, and independent than centralised power plants. As a result, it requires many more grid services, such as load following, frequency regulation, black-start capabilities, and provision of operational reserves in order to maximise the utilisation of the VRE. Many technologies now are available to provide these services, helping to accelerate the adoption of renewable energy generation.	In addition to the strategies for enabling the integration of more renewable energy, other strategies take advantage of the unique characteristics of renewable electricity to meet new types of demand, such as hydrogen production.

Source: *IRENA, Smart Electrification with Renewables: Driving the Transformation of Energy Services, 2022.*

[12] More information available here.
[13] Available here.

Hydrogen will also play a key role in the energy transition and is becoming an increasingly sought-after alternative source of energy. IRENA's **Geopolitics of the energy transformation: The hydrogen factor**[14] report is a response to the growing need for a deeper understanding of the broader effects of establishing a hydrogen market, including its geopolitical aspects. Undertaken as part of the work of the Collaborative Framework on the Geopolitics of Energy Transformation (CF-GET) and benefiting from a wide range of expert input in the fields of energy and geopolitics, the report builds on IRENA's substantial body of work on hydrogen. It also considers whether and how hydrogen may disrupt future energy systems, reflecting on many of the key themes discussed in IRENA's 2019 **Global Commission's report, A new world: The geopolitics of the energy transformation**.[15] The report was launched at the twelfth session of the IRENA Assembly.

The analysis offers insights into how countries and stakeholders can navigate uncertainties and shape the development of hydrogen markets, and outlines policy considerations to help mitigate geopolitical risks and capitalise on opportunities. Some of the key messages emanating from the report are that hydrogen is likely to increasingly disrupt energy value chains in the coming years and influence the geography of energy trade, further regionalising energy relationships. Countries with an abundance of low-cost renewable power could become producers of green hydrogen, with commensurate geo-economic and geo-political consequences. Indeed, an increasing number of countries have developed – or are on the verge of developing – net zero strategies, and are recognising that hydrogen can significantly contribute to the decarbonisation of harder-to-abate sectors. It is also anticipated that hydrogen trade and investment flows will spawn new patterns of interdependence and bring shifts in bilateral relations. The summary of the results of the geopolitics of hydrogen surveys of experts and IRENA Members can be found in the Annex of the report.

The report has generated considerable attention from Members. Upon request, IRENA gave in-depth presentations on the report's findings to high-level government officials of Germany, Italy, Norway, United Kingdom, and United States of America, to name a few. The report has also attracted attention from the wider public. The report's launch was promoted via a campaign, driving more than 25% of report page visits in the first two weeks and representing a 15% increase from the benchmark for report page visits from social media. As such, content related to the report attracted over 50,000 visitors and there were 12,000 report downloads. In addition, the report's press release was IRENA's most read press release of Q1 with 12,000 views.

IRENA Director-General presents the Hydrogen Factor report to the Ministry of Foreign Affairs, the Ministry of Economic Affairs and Climate Action, Germany and the diplomatic community, Berlin (March 2022).

Low-carbon, including renewable, carbon-free "green hydrogen" is key to replacing fossil fuels in those sectors that cannot be electrified, including heavy land, sea and air transport industrial heating and chemical feedstocks. IRENA has collaborated with the G7 to develop the **G7 Hydrogen Action Pact (G7-HAP)** with the goal to increase energy security and address climate change through the acceleration of low-carbon hydrogen deployment. Launched at the G7 Ministerial Meeting in Berlin on 25-27 May 2022, the Pact prioritises six areas for the G7 to support the development of a global low-carbon and green hydrogen market.

Geopolitics of the energy transformation: The hydrogen factor

[14] Available here.
[15] Available here.

IRENA's **Accelerating hydrogen deployment in the G7: Recommendations for the Hydrogen Action Pact**[16] report briefly summarises the status and outlook for hydrogen in each G7 member – including analyses of technology, costs, strategy and stated policy support for each country – and presents recommendations for accelerating global hydrogen trade. The report is the outcome of IRENA's assessment of policy gaps by G7 members, as well as a review of existing and emerging hydrogen certification. The report was launched at the IRENA Pavilion at COP27 on 16 November 2022. Prior to this, IRENA had convened two workshops with the G7 and one with industry. IRENA's collaborative approach has assisted the G7 in fulfilling one of the aims of the Pact: to streamline the work undertaken by over 26 global initiatives and identify the most important tasks to facilitate and accelerate hydrogen production and trade.

The potential of green hydrogen, energy efficiency, innovation and renewable energy in creating greener economies and deepening energy cooperation between the MENA region and Europe was the focus of the **Middle East North Africa Europe Future Energy Dialogue (MEFED)**[17] **2022**. Co-organised by the German Federal Government and the Jordanian Government, and held at the Dead Sea on 8-9 June 2022, the Dialogue continued the conversations initiated at the Berlin Energy Transition Dialogue (BETD). The Dialogue built on the Middle East North Africa Renewable Energy Conference (MENAREC) series, whilst broadening its scope and offering new formats and fora. At the meeting, the IRENA Director-General delivered a keynote speech on the region's decarbonisation status and potential, underlining the importance of international cooperation, progressive policies and concerted investment. IRENA senior staff also participated in various sessions and shared the Agency's knowledge and perspectives on these issues.

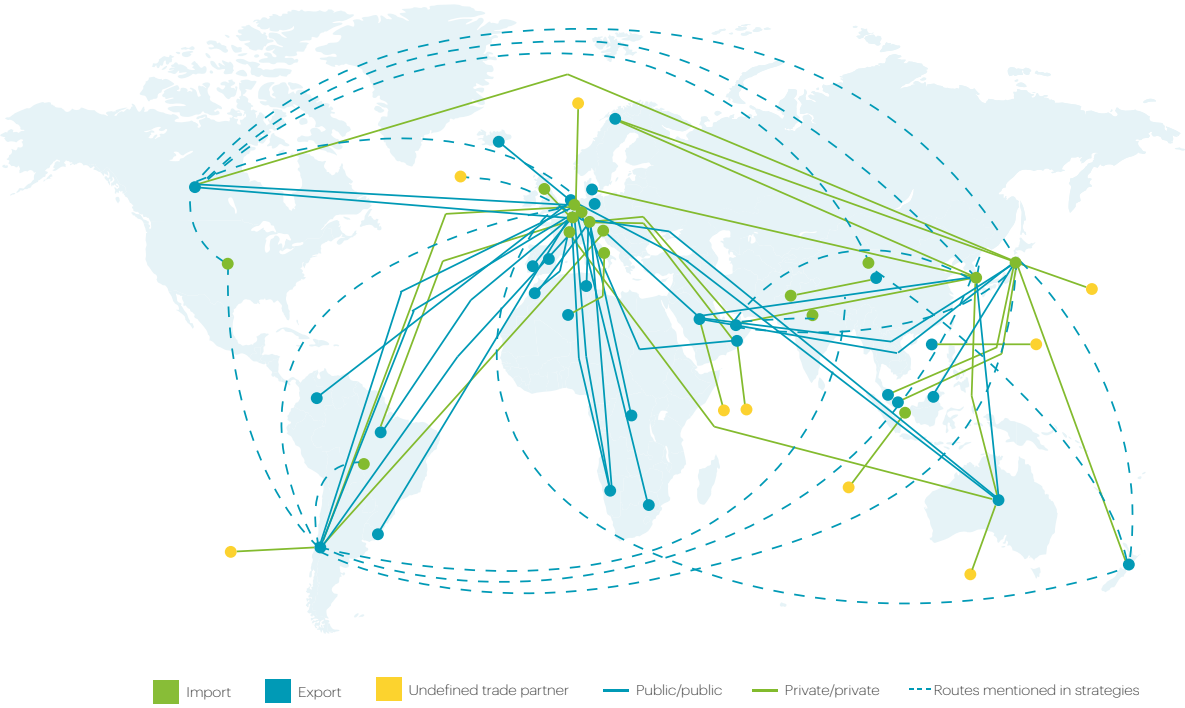
[16] Available here.
[17] Available here.

IN FOCUS
Global hydrogen trade to meet the 1.5°C climate goal

IRENA also prepared a series of three reports focusing on **Global hydrogen trade to meet the 1.5°C climate goal** to assess various scenarios by 2050 and provide a framework for the actions that policymakers should take in the coming decade to enable this global trade.

The critical factor that will determine the cost-effectiveness of trade in hydrogen will be whether scale, technologies and other efficiencies can offset the cost of transporting hydrogen from low-cost production areas to high-demand areas. The first report, **Trade outlook for 2050 and way forward**[18], provides an overview of the current state of hydrogen trade (Figure 12) and integrates components (*e.g.* supply and infrastructure) from the other reports in the series, complemented by an assessment of the outlook for global hydrogen trade by 2050. It includes an examination of the cost and technical production potential of green hydrogen at the global level under different scenarios and assumptions in 2030 and 2050.

FIGURE 12 **Bilateral trade announcements for global hydrogen trade until March 2022**



Source: *Global hydrogen trade to meet the 1.5°C climate goal: Trade outlook for 2050 and way forward, 2022.*

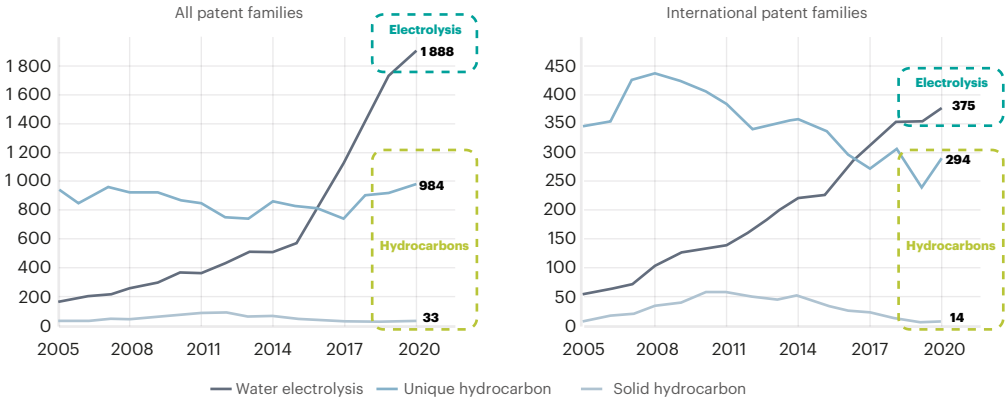
[18] Available here.

The second report, **Technology review of hydrogen carriers**[19], examines the state-of-the-art of hydrogen infrastructure under four different technology pathways. Specifically, the report focuses on hydrogen transport rather than the transport of commodities made using hydrogen – such as iron – and covers various technology options to transport hydrogen across long distances and in large volumes. It was prepared in collaboration with ENEL Foundation and Bruno Kessler Foundation. The third report on **Green hydrogen cost and potential**[20] estimates the potential for green hydrogen production as a function of land availability based on a geospatial analysis, and explores the global cost evolution of green hydrogen for 2030 and 2050.

These reports identify short-term actions required to enable global trade. Some of the suggested measures, such as certification, are applicable at the global level, while others are country-specific and depend on local conditions such as energy mix, natural resources and level of mitigation ambition.

The enhanced competitiveness of renewable hydrogen depends on the reduction in electrolyser system costs. Technological innovation has a crucial role to play in this process. IRENA and the European Patent Office jointly published a report on **Innovation trends in electrolysers for hydrogen production**[21], using patent statistics to reveal trends in this field and provide an insight into rapidly expanding technology domains. According to the analysis, patent filings for hydrogen production technologies have grown on average by 18% annually since 2005, a much higher rate than most other technologies in the energy sector (Figure 13). Europe and Japan account for more than 50% of the total number of international patents, followed by the United States. Chinese international patents account for only about 4% across the five technology areas but China dominates in terms of the number of domestic patent filings.

FIGURE 13 **Patent trends in hydrogen production processes**



This figure shows the 2005-2020 trend of patent families (left-hand side) and international patent families (right-hand side), comparing hydrogen production processes based on water electrolysis with processes using liquid or solid hydrocarbon feedstock.

Source: *IRENA, Innovation trends in electrolysers for hydrogen production, 2022.*

[19] Available here.
[20] Available here.
[21] Available here.

Renewable ammonia is an additional, essential component of the hydrogen economy. By 2050, according to the IRENA 1.5°C scenario, the transition will lead to a 688 million tonne ammonia market – nearly four times larger than today's market. IRENA and the Ammonia Energy Association (AEA) released the **Innovation outlook: Renewable ammonia**[22] report, which compares renewable ammonia to conventional ammonia and fossil-based ammonia, providing an associated technology status and outlook. The report also provides a comprehensive breakdown of future markets for renewable ammonia.

In countries with abundant renewable energy resources, such as the members of the Gulf Cooperation Council, green hydrogen may emerge as a major enabler of the energy transition. IRENA, the EU and the PtX Hub are collaborating through a series of workshops to enhance dialogue over the challenges and necessary policy measures to develop green hydrogen and support the development of a global regulatory framework. The first two workshops took place in 2021. The third workshop on **Enabling Measures** took place on 22 January 2022 and was organised together with the World Economic Forum to facilitate collaboration between IRENA Members and the private sector. The fourth meeting was convened on 5 April to facilitate **A Dialogue Between the EU and Gulf Cooperation Council on a Regulatory Framework to Develop Green Hydrogen Supply, Demand and Trade**.[23]

The workshops fall within the scope of the IRENA Collaborative Framework on Green Hydrogen. The fifth meeting[24] was held on 28 April, providing an opportunity to compare notes and discuss regional/global regulatory frameworks between the EU and Canada. IRENA and PtX hub held the second **EU-Canada Dialogue on Hydrogen**[25] on 20 June to consider how to build a sustainable supply chain of renewable and low-carbon hydrogen from Canada to the EU, notably focusing on transportation and demand.

As part of the **Indonesian G20 Presidency**, IRENA organised a workshop on **Accelerating Green Hydrogen Technologies and Energy Storage for the Energy Transitions**[26] on 15 June 2022, in association with the Energy Transitions Working Group. Participants had the opportunity to discuss experiences and plans in G20 countries for deploying energy storage technologies to meet the various requirements of the power system and provide energy services that facilitate its decarbonisation, while increasing reliability and energy security. They also considered how the production of green hydrogen can bring flexibility to the operation of power systems by showcasing G20 countries' experiences.

For the first time, IRENA has collected data on a range of quantitative innovation indicators on the costs and performance of renewable technologies, patents and standards. The report, **Renewable technology innovation indicators: Mapping progress in costs, patents and standards**[27], provides qualitative and quantitative insights on how seven renewable energy technologies have progressed through time, either fully or in part due to research, development and demonstration activities.

On 23 and 24 March 2022, IRENA organised the **Innovation Day Canada**[28] in cooperation with Natural Resources Canada to exchange knowledge concerning challenges and innovative solutions to decarbonise power and end-use sectors. More than 20 expert panellists and 300 participants from all continents explored four main areas: addressing energy access for remote communities via mini grids of the future; innovative hydropower solutions for a clean, reliable and flexible grid; pathways to decarbonise the road freight sector; and innovations to reduce emissions from the steel and iron sector. The discussions identified several good practices replicable at global scale, covering topics of technology and processes, enabling frameworks, business models, and market readiness for wide-scale deployment and increased use of renewables and enabling technologies.

[22] Available here.
[23] More information available here.
[24] More information available here.
[25] More information available here.
[26] More information available here.
[27] Available here.
[28] More information available here. Simulator available here.

Solutions for regions

Despite the fact that Central America's contribution to global CO_2 emissions is minimal, the region will be adversely impacted by climate change alongside all others. The report, **Renewable energy roadmap for Central America: Towards a regional energy transition**[29], provides a comprehensive pathway for the development of a cleaner, sustainable regional energy system and elaborates on how end-use sector (buildings, transport, industry) electrification, feasible expansion of renewable generation and energy efficiency solutions will influence the process. It also discusses the importance of expanding the existing level of regional power sector integration, while presenting sector-specific technological pathways, investment opportunities and tailored actions. The project included the delivery of workshops involving all countries in the region, both during the development of the analysis as well as during its final stages, to discuss results.

Many landlocked developing countries (LLDCs) are rich in renewable resources and can take full advantage of decreasing renewable energy costs to make progress toward realising a clean energy transition and socio-economic advancement. IRENA and the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS) prepared the **Scaling up renewables in landlocked developing countries**[30] report to present deployment trends, drivers, barriers and opportunities for energy transition in LLDCs. The report discusses the various challenges faced in attracting renewables investment to achieve universal access and net zero targets, and offers recommendations for LLDCs to accelerate deployment. The report also informed the substantive preparatory process on the thematic area of renewable energy for the Third United Nations Conference on LLDCs in 2024, which aims to formulate and adopt a renewed framework for international support.

The Southeast Asia region will see rapid economic growth in the coming decades and energy use is set to grow significantly. IRENA's second edition of the **ASEAN renewable energy outlook**[31], developed in collaboration with the ASEAN Center for Energy and the ASEAN Renewable Energy Sub-sector Network, presents a comprehensive pathway for the decarbonisation of the region's energy system. Guided by IRENA's WETO, the report explores the role of end-use sector electrification, the expansion of renewable generation, energy efficiency solutions, emerging technologies such as electric vehicles, hydrogen and battery storage-systems, as well the importance of expanding regional power sector integration.

Whilst all renewable energy sources have a role to play in Southeast Asia's energy transition, IRENA's report, **Scaling up biomass for the energy transition: Untapped opportunities in Southeast Asia**[32], focuses on the potential for bioenergy. The report studies five countries – Indonesia, Malaysia, Myanmar, Thailand and Vietnam – demonstrating an abundance of untapped bioenergy in the region and identifying immediate opportunities for adopting bioenergy in its constituent energy markets. The analysis also demonstrates the potential for sustainable biomass to economically meet the region's energy demand in the medium and long term. Policy options are presented and critical issues are highlighted, such as the sourcing of sustainable bioenergy feedstock and the need to foster collaboration among stakeholders.

[29] Available here.
[30] Available here.
[31] Available here.
[32] Available here.

Bioenergy plays a key role in global decarbonisation efforts, yet its global expansion may increase pressure on land use, leading to competition for food production, deforestation and other environmental impacts. IRENA has developed the **Bioenergy Simulator**[33], a web-based geospatial tool that allows users to understand bioenergy potential and related issues in a specific selected area. The Simulator is part of the **Global Atlas for Renewable Energy**[34], and is now publicly available.[35]

Long-term energy planning is crucial for achieving national and global net-zero targets, and **IRENA's Long-term Energy Scenarios (LTES) Network**[36] explores how governments develop and use LTES to navigate the clean energy transition. Net-zero targets require comprehensive pathways that consider elements that go beyond the power sector, and as such, require a broad scope of expertise, stakeholder participation and well-integrated scenario development frameworks. The LTES Network maintains its strategic and outreach activities through constant communication and the creation of thematic advisory groups to enhance engagement on technical topics.

Earlier in the year, the Network launched the beta version of the **National Energy Transition Planning dashboard**[37], that systematically gathers key features of long-term planning documents published by various national governments. The dashboard is being updated to reflect a stocktaking of various elements of the energy transition that have been defined through discussions and analyses held by the Network. Stakeholder participation in scenario development is a priority for the LTES Network. To promote this, IRENA organised a panel, **Energy scenario communication for strengthened inputs and trustworthy outputs**[38], on 25 May 2022, on the margins of the International Energy Workshop 2022. Discussions focused on key practices for successful communication and stakeholder engagement in the scenario development process. Attended by approximately 50 participants, the event marked the beginning of a series of discussions on this topic with the LTES Network community.

On 7-9 December 2022, the Network's 4th annual **International Forum on Long-term Scenarios for the Clean Energy Transition**[39], was convened in Bonn. The Forum brought together scenario practitioners to discuss how long-term scenarios can help governments navigate uncertainties globally, address the latest socio-technical challenges and make the most of the opportunities offered by the transition to a low-carbon economy.

[33] More information available here.
[34] Available here.
[35] Available here.
[36] More information available here.
[37] More information available here.
[38] More information available here.
[39] More information available here.

IRENA's report, **Scenarios for the energy transition: Experience and good practices in Latin America and the Caribbean**[40], jointly prepared with the GET.transform and the UN Economic Commission for Latin America and the Caribbean (ECLAC), summarises findings from IRENA's 2021 webinar series **LTES for Developing National Clean Energy Transition Plans in Latin America**.[41] Key findings include broader scenario scopes, increasing integration of climate and energy goals, emphasis on participatory planning processes, increasing shares of renewables in scenarios, the importance of energy data transparency, and the role of international co-operation in enabling long-term planning.

Engagement within the LAC region was further explored through the side event on **Renewable Energy for a Sustainable Future**, organised on the margins of the **Regional Energy Congress (COREN) 2022** on 25 August 2022. This event highlighted strategic actions, best practices and uses in LAC countries and opened the debate on the challenges and opportunities governments face in incorporating the aspects of a just energy transition in their energy planning processes.

IRENA continues to support the development of the **Continental Power Systems Master Plan (CMP)**. The CMP covers three main pillars: future demand assessment; capacity expansion planning; and network planning. IRENA's support consists of targeted training workshops on the second pillar. For this purpose, IRENA developed, for the first time, a capacity expansion model for the entire African continent: SPLAT-Africa. The first of four week-long workshops was held in Addis Ababa in June, and the second took place in Cairo on 14-18 August. The third was hosted in Bonn on 21-25 November. The training workshops were followed by dissemination events.

Global demand for food and water is expected to grow by 50% by mid-century, increasing pressure on existing water, energy, and food systems. IRENA's **Powering agri-food value chains with geothermal heat: A guidebook for policy makers**[42] report provides recommendations and addresses challenges related to inadequate data on geothermal resources and existing heating demand for agri-food applications; absent or misaligned enabling framework conditions; inadequate financing; and lack of awareness. Case studies of geothermal agri-food applications in Africa, Asia, Europe, the Americas, and Oceania are also presented. The report also proposes tools and methodologies to evaluate the social and economic impacts of using geothermal energy in the agri-food sector to support decision making.

Abu Dhabi Sustainability Week (ADSW) Talks[43] is an ADSW digital interview series exploring the different commitments being made by leaders to address global sustainability challenges. The Director-General was invited to an interview to discuss his vision for IRENA and hope for our common future, the technological innovations that will most dramatically change our energy future, and the role ADSW could play in shaping the global climate action agenda.

ADSW Talks

[40] Available here. The report is available in English and Spanish.
[41] More information available here.
[42] Available here.
[43] More information available here.

Investments for a sustainable future

IRENA supports the acceleration of renewable energy deployment through the **Climate Investment Platform (CIP)**[44] with a unique service offering available to Members. The Platform acts as a bridge between renewable energy projects and actors seeking to contribute to renewable energy project development through finance, technical assistance and research, as well as other means. Once projects qualify for support under the CIP, IRENA provides technical assistance to develop comprehensive Project Information Documents (PIDs) that verify, summarise and detail all the relevant information necessary to attract financing. Projects are then introduced to financial partners by presenting relevant PIDs. A project and a financier are considered matched once IRENA's introduction leads to both parties agreeing to explore the option of providing funding to the project.

Now in its third year, 362 projects have been sourced on the CIP, with 175 projects eligible for support. Of the 362 projects, 130 are from sub-Saharan Africa, 55 are from South America, 27 from the MENA region, 15 from Southeast Asia, 31 from South Asia, 13 from Southeast Europe, 9 from Central Asia, and 12 from SIDS. The remaining projects are based in other locations. In total, 48 projects are currently actively supported, out of which 34 projects are supported with PIDs, while 28 projects are at the matchmaking stage and 9 projects have already been matched to potential financiers (Table 4).

TABLE 4 **Number of projects supported by region**

Region	# of Total Projects	# of Projects supported
Central Asia	9	0
MENA	27	2
South America	55	2
South Asia	31	7
Southeast Asia	15	13
Southeast Europe	13	1
SIDS	12	5
Sub-Saharan Africa	129	18
Other	71	-
Total	**362**	**48**

As of August 2022, CIP has approximately 339 registered partners, of which 83 are willing to provide financial support to projects and 75 are willing to provide technical assistance. Partners include multilateral organisations, international development organisations, international financing institutes, private companies, commercial banks, and academic

[44] More information available here.

institutions. The partners characterise the CIP's global reach and are distributed as follows: 29% of partners are from Europe, 11% are from North America, 24% are from Sub-Saharan Africa, 1% are from Australia, 3% are from East Asia, 13.5% are from the MENA region, 3% are from Southeast Asia, 8% are from South Asia, and 7.5% are from Latin America and the Caribbean (Table 5).

TABLE 5 **Climate Investment Platform**

Number of MW Supported (42 projects)	**848**
Number of MW Matched (9 projects)	**241**
Technology Type Most Matched	**Solar**
Minimum Project Size Matched	**3.5**
Maximum Project Size Matched	**73.6**
Region with Most Matches	**Sub-Saharan Africa**
Cumulative Financial Value of Projects Matched	**591.11 million USD**

The **Energy Transition Accelerator Financing (ETAF) Platform**[45] is an initiative led by IRENA to facilitate capital mobilisation from international financial institutions – such as multilateral development banks (MDBs), development financial institutions (DFIs) and the corporate sector – to scale up the implementation of renewable energy projects and accelerate the energy transition in developing countries (Table 6). The ETAF platform aims to mobilise at least USD 1 billion by 2030 and facilitate the implementation of at least 1.5 GW of renewable energy technologies. At COP26, the UAE through the Abu Dhabi Fund for Development (ADFD) announced a commitment of USD 400 million in anchor funding for the ETAF. ETAF benefits from ADFD's 50 years of experience in concessional and development financing worldwide, as well as the successful track record of the IRENA-ADFD Project Facility. In November 2022, during COP27 in Sharm El Sheikh, Egypt, the Asian Infrastructure Investment Bank (USD 300 million), Masdar (USD 200 million) and SWISS RE (risk advisory, de-risking strategies and insurance solutions) signed ETAF Cooperation Agreements (CAs) joining ADFD as funding partners. The Inter-American Development Bank (IDB) also announced its interest in becoming a partner in ETAF and endeavor to co-finance up to USD 100 million of ETAF projects in renewable energy and decarbonisation technologies in Latin America and the Caribbean (LAC) region.

ETAF is now ready to receive eligible renewable energy projects through its website. An official call for projects was launched at COP 27.

TABLE 6 **Energy Transition Accelerator Financing (ETAF) Platform**

	**A multi-stakeholder climate finance solution to advance the global energy transition**
	**ETAF aims to accelerate energy transitions by mobilising and directing USD 1.0 billion into renewable energy projects in emerging economies**
	**ETAF leverages its partners' financing and project development expertise to achieve 1.5 GW of new project deployments before 2030**

[45] More information available here.

As part of a series of capacity-building activities aimed at accessing climate finance and promoting the deployment of renewable technologies in SIDS, IRENA co-organised a 5-day virtual training workshop from 1-4 March and on 18 March on **Climate Financing for Small Island Developing States (SIDS)** [46], together with the Ministry of the Environment of Japan through the SIDS Lighthouses (LHI) Initiative and the Green Climate Fund. The objective was to deepen the understanding of the requirements and procedures of various climate financing schemes, while also introducing various renewable technology options. IRENA used this opportunity to present details of two flagship initiatives – the Climate Investment Platform and the Energy Transition Accelerator Financing Platform.

IN FOCUS
IRENA-G20 Investment Forum for Energy Transitions

As part of IRENA's support to the Indonesian Presidency of the G20, IRENA co-hosted **Indonesia's G20 Energy Transition Investment Forum Pre-event**[47] on 19 July 2022, on the margins of the 2nd Partners in Energy Transitions meeting organised by the Task Force on Energy, Sustainability & Climate, B20. IRENA presented the Investment Forum as a key element of the Agency's strategy to increase its impact on the ground and add significant value in enabling investments in renewable energy projects. The Pre-Forum event was an opportunity to work closely with key stakeholders and strategic partners, such as governments, investors, project developers and the next generation of entrepreneurs, to help build momentum towards the G20 Energy Transition Investment Forum.

The **G20 Investment Forum on Energy Transitions**[48], co-organised by the Government of Indonesia and IRENA, was convened on 31 August - 1 September 2022, in conjunction with the G20 Energy Transition Ministerial Meeting in Bali, Indonesia, and attracted over 250 in-person participants and more than 1 200 online participants. The IRENA Investment Forum is a key element in the Agency's strategy to support the mobilisation of investments in energy transitions. The Forum convened global energy leaders to discuss how investments could be mobilised to support the energy transition and achieve carbon neutrality as well as drive energy transition investments, with particular emphasis on the Southeast Asia region. Moreover, it featured high-level policy dialogue and deep dives on finance and investment as well as one-to-one matchmaking sessions between project developers and financiers. Finally, it also laid the foundation for accelerating the net-zero pledges, made by global leaders at COP26, and mobilising the financing required for the energy transition. Some of the key messages that emanated from the discussions was the importance of creating an enabling environment as well as tailored financial solutions for the ASEAN region. Participants also stressed the importance of forging strong partnerships around project development.

Parallel matchmaking sessions were also organised to connect public and private project proponents with potential financial and commercial partners. The sessions were carried out in two formats, namely closed-door meetings, and an exhibition room. As a result, IRENA facilitated 32 bilateral matchmaking meetings. The exhibition room enabled ten project proponents to present over 27 projects and it attracted over thirteen potential financiers. In addition, IRENA with co-founding partner Siemens Energy and thirteen companies across all industry sectors officially launched the **Global Alliance for Industry Decarbonization.**[49] The new Alliance aims to accelerate net-zero ambitions and the decarbonisation of industrial value chains in pursuit of the Paris Agreement climate goals.

The G20 Energy Transitions Ministers' Communiqué[50] outlines the priority areas for action, namely, securing energy accessibility, scaling up smart and clean energy technology, advancing energy financing, as well as partnerships for just, affordable, reliable and sustainable energy transitions.

[46] More information available here.
[47] More information available here.
[48] More information available here.
[49] More information available here.
[50] Available here.

International cooperation and partnerships

The 12th session of the **IRENA Assembly**[51] took place virtually from 15 to 16 January 2022 under the theme "Energy Transition: From Commitments to Action", bringing together Heads of State/Government, Ministers, and energy decision-makers, as well as multilateral organisations, global stakeholders and private actors. At the Assembly, Members gathered to reassess long-standing assumptions, perceived barriers and default decisions, and discuss the energy transition as an investment in our collective future.

IRENA 12th Assembly

The opening also featured a **High-level Meeting on the Outcomes of COP26 and the High-level Dialogue on Energy,** aligned with the Assembly theme. The session's objective was to take stock of the energy-related outcomes of COP26 and the Dialogue and identify concrete actions that can accelerate the energy transition, considering the 2030 timeline. It also considered how to use IRENA's General Assembly and the Global High-Level Forum on Energy Transition to best support these efforts, including links to the upcoming COP27 in Egypt and COP28 in the UAE.

[51] More information available here.

The **Geopolitics of the energy transformation: The hydrogen factor** report was also officially launched at the Assembly, with Mr Francesco La Camera, IRENA Director-General, presenting the key findings, followed by a short exchange around the larger topic and the role of hydrogen. The launch event also included a pre-recorded discussion of the Director-General with Mr Daniel Yergin, Vice Chairman of IHS Markit and Chairman of CERAWeek, on the future of hydrogen.

Related Ministerial Roundtables and High-level events focused on pressing issues of the energy transition were held on 13 and 14 January 2022 as well. The meeting on **Long-Term Energy Scenarios for Developing Energy Transition Plans in Africa - Featuring Regional Power Pools** served to share the lessons learnt from the African power pools' LTES planning practices, both in terms of institutional governance as well as LTES methodologies. The **Ministerial Meeting on Just and Inclusive Energy Transitions in Africa - Promoting Development and Industrialisation** focused on the relationship between development and energy, diving deep into the interlinkages between SDG 7 and other SDGs, including SDG 8 on Decent Work and Economic Growth and SDG 9 on Industry, Innovation and Infrastructure. It provided a platform to showcase leadership and commitments in support of putting energy transitions at the centre of development and industrialisation goals in Africa. The Ministerial Meeting also witnessed the launch of IRENA's report **Renewable energy market analysis: Africa and its regions.**

Several Stakeholder Engagement events were organised virtually on the margins of the 12th IRENA Assembly that brought specific perspectives on the energy transition from parliamentarians, youth and the private sector. **IRENA's Legislators Forum**[52] was convened on 13 January under the overarching theme, "Parliamentary and regulatory actions to drive national energy transition policies: From commitment to action". At the meeting, participants had the opportunity to engage in inclusive and diverse discussions on actions and share the most up-to-date policy measures that can guide legislators in supporting countries to shift the energy transition to the implementation phase of national and international commitments.

The fifth edition of the **IRENA Public-Private Dialogue**[53] was also held on 13 January, bringing together policy makers, industry associations, private sector stakeholders and civil society to explore ongoing and planned efforts to promote circular economy and end-of-life management for renewables. The first session provided an industry perspective on what is needed to advance sustainable life-cycle practices and resource efficiency for renewables as the energy transition accelerates. The second session showcased public and private actors' insights on policy actions urgently needed from governments and the energy industry to accelerate global progress towards unlocking the benefits of a truly sustainable renewable energy sector.

[52] More information available here.
[53] More information available here.

IRENA YOUTH

For the third year in a row, **IRENA's Youth Forum**[54] was organised on the margins of the Agency's Assembly. The 2022 edition of the IRENA Youth Forum was held on 13 January under the overarching theme "Youth-led solutions to accelerate the energy transition and achieve climate objectives" and highlighted the role of young people in identifying and developing solutions that can promote and accelerate the renewables-based energy transition to achieve climate targets and other sustainable development goals. Over 400 young energy leaders gathered virtually and called on organisations, governments, private sector, academia and civil society to take urgent action to ensure that the energy transition is led by young people. The meeting also offered the opportunity to identify the essential areas that require support for youth to contribute to the advancement of a global energy transition.

As chair of the **IRENA Global Council on Enabling Youth Action for SDG 7**[55], the IRENA Director-General dedicated the focus of the Council to the intersection of Youth and SDG 7. In his opening remarks at the first meeting on 14 February 2022, he underlined that "the world is not on track to realise the SDG 7 target of affordable, reliable and sustainable energy for all. Referred to by the Director-General as an 'intergenerational Council', the Council brings together 18 young leaders, government representatives, expert practitioners and delegates representing different institutions and regions, to develop and adopt an action plan with concrete initiatives that can drive forward youth-led action on energy access and the transition to a renewable energy future. Within the framework of the Council, IRENA organised a workshop, under the IRENA Youth Talk initiative, on 27 June 2022. The workshop discussed **The Role of Governments in Unlocking Private Finance for Youth Actions on SDG 7**[56]. The outcome of the meeting fed into the NDC Partnership Youth Engagement Forum, held from 21 to 28 July 2022.

More than 2.6 billion people around the world still rely on traditional fuels for their cooking needs, yet progress on the realisation of the relevant SDG 7 target still lags. During the seventh edition of the Renewables Talk for IRENA Permanent Representatives on 4 March 2022, IRENA and the Government of the United Arab Emirates launched the **Beyond Food partnership**[57], a new joint initiative to provide people crucial access to sustainable energy for cooking. This partnership, in collaboration with Nama Women Advancement Establishment, will focus on enterprise support and twinning targeting women entrepreneurs.

[54] More information available here.
[55] More information available here.
[56] More information available here.
[57] More information available here.

Last year's G20 Leaders' Summit concluded with a Declaration that emphasised the importance of action in the areas of energy and climate and included commitments to reduce emissions and promote zero or low carbon emissions and renewable technologies. In this context, IRENA jointly organised an event with the Global Renewables Congress and the Climate Vulnerable Forum Global Parliamentary Group, on **G20: From commitment to action**[58] on 31 August 2022. The event sought to transform commitments into actions by galvanising enabling policy frameworks for global energy transitions across sectors powered by renewables. Discussions highlighted policy recommendations for G20 countries as well as the introduction of a new handbook by the Global Renewables Congress exhibiting existing renewable energy policy case studies in the Global South.

The COVID-19 pandemic further aggravated the challenges faced by SIDS, yet their commitment to renewables remains unwavering. The 2022 edition of the **SIDS Lighthouses Initiative (LHI): Progress and way forward**[59] annual report provides an overview of energy transformation and implementation progress in SIDS in 2021. The report presents key developments in the energy transformation, undertaken jointly by SIDS and development partners, as well as updates on achievements and best practices across the Initiative's eleven priority areas. It also highlights the areas in urgent need of support in the context of the energy transition and climate action in SIDS.

To drive global offshore wind deployment, the Government of Denmark, IRENA and the Global Wind Energy Council (GWEC) joined forces to establish the **Global Offshore Wind Alliance (GOWA).** GOWA is a multi-stakeholder alliance consisting of governments, private sector actors from across the offshore value chain and international organisations. GOWA's vision is to help create a world in which offshore wind makes a significant contribution to the energy transition and SDGs' realisation, through large-scale renewable power, while benefiting regions, countries, and critical sectors such as industry and transportation. The goal is to drive global offshore capacity to a minimum of 380 GW by 2030 and 70 GW each year thereafter towards 2050 as well as raise political ambition and create an inclusive platform for knowledge exchange and collaboration. A particular focus will be on emerging markets and developing countries. A soft launch took place during the United National General Assembly in New York in September 2022, while GOWA was formally launched at COP27.

IRENA, along with companies[60] across all industry sectors, launched the **Alliance for Industry Decarbonisation**[61] at the G20 Investment Forum in September 2022. The partners adopted the Bali Declaration to accelerate net-zero ambitions and the decarbonisation of industrial value chains in pursuit of the Paris Agreement climate goals. IRENA acts as the Secretariat of the Alliance. Siemens Energy and Tata Steel co-chair the Alliance leadership, and knowledge partner Roland Berger supports the Alliance by sharing best practices. On 11 November 2022 IRENA and the Alliance held the **CEO Roundtable Meeting**[62] at COP27 to outline a joint vision and implementation plan focused on six pillars and enablers: renewables, green hydrogen, bioenergy with Carbon Capture, Utilisation and Storage, heat process optimisation, human capital, and finance. The Alliance is urging new members to sign up and join their common vision to speed up the energy transition. Membership is open to public and private firms and stakeholders operating in energy-intensive sectors ready to decarbonise their activities.

On 21-23 September 2022, the United States hosted the first ever Global Clean Energy Action Forum, a joint meeting of the **13th Clean Energy Ministerial (CEM)** and **7th Mission Innovation (MI) Ministerial**[63] meeting in Pittsburgh. This year's CEM13/MI-7 was held under the theme Rapid Innovation and Deployment with the goal to help accelerate their pace and scale through collaborative efforts and shared strategies. The subthemes were Jobs and Community; Technology Transformation; and Unprecedented Deployment. The IRENA Director-General gave remarks at the opening Call-to-Action[64] plenary meeting that brought together global energy leaders to reflect on remaining gaps and opportunities for global energy cooperation. He also gave closing remarks at the event officially launching the new CEM Initiative on Transforming Solar: Supply Chains, whose initial focus will be on the solar PV manufacturing value chains. In addition, the Director-General participated in Ministerial Roundtables on power sector transformation and just transition. In the margins of the CEM13/MI-7, IRENA co-organised with its partners a series of side-events on the Breakthrough Agenda Report: Accelerating Sector Transitions Through Strengthened International Collaboration; Job Creation and Gender Balance in the Energy Transition: Priority Actions and Perspectives; Pathways for Rapid

[58] More information available here.
[59] Available here.
[60] The founding members include Enel Green Power, TAQA Arabia, Eni, Technip Energies, EDF Renewables, JSW, Tata Steel, Sable Chemicals, Tatanga Energy, Repsol, Equinor and TAQA. Since the launch, 13 new partners joined the Alliance, with more set to join in the next weeks.
[61] More information available here.
[62] More information available here.
[63] More information available here.
[64] More information available here.

Decarbonisation of Power Systems; G7 Hydrogen Action Pact; Tracking the Progress of Innovation; Global dialogue on Road Transport Pathways in LTES; and the role of BECCS and DACCS.

IRENA, in collaboration with the Government of El Salvador and the International Geothermal Association convened the **Second High-level Conference of the Global Geothermal Alliance (GGA)**[65] on 29 September – 1 October 2022 in San Salvador, El Salvador. Discussions focused on developments, challenges, and solutions of the global geothermal community and the progress of geothermal deployment. IRENA organised a side event to promote geothermal as an integral energy solution in SIDS as well as a capacity building workshop on powering agri-food value chains with geothermal heat with a focus on Latin America. In addition, countries endorsed the San Salvador Declaration, reaffirming the political commitment to foster geothermal development across the world.

The GGA develops publications for policy makers as well as geothermal market and technology assessments to promote the deployment of geothermal energy in the electricity and end use sectors. Seven years since its establishment, the GGA carried out a review of its activities. The aim of the review was to assess whether the initial objectives of the Alliance are still aligned with the expectations of the constituency as well as with the ongoing changes in the geothermal sector. The results of the review provide a strategic and forward-looking implementation plan that the GGA can adopt in the coming years.

At the sixth **Annual Strategy meeting of the Coalition for Action**[66], held in conjunction with the 12th session of the IRENA Assembly on 25 January 2022, Coalition members strategically discussed how the work of the Coalition can build on the success of 2021. Members also decided on the Coalition work programme for 2022 and main action deliverables. Between April and June 2022, the Coalition also organised expert webinars for its Business and Investors Working Group and the Decarbonising End-use Sectors Working Group. Moreover, the Coalition organised topical webinars on Labour Perspectives: Keys to a Just and Renewable Energy Future and another on Community Energy Benefits for its broad membership.

IN FOCUS
IRENA wins the United Nations SIDS Partnerships Award

In recognition of IRENA's invaluable support to SIDS transition to a sustainable energy future, IRENA received the first ever **United Nations SIDS Partnerships Award**[67] in the environmental category. The ceremony took place on 11 July 2022 in New York, on the margins of the UN High-level Political Forum on Sustainable Development. The award recognises IRENA as the coordinator of the **SIDS LHI**[68] and acknowledges the Agency's response to a call for action under the SIDS Accelerated Modalities of Action (SAMOA) Pathway to strengthen cooperation and partnerships towards the achievement of the Paris Agreement and SDGs. Launched by Portugal and Samoa, as Co-Chairs of the Steering Committee for SIDS Partnerships, the award was created in line with the Pathway and addresses SIDS' unique challenges in realising the 2030 Agenda and the Paris Agreement.

The SIDS LHI is an inclusive multi-stakeholder framework of action bringing together 39 SIDS from the Caribbean, the Pacific, the Atlantic, Indian Ocean and South China Sea (AIS) regions, as well as 32 partners from public, private, intergovernmental and non-governmental sectors. Some of IRENA Members supporting the Initiative are Denmark, the EU, France, Japan, Germany, Italy, New Zealand, Norway, the UAE and the United States. The Initiative seeks to achieve a target of 10 GW of total renewable energy installed capacity in all SIDS by 2030.

[65] More information available here.
[66] More information available here.
[67] More information available here.
[68] More information available here.

Collaborative Frameworks

IRENA's **Collaborative Frameworks**[69] (Table 6) are strong evidence of the Agency's commitment to enhancing Member engagement and ownership of the programmatic output, while enabling peer-to-peer collaboration and exchange of national experiences, challenges and respective solutions.

TABLE 7 **List of Collaborative Frameworks and their respective Co-facilitators**

COLLABORATIVE FRAMEWORK on Critical Materials for the Energy Transition		
COLLABORATIVE FRAMEWORK on Enhancing Dialogue on High Shares of Renewables in Energy Systems		
COLLABORATIVE FRAMEWORK on the Geopolitics of Energy Transformation		
COLLABORATIVE FRAMEWORK on Green Hydrogen		
COLLABORATIVE FRAMEWORK on Hydropower		
COLLABORATIVE FRAMEWORK on Just and Inclusive Energy Transition		
COLLABORATIVE FRAMEWORK on Ocean Energy/Offshore Renewables		
COLLABORATIVE FRAMEWORK on Project Facilitation to Support on-the-ground Energy Transition		

[69] More information available here.

IN FOCUS
Collaborative Framework on Critical Materials for the Energy Transition

Currently, climate-neutral energy systems require significant amounts of critical minerals including lithium, nickel, cobalt, copper and rare earth elements for renewable energy installations and storage solutions. As climate goals become more ambitious and renewables develop into an indispensable pillar of net zero commitments, prices of raw materials have begun to surge. The **Collaborative Framework on Critical Materials for the Energy Transition**, launched on 21 March 2022, will promote the exchange of knowledge and best practices, and coordinate actions to ensure that the scarcity of minerals and materials does not threaten the accelerated deployment of renewable energy.

At the first meeting, Peru and the United Kingdom were appointed co-facilitators and it was decided that the work of the Framework would be consucted through three Workings Groups (WG) focusing on:

OBSERVATORY	DE-RISKING SUPPLY	ESG AND MINING
Collect data that help **understand scarcity and potential supply shortages** that may affect the energy transition in the coming decade	Develop and apply **strategies to de-risk supply**	Develop and apply strategies to **raise acceptance for new mining projects**

Members also stressed IRENA's key role in this field due to its near-universal Membership and convening power, and identified the priority areas of action to address around the topic. These are:

- Ensuring sustainable and responsible mining. Greenhouse gas emissions resulting from the mining industry must be tackled and taken into serious consideration.
- Data transparency is of high importance to better understand critical materials and potentials supply chain shortages. Countries need to develop a national coverage database.

IRENA has already rapidly built knowledge on the topic, in partnership with key stakeholders. This year, IRENA published the technical papers, **Critical materials for the energy transition: Lithium**[70] and **Critical materials for the energy transition: Rare earth elements**[71]. WETO 2022 also includes one chapter on possible pathways to address the issues around critical materials.

The Working Group (WG) on De-risking Supply organised its first meeting on 9 June 2022[72] to consider priority areas to de-risk the supply chain of critical materials and minerals. The first meeting of the WG on Observatory for Critical Materials and Minerals convened on 6 July 2022[73] to explore how best to understand scarcity and potential supply shortages that may affect the energy transition in the coming decade. Likewise, the WG on ESG and Mining held its first meeting on 12 September 2022[74] to discuss methods to raise acceptance for new mining projects, best ESG practices, standards, and certification for green sourcing, and creating local mining benefits.

[70] Available here.
[71] Available here.
[72] More information here.
[73] More information available here.
[74] More information available here.

The **Collaborative Framework on Enhancing Dialogue on High Shares of Renewables in Energy Systems** focuses on (I) energy markets and regulations, (II) energy system planning, (III) energy system operation, (IV) cross-sectoral strategies, (V) cross-border interconnections, and (VI) energy system innovation. The pilot phase includes thematic discussions on the first three workstreams. A meeting on Workstream (II)[75] was convened on 2 June 2022 to provide a platform for an exchange of experiences and best practices on LTES, planning models, and innovative approaches and means to improve key areas of energy system planning. The Framework met again on 20 October 2022[76] to discuss Workstream (I) on how to facilitate the penetration of renewables and secure stable regulatory frameworks that contribute to long-term investment security. In addition, El Salvador and Japan were appointed new Co-facilitators.

The **Collaborative Framework on the Geopolitics of Energy Transformation (CF-GET)** held a meeting on 26 April 2022. The meeting was split into two segments. During segment I, Members held a high-level discussion on the findings of the recently launched geopolitics report on hydrogen and exchanged views on the evolving geopolitical energy landscape and the role of hydrogen in the process. In segment II, Members discussed and agreed on the priority topics the Framework should take forward in 2022. At the sixth meeting of the Framework that took place on 28 November 2022[77], Members had the opportunity to provide input on the thematic directions of a data-driven indicators framework at the nexus of geopolitics and energy transition. They were also apprised of activities under the Collaborative Framework on Critical Materials and updated on plans for a deep dive on the geopolitics of critical materials supply chains. Moreover, Namibia and Norway were appointed the two new Co-facilitators.

On 23 May 2022, the **Collaborative Framework on Green Hydrogen held its fifth meeting**[78] to explore the role of international trade of hydrogen in strengthening energy security, while accelerating the decarbonisation of hard to abate sectors; key barriers to the development of international green hydrogen projects and trade; and the sharing of best practices related to the development of successful bilateral hydrogen trade deals. In addition, the meeting marked the launch of the second instalment of the Global Hydrogen Trade to Meet the 1.5°C Climate Goal reports focusing on Green Hydrogen Cost and Potential. On 5 October, the sixth meeting of the Framework took place. The meeting's objectives were to share the latest developments in the field of hydrogen certification and highlight areas of possible participation; discuss Member activities and priorities and collect feedback from Members on priorities for IRENA's work. [79] Germany and the UAE have taken up the role of the Framework's co-facilitators.

On 1 June 2022, IRENA organised the fourth meeting of the **Collaborative Framework on Hydropower** [80] to consider critical challenges and potential solutions pertaining to the advancement of sustainable hydropower globally. At the meeting, Members received an overview on IRENA's latest work and findings on hydropower, the status and outcomes of other relevant initiatives from other stakeholders, and an update on the International Conference on Hydropower Investment in Developing Countries. The Conference was co-organised by the Government of Switzerland and IRENA, and took place in Geneva on 13-15 October 2022, with the aim to promote hydropower development and facilitating investments in the sector mainly in the Asia-Pacific region, Latin America, and Africa. At the 6 December 2022[81] meeting, Members were informed of the Conference's outcomes and the Agency's latest work on the issue. Members appointed Canada and Zimbabwe as the new co-facilitators.

The second meeting of the **Collaborative Framework on Just and Inclusive Energy Transition** on 21 October 2021[82] saw the high-level launch of a special edition of the IRENA **Renewable energy and jobs: Annual review**, developed in cooperation with the ILO. The Framework met again on 6 September 2022 to share and capture country experiences on advancing just and inclusive energy transitions, with a focus on creating and retaining jobs and fostering livelihoods. The meeting focused on concrete examples of how policymakers have approached challenges and opportunities in this regard. The dialogue is part of a series of country and multi-stakeholder exchanges on specific

[75] More information available here.
[76] More information available here.
[77] More information available here.
[78] More information available here.
[79] More information available here.
[80] More information available here.
[81] More information available here.
[82] More information available here.

themes related to just and inclusive energy transitions. The COP27 Roundtable on ***Making Energy Transitions Work for People: Decent Jobs, Skills, Livelihoods and Inclusion*** focused on the opportunities and challenges that the energy transition offers to workers and communities. The roundtable brought together a diverse group of actors to discuss experiences, priority action areas and on-going efforts. Insights will inform the work of the Framework.

The **Collaborative Framework on Ocean Energy/Offshore Renewables** has agreed on 13 topics around the areas of technology development, research and innovation, market incentives, and sustainability. The Framework met on 24 June 2022[83] to advance government understanding of offshore wind, with a focus on creating enabling frameworks for the scale up of offshore renewable technologies. Participants exchanged knowledge on the best practices in implementing enabling frameworks to accelerate the deployment of offshore renewables globally and identified synergies with the **Global Offshore Wind Alliance (GOWA)**.[84] The fifth meeting of the **Collaborative Framework took place on 1 November 2022**[85] to discuss ways to facilitate and expedite permitting processes for offshore wind farms and instruments to scale up investment in ocean energy technology. The meeting also served to collect inputs on two upcoming briefs, namely on "Enabling Frameworks for Offshore Wind Scaleup: Innovation in permitting", prepared by IRENA and the Global Wind Energy Council, and on "Scaling up investment in Ocean Energy Technologies", prepared by IRENA and Ocean Energy Europe.

The **Collaborative Framework on Project Facilitation to Support on-the-ground Energy Transition** convened its inaugural meeting on 19 May to explore priority issues, objectives, collaborative processes and a proposed way forward for the Agency's work on project facilitation and support. The Framework's goal is to explore ways to tailor project facilitation support to address Members' needs and help them create an enabling environment to scale up private investment in renewable energy projects or deploy renewable technologies at scale. In addition, the Framework will further highlight the unique challenges Members face in attracting capital to fund renewable projects and focus on how IRENA can amplify its existing support, and further tailor its assistance to help Members build a pipeline of bankable projects. At the first meeting Members agreed to the general principles and the processes needed for participation, reporting and high-level meetings, and Austria and Egypt were elected as co-facilitators.

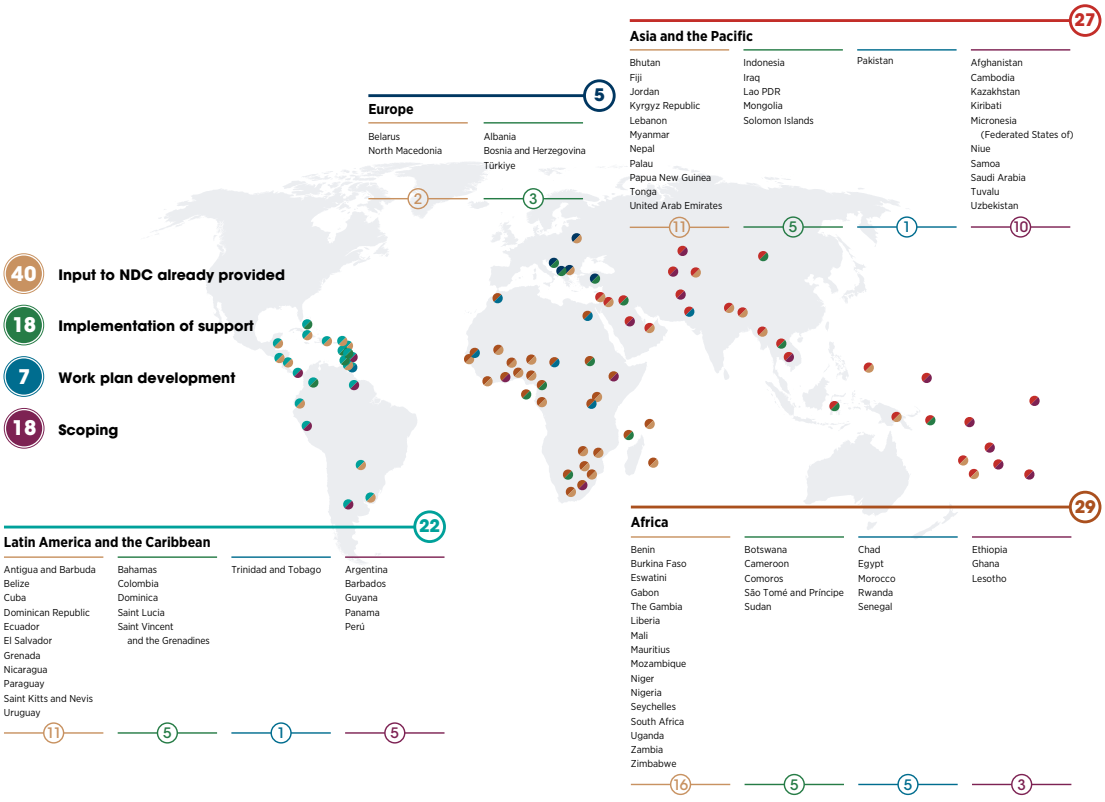
The Collaborative Framework on Oil and Gas Sectors and the Energy Transition is currently under development.

Targeted climate action

IRENA's Members are increasingly reaching out to the Agency with requests to receive targeted support for climate action to enhance their NDCs and support implementation. In response to this, IRENA is currently engaging and supporting 83 countries in terms of NDC enhancement and implementation across all continents. This is equivalent to 2 billion people and covering total energy-related greenhouse gas emissions of 4 billion tonnes of carbon dioxide equivalent per year. Currently, IRENA's NDC enhancement and implementation support includes 164 work packages to support the needs of IRENA Members, who are parties to the Paris Agreement in enhancing and implementing their energy transition plans while reflecting these climate action commitments in NDC submissions (Figure 14). IRENA's contribution to long-term strategies includes six work packages of which four exist within the NDC Support umbrella.

[83] More information available here.
[84] GOWA is an initiative founded by IRENA together with Denmark and the Global Wind Energy Council (GWEC).
[85] More information available here.

FIGURE 14 **IRENA's engagement**

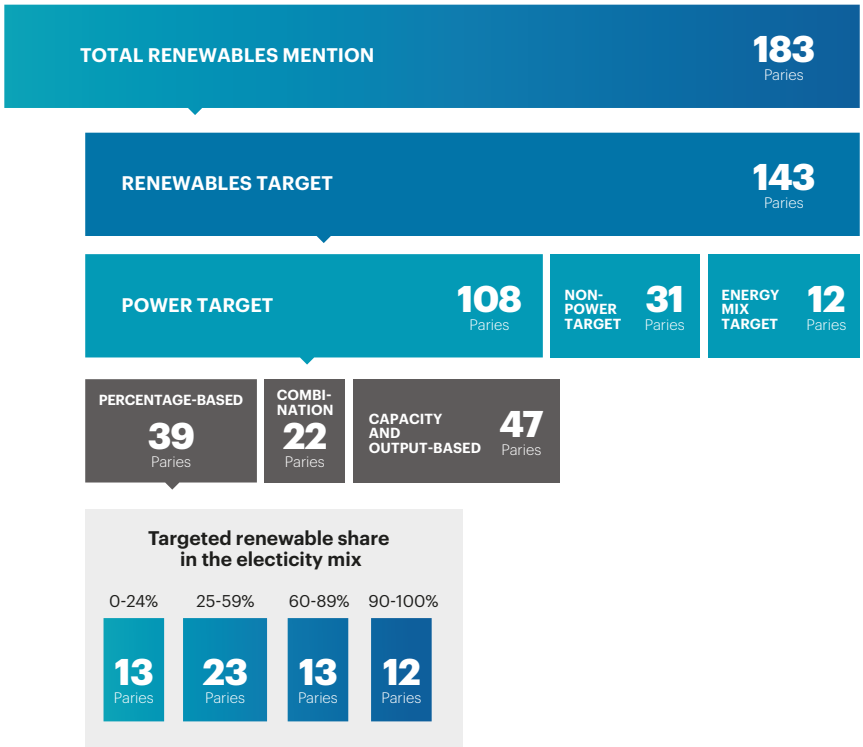


Despite making a sizeable difference to greenhouse gas emissions and global temperature rise, we still need to set the world on a climate-safe pathway. IRENA's **NDCs and renewable energy targets in 2021: Are we on the right path to a climate-safe future?**[86] report assesses current climate pledges in light of the challenge ahead, and explores the transformative opportunity offered by renewable energy that can serve as an important vehicle for delivering the required emission reductions, as well as multiple Sustainable Development Goals. Governments, financial institutions, and private sector entities must broaden ambition commensurate to the scale of the climate threat, followed by real, short-term, accelerated implementation - a key aspect of the Glasgow Climate Pact made at COP26.

[86] Available here.

Renewable energy is one of the key components of the energy transition, but not all countries have included targets for their deployment in their NDCs. IRENA's report, **Renewable energy targets in 2022: A guide to design**[87], sets out to support governments in designing renewable energy targets that can help achieve these pressing objectives. The report presents an overview of the latest updates in climate commitments made ahead of COP27, focusing on the renewable energy targets in NDCs. For instance, as of 16 October 2022, 183 Parties had included renewable energy components in their NDCs, of which only 143 had a quantified target (Figure 15). It also provides guidance on designing targets to achieve policy objectives related to the climate and beyond, within the specific contexts of jurisdictions, including resource availability, the level of development of the renewable energy sector and necessary infrastructure, and the future energy mix.

FIGURE 15 **Renewable energy targets in NDCs (as of 16 October 2022)**

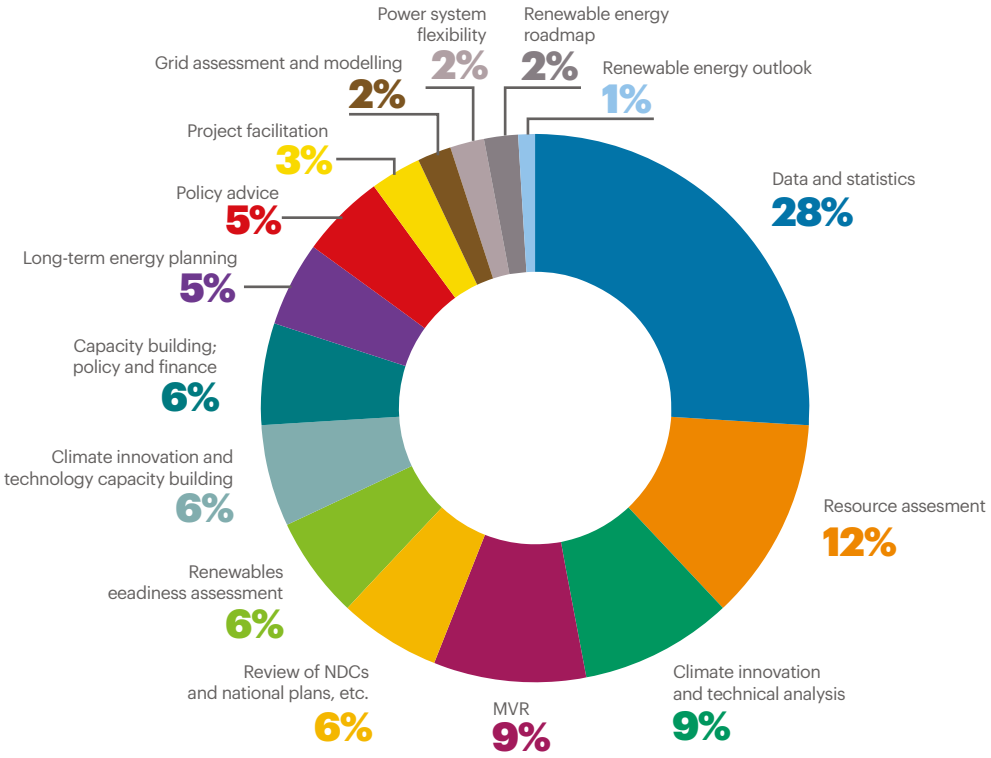


Source: *IRENA, Renewable energy targets in 2022: A guide to design, 2022.*

IRENA provides support to enhance Members' ambitions regarding climate commitments and to effectively implement national climate action policies and plans. IRENA's support covers a total population of around 2 billion people and an estimated combined emissions of 4 billion tonnes of carbon dioxide (CO_2) equivalent. **IRENA's energy transition support to strengthen climate action**[88] report highlights the ongoing and previous work to this end. of the Agency to support countries through its various long-term strategies (work packages), including those concerned with project development, financing and investment, while the Annex of the report lists support and climate action commitments for individual countries (Figure 16).

[87] Available here.
[88] Available here.

FIGURE 16 **Distribution of IRENA's work packages (%)**



Source: *IRENA, IRENA's energy transition support to strengthen climate action, 2022.*

The Breakthrough Agenda was launched at COP26 in Glasgow in 2021 by 45 countries representing more than 70% of the planet's economic output, committing to work together to make clean technologies and sustainable solutions the most affordable, accessible and attractive options in each of the emitting sectors by 2030. The Agenda could make an important contribution to strengthening international collaboration where it is needed most and focus attention on critical problems to solve in each emitting sector, namely power, hydrogen, road transport, steel and agriculture. Leaders invited IRENA, the IEA and the UN High-Level Climate Champions to conduct an annual assessment to evaluate progress against the objectives of the Breakthrough Agenda in high-emitting sectors, track progress and identify priorities for stronger collective action that could have the greatest impact in accelerating transitions. The first assessment, **Breakthrough Agenda Report: Accelerating sector transitions through stronger international collaboration**[89] was released on 20 September 2022.

[89] Available here.

IN FOCUS
IRENA supports COP27

IRENA is conveying this message throughout its work to stress the urgency of implementation, laying the foundation for the energy transition tracks of COP27.

The 27th United Nations Climate Change Conference (COP27) was held in Sharm El Sheikh, Egypt from 6 to 18 November 2022. In line with the COP27 Presidency's priorities, the African COP presented a strategic opportunity to accelerate implementation across development and climate priority areas, where renewable energy can play a central role. With shifting narratives and crises necessitating short-term responses, IRENA sought to maintain the focus on a renewables-based energy transition as a solution for multiple problems, notably energy security, energy access and job creation. Consolidating climate action to harness immense renewable potential on the continent will help achieve multiple priorities across mitigation and adaptation and resilience, such as universal access and areas like agriculture, water, health and education. IRENA therefore supported the Egyptian COP27 Presidency to promote the acceleration of energy transitions in Africa and beyond by showcasing its work on green hydrogen, just transitions, adaptation and resilience, urban cities, and investment and project facilitation, among others.

At COP27, IRENA[90] hosted and organised events that highlighted these topics to promote the sharing of knowledge and mobilise investment for energy transitions. For example, as the lead of energy within the Marrakech Partnership for Global Climate Action, IRENA coordinated the Energy Action Event on Energy Day on 15 November 2022, which highlighted signals of progress in the energy transition and explored how to accelerate solutions with speed, scale and justice. IRENA also organised a joint official side event with REN21 and Sustainable Energy Africa on accelerating energy transitions in Africa with renewable energy.

Finally, IRENA had a pavilion at COP27 to showcase the work of the Agency and partners, emphasising energy transitions to achieve climate and development goals. Events in the IRENA pavilion convened Members, private sector, civil society, academia and others from different sectors to provide a holistic and inclusive view on energy transitions, instilling the notion that all belong in this discussion to ensure a just and equitable energy transition.

At COP27, the IRENA Director-General participated in several high-level meetings such as the one on ***Investing in the Future of Energy: Green Hydrogen*** organised by the COP27 Presidency, and the ***High-level Meeting on Delivering on Ambitious Climate Commitments: Finance for Implementation*** organised by the NDC Partnership. He also had a Fireside Chat with Mr Makhtar Diop, IFC Managing Director to discuss ways to propel the achievement of the energy access agenda.

The 28th session of the Conference of the Parties (COP28) to the UNFCCC is scheduled to take place in the United Arab Emirates from 6 to 17 November 2023. For COP28, IRENA is already in discussions with the Government of the UAE on how to build on the narrative from COP27 and highlight energy transitions in the MENA region. Particularly, IRENA is supporting the COP28 Presidency in the process of the UNFCCC First Global Stocktake, which will conclude at COP28 in 2023. The Global Stocktake intends to increase the ambition of actions and support for collectively addressing climate change by understanding the status of the transition and how to accelerate the transition to align with a 1.5°C pathway. IRENA will support the UAE in convening global and regional meetings to showcase how the energy transition can support the Global Stocktake process and achieve the Paris Agreement goals.

[90] More information available here.

IRENA is leveraging climate fora, such as **Regional Climate Weeks**, to showcase how energy transitions can be a solution to climate change, while bringing socio-economic benefits. Organised by the core partners[91], Regional Climate Weeks provide a platform for governments, cities, private sector leaders, financial institutions, and civil society to discuss opportunities to build forward from the pandemic by identifying opportunities to enhance climate action. Regional Climate Weeks 2022 kicked off with the first-ever **Middle East and North Africa Climate Week (MENACW2022)** convened on 28-31 March 2022 in Dubai, UAE, in which IRENA participated as a regional partner. In this context, IRENA supported the core partners' sessions and organised sessions on energy transitions in the MENA region. In 2022, the Regional Climate Weeks will focus on three themes that build on last year's outcomes: national actions and economy-wide approaches; integrated approaches for climate-resilient development; and seizing transformation opportunities. MENACW will accelerate collaboration and integrate climate action into global recovery.

At MENACW, IRENA hosted five sessions[92] on pertinent issues. On 28 March, IRENA held an event on **Catalysing Concerted Action on the Ground towards Achieving the Global Energy Transition** based on the IRENA-UNDP partnership and its aim to scale up both project facilitation globally and the flow of renewable energy (RE) investment towards countries of the region. A session on **Enabling Frameworks to Accelerate the Energy Transition** took place on 29 March to outline the need for policy ambition and enabling regulation in the power sector to mobilise large-scale private sector investment in renewable energy and energy efficiency in the region. The **Renewable Energy Driving Climate Action towards Net-zero in 2050 across the MENA Region** event on the same day served to present the latest findings on the energy transition, drawing from IRENA's 2021 WETO and contextualise it to the MENA context. On 31 March, the session on **Technology Options for a Just and Inclusive Energy Transition** explored how energy transition technologies can accelerate the energy transition in the region, enhance socio-economic benefits, and showcase partnership opportunities. On the same day, IRENA also organised an event on **Collaborations and Partnerships to Accelerate a Just and Inclusive Energy Transition** to highlight the importance of increased collaboration and partnerships in supporting the implementation of energy commitments and pledges made at the High-level Dialogue on Energy and COP26 in order to build momentum with concrete progress by COP27.

[91] UNDP, UNEP, UNFCCC, and World Bank.
[92] More information available here.

The **Latin America and the Caribbean Climate Week (LACCW) 2022** was convened on 18-22 July 2022 in Santo Domingo, the Dominican Republic. LACCW engaged and empowered stakeholders to drive climate action, address social inequalities and invest in development for the benefit of humanity and nature. At LACCW, IRENA worked with partners to promote energy transitions to advance climate action, address social inequalities and invest in development that is good for humanity and nature. Specifically, IRENA co-organised a session with UNEP on promoting sustainable energy transitions for climate justice and energy security and co-organised a session with UNFCCC on the potential of green hydrogen production, finance and use in the region. Additionally, IRENA organised a side event to showcase how renewable energy can accelerate regional climate action and build momentum towards net-zero across the LAC region.

Lastly, the Africa Climate Week 2022 was held on 29 August to 2 September in Libreville, Gabon. On the margins of the ACW, IRENA organised three side events. On 30 August, IRENA organised an event on ***Maximising socio-economic gains in Africa through just and sustainable energy transitions*** to showcase how the shift to an economy underpinned by a just, sustainable, and secure energy system will maximise socio-economic gains for the continent, and the pre-requisites to achieve this. On that day, IRENA and the Ministry of Electricity and Renewable Energy, Egypt convened a meeting on ***Ratcheting up the Energy Transition for Climate Action in Africa***. IRENA also presented its work in Africa at the Action Hub. In addition, together with UNFCCC and the Africa Green Hydrogen Alliance, IRENA organised an event on ***Potential for Green Hydrogen to Achieve Climate and Development Goals in Africa*** on 31 August. IRENA also participated in several other events on topics such as the global stocktake, green finance and investment, food loss and waste in the region.

Communications and outreach: Amplifying impact

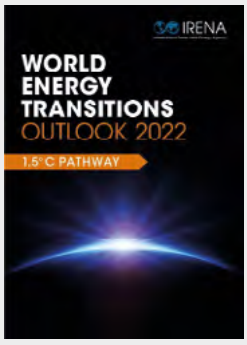
IRENA continues to strengthen its communication and outreach activities. Since the beginning of 2022, IRENA has been referenced in over 49,200 media articles in 49 languages across 161 countries, representing a 35% increase compared to the same time period in 2021.

During this period, key IRENA reports were launched. For example, IRENA's flagship **World energy transitions outlook 2022 (WETO)** report was disseminated through a press release in nine languages. In its first two weeks, WETO 2022 was mentioned 2,290 times in 16 languages across 69 countries, representing more than twice the number of mentions seen in the first two weeks since the launch of WETO 2021 (Table 7). The flagship report has seen interest by a wide-range of top-tier outlets including *Time*, *The Independent*, *Financial Times*, *Der Spiegel*, *Handelsblatt* and *Forbes*.

Global media outreach also accompanied the launch of the Agency's report, **Renewable power generation costs in 2021**, resulting in 714 articles in 53 countries since launch, representing 23% more coverage than *Renewable power generation costs in 2020*. Similar global outreach for the launch of the Agency's **Renewable capacity statistics 2022** report resulted in 734 articles in 57 countries since launch, representing a 20% increase in media coverage compared to last year's edition.

The number of visitors to IRENA websites has also increased significantly, reaching well beyond the mark of 1.8 million users. Overall, www.irena.org has generated 5.6 million pageviews, corresponding to an increase of 20% compared to last year. Continuity of new formats like interactive visual stories encouraged user interaction and grow return visitor rates to establish the website as a reliable knowledge hub for energy transition. The peak days in this period were marked by flagship publication launches. For example, content related to WETO 2022 and the *Power generation costs in 2021* report attracted over 55,000 pageviews each, and almost 28,000 and 18,000 report downloads respectively. The report's press release was the second most read IRENA press release of 2022 so far with 23,000 views, with the best performer being the release related to the *Geopolitics of the energy transformation: The hydrogen factor* report, with over 25,000 views.

TABLE 8 **WETO social media presence**



74 Countries

16 Languages

2 290 Articles

55 000 Views

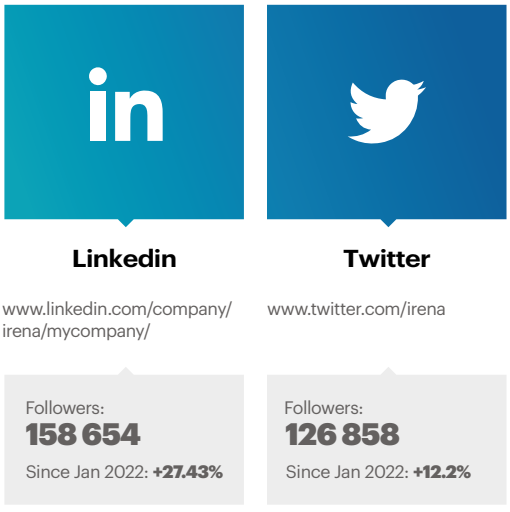
28 000 Downloads

In 2022, IRENA communications placed a stronger emphasis on storytelling, with eight human impact stories published on the website since the beginning of the year compared to two for the same period in 2021.

In terms of social media presence, IRENA has reached 158,654 LinkedIn followers, up from 124,564 followers in January 2022, an increase of 27.4%. During the same period in 2021, IRENA saw an increase of 2% in followers. Furthermore, IRENA's Twitter account has now 126,858 followers, up from 113,081 followers in January 2022 – an increase of 12.2% – while in 2021 followers had increased by 17.8% during the same period. Finally, IRENA's Facebook account experienced a slight drop from 468,600 to 464,987 followers since January 2022, an increase of almost 1%. There was a similar decrease in Facebook followers during the same period in 2021. As such, LinkedIn remains IRENA's fastest-growing social media platform (Figure 17).

IRENA continues to strengthen its use of short video to promote reports, events and campaigns on social media. Most notably, the short video on *Renewable power generation costs in 2021* received the highest number of views among all videos in 2022, reaching almost 21,000 views on Twitter. Dedicated mailing campaigns outside of IRENA's daily Media Brief provide targeted information on IRENA press releases, publications, and events to a pool of 80,128 stakeholders. Between January and December 2022, IRENA sent 43 press release, 31 event invitations and 12 special edition (COP27) mailings, including to Member Focal Points. The mass emails on WETO 2022 resulted in the highest open rate: 57% followed by the Costs report at 54.4%.

FIGURE 17 **IRENA's social media statistics**



IN FOCUS
IRENA's outreach activities

IRENA is expanding its outreach efforts, to ensure its work is reaching a wider audience and has an amplifying effect on the energy transition process. **IRENA Insights**[93], a series of short, focused webinars, have been offering invaluable access to key findings from the Agency's latest programmatic work on pertinent issues. Since January 2020, IRENA has organised almost 40 IRENA Insights webinars. Below is a list of the webinars organised in 2022:

- The first one was held on 25 January to share key takeaways from the IRENA's 2021 **Reaching zero with renewables: Capturing carbon**[94] technical paper.
- Another webinar took place on 8 February to share insights from the IRENA 2021 report on **Sector coupling in facilitating integration of variable renewable energy in cities**[95] .
- At the webinar held on 22 February, IRENA shared key insights from the report, **A pathway to decarbonise the shipping sector by 2050**[96] report.
- On 8 March, IRENA organised a webinar on **INSPIRE: IRENA's Platform on Patent Data and International Standards for Renewables** to explore the value of patents and standards data analytics and how information can be translated into valuable insights for policymakers, entrepreneurs, industry, research bodies and other key stakeholders in the energy sector.
- Key takeaways from IRENA's 2022 **Geopolitics of the energy transformation: The hydrogen factor** report were shared on 22 March.
- IRENA presented key insights from the IRENA **Smart electrification with renewables: Driving the transformation of energy services** report on 5 April.
- On 7 June 2022, IRENA held a webinar to present the main findings of the report on **Innovation trends in electrolysers for hydrogen production**
- The webinar on 21 June served to discuss the **Renewable energy roadmap for Central America: Towards a regional energy transition** report.
- The messages from the **Grid codes for renewable powered systems** report were the focus of the 6 September webinar.
- The 20 September webinar focused on a trilogy of reports on the **Global hydrogen trade to meet the 1.5°C climate goal.**
- IRENA presented key insights of its annual **Renewable power generation costs** report on 4 October.
- On 18 October, the Global Geothermal Alliance presented the findings of its report titled, **Powering agri-food value chains with geothermal heat: A guidebook for policy makers.**
- The 22 November webinar discussed findings from the most recent edition of IRENA's report series, **Renewable energy and jobs: Annual review 2022.**
- The last webinar was held on 6 December to present key messages from the **Solar PV: A gender perspective.**

IRENA's first session of the **Policy Talks 2022** was organised in January to discuss the topic of ***Reaping the socioeconomic benefits of the energy transition - building a comprehensive policy framework.*** The second session, convened on 8 March with the theme ***Enabling Green Hydrogen: Industrial Policy, Certification Systems, and Inclusiveness***[97], provided insights from IRENA on the most relevant issues related to green hydrogen and served to present key findings of the *Green hydrogen for industry: A guide to policy making* report and the IRENA Coalition for

[93] More information available here.
[94] Available here.
[95] Available here.
[96] Available here.
[97] More information available here.

Action brief on **Green hydrogen certification.** The third session[98] was held on 23 June and discussed the findings of the **RE-organising power systems for the transition** report. The fourth IRENA Policy Talk 2022, held on 28 June, focused on **Sustainable Bioenergy for the Energy Transition** and served to present the key findings of the upcoming *Bioenergy for the energy transition: Ensuring sustainability and overcoming barriers* report. [99]

LOOKING AHEAD

This section provides a snapshot of some of IRENA's upcoming publications.

Innovation is crucial to be able to manage this electricity system of the future. Smart additional power loads, minimising the impact on peak demand and grid congestion as well as the right additional infrastructure investments are needed. New technologies, digitalisation, innovative regulation, business models and changes in system operation are also needed. IRENA's **Innovation landscape report** for end-use electrification will provide the toolbox needed for successful innovation.

In collaboration with the VTT Technical Research Centre of Finland, **IRENA's FlexTool** Version 3.0 is in advanced stage of development. The goal is to update the modelling framework and code to improve its user-friendliness and make it more powerful.

Save the date

Key dates in 2023

IRENA International Renewable Energy Agency	ABU DHABI SUSTAINABILITY WEEK	IRENA International Renewable Energy Agency	IRENA International Renewable Energy Agency	
13th Assembly	**Abu Dhabi Sustainability Week**	**25th Council**	**26th Council**	**COP28**
14-15 **January** Abu Dhabi	**14-18** **January** Abu Dhabi	**23-24** **May** Abu Dhabi	**19-20** **October** Abu Dhabi	**30 - 12** **Nov Dec** Abu Dhabi

[98] More information available here.
[99] More information available here.

Selected upcoming IRENA events and publications

TABLE 9 Tentative list of IRENA events, 2023

Date	Event name
14-15 Jan	13th IRENA Assembly
14-21 Jan	Abu Dhabi Sustainability Week
16 Jan	Coalition for Action Annual Strategy Meeting
23-24 May	25th IRENA Council
27 Sept	Innovation Week
19-20 Oct	26th IRENA Council
30 Nov-12 Dec	COP28

TABLE 10 Selected upcoming publications, 2023

Date	Provisional report title
Q1-2023	Global geothermal market and technology assessment
Q1-2023	Planning and prospects for renewable power: North Africa
Q1-2023	Long-term energy scenarios and low-emission development strategies: Stocktaking and alignment
Q1-2023	Socioeconomics of the energy transition: Indonesia
Q1-2023	REmap Nigeria
Q1-2023	Innovation landscape smart electrification: Synthesis report
Q1-2023	Global renewable finance landscape
Q1-2023	World energy transitions outlook 2023 (executive summary)
Q1-2023	Malaysian energy transition outlook
Q1-2023	Scenarios for the energy transition: Experience and good practices in Africa
Q2-2023	Renewable energy capacity statistics 2023
Q2-2023	World energy transitions outlook 2023 (full report)
Q3-2023	Renewable power generation costs in 2022
Q3-2023	Geopolitics of the energy transformation
Q3-2023	Renewable energy statistics 2023

EFFECTIVE FUNCTIONING OF THE ORGANISATION

To deliver on the Agency's mandate, IRENA relies on the contributions and support of its Members, cooperation with a wide range of experts and institutions, and the commitment of its talented staff. This chapter summarises IRENA's key institutional and strategic activities to date.

The Administration and Management Services Division supports efficient implementation of the Work Programme and facilitates effective use of the Agency's resources. IRENA continues to innovate in its processes and practices to remain responsive to the dynamic nature of its programmatic work.

In this regard, the regular enhancement of the ERP system and other online tools continue to facilitate timely and streamlined support to programme implementation.

Finance and budget

The Finance Section continues to maintain the books of the Agency in full compliance with the Agency's Rules and Regulations and International Accounting standards including processing and recording of payments, contributions and payroll. Finance endeavours to continue to seek improvements and increase efficiencies in its processes whilst maintaining internal controls and mitigating potential risks.

Information and Communication Technology (ICT)

ICT continues to serve as a strategic enabler and tool for the Agency in the implementation of its Work Programme by providing state-of-the-art IT services and solutions to IRENA business units. ICT regularly maintains and consolidates its IT capabilities through initiatives for infrastructure modernisation (in HQ as well as in the Bonn and New York Offices, cloud and on site), operational excellence (IT governance, cost optimisation, proactive maintenance, regular monitoring) and internal capacity building (trainings, technology workshops).

As per the IT strategy that is closely aligned with the IRENA Medium-term Strategy, ICT is strengthening its role as a:

- Driver of digital transformation towards higher institutional effectiveness and efficiency through the maintenance and enhancement of the Executive dashboard, ERP and other online tools for collaboration and knowledge sharing.

- Enabler of the development of value-added business capabilities on renewable energy through the maintenance and enhancement of the IRENA website and web platforms on renewable energy.
- Pillar of organisational resilience and compliance through the implementation of the cybersecurity management framework and the business resilience plan.

Human Resources

The work of Human Resources spans administrative, operational and strategic activities. Significant effort has been placed on further aligning human resource policies and processes with the Agency's strategic and programmatic objectives. These include additional personnel sourcing and building the organisational capabilities necessary to achieve IRENA's operational objectives, with the right combination of skills, knowledge, competencies and expertise, while promoting geographical, cultural and gender diversity. Human resources practices, rules and procedures have continued to be refined and updated to ensure effective and efficient responsiveness to the Agency's emerging and evolving needs and challenges, while safeguarding its core values and principles. Attracting, developing and retaining highly qualified staff is key to the Agency's success. In this respect, IRENA has stepped up its outreach efforts to attract talent from all over the world, including by tapping into Members' expertise, and through the mechanisms provided by the decision of the Assembly at its second session (A/2/DC/5) such as loan and secondment arrangements (Tables 11 and 12).

Since 1 January 2022, 78 vacancies (core and project, including Interns and Associate Professionals) were announced and over 11,400 applications were received. Out of 93 core posts, 89 are filled or under recruitment (78 filled and 11 under active recruitment) and 4 are vacant. The 78 staff in core posts are from 50 nationalities out of which 45% are women and 55% are men (Table 10). There are also 139 project posts that are currently filled or under recruitment (101 filled and 38 under active recruitment). (Figure 18). Combined core and project posts amount to a total of 179 staff, who come from 74 nationalities (Figure 19 and 20), comprising 47% women and 53% men.

FIGURE 18 **Staff status as of 30 November 2022**

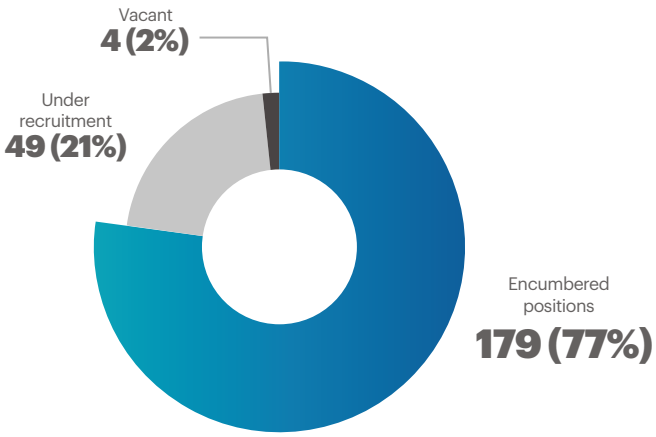


FIGURE 19 Human resources statistics

Nationalities at IRENA

74

Staff Gender Balance

47% 53%

Senior Team Gender Balance

50/50

FIGURE 20 Geographical distribution (core and project posts) as of 30 November 2022

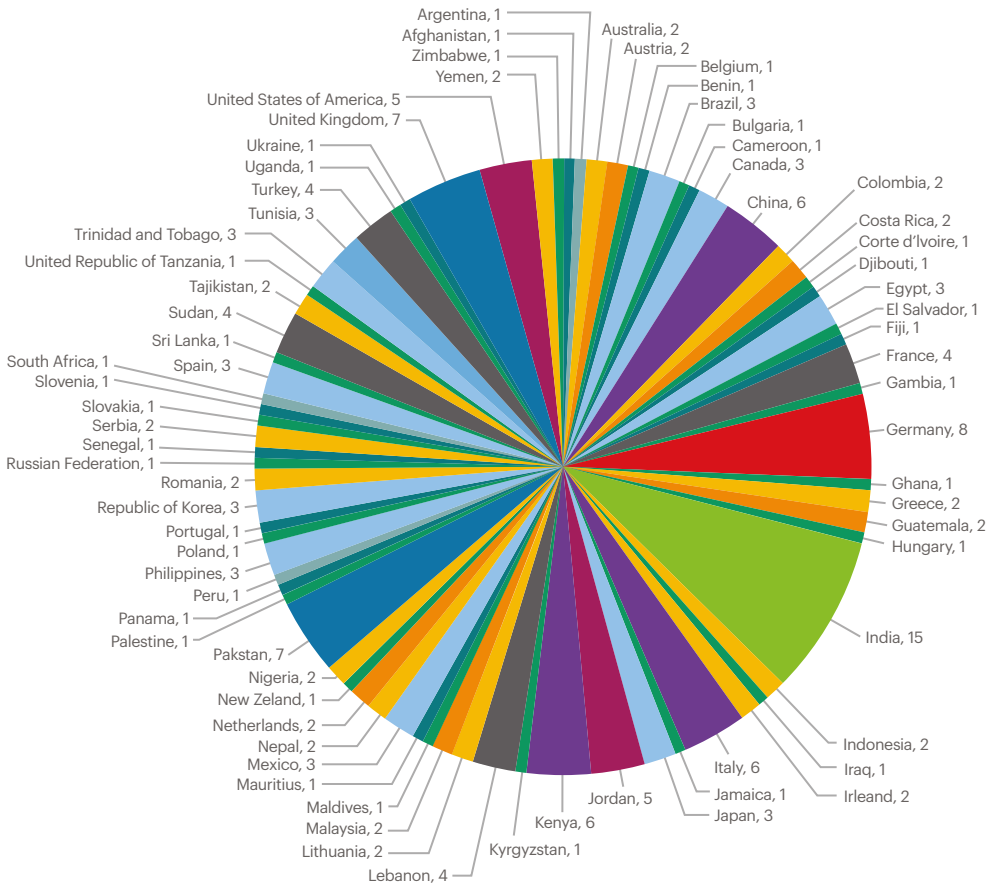


TABLE 11 Filled/under recruitment; core and project posts by level as of 30 November 2022

Level	Filled or under recruitment	Total
ASG	1	1
D-2	1	1
D-1	7	7
P-5	23	23
P-3/4	84	85
P-2/1	70	70
Sub-total Professional and above	186	187
General Services	42	45
Total	**228**	**232**

TABLE 12 Loaned and seconded personnel as of 30 November 2022

Division	Title	Loaned from
CEP	Programme Officer	United Arab Emirates
CEP	Programme Officer*	Republic of Korea
ODG	Liaison and Protocol Officer	United Arab Emirates
ODG	Communications Officer	United Arab Emirates
ODG	Programme Officer, Planning and Programme Support	United Kingdom
ODG	Senior Advisor to the Director-General*	Italy
IITC	Programme Officer, State Grid Corporation of China	China
IITC	Analyst – Renewable Energy Scenarios and Roadmaps*	Denmark
IITC	Programme Officer, KETEP	Republic of Korea
PFS	Programme Officer, ENI	Italy

**IRENA received direct resources for these personnel.*

Procurement

The Agency has continued to implement its administration of cost-effective procurement process for goods, services and other related requests. To ensure the transparency, fairness, openness, and competitiveness of the procurement process and bidding opportunities, the Request for Proposals (RFP) or Invitation to Bid (ITB) are mostly posted on IRENA's website and disseminated to the vendors registered with IRENA's vendors' database. In addition, high value and complex procurement opportunities are also uploaded and advertised on the United Nations Global Market (UNGM) portal, to maximise competition and include international vendors.

The quarterly and Master Procurement Plan continues to be updated through an automated portal on ERP. As of 30 November 2022, more than 400 procurement contracts and agreements for goods and services have been awarded totalling USD 4.7 million. Furthermore, as of 30 November 2022, the number of vendors registered in Procurement Section database has increased within the last three years also to reach almost 300 vendors from various countries worldwide.

General services and travel

Travel support and services were provided to staff, delegates and participants in conferences and workshops. From 1 January to 15 Nov 2022, the Agency facilitated participation in 60 workshops and 1,740 travel services. The section continues to provide facility management services for IRENA Headquarters and staff. This is an important function which contributes to a healthy and productive work environment while delivering continuous day-to-day services for staff. As part of these ongoing services, General Services has instituted a Health and Safety programme and continues to explore further enhancement measures to provide an even better work environment for staff.

IMPLEMENTATION PROGRESS OVERVIEW

There are a total of 64 Work Programme outputs for the 2022-2023 biennium, spreading across the four strategic objectives or pillars identified in the current Medium-term Strategy: a centre of excellence for knowledge and innovation; a global voice of renewable energy; a network hub for all stakeholders; and a source of advice and support for countries (Figure 21). At the 23rd meeting of the Council, Members requested more granular reporting on the status of implementation of activities under each output and detailed information on whether they are funded by core assessments or voluntary contributions.

The assessment of progress is undertaken based on the average progress in delivering the activities. Based on the overview of progress today, the pace of implementation corresponds to the mid-cycle, and there is no issue of concern or obstacle that needs to be brought to the attention of Members.

FIGURE 21 **IRENA's strategic objectives**

Centre of Excellence for Energy Transition	Global Voice of Renewables	Network Hub for Energy Transformation	Source of Advice
Empower effective policy and decision-making by providing authoritative knowledge and analysis on renewables-based energy transformation at global, national and sectoral levels.	Shape the global discourse on energy transformation by providing relevant, timely, high-quality information and access to data on renewable energy.	Provide an inclusive platform for all stakeholders to foster action, the convergence of efforts and knowledge sharing for impact on the ground.	Support country-level decision-making to accelerate the renewables-based transformation of energy systems, advance strategies to decrease global emissions and achieve sustainable development.

Resource overview

This section presents details of the core budget and voluntary contributions applicable to the Work Programme for 2022-2023.

Biennial budget overview

TABLE 13 **2022-2023 biennium budget utilisation by funding source (in USD thousands)**

	2022-2023 Biennium budget	Utilisation as of 30 Nov 2022	
		Commitment and expenses	Proportion of 2022-2023 biennium budget
Assessed contributions (core budget)	44 778	23 232	52%
Core non-assessed UAE			
UAE support	5 000	1 936	39%
Governing body meetings	3 200	1 527	48%
IT infrastructure support	920	451	49%
Subtotal	9 120	3 914	43%
Core non-assessed Germany			
Innovation and Technology Centre	10 890	4 984	46%
Subtotal	10 890	4 984	46%
Total core non-assessed	***20 010***	***8 898***	***44%***
Grand total	**64 788**	**32 130**	**50%**

Core non-assessed contributions

as of 30 November 2022, in USD

Budgeted Voluntary Contributions

	2022	
	Committed	**Received**
Germany		
IRENA Innovation and Technology Centre	5 445 000	5 445 000
United Arab Emirates (UAE)		
UAE support	2 500 000	2 500 000
Governing body meetings	1 600 000	1 600 000
IT infrastructure support	460 000	460 000
Subtotal UAE contributions	4 560 000	4 560 000
Total budgeted voluntary contributions	**10 005 000**	**10 005 000**

Other Voluntary Contributions

	2022	
Donor/project	**Committed**	**Received**
Germany	1 544 489	1 101 395
Japan	639 277	639 277
Norway	1 888 969	1 888 969
Republic of Korea	624 473	624 473
United Arab Emirates (UAE)	2 562 000	2 482 000
United Kingdom of Great Britain and Northern Ireland	130 890	-
United Nations Office for Project Services (UNOPS)	250 000	250 000
Total	**7 640 098**	**6 986 114**

Multi-Year Voluntary Contribution

Donor/project	Multi-year commitments	Received prior to 2022	Received during 2022
Canada	385 712	-	385 712
Denmark*	7 620 986	5 764 034	-
European Commission	1 774 576	-	1 322 917
Germany (International Climate Initiative)*	6 796 311	5 693 564	-
Germany (Physikalisch-Technische Bundesanstalt [PTB]/BMZ)	564 667	-	280 899
Government of the Walloon Region, Belgium	3 110 491	-	1 003 009
Kingdom of the Netherlands	800 320	-	200 080
United Nations Development Programme(UNDP)	6 200 000	1 433 715	486 000
Total	**27 253 063**	**12 891 313**	**3 678 617**

**Contributions pledged and partially received prior to 2022.*

Fund for developing countries representatives

	2022	
Donor	**Committed**	**Received**
Flanders Region of Belgium	12 533	12 533
Total	**12 533**	**12 533**

FIGURE 22 **Received and outstanding assessed contributions for 2021 core budget (in USD millions, as of 6 December 2022)**

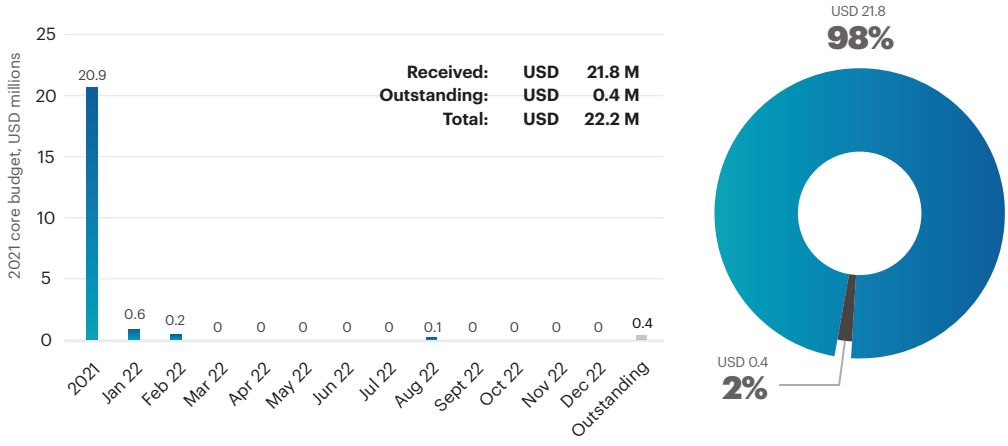


FIGURE 23 **Received and outstanding assessed contributions for 2022 core budget (in USD millions, as of 6 December 2022)**

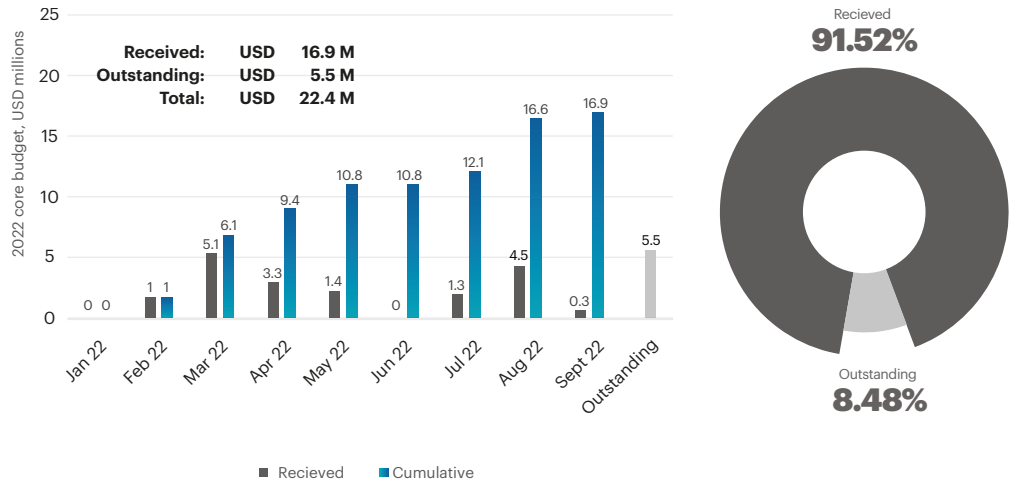


FIGURE 24 **Number of Members with received and outstanding contributions to the 2021 core budget (6 December 2022)**

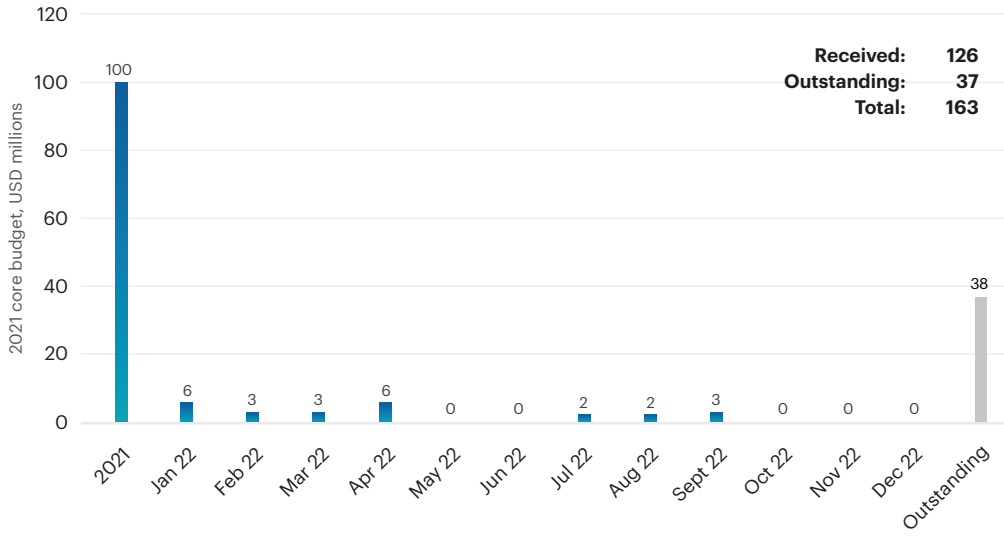
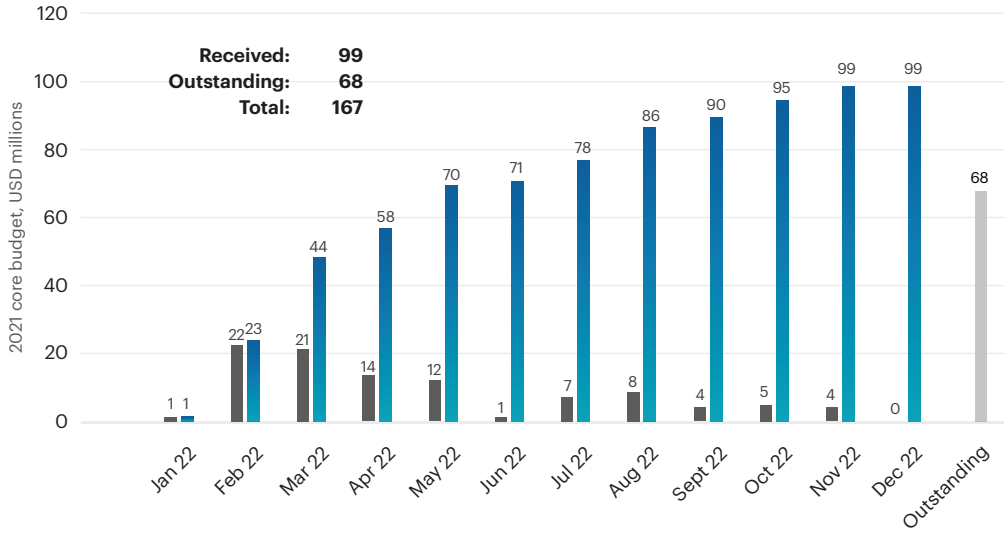


FIGURE 25 **Number of Members with received and outstanding contributions to the 2022 core budget (14 September 2022)**



IRENA Donors (2022-2023)

Canada		
	**Ministry of Natural Resources**	Global Initiative for Transitioning Remote Communities to Renewable Energy
Denmark		
	**Ministry of Foreign Affairs**	Long-term Planning SIDS Lighthouse Initiative 2.0
Denmark		
	**European Commission** **DG ENER** **DG NEAR**	EU Remap: In-depth analysis of renewable energy technology opportunities to support regional cooperation in national energy and climate plans Conditions and obstacles for the development and integration of renewable energy sources in the Eastern Partner countries.
Flanders Region of Belgium		
	**Flanders Region of Belgium**	Fund for Developing Country Representatives (FDCR)
Germany		
	**Federal Ministry of Economics and Technology (BMWK)** **Federal Foreign Office** **International Climate Initiative** **Physikalisch-Technische Bundesanstalt (PTB)**	World Energy Transitions Outlock, Longterm Energy Scenarios, Green Hydrogen Geopolitics of Hydrogen Economy SIDS Lighthouses Quality Infrastructure for Green Hydrogen
Japan		
	**Ministry of Agriculture, Forestry and Fisheries (MAFF)** **Ministry of Economy, Trade and Industry (METI)**	Development of Circular Economy with Bioenergy and Co-products Various Projects
Kingdom of the Netherlands		
	**Ministry of Foreign Affairs**	Geopolitics of the Energy Transition

IRENA Donors (2022-2023)

Norway		
	**Ministry of Foreign Affairs**	Various Projects
Republic of Korea		
	**Republic of Korea**	Seconded official
Belgium		
	**Government of the Walloon Region, Belgium**	Deployment of renewable energy and decentralised renewable energy with a focus on Francophone Africa.
United Arab Emirates		
	**United Arab Emirates**	UAE FlexTool and various projects
Unites Kingdom of Great Britain and Northern Ireland		
	**United Kingdom of Great Britain and Northern Ireland Department for Business, Energy & Industrial Strategy**	COP26 activities under the Glasgow Breakthrough Agenda & Seconded official
United Nations		
UNOPS	**United Nations Office for Project Services (UNOPS)**	Climate Vulnerable Forum
United Nations		
	**United Nations Development Programme (UNDP)**	UNDP Climate Promise

As directed by its Membership, IRENA continues to diversify its resource base by seeking extra-budgetary support. In the 2022-23 biennium, IRENA received to date a total of USD 10 677 265 through voluntary contributions, with an additional USD 4 044 851 to be received before year end.

WORK PROGRAMME 2022-2023 IMPLEMENTATION MATRIX

This section presents a full matrix detailing the progress of Work Programme activities by output and by pillar, resourced by both core and voluntary contributions.

The asterisk (*) indicates that the delivery of the programmatic output is financially supported by one or more voluntary contributions. If there is not an asterisk, then the delivery of the programmatic activity is exclusively covered by the core non-assessed and/or core assessed contributions.
At the twenty-third meeting of the Council, Members requested more nuanced information in the implementation matrix section in the form of a traffic light system. In response, the IRENA Secretariat is introducing a speedometer in the 'Status' column with four traffic lights (and an arrow that would resolve possible issues, if printed black and white) indicating:

- Red for an activity stalled long-term or will be abandoned
- Orange for when progress is lagging, but we are confident we will deliver within the programmatic cycle
- Green for when it is on track or has not started yet and
- Blue for when it is completed.

The legend below outlines some of the risk factors/reasons why progress for an activity might be lagging or stalling, but the list is not exhaustive.

	Risk Factors
External risks	**Project affected by difficulties in engagement/commitment of stakeholders.**
	Commitments affected due to changes of government and/ or political priorities.
	Lack of access to data.
	Limited capacity of local partners impedes progress and results.
	Catastrophic events *(e.g. natural hazards and disasters, pandemics etc.)* affect operations and schedules.
Internal risks	**Key IRENA staff working on the activity has left.**
	Shifting priorities in the course of the year.

I. Centre of Excellence for Energy Transition

Core assessed and core non-assessed resources (in USD thousands): 14 108. Outputs supported by additional voluntary contributions are footnoted.

Objective: Empower effective policy and decision-making by providing authoritative knowledge and analyses on renewables-based energy transformation at global, national and sectoral levels.

Outputs	Status	Description
World Energy Transitions Outlook (annual editions)* [100]		"World Energy Transitions Outlook 2022" (March 2022)
		"World Energy Transitions Outlook 2023"
Regional Energy Transition Outlooks (selected regions in Africa, Europe, Latin America)*		"Renewable Energy Roadmap for Central America" report (March 2022) [101]
		"Renewable Energy Outlook for ASEAN: Towards a regional energy transition" report (September, 2022) [102]
		"Renewable Energy Roadmap for South America" report [103]
		"Renewable Energy Roadmap for EU" report [104]
Innovation Landscape for the Energy Transition		"Smart Electrification with Renewables: Driving the Transformation of Energy Services" report (February 2022) [105]
		Brief on 100% RE power systems
Geopolitics of the Energy Transformation: biennial report on trends*		"Geopolitics of Energy Transformation: Indicators and Trends" report [106]
Global Landscape: Renewable Energy Finance report		"Global Landscape of Renewable Energy Finance 2022" report

[100] Supported by the Government of Germany.
[101] Supported by the Government of Norway.
[102] Supported by the Government of Denmark.
[103] Supported by the Government of Norway.
[104] Supported by the European Commission.
[105] See related webinar here.
[106] Supported by the Government of Norway.

Renewable Energy Capacity and Generation (annual update)		"Renewable Capacity Statistics 2022" report (April 2022)
		Downloadable query tools update 2022
		Interactive dashboards update 2022
		IRENASTAT online database update 2022
		"Renewable energy statistics 2022" report (July 2022)
		Energy profiles update 2022. (August 2022)
		"Off-grid renewable energy statistics 2022" report.
		Annual data update for SDG 7 (indicators 7.a.1 and 7.b.1/12.a.1). (February 2022)
		International Energy Statistics (InterEnerStat) Task Team on the revision of Standard International Energy Product Classification (SIEC).
Power Generation Costs (annual update)		"Renewable Power Generation Costs in 2021" report (July 2022)
		"Financing Costs: A survey and review of Project Level WACC" report
Costs and Performance of End-use Technologies – selected insights		"Renewable solutions in end-uses: Heat pump costs and markets" (November 2022)
Annual Jobs Review (annual update)		"Renewable Energy and Jobs 2022" report (September 2022)
		"Renewable Energy and Jobs 2023" report
Patents and Standards database INSPIRE (annual update)		Updated tool
		"Innovation Trends in Electrolysers for Hydrogen Production" (May 2022)[107]
		"Grid Codes for Renewable Power Systems" report (April 2022)
		"Renewable Technology Innovation Indicators: Mapping progress in costs, patents and standards" report (March 2022)[108]

[107] See webinar here.

[108] Supported by the European Commission's Horizon 2020 research and innovation programme.

Global Atlas updates on renewable potentials		Improving functionalities of the IRENA Global Atlas for Renewable Energy platform.
		Maintaining the operation of the Global Atlas for Renewable Energy platform by upgrading Geoserver and backend.
		Annual update of the renewable energy resource datasets from data providers (Members, international institutions and private sectors – WCMC-UNEP, ORNL, WRI, NOVELTIS, ANU, FAO, and Meteotest).
		Bioenergy Simulator [109] News article. Simulator.
		Maintaining the operation of the Bioenergy simulator platform by upgrading the backend.
		Revamping of the Bioenergy simulator platform – updating of the datasets, improving the methodology, and upgrading the user interface.
		Webinars on the Global Atlas for Renewable Energy • Open-Source Geospatial Solutions for Energy Access organised by the World Resource Institute (April 2022, 40 participants) • Energy System Modelling for the Energy Transition organised by the SDG 7 Youth Constituency (September 2022, 25 participants)
SDG 7 Tracking Report (2022 and 2023 editions) *		"Tracking SDG 7: The Energy Progress Report" (2022) report[110] (June 2022)
Innovation Week		**Innovation Engagements and Networks during the reporting period include:** Innovation Day: Canada March 2022 (March 2022)
		**Support to Mission Innovation. In 2022, this included:** Support to Missions on Power, Hydrogen, Net-zero industry. Member of the Technical Advisory Group; and contributions provided to the discussions on the MI Insights Module. Active engagement in Mission Innovation Ministerial in Pittsburgh, USA Signed a new MoU in GCEAF in Pittsburgh
		Support to Glasgow Breakthrough Agenda – The Breakthrough Agenda Report 2022.[111] (September 2022)
		Support for Global Offshore Wind Alliance (GOWA) meeting with countries (March 2022)
Human resources and workforce planning strategy		43 new staff appointments and internal movements and eight new Associate Professionals.
		Reclassification and comprehensive review of all Terms of Reference.
		Update of HR Policy Manual: Directives in draft on Remote Work, Performance Management, Recruitment, and Individua Consultants.

[109] Supported by the Government of Norway.
[110] Supported by the International Bank for Reconstruction and Development.
[111] Supported by the Government of the United Kingdom.

II. Global Voice of Renewables

Core assessed and core non-assessed resources (in USD thousands): 9 773. Outputs supported by additional voluntary contributions are footnoted.

Objective: Shape the global discourse on energy transformation by providing relevant, timely, high-quality information and access todata on renewable energy.

Outputs	Status	Description
Socio-economic Analyses at country level* (reports and country briefs)[112]		"Socioeconomic Footprint of the Energy Transition: Japan" report (September 2022)
		"Socioeconomic Footprint of the Energy Transition: Indonesia" report
		"Socioeconomic Footprint of the Energy Transition: ASEAN" report
		"Socioeconomic Footprint of the Energy Transition: Egypt" report
		"Socioeconomic Footprint of the Energy Transition: South Africa" report
Leveraging Local Capabilities (selected technologies)		"Leveraging Local Capacity for Small Scale Hydropower" report
		"Leveraging Local Capacity for CSP" report
Ecosystems for Sustainable Livelihoods*		"Fostering Livelihoods with Decentralised Renewable Energy: An Ecosystems Approach" report (January 2022)
Decentralised Renewable Energy Solutions* (policies for mini-grids; solutions for clean cooking)		"Policies and Regulations for Renewable Energy Mini- grids" report
		"Public Financing Instruments for Universal Energy Access" report
Renewable Energy Policies in the Power Sector (decentralised generation; high-risk environments)		"Renewable Energy Auctions: design in higher risk contexts" report
		"Renewable Energy Auctions: Southeast Asia" report (December 2022)
Power Market Design for the Energy Transition Report		"Re-organising Power Systems for the Transition" report (June 2022)

[112] Supported by Government of Denmark (reports on Egypt; South Africa; Indonesia and Southeast Asia) and Government of Japan (report on Japan).

Renewable Energy Education and Skills*		"Education for the Energy Transition" report in collaboration with UNESCO
		Initiative on Educating the Educators including "Renewable Energy Toolkit for Teachers" [113]
		Workshop bringing together global education partners and stakeholders held in Abu Dhabi to form a new Energy Transition Education Network (July 2022). [114] Energy Transition Education Network launched at COP27 (November 2022)
		E-learning platform with online self-study courses on key renewable energy topics. [115]
Renewable Energy Policies for Cities: localising end-use value chains		Activities planned to start in 2023
Climate Policy: renewable energy and NDCs*		"NDCs and Renewable Energy Targets in 2021" report (January 2022)
		"Renewable Energy Targets in 2022: A Guide to Design" report (November 2022)
Climate Change Adaptation: methodology and country analyses*		"Renewable Energy in Adaptation: Methods and Metrics" report
Geopolitics of the Energy Transformation: deep dive on a selected topic*		"Geopolitics of Energy Transformation: Critical Materials Supply Chains" report [116]
Gender and Renewable Energy report: tracking global progress		"Solar PV: A Gender Perspective" report. (September 2022)
		"Gender and Renewable Energy Report: Tracking Global Progress" 2023
Energy Transition for End-uses (transport and industry decarbonisation)		Innovation Day: Canada March 2022, with focus on Road Freight and Decarbonisation of Iron & Steel sectors (March 2022) [117]
		"Bioenergy for the Transition: Ensuring Sustainability and Overcoming Barriers" report (August 2022)
		"Innovation Outlook: Renewable Ammonia" report (May 2022)
		Partnership Agreement between IRENA and the International Chamber of Shipping
		Collaboration agreement with UN Global Compact as knowledge partners of the Just Transition Maritime Task Force
End-use Decarbonisation: guides for policy-making (procurement; heating and cooling; transport; green hydrogen)*		"Green hydrogen for industry: A guide to policy making" [118] report (March 2022)
		"Renewable energy policies for decarbonisation of transport" report

[113] Supported by Government of the United Arab Emirates.
[114] Supported by Government of the United Arab Emirates.
[115] Supported by Government of Norway.
[116] Supported by the Government of Norway.
[117] More information available here.
[118] Supported by the Government of Japan.

Greening the Gas System*		Hydrogen-ready LNG import terminals paper.
		Accelerating hydrogen deployment in the G7: recommendations for the Hydrogen Action Pact (November 2022) [119]
Energy Transition and Critical Materials*		"Critical Materials For The Energy Transition: Lithium" brief (January 2022)
		"Critical Materials for The Energy Transition: Rare Earth" brief (May 2022) [120]
End of Life and Circular Economy* (storage and batteries; solar PV panels)		"End-of-Life Management of Solar Photovoltaic in the Energy Transition" report
Corporate Sourcing of Renewable Energy*		Activities planned to start in 2023
Comprehensive Global Communication Strategy with accessible and multilingual content and information*		Comprehensive Global Communication Strategy for 2022 was successfully implemented, including the second phase of strategic media partnership and social media campaign
		Press release translations, international media outreach and communications amplified reach of key publications such as "WETO 2022" [121] and the "Geopolitics of the Energy Transformation: The Hydrogen Factor" [122]
		Strategic communications support around key, global high-level events, including the IRENA Assembly, EXPO2020, ADSW, BETD, HLPF, G20 and COP27
		Issued 56 IRENA reports and an additional 48 specialised publications
		Issued 27 translations of IRENA reports, serving nine different languages (Arabic, Chinese, French, German, Italian, Japanese, Portuguese, Russian and Spanish)
		Issued 4 IRENA technical papers
		Over 3.5 million downloads of IRENA publications since 1 January 2022
		IRENA publications featured on knowledge sharing platforms and in electronic libraries/stores, including Apple store, Scribd, Refinitiv, Amazon and others
		Maintain regular strategic publication output, with predictable flagship reports, timely thematic studies and other specialised releases
		Continued application of the Agency's digital-first communication approach, with printing limited to key publications and/or peripherals

[119] Supported by the Government of Germany.
[120] See webinar here.
[121] Supported by the Government of Germany.
[122] Supported by the Government of Germany.

Re-issued *IRENA Publications Management Guidelines 2022* (v2), governing the Agency's report production and output. Delivered associated online awareness sessions with all publishing teams to highlight updates and changes, as well as to reinforce original key messages/takeaways relating to IRENA publishing and quality control processes

Ongoing communication support provided in relation to publication releases, webinars, press releases, digital stories, short videos, website updates etc.

IRENA Insights webinar series

- *Jobs in Renewable Energy Sector*
- *Reaching Zero with Renewables: Capturing carbon*
- *Sector Coupling in Facilitating the Integration of Variable Renewable Energy in Cities*
- *Pathways to Decarbonise the Shipping Sector by 2050*
- *INSPIRE: IRENA's Platform on Patent Data and International Standards for Renewables*
- *Geopolitics of the Energy Transformation: The Hydrogen Factor*
- *Smart Electrification with Renewables: Driving the Transformation of Energy Services*
- *Innovation trends in electrolysers for hydrogen production*
- *Innovation Outlook - Renewable Ammonia*
- *Grid Codes for Renewable Powered Systems*
- *Renewable Energy Roadmap for Central America: Towards a Regional Energy Transition*
- *Renewable Power Generation Cost Report 2021*

Webinar series: Critical Materials for the Energy Transition

- *Rare Earth Elements*
- *Deep-Sea Mining Technology*

Policy Talks 2022 webinar series

- *Enabling Green Hydrogen: Industrial Policy, Certification Systems, and Inclusiveness (March 2022)*
- *Reaping the socioeconomic benefits of the energy transition - building a comprehensive policy framework (January 2022)*
- *Restructuring the power system for the energy transition (June 2022)*
- *Sustainable bioenergy for the energy transition (June 2022)*

Events and workshops

- *REN21 RENdez-vous Africa: What Could an African Green Deal Look Like? (February 2022)*
- *UNDP Reginoal Bureau for Africa Energy Workshop (March 2022)*
- *RENAC Training Seminar (March 2022)*
- *MENA Climate Week (March 2022)*
- *Meetings of the UN Interdepartmental Task Force on African Affairs (April and June 2022)*
- *MENA Europe Future Energy Dialogue (June 2022)*
- *Africa Climate Week (August 2022)*
- *Africa-EU Energy Partnership Forum (September 2022)*

Online content

- *Social media campaign with AfDB*
- *Social media videos*
- *Blog posts*

		Dissemination of the "Renewable Energy Roadmap for Central America" report (March 2022) • *Renewable Energies in Latin America and the Caribbean: Towards a Regional Energy Transition (June 2022)* • *Insights Webinar ("Renewable Energy Roadmap for Central America: Towards a Regional Energy Transition") (June 2022)* • *COREN 2022 - El Salvador ("Las energías renovables como impulsoras en la electrificación de los sectores de uso final") (August 2022)* • *IRENA invited to present the study at the CDMER Meeting Nr. 96 (August 2022) - Consejo Director del Mercado Eléctrico Regional de América Central* • *CIER 57th Annual Meeting – Paraguay ("Hojas de Ruta de Energía Renovables de Centroamérica y Surámerica") (November 2022)* • *RRA Honduras – Honduras, IITC/REmap division to present "Renewable Energy Roadmap for Central America: Towards a Regional Energy Transition" and Honduras country case (December 2022)* IRENA *invited to present in the OLADE Energy Week 2022 in Panama City, IITC/REmap division to present "Renewable Energy Roadmap for Central and South America" (December 2022)*
		Dissemination of the "Geopolitics of the Energy Transformation" report (January 2022) [123] • *Launch of "Geopolitics of Energy Transformation: The Hydrogen Factor" report during the twelfth session of the IRENA Assembly (January 2022)* • *"Hydrogen Economy Hints at New Global Power Dynamics" (January 2022).* • *IRENA Insights webinar: Geopolitics of the Energy Transformation: The Hydrogen Factor (March 2022)* • *Presentation by IRENA's Director-General in March 2022 at an in-person event co- hosted by the Governments of Germany, Norway, and the UAE, as well as separate presentations requested by the Governments of Chile, Italy, the United Kingdom, and United States of America.* • *Presentations for non-Member organisations, including the African Union Development Bank, the Africa Renewable Energy Initiative, the Clingendael Institute, the 2022 Financial Times Hydrogen Summit, the German Institute for International and Security Affairs, the GIZ Hydrogen Diplomacy Initiative, the Spanish Energy Club, and the United Nations Global Compact in Poland.* Podcasts including with the Columbia SIPA and Reuters/Aramco.
Regional Communication Strategies		Creation of content targeted at regional markets, including newsroom articles, human impact stories, videos, regional media outreach and DG interviews with local, regional, and international press.
		Strategic communications support around key regional events such as MENACW, Africa Climate Week, and IRENA's first Investment Forum for Southeast Asia.[124]
Promotion and use of digital knowledge products and information*		Ongoing placement of IRENA e-books on selected e- stores.
		8 interactive stories developed and published.
		2 digital reports based on flagship publications developed and pending publication.

[123] Supported by the Government of Norway.
[124] Supported by the Government of Denmark.

	Technical papers section under the Education component of the website implemented.
	New upgraded irena.org website successfully launched on 25 October 2022.

III. Network hub

Core assessed and core non-assessed resources (in USD thousands): 8 336. Outputs supported by additional voluntary contributions are footnoted.

Objective: Provide an inclusive platform for all stakeholders to foster action, convergence of efforts and knowledge sharing for impact onthe ground.

Outputs	Status	Description
IRENA Investment Forums*		G20 Energy Transitions Investment Forum Pre Event in collaboration with B20 2nd Partners in Energy Transition Meeting in Jakarta, Indonesia (Southeast Asia region) (July 2022) [125]
		G20 Energy Transitions Investment Forum in Bali, Indonesia (Southeast Asia region) (September 2022) [126]
		West Africa Investment Forum[127] Nigeria [Postponed].
Regional Action Agendas and Clean Energy Corridors		**Africa** "Mano River Union Renewable Energy Market Analysis" report.
		Side event, Energy Transition for Africa, during TICAD8[128] (August 2022)
		Capacity Building on Long-Term Energy Planning in the Republic of Cameroon [129]: • *Fourth training course (March 2022)* • *Final consultation workshop (November 2022)*
		WACEC: Regional capacity building workshop on Design and Negotiation of Bankable Power Purchase Agreements in West Africa, organised with ECREEE, ERERA, WAPP and GIZ (September 2022)

[125] Supported by the Government of Norway.
[126] Supported by the Government of Denmark.
[127] Supported by Government of the Walloon Region, Belgium.
[128] Supported by the Government of Japan
[129] Supported by the Government of Denmark.

	Chad Renewable Readiness Assessment: Kickoff event (October 2022).
	Renewable Energy Roadmap for Nigeria – Final engagement workshop with national stakeholders (December 2022).
	**Asia** Launch of the Kyrgyz Republic Renewable Readiness Assessment (December 2022)
	Event on Socioeconomic footprint of the energy transition: Egypt and Southeast Asia at COP27 (November 2022)
	Event on Renewable Energy Transitions in the ASEAN Region at COP27 (November 2022)
	The 2nd Singapore – IRENA High-Level Forum (October 2022)
	Launch of the Indonesia Energy Transition Outlook report in Jakarta, Indonesia [130] (October 2022)
	The 40th ASEAN Ministers on Energy Meeting (AMEM) including the 6th AMEM-IRENA Dialogue (September 2022).
	G20 Energy Transition Working Group Webinar onExpanding Solar, Wind, and Ocean Energy Solution (June2022)
	G20 Energy Transition Working Group Webinar on Accelerating Green Hydrogen Technologies and Energy Storage for the Energy Transitions (June 2022)
	"Renewable Energy for Agriculture: Insights from Southeast Asia, A focus on heating and cooling needs" report (June 2022)
	The 40th ASEAN Senior Officials Meeting on Energy (SOME) (June 2022) [131]
	The 29th ASEAN Renewable Energy Subsector Network (RE-SSN) Meeting (May 2022).
	ASEAN-IRENA Consultation Workshop (May 2022) [132]
	Capacity Building for Renewable Energy Targets in the Kyrgyz republic (March 2022)
	"Scaling Up Biomass for the Energy Transition: Untapped Opportunities in Southeast" report (February 2022)[133]
	"Renewable Energy Outlook for ASEAN: Towards a Regional Energy Transition" report (September 2022)[134]
	Renewable Readiness Assessment for the Kyrgyz Republic: Validation Workshop (February 2022)
	**Latin America and the Caribbean** Honduras Renewable Readiness Assessment: Consultation Workshop (December 2022).
	Honduras Renewable Readiness Assessment: Kickoff event (September 2022).

[130] Supported by the Government of Denmark.
[131] Supported by the Government of Denmark.
[132] Supported by the Government of Denmark.
[133] Supported by the Government of Japan.
[134] Supported by the Government of Denmark and the Government of Japan.

	Side event on Renewable Energy to Accelerate Regional Climate Action and Build momentum towards Net-Zero across the LAC Region during the 2022 Latin America and Caribbean Climate Week (July 2022).
	Hybrid webinar for Renewable Energy and Energy Efficiency in Paraguay, co-organised with WEC and the Vice Minister of Energy and Mines of Paraguay (March 2022).
	Firm Capacity for RE Projects using PPAs in Central America: Stakeholder Consultation Workshop and Questionnaire (February 2022)
	Webinar on Accelerating the Energy Transition in Colombia: Renewable Energy Auctions, co-organised with USAID (February 2022).
	**Middle East and North Africa** Open Solar Contracts Capacity Building Workshop: Iraq, co-organised with UNDP & UK Embassy, (June 2022).
	MENA Europe Future Energy Dialogue meeting, co- hosted with the Federal Government of Germany and Jordanian Ministry of Energy and Mineral Resources (June 2022)
	A Dialogue Between EU and Gulf Cooperation Council on a Regulatory Framework to Develop Green Hydrogen Supply, Demand and Trade, co-organised with the European Union, (April 2022)
	MENA Climate Week 2022 organised workshop in partnership with UNDP: Catalysing Concerted Action on the Ground towards Achieving the Global Energy Transition and a side event: Renewable Energy Driving Climate Action towards Net-zero in 2050 across the MENA Region (March 2022)
	A 2-day Energy Transition Workshop in Iraq: Best Practices & Scoping, co-organised with the United Nations Development Programme a (March 2022).
	Consultative workshop on IRENA's North African Power Pool modelling, organised in partnership with League of Arab States and the African Union, within the framework of the ongoing work on the African Continental Master Plan (March 2022)
	Virtual regional capacity building workshop: Renewable Energy Targets setting in Arab Countries (February 2022).
	Virtual sub-regional (North Africa) capacity building workshop: Improving Resource Assessment Practice in the North Africa: A Solution to Streamline Early-Stage Solar and Wind Market Planning (February 2022).
	A workshop on Enabling Measures, co-organised with the World Economic Forum (January 2022)
	**Southeast Europe** Regional capacity building workshop on Sustainable Use of Biomass, organised with Energy Community Secretariat (November 2022).
	Regional capacity building workshop on Long Term Energy Scenarios, organised with IAEA (November 2022).

		EU Sustainable Energy Week 2022: The Potential of Renewable Gases to support the Energy Transition and Guarantee Security of Supply, joint event with Centre on Regulation in Europe and Florence School of Regulation (September 2022)
		A workshop on Hydropower as a key factor in improving energy efficiency and promoting renewable energy, co-organised with the Ministry of Energy of Kyrgyz Republic and State Standardization Committee of Republic of Belarus.
		Renewable Readiness Assessment for Bosnia and Herzegovina: Validation Workshop (April 2022) [135]
		IRENA-FAO Energy Compact on 'Energising Agri- food Systems with Renewable Energy'.
		Multilateral Energy Compact on 'Renewable energy for peacekeeping'.
		Event on Renewable Energy Opportunities in UN Peacekeeping Settings, co-organised event with UN-DOS and United Arab Emirates, held during SEforALL Forum 2022 (May 2022)
		Multilateral compact for 'Health Facility Electrification'.
		IRENA-GGA-IGA Energy Compact on 'Scaling up geothermal heating and cooling globally'.
		IRENA-AOSIS Energy Compact on 'Islands Energy Transition towards a 1.5-degree world' - operationalised through the SIDS Lighthouses Initiative.
		NDC analysis for SIDS.
Energy Compacts & Collaborative Frameworks Implementation*		**Collaborative Frameworks** Establishment of a new Collaborative Framework on Critical Materials for the Energy Transition (March 2022)
		Collaborative Framework on the Geopolitics of Energy Transformation: 5th meeting (April 2022)
		Collaborative Framework on Project Facilitation to Support Energy Transition 1st meeting (May 2022)
		Collaborative Framework on Hydropower: 4th meeting (June, 2022)
		Collaborative Framework on Enhancing Dialogue on High Shares of Renewables in Energy Systems: 4th meeting (June 2022)
		Collaborative Framework Critical Materials: Working Group 'De-risking Critical Materials and Minerals Supply' (June 2022)
		Collaborative Framework Critical Materials: Working Group 'Observatory for Critical Materials and Minerals' (July 2022)
		Collaborative Framework Critical Materials: Working Group 'ESG and Mining' (September 2022)
		Collaborative Framework on Enhancing Dialogue on High Shares of Renewables in Energy Systems: 5th meeting (October 2022).

[135] Supported by the Government of Norway.

		Collaborative Framework on Green Hydrogen: 6th meeting (October 2022)
		International Conference on Hydropower, co- organised with the Government of Switzerland (October 2022).
		Collaborative Framework on Ocean Energy/Offshore Renewables: 5th meeting (November 2022)
		Collaborative Framework on the Geopolitics of Energy Transformation: 6th meeting (November 2022)
		Collaborative Framework on Hydropower: 5th meeting (December, 2022)
		Support on a technical and organisational level to the planning efforts for the establishment of an intergovernmental Global Offshore Wind Alliance (GOWA) in collaboration with international stakeholders including the overnment of Denmark and GWEC.
Off-Grid Renewable Energy Solutions: Agri-food systems*, health*, clean cooking		Launched the Beyond Food Partnership, a new joint initiative with the Government of the United Arab Emirates (March)
		IRENA-WRI webinar on Scaling-up solar irrigation: Lessons from policies and programmes (February 2022)
		Renewable Energy for Agri-food Systems: Scaling Investments towards Climate Action and 2030 Agenda event during COP27, Egypt (November 2022)
		**Publications** IRENA's input to joint publication of "Global Health Assessment" report with clear picture of status of healthcare electrification and requirements.[136]
		Electrification with Renewables: Enhancing Healthcare Delivery in Burkina Faso report [137] (October 2022)
		Decentralised Solar Electricity for Agri-food Value Chains in the Hindu Kush Himalaya Region (September 2022)
		Report for technical recommendations, including design, of decentralised RE to electrify health centres Mali and Sao Tome & Principe[138]
6th International Off-grid Renewable Energy Conference (IOREC)*		6th edition of IOREC in Nigeria (November 2022)[139] [Postponed].
SIDS Lighthouses Initiative*		Updating the knowledge base in SIDS: Cost data collection and cost-benchmarking tool development.
		Implementation and capacity building, as well as completion of Quickscans for Belize[140], Barbados and Grenada.

[136] Supported by the Government of the Walloon Region, Belgium.
[137] Supported by the Government of the Walloon Region, Belgium.
[138] Supported by the Government of the Walloon Region, Belgium.
[139] Supported by the Government of the Walloon Region, Belgium.
[140] Supported by the Government of Denmark.

	**Initiative coordination**[141] Four new partners joined the initiative: Saint Kitts and Nevis and University of Delaware. Total: 38 SIDS[142] and 33 development partners.[143]
	**Events**[144] Capacity Building on PPA for Caribbean SIDS, St. Vincent and the Grenadines[145] (November 2022)
	Solomon Islands RRA: Stakeholder consultations[146] (November 2022).
	Event on Closing the Gap: Securing Lives, Creating Livelihoods in Small Islands Developing States, held during COP27 in Egypt[147] (November 2022)
	Capacity Building Initiative on Design of Bankable Power Purchase Agreements (PPAs) in the Atlantic, Indian Ocean and South China Sea (AIS) Small Island Developing States (SIDS) (September 2022).
	A two-day event on Energy Management and Energy Audits in Small Island Developing States (June 2022)
	Technical webinar support series[148]: Grenada Capacity Building Programme for Energy Management & Energy Audits (April 2022) ; (May 2022) ; (June 2022).
	Capacity Building on Climate Investment and Financial Flows in the Energy Sector in the Seychelles[149] (April 2022)
	Training Workshop on Climate Financing for Small Island Developing States – co-organized with the Ministry of the Environment of Japan & Green Climate Fund (March 2022)
	Technical webinar series on Accelerating the development of Ocean Thermal Energy Conversion (OTEC) in SIDS (February 2022)
	**Publications**[150] Annual Progress Report: SIDS Lighthouses Initiative – Progress and way forward (August 2022)

[141] Supported by the Government of Denmark and Germany, as part of the German Government International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative based on a decision adopted by the German Bundestag.

[142] Antigua & Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Cabo Verde, Comoros, Cook Islands, Cuba, Dominican Republic, Fiji, Grenada, Guyana, Kiribati, Maldives, Marshall Islands, Mauritius, Micronesia (Federated States of), Montserrat, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Seychelles, Singapore, Solomon Islands, Tonga, Trinidad and Tobago, Turks and Caicos, Tuvalu, Vanuatu.

[143] Denmark, France, Germany, Italy, Japan, New Zealand, Norway, United Arab Emirates, United States of America, Association of the Overseas Countries and Territories of the European Union, Caribbean Electric Utility Services Corporation, CARILEC, Clean Energy Solutions Center, Clinton Climate Initiative, ENEL, European Union, Greening the Islands, Island Innovation, Islands and Small States Institute (ISSI), Indian Ocean Commission, International Renewable Energy Agency, Organisation of Eastern Caribbean States, Pacific Islands Development Forum, Pacific Community (SPC), Pacific Power Association, Rocky Mountain Institute - Carbon War Room, Solar Head of State, Sustainable Energy for All, Sur Futuro Foundation, United Nations Development Programme, United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UNOHRLLS), University of Delaware, World Bank.

[144] Supported by the Government of Denmark and Germany.

[145] Supported by the Government of Denmark and Germany, as part of the German Government International Climate Initiative (IKI).

[146] Supported by the Government of Denmark.

[147] Supported by the Government of Denmark.

[148] Supported by the Government of Denmark.

[149] Supported by the Government of Germany, as part of the German Government International Climate Initiative (IKI).

[150] Supported by the Government of Denmark and Germany, as part of the German Government International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) supports this initiative based on a decision adopted by the German Bundestag

Global Geothermal Alliance (GGA)*		**Facilitation and coordination of the GGA** [151] Growing GGA constituency. New GGA Member State: Panama. Total 50 Countries[152] and 54 Partners[153]
		**GGA website developed into a knowledge sharing platform** Updated geothermal profiles: Africa, Europe, Asia, Latin America and Caribbean, North America
		Updated GGA Brochure
		Themes on International Training Centres and Geothermal Resource Assessment Methodologies
		**Revised geothermal heating and cooling targets for the GGA** IRENA and the International Geothermal Association in support of the Global Geothermal Alliance aims to raise ambition on an existing goal of the GGA – to achieve more than two-fold growth in geothermal heating by 2030 through the joint submission of the IRENA -GGA – IGA Energy Compact "Scaling up geothermal heating and cooling globally"
		Development of a strategic and forward- looking implementation plan for the GGA
		**Publications** "Powering Agri-Food Value Chains with Geothermal Heat – A guidebook for policy makers" report (June 2022)
		"Global Geothermal Market and Technology assessment" report
		"Strategic Heating and Cooling Plan for Mongolia" report
		**Events** 2nd High-Level Conference of the Global Geothermal Alliance – Geothermal: Driving the Energy Transition for Fostering Sustainable Development & Climate Action (September 2022)
		Powering Agri-food Value Chains with Geothermal Heat to Enhance Food Security and Climate Action – Africa, Training, Djibouti (November 2022)
		Geothermal as an Integral Energy Solution in SIDS – Workshop, El Salvador [September 2022]

[151] Supported by the Government of Japan.

[152] Argentina, Bolivia, Burundi, Chile, Colombia, Comoros, Costa Rica, Djibouti, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, France, Germany, Guatemala, Honduras, Iceland, India, Indonesia, Italy, Japan, Kenya, Kingdom of the Netherlands, Malaysia, Mexico, Montserrat, New Zealand, Nicaragua, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland,Portugal, Romania, Saint Vincent & the Grenadines, Solomon Islands, Switzerland, Tonga, Türkiye, Uganda, United Kingdom, United Republic of Tanzania, United States of America, Uruguay, Vanuatu, Zambia, Zimbabwe.

[153] African Development Bank, African Union Commission, AGH University of Science and Technology (Poland), Andean Geothermal Center of Excellence (Chile), Asian Infrastructure Investment Bank (AIIB), Association GeoEnergy Celle e.V. (Germany), Atlantic Council, Australian Geothermal Association, Canadian Geothermal Energy Association, Bulgarian Association on Geothermal Energy, Caribbean Electric Utility Services Corporation (CARILEC), Centro Mexicano de Innovación en Energía Geotérmica (CeMIEGeo), Chilean Geothermal Council, Chinese Renewable Energy Industries Association (CREIA), Chinese Renewable Energy Engineering Institute, Colombian Geothermal Association, Eastern African Power Pool, Ecuadorian Geothermal Association, Energy Institute Hrvoje Požar (Croatia), European Geothermal Energy Council, Geothermal Canada, GEODEEP - Geothermal Cluster for Heat and Power(France), Geoscience Ireland, Geothermal Energy Advancement Association, Geothermal Power Plants Investors Association (Türkiye), Geothermal Rising (USA), Geothermal Training Programme in Iceland (GRO GTP), Iceland GeoSurvey, Iceland Geothermal Cluster Initiative, Iceland School of Energy, Inter-American Development Bank, International Geothermal Association, International Renewable Energy Agency, Islamic Development Bank, Macedonian Geothermal Association, Mexican Geothermal Association, National Energy Authority (Iceland), New Partnership for Africa's Development, Nordic Development Fund, Organization of American States, Organisation of Eastern Caribbean States, Pacific Community, Peruvian Renewable Energy Association, Regional Center for Renewable Energy and Energy Efficiency, Renewable Energy and Energy Efficiency Women´s Network, SerbianGeological Society, Serbian Geothermal Association, Southern Africa Power Pool, United Nations Environment Programme (UN Environment), United Nations Industrial Development Organization (UNIDO), United States Energy Association (USA), University of Geneva, Women in Geothermal, World Bank.

		Powering agri-food value chains with Geothermal Heat – Latin America Workshop, El Salvador (September 2022)
		Powering agri-food value chains with Geothermal Heat – Africa Capacity Building Webinar (July 2022)
		Powering agri-food value chains with Geothermal Heat – Global Capacity Building Webinar (June 2022)
		In collaboration with Mongolian Ministry of Energy, hosted capacity building events on Integrating Renewable Energy Solutions in Mongolia's District Heating Systems: • *Strategic Heating and Cooling Planning (May 2022)* • *Enabling Framework Conditions and Addressing Technical Barriers (June 2022)*
Long-term Energy Scenarios initiative and network*		**Membership and partnerships**[154] Growing membership, with 26 country members and 12 technical partners currently in conversations with Peru, India, and USA to join the LTES Network
		Bilateral discussions with technical partners on long- term collaboration, mainly with the following: • *UNFCCC and the World Resources Institute on gathering insights from LTES in LT-LEDS* • *GET.transform/GIZ on long-term scenarios and planning in the Global South* • *World Energy Council on demand-side scenarios and scenario communications* • *China's State Grid Energy Research Institute*
		Workplan survey conducted with members and partners to formulate May 2022-April 2023 working plan.
		**Events**[155] Webinar series on Long-Term Energy Scenarios (LTES) For Developing National Energy Transition Plans In Africa (January 2022)
		Side event at the Berlin Energy Transition Dialogue 2022 on Insights from Net-zero LTES for National Energy Planning (March 2022)
		Side event at the International Energy Workshop 2022 on Participatory Processes in Long- term Energy Scenario Development (May 2022).
		Side events at the CEM/MI (September 2022) • *Job Creation and Gender Balance in the Energy Transition: Priority Actions and Perspectives.* • *Pathways for Rapid Decarbonization of Power Systems.* • *The Breakthrough Agenda Report 2022: Accelerating Sectoral Transitions through Stronger International Collaboration.* • *LTES Campaign Global dialogue on long-term transition pathways for road transport* • *Facilitating and Accelerating PtX-Market Ramp-up.* • *Accelerating technology-based carbon removals: BECCS and DAC.* • *Innovation cooperation: global approaches to enhancing national policies and measuring progress.*
		4th International Forum on Long-Term Energy Scenarios (December 2022)

[154] Supported by the Governments of Denmark and Germany.
[155] Supported by the Government of Denmark.

		**Publications and analysis**[156] National Energy Transition Planning dashboard update (March 2022)
		"Scenarios for the energy transition – Experience and good practices in Latin America and the Caribbean" report (July 2022)
		"Scenarios for the energy transition – Experience and good practices in Africa" report.
		Report review of alignment between Long-Term Energy Scenarios and Long-Term-Low Emissons Development Strategies (with UNFCCC) [to be published in January 2023].
Peer-to-Peer Network "Energy Transition Connect"		Activities planned to start in 2023.
Coalition for Action		**Reports/briefs published, and events held** Public-Private Dialogue at the 12th IRENA pre- Assembly on circular economy and end-of-life management of renewables (January 2022)
		Coalition Annual Strategy Meeting (January 2022)
		Coalition for Action "Decarbonising End-Use Sectors: Green hydrogen certification" brief (March 2022)
		Coalition for Action country papers for Coalition Business and Investors Group: the Philippines (March 2022)
		Reports/briefs and events:Coalition for Action regional/country papers of the Coalition Business and Investors Group: West Africa and Argentina and associated bilateral meetings with government representatives.
		Coalition for Action white papers on "Community energy benefits" and a "Community energy checklist for governments."
		Coalition for Action white paper on "Towards 100% renewable energy: Opportunities and challenges of sector coupling".
		Coalition for Action brief on "Comparative review of 100% renewable energy scenarios".
		Coalition for Action white paper on "Towards 100% renewable energy" (specific focus TBD).
		Coalition for Action brief on "Finding Common Ground for a Just and Renewable Energy Future: Labour and employers' perspectives on a just transition."
		Coalition for Action series of webinars: labour perspectives, employers' perspectives and a joint discussion on a just transition convening Coalition members, labour unions and selected governments.
		Coalition for Action white paper on "Best practices in integrating renewables into agriculture" and associated webinar with stakeholders.
		Coalition for Action white paper on "Making green hydrogen economically viable: opportunities, challenges and key recommendations" and associated webinar with stakeholders.
		Coalition for Action white paper on "Green hydrogen and decarbonisation: Creating socioeconomic benefits".

[154] Supported by the Government of Denmark.

		IRENA Report on "The Role of Citizens in the Energy Transition".
Resilient Remote Communities*		Guidebook for implementation of decentralised RE in isolated remote communities. [157]
		Transitioning remote communities to renewables event during COP27, Egypt (November 2022)
Youth Forum		Third IRENA Youth Forum during the 12th Assembly to showcase youth-led solutions to accelerate the energy transition and achieve climate objectives (January 2022)
		Launch of the IRENA Global Council on Enabling Youth Action for SDG 7 to drive forward youth-led action on energy access and the transition to a renewable energy future (February 2022)
		Fourth IRENA Youth Forum to be held during the 13th Assembly in January 2023, including Pre-Forum engagement day.
		2022/2023 edition of the IRENA Student Trainee Programme to support Governing Body Meetings.
		Development of a Peer Education Toolkit, in cooperation with the SDG 7 Youth Constituency that includes workshop plans, presentations and background materials that youth leaders can use to deliver peer trainings within their schools, communities and constituencies[158]
Youth Talk		Seventh edition of the IRENA Youth Talk (June 2022)
		Career guide for young people to determine skill requirements to pursue a professional career in sustainable energy sectors.
		Virtual training workshop for youth on Energy System Modelling for the Energy Transition (September 2022)
Legislators Forum		Seventh IRENA Legislators Forum during the 12th Assembly to discuss parliamentary and regulatory actions to shift the energy transition from commitments to implementation in the Decade of Action (January 2022)
		IRENA Legislators Dialogue "G20: from Commitment to Action", held during G20 Energy Week (August 2022)
		IRENA Legislators Dialogue "Multi-Actor Partnerships for Renewable Energy" held at COP27 (Nov 2022)
		Eighth IRENA Legislators Forum to be held during the 13th Assembly in January 2023.
		Review for Parliamentarians issue n.14.
IRENA Student Leaders Programme		10-week virtual training for university students consisting of lectures and research assignments. Over 200 trainees from around the world took part in the Spring 2022 Cohort.

[157] Supported by the Government of Canada.
[158] Supported by the Government of Italy.

IV. Source of Advice

Core assessed and core non-assessed resources (in USD thousands): USD 7146. Outputs supported by additionalvoluntary contributions are footnoted.

Objective: Support country-level decision-making to accelerate the renewables-based transformation of national energy systems, advance strategies to diversify energy sources, reduce global emissions and achieve sustainable development.

Outputs	Status	Description
Renewable Readiness Assessments*		RRA of Burkina Faso[159]
		RRA of Bosnia and Herzegovina[160]
		RRA Solomon Islands[161]
		RRA of Chad[162]
		RRA of Somalia
		RRA of the Kyrgyz Republic (December 2022)
Energy Transition Outlooks* (country level)		Indonesia Energy Transition Outlook report[163] (October 2022)
		Malaysia Energy Transition Outlook report[164]
		Renewable Energy Roadmap for Nigeria*
Policy Framework for Energy Transition (PFET) modules		PFET Targets, with capacity building workshops done in the Arab region and Kyrgyzstan
Renewable Energy Statistics collection and use*[165]		Bioenergy survey for monitoring SDGs and NDCs: Ethiopia [phase 1 completed, phase 2 ongoing]
		Bioenergy survey for monitoring SDGs and NDCs – Ghana

[159] Supported by the Government of the Walloon Region, Belgium.
[160] Supported by the Government of Norway.
[161] Supported by the Government of Denmark.
[162] Supported by the Government of the Walloon Region, Belgium.
[163] Supported by the Government of Denmark.
[164] Supported by the Government of Denmark.
[165] Supported by the Government of Norway.

		Bioenergy survey for monitoring SDGs and NDCs – Kazakhstan
		Bioenergy survey for monitoring SDGs and NDCs – Lesotho
		Energy surveys for NDC implementation roadmaps – El Salvador
		Energy surveys for NDC implementation roadmaps – Saint Lucia
		Energy surveys for NDC implementation roadmaps - Sudan
		Energy surveys for NDC implementation roadmaps – Tonga
Renewable Energy Policies for Cities		Maintaining the operation of the SolarCity simulator platform by updating the backend
		SolarCity simulator[166] for San Salvador, El Salvador
		SolarCity simulator[167] for Bamako, Mali
		SolarCity simulator[168] for Sao Tome, Sao Tome and Principe
		SolarCity simulator for Khartoum, Sudan
		SolarCity simulator[169] for Sahinbey, Türkiye
		SolarCity simulator[170] for Charlestown, Saint Kitts and Nevis
		SolarCity simulator[171] for Basseterre, Saint Kitts and Nevis
		Capacity building on rooftop solar PV potential and the use of the SolarCity simulator • *Workshop for Mauritius high level government representatives (February 2022, 32 participants).* • *2nd NDC Investment Forum under the Caribbean NDC Finance Initiative (July 2022, over 100 participants).* • *Webinar series on Open-Source Geospatial Solutions for Energy Access organised by the World Resource Institute (April 2022, 40 participants).* • *Workshop on Project Financing and Design of Bankable (PPA) in AIS and SIDS (Aug 2022)* • *Webinar on Energy System Modelling for the Energy Transition (September 2022, 25 participants)* • *Workshop on Project Financing and Design of Bankable (PPA) in the Caribbeans (Nov 2022, 35 participants).*
Renewable Energy Education and Skills*		Support provided to the Ministry of Education, UAE on how to integrate renewable energy into the national education curriculum.
Cross-sectoral assessments for decentralised renewable solutions*		Activities planned to start in 2023

[166] Supported by the Government of Japan and Denmark.
[167] Supported by the Government of Japan and Denmark.
[168] Supported by the Government of Japan and Denmark.
[169] Supported by the Government of Japan and Denmark.
[170] Supported by the Government of Japan and Denmark.
[171] Supported by the Government of Japan and Denmark.

African Continental Power Systems Master Plan (CMP)*		Support provided to the development and kick- off of six support studies: Green hydrogen, battery energy storage system, hydro reservoir and pump storage plants, geothermal power plants, wind power, solar power
		The CMP training programme developed together with AUDA-NEPAD team
		Continental Africa SPLAT-MESSAGE model completed and undergoing testing
		Training session #1, one week training sessions with the CMP modelling team in Addis
		Training session #2, one week training sessions with the CMP modelling team in Cairo
		Training session #3, one week training sessions with the CMP modelling team in Bonn
		North Africa modelling report, to be launched at 13 Assembly
		Model supply region (resource zoning for modelling) report
		Cooperation framework around energy planning hub with GIZ
		Cameroon national masterplan development support programme
		Development of a capacity building programe for Senegal, with GIZ
		Regional modelling analysis & planning support programme for CAPP countries [phase 2 kick off][172] • *Programme development with stakeholders* • *Kick off meeting (Sep 2022)* • *First training (Oct 2022)* • *Second training (Nov 2022)*
		"Regional Modelling Analysis & Planning Support Programme for CAPP countries [Phase 1 completed]
Climate Action Innovation and Technology: mitigation, adaptation and NDC implementation*		**Publications and analysis** Technology and Infrastructure briefs on mitigation analysis in SIDS and LDCs (i.e., Antigua and Barbuda, Saint Kitts and Nevis, Sao Tome and Principle, El Salvador, The Gambia)
		Technology and Infrastructure brief on Power System Resilience for Climate Adaptation
		Technology and Infrastructure report on "Synthesis of past IRENA grid assessment studies for SIDS"
		Technology and Infrastructure report on "Grid Integration Assessment for the Republic of Mozambique"[173]
		**Technical assistance and capacity building** Technology and Infrastructure toolkit including mitigation analysis, transport sector decarbonization

[172] Supported by the Government of the Walloon Region, Belgium.
[173] Supported by the Government of Norway.

	Technical assistance for NDC implementation (Sao Tome and Principle, Antigua and Barbuda, Bosnia and Herzegovina, Belarus) and LT-LEDS development support (Kazakhstan and Mongolia)
	Capacity building for NDC implementation (Caribbean SIDS, Southeast Asia, Southern Africa)
	Grid Assessment and Modelling capacity building workshop(s) in Sub-Saharan Africa[174]
	Grid Assessment and Modelling technical assistance and capacity building for SIDS
	Grid Assessment and Modelling technical assistance and capacity building in Arab states
	Implementation of Quickscans activities in SIDS
	Support at a technical and organisational level with planning efforts, to establish an intergovernmental Global Offshore Wind Alliance (GOWA), in collaboration with international stakeholders. 14 member countries joined the Alliance including Australia, Belgium, Colombia, Denmark, Germany, Ireland, Japan, Portugal, Poland, Spain, the Netherlands, Norway, the UK, and the US
	**Events** Contribution to the Bonn Climate Change Conference for the Ocean and Climate Change Dialogue (June 2022)
	Global Offshore Wind Alliance COP27 launch event "Offshore Wind as a Key Solution to the Climate and Energy Security Crises"
	Support to other COP27 events and activities.
	Climate Action webinars in preparation for COP27 and COP28.
	"IRENA's Energy Transition Support to Strengthen Climate Action: Insight to Impact 2022" report (November 2022)
	"The Breakthrough Agenda Report 2022: Accelerating Sector Transitions through Stronger International Cooperation" report (September 2022)

[174] Supported by the Government of the Walloon Region, Belgium.

		IRENA is engaging with 83 countries on NDC enhancement and NDC implementation through direct country request and institutional partners[175] • *Scoping/on hold (18)* • *Work plan development (07)* • *Implementation of Support (18)* • *Input to NDC already provided (40)* Climate action support provided to Antigua and Barbuda, Belize, Benin, Bhutan, Burkina Faso, Cuba, Dominican Republic, Ecuador, El Salvador, Eswatini, Fiji, Gabon, Grenada, Jordan, Kyrgyz Republic, Lebanon, Liberia, Mali, Mauritius, Mozambique, Myanmar, Nepal, Nicaragua, Niger, Nigeria, North Macedonia, Palau, Papua New Guinea, Paraguay, Saint Kitts and Nevis, Seychelles, South Africa, The Gambia, Tonga, Uganda, United Arab Emirates, Uruguay Zambia, Zimbabwe, in reviewing mitigation and adaptation targets set by countries towards the enhancement of their NDC. Climate action support on- going to Albania, Bahamas, Bosnia and Herzegovina, Botswana, Cameroon, Colombia, Comoros, Dominica, Indonesia, Iraq, Lao PDR, Mongolia, Saint Lucia, Saint Vincent and Grenadines, Sao Tome and Principe, Solomon Islands, Sudan, Türkiye, towards the implementation of their NDC Climate action support under preparations to Afghanistan, Barbados, Belarus, Cambodia, Chad, Cook Islands, Egypt, Ethiopia, Georgia, Ghana, Guyana, Indonesia, Iraq, Lao PDR, Kazakhstan, Kiribati, Lesotho, Micronesia (Federal State of), Morocco, Mozambique, Niue, Pakistan, Panama, Peru, Rwanda, Samoa, South Africa, Thailand, Trinidad and Tobago, Tuvalu for towards the implementation of their NDC
		IRENA's contribution to LTS support includes 6 work packages which exist within the LTS development and review in the following countries Ecuador, Kazakhstan, Jordan, and Mongolia
		**Events** Support to Latin America and Caribbean Climate Week (July 2020)
		Support to Africa Climate Week (Aug-Sept 2022)
Climate Investment Platform implementation: 14 clusters*		CIP coordination[176] 339 partners engaged.
		362 projects registered.
		175 projects eligible for support.
		48 projects with the Project Information Documents (PIDs) or Project Information Sheet (PIS) actively supported
		34 projects that received technical assistance in the form of completed PIDs.

[175] Supported by NDC CAEP and United Nations Development Programme.

[176] Supported by UNDP and the Governments of Denmark (SIDS), Norway; and Germany as part of the German Government International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) support this initiative based on a decision adopted by the German Bundestag.

		9 projects matched to financing partners.
		**Other deliverables** Development of online platform (CRM) to semi- automate the work of the CIP.
Energy Transition Accelerator Financing Platform* (ETAF)		**ETAF coordination**[177] USD 400m commitment announced by UAE USD 200m commitment announced by Masdar USD 300m commitment announced by AIIB De-risking products commitment announced by Swiss Re.
		13 project proposals have been submitted.
		Discussions with IDB.
Risk Mitigation Facility*		Concept note developed.
		Procurement of consultant services for the Market Assessment.
Facilitation and development of a pipeline of projects*		Engagement with UN Agencies, MDBs and other stakeholders to further develop a project pipeline
Project site assessments and feasibility assessments [178]		Project site assessment for 12 solar PV, parabolic trough collector, and onshore wind sites earmarked for project development in El Salvador.
		Project site assessment for 8 solar PV, parabolic trough collector, and onshore wind sites earmarked for project development in Mali.
		RE potential assessment for 3 countries (Colombia, Mali, and El Salvador).
		Extended the project site assessment service to include concentrated solar power (CSP) technologies – parabolic trough collector (PTC), central receiver system (CRS), and linear Fresnel reflector (LFR)
		Training material on concentrated solar power (CSP) technologies – parabolic trough collector (PTC), central receiver system (CRS), and linear Fresnel reflector (LFR).
		Capacity building for: • *Arab states on resource potential assessment and zoning analysis (February 2022, 29 participants).* • *African countries on renewable potential assessment, workshop organised by Commonwealth, AfDB, and Chatham House (July 2022, 60 participants).* • *Mozambique on generation profiles, workshop on grid integration analysis (July 2022).* • *Mozambique on Wind Power organised by Global Wind Energy Council (October 2022, 33 participants).*

[172] Supported by the Government of Norway and the Abu Dhabi Fund for Development.

[178] Supported by the Government of the Walloon Region, Belgium.

ADDITIONAL OUTPUTS

Strategic management

Outputs	Status	Description
Governance Support Office		In-person engagement with Members to discuss and exchange views on enhancing strategic collaboration through the coordination of over 40 high-level Members' visits to the IRENA HQ (Heads of States, Ministers of Foreign Affairs, Ministers of Energy, Special Envoys for Climate Change, etc.)
		Engagement and outreach with States in accession and non-Members to enhancing the benefits of becoming an IRENA Member as well as expediting ratification and accession process
		In-person engagement with IGOs, Academia and Private Sectors representatives to discuss and exchange views on enhancing strategic collaboration
		**Governing Body meetings:** Organisation and conduct of the 12th session of the IRENA Assembly for peer-to-peer engagement among Members and Stakeholders (January 2022)
		Summary Report of the 12th session of the IRENA Assembly
		23rd Council meetings, including the meetings of the Administration and Finance Committee (AFC) and the Programme and Strategy Committee (PSC)
		Summary Report of the 23rd Council meeting
		24th Council meetings, including the meetings of the Administration and Finance Committee (AFC) and the Programme and Strategy Committee (PSC)
		13th session of the IRENA Assembly for peer-to-peer engagement among Members and Stakeholders (January 2023)
		**High-Level Meetings:** Second edition of the Global High-Level Forum on Energy Transition
		**Permanent Representatives:** Engagement and outreach with PRs of IRENA and other heads of missions to enhance their role as direct on-the-ground liaison with IRENA, resulting in over 10 ceremonies for the Presentation of Credential Letters and in an increased number (64) of accredited Permanent Representatives
		Seventh edition of the Renewables Talk for Permanent Representatives to launch the Clean Cooking Platform with a view to fostering cooperation and coordinated action in promoting the deployment of clean cooking solutions. (March 2022)

		Eighth edition of the Renewables Talk for IRENA Permanent Representatives hosted by the Embassy of Switzerland to the UAE aiming at fostering discussion about delivering transformative change to coastal communities and island territories through the innovative power of renewables (April 2022)
		Ninth edition of the Renewables Talk for IRENA Permanent Representatives hosted by the Embassy of Malta to the UAE (November 2022)
		Tenth edition of the Renewables Talk for IRENA Permanent Representatives hosted by the Permanent Mission of UAE to IRENA (December 2022)
New York Liaison Office		Facilitation of participation of the UN high-level stakeholders at the twelfth session of the IRENA Assembly.
		Provision of technical inputs to the UN-Energy Plan of Action.
		Preparation of the inputs to the thematic review of the 2022 UN High-level Political Forum on Sustainable Development
		Preparation of the official side event of the High-Level Political Forum on Sustainable Development on Beyond the Talk: Financing Renewable Energy to Fuel the SDGs (July 2022)
		Coordination of IRENA participation in the 2022 UN High-level Political Forum on Sustainable Development, including side events.
		Outreach to selected UN bodies and New York based Permanent Missions on the launch of the World Energy Transitions Outlook 2022.
		Engagement with the New York based Permanent Missions to the UN with the purpose of strengthening IRENA voice at the UN level.
		Engagement with the UN system based in New York for the purpose of exploring opportunities to work closely on the ground.
		Support to preparation of the "Tracking SDG 7: The Energy Progress 2022" Report.
		Preparation of the inputs to the UN-Energy Annual Report.
		Coordination of IRENA inputs to the UN Interdepartmental Taskforce on African Affairs (IDTFAA) with the focus on energy financing, technology and innovation, planning.
		IRENA inputs to 2022 ECOSOC Forum on Financing for Development.
		Preparation of the concept of engagement with the United Nations Resident Coordinator System.
		Participation in the Global South-South Development Expo 2022 and showcasing of IRENA products to the Global South in support to energy transition and achievement of SDGs.
		Coordination of IRENA participation in the 2022 UN High-Level Week.

		Finalisation of and support to the launch of the joint UNOHRLLS-IRENA report "Scaling up Renewables in LLDCs"
		Statements delivery and discussions on the related aspects of the work of the Second Committee of the 77th General Assembly
		Engagement with the New York based Permanent Missions in light of the General Assembly Resolution "Ensuring access to affordable, reliable, sustainable and modern energy for all"; preparation and dissimination of the inputs to the Resolution.
		Preparation of IRENA inputs and facilitation of IRENA participation at the LDC5 conference.
		Facilitation of participation of the UN high-level stakeholders at the 13th session of the IRENA Assembly.
Legal Office		The Legal Office has been providing legal advice and guidance in relation to all the areas of activity of the Agency. More than 600 requests for assistance have been processed from the 1st of January to the end of November of 2022 covering, among others, institutional and governance matters; preparation of and advising on the preparation of internal issuances, guidelines and directives; administrative and HR matters; commercial contracts; collaborative arrangements, agreements and strategic partnerships; communications; and publications matters, as further described below:
		**Institutional and governance matters** The Legal Office has provided legal support for: (i) the conduct of the 12th session of the Assembly; (ii) the 23rd Council; and (iii) the 24th Council. This included facilitating the work of the Credentials Committee in the context of the Assembly session; reviewing the credentials of the Permanent Representatives designated by the Members; supporting individual Members in their submission of the credentials; and reviewing from a legal perspective the relevant documentation submitted to IRENA's governing bodies. The Legal Office has also provided legal support as needed in connection to proposals and queries submitted by the Members to IRENA's Council.
		**Internal legal framework** The Legal Office has been providing ongoing legal support to various units with respect to the interpretation and review of the internal issuances, guidelines, and directives.
		**Administrative and HR matters** The Legal Office has been closely involved in advising on several HR matters, including but not limited to the review of secondment arrangements agreed with other entities and international organisations.

Cooperation arrangements and commercial contracts More than 100 requests have been processed concerning conclusion of cooperation arrangements, including MoUs, partnership agreements, cooperation agreements, voluntary contributions, etc. More than 25 commercial agreements and contracts have been reviewed in addition to the legal support provided to the Contract Review Committee and in relation to other requests for assistance submitted by the Procurement office. With respect to the above, the Legal Office has also been supporting various teams in the negotiations of complex agreements and contracts, including those relevant for the IRENA's platforms including ETAF.

Communications and ICT The Legal Office has been closely involved in providing legal support on matters relating to the fraudulent use of IRENA's name and logo and drafted a scam alert to be placed on IRENA's website to warn the public at large about various fraud schemes consistent with the practice followed by other international organisations. The Legal Office has also been closely involved in the review of the Terms of Use of IRENA's website in consultation with Communications colleagues.

Publications The Legal Office has been involved in the review of the *IRENA Publications Management Guidelines 2022* and has been advising on other matters relating to the use of IRENA's intellectual property, use of IRENA's name and logo, disclaimers, *etc.*

Other matters The Legal Office has been providing ongoing legal support on the integration of various third- party data into the Global Atlas for Renewable Energy and has been supporting other teams with respect to various other initiatives. For instance, the Legal Office has supported PPS in the review of Terms of Reference of the Regulatory Energy Transition Accelerator (RETA) and the Rules of the RETA Steering Committee, where IRENA acts as one of the permanent members amongst other international organisations.

Events Unit		Events and Missions database for internal and external communication maintained
		Organised 209 events since January 2022, of which 136 were virtual and 73 were hybrid
		Student Leaders Programme, part of Growth@IRENA programme (online): 227 students registered for the Spring Cohort 2022 and 220 students attended, similar numbers were attended for the Autumn Cohort 2022 extended to international participation
		Outreach activities with the UAE, including EXPO 2020, World Government Summit, Abu Dhabi Sustainability Week (ADSW)/ The World Future Energy Summit (WFES), Abu Dhabi Global Markets (ADGM), Abu Dhabi Youth Hub (ADYH), Dubai Cares, Dubai Electricity & Water Authority (DEWA)'s Innovation Centre and the upcoming COP27 and COP28
		Continue to maintain the Fund for Developing Country Representatives (FDCR) and supported the participation of three eligible LDC and SIDS Members to attend the 23rd Council and Committee meetings and one eligible SIDS Member to attend the 24th Council and Committee meetings.
Diversification of resource base		**New contributions concluded in 2022-23** Walloon, Government of Belgium (Various projects, focus on French speaking Africa). Germany BMWK (G7 support on Hydrogen, WETO and LTS) Japan METI (Various projects) Japan MAFF (Circular economy with bioenergy) Republic of Korea (seconded official) UNDP (Climate Promise) United Kingdom, BEIS (Breakthrough Agenda)
Monitoring and evaluation system		Development of IRENA's Theory of Change
		Internal coordination to improve and enhance IRENA's M&E system
Programmatic reports to the Council and Assembly		23rd meeting of the IRENA Council:"Progress Report of the Director-General on the Implementation of the Work Programme and Budget for 2022-2023"
		Draft Framework for the Medium-term Strategy 2023- 2027
		24th meeting of the IRENA Council:"Annual Report of the Director-General on the Implementation of the Work Programme and Budget for 2022-2023"
		Draft Medium-term Strategy 2023-2027 – Report of the Director-General
		Since January 2022, IRENA Director-General attended 237 events and held 334 bilaterals with representatives from different entities (including regional bodies, non- governmental organisations and the sector as well as Governments.) Active outreach by IRENA Deputy Director-General and Director to Members, intergovernmental organisations, multilateral and regional entities and other stakeholders
		13th session of the IRENA Assembly:"Annual Report of the Director-General on the Implementation of the Work Programme and Budget for 2022-2023"
		Medium-term Strategy 2023- 2027

Enabling IRENA delivery

Outputs	Status	Description
Upgrades and enhancements to the IRENA website, platforms, and other IT systems.		CIP[179] back-end processing tool
		ETAF platform enhancements
		Country Engagement Platform
		New IRENA Intranet launched
		Website upgrade - new website launched
		ERP quarterly upgrades [Q1, Q2 and Q3 upgrades completed, Q4 under preparation]
		Enhancements in ERP reporting and other modules (HR, Budget, Finance)
		Executive dashboard and other Dashboards enhancements [Staff accounts, Procurement and Ethics dashboard completed, others under development]
		New ERP Recruitment module
		Continuous support to hybrid and virtual events including collaborative framework meetings
Efficient budget services		Support across the Agency and to external clients in administration of core funds and voluntary contributions, internal reporting, as well as reporting to donors and governing bodies.
		Budget Section supported development and rollout of internal Executive budget dashboard, and its maintenance.
Delivery of efficient financial services		IRENA and IRENA SPF 2021 Audited Annual Financial Statements submitted to Assembly.
		Provision of full financial services to the Agency [ongoing].
Support to the Provident Fund operations		Annual meeting of members conducted on 22 March 2022.
		PF Management Board holds quarterly meetings to review Provident Fund performance. First one was held on 2 February 2022

[179] Supported by the governments of Denmark; Germany, as part of the German Government International Climate Initiative (IKI). The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) support this initiative based on a decision adopted by the German Bundestag and UNDP.

Efficient procurement services		Maintain open, fair, transparent and competitive procurement bidding process in line with relevant regulations and policies.
		Develop a process of procurement operation through establishment of 28 Long-Term Agreements LTA to allow for an effective and efficient response and implementation of work programme.
		Automate the annual and quarterly procurement plan continues to be maintained and updated throughout the year.
Effective general and travel services		Administration support, enhancement of Facility Management and other services.
		Health and Safety program continues to take further measures to enhance the work environment.
		Travel Logistic services for 60 workshops and 1 704 travel services for the period of 1 January to 30 November 2022.

IRENA
International Renewable Energy Agency

A/13/3

Thirteenth session of the Assembly
Abu Dhabi, 14-15 January 2023