

Issue 29 / November 2024

Energy Journal

**New Energy Connections
for a Sustainable
Tomorrow**

Inspired with innovation **CESI**

Energy Journal

CESI's house organ
Editorial coordination
Paolo Chighine / CESI
Luana Facciolo / CESI
Davide Cospito / CESI

Project, design and translations

Cultur-e
www.cultur-e.it

CESI

Inspired with innovation

via Rubattino, 54
I-20134 Milano – Italia
info@cesi.it
www.cesi.it

While all efforts have been made to contact relevant copyright holders with respect to the materials included in this publication, we invite any person whose rights have not been cleared as yet to contact the Publisher for necessary arrangements.



Editorial

Integrated Networks: Global Strategies for a Sustainable Future



Paolo Chighine

The current geopolitical scenario is marked by significant uncertainty, and the conflict in the Middle East further threatens the equilibrium of international relations. War not only disrupts regional stability but **also has a direct impact on global energy markets**, increasing the strain on nations and businesses that depend on resources from this strategic area. In a context of increasing complexity, **energy security and source diversification have become fundamental priorities for governments and companies** seeking innovative solutions and transnational collaboration to reduce risk and guarantee stable supplies.

We know that the energy transition requires solid infrastructure, both material and immaterial. **Regulations and markets must be**

as aligned as possible to guarantee the efficient operation of the energy system and promote a normative framework and structural reforms that will attract investments. Interconnections and storage are crucial to this process: by balancing the use of different energy sources and ensuring supply continuity, these elements are essential to achieving decarbonization objectives.

To implement the ambitious decarbonization objectives set for the power sector by 2030, the European Union will need to focus on the integration of electric networks beyond its borders. Indeed, CESI has emphasized that true progress in the energy transition will only be achieved through greater interconnections between the EU and neighboring regions, by combining resources and infrastructure. This

vision calls for the development of major electric interconnection projects through large investments, technological innovation, and new business models capable of guaranteeing a more resilient and flexible grid. The “Green Energy Corridor” Project, for example, which proposes a submarine cable across the Black Sea to transport electricity produced by renewables in the South Caucasus to Europe, represents a significant step in this direction.

At the recent COP29 Summit, CESI had the opportunity to concretely express its vision on the energy transition in various meetings with top executives. In particular, our Group **CEO, Nicola Melchioti**, took part, together with the Energy Ministers of Azerbaijan, Georgia, Romania, and Hungary, in the 9th Meeting of the Ministerial Committee on the “Green Energy Corridor” Project. This groundbreaking initiative promotes the transport of wind, solar, and hydrogen energy from Azerbaijan to Romania, via the Caucasus and the Black Sea. CESI has been appointed to evaluate the infrastructural feasibility of the project.

Meanwhile, Mediterranean countries are already interconnected by a system of electric networks and gas pipelines. However, the evolving geopolitical panorama and the emergence of new technology are shifting attention towards countries in North Africa and the Middle East. These countries are consolidating their role as suppliers of energy to Europe, pointing to the need for greater cooperation and better interoperability between the energy systems on the two sides of the Mediterranean.

This is why we have decided to concentrate on a crucial issue for the future global energy scenario: **market integration and energy interconnections**, with a particular focus on Europe. In an age where strategic partnerships and sustainable development are at the core of international policy, opportunities to strengthen relations between Europe, Africa, and Asia are emerging forcefully, pointing to shared benefits and a new approach to energy challenges.

In the **Scenario** section, we address how energy cooperation can become a driver of growth for business, regional economies, and the entire Mediterranean area as a catalyst for development. The article describes how – due to its geopolitical instability – this area will become increasingly central to Europe’s energy security. Thanks to projects like the **submarine interconnection between Italy and Tunisia**, Italy will strengthen its role as a bridge between the European continent and Africa, promoting strategic collaboration and investments in the energy transition and sustainable development.

The integration and coordinated management of energy systems is not limited to large transnational infrastructure but can also be applied to specific contexts such as major international events. In the **Top Story** section, we analyze how global events (e.g., large sporting events like the **Paris Olympics** or the **Super Bowl**) represent true microcosms of energy interconnection. The ability to coordinate

various sources of energy, integrate renewables, and guarantee operational efficiency reflects – on a temporary local scale – the same dynamics of interoperability and sustainability that characterize greater infrastructural projects. Although circumscribed, these examples provide valuable insights into how the energy transition may be applied to complex challenges, contributing to the definition of an integrated approach for a future global energy scenario.

The **Future** section addresses technology and new opportunities for international cooperation and sustainability, providing concrete examples of innovative projects – **interconnections between Europe and the Middle East or Sub-Saharan Africa** – to explain how technology not only drives decarbonization but also improves the resilience of power grids. From the decarbonization roadmap of **Emirates Global Aluminum** to the crucial **Medlink** Interconnection that will transfer North African renewable energy to Italy, the challenges of the future of energy are addressed through ambitious visions and concrete solutions. Additionally, we report on the international projects assigned to **CESI and KEMA Labs**, working to ensure the security, reliability, and decarbonization of global electric grids.

The **Opinions** section concludes this issue with a series of views, including that of **Jason Bordoff**, founder of the Center on Global Energy Policy at Columbia University, who underlines the importance of integrating energy markets to accelerate the transition towards decarbonized energy. While Bordoff emphasizes how greater international collaboration could balance national interests and promote a more secure and electrified future, **Michael Tanchum**, an expert in Middle Eastern and North African Energy Geopolitics, points to the strategic role that will be played by interconnections between Europe, Africa, and the Middle East. Projects such as Xlinks demonstrate how the transport of energy and green hydrogen will drive the transition towards a sustainable future. In conclusion, **Roberto Vigotti**, Secretary General of the RES4Africa Foundation, highlights the importance of adopting a holistic approach – fundamentally based on the digitalization of networks and the development of renewable energy – to face energy challenges in Africa.

Enjoy the reading!

Paolo Chighine
*CESI Group Communication and External Relations
Executive Vice President*

Contents



8

News

Latest from CESI



10

Scenario

The Mediterranean: A New Hub for Energy Integration



18

Industries & Countries

Industry and Energy: The Future is at Hand



30

Top Story

Great Events: The Key Role of Energy Integration



36

Future & Technology

Interconnection and Renewables: CESI's Vision for a Sustainable Future



46

Opinions

Energy Market Integration is Key



50

News & Events

Upcoming Energy Events

Energy Journal can be browsed and downloaded at www.cesi.it

“The project that can make Europe more independent and energetically secure [...] is an infrastructure connecting all EU member states: a European grid.”

Teresa Ribera, European Commission Executive Vice-President for a Clean, Just, and Competitive Transition

News

Latest from CESI



Arab Emirates



Roadmap to Decarbonization

Emirates Global Aluminium (EGA), the UAE's largest industrial company outside the oil and gas sector, is pursuing a significant energy transition to align with the country's net zero by 2050 goal. EGA, the world's largest producer of premium aluminium, generates over 50% of its greenhouse gas emissions from electricity production, primarily fueled by natural gas. CESI is assisting EGA in developing a comprehensive roadmap for decarbonizing its power generation, exploring various green energy alternatives including solar, wind, hydrogen, and carbon capture technologies. This study will ensure a sustainable energy transition while maintaining the security of supply to EGA's critical smelting operations.



This study will ensure a sustainable energy transition.



Interconnection



Medlink HVDC Interconnection for Italy's Decarbonization

CESI plays a pivotal role in the Medlink transnational interconnection project, which aims to transfer renewable energy generated in Algeria and Tunisia to Italy's AC transmission network via a 2 GW, 525 kV bipolar HVDC link. After successfully conducting the pre-feasibility study, CESI is now leading the feasibility phase, focusing on the detailed specification of the system's components. This includes designing the AC transmission systems in Algeria and Tunisia, the extensive submarine cable connections across the Mediterranean, and the integration with Italy's grid. CESI's responsibilities also encompass defining the scope of supply, engaging with key suppliers, and preparing comprehensive project documentation to ensure the successful implementation of this critical link in Italy's decarbonization strategy.



To transfer renewable energy generated in Algeria and Tunisia to Italy's AC transmission network.



Certifications



The role of KEMA Labs in international standards

KEMA Labs plays a vital role in testing and certifying digital substation components to ensure their safety, reliability, and compliance with international standards. They offer rigorous testing services that validate the performance of products like the SEL Ethernet Switches, which recently received certifications for their quality. These certifications help manufacturers demonstrate compliance and innovation, contributing to the resilience and safety of modern power grids. KEMA Labs remains committed to impartiality and upholding global standards through its thorough evaluation processes.



These certifications help manufacturers demonstrate compliance and innovation.



Offshore



Netherlands, a project to expand the electrical grid

KEMA Consulting has secured contracts from TenneT to support the expansion of the offshore power grid in the Netherlands. The project focuses on HVDC converter stations and connections between offshore wind farms and the national grid. KEMA will handle system studies and infrastructure installation, contributing to the energy transition towards renewable sources. Part of the CESI group, KEMA Consulting, with the support of Consulting Division, has extensive experience in HVDC projects and innovative solutions for complex power grids.



CESI Consulting has extensive experience in HVDC projects.



Scenario

The Mediterranean: A New Hub for Energy Integration

The key positioning of the Mediterranean is boosting the GDP of the entire region; economic development includes the deployment of new energy infrastructures like the ELMED interconnector, a submarine interconnection between Italy and Tunisia, and the Mattei Plan that aims to strengthen ties (not only energetic) with Africa.

The war in Eastern Europe has led to geopolitical turbulence that is impacting the security of supply, while the crisis in the Middle East has raised new doubts concerning the stability of this crucial region. There are three consequences to this situation that have shifted energy system priorities. The sustainability and zero emissions objectives were foremost on the energy trilemma of sustainability, security, and equity. However, following Russia's invasion of Ukraine, the triangle has rotated, and the "security" issue now sits at the vertex. Securing supplies and reducing dependence have become essential elements of European energy strategy. According to the [Med & Italian Energy Report](#), the share of Russian gas imports in the EU – amounting to 45% before the war in Eastern Europe (2021) – fell to 24% in 2022 and to 15% in 2023.

Globally, Europe has the highest energy import dependence (55.5%) compared to China that only imports 20% of its energy needs and the United States that are completely self-sufficient. In Europe, Italy needs to import the most energy (73.5%), while France, also thanks to its nuclear energy, imports the least (44.2%). Over the past twenty years, European production of electric energy has undergone a significant transformation. According to the Ember report "European Electricity Review 2024", the use of coal has dropped from 31% to 12%, while that of

natural gas has increased from 12% to 17%. The energy produced by the combination of wind and solar represents 27%, while nuclear 23%, hydroelectric 12%, bioenergy and other renewable resources 6%. And renewables have risen from 15% to 38%. The growth rate of electricity produced by renewables is expected to more than double by 2027.

In May 2022 Europe has introduced the REPowerEU Plan to address this crisis. The plan aims to rapidly reduce reliance on Russian energy and accelerate the ecological transition through measures based on three pillars: diversification of energy supplies, energy savings, and an increased penetration of renewables. The plan will allocate € 300 billion, with € 210 billion in new investments in addition to those already established by the "Fit for 55" strategy.

According to a report published by the Oxford Institute for Energy Studies ("[Italy and its North African Gas Interconnections: A Potential Mediterranean Gas 'Hub'?](#)"), the current geopolitical instability in the Middle East affects a region that is both strategic and vulnerable for global energy security. Indeed, 20% of international oil trade passes through the Strait of Hormuz, and 10% (in addition to 8% of global LNG) transits through the Suez Canal. Thus, these two bodies of water witness the transit of over 28 million barrels of oil a day. In fact, the Mediterranean



For further information on this topic, please contact:

Bruno Cova (Power System Excellence Director)
bruno.cova@cesi.it

Strengthening the Electrical Interconnection Framework

The countries bordering the Mediterranean are already interconnected by an extensive network of power grids, pipelines, and renewable energy projects. However, the evolving geopolitical scenario and the rise of new technology has made North African and Middle Eastern countries central to new energy flows to Europe. This requires “greater cooperation and improved interoperability with the main industries in the sector,” as is explained in a note published in May at the forum held in Selinunte (Sicily) and attended by energy authority presidents of MEDREG (Association of Mediterranean Energy Regulators) together with executives of major companies in the energy sector. The objective is to improve collaboration on the energy market amongst the countries bordering the Mediterranean.

According to Stefano Besseghini, President of the Italian Regulatory Authority for Energy and the Environment (ARERA), cooperation is necessary to adopt a coherent regulatory approach at the regional level, a prerequisite to attract infrastructural investments and exploit the full potential of renewable energies in the Mediterranean area and, ultimately, decarbonize the energy sector. ➤

➤ basin has always been characterized by a net flow of Oil & Gas from the south to the north. Moreover, the Mediterranean also plays a crucial role as a transit area for the supply of commodities to Europe from the rest of the world.

Currently, the countries on the European and Eastern shores of the Mediterranean depend on southern Mediterranean countries for respectively 18% and 27% of their oil, crude oil, and gas. The economies of southern Mediterranean countries rely heavily on exporting fossil fuels, while their enormous solar and wind energy potential stands in net contrast to the limited installed renewable capacity (9.8%). In North Mediterranean countries, on the other hand, the European Commission is driving the development of renewables via the National Energy and Climate Plans (NECPs, reviewed every two years) of Member States and provides support to help member states achieve their decarbonization objectives.

A temporary solution could be provided by liquefied natural gas (LNG) to which the final document of the Environment, Energy, Climate G7, held between the end of April and May in Piedmont, dedicated an entire chapter. “An increase in LNG supplies can play an important role in ending our dependence on Russian gas imports. Investments in this sector can be used to counter the current crisis and address potential shortfalls on the gas market. Indeed, we are working to transition away from Russian gas imports as rapidly as possible. In the exceptional circumstance of accelerating the phase-out of Russian energy,” continues the report, “public investments in the gas sector can serve as an appropriate temporary response, subject to clearly defined national conditions, if implemented in a manner consistent with national requirements and climate objectives.”

Following the sanctions imposed by the EU, gas imports from Russia were practically eliminated over the course of two years, declining

from 29.2 billion cubic meters in 2021 to 2.8 billion in 2023. Indeed, Russian gas dropped from satisfying 40% of the national requirement in 2021 to 4.7% in 2023. It was substituted by gas reaching Italy through pipelines from other countries (mainly Algeria and Azerbaijan) and partly by increasing the percentage of liquid natural gas shipped to Italy. Indeed, LNG imports increased by nearly 70% over two years.

In greater detail, the gas imported in 2023 was mainly supplied by Algeria (25.5 billion cubic meters), Azerbaijan (10 billion), Qatar (6.8 billion), United States (5.3 billion), Norway and Holland (6.6 billion), and Libya (2.5 billion), with other countries providing the remaining 2 billion cubic meters. In 2023, ca. 14.5 billion cubic meters arrived by ship: Qatar, Algeria, and the United States provided 88% of imported LNG (vs. a total of 94% in 2021). This is a true substitution, and it has shifted the energy barycenter from the east to the south, positioning the Mediterranean as a pivotal energy hub.



➤ The issue of electric grids was also addressed by the twenty-seven EU member states when they called on the Energy Council to implement a coordinated and long-term plan to drive investments (also through the EIB) and improve the framework in order to guarantee that the expansion of the EU grid will conform to climate objectives. Member states have adopted the conclusions on sustainable electric grid infrastructure as per the action plan approved in November 2023 by the EU for the development and expansion of energy grids. Participating ministers acknowledged the need for “unprecedented investments” in power grids, both at the transmission and distribution level, in order to ensure a highly interconnected, integrated, and synchronized system. Furthermore, the forum also focused on infrastructural and supply security, inviting the EU to help member states “improve power supply security” by concentrating on risk preparedness, with a particular focus on hybrid threats and critical infrastructure.

As emphasized by ECCO, an Italian non-profit think tank on climate change, in its report entitled “Gas-to-Clean Transition in the Mediterranean: Towards New Partnerships with Algeria and Egypt”¹, the European Energy Security Strategy presented in May 2014 following the Ukrainian crisis sparked by the Russian annexation of Crimea, already acknowledged the foreign policy implications of its energy strategy and the need to implement a common, coordinated approach. In its subsequent communication on a Strategy for a European Energy Union, in February 2015, the European Commission indicated the need to diversify gas supplies to increase resilience to any interruption and, in particular, indicated Transmed – Algeria and the Mediterranean – as key to this diversification strategy.

The report then focuses on how, with the launch of the Green Deal in 2019, the EU reiterated its determination to bind energy policy to the achievement of climate objectives. Indeed, the agreement became an integral part of the EU post-pandemic recovery plan with the substantial resources allocated to “Next Generation EU,” 30% of which have been dedicated to adapting member state economies to climate objectives. In 2021, with the “Fit for 55” Package, the EU described the policy actions necessary to achieve the decarbonization objectives, including the achievement of 42.5% renewables in its energy mix by 2030 and an increase in energy efficiency objectives.

1. <https://eccoclimate.org/wp-content/uploads/2022/04/Transizione-gas-to-clean-per-il-Mediterraneo.pdf>

In 2022, the Commission published the REPowerEU plan, which set out a series of measures to rapidly reduce the EU’s dependence on Russian fossil fuels well before 2030 by accelerating the clean energy transition. The REPowerEU plan is based on three pillars: saving energy, producing clean energy and diversifying the EU’s energy supplies. As part of its scaling up of renewable energy in power generation, industry, buildings and transport, the Commission proposed to increase the target in the directive to 45% by 2030.

The Malta Declaration and the Mattei Plan

Presented by the Italian Government at the end of January 2024, the Mattei Plan for Africa is a strategic Italian diplomacy, development cooperation, and investment project to strengthen and renew its ties with the African continent. The plan addresses five main priority areas: education and training, health, agriculture, water, and energy. Funding currently stands at €5.5 billion, which the government aims to increase by involving international financial institutions, multilateral

development banks, the European Union, and donations by other countries. And this is also the context for the renewed interest in the Mediterranean area, although many unknowns remain to be solved, above all those related to the area’s geopolitical stability.

To address this issue, in May, nine countries bordering the Mediterranean undersigned the Malta Declaration with which the EU Med9 countries (Croatia, Cyprus, France, Greece, Italy, Malta, Portugal, Slovenia, and Spain) agreed to develop a road map to promote the Mediterranean as a hub for green energy. And this agreement complements the second phase of the Green Deal: a plan for electric grids and major projects through which to implement the decarbonization of the gas sector, such as the Italian hydrogen corridor which will represent the backbone of the system.

This infrastructure, which was presented by the European Commission in an energy transition context that has been radically transformed since 2022, is one of the projects of common interest (PCI). These include 85 initiatives for smart electricity grids and cross-border interconnectors, 14 ➤

➤ for CO₂ transport (previously only 6) and, for the first time, 65 proposals on electrolyzers and hydrogen. The first group includes ELMED, a 600 MW high-voltage submarine interconnector that will connect Europe and North Africa through Italy, representing the second Europe-North Africa electrical interconnection². The ELMED submarine cable – 220 kilometers long and lying at a depth of ca. 800 meters in the Strait of Sicily, interconnecting Italy and Tunisia – is part of the Mattei Plan, a strategic project for the Italian electricity system, and meets the objectives of the National Energy and Climate Plan (NECP). Investments in the project, which will be operative in 2027, amount to €800 million. The other two groups include the “SouthH2 Corridor” and the “Callisto Mediterranean CO₂ Network” projects, in both of which Italy plays a leading role. And this list is just one part of the grid revolution planned by the EU.

On May 30, at the European Energy Council held in Brussels, Italy, Austria, and Germany

2. The first one is the interconnection between Spain and Morocco, in operation since 1998.

undersigned a memorandum of understanding for the development of the hydrogen “SouthH2 Corridor.” The pipeline will extend from North Africa – where the greatest amount of renewable hydrogen will be produced – through Sicily and Italy to Austria and Germany, helping the EU achieve its goal of importing 10 million tons of renewable hydrogen by 2030, as outlined by the REPowerEU energy plan. In November, this project was added to the EU’s Projects of Common Interest (PCI) recognizing its “key” potential to transport hydrogen “towards European industrial areas and support decarbonization,” besides providing a point of contact with “our partners in North Africa,” explained Energy Commissioner Kadri Simson, who attended the signing ceremony.

As part of European plans to develop a true European hydrogen backbone, the SouthH2 Corridor will use reconverted infrastructure to transport hydrogen, only developing new infrastructure where necessary. According to estimates, the system should be operative by 2030 and will have the capacity to import 4 million tons of hydrogen per year from North Africa, satisfying 40% of the objective set by REPowerEU.



A Memorandum with Tunisia

On the same day, the Italian Government formally inaugurated the “A Road Map to Connect Africa to Europe for the Production of Clean Energy” Project, funded by the European Commission and implemented with the contribution of the World Bank. Aiming to support the objectives of the Mattei Plan for Africa (especially in terms of energy), the project will map energy interconnection infrastructure – both existing and planned – to transport clean energy from Africa to Europe, passing through Italy, a strategic hub between the two continents. The meeting included members of the Italian Government and representatives from the EU Commission and World Bank. The objective was to ensure the

sharing of the various initiatives related to the production, transmission, and distribution of energy flows between Europe and the African continent, in line with the Mattei Plan, which, as specified in the final note «aims to promote shared development with countries in the south Mediterranean, ensuring greater energy security and diversification».

In this context, at the Tunisia Investment Forum (TIF) held in mid-June, Tunisia and the European Union undersigned a Memorandum of Understanding on “a strategic partnership to promote and develop investment potential in renewable energy and guarantee energetic and strategic supplies.” The EU has allocated €334.6 million to support the ELMED Italy-Tunisia electricity interconnection, while the European Bank for Reconstruction and Development (EBRD), the

European Investment Bank (EIB), and the KfW (Kreditanstalt für Wiederaufbau - Reconstruction Credit Institute) have provided a further €125 million for the purchase of the submarine powerline.

The renewed centrality of the Mediterranean is also underlined in the updated edition of the “Mediterranean Sustainable Development Index.” According to the index developed by The European House Ambrosetti to measure the attractiveness of southern Italy, the GDP of the “core” Mediterranean area increased by 4.8% between 2021 and 2022. In addition to Italy, this area includes 22 other countries from the European Union, the Balkans, the Middle East, and North Africa. And the result is far superior to that of large global economies such as China (+3%) and the United States (+2.1%).

Industries & Countries

Industry and Energy: The Future is at Hand

Funding for electric networks – up by more than 20% in 2023 – reflects the need for greater interconnection, especially to facilitate energy flows towards the markets in central Europe.

The energy transition has recently gathered speed thanks to the diffusion of decarbonization technology and record-level capital investments. In 2023, for the first time, combined investments in renewable energy and networks exceeded those in fossil fuels and, by the end of this year, global investments in decarbonized energy will nearly double those in fossil fuels. This result was achieved thanks to improved supply chains and the reduced cost of clean technology, as certified by **World Energy Investments** that forecasts that global energy investments will exceed US\$3000 billion, for the first time, in 2024. In particular, US\$2000 billion will be allocated to decarbonization technology including renewable energy, electric vehicles, nuclear energy, grids, storage, low-emission fuels, improved efficiency, and heating. The remaining part will be invested in coal, gas, and oil.

When the Paris Agreement was sealed in 2015, total investments in renewable and nuclear energy for the production of electricity were twice those dedicated to energy produced from fossil fuels. Now, the report indicates that this amount will increase tenfold in 2024. And thanks to greater investments

than in all other forms of electricity generation technology, solar photovoltaic will lead the transformation of the energy sector. Indeed, by the end of 2024, investments in solar photovoltaic are slated to reach US\$500 billion as the falling cost of solar panels stimulates new investments.

Over 2024-25, the global demand for electricity will increase at the highest rate since the post-Covid recovery period. And the growing global demand for energy is the key factor behind the need for grid improvement. Network development and energy storage have represented a significant obstacle to the transition towards decarbonized energy. According to the IEA Report on [Electricity Grids and Secure Energy Transitions](#), global energy transition objectives are at risk. Their achievement would require the development or substitution of 80 million kilometers of powerlines by 2040, doubling investments to more than US\$600 billion per year by the end of the current decade.

According to a study developed by [Rystad Energy](#), if we wish to limit global warming to 1.8 degrees Celsius over pre-industrial levels, we will need US\$3.1 trillion in



For further information on this topic, please contact:

Ulderico Bagalini (Head of Power Transmission Planning)
ulderico.bagalini@cesi.it

> network infrastructure investments by 2030. According to the Norwegian study, this year, global grid investments will reach US\$374 billion – and 30% will be invested in China. Asia will lead grid expansion investments, but other regions are also looking to increase power transfer capacity in transmission and distribution grids. In the United States, the **Infrastructure Investment and Jobs Act** (IIJA) will allocate US\$65 billion to the improvement and expansion of national electric infrastructure, while the European Commission launched the Action Plan for Grids in November 2023 seeking investments for €584 billion (US\$626 billion) over 2020-30.

In the United Kingdom, the **National Grid** launched an action plan to renovate its grid for the first time in decades, investing over £16 billion (US\$20 billion) over 2022-26. These measures are necessary as global grid infrastructure does not meet the requirements of a future energy system. Grid expansion is also fundamental to support the production of renewable energy, which is often intermittent and generated far away from final consumers. Moreover, the Rystad Report points out that distributed energy sources such as rooftop solar energy can reduce the need for new powerlines. However, what is clear to analysts is that “the current global energy infrastructure will not satisfy the needs of a future energy system.”

Urgent Grid Investments

Grids could represent a bottleneck for the energy transition. Luckily, however, investments are on the rise. According to the [World Energy Investment 2024](#) Report, 2023 marked a positive change for grids and various global regions are developing electrification networks,

even though a far greater effort is necessary. Advanced economies and China continue to lead investments in electric networks and represent ca. 80% of all global investments. **China** has maintained investments at US\$80 billion, while in 2023 investments increased by 11% in advanced economies, especially in the **United States**, which allocated US\$100 billion to improve grid reliability and update ageing infrastructure. The **European Union** has also significantly increased investments, reaching US\$60 billion, thanks to the European Commission's **Grid Action Plan**.

In particular, the European Union requires further investments to interconnect grids and facilitate the flow of renewable energy from southern European to central European markets. In general, the main challenge for advanced economies is to support the growth of investments and guarantee that they are effectively implemented along the entire supply chain. Network investments in developing countries, excluding China, have increased by a significant 15%, reaching nearly US\$80 billion in 2023. However, this figure conceals very different models. Investments in **India**, for example, have remained stable notwithstanding the introduction of tenders for smart meters (only 10% of the planned number has effectively been installed). Investments remain largely stable in **Africa** and **southeast Asia**, too.

This lack of new investments is partially compensated by a twofold increase in **Latin America** as countries like Colombia, Chile, Panama, and Brazil have gone to great efforts to increase spending. **Brazil** more than doubled its grid investments in 2023 thanks to tenders for a record 10,500 kilometers. (China State Grid won the largest tender.) In **Africa**, more than half of the investments are provided by public sources and only one out of three public services has actually managed to recover operative costs and debts, notwithstanding

government subsidies. A positive exception is represented by **South Africa**, which plans to create an independent office for transmission projects in order to acquire new transmission capacity based on the build-operate-transfer model. In general, however, grid connectivity in Africa remains a challenge.

Investments in Renewables

At the **Dubai COP28** international climate conference, participating countries declared the “beginning of the end” of the fossil fuel era and agreed to triple the installed capacity of renewable energy by 2030. And while global expenditure in renewable energy has reached a record US\$723 billion in 2023, further action will be necessary to triple this record.

Under the current market conditions, investments in renewables over the next seven years could cover two thirds of >

➤ the cost necessary to triple the installed capacity of decarbonized energy by 2030. This leaves a gap of ca. US\$400 billion a year in the spending necessary for renewables between 2024 and 2030. While **advanced economies and China** will have to increase annual investments by an average 6% to satisfy the overall demand, the spending gap is particularly marked in **developing countries**, in which annual investments will have to increase by 30% a year.

Grids and battery storage are key factors to triple the installed capacity of renewable energy. While investments in grids have been relatively stable in recent years, there was a significant increase in 2023, and investments are expected to rise even further. Notwithstanding this, the IEA **Stated Policies Scenario** (STEPS) indicates that grid investments continue to remain insufficient compared to what is necessary to triple the renewable energy capacity. Current global grid investments will have to increase, on average, by 11% to satisfy the cumulative necessary investments.

Thanks to the ability to flatten load profiles – by storing energy when it is produced in abundance and releasing it when the system requires additional power – **battery storage systems** are ready to support the variability of renewable energy generation. Although these systems have undergone a marked growth over the last two years, investments in battery storage systems only represent ca. two thirds of the cumulative required investment. This means that annual investments in battery storage systems will have to increase by 25% every year.

Economic Transition

China will make the greatest investments in decarbonized energy in 2024, reaching an estimated US\$675 billion, as a result of its strong internal demand, particularly in three sectors: solar, lithium batteries, and electric vehicles. Europe and the United States will follow with respectively US\$370 and US\$315 billion in green energy investments. These three major economies alone constitute more than two thirds of all global investments in decarbonized energy, underlining the disparity of international capital flow in the energy sector.

According to the **BNEF New Energy Outlook 2024**, a completely decarbonized global energy system by 2050 could cost as much as US\$215,000 billion, not an insignificant amount, as underlined in the report, but only 19% more than an economy-guided transition in which the objectives of the Paris



Agreement were not met, and global warming were to reach 2.6°C.

This year’s **New Energy Outlook** presents two scenarios. The first, Net Zero, traces the route to zero emissions at the national and global level by 2050, thereby achieving the objectives of the Paris Agreement. The second, the Economic Transition Scenario, shows how the transition could be achieved solely on the basis of economic strength and technological innovation by promoting low-carbon emissions without any political action.

The **Economic Transition Scenario** (ETS) presents a world in which politicians pursue the energy transition based solely on

long-term efficiency trends and green energy technology that is competitive and widely commercially available. These measures alone would help to reduce current global emissions by 27% by 2050 and halve them in a contra-factual “no transition” scenario in which no further progress is made on decarbonization.

ETS does not require further support for decarbonization technology beyond existing measures, but it is based on a condition of equality that would allow these solutions to freely access markets and compete with dominant technology. This is the basis for the global capacity in renewable energy to double by 2030 and increase fourfold by 2050, as compared to current levels. This type of growth would see

fossil fuels overcome as the main source for the production of electricity, as renewables would reach a 50% supply quota by the end of the current decade.

Geographic Concentration

Together, China, the United States, and the European Union account for ca. 80-90% of the global productive capacity for solar photovoltaic, wind energy, batteries, electrolyzers, and heat pumps. And not much is expected to change through 2030, even if all the announced projects are completed. The



➤ situation is slightly different with regard to battery cells. China's global quota seems destined to decrease as both Europe and the United States will reach a ca. 15% quota by 2030, as long as all scheduled projects are completed. In fact, European and American battery cell production capacity will satisfy national needs by 2030, associated with their respective climate objectives.

New data and analyses provide information on the key factors affecting production costs and the differences between regions. China is the lowest-cost producer for all technology. Various factors, besides production cost, influence business investment decisions, including internal market size, availability of skilled workforce, availability of necessary infrastructure, authorization procedures and regulations, proximity to clients, and synergies with existing industry. According to the IEA, political action can increase the attractiveness of investments in given regions, without having to directly subsidize production costs.

United States

As indicated by the ECCO think tank report on [The USA and Technology for the Energy Transition](#), the American government has introduced a series of acts and measures

addressing climate change and the energy transition. New legislative tools promoting investments in decarbonized energy in the United States include the **Bipartisan Infrastructure Investment and Jobs Act** of 2021, which allocated ca. US\$550 billion for green energy and infrastructure, and the **US Inflation Reduction Act (IRA)** of 2022, which provides an estimated US\$370 billion in funding to promote energy security and address climate change.

These incentives are driving a more rapid diffusion and development of new decarbonized energy production capacity. By the end of 2023, the Infrastructure Investment and Jobs Act allocated nearly US\$75 billion for green energy, including **projects for grid improvement and expansion** (US\$21.3 billion), decarbonized energy demo projects (US\$21.5 billion), energy efficiency (US\$6.5 billion), and production of decarbonized energy and workforce development (US\$8.6 billion).

The rise in green energy investments shifted capital flow to align with the long-term objective, announced in 2021, to achieve net zero emissions for the entire economy by 2050. Nonetheless, investors in decarbonized energy have had to face various obstacles, including the **high cost of funding** due to high reference interest rates (more than 5.0% in

the summer of 2023). US expenditure in decarbonized fuels is increasing, in a context of growing interest for the opportunities provided by low-emission hydrogen.

India

With a 7.8% GDP growth rate in 2023, India is the most rapidly growing global economy. It **now boasts the fifth largest economy** and is expected to become the third by 2030, behind the United States and China. However, pro capita income is 50% lower than the global average and development priorities remain focused on reducing poverty, boosting employment, and developing infrastructure. As a result of the potential GDP growth, urbanization, increased construction, and consequently the growing need for electricity and materials such as cement and steel, the demand for energy in India will overtake that of all other global regions by 2050. At present, its energy system is based on imported fossil fuels, especially crude oil and natural gas.

In late July, Economics Minister Nirmala Sitharaman presented the **initiatives addressing climate change and energy security** to the Indian Parliament. ➤



➤ The report mainly focused on the ambitious OWOSOG (**One World, One Sun, One Grid**) Project, an initiative by the International Solar Alliance, India, France, and the United Kingdom, to develop a global green energy network based mainly on solar and wind energy. Three phases are scheduled for India. In the first phase, the **Indian grid will be connected to networks in the Middle East and southern and southeastern Asia** to create single grid. During the second phase, the grid developed in the first phase will be connected to renewable resources in **Africa**. The third phase will pursue true **global interconnection**, aiming to achieve ca. 2600 GW by 2050.

The Indian government aims to reach net zero emissions by 2070 and has recently increased its investments in solar and wind energy, as well as announcing measures to promote national supply chains for decarbonized energy. In 2020, the country announced an incentives program for the national production of **solar panels, batteries, and other green energy devices**. India has also recently experienced a peak in decarbonized energy investments. Expenditure in this sector reached US\$68 billion in 2023, a nearly 40% increase over 2016-20, and nearly half was allocated to the production of low-emission energy, including solar photovoltaic.

Investments in **fossil fuels** increased by 6% over the same period, reaching US\$33 billion in 2023, because of the growing demand for fuel and electricity produced by coal. Investments in green energy should double by 2030, in view of current policy; however, they will have to increase by a further 20% to fully meet the country's energy and climatic objectives.

China

According to **GlobalData** information cited by Energy Monitor, China is investing

more in transmission networks than all other countries combined. In 2022, China invested US\$166 billion in its transmission networks, while the rest of the world invested a total of US\$118 billion. China, however, has to face an urgent demand for electricity that is driving the development of new coal-fueled electricity plants, as the country struggles to balance demand and supply. The Chinese government has announced that the country will reach peak carbon emissions in 2030 and carbon neutrality by 2060.

Parallely, in 2023, **China produced as much solar photovoltaic energy as the entire world did in 2022**, while its wind energy capacity increased by 66%. In the last five years, China has also added 11GW of nuclear energy, far more than any other country. Its immense energy capacity and the government's support for green technology help attract strong investments in decarbonized energy. However, pressure is mounting on China's ability to export this technology to other major international markets, including Europe and the United States.

European Union

The European Union is a world leader in the promotion of decarbonized energy. In 2023, investments in energy generation from renewables amounted to ca. US\$110 billion, a 6% increase over the previous year. **Investments in electric networks also increased**

by over 20% in 2023, nearly reaching US\$65 billion – a very positive development that reflects the need for greater interconnection, especially to facilitate energy flows towards central European markets.

The EU boasts one of the most extensive and resilient grids, worldwide. However, 40% of the grid is over 40 years old and must be modernized. Forecasts indicate that, **by 2030, it will be necessary to invest approximately €375-425 billion in distribution networks**. In total, the EU Commission estimates that during the course of this decade, alone, it will be necessary to invest ca. €584 billion in electric networks, a significant percentage of the overall investments required to transition towards decarbonized electric energy.

In order to contribute to the implementation of the European Green Deal, at the end of 2023, the European Commission presented the [Action Plan for Grids](#) to guarantee a greater efficiency and a more rapid and capillary expansion of electric networks. Keeping in mind that 40% of distribution networks are more than forty years old and considering that cross-frontier energy transmission is forecast to double by 2030, this will require investments totaling €584 billion.

The consumption of electric energy is predicted to increase by ca. 60% by 2030. **Networks will have to adapt to a more digitalized, decentralized, and flexible system**, composed of millions of roof-top solar ➤

panels, heat pumps, and local energy communities sharing resources, as well as the integration of offshore renewables into the grid, a greater number of electric vehicles that will require charging, and a growing need for hydrogen production. The action plan addresses the main challenges related to the need to extend and digitalize electric energy transmission and distribution networks in the EU, and optimize their use, by **identifying concrete actions to help attract the investments necessary to ensure high-quality electric networks.**

The European Union aims to reduce greenhouse gas emissions by no less than 55% by 2030, as compared to the levels registered in 1990, and achieve climatic neutrality by mid-century. In addition to a series of policies and objectives focusing on a greater diffusion of renewable energy and energy efficiency, there also is a **focus on the diversification and resilience of decarbonized energy supply chains**, both in terms of production and critical minerals. In June 2024, the European Commission adopted the **Net Zero Industry Act**, a measure that aims to ramp up the production of green technology, satisfy 40% of EU diffusion requirements by 2030, and reduce the current reliance on imports.

Investments by Enel and Terna

In conclusion, we come to a brief focus on Italy. One figure – 18.6 – truly impressed the markets on the day that Enel presented its industrial plan for 2024-26. The Italian multinational plans to invest €18.6 billion in distribution networks. **Clearly, Enel believes that infrastructure will play a central role in the new energy scenario.**

On the one hand, the energy transition will increase network loads; on the other, climate change poses a new threat to infrastructure as new meteorological events prove increasingly more extreme and frequent. This is a scenario that requires new investments and regulations to guarantee resilience.

Further proof of Enel's commitment is that the **€18.6 billion allocated for networks represents 53% of the total investments for 2024-26.** More specifically, 50% of these investments will be dedicated to improving quality, resilience, and digitalization, 32% will be allocated to the development of new connections, and 18% will be used for the ordinary management of assets. The great majority of these funds (80%) will be invested in Europe. In Italy, Enel will invest over €12 billion in distribution networks, 47% more than in the previous three years. Moreover, €2.8 billion will be allocated to the Iberian Peninsula and €3.5 billion to Latin America, again with significant increases over the previous industrial plan.

Terna's new industrial plan for 2024-28 aims to consolidate its strategic role as enabler of the Italian electric system and, more in general, to bolster its commitment to support the energy transition. In order to achieve the objectives of the European Green Deal and the National Integrated Plan for Energy and Climate (PNIEC) in terms of decarbonization, Terna is calling for a significant increase in investments, the largest ever recorded by the Group: a total of €16.5 billion euro, +65% over the previous plan, including €2.6 billion in 2024.

In order to fulfil its role as Transmission System Operator and transition enabler, Terna has identified a series of key objectives. In the first place, the Group will continue to

guarantee the transmission of energy in Italy in an increasingly volatile scenario. Indeed, the country is transitioning from a traditional system with centralized generation plants to a complex and decentralized system characterized by a growing integration of renewables that requires an entirely new management model.

Investments will also be used to **improve grid resilience** and counter the intensification of extreme meteorological events by introducing new technological and digital solutions to efficiently and rapidly manage the grid, guaranteeing quality and continuity to the supply of electricity at the lowest possible cost to the final consumer.

Furthermore, the energy transition advances hand in hand with the digital transition that enables it. Thus, the **Twin Transition** is a key concept in the new plan that has allocated ca. €2 billion for digitalization and innovation. These investments in technology and digital tools, such as artificial intelligence and robotics, will allow the grid to be increasingly interconnected, smart, and secure.

Yet another key task for Terna will be to continue to guarantee a high level of security to the grid and prepare for the new challenges that an increasingly decentralized and complex system presents in terms of safeguarding physical assets and cybersecurity.



Top Story

Great Events: The Key Role of Energy Integration

The Super Bowl, music concerts, the European Football Championship, and the Paris Olympics. Designing integrated and sustainable energy systems for great events is essential to guarantee security, reliability, and sustainability, and avoid blackouts.

For further information on this topic, please contact:

Bruno Cova (Power System Excellence Director)
bruno.cova@cesi.it

The timing of the power outage that struck the Super Bowl – an event that is broadcast globally and attracts more than 113 million viewers in the United States alone – in February 2013 could not have been worse. Energy managers around the globe still wince thinking about the blackout that interrupted the Super Bowl played by the Baltimore Ravens and the San Francisco 49ers at the New Orleans Superdome for a long thirty-four minutes. The power outage affected half the stadium, including the lighting system and various electronic devices essential for the television broadcast.

Just a few months earlier, in October 2012, a similar blackout had led to the definitive suspension of the “Superclásico de las Américas,” the soccer game between Argentina and Brazil that was to take place in the “Centenario di Resistencia” Stadium in the north of Argentina. Unfortunately, right after the players entered the field, a fire broke out in the stadium’s generator forcing the players to wait in the dark for the energy to return. And, in the end, the system could not be repaired.

Ten years on, the organizers of great sporting, musical, political, and cultural events have learned the lesson provided by the dozens of other emergency situations that have led to blackouts, implementing and improving energy plans, also thanks to new digital technology. In this case, the key word is “integration” as applied to power systems, distribution networks, and the installation of temporary networks any time that permanent infrastructure may prove insufficient.

Integrated Energy Systems

Planning integrated and sustainable energy systems for great events is therefore essential to guarantee their security, reliability, and sustainability. By optimizing the consumption and production of



➤ energy, event organizers can reduce energy expenses, decrease emissions, and promote the adoption of renewables. Integrating sustainable energy management systems for sports and musical events is fundamental not only to reduce their ecological footprint, but also to avert unforeseen events (such as bad weather) that can present significant challenges to energy management. As emerges from a study published in 2023, entitled “Towards sustainable energy systems considering unexpected sports event management: integrating machine learning and optimization algorithms” on scientific journal *Sustainability - MDPI*, the integration of machine learning and optimization algorithms can help overcome these challenges, optimizing energy consumption and improving sustainability and cost efficiency.

It is therefore essential to analyze data with real-time monitoring and management tools. The combined use of artificial intelligence and energy management systems allows a direct monitoring of consumption, optimizing the use of energy and reducing waste. These systems may also employ usage models to automatically regulate the supply of energy. The main objective is always to reduce the consumption of power. At the recent **European Football Championship in Germany**, softer lighting before and after the games, a review and optimization of energy consumption needs, and a minimal use of eco-compatible generators, enormously reduced power consumption.

Turning to international conferences, at meetings such as the **Dubai COP28**, real-time monitoring systems were used to regulate heating, cooling, and lighting, based on the location of guests and the event schedule. At the **Paris Olympics** tennis facilities, an automatic system interconnected all infrastructure, including the mechanical ventilation, the lighting, and the power management systems.



Speaking about the Olympics

“The 2024 Paris Olympics were not only an extraordinary sporting event, but also a model of sustainability and innovation. The Olympic infrastructure will leave a mark on the French capital and its citizens, for years. Rendering platforms enabled designers to conceive a **different post-Olympic use for infrastructure right from its design phase**, allowing an optimal use of resources and avoiding the construction of buildings that would have no use beyond the Olympics.”

This statement by **Roderick Bates**, Director of Corporate Development at Chaos (a global leader in 3D visualization technology) perfectly matches the objectives of the French organizers who worked hard in the months leading up to the Olympics to reduce the environmental footprint of the competition – in view of climatic change – by turning to renewable energy and sustainable transport systems and infrastructure, with innovative circular economy solutions for waste management.

Events like the Olympics require extensive and complex energy infrastructure. In addition to the sports facilities, even the Olympic villages and the media and entertainment areas require a robust and reliable power network. And notwithstanding a meticulous security plan, the French TGV high-speed railway tracks were sabotaged just a few hours before the opening ceremony.

While for the European Football Championship – held in Germany between June and July 2024 – [UEFA developed a 40-page ESG Strategy](#), the recent Olympic Games were viewed by France as an extraordinary opportunity to accelerate its ecological transition. While carbon dioxide emissions totaled 3.4 million tons at London 2012 (3.6 at Rio 2016 and 1.9 at Tokyo 2021), the Paris Olympics only produced 1.58 million tons of CO₂ emissions, the equivalent generated by 150,000 French citizens during the course of a year.

Olympics and Euros are just two amongst many examples of how great events need to **integrate and manage complex energy systems, whether they are business** ➤

➤ **events (fairs, congresses), cultural events (concerts), or sporting and political events.** Planning is paramount. Great events require a significant quantity of power and a systemic approach to planning and implementing sustainable energy solutions. In fact, **the E in ESG** (Environment) also addresses climate action, sustainable infrastructure, and the circular economy.

Climate Action and the Circular Economy

In 2023, the **Glastonbury Festival** (the foremost music festival in the United Kingdom) was powered entirely by electricity produced from low impact and fossil fuel-free sources, as well as by solar photovoltaic and hybrid

battery systems. All the generators on the 900-acre site, including those driving the iconic pyramid stage, were fueled by renewable HVO (Hydrotreated Vegetable Oil) without palm oil, produced by recycling cooking oil. This means that the total CO₂ emissions produced over the fuel's entire life cycle was reduced by up to 90%.

These systems not only guarantee a more sustainable use of resources, but also help to create a positive environmental impact by reducing CO₂ emissions produced at great events. In this context, **a significant quota of CO₂ emission cut at great events is related to smart mobility.** At Euro 2024, in Germany, the environmental impact produced by spectators was reduced thanks to a series of initiatives. In terms of transport, every ticket holder – spectators, athletes, organizers, and

staff – was able to use local transport for free for 36 hours on the match day and take advantage of discounted tickets for long-distance national trains and InterRail tickets. The solution was less private transport and more rail and electric-powered transport.

Integration and energy savings can also be pursued by **incentivizing sustainable behavior.** In the UEFA strategic plan, participants and suppliers were encouraged to adopt sustainable practices and make use of the electric vehicle charging stations, recycling stations, and incentives available to those opting for low-impact energy options.

Moreover, in planning great events, it is fundamental to apply the **principles of circular economy to the management of energy.** Heat recovery and energy recycling reduce waste

and improve efficiency. At winter events, the heat generated by lighting systems and other devices can be recycled for other purposes such as heating. The **4R Philosophy** also requires that organizers integrate reduction, reuse, recycling, and recovery systems to produce less waste – avoiding single-use plastics, too – and privilege recycled materials for construction, favoring the rental and reuse of existing tools.

In addition to the use of renewable energy (mainly solar and wind) to reduce the environmental impact and manage the energy requirements of events, it is also important to **integrate energy storage technology into the general system.** And flexible infrastructure is necessary, too. Large-scale events should be able to rely on electricity networks that can adapt to various energy sources and optimize their use. In some cases, this includes the implementation of micro-grids that operate independently of the general grid and exploit local and renewable power sources.

Conclusions

In general, **energy management systems are fundamental to efficiently monitor the consumption of power at great events.** Stadiums and facilities like those used for the Olympics or soccer championships use advanced systems to monitor the power consumption of lighting systems, screens, and other critical infrastructure, optimizing peak energy usage. At concerts and festivals, organizers adopt energy management software to regulate the supply of power based on the number of participants and audiovisual system consumption, thereby reducing the need for power.

The integration of sustainable energy systems is not only essential to prevent blackouts such as those that have occurred in the past, but it also embodies a more efficient and environmentally friendly, forward-thinking approach. The use of advanced technology such as **artificial intelligence and optimization algorithms** allow the real-time monitoring and management of energy consumption, reducing waste and costs. Adopting innovative solutions – along with the implementation of flexible infrastructure and the use of renewable energy sources and energy storage systems – is a fundamental step to guarantee the sustainability of large-scale events. Events like the Paris 2024 Olympics and the European Football Championship in Germany reveal how **energy planning and systematic integration** are not only necessary, but also represent an opportunity to accelerate the ecological transition and provide a positive outlook for future generations.



Future & Technology

Interconnection and Renewables: CESI's Vision for a Sustainable Future

From trans-European to sub-Saharan networks, CESI promotes an integrated energy strategy favoring international cooperation and an optimal use of green resources. The objective is to decarbonize and improve the resilience of electric grids, reducing our dependence on fossil fuels.

Trans-European energy networks represent a strategic pillar of the European Union's energy policy, which aims to **connect member country infrastructure** and achieve the ambitious objective of climate neutrality by 2050.

nections, promoting international cooperation, and proposing methods to simplify and expedite authorization procedures.

The New Italian NECP

The TEN-E Regulation, which is at the core of this strategy, sets the standards for trans-European energy networks and identifies eleven priority geographical corridors and three key thematic areas. Moreover, TEN-E also introduces projects of common interest (PCI) amongst member states and projects of mutual interest (PMI) with third countries, predominantly focusing on renewable energy sources and excluding funding for new natural gas projects.

In order to address the most recent EU regulations, in July 2024, the Meloni Government presented the new **Italian National Energy and Climate Plan** to the European Commission. The document – that reviews and updates the original text approved in 2019 with the objective of reinforcing the country's energetic and environmental commitments by 2030 – sets ambitious objectives for renewable energy by 2030.

TEN-E promotes the **integration of renewable energy and clean technology in the European energy system**, connecting regions that are isolated from energy markets, strengthening existing cross-border intercon-

The plan calls for a 39.4% target on the final gross consumption of energy, a significant 9.4% increase over the 2019 NECP. This means that, by that date, 43 toe (tons of oil equivalent) on a total energy consumption of 110 toe will have to be provided by



For further information on this topic, please contact:

Andrea Meola (Business Development Director)
andrea.meola@cesi.it

➤ renewable sources. As a comparison, in 2023, renewables only accounted for 19.9% of final energy consumption in Italy.

The objectives are further defined in terms of the electric, thermal, and transport sectors. **In the electric sector, the plan aims to cover 63.4% of consumption with renewable sources by 2030**, driving the general growth of renewables. This would correspond to 237 TWh in renewable energy production, 10 TWh of which would be allocated to the production of green hydrogen.

CESI's Vision

In order to increase the quota of renewable energy sources in the electric sector from 55% to ca. 70% by 2030, the **European Union must not limit itself to only exploiting local resources**. According to CESI, in order to decarbonize European electricity, it will be necessary to **integrate EU renewable resources with those in bordering regions**. This strategy requires the development of vast interconnection projects which, in turn, require large-scale investments, technological evolution, and the development of new business models.

CESI is committed to collaborating closely with private and institutional project promoters to conduct feasibility studies that will define required technological solutions, assess environmental impact, economic indicators, and regulatory frameworks, guaranteeing conformity to EU regulations and directives. The analysis also includes the definition of possible business models and funding schemes.

Various projects are currently being evaluated. Indeed, some have already reached an advanced stage and are either included in the ENTSO-E TYNDP or have already applied for connection to the national transmission network. The two main areas of interest are the **greater Mediterranean area**, including



the Middle East and Saudi Arabia, and the **trans-Caucasic region** in which Azerbaijan will play a key role thanks to the unexploited wind potential on the Caspian Sea.

CESI for the Mediterranean and Middle East

In terms of multilateral projects – addressing not only European objectives, but also local energy consumption that will need to be progressively decarbonized – CESI has been actively involved in various energy interconnection operations, including the **Great Sea Interconnector**, a project that aims to **connect Greece with Cyprus**, the only EU member state that remains isolated from the continental energy grid. This project also calls for further extension towards **Israel**, as part of the EuroAsia Initiative, and towards **Egypt**, as part of EuroAfrica.

Another significant project is **Medlink**, a double interconnector that will join **Algeria and Tunisia with Italy**, further reinforcing energy interconnections between North Africa and Europe. Moreover, Project **Green Vein** calls for the development of an interconnection between **Egypt and Italy**, an initiative that promises to improve energy security and diversify supply sources.

In greater detail, Projects Medlink and Green Vein have been developed to provide an estimated 20-24 TWh per year of 100% renewable energy. This volume would represent **ca. 5% of the Italian energy demand for 2030-40**. And thanks to the practically constant production capability – with an interconnector load factor greater than 75% – these projects would significantly reduce the need for energy reserves and balancing operations. Furthermore, the connection stations in Northern Italy would contribute to reducing the risk of energy transmission congestion along the country's south-north axis, improving the efficiency and security of the national grid.

On an even greater geographical scale, a study is underway to explore the possibility of connecting **Saudi Arabia** to Italy, a project that could open up new clean energy routes between the Middle East and Europe.

CESI for the Caucasus

In 2022, **Georgia** called on CESI to draft a feasibility study for a submarine electric interconnection with **Romania**. This



➤ project, known as the **Black Sea Submarine Cable (BSCC) Project**, is part of the ten-year development plan for the Georgian grid (2020-30) and aims to improve the reliability of energy supplies in Georgia and strengthen regional connectivity.

Besides the electrical component – an HVDC system connecting Georgia and Romania across the Black Sea with ca. 1100 kilometers of 525 kV submarine cables – the project also plans to lay a **fiber optic cable to increase broadband data traffic** and reduce Internet costs in the southern Caucasus. This improvement could also generate further profit by allowing data to flow towards the Middle East and Central and Southern Asia, driving the development of the IT sector.

CESI's commission includes six main tasks: estimate the optimal interconnection capacity, define project technical specifications, conduct a detailed study on the electric systems to be interconnected, calculate construction costs, prepare an economic analysis and financing options, and supervise the implementation plan and the drafting of tender documents.

Commissioned by the Ministry of Energy of the Republic of Azerbaijan, at the beginning of 2024, CESI initiated a feasibility study on the green energy corridor connecting **Azerbaijan, Georgia, Romania, and Hungary**. The study will present optimal scenarios for the export of energy, with a particular focus

on variable renewable energy and the trade of green hydrogen amongst Azerbaijan, Georgia, Romania, Hungary, and other potential European markets.

At the recent COP29, CESI's CEO Nicola Melchioni joined the energy Ministers of Azerbaijan, Georgia, Romania, and Hungary at the 9th Ministerial and Steering Committee Meeting. The discussion focused on progress, next steps, and critical infrastructure requirements for the Green Energy Corridor.

The final objective of the feasibility study is to define a unified strategy and overall plan for 2030-40 to optimize the use and commerce of the abundant renewable energy resources available in these countries.

The Mattei Plan for Africa

The Mattei Plan, launched in January 2024 at the Italy-Africa Summit held in Rome, is an attempt to renew relations with African countries by defining a more direct and transparent approach to relations with partners on this continent. This new course aims to evolve incrementally, progressively involving both African and Italian actors.

The ambitious initiative is organized along **five priority areas with nine pilot countries** and aims to drive African progress by

combining development cooperation with a greater involvement of the Italian entrepreneurial sector and the country at large. The launch of the Mattei Plan coincided with the Italian Presidency of the G7, with the Italian government confirming its intention to include Africa as a policy priority.

Moreover, at the end of May 2024, the Mattei Plan held the fourth meeting of its Technical Coordination Table on Energy Security and formally inaugurated the "A Road Map to Connect Africa to Europe for Clean Energy Production" Project, funded by the European Commission and implemented by the World Bank.

The project – which supports the objectives of the Mattei Plan for Africa with a particular

focus on energy – aims to **map all energy interconnection infrastructure**, both existing and under development. This infrastructure will facilitate the flow of clean energy from Africa to Europe, via Italy, positioning the EU member state a strategic hub between the two continents.

CESI for Africa

In this context, CESI has been working on various interconnection projects to integrate the electric systems of a number of **sub-Saharan African countries**. And this initiative is coherent with the objective of improving access to energy and lining ups with the **Sustainable Development Objectives (SDGs)**

of the United Nations, considering that today ca. 600 million Africans still do not have access to electric energy.

Uganda – South Sudan

Since the spring of 2023, as lead partner of a joint venture, CESI has been involved in a project for a new 400 kV interconnection between Uganda (Olwiyo) and South Sudan (Juba), which will be the first electric transmission infrastructure in South Sudan, promoting access to electricity and the development of the electricity market in Eastern Africa. The project calls for the development of an economic-technical feasibility study, a preliminary project, an environmental and social impact assessment (ESIA), ➤

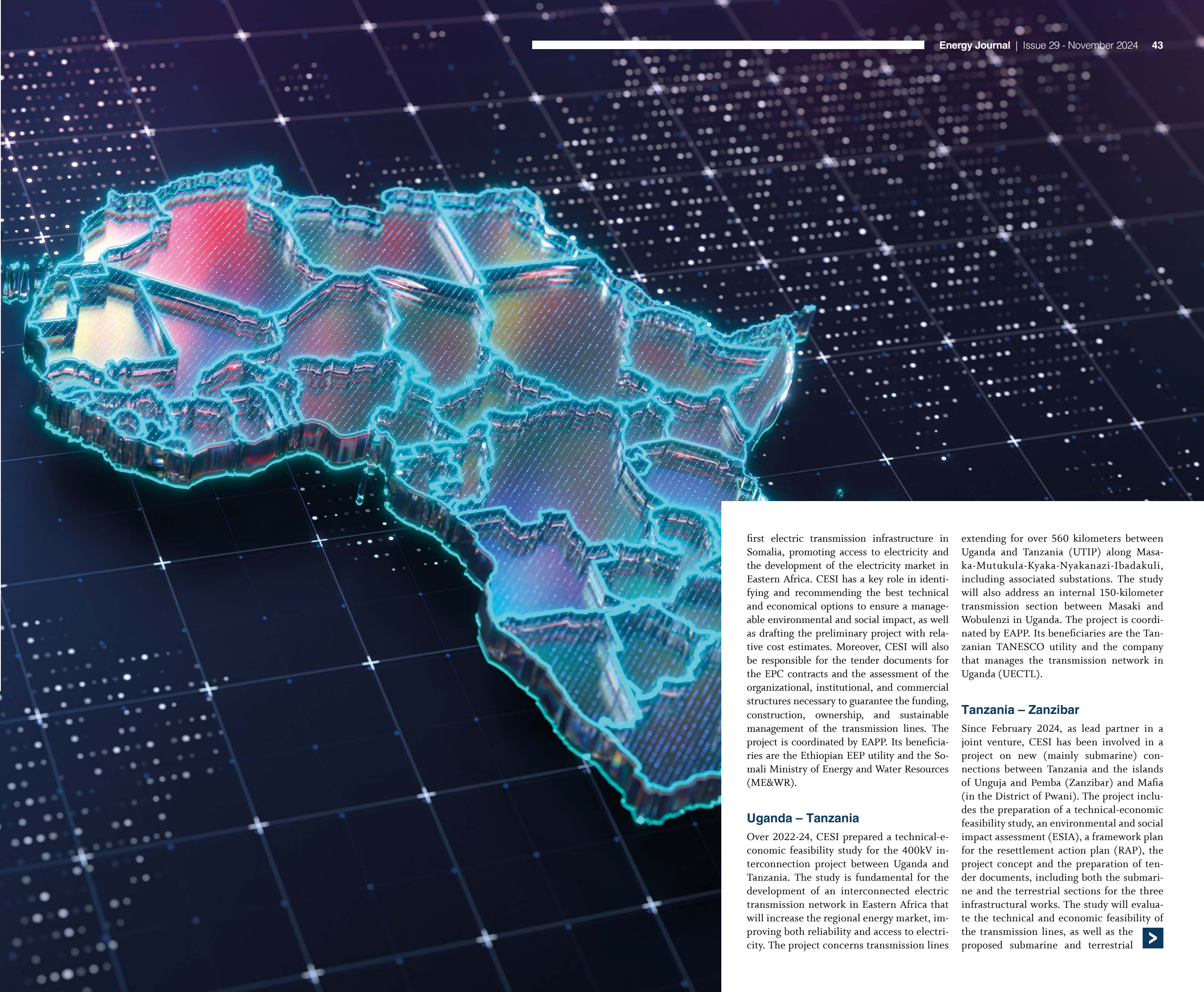
➤ and a resettlement action plan (RAP) for 170 km in South Sudan and 138 km in Uganda. CESI is in charge of the main activities for the feasibility study in order to analyze and evaluate the overall feasibility of the interconnection line, based both on existing and planned electric energy generation and the existing electric grid. The project is coordinated by NELSAP. Its beneficiaries are the South Sudan SSEC electric utility and the company that manages the transmission network in Uganda (UECTL).

Sudan – Ethiopia

In the same area, CESI has been hired as a consulting firm to update the feasibility study for the extra high voltage (EHV) interconnection project between Sudan and Ethiopia. The main objective of the commission is to conduct a technical-economic feasibility study for the EHV interconnection (500 kV) between Ethiopia and Sudan, including a review of the detailed 2016-17 feasibility study and the selection of the best technical, economic, and financial solution. The project is coordinated by EAPP (Eastern Africa Power Pool). Its beneficiaries are the Sudanese SETCO and the Ethiopian EEP utilities.

Ethiopia – Somalia

Remaining in Eastern Africa, in May 2023, CESI began providing consultancy services for the feasibility study of electric transmission interconnections between Ethiopia and Somalia. The main objective of the study is to evaluate the technical pre-feasibility, the economic feasibility, and the sustainability of the transmission lines proposed between the two countries (a north interconnector with the Somaliland Region and a south interconnector with the area of Mogadishu). The project envisions the



first electric transmission infrastructure in Somalia, promoting access to electricity and the development of the electricity market in Eastern Africa. CESI has a key role in identifying and recommending the best technical and economical options to ensure a manageable environmental and social impact, as well as drafting the preliminary project with relative cost estimates. Moreover, CESI will also be responsible for the tender documents for the EPC contracts and the assessment of the organizational, institutional, and commercial structures necessary to guarantee the funding, construction, ownership, and sustainable management of the transmission lines. The project is coordinated by EAPP. Its beneficiaries are the Ethiopian EEP utility and the Somali Ministry of Energy and Water Resources (ME&WR).

Uganda – Tanzania

Over 2022-24, CESI prepared a technical-economic feasibility study for the 400kV interconnection project between Uganda and Tanzania. The study is fundamental for the development of an interconnected electric transmission network in Eastern Africa that will increase the regional energy market, improving both reliability and access to electricity. The project concerns transmission lines

extending for over 560 kilometers between Uganda and Tanzania (UTIP) along Masaka-Mutukula-Kyaka-Nyakanazi-Ibadakuli, including associated substations. The study will also address an internal 150-kilometer transmission section between Masaki and Wobulenzi in Uganda. The project is coordinated by EAPP. Its beneficiaries are the Tanzanian TANESCO utility and the company that manages the transmission network in Uganda (UECTL).

Tanzania – Zanzibar

Since February 2024, as lead partner in a joint venture, CESI has been involved in a project on new (mainly submarine) connections between Tanzania and the islands of Unguja and Pemba (Zanzibar) and Mafia (in the District of Pwani). The project includes the preparation of a technical-economic feasibility study, an environmental and social impact assessment (ESIA), a framework plan for the resettlement action plan (RAP), the project concept and the preparation of tender documents, including both the submarine and the terrestrial sections for the three infrastructural works. The study will evaluate the technical and economic feasibility of the transmission lines, as well as the proposed submarine and terrestrial



➤ cables, guaranteeing a sustainable management of the projects' environmental and social impact. CESI plays a crucial role in all development phases, providing know-how to guarantee that the project will be technically solid, economically sustainable, and meet all environmental and social regulations.

IRP Namibia

Since 2021, CESI has been providing consultancy services for the development of an Integrated Resources Plan (IRP) for NamPower, the national Namibian electric utility. The main objective is to develop a plan that will direct and orient investments for both existing and future transmission and generation infrastructure, energy sales, and demand management options for the next 30 years. The plan must include projects that provide a flexible

answer to market uncertainty. Moreover, the IRP will develop a long-term plan to guarantee a reliable, secure, and accessible energy supply during the transition period of the electric sector, in view of the increase in renewable energy and distributed energy resources. The IRP will also devise and review all transmission, generation, and electrification plans to define a roadmap and specific action plans for the short, medium, and long term.

Short-term Grid Development Plan for Zambia

Between 2021 and 2022, CESI worked on a short-term grid development plan for Zambia with the objective of analyzing the feasibility of integrating a 440MW capacity of renewable energy into the Zambian grid over 2022-30. The study aimed to guarantee that the integration of renewables would take place in a safe

and economically sound manner, respecting the country's clean energy objectives and providing a solution to the growing demand for electricity. The short- and medium-term grid development plan will provide a clear overview of various crucial aspects, including the potential benefits of regional cooperation, the transition to reduce coal generation, the costs of electricity provided by the system, the future role of hydropower generation to provide a reliable energy supply, and support to the integration of renewable resources. Moreover, the study will help policy makers select the optimal location for new renewable plants, minimizing the overall social cost, through a high-level cost-benefit analysis.

Strengthened Policy and Regulatory Framework – Botswana

Last, but not least, since 2023, CESI has been providing consulting services to the Botswana Renewable Energy Support Project in order to reinforce the legislative and political framework for the implementation of an integrated resources plan (IRP). The project aims to provide Botswana with adequate, custom-tailored tools, supporting the ability of BERA (Botswana Energy Regulatory Authority) to implement the regulations. The main objectives include evaluation of sector policy and regulations in relation to the recently approved IRP, the involvement of stakeholders at the national and state level in gathering best practices and lessons, and the delivery of consulting services to the Government of Botswana (GOB) to strengthen the governance of the sector and attract greater private investments. Moreover, the project calls for the development of the necessary technical studies, regulatory tools, and practical training to BRERA management and the Ministry of Minerals and Energy (MME) for the implementation of recommendations and the production of indicated reports. Finally, as part of the project, CESI also developed a new network code for Botswana.



Opinions

Energy Market Integration is Key

In the current context of geopolitical crisis brought about by the conflicts in the Middle East and Eastern Europe, the Mediterranean plays an increasingly strategic role for the effective collaboration of the countries involved. Regarding energy transfer infrastructure, here are the opinions of various experts on the importance of market integration, renewables, and electrification.

In a recent conversation at The Aspen Institute, **Jason Bordoff**, founder and Director of the Center on Global Energy Policy at Columbia University, emphasized how the integration of global energy markets is a key element to accelerate the transition towards clean energy technology. Balancing national interests with the need for greater international cooperation, especially between developed and emerging economies, can promote an efficient adoption of this technology and enable a more electrified and secure future, in terms of energy.

On the Mediterranean front, we spoke with **Michael Tanchum**, Professor of International Relations and Political Economy in the Middle East and North Africa, who explores the various opportunities available for renewable energy in North Africa. In a long interview in July, Prof. Tanchum emphasized the importance of energy transfer infra-

structure and interconnections between Europe, the Middle East, and Africa. Projects such as Xlinks, which aims to provide the United Kingdom with energy directly from Morocco, reveal how a greater energy market integration would be able to drive the transition towards a sustainable future.

Roberto Vigotti, Secretary General of the RES4Africa Foundation, provides us with an outlook on the challenges faced by the African continent. Indeed, over 600 million people still have no access to electricity in Africa, where it will be fundamental to adopt a holistic approach extending beyond the traditional model of an electric grid. Vigotti believes that the evolution of the energy sector in Africa will be closely connected to the development of digital technology and renewables. It will, however, require significant investments and collaboration strategies involving both public and private organizations.

Jason Bordoff

Founder and Director of the Center on Global Energy Policy at Columbia University, and an Expert on Global Energy Policy and Decarbonization



Discussing the importance of integrated global markets, Bordoff emphasizes that the energy transition will not take place without integrated global markets and comparative advantages. It is fundamental that we understand that energy market integration is key to promoting a more efficient adoption of clean energy, avoiding any form of protectionism that could slow down this progress.

«Because you can't have a clean energy transition at the scale and speed we need without integrated global markets, without comparative advantage. There are parts of the world that are going to be better at making some things than others. And it is probably correct to maybe not think about China quite the same way we did 30 years ago in the formation of the WTO, but it is also the case that you can't have every country try to make the clean energy transition happen within its own borders. And what we're actually seeing today are countries that can't compete with a trillion dollars in subsidies, that are worried they'll lose investment, and they're putting up roadblocks.»

On the role of geopolitical tension in the market integration process – given the competition between major powers like the United States, Europe, and China for the energy transition – Bordoff underlines the importance of balancing national interests with the need for global interconnections. While the transition towards a decarbonized energy system will take several decades (and will be a difficult and complex process), on the other, Bordoff imagines a future in which a more electrified world will enjoy the benefits of energy security, and the reduction of geopolitical conflict related to the energy trade.

«That's about the multi-decade process of transition. Like, getting from here to there is going to be difficult and complicated. We often think about the end state: what does net zero look like?

Hopefully, we get close to that or all the way there. And when we get there, I think it is a world, as I said earlier, that is more energy-secure. A lot of energy security risks today come from global trade. A decarbonized world, we know, will be one that is much more electrified. Electricity tends to be produced and consumed more locally. According to the International Energy Agency, global energy-related trade is around 40% of what it is today in a world that gets to net zero. So that has energy security benefits, that can reduce the potential for geopolitical conflict.»

Last, but not least, Bordoff addresses the International Energy Agency forecast that US\$1.5-2 trillion a year will be needed by 2030 to support the energy transition in emerging and developing economies. And this issue is related to the idea of interconnection as a tool to promote the development of new energy infrastructure and a greater integration of markets amongst developed and emerging economies to ensure that resources are used in the most efficient and sustainable manner.

«We're going to need somewhere between, according to the International Energy Agency, \$1.5 to \$2 trillion by 2030 into the clean energy transition and emerging and developing economies, compared to \$250 billion this year. I mean, just several-fold more in parts of the world where there are a lot of challenges to putting capital to work. We need to overcome those in ways that benefit those local economies [...]

[...] So, what if countries that are wealthier and have historically contributed the bulk of the emissions thought about where to deploy some of these technologies globally that improved cooperation between rich and poor countries, created economic opportunities in parts of the world that historically have been targets of investment for extraction? We can think about being targets of investment for clean energy solutions.»

Geopolitics and the Energy Transition
Jason Bordoff in conversation with Greg Gershuny
The Aspen Institute (22 marzo 2024)

Michael Tanchum

Professor of International Relations and Political Economy in the Middle East and North Africa at the University of Navarra in Spain, Michael Tanchum is specialized in energy geopolitics and energy interconnections between Europe, the Middle East, and Africa.



In a July 2024 interview on renewables in North Africa, Prof. Tanchum highlighted the importance of coordinating destination markets and energy transfer infrastructure to guarantee the success of renewable energy projects. In particular, Prof. Tanchum mentioned Project Xlinks, which aims to provide the United Kingdom with a significant quota of energy via submarine cables connecting it directly to Morocco.

«As regards electricity, we have found that it plays a crucial role, but its extent depends on two factors: the first is linked to the coordination condition of the destination markets, and the second concerns intra-European interconnections. For instance, Morocco's Xlinks project is slated to supply 8% of the UK's power, equivalent to the output of a nuclear power plant like Hinkley Point.»

Tanchum also discussed the opportunities provided by maritime green hydrogen transport as green ammonia, as in the cases of Morocco and Egypt. Although there are doubts about the efficiency of using pipelines to transport hydrogen, especially through Algeria and Tunisia, new pipelines could be created to connect Italy and central Europe, thereby contributing to the network of intra-European interconnections.

«Our analysis indicates that, in terms of green hydrogen, the best and most cost-efficient way to transport green hydrogen is in the form of seaborne shipments of green ammonia. We've already seen this from Morocco and Egypt, with Egypt poised to use the Suez Canal to ship in many directions. This also creates flexibility for Tunisia and Algeria, as all North African countries can ship green ammonia. »

[Interview with Michael Tanchum \(19 luglio 2024\)](#)
[Renewable Energy Megaprojects in North Africa](#)

Roberto Vigotti

Secretary General, RES4Africa Foundation



In the African context, marked by major challenges related to access to energy and the development of a suitable electric grid, it is fundamental to reconsider traditional electricity distribution models. In rethinking the entire system, the digital transformation of networks is a crucial element for the energetic future of the continent. Quoting an IRENA Report, Vigotti believes that the role of technology is more important than that of fuels for the development of a new African energy paradigm.

«For Africa, where over 600 million people have no access to electricity, the traditional grid model is not viable. A new holistic approach is necessary in terms of efficiency, flexibility, transparency, and long-term sustainability, along with the digital transformation of networks. According to an IRENA Report published in April 2024, technology rather than fuel is the fulcrum of the new African energy system. Digital technology is essential for the African continent: not only to improve grid operation and the quality of electricity supplies, but also to extend decentralized energy solutions to communities in remote and low-income areas.»

The energetic future of Africa is closely related to the development of renewable energy. However, the transition towards clean and su-

tainable energy sources has lagged behind the rest of the world, and this is mainly due to a lack of investment and international attention. Vigotti emphasizes the need to bridge this gap.

«An energy system based on renewables could contribute to solving many of the social, economic, health-related, and environmental challenges faced by Africa. However, Africa has long been left behind in the global energy transition. In fact, over the past two decades, Africa has attracted no more than 2% of global investments in renewables, which amounts to less than 3% of jobs in the global renewable energy sector [...] Notwithstanding this discouraging data, African countries have an abundant and unexplored energy potential that could provide a solid basis for the transformation of the energy sector. In particular, there is extraordinary potential in terms of solar energy that amounts to 40% of the global total, while costs for hydroelectric and geothermal energy are decreasing, making renewable sources increasingly accessible. On top of this, Africa has 40% of the global reserves of key minerals for batteries and hydrogen technology. The energy transition reserves enormous promise for Africa and some data allows for an optimistic outlook on a future in which renewable energy will not only power the continent, but also drive its sustainable and inclusive economic growth.»

In recent decades, Africa has made significant progress in reducing poverty and inequality and increasing access to vital services such

as electricity. For Africa to successfully face a sustainable electrification challenge, it will need to adopt an overall strategy embracing all facets of electric systems and their value chains. This outlook will need to address not only energy production, but also distribution, final use, and industrial growth, in the context of a growing demand for energy.»

«Italy is the closest frontier of the African continent and, as such, is a perfect reliable partner for African stakeholders, especially in the renewable energy and electric grids sector, thanks to its technological excellence and ability to manage such a complex sector. [...] The success of sustainable electrification for Africa requires a systemic approach embracing all aspects of electric systems and their value chains. In particular, this means acting in the following sectors: optimizing electrification plans, expanding generation from renewable sources, reinforcing and developing reliable electric grids, electrification of final use, digitalization and smart grids, as well as promoting green industrialization and a resilient supply chain.»

[Un mix energetico per l'Africa \(agosto 2024\)](#)
[Africa: la Trasformazione Energetica richiede risposte immediate \(maggio 2024\)](#)

[Accelerare l'elettrificazione sostenibile in Africa: la chiave per lo sviluppo economico e sociale del continente \(aprile 2024\)](#)

News & Events

Upcoming Energy Events

Irena Youth Forum

January 9-13, 2025

📍 Abu Dhabi, UAE

www.irena.org

Held in conjunction with the 15th IRENA Assembly, this Youth Forum is designed for the next generation of leaders poised to shape the future of renewable energy. The event will bring together young professionals, activists, and decision-makers from around the world to discuss innovative solutions and the policy changes needed to accelerate the global energy transition. Through interactive panels, networking sessions, and mentorship opportunities, participants will gain valuable insights and connections to further their impact on the renewable energy sector. The forum emphasizes youth empowerment, promoting the role of young leaders in advancing sustainable development goals and fostering a cleaner, greener future for all.

World Future Energy Summit 2025

January 14-16, 2025

📍 Abu Dhabi, United Arab Emirates

www.worldfutureenergysummit.com

The World Future Energy Summit is a leading global event dedicated to clean energy and sustainability. The upcoming edition will be held from January 14 to 16, 2025, at the Abu Dhabi National Exhibition Centre (ADNEC) in Abu Dhabi. The summit will bring together industry leaders, innovators, and policy-makers to discuss and showcase the latest solutions in renewable energy, water management, and green technologies. Participants will have the opportunity to attend conferences, explore technology exhibitions, and engage in networking sessions, fostering collaborations that accelerate the global transition towards a sustainable energy future.

IPTC – International Petroleum Technology Conference 2025

February 18-20, 2025

📍 Kuala Lumpur, Malaysia

www.iptcnet.org

The International Petroleum Technology Conference (IPTC) is one of the most prominent technical events in the Middle East and Asia-Pacific regions. This conference provides a unique platform for sharing innovative ideas and showcasing cutting-edge technologies aimed at achieving the 2030 decarbonization goals. Attendees will have the opportunity to engage with industry leaders, participate in technical sessions, and explore strategies to drive sustainability and innovation in the energy sector.

International Energy Week 2025

February 25-27, 2025

📍 London, United Kingdom

www.iweek.co.uk

International Energy Week, one of the most anticipated events in the global energy panorama, will focus on energy transition, sustainability, and innovation. Organized by the Energy Institute, it will bring together world leaders, experts, and stakeholders from the energy sector to address the achievement of the net-zero challenge. The program includes high-level panels, workshops, and networking opportunities to discuss strategies, emerging technologies, and solutions to support a fair and sustainable energy transition.

KEY – The Energy Transition Expo

March 5-7, 2025

📍 Rimini, Italy

www.key-expo.com

KEY – The Energy Transition Expo is the reference event in Italy for technology and solutions dedicated to the energy transition. The event will provide an extensive program of conferences, workshops, and showcase areas addressing renewable energy, energy efficiency, smart grids, and energy storage. Participants and sector professionals will be able to learn more about opportunities related to the integration of renewable sources in electricity grids and learn about the technological innovations that will drive the future of sustainable energy.

StocExpo 2025

March 11-12, 2025

📍 Rotterdam, Netherlands

www.stocexpo.com

StocExpo is the leading international event for the energy and industrial storage sector, with a focus on energy transition infrastructure. The event, which will take place at the Rotterdam Ahoy, offers a unique platform for professionals in renewables, hydrogen, LNG, and electricity storage networks. Attendees will have access to a cutting-edge technology showcase, educational sessions with industry experts, and networking opportunities to discuss solutions for resilient and sustainable energy networks.

Shaping a Better Energy Future

CESI is a world-leading technical consulting and engineering company in the field of technology and innovation for the electric power sector. In particular, through its Division KEMA Labs, CESI is the world leader for the independent Testing, Inspections and Certification activities in the electricity industry. With a legacy of more than 60 years of experience, CESI operates in 40 countries around the world and supports its global clients in meeting the energy transition challenges. CESI also provides civil and environmental engineering services.

The company's key global clients include major utilities, Transmission System Operators (TSOs), Distribution System Operators (DSOs), power generation companies (GenCos), system integrators, financial investors and global electromechanical and electronic manufacturers, as well as governments and regulatory authorities. In addition, CESI works in close cooperation with international financial institutions such as, among others, the World Bank Group, the European Bank for Reconstruction and Development, the European Investment Bank, the Inter-American Development Bank, the Asian Development Bank.

CESI is a fully independent joint-stock company headquartered in Milan and with facilities in Arnhem, Berlin, Prague, Mannheim, Dubai, Rio de Janeiro, Santiago de Chile, Knoxville (USA) and Chalfont (USA).

www.cesi.it

CESI

Inspired with innovation