2024

March

Impediments and Opportunities for the Energy Transition

CEO Roundtable White Paper

The Al-Attiyah Foundation

01 OUR MEMBERS

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The meeting commenced with a customary welcome from H.E. Abdullah bin Hamad Al-Attiyah, extending greetings to members, guests, and speakers gathered for the inaugural CEO Roundtable of 2024. He noted the timeliness and relevance of the chosen topic, resonating with all present.

CEO WHITE PAPER

H.E. Abdullah bin Hamad Al-Attiyah created the Foundation as a platform for knowledge exchange and to support the global community in the quest towards a sustainable energy future.

The CEO Roundtable is an opportunity for CEOs, Foundation members and partners to meet in one room and examine pertinent energy and sustainable development topics.

03 MODERATOR & SPEAKERS

Moderator:

Nawied Jabarkhyl, Broadcaster and Director – Head of International Media Relations at APCO Worldwide

Speaker

Dr. Patrick Allman-Ward, Dana Gas Group CEO

Speaker

Jonathan Shopley, Managing Director Climate Impact Partners

Speaker

Frank Wouters, Senior Vice President / Head of International Business Development New Energy at Reliance Industries Limited

Speaker

Roland Roesch, Director, Innovation and Technology Center, IRENA

Speaker

Ahmed Khalifa, Professor of Economics Qatar University

Nawied Jabarkhyl, serving as the Roundtable moderator, introduced five distinguished guest speakers, each invited to present their perspectives. Accompanied by presentations detailed in Appendices A, B, and C, the speakers offered insights into crucial facets of addressing climate change and advancing sustainable energy solutions.

Frank Wouters, Senior Vice president and Head of International Business Development New Energy at Reliance Industries Ltd spoke of the need to advance all relevant technologies in the fight against climate change. He highlighted the advances in solar power in terms of adaption and reduction in costs. However, he noted that there is a need to balance more electrification (clean atoms) with more low CO2 emission generation (clean molecules). In the area of clean molecules, carbon capture and the use of biofuels must increase but there are limitations to current technologies. Mr Wouters also spoke of hydrogen in the energy mix, noting that the developing production technology of gas pyrolysis (methane to hydrogen – turquoise hydrogen) is feasible in Qatar. Hydrogen can be readily converted to ammonia or methanol for transportation or direct use by existing proven industrial processes. In many industrialised countries, grid constraints are becoming a major impediment to the implementation of projects which otherwise have strong business cases for implementation. (Appendix A)

Roland Roesch, Director of the Innovation and Technology Centre, described International Renewable Energy Agency's (IRENA) role in promoting the various forms of renewable energy. He presented IRENA's Central Scenarios for CO2 emissions up to 2050, noting that a slight reduction in emissions is likely. He reminded the audience that the COP28 pledge states that Renewable Energy capacity must treble whilst energy efficiency must double for G20 countries.

He also presented the latest version of the well-established "IRENA Progress Charts" showing progress toward Electrification and Energy Efficiency (shown in Appendix B). He reminded the audience that an emerging shortage of relevant skills will be an obstacle to overcome in the coming years.

Dr. Patrick Allman-Ward, Group CEO of Dana Gas, said that the need to move low emission technologies is now well recognised and underlined the importance of the energy trilemma (affordable, renewable, and secure energy). He noted that an increasing global population is driving demand for energy usage upwards and the need to displace coal (a high emitter) with gas (relatively low emitter) is of paramount importance.

However, the current trend is not one of coal displacement but rather that renewables as being used in an additive fashion (i.e. to cope with increasing energy demands). Currently, Combine Cycle Gas Turbines (CCGT's) are used as base load generators. However, they will fit into "mid-range" generators readily where they can be used to complement solar and wind generation and be used in conjunction with batteries or even pumped hydro. He commented that the need for CCUS projects is critical, but the amount of industrialisation needed is equivalent to reproducing the entire existing oil industry nearly twice over. Ambitious targets are fine, but they must also be realistic, he concluded.

Jonathen Shopley, Managing Director of Climate Impact Partners, spoke of the need to promote and improve the various voluntary and compulsory carbon trading markets. Such markets help in establishing the market price for carbon. However, different rules and regimes exist in various markets. Some standardisations would help in understanding for all participants but progress on this is slow. He noted that the role of efficient markets is to allocate capital efficiently so a developed carbon market would move capital to where it was needed most urgently. This would be geared towards the less developed parts of the world which are being most impacted by climate change.

Ahmed Khalifa from Qatar University spoke of the need to combine technology advances with behavioural science measures and experimentation. The mechanisms by which subsidies for utilities need to be more efficiently targeted.

He noted that it is better to give subsidies as cash and let individuals allocate that cash rather than to subsidise the utilities themselves as individuals may only waste the utility. There is also a great need to reevaluate energy efficiency in buildings, transportation the commercial areas of activity within Qatar. (AppendixC).

The floor was then opened to other participants of the Roundtable for comments, questions, and discussion.

The following were some highlights from the session:

- Climate change (or abatement of its effects) is not the only problem facing the world. Water is becoming an increasing scarce resource in some regions.
- Increasing pollution of such resources is also making the use of water resource more difficult.
- A number of attendees also expressed scepticism on how quickly hydrogen as an energy source can be adopted, even as a niche fuel.
- Renewable generation sources are not displacing coal in major coal using economies but are rather supplementing it to cope with rising energy demands.
- The use of gas is more efficient than coal (CCGT's are thermally more efficient than even super-heated coal generators) so gas should be promoted in any gas transition process.
- District heating and cooling is more efficient than single user heating and cooling. Fuel subsidies should be more carefully targeted.
- In many developing regions, domestic heating and cooling should be installed at the construction phase.
- The United States based Inflation Reduction Act has the potential to finance decommissioning of overseas coal plant.
- Climate change effects in the US (such as droughts, fires, and water shortages) have now changed sentiment. More action to abate the effects can be expected.
- The work of the UN in addressing global challenges was discussed.

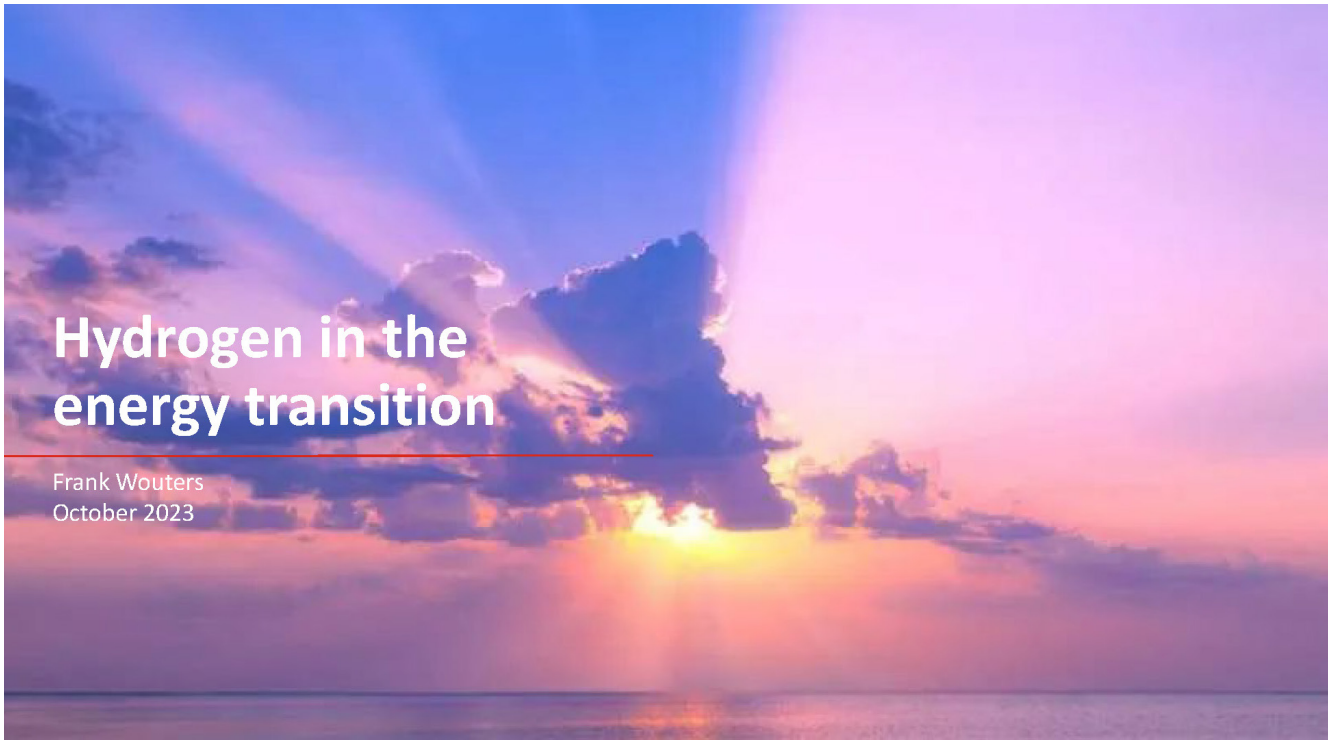
- Industrial achievements should not be downplayed.
- The energy transition facilitates new opportunities in business and private sector involvement is crucial in the coming decades.
- The energy transition will not end in 2050, it will continue for decades more.
- Delays in implementing viable solutions today will only increase implementation and abatement costs in the future.
- Hydrocarbons will be part of a solution for many years past 2050.
- Although the Energy Trilemma is important in developing policy and strategies to combat climate change, pollution, food and water shortages should not be neglected.

CONCLUSIONS

In closing, Nawied Jabarkhyl emphasised the significance of the energy transition as a "noble cause" that demands relentless pursuit. He reiterated the imperative for collective action and collaboration in addressing the complex challenges posed by climate change and transitioning to sustainable energy systems.

Following Mr. Jabarkhyl's remarks, H.E. Abdullah bin Hamad Al-Attiyah further underscored the gravity of the situation, emphasising that pollution in all its forms poses a tangible threat to humanity. He reiterated the urgent need for concerted efforts to combat pollution and mitigate its adverse effects on the environment, public health, and socio-economic stability. Furthermore, H.E. Al-Attiyah expressed heartfelt gratitude to the Foundation's member companies for their support and invaluable contributions to the Roundtable. Their dedication and commitment to driving positive change were instrumental in fostering meaningful dialogue and actionable solutions during the session.

Frank Wouters, Senior Vice president and Head of International Business Development New Energy at Reliance Industries Ltd;



Flow

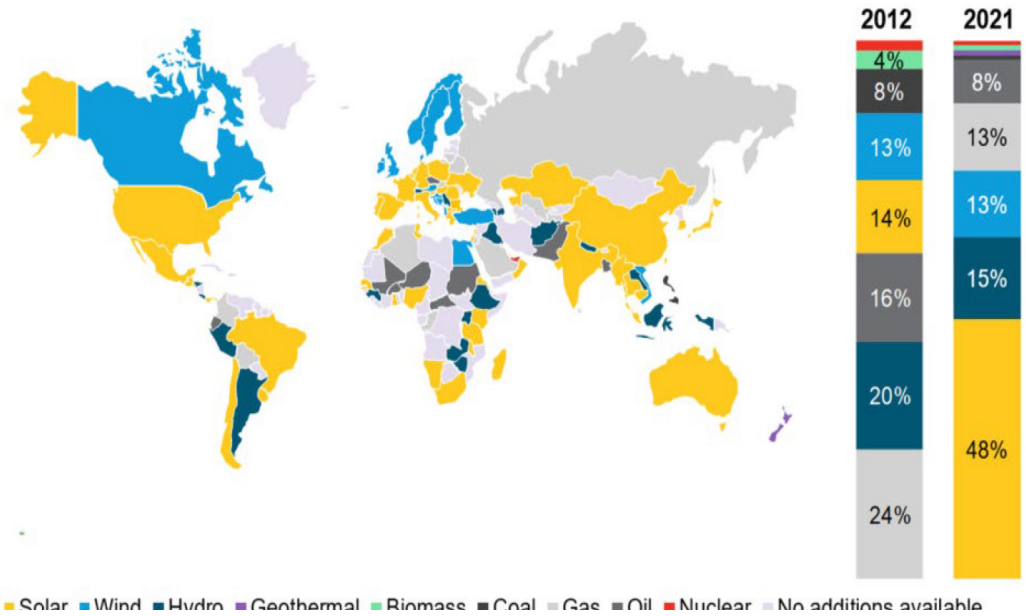
1. The energy transition
2. Hydrogen

1

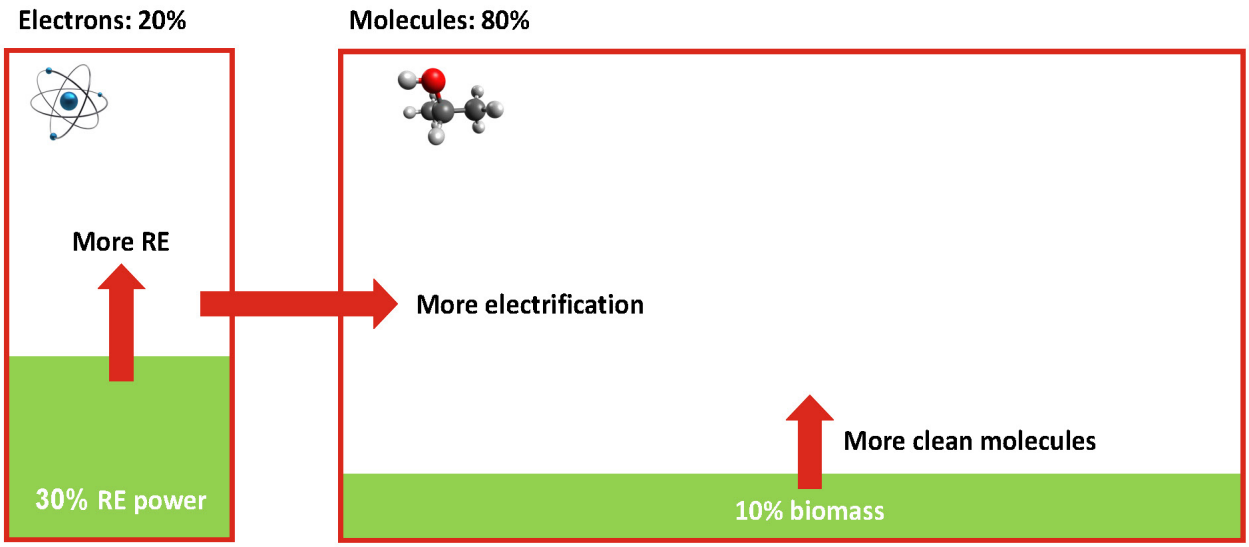
The energy transition

Electricity and hydrogen

Most popular new power-technology additions in 2021



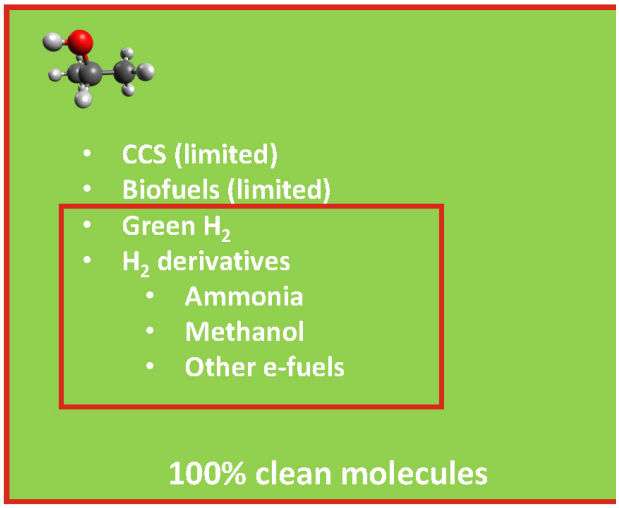
Final energy in 2020



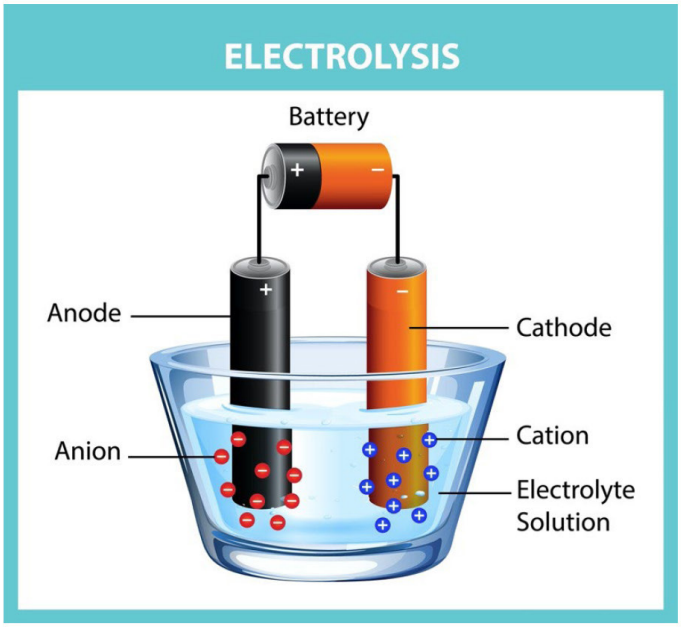
Final energy in 2050

Electrons: 50%

Molecules: 50%

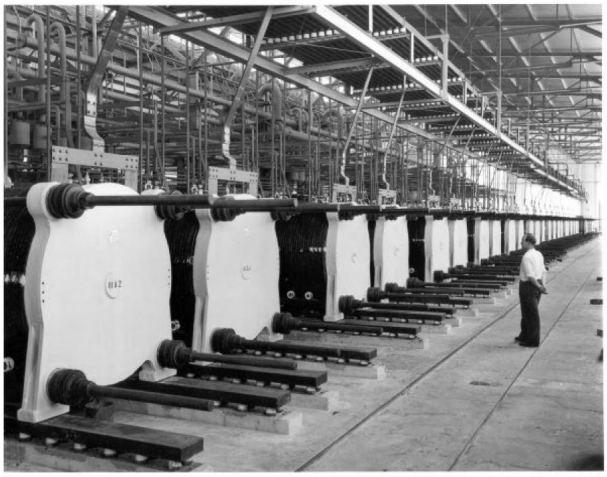


How to make green hydrogen: electrolysis



How to make green hydrogen: electrolysis

Rjukan, Norway; 1927 – 1970's

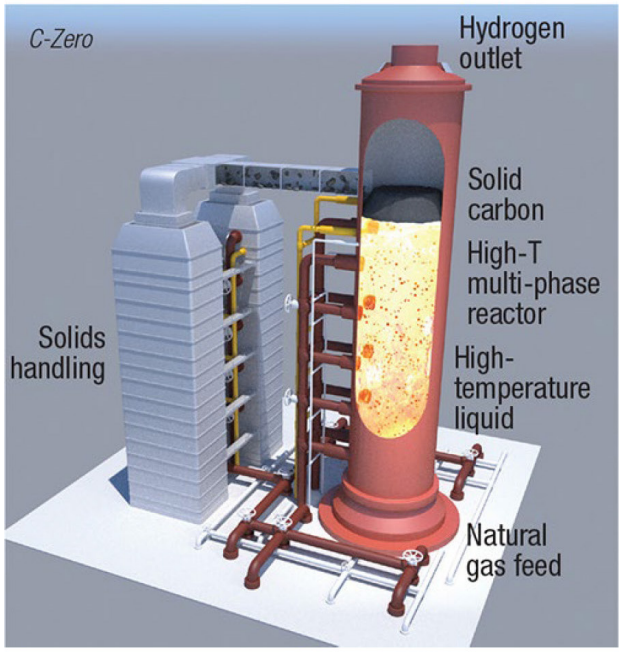


Glomfjord, Norway; 1953 – 1991

Source: NEL

10

Turquoise hydrogen: pyrolysis



Source: C-Zero

Roland Roesch, Director of the Innovation and Technology Centre, IRENA;

IRENA
International Renewable Energy Agency

IRENA Innovation and Technology Centre

Dr Roland Roesch, Director

The International Renewable Energy Agency

IRENA
International Renewable Energy Agency

- Established in 2011
- Headquarters in Masdar City, Abu Dhabi, UAE
- IRENA Innovation and Technology Centre (IITC) – Bonn, Germany
- Permanent Observer to the United Nations – New York, USA
- 168 Members and 16 States in Accession

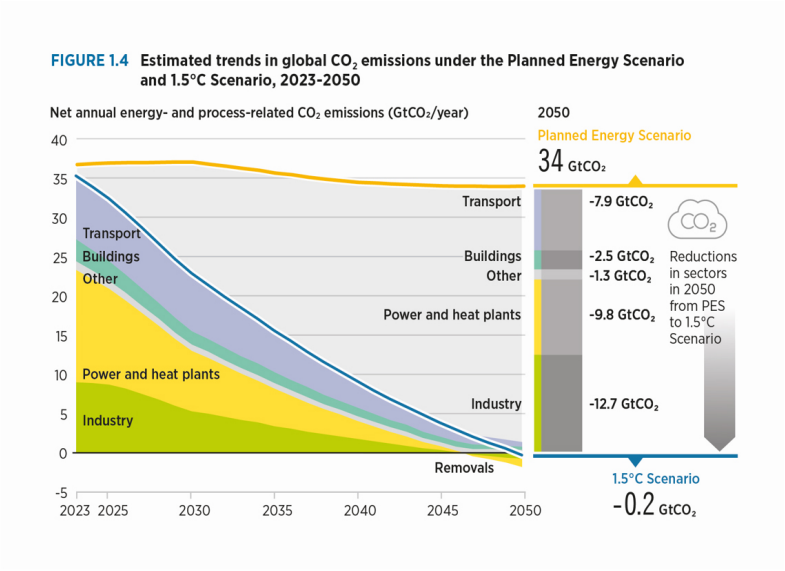
Mandate

To promote the widespread adoption and sustainable use of **all forms of renewable energy** worldwide

Bioenergy | Geothermal Energy | Hydropower | Ocean Energy | Solar Energy | Wind Energy

IRENA World Energy Transitions Outlook sets a path to net zero emissions

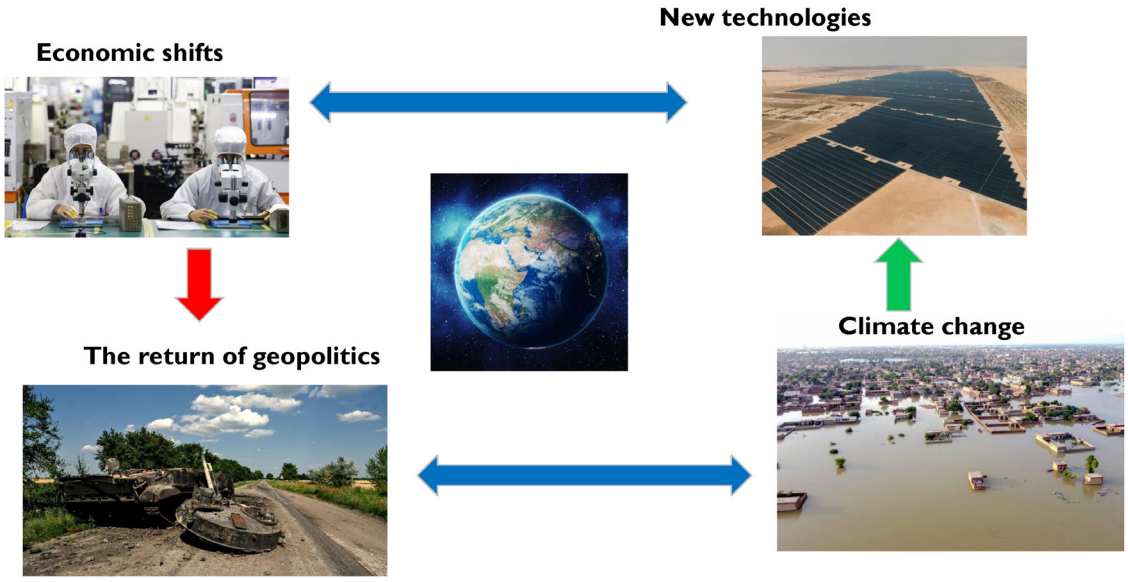
IRENA International Renewable Energy Agency



- In the Planned Energy Scenario, annual emissions would **decline only slightly** to 34 $GtCO_2$ in 2050
- For the 1.5°C climate target, global CO_2 emissions need to drop to **net zero by 2050**
- The steepest decline is necessary towards 2030, now is the time for **immediate actions**

QAMAR ENERGY

Key themes in global energy



Sources: Qamar Energy research

Qamar Energy | 2023

The Pledge

RE Power Capacity x3

Three-fold increase by 2030

Energy Efficiency x2

Double rate of improvement by 2030

11 000 GW by 2030

Despite progress: The energy transition is not on track to 1.5

IRENA International Renewable Energy Agency

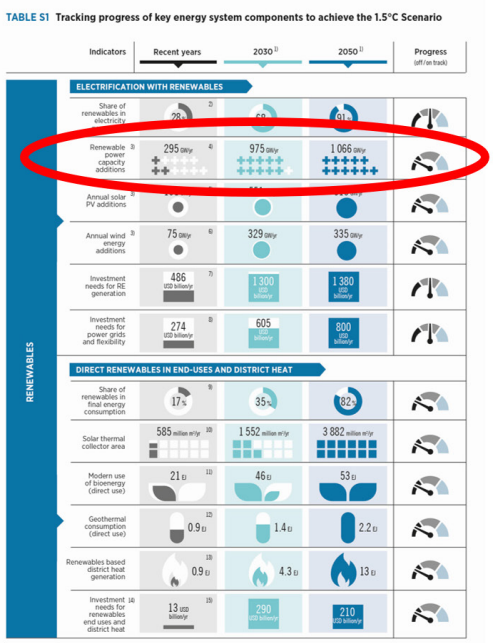


TABLE S1 Tracking progress of key energy system components to achieve the 1.5°C Scenario

Indicators	Recent years	2030	2050	Progress (off / on track)
RENEWABLES				
ELECTRIFICATION WITH RENEWABLES				
Share of renewables in electricity	28 %	60	91 %	
Renewable power capacity additions	295 GW/y	975 GW/y	1 066 GW/y	
Annual solar PV additions				
Annual wind energy additions	75 GW/y	329 GW/y	335 GW/y	
Investment needs for RE generation	486 USD billion/y	1 300 USD billion/y	1 380 USD billion/y	
Investment needs for power grids and flexibility	274 USD billion/y	605 USD billion/y	800 USD billion/y	
DIRECT RENEWABLES IN END-USES AND DISTRICT HEAT				
Share of renewables in final energy consumption	17 %	35 %	82 %	
Solar thermal collector area	585 million m²/y	1 552 million m²/y	3 882 million m²/y	
Modern use of bioenergy (direct use)	21 EJ	46 EJ	53 EJ	
Geothermal consumption (direct use)	0.9 EJ	1.4 EJ	2.2 EJ	
Renewables based district heat generation	0.9 EJ	4.3 EJ	13 EJ	
Investment needs for renewables end uses and district heat	13 USD billion/y	290 USD billion/y	210 USD billion/y	

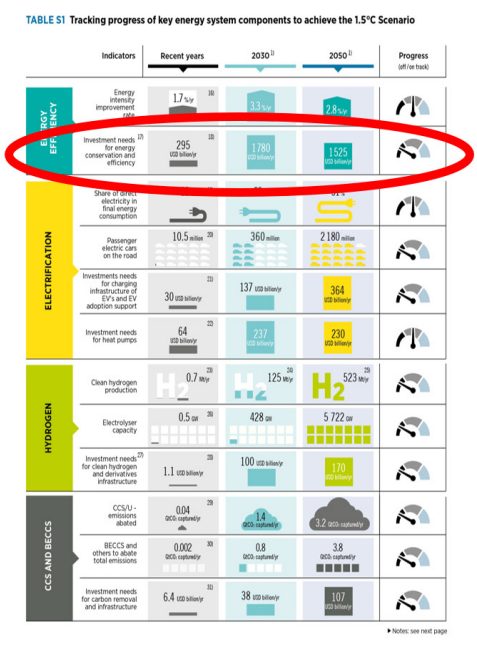
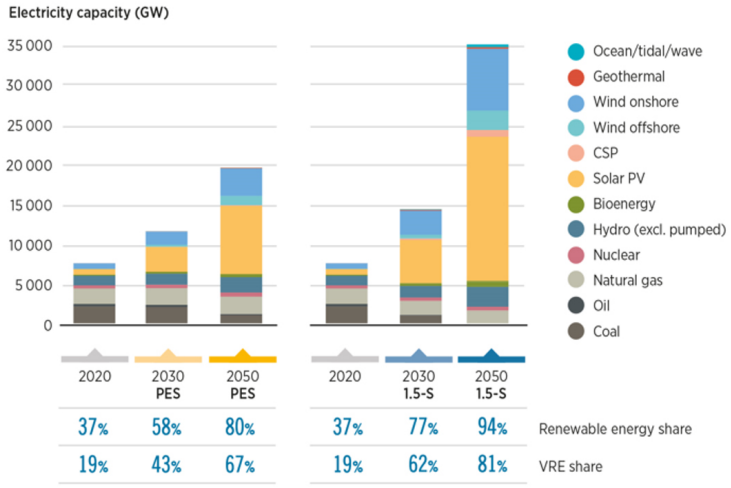


TABLE S1 Tracking progress of key energy system components to achieve the 1.5°C Scenario

Indicators	Recent years	2030	2050	Progress (off / on track)
ENERGY EFFICIENCY				
Energy intensity improvement rate	1.7 %/y	3.3 %/y	2.8 %/y	
Investment needs for energy conservation and efficiency	295 USD billion/y	1780 USD billion/y	1525 USD billion/y	
ELECTRIFICATION				
Share of direct electricity in final energy consumption				
Passenger electric cars on the road	10.5 million	360 million	2 180 million	
Investments needs for charging infrastructure of EV's and EV adoption support	30 USD billion/y	137 USD billion/y	364 USD billion/y	
Investment needs for heat pumps	64 USD billion/y	237 USD billion/y	230 USD billion/y	
HYDROGEN				
Clean hydrogen production	0.7 Mt/y	125 Mt/y	523 Mt/y	
Electrolyser capacity	0.5 GW	428 GW	5 722 GW	
Investment needs for clean hydrogen and derivatives infrastructure	1.1 USD billion/y	100 USD billion/y	170 USD billion/y	
CCS AND BECCS				
CCS/U - emissions abated	0.04 GtCO₂ captured/y	1.4 GtCO₂ captured/y	3.2 GtCO₂ captured/y	
BECCS and others to abate total emissions	0.002 GtCO₂ captured/y	0.8 GtCO₂ captured/y	3.8 GtCO₂ captured/y	
Investment needs for carbon removal and infrastructure	6.4 USD billion/y	38 USD billion/y	107 USD billion/y	

▸ Notes: see next page

Renewables must dominate capacity and generation mix by 2030 for 1.5°C



- Total installed RE capacity must reach **11 147 GW** in 2030 (77%)
- Solar PV provides the bulk of capacity and generation
- Current policies fall short of what is needed

Notes: 1.5-S = 1.5˚ C Scenario; CSP = concentrated solar power; GW = gigawatt; PES = Planned Energy Scenario; PV = photovoltaic; VRE = variable renewable energy; TWh = terawatt hour. Bioenergy includes biogas, biomass waste, biomass solid, and biomass solid CCS; CCS = carbon capture and storage.

6

The COP28 Tripling Pledge

- Joined by more than 140 states to date
- RE is mature, commercially viable, and solutions are ready to scale up
- Multiple benefits for complex systems like energy:

IRENA Director General Francesco La Camera, UAE Ambassador Majid Al Suwaidi, GRA CEO Bruce Douglas. Image Credit: Ahmed Ramzan/Gulf News

- Help visualize the final goals and therefore plan the steps to success
- Spur analysis of how different pathways to the goal can be achieved and their trade-offs
- Focus policy makers on identifying barriers and opportunities
- Clarifying short-term and medium-term actions required
- Send clear signals to consumers and investors of the direction of travel
- Increase the chance of success

7

Professor Ahmed Khalifa, College of Business and Economics, Qatar University

Energy Transition and Efficiency: Economics lens

NPRP9-232-5-026, NPRP10-0131-170-300 and NPRP12C-0821-190017

Ahmed Khalifa
College of Business and Economics, Qatar University

March 6th, 2024

Introduction
Content

- What factors are crucial in the context of energy transitions and efficiency?
- A focus on the Importance of technology and behavioral Change "Field Experimental study
- Does Carbon Pricing and Carbon Credit Matter?
- Conclusion and Policy Recommendations

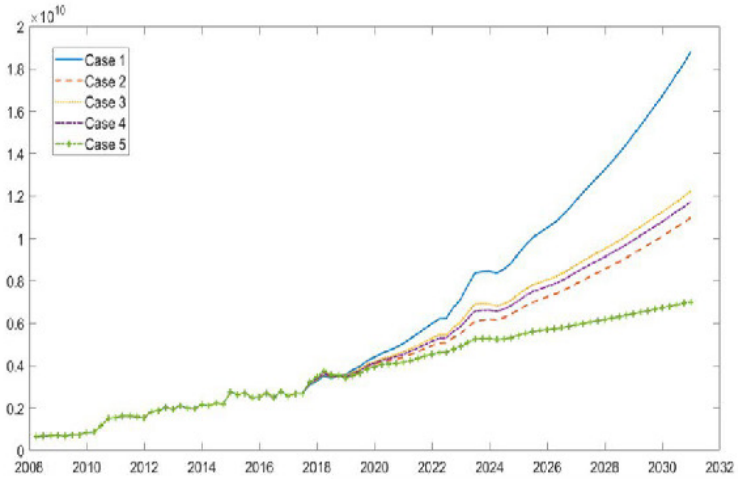
Our Research at Qatar University

Please scan the QR code for for COP28:

- The importance of accelerate climate action.
- Emission reduction targets" in their next nationally determined contributions (NDC)
- Tripling renewable and doubling energy efficiency by 2030.
- Recognizes the need to significantly scale adaptation finance beyond doubling, to meet urgent and evolving needs

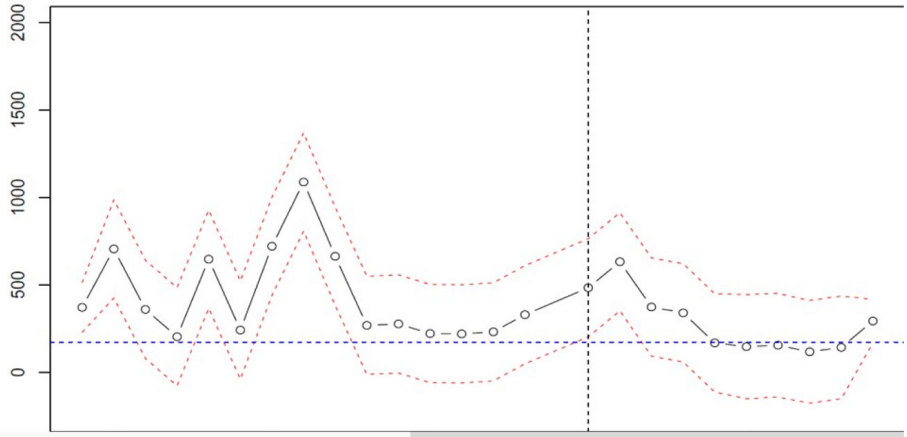
Selected Results for the Electricity consumption

For the electricity scenarios forecast, please scan



Technology Experiment

Water Aerator



Behavioural intervention and Energy Conservation in Qatar

For the Filed experiment of electricity use, scan

Main results of the field experiments

- Behavioural intervention may reduce electricity consumption by 4 %
- Technology has a significant impact for conservation in Qatar
- Market tools with behavioural interventions are necessary to achieve Qatar's targets in energy transition, efficiency and CO2 emissions reductions
- The Vickrey Price Auction (VPA) algorithm for implementing efficient carbon pricing globally.

Conclusion and Policy Recommendation

Recommendations with a specific technicality

1. The importance of Evaluating and Re-Framing the Subsidy Policy in Qatar
2. Seamless Integration of Technology and Behavioral Nudges is Essential
3. Enforcing Mandatory Auditing for resources in Qatar "Buildings, Transportation, Commercials, Economic Sectors"
4. Employing Market Tools to Scale Entrepreneurial Initiatives in Efficiency and Energy Transitions
5. Adopting a Scientific Approach to Efficiently Allocate Economic Resources

Selected projects (Team Members)

for more information, scan

Thank you

Do you want to keep up-to-date with the latest developments in energy? All past issues of the Al-Attiyah Foundation's Research Series, both Energy and Sustainability, can be found on the Foundation's website at www.abhafoundation.org/publications

December – 2023

The Year That Was – Reflecting on 2023 and Plotting Climate Action in 2024

The Al-Attiyah Foundation's fourth CEO Roundtable of the year was held on December 6. The Trilemma for Energy, encompassing Energy Affordability, Energy Sustainability, and Energy Security, formed the basis of the session's analysis of trends witnessed over the past 12 months and predictions for 2024.

(QRCODE)

September – 2023

Hydrogen Technology – From Strategy to Delivery

Hydrogen is the most abundant element in the universe and also burns without producing carbon dioxide. Due to these properties, many experts have claimed that it is the "wonder fuel" and could play a major role in the race to net-zero emission by mid-century.

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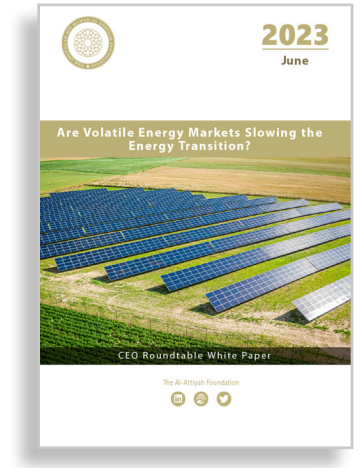

June – 2023

Are Volatile Energy Markets Slowing the Energy Transition?

Various institutions within governments, academia, research institutions and the private sector are addressing the need for mitigating actions to either abate or counteract the effects of climate change. However, it is often observed that the prices of fossil fuels are volatile.

(QRCODE)

Our partners collaborate with the Al-Attiyah Foundation on various projects and research within the themes of energy and sustainable development.

Qatar Foundation
Unlocking human potential
مؤسسة قطر
لإطلاق قدرات الإنسان

KAHRAMAA
Qatar General Electricity & Water Corporation

World Petroleum Council

جامعة قطر
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INTERNATIONAL COOPERATION PLATFORM
İSTANBUL

ISAG
Istituto di Alti Studi in Geopolitica e Scienze Ausiliarie

MITSUI & CO.

إرثنا
earthna

GORD
Gulf Organisation for Research & Development
المنظمة الخليجية للبحث والتطوير

United Nations Global Compact

NATIONAL COUNCIL ON U.S.-ARAB RELATIONS

GULF TIMES

Middle East Institute

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Ministry of Environment and Climate Change
State of Qatar • دولة قطر

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Qatar Free Zones Authority
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ICC Qatar

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