

About Future Cleantech Architects:

We are a climate innovation think tank.

We exist to close the remaining innovation gaps to reach net-zero emissions by 2050. To reach this objective, we accelerate innovation in critical industries – such as cement, aviation, or shipping – where sustainable solutions are still in very early stages.

We urge policy-makers to intensify and better prioritize their R&D activities. Moreover, we initiate and actively drive high-level research consortia on critical technologies for these neglected technological sectors.

Connect with us to join this mission or support our work.



Key takeaways



Innovation



LDES

Long Duration
Energy Storage



Innovative
Renewables



Aviation



United Nations Climate Change
Global Innovation Hub

DRIVING CLEANTECH INNOVATION HARDER ON THE GLOBAL STAGES AT COP28, IN DUBAI.

The 28th Conference of the Parties (COP28) took place in Dubai, UAE, from the 30th of November until the 13th of December, 2023. As in the past years, Future Cleantech Architects attended the conference, co-hosting two sessions on Innovative Renewables for Energy Security and on Future RD&D Needs, producing an Aviation short film, and actively participating in a number of interviews, events, and panels with the goal to push cleantech innovation harder.

COP28
UAE

Key takeaways

About COP28: 03

Future RD&D Needs: 05

Innovative Renewables: 07

Aviation: 09

Key quotes: 11



Future RD&D Needs

Key takeaways

Perspectives on Key Global Technology Development Needs

According to the IEA, more than 50% of technical innovations needed to reach net zero by 2050 either do not yet exist or are not on track (IEA, 2019). The acceleration of Research, Development, and Demonstration (RD&D) in critical sectors is imperative to ensure these technological gaps are closed on time. While national governments play a pivotal role in driving the global energy transition, it is crucial to recognize that fostering cleantech advancements requires more than just public investment in clean energy RD&D. To achieve optimal effectiveness, the innovation ecosystem must fulfill a diverse array of functions, such as mobilizing resources, cultivating and disseminating new knowledge, facilitating entrepreneurial experimentation and the emergence of new markets, establishing social acceptance for novel technologies, guiding the pursuit of knowledge in specific directions, and facilitating knowledge transfer to interconnected industries.



1 Economic and institutional barriers

The biggest roadblocks in advancing breakthrough climate technology are institutional and economic in nature. These barriers shift towards socio-cultural barriers with increased deployment and development. Monitoring barriers for RD&D in developed economies can help predict which barriers developing economies are likely to face in future.

2 The public sector is a key stakeholder for fostering RD&D

The public sector is seen as the key enabler and barrier for advancing RD&D. Policy-makers are key to creating spaces where entrepreneurs can engage with both the public and private sectors and decide on a collective direction for climate innovation. Reducing bureaucracy and providing long-term stability are determined as two key public sector tasks.

3 Cleantech needs innovative financing and market tools

When markets are based purely on competition, cleantech startups and green alternatives are at a competitive disadvantage. To combat these risks, market-shaping instruments such as tax rebates, subsidies, or pricing mechanisms may provide much needed support.

4 Strengthen the innovation ecosystem

Although the current global RD&D environment is seen as slightly favorable, a change in the innovation ecosystem is needed. Cross-border collaboration, bundling of resources, efficiently allocating finance, scaling-up results, better feedback culture, and sharing lessons learned are all needed to create a strong ecosystem where innovation can thrive.

5 Energy storage RD&D must be prioritized

The Future RD&D Needs survey, a project in collaboration with UN Climate Change's Technology Executive Committee, identified energy storage as the most urgent high-impact emissions reduction technology to focus RD&D efforts on across almost all regions, countries, and professional sectors.



Innovative Renewables for Energy Security

Key takeaways

Alternative sources of flexible low-carbon energy to meet global electricity demand

Global electricity demand for net-zero is predicted to more than double from 2020 to 2050. Most of the needed green power will come from solar, PV and wind, thanks to their affordability and quick deployment. However, their intermittency remains a challenge. While innovative renewables are far behind conventional wind and solar, their characteristics, such as providing flexibility and resilience, make them an integral part of future energy systems. Innovative renewables are still in the early stages of development and commercialization, so they need dedicated support to realize their potential. Solar PV presents a very successful historical precedent of how long-term policy support, in combination with public R&D and market stimulation, can make this kind of technology viable enough to scale and have a massive impact globally.

1

Targeted innovation for renewables

Innovation in developing new renewables has a clear purpose: to offer extra value such as new resources, increased load factors, and different generation profiles that complement the intermittency of wind and solar.

2

Policy targets work as signals to secure the market environment

Creating a supportive and well-defined framework is essential for catalyzing growth and innovation in the clean energy sector. It is crucial to establish clear signals to the market, indicating the direction and priorities for sustainable technologies. The focus should then be on cleantech business acceleration services, mentorship programs, and fostering collaboration with governments.

3

An example from Europe for innovative renewables

The revised EU Renewable Energy Directive will be a milestone of long-term policy support for emerging technologies, containing a provision of 5% of newly installed renewable energy capacity dedicated to innovative technologies.

4

Bridge the gap between early stage research and commercial roll-out

There is a support gap between very early-stage research in laboratories and large-scale commercial rollout, especially with a lack of demonstrable prototypes to encourage private finance to step in. Fostering the whole innovation ecosystem, especially through mentorship programmes and publicly funded incubators, could provide valuable resources to innovators and start-ups.

5

Increase innovation & inter-governmental collaboration

Intergovernmental and interinstitutional collaboration is crucial. Efforts should be allocated to create collaborative ecosystems, involving multiple sectors, ministries, countries, and players to find innovative solutions for the challenging aspects of decarbonization.

Aviation Key takeaways

A Future Cleantech Film on Aviation,
produced at COP28

The largest contributor to aviation's warming impact on the planet are contrails (>50%). Airplanes are built to last; the average lifespan of an aircraft is over 25 years. Therefore, what is happening in the industry as well as the type of aircraft leaving the production line today has far-reaching implications. Additionally, safety, testing, and verification are lengthy procedures that must be sped up and simplified to enable the entry of new technology into the market and help reduce the sector's warming impact. One of the key solutions on the road to 2050 are SAFs. However, in 2022 SAFs still made up less than 0.1% of the market share of jet fuel. Policy measures such as ReFuelEU, the EU Emissions Trading System (ETS), the UK SAFs mandate, as well as other similar initiatives are key drivers to decarbonize the sector.



1 Reducing both CO₂ and Non-CO₂ emissions

The aviation sector is responsible for about 2.5% of global CO₂ emissions. However, CO₂ is only part of the problem. More than 60% of aviation's warming impact on the planet is caused by non-CO₂ emissions. Hence, warming impact is the best indicator of the sector's effect on the planet.

2 Addressing aviation's inter- national challenges

Demand for flying is expected to continue to increase until 2050 and current policies are not enough to fully combat the sector's emissions. More than 50% of these emissions come from international flights, which are hard to regulate. Crossborder regulation and international cooperation are paramount to addressing these emissions fully.

3 Advancing and de-risking innovation for aviation

Currently, solutions such as hydrogen and battery-electric planes are still in the testing phase, focusing on short-haul flights with limited capacity. Re-investing aviation tax revenue into these technological solutions can help accelerate and de-risk innovation.

4 Ambitiously deploying alternative technologies

By 2050, an ambitious combination of battery-electric, hydrogen, and sustainable aviation fuel (SAF) planes, in place of conventional planes operating on jet fuel, could lead to a ~55% warming reduction.

5 Non-CO₂ effects: mitigating contrails

Contrails are the single largest contributor (~55%) to aviation's warming impact on the planet and are a neglected area of high leverage. Marginally rerouting ~10% of all flights is enough to avoid forming ~80% of all contrails.

Key quotes



“ Policymakers are now more willing and more open to engage around things like market shaping initiatives. But they don’t know how, and that is, I think, where they also need a lot of help to understand, how these mechanisms can work.”

Barbara Diehl |
Chief Partnership Officer | Federal Agency for Disruptive Innovation (SPRIND), Germany



“ We need to innovate in governance, in the way we develop policies and in regulatory practices.”

Elena Ocenic |
Senior Policy Adviser on Climate and Sustainability | Presidential Administration of Romania



“ Policymaking should be a process where you engage the private sector, bring them on board, to say where we can go collectively. Because then this talks to how you leverage the public funding to attract the private investments to the technology development process.”

Alois Mhlanga |
Chief | Climate Technologies Innovation Unit, Division of Decarbonization and Sustainable Energy, UNIDO



“ The Renewable Energy Directive is an accelerator for innovation. It’s a key to the competitiveness of renewable energies. [...] The new EU directive gives every relevant technology the right to be researched.”

Markus Pieper | (EPP, Germany) |
Member of the European Parliament | Rapporteur on the revision of the Renewable Energy Directive



“ The integrated support chain is crucial for the development and commercial viability of innovative technologies. While Europe excels in some areas, there is a gap in mid-stage funding, where a more targeted program is needed. In comparison to regions like the US, Europe could benefit from larger and well-funded incubators to foster innovation more effectively.”

Johanna Schiele |
Policy Officer EU Innovation Fund (DG CLIMA) | European Commission



“ In many countries, the [innovation] ecosystem is still developing [...] what could enhance [innovation ecosystems] is if we have clear signals from the market coming from government policy targets.”

Sunyoung Suh |
Cleantech Expert | Climate Technologies Innovation Unit, Division of Decarbonization and Sustainable Energy, UNIDO