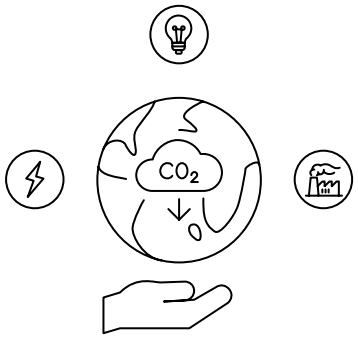
AFRY

Decarbonisation: Time to start adapting

We have seen over thirty years of concerted global policy actions and investment to reduce global carbon emissions. But carbon emissions are inexorably increasing and will continue to do so. In 2023, energy-related emissions exceeded the 40 GtCO2e level, with emissions from the direct use of energy breaching 35 GtCO2e for the first time.

The high risk of the two structural trends driving this increase continuing will make adaptation to increasing CO2 levels and rising temperatures a priority for government and business.



Trend One: Hydrocarbon-based growth in primary energy use is underpinned by increasing demand in the Global South

Energy use is closely linked to better health and living standards

The Global South is increasing its use of thermal energy to address energy poverty and security, rather than focusing on reducing emissions

Consumption of primary energy in the Global South in 2023 accounted for 56% of total energy consumed and grew at twice the global average rate of 2% (World Statistical Review of Energy 2024)

India and China have not committed to 2050 goals and are developing energy systems that include thermal, renewable energy sources (RES), and nuclear

Coal and gas are the cheapest, most accessible, and secure ways to provide reliable and affordable energy in developing countries

According to the WHO, 2.6 billion people use biomass for heating and cooking. Average energy use per person in Africa, South Asia, and Latin America is 30 GJ, compared to almost 230 GJ in North America. Even a small increase in energy use per person in these regions would significantly boost demand for primary energy, which can only be met by thermal sources

Trend Two: Electrification and digitalisation are accelerating in the OECD and offsetting efficiency gains made through efficiency and behavioural change

1

In 2023, electricity demand in North America and Europe slightly decreased by 1% and 2%, respectively (World Statistical Review of Energy 2024)

2

Decarbonization plans assumed that electrification would reduce energy consumption through efficiency, but this contradicts the Jevons' paradox. Experience shows that increased efficiency leads to higher demand (IEA World Energy Outlook 2024)

3

Future reductions in demand will be offset by the growing digital demand from data storage, computing, cloud migration, and AI scaling

4

Data center power demand is expected to grow by 160% by 2030, reaching over 1000 TWh. From 2013 to 2023, Google's electricity use increased nearly sevenfold, and its CO_2 emissions rose from 1.8 $MtCO_2e$ to 14.3 $MtCO_2e$ (Goldman research, Statista, Google ESG reports)

5

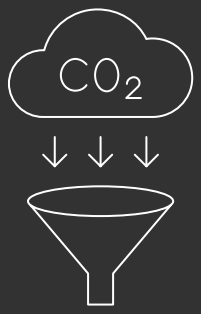
In the US, the retirement of thermal power plants is being delayed and gas generation is planned to ensure system reliability

6

Tech giants aiming for 24/7 green energy are investing in their own secure, carbon-free power solutions, including nuclear, in the US (e.g., Google, Microsoft, Oracle, Amazon)

7

The new US government's industrial policy will increase energy intensity to support the reshoring of energy-intensive manufacturing



Conclusions

1. There is a concrete risk that growth in CO2 emissions from increased energy demand, fulfilled through fossil fuels, outpaces any current emissions reductions measures over the 2050 period
2. The policy impact will logically then not halt the rise in global temperatures in line with Paris objectives
3. Businesses need to consider pragmatic emissions adaptation measures alongside their emissions reduction programmes

What do we mean by emissions adaptation?

Governments and businesses now have enough experience to understand the limits of current emissions reduction methods

Adaptation plans should be based on clear scenarios, impact analysis, and risk assessment, and be integrated into long-term strategic planning

Government policies should include incentives for both emissions reduction and adaptation strategies

Adaptation usually involves small changes to current operations, requiring relatively low effort to help adjust to rising temperatures

Businesses should recognize the limits of their emissions reduction targets and consider investing in adaptation strategies targeting identified risks

---

Examples include:

Agriculture is adjusting its strategies to account for changes in crop cycles and growing seasons

Infrastructure planning is being revised to adapt to more extreme weather patterns

Big tech companies are proactively investing in long-term, reliable energy sources

The shipping industry is shifting to oversupplied LNG to reduce carbon emissions practically and economically

Carbon capture and storage (CCS) is being accelerated in sectors that rely heavily on thermal heat generation

AFRY provides engineering, design, digital and advisory services to accelerate the transition towards a sustainable society.

We are 19,000 devoted experts in industry, energy and infrastructure sectors, creating impact for generations to come. AFRY has Nordic roots with a global reach, net sales of 27 BSEK and is listed on Nasdaq Stockholm.

Making Future

AFRY