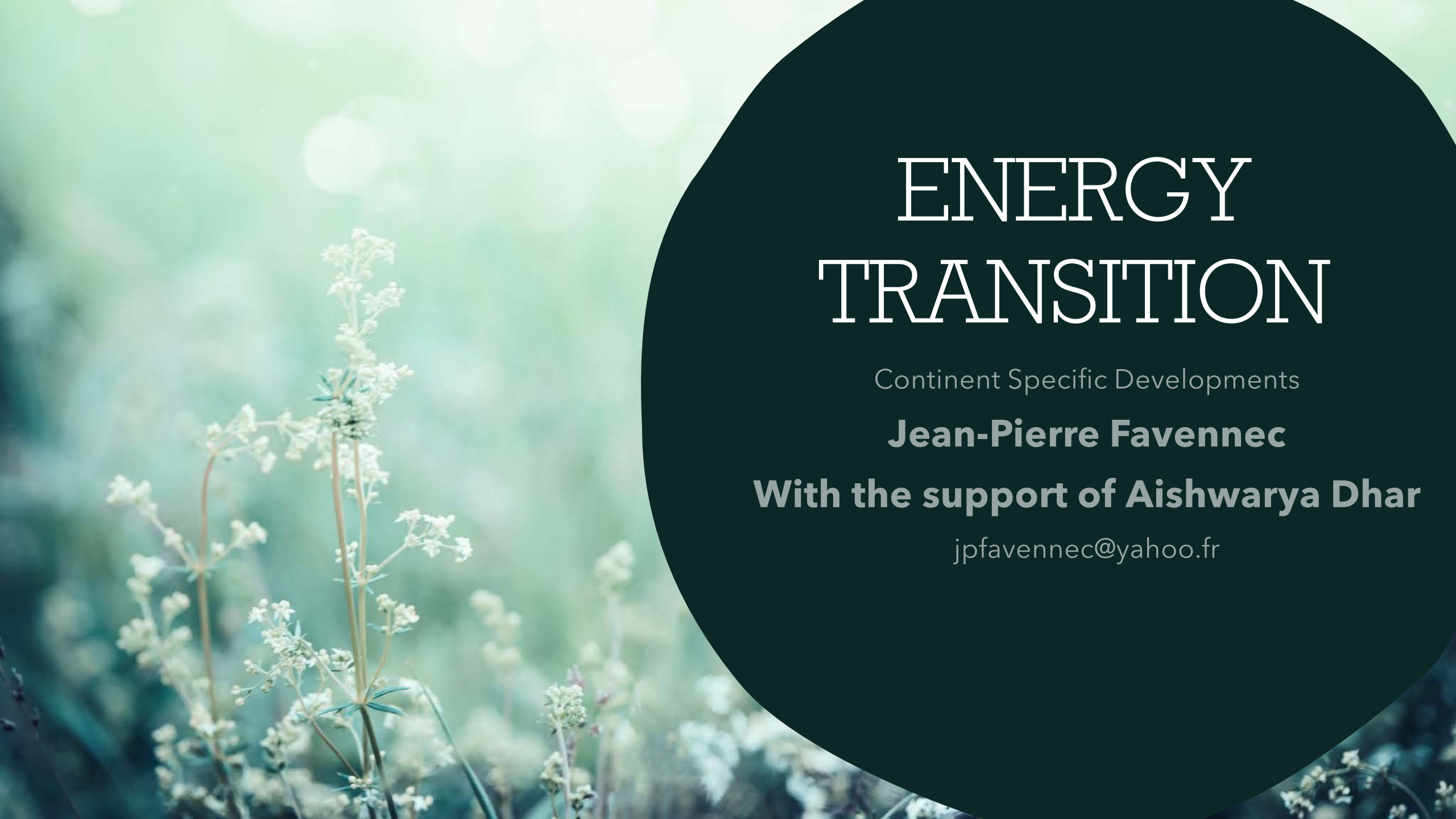

ENERGY TRANSITION

Continent Specific Developments

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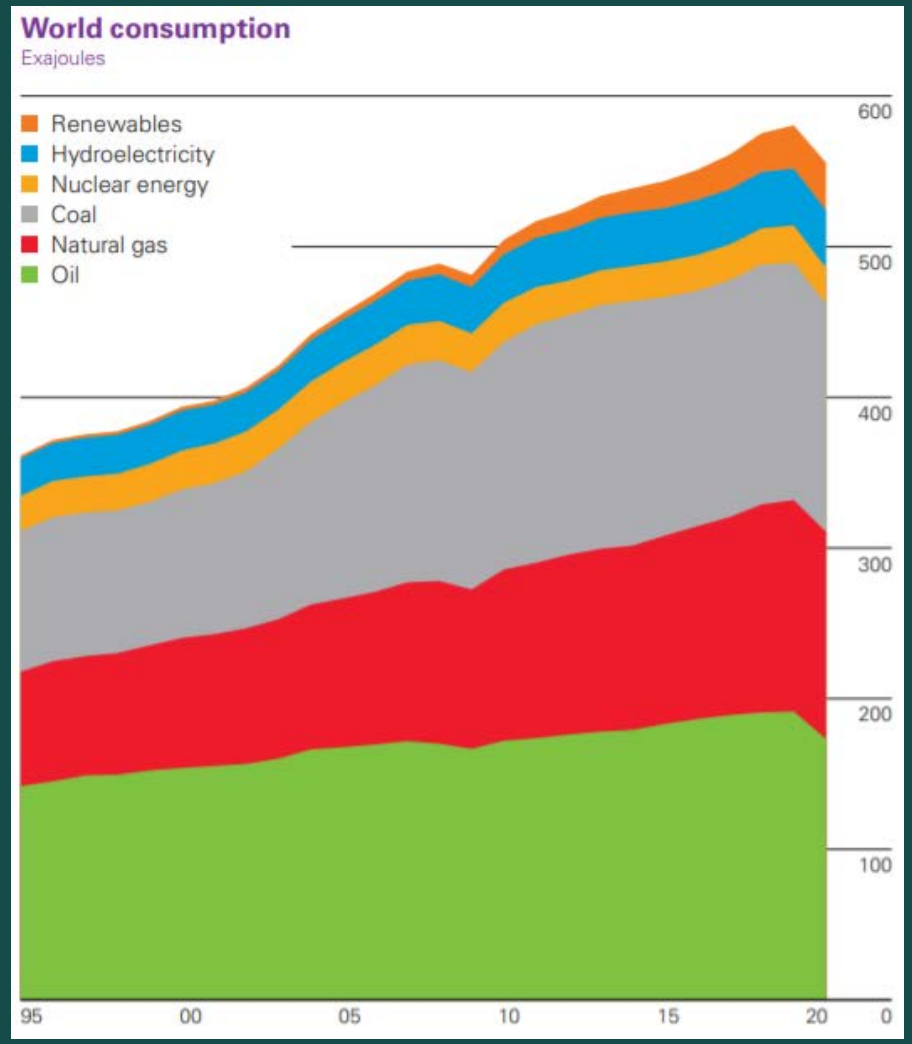
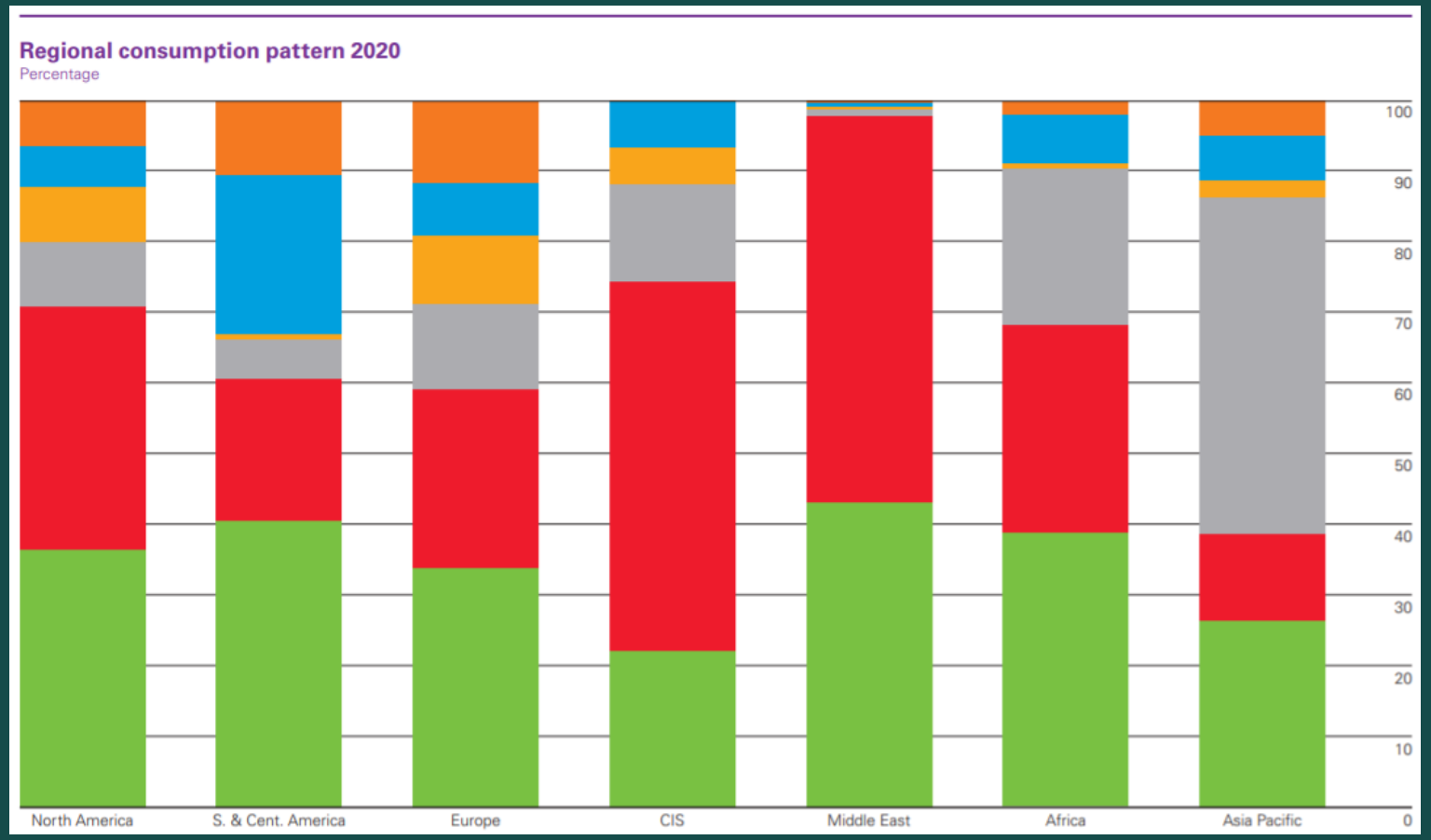
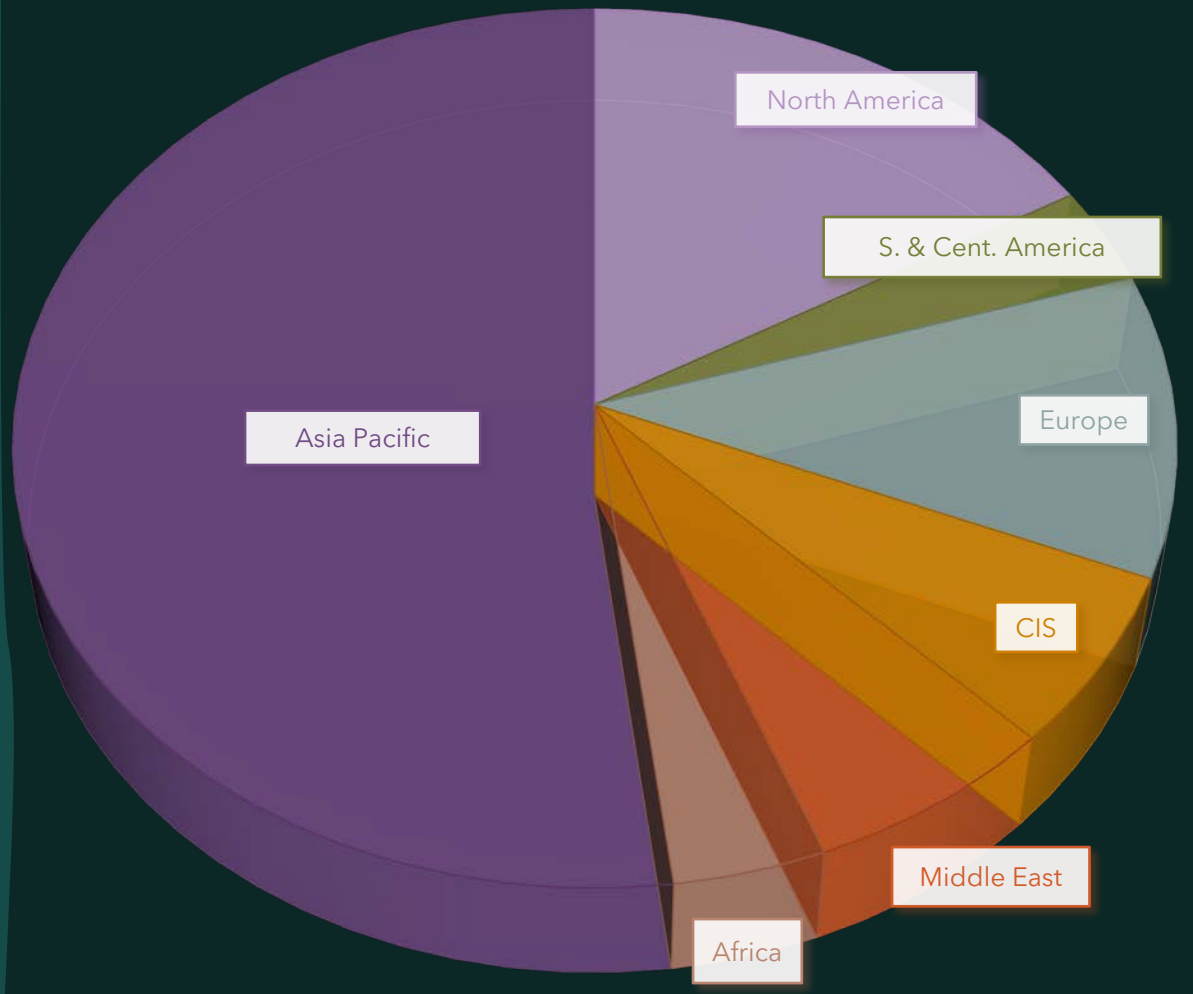
Primary Energy Consumption by Source: BP Stats 2021

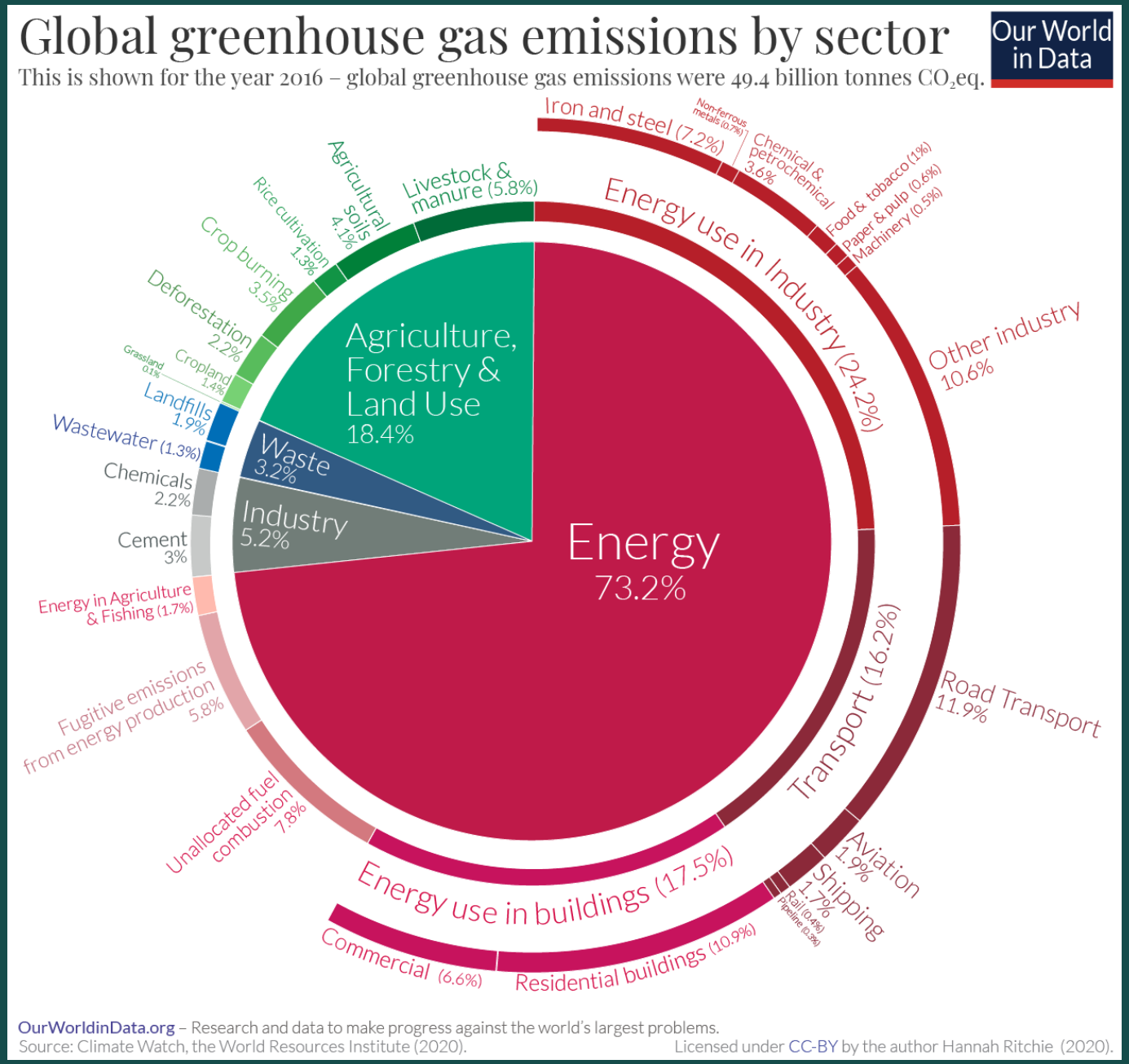


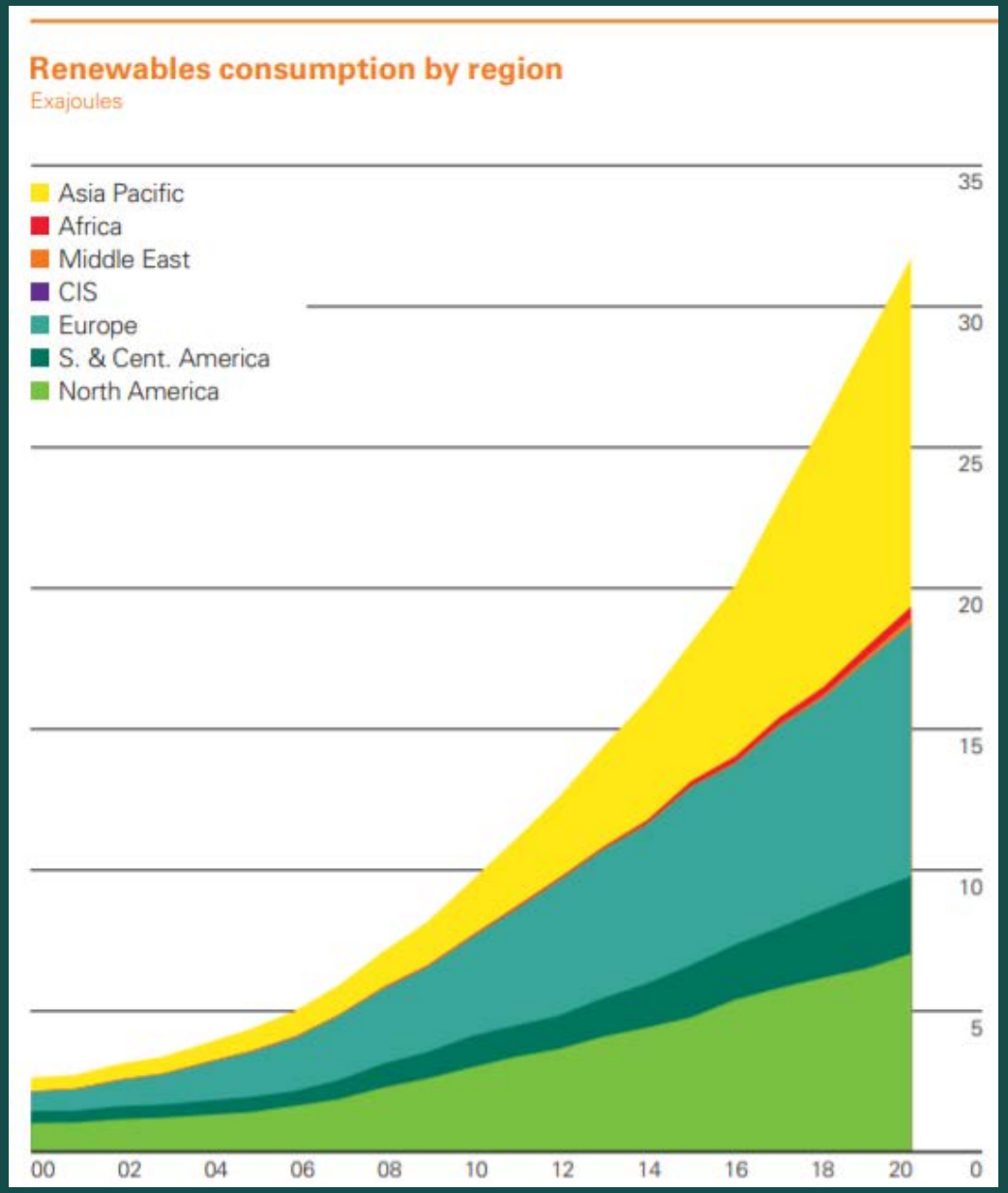


Carbon Emissions By Continent: BP Stats 2021



GHG Emissions By Sector: OurWorldinData





Renewable Consumption by Region- BP Stats 2021

NORTH AMERICA: U.S.A.

- Climate policy and clean energy is extremely politicized where concern over climate change is split between party lines.
- On January 20, 2021, President Biden signs the instrument to bring US back into the Paris Agreement.
- U.S.A's updated NDC sets a goal of reducing emissions by 50-52% based on a 2005 baseline by 2030. Goal clearly cannot be achieved by focusing on coal and power alone, as e.g. transport makes up 30% of US emissions.
- Biden pushing to decarbonize the power sector by 2035 and is directing heads of agencies to stop fossil fuel subsidies ($20 billion/year). According to EIA, share of renewables in the US electricity mix will increase from 21% in 2020 to 42% in 2050
- Biden to deliver $11.4 billion a year in public finance to developing countries to support climate action by 2024
- US tariffs on Chinese solar panels hindering growth of new renewable capacity
- Biden's "Build Back Better Infrastructure" Plan -> Two key pieces of infrastructure legislation on the agenda: $1 trillion Bipartisan Infrastructure Bill and the $3.5 trillion Build Back Better Act, yet to be passed by the House of Representatives (Democrat majority).
- To reach the emissions reduction goal, US oil consumption would need to fall by a third -- very ambitious considering EVs currently make up just 2% of new vehicle sales in the US.
- Administration announced plans on 31st Aug 2021 to open millions of acres for oil and gas exploration (court order).
- Biden remains silent on the issue of ***carbon pricing.***

NORTH AMERICA: CANADA

- Canada has missed every emissions' target it has ever set. Oil and gas industries constitute majority of carbon emissions.
- In July 2021, Canada submitted stronger NDC: aiming to cut carbon emissions by 40-45% over 2005 levels by 2030 and get Canada to net-zero emissions by 2050.
- While stronger than the previous target of 30%, it still falls short of the at least 54% domestic reduction needed to be Paris compatible.
- Fossil fuel subsidies to producers total $3.3 billion annually, which amounts to paying polluters $19/tonne to pollute.
- Existence of National Carbon Tax since 2019 and investment in clean energy research.
- The government also bought the Trans Mountain Oil Pipeline Project to unlock pacific markets for Alberta oil sands for $3.4 billion when the expansion was abandoned by the Texas-based Kinder Morgan- pointing to the contradictory approach of the government when it comes to climate action.
- Extreme vulnerability of indigenous communities to climate change and environmental racism in Canada deeply affect the clean energy transition. High environmental and social costs due to vulnerability.

SOUTH AMERICA

- More than quarter (32%) of South America's primary energy comes from renewables-> twice the global average, out of which hydropower alone constitutes 22%.
- Existence of dynamic renewable energy markets in the region especially in hydropower and biofuels
- It is the single most energy efficient region in the world.
- LAC countries have set a collective target of 70% renewable energy use by 2030, 2x more than EU's target. Pandemic has accelerated renewables-led economic recovery policies in the region.
- Brazil, Mexico and Chile are ranked amongst top ten global renewable energy markets in terms of investment. Other countries like Costa Rica, Uruguay and Paraguay generate virtually all their electricity through renewables.
- Latin America will see an additional 131GW of installed wind capacity and 172GW of new solar capacity by 2050, according to IRENA.
- Clean energy investment needs in the region are estimated at $45 billion per year between 2020 and 2050.
- However, hydropower is becoming less reliable due to changing weather patterns like rain and droughts.
- Energy transition often leads to unequal distribution of costs and benefits in the region, especially for populations dependent on traditional energy infrastructure for livelihood.

EUROPE

- Impressive record of decarbonizing power systems through renewable energy technologies, concentrating policy efforts towards reducing emissions from transport, industry and buildings while supporting energy system integration.
- Sweden, Finland, Latvia, Denmark etc. are on track with meeting 2020 renewable energy targets whereas Spain, France, Germany and Netherlands are not.
- Aims to become the world's first climate-neutral continent by 2050. Yet, EU is not on track to meet its 2030 target to reach 32% of renewable energy in the energy mix (currently at 19%)
- While share of renewables in electricity production reached 32% in 2018, deployment of energy efficiency mechanisms and use of renewables in sectors like transport, buildings and industry have been relatively slow.
- In June 2021 the European Climate Law, which made both the new target, and the goal of reaching climate neutrality by 2050, binding, was adopted.
- "Fit for 55" package launched in July 2021, proposing the emissions reduction target to be set at 55% by 2030, alongside a holistic revision of the EU's climate and energy legislation.
- The package introduces a globally unprecedented **Carbon Border Adjustment Mechanism (CBAM**) for pricing imported carbon and a major overhaul of the **Emissions Trading System (ETS)**
- Reduced capacity to expand renewables after COVID-19 predicted + rebounding CO2 emissions. Many EU member states still do not have a coal phase-out plan by 2030. Other countries are planning to replace coal with natural gas.

CIS

- Economies of the CIS are highly dependent on hydrocarbon revenues, especially Russia. Almost 90% of primary energy consumption in the CIS and Georgia comes from fossil fuels (public health concerns).
- Fossil-fuel consumption subsidies, including those related to electricity generation, remain high in the CIS region, disincentivizing rapid improvements in energy efficiency.
- Globally increasing renewable targets and energy transition towards low-carbon pathways are assumed to be threats to hydrocarbon revenues by Russia.
- 83% power generation in Russia is supplied by fossil fuels. Russia is 4th in primary energy consumption and carbon dioxide emissions in the world.
- Instead of focusing on renewable energy sources, Russia is betting on gas as an energy transition fuel in Europe and Asia. Coal and gas is significantly cheaper in Russia in comparison with electricity from renewables
- Ambitious targets of expanding natural gas production- 750 bcma gas production and 250 bcma of exports by 2035.
- Russian Energy Strategy 2035- aiming at structural diversification, decentralization and digital transformation of the energy infrastructure.
- Russia also aims to diversify exports, increase investment in production of LNG, hydrogen and helium and rapidly modernize its FEC infrastructure.

AFRICA

- Key driver of global energy demand growth and a region with abundant reserves of fossil fuels, solar power and key minerals that will be vital for clean energy transitions worldwide.
- Although Africa produces 2% of global energy-related CO2 emissions, the continent will face massively disproportionate impacts of global climate change, owing to geographical characteristics.
- Energy demand growth in Africa is expected to grow twice as fast as the global average over the next 2 decades.
- The continent is not ready to meet its development needs while providing energy access to all under the current policy framework.
- Africa's Agenda 2063 has ambitious sustainable development goals which can allow Africa to become the first continent to develop its economy primarily by using renewables, natural gas and energy efficiency.
- However, Africa will remain (at least until 2025) the least carbon efficient oil producing frontier with over 30 kilogram CO2 emitted per barrel of oil equivalent produced. Need for more efficiency via electrification, reduced gas flaring and more energy efficient extraction methods.
- Massive solar resources- the richest in the world- can be tapped
- Africa is home to major reserves of rare minerals like cobalt and platinum which are indispensable for clean energy technologies worldwide. (DRC and South Africa)
- Major issues in the next decade: tackling the lack of access to electricity and clean cooking in addition to securing a reliable electricity supply
- Natural gas discoveries can allow natural gas to emerge as the key driver of industrial growth

ASIA-PACIFIC

- Asia Pacific represented 37% of global renewables consumption and 40.9% of global renewable power generation in 2019 out of which 44% accounted for wind energy and 34% solar energy. However, 9% of electricity generation in APAC comes for renewables and coal constitutes a whopping 58% in the power mix, followed by hydroelectricity (14%) and natural gas (11%)
- China was the largest contributor to renewable growth in 2019.
- The most important region in the world in global energy transition due to its large population share and equally large share of industrial production. Rising concerns with respect to air pollution and carbon emissions in the region
- China and India – key drivers of this transition due to rapidly increasing energy demand, population size, carbon emissions and economic growth.
- South East Asia is more conducive for renewable energy expansion due to advanced institutions and competitive energy markets whereas under-developed economies have limited institutional capacity to invest in clean energy transitions
- Other factors like agriculture, forestry and land use ranging from crops, livestock and deforestation constitute 24% of global carbon emissions and it is these aspects that Asian countries could pay attention to in the future
- China's technological advances in renewable energy sector makes it necessary for other countries to invest and cooperate with China in research and development of renewable energy sources, giving China considerable edge in global markets.

ASIA-PACIFIC

- China announced its carbon neutrality pledge in September 2020 followed shortly by Japan and South Korea.
- Electrification will be key to accelerating the transition to renewables, but rising power demand will prolong Asia Pacific's fossil fuel dependence for the next decade at least.
- Japan recently surprised the market with a more ambitious emission reduction target - a 46% cut by 2030 from 2013 levels. Its aggressive plan to reduce both coal and LNG in the generation mix requires immediate action to boost controversial nuclear power from 6% today to 20-22% by 2030.
- Intermittency issues for renewables remain. As a result, fossil fuels will stay dominant and emissions will continue rising in developing countries, unlikely to peak until the late 2040s. Yet, their emission per capita levels will generally remain below developed economies.
- Average battery storage duration in Asia Pacific is projected to increase from 2 hours today to 7-8 hours by 2050, improving grid flexibility in the process.
- 455 million people who lack access to electricity in Asia-Pacific and 1.9 billion people still dependent upon traditional solid fuels for cooking and heating
- The Australian government, on the other hand, has ramped up its "gas-fired recovery" over a green economic recovery, refused to increase its 2030 domestic emissions target, and is not on track to meet its climate targets.

MIDDLE EAST

- Despite its over-dependence on rents from fossil fuels, the Middle East is inclined towards bringing forth a sustainable energy transition due to associated benefits like economic development and diversification, water security, job creation and a healthier balance of trade.
- High volatility of oil prices in the international arena, reinforced by the COVID-19 pandemic that brought the global energy markets to a standstill, have forced the oil dependent nations in this region to try diversifying their economies
- Saudi Arabia and UAE are particularly committed towards increasing the region's stake in renewables to curb climate change. Abu Dhabi has considerably scaled up investment in wind and solar energy.
- The demand for fossil fuels is expected to remain the same, if not more, even if the world is moving towards renewables. Thus, instead of solely expanding wind and solar capacity, the middle eastern countries can invest in other decarbonization technologies like replacing fossil fuel powered desalinating plants with renewable powered ones in addition to investing in hydrogen economy and CCUS to enhance oil recovery.
- Saudi Vision 2030: aimed at partially privatizing Saudi Aramco to generate revenue and decrease the kingdom's dependence on oil exports. Goal to produce 30% of energy from renewables by 2030 incl. nuclear.
- A plan to build the Neom megacity run on 100% renewable energy + a $28 billion renewable energy development program implemented in 2019.
- Ambitious targets for renewables : Pan Arab Clean Energy Initiative aims to reach a combined 80 GW of renewable capacity by 2030
- COVID-19 has led to the diversion of economic resources towards public expenditure and a cut-back in investment projects by state-owned enterprises. Energy transition in the middle east is thus, likely to take a back-seat in the short to medium term.