

Research report for G20 **Economic and Environmental Maximisation of Wind & Solar Energy**

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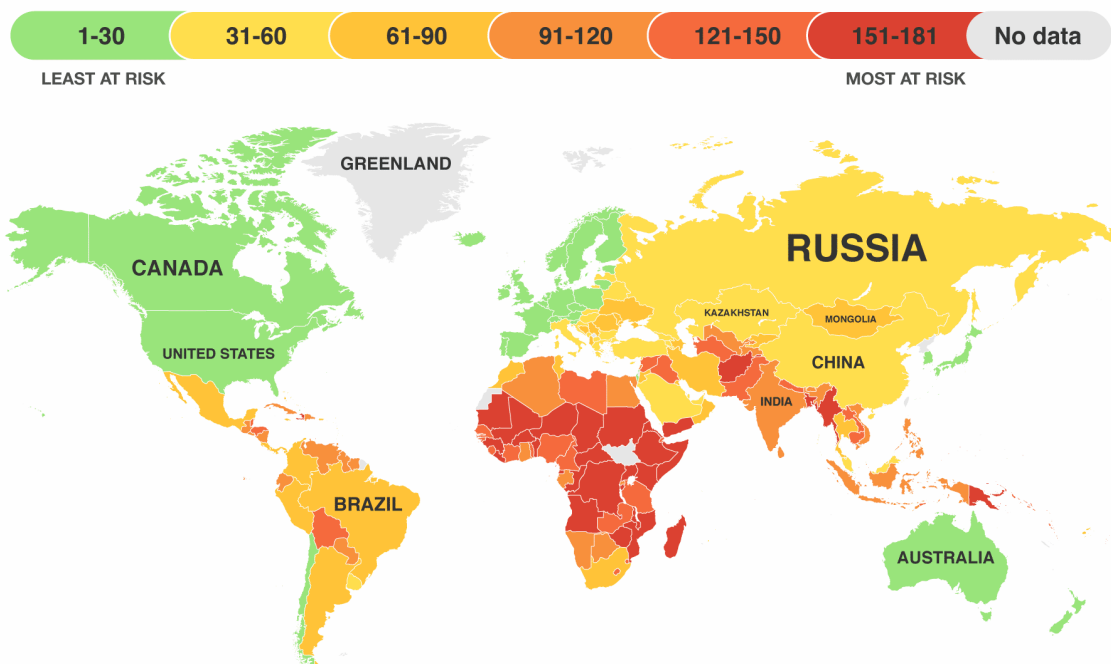
President of G20

17th March 2022

Introduction

40% of the world population lives within 100km of the coast. With sea levels rising and no sign of a decline in the rate at which this occurs, it is evident that strong action is far overdue as almost half the population would lose their residences. Usage of fossil fuels and other non-sustainable energy sources has led humanity into its greatest crisis yet. Although wind and solar energy sources are renewable and sustainable, they quite simply lack the efficiency to replace fossil fuels completely. This is why this topic is being discussed at the conference; to establish whether member states are willing to maximise the usage of these energy sources and what protocols must be established to ensure the conclusion reached is maintained.

WORLD MAP



Key terms

- Renewable - Referring to an energy source which can be produced in the same quantities and speed as it is utilised.
- Sustainable - Referring to an energy source which is able to be continuously used for an extended period of time.
- Wind energy - The process by which wind is used to generate mechanical power or electricity by converting kinetic energy to mechanical, usually using wind turbines.
- Solar energy - Radiation from the Sun capable of producing heat, causing chemical reactions, or generating electricity.
- Fossil fuels - Any of a class of hydrocarbon-containing materials of biological origin occurring within Earth's crust that can be used as a source of energy. Namely coal, oil, and natural gas.
- Global warming - The long-term heating of Earth's climate system observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere
- Climate change - A long-term change in the average weather patterns that have come to define Earth's local, regional and global climates.
- COP26 - Conference Of the Parties, the 197 nations that agreed to a new environmental pact, the United Nations Framework Convention on Climate Change, at a meeting in 1992. The 26th meeting of these parties is known as COP26
- Net zero - Any process which emits the same amount of pollutants as it takes out of the atmosphere.
- Ecosystems A community or group of living organisms that live in and interact with each other in a specific environment.
- CO₂ - Carbon dioxide, a greenhouse gas which has been known to be one of the main causes of global warming.
- Photovoltaic (PV) cell
- Electronic component that generates electricity when exposed to photons, or particles of light



Background information

Solar energy has been used for thousands of years; the Ancient Greeks in the 3rd century B.C. were known to harness solar power with mirrors to light torches for religious ceremonies. These mirrors became a normalised tool referred to as “burning mirrors.” Chinese civilization documented the use of mirrors for the same purpose later in 20 A.D. In the late 1700s and 1800s, researchers and scientists had success using sunlight to power ovens for long voyages. They also harnessed the power of the sun to produce solar-powered steamboats. The date of the invention of the solar panel is disputed, but the modern silicon solar cell was invented by Daryl Chapin, Calvin Fuller, and Gerald Pearson’s creation of the silicon PV cell at Bell Labs in 1954. Many argue that this event marks the true invention of PV technology because it was the first instance of a solar technology that could actually power an electric device for several hours of a day. The first ever silicon solar cell could convert sunlight at four percent efficiency, less than a quarter of what modern cells are capable of.

People used wind energy to propel boats along the Nile River as early as 5,000 BC. By 200 BC, simple wind-powered water pumps were used in China, and windmills with woven-reed blades were grinding grain in Persia and the Middle East. New ways to use wind energy eventually spread around the world. By the 11th century, people in the Middle East were using wind pumps and windmills extensively for food production. Merchants and the Crusaders brought wind technology to Europe. The Dutch developed large wind pumps to drain lakes and marshes in the Rhine River Delta and for food production. Immigrants from Europe eventually took wind energy technology to the Western Hemisphere.

In the 1970s major oil shortages caused the need for different sources of energy to be explored. In 1990, 16 countries generated a total of 3.6 billion kWh of wind energy. In 2019, 127 countries generated a total of 1.42 trillion kWh of wind energy. From 1960 to 2016 efficiency of solar panels has increased from 8% to 34.5%. From 1956 to 2020 the price of solar panels dropped from \$300 per watt to \$0.5 per watt.



Major affiliations involved:

Intergovernmental Panel on Climate Change (IPCC) - The Intergovernmental Panel on Climate Change was established by the United Nations Environment Programme and the World Meteorological Organisation in 1988 to provide the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts.

United Nations Environment Programme (UNEP) - The United Nations Environment Programme (UNEP) was established in 1972, is the voice for the environment within the United Nations system. UNEP acts as a catalyst, advocate, educator and facilitator to promote the wise use and sustainable development of the global environment.

World Meteorological Organisation (WMO) - The World Meteorological Organisation (WMO) originated from the International Meteorological Organisation, which was founded in 1873. Established in 1950, the WMO became the specialised agency of the United Nations in 1951 for meteorology (weather and climate), operational hydrology and related geophysical sciences.

Climate and Health Council - The Climate and Health Council is an international organisation consisting of doctors, nurses and other health professionals who recognise the urgent need to address climate change to protect health. It works towards a world where the impacts of climate change on health are understood and tackled in a way that improves the public's well-being.

Climate and Development Knowledge Network - The Climate and Development Knowledge Network is an alliance of organisations to support decision makers in designing and delivering climate compatible development. It combines research, advisory services and knowledge-sharing in support of locally owned and managed policy processes. It works in partnership with decision-makers in the public, private and non-governmental sectors nationally, regionally and globally.

Timeline of events

- 500 BC - Passive solar energy used in Greek homes
- 200 BC - Coal mining starts in China
- 644 AD - First windmill in recorded history built in Iran
- 1100 - Windmills are introduced in Europe
- 1690 - Due to wood depletion, use of coal becomes generalised in Europe
- 1859 - First oil well drilled in America
- 1868 - First modern solar power plant in Algiers used to heat water to drive a steam engine.
- 1885 - Karl Benz develops the first working motorcar powered by petrol.
- 1973 - Worldwide energy shortages are caused by the oil embargo of key oil-producing countries
- 1974 - Silicon photovoltaic cell for harnessing solar power is developed by Joseph Lindmayer in the USA.
- 2003 - The world's biggest power cut affects more than 50 million people when a fault in a power company in Canada causes a black-out across the eastern USA and Canada.

Relevant UN Treaties and Resolutions

- Paris Agreement: https://unfccc.int/sites/default/files/english_paris_agreement.pdf
- Cop 26 Glasgow Climate Pact: https://unfccc.int/sites/default/files/resource/cop26_auv_2f_cover_decision.pdf
- Kyoto protocol: <https://unfccc.int/resource/docs/convkp/kpeng.pdf>
- Rio convention: <https://www.jus.uio.no/lm/environmental.development.rio.declaration.1992/portrait.a4.pdf>
- Montreal protocol: <https://treaties.un.org/doc/publication/unts/volume%201522/volume-1522-i-26369-english.pdf>

Possible solutions

There have been many attempts to solve this ever growing issue.

Possible solutions include:

1. A limit to what percentage of a country's energy is sourced from fossil fuels and other non-sustainable resources.
2. Improving UN relations through trade and holding more talks surrounding the issue
3. Aiding of countries who rely on fossil fuels and have no possibility of changing energy sources
4. Reinforcement of previous agreements and evaluation of actions taken by UN parties.

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