

Research report

Committee: Ecology and environment

Topic: The Question of Sustainable Energy Production

Introduction:

In an increasingly polluted world, we must search for methods to provide for our wants and needs in a way that does not damage our environment, in order to ensure its use for future generations. In 2013, sustainable energy accounted for 22% of the global mix, up 4.5% from the year before. However currently we are not using enough methods for the energy created to be truly sustainable. In Western countries, particularly beginning at the industrial revolution, there is a heavy reliance on fossil fuels. This reliance has been damaging the planet as it contributes to the greenhouse effect. We must work as a global society to create and utilise the technology needed all over the world.

Definition of key terms:

Sustainable energy - an energy system that serves the needs of the present without compromising the ability of future generations to meet their energy needs.

Renewable energy - energy produced by a renewable resource that is naturally replenished over time.

NB please note the difference between sustainable and renewable. For example, nuclear energy is a renewable but not sustainable resource. It will replenish over time, making it renewable, however it has negative effects on the environment for both now and the future, which means it is not sustainable.

Low-carbon power - processes or technologies that produce power with significantly lower amounts of CO₂ emissions than emitted by conventional fossil fuel power.

Hydroelectricity - electricity produced by hydropower, the power derived from the energy of falling or fast-running water.

Geothermal energy - energy produced through the thermal energy produced and stored in the earth.

Energy storage - the capture of energy produced at one time for use at a later time.

Biofuel - a fuel derived from living matter.

Green building - both the structure and the application of processes that are environmentally responsible and resource-efficient throughout a building's life cycle: from planning to design, construction, operation, maintenance, renovation and demolition.

MTOE - million tonnes of oil equivalent.

TWh - terawatt hours, a unit used to measure electricity in large amounts eg globally.

Contextual information:

In recent years, searching for cleaner sustainable methods for our energy needs has become crucial. In a developing world, our energy needs increase every day; in 2008, consumption was 132000 TWh, by 2012, this had increased to 158000 TWh annually. However, as this energy is crucial for day-to-day life, we must search for ways to preserve this for future generations. Currently, the main producer of energy is fossil fuels. Fossil fuels are a non-renewable source, and so are not a sustainable method for energy production. Failing to find a sustainable energy source suitable for all will hinder development, increase inequality and is contributing greatly to climate change, caused by the greenhouse effect. The greenhouse effect is the trapping of the sun's heat in the earth's atmosphere. The warmth is trapped in our atmosphere by the gases such as CO₂ or SO₂. These are some of the gases created through the use of fossil fuels. This extra warmth from the sun is stored in the atmosphere. This is contributing to climate change.

From 1990 to 2008, the average energy per person increased by 10% while the population increased by over 27%. This high energy increase, combined with the devastating effect that it could have on our planet, means we need to work to find a realistic solution to methods for creating sustainable energy. There are next to no issues from countries (other than unavoidable, such as being limited by funding or geography) as climate change will affect all countries so all countries must work together to be as sustainable as possible.

Major countries and organisations involved:

Intergovernmental Panel on Climate Change (IPCC) - an intergovernmental body of the United Nations, established in 1998, which produces reports supporting UNFCCC. It is an internationally accepted authority on climate change.

Renewable Energy Policy Network for the 21st Century (REN21) - aim to facilitate knowledge exchange, policy development and joint action by bringing together governments, non-governmental organisations, research and academic

institutions, international organisations and industry. They educate the public as to the individual things they can do and create research reports to aid countries.

International Network for Sustainable Energy (INFORSE) - operates in different regions, leading to several groups: INFORSE-Europe etc. They are networks between governments and NGOs and work to develop solutions and scenarios to help countries move to 100% renewable energy with factor four energy efficiency by 2050.

Sustainable Energy for All (SEforALL) - an international organisation set up by the then Secretary-General of the UN, Ban Ki-moon, to help mobilise achievement of universal clean energy access, set out by three goals:

EKOenergy - an ecolabel given to electricity. It is a non-for-profit initiative made by the EKOenergy network, a group of environmental NGOs from over 30 countries. It is the only international ecolabel for electricity. There are five criteria to meet to use the label: consumer information, sustainability, climate, tracking of electricity and auditing.

International Energy Agency (IEA) - an intergovernmental organisation which advises its member states as to the '3Es of energy policy:' energy security, economic development and environmental protection. They have been criticised for underestimating the role of renewable energy sources in future energy systems.

Japan - pre 2011, Japan relied on nuclear energy to provide up to 30% of its power. After the Fukushima disaster, the government decided to close down all 50 nuclear reactors and move to fossil fuels. Since 2015, 4 reactors have re-opened however the public remains strongly opposed to their use. Currently about 10% of energy produced in Japan is from renewable resources, down from 33% in 1950. In July 2018, the government pledged to increase renewable energy sources to 24% by 2030.

Iceland - in 2015, over 99% of Iceland's energy came from renewable sources, with 73% hydropower and 27% geothermal power. Its unique geology means it has an advantage when it comes to producing both hydropower and geothermal energy, and so allowing it to become the world's largest green energy producer per capita at 55000 KWh per person per year.

Sweden - in 2014, just over 50% of energy was from sustainable sources, the highest out of any EU country. The government set a target of 100% sustainable energy production by 2040. Hydropower, wind and solar are the three main types of renewable sources used.

Germany - intends to eliminate use of nuclear power by 2022. In 2016, renewables were at almost 30%. There are also specific examples of sustainability projects in Germany, such as the Vauban district, Freiburg, where local government encourages residents to use public transport, not own a car or use renewable energy sources through rewards, such as free football season passes.

Timeline of events:

1896 - Physicist Svante Arrhenius calculated the first estimates as to how CO₂ could increase the Earth's surface temperature, creating the greenhouse effect.

1938 - Otto Hahn discovered the process of nuclear fission to produce nuclear energy, which won him the 1954 Chemistry Nobel Prize.

25 April 1986 - a level 7 nuclear disaster occurred at Chernobyl power plant, Ukraine, one of only two events to have reached a level 7. The disaster caused 31 direct deaths and 15 indirect deaths. This contaminated 100000km² of land, killing 4km² of forest and killing many animals. The disaster cost Ukraine over \$235 billion.

21 March 1994 - UNFCCC entered into force in 197 different states.

17 November 2007 - IPCC concludes climate change is happening and is mostly caused by humans.

11 March 2011 - the Fukushima Daiichi power plant disaster occurred, the second of only two nuclear disasters ever to occur. The power plant was destroyed by the tsunami affecting the Tohoku region. After this disaster, Japan closed down all 50 of its nuclear reactors.

2012 - International Year of Sustainable Energy for All. This was set up to demonstrate the importance of sustainable energy in achieving global development and inequality.

25 September 2015 - adoption of the UN Sustainable Development Goals by all 193 countries in the UN, particularly noting goal seven.

12 December 2015 - Paris Agreement adopted by consensus by 195 countries.

Relevant UN treaties and events:

- **United Nations Environment Programme (UNEP)** - an agency of the UN that coordinates its efforts to assist developing countries to implement environmentally sound policies and practices. Between 1975 and 1995 along with UNESCO they led an environmental education programme, which gave practical guidance explaining how to mobilise education for environmental awareness. They created 2012 - The International Year of Sustainable Energy for All.
- **United Nations Conference on Environment and Development (UNCED)** - a conference held in Rio de Janeiro in 1992, searching to find alternative sources of energy to replace fossil fuels, amongst other issues. This conference led to the creation of the Paris Agreement.

- **United Nations Framework Convention on Climate Change (UNFCCC)** - international environment treaty, ratified by all member states and some others (197 states in total) which set out the goal of 'stabilising greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.'
- **Paris Agreement** - a subsection of the UNFCCC, dealing with greenhouse gas emissions mitigation, adaptation and finance, due to start in 2020. The agreement's long term goal is to keep the increase in global average temperature well below 2°C below pre-industrial levels and to limit the increase to 1.5°C.
- **UN Sustainable Development Goals** - a list of 17 goals set out by the UN General Assembly in 2015, with a target of achieving the goals by 2030. Goal 7 is to 'ensure access to affordable, reliable, sustainable and modern energy for all.'

Possible solutions:

Finding a world-wide solution is difficult as some countries are more suitable for producing certain kinds of energy than others. For example, countries nearer the equator are going to be more suitable than countries far away when considering solar power. Likewise, many countries are not in a position where they are wealthy enough to look to providing renewable energy for their residents. A solution to this issue may involve some countries more adapted - such as Iceland, for geothermal energy - producing energy which shall be transported to other countries which aren't as geographically suitable and/or could not afford the technology. A possibility for a solution for the issue of some countries being able to afford this technology would be a fund; this fund could be paid into by richer countries and a sub-committee could be set up and it is at their discretion that the funds are given to governments to aid the purchase of sustainable energy technologies.

Bibliography:

UN:

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<https://www.un.org/sustainabledevelopment/sustainable-development-goals/>

<https://www.unenvironment.org/>

<https://www.ipcc.ch/>

General knowledge:

<https://ourworldindata.org/energy-production-and-changing-energy-sources>

https://en.wikipedia.org/wiki/Sustainable_energy#History

Other groups mentioned:

<https://www.iea.org/>

<http://www.inforse.org/>