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networks

Facilitating the Development of UTEs to Fight Against Energy Poverty

Geothermal-DHC session

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Outline

What is Energy Poverty?

Fossil Fuels and Energy Poverty Relationship

Fossil Fuel Consumption Statistics in the World

The Role of Fossil Fuel Companies on Exacerbating Injustice during the Energy Crisis

The Importance of UTEs to Alleviate Energy Poverty

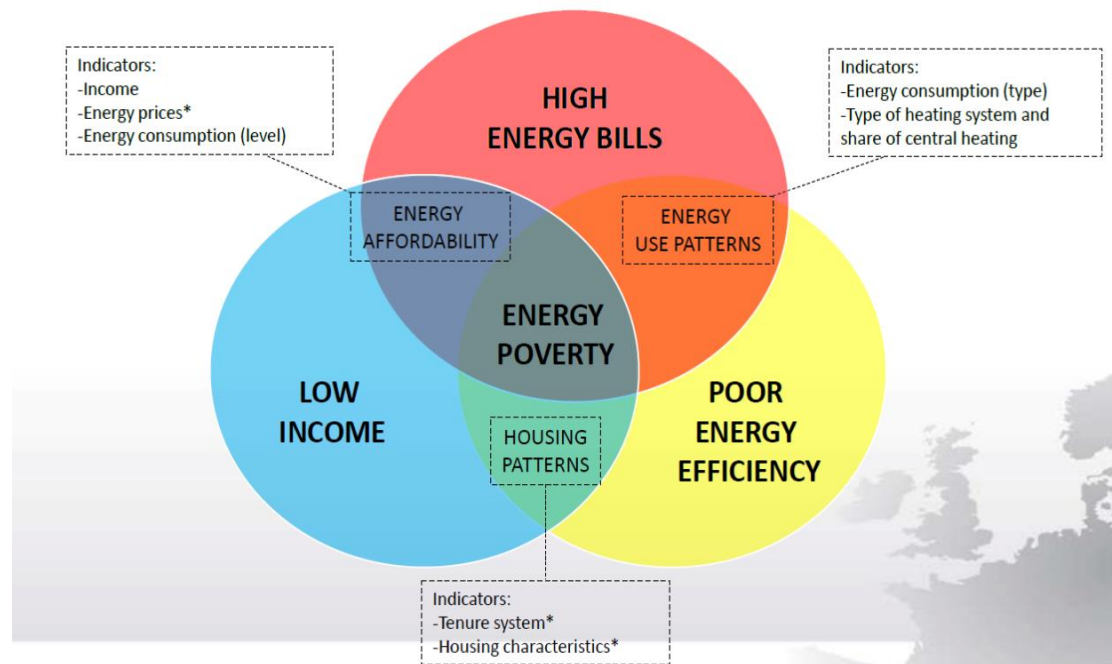
Policy Recommendations

WHAT IS ENERGY POVERTY?

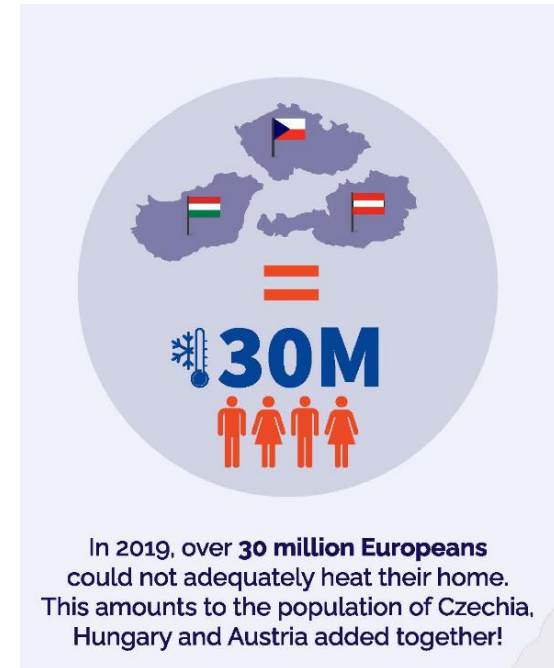
According to the World Economic Forum (2010), energy poverty occurs when there is **no access to sustainable modern energy services and products**. However, sustainability is only one side of the problem:

Energy poverty mainly occurs when there is no access to adequate, affordable, reliable, quality, safe and environmentally sound energy services to support economic and social development (habitat.org, 2022).

WHAT IS ENERGY POVERTY?



Source: EnR, 2017



Source: Jacques Delors Institute 2021

Energy Poverty: A problem waiting to be solved all over the World

Fossil Fuels and Energy Poverty Relationship

Fossil fuels were historically the sole way for those in poverty to get access to modern energy services.

Despite the fact that there are now alternatives, many people who live in poverty still utilize fossil fuels.

We must make sure that sustainable energy alternatives to oil and gas are accessible to people living in poverty in order to achieve universal energy access and keep the average world temperature rise to 1.5°C (odi.org, Halkos and Gkampoura, 2023).



Source: odi.org

Fossil Fuel Consumption Statistics

Table 1. Fossil fuel consumption worldwide from 1965 to 2020

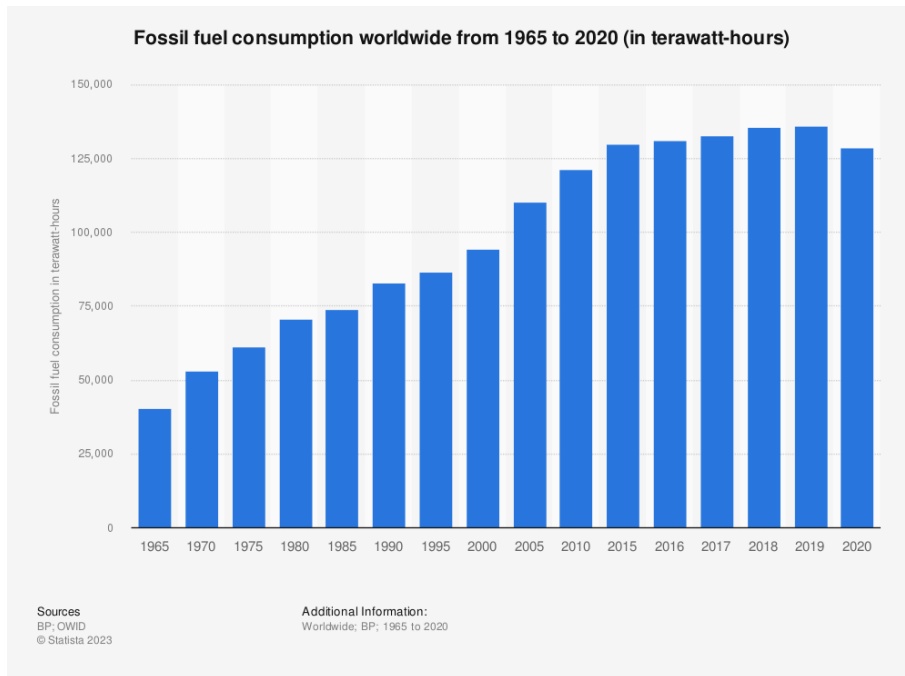
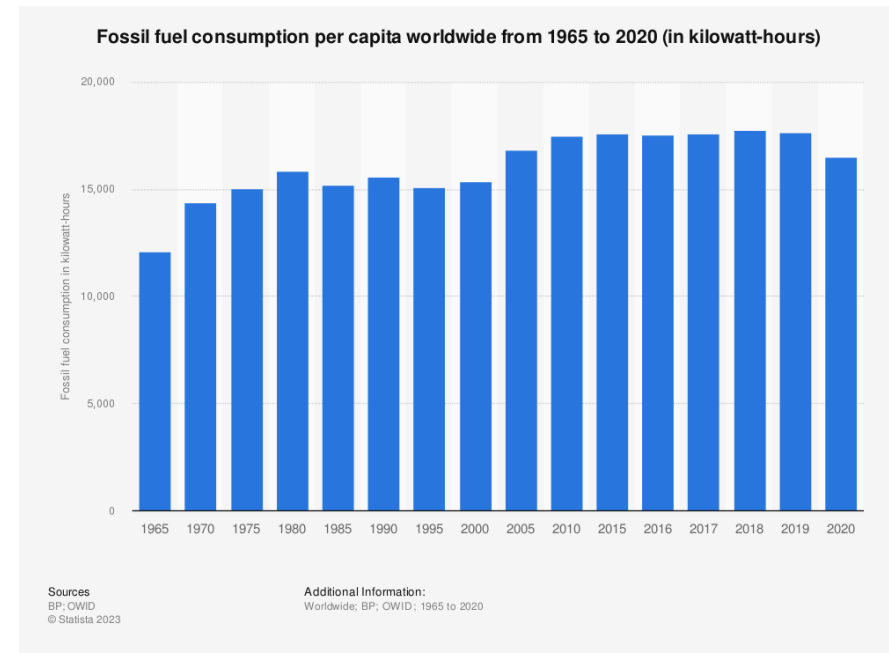


Table 2. Fossil fuel consumption per capita worldwide from 1965 to 2020



Source: Statista

The Role of Fossil Fuel Companies on Exacerbating Injustice during the Energy Crisis

- ▶ Energy suppliers and fossil fuel businesses actually profit from high inflation, giving them record profits, while millions of consumers suffer from rising energy prices and struggle to make ends meet.
- ▶ Customers with low consumption ultimately pay substantially higher per-unit pricing as a result of tariff arrangements.
- ▶ Prepayment meters and disconnections trap people in a cycle of poverty.
- ▶ Those who are already at risk for health problems are unable to heat their homes effectively.
- ▶ **Source:** Greenpeace.

Environmental Justice Impacts:

Fossil fuel companies are directly responsible for **over 600** documented cases of **human rights violations** due to environmental injustice worldwide.

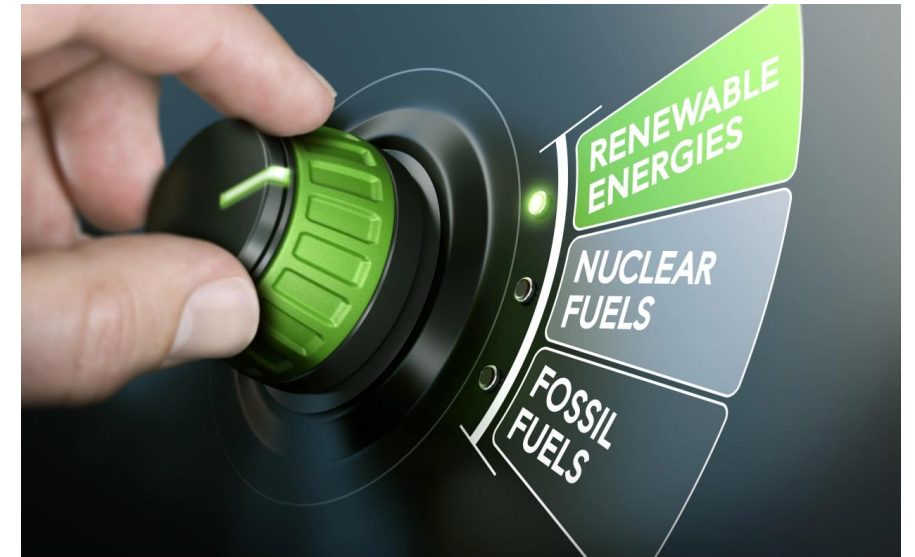
- ejatlas.org



The Role of Fossil Fuels on Energy (In)efficiency



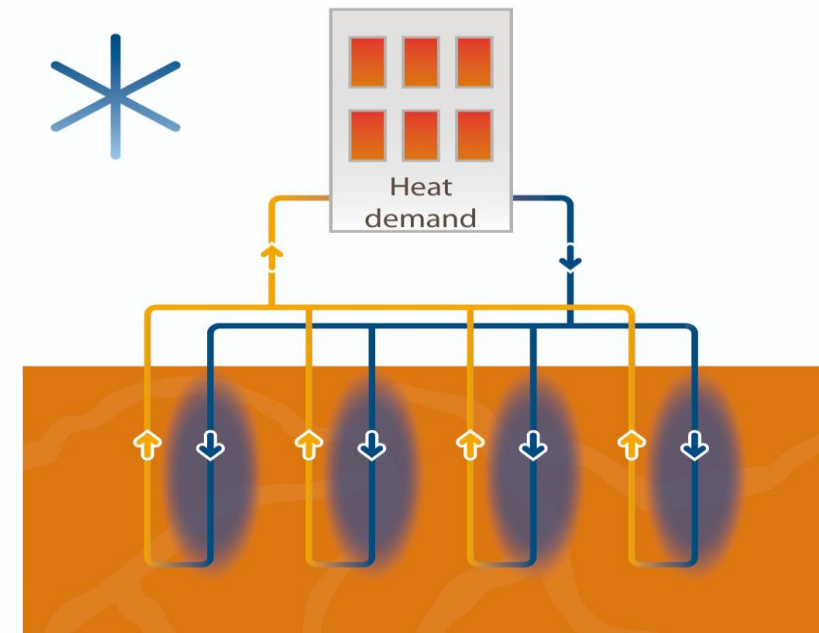
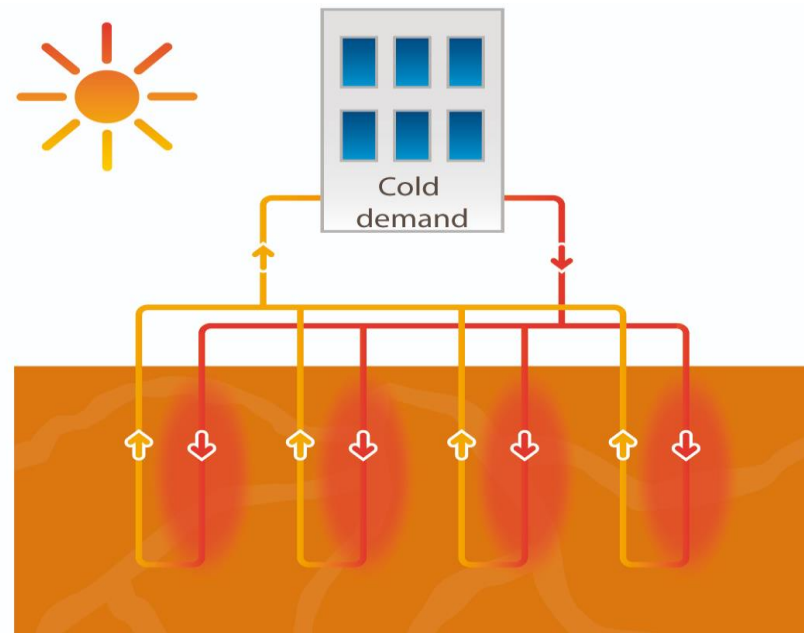
Source: <http://hinkhousescience.weebly.com/fossil-fuels-mini-unit.html>



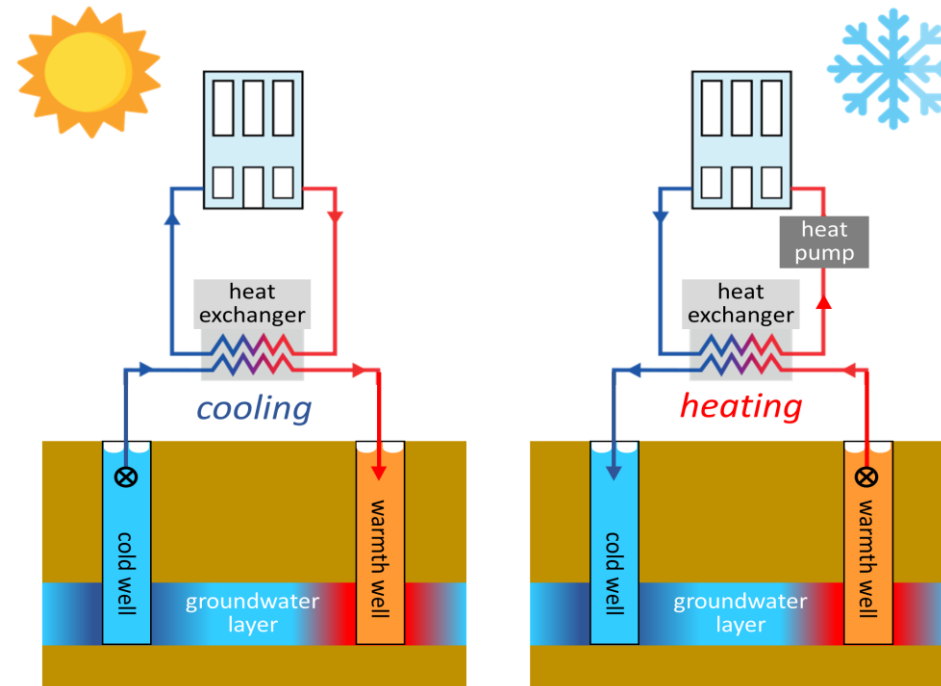
Source: <https://www.fortuneindia.com/macro/net-zero-targets-may-fail-unless-energy-efficiency-improves-danfoss/110495>

So, What could be the Solution?: The Importance of UTEs to Alleviate Energy Poverty

- ▶ The answer of this question could be the «underground thermal energy storage systems».
- ▶ Energy storage is a crucial piece of technology for both energy efficiency and effective, widespread use of renewable energy.
- ▶ By storing excess energy during times of low demand for later extraction during times of high need, it effectively tackles the inherent weakness of renewable energy, which is an unstable energy source.

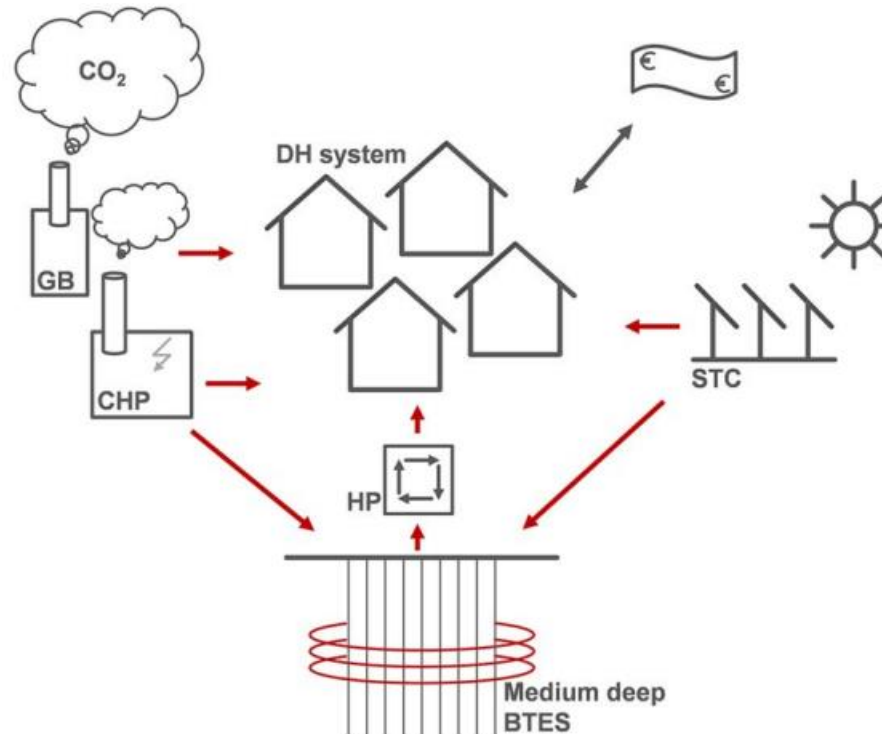


Aquifer Thermal Energy Storage (Open System) as a Type of Underground Thermal Energy Storage



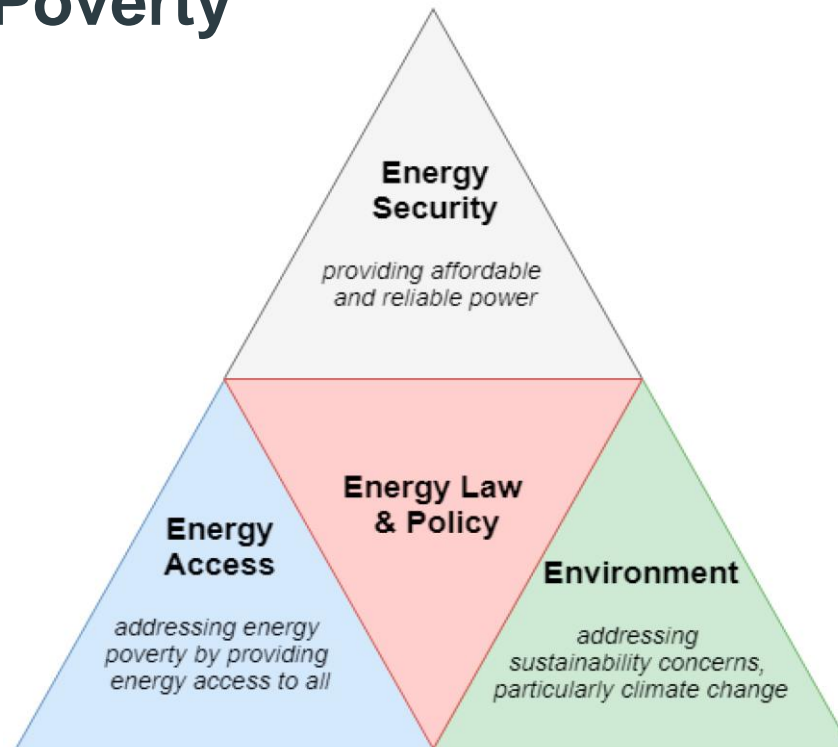
Source: Wageningen University & Research(2023).

Borehole Thermal Energy Storage in District Heating Systems as a Solution to Energy Poverty



Source: Welsch et al., 2018

Underground Thermal Energy Storage Systems as a Solution to Energy Poverty



Source: Setyowati (2020)

Policy Recommendations

- Possible policy recommendations could be:
 1. Taxing fossil fuels for CO₂ emissions to make this new technology more profitable
 2. Providing targeted financial assistance for test and pilot initiatives of UTES
 3. Streamlining the permitting process for underground energy storage projects since it can be lengthy and complex
 4. Developing standards and regulations to ensure the safety and reliability of these systems
 5. Encouraging research & development to advance UTES (funding for research institutions, collaboration between industry and academia, etc.)
 6. Supporting public education and outreach to increase awareness and understanding of underground energy storage systems

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