SUSTAINABILITY

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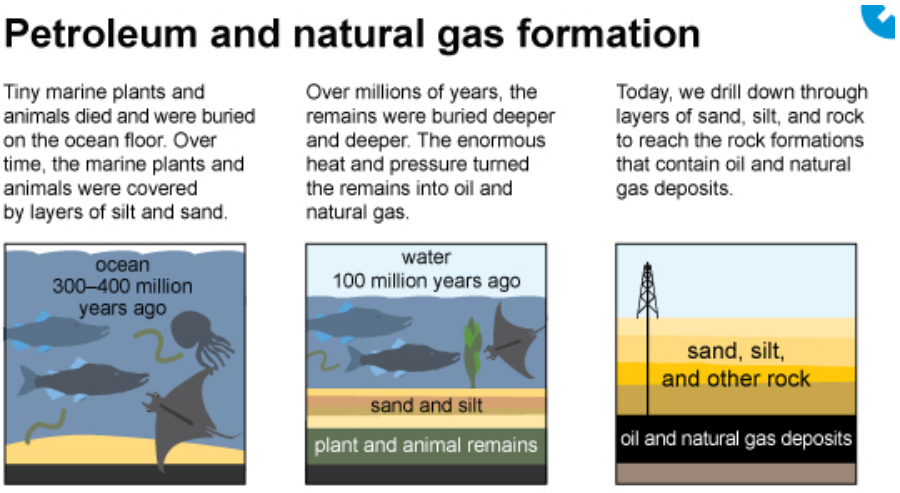
TASi MEASUREMENT

NEWS

The 28th Conference of the Parties (COP28), a United Nations climate change conference, will start on November 30th. More than 70,000 delegates from around the world will meet to share results in the first-ever global stocktake. The stocktake will 'take inventory' of the member countries' current climate progress. This first-ever global 'report-card' will help policymakers and stakeholder affect future climate action.

ENERGY DEMANDS: FOSSIL FUELS

Goal 7 of the United Nation's 2015 **Sustainable Development Goals (SDGs)** is to "ensure access to affordable. Reliable, sustainable, and modern energy for all". Energy demand is growing worldwide due to increasing population and rising living standards. There is a growing demand for heating, cooling, lighting, and connectivity. We are gradually building a different energy system as technology for batteries, wind, solar, and other renewable energies improve, and costs decrease. Most energy today comes from **fossil fuels**, a **non-renewable** energy source. Fossil fuels may eventually be replenished, but regeneration takes hundreds of millions of years, which is irrelevant to human civilization. This means this resource has a finite supply; it is no longer available once it is gone. As the name implies, these fuels are fossilized remains of ancient organisms. 95% of the world's petroleum came not from giant land animals (dinosaurs) but from microscopic marine organisms. Today's three primary forms of fossil fuels are oil, natural gas, and coal. Each variety was formed at different depths, pressures, temperatures, and geographies.



Source: Adapted from National Energy Education Development Project (public domain)

USES AND PROBLEMS WITH FOSSIL FUELS

Petroleum forms the basis of contemporary society. It is difficult to find any non-metal object or plastic product that does not have a petroleum component. Most synthetic chemicals used in agriculture and manufacturing come from petroleum products. Fossil fuels are used for transportation, electricity generation, industry, and buildings. The machinery used to grow almost all the food in the developed world is powered by petroleum. Extensive transportation systems are required to move the fuels, and about 2.2 million miles of pipelines exist between wells, refineries, storage facilities, and end users.

Numerous environmental problems are associated with burning, extracting, and processing fossil fuels. Burning coal emits mercury, generates SOx and NOx that result in smog and acid rain, and leaves behind coal ash contaminated with toxic heavy metals that accumulate in landfills and holding ponds. The massive quantities of toxic waste generated during these processes are only sometimes contained. Spills and carbon emissions also come from pipeline accidents and refining. The Deepwater Horizon drilling platform incident in the Gulf of Mexico resulted in the deaths of thousands of creatures. Additional harm occurs from the chemicals used to clean oil spills. However, the most dangerous byproduct of fossil fuels is the heat-trapping **Greenhouse Gases** emitted during combustion. We like fossil fuels because of their cheap energy. Historically, planners who designed road systems for a culture where every person had an automobile instead of public transportation and homes in the suburbs far from town did not know of the harmful pollution fossil fuels caused. These luxuries come from a time when gasoline was cheap. The world currently consumes 4 barrels of oil for every 1 barrel discovered, and eventually, we will run out.

ALTERNATIVE ENERGY

Alternative energy is a term used to describe a range of alternatives to fossil fuels. Most alternative energy strategies use energy from **Renewable** resources such as sunlight, wind, waves, geothermal heat, and biomass. Government subsidies have proven essential to mainstreaming alternative energy.

- The most widely recognized alternative energy is **photovoltaic (PV) cells** or **solar energy**. Solar cells are semiconductors that convert sunlight to DC electricity. Individual solar cells produce about half a volt each. Therefore, solar panels and arrays are constructed to gather more power. Energy from sunlight is free, but generating electricity from sunlight is not free. However, light can also be harnessed via **solar thermal energy**. This method has become popular in new buildings for space heating and for heating industrial water.
- Building a solar system does use chemicals during manufacturing, and rare minor metals such as iridium and gallium must be mined, often in toxic and poor working conditions. The long-term supply of these resources is uncertain. The orientation of solar panels must also be considered to maximize efficiency. In the Northern Hemisphere, the panels must be tilted towards the South, and visa versa.
- Solar and Wind are intermittent. Hence, storage is a necessary element in renewable energy systems. Most energy storage in the world is pumped **hydroelectric power**. When the power supply exceeds demand, water is pumped to the higher reservoir for storage. When demand exceeds supply, water is released through a turbine to generate electricity. Compared to a coal power plant, which is 33% efficient, hydro is about 90% efficient. The most significant drawback of hydro is the damming process, which destroys local ecosystems.
- **Geothermal** power harnesses the earth's internal temperature to generate heat or electricity. The heat is used the same way coal and nuclear reactors are used to turn steam turbines and drive power generation. In enhanced geothermal systems, deep wells are dug, and water is pumped through the hot rocks below and then returned to the surface as steam.
- Many manufacturers use large amounts of power and release significant waste heat. In addition, about two-thirds of the energy produced by power plants is discarded as waste heat. **Combined heat and power (cogeneration)** have both resources in the same facility and are used extensively in Europe.
- **Biomass** consists of plants or plant waste that can be converted into energy via combustion or converted into a gas or liquid fuel. Examples include wood waste from sawmills, agricultural byproducts, or municipal solid waste. Burning biomass has trade-offs: residual chemicals may be released as toxic air pollution, requiring burning fossil fuels. However, experts consider biomass burning carbon neutral because most of the material burned is from the recent carbon cycle.
- **Wind** as energy has been used for almost 4,000 years. Today, modern wind turbines are 200-300 feet tall and blades 50-100 feet long. Within the turbines rests a generator the size of a large truck called a nacelle. The taller the tower, the greater the energy generation.
- **Hydrogen, tidal energy, wave energy,** and **landfill gas** are other emerging alternative energy technologies.

If you are interested in learning more or have thoughts about how we could be doing better, please get in touch with me.

All responses will be kept confidential.

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FINAL THOUGHTS

The global transition to renewable energy is a pivotal response to the escalating challenges of climate change and environmental degradation. As societies increasingly recognize the finite nature of fossil fuels and their detrimental impact on the planet, a profound shift towards sustainable alternatives has gained momentum. Renewable energy sources, such as solar, wind, hydropower, and geothermal, are at the forefront of this transformation. Their inherent eco-friendly attributes contribute to reduced greenhouse gas emissions, mitigating the adverse effects of climate change. The transition promises cleaner air and water and fosters technological innovation, job creation, and energy independence. Governments, industries, and individuals are pivotal in promoting this transition for a greener, more sustainable future.