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GLOBAL SUPPLY OF ENERGY

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1 Introduction

- Energy is important for all human activities, and without energy life will be very difficult.
- Industrial civilization, economic growth and the life styles of the developed world during the past 100 years have been dependent on energy.
- Therefore, ensuring that everyone has sufficient access to energy is a big challenge for the global community.

- So, it is very important to understand how much energy we need now and in the future, how much energy we already have, and what we should do to fill the gap between what we have and what we need.
- In other words we need to study the global supply and demand for energy.
- In this class we will focus on energy supply by looking at the global energy production and marketing.
- But we must not forget that our global energy systems also have important environmental impacts. The more energy we consume, the more problems we create to our present and future generations.

2 Energy Sources

- The energy we use to support all human activities comes from a variety of sources. These sources are divided in two types:
- Renewable energy, which is energy that is generated from natural resources such as the sun, water, and wind.
- These energy sources are called “renewable” because they continue generating energy all the time.
- Non-renewable energy, which is energy that comes from resources that will run out like coal, natural gas, and petroleum.
- The meaning of “run out” is that these resources stop providing us with energy because their quantities (or reserves) are limited.
- Now let us look more closely at the global energy production (or energy supply) by different sources.

3 Energy production by source

- Historical and current energy systems are dominated by non-renewable energy, which is also called fossil fuels (coal, oil and gas).
- Let us first take a look at how global energy production- both in terms of quantity and source- has changed over the years.
- In 1800 nearly all of the world's energy was produced from biomass (burning wood and other organic matter).

- At that time, the world was using a small amount of coal in industry and transport.
- This period witnessed the Industrial Revolution, which was the transition to new manufacturing processes in Europe and the United States in the period from 1760 to 1840.
- This transition included going from hand production methods to machines, new chemical manufacturing and iron production processes, the increasing use of steam power and water power, the development of machine tools and the rise of the mechanized factory system.

- Oil production began around 1870, followed by natural gas and hydroelectricity.
- By 1900, the world energy production was about 50% coal and 50% biomass fuel (energy) including oil and gas.
- By the mid-20th century oil production was up to around 20% of the total energy that the world used.
- By 1960 the world had moved into nuclear electricity production.
- Between 1980 and the 1990s renewable energies production started.

- The chart below shows the different sources of energy the world currently produces.

- Oil 33%
- Coal 27%
- Gas 21%
- Solar and wind 11%
- Nuclear 6%
- Hydropower 2%

4 Worldwide energy suppliers

- Worldwide energy supply is the global production and preparation of fuel, generation of electricity, and energy transport.
- Energy supply is a huge and important activity in the world economy today.
- More than 10% of the world income is spent on energy.
- Of all energy that is produced in the world, 80% is fossil energy. Half of that (40%) is produced by China, the United States and the Arab Gulf states.

- The Gulf States and Norway export most of their production to countries where energy production is insufficient like some European countries and Japan.
- During the past 20 or 30 years, non-renewable energy production increased slowly as a result of new oil and gas discoveries in many countries.
- The production of non-renewable energies like solar and wind energy continued to grow by more than 20% per year during the same period.
- In the Gulf States Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the Arab Emirates produce most.
- A small part comes from Bahrain, Jordan, Lebanon, Syria and Yemen.

- The top producers in Africa are Nigeria, S-Africa, Algeria and Angola.
- In Europe, France, Germany, Poland and Netherlands produce most.
- The chart below shows the top oil producers.
- It shows that Saudi Arabia is the biggest oil producers with nearly 10 million barrels of oil per day.

5 Energy Reserves

- Reserve is something that is saved for future use.
- While a lot of energy is produced every day, there are still a lot of energy reserves that are still hidden in the earth which have not yet been produced (extracted).
- The Middle has the biggest oil reserves in the world with more than 800 trillion of barrels.
- Saudi Arabia alone has more than 16% of the total global reserves of oil.

6 Energy supply future projections

- Global energy supply will grow over the next 25 because of new discoveries that are currently ongoing.
- Oil production will grow and continue to be the primary source of energy.
- The production of natural gas will also grow, with increasing use in power generation, as utilities look to switch to lower-emissions fuels.

- Oil and natural gas will continue to supply about 55% of the world's energy needs through 2040.
- The production of coal will also increase slightly because there are many countries that still depend on coal.
- The global push for clean energy sources will lead to big increases in renewables such as wind and solar.
- By 2040, nuclear and all renewables will be approaching 25% of global energy supplies.
- Technology improvements will lead to increase in the production of wind, solar and biofuels energies by 5% per year.

7 Global energy trade

- The distribution of energy resources can have an obvious impact on energy trade across the world.
- The other important factor in energy trade is domestic levels of energy consumption.
- If a country is rich in resources but also has high domestic levels of consumption, it may have little energy left to export.
- Other influences on energy trade may be geopolitical: for example, some countries may want to conserve fuel resources to maintain levels of energy security into the future.

- In terms of income level, we see that there is a distinct flow of energy resources from low, middle and upper middle income to high-income nations (with the exception of lower middle income).
- On a continental basis, we see the dominance of energy exports from the Middle East & North Africa (being a net exporter of 127 percent of its consumption levels).
- Sub-Saharan Africa is also a net exporter of energy (despite having low levels of coal reserves and only moderate levels of oil and gas)- this is most likely a result of low levels of domestic consumption.
- North America and Europe & Central Asia reach a balance between consumption and trade.
- South Asia is a net importer of energy, importing approximately one-third of its energy consumption.

8 Summary

- Energy issues have always been important in international relations, but in recent they have become even more important than in the past due to the widespread awareness of existing limits to energy sources and negative climate effects of energy impacts.
- One of the considerations which influences energy supply is the relative health and safety implication of energy sources.
- The concerns are related to accidents in the production of energy, potential nuclear incidents, and local air pollution.
- Over the longer-term, these health concerns relate the relative energy drivers of climatic change (which can affect health and safety in various forms, including food access, water resources, sea-level rise, extreme weather events and disease distribution).

9 Review Questions

- Where are the largest energy reserves in the world?
- Which regions supply different types of energy?
- How much oil is the world going to produce in the next 20 years?