

Midterm project

Name Kunal Harinkhede roll no. 231290402

Country : South Korea

Course sustainable net zero energy emission enabling

Taks 1: Energy balance for the year 2020

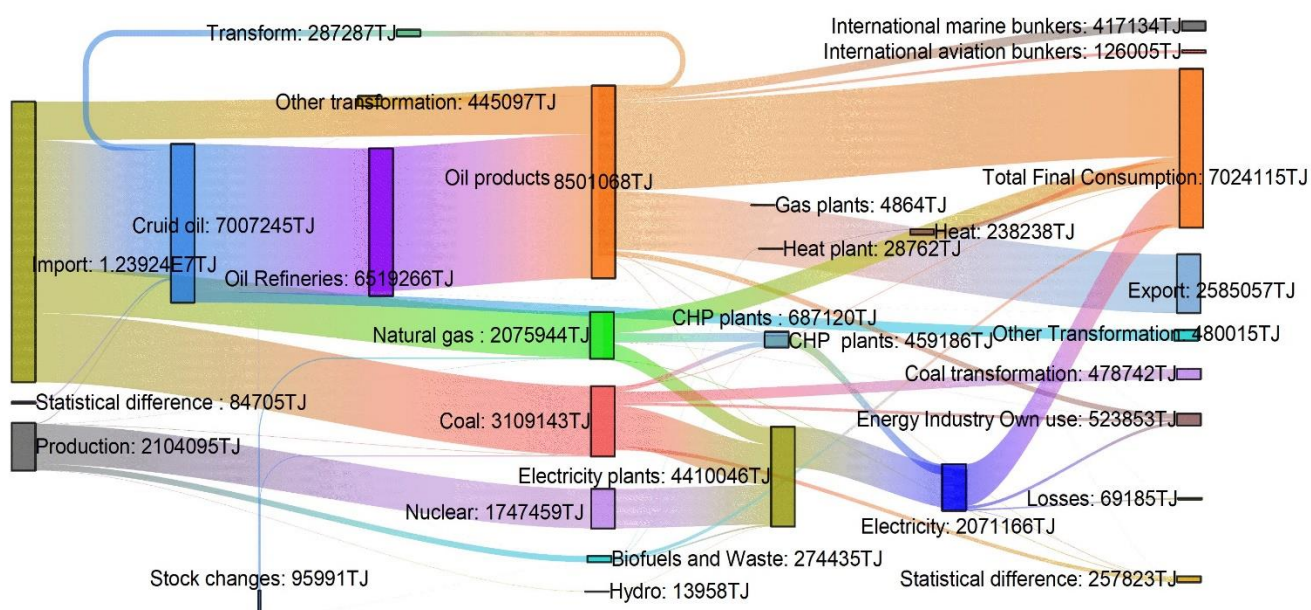
Data for the energy balance table for the year 2020 has been taken from IEA world energy balance and statistics 2022 [1].

All the data is in Tera Joule (TJ).

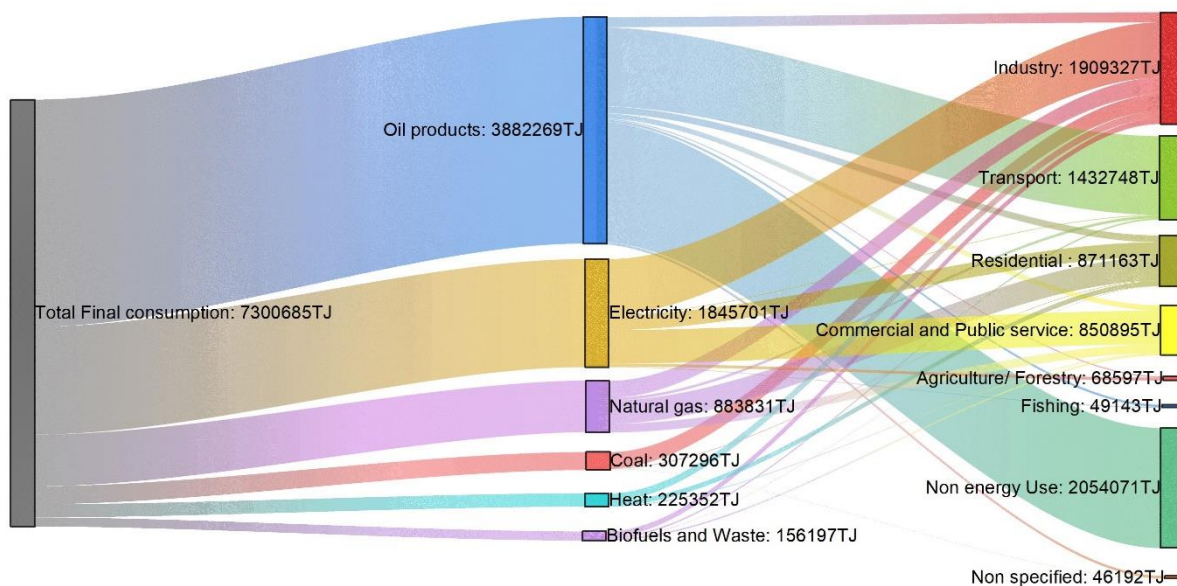
South Korea Energy Balance Table-2020

	Coal	Crui d oil	Oil Prod uct	Natur al Gas	Nucl ear	Hy dro	Solar, Wind, other	Biofuels and waste	Elect ricity	He at	Tota l
Production	197 53	407 83	0	6940	174 745 9	13 95 8	102212	273038	0	216 4	2206 307
Import	305 249 5	563 583 6	1691 887	2012 136	0	0	0	0	0	0	1239 2354
Export	0	- 270 4	- 2582 353	0	0	0	0	0	0	0	- 2585 056
International marine bunkers	0	0	- 4171 34	0	0	0	0	0	0	0	- 4171 34
international aviation bunkers	0	0	- 1260 05	0	0	0	0	0	0	0	- 1260 05
Stock changes	368 95	- 526 0	6442	5265 4	0	0	0	-1397	0	0	8933 4
Total primary energy available	310 914 3	566 865 6	- 1427 162	2071 730	174 745 9	13 95 8	102212	271641	0	216 4	1155 9801
Transformation	0	287 287	- 2528 89	0	0	0	0	0	0	0	3439 8
statistical differences	- 175 961	833 08	- 2094 7	- 3446 9	0	0	0	1397	- 2143 4	- 501 2	- 1731 17
Electricity plants	- 2E+ 06	0	- 2952 0	- 7520 67	- 174 745 9	- 13 59 8	-90311	-72717	1823 762	- 114 4	- 2676 955

Shankey diagrams for the year 2020:



Shankey diagram for energy supply 2020



Shankey Diagram for energy consumption 2020

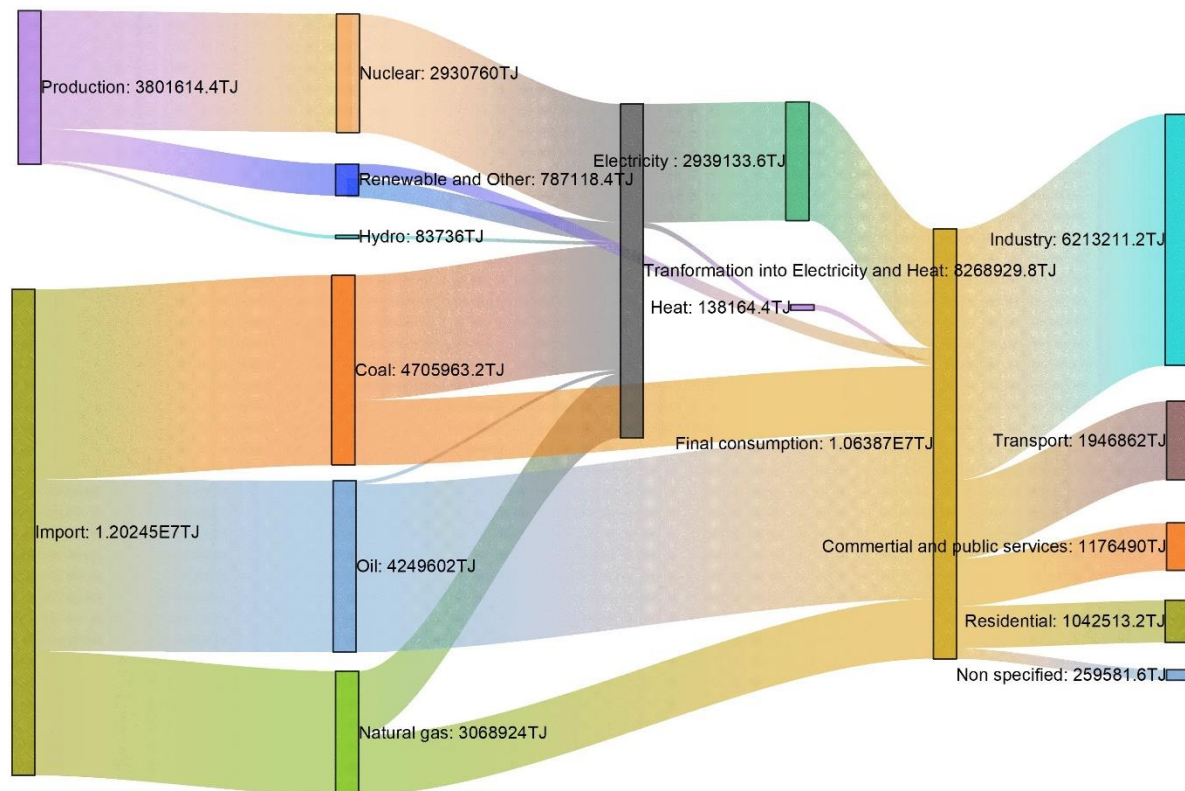
Task 2:

Energy balance table for the projected year 2035:

The data for the projected year 2035 has been taken from the South Korea's master energy plan outlook and policies to 2035 [2], all the data was in million Tones oil equivalent (millions Toe) which was converted into Tera Joule (TJ).

South Koreas Projected energy balance table for 2035

[illegible]



Sankey diagram for projected year 2035 energy flow

Task 3:

1. Is the country on right path towards achieving net-zero emission by 2050

From the comparison of energy balance table for year 2020 and projected year 2035,

It is seen that the share of renewable energy for the year 2020 in total energy supply without nuclear was about 3.5% of total primary energy supply and share of nuclear energy was about 15.11%. and for the projected year 2035 the share of renewable energy without nuclear will be 5.5% and share of nuclear energy will be 18.51% of total energy supply, it depicts that the transition towards the renewable energy supply will be at very low growth rate.

Similarly, share of renewable in final energy consumption for the year 2020 without the nuclear was 2.29% and for projected year in 2035 will be 2.912%, which depicts negligible amount of increment of renewable in final energy consumption although in the generation of electricity and heat the amount of renewable is significant.

Above analysis depicts that country is transitioning with a very growth rate towards renewable energy, which is not sufficient achieve net zero by 2050.

2. Analysis of existing policies, laws to address climate change and emission reduction

- Low price policy has reinforced the energy consumption pattern and the disproportionate use of certain types of energy like electricity has been accelerated.
- Serious problems are occurring due to the electrification of energy consumption, during the generation and transmission process has a significant amount of energy loss happens which is about 63% [2].
- For electricity the sudden increase in demand may result in imbalanced supply demand profile if the supply infrastructure is insufficient.
- Expansion power of generation facilities will results in environmental degradation and transmission network overloading.
- Creation of new markets in less economical areas for renewables and smart grid are limited due to low electricity prices.
- A large scale centralise supply infrastructure was expanded to fulfil growing demand instead of reducing demand by aggressive measures. This expanded supply infrastructure results in expanded grid, large power generating facilities which further imbalance supply demand.
- A narrow focus on efficiency during the rapid growth of the nuclear power industry has been seen.

3. Measures and strategies to accelerate progress towards net zero emissions

- Reorient the energy policy to emphasize innovation in demand management, it will be achieved by improving energy efficiency by sector and optimised use of energy sources.
- Need to rationalise the energy pricing system, it will help in increasing the productivity of energy systems.
- Need to revitalise the demand management market.
- Need to increase the distributed power supply share and Improvement in power grid resilience which helps to reduce the imbalance in supply demand due to sudden demand increment in peak hours.
- Transition towards renewable and safe energy should be at a higher growth rate to achieve the net zero emission by target year 2050.
- Need to extend the deployment of renewable energy policies to power generation, heat generation, transport sectors. Also implementing a private sector driven deployment system.

4. Potential challenges country will face while transition towards net zero emission

- In South Korea the coal, oil and natural gas domestic production covers only about 1% of total energy demand [3]. Due to high dependency on imported energy supply, South Korea's energy policy need to focus on energy supply security.

- As high dependency on fossil fuel-based energy supply, South Korea will face difficulties in transitioning towards renewable energy sources as the current share of renewable is very less compare to fossil fuel-based energy supply.

References

- [1] "IEA world energy balance and statistics 2022," IEA.
- [2] "Korea energy master plan outlook and policies 2035," MINISTRY of trade, industry and energy south Korea.
- [3] "Korea energy policy review 2020," IEA.