

Global Environmental Policy Making on Technology

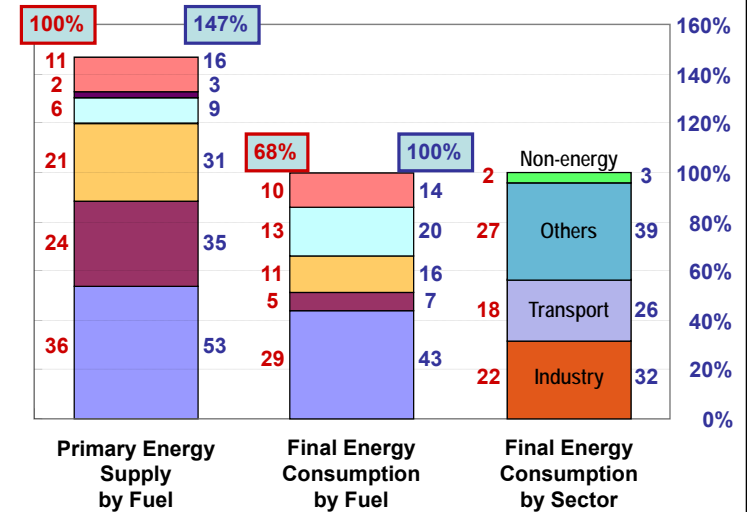
環境・エネルギー技術政策

6th and 20st, October, 2014

Jun TAKAHASHI

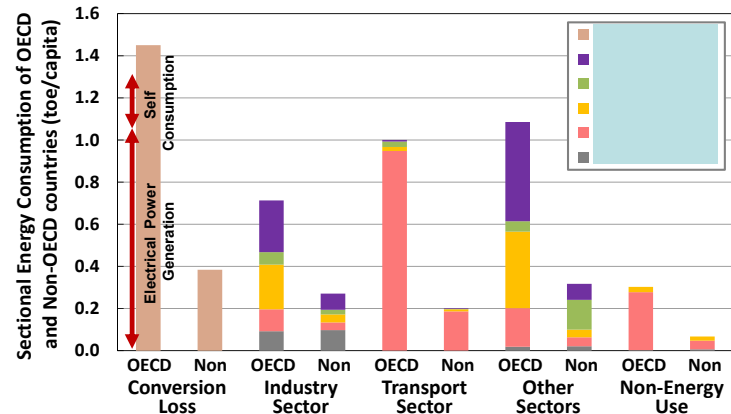
- ✓ Global energy balance
- ✓ How to read statistics data ?
 - ✓ Long-term viewpoint
 - ✓ Suspect an interpretation and the data itself !
- ✓ How to make a policy ?
- ✓ Quiz

World Energy Balance (Source IEA statistics)



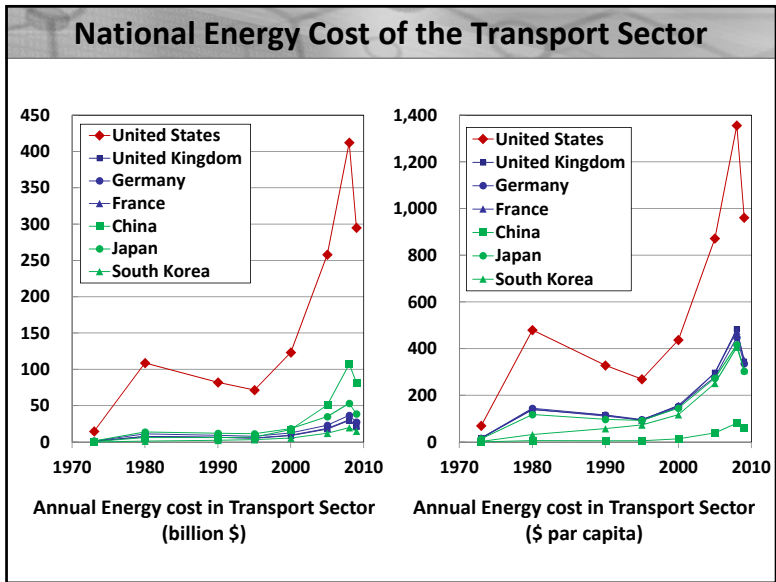
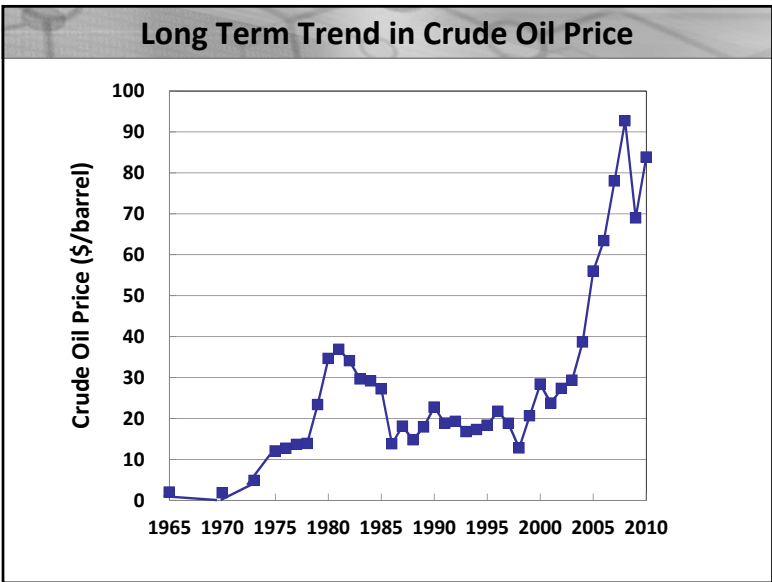
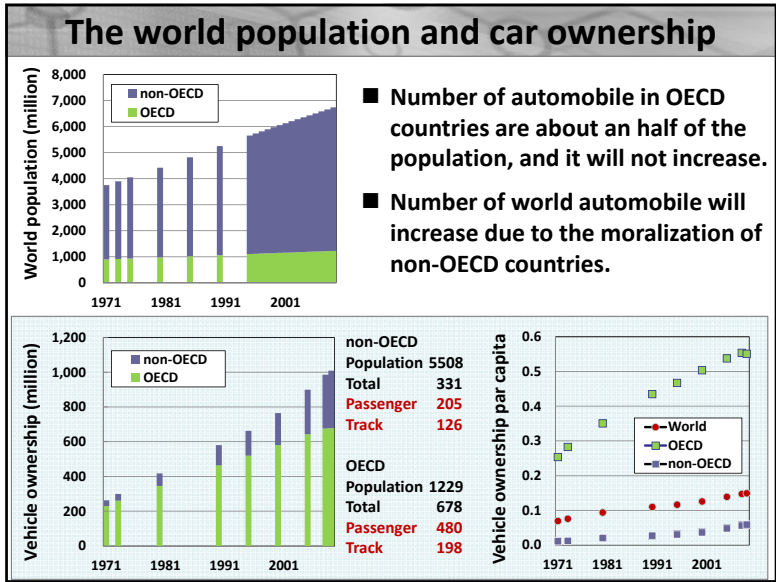
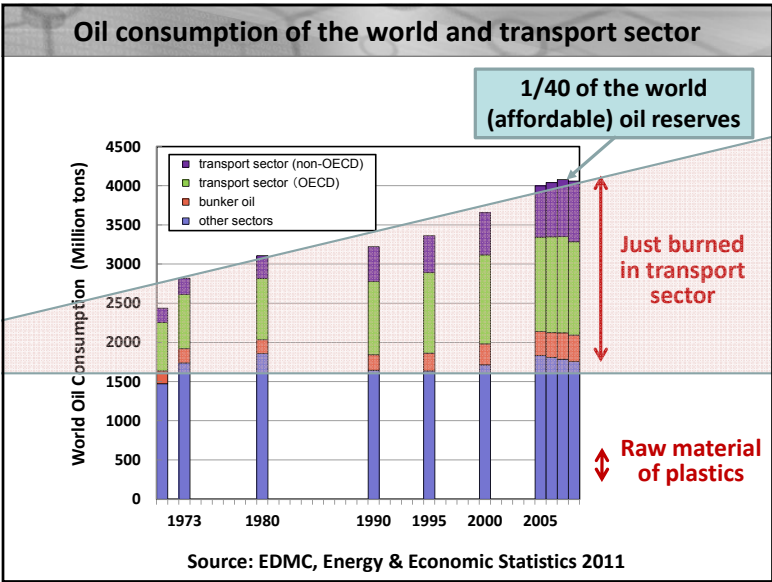
Sectional Energy Consumption of OECD and Non-OECD countries

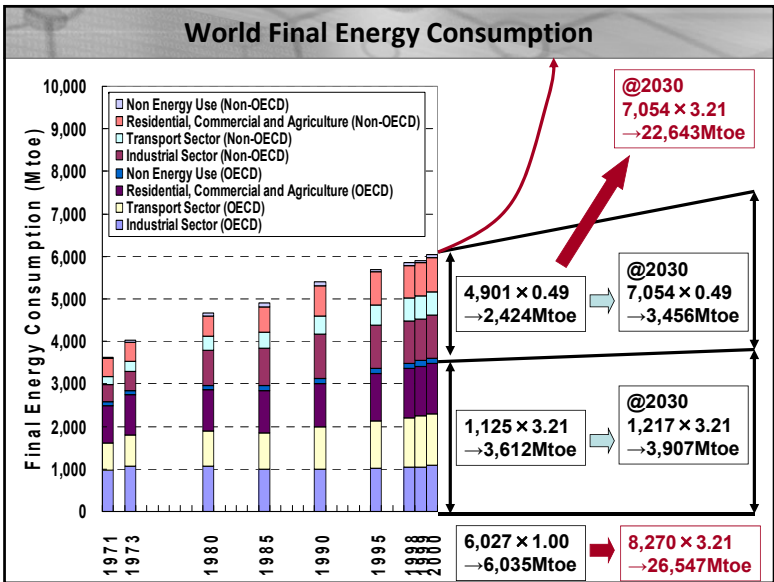
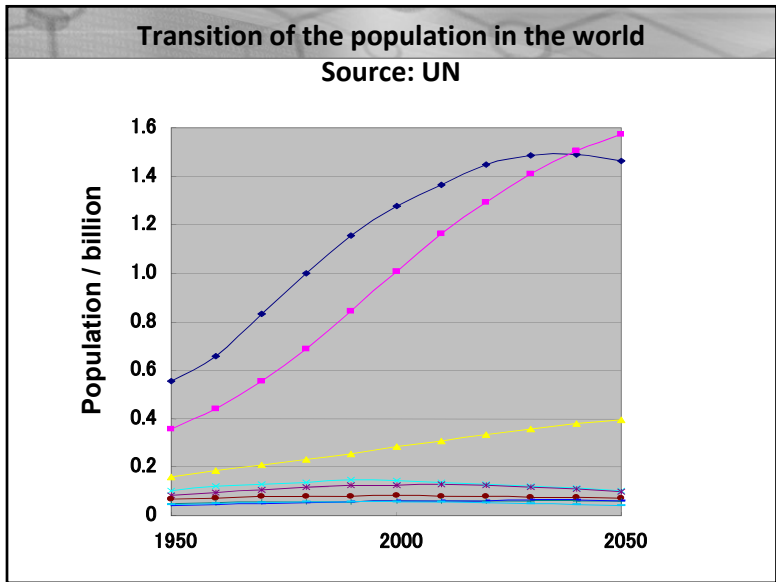
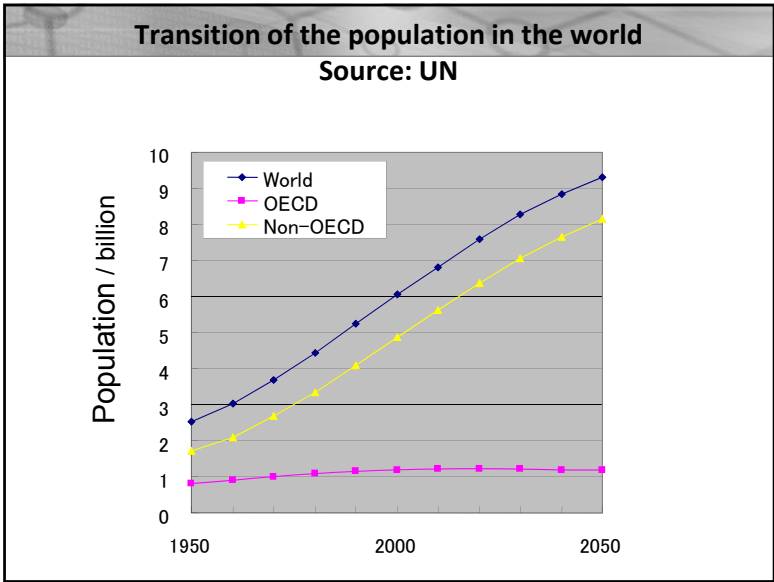
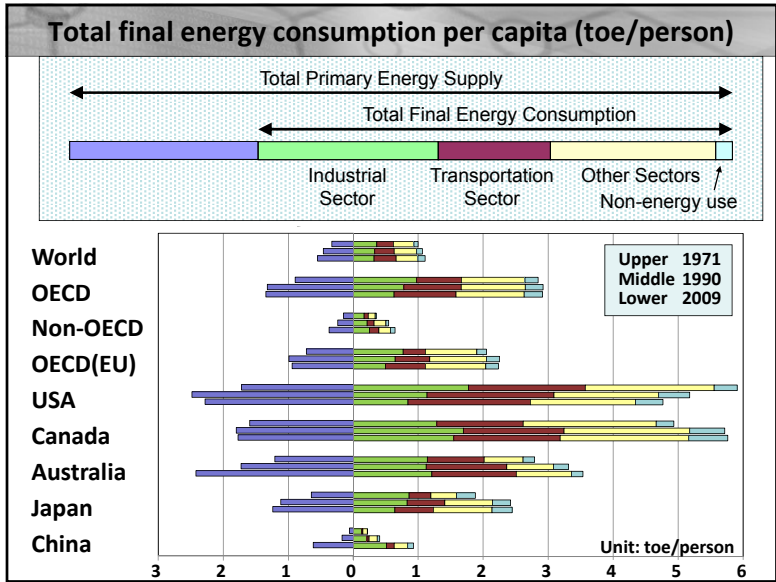
2008	Population	Total Primary Energy Supply	Total Final Energy Consumption
OECD	1190 million	4.56 toe/capita	3.11 toe/capita
Non-OECD	5498 million	1.24 toe/capita	0.86 toe/capita



Annual World Material Production

- **Crude steel production: 1.4 billion tons**
 - Coking coal for steel production: 0.7 billion tons (= 0.1 tons per capita)
 - World coal consumption: 3.3 billion tons (2.5 billion tons for fuel)
- **Plastics production: 0.25 billion tons**
 - Oil consumption for plastic production: 0.5 billion tons
 - World oil consumption: 4 billion tons (2.1 billion tons for transport)





Calculation of the amount of solar energy

Reference

- World primary energy supply is about 1.5 toe/ year par capita
 - 1.5 [toe/ year par capita] = 40000 [kcal/day par capita]
- Human need energy of 2000 [kcal/day par capita] to live.

Solar energy flowing into the earth

$$0.7 \times \pi R^2 [m^2] \times 1367 [J/m^2s]$$

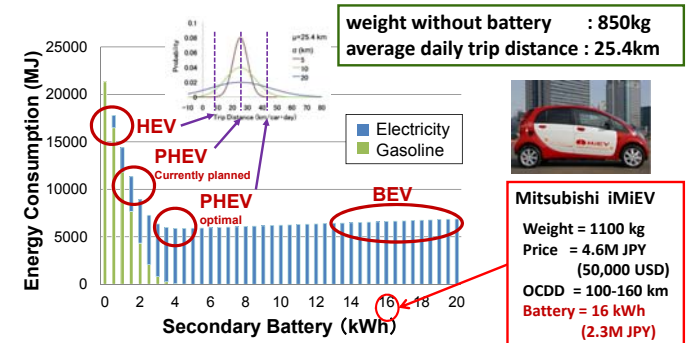
$$= 0.7 \times 1.286 \times 10^{14} [m^2] \times 1367 [J/m^2s]$$

$$= 1.23 \times 10^{17} [J/s]$$

$$= 2.94 \times 10^{13} [kcal/s] \quad (= 40000 \times 10^4 [kcal/day par capita])$$

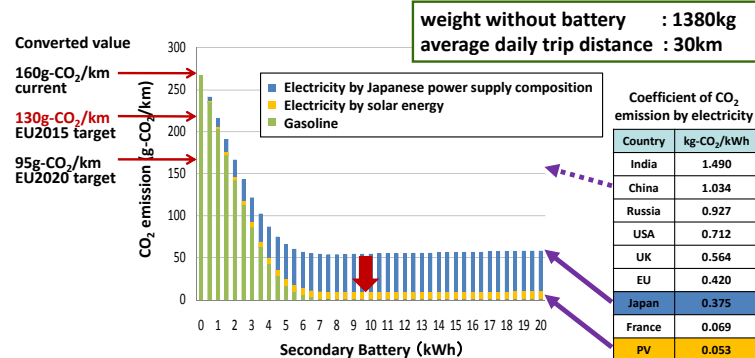
$$= 2.94 [Mtoe/s] \quad (= 1.5 \times 10^4 [toe/year par capita])$$

Energy Consumption Structure of mini-PHEV



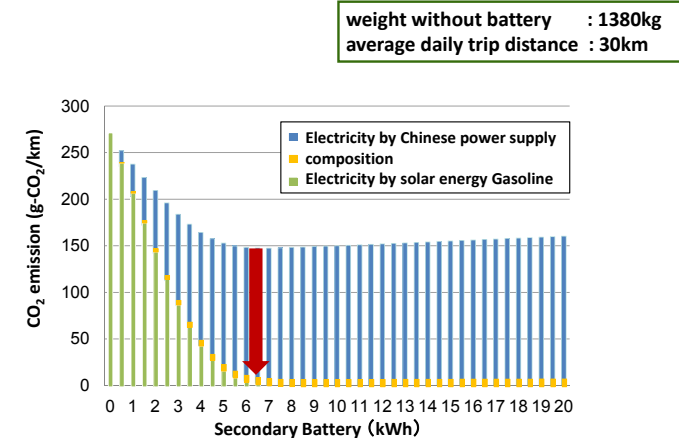
- There is an optimal amount of secondary battery depends on the weight of vehicle and average daily trip distance.
- Hence, the spread of such an optimal PHEV must be difficult in case of heavier cars and countryside.

CO₂ Emission Structure of Japanese PHEV

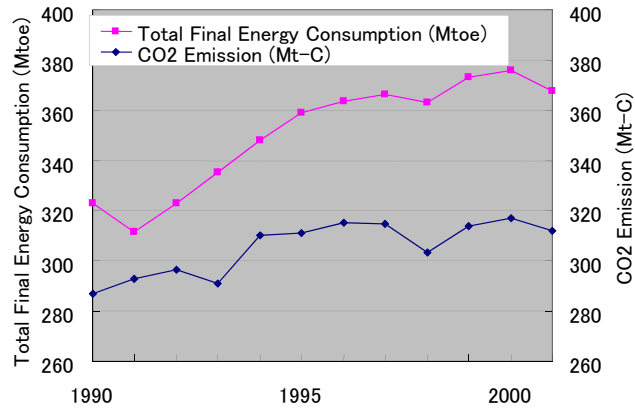


- Combination of solar and PHEV shows a significant effect !!!
 - 3m² of PV generates 2kWh daily, hence PV-PHEV is possible.
 - The amount of secondary battery is more important from a viewpoint of CO₂ emission.

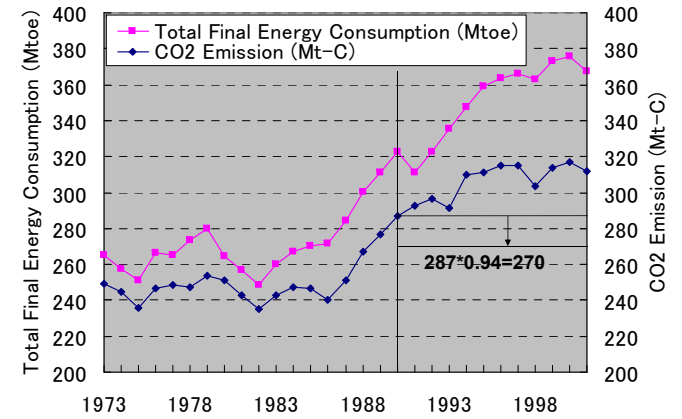
CO₂ Emission Structure of PHEV in China



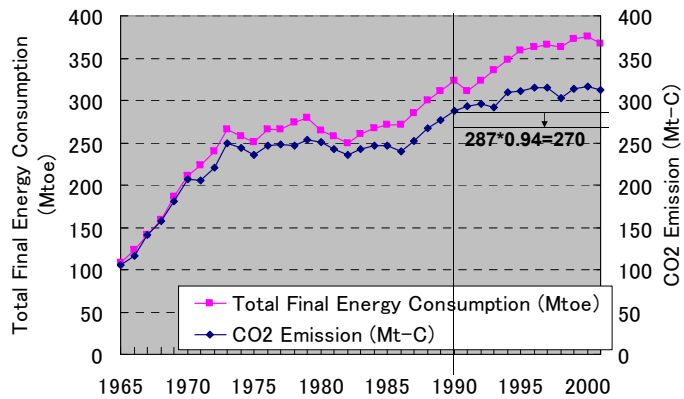
Japanese TFC and CO2 Emission (1990-2001)



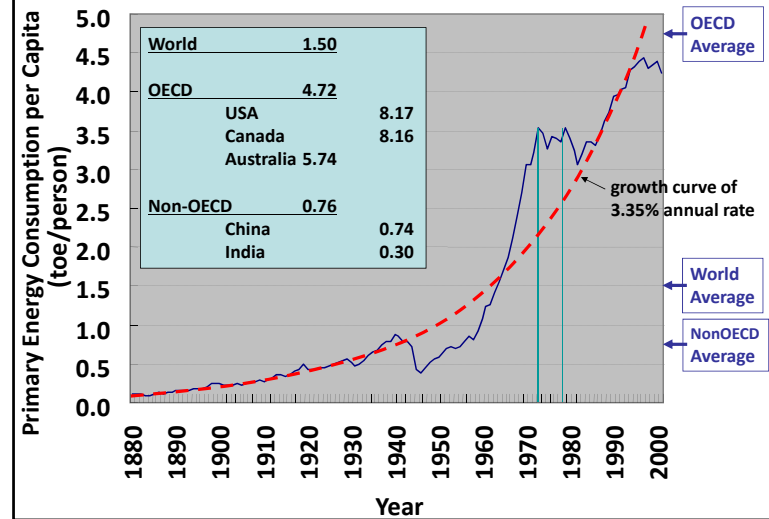
Japanese TFC and CO2 Emission (1973-2001)

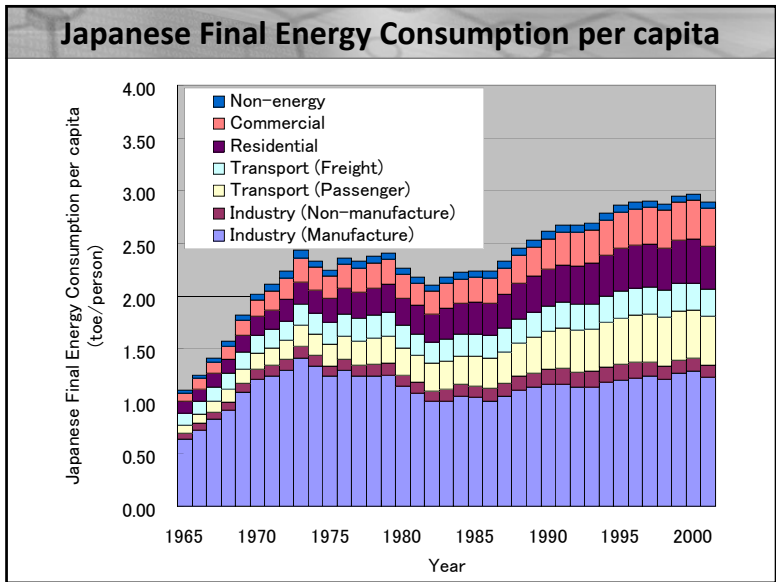
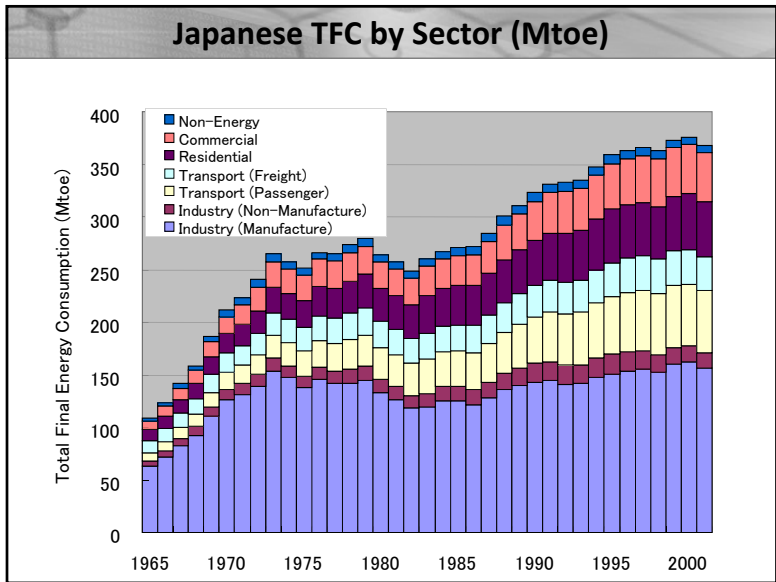
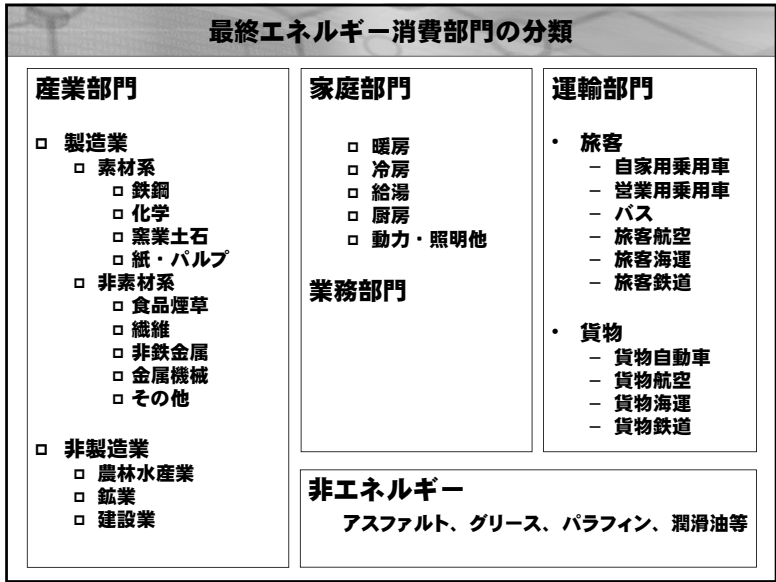
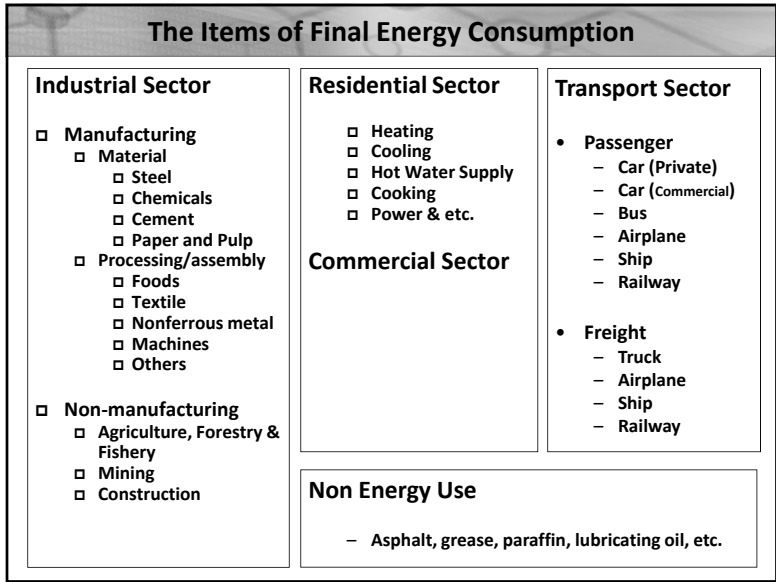


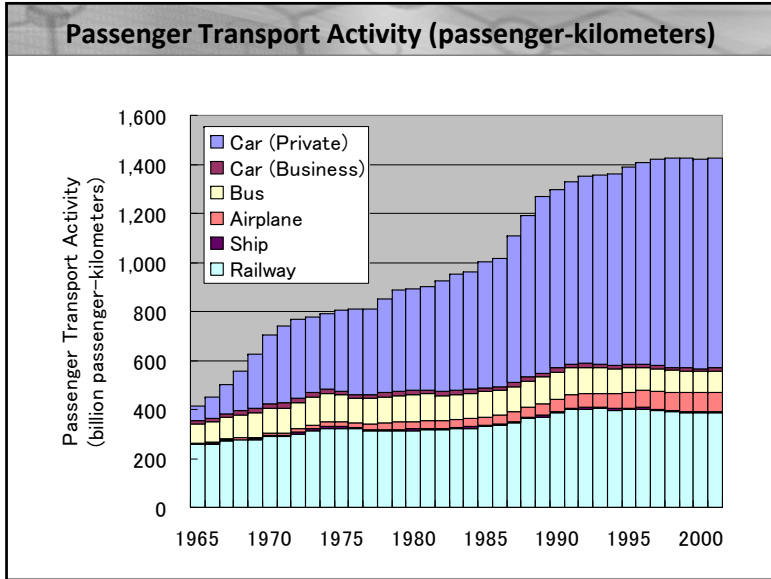
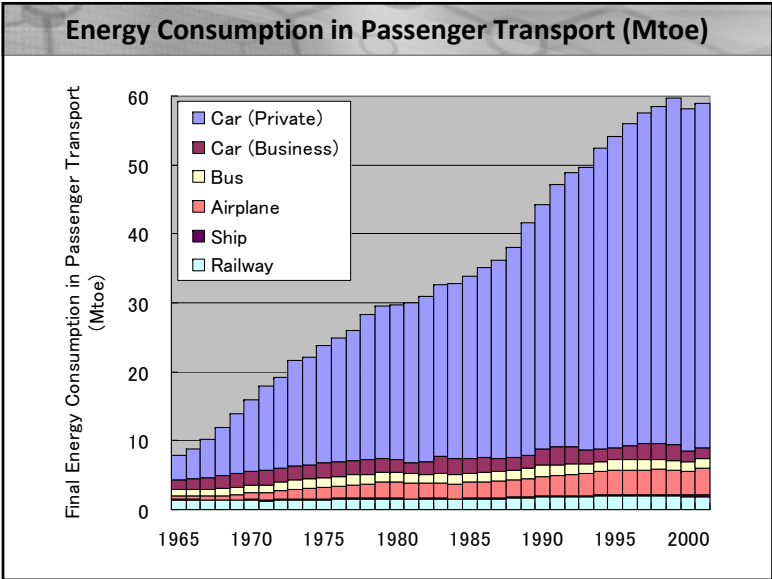
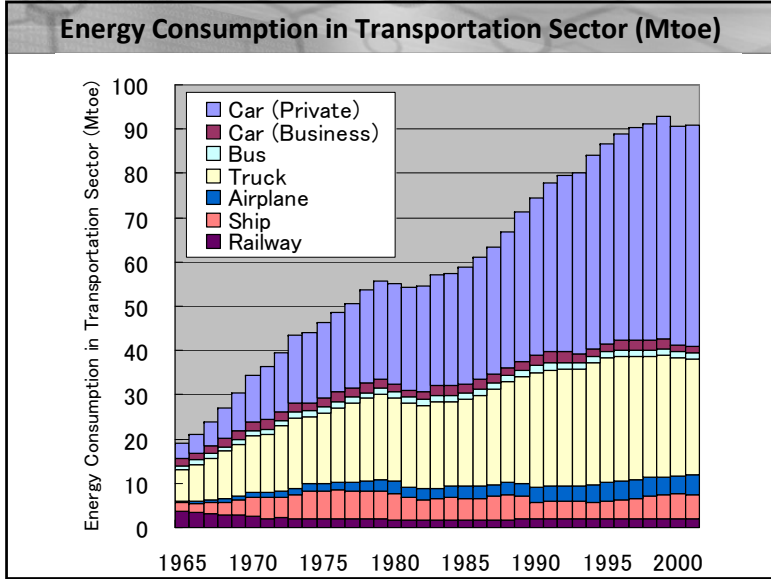
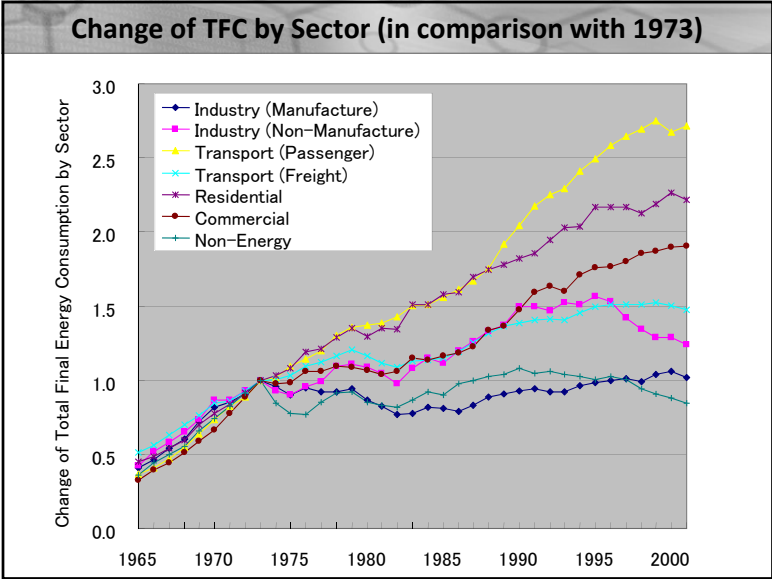
Japanese TFC and CO2 Emission (1965-2001)

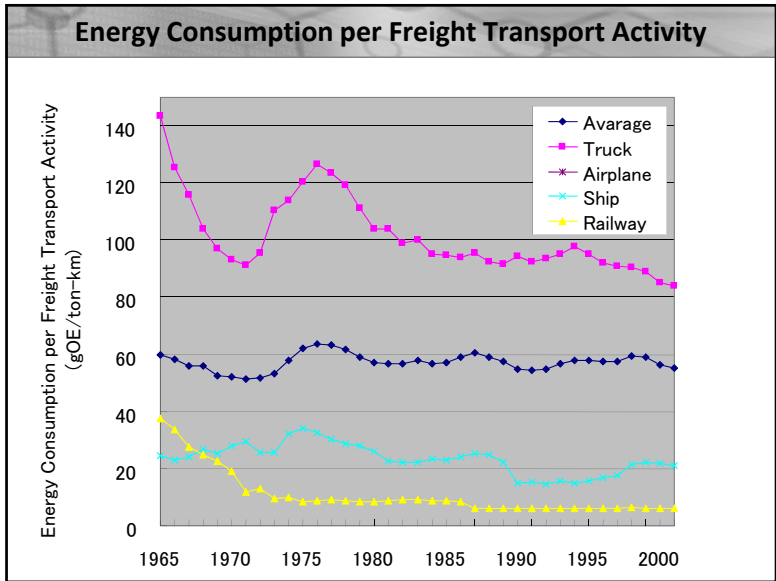
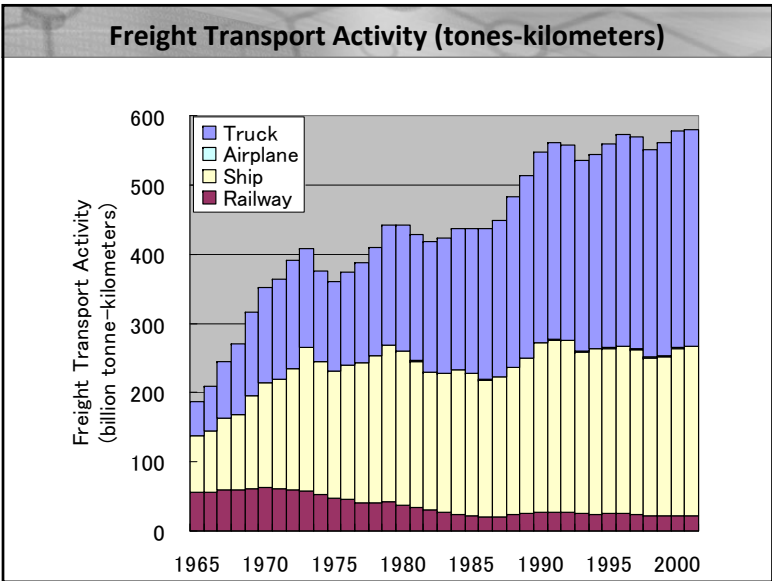
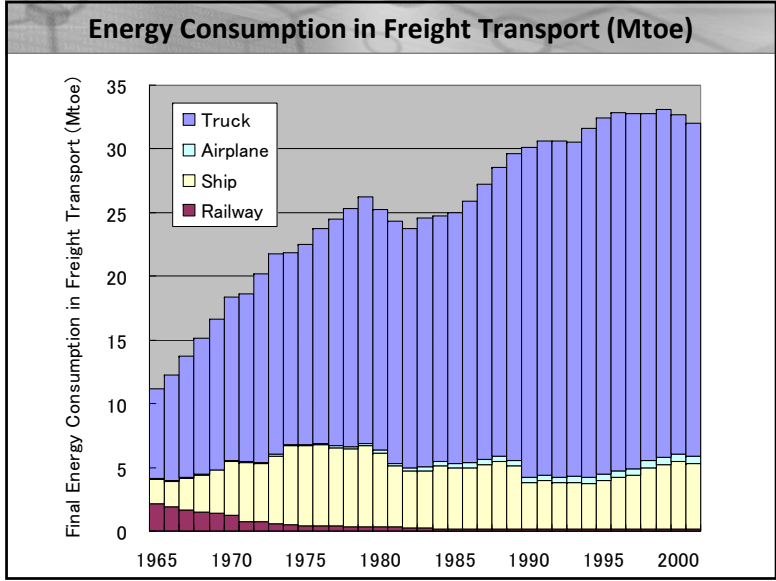
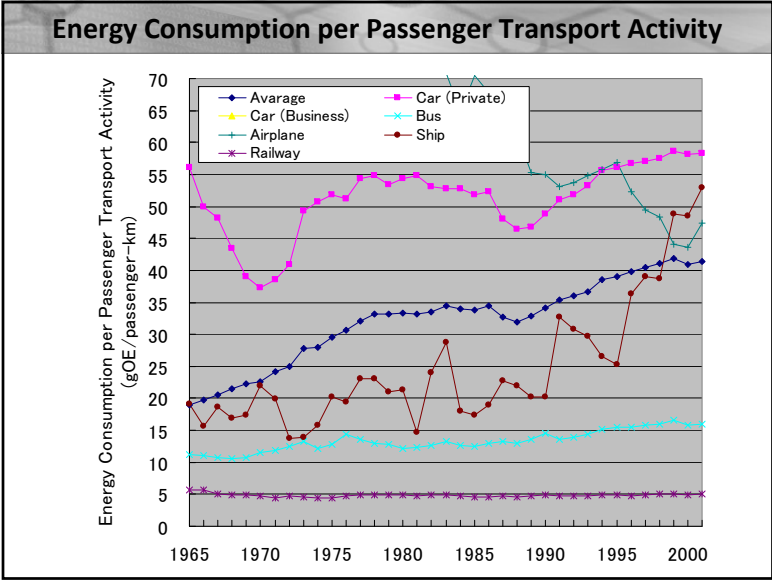


Primary Energy Consumption per Capita (toe/person)

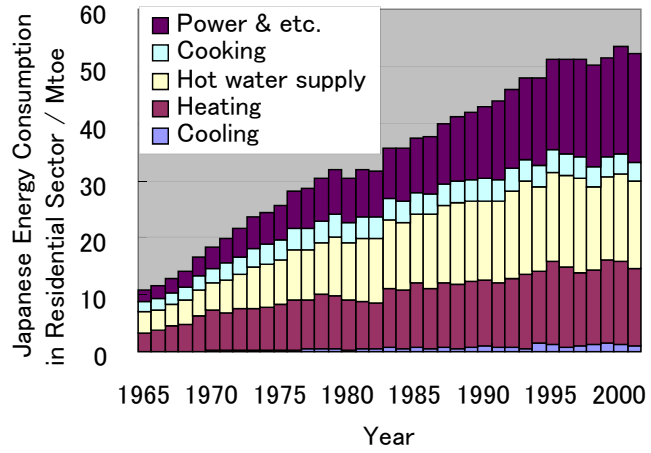




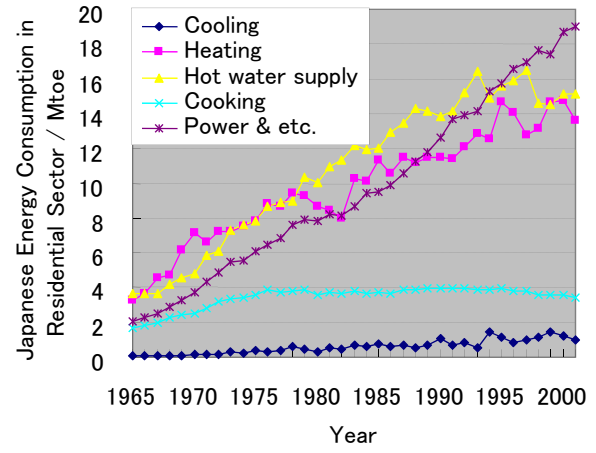




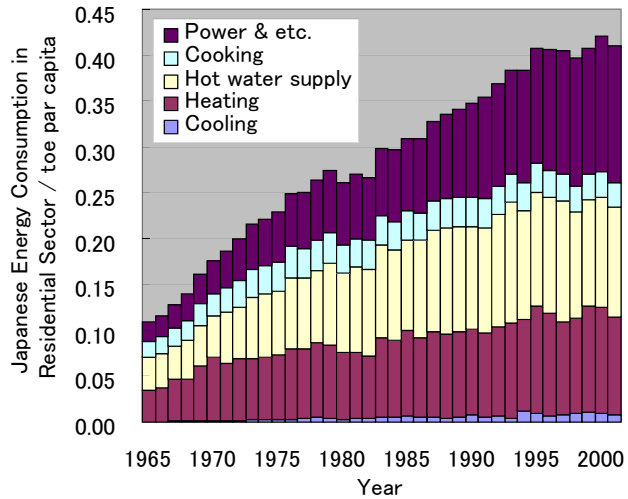
Japanese Energy Consumption in Residential Sector



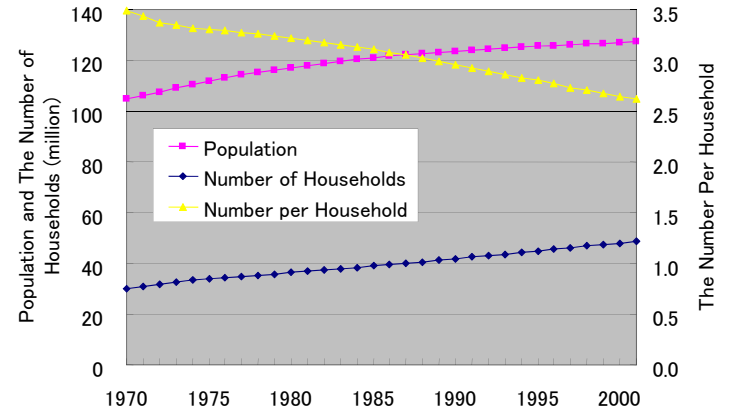
Japanese Energy Consumption in Residential Sector

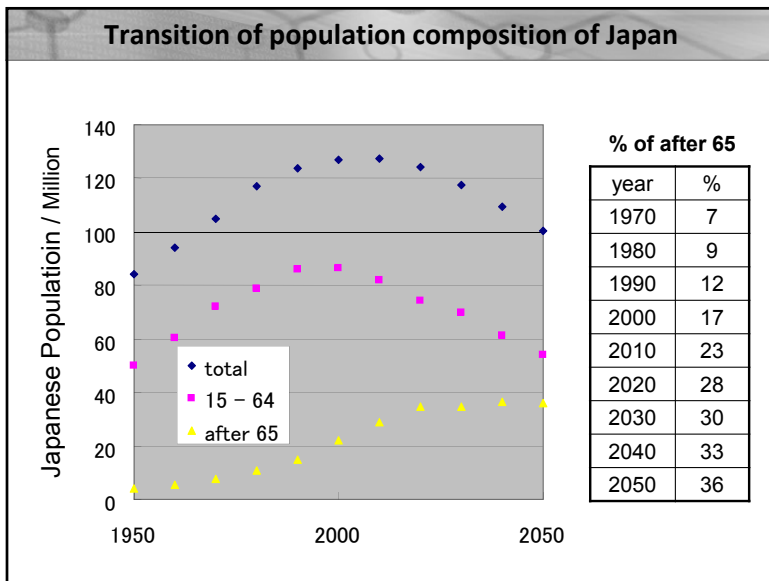
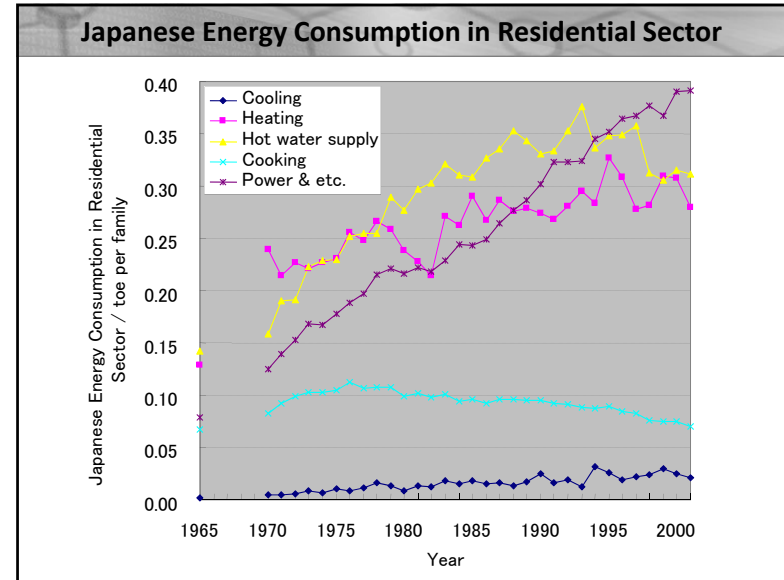
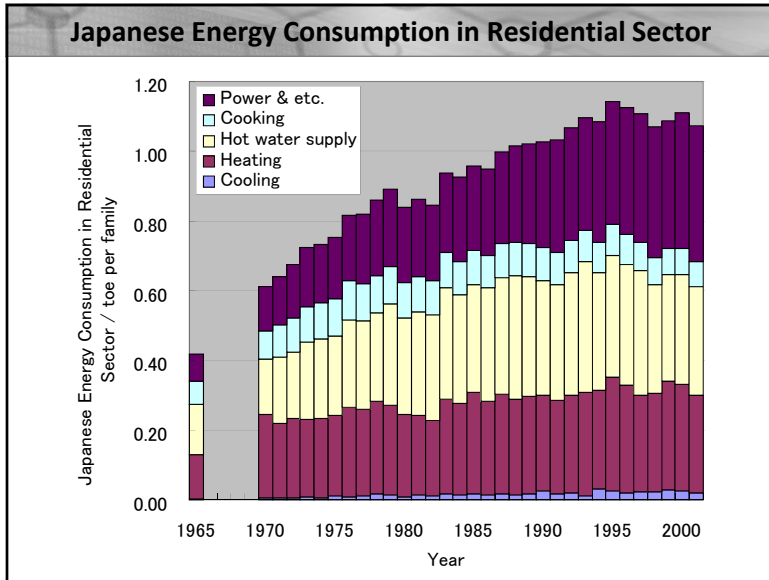


Japanese Energy Consumption in Residential Sector



Japanese Population and The Number of Households





- ### Student's Presentation at 20th October
- ✓ **Theme**
 - ✓ Consider effective policy **to reduce world's fossil fuel consumption** by using statistics shown in today's lecture or following website first.
 - ✓ <http://www.iea.org/>
 - ✓ Then, **show your assumption** about technological development, i.e. electric vehicle, and introducing schedule of the technologies to our society.
 - ✓ Evaluate the **long term effect** of the technologies on the reduction of fossil fuel consumption **till 2050** quantitatively based on your assumption.
 - ✓ **Presentation and Submission at 20th October**
 - ✓ You have to **make a group** which consists of 2 to 5 students.
 - ✓ Discuss well about your presentation in your group.
 - ✓ Presentation will start **from 15:20** at 20th October
 - ✓ Every group have to make a **15 to 20 minutes presentation** by using Microsoft powerpoint.
 - ✓ After the class, the slide (if necessary modified) which includes names of the group member have to submit by e-mail to **TA student**.
 - ✓ If you can't contribute any presentation, you should submit more than 10 pages PPT file by e-mail to **TA student** by 20th October.