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Joint ICTP-IAEA Workshop on Vulnerability of Energy Systems to Climate Change and Extreme Events

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Vulnerability of the Hungarian Energy System

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Vulnerability of the Hungarian Energy System -Outlook-

Made by

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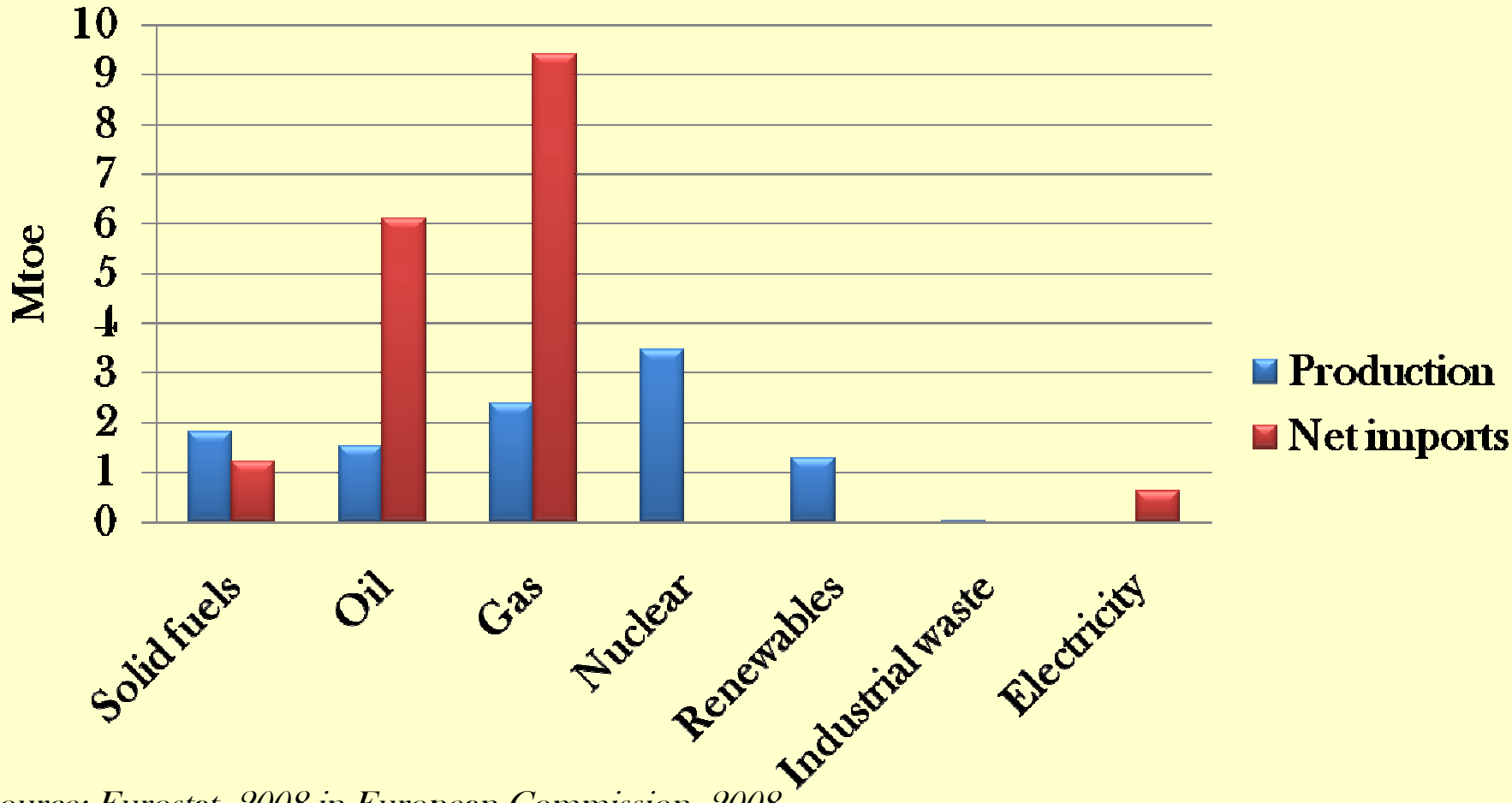
Agenda

1. Introduction of Hungary and the energy system
2. Main power plants
3. Climate itself and the frequent weather extremes
4. Examples: Nuclear PP & Energy transmission
5. Energy Policy
6. Future outlook
7. Conclusion

Briefly about Hungary

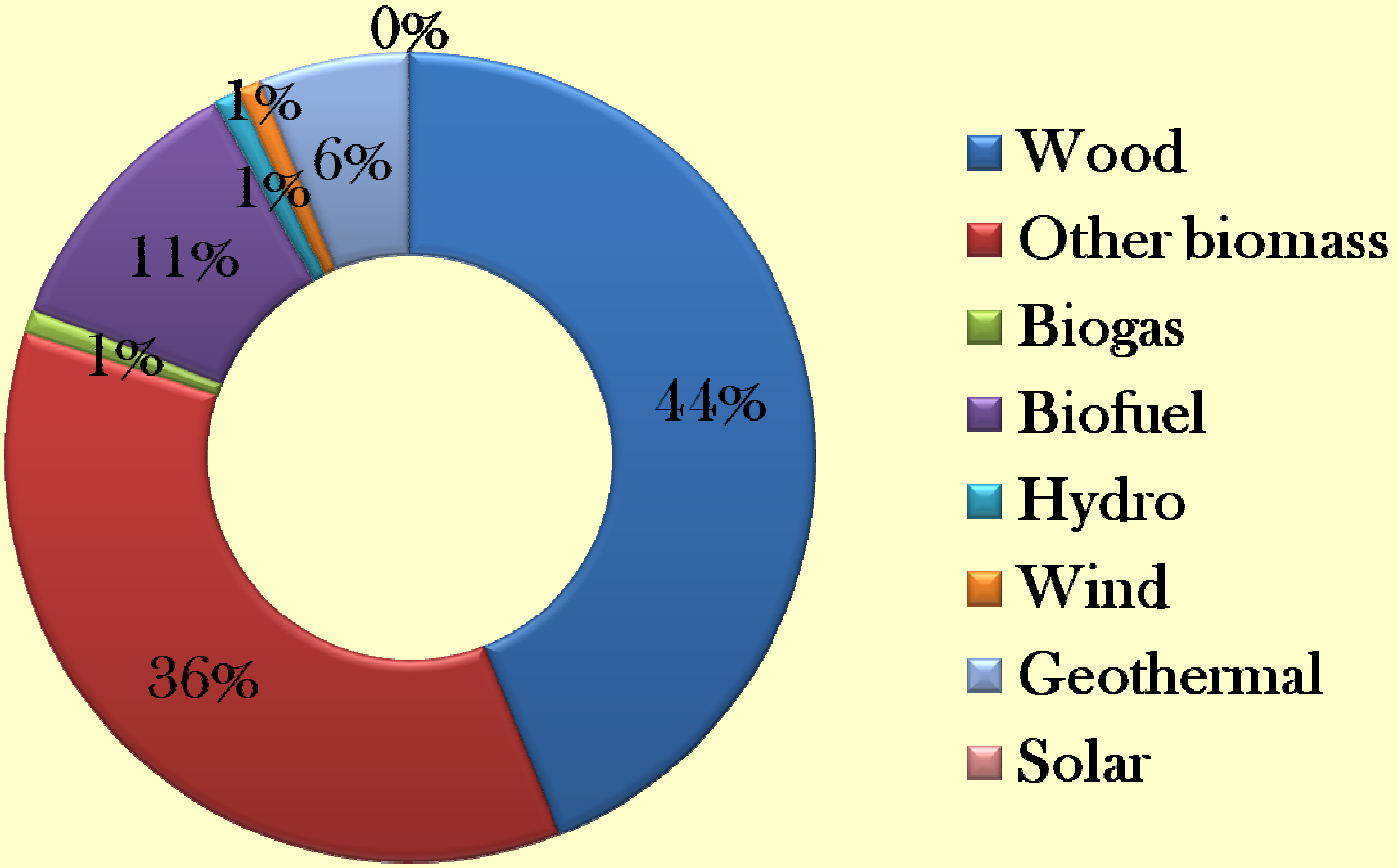
- Location: Central Europe
- Population: nearly 10 million
- Member of EU since 1 May 2004

Composition of Hungarian Energy Sources in 2006



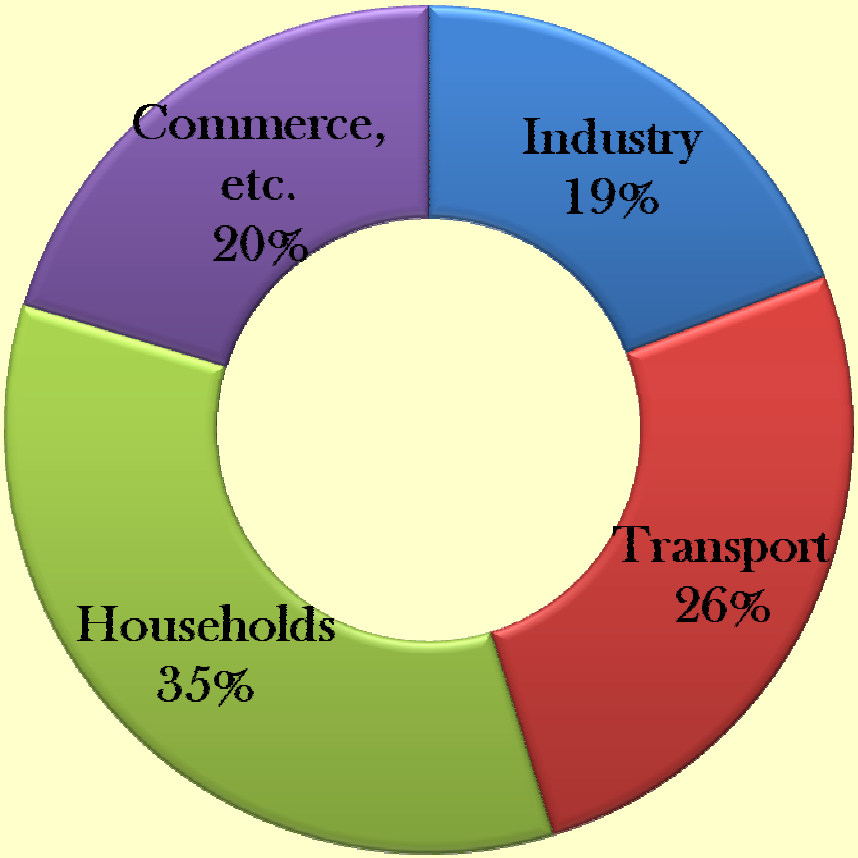
Source: Eurostat, 2008 in European Commission, 2008

Renewable Energy Consumption in 2008



Source: www.energiaklub.hu

Final Energy Consumption by Sectors in 2006



Source: Eurostat, 2008 in European Commission, 2008

Power Plants above 50 MW

Namely 31 power plants operate in Hungary

- 1 Nuclear PP
- 2 Hydro PP
- 6 Biomass PP
- Rest of the PP are working with lignit, brown & black coal, natural gas, heavy oil etc.

Source: www.energiaklub.hu

Signs of the Climate Change

„VAHAVA program", a research program was conducted in 2006

<u>Expected slow changes:</u>

- Increasing temperature → aridity, salinization
- Decreasing precipitation with high volume → drought, mudslide, flood

Already Occured Weather Extremes

Wind storm

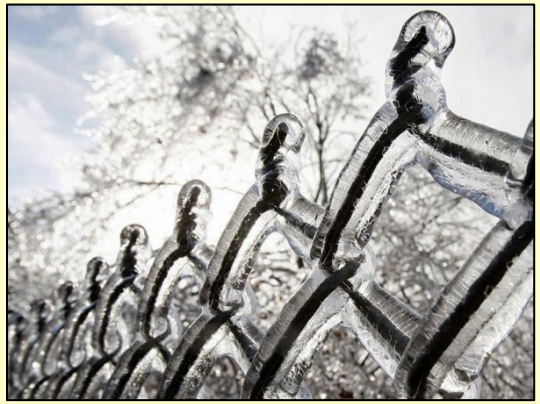
Intense rain

Glazeice (freezing rain)

Ice storm

Flood

Drought



Nuclear PP at Paks 1/3

Constructed in 1973-1987

Capacity of 2000 MW

4 reactor blocks operating

Uses fresh water for cooling
(retrieving it from the Danube)

Nuclear PP at Paks 2/3

- Flood
  - PP is located on a 96,5-97 mBf
  - Historical data

Flood in 1965	**93,85 mBf**
Flood in 2006	**93,99 mBf**

Source: KHT, 2006

  - Three times more flood than 50 years ago
  - As a response to the flood in 2002, the authority revised the „safety level" of the river
- Drought
  - Intake pump was on 84,74 mBf
  - It is deeper now

Drought in 25.11.1983	**84,72 mBf**
Drought in 31.08.2003	**84,42 mBf**

Nuclear PP at Paks 3/3

- Earthquake
  - Has an increasing tendency
  - The strongest measured was less than M_L 1.00
  - In 1997 the earthquake resistance was reinforced
- Iced water
  - Water pumping can be blocked if the water will freeze
  - In 1984 and 1985 river was frozen
  - PP helps melting the ice

- Warming of water
  - Highest measures was 26.7 Celsius
  - Should develop alternative solutions for cooling

Energy Transmission

- Hail storm
  - Latest hail storm was in June 2009
  - Mostly impacts agriculture, infrastructures (windows, cars)
  - As a protection in the early 1990s the soil generated hail storm preventive system was launched in the three most impacted counties
  - Loss was decreased by 14% in agriculture
- Glazeice
  - Mostly impact the grid lines and poles, transportation
- Wind storm
  - Wind speed occurs between 90-200 km/h
  - Cause blackouts, pole damages, break away cables

Energy Politics 1/2

- 2007 European Council launched a Program to achieve until 2020
  - Cut greenhouse gas emission by 20%
  - Increase the proportion of renewable by 20% (from the current 8,5%)
  - Cut the total energy consumption by 20%
- 80% of the Hungarian population lives in energy poverty
  - Improve energy efficiency
  - Substitute the old systems with modernized
  - Turn to innovative, alternative solutions

Energy Politics 2/2

Lack of political consistency & support

Price of renewable should be supported!

Only 8% of the government budget is spent on energy efficiency investment

Need for harmonized regulations

Future Path

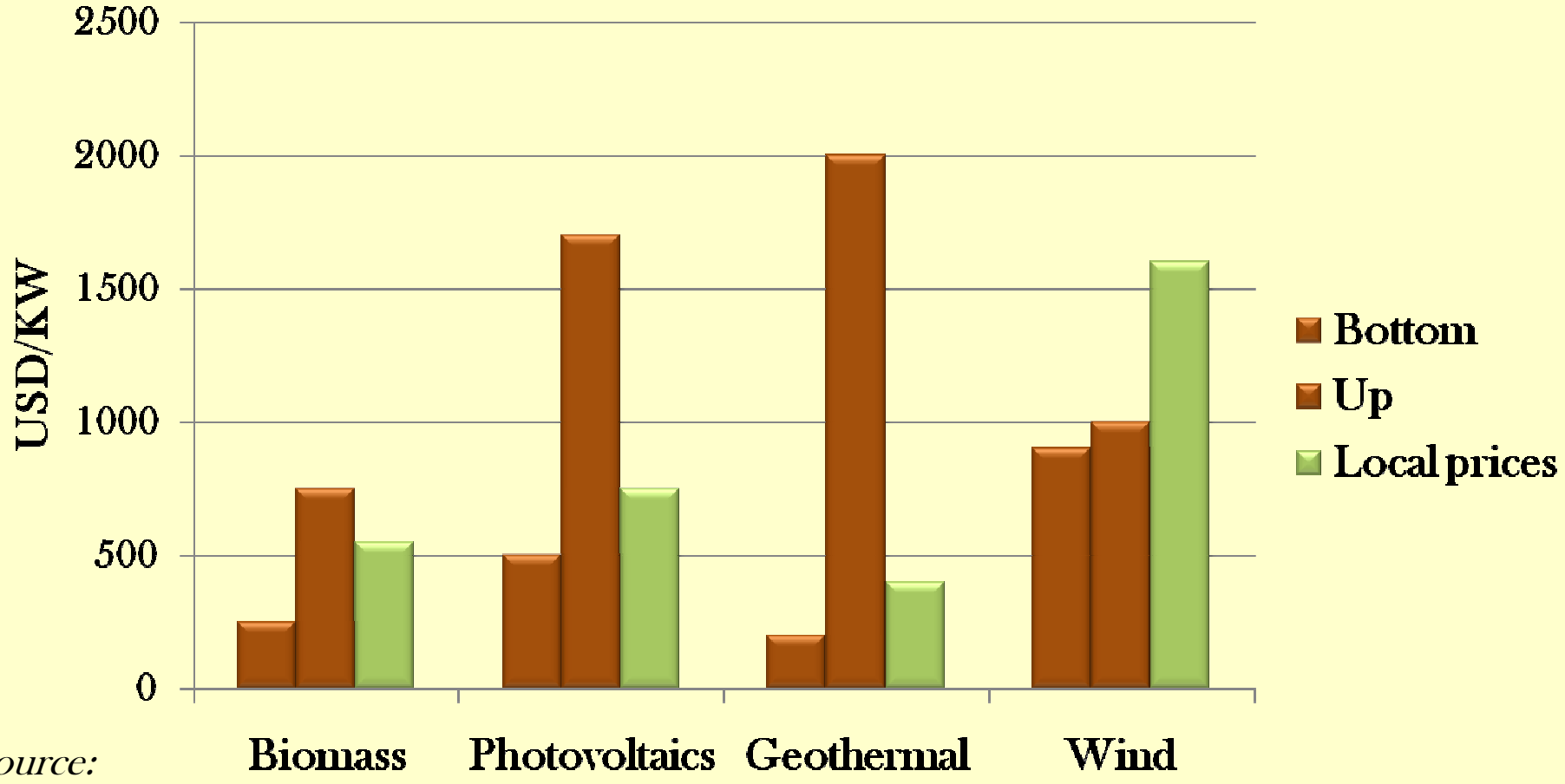
Reduce the import dependence!

Conclusion of research programs:

- Biomass and geothermal has high potentials
- Investors are expected to build more nuclear, biomass PPs and windmills as well
- Growing need for green energy

Investment Prices per Renewable Technologies in 2008

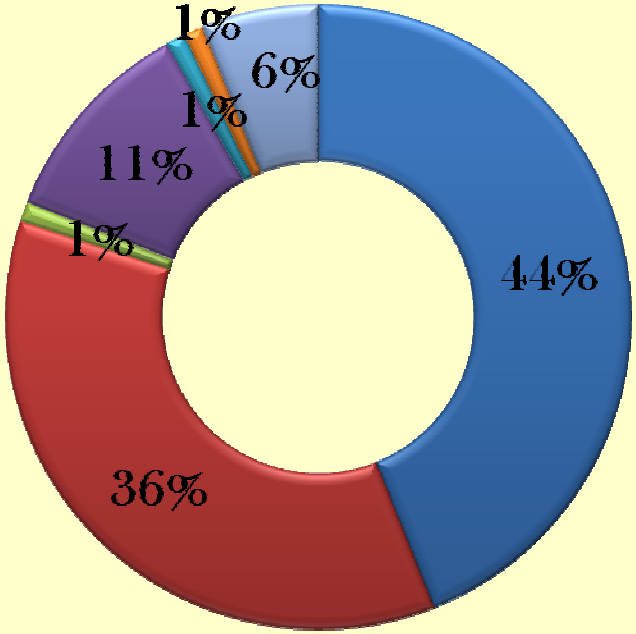
(European and local costs of projects)

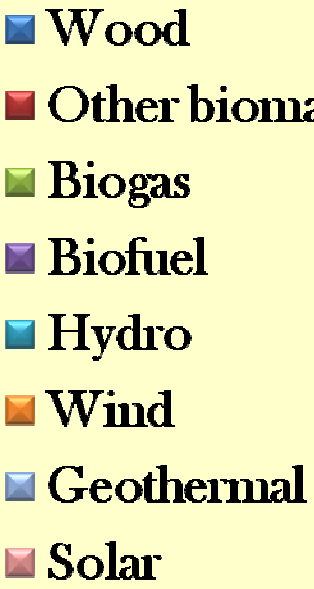


Source:
IEA, Fliedleifsson, Energiaklub

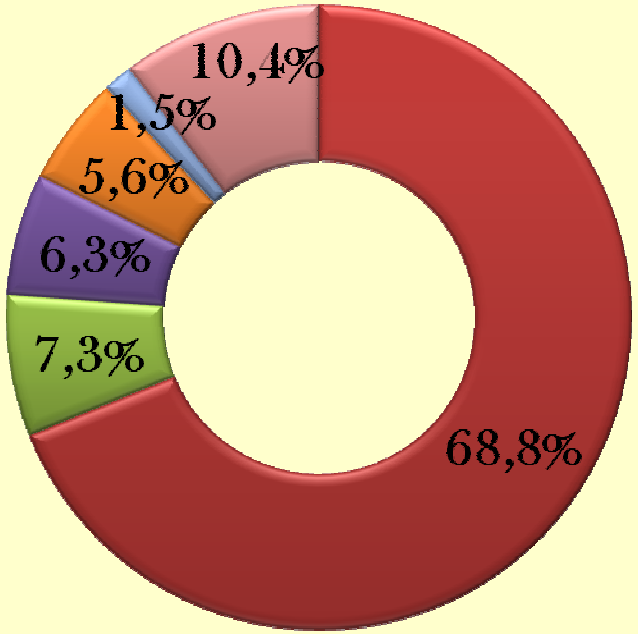
Renewable Energy Consumption

In 2008





In 2020



Solar is less than 1%

Wood is combined with other biomass
Hydro is less than 1%

Source: www.energiaklub.hu

Conslusion

- World is changing, but be careful with the existing information
- Focus on Research and Development (R&D)
- Should plan strategically and sustainably ahead

Key factors:

1. Sustainable development
2. Responsible management
3. Consideration of future generation

Thank you

for your attention!

Katalin Hartung 2010
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