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**Markets for the commercial use of biomass for heat
and power generation – the cases of Bulgaria,
Rumania and Turkey)**

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AGENDA

- Turkey
- Romania
- Bulgaria

Forests in Turkey

Forest holdings mainly state forests. Areas in East and South where deforestation took place – Sometimes soils are degraded

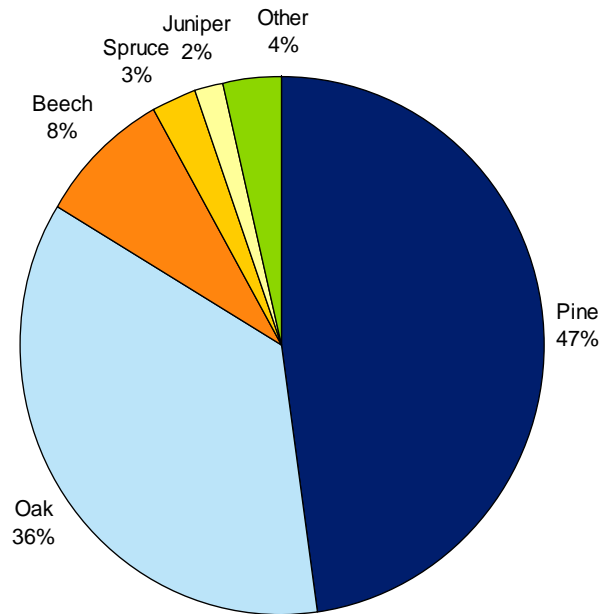
Forests cover 21.2 Mha in Turkey



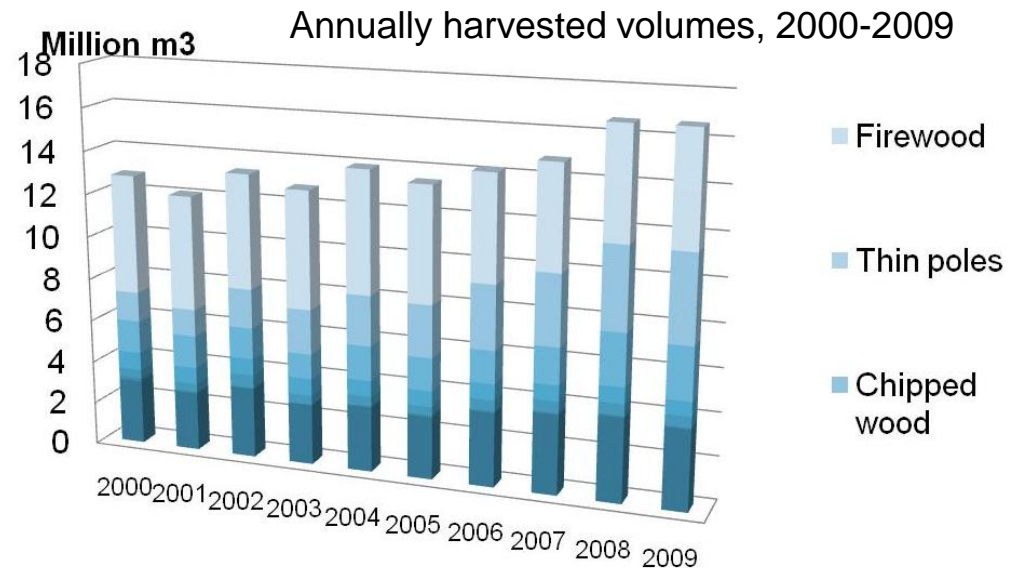
source: GDF

Forst-based Biomass in Turkey

Annual Volumes of harvested wood is growing but the potential is higher.
Private investors are needed!



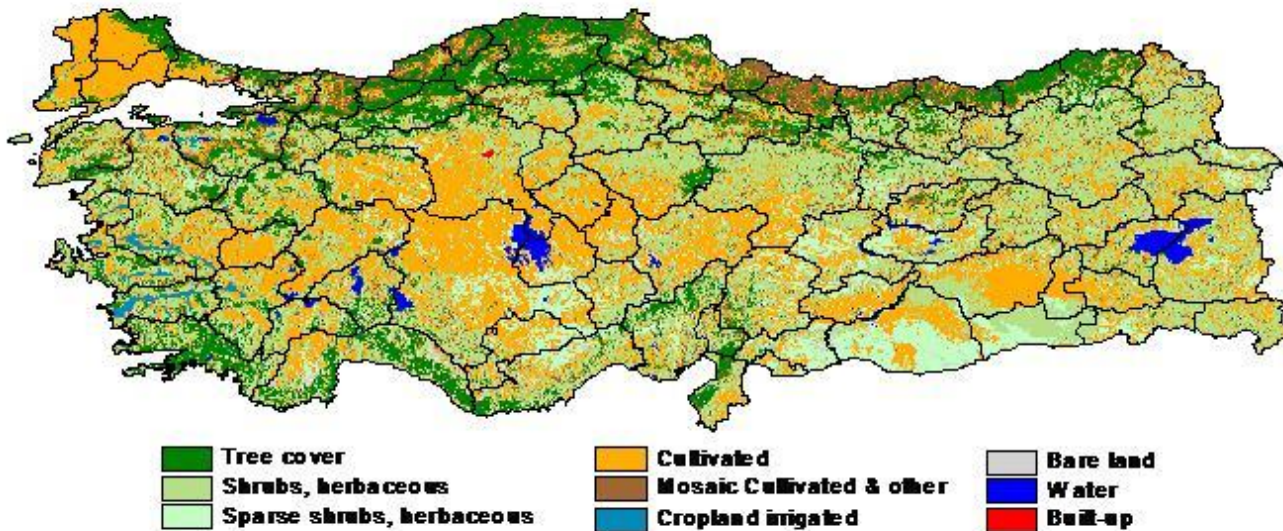
source: Pöyry



source: GDF

Agriculture in Turkey

The Agricultural Sector is in a professionalization process. Smaller Holdings get in the Eastern regions transferred into bigger combines.

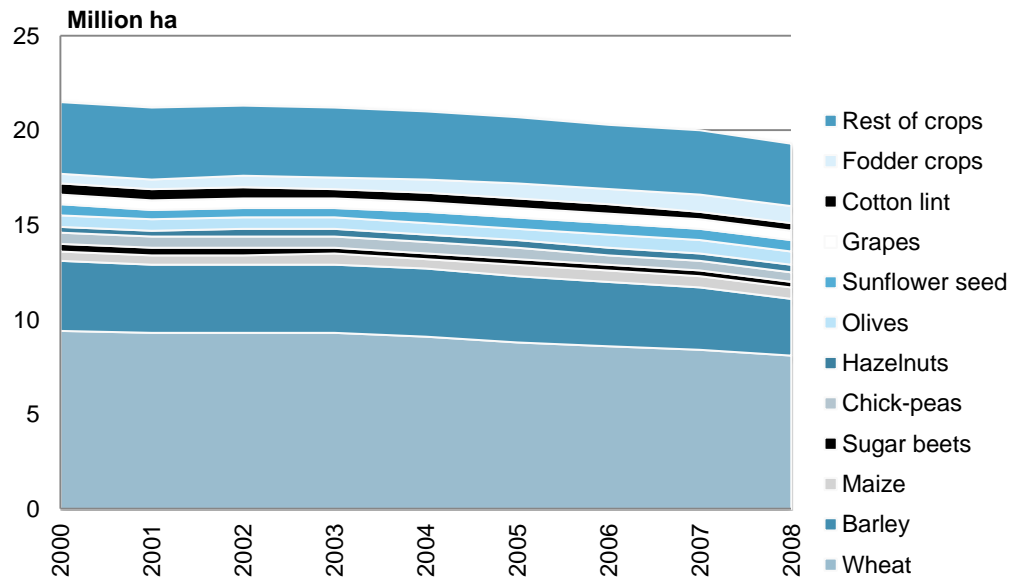


Source: GLC2000

- Typically small farm
- privately owned
- approximately 3 million agricultural holdings
- agricultural holdings (67 %) are mixed farms with crop production & livestock production

Agricultural commodities in Turkey

Crops volumes are declining the last years but Turkey is still a big producer for Agricultural Commodities - Turkey was the 11th largest producer of wheat worldwide. The Residues are big potential for Bioenergy usage.



Other Agri-commodities:

- hazelnut, cherry, fig, apricot, quince and pomegranate
- watermelon, cucumber
- chick peas, tomatoes, eggplants, green pepper, lentil, pistachio
- onions, olives (rank 4)
- sugar beet (rank 5)
- cott seed, grapes, tobacco, tea, apples (rank 6)
- barley (rank 7)
- sunflower seed (rank 10)

Source: FAOSTAT

Overview of Developments in Turkey

Bioenergy is under development in Turkey. Investment opportunities in the Raw Material Sourcing and in the technology

Raw Material

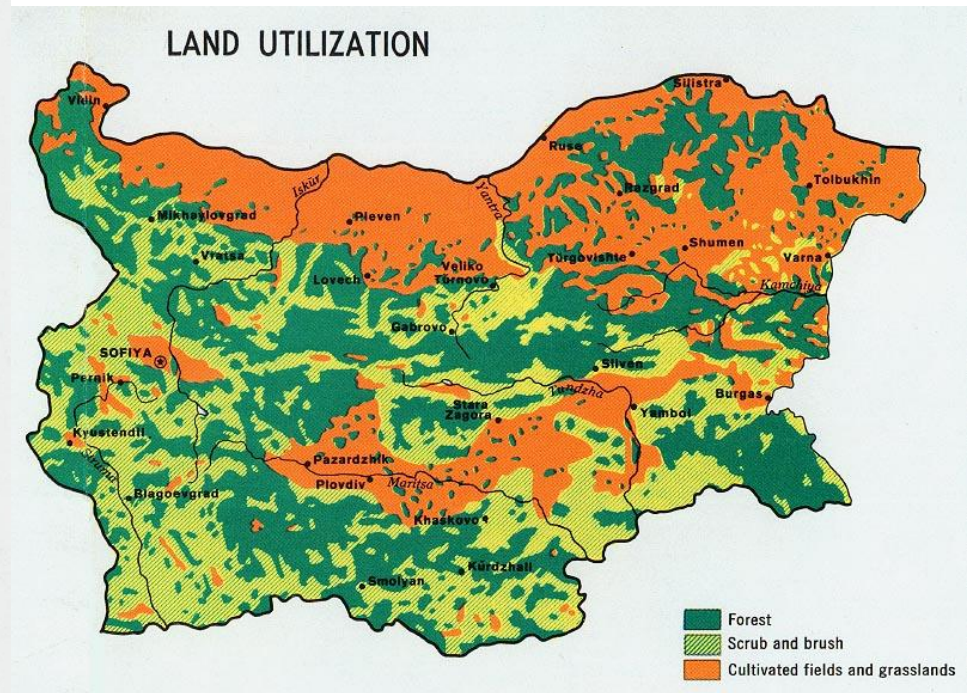
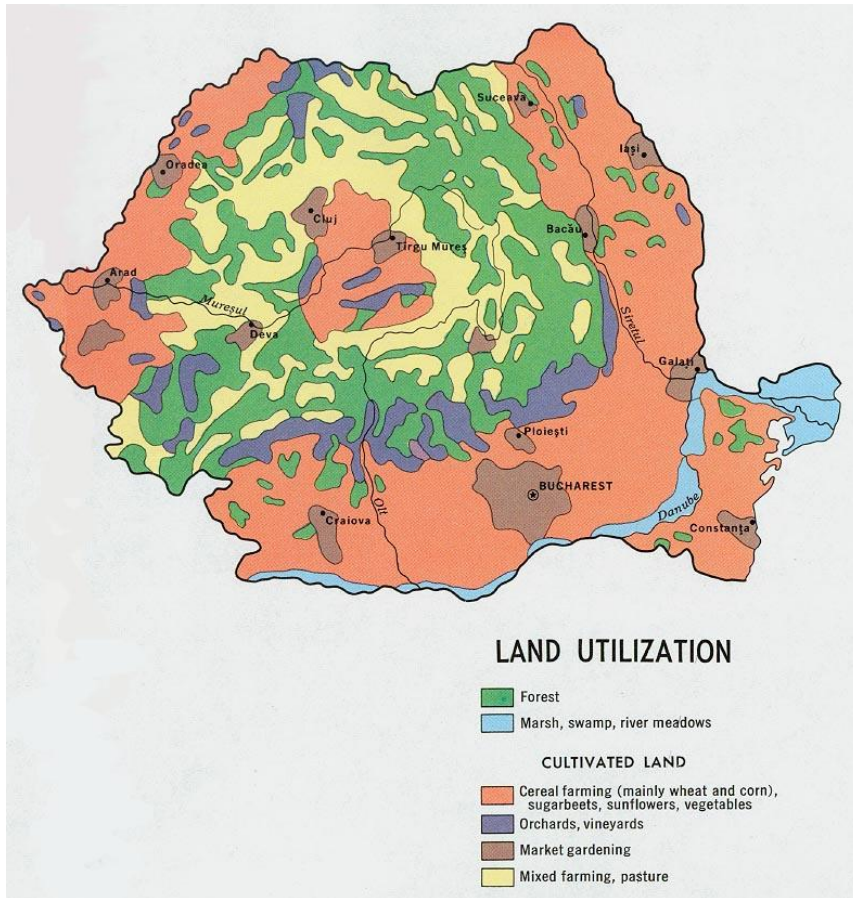
- Forestry
 - Infrastructure
 - Forestation of unused and degraded lands
- Agriculture
 - Restructuring of small Farm holdings -> combines
 - Short Rotation on unused land
 - Development of Business of Residues
- Waste
 - Waste Management systems – Separation in Biowaste Collection

Technology

- CHP
 - Green Field Investments
 - Co-firing of Biomass in Coal Plants
- Pellets
 - Plants based on short Rotation
- Biogas
 - Cities - based on Biowaste
 - Rural Areas – based on Manure

Land use in Bulgaria and Romania

Agriculture and Forestry in Bulgaria and Romania are developed but need improvements along the Supply chain.



Status quo and Development in Biomass Sourcing in Bulgaria and Romania

Agriculture and Forestry in Bulgaria and Romania are developed but need improvements along the Supply chain.

Forestry

- Infrastructure in the Supply Chain (Lack of technical equipment for the collection and transportation of Forest Residues - collection manually)
- The prices for wood vary widely
- The organisation of wood yield and transportation is under the supervision of the State Forest Department
- No synergy between the Ministries to develop Forestry Infrastructure
- No Unified Approach of energy utilisation of wood in the Forestry Law
- Unregulated logging is a serious problem and state authorities are struggling to regulate the situation
 - No training/educational courses exist for this sector to develop

Agriculture

- Difficulty to provide a stable mid to long term price of Solid Agricultural Waste (SAW)
- Mid to long term risk for changes in the agricultural production to occur
- Over 80% of farm land is privately owned
- Lack of know how and expertise in Biomass from Agricultural
- Short Rotation (Poplar and Salix) under Development

Waste

- Currently constructing new landfills with funds provided by EU on municipally owned land
- Lack of legal commitment to reduce the country's physical waste and emissions from landfill gas
- Separate municipal waste collection has only recently been established.
- Due to the delayed construction of new landfill sites and lacking funds there is a lack in the development of project for waste utilisation
- Lack in expertise and know how in the energy utilisation of domestic wastes

Development in Biomass Technology in Bulgaria and Romania

Technology

CHP

- No specialised biomass boilers are currently in use for the combustion of wood, resulting in a low energy efficiency factor of energy conversion
- No specialised boilers for the combustion of agricultural residues – Investments in this field running
- The National Long-Term Program to Encourage the Use of Biomass has made efforts to set prices for biomass (including wood) , however does not have the necessary instruments at hand to implement its targets.
- The transmission and distribution grid is obsolete with practically no free capacity

Pellets

- Due to cross subsidising of the energy sector the cost of pellets and briquettes are very high and are therefore mostly exported
- Usage of Pellets from Agricultural Residues (Sunflower Husk)
- Imported equipment (e.g. from Denmark) is expensive and thus not attractive to investors
- The seasonal yield requires the construction of storage/warehouses (creating costs)

Biogas

- No major investments into biogas plants has been made in last years
- Imported components from the EU-15 for biogas plants are expensive
- The current stimulus in place for the selling of electricity from biogas and green certificates is not strong enough
- Investments in the combustion of Landfill gas are running – More investments could be applied with the attraction of Private Investors
- Biogas based on Biowaste will be increasing with the investments in the Waste Management (incl. Collection and Separation)

Overview of Developments in Bulgaria and Romania

Bioenergy in Bulgaria and Romania developed but still opportunities in Supply Chain and New Economy of Scale Technology

Raw Material

Forestry

- Infrastructure
- Investment along the Supply Chain

Agriculture

- Short Rotation
- Development of Agricultural Residues Usage

Waste

- Waste Management systems – Separation in Biowaste Collection

Technology

CHP

- Plants in Economy of Scales based on Agricultural residues

Pellets

- Agricultural Residues (Sunflower Husk etc.)

Biogas

- based on Biowaste and Landfill Gas