Ukraine

Market opportunities for bioenergy

In focus

Ukraine has a high potential to develop in agriculture and forestry; this offers different market opportunities for bioenergy. The growing biomass market in Ukraine already exports to Belgium, Denmark, France, Germany, Italy, Netherlands, and Poland.

- Strategic position at the crossroads between Europe and Asia; second-largest country in Europe;
- Ukraine has a largely undeveloped potential for the production of biomass feedstock;
- Ukraine is a large producer and exporter of agricultural commodities;
- Important exporter of wood pellets and rapeseed and sunflower feedstock for biodiesel production to Europe.

The Netherlands is an important partner of Ukraine. Biomass is one of the priority subjects for the Dutch-Ukrainian cooperation as stated in the Protocol of the Meeting of the Ukrainian-Netherlands Working Group on Agriculture. NL Agency Sustainable Biomass Programmes and NL Agency International EVD support entrepreneurs deploying sustainable bioenergy projects in Ukraine.

Potential markets: Key facts

Production biofuels
- Biodiesel: Approximately 100 ktons per year in 2011;
- Bioethanol: Around 420-470 ktons per year in 2011.

Production bioenergy
- Currently about 30 PJ/year of woody biomass for energy – mostly heat;
- Total production of pellets and briquettes jumped from 290 ktons (5.2 PJ) in 2009 to 640 ktons (11.4 PJ) in 2010. Most pellets and briquettes are produced, from sunflower husks. Briquettes are also produced from oak and pine wood. More than 90% of those pellets and briquettes are exported;
- Typical prices for wood pellets in 2010 varied from 70 to 100 EUR/ton; price gets higher when purchased closer to the west borders of Ukraine.

Key figures 2011

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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<tbody>
<tr>
<td>GDP</td>
<td>165 billion US$</td>
</tr>
<tr>
<td>GDP growth</td>
<td>5.2%</td>
</tr>
<tr>
<td>GDP per capita (PPP, current international)</td>
<td>7,300 US$</td>
</tr>
<tr>
<td>Contribution agriculture to GDP</td>
<td>9.4%</td>
</tr>
<tr>
<td>Inflation rate (consumer prices)</td>
<td>9.0%</td>
</tr>
<tr>
<td>Population</td>
<td>44.9 million people (July 2012)</td>
</tr>
</tbody>
</table>
Land use (Millions of Has)
- The total land area size of Ukraine is 57.93 Million Has;
- Of this, 70% is agricultural land (with 2.2 Million Has of irrigated lands), and 17% is forestry.

Key developments in Ukraine
Three steps characterize the typical bioenergy chain: feedstock production, logistics and conversion. Identification of their potential and limitations is crucial for a successful project.

1. Feedstock production

Biomass from forestry
- Current forest industry is relatively small-scaled;
- The Annual Allowable Cut ranged from 5.2 to 5.7 million m³ of commercial wood last decade. This is expected to increase by 10-15% for the next decade;
- While almost 40% of forest land is currently fully utilised,
- Some areas have considerable volumes of excess residues left in the forests.
- Annually only 0.9% of the total growing stock is harvested. Forest biomass is mainly available in the north and west of the country;
- Key harvested tree species are pine, followed by spruce, birch and alder.

Estimated forest potential in PJ (BEE study, 2010)

<table>
<thead>
<tr>
<th></th>
<th>Theoretical*</th>
<th>Technical**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stemwood</td>
<td>263.72</td>
<td>49.95</td>
</tr>
<tr>
<td>Primary forest residues</td>
<td>28.70</td>
<td>22.63</td>
</tr>
<tr>
<td>Secondary forest residues</td>
<td>19.82</td>
<td>16.50</td>
</tr>
<tr>
<td>Total</td>
<td>312.24</td>
<td>89.08</td>
</tr>
</tbody>
</table>

* Maximum amount of biomass available within biophysical limits
** Fraction of theoretical potential that is available within technological possibilities (e.g. processing techniques, infrastructure, and accessibility)

Biomass from Agriculture
- Ukraine is one of the six largest grain exporters of the world and a large producer and exporter of oilseeds, and sugar beets;
- Production of oilseed crops has increased considerably during last years;
- Agricultural biomass is concentrated in the central, south eastern and southern regions of the country;
- The estimated availability of land for energy crops is 4.7 million hectares of free land.

Biomass potential from energy crops in PJ
(Scientific Engineering Centre “Biomass”, 2011)

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<thead>
<tr>
<th></th>
<th>Theoretical</th>
<th>Technical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poplar, miscanthus, acacia, alder, willow, switch grass</td>
<td>345</td>
<td>293</td>
</tr>
<tr>
<td>Rape (straw)</td>
<td>54</td>
<td>38</td>
</tr>
<tr>
<td>Rape (biodiesel)</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Corn (biogas)</td>
<td>44</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>468</td>
<td>387</td>
</tr>
</tbody>
</table>
Estimated biomass potential from agricultural waste

- The major part of this potential is found in the central regions of Ukraine.

Potential of agricultural residues in PJ (BEE study, 2010)

<table>
<thead>
<tr>
<th></th>
<th>Theoretical</th>
<th>Technical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary agricultural residues</td>
<td>1135.52</td>
<td>415.05</td>
</tr>
<tr>
<td>Secondary agricultural residues</td>
<td>32.90</td>
<td>18.29</td>
</tr>
<tr>
<td>Manure (biogas)</td>
<td>90.87</td>
<td>68.09</td>
</tr>
<tr>
<td>Total</td>
<td>1,259.29</td>
<td>501.43</td>
</tr>
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</table>

Relevant trends and theoretical potential

- Biomass potential of Ukraine is considered as significant; total potential from forestry, energy crops and agricultural waste is approximately 1000 PJ;
- By 2020, 3 Mha (9% of current cultivated land) are expected to be used for lignocellulosic energy crops;
- Realizing its potential sustainably, Ukraine could satisfy 13-15% of the country’s demand in primary energy.

2. Logistics

Road transport

- Ukraine has a large road system with 165,844 km of paved roadways;
- Transportation costs for wood range from 1.1 to 1.9 €/km;
- Transportation difficulties exist in forest areas due to weak harvest infrastructure;
- Infrastructure improvements could reduce overall transport costs and ensure reliability of the supply chain.

Rail transport

- Extensive railway transport infrastructure with 21,684 km of railways.

Air transport, sea transport and waterways

- Ukraine has 179 airports with paved runways and 233 with unpaved runways;
- Main seaports in the coasts of the Black and Azov seas are: Feodosiya (Theodosia), Illichivsk, Mariupol, Mykolayiv, Odesa and Yuzhny;
- There are 2,185 km of waterways in Ukraine, most on Dnieper river.

3. Conversion

- Technology is generally imported; this results in an increase of start-up costs;
- Wood waste and wood chips are used in industrial boilers at forestry and woodworking companies;
- Primary agricultural residues are used for combustion in boilers, production of pellets and briquettes;
- More than 60 straw fired boilers are in operation at agricultural companies and schools in rural areas;
- Three large biogas plants generate power from manure, more biogas plants are under construction;
- Up to 200 small and medium-scale installations produce pellets and briquettes from residues;
- Bioethanol (2011): 6 small plants producing 50 ktons per year and 1 plant accounting for 120-150 ktons;
- Biodiesel (2011): 84 biodiesel installations.
Investment climate
• Ukraine appeared on the 2011 Ernst & Young Renewable Energy Country Attractiveness Indices, proving to be an attractive emerging market for renewable energy. Reasons given are attractive policies and good available potentials. On the other hand there is no systematic accumulation and dissemination of information between the different authorities.
• The European Bank for Reconstruction and Development also mentions that renewable energy prospects are considered as reasonably good. The Bank considers the uncertain economy, lack of financing and extreme bureaucracy as major impediments to the growth of renewables energies in Ukraine.

Triggers for investment
• Considerable biomass energy potential promoted by the Ukrainian government;
• Costs of forest residues, woodchips from short rotation, and energy crops are very competitive compared to western Europe;
• Interesting market for traders;
• There is a need for technology and know-how transfer.

Things to remember
• Strong local partnership is required;
• There is potential for local entrepreneurs but international competence is required;
• Define the project’s competitive edge;
• Ensure capital for long term investment projects;
• Obtain a full understanding of legal procedures and policies;
• Business culture is extremely diverse in Ukraine;
• Build up a network of contacts and understand your partners’ culture and position.

Projects funded by Sustainable Biomass Programmes
• Two sustainable biomass projects are supported by NL Agency:
  • The project “Pellets for power: Sustainable biomass import from Ukraine for the International Energy market” develops a sustainable business model for pelletizing agricultural residues and/or biomass crops in Ukraine for domestic and EU energy markets;
  • The project “Towards certified sustainable wood pellet production in Ukraine to export to the Netherlands” work towards sustainable produced wood pellets in the region of Vinnytsa.

Relevant other contacts
Contacts that can help companies entering the Ukrainian bioenergy market include:
• Netherlands Ukrainian Sustainable Energy Platform (NUSEP), http://www.nusep.org/
• Netherlands Embassy, http://ukraine.nlembassy.org/
• Ukrainian Agribusiness club, http://agribusiness.kiev.ua/

• Ministry of Economic Development and Trade of Ukraine, http://www.me.gov.ua
• Ministry of Agrarian Policy of Ukraine, http://www.minagro.kiev.ua
• Ministry of Ecology and Natural resources Ukraine, http://www.menr.gov.ua/
• Ministry of Regional Development, Construction and Utilities, http://www.minregion.gov.ua
• Ministry of Infrastructure, http://www.mintrans.gov.ua

Other relevant organizations:
• Deutsche Gesellschaft für Internationale Zusammenarbeit, http://www.giz.de
• Renewable Development Initiative, European Bank for reconstruction and development, http://www.ebrdrenewables.com
• Rotterdam Biomass Commodities Network, www.rbcn.nl
Projects supported by NL Agency Sustainable Biomass Programmes

Pellets for Power: Sustainable Biomass Import from Ukraine. Project experiences

Objectives:
- Develop a sustainable business model for pelleting biomass in Ukraine, for domestic and Dutch energy markets, in compliance with the RED and NTA 8080 sustainability requirements;
- Testing sustainability of reed harvesting and energy crop production on marginal land while avoiding Indirect Land Use Changes (ILUC).

Activities:
- Developing a business model based on 3 biomass sources (straw), reed and switchgrass;
- Conducting experiments with switchgrass cultivation on different qualities of soil;
- Sustainable reed harvesting, optimizing productivity whilst avoiding negative impact on environment and biodiversity;
- Testing the Dutch NTA 8080 sustainability standard for implementation and adaptation in Ukraine;
- Disseminate “best practices” for sustainable biomass production in Ukraine.

Why Ukraine?
With the Netherlands in transition towards the “biobased economy”, Ukraine has good potential to supply part of the required large volumes of biomass. Vast amounts of straw are produced in Ukraine as by-products of cereals and large areas of reed are available, as well as millions of hectares of unused and marginal land for energy crop production. Furthermore, the choice for Ukraine was based on available contacts with two companies, now partners in the Pellets for Power project.

What are the lessons learnt? (Advice to companies)
- Hire a local director in Ukraine (knows the culture, has contacts / network spot, speaks the language);
- Having a biomass project in Ukraine financed by a bank is not easy to achieve;
- Corruption and unreliability of companies and other organisations in Ukraine are bottlenecks that make it very difficult to set up agreements or arrangements.

Plans for the future
Based on the guidelines for sustainable biomass production developed in this project, the commercial project partners will continue developing functional and sustainable supply chains. They have started producing reed already and contacts will be established with potential customers in Poland and other EU Member States interested in biomass feedstock for energy production, or possibly for chemical processes.

Project experiences to go towards certified sustainable wood pellet production in Ukraine for export to the Netherlands

Objectives:
Aiming to work towards sustainably produced wood pellets in the Netherlands (FSC and NTA8080 certified). The raw material for wood pelleting - sawdust and waste wood - will be imported from Ukraine.

Benefits of the project:
The Van den Nagel bio-energy company is interested in buying certified sustainable biomass for electricity production. Since the Netherlands have limited potential to produce biomass, Van den Nagel bio-energy is extending its interest to other countries like Ukraine. Ukraine has a big potential to deliver certified sustainable biomass for the Dutch market given its extensive areas with forestry and agricultural production.

At first, the idea was to transport woodchips from Ukraine to the Netherlands. However, the sales price of woodchips is very low and therefore it appeared not profitable to import them to the Netherlands. Somewhat later Van den Nagel bioenergy hit upon the idea that it might be better to produce pellets from Ukrainian saw dust and waste wood in the Netherlands. Calculations showed that the end product would turn out to be more profitable. This is a win/win situation. Many saw mills in Ukraine throw away their waste (saw dust, branches and tops), because there is no market for it.

What are the lessons learnt? (Advice to companies)
- Make sure you have a reliable and English speaking local counterpart when doing business in Ukraine. Procedures and transactions are little transparent for western companies and communication is a challenge;
- At least for producers of solid biomass (e.g. pellets), first focus on local markets, as EU markets are difficult to find, for now.

Plans for the future
- Placing the pelleting unit in the Netherlands;
- Arranging for FSC certification of suppliers in Ukraine;
- Making sure that the available amount of biomass for energy in the Netherlands increases as a result of the project.
Relevant policies

### Energy and climate

- **Energy Strategy 2030**: Reduce dependence on natural gas, increase energy conservation and diversify energy resources.
- Wholesale electricity market has to purchase electricity from alternative energy sources under “green” rate; this is 0.12 €/kWh for biomass (2012); (Law on electrical power).
- Mechanisms regulating waste management are not robust.

### Transport

- Law of Ukraine on biofuels (2009) stimulates the production and consumption of gaseous, liquid and solid fuels from biomass for transport and other energy uses.
- License is required for trading biofuels (2010);
- Blending targets for the promotion of biofuels under development.

### Agriculture

- Moratorium on sales of agricultural land extended to January 1, 2013.

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### Public support for project development and bioenergy

#### Supporting sustainable biomass, Ukraine

There exists a range of tax exemptions to green energy companies and projects including:

- The law on the “green” tariff establishes feed-in tariffs for power production from renewable energy sources including biomass; biogas not included but expected in the future;
- The biofuels law exempts certain equipment from customs duties and import tax for producers and consumers of fuels produced from biomass;
- Incentive measures release biomass as a commodity from VAT in relation to its GHG abatement;
- A 75% land tax reduction on the purchase of land for green energy projects.

#### Supporting sustainable biomass, Netherlands

The Biomass Action Plan was developed within the Dutch-Ukrainian Project on Biomass and Biofuels. The Dutch government supports the Ukrainian Ministry of Agricultural Policy to implement the Biomass Action Plan, and to develop a sustainability certification system for biomass in Ukraine. This is accompanied with matchmaking for Business and R&D activities between Dutch and Ukrainian actors in the fields of biotechnology, biofuels and biomass.

### Role of innovation, science and technology

#### Key universities in Ukraine and cooperation programmes

- National Technical University of Ukraine “Kiev Polytechnic Institute”, http://inter.kpi.ua/
- Odessa National Polytechnic University, www.opu.ua/en
- Poltava State Agrarian Academy, www.pdaa.com.ua

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### Universities involved in NL Agency’s sustainable bioenergy programmes

- Alterra Wageningen University and Research Centre, http://www.alterra.wur.nl
- Saxion Research Centre for Urban & Environmental Development, http://www.saxion.edu/
- Utrecht University, www.uu.nl
- Agrotechnology & Food Sciences Group, Wageningen University, www.wur.nl

#### Biomass and sustainability

- As a result of the Chernobyl catastrophe, more than 3.5 Mha of forest land were radioactively contaminated and 157,000 ha being banned from any forest use.
- Sustainability certification for bioenergy is not considered in current legislation. Only contaminated wood is prevented to enter into the supply chain;
- Only a small portion of forest certification is done;
- The idea of sustainable development under the Programme for the Endorsement of Forest Certification (PEFC) is under debate in Ukraine;
- Biofuels are subject to obligatory quality certification. This experience may be used for later sustainability certification;
- To take into consideration when developing a project:
  - Potential competition between the use of residues for energy and for livestock;
  - Risk on depletion of organic matter and nutrients in soils because of straw removal.

### Initiatives:

- First EU accepted sustainability certificates (ISCC) are provided to Ukrainian biofuel producers.
NL Agency offers support

Knowledge centre
• Extensive knowledge and information is available to answer your questions on bioenergy, Ukraine and related topics. Project reports and presentations are available on request.

Support
• Various programmes are developed to support innovative pilot projects, joint investments, and transfer of technology, knowledge and skills in social and economic sectors.

Network
• Activities to exchange knowledge and information, and to establish links between new initiatives and private businesses in Ukraine, with Dutch companies.

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The NL Energie en Klimaat (Dutch Energy and Climate) division supports social development by working on energy and climate solutions for the future.