Central European Initiative
Ministerial Conference on Science and Technology
Biotechnology for Healthy and Active Life in CEI Region

Biofuels, energy security and health effects

ROMANIA, 26 October 2017 - Minsk, Belarus
Romania

- **Location**: Southeastern Europe, bordering the Black Sea, Bulgaria, Hungary, Moldova, Serbia, Ukraine (north), Ukraine (east); **Geographic coordinates**: 46 00 N, 25 00 E;

- **Area**: 238,391 sq km; **Land Boundaries**: total: 2,508 km;

- **Population**: 21,790,479 (July 2013 est.);

- **Ethnic groups**: Romanian 89.5%, Hungarian 6.6%, Roma 2.5%, Ukrainian 0.3%, German 0.3%, Russian 0.2%, Turkish 0.2%, other 0.4% (2002 census);

- **Government type**: republic; **capital**: Bucharest;

- **Religions**: Eastern Orthodox 86.8%, Protestant 7.5%, Roman Catholic 4.7%, other (mostly Muslim) and unspecified 0.9% (2002 census);

- **Natural resources**: petroleum (reserves declining), timber, natural gas, coal, iron ore, salt, arable land, hydropower.
The utilization of biofuels and other renewable fuels in order to replace petrol fuel and diesel fuel, & to contribute to certain objectives, such as:
1. the fulfilment of the commitments on climatic changes,
2. ensuring the security of supply compatible with the environment and
3. promoting the utilization of renewable energy sources.

The following signification:
- **BIOFUELS** – gas or liquid fuels used for transport, produced from biomass;
- **BIOMASS** – biodegradable part of products, waste and residue from agriculture, including vegetal and animal substances, forestry and related industries, the biodegradable part of urban and industrial waste;
- **other RENEWABLE FUELS** – renewable fuels, other than bio-fuels, coming from renewable energy sources;
- **ENERGY CONTENT** – lower calorific power of a fuel.
The BIOFUELS includes at least the following:

1. **BIOETHANOL** – ethanol produced from biomass and/or the biodegradable fraction of waste;
2. **BIODIESEL** – a methyl ester, of diesel quality, coming from vegetal or animal oil, to be used as biofuel;
3. **BIOGAS** – a fuel gas produced from biomass and/or from the biodegradable fraction of waste;
4. **BIOMETHANOL** – produced from biomass, to be used as biofuel;
5. **BIODIMETHYLETHER** – produced from biomass, to be used as biofuel;
6. **bio-ETBE** (*ethyl-tertio-butyl-ether*) – produced on the basis of bioethanol;
7. **bio-MTBE** (*methyl-tertio-butyl-ether*) – produced on the basis of biomethanol;
8. **synthetic BIOFUELS** – synthetic hydrocarbons/mixtures of synthetic hydrocarbons, produced from biomass;
9. **BIOHYDROGEN** – hydrogen produced from biomass and/or from the biodegradable fraction of waste;
10. **pure VEGETABLE OIL** – produced from oil plants through pressing, extraction or comparable procedures, crude or refined.

The national legislation, the Directive 2003/30/EC for promoting the use of bio-fuels and other renewable fuels for transport.
Biomass

The power in biomass (biochemical bond energy) is finally based upon the capacity of plants to transform light energy radiated onto plants by the sun via photosynthesis into biochemical energy.

Combustion or gasification of biomass burning is the process of transforming the bio-chemical binding energy into heat energy and hence represents an indirect utilisation of sun energy (bio energy).

**Source of energy**

- Thin wood
- Remainder wood
- Remainder wood from sawmills
- Industrial remainder wood
- Wood pellets
- Grain plants
- Straw, hay from landscape-management
- Other energy plants
The energy cycle of renewable resources

‘biomass’ resources are the biodegradable fraction of products, wastes and residues from agriculture, forestry and related industries as well as the biodegradable fraction of industrial and municipal wastes.
Example of pyrolysis drop in facility:

Biofuels, energy security and health effects
Arhitectura trebuie să conțină:

- Procesor Pentium III sau mai nou, la frecvență de minimum 500 MHz (recomandat 800 Mhz)
- Minimum 128 MB RAM
- Partea video: 1024 x 768 VGA cu True Color (minimum) și adaptor care să suporte această rezoluție
- Minimum 300 MB liberi pe HDD pentru instalare
- Mouse, trackball sau alt dispozitiv de punctare
- Unitate de CD (utilă doar la instalare)

Elemente hardware opționale:

- Adaptor video Open GL – compatibil 3D
- Imprimantă sau plotter
- Digitizor
- Modem sau acces la o conexiune Internet
- Placă de rețea

Biofuels, energy security and health effects

Biomass potential in Romania

Sursa: IINL, 2006
Romanian Biomass Potential

Fig.1. Potențialul biomasei în România (pe județe)
Absorption de CO2 par les plantes lors de leur croissance

Culture des plantes (Tournesol, colza, betteraves, blé, maïs...)

Atmosphère

Emission de CO2

Véhicules à moteur diesel et essence

Huile végétale et éthanol

Biodiesel et bioéthanol
Ethical Principles and their application through policy

Principle 1: Biofuels development should not be at the expense of people’s essential rights (including access to sufficient food and water, health rights, work rights and land entitlements).

Principle 2: Biofuels should be environmentally sustainable; Policies are needed to investigate the application of biotechnologies for genetic improvement of crops where this has the potential to support the environmental performance of biofuels production, with appropriate regulatory oversight.

Principle 3: Biofuels should contribute to a net reduction of total greenhouse gas emissions and not exacerbate global climate change.

Principle 4: Biofuels should develop in accordance with trade principles that are fair and recognise the rights of people to just reward (including labour rights and intellectual property rights).
Point of view

- Green Energy Investors (developing technologies for producing and using green energy)
- Agriculturists / farmers
- Large food companies
- The car industry
- General public – including local administration - producing biofuels locally
- Oil companies
Romanian territory is 40% agricultural land and 27% forest areas.

- The share of biomass in the total energy of the country is almost 10%.
- The largest part of the biomass is used for heating purposes, home use for cooking and hot water preparation.
- About 95% of the biomass currently used is firewood and agricultural waste, the rest is wood waste from industrial processes.
Biomass production potential in Romania

Biomass potential – the Romanian territory has been organized in 8 potentially bio-energy production regions

- 1. Danube Delta
- 2. Dobrogea
- 3. Moldova
- 4. Carpathian mountains
- 5. Transylvanian plateau
- 6. The Western Plain
- 7. Subcarpahians
- 8. The South Plain

source of information ICEMENERG, 2007
Animatii

Problema

Si versiunile mai vechi de AutoCAD includ functii de realizare a unor imagini statice informative, dar clienti doresc in general mai mult. Ei vor efecte video care prezinta intr-un mod dinamic elementele proiectului propus. Isi doresc sa "mearga" virtual prin sau in jurul proiectului, fara a fi constransi la o singura vederi.

Versiunile precedente de AutoCAD nu includ astfel de functii care sa permita proiectantului sa-invite clientul sa faca un tur virtual al proiectului, sau sa inregistreze o animatie a proiectului pe care sa o trimita clientului spre analiza.

Solutia

Folosind functiile de animatie "Walk" si "Path" din AutoCAD 2007, un proiectant poate stabili punctele de interes dintr-un model ca apoi sa creeze un traseu sau o simpla plimbare pe langa punctele de interes pentru a realiza un fisier de animatie care sa fie apoi distribuit.

Proiectantul poate sa foloseasca aceste functii intr-un mod dinamic pentru a oferi pe viu clientului un tur al proiectului.

Biofuels, energy security and health effects

Biomass potential in Romania

Sursa: INL, 2006
Lumini, materiale si randare

Problema
O iluminare corespunzatoare poate imbunatatii in mod dramatic efectul unei imagini randate, schimband complect aspectul si senzatia conferita de un desen.

In versiunile precedente de AutoCAD este dificila pozitionarea cu acuratete a unei lumini intr-un desen si sa apreciezi cum va afecta o imagine inainte ca aceasta sa fie randata.

Afisarea corect a materialelor este un alt element crucial pentru a te asigura ca imaginea randata va avea impactul scontat.

Chiar si dupa aplicarea corespunzatoare a luminilor si texturilor, ajustarea parametrilor asociati cu o randare reusita poate fi un proces complex.

Randarile sunt procese eficiente atat pentru investigarea alternativelor de proiect cat si pentru a prezenta clientului, sau comisiei de aprobare, efectul proiectului asupra mediului in care se afla.

Solutia

Noua functie interactiva de iluminare din AutoCAD 2007 permite utilizatorilor sa placeze rapid si cu acuratete intr-un desen lumini indepartate, punctiforme sau in fascicul. Dupa ce sursa de lumina a fost pozitionata, proiectantii pot stabili aria de iluminare acolo unde o doresc. In urma pozitionarii luminilor proiectantii pot vedea in timp real efectul acestea asupra umbrelor, fara a trebui sa randeze intai imaginea.

In AutoCAD 2007, aplicarea texturilor pe un model este la fel de usoara precum aplicarea sistemelor de hasurare in 2D. Utilizatorii “trag” materialele dintr-o librarie predefinita pe orice fata de solid sau suprafata definita a modelului. Materialele se ajusteaza automat la scara, fara a fi necesara o ajustare manuala functie de marimea modelului. Daca in libraria de materiale nu sunt gasite materialele dorite, proiectantii pot utiliza noul editor de materiale pentru a edita materialul si a crea o librarie customizata.

AutoCAD 2007 incorporeaza cea mai noua tehnologie de randare, motorul de randare "mental ray®". Aceasta puternica tehniologie (incorporata si in alte produse Autodesk precum Autodesk® 3ds Max®) a fost integrata intr-o nou interfata de utilizator care parmite realizarea facila a unor randari exacte si realiste.

---

Biofuels, energy security and health effects

---

Biomass potential in Romania

---

Counties, towns and communes with high agricultural biomass potential and high potential for the development for biofuel production:

- Brăila - 1 towns, 40 communes
- Buzău - 1 towns, 80 communes
- Constanța - 2 towns, 54 communes
- Galați - 2 towns, 56 communes
- Tulcea - 4 towns, 44 communes
- Călărași - 2 towns, 48 communes
- Dâmbovița - 4 towns, 78 communes
- Giurgiu - 2 towns, 47 communes
- Ialomița - 1 towns, 50 communes
- Teleorman - 84 communes
- Mehedinți – 4 towns, 59 commune
- Arad - 3 towns, 66 communes
- Timișoara - 73 communes
- Bihor - 7 towns, 90 communes

---

Counties with high wooden biomass and having no town heating system:

- Neamț - 2 towns, 69 communes
- Suceava - 2 towns, 99 communes
- Arad - 3 towns, 66 communes
- Caraș – Severin - 6 towns, 69 communes
- Hunedoara - 5 towns, 54 communes
- Bihor - 7 towns, 90 communes
- Bistrița – Năsăud - 3 towns, 56 communes
- Maramureș - 6 towns, 64 communes
- Alba - 4 towns, 65 communes
- Brașov - 5 towns, 45 communes
- Covasna - 2 towns, 34 communes
- Harghita - 3 towns, 52 communes
- Mureș - 5 towns, 85 communes
Biomass potential in Romania
Biofuels in Romania
challenges
and
opportunities
**Potential for Biofuels production in Romania**

<table>
<thead>
<tr>
<th>Nr</th>
<th>Region</th>
<th>Forest Biomass</th>
<th>Wood byproducts</th>
<th>Agricultural Biomass</th>
<th>BIOGAS</th>
<th>Urban waste</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>x 1000 t/year</td>
<td>x 1000 t/year</td>
<td>x 1000 t/year</td>
<td>TJ</td>
<td>x 1000 t/year</td>
<td>TJ</td>
</tr>
<tr>
<td>I</td>
<td>Danube Delta</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>54</td>
<td>19</td>
<td>844</td>
<td>71</td>
<td>182</td>
<td>29.897</td>
</tr>
<tr>
<td></td>
<td></td>
<td>451</td>
<td>269</td>
<td>13.422</td>
<td>1.477</td>
<td>910</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Dobrogea</td>
<td>166</td>
<td>58</td>
<td>2.332</td>
<td>118</td>
<td>474</td>
<td>81.357</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.728</td>
<td>802</td>
<td>37.071</td>
<td>2.462</td>
<td>2.370</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Moldova</td>
<td>1.873</td>
<td>583</td>
<td>1.101</td>
<td>59</td>
<td>328</td>
<td>65.415</td>
</tr>
<tr>
<td></td>
<td></td>
<td>19.552</td>
<td>8.049</td>
<td>17.506</td>
<td>1.231</td>
<td>1.640</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>Carpathians</td>
<td>835</td>
<td>252</td>
<td>815</td>
<td>141</td>
<td>548</td>
<td>43.757</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8.721</td>
<td>3.482</td>
<td>12.956</td>
<td>2.954</td>
<td>2.740</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>Transilvanian</td>
<td>347</td>
<td>116</td>
<td>1.557</td>
<td>212</td>
<td>365</td>
<td>60.906</td>
</tr>
<tr>
<td></td>
<td>Plateau</td>
<td>3.622</td>
<td>1.603</td>
<td>24.761</td>
<td>4.432</td>
<td>1.825</td>
<td></td>
</tr>
<tr>
<td>VI</td>
<td>West Plain</td>
<td>1.248</td>
<td>388</td>
<td>2.569</td>
<td>177</td>
<td>1.314</td>
<td>110.198</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.034</td>
<td>5.366</td>
<td>40.849</td>
<td>3.693</td>
<td>6.570</td>
<td></td>
</tr>
<tr>
<td>VII</td>
<td>Subcarpathians</td>
<td>204</td>
<td>62</td>
<td>3.419</td>
<td>400</td>
<td>1.350</td>
<td>126.639</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.133</td>
<td>861</td>
<td>54.370</td>
<td>8.371</td>
<td>6.750</td>
<td></td>
</tr>
<tr>
<td>VIII</td>
<td>South Plain</td>
<td>4.727</td>
<td>1.478</td>
<td>12.637</td>
<td>1.178</td>
<td>4.561</td>
<td>518.439</td>
</tr>
<tr>
<td></td>
<td></td>
<td>49.241</td>
<td>20.432</td>
<td>200.935</td>
<td>24.620</td>
<td>22.805</td>
<td></td>
</tr>
</tbody>
</table>

*Biofuels, energy security and health effects*
Some historical data

- 1978-1989
  - 32 industrial installations
  - 5169 small and middle size installations for family farms and cooperatives all over the country
- 1974 - National program: Research and implementation of new energy resources
- 1975 - Pilot facility for animal waste with a capacity of 30 m³/day
- 1978 - Biogas facilities build for waste water treatment - capacity 2000 m³/day
- 1979 – Pilot plant for biogas production from pig manure with a capacity of 580 m³/day
- 1979 - Development of small capacities (home-use) for biogas production. Capacity 5-10 m³ but also 20, 30, 40 and 50 m³/day
- 1980 - Almost all major cities had biogas production systems. The total biogas production capacity was reported to be of 85000 m³ biogas/day (30 million m³ per year).
- 1982 - Anaerobic digestion of biodegradable wastes from pig farms. Typical capacities around 7000-8000 m³/day

Conclusion: over 400 facilities developed with a total energy production of 0.18 TW h/year but no data on their efficiency.
Biofuels investments in Romania - Biogas

- Investments for biogas production started after 2007
  - Ațel – biogas plat from corn – 1Mkw/h
  - Siromex- Baia Mare – 10milion Euros invested in a biogas plat - 3.800 / day used for the concrete production, an oil factory and house heating
  - Suceava- Joint Implementation program with the support of the Danish government – the DEPA agency (Environmental Danish Agency) and the ministry of Agriculture, Forest and Rural Development of Romania, mediated by the Grue Hornstrup consulting company-Denmark
  - Bihor - CEFA – 1000 homes heated by swamp biogas
  - Botosani in Botosani county - 30 millions Euros investment for biogas produced from municipal waste – Swedish company involved.
Biofuels investments in Romania - Biogas

- **Baia Mare** – Biogas plant using 112 t of molasses producing 2000 m$^3$ used for the production of alcohol in the local distillery.
- **Dolj county** - Mischie commune – producing 1200 m$^3$ - Biogas from pig manure and organic residues.
- **Bihor county** – biogas production unit of 6000 m$^3$ - investment stopped at 80%.
- **Buftea near Bucharest** - biogas production unit of 3000 m$^3$ – investment stopped at 75%.
- **CarmOlimp company** is waiting from 1 year the response of authorities for starting the construction of a biogas plant.
Biofuels investments in Romania - Biodiesel

Over 30 large companies producing biodiesel

- BRD - Groupe Societe Generale and the Portuguese bank Caixa Geral invested 25,1 milions Euros in the Martifer group project in Romania – which is now producing biodiesel
- Ultex Tandarei – producing Biodil
- Argus Ramnicu Valcea
- Chemision
- Autoelite Baia Mare,
- Ulerom, Argus Contanta, Rompetrol, Petrom,
Biofuels investments in Romania - Bioetanol

- Over 10 major investments in bioetanol plants
- All alcohol plants can produce etanol (D. Obrogeanu, Argus company producing biodiesel)
## European Norm EN 14214 / Biodiesel

<table>
<thead>
<tr>
<th>Properties</th>
<th>Units</th>
<th>Min.</th>
<th>Max.</th>
<th>Test methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density at 15°C</td>
<td>kg/m³</td>
<td>860</td>
<td>900</td>
<td>EN ISO 3675, EN ISO 12185</td>
</tr>
<tr>
<td>Cetane number</td>
<td></td>
<td>51,00</td>
<td>-</td>
<td>EN ISO 5165</td>
</tr>
<tr>
<td>Kinematic viscosity at 40°C</td>
<td>mm²/s</td>
<td>3,50</td>
<td>5,00</td>
<td>EN ISO 3104</td>
</tr>
<tr>
<td>Flash point</td>
<td>°C</td>
<td>101</td>
<td>-</td>
<td>ISO / CD 3679</td>
</tr>
<tr>
<td>Carbon residue (on 10% distillation residue)</td>
<td>% wt.</td>
<td>-</td>
<td>0,30</td>
<td>EN ISO 10370</td>
</tr>
<tr>
<td>Oxidation stability at 110°C</td>
<td>hrs</td>
<td>6</td>
<td>-</td>
<td>pr EN 14112</td>
</tr>
<tr>
<td>Copper strip corrosion (3h at 50°C)</td>
<td>rating</td>
<td>Class 1</td>
<td>-</td>
<td>EN ISO 2160</td>
</tr>
<tr>
<td>Esters</td>
<td>% wt.</td>
<td>96,50</td>
<td>-</td>
<td>EN 14103</td>
</tr>
<tr>
<td>Water</td>
<td>mg/kg</td>
<td>-</td>
<td>500</td>
<td>EN ISO 12937</td>
</tr>
<tr>
<td>Sulphated ash</td>
<td>% wt.</td>
<td>-</td>
<td>0,02</td>
<td>ISO 3987</td>
</tr>
<tr>
<td>Sulphur</td>
<td>mg/kg</td>
<td>-</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Acid value</td>
<td>mg KOH/g</td>
<td>-</td>
<td>0,50</td>
<td>pr EN 14104</td>
</tr>
<tr>
<td>Iodine value</td>
<td></td>
<td>-</td>
<td>120</td>
<td>pr EN 14111</td>
</tr>
<tr>
<td>Methyl linolenate</td>
<td>% wt.</td>
<td>-</td>
<td>12,00</td>
<td>pr EN 14103</td>
</tr>
<tr>
<td>Polyunsaturated methyl esters</td>
<td>% wt.</td>
<td>-</td>
<td>1,00</td>
<td>-</td>
</tr>
<tr>
<td>Methanol</td>
<td>% wt.</td>
<td>-</td>
<td>0,20</td>
<td>pr EN 14110</td>
</tr>
<tr>
<td>Glycerides</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monoglycerides</td>
<td>% wt.</td>
<td>-</td>
<td>0,80</td>
<td>pr EN 14105</td>
</tr>
<tr>
<td>Diglycerides</td>
<td>% wt.</td>
<td>-</td>
<td>0,20</td>
<td>-</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>% wt.</td>
<td>-</td>
<td>0,20</td>
<td>-</td>
</tr>
<tr>
<td>Free glycerol</td>
<td>% wt.</td>
<td>-</td>
<td>0,02</td>
<td>-</td>
</tr>
<tr>
<td>Total glycerol</td>
<td>% wt.</td>
<td>-</td>
<td>0,25</td>
<td>-</td>
</tr>
<tr>
<td>Alkaline metals (Na, K)</td>
<td>mg/kg</td>
<td>-</td>
<td>5</td>
<td>pr EN 14108, pr EN 14109</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>mg/kg</td>
<td>-</td>
<td>10</td>
<td>pr EN 14107</td>
</tr>
<tr>
<td>Total contamination</td>
<td>mg/kg</td>
<td>-</td>
<td>24</td>
<td>EN 12662</td>
</tr>
</tbody>
</table>
GLOBAL SECOND GENERATION BIOFUELS (ADVANCED BIOFUELS) MARKET
Segmentation and Forecast (2013 - 2020)

**Global 2G Biofuels Market**
Global 2G biofuels market is expected to reach **12.2 MGY** by 2020.

Growing at a CAGR of **52.4%** (2013-2020)

**Global 2G Biofuels Market, by Fuel Type**
- Cellulosic Ethanol
- Biodiesel
- Biobutanol
- BioDME
- Others

The Volume Comparison (2020)

**Global 2G Biofuels Market, by Geography**
- Asia-Pacific is the fastest growing segment
  - By Volume (2014-2020)
- LAMEA, North America, Europe

**Global 2G Biofuels Market, by Feedstock**
- Simple Lignocellulose
- Complex Lignocellulose
- Syngas/ Biomass/ MSW
- Algae
- Other feedstock

**Top Impacting Factors**
- Increasing Foreign investment in the developing countries
- High efficiency to create clean market
- Economical support for business establishment
- Increasing global bioenergy potential
- Energy Independence
- High initial capital investment for cellulosic ethanol
- Favorable administrative regulation and policies
- Sequential decision issue of Bio DME
- For More Details See Table of Contents
Biofuel demand by region 2010-50

Note: FSU = Former Soviet Union.
Source: IEA, 2010c.
# Green energy potential

<table>
<thead>
<tr>
<th>Product</th>
<th>Volume (m³)</th>
<th>Weight (t)</th>
<th>Biogas (m³)</th>
<th>Electricity (Kwh)</th>
<th>Heat energy (Kwh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle sewage</td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>27</td>
<td>54</td>
</tr>
<tr>
<td>Cattle manure</td>
<td>1</td>
<td>0.3</td>
<td>10.1</td>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>Pig sewage</td>
<td>1</td>
<td>1</td>
<td>15.6</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>Pig manure</td>
<td>1</td>
<td>0.3</td>
<td>23.5</td>
<td>42</td>
<td>94.8</td>
</tr>
<tr>
<td>Bird sewage</td>
<td>1</td>
<td>1</td>
<td>44.5</td>
<td>80</td>
<td>160</td>
</tr>
<tr>
<td>Bird droppings</td>
<td>1</td>
<td>0.3</td>
<td>29.3</td>
<td>52</td>
<td>105</td>
</tr>
<tr>
<td>Sheep manure</td>
<td>1</td>
<td>0.3</td>
<td>21.1</td>
<td>38</td>
<td>76</td>
</tr>
<tr>
<td>Horse manure</td>
<td>1</td>
<td>0.3</td>
<td>18.9</td>
<td>34</td>
<td>68</td>
</tr>
<tr>
<td>Stover</td>
<td>1</td>
<td>0.025</td>
<td>67.6</td>
<td>121</td>
<td>243</td>
</tr>
<tr>
<td>Ensiled grass</td>
<td>1</td>
<td>0.5</td>
<td>89</td>
<td>150</td>
<td>320</td>
</tr>
<tr>
<td>Hay</td>
<td>1</td>
<td>0.35</td>
<td>137.8</td>
<td>248</td>
<td>498</td>
</tr>
<tr>
<td>Clover</td>
<td>1</td>
<td>0.3</td>
<td>64</td>
<td>116</td>
<td>230</td>
</tr>
<tr>
<td>Straw</td>
<td>1</td>
<td>0.04</td>
<td>12</td>
<td>21</td>
<td>49</td>
</tr>
<tr>
<td>Cornstalks</td>
<td>1</td>
<td>0.4</td>
<td>123.8</td>
<td>222</td>
<td>446</td>
</tr>
<tr>
<td>Apple waste</td>
<td>1</td>
<td>0.3</td>
<td>2.8</td>
<td>4.8</td>
<td>9.4</td>
</tr>
<tr>
<td>Molasses</td>
<td>1</td>
<td>0.3</td>
<td>66.4</td>
<td>123</td>
<td>246</td>
</tr>
<tr>
<td>Whey</td>
<td>1</td>
<td>1</td>
<td>15.3</td>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>Vegetable waste</td>
<td>1</td>
<td>0.4</td>
<td>14.5</td>
<td>26</td>
<td>52</td>
</tr>
<tr>
<td>Tomato peel</td>
<td>1</td>
<td>0.4</td>
<td>29.8</td>
<td>53.8</td>
<td>107</td>
</tr>
<tr>
<td>Oil mill waste</td>
<td>1</td>
<td>0.5</td>
<td>357</td>
<td>642.6</td>
<td>1286</td>
</tr>
<tr>
<td>Citrus paste</td>
<td>1</td>
<td>0.3</td>
<td>36.8</td>
<td>65.8</td>
<td>131.7</td>
</tr>
</tbody>
</table>
Share of wind in total gross electricity generation in the EU Member States, 2016 (%)
Some conclusions

- In 2007 the biodiesel produced in Romania was 10-12% cheaper than diesel. Romanian producers are looking for a national standard for biodiesel quality in order to be more permissive about the iodine concentration in plant oil used for biodiesel production.

- In 2009 the decrease of the crude oil price made the production of biodiesel less profitable thus some companies put their production on hold.

- We are producing biofuels but we have no filling station.

- Lack of end users: car dealers, local public transportation, etc.

- Increase the public awareness on biofuels (which should be started in agricultural universities, through pilot stations).
Disseminating the information about biofuels

- Two EU funded projects on biofuels – funded by the IEE
  - BIOMOTION
  - BiG-East - Project number: EIE/07/214
- 14ALLBio - a European Project funded by the European Commission under the 6th Framework Programme aiming to develop a Development Capacity Index (DCI) covering two years to inform policy makers about the exploitative potential of the biotech sector in New EU Member States and Candidate Countries. (www.14allbio.eu)
For the future

- Promoting new regulation for the sanitation of biodegradable debris/sewages/municipal waste etc. in favor for the biogas and fertilizer production
- Joint actions between the Ministry of Agriculture, Ministry of Industry and Ministry of Energy and the Ministry of Transportation for supporting biofuels production and use on the Romanian market.
- A more sustained information of local authorities and end users about biofuels.
- Promoting bioenergy production and use in universities and schools.
- Informing the general public on the benefits of producing biofuels and bioenergy.
- Identification of the existing equipments and improve their efficiency.