WP 4.2.4

Study on Biomass Trade in Italy

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1 Available biomass potential

Italy is largely dependent on foreign energy supplies. This dependence account for over 80% of the total Italian energy demand of 192 Mtoe (2008). The contribution of renewable energy sources (including hydroelectric power) to the last years national energy budget amounted to about 9%, of which 1/3 came from biomass [ENEA, Rapporto Energia e Ambiente 2008].

Biomass commonly used in Italy for the production of electric and/or thermal energy consist mainly of forest, agricultural and agro-industrial residues; for these types of biomass, formed by discards and by products of heterogeneous productive activities, it is quite difficult to give a precise quantification, therefore it is impossible to know the availability on the market of energy.

In the biomass thermal energy sector, the most important contribution comes from the use of fire wood in the households (over 50,000 TJ/y) and in industry (over 40,000 TJ/y), while it is estimated a production of 15,000 TJ/y by means of cogeneration plants; more limited the heat production by means of district heating plants (about 2,000 TJ/y).

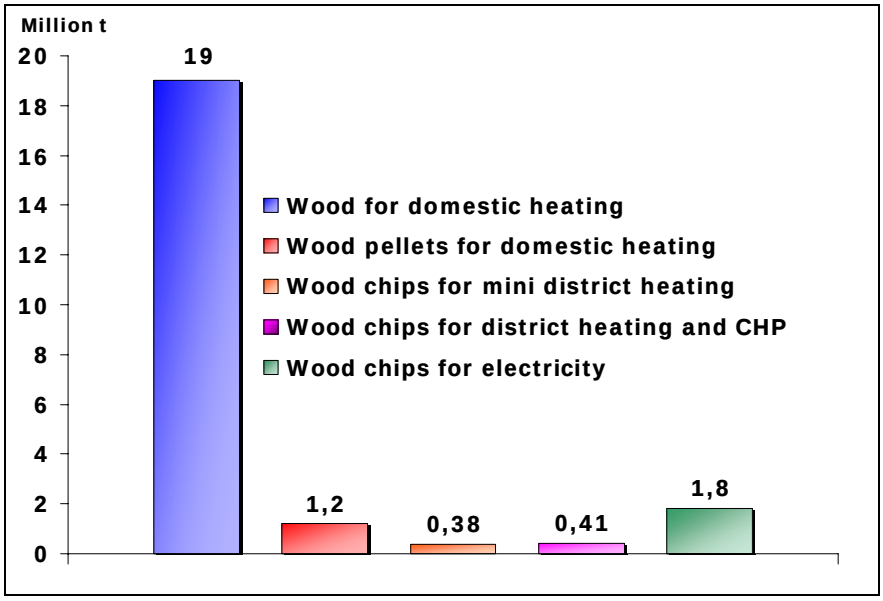
As regards the Italian biomass chain for the production of electric energy, so far it represents an important reality in the sector. In fact this chain is strong of about 50 plants, with a total net installed power of nearly 400 MWe and an annual biofuel consumption estimated around 4.5 Mt (as received).

The fuel is generally chipped wood of various quality but also agro-industrial residues, as rice husk or nut shells, vinasse and olive cake, are widely utilized. It is important to underline that the biomass origin is not always national, but there are sensible ligno-cellulosic biomass import from abroad, mostly for the plants located in the south of the Country.

The quantification of the wood consumption for energy purposes in Italy is an extremely complex operation, because it does not exist any survey that is sufficiently reliable, in particular for what it concerns the household usages. These biomass quantities are only estimable, due to the role of self-supply and the short-distance trade.

A survey carried out by AIEL (Italian Association for Wood Energy) in 2009 gave estimates about 22,8 Mt of total woody biomass, of which about 19 Mt (83%) consumed only by the Italian families for domestic heating.

Fuel wood utilisation in Italy (2009)



Source: AIEL, 2009

According to a recent survey carried out by ITABIA (Italian Biomass Association), the annual quantity of residue biomass (from agriculture, forestry, agro-industry, wood industry and urban waste) amounts to more than 25 million tons of dry matter (it doesn't take into account significant quantities of biomass, which is today inaccessible due to economic, logistical or market reasons).

In terms of energy content this quantity of available biomass, with also animal manure and potential energy crops, can be summarized with good approximation in the values of the table below, that are expressed in millions of equivalent tons of oil (Mtoe/year).

Biomass	Potential Mtoe/year
Residues from agriculture and agro-industry	5
Forestry and wood industry	4.3
Urban solid waste	0.3
Animal breeding	10-12
Firewood	2-4
Energy crops (potential)	3-5
Total	**24-30**

Source: ITABIA, Goals of Bioenergy in Italy Report 2008. Key elements for 2020 objectives

The estimated quantity of available waste derived from herbaceous and woody plants (excluding the share of existing but not suitable residues) amounts to approximately 9.3Mt/year of dry matter.

Crops	Agricultural residues	Potential (kt/year of d.m.)
Wheat	straw	2,100
Barley	straw	380
Oats	straw	120
Rice	straw	550
Maize	stalks/cops	3,100
Grapevine	shoots	880
Olive tree	wood, branches, fronds	800
Orchard	branches	1,010
Total	straw, stalks, stems, leaves, etc.	**9,300**

Source: ITABIA, Goals of Bioenergy in Italy. Report 2008
Key elements for 2020 objectives

The annual quantity of forest biomass that can be used for energy purposes would amount to around 13 million tons of wet matter, without reducing forest consistency which corresponds to about 6.5 millions of tons expressed in dry matter.

Type of woodland	Forest biomass	Potential (kt/year of d.m.)
High forests (broad -leaved trees, conifers)	Branches, tops and small residues	1,800
Coppice woodlands (simple, compound)	Whole plant	4,700
Total		**6,500**

Source: ITABIA, Goals of Bioenergy in Italy. Report 2008
Key elements for 2020 objectives

The availability of residues from the agro-industry and wood industry is significant in terms of energy content. The overall availability of industrial residues, expressed as dry matter, amounts to around 8.4 Mt/year, of which 3.9 Mt come from agro-industry and 4.5 Mt/year from the wood industry.

Sector agro-industry	Types of waste	Potential (kt/year of d.m.)
Agro-Industry		
Sugar refinery	Molasses, dry pulp, sludge	1,570
Tomatoes	Peels and seeds	135
Citrus fruit	Pulp and peel	210
Fresh fruit	Stones	35
Dried fruit	Peels	135
Flour milling	Bran	185
Pasta industry	Part breaking off	60
Rice industry	Husk, chaff, starch, green grains, broken parts	520
Oil	Virgin residues, exhausted residues	750
Wine	Virgin pomace, exhausted pomace, grape stalks	300
Total		**3,900**
Wood Industry		
Primary wood processing	Barks, wane, etc.	2,500
Secondary wood processing	Sawdust, woodchips, etc	1,700
Paper industry	Pulp-paper, pulper	300
Total		**4,500**

Source: ITABIA, Goals of Bioenergy in Italy. Report 2008
Key elements for 2020 objectives

According to a recent estimate by ENEA contained in the Atlante Nazionale delle Biomasse, Italy has a huge energy potential that could derive from the anaerobic digestion of the organic fraction of municipal waste (OFMSW) and from cattle and pig manure.

The energy potential from OFMSW was about 1,330 millions Nm^3 biogas in 2006, considering not only the humid fraction of municipal waste from separate waste collection, but also the residual fraction from the undifferentiated waste, to be potentially recovered or otherwise destined to the landfill.

The national energy potential from cattle and pig manure, taking into account also small breedings, is about 1,827 millions Nm^3 biogas.

Organic waste	Biogas potential (10^6Nm3)
Organic fraction of municipal solid waste	1,330
Cattle and pig manure	1,827
Total	**3,157**

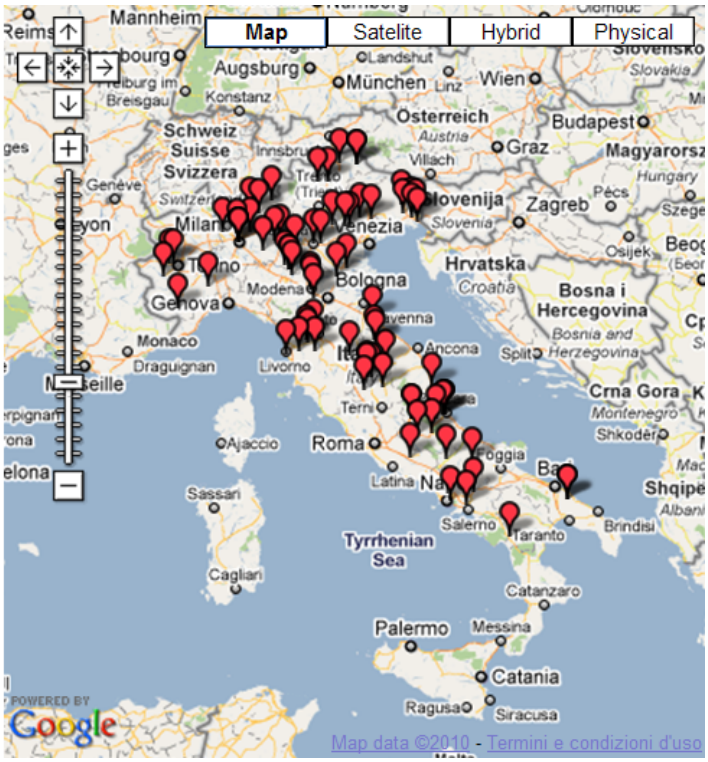
Source: ITABIA, Goals of Bioenergy in Italy. Report 2008 Key elements for 2020 objectives

Dedicated crops are limited to a few thousand hectares of sunflower, soy and rapeseed for biodiesel and a few thousand hectares of poplars (Short Rotation Forestry, SRF) in Northern Italy.

2 Installed pellets/other solid capacities, pellet consumption, import and export

Currently, in Italy there are 85 pellet manufacturers that are manly of small to medium size [www.pelletsatlas.info].

Most of them use their own sawmill residues (sawdust, shavings etc.) as raw material and sell the pellets inside their region where the plants are located.



Source: www.pelletsatlas.info

The annual pellet consumption has grown from 150,000 in 2001, to approximately 850,000 tons in 2008, such as the production has grown from 160,000 tons in 2001 to approximately 650,000 tons in 2008.

All the pellets produced in Italy is sold entirely into the national borders, especially in the Northern regions, main concentration area for pellet production and consumption. It is to be underlined that there is no pellets export, while the import level resulted in 2008 over 200,000 tons.

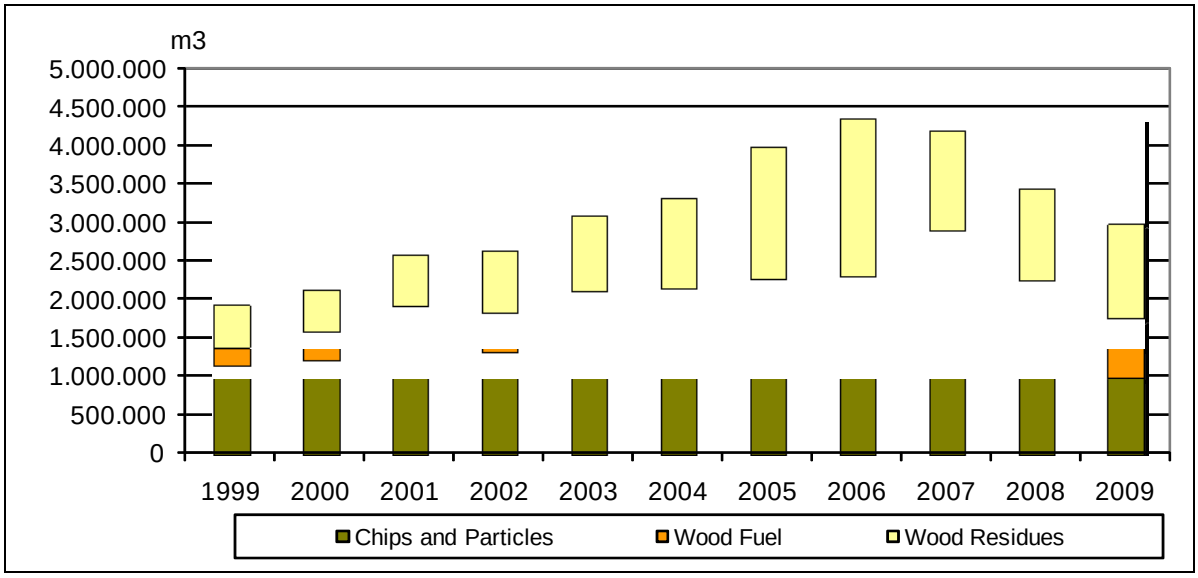
Due to shortage of raw material the Italian producers are forced to get the raw material from foreign countries, especially the Balkans, Romania and Bulgaria, or pellets from Austria, Germany and Slovenia.

The price of pellet in Italy is very volatile and depends on the season, with the peak cost in middle to late winter and the lowest cost during late spring and summer. The average price of pellet in 2008 are 160 to 210 €/t wholesale and 260 to 310 €/t retail.

Italy is one of the first countries importing wood biomass. Import growth was parallel to the progressive entry into operation of thermal power plants fired with wood biomass in the years around 1990 and 2000.

A significant amount of the solid ligno-cellulosic biomass demand is filled by imports from foreign countries, often very far away by ship.

Import of chips and particles, wood fuel and wood residues in Italy (1999-2009)



Source: FAO, Forestry database, 2010

Production and trade of chips and particles, wood fuel and wood residues in Italy (2008-2009)

	2008			2009		
	Production (m3)	Import (m3)	Export (m3)	Production (m3)	Import (m3)	Export (m3)
Chips and Particles	530,000	979,000	3,205	420,000	1,146,000	2,564
Wood Fuel	5,673,342	782,000	663	4,980,501	954,000	530
Wood Residues	250,000	1,222,000	11,870	200,000	1,417,000	9,496

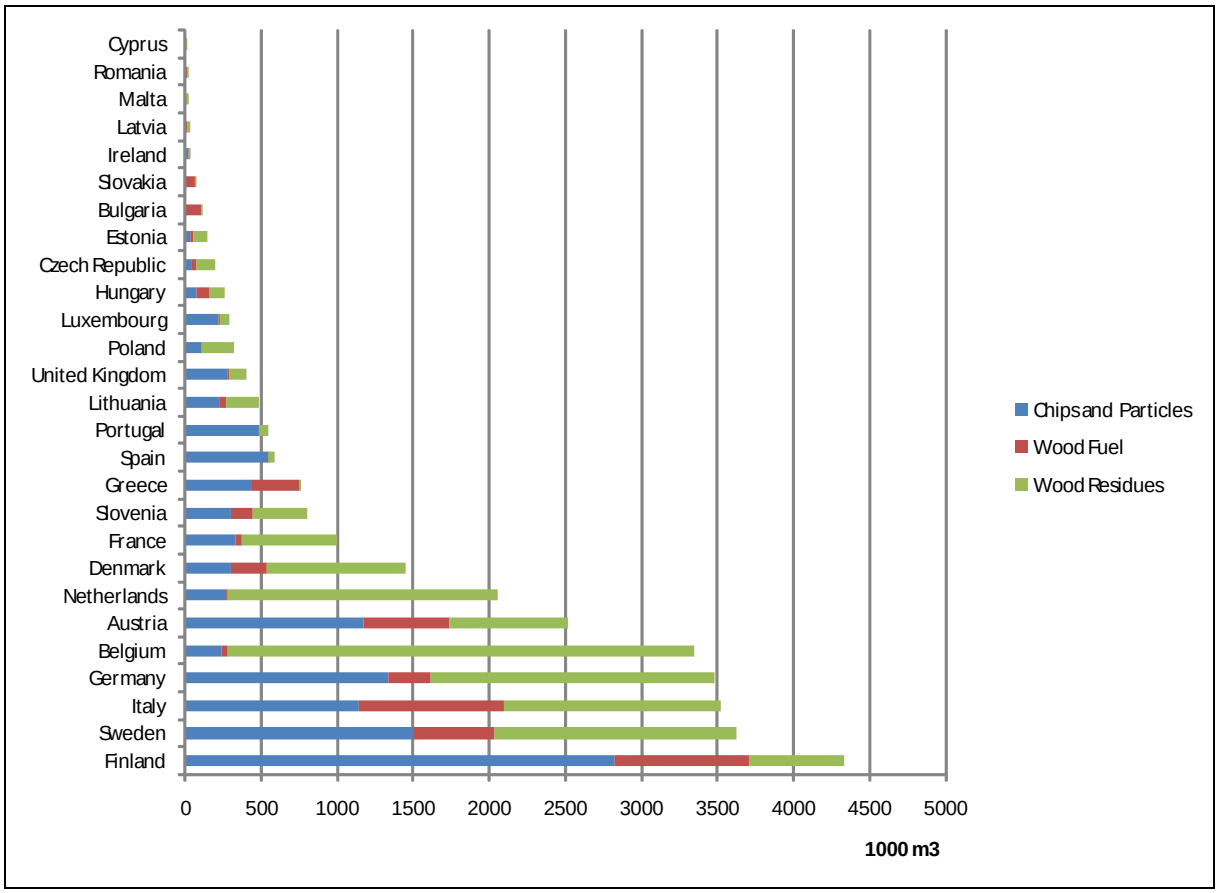
Source: FAO, Forestry database, 2010

Italy import of chips and particles (2007-2008)

2007		2008	
Import (m3)		Import (m3)	
Austria	369,614	Austria	334,100
France	178,564	France	120,759
Switzerland	148,759	Switzerland	75,012
Ukraine	123,000	Slovenia	45,404
Slovenia	50,852	Germany	27,890
Brazil	42,000	Spain	2,162
USA	9,000	Portugal	1,257
Germany	5,000	Tunisia	1,113
Spain	4,150	Netherlands	587
Croatia	1,361	Slovakia	430
Total	**1,579,000**	**Total**	**979,000**

Source: FAO, Forestry database, 2010

Import in the UE Country of chips and particles, wood fuel and wood residues in 2009



Source: FAO, Forestry database, 2010

3 Installed biofuels capacities, biofuels consumption, import and export

Biodiesel

In 2009 there were in Italy 19 biodiesel plants with a total production capacity of 2,457,194 tons.

Source: www.assocostieri.it

Biodiesel production and trade (2008–2009)

Year	Production Capacity (t)	Production (t)	Import (t)	Export (t)
2009	2,457,194	694,000	465,000	90,000
2008	-	670,449	239,887	108,426

Source: Assocostieri, 2010

In 2008 the total production of biodiesel in Italy was 670,449 t, of which 108,426 t were exported and 562,023 t were distributed into the national market together with an amount imported of 239,887. In 2009, 694,000 t were produced, 90,000 t were exported and 465,000 were imported [Assocostieri (Italian association of biodiesel producers)].

In 2009 the production capacity was estimated in 2,457,194 t, so the Italian biodiesel industry is underexploited.

The raw materials for biodiesel production are mainly imported as oil (rapeseed oil for 70 percent of the total and soybean oil for the 20 percent). Most of the rapeseed oil is

imported from other EU countries, while soybean oil is either imported from the EU or produced in Italy from imported grains.

Italy imports mainly from USA, Netherland, Germany and France, whereas exports primarily towards France and in much smaller amounts towards Austria and Spain.
It happens that large volumes of rapeseed and soybean oil are imported from other EU countries, processed in Italy into biodiesel and frequently re-exported to the same countries from where the raw material came.

Biodiesel trade (January-October 2008)

Imports (t)		Exports (t)	
Austria	390	Austria	8329
Belgium	226	Belgium	273
France	11576	France	79921
Germany	10681	Germany	774
Greece	12468	Greece	2047
Netherlands	25915	Slovenia	572
EU	**61321**	Spain	10958
U.S.A.	39653	**EU**	**102905**
Argentina	4984	Turkey	104
Indonesia	6959	Other Countries	149
Total	**112917**	**Total**	**103158**

Source: F.O. Licht 2008 World Ethanol and Biofuels Report

Bioethanol
In Italy there are more than 70 ethanol distilleries, but only three plants (Alcolplus, IMA and Silcompa) are able to produce fuel grade ethanol.

Bioethanol production (2008)

2008	Production capacity (t)	Production (t)
Bioethanol	247,500	102,000
ETBE	400,000	230,000

Source: Assocostieri, 2010

The main feedstock used are wine industry by-products, wine (derived from mandatory distillation as imposed by the EU regulations), cereals, fruits and molasses.

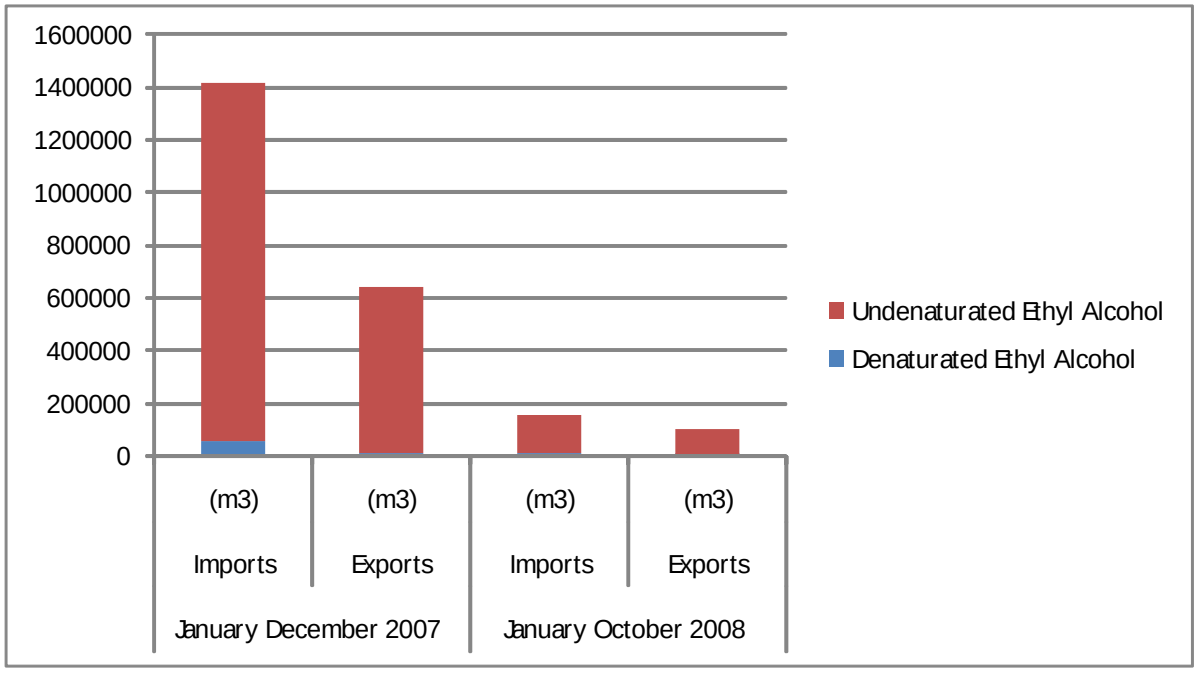
Both the import as well as the export in the alcohol sector are very relevant in Italy.

Ethyl alcohol trade (2007-2008)

	January-December 2007		January-October 2008	
	Imports (m^3)	Exports (m^3)	Imports (m^3)	Exports (m^3)
Denaturated Ethyl Alcohol	53,838	11,360	7,722	1,474
Undenaturated Ethyl Alcohol	1,361,115	630,306	147,810	98,398
Ethanol in blends	0	0	49,071	0
Ethyl Alcohol	**1,414,953**	**641,666**	**204,605**	**99,872**

Source: F.O.Lichts 2008 World Ethanol and Biofuels Report

Ethyl alcohol trade (2007-2008)



Source: F.O.Lichts 2008 World Ethanol and Biofuels Report

Undenaturated ethanol trade (Jan-Dec 2007)

Imports (m^3)		Exports (m^3)	
France	526,118	Sweden	350,686
Netherlands	79,081	France	170,154
Germany	64,541	Greece	31,813
EU	**712,270**	Spain	25,137
Croatia	74,061	Germany	9,642
Turkey	52,261	Austria	9,512
Serbia	51,862	Slovenia	8,711
Egypt	294,402	Hungary	6,487
Pakistan	104,765	Czech Rep	5,595
Ethiopia	41,658	**EU**	**618,905**
Total	**1,361,115**	**Total**	**630,306**

Source: F.O. Licht 2008 World Ethanol and Biofuels Report

Undenaturated ethanol is mainly imported from EU Country such as France, Netherlands and Germany and comes also from non EU countries such as Egypt and Pakistan. Exports of undenaturated ethanol from Italy are mainly directed towards Sweden and France.

The main markets for the ethanol produced and traded in Italy are that of food and beverages (28%) and distillates (18%). Industrial usage is another important market, around 28%, (10% of which is represented by cleansing products. Cosmetic products represent around 5% of the market.

In 2005, bioethanol for transport represented only 5% of the whole ethanol market and was distributed uniquely as an additive (ETBE), but not as substitution fuel, in gasoline blends.
In 2006 and 2007 not a single litre of bioethanol was used as transport fuel and, according to Assodistil (the Italian distilleries association), in 2007 the production of fuel grade ethanol (60,000,000 litres) was entirely exported to Sweden.

4 Promotional measures favourable for regional/international trade

The adoption of the Directive 2009/28/EC on the promotion of the use of energy from renewable sources (with targets of share 17% in final energy consumption and 10% in transport sector by 2020), represents an opportunity for the development of bioenergy and biofuels in Italy.

In the last years, the main barrier to the development of bioenergy and biofuel production in Italy has been the lack of a stable and clear regulatory framework.

The recent adoption of new and clear incentives for bioelectricity will probably stimulate the further implementation of new plants.

Although most of the feedstock is expected to be supplied by local farmers, it is foreseeable that part of this feedstock will also come from trade, particularly in the case of bioliquids.

Political approach to biomass trade

So far no sustainable scheme for transport and use of biomass is available in Italy, least of all regarding the import/export of raw material both with European Countries and overseas.

So far no cross-border regulations like legal acts or agreements with other Member States and/or with third countries are in force. It is worth to be mentioned the private agreements addressed to the trade of biomass.