IEA Bioenergy Task 40

Biomass and Bioenergy Trade in Italy

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1. INTRODUCTION.

The purpose of this report is to highlight the state of bioenergy utilisation in Italy. Future trends of the use of biofules will be analysed, with particular attention paid to the status of the supply chain for wood fuels utilisation and sustainability.

General and detailed information of Italy will be given, in order to to assess the real potential of the biofuels market in Italy.

In this report, data are presented with SI units and if data is not available, it is marked with a particular sign “**-**“

Italy has a surface of 301,277 km^2 with a population of approximately 58 million people. The country is surrounded by coast (7,600 km and appoximately 34% of the land surface is forest. This fact represents a big potential for bioenergy use, but unfortunately the forest utilisation (trees and residues) is a precise and detailed activity to be developed. This is also confirmed by the strict economic balance that has to be evaluated for forest utilisation at industrial level.

Italy has a complex energy situation, in fact its dependence on foreign countries is becoming a serious issue, due to the current international problem of energy supply. In the following sections detailed energy data will be given and analysed.

The following table, table 1 represents the needs of the Primary Energy of Italy during the last four years:

Sources	2002(Toe)	2003 (Toe)	2004 (Toe)	2003/2004 (%)
Solid Fuels	14.2	15.3	17.1	11.5
Natural Gas	58.1	64.1	66.5	3.8
Oil products	92.0	90.8	88.0	-3.1
Renewable Energies	12.6	13.0	15.2	17.5
Net electricity import	11.1	11.2	10.0	-10.5
Total	188.1	194.4	196.8	1.2

Table 1: Needs of Primary Energy of Italy

2. BIOMASS RESOURCES

The biomass utilisation has a strong historical link to heating systems. Traditionally, rural areas were heated only by this resource. Now, new technical problems have to be considered in order to create a stabile supply chain and a consequential efficient and economic biomass utilisation. The industrial processes, high efficiency of boiler and stoves, and high density of the territory are parameters that have to be studied. These technologies are penetrating the market and it is necessary to assess carefully the productivity of a territory, considering all the sustainability aspects. The following tables 2 and 3 present the availability of forest residues and Industrial by-products/residues in Italy. The data refers to 2005 and reflects the possible utilisation of the solid biomass energy sector.

FOREST RESIDUES	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**
Forest area	40	11	6.000.000	hectares
Annual increment of wood in forests	40	11	300.000	hectares
Annual final fellings (average)	40	11	210.000	hectares
Annual thinnings (average)	40	10	182.000	hectares

Table 2: Availability of forest residues in Italy

INDUSTRIAL BY-PRODUCTS / RESIDUES	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**
Sawdust	15-20	13-14	450.000	m^3 (solid)
Bark	-	-	-	m^3 (solid)
Chips	20	12	200.000	m^3 (solid)

Table 3: Availability of Industrial by products/residues in Italy

This table does not consider the total amount of industrial residues that are already used for heating purposes in the northern part of Italy. This specific area is full of wood industries and most heating systems of industries are fuelled or partially fuelled by biomass.

ISTAT, the National Institute of Statistical data, was an useful source t for this data collection. The following data is extracted by the last national census.

As it was previously said, the biomass utilisation for domestic (residential) firewood has a very high value. In fact at least 18 Million cubic metres of fire wood are already used every year for heating purposes.The following tables 4, 5, 6 shows the availability of biomass resources in Italy.

DOMESTIC (RESIDENTIAL) FIREWOOD	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**
Firewood (logs)	30	12	11.000.000	m^3 (solid)
Chopped and splitted firewood	30	12	8.000.000	m^3 (solid)

Table 4: Domestic firewood utilisation in residential sector

WOOD WASTES / USED WOOD	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**
Chemically treated industrial wood residues (no heavy metals or halogenated organic c ompounds)	-	11	550.000	m^3 (solid)

Table 5: Utilisation of wood wastes

REFINED WOOD FUELS	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**
Pellets	10	17,5	390.000	m^3 (solid)
Briquettes	10	17,5	100.000	m^3 (solid)
Other refined wood fuels (specify)	-	-	-	m^3 (solid)

Table 6: Utilisation of refined wood fuels

The wood pellet market is now experiencing a very positive spell.. The interest for this wood product is increasing due to a substantial rise in national energy expenses. Alternative fuel solutions for domestic heating such as straw, paper waste and packaging (residues) are not in use at the moment. Pure wood pellet seems to be an attractive option to the Italian market. Future developments in this sector are foreseen for the next years, due to the high demand for this product.

OTHER BIOMASS RESOURCES	**Av. moisture %**	**Av. net calorific value as received (MJ/kg)**	**Amount**	**Unit**
Short rotation coppice (willow. poplar, etc.)	40	11	350.000	hectares
Energy grasses (reed canary grass, miscanthus, etc; specify)	50	11	350.000	hectares
Land area for short rotation coppice / energy grasses	N/A	N/A	700.000	hectares

Table 7: Utilisation of other biomass resources

3. CURRENT ENERGY USE OF BIOMASS

The following tables show that the utilisation of biomass is related to industrial activities. In fact the forest biomass utilisation and all activities related to this field, have concrete costs. For this reason the market actors[1] prefer to use pre-treated biomass, rather than activate all operational processes that constitute the supply chains. For example, a parallel investigation on the Italian pellet market developed by ETA, showed that some producers also use the forest residue for their biomass supply. This data, even if it is not included in the above tables, can be considered viable.

FOREST RESIDUES	Amount	Unit
Forest residue chips from final fellings (tops, branches, bark)	0	PJ
Forest residue chips from thinnings (whole tree chips)	0	PJ
Chips from delimbed small-sized trees (stem chips)		PJ

Table 8: Forest residues contribution to national energy balance

INDUSTRIAL BY-PRODUCTS / RESIDUES	Amount	Unit
Sawdust	0,003	PJ
Bark		PJ
Chips	0,00120	PJ
Waste liquors (e.g. black liquors)		PJ

Table 9: Industry residues contribution to national energy balance

DOMESTIC (RESIDENTIAL) USE	Amount	Unit
Firewood (logs)	10.000.000	m^3 (solid)
Chopped and splitted firewood	7.000.000	m^3 (solid)

Table 10: Domestic residential uses of biomass

WOOD WASTES / USED WOOD	Amount	Unit

Chemically treated industrial wood residues (no heavy metals or halogenated organic compounds)	0,003	PJ
Construction & demolition waste	-	PJ
Packaging and paper waste	-	PJ
Other wood wastes (specify)	-	PJ

Table 11: Wood wastes contribution to national energy balance[2]

REFINED WOOD FUELS	Amount	Unit
Pellets	0,006	PJ
Briquettes	0,00175	PJ
Other refined wood fuels (specify)		PJ

Table 12: Utilisation of biomass related to Industrial activities.

The above tables show that the utilisation of biomass is related to industrial activities. In fact the forest biomass utilisation and all activities related to this field, have concrete costs. For this reason the market actors prefer to use pre-treated biomass, rather than activate all operational processes that constitute the supply chains. For example, a parallel investigation on the Italian pellet market developed by ETA, showed that some producers also use the forest residue for their biomass supply. This data, even if it is not included in the above tables, can be considered viable. The following table presents the type of raw material used for the pellet production:

Type of Raw Material	National Production [%]
Sawdust	65,0
Wood shavings	19,0
Residues from sawmills	5,0
Forest chips or residues	11,0

Table 13: Quantity of wooden material used for Pellet production in Italy

Table 14 related to the above table 7 shows the amount of energy produced by other biomass resources, eg the short rotation coppice plantation (350,000

[2] Unfortunately the data reported in the table 11 is incomplete. Research on this content is still being developed and final data are still missing.

hectares used) and energy grasses plantation eg reed canary grass, miscanthus, etc (350,000 hectares).

OTHER BIOMASS RESOURCES	Amount	Unit
Short rotation coppice (willow, poplar, etc.)	0,00385	PJ
Energy grasses (reed canary grass, miscanthus, etc; specify)	0,00385	PJ

Table 14: Other biomass resources

4. CURRENT BIOMASS USERS

BIOMASS USERS	Amount	Unit
No. of biomass fuelled DH plants (> 1 MW)		pieces
Installed capacity of biomass fuelled DH boilers	158	MW_{th}
No. of biomass fuelled CHP plants		pieces
Installed capacity of biomass fuelled CHP boilers	1,518	MW_{th}
	1,203	MW_e
No. of biomass fuelled power plants	27	pieces
Installed capacity of biomass fuelled boilers	257	MW_e

Table 15: Installed capacity of DH and CHP plants in Italy.

The following data was not available:

- capacity of solid biomass fuelled boilers in pulp & paper industry;
- capacity of recovery boilers in pulp & paper industry;
- capacity of biomass fuelled boilers in sawmills;
- capacity of biomass fuelled boilers in other industries.

In fact the *Association of Paper Industries* and *Sawmills Association* were contacted to ask about relevant information, as capacity of boilers installed, but they declared not to have the mentioned data.
Using the findings of the AIRU "Italian Association of Urban Heating" data on the DH pipeline installed in Italy was compiled in table 16 below. The total Mm^3 per Region are presented.

DH Pipeline Volume – 2005		
Region	**Mm^3**	**%**
Lombardia	69,2	44,5
Piemonte	34,6	22,2
Emilia Romagna	27,2	17,5
Veneto	11,6	7,5
Trentino A.A.	7,2	4,7
Lazio	2,2	1,4
Liguria	2,1	1,4
Toscana	0,9	0,6
Marche	0,5	0,4
Total	155,6	100,0

Table 16: DH pipeline installed in Italy

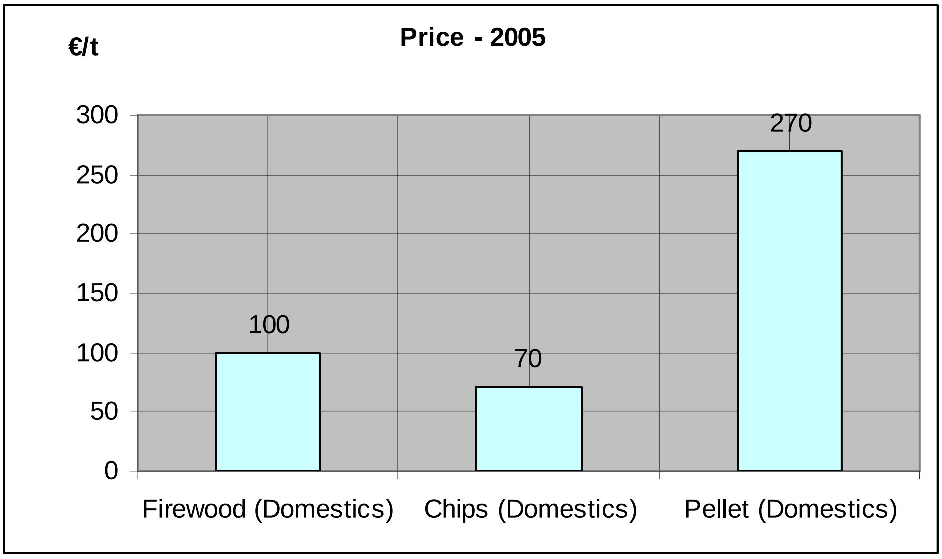
5. FUEL PRICES IN DOMESTIC USE (RETAIL PRICES)

The following prices of Wooden energy products, refers to year 2004-2005. The cost of biomass in general is strongly related to its utilisation. In fact, in the regions were there is a higher utilisation of wooden energy products per inhabitants, the cost is also higher. The main products that are considered in this analysis are Chips, Pellet, Firewood and Sawdust. All prices refer to retail price.

Energy Product	Price – 2005 (€/t)	€/kwh
Firewood (Domestics)	100	0,029
Chips (Domestics)	40	0,013
Pellet (Domestics)	270	0,06

Table 17: Wooden energy products prices in Italy for the year 2005 for domestic sector

The following graph presents the data expressed in the previous table.



The value of VAT in Italy for energy products is 10%. On average; the VAT value is double for other commercial products (20%). The above graph presents commercial prices of wooden products, including VAT and Taxes.

To provide a clear energy situation of Italy, it is resonable to compare the biomass products for energy purposes with other traditional fuels. Moreover, in this case the area of utilisation of the fossil fuels can be an important parameter to calculate the final cost of fuel. In fact some regions (especially the ones with diffuse mountain side population) put a more convenient price for heating purposes but put a higher price for fuels destined for the transport sector.

Following table 18 presents the prices of traditional fuels in Italy for the year 2005.

Traditional Energy Product	Price – 2005	€/kwh
Fuel oil	1,20 (€/l)	0,09995
Natural gas	0,66 (€/m^3)	
Coal	1 (€/kg)	0,11494 3

Table 18: Prices of traditional fuels in Italy for the year 2005

This above table can be integrated with the folowing one in order to present a clear situation of heating systems in Italy. The table 19 shows the mix of energy sources used for the heating system in Italy[3].

Energy Sources	2005	
	Tep	%
Natural Gas	1.014.018	68,9
Solid Urban Wastes	184.167	12,5
Carbon	106.442	7,2
Oil products	68.827	4,7
Industrial Thermal utilisation	4.330	0,3
Geothermal	10835	0,7
Biomass	82.092	5,6
Total Fossil	1.189.287	81,0
Total Renewables	281.425	19,0
Total	1.407.712	100,0

Table 19: Energy sources used for the heating system in Italy

[3] Scientific magazine, 2006; The Urban Heating Systems. www.energiaitalia.com

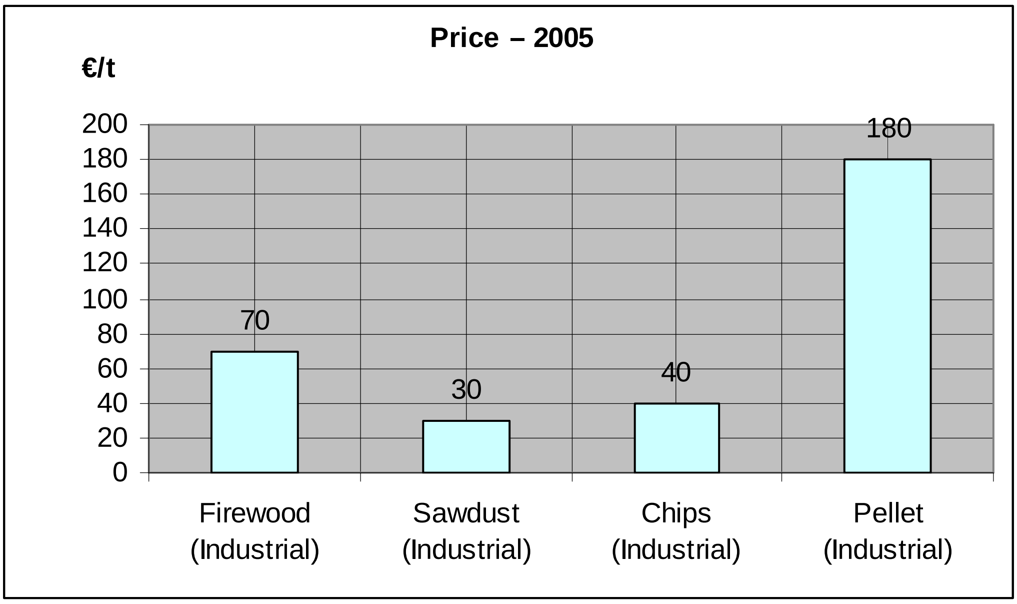
5.1. FUEL PRICES IN INDUSTRIAL HEATING /CHP / ELECTRICITY PLANTS

The following table 20 presents the price of wooden energy products, in the year 2004-2005. All the prices refer to the industrial sector.

Energy Product	Price – 2005 (€/t)	€/kwh
Firewood (Industrial)	70	0,023
Sawdust (Industrial)	30	0,007
Chips (Industrial)	40	0,013
Pellet (Industrial)	180	0,04

Table 20: Wooden energy products prices in Italy for the year 2005 for Industrial sector

This following graphs present the data expressed in the prevoius table.



In addition, for the industrial sector the VAT value is 10%. The above graphs present commercial prices of wooden energy produts, including VAT and additonal taxes.

Traditional Energy Product	Price – 2005	€/kwh
Diesel	0.994 (€/l)	0.09
Natural gas	0.33 (€/m^3)	
Coal	0,58 (€/kg)	0,066667

Table 21: Prices of traditional fuels in Italy for the year 2005 in the Industrial sector.

All the above prices refer to "thermal and electricity production sector". For a complete overview of the Italian schema, table 22 presents the data about the electricity producion in Italy for the year 2004.

Electricity Production by sources	2004
Hydro gross production	49.908
Thermal gross production	246.125
Geothermal gross productio	5437
Wind and PV gross production	1.851
Total gross production	**303.321**
Consumption auxiliary services	13.299
Total net production	**290.013**
Energy destined to pumps	10.300
Net production	**279.722**

Table 22: Electricity producion in Italy for the year 2004

6. FUEL AND ENERGY TAXATION

Concerning the electricity price, the costs and taxes that compose the electricity bill are several. This section will present the contents of the bill. The following scheme represents the composition of the bill and the following paragraphs will explain the costs covered by every tax.

A + B + C + D + E = Electricity Bill

A. Rate for the transmission service:
This rate, called TRAS, covers the costs for the transport of the electric power on the net of national transmission.

The value of electricity prices are presented in the following table.

Type of contract	€cents/kWh (2006)
Low voltage users (public illumination)	0,23
Other low volatge users	0,38
Meddle voltage users	0,22
Other meddle voltage users	0,36
High voltage users	0,30

Table 23: Electricity price in Italy for the year 2006

B. Rate for the distribution service:

This rate covers the costs for the transport of the electric power on the distribution networks and related business activities (invoicing, management contracted, etc.)

C. Rate for the measure service:

This rate, called MIS, is destined to cover the costs of installation and maintenance of the meter, (including the costs of survey and recording of the measures).

D. Rate for the sale service:

This rate covers the costs of purchase and sale of the electric power to the customers of the bound market (comprises the costs of commercialization of this service, representing member COV to you) and the burdens deriving from the application of the norm on Green Certificates.

E. The rate components – A, UC, MCT:

The A rate covers the burdens supported in the general interest of the electrical system (the research costs, the costs for the improvement of renewable energies source); the UC rate covers other costs of the electric service.

Regarding liquid traditional fuels, Italy has a very strict system of rules, that include several taxes. The following costs refer to the year 2003. Even if the value of costs are out of date, and the final price has increased in the last two years, the internal composition of price is the same. Table 24 presents the Composition of costs for liquid biofuels in Italy for the year 2003.

Liquid fuels	Price	Tax	Vat	Total taxes	Cost with no taxes
Gasoline	1,090	0,542	0,182	0,724	0,366
Diesel	0,905	0,403	0,151	0,544	0,351
GPL	0,579	0,157	0,096	0,253	0,326

Table 24: Composition of costs for liquid biofuels in Italy for the year 2003.

As displayed in the previous table, the contribution of national taxes to the final price of the fuel is relevant and in some cases the total taxes value is double compared to the price.

If, for the consumption of energy many taxes are foreseen, the national government offers financial benefits to (public/private) companies? who decide to produce electricity and gives it to the grid connection. These benefits are called Green Certificates. The value of these certificates is evaluated by national authorities every year. In this case an electricity producer has favored by an extra economic revenue. The following table 25 presents the value of Green Certificates during the last four years. Source: GRTN

Year	Value of Green Certificates [euro/MWh]	Period
2005	108,92	2005 / 2006 / 2007
2004	97,39	2004 / 2005 / 2006
2003	82,40	2003
2002	84,18	2002

Table 25: Value of Green Certificates during last four year

The introduction of the Green Certificate System in the Italian market started in 1999 with the article n° 11 of Italian Decree-Law n° 79/99 and resulted in a significant promotion for renewable energies. In this way the old system called Cip6 was replaced? by the new mechanism based on Green Certificates, which is stocks issued by the Public Electric Administrator (now called GRTN) with a value in Euro as they express as money the environmental engagement of the holder.Law no. 239 of 23 August 2004 (the so-called "Marzano Law") reduced from 100 MWh to 50 MWh (of electricity generated from renewables) the denomination of each Green Certificate.

In the Green Certificates market, demand is represented by the obligation for electrical producers and importers to enter the Italian public grid every year with an electrical amount produced by renewables equal to 2% of what produced and/or imported by conventional energy sources the previous year. Starting from 2004 and up to 2006, every year the compulsory quota is increased by 0,35 %, in accordance to article n° 4, subsection n° 1 of Decree-Law n° 387 / 2003. Compulsory quota increases for periods 2007-2009 and 2010-2012 are going to be fixed with suitable Decree-Laws issued by Italian Ministry of Productive Activities. On the other side, offer is represented by all Green Certificates issued to Operators with energy plants which are IAFR (Plants supplied by renewable sources) accredited by the Public Electric Administrator (GRTN), as well as Green Certificates which GRTN self –issues for the energy produced with Cip 6 plants. Every energy plant, which is IAFR accredited, may receive Green Certificates for twelve years, according to the latest Decree-Law n° 152 dd. 03 Aprile 2006, article 267, subsection n° 4, letter d) (it was eight years in accordance to article n° 20, subsection 5 of Decree-Law n° 387 / 2003).

The present standard has assigned to GRTN the important task to verify and qualify all plants with renewable energies as IAFR accreditation, according to different requirements as requested by Decree MICA 11 November 1999, Decree MAP 18 March 2002 and Decree-Law n° 387 / 2003. Particularly, IAFR accreditation can be obtained by all plants that started operating after the 1st of April 1999, following a new construction, an upgrading, a total or partial remaking, and a reactivation by energy plants operating in co-combustion, and started to run before this date. According to article n° 2, subsection n° 15, Decree-Law n° 79 / 1999, IAFR accreditation can be released to energy plants which use the following renewable energies :

- Sun;
- Wind
- Hydro resources
- Geothermal resources
- Tides
- Wave motion
- Transformation of vegetables or organic and inorganic trash into electrical energy.

The list of accredited plants, both running and in construction, is published every year by GRTN and is available in the Accredited Plants Bulletin.

In 2002, Italian total demand was 3,23 TWh while offer was only 0,89 TWh. The difference (2,34 TWh) was covered by Green Certificates at GRTN disposal.

In 2003, total demand was 3,47 TWh while offer was only 1,49 TWh. The difference (1,98 TWh) was covered by Green Certificates at GRTN disposal.

In 2004, total demand was 3,89 TWh while offer was 2,89 TWh. The difference (1,00 TWh, corresponding to 20’000 Green Certificates) was covered by Green Certificates at GRTN disposal.

In 2005, the reference price for the Green Certificate market was 108,92 €/MWh (excluding 20 % VAT).

A particular way to obtain Green Certificates in Italy is represented by article n° 1, subsection n° 71 of the a/m Marzano Law. This article refers to the electric energy production by hydrogen fuel cells and by CHP plants with district heating but limited to the thermal energy quota actually used for the district heating. At the end of 2006, the Italian Government promulgated a Decree-Law (dd. 24 October 2005) as application of Marzano Law. The present standard setting is assigned to GRTN, whose central task is to verify and qualify all plants by means of a suitable request indicating general data, with an enclosed report indicating how the CO_2 emissions reduction is achieved.

7. BIOFUELS POLICIES IN ITALY. ADOPTION OF BIOFUELS DIRECTIVE

Recent Italian legislation cut the amount of biodiesel production eligible for tax relief from 300,000 tons to 200,000 tons per year beginning from 2005. The reduction is due to budget constraints and the desire to favour alternative energy sources coming from domestically produced agricultural raw materials. The same legislation allocated 219 million Euros to fund the tax relief for the production of one million hectolitres per year of bioethanol. While biodiesel is obtained mainly from imported oils (rapeseed and soybean oil), bioethanol will be obtained mainly from surplus distilled wines, as well as sugar beets and corn produced in Italy.

Law Decree n.128 of 30 May 2005, adoption of Directive 2003/30/EC, set up the following national targets for biofuel consumption as a percentage of the total transport fossil fuels, to be measured in terms of energy content

- 1% by 2005 and
- 2,5 % by 2010

Targets not corresponding to reference values set by the Biofuels Directive.

Unlike in other EU member countries, Italian production of biodiesel fuel, obtained from oilseed oils, is forecast to decrease dramatically this year and in the near future. The Italian budget law for 2005 unexpectedly reduced biodiesel tax relief from the previous 300,000 tons per year to 200,000 tons. Last December, when discussions in the Italian Parliament on that law were in progress an amendment was introduced and quickly passed. Tax relief was cut, according to Government sources, due to budget limitations. This action clashed with the previous policy which had increased the amount of biodiesel eligible for subsidy from 125,000 tons in 2000/01, to 300,000 tons per year for the three-year period 2001/02 to 2003/04. Given the extremely high consumption tax on gasoline and any petroleum products in Italy, the only way to make biodiesel competitive with fossil products is the establishment of a tax relief policy, supported by environmental considerations.

Budget Law 2005, valid for the period 2005-2007:

- 200,000 tons/year of biodiesel tax exempted
- tax relief for about 1 million hectolitres of bioethanol/year; between them 900,000 ETBE and 100,000 bioethanol

Tax reduction blocked by EU DG Competition. Current legislative framework

In the framework of urgent interventions in the agricultural sector, in order to develop the agro-energy chain, the Law n.81, 11 March 2006, declared that:

- Bioethanol production and marketing will be supported starting from January 2008 for a 6 year period;
- Starting from July 2006, diesel and petrol fuels suppliers are required to achieve 1% share, in terms of low heating value, of biofuels within the total amount of fuel they placed on the market in the previous year;
- This percentage shall increase by 1% each year up to 2010.

The 2005 Budget Law allocated 73 million euros per year in the period 2005-2007 to support bioethanol production, but only 15 millions have been used

In the 2006 Budget Law it is stated that the 58 million euros not used will be allocated as follows:

- Up to 10 million euros for a further 20.000 tons of tax exempted biodiesel in 2006;
- Up to 5 million euros for research in the bioenergy field;
- The remaining 43 million euros for a fund for promotion and development of agro-energy chains. **220.000 tons of biodiesel tax exempted in 2006**

Biodiesel in Italy

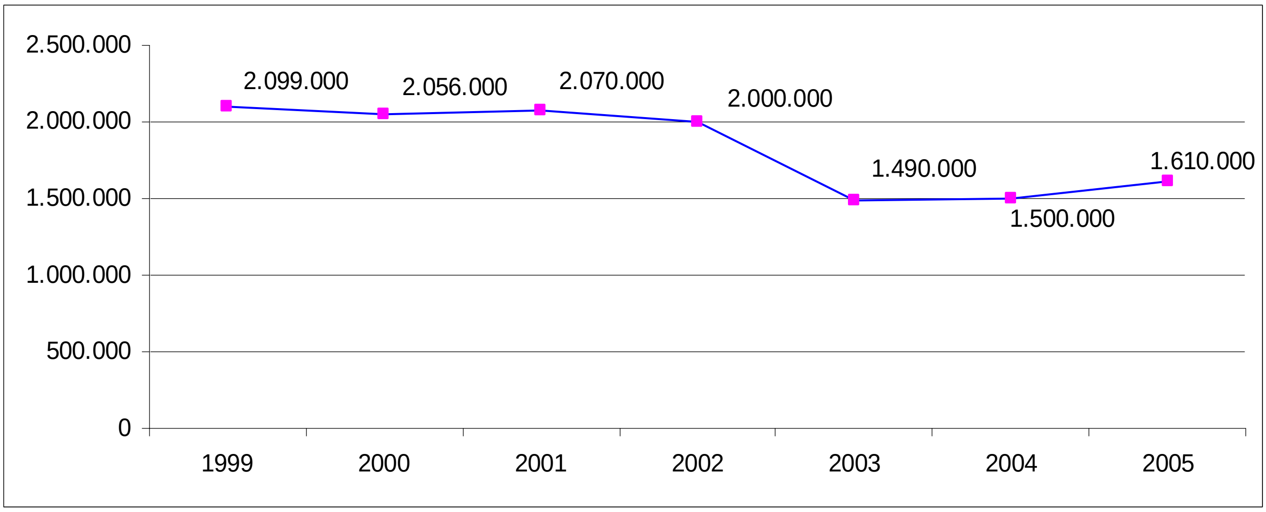
The current Biodiesel production in Italy for the year 2006 was around **600,000 tons**

Biodiesel produced in Italy is from imported feedstock (about 70%), mainly rapeseed oil from Germany. The main utilisations are listed here below:

- Mainly (90% of the tax exempted biodiesel) as an additive blended (5% max) in low sulphur content diesel to increase the lubricating power;
- 100% biodiesel is just used for heating purposes;
- higher percentages (up to 30%) blends with fossil diesel only for specific utilisations, as for public transport companies or private companies.

Bioethanol production in Italy (in hectolitres). Source: AssoDistil

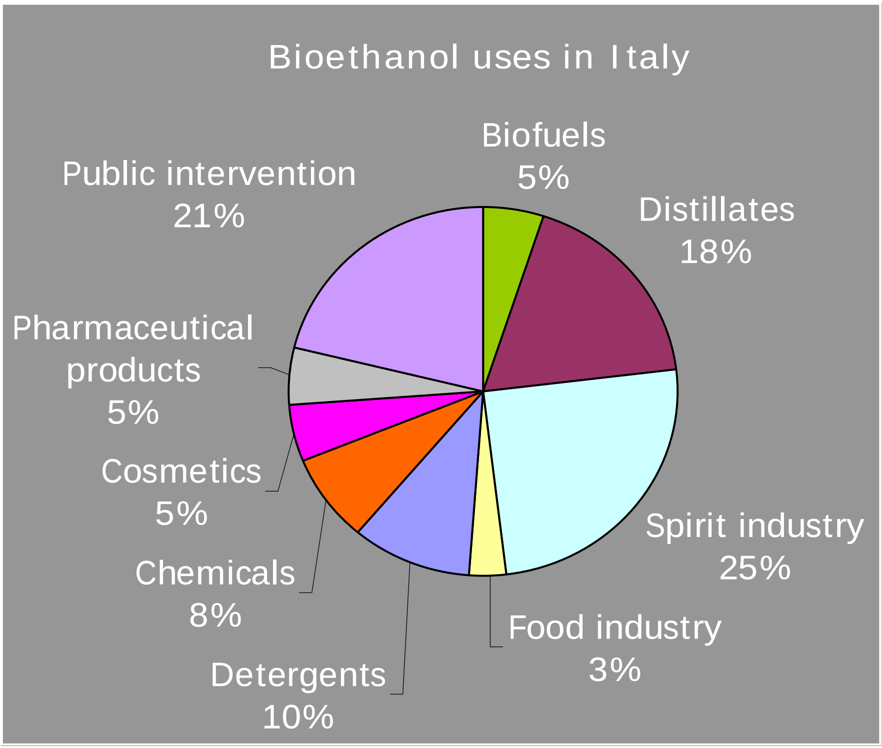
The data about Bioethanol production for Italy are represented in the following graphic. The Ethanol production in Italy in the year 2005 was around **1,610,000 hectolitres**.



Italian bioethanol produced from national products:

- vinic alcohol
- molasses/sugar beets
- cereals

The future production will be made mainly from corn. Source: AssoDistil. The following graphic represents the future Bioethanol uses in Italy.



The following table 26 compares the utilisaton of Bioethanol and Biodiesel with Petrol and traditional Diesel in Italy.

	Consumption 2005 (tons)	**Bioethanol from 1st July 2006 (*)**	**Biodiesel from 1st July 2006 (**)**	**Hectares**
Petrol	14,926,000	approx. 246,000 tons; 3,1 million hl		approx. 70,000
Diesel	24,321,000		approx. 268,000 tons	approx. 315,000

Table 26: Utilisaton of Bioethanol and Biodiesel with Petrol and traditional Diesel in Italy.

*Source: AssoDistil; **Source: Coldiretti

The Expected values for the year **2010:**

- Bioethanol: 15,600.000 hl - 1.230,000 tons
- Biodiesel: 1,340,000 tons

Biofuels potential in Italy

Agro-energy crops for biofuels production could use a maximum of 20-30 % of the total surface available for agricultural purposes (8.000.000 hectares). The 5-6 % biofuels within total transport fuels is the current maximum potential. This mentioned production could create 30,000 new jobs.

Conclusions

- With existing policies a real development of the biofuels production, distribution and utilisation chains, of the proper infrastructure is not possible: there is a lack of a clear legislative framework and strong support measures;
- The farmers' associations, the biofuel associations, the vehicle (both light and heavy) manufacturers are willing biofuel market penetration;
- Many municipalities, provinces, regions, public transport companies are expressing their interest in biofuels. Media have started dealing with biofuels, signal of an increasing interest;
- There is a need to set up a network among the key players in the conversion process from fossil fuels to biofuels in order to make things happen and increase lobby power;

- The European Commission should review biofuel policies: a harmonization in tax reduction/exemption and in biofuel obligations (also for eliminating internal market barriers) and a stronger support to member States are necessary.

8. ITALIAN PELLET MARKET (WOOD AND AGRI PELLET)

The Italian pellet market is experiencing a positive period. The market for wood pellet is increasingly active and thus steadily maturing, while for the agri pellet product the market is yet to become real and stable. Consideration on this last product will be made on the base of future development and possible potential.

Wood Pellets:

The potential production of wood pellet in Italy is about 700,000 tons per year. The nowadays production is closed to 260,000 tons per year, while the Italian consumption is around 320,000 tons per year. This gap between national consumption and utilisation is covered by importing from foreign countries.

The market for the year 2005 and 2006 was characterised by two important aspects connected to the utilisation of pellet product:

- General lack of raw biomass material for the production;
- Very high number of pellet boiler and stoves sold.

The following table 27 presents the national production for the year 2005 and 2006 per region.

REGION	Production 2005 [t/anno]	[%]	Production 2006 [t/anno]
Lombardia	31,920	13,3	35,112
Veneto	57.600	24,0	63.360
Trentino Alto Adige	8.160	3,4	8.976
Friuli Venezia Giulia	23.520	9,8	25.878
Piemonte	4.320	1,8	4.752
Emilia Romagna	11.520	4,8	12.672
TOTALE NORTH	**136.800**	**57,0**	**150.480**
Toscana	29.280	12,2	32.208
Abruzzo	16.800	7,0	18.480
Umbria	4.560	1,9	5.016
Marche	5.760	2,4	6.336

Lazio			
TOTAL CENTRE	**56.400**	**23,5**	**62.040**
Campania	29.520	12,3	32.472
Molise	6.480	2,7	7.128
Puglia	3.360	1,4	3.696
Basilicata	4.320	1,8	4.752
Sicilia	2.640	1,1	2.904
TOTAL SOUTH	**46.320**	**19,3**	**50.952**
TOTAL ITALY	**240.000**	**100,0**	**264.000**

Table 27: National production for the year 2005 and 2006 per region.

Concerning the Italian pellet market, the cost for the production and sale are written in the following table, as follows.

Pellet	**[€/t]**
Production cost (including raw material)	**60 - 120**
Wholesale price	**120 - 170**
Retail proce	**220 - 300**

Table 28 : Pellet Production and purchase costs.

The Italian market registered also purchase cost of 350 €/ton. This price is not directly connected to the production costs, but it is related to the initiatives of “free-riders” (producers and retailers that want to earn money from this market) those who are able to sell their products, even if the price seems too expensive compared to other energy products.

A comprehensive study on biomass availability will need to be carried out in the upcoming years, to guarantee a supply to all pellet users. Moreover, even if Italy has a big surface covered by mountain area, the cost for the biomass collection in forest can be too high, creating a problem with producers, due to limited amount of wood.

Agri-pellets

Resources and transformation

There is a very large potential in the world for the exploitation of cellulosic biomasses. One of the possibilities, which promises a high compatibility with present applications, is the form of the pellet. It is an easy to handle fuel, which requires a modest investment for application in boilers (5 Euro/kW for power plants). Moreover, it is very dense (half in weight of oil) and dry (max. 10%), and therefore convenient to store and to transport.

A new pelletiser technology will make pellets feasible for large scale applications, due to its advantages:

1) No thermal *pre-drying* is needed, because this is done by very high mechanical pressure, so it requires much less energy (80-120 kWh/ton of pellets) and space to produce pellets;

2) *Mixing* of several types of biomass is possible (60 types were tested among wood and non wood, without binding materials), so it is possible to make pellets that respond exactly to some standard of quality.

3) Low total processing *cost*: ~ 35 €/t pellets (EU);

Local transformation of biomass into pellets will avoid the *classical biomass problems* of collection, transport and storage of voluminous and degrading biomass.

There are *two possible resources* of biomass for making the so-called agri-pellets (lower quality pellets) of significant importance for the future energy mix of the world:

1. *Agriculture* has two main potential areas (residues and energy crops), and can yield in about 5-10 years from now ~ 5.6 billion TOE/y (world-wide). Appr. 1/3 of this are from residues;

2. *Forest* maintenance yields appr. 3 ton/ha biomass per year and is a strong opportunity for countries, where this activity has been too expensive till now, like in the Russian Federation.

The absence of thermal pre-drying makes the technology suitable to be realised in very *large scale* (20 ton/hour for large central plants like sugar mills) or in the form of *small, mobile units* (down to 50 kg/hour).

Agri-pellets are an opportunity to offer pellets of lower quality to the market of *large users*, preserving wood pellets for *domestic* use.

Application and impact

Agri-pellets can be used for a wide *range of powers* (10 kW – 300 MW). The lower end of the range will depend on the capability to adapt small burners to lower quality pellets.

This fuel will, due to its *standard format*, make it possible to transform agri-forestal residues into a modern fuel for the industry, the power sector but also for heating and cooling (with absorbtion technology).

The *chemical industry* can transform pellets in many other commodities: carbonisation will yield charcoal pellets that are the base for bio-cokes (low sulphur), hydrogen (through steam reforming) and many others.

The *impacts* will be:

- Better *Security of Supply*, as most countries in the world have agricultural terrains and/or forests;
- *Less transport* of fossil fuels over large distances, so less energy and hazards;
- Formation of a *new fuel market*: its easy transport and storage allows trade;
- "Emancipation" of simple combustion biomass from a defragmented market with too many formats to a *standard format* that is easier to standardise;
- *Diversification* of the existing pellet market in distinct qualities: high quality for the domestic user, lower quality for the (power) industry;
- *Job* creation: 500 dry ton biomass per year corresponds typically with one job;
- CO_2 reduction: 1 ton of agri-pellets replacing oil avoids 1.6 tons of CO_2;
- Other greenhouse gases: pelletising agricultural or forest residues will avoid its degrading on the field with formation of CH_4, 21 times stronger than CO_2 as greenhouse gas;
- Much easier *compliance* with the objectives for sustainable development (Kyoto, green energy targets and other);
- *Waste* management in agriculture and industry.

9. BIOMASS IMPORT AND EXPORT

The solid biomass fuels market in Italy is structured at regional level. Most of energy products are used in the region where they are produced.
Importation of solid biofuel is becoming an important sector, in fact during last year at least 50,000 ton of pellets were imported mainly from Austria, Switzerland, Slovenia, Germany and Slovakia. For the next years a development in the pellets pellets is foreseen and potentially approximately 100,000 tons per year will be imported. This situation is also influenced strongly by the limited experience and investments that entrepreneurs are making to increase the quality of the supply chain for pellet production. Italy at the moment is undergoing a positive spell concerning biomass utilisation, but not enough fuel is produced. As a result, at the moment the exportation of biomass fuels is slight at the Italian market.

Situation in the liquid biofuels sector is different. Biodiesel in Italy is mainly produced from rapeseed oil (about 70 percent of the total) and soybean oil (20 percent), with the remainder coming from both sun and palm oils. Rapeseed oil is imported from other EU countries, while soybean oil is either imported from the EU or domestically produced from imported beans (oil from domestic beans, being GM free, is used for food consumption). In 2006 despite the lower tax relief quota, production of biodiesel reached 600,000 tons hanks to the export opportunities to the other EU countries.Industry sources indicate that about two thirds of total production were shipped abroad, mainly to Germany, France, Austria and Spain.A similar situation is expected to prevail in 2007, with an Italian production level well above actual domestic consumption. In other words, Italy imports from other EU countries large volumes of rape and soy oil, which are processed into biodiesel, only to be re-exported within the EU, sometimes to the same countries from whence the raw material came.While in 2005 the local distilling industry imported some alcohol from Brazil and processed to ETBE for a total production of 580,000 hectoliters, in 2006 bioethanol production rose to 1,280,000 hectoliters, obtained from alcohol produced both the distillation of wine surpluses and molasses. Actual domestic consumption, however, remained minimal (about 100,000 hectoliters in both 2005 and 2006) with most of the production exported to Scandinavian countries and France.

10. CONCLUSION

This report aimed at giving the rough overview of the biomass potential and utilisation in Italy. Energy initiatives in recent years have become more frequent and the more and more diversified energy market form resources point of view will offer benefits to both enterpreneurs and citizens. Surely the big potential deriving from forest and agricultural utilisation are destined to become an important aspect of the supply chain of bioenergy.
The main issues which relate to the bioenergy sector situation could be summarised under three points:

- There is a lack of combined data concerning number of plants fuelled with biomass, installed capacity of boilers, real biomass potential for energy purposes. The creation of accurate databases or statistical data could increase the reliability of the sector and atract potential investors.

- Economical and technical evaluation for the installation of new DH and CHP plants fuelled with biomass. Previous experiences showed that plants with higher capacity than 1 MW present an easier economic balance. This data could be deepened in order to activate new power plants. Moreover the utilisation of heating and electricity produced have to be balanced.

- There is lack of a diffuse education about the energy sector. Considering all the problems that Italy is having with energy supply, a more accurate srtategy and education is needed.

Another fact that is probably in conflict with optimal utilisation of biomass, is the dimension of private land and forests in Italy. It is quite frequent to find several owners in a small portion of land. For an efficient utilisation of land for bioenergy purposes, mergers or farmers cooperatives could be the solution.
To conclude, in order to boost bioenergy sector in Italy, high level investments are still needed in all energy related infrastructure and organisation of the efficient biomass supply chains, including optimal allocaltion of the wood material suppliers and improved logisticsItaly as a one of the largest country in Europe has a great energy demand which could be partly coverd by bioenergy, but even though continously more efforts are made towards furhter deployment of biomass fules in the country, so far the potential is not properly exploited.

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