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The lack of a national strategy hampers investment in Italy's renewable energy industry. Yet at the local level some remarkable bio-energy initiatives are taking place. And with an association of half a million farmers beginning to look at "agro-energy", anything may happen.

Italy looks for new balance

| by James Osborne

In March 2003, a milestone was reached in the biofuels industry when Volkswagen launched the Golf 1.6 Total Flex, the first commercial vehicle in Brazil capable of running on any blend of conventional gasoline and ethanol, a fuel derived from sugarcane. For the first time, drivers could fill their cars with either fuel and know their engine would adapt. Italy had something to be proud of: the technology under the Volkswagen bonnet was Italian. Magneti Marelli, a subsidiary of Fiat headquartered just outside Milan, was the first to introduce this flex-fuel technology. In part thanks to Marelli, Brazil's biofuel strategy has now blossomed with more than half of fuel consumption in the gasoline market coming from sugarcane-based ethanol in 2008.

Back home, such possibilities are unheard of on the choked streets of Milan, Turin and Rome. Biofuel use in Italy accounted for only 0.43% of total transport fuel consumption in 2006. The idea of introducing pumps for E85, a mix containing 85% ethanol, is still at the demonstration phase.

'Italy made some good early efforts in

the 1990s but now it has slipped behind Germany, France and Spain,' says Giuseppe Caserta, chairman of Italian biomass association Itabia. 'We muddle along.'

Artichokes |

One major barrier is Italy's huge and fragmented agricultural industry, which is dedicated to food production. The vast majority of farmers, who get little guidance from central government about the long-term possibilities of biomass production, are not inclined to shift away from traditional crops. This is understandable in a country that, according to the United Nations, was a world top 10 producer of more than 40 agricultural commodities in 2005, from apricots, asparagus and almonds to strawberries, spinach and sheep's milk. No other country in the world grew more artichokes, grapes, kiwi fruit or olives that year.

'Italian farming is dedicated to providing food,' explains Caserta. 'In addition, there are no surplus agricultural areas (for biomass production) apart from marginal areas, so it's not easy. In terms of potential for biodiesel, Italy is much more oriented

towards the cultivation of sunflowers, not oilseed rape. It isn't easy to get people to switch to rape. The average size of the Italian farm is about 10 hectares so you need to put together thousands of farmers. There is some excess alcohol from wine production but it's all sold to Sweden so they can put it in their buses.'

A position paper prepared by the previous government, headed by Prime Minister Romano Prodi, forecast total fuel demand for road transport of 40 million metric tons in 2020 in Italy, creating the need for 5.5 million tons of biofuels to hit the EU's 10% target in terms of energy content. To provide this fuel from domestic biomass production, Italy said it would need to cultivate 5 million hectares of land, equivalent to 17% of the entire country's landmass and 60% of its arable land. Importing biofuels would be a better solution, the government concluded, adding that the country could produce 800,000 to 1 million tons a year of biofuels by 2020, about 20% of forecast demand. Italy is likely to become a lucrative export market for major producers such as Brazil.

But importing 80% of biofuels would be of little help in increasing Italy's energy independence. The country imported 86.8% of its energy needs in 2006, according to Eurostat, compared with an EU average of 53.8%. At least the flex-fuel technology wouldn't need to be imported.

Local industry |

All this doesn't mean that bio-energy has no future in Italy. Itabia estimates that domestic consumption of biomass

chain – contracts, quality standards, storage facilities, everything needs to be worked out.'

This difficulty in procuring quality supplies over the long term at competitive prices pushes bigger operators to look abroad for their fuel. CEG is a joint venture of two Swiss companies – power-plant engineering firm Laborex and state-owned utility Azienda Elettrica Ticinese – and is developing 70 megawatts of biomass-

to boost local supply chains,' he explains from the company's offices in Chiasso, on the Italy-Switzerland border. 'But as operators we have a lot of difficulty in agreeing terms with the agricultural sector. It's as if there's an impenetrable wall between agriculture and the renewable energy industry. We need them to accept medium- or long-term accords but they will only analyse the situation on a year-by-year basis.'

Opposition |

In Italy, CEG is taking part in research into obtaining bio-oils from marine algae, which Brusa says may give yields in line with palm oil and have a much lower environmental impact. Such second-generation technology has also attracted the attention of Mossi & Ghisolfi, a family-owned company employing 2,600 people globally. It's the world's biggest producer of PET for packaging applications and Italy's second-largest chemicals company but also has an engineering and construction subsidiary serving the biofuels industry, among others. It considers second-generation biofuels a major opportunity

'It's as if there's an impenetrable wall between agriculture and the renewable energy industry'

amounted to 5.65 million tons of oil equivalent (Mtoe) in 2005, most of it for generating heat. Italy is also Europe's third-biggest producer of biodiesel, although much of it comes from imported oils. Success stories, however, are isolated examples driven by inspired local administrations, enterprising businesses or local agricultural networks.

The Tuscany regional government has distinguished itself in recent years for the promotion of renewable energy sources, from solar to geothermal. When in 2006 it noticed the success of EU-funded projects installing wood-fired district-heating systems in remote villages that were not linked to the natural-gas grid, it set aside a 4 million-euro fund to develop more. The administration was overwhelmed with 47 project requests and has since allocated a further 8 million euros to cover all of them.

Marco Failoni, deputy chairman of AIEL, the Italian association for agro-forestry energy sources, says the region will see by 2010 more than 50 plants of up to 1.2 megawatts working – each one enough to supply heating for a village. The success of the initiative has highlighted the need to organise the local biomass industry. 'Forestry companies are typically quite weak and in Tuscany it's very fragmented,' explains Failoni. 'The local authorities need to find a way to work with the supply

fired co-generation capacity in Italy. Its first plant, a 3.2-megawatt facility in Occimiano, mid-way between Milan and Turin, started in January 2008, burning palm oil from Indonesia. It's impossible for now to source a similar fuel from Italy, according to Laborex's head of development, Alessandro Brusa.

'The 2007 and 2008 budget laws sought

Output slips

- Biofuels accounted for 0.43% of Italy's transport fuel consumption in 2006 compared with a national target of 2%; the aim is to reach 5% by 2010
- Italy has the second-highest car-ownership rate in the European Union (trailing only Luxembourg) at 558 per 1,000 people, giving a total of almost 35 million automobiles on the road
- Italy is Europe's third-biggest market for auto diesel (after France and Spain) and the No. 3 consumer of petrol (after Germany and the UK)
- Italy produced 363,000 metric tons of biodiesel in 2007, a 19% decrease from the previous year but still the third most in Europe
- Italian biodiesel production capacity expanded 15% to 1.57 million metric tons in 2008
- Italy has 15 biodiesel plants in operation with another four under construction; the biggest producers are Ital Green Oil, Novaol, Oxem, Mythen and Oil.B
- Italy's main bioethanol producers are IMA (Bertolino Group), Alcoplus and Silcompa while Grandi Molini is constructing a plant at Porto Marghera, near Venice
- Italian ethanol fuel output slipped 23% in 2007 to 60 million litres
- Italian production of solid biomass in 2007 increased 6% to 2.03 million tons of oil equivalent (Mtoe)

and is pouring 120 million euros of R&D investment into the business.

Dario Giordano, head of research, is awaiting delivery of a pilot plant in April so that by May the company can start continuous production of 1 ton a day of bioethanol and to confirm its findings from three years of research in the laboratory. At the same time it's planting 200 hectares of land to demonstrate its two preferred energy crops: fibre sorghum and giant reed (*Arundo donax*).

The company has decided to jump directly to second-generation production because of the substantial benefits in terms of yield but also because of environmental opposition to its plans to build a first-generation plant fed by maize near its headquarters in Tortona. 'For each ton of biodiesel you need about 1 hectare of land, while for ethanol it's about 3 tons,' says Giordano. 'But with the plant strains we've identified, we can get 13 tons of ethanol per hectare. The first-generation plant would have been necessary to start building infrastructure and know-how.' He's now scouting possible sites around Italy to locate an industrial sized demonstration unit capable of producing 20-30,000 tons of ethanol a year, perhaps by 2012.

These kinds of initiatives demonstrate not only the progress that is being made despite the lack of a national framework but also the potential for bio-energy to blossom in Italy. The current government's attitude is uncertain. 39-year-old Minister of Agriculture Luca Zaia has until now given few signs that the government looks favourably on biofuels, say Itabia's Caserta and Gianpietro Venturi, professor of general agronomy and crop science at Bologna University.

'If you had asked me two or three months ago, I would have said there was no political backing because there was a lot of fear about biofuels,' says Venturi, who counts former minister De Castro as an ex-pupil. 'But based on the contacts I have in the past months it seems they understand that biofuels will not substitute all oil and gas or conflict with other energy priorities

such as the development of nuclear power but actually help to reduce emissions.'

Venturi, 73, a professor at Bologna for 25 years and author of more than 500 publications, is chairman of Biofuels Italia, a grouping of 97 companies, universities, research institutes and industry bodies formed



Agriculture minister Luca Zaia. Photo: Nicolas Bouvy/EPA

in January 2008. The organisation wants to help give guidance to parliament and relevant ministries during implementation of the new European legislation. 'Many people are afraid to invest because they are not sure what will happen,' Venturi says. 'Small things can develop but nothing on a big scale. I would think three or four times before setting up in this business.' Still, Venturi says some farmers are interested and come to him for advice.

Federico Vecchioni, chairman of Confagricoltura, the confederation of Italian agriculture, announced in late January the creation of a new company, Terrae, that would help reform Italy's sugar beet industry and focus in particular on what it terms "agro-energy". Terrae plans to invest 221 million euros to build plants capable of producing 2.4 terawatt-hours of electricity - 0.7% of national demand - and 1 terawatt-hour of heat. 'Italian agriculture has ample space to develop in the renewable energy sector and can make a big contribution to reducing CO₂

emissions,' Vecchioni explained. 'Terrae is basing a lot of its strategy on the production of biomass, biogas and biofuels, alternatives to fossil fuels that promise increasing profit margins.'

The projects include converting a sugar refinery in Casei Gerola, near Pavia, so it can turn crops such as fibre sorghum from 3,000

hectares of land into electricity and heat and another, near Ferrara, that will burn 40,000 tons of vegetable oil a year for power generation.

Confagricoltura certainly has the size to push the bio-energy agenda in Italy. Its 526,000 members farm a combined 5 million hectares, 38.5% of Italy's agricultural land. But it may not be looking to operate simply as a provider of raw material for the renewable energy industry but to grab a slice of the higher-margin business of selling energy itself. In early 2008, Vecchioni described the relationship as follows: 'The contribution of Italian agricultural companies becomes important because we're talking about energy production to cover the needs of farmers but above all because we're talking about energy as an alternative source of income.' The time has come for the parliament and Minister Zaia to strike a balance between these various parties and produce a long-term framework for the development of Italy's bio-energy industry. ■