

BIOPRODUCTS: DIVERSIFYING FARMERS' INCOME

**How a bioproduct industry will affect the EU27
agricultural sector**

25 March 2011



EXECUTIVE SUMMARY

In Europe today there is an agricultural residue resource available that could be sustainably harvested without altering current agricultural land-use patterns. This resource could be turned into a variety of bioproducts ranging from transport fuels to chemicals and plastics. And it can be grown again and again each year in perpetuity.

This agricultural residue resource presents a unique opportunity for the EU27 agricultural sector to deliver on the EU 2020 strategy: innovate using available industrial biotech solutions; invest in tomorrow's rural infrastructure projects; reduce greenhouse gas emissions; and start the transformation towards a competitive bio-based economy.

In this report Bloomberg New Energy Finance explores how agricultural residues could help diversify farmers' revenues and build a next-generation bioproduct value chain in Europe over the next decade. The development of this industry will likewise present a chance to redirect part of the European Union's structural funds and realign its agricultural policies towards:

- The farming community responsible for collecting and delivering agricultural residues;
- And the stakeholders attempting to build the bioproduct value chain and production facilities.

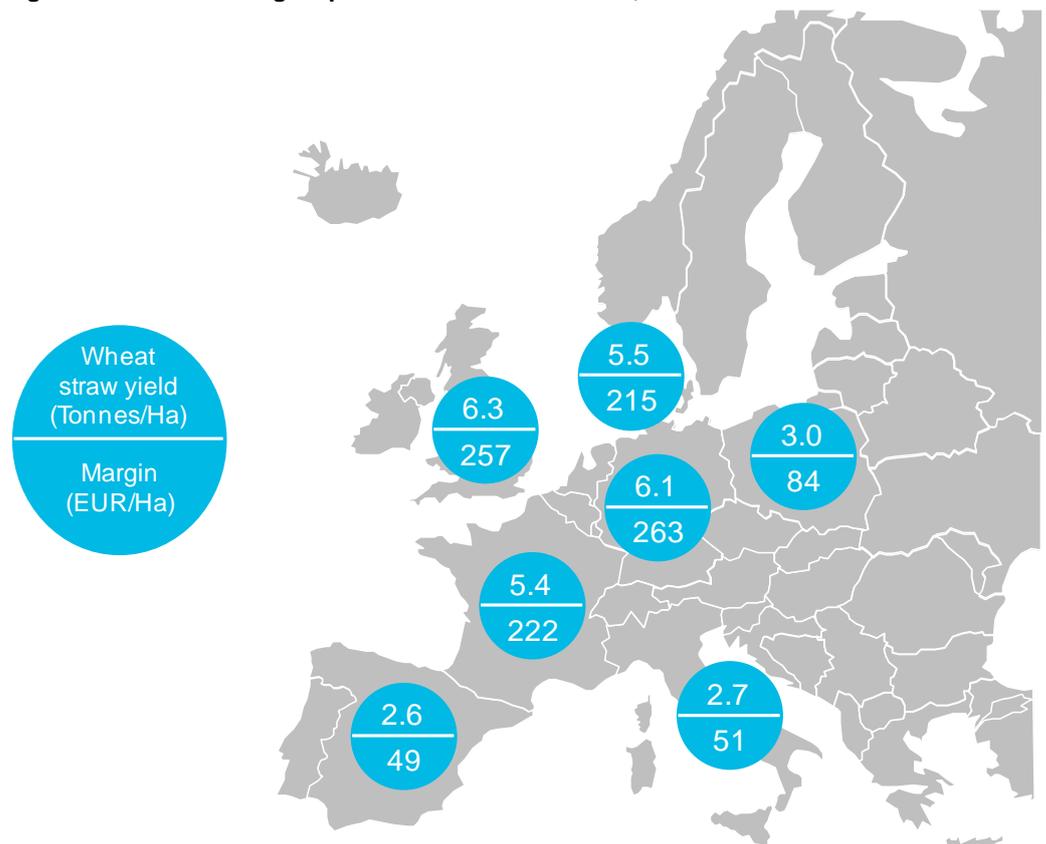
UPSIDES

The process of harvesting agricultural residues and converting this resource into various bioproducts could bring numerous benefits to the agricultural sector and the EU27.

- *Additional farmers' margins:* French wheat farmers, for example, could make an additional EUR 222 per hectare from harvesting, loading and transporting wheat straw to a biorefinery when delivered gate prices are at EUR 80 per dry tonne. If the gate price is lower, at EUR 60 per dry tonne, then they will still make EUR 115 per hectare from collecting wheat straw.
- *Diversifying farmers' income:* EU27 demand for agricultural residues like wheat straw should help farmers diversify away from the food chain. If enough biorefineries can be built and agricultural residue demand opens up, wheat straw could be used as a feedstock in the production of biofuels, biochemicals and bioplastics. Polish wheat farmers, for example, could generate up to 40% of their income per hectare from collecting wheat straw under a gate price scenario of EUR 80 per dry tonne. Farmers would therefore no longer be solely dependent on the food industry markets.
- *Growth and "CAP greening":* the creation of a large European agricultural residue market should also provide an excellent opportunity for economic growth in the agricultural sector. There is a good opportunity to make use of European structural funds and resources from the Common Agricultural Policy, which collectively could be directed at a new industry producing greener transport fuels, chemicals and plastics.
- *New revenue generation:* under a high gate price scenario, the next-generation ethanol industry in 2015 has the potential to help generate revenues within the EU27 community of up to EUR 20bn. This would simultaneously lower its dependence on foreign petroleum products and reduce its annual crude oil import bill.
- *Energy independence and lowering crude imports bill:* by 2020 the EU27 community will spend approximately EUR 40bn a year importing crude oil and converting it into gasoline if oil prices at \$100 a barrel persist. In the current context of volatile crude oil prices and energy security concerns, the potential benefits of next-generation bioproduct production should not be underestimated.

- *Job creation:* in addition, under the high scenario, 520,000 man-years of employment could be created up to 2020 as a result of constructing the necessary biorefining capacity, operating these biorefineries and delivering agricultural residues to these plants. Under a low scenario, 350,000 man-years of employment are still generated in the next decade. From 2015 onwards, up to 31,000 permanent new jobs could be created in the collection and transport of agricultural residues in rural areas alone.
- *Reduce greenhouse gas emissions:* using all agricultural residue supply, as envisaged in our economically-driven high scenario, to make next-generation ethanol should help reduce EU greenhouse gas emissions from the fossil gasoline market by more than 25% by 2020. It is worth noting the substitution of a litre of fossil gasoline with a litre of next-generation ethanol, using the enzymatic hydrolysis technology, lowers GHG emissions by approximately 80%. However, economics dictate that next-generation ethanol will not be able to replace all of the EU fossil gasoline demand by 2020.
- *Towards a bio-based economy:* the development of a bioproduct industry in rural areas should constitute the first step away from a petroleum dependent economy. It will lead towards a more diversified future where renewable biomass becomes a significant feedstock for both fuel and chemical production.

Figure 1: Farmers' margins per hectare of wheat straw, 2015



Source: Bloomberg New Energy Finance, FAO

Note: 'Margin' is calculated under a high gate price scenario of EUR 80 per tonne less the national costs of collecting, loading and transporting wheat straw. Agricultural residue yields per hectare are based on projections.

BARRIERS AND POLICY REQUIREMENTS

There are however barriers preventing the EU from unlocking the value of this agricultural residue resource. Bloomberg New Energy Finance has outlined some actions that could be taken by European policymakers and other stakeholders to unlock this potential.

- *New biofuels mandate*: a specific and large next-generation biofuels mandate, similar to the US renewable fuel standard, would drive long-term demand. The mandate would also provide the market security required by the agricultural and investment sectors to deploy capital in the construction of biorefining capacity. A next-generation biofuels mandate should likewise ultimately drive demand for agricultural residues.
- *Agricultural policies and structural funds*: to reinvigorate rural communities in line with its EU 2020 growth strategy, the EU could use its Common Agricultural Policy, rural development funds and structural funds to stimulate agricultural innovation and enable farmers to diversify their income.
- *Collection incentives*: in its infancy the industry would also benefit from agricultural residue collection subsidies, which are progressively scaled back as the market develops.
- *Blending credits*: tax breaks for blending next-generation biofuels with fossil transport fuels would improve the short-term production economics. But they should also be gradually reduced as the industry reaches its maturation point around 2018.
- *Remove technical impediments*: current regulations prevent biofuels from penetrating more than 10% of the fossil diesel and gasoline markets. Removing them will help the industry meet its full potential.
- *Bioproduct value chain creation*: a clear policy, active investment and agricultural innovation are all required to drive the creation of a new industry and a new bioproduct value chain.

STUDY CONDITIONS

Bloomberg New Energy Finance's study is designed to show how much agricultural residue will be available between now and 2020, under certain conditions.

- It assumes that of the 1.2bn tonnes of residues available in 2015, 75% will be returned to the field to protect soil quality; while 7.5% will go towards biopower production and animal husbandry; with the remaining 17.5% being made available for bioproduct conversion, under the appropriate economic circumstances.
- Agricultural land-use patterns have deliberately been held constant up to 2020 to negate any indirect land-use change (ILUC) concerns. Energy crops have likewise been excluded from the methodology as it is difficult to determine in which specific EU27 countries they will be grown. One of the primary intentions of the study is to show what resources are available with little or no ecological change.
- Our technical-economic model shows the costs of harvesting, loading and transporting 12 different agricultural residue types. These costs from the model dictate it would only be economic to collect half of the 17.5% available for bioproduct conversion.
- Industry consensus suggests biorefinery gate prices for agricultural residues in the next decade will be between EUR 50 and EUR 100 per dry tonne: this study shows the consequences of a low delivered gate price of EUR 60 per dry tonne and a high delivered gate price of EUR 80 per dry tonne.
- The scenarios assume that the industry responds very rapidly in building up the necessary capacity in response to the opportunity of a next-generation bioproducts industry and any delay would defer revenues into future years. The study is a representation of how a European next-generation bioproduct could evolve in the next decade and not an industry development forecast.

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