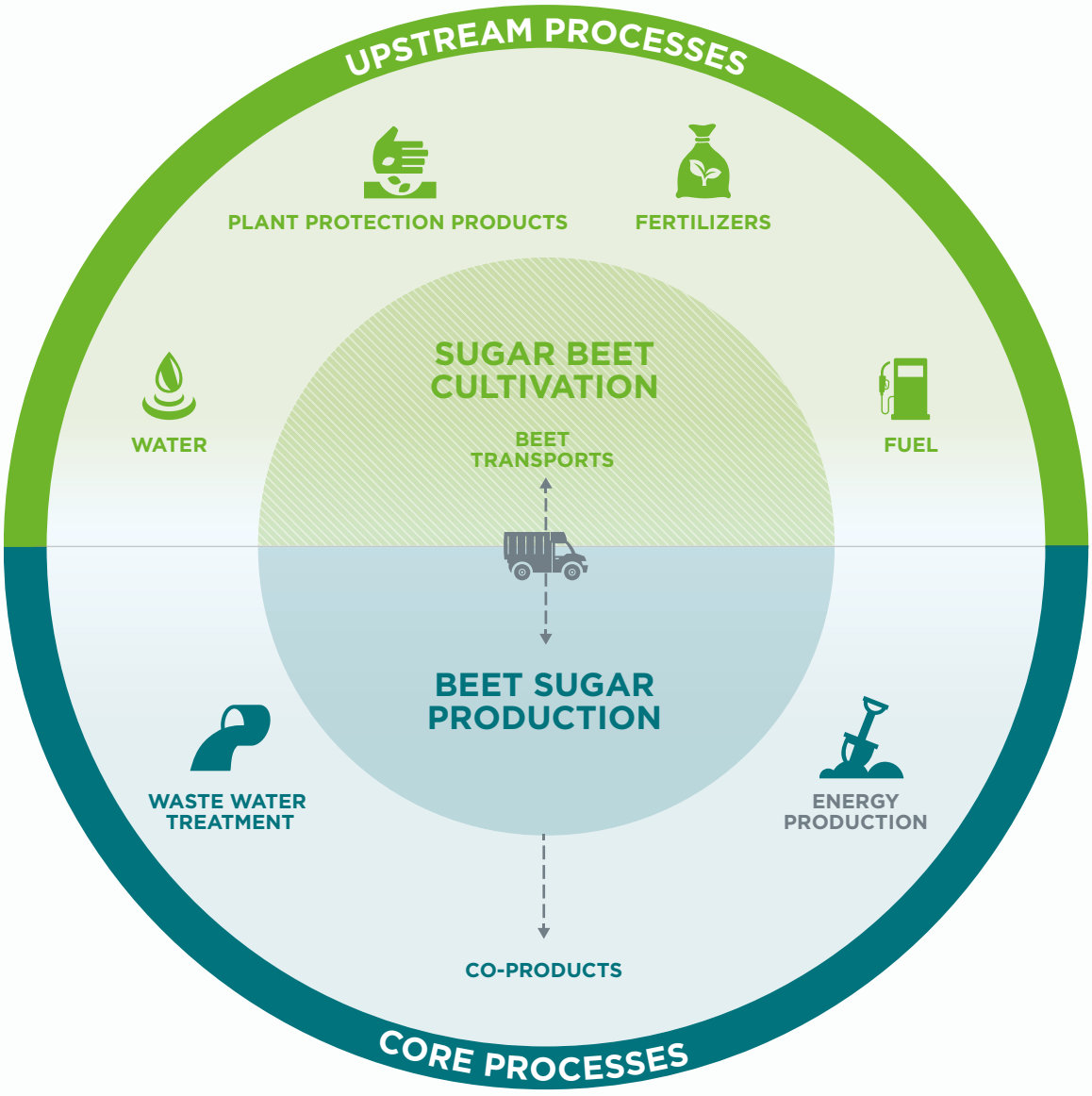
# Assessing the impacts of EU sugar production

## And what we learned about life-cycle assessment




This briefing covers our comprehensive 2014 study of the environmental footprint of EU-grown and-produced beet sugar. This study helped us identify sugar production's environmental hotspots to improve our understanding of the environmental effects of all the products leaving the sugar factory. The result is an insider's view of the significant environmental impacts of beet sugar production in the European Union.

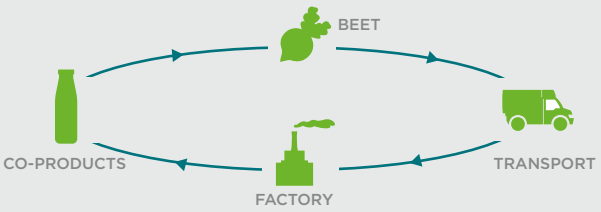
OUR 2014 STUDY GAVE US INVALUABLE INSIGHT INTO THE POTENTIAL USES OF LIFE CYCLE ASSESSMENT (LCA) METHODOLOGIES. THIS IS PARTICULARLY IMPORTANT AS THE EUROPEAN COMMISSION IS DEVELOPING THE PRODUCT ENVIRONMENTAL FOOTPRINT METHODOLOGY FOR ASSESSING THE ENVIRONMENTAL PERFORMANCE OF PRODUCTS.

The CEFS study was carried out within the scope of the EU Sustainable Consumption and Production Roundtable, the goal of which is to examine food production and supply in Europe with a more comprehensive and global "life-cycle-approach".

In this briefing, we describe how we conducted the study, and its results. We also share our findings about the environmental impacts associated with EU beet sugar and where they occur. Finally, we discuss the issues and challenges we found with the various LCA methodologies, and why we believe these challenges mean LCA is unsuitable for use in product comparisons and eco-labels.

## ABOUT THE LCA STUDY

The CEFS study examined five different LCA methodologies on 15 different impact categories including climate change and eco-toxicity. It also tested seven different methodologies for distributing the impacts of sugar production across its 11 different products – including white sugar, beet pulp, molasses, ethanol and sugar factory lime. For the most part, we used data obtained directly from 11 different European sugar companies for the analysis, covering 18 countries over five years, from 2008-2013. We carried out the study working with the Swiss technical consultancy Ernst Basler+Partner, in coordination with the Swiss Federal Institute of Technology in Zurich (ETHZ).




### 1 WHAT IS LIFE-CYCLE ASSESSMENT (LCA)?

The assessment of the environmental impacts of a given food product throughout its lifespan from raw materials through purchase by the customer.

### 2 ARE THE RESULTS RELIABLE?

Yes – the study is strongly representative of real-world performance in the EU beet sugar industry. Depending on the year, the data covered between 89% and 96% of the total harvested area in Europe and approximately 90% of EU beet sugar production. This coverage was cross-checked using the CEFS Sugar Statistics.

The methodologies we tested included the ILCD methodology used by the European Commission as part of the ISO 14040 standard on life-cycle assessment, and covered the identical impact categories as in the Product Environmental Footprint methodology.

The European Food Sustainable Consumption and Production (SCP) Round Table is an initiative co-chaired by the European Commission and food supply chain partners and supported by the UN Environment Programme (UNEP) and European Environment Agency. There are 16 member organisations representing the European food supply chain. Participation in the European Food SCP Round Table is also open to consumer representative organisations and environmental/nature conservation NGOs. The European Food SCP Round Table's vision is to promote a science-based, coherent approach to sustainable consumption and production in the food sector across Europe, while taking into account environmental interactions at all stages of the food chain. The initiative aims to ensure that environmental information be scientifically reliable and consistent, understandable and not misleading, so as to support informed choice.

## 3 WHICH ENVIRONMENTAL IMPACTS ARE MOST ASSOCIATED WITH EU BEET SUGAR PRODUCTION?

This depends on which methodology is used. Averaging across the five methods applied in the study, only four environmental impact categories (out of 15 studied) were found to be significant impacts from EU beet sugar production. These were:

- Climate change
- Resource depletion
- Land use
- Particulate matter

Together, these broad categories account for around two-thirds of the total impacts. However, each method produces its own result. For example, when applying the international ILCD method, the top impacts are climate change, human toxicity, eco-toxicity and water resource depletion. Water resource depletion was found to be relevant only when beet fields are irrigated – this applies to less than 10% of the total EU beet area.

Since the outcome is so variable it is essential to define clear rules as to which LCA methods must be used for the various impact categories, before LCA can be broadly applied to deliver reasonable results.

## 4 AT WHAT STAGE OF PRODUCTION DO THESE IMPACTS ARISE?

Our analysis showed that on average, beet cultivation takes the largest share of the total environmental impacts. This is linked to emissions to soil, mainly from the use of mineral fertilisers and fossil fuel-driven agricultural machinery. The sugar factory came second in the share of total environmental impacts. The factory's impacts were related to the use of fossil fuels to produce heat and electricity used in processing. For all of these reasons, climate change is shown to be the most significant environmental impact.

## 5 HOW ARE THE ENVIRONMENTAL IMPACTS ACCOUNTED FOR ACROSS THE LIFE-CYCLE OF BEET SUGAR?

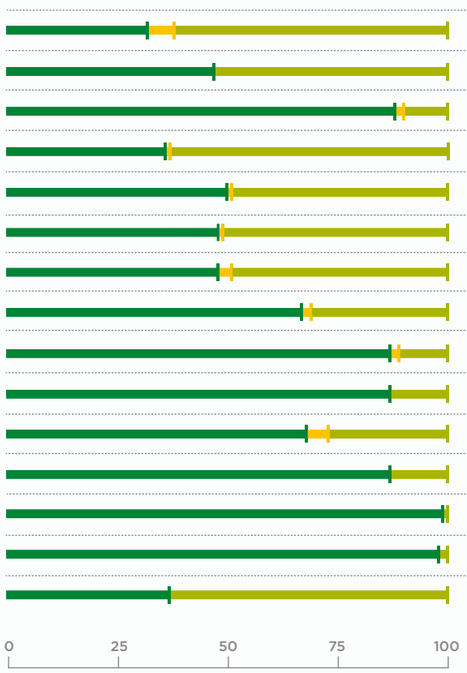
In order to interpret the results of a life-cycle analysis, there must be a designated method of distributing the impacts across all products. After all, besides sugar, a beet sugar factory also produces products including beet pulp, molasses and sugar factory lime that serve as ingredients for feed, fuels, chemicals and other applications.

There are various methods used for allocating the life-cycle impacts across the product range – for example, impacts can be allocated according to their sucrose content, or alternatively, according to the product's dry mass. The choice of allocation method has a direct impact on the net environmental impact of white sugar: if we use sucrose content, then white sugar has a 91% share of the environmental impacts. If we use the dry-mass method, this reduces all the way to 29%.

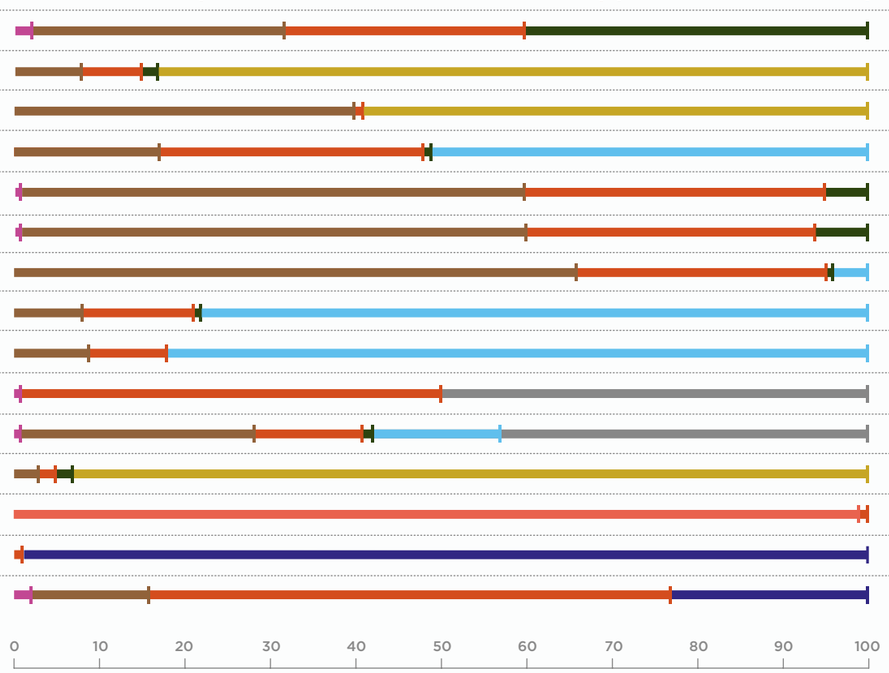
Some argue in favour of allocating impacts according to the products' economic value. However this is an unreliable method, given the volatility of prices in a wide variety of markets. Furthermore, it suggests that environmental impacts are already fully internalised in market prices. If that were the case – and it is not – there would be no need for LCA at all. Economic value is an inaccurate method for allocating environmental impacts – the results could be entirely different each and every time the analysis is conducted, even using exactly the same impact data.

We believe the best methodology for allocating impacts across the product portfolio is by energy content. This method covers the whole of the beet sugar product range, with the exception of sugar factory lime, and produces a scientifically robust analysis.

TOTAL ENVIRONMENTAL IMPACTS
BEET CULTIVATION, TRANSPORT AND
PROCESSING FOR THE ILCD METHOD




ENVIRONMENTAL IMPACTS BEET CULTIVATION




ENVIRONMENTAL IMPACTS SUGAR FACTORY


LEGEND

## 6 WHAT PROBLEMS DID YOU ENCOUNTER WITH THE METHODOLOGIES, AND HOW CAN THESE BE OVERCOME?

Despite using standardised methodologies contained in international guidelines, such as the ISO 14040 standard and the ILCD handbook, the study showed that the five different LCA methodologies lead to considerably different results even when applied to the same product with the same dataset. This was especially evident in the case of the ILCD method, which was unique in finding human toxicity as a significant environmental impact. Under analysis, we found that this was linked to the chromium VI emissions from the disposal of spoils from coal and lignite mining. However, coal accounts for only about one-quarter of the energy used in the EU beet sugar industry – not sufficient to produce such a finding, and not related to beet sugar production per se.

For this reason, we believe it is essential that the European Commission reviews the maturity of the human toxicity and eco-toxicity impact categories as well as the accuracy of the emissions data, when using public databases.

## 7 WHAT DOES THE STUDY SHOW ABOUT THE POTENTIAL USES OF LCA TECHNIQUES?

The methodological shortcomings inherent in LCA suggest that the tools are not yet sufficiently mature to be used for product comparison and consumer communications, such as eco-labels. However, it could be helpful to use LCA for internal hot spot analyses within product supply chains, to help guide decisions that reduce the company's environmental impacts.

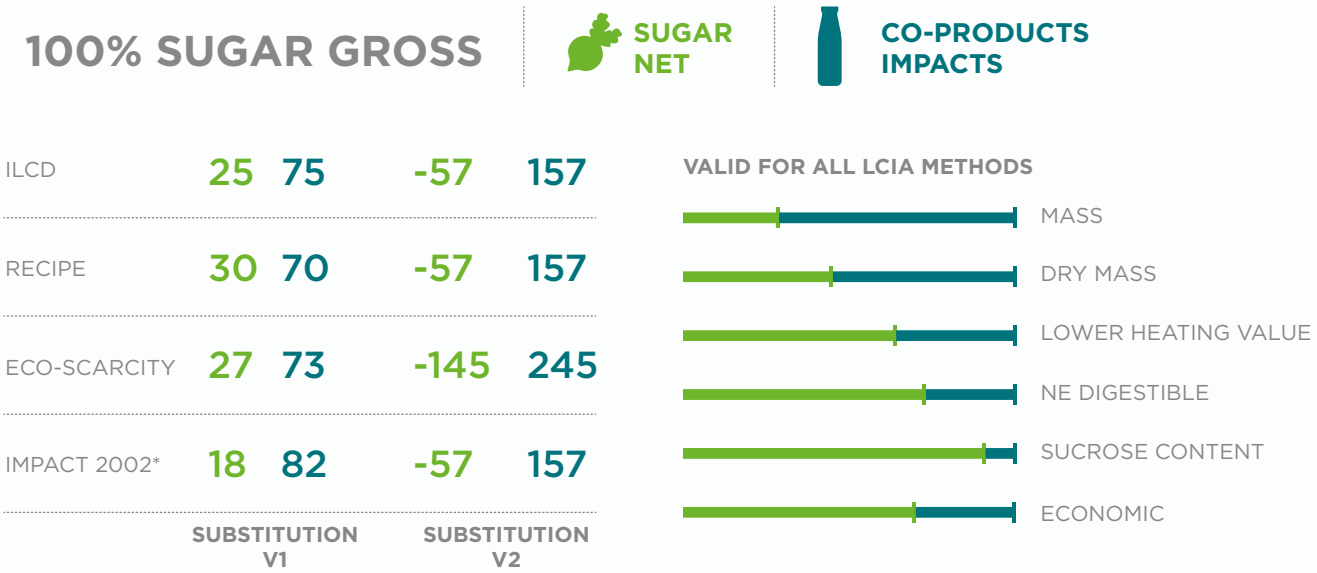
We believe – and the results of the study clearly show – that LCA tools depend on the right quality input data, and the use of the best methodologies, in order to produce valid and meaningful results. Therefore, we advocate the EU decision makers take the following actions as part of the Circular Economy initiative:

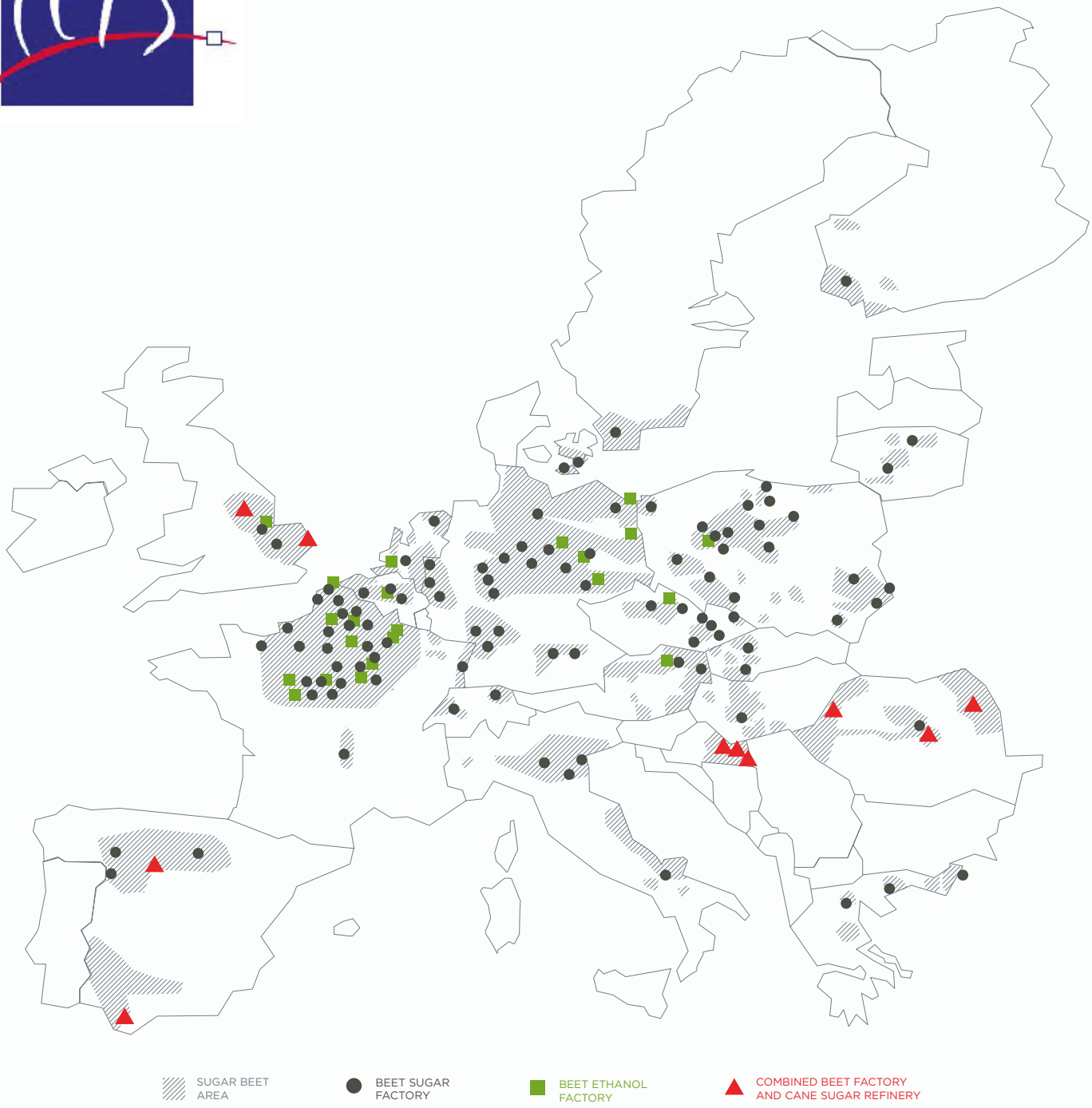
1 Life-cycle analysis should not be used at this time for product eco-labeling. The tools are not sufficiently mature, and the base data not sufficiently reliable.

2 LCA methodologies must be based on an accurate and reliable method for allocating impacts. For EU beet sugar, we believe this must be based on energy content. We urge EU decision makers not to allow economic value generated to be used for this purpose, as this will lead to results skewed by prices on global markets, that are not reflective of the real-world environmental impacts generated.

3 Public databases used for LCA must be cross-referenced and quality-checked, and representative of the given individual sectors.

DIFFERENT METHODS PRODUCE DIVERGENT RESULTS WHEN ALLOCATING IMPACTS OF VARIOUS BEET SUGAR PRODUCTS.






## MORE INFORMATION:

 Founded in 1953, CEFS represents all European beet sugar manufacturers and cane sugar refiners, covering sugar production in 21 EU countries plus Switzerland.

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This briefing note draws on the results of an extensive study of lifecycle analysis conducted in 2014.
Full results are available online.