ISSUE BRIEF: WATER

DOES THE BEET SUGAR SECTOR USE WATER RESPONSIBLY?

ABOUT THE ISSUE

Water is a vital input for all agricultural products, and sugar beet is no exception. Throughout the world, sources of fresh water are coming under increasing pressure from farming, industry and human needs. Agricultural raw materials can sometimes make a substantial contribution to the overall water impact of finished products. The beet sugar sector has taken numerous steps to improve the water efficiency of its operations, reduce pollution and have a lower impact on local water supplies, all across Europe.

ON THE FARM

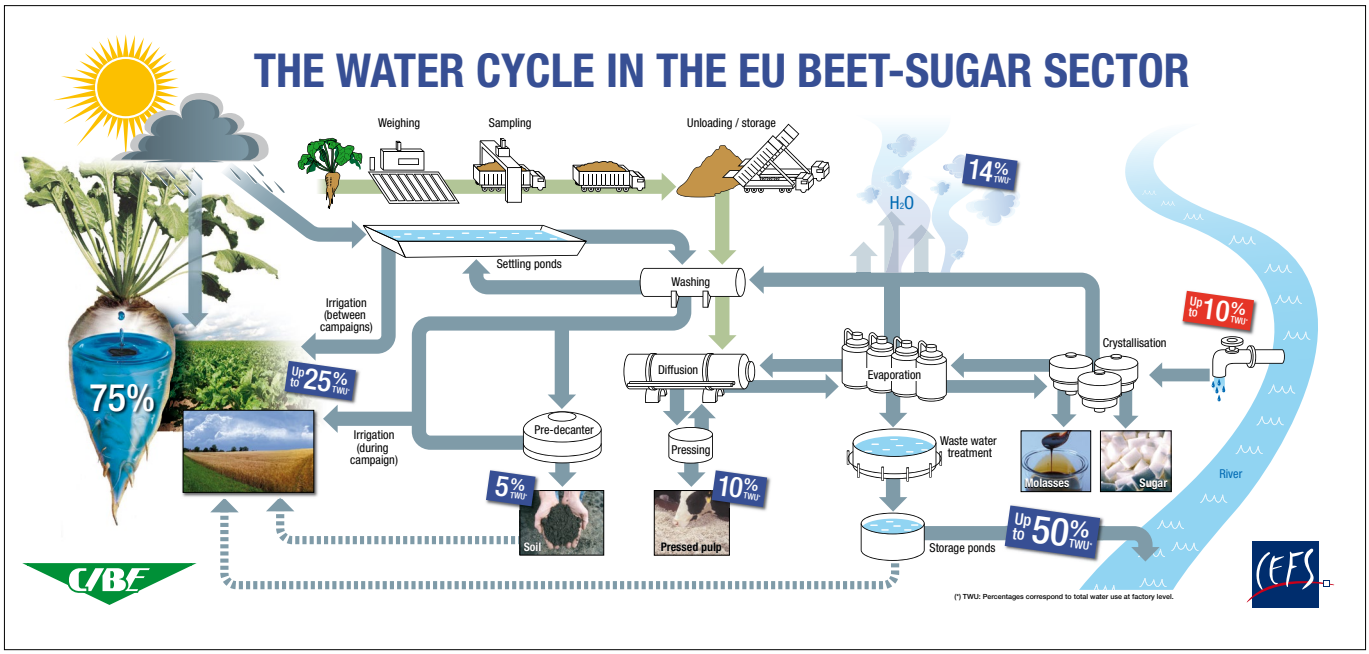
Growing sugar beet requires an average of 550 to 720 mm of water per growing season. Although local rainfall patterns vary enormously across the continent, in most locations rainfall alone is sufficient to sustain the crop, without any adverse impact on local water availability. Use of irrigation in beet growing is very limited across Europe: on about two-thirds of the EU beet area irrigation is used on less than 10% of the crop, while on a further 20% sugar beet is not irrigated at all.

IN THE FACTORY

Sugar beet processing involves the use of water at various stages, including cleaning, heat transfer, cooling and beet transportation into the factory. Within the factory, the beet itself – comprising 75% water – is by far the most important source of water. In fact, up to 90% of the water used during processing originates from the sugar beet itself. Therefore, sugar factories only need limited supplies of fresh water, mainly for cooling, which come primarily from groundwater or water not suitable for drinking.

FIGURE: THE WATER CYCLE IN THE EU BEET SUGAR SECTOR

Sugar factories have a positive water balance – the main water source is the sugar beet



Source: CIBE-CEFS Green Week 2012

REDUCING IMPACTS, IMPROVING PERFORMANCE

The most important means of conserving water is to avoid having to use additional water in the first place. Farmers take a range of steps to minimize the need for irrigation and improve the water profile of their sugar beet crops, including irrigation management plans based on calculations of the crop's specific water requirements. Conservation of topsoil helps reduce evaporation losses (as well as maintaining soil fertility). Careful application of plant protection products and fertilizers, and capturing sediment helps prevent runoff of these materials into water courses.

During processing, the water contained in the beet is turned into steam in order to extract the sugar. The majority of this steam is condensed to become liquid again and used in several phases of refining and production, and is recycled several times in a closed system before discharge. Water recovered from pressing the beet pulp is similarly used in the extraction and refining processes. Efficient water treatment systems ensure that wastewater is discharged with the lowest possible ill effects. Organic loads (biological oxygen demand, or BOD) are reduced by more than 90% before effluents are reused in agriculture or returned to local water courses.

FIGURE: GLOBAL AVERAGE WATER FOOTPRINT OF SWEETENERS AND BIOETHANOL FROM SUGAR CANE, SUGAR BEET, MAIZE

	SUGAR / ISOGLUCOSE	ETHANOL
	m^3/ton	liter/liter
SUGAR BEET	935	1.335
SUGAR CANE	1500	2.855
MAIZE	1125	1.910

Source: Gerbens-Leenes, PW and Hoekstra, AY (2009) 'The water footprint of sweeteners and bio-ethanol from sugar cane, sugar beet and maize', Value of Water Research Series no 38, UNESCO-IHE. Available at http://tinyurl.com/ktvmygn

CASE STUDIES: OPTIMISING WATER USE WITH TECHNOLOGY

Good irrigation practices allow farmers to apply only the minimum water required. 'Acqua Facile', developed by Beta Italia, gives Italian farmers a water requirements calculator based on historical temperatures for all Italian beet-growing provinces. 'Balance Hídrico', developed by AIMCRA, allows farmers in Spain to see the water needs of their crops in real time, via the Internet and mobile phone. 'Irribet', developed by ITB, allows growers in France to calculate the water balance for each field, based on a model specifically adapted to the beet crop.

CASE STUDY: RECYCLING PROCESS WATER

British Sugar's factory at Cantley has significantly increased its use of recycled water and reduced abstraction of water from other sources. In 2011, the company used water drawn from the River Yare for use in the factory for cooling purposes. Meanwhile, cooled

process condensate was collected in a pond awaiting permitted discharge to the river. A project team examined the feasibility of using this cooled condensate to replace river water. With the installation of 200 metres of pipeline, a pump now feeds the cooled condensate via the original system in the factory. River water is no longer used for cooling.

WHAT'S NEXT

Water footprinting methodologies are being developed to capture the total impact of a product on surface and ground-water, rainwater stored in soils, and on water pollution that occurs in production. The UN Global Compact's Water Action Hub collates good practices and initiatives across companies in regions around the world.

MORE INFORMATION

See Good Practices

Part A – Cultivation:

2. Water
   - 2.1 Preventing run-off to watercourses
   - 2.2 Preventing nitrate leaching
   - 2.3 Efficient irrigation

Part B – Processing:

3. Water Efficiency & Protection
   - 3.1 Reduction of fresh water demand
   - 3.2 Preventing water pollution

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