

Annex B2-3:

Report on Verification of technic in operation with a satisfying operational performance defined for the pilot plant



Subject <i>Deliverable under Action B.2</i>	Project acronym / Ref. No. Etanolix 2.0 for LIFE+ / LIFE12 ENV/SE/000529	Date 31/01/2017
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Performance verification

The larger quantities of intake of raw-material to the receiving station occurred for the first time on 11/05/2015. The volumes were quite moderate in the beginning for testing purposes of all equipment. Volumes have after that increased over the time until the end of this report period 31/12/2016 see *Figure 1*.

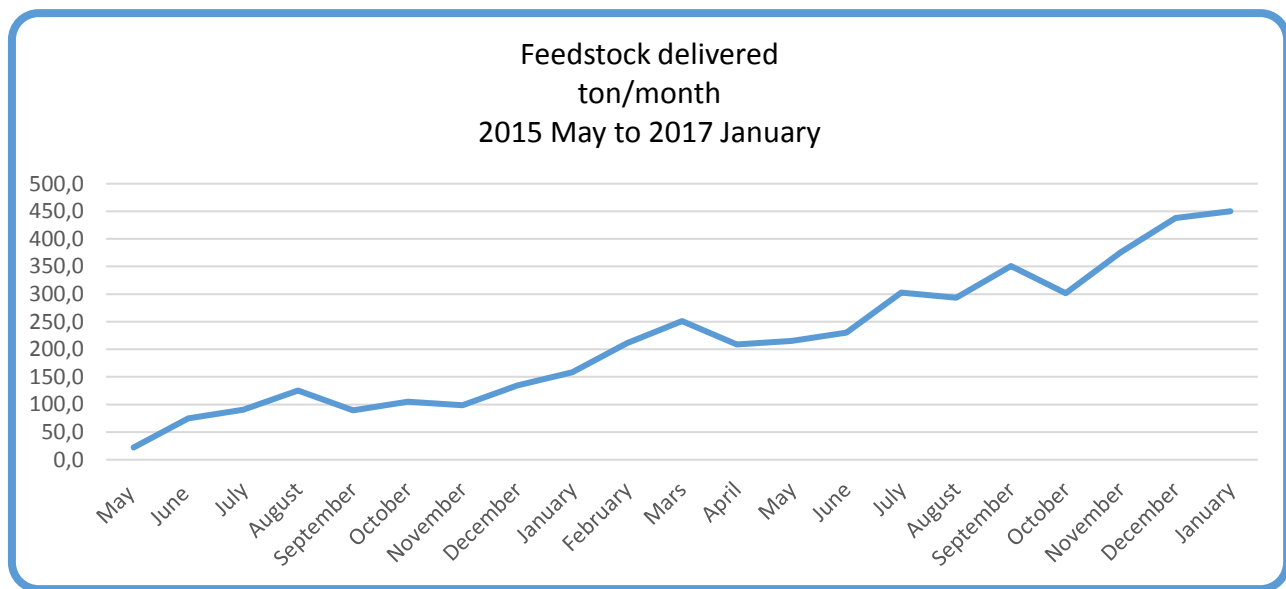


Figure 1: Feedstock delivered during the period.

The verification of the operation, with a fully satisfying performance, would normally have to be continued with the operation in a steady state continuous mode. We have not yet received that state. In the end of the period (31/12/2016) we are running at approx. 25 % of throughput according to design. We need to reach approx. 50% of feedstock delivered to be able to continuous operation.

New contracts on different feedstocks together with improved equipment, routines and fine tuning is calculated to make us reach that state during Q1 2017.



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However, all equipment at the plant has been operating during a sufficient amount of time, making it possible to evaluate the state of technologies in operation.

Integration to the Refinery

Steam

System for 3 bar low pressure steam have worked without problem. Fine tuning of controls for heating at Etanolix have been performed for best efficiency.

Instrument air

Have worked without problem.

Plant air

Have worked without problem.

Potable water

A few problems have occurred during really cold weather due to freezing. Additional heat tracing and insulation have been installed, which has solved this problem.

Cooling system

Have worked without problem.

Nitrogen

Have worked without problem.

Electricity

Have worked without problem.

Connection/control to Refinery control room

Have worked without problem.

Fire system

Have worked without problem. Tests have been performed with satisfying results.

Alarm system

Tests have been performed with satisfying results.

Water treatment plant/sewer



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No effect has been detected on the refinery water treatment plant.

Laboratory

Since the unit was started up a laboratory test program have been in place with analysis carried out on both ethanol and stillage. All quality parameters that are required to test for to enable a product on the market has been continuously measured according to this program. 100% of all ethanol produced have been transferred to the refinery for production of low blend gasoline.

Maintenance

All equipment that need maintenance is integrated in the Refinery's main maintenance system. Determining proper testing intervals is ongoing.

Receiving station

Receiving container was, at an early stage, considered having capacity problems. An improved design of the receiving container was carried out during June and July 2015, making it possible to increase the throughput to up to 20 tons per loading. The container was lowered and the upper part was widened.

Maximum load is depending on type of feedstock. Crumbs and chips is easier to treat and allows a little bit heavier load than bread. In average is the maximum load set to 12 tons.

We have not yet been able to ramp up and process the calculated volume of bread of 80 tons/day, as will be the main target.

Processing rate and capacity is restricted in the receiving bin due to the weight of the incoming raw material. If the receiving container capacity is exceeded, the processing rate is decreased or could even cause a stop to the production.

The speed is more or less unchanged during the demonstration phase due to above reason together with intermittent stops in receiving bin caused by jamming.

Investigation is continuing by manufacturer PST for presentation of a solution for enhancing speed and weight capacity in beginning of 2017.

New tests for optimizing screw pattern and force will be conducted together with implementing the new solution.

A restricted heat exchanger in the hydrolysis step reduces maximum speed. This will be investigated when the problem with the receiving bin treatment speed has been solved.



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