

TopDutch Innovation Challenge: **The case of UCC Coffee**

NOM

TOP
DUTCH
HUB

UCC
COFFEE

The company UCC currently roasts its coffee using natural gas. In order to continue to produce their delicious coffee through the sustainable transition, this originally Frisian coffee roaster with a Japanese parent-company wants to prepare for a future without natural gas.

After considering whether to use electric roasting, or to choose another (sustainable) fuel, the decision was made to switch to hydrogen. This choice is mainly motivated by the expectation that it will be a long time before the electricity grid is reinforced enough to supply the needed level of electricity. The availability of sufficient hydrogen is expected much earlier due to the developments of the project 'Bolsward Energiestad'. This project includes the construction of a hydrogen plant that is expected to be able to supply green hydrogen from 2029.

However, UCC's ambitions are so high that it doesn't want to wait until the hydrogen infrastructure is ready. UCC wants to initiate the change now by making one of their roasters also compatible with hydrogen.

The challenge:

UCC has three roasters. The largest can handle batches of 350kg at a time, the second can handle 250kg at a time, and the smallest 150kg. This small one is used only at peak times.

The largest burner must be made suitable for two energy carriers: hydrogen and natural gas. At the moment, the price of hydrogen is still too high to switch immediately and completely to hydrogen. By making one burner suitable for two fuels, UCC can already gain experience for the time when natural gas is phased out and production runs entirely on hydrogen. The other two burners will continue to burn natural gas for the time being.

Roaster 3:

The current roaster is almost 20 years old but is expected to last another 10-20 years. The challenge is therefore to convert this current burner (Neuhaus Neotec) and make it suitable for hydrogen as well as natural gas.

The roaster to be converted consumes over 500,000 m³/year of natural gas per annum. It does that in a primary roaster and an afterburner. On average, the primary burner burns about 40 m³/hour of natural gas during production. In the afterburner this is 20 m³/hour of natural gas.

With the primary roaster the air temperature is raised to 340°C and in the afterburner it is raised to 400°C. This hot air is blended with outside air to quickly and accurately achieve its prescribed temperature profile (130-240°C) in the coffee roasting chambers.

The largest roaster is a very important link in the current production capacity and will remain so in the future. Because of this, part of the challenge is to have as little loss in production as possible during the modifications. This requires very good preparation, preliminary work and preliminary research to keep the conversion within the regular schedule as much as possible during major maintenance. Normally a maximum of 3 days of downtime is planned for this. The goal, therefore, is to complete the conversion within 3 days.

The modifications will be followed by a test period in which hydrogen will be used for firing. The final switch will follow when the price of hydrogen for UCC approaches that of natural gas.

During the test period the hydrogen will have to be delivered by trucks. The adjustments at the plant for these deliveries will be needed for the period until a pipeline is in place to supply hydrogen from the planned hydrogen plant or from a central pipeline through the Northern Netherlands. Ideas on this are also welcome.

Call for solutions:

As you read this challenge, are you thinking, "I have the solution!" and want to explore with UCC how this conversion can be realized? Are you able to provide technology, knowledge or expertise that will help them do this?

Then apply no later than September 15, 2024 by filling out [the online form](#). If you have further questions, feel free to reach out to Fleur Mulder (NOM) by sending an email to mulder@nom.nl.

After an initial selection by UCC and NOM, we will invite a number of parties to visit UCC. During that visit, we can go deeper into the technical specifications and take a closer look at the roaster. The financial feasibility of the conversion and the switch to hydrogen will then be further investigated with the party offering the best solution for UCC. Of course, there will be plenty of time to ask questions and refine the solution.

The final selection of the winner will take place in early October. The party offering the best solution for UCC will win the tender to carry out the conversion. In addition, the winner will go together with UCC and NOM to the World Expo in Osaka, Japan in September 2025. There, they will present the innovation together.

In short, seize this opportunity to find a new customer in UCC and show your innovative strength on the world stage!