

**TOP
DUTCH**

Naturally leading
the transition



Your invitation to the

TOPDUTCH INNOVATION CHALLENGE

NOM

kikkoman 

UCC.
COFFEE

Do you have the knowledge and technology to help **two top Japanese companies in the Northern Netherlands** find a solution to their challenge? Then sign up today for the **TopDutch Innovation Challenge!**

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1.The challenge

Say 'konnichiwa' to your next innovation partnership

Did you know that amongst our neighbors here in the Northern Netherlands, we can count two major Japanese food manufacturers? Yes, Kikkoman – the famous soy sauce brand you'll recognize from your supermarket shelves – have a spot in Sappemeer, and the multinational coffee roasters UCC have a base in Bolsward. And, like all TopDutch companies, they love a chance for collaboration.

Both companies have a sustainability challenge they're facing. They're working with the NOM to look for a local start-up, scale-up or SME with the right technology, knowledge or expertise to jointly develop and implement a solution to this challenge. Could you be their partner?

In return, you can gain a new, multinational client. And in addition, the winning partnerships will earn an all-expenses-paid trip to the World Expo Osaka 2025 and an opportunity to showcase their innovation to an international audience!



World Expo Osaka 2025

From April 13 to October 13 2025, the World Expo with the theme 'Designing Future Society for Our Lives' will take place in Osaka, Japan. About 150 countries and 25 organizations will participate in it, and 28 million visitors are expected to arrive. This makes the Expo an international stage for countries to present themselves to the world.

The Netherlands will have a powerful presence at the Expo, with the large Netherlands Pavilion offering visitors a unique taste of the nation's innovation, sustainability and the solutions it offers for global challenges.

The Netherlands has their own theme for the Expo: 'Common Grounds: a Dutch invitation for creating healthy societies together'. With this, the Netherlands Pavilion will aim to be a platform to bring different perspectives and expertise together to create common solutions.



Japanese challenges and Dutch innovations

The Expo in Osaka is the perfect opportunity to both celebrate and intensify the innovative cooperation between Japan and the Netherlands. In the TopDutch region, we're doing this by organizing an innovation challenge. Two top Japanese companies with a base in the Northern Netherlands are ready to spend the next year innovating together with a Dutch start-up to find a solution to a challenge they are facing.

Soy sauce producer Kikkoman and coffee roaster UCC have formulated challenges to make their production process even more sustainable and circular.



Artist impression of the NL Pavillion at Osaka 2025, ©PLOMP

2.The challenges

At a glance: **UCC**



The company: UCC is an originally Frisian coffee roaster with a Japanese parent company.

The challenge: UCC wants to transition their coffee roasters from running on natural gas to hydrogen. In the short-term, the first step is to make their largest roaster compatible with both gases, with hydrogen being used for testing until the price is commercially competitive.

Who are we looking for? UCC are looking for a partner to carry out the conversion. The winning partner will put forward a solution that offers reliable technology, financial feasibility and requires as little downtime as possible.

What's in it for you? 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.

At a glance: **Kikkoman**



The company: Kikkoman is a world-famous Japanese soya sauce brand with a presence in the TopDutch region for over 25 years.

The challenge: Kikkoman hopes to find a suitable and innovative application for the waste stream 'soy cake'. They envision making bio-plastics from soy cake that can be used to produce packaging.

Who are we looking for? Kikkoman is looking for a production partnership. As solution provider, you will start a partnership with Kikkoman in which you develop a process to handle the soy cake, in order to produce packaging exclusively for Kikkoman at your own company.

What's in it for you? The applicant offering the best solution for Kikkoman will win the tender to develop the new soy cake application. In addition, the winner will go together with Kikkoman and the NOM to the World Expo in Osaka.

Roasting **coffee** **with hydrogen**

Challenge by



The company

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.

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.

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.

The solution

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 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.

Do you have the technology, knowledge or expertise that will help UCC realize this conversion? **Apply before the 15th of September 2024!**

Bioplastic bottles from waste streams

Challenge by  **kikkoman**

The company

Kikkoman was founded in Japan and has had a facility in Hoogezand-Sappemeer for more than 25 years. Kikkoman is known for its soy and teriyaki sauces and is committed to sustainability and circularity. The TopDutch Innovation Challenge is therefore perfectly to their taste!

At Kikkoman, soy sauce is made from the 4 natural ingredients of soybeans, wheat, salt and water. Proteins from soy beans provide the unique umami flavor of Kikkoman Soy Sauce. Its pleasant aroma and sweet taste are largely due to starch in wheat.

The production process

Soybeans are soaked in water and then steamed at high temperatures. Wheat is roasted and crushed to facilitate fermentation. For this purpose, 'Kikkoman Aspergillus', a kind of koji mold, is mixed into the steamed soybeans and roasted crushed wheat. After a three-day process, the basis for soy sauce production - soy sauce koji - is made.

Next, salt and water are mixed into the soy sauce koji to create a mixture called 'moromi'. The moromi is transferred to a tank for fermentation and aging. This process takes several months. Once complete, the soy sauce is pressed from the aged moromi by pouring it into three-fold cloths that are folded back into multiple layers. Under the force of gravity, the soy sauce flows out from the moromi.

After this, the moromi is slowly and steadily mechanically pressed for about ten more hours

to obtain a beautifully clear soy sauce. The soy sauce pressed from moromi is called “raw soy sauce”, and this is left in a clarifier for about three days to separate into its various components. Oil floats to the surface and sediment settles on the bottom.

Only the clarified portion in the middle is extracted. The clarified raw soy sauce is then passed through a heating device, halting all enzymatic activity, stabilizing its quality, adjusting its color and aroma, and readying it for its final quality-control check and bottling.

Several waste streams are created during the production process: soy cake (sediments), soy oil and wastewater.

The challenge

Kikkoman hopes to find a sustainable and innovative application for the soy cake. Can we make a high-quality product from this waste stream?

Currently, soy cake is sold as animal feed. But Kikkoman would like to value it higher, and use it as a raw material for a new product. The ideal solution according to Kikkoman? Use it to create their own packaging material.

Currently, bottles for soy sauce are purchased at a high cost. How great would be to make a circular version of these bottles from their own waste streams! So, is it possible to make bio-plastics from soy cake to produce Kikkoman’s soy sauce bottles?

Kikkoman is looking for a production partnership. As solution provider, you will start a partnership with Kikkoman in which you develop a process to handle the soy cake, in order to produce packaging exclusively for Kikkoman at your own company.

Soy cake at the end of the process consists of the following components: (continues on page 14)



Factor	Percentage
% Moisture	31.3
% Crude protein	19.2
% Starch	4.9
% Crude Fat	11.2
% Ash	7.69
% Calcium	0.31
% Phosphorus	0.11
% Magnesium	0.04
% Potassium	0.28
% Sodium	2.506
PPM Iron	57
PPM Zinc	38
PPM Copper	38
PPM Manganese	10
% Sulphur	0.21
% Chloride Ion	3.67

The solution

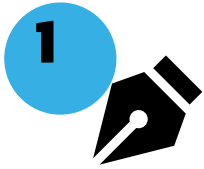
Per year, Kikkoman keeps about 5,000 to 6,000 tons of soy cake after the production process. This generates between €600,000 and €800,000 through sales to farmers. A nice new circular application should be economically beneficial for the business in the long-term, but is not necessary in the short-term.

After an initial selection by Kikkoman and NOM, we will invite a number of applicants to visit Kikkoman. During that visit we can go deeper into the technical specifications and examine the soy cake. With the party offering the best solution for Kikkoman, the chemical and financial feasibility of the new application will be investigated further. Of course, during and after this visit, there will be plenty of time to ask questions and refine the solution.

The applicant offering the best solution for Kikkoman will win the tender to develop the new soy cake application. In addition, the winner will go together with Kikkoman and the NOM to the World Expo in Osaka, Japan in September 2025. There, they will present the innovation together.

Do you have the technology, knowledge or expertise that will help Kikkoman realize this conversion? **Apply before the 15th of September 2024!**

3.The timeline



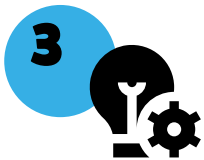
Apply

Apply no later than **September 15 2024**, by filling out the online form.



Company visit

After an initial selection by selection by the challenge owners and NOM, we will invite a number of parties to go on a company visit. During that visit, the technical specifications can be discussed in more detail.



Refining the solution

With the parties offering the best solutions for UCC and Kikkoman, the financial feasibility of the solutions will be further explored. Of course, there will be plenty of time to ask questions and refine the solution.



And the winner is...

The final selection of the winner will take place in October. The parties offering the best solution for Kikkoman and UCC – one per challenge – will win the tender to implement the solution.



Implementation

After the match is made, the winners will develop and implement their solution with UCC and Kikkoman, resulting in a financial partnership.



World Expo 2025

In addition, the winners – together with UCC, Kikkoman and the NOM – will go to the World Expo in Osaka in September 2025 at our expense!

There, they will jointly present the innovation to a wide audience of Dutch and Japanese executives. The perfect opportunity to find new customers and partners.

4.The NOM

About the NOM

NOM is the Investment and Development Agency of the Northern Netherlands, offering tailored financing and advice to innovative entrepreneurs who want to grow or establish themselves in the TopDutch region. We help entrepreneurs move forward with money, connections and knowledge. NOM puts entrepreneurs first; we do not stand for, but alongside the entrepreneur. Our services are independent, accessible and creative. They contribute to the growth of entrepreneurs and thus strengthen the Northern economy in a sustainable way.

About TopDutch

The TopDutch region is the economic region of the Northern Netherlands. We're not just TopDutch because we're literally located at the top of the Netherlands. We're mostly TopDutch because we're home to top Dutch business ecosystems, with bold ambitions and innovative solutions.

The TopDutch brand is a campaign commissioned by the Province of Friesland, Province of Drenthe and Province of Groningen. By using TopDutch as the international economic brand for initiatives and networks, we support ambitions and the ecosystem.

Contact



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