Greenhouse Horticulture Energy Transition Mission to Korea

The energy transition mission from 13 to 16 March 2023 was successful. We had 11 participants in the greenhouse horticulture track, and they were a good mixture of companies for greenhouse, climate control, and energy solution. We tried to let greenhouse horticulture companies interact with other track(hydrogen and battery) companies and achieved it by joining the joint program: Trade dinner, Posco visit, and InterBattery exhibition. The matchmaking event also went well, as all the companies had five good-quality meetings with potential agents, partners and farmers. The 2 MOUs about Aquathermal Energy and ATES(Aquifer Thermal Energy Storage) system were substantial and concrete. The greenhouse horticulture seminar played an essential role in positioning the Netherlands as the leader of energy transition in horticulture. The field visits helped the Dutch companies understand the current situation and ambitions of the Korean horticulture sector.

1. Energy transition mission to Korea and Japan

From 13 to 17 March 2023, the Netherlands organized a trade mission to Korea and Japan about energy transition. The mission, led by Liesje Schreinemacher, Minister for Foreign Trade and Development Cooperation, participated in trade shows, seminars, matchmaking events, and company visits. The Trade mission comprised over 40 companies and knowledge institutes active in hydrogen, battery, greenhouse horticulture, and offshore wind.

2. The goal of the energy transition mission

The world faces an energy challenge unlike any other. Over the next twenty years, the world will consume nearly 36% more energy than we do now. With fossil fuels no longer a long-term option for the well-being of our people and planet, the demand for renewable energy is at the forefront of our priorities. Together with partners in Korea, the Netherlands will build partnerships and pave the way for a more sustainable future. While Korea still relies heavily on fossil fuels, both countries are ready to leap and move towards greener energy and technologies. The mission is to invite everyone working in, or researching, renewable energy, battery technology, and sustainable horticulture to join us in stimulating innovation for a more sustainable future.

3. Why Greenhouse Horticulture?

The Dutch horticulture sector is ambitious in energy transition and climate change: by 2040, it will operate in a climate-neutral manner. The sector will phase out fossil fuel use by using geothermal/aquathermal and residual heat, and hydrogen. With soaring energy prices and the problems of climate change, this transition is urgent, and cooperation is needed. In this trade mission, we share innovations supporting the energy transition in greenhouse horticulture in our two countries and foster opportunities for collaboration. With this, we support joint efforts in the vital shift toward fossil-free production of food and flowers.

4. Why Korea?

Korea has around 55,000 greenhouse areas, and most of them are plastic greenhouses. The Korean government has tried to develop greenhouses into Dutch-style hi-tech glasshouses through different subsidy programs since the 1990s. Korea now has around 400 ha hi-tech glasshouse areas, which are growing. Thanks to these efforts, Korea is now the largest exporter of paprika to Japan. It is one of the

successful accomplishments of win-win cooperation between the Netherlands and Korea. Recently, new opportunities have emerged in the Korean horticulture sector. Korean government's continuous efforts to promote smart farming raised awareness of hi-tech horticulture in society. Unlike in past years, the private sector has started hi-tech glasshouse projects without governmental subsidies. It became possible because of investments by banks and private investors. Most of those projects are related to energy transition. Due to soaring energy prices and the societal demand for carbon neutrality, Korean project leaders should consider renewable energy sources. Both countries can share innovations supporting the energy transition in smart agriculture and seek cooperation opportunities.

5. List of participants Greenhouse Horticulture track

As shown below, 9 companies and 11 people joined the greenhouse horticulture track in the trade mission. It was a good combination of greenhouse builders(Bom Group, Dalsem, Tebarex, and Van der Hoeven), a climate control system company (Priva), energy solution companies (IF Technology and Witteveen + Bos), and a knowledge institute (Wageningen UR). When the Netherlands embassy in Seoul and RVO started recruiting companies, we struggled to link greenhouse builders to energy transition and energy solution companies to the greenhouse business. We made it through close communication and several pre-meetings with companies.

- Top Sector Horticulture and Starting Materials joined the mission as a track leader.
- Bom Group was looking for Korean partners and seeking potential greenhouse projects.
- Dalsem had been inactive in Korea over the last years and would like to re-enter the greenhouse market.
- Tebarex joined the mission to strengthen the relationship with current Korean partners.
- Van der Hoeven was exploring opportunities for large greenhouse projects.
- Priva (2 persons) was one of the leaders in the climate control system market in Korea and would like to reinforce its position.
- IF Technology and Witteveen+Bos (2 persons) had tried introducing aquathermal energy and ATES system to Korea and needed concrete projects.
- Wageningen UR had conducted a seed money project for a demonstration greenhouse in Seosan and would like to develop the current partnership into a more innovative research cooperation.

6. Program for Greenhouse horticulture Track

1) **Kick-off meeting on Mon 13 March (18:30 ~ 20:30)**
   All the participants from the four tracks joined the kick-off meeting and network with the mission participants, the Netherlands embassy in Seoul, and the Dutch government delegation.

2) **Visit Posco on Tue 14 March (10:00 ~ 11:30)**
   Around 45 people, including the Dutch government, all the greenhouse horticulture track, part of the hydrogen track, and part of the battery track, visited Posco. We added this visit to the greenhouse horticulture track program to know general energy transition trends in Korea. Posco was very active in hydrogen business by making green hydrogen plants in the Middle

East and Australia for carbon-neutral steel production, and battery business using their current global network to source raw materials.

3) **Business Matchmaking Event on Tue 14 March (14:00 ~ 17:00)**
6 companies(Bom Group, Dalsem, Tebarex, Van der Hoeven, IF Technology and Wtteveen+BOS) joined the Matchmaking event. The Netherlands embassy in Seoul hired an external consultant to arrange five matchmaking meetings for each company in the greenhouse horticulture track. The Netherlands embassy in Seoul supported this event by sharing contact details of potential partners.

4) **Trade reception and MOU ceremony on Tue 14 March (18:00 ~ 20:00)**
The Netherlands and Korea signed seven memorandums of understanding between their companies and agencies to enhance cooperation on energy transition in different sectors. The signing ceremony was attended by Trade Minister Liesje Schreinemacher and her Korean counterpart Ahn, Duk-geun. Two MOUs were about greenhouse horticulture;

   a. Memorandum of Understanding on Business Cooperation for Introduction and Operation of "Aquathermal Energy & ATES System" in the Korean Market, by IF Technology, Witteveen +Bos, Leisure World, and Seungshin Construction

b. Memorandum of Understanding for Participating Business for Introduction of "Aquathermal Energy & ATES System" in the Seosan Agri-bio Special District, Chung-Nam Province, by IF Technology, Witteveen +Bos, Leisure World and Dewlbio.

5) **Interbattery exhibition at COEX on Wed 15 March (10:00 ~ 11:30)**
Even though the Interbattery exhibition was not directly related to greenhouse horticulture, The Netherlands embassy in Seoul added this program expecting interaction between different energy tracks. Greenhouse horticulture companies had a chance to look around the exhibition focusing on energy development in the Korean market. They also had their business meetings with their partners in the Netherlands pavilion. Embassy arranged press interviews with Dalsem and Priva upon request of Money Today, an economic newspaper in Korea.

6) **Seminar on energy Transition in greenhouse on Wed 15 March (14:00 ~ 18:00)**
The seminar took place in JW Marriott Seoul with around 100 audiences: farmers, researchers, government officials, and journalists. The seminar was opened by Ms. Gelare Nader, Agricultural Counsellor of the Netherlands Embassy, and congratulated by Mr. Gert Stiekema, Top Sector Horticulture & Starting materials, and Dr. Changgil Kim, Sub-committee chair of the Korean presidential committee for Agriculture, Fisheries and Rural policy. The list of presenters is as shown below.

a. **Sustainable heating & cooling of greenhouses by using ATES and aquathermal energy by Mr. Bas Godschalk, IF Technology, and Dr. Saleh Mohammadi, Witteveen + Bos**

Mr. Godschalk and Dr. Mohammadi shared the feasibility study result on ATES in Busan last year and views on the potentiality of Aquathermal energy and ATES system for greenhouse horticulture projects in Korea.

b. **The fossil-free greenhouse of the future by Mr. Ruben Kalkman, Bom Group**
Mr. Kalkman proposed a fossil-free/renewable energy option for Korean greenhouses under extreme weather.

c. **Energy transition cases in Greenhouse Horticulture by Mr. Tim Tijsma, Van der Hoeven**
Mr. Tijsma introduced several innovative technologies using solar energy and water for greenhouse horticulture.

d. **Hyundai Seosan Green Bio Smart city & Demonstration Farm project by Mr. Nam-Hoon Kim, Leisure World and Mr. Rick de Jong, Wageningen UR**
Mr. Kim introduced the Seosan Green Bio Smart city project that includes agro-tourism(Little Netherlands), agri-business, a demonstration greenhouse, and rural housing. Mr. De Jong shared the concept plan for the demonstration greenhouse conducted under the NL seed money project.

e. **Recent Progress of Greenhouse-related Projects and Energy Efficiency Improvement Plans in Korea by Dr. Yoon-Ho Park, Korea Rural Community Corporation**
Dr. Park introduced the Korean government's plans for energy transition in greenhouse horticulture. KRCC, the semi-governmental corporation, focused on blue hydrogen.

f. **Combined Technology of FC-CHP System with Greenhouse by Mr. Hyunjoo Shin, Blue Energy Farm**
Blue Energy Farm was working with Van der Hoeven and Korean hydrogen companies such as SK and Hanwha, planning to make a large greenhouse district using waste heat and CO_2 from hydrogen energy cell plants.

g. **MGS Double Hook System & Energy Saving Effect by Mr. Kisung Kim, Essence Farm**
Essence Farm presented energy-efficient heat pumps and energy-saving Moving Gutter Systems developed for themselves.

h. **Net Zero Smart Farm using Waste Heat from Steel Factory by Mr. Dongmyeong Shin**
Mr. Shin illustrated the recently completed Daehan Steel's pilot greenhouse using waste heat from its steel factory.

Dutch presenters focused on fossil-fuel-free solutions such as Aquathermal/geothermal energy, ATES (Aquifer Thermal Energy Storage) system, and solar energy. In contrast, Korean presenters focused on efficiency to decrease energy costs by using blue hydrogen, efficient

heat pump, and residual heat. It was a fruitful seminar to share views on energy transition and learn from each other.

After the seminar, the Dutch delegation, Korean speakers, and Korean partners (30 people) had a networking dinner (18:30 ~ 20:00). The greenhouse horticulture track stayed in Korea until Thursday, 16 March, while others left for Japan on 14 March in the afternoon.

7) Field trip on Thu 16 March (7:30 ~ 19:30)

The greenhouse horticulture track visited three destinations to learn the current status of the Korean horticulture sector and energy development.

The greenhouse horticulture track visited Woodeumgee farm between 10:00 and 11:30. Embassy arranged this visit because we could see the development of the Korean greenhouse sector from mid-tech to hi-tech in this farm (11 ha total). Woodeumgee farm was the first semi-closed greenhouse developed by a Korean farmer(owner). Tebarex, one of the delegation members, installed the internal system, including nutrition and irrigation. The farm recently adopted Priva's labor management system and cooperated with Signify to install LED lights. This farm was concerned about soaring energy prices as they use 100% electricity as an energy source. In that sense, the discussion between the Woodeumgee farm owner and the Dutch horticulture and energy companies was fruitful. Wooedumgee farm planned to expand the

greenhouse to 8ha more in the current location and its business to Seosan reclaimed land (20ha).

After that, the delegation visited the Hyundai Seosan green-bio smart city site between 13:00 and 14:00. The district details are in another ABB article: South Korea will welcome "Little Netherlands" in Hyundai's Seosan based reclaimed land. | Nieuwsbericht | Agroberichten Buitenland. The district was still under construction for infrastructure, and the first farm in this district, Dewlbio, a mushroom farm, was waiting for a groundbreaking ceremony this spring. This visit drew the attention of IF Technology and Witteveen+Bos, who would like to know if this reclaimed land suited Aquathermal Energy and ATES system. Priva and WUR, who joined the seed money project for a demonstration greenhouse in this district, had a chance to look around the area.

Between 16:00 and 17:30, the delegation visited Essence Farm, which was still under construction by Certhon. The 2-ha greenhouse was a fully-automated 100% climate-controlled greenhouse for leaf vegetables. Like most Korean hi-tech greenhouses, they used electricity but developed their energy system using a newly-developed heat pump, buffer water tank, and a patented energy-saving Moving Gutter System. Dutch greenhouse companies were interested in the innovative new energy systems. Essence Farm planned to expand the farm in the same region and would like to continue cooperating with Dutch companies.

7. Follow-ups

- Top Sector Horticulture, as the leader of the greenhouse horticulture track, shared information on the development of energy transition in the Dutch horticulture sector with the mission participants and the Netherlands embassy in Seoul. An EU-Korea research fund is proposed as an instrument for energy transition research cooperation between the two countries.

- IF Technology and Witteveen+Bos are keeping in touch with their MOU partner, Leisure World, for the projects in the Hyundai Seosan district and business in Korea. Already two farms in the district, Woodeumgee Farm and DewlBio, have agreed to adopt ATES system in their farms. More projects will be followed.

- Priva stayed in Korea the next week and continued business discussions with the current Korean partner, Mifko. Priva has played a role in the seed money project in the Hyundai Seosan district and will seek business opportunities there.

- BOM Group also stayed in Korea the next week and met with potential partners. BOM Group is trying to find the right local partner.

- Dalsem has become interested in the Korean market and will return to Korea to prepare for actual business. Dalsem will try to build partnerships with companies introduced during the matchmaking event.

- Tebarex will continue cooperation with the current Korean partner and customers and try to expand the business to other projects based on the new contacts in the mission.

- Van der Hoeven will materialize the current project and seek other potential projects.

- Wageningen UR had a chance to meet Korean agricultural research institutes, universities, and companies for greenhouse and energy transition cooperation. WUR will keep in touch with them to develop cooperation in research.