Smart Farm Solution - Plasma·AI based smart storage cloud platform

Company Profile

Dec. 2022

EL TECH Co., Ltd.

1. Company Overview / information

- Company name : EL TECH Co., Ltd.
- Established date : January 10, 2017
- Physical address : ICT Convergence Center, 35, Techno 9-ro, Yuseong-gu, Daejeon, Republic of Korea, PO BOX 34027
- Phone number : +82-42-633-9511
- Fax number : +82-70-7656-9511
- Website URL : www.e-l.co.kr
- Email address : jonathan.yun@e-l.co.kr
- Capital : 125 million KRW
- Employee : 7
- Revenue : 897 million KRW @2021
- Certifications : ISO9001/14001, AS9100D

1. Company Overview / history

2022.10	Patent application for big data AI-based plasma agricultural products storage system
2022.04	Received an order from the Ministry of SMEs and Startups
2021.10	Plasma Technology transfer agreement with Korea Nuclear Fusion Energy Research Institute (KFE)
2021.07	Received an order from Korea Gas Corporation to develop a wireless explosion-proof system
2021.01	Acquired AS9100D aerospace quality certification
2020.09	Recognized as an excellent employee invention company
2020.07	Factory registration
2020.01	Acquired ISO 9001:2015/ ISO14001:2015 certification
2019.07	Established an affiliated research institute
2019.06	Received order for building structure displacement monitoring system
2019.02	Development of DDR4 memory interposer for Samsung Electronics
2018.10	Verification board design for KARI's Multipurpose Practical Satellite No. 7
2017.11	Acquisition of venture firm status
2017.11	Verification board design for KARI's Multipurpose Practical Satellite No. 6
2017.01	Establishment

1. Company Overview / core member

Choe Woohyun / CTO & Co-founder

NHN Technology Services, Samsung SDS

Master's degree in DB at KAIST

LYU, DEUK-SU / Wireless communication, H/W design

Electronics and Telecommunications Research Institute

Master's degree in Electrical and Electronic Engineering at KAIST

Nam Young Hyun / fluid analysis, plasma control

Korea Research Institute of Standards and Science, Doosan Heavy Industries & Construction

PhD in mechanical engineering at Tohoku University

Han Buoungyul / IoT sensors

LG semiconductor / Semisolution

Master's degree in electrical engineering at Korea University

1. Company Overview / base technology

EL TECH Co., Ltd.

- Data BUS terminating error correction technology
- S-parameter analysis technology for BUS transmission, reflection, and crosstalk
- Impedance matching technology
- Power supply PDN and resonance analysis technology
- High-speed communication connector design technology
- BUS interface, FPGA, CPLD circuit design and SI / PI analysis technology

- DB data visualization technology
- Pattern analysis technology using CBL/RRMSE/SVR techniques
- Statistics/LSTM/Ensemble-based Prediction Algorithms
- Multicasting-based big data processing technology
- Predictive Algorithm Engine Design Technology
- html5/css web UI based dynamic-adaptive web design technology
- Architecture design technology using open source such as python/flask/mysql

- oneM2M, LWM2M operation technology
- Pattern analysis technology using CBL/RRMSE/SVR techniques
- Structure safety diagnosis and machinery through sensor data analysis Failure Prevention Platform
- Plasma-based AI smart cold storage platform

1. Company Overview / patents

- **Big Data/AI-based Plasma Agricultural Products Storage System**
- **Hybrid gateway applicable to LoRa and LwM2M technologies**
- **Data and algorithm sharing cloud system**
- **All-sky photo-based content sharing and prediction service provision server**
- **Sensor anomaly detection system for building monitoring using ensemble algorithm**
- Pin length and impedance matching connector for high-speed communication
- Step-locking prevention bolt and nut structure
- High-speed communication connector that can improve transmission quality and adjust characteristics
- Crack sensor and low-power driven crack detection system using the same
- Power application system between window and window frame with heating sheet attached

general **related** **core**

2. Technology / IoT sensors

Oxygen (O_2) Sensor

■ Technical Specification

operating temperature	-10 ℃ to +50 ℃
operating pressure	700 to 1300 mbar
operating humidity	5% to 95% Rh (Non-condensing)
sensor type	Galvanic cell (lead-oxygen battery)
measurement range	0~25% volume Oxygen
accuracy	< ±1.0% full scale
response time(T90)	< 15 sec for 90% response
zero offset voltage	Less than 0.5mV in 100% N2 @ 25℃ 40% RH

Nitrogen dioxide (NO_2) Sensor

■ Technical Specification

operating temperature	-20 ℃ to +50 ℃
operating pressure	800 to 1200 mbar
operating humidity	15% to 90% Rh (Non-condensing)
sensor type	Electrochemical
measurement range	0~20 ppm
resolution	< 0.1 ppm typical
response time(T90)	< 30 sec
repeatability	< ±5%

continue

Nitrogen monoxide (NO) Sensor

■ Technical Specification

operating temperature	-20 ℃ to +50 ℃
operating pressure	800 to 1200 mbar
operating humidity	0% to 90% Rh (Non-condensing)
sensor type	Electrochemical
measurement range	0 ~ 500 ppm
resolution	10 ppm typical
response time(T90)	< 30 sec
repeatability	< ±2%

Ethylene(C_2H_4) Sensor

■ Technical Specification

operating temperature	-20 ℃ to +55 ℃
output sensitivity	29±5 mV / % methane
linear to	3% methane
Long Term Sensitivity Drift	< 5% signal / month
measurement range	0 ~ 100 % LEL
response time(T90)	< 10 sec

* Flow rate of 300ml/min. Conditions at 23 ± 2 ℃, 60% RH, and 1 atm unless otherwise noted.

continue

Carbon dioxide(CO_2) Sensor

■ Technical Specification

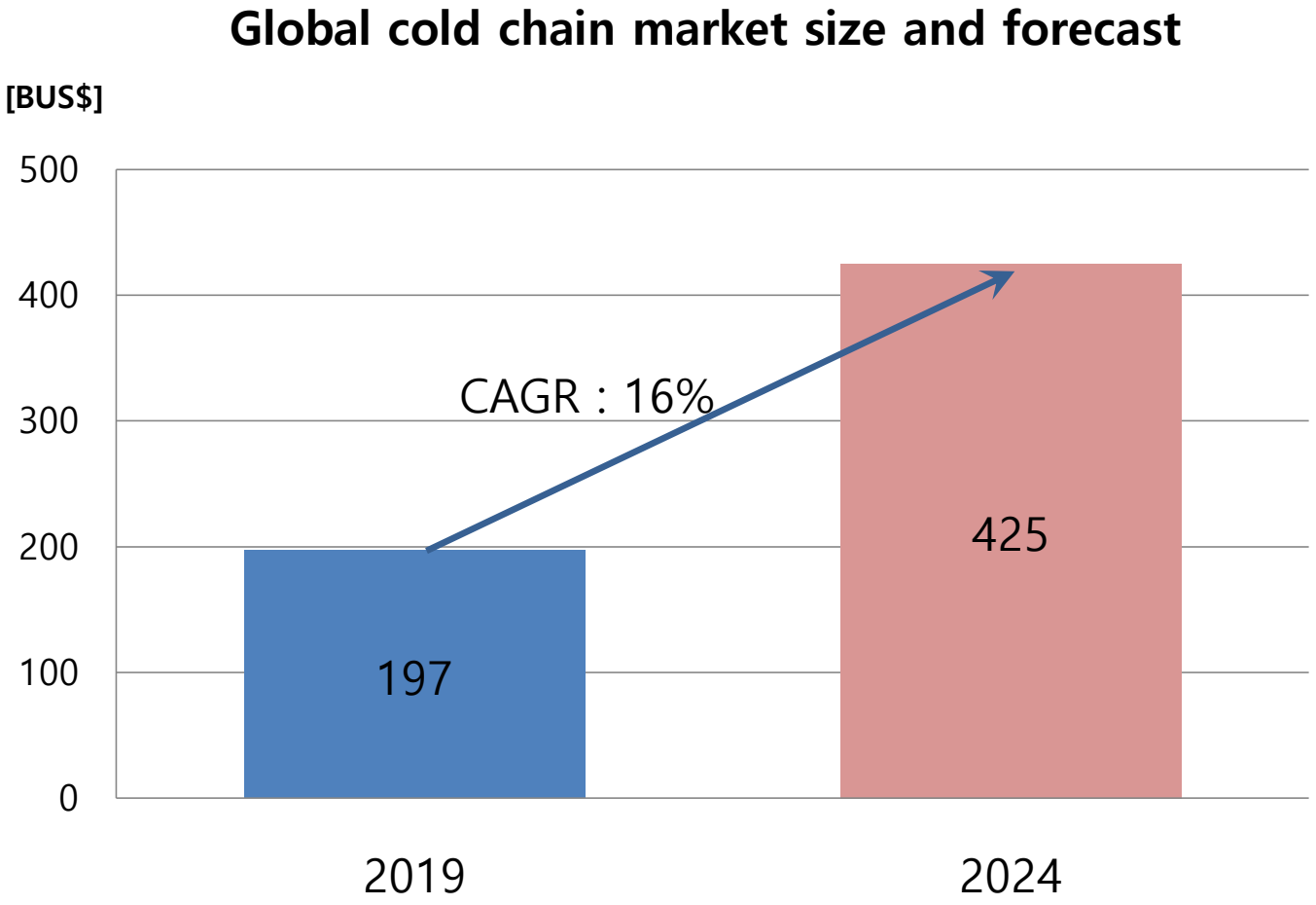
operating temperature	-20 °C to +50 °C
operating humidity	0% to 90% Rh (Non-condensing)
sensor type	NDIR
measurement range	0 ~ 500 ppm
resolution	10 ppm typical
response time(T90)	< 30 sec
repeatability	< ±2%

Ozone (O_3) Sensor

■ Technical Specification

operating temperature	-30 °C to +50 °C
operating pressure	800 to 1200 mbar
operating humidity	15% to 90% Rh (Non-condensing)
measurement range	0 ~ 20 ppm
sensor type	Electrochemical
resolution	0.1 ppm typecal
response time(T90)	< 40 sec

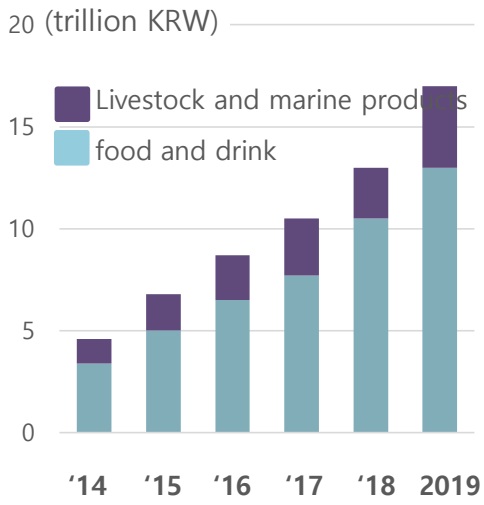
3. Target market / global



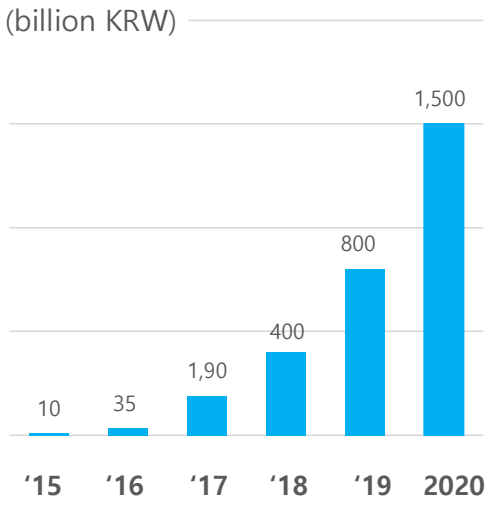
※ source : TechNavio, Global Cold Chain Market, 2020

3. Target market / domestic

[fresh food online transaction trend]



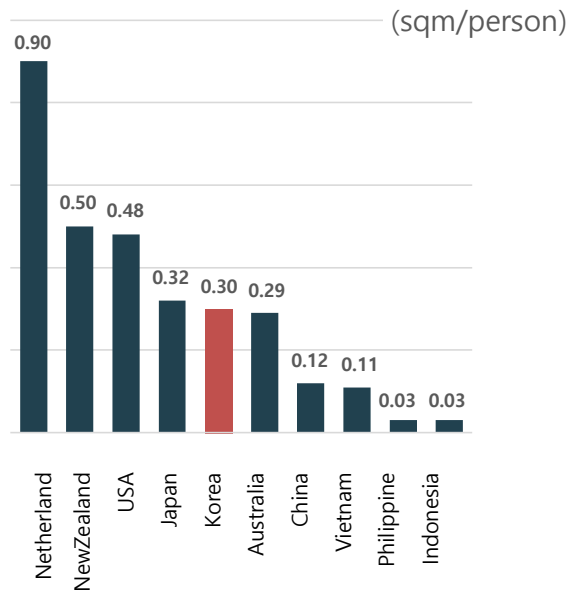
[early morning express delivery market size]



The dawn of fresh food, the size of the online market is continuously increasing

▶ Set the direction of targeting the domestic and export markets based on the fresh food needs of general consumers

[Proportion of use of cold storage per city population]



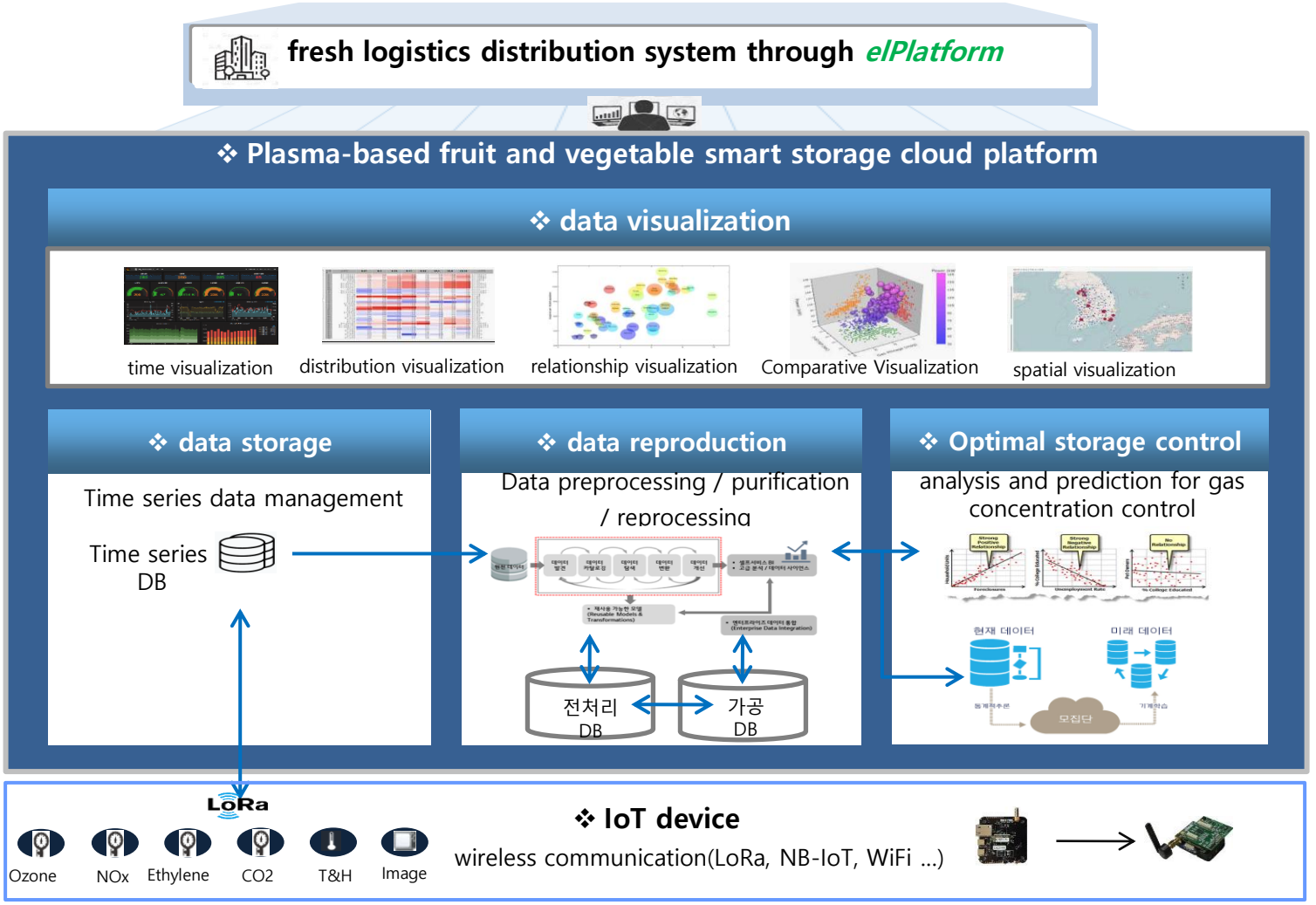
▶ The rate of use of cold storage per city population is lower in Korea than in the US/Japan

Source. Statistics Korea, Samsung Securities, CBRE

4. Product / elPlatform

elPlatform

Plasma-based optimal storage control system for fresh logistics equipped with smart IoT sensor applied big data and AI learning function



4. Product / IoT sensor

IoT sensors

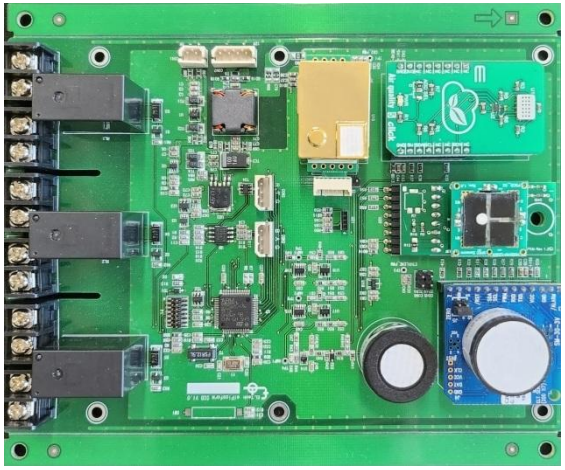
Temperature &Humidity

Ozone

carbon dioxide

ethylene

All-in-one module : sensor, wireless communication



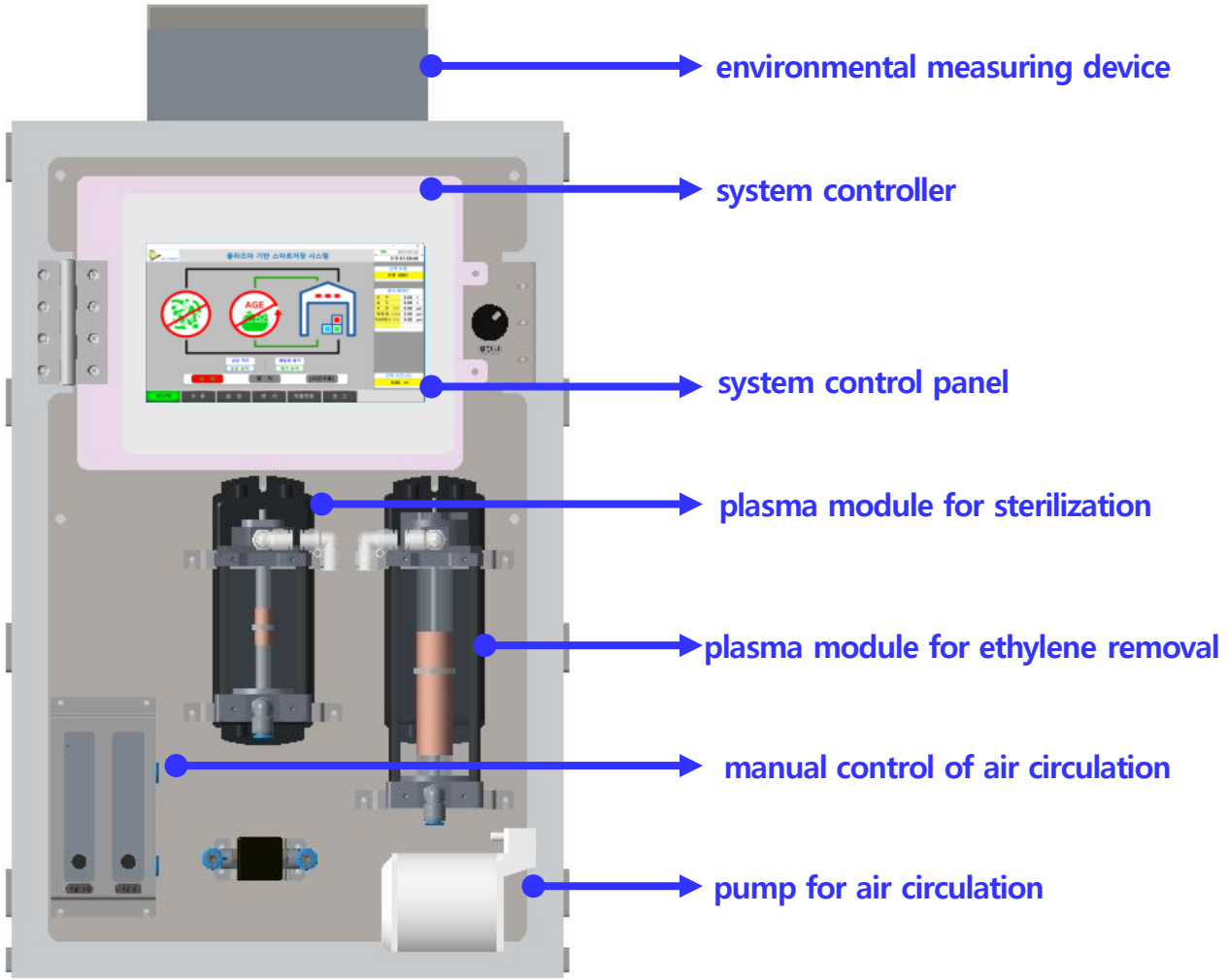
4. Product / plasma

- **Ozone, NOx generator : sterilization, suppression of breathing**

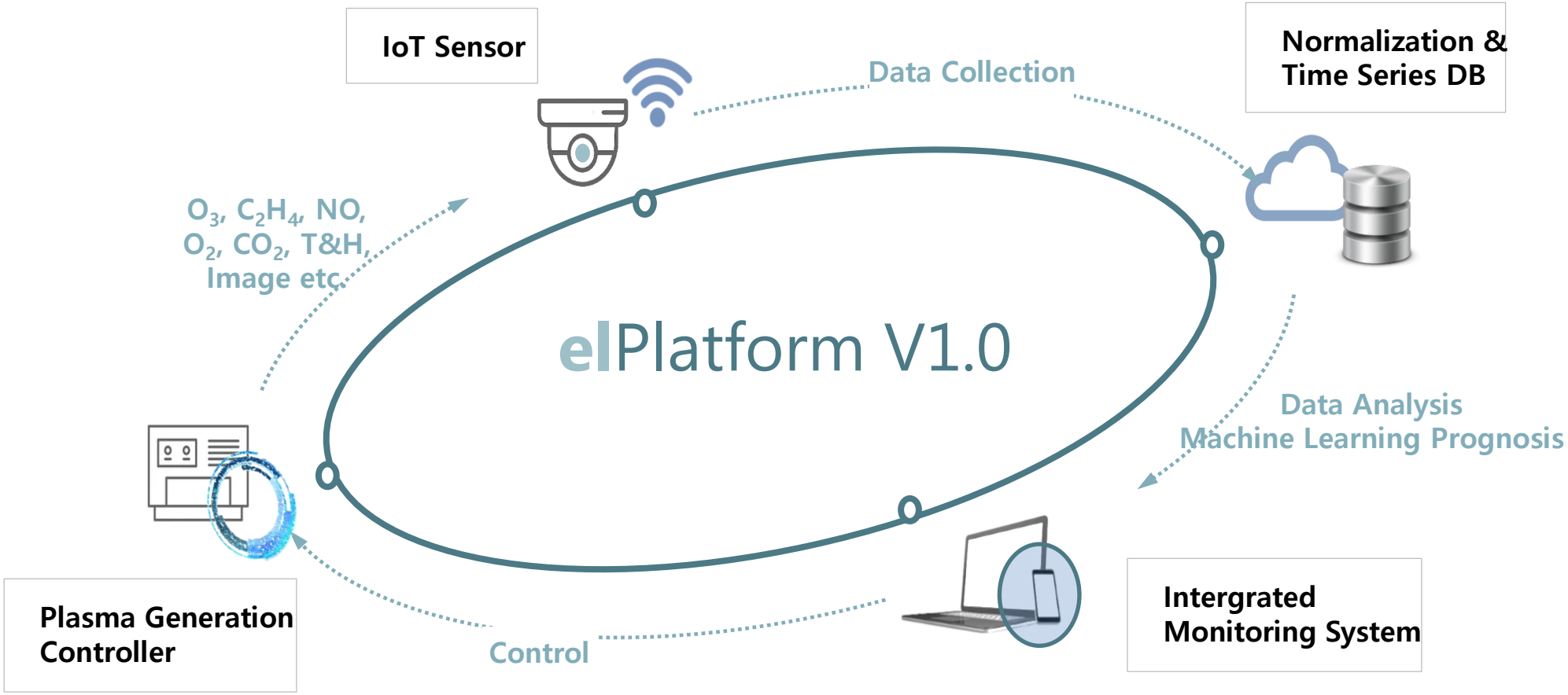
- **Ethylene Removal : inhibition of aging**

4. Product / storage control system

Stand-alone type storage control system



4. Product / elPlatform is ...



4. Product / function comparison-1

Cold storage .vs. CA(Controlled Atmosphere) .vs. Plasma comparison

situation		cold storage	CA	Plasma	
microbial spoilage	Microbial disinfection/inactivation	△	△	◎	- Direct sterilization of airborne microorganisms by direct plasma treatment - Indirect sterilization of crop surface microorganisms by active species
		Presence of low-temperature growth microorganisms Absence of sterilization function	Presence of low-temperature growth microorganisms Absence of sterilization function	Excellent for sterilization and inactivation	
	Sterilization of residual microorganisms	△	△	◎	- Sterilization of residual microorganisms in storage facilities by indirect plasma treatment
		Residual Hazardous Chemical Substances	Residual Hazardous Chemical Substances	Eco-friendly sterilization	
Aging by maturation process	respiratory depression	△	○	○	- Regulates the amount of nitrogen monoxide (NO) produced by inhibiting breathing/metabolism of fruits and vegetables
		Respiratory depression caused by cold ▶Refrigeration damage, freeze damage	Respiratory inhibition by low temperature and O2, CO2 concentration ▶internal browning	Respiratory inhibition by Nox ▶Storage temperature can be increased ▶Minimize cold damage, frost damage, and internal browning	
	ethylene removal	X	X	◎	- Ethylene removal by plasma direct treatment
		Absence of ethylene removal technology ▶Need to add ethylene removal technology (activated carbon, zeolite, etc.)	Absence of ethylene removal technology ▶Need to add ethylene removal technology (activated carbon, zeolite, etc.)	Excellent for atmospheric ethylene removal	
facility operation	energy efficiency	△	X	◎	- Complex action of microbial sterilization and respiratory inhibition by NO - Storage temperature can be raised
		high power consumption	high power consumption	efficient power consumption	
	Initial Facility and Maintenance Economics	○	△	◎	- Initial Facility Investment cold storage ≤ Plasma ≪ CA - maintenance cost Plasma < cold storage ≪ CA - 80% reduction in power consumption compared to normal 0~4℃ refrigerated storage when storage temperature 15℃ constant temperature storage application solution is secured ▶ Minimize carbon emissions - Adequate for small area such as container, for cargo vehicles
		-	- High initial facility investment cost - High Facility maintenance cost - Difficulty in worker safety management - adequate for large stores	- Very low initial facility cost and maintenance compared to CA storage - work-friendly environment	

4. Product / function comparison-2

Existing Plasma .vs. elPlatform Plasma comparison

function		existing Plasma storage	Plasma· AI-based smart storage cloud platform
Sterilization		Various viruses Bacteria formaldehyde mold	Various viruses Bacteria formaldehyde mold
ethylene removal		Excellent anti-aging effect	Excellent anti-aging effect
respiratory depression		no function	Excellent respiratory suppression/metabolism effect through NO injection
Use and disposal of by-products	Utilization of exhaust ozone	no function	Secondary humidification sterilization by Ozone is possible after the generation of ozone aqueous solution
	Utilization of exhaust NO		Secondary humidification sterilization by HNO2 is possible after generating HNO2 aqueous solution
	Utilization of exhaust ozone + NO		Reduced HNO2 and HNO3 can be recycled as fertilizer raw materials
Optimal control based on big data and AI		simple concentration control	Optimal control application based on big data and AI
power consumption		About 1.5KW or more based on 33 ㎡	About 1.5KW or more based on 33 ㎡

4. Product / authorized institution test result

Authorized institution test result

test date	test institute	test content	test result
2020.10.5.	Chonbuk National University SELS Research Center	Mold inactivation assessment	- confirmed that the growth of mold was inhibited in the experimental group (plasma treated) - More than 99.997 ~ 99.9994% (4 ~ 5 log) mold inactivation confirmed
2021.4.30.	Korea Testing & Research Institute	Ethylene initial concentration measurement (according to KS I 2218:2009 detector tube type gas meter)	Ethylene concentration : 110 ppm
2021.4.30.	Korea Testing & Research Institute	1st test of ethylene concentration measurement at the rear end of plasma module (according to KS I 2218:2009 detector tube type gas meter)	Ethylene concentration : non-detection
2021.12.3.	Korea Testing Laboratory	elPlatform (V1.0)	- The result of preprocessing performance evaluation and outlier performance evaluation satisfies the criteria presented by the client - Predictive RRMSE result satisfies the criteria presented by the client - service failure rate : 0 %

5. Business scope / marketing plan

Marketing plan for each stage

Marketing plan

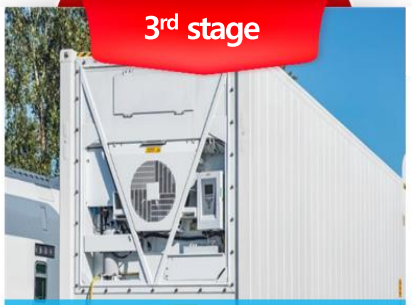
1st stage

production site small storage

2nd stage

production site small storage, wholesale market, retail store

3rd stage

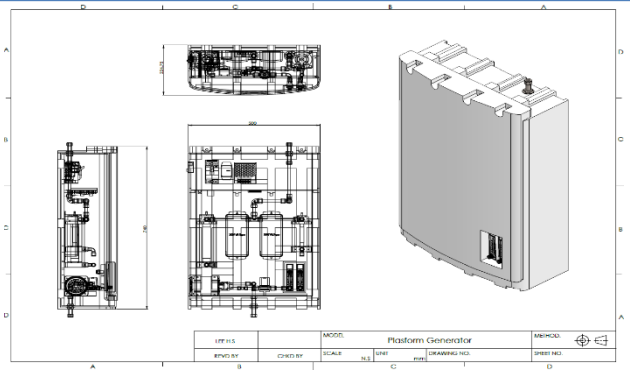


Transportation vehicles, containers for import and export consumer electronics storage

4th stage

strategic country export

Fresh Keeper, Solution / Platform



elPlatform

FEELIOT

5. Business scope / initial stage sales strategy

1st & 2nd stage sales strategy

target market	sales strategy
- Production site Small Smart Storage **- Logistics Transportation Smart Refrigerated Vehicle** **- Cold Containers for Export**	- Through collaboration among consortium companies, completed plasma ozone generator, NO generator, plasma ethylene removal device, and ozone water generation preprocessor along with the line-up of ozone, ethylene, and NO gas IoT sensors. - Proposal and implementation of pilot projects for 15 cities/guns in Daejeon/Chungnam region based on the results of small smart storage(10/16.5/33 ㎡) prototype verification - Publicity through performance comparison between the existing freshness maintainers currently installed and operated in various regions nationwide and our smart storage platform (smart IoT and big data/AI-based fruit and vegetable plasma low-temperature storage platform) **(Sales strategy 1) Expansion of the market through the sales network of consortium companies that have entered the cold storage market** **(Sales strategy 2) Visit and introduce domestic and international success cases to 82 county offices and 77 autonomous city halls, special city halls, and administrative city halls across the country, which support small storage facilities. open dealerships to city and province dealers for sales expansion** **(Sales strategy 3) Publicity for self-loading truck owners through vehicle manufacturers such as Hyundai Motor Company and special vehicle remodeling companies**

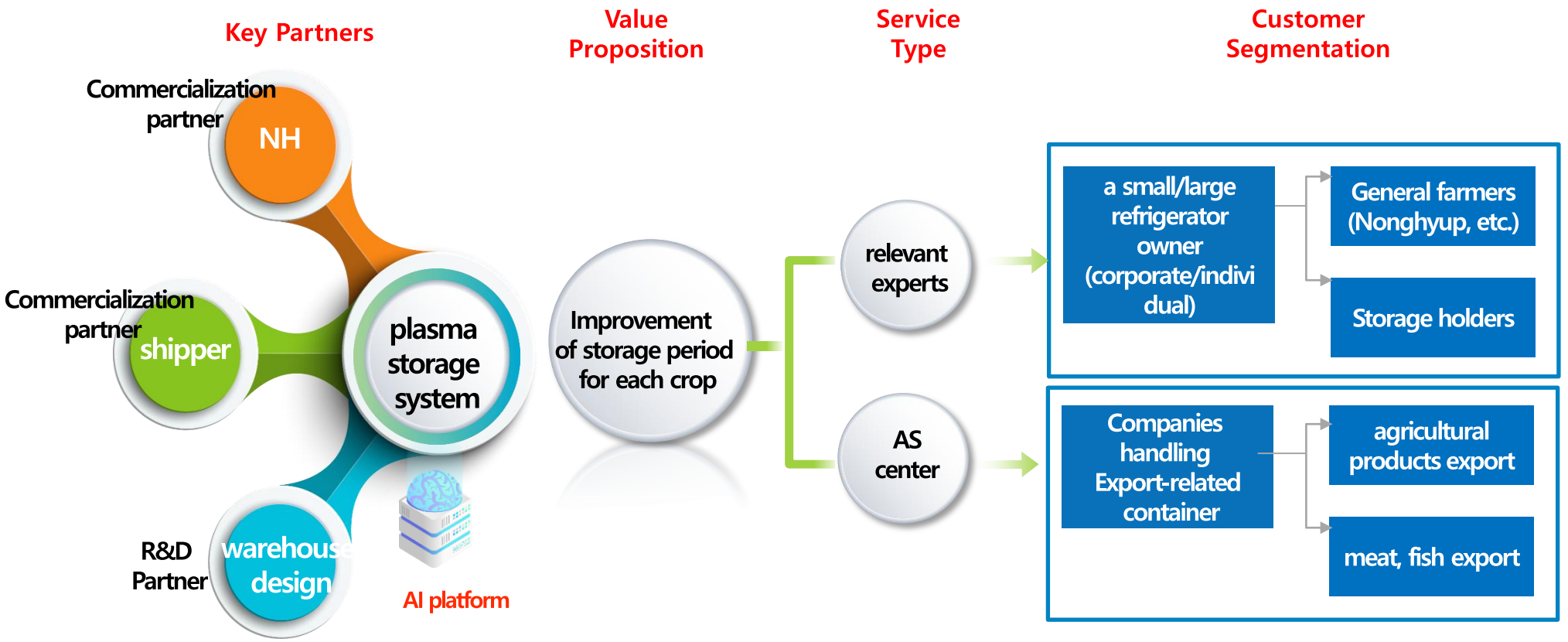
5. Business scope / collaboration model-1

■ With manufacturing partner

EL Tech + Smart-Tech	Core Partner (under negotiation)	commercialized product
Direct sales	 • Refrigeration and refrigerator owners (farmers, etc.) / individuals	AI plasma system AI plasma cold storage Household Freshness Keepers
Cooperation	 • Refrigeration and refrigeration equipment manufacturers	AI plasma system
Cooperation	 • refrigerated container manufacturers • Fresh logistics distributor • Cold transport vehicle manufacturers	plasma refrigerated container plasma refrigerated vehicle

5. Business scope / collaboration model-2

With business partner



- Real-time control plasma module
- Temperature/humidity wireless control
- Real-time DB collection and big data AI-based processing
- mobile monitoring app

- periodic SW maintenance
- periodic HW maintenance
- Software performance improvement (upgrade)
- Sensor, plasma module replacement, etc.

5. Business scope / partners

Technology development partners

- Big data/AI technology
- IoT standardization
- LoRa wireless communication
- plasma controller

Sookmyung Women's University **Yeungnam University** **ETRI** **Hanbat University**

Business partners

- Storage and safety verification
- Plasma equipment & automation improvements

Korea Institute of Fusion Energy **SMART-TECH**

5. Business scope / customers

Customers

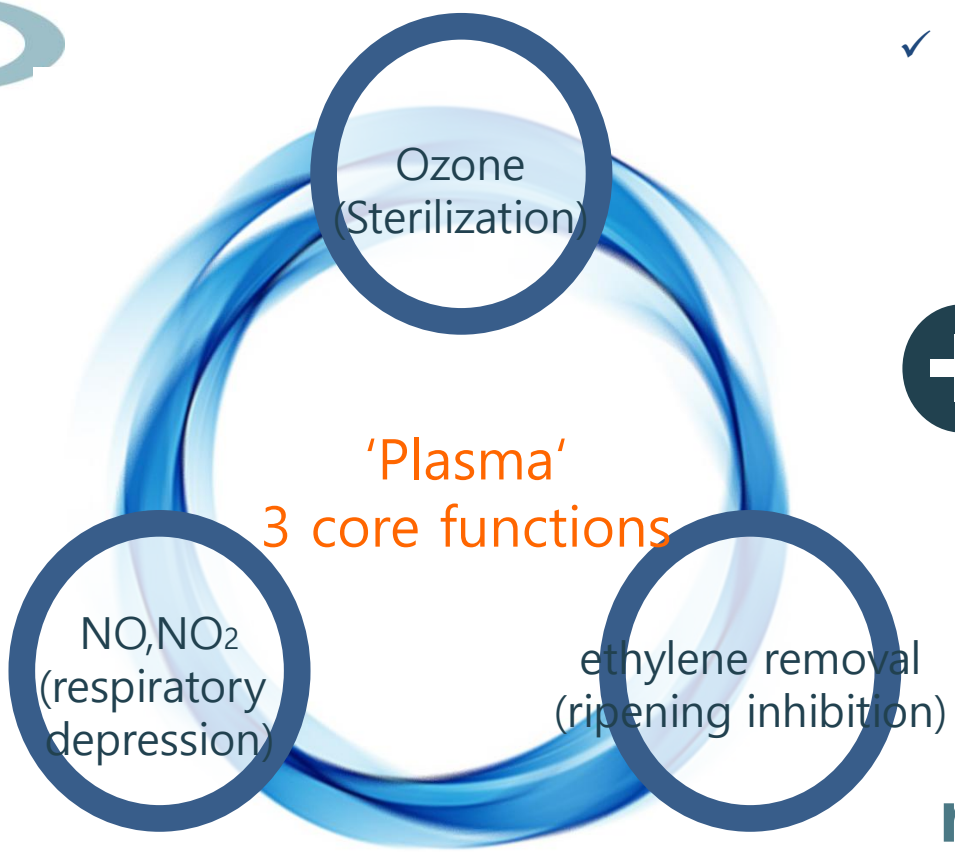
- **HANSALIM**

Eco-friendly organic cooperative

- **CHOROC MEANS ORGANIC**

Organic eco-friendly market

5. Business scope / mission



✓ **Meeting of Plasma & Big Data·AI-based remote control technology as a solution to food storage challenges**

'remote control technology'
(IoT solution,
room temperature storage)

"Extended storage period
+
reduced maintenance cost"

- **Improving weight loss rate**
- **Reducing waste at the storage and distribution stage**
- **Providing fresher food**
- **Farm household income improvement**
- **low carbon storage**

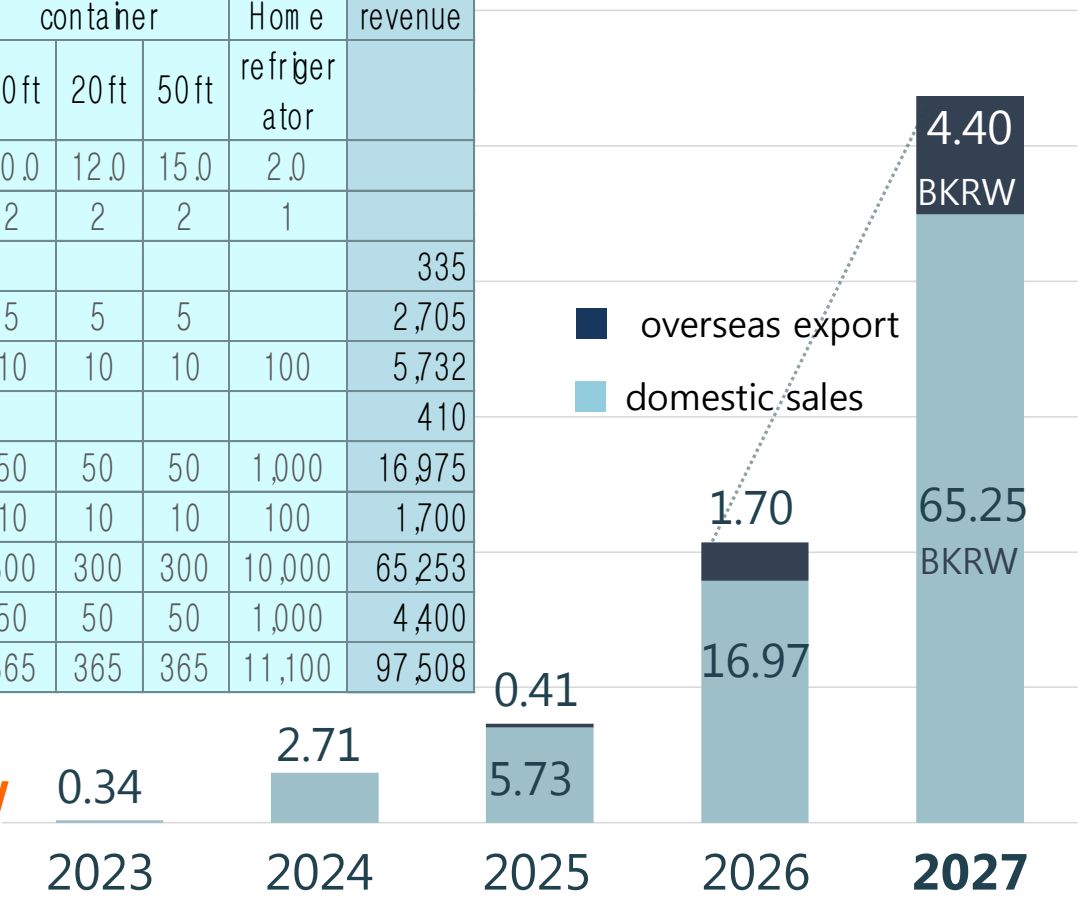
5. Business scope / vision

Sales goal

Content		warehouse					container			Home refrigerator	revenue
		6.6㎡	10㎡	16.5㎡	33㎡	over 330㎡	10ft	20ft	50ft		
unit price	platform	7.0	7.0	7.0	8.0	70.0	10.0	12.0	15.0	2.0	
	Mainten	1.2	1.2	1.2	1.5	12.0	2	2	2	1	
sales quantity	2023	5	5	5	5	2					335
	2024	50	50	50	10	10	5	5	5		2,705
	2025	100	100	100	20	20	10	10	10	100	5,732
	export					5					410
	2026	200	200	200	100	50	50	50	50	1,000	16,975
	export	5	5	5	5	20	10	10	10	100	1,700
	2027	500	500	500	200	100	300	300	300	10,000	65,253
	export	25	25	25	25	50	50	50	50	1,000	4,400
sum		855	855	855	335	182	365	365	365	11,100	97,508

Sales goal: 69BKRW

(FY2027, Including overseas export)



continue

Exit plan

1. Attracting investment in 2023

2. 2023 development product release elPlatform V1.0

3. Acquired NET, NEP certification in 2023

4. 2025 headquarters US flip

5. Listed on NASDAQ in 2028