

# COMPANY & BUSINESS OVERVIEW

2024. 03



## IoT based Smart Energy Infrastructure Solution Company

### Features

Establish	July 4 <sup>th</sup> , 2007
CEO	Soobin Yim, Hyunjong Kim (Co CEO)
Employee	35 person (Researcher: 27, Avg. Engineering Career: 20 years)
Main Production	<ul style="list-style-type: none"> <li>• Hi-Speed PLC SoC &amp; Module, Modem</li> <li>• Wireless Solutions (LTE, Wi-SUN, ZigBee, BLE, wM-BUS)</li> <li>• Meter/MODEM/DCU/Server for KEPCO AMI</li> <li>• Low speed EV Charger</li> <li>• LED Light Control System for Korean Expressway Standard</li> <li>• Low Power Water Treatment System</li> </ul>
Patent	<ul style="list-style-type: none"> <li>• Registration: 30</li> <li>• Patent Pending: 8</li> <li>• Design Registration: 1</li> </ul>

### Business

- Application-specific integrated circuit design (PLC SoC, Etc.)
- AMI(Advanced Metering Infrastructure) for KEPCO and Civilian demands
- BEMS / FEMS / Smart City
- LED Light Dimming Control System
- Electric Vehicle Charge System
- Intelligent small-scale water facility and eco-friendly water treatment system

## Foundation & Setup

### 2007

- Established Crenus Co., Ltd.

### 2008

- Established R&D Center
- Ubiquitous PLC SoC Development

### 2009

- Development of human body communication modem (SMBA)
- Development of high-speed PLC certification equipment (Korea Electric Research Institute)
- AMI Low Pwr. PLC ASIC Development Challenge (KEPCO)
- Load monitoring ctrl. Device (KDN)

## Level Up

### 2010

- Developed DCU for AMI
- PLC based IHD development and delivery (Gangneung City, Changwon City, Etc.)

### 2011

- Development of Power Meter Embedded Security Chip (SMBA)
- Delivered Wi-Fi IHD (Smart Grid Institute)

### 2012

- Developed PLC SoC chip(HS-PLC) for AMI
- Dominican AMI Pilot Project (KEPCO KDN)
- AMI BMT test equipment development and delivery (KEPCO)

### 2013

- Delivered LED Dimming system for Parking Lot Delivered for Uzbekistan AMI pilot project (KEPCO KDN)
- Merged with UTILLINK Co., Ltd

### 2014

- Changed Company name to CNU Global Co., Ltd
- Received the first contract for KEPCO AMI

## Take Off

### 2015

- Developed and received order of LED lighting control (Korea Expressway Corporation)
- Received order for ultra-fine dust sensor SoC development (Ministry of Industry)

### 2016

- Received order for 2<sup>nd</sup> Low Volt. AMI Project - DCU & MODEM (KEPCO)
- Winner of LED Lighting Control Proj. (Korea Ex.)
- Received order for Apartment AMI (Korea Smart Grid Institute)

### 2017

- Received order for 3<sup>rd</sup> Low Volt. AMI project (KEPCO)
- Received order for High Volt. Meter LTE MODEM (KEPCO, w/KT)
- Participated at KEPCO CIS Export Promotion Consul (Russia, etc.)

### 2018

- Received order for 4<sup>th</sup> Low Volt. AMI Project (KEPCO)
- Development Air conditional control with PLC comm. for Samsung
- Development PLC SoC (IoT-PLC) for AMI

### 2019

- Received order for Street Light Replacement ESCO Project (Korea Ex.)
- Joined ATT Project(IoT-PLC) at Jejudo (KEPCO)
- Participated at Vietnam-Korea Smart Electric & Energy Week (with KEPCO KDN)

### 2020

- Winner of AI Hybrid Multi-Core IC Dev.
- Delivered Waterproof Smart Meter pilot Proj. for Laos
- Received order for the AMI maintenance business contract (APT. Households: 150,000)
- KEPCO's first security-enhanced electricity meter certified in Korea

### 2021

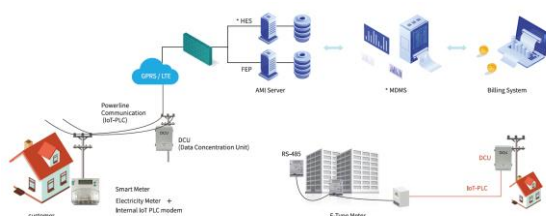
- Winner of Intelligent small storage facility management System Project (Ministry of Science)
- KEPCO Low Volt. AMI 5-1 Project KDCU and MODEM
- Joined AMIGO(security type meter) pilot project of KEPCO

### 2022

- Civilian AMI Project (Ministry of Industry, (APT. Households: 300,000)
- Electric Vehicle(EV) Charger

## Smart Metering Business

- **Joint the KEPCO AMI Business**
  - High Voltage AMI (LTE)
  - Low Volt. AMI (PLC, Wi-SUN, LTE)
- **Apartment AMI Business**
- **Overseas AMI Business**
- **Integrated meter reading system (Power, Waterworks, Gas)**
- **Smart Meter (KEPCO, Civilian Products, Overseas)**
- **Total Solution (included Server Platform)**



## Energy Efficient Business

- **Smart LED lighting control Business (Korean Expressway Corp., Local Gov., Oversea)**
- **Chargeable EV outlet Business**
- **System air conditioner controller Business**
- **Demand Response Solutions**
- **BEMS / FEMS Business**



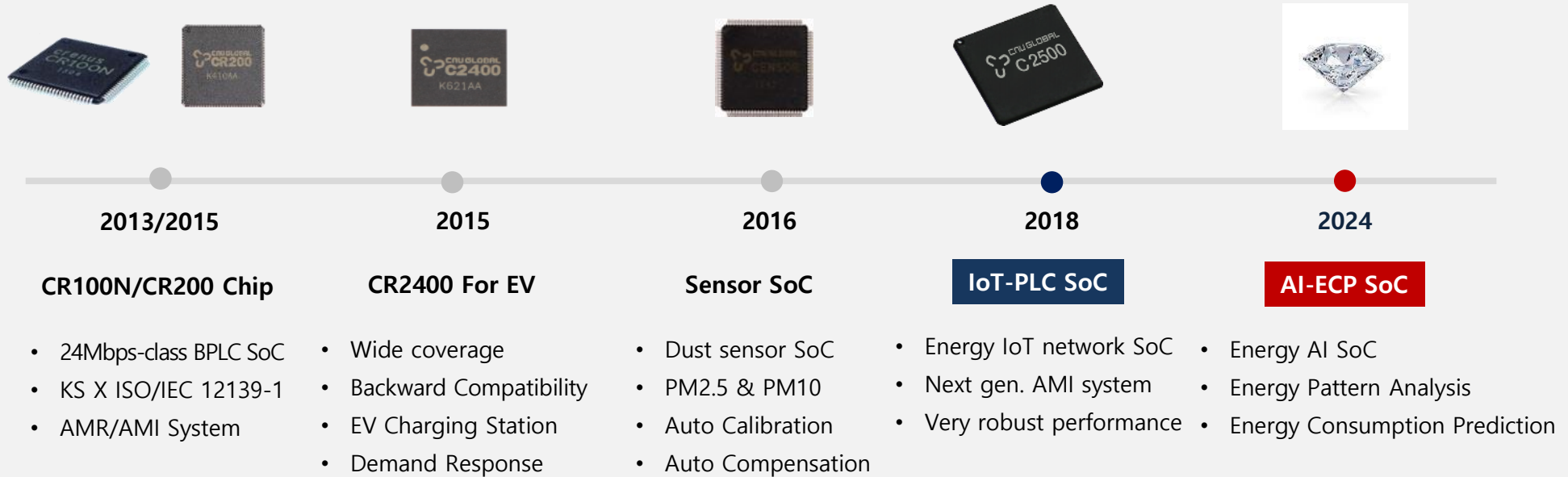
## Water treatment Business

- **Intelligent small-scale water facility and eco-friendly water treatment system**
- **Application of water treatment business**
  - Wastewater and Sewage treatment facilities
  - Household water treatment facility
  - Desalination plant (Smart Farm)





# ASIC Products Roadmap



## PLC ?

Power-line communication (also known as PLC) **carries data on a conductor that is also used simultaneously for AC electric power transmission**. Korea Expressway Co. and KEPCO set as default communication method.

※ PLC (Power Line Communication)

## Specifications

- Windowed OFDM transceiver
- ~28MHz used frequency band
- Robust frequency & time diversity
- Convolutional Turbo Code(CTC)
- Based IEEE802.15.4 Media Access Control (MAC)
- RPL/6LoWPAN) support
- AES128/ARIA128 decryption and encryption

## Features

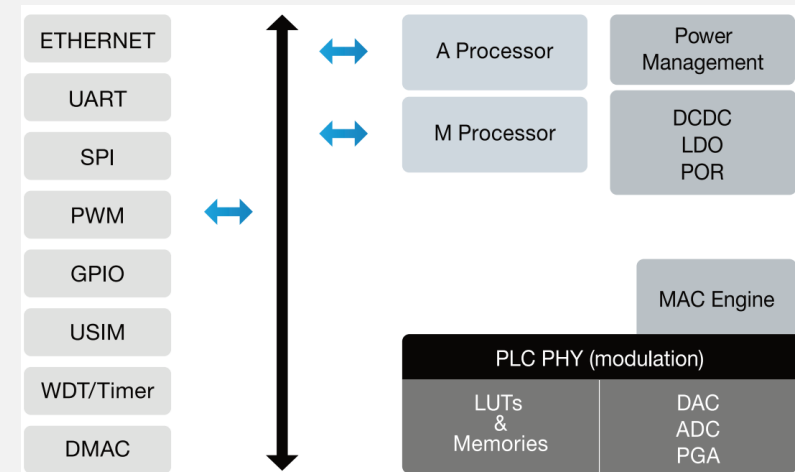
- 76pin MLF Package(9x9mm)
- Embedded PGA, RX BPF
- Embedded 12bit ADC and DAC
- On-chip DCDC/LDO
- Dual Embedded 32bit Processor
- Support multiple application interfaces

### Product & Feature

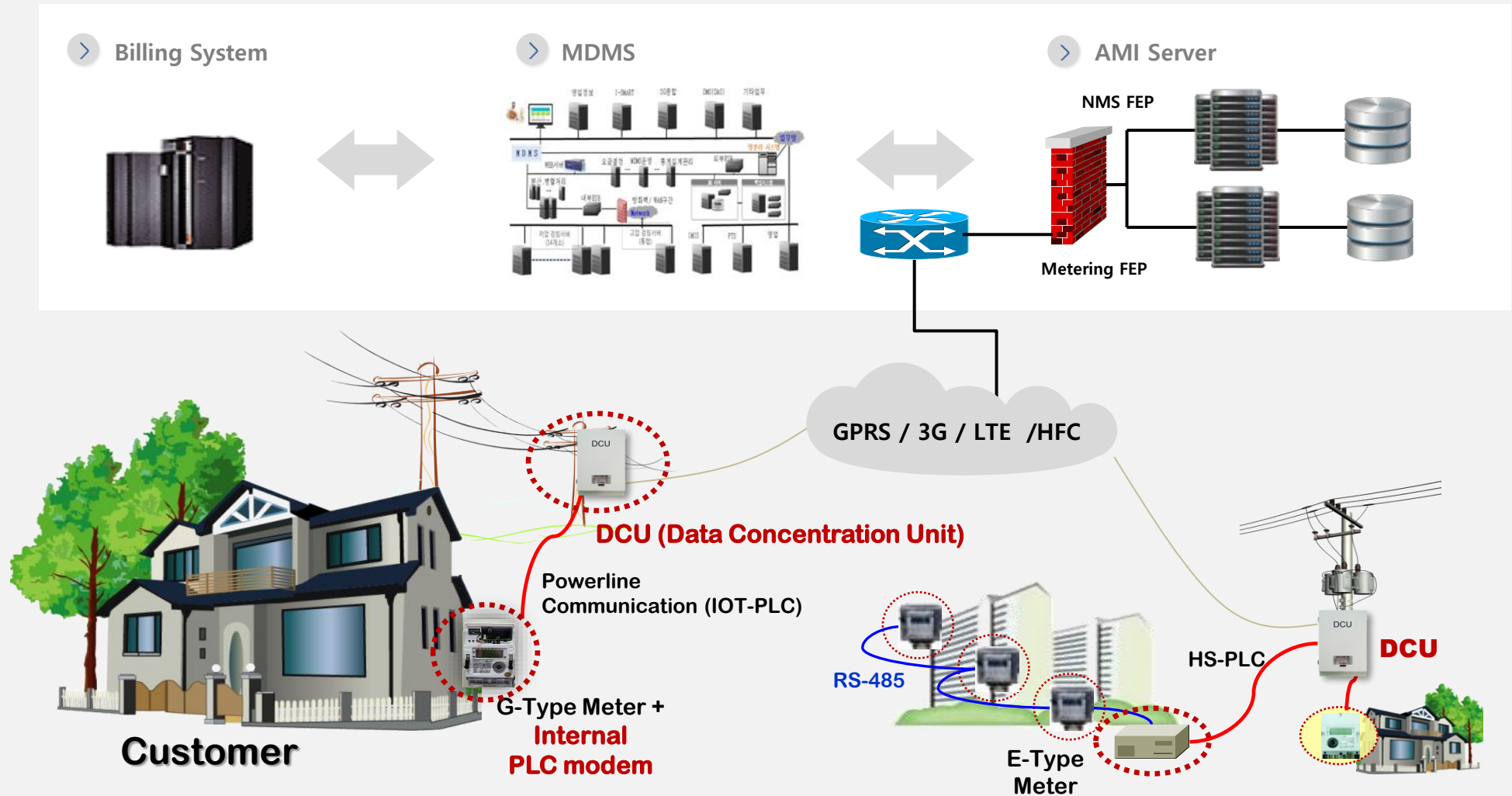


**C2500**

**Robust & High-speed IoT-PLC SoC**

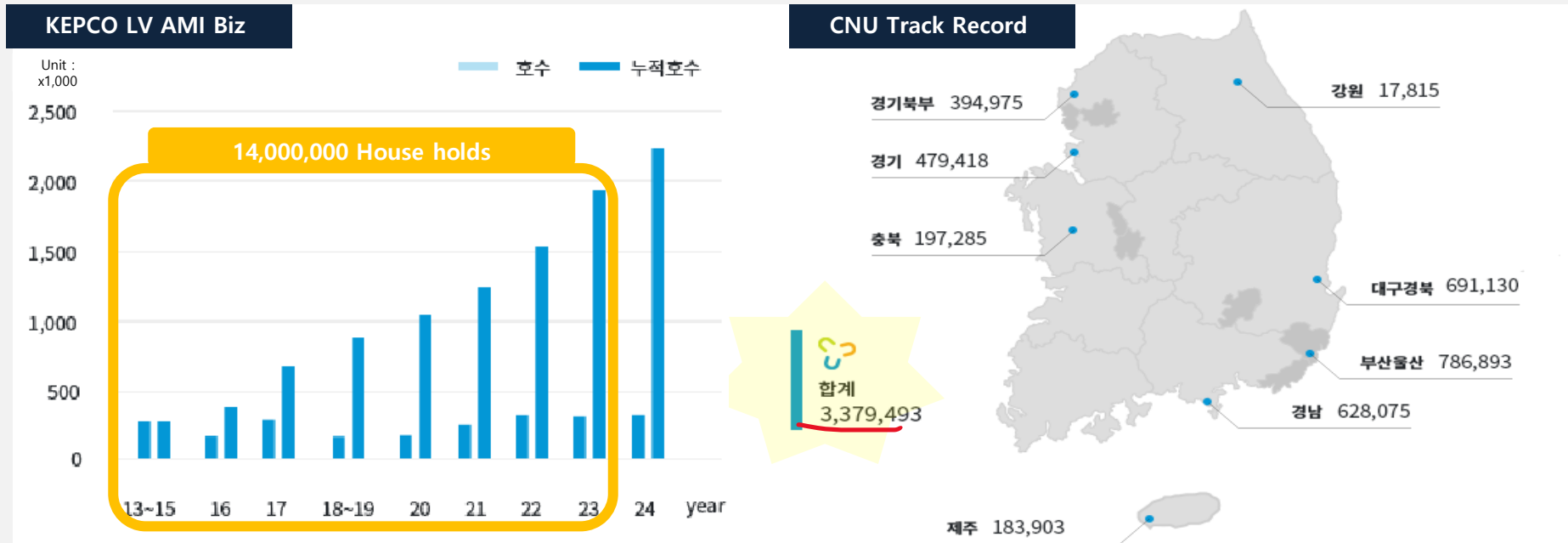


## Structure of the Hi-Speed PLC based AMI System



# AMI Business of KEPCO (Low voltage AMI)

## Roadmap of KEPCO AMI Business & CNU Track Record **KEPCO AMI 3,300k households(2022.05)**



## Business Track Records

1st Biz	(2013) Supplied PLC MODEM, Master MODEM for DCU
2nd Biz	(2016~2017) Supplied PLC MODEM, DCU
3rd Biz	(2017~2018) Supplied PLC MODEM, DCU
4th Biz	(2018) Supplied PLC MODEM, DCU (2019) Jeju K-DCU Project based on IoT-PLC technology
5th Biz	(2021) Supplied PLC MODEM, K-DCU
Smart Meter	(2021~2022) Smart meter(AMIGO) Project

## Competitiveness

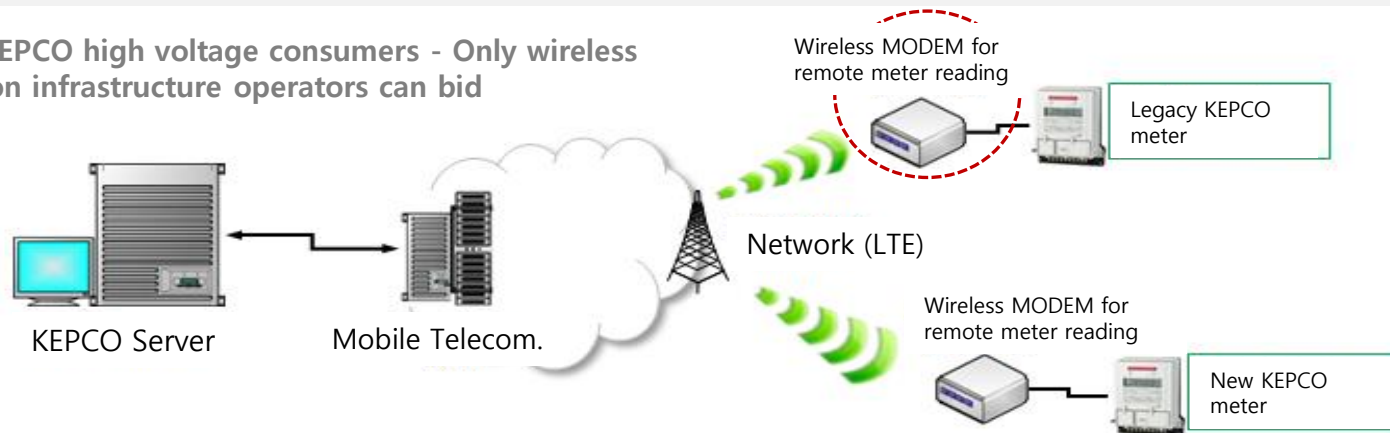
- Completed development and optimization of PLC SoC (HS-PLC, IoT-PLC)
- Possessing technological leadership as a joint developer of AMI technology with KEPCO
- High reliability & stability products secured by 20 years of technology and field experience
- High awareness and leadership among KEPCO/KEPCO KDN/Smart Grid market participants



# KEPCO AMI Business (High Voltage AMI)

## Block diagram of High Voltage AMI (KEPCO)

Projects for KEPCO high voltage consumers - Only wireless communication infrastructure operators can bid



## Biz Status & Track Records

- **Conducting business by forming a consortium with a domestic mobile telecommunication company**
- **Supply History**
  - 2016 – Won a KEPCO's exclusive High volt. Reading meter project contract
  - 2016 – Won a KEPCO High volt. modem Business contract and Supply
  - 2017 – Won contract and supplied a KEPCO's exclusive high volt. meter reading business
  - 2017 – Won contract and supplied of KEPCO high volt. Slave modem business
  - 2022 – Will be announced by KEPCO

## Products & Features

### Exclusive High voltage

- Supporting DLMS meter reading protocols with IEC 62056 standard
- Support for high-voltage watt-hour meter and light interface
- Supporting communication protocols with the KEPCO high pressure metering server
- High performance SMPS built-in

### Slave MODEM

- LTE based ultra-low power modems
- Four types of LTE modems for watt-hour meter type
- Support for telecommunication company and KEPCO FOTA



## Business overview

- Smart meters and AMI system construction projects for 8.5 million apartment households
- Promoting AMI projects for apartment consumers ahead of the introduction of the TOU plan (Ministry of Commerce and Industry)



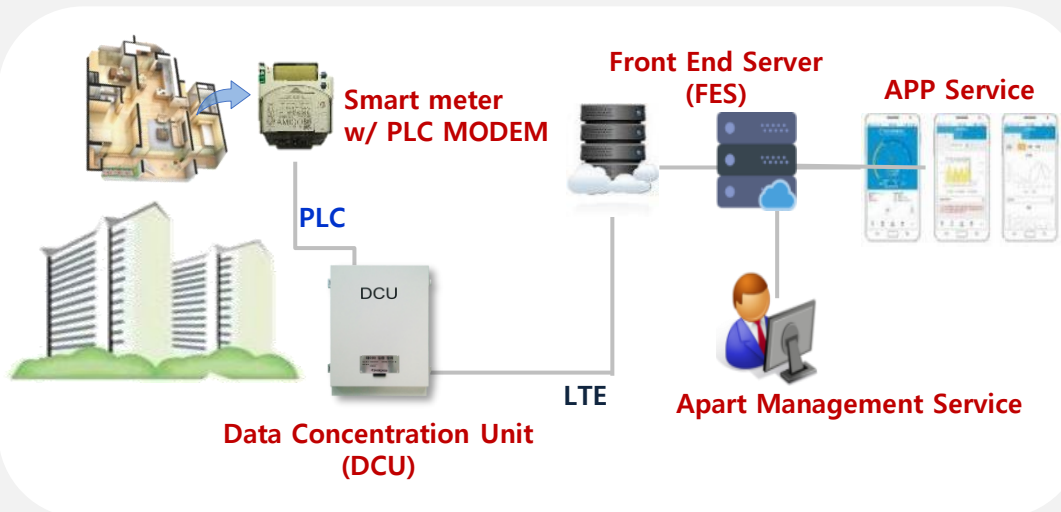
Participation in the SG expansion project hosted by the Korea Smart Grid Institute



Completed expansion project

- A nationwide project led by the SG business group under the Ministry of Trade, industry and Energy
- **AMI building in 140,000 homes for three years (2015-2017)**
- **AMI building in 360,000 homes (2023)**
- Delivery and Install of Smart meter / PLC-based MODEM / DCU / Servers
- O & M project in progress for AMI systems installed for the next 10 years
- Efficient maintenance and repair through our AMI server

## Apartment AMI Configuration based on PLC



## Products

Smart Meter



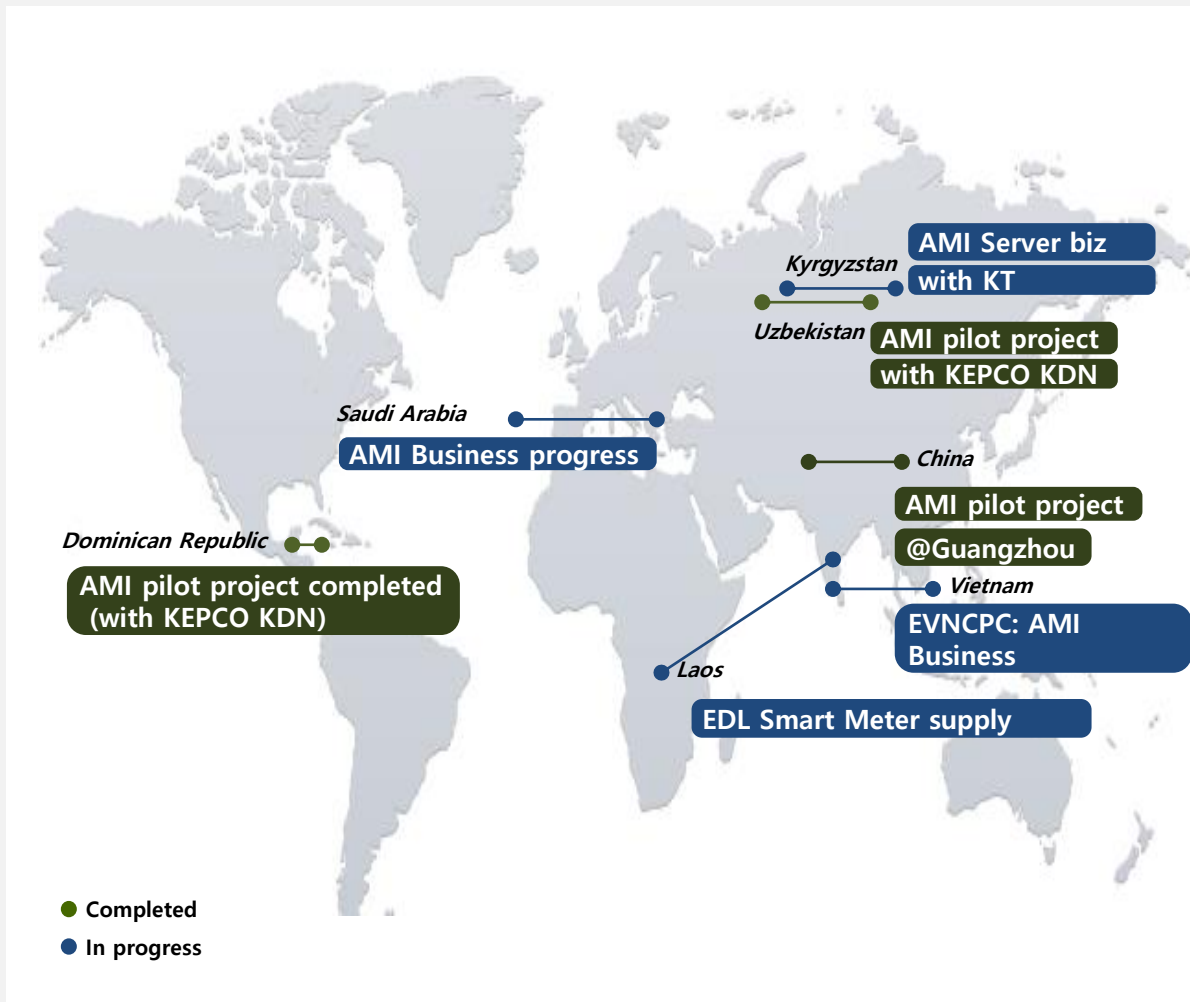
PLC MODEM



DCU



## Business overview



## > Business strategic

### Joined with KEPCO / KEPCO KDN

- KEPCO KDN AMI Solution strategic partner
- Development of AMI solution service for overseas business

### Joined with Domestic top tier partners

- Strategic Partners (KT – Korea Telecom)

### Exhibition & Project

- Participated in domestic and overseas exhibitions related to smart grid
- Participation in a consortium for policy support projects such as KOTRA

# Smart Meter Business (KEPCO / Civilian demand / Overseas)

## KEPCO/Civil Opportunity Factors

- KEPCO's watt-hour meter purchase
  - Built-in security function(KCMVP) and wired/wireless communication function required
- The inevitable game change in existing watt-hour meter industry
  - Business reorganization focusing on companies that have secured communication and security technologies
- Domestic market status
  - Security watt-hour meter for KEPCO → 22.5 million
  - Security watt-hour meter for civilian → 8.5 million unit

## Smart Meter Main Feature

- Metering Info.: Items, Load history, real-time measure, TOU info.
- Meter reading function: periodic/irregular/seasonal meter reading
- Security function: Built-in NIS encryption module (KCMVP)
- SW upgrade function: support remote firmware upgrade
- Communication support function: Various wired and wireless c

## Products & Features



**AMIGO**  
Compact type

- Security meter for Apartment
- Uninterruptible replacement support
- Built-in security and wireless communication



**AMIGO**  
Single phase(60A)

- Single phase 60A meter
- Built-in security and wireless communication
- Detachable modem support



**AMIGO**  
Deposition type

- AC 3-phase 4 wire 50A
- Built-in security and wireless comm.
- Detachable modem support



**AMIGO**  
3-phase type

- AC 3-phase 4 wire 120A
- Built-in security and wireless comm.
- Detachable MODEM support



**Export waterproof**  
watt-hour meter

- Mainly used in Southeast Asia
- IP56 level

# Billing-type EV outlet (low speed charger) Business

## Business background

- Lack of EV charging infrastructure
  - Need to build electric vehicle charging infrastructure suitable for a residential environment
- **Low-speed type charger (3.5kW, 7kW, 11kW)**
  - Low installation cost because there is no additional power distribution capacity expansion work
  - Saving install space
- Resolving friction between electric vehicle owners and general car owners due to lack of parking space
- Supports security and scheduling charge

## 제품 특징

Item	Legacy outlet type	Apartment custom Smart EV charge system	Etc.
Config	Charger+LTE modem (1:1) ※ LTE fee	Charger+PLC modem (1:N) ※ Free for LTE fee	Reduction of construction & operation costs
Charging Fee	Simple Charging	Smart Charging ※ Peak management, Safety related to the capacity considering	Linkage with charge rate and apartment power management

- Product release schedule: ~ June 2023

## Apartment EV charger infrastructure diagram

### Electric Vehicle Charger Infrastructure Operation

Apartment

Service Provider

Local Gov.

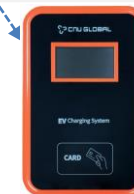
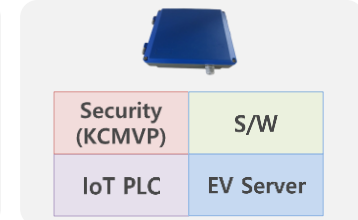
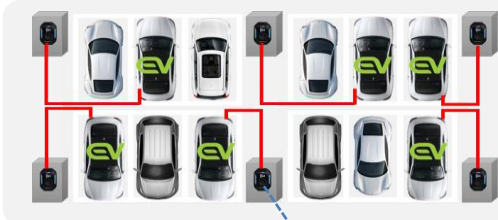
KEPCO



### Apartment Smart Electric Vehicle Charging

Building an outlet-type EV charging system

EV Charger control unit





# Smart LED Lighting Control System Business

## Business overview and status

- **Korea Expressway Corporation LED tunnel light, streetlight business (new construction, replacement)**
  - Fully applied to new highways since 2015
  - Replacing 600,000 existing tunnel lights and 200,000 streetlights
  - ESCO project in progress: scheduled to be replaced by 2022
- **Local government LED tunnel light, streetlight replacement project → 500,000 units.**
- **Ministry of Land, Infrastructure & Transport LED tunnel light / streetlight new establishment and replacement project**



LED tunnel light control system



LED streetlight control system

## Business promotion strategy and goals



### Achieving the market share goal

Target to achieve 40% of Ex's ESCO business share in '20 based on business performance in '19



### Build a cooperative relationship

Strategic cooperation by selecting lighting companies with technological prowess  
TECHEN, Chunil, T Solution, etc.



### Global Business promotion

Promotion of Southeast Asian LED streetlight dimming business through overseas agents

# Smart LED lighting control system products

## Products & Features



### Tunnel LED light control MODEM

- Korea Expressway corporation standard PLC(ISO/IEC12139-1) SoC development
- Satisfying the dimming MODEM standard of Korea Expressway Corporation
- Dimming control, status, and information transmission



### Tunnel LED light controller

- Korea Expressway standard PLC communication support
- Support for Korea Expressway standard lighting control protocol
- Bidirectional illuminance/luminance meter interlocking control
- Real-time remote control support through RTU linkage

## Products & Features



### Streetlight LED light control MODEM

- Korea Expressway standard PLC communication support
- Road construction dimming MODEM standard
- Built-in light pole (IP56 waterproof/dustproof support)
- Dimming control, status, and information transmission



### Streetlight controller

- Korea Expressway standard PLC communication support
- Support for Korea Expressway standard lighting control protocol
- Built-in LTE MODEM (real-time remote control by remote server possible)

## Competitiveness

- Dimming MODEM and Light Controller with self-developed PLC SoC
- Participated in the business from the begging and completed various on-site installation and operation experiences and product reliability through product improvement
- Securing the highest level of surge reliability, **6KV surge guarantee for all products (certified report provided)**
- Site optimization, **guarantees product integrity even when three-phase power (380V) is accidentally connected by an electrician**
- Implementation and provision of various additional functions (remote control, real-time monitoring, etc.)
- Securing the speed and efficiency of product maintenance – product support and operation of a dedicated team

# Parking Lot LED lighting control business

## Business overview and status

- A project to reduce power consumption and increase safety
  - By adjusting the brightness of LED lights by detecting the movement of vehicles or people
- Developed detection sensors, wireless communication modules and dimming controllers
- Orders and installation results
  - Homeplus parking lot (75,000 unit)
  - LH corporation's new apartment (Suwon Homaesil apartment, etc.)
  - Supply of underground parking lot for residential and commercial complexes and apartment in progress
- Overseas LED lighting control business in progress

## Competitiveness

- 30% additional energy-saving effect by dimming in conjunction with PIR sensor
- 2.4Ghz RF wireless communication
- Supports various types of dimming control (group control, pattern control, manual control)
- External Microwave Sensor Interlock Control
- Ease of installation and opening operation

### Products & Features



**SDC-RF24**

Smart Dimming  
Control Unit



**SDG-RF24**

Smart Dimming  
Gateway



**SDM-RF24**

Microwave  
Sensor



## Business overview and status



▲ KT는 인공지능(AI)으로 건물의 에너지 사용패턴을 분석해 비용을 절감해주는 월정액 유료서비스 '기가 에너지 매니저(GiGA energy manager)' 라이트(Lite)와 프리미엄(Premium) 버전을 출시했다고 23일 밝혔다. ©KT

<p><b>투자·운영비 없음</b></p> <p>별도 설비 및 시스템 도입 비용 없음 무료로 건물 에너지 소비 분석 및 월간리포트 제공</p> <p>☑ 건물 에너지 진단/분석 ☑ 투자비 및 이용요금</p> <p>0원</p>	<p><b>에너지 관리 효율성 제고</b></p> <p>경영자 및 설비 관리자 업무에 따른 건물 에너지 관리 효율성 제고 및 관리 목표 달성</p> <p>1 전력요금 절감 2 수지에 근거한 경영 3 에너지 효율 관리 4 비용개선 기회 포착 5 질 높은 정보 확보 6 효율적인 관리 기반</p>	<p><b>전기요금 절감</b></p> <p>지능형 데이터 분석으로 맞춤형 에너지 절감 컨설팅 실현</p> <p>예시) 최적 선택요금제 가이드 제시</p> <p>▶ 선택요금제 변경시 전기요금 절감 효과 <b>10~20%</b></p> <p>절감사례)</p> <p>개선 전    개선 후    연간 230만원 절감</p> <p>※ 인천OO금융 사례</p>
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늘 곁에 kt

- Strategic business partner of KT Energy Efficiency Project Group
- Supplied measuring equipment for high-pressure energy DR business
- High Voltage Power Meter + LTE MODEM
  - Detects the pulse signal of the high-voltage watt-hour meter, reads the power consumption every 5 minutes, and delivers it to the server through LTE communication
- Real-time monitoring, analysis and diagnosis of power usage through KT-MEG
- Power consumption reduction by monitoring and controlling high voltage consumer peak power

## Products & Features



LTE Modem for DR



Accessory



A night-time photograph of a city skyline, featuring numerous illuminated skyscrapers and buildings against a dark blue sky. The foreground shows the silhouettes of lower residential buildings.

# THANK YOU !



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