



มหาวิทยาลัยเชียงใหม่
CHIANG MAI UNIVERSITY

CMU
CHIANG MAI UNIVERSITY



CMU Smart University

บริษัท บีซีพีจี จำกัด (มหาชน)
บริษัท ไทยดิจิทัลเอนเนอร์ยีเดเวลอปเม้นท์ จำกัด

Our goals



- To enable *prosumerization and smart grid* through blockchain-based peer-to-peer electricity trading platforms
- To promote *self-sustainability and energy independence* via solar power, energy storage and energy & efficiency management
- To support *DEPA's Long-Term Development Plan*: three Thai cities will enter world ranking in 2032 and one Thai city will be ranked in Top 10 in 2036
- To support *Thailand's Net-Zero goal* by lowering GHG Emissions of Chiang Mai University by 25% from 2018 base line

CMU Smart City Done by BCPG / TDED



Smart City
& Smart Campus



Net Zero Building (ERDI Bldg.)

P2P Energy Trading

Smart Metering & Billings

Energy Efficiency

AI Analytics

Cooling

EV Chargers

15 MW Solar Energy

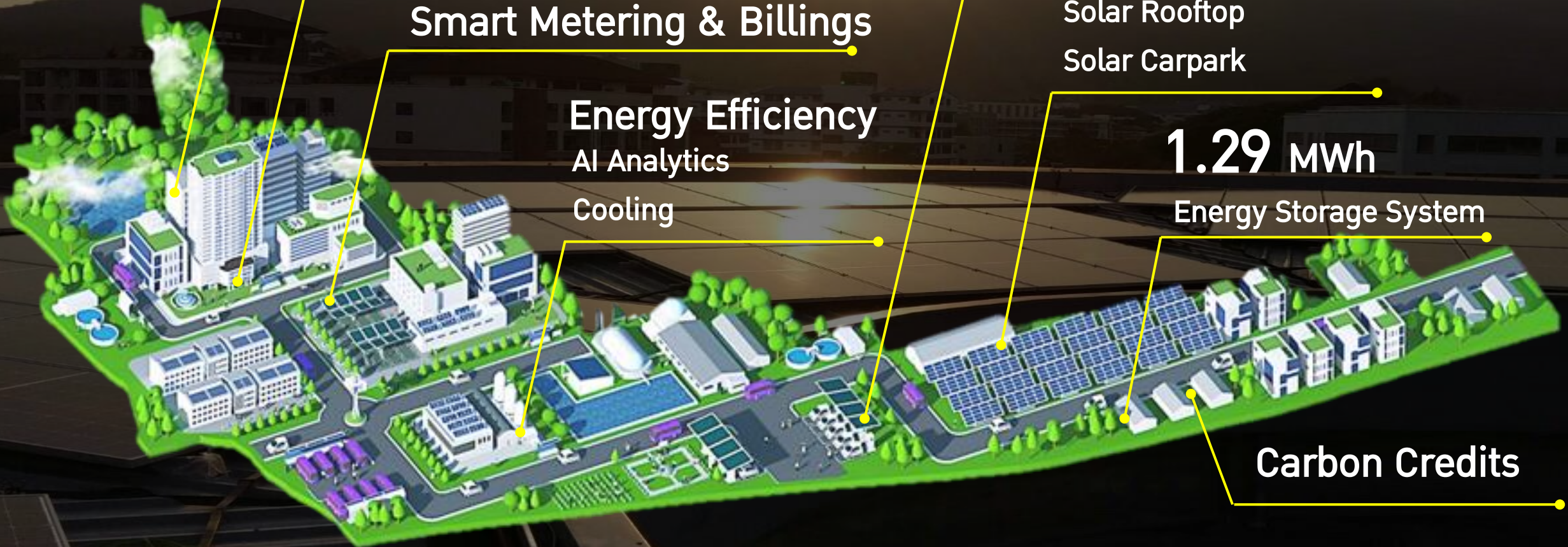
Solar Rooftop

Solar Carpark

1.29 MWh

Energy Storage System

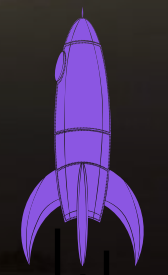
Carbon Credits



Solar Energy Installation



25.13 MW



15 MW

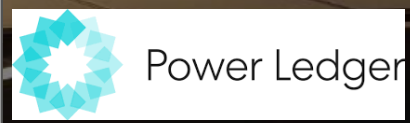
New Target on Agreement (+3 MW)

Feb 2022

Extension 10.13 MW. In 2024 -2027

2020 - 2022

Smart City Collaboration



Thai Digital Energy Development Co., Ltd. (TDED) founded



May 2019

Mar 2019



12 MW

Solar Rooftop Installation Agreement

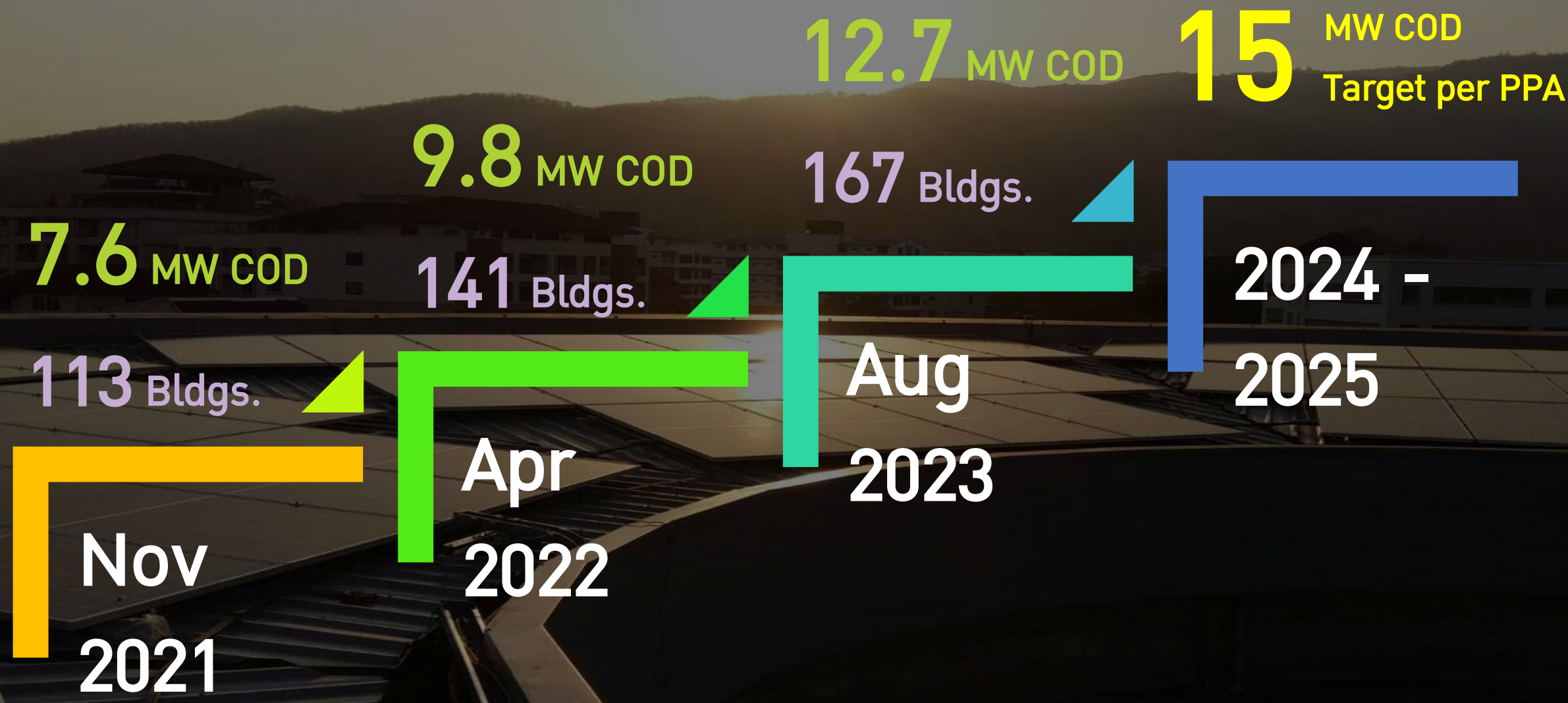
1.29 MWh ESS

BCPG Develop Smart Energy from T77



CMU Developed Smart City Plan

Solar Energy Installation

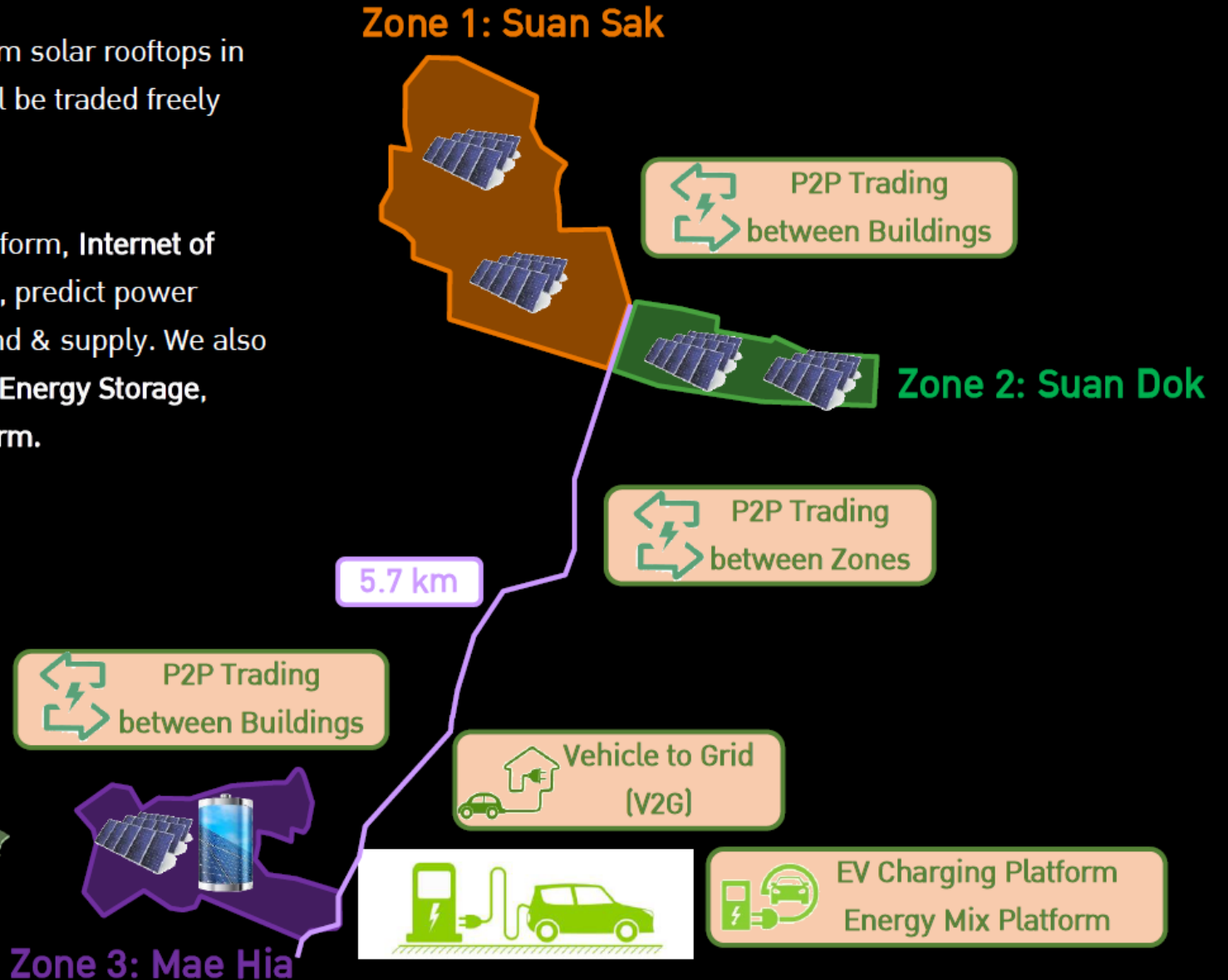
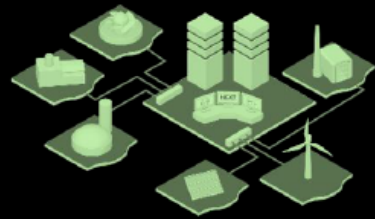
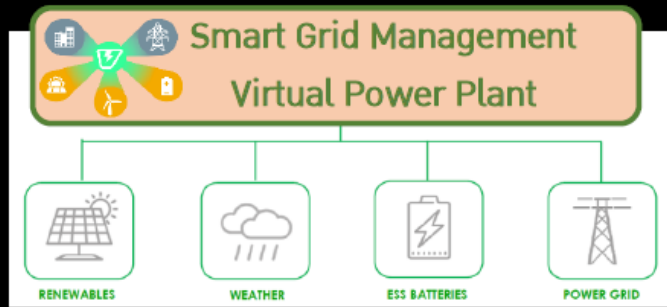


DEVELOPMENT FEATURE



With our **blockchain-based platform**, electricity from solar rooftops in each building in Suan Sak and Suan Dok Zones will be traded freely across the zones.

In Mae Hia zone, apart from blockchain-based platform, **Internet of Things (IoT)** will help monitor energy consumption, predict power generation from solar rooftops and manage demand & supply. We also aim to leverage energy management system with **Energy Storage**, **Vehicle to Grid**, **EV Charging** and **Energy Mix Platform**.



THE SYNERGY OF TECHNOLOGIES

In this area, the smart grid will be fully implemented together with our blockchain-based platform and data analytics system.

Excess electricity of each building will be stored in the energy storage of **ERDI Building** which is designed to be Net Zero Energy building.



ERDI – ROLE MODEL OF NET ZERO ENERGY BUILDING



SMART ENERGY MONITORING



Real-Time Data

- Solar energy
- Energy storage
- EV charging station
- Building management (air-conditioning & lighting)

EV Charging Station



Solar Energy

- Generated electricity 144 kW
- System efficiency 97%
- Invertor status : **OK**



Air-Conditioning & Lighting

- Room temperature **25 °C**
- Lighting status : **On**



Energy Storage

- Power level : 80%
- Charging status : **ON**



In Energy Research and Development Institute of Nakornping Building (ERDI), energy demand and supply will be real-time monitored and managed efficiently.

With 1.29 MWh energy storage, ERDI will be able to cover its own consumption during the nighttime without importing electricity from the grid.



Project Performance 2023



การสร้างคุณค่าต่อสิ่งแวดล้อม

ช่วยลดการใช้ไฟฟ้าจากพลังงานเชื้อเพลิง
เป็นการใช้ไฟฟ้าจากพลังงานแสงอาทิตย์



2566 Total Consumption

16,774 MWh



Carbon Emission Reduction

8,146 tCO₂e



การสร้างคุณค่าต่อสังคม

ส่งเสริมให้เกิดการพัฒนาคุณภาพชีวิตที่ดีขึ้น



CMU Population 52,000 per day

- Student **26,000** people
- University Staff **11,200** people
- Visitor **15,000** people



การสร้างคุณค่าต่อเศรษฐกิจ

นวัตกรรมช่วยสร้างมูลค่าเพิ่มแก่องค์กร



Cost saving

20 mil-THB

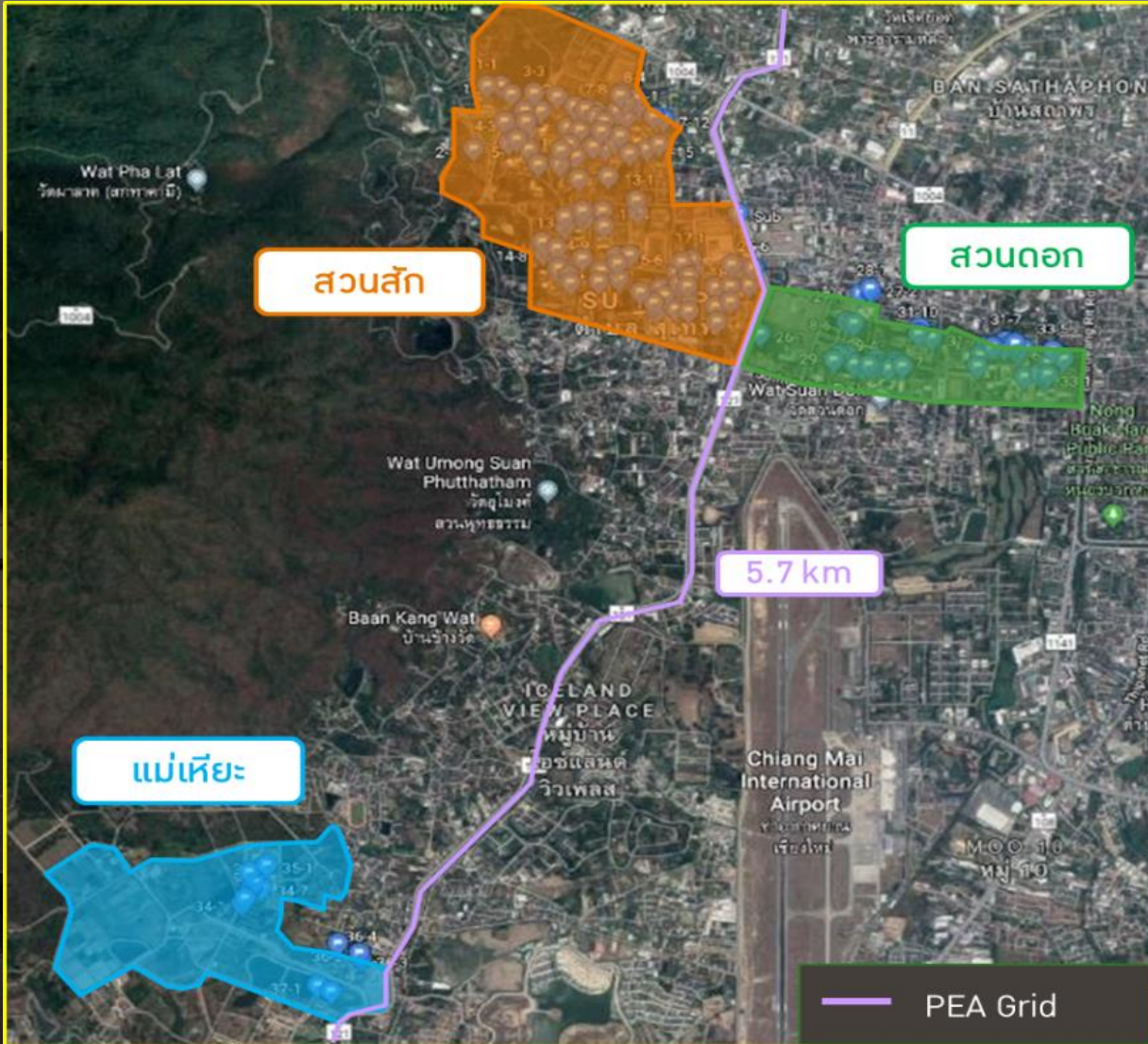
↓ 25.25%



Net Profit

8.8 mil-THB

Project Performance



3 Zone

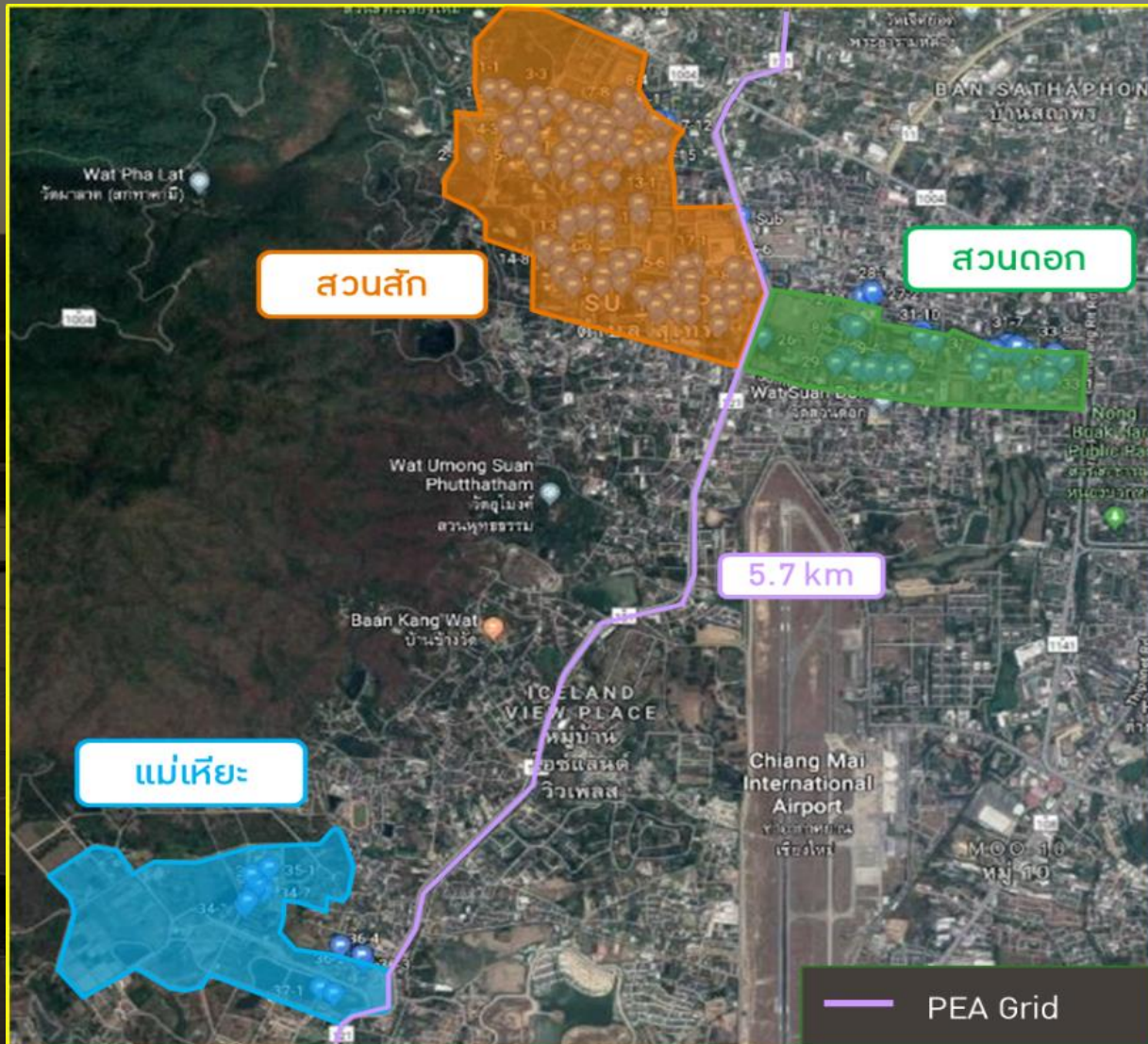
สวนสัก
สวนดอก
แม่เหียะ

50k+
Population/day

Student 26,000 man / day
Staff 11,200 man / day
Visitor 15,000 man / day

Car + Bike 30,000+ Unit / day

CMU Electrical Configuration



3 Campus Zone

สวนลັก
สวนดอก
แม่เหียะ

5 22 kV Internal Feeders from 115 kV PEA

สวนลັก
สวนดอก

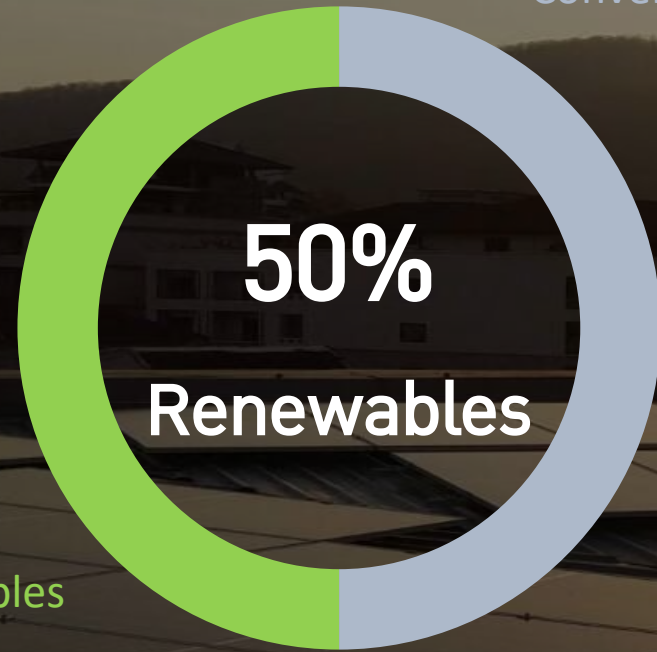
1 22 kV Feeder from PEA

แม่เหียะ

CMU Smart City Target - Energy



Conventional



Renewables

within 2030



25%

Lower GHG Emission
From 2018 Base Line



Smart City & Smart Campus

Total Buildings

> 180 Bldgs.



Solar Rooftop

15 MW

with 1.29 MWh ESS

CARBON REDUCTION

>9,000 tCO₂/Y

with

Smart City
Solutions

- Smart Grid, Virtual Power Plant
- Net Zero Carbon Building, Building Energy Management
- Electric Vehicle Charging Platform
- Carbon Certification & Trading Platform

Joint Credit Mechanism (JCM)



JCM THE JOINT CREDITING MECHANISM Global Environment Centre Foundation

Access Contact Search Japanese

Overview Call for Proposals **Projects** News Publications JCM Global Match

2.7MW Solar Power Project with Blockchain Technology in Chiang Mai University Town Community

Representative Participant
Inabata Co., Ltd.
Partner Participant: Thai Digital Energy Development Co.,Ltd

Host Country	Thailand
Selected Year	2020
Type	JCM Model Project
Sector	Renewable Energy

Outline of GHG Mitigation Activity Active Not registered

This project introduces a 2.7 MW solar power generation system on the roofs of multiple buildings in Chiang Mai University, Thailand. This project is operated by blockchain technology which realizes the expansion and maximum utilization of renewable energy on campus and reduces greenhouse gas (GHG) emissions by introducing renewable energy.

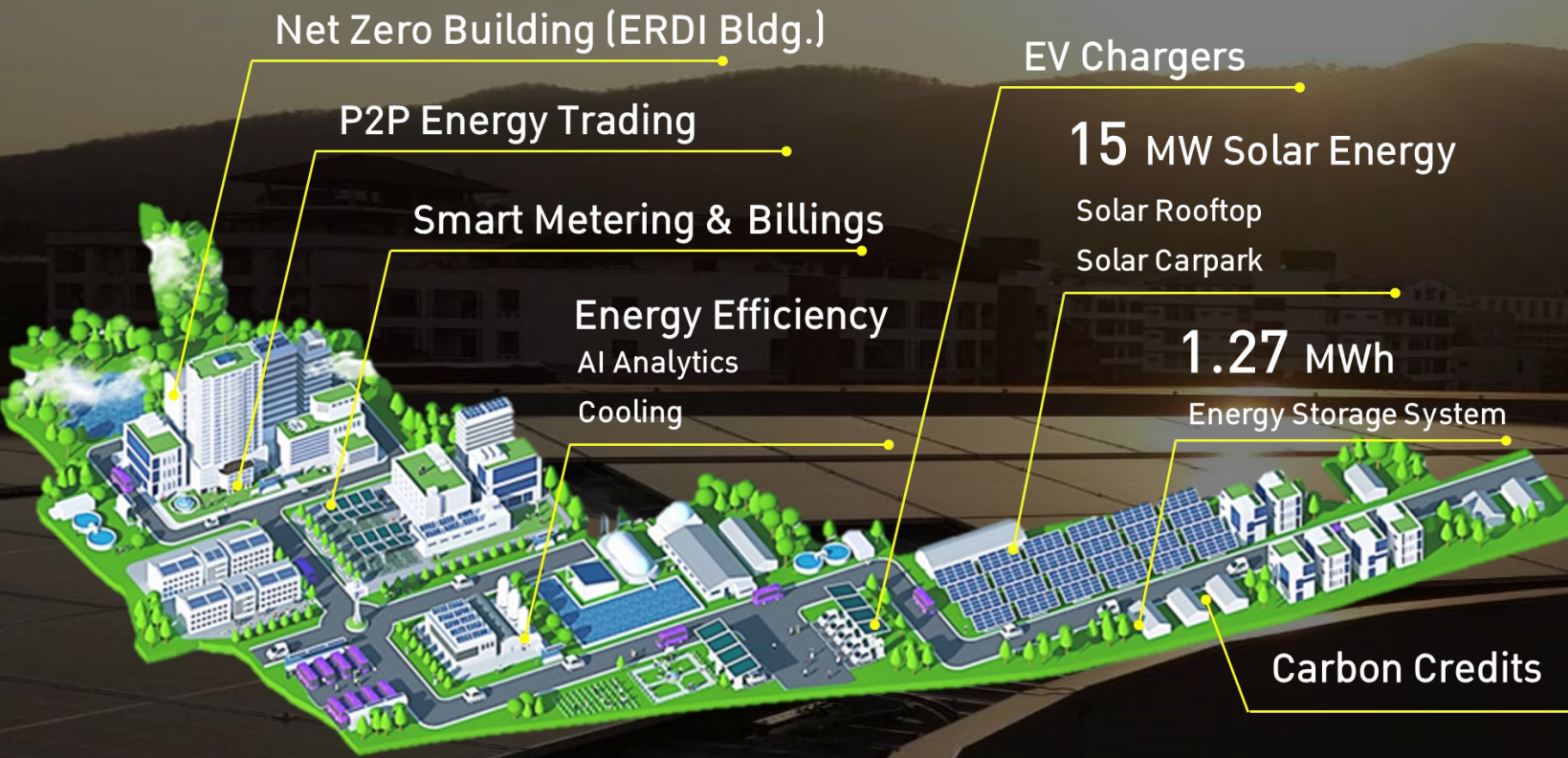
```
graph LR; subgraph "Chiang Mai University Town"; direction TB; B1[Building A] --- S1[Solar panels]; B1 --- I1[Inverter]; B1 --- SM1[Smartmeter]; B2[Building B] --- S2[Solar panels]; B2 --- I2[Inverter]; B2 --- SM2[Smartmeter]; B3[Building C] --- S3[Solar panels]; B3 --- I3[Inverter]; B3 --- SM3[Smartmeter]; end; I1 --- EM[Energy management With blockchain technology]; I2 --- EM; I3 --- EM; SM1 --- EM; SM2 --- EM; SM3 --- EM;
```

2.7 MW

Registered to JCM

Smart City Project with Low-Carbon Footprint Blockchain Technology in University Town Community

Future Development



- **Virtual Power Plant**
- **Vehicle to Grid**
- **Building Management**
- **Carbon Trading Platform**
- **IOT & AI**



Forward | Green | World