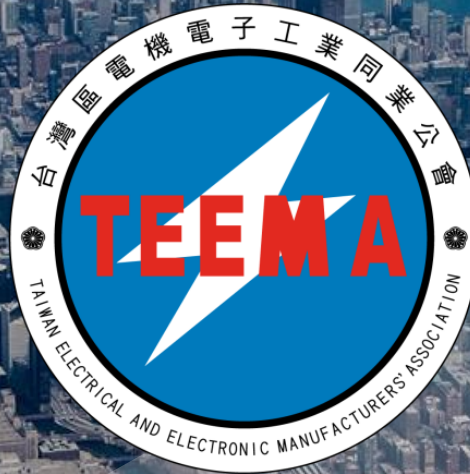


# Green Energy & Energy Storage Development and Policies in Taiwan



**T**aiwan **E**lectrical and **E**lectronic  
**M**anufacturers' **A**ssociation

**Dec 05 2019**

**Joseph Cheng**



An aerial photograph of the Chicago skyline, showing the city's dense urban landscape and its proximity to Lake Michigan. The image is partially obscured by a dark blue geometric overlay on the left side, which also contains the large white letter 'C' that starts the word 'Contents'.

# C**ontents**

**1**

Brief Introduction of TEEMA

**2**

Forward-looking Infrastructure Development Program: Green energy

**3**

Energy Issues and Development Program

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Household energy storage industry trends

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Introduction of a Successful Case Studies



# Part ONE

## **Brief Introduction of TEEMA**





# Brief Introduction of TEEMA

## »» About TEEMA

- **TEEMA stands for Taiwan Electrical and Electronics Manufacturers' Association**
- **Founded in 1948**
- **About 3,006 members with a total of about 783,430 employees**

## »» Our member

With more than 3,000 members, categorizing by products into 16 categories including communications, semiconductors, optoelectronics, consumer electronics, electrical devices and apparatus, and ect.

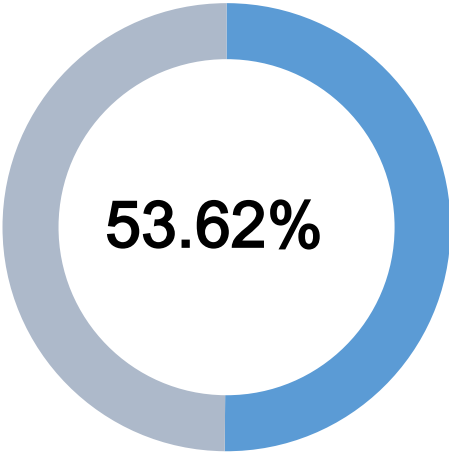
**2,169 SME  
(Capital below  
US\$2.54Million)**

**844 Large  
Enterprises  
(Capital above  
US\$2.54Million)**

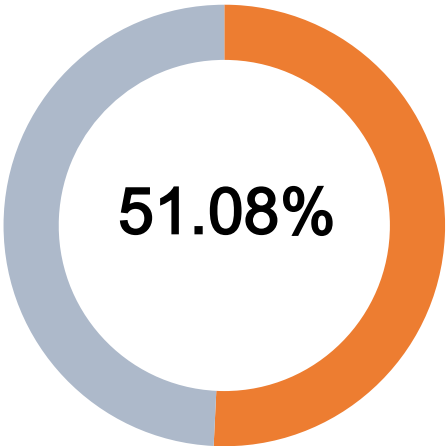


# Industrial Performance

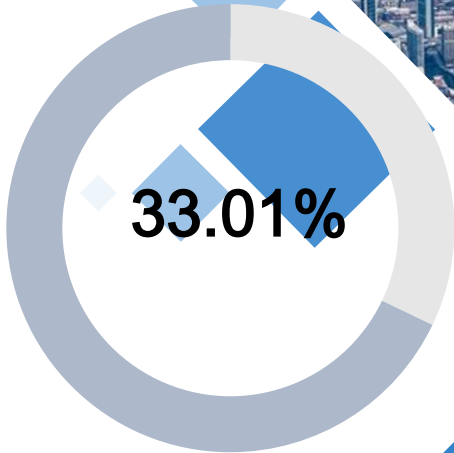
Production Value in 2018



Export in 2018



Import in 2018



Comparison	Production Value	Export Value	Import Value
Taiwan	US\$490,412.89	US\$336,050.27	US\$286,655.43
E/E Industry	US\$262,965.55	US\$174,173.93	US\$94,630.42

An aerial photograph of the New York City skyline at sunset. The image is partially covered by a large, semi-transparent triangle that points towards the right. The text "Part TWO" is overlaid on this triangle in a large, white, sans-serif font. The skyline features numerous skyscrapers, including the MetLife building on the left and the Empire State Building in the center. The sky is filled with dramatic, orange and blue clouds.

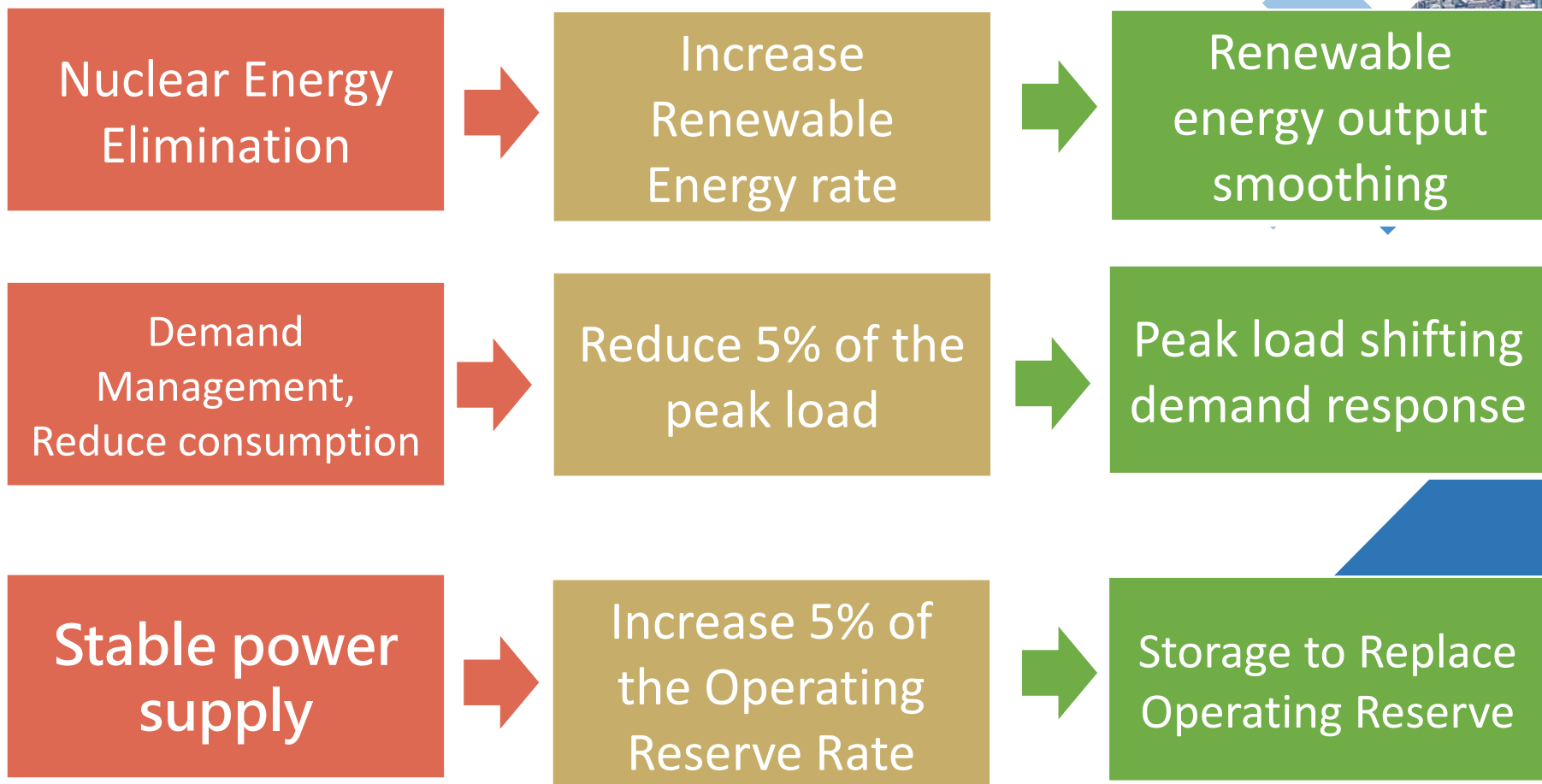
# Part TWO

## Forward-looking Infrastructure Development Program: Green Energy

In the bottom right corner, there are several overlapping blue geometric shapes, including triangles and polygons, in various shades of blue.



# Energy Transformation Strategies, Goals, and Methods



# 4 Major Spindles of Green Energy Construction

## Smart Innovative Energy Saving

Promote the construction of low voltage smart meters: Implement the proper electricity pricing plan, save energy and reduce the peak load, expand the performance of the smart meters.

## Photovoltaics (PV)

The “Two-year Solar PV Promotion Plan “ has been helping the industry in development of high efficiency, low-cost component technology.

## Wind Power

Establish underwater foundations and heavy wharf for wind power development, such as the Kaohsiung Marine Technology Industry Innovation Zone and the Taichung Port Offshore Wind Power Industry Zone.

## Shalun Smart Green Energy Science City

With the goal of constructing an innovative green energy industry ecosystem, building a green energy technology industry platform and related plans to drive the development of Taiwan's green energy industry.

2

3

4





## Expectations of Green Energy Construction

- ◆ **Transformation:**  
Strengthen energy security, with the goal of 20% renewable energy ratio, innovate green economy, and promote environmental sustainability and social equity.
- ◆ **Industry:**  
To make Taiwan an important base for the development of green energy industry in Asia, and act as an essential role in global green energy industry within 5 to 10 years.
- ◆ In response to the advent of the green economy era, Taiwanese government is promoting the green energy construction, with the goal of nuclear energy elimination and industrial innovation, while attracting top international manufacturers to invest in Taiwan, and combining local potential manufacturers to enhance the future competitiveness of Taiwan's industry.

A series of overlapping blue triangles of varying shades pointing downwards from the top edge of the slide.

# Energy Issues and Development Program

A triangular inset showing a high-angle, nighttime view of a dense city skyline with many illuminated buildings.

## Part THREE



# Transformation Issues

- ◆ Increase the proportion of renewable energy supply, reduce or stop nuclear power generation.
- ◆ Using gas instead of coal for thermal energy generation, reducing carbon emission and air pollution.
- ◆ Power grid intellectualizing and decentralizing, reducing the risk of large-scale power outages.
- ◆ Combining supply and demand management to improve use efficiency.
- ◆ Open up the power trading market and create an innovative business model.



# Development Program

- ◆ **Development Goals:**  
Balanced development of green economy, environmental sustainability and social equity, achieve the goal of nuclear energy elimination in 2025 to sustain energy development.
- ◆ **Energy Safety:**  
Effectively apply various energy according to their advantages, in order to build a stable, affordable and low-risk energy supply and demand system.
- ◆ **Green Economy:**  
Strengthen the all-directional development of energy conservation, energy creation, energy storage and intelligent system integration. Combine the advantages of regional resources and talent, motivate the green economy.
- ◆ **Sustainability:**  
Improve the air quality, deploy energy facilities, complete the back-end disposal of nuclear power generation and build a clean energy system.





# Key Policy Actions

## Part FOUR



# The 4 Major Spindles of Green Energy Construction

## Energy Creation

Energy creation refers to the use of renewable energy such as solar energy, wind energy, biomass energy and geothermal energy for power generation. Upgrading the development of energy creation technology-related industries by developing new energy technologies.

## Energy Conservation

Energy-saving technology research and development planning, create energy-saving, sustainable industries according to the construction of smart cities and policies.

## Energy Storage

In response to the government's policy and the demand of the development of green energy industry, using the battery technology research and development platform to improve the battery industry technology, establish energy storage system verification and audit regulations.

## Smart System Integration

Integrate power management of smart homes, commercial buildings, factories, etc. to provide demand response and achieve the goals of energy-saving.

1

2

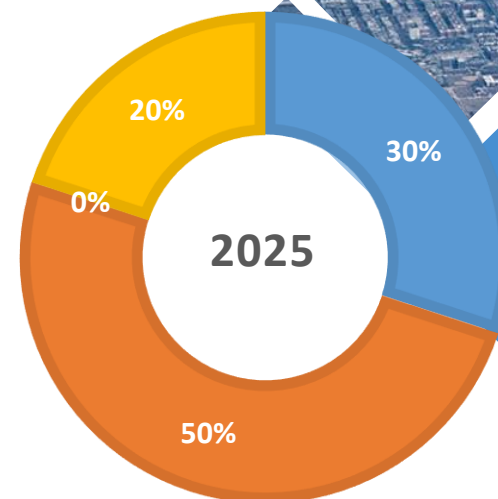
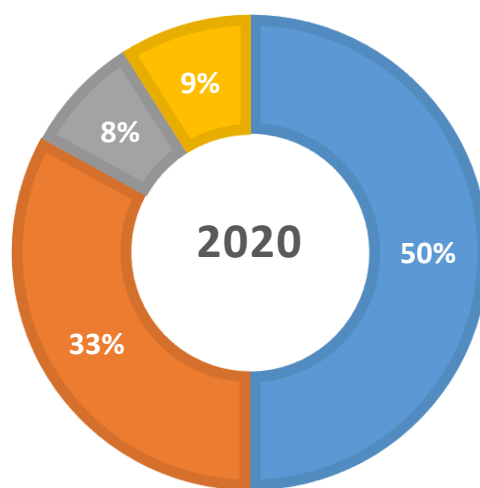
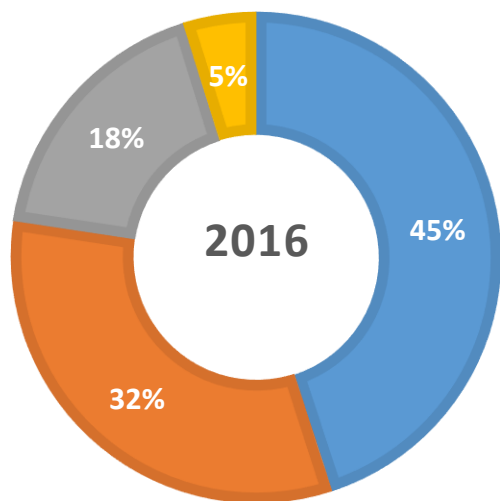
3

4





# Energy Transformation Plan



■ Coal Gas

■ Natural Gas

■ Nuclear

■ Renewable Energy


## Renewable Energy Installed Capacity

Energy	2016	2020	2025
Solar Photovoltaics	1,342	8,776	20,000
Onshore Wind Power	747	1,200	1,200
Offshore Wind Power	8	520	3,000(5,500)
Geothermal Energy	1	150	200
Biomass Energy	742	768	813
Hydropower	2,089	2,100	2,150
Total	4,929	13,514	27,363(29,923)



# Part FIVE

## **Green Energy Technology Industry Innovation Promotion Program**





# Promotion Program

## ◆ Solar Photovoltaics:

### A. Duration and objectives:

Photovoltaics cumulative capacity to reach 20 GW in 2025, with an expected annual power generation of 25 billion kWh.

### B. Background:

To achieve the goal of nuclear elimination in 2025, using photovoltaics according to the renewable energy application of our industry foundation, increase the green energy efficiency.

### C. Programs:

1. Two-year Solar PV Promotion Plan
2. Green Energy Roofs project
3. Expand the checking of idled lands



# Promotion Program

## Wind Power:

### A. Duration and objectives:

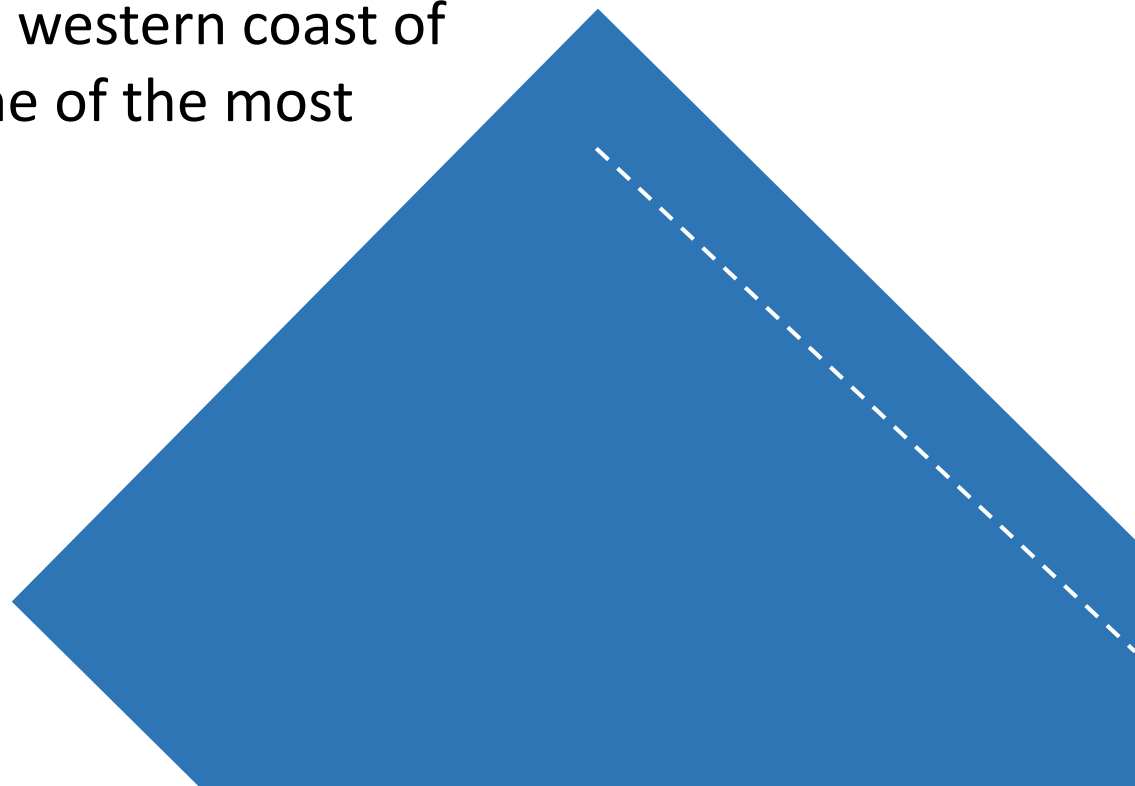
The cumulative capacity to reach 1.2 GW for onshore wind power and 5.5 GW for offshore wind power in 2025, total 6.7 GW.

### B. Background:

We have excellent wind power resources in the western coast of Taiwan and the Taiwan Strait. Wind power is one of the most economically viable renewable energy.

### C. Programs:

1. Four-Year Plan of Promotion for Wind Power
2. Regulatory Coherence
3. Infrastructure construction
4. Environment and ecosystem protection



# Promotion Program



## Smart Power Grid

### A. Duration and objectives:

Complete 24,000 (about 86%) power grid distribution in 2020, automation switch device upgrading, and complete 303 (about 50%) substation intelligentization.

### B. Background:

In line with the energy transformation policy, promote key projects including transmission and distribution automation, smart meter system infrastructure, and micro-grid technology development to achieve long-term renewable energy development goals.

### C. Programs:

1. Promote automation of power transmission and distribution: distribution automation, and substation intellectualization.
2. Building smart meter system infrastructure.



# Promotion Program



## Shalun Smart Green Energy Science City

### A. Duration and objectives:

With the four major spindles which are energy conservation, energy storage, energy creation and smart energy-saving, to promote the research and development of advanced energy technology research and its application, focusing on the front-end green process equipment and the innovative application of the back end.

### B. Background:

Based on the integration of energy creation, energy conservation, energy storage and smart systems, strengthen the features of industrial research village with the Joint Research Center for Green Energy Technologies. Combining Green Energy Technology Demonstration Site and universities, research institutes, exhibitions and commercial areas, to establish the green energy industry network and the estuary.

### C. Programs:

Joint Research Center for Green Energy Technologies (Ministry of Science and Technology)

Green Energy Technology Demonstration Site (Ministry of Economic Affairs)

# Energy Storage System Application Effect

Energy Market  
Arbitrage

Provide Assisting  
Service

Reduce the  
Assisting  
Demand

Reduce the Cost  
of Electricity  
Production

Reduce Power  
Generation  
Investment

Delay Transmission  
and Distribution  
System Investment

Increase User  
Reliability

Improve  
Electricity Quality

Integrate  
Intermittent  
Renewable Energy

Reduce the Usage of  
Traditional Power  
Generation Equipment

Increase User  
Reliability

Improve  
Electricity Quality



An aerial photograph of the New York City skyline at sunset. The sun is low on the horizon, casting a warm orange glow over the city. The Empire State Building is prominent in the center. The Hudson River is visible on the left, and the East River is on the right. The sky is filled with dramatic, dark clouds. The image is partially covered by a dark, semi-transparent triangle on the left side.

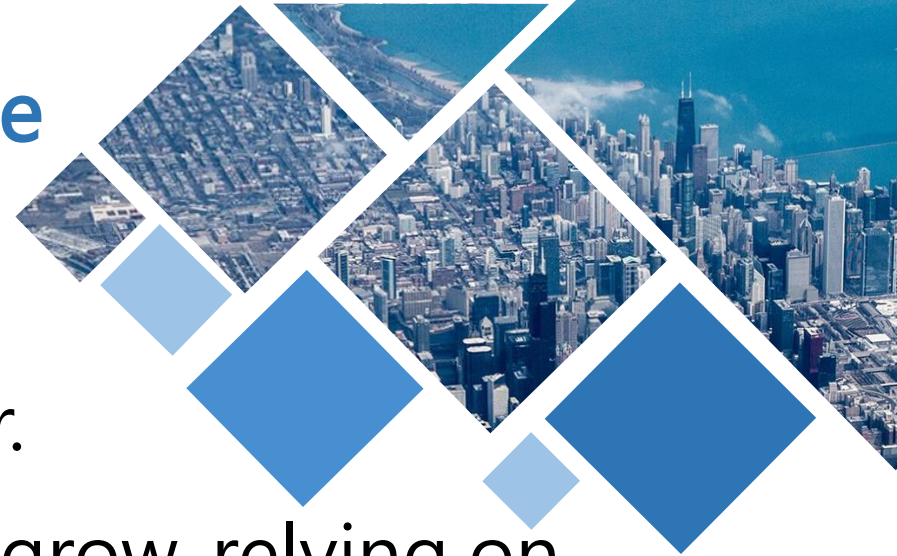
# Part SIX

# The Trend of Household Energy Storage Industry

In the bottom right corner, there are several overlapping blue geometric shapes, including triangles and polygons, in various shades of blue.

## The Trend of Household Energy Storage Industry

- ◆ The market demand for global energy storage batteries is about 6GWf per year.
- ◆ Household energy storage is starting to grow, relying on the national policy subsidies.
- ◆ Japan continues to provide subsidies to stimulate general household energy storage.
- ◆ Germany has a subsidy policy to improve the efficiency of renewable energy use.
- ◆ As an emerging, Taiwan may consider combining local enterprises to seize the business opportunities.





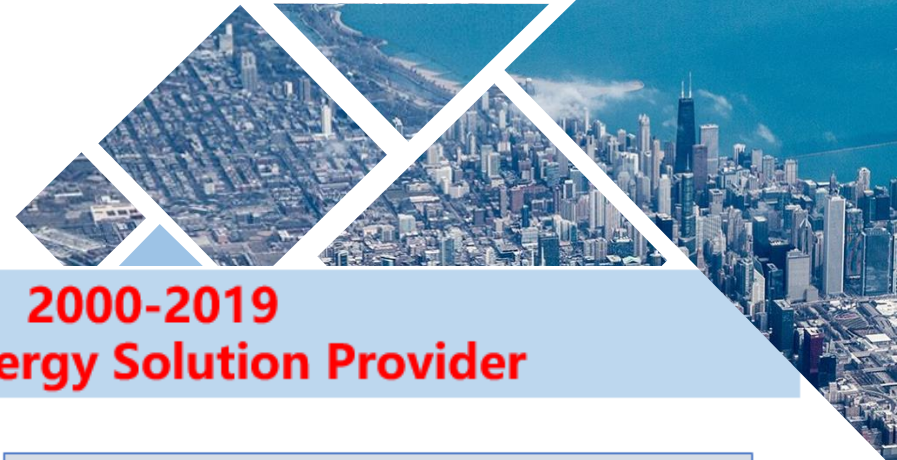


# Part SEVEN

## Introduction of Successful Case Studies



# Case Study-Tatung Co., Ltd.



## 1949-2000 Power Equipment Provider

## 2000-2019 Smart Energy Solution Provider

Industrial Motor

Mechanical Meter

Switch Gear

Amorphous Transformer

Smart Meter



- Smart Metering
- Building/Campus EMS
- Substation Turnkey Solution
- Power Plant Turnkey Solution

1949

1955

1967

1990

2004

At Present

1950

1966

1974

2000

2018



Power Transformer

Power Cable

Generator

Substation  
Turnkey System

MW Scale Energy  
Storage System

- Solar System
- Micro Grid System
- Big Data and AI Application
- MW Scale Energy Storage



# Products & Solutions –Smart Energy Company

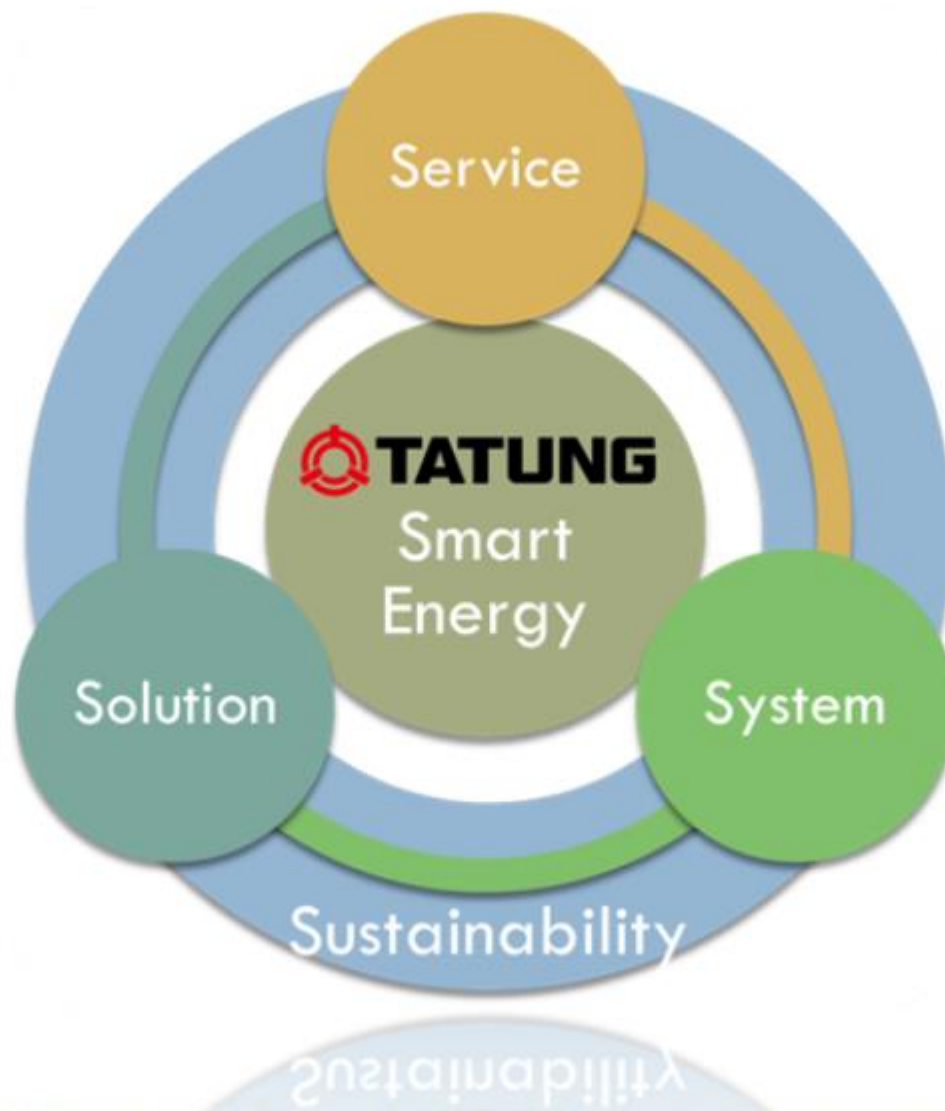
Electronics and  
Appliances

Motor and Diesel  
Generator Set

Industrial  
Appliance

Wire & Cable

Solutions  
public  
construction



Smart Grid

Solutions  
Electro-Mechanical  
Systems

Solutions  
Smart  
Solutions

Solutions  
Information  
System



# Micro Grid System in Tatung



## Household

### 台東登山屋

Tai-Tung Mountain,  
Taiwan



- 2.5kW PV
- 1.5kW Wind
- 15kWh ESS
- Support Lighting and Comm. Electricity

- **Facture:**
- 獨立型風光互補  
Integration of PV and wind energy without utility's grid

## Disaster Prevention

### 新北烏來區公所

Wulai District, Taiwan



- 18kW PV
- 60kWh ESS
- Support Emergency and Living Electricity

- **Facture:**
- 防災型不斷電系統  
Uninterruptible Power System for Disaster Prevention

## Village

### 屏東光采濕地

Guan-Tsai Wetland,  
Taiwan



- 78kW PV
- 10kW Wind
- 159kWh ESS
- Load Shedding
- Forecasting
- Islanding Operation

- **Facture:**
- 村莊等級孤島運轉  
Village-based Islanding Operation
- 2015 APEC銀質獎  
2015 APEC ESCI Silver Medal

## Island

### 澎湖七美低碳島

Chi-meí Island,  
Taiwan



- 355kW PV
- Smart PV Inverter
- Autonomous Control

- **Facture:**
- 2018 智慧城市展創新應用獎  
2018 Innovation Application Award
- 智慧型變流器導入  
Smart PV Inverter

## Island

### 南沙太平島

Itu Aba Island  
(Taiping Island)



- 160kW PV
- 612kWh ESS
- **Facture:**
- 節省柴油燃料成本  
Reduce Fossil Fuel



## Water and Electricity

### 杜拜

Dubai



- 20kW PV
- 84kWh ESS
- 200L Water Generator

- **Facture:**
- 獨立型水電結合  
Integration of Water and Electricity Resource
- 2016系統整合獎  
2016 System Integration Award

## MW Scale

### 高雄永安

Kaohsiung, Taiwan

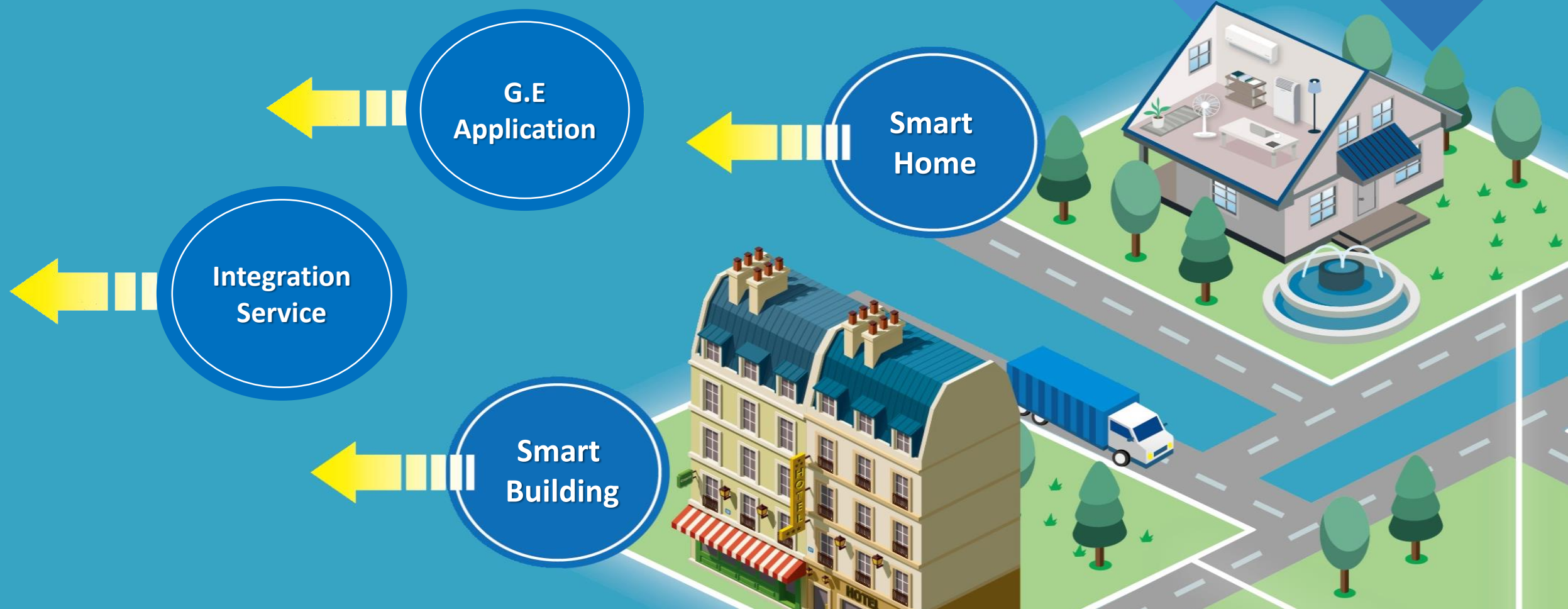


- 1.2 MWh ESS
- Smoothing
- Stable Output
- Voltage Regulation
- Frequency Regulation
- Reducing Reverse Power
- Scheduling

- **Facture:**
- 台灣第一套MW等級儲能系統  
First MW Scale Energy Storage in Taiwan



# Case Study-TECO Electric & Machinery Co., Ltd.



## Intelligence Appliances with I-cloud

### Features:

- ✓ Remote control management through phones and tablets
- ✓ Energy conservation visualization



## Smart Building Energy Management (EMS System)

### Features:

- ✓ Building up energy expense devices by utilizing distributed control and central management



## AC Integration Service

### Features:

- ✓ In line with the energy-expense-centered idea to set up services and offer overall solution programs
- ✓ Offer product diagnostic analysis and remote maintenance and monitoring system (RMMS)





An aerial photograph of the Chicago skyline, showing a dense cluster of skyscrapers along the city's edge. The Chicago River flows through the city, and Lake Michigan is visible in the background. The image is overlaid with a semi-transparent blue geometric shape on the right side. The word "THANKS" is written in large, white, sans-serif capital letters across the center of the image.

# THANKS

Dec 05 2019