

CORPORATE ADOPTION OF HOURLY RECS: PROGRESS, CHALLENGES, AND NEXT STEPS



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Corporate Adoption of Hourly RECs: Progress, Challenges, and Next Steps

The Usage of T-REC to Support Company to Achieve 24/7 Carbon-Free Energy (CFE)

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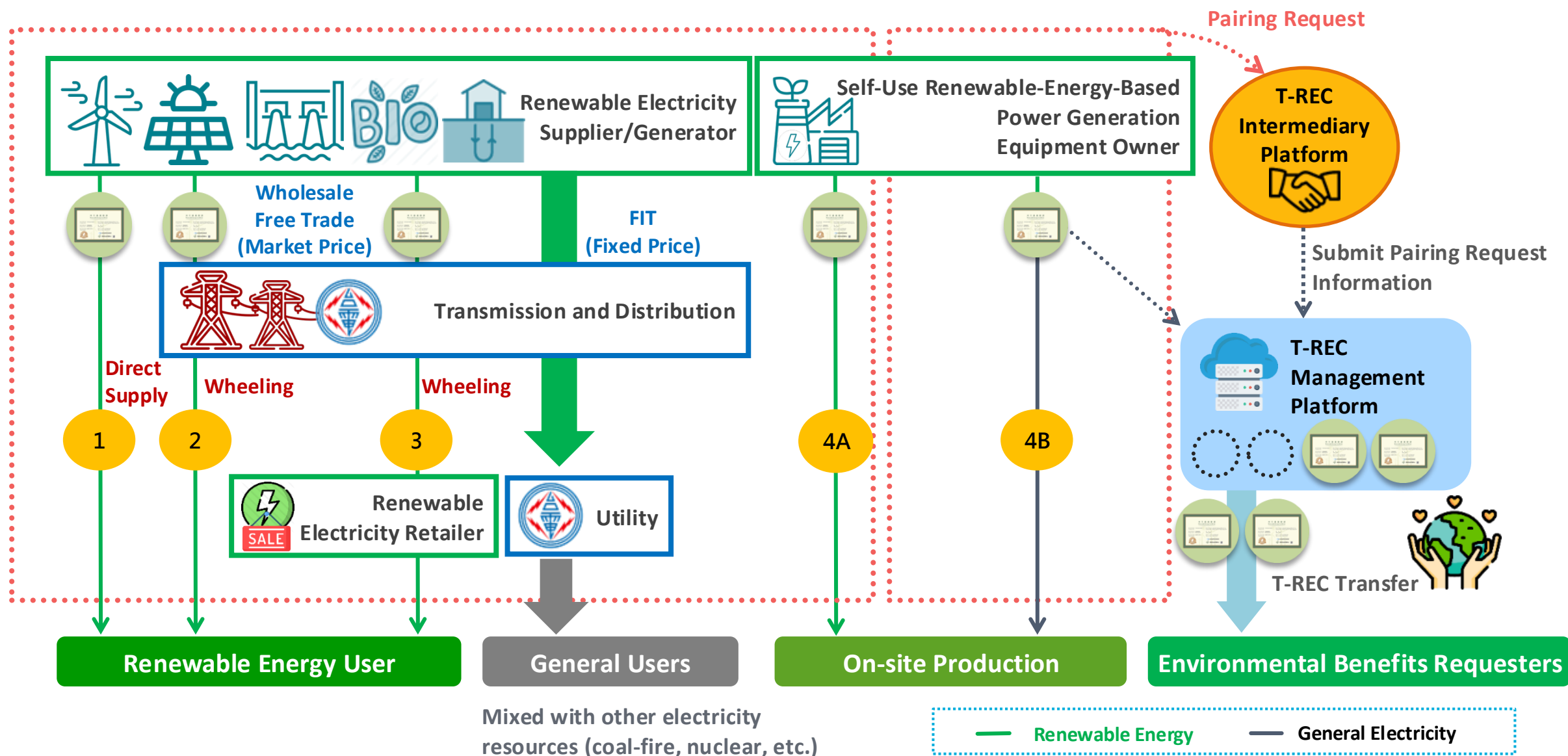
Experience

- GHG Protocol Scope 2 TWG, member (2024~)
- Taiwan Renewable Energy Association, Secretary General (2024)
- EnergyTag Advice committee (2023~2024)
- Taiwan Renewable Energy Certificates Mechanism project, PI (2017~)
- Taiwan Power Company Power Trade Platform preparatory group, Advice committee (2018~2020)
- Office of Energy and Carbon Reduction, Executive Yuan, Advice committee (2019~2021)
- Taiwan Smart Grid Industry Association, Deputy Secretary General (2010~)

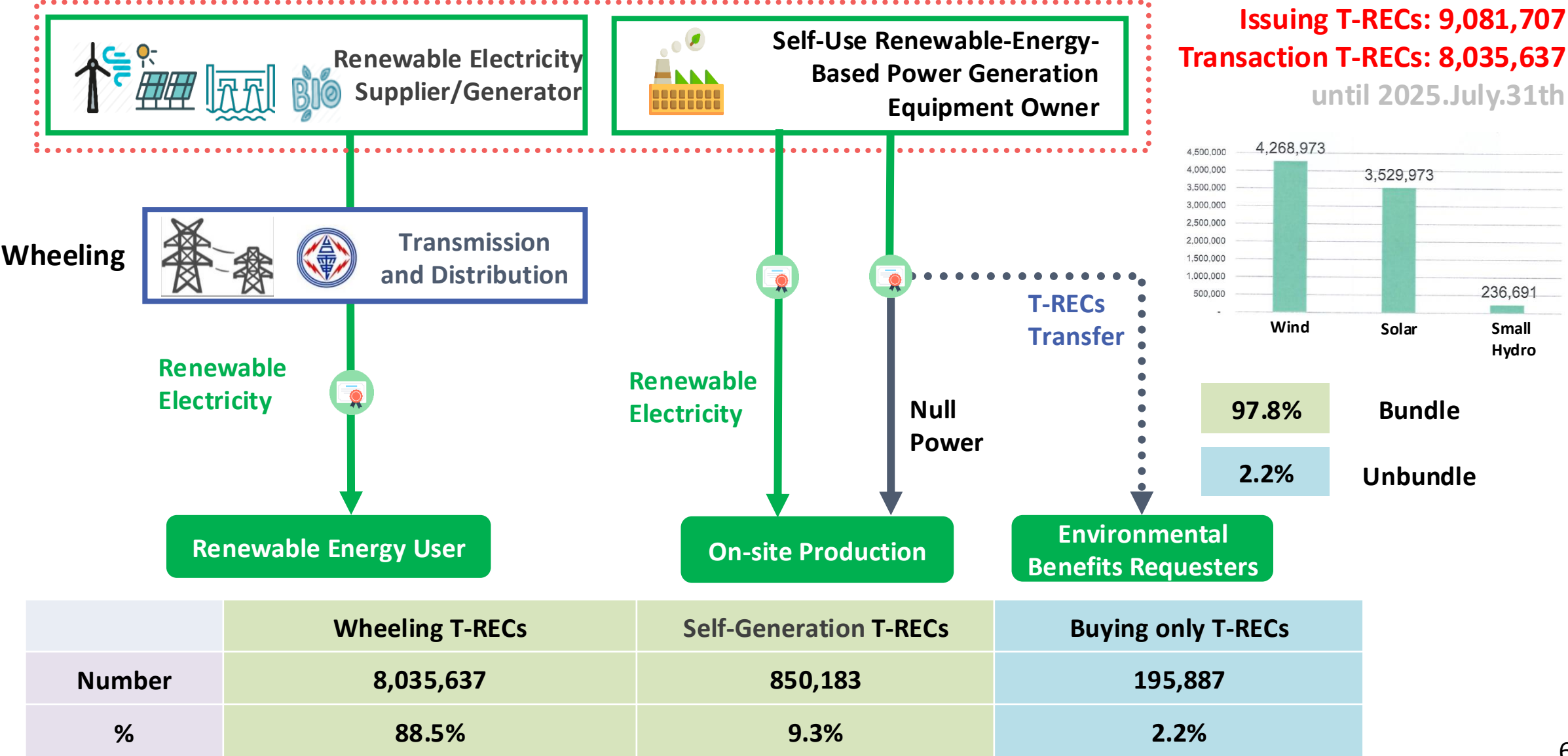
Introduction of T-REC Development Status



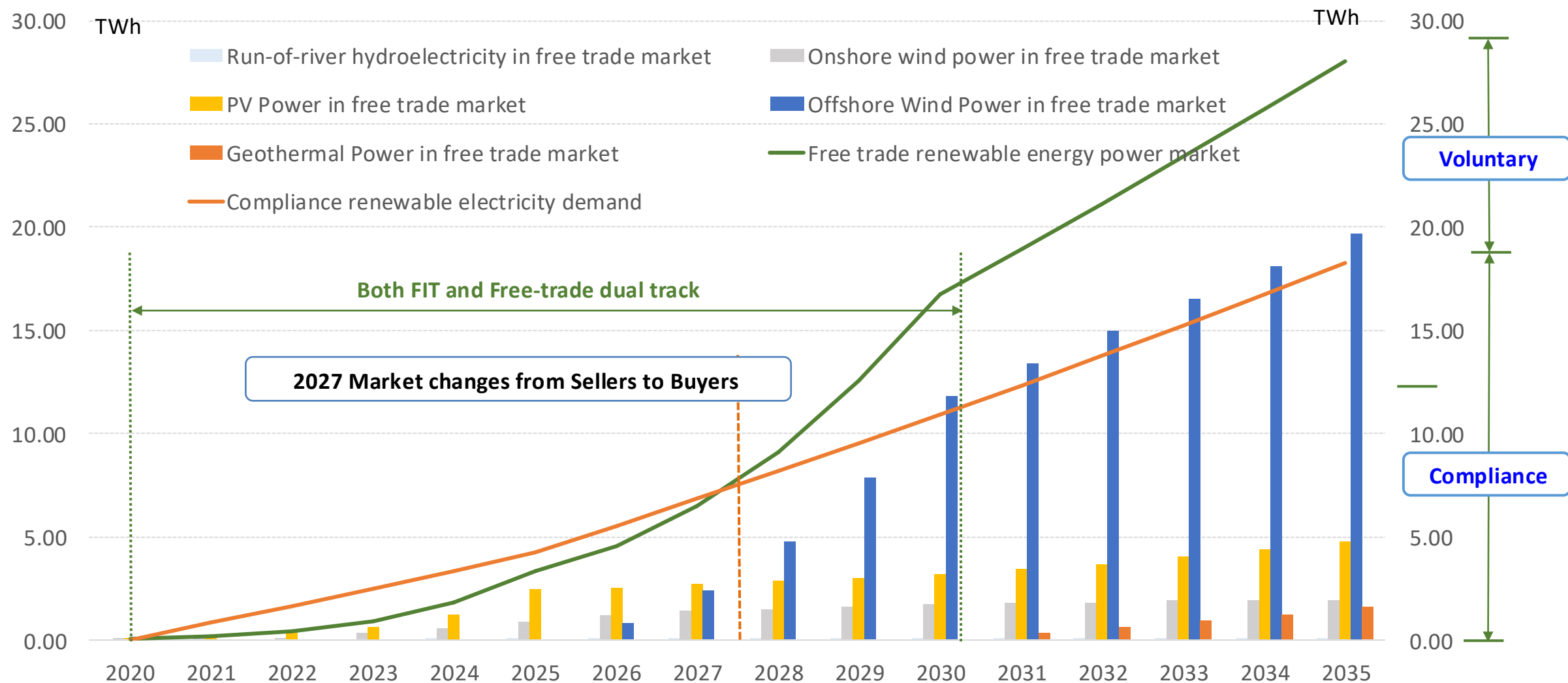
T-REC Transfer Model Building



The T-REC Issuance Static



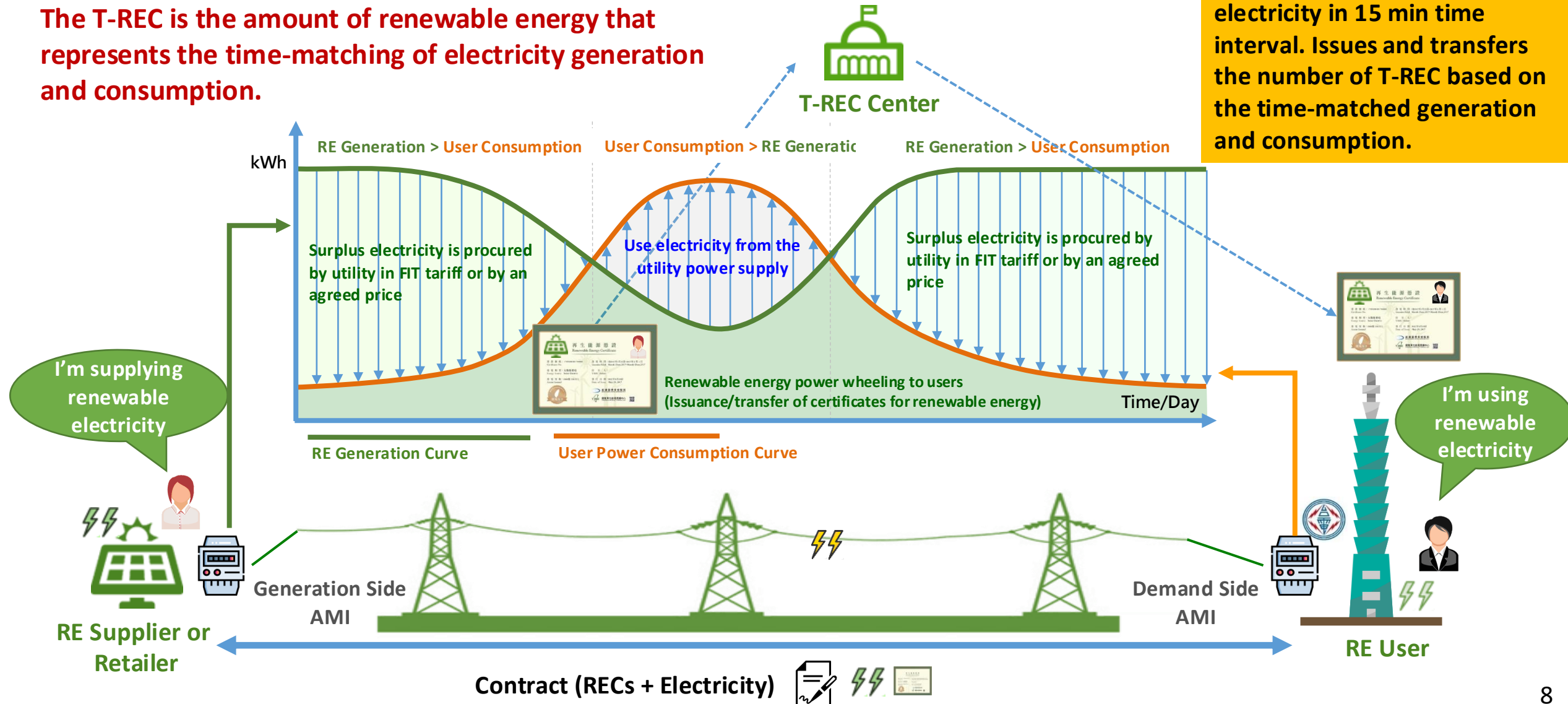
Supply and Demand Prediction of Taiwan Renewable Power (T-REC) Market



The Usage Model of T-REC to Supports time matching Renewable Electricity

The T-REC is the amount of renewable energy that represents the time-matching of electricity generation and consumption.

The AMI records the generation and consumption of electricity in 15 min time interval. Issues and transfers the number of T-REC based on the time-matched generation and consumption.

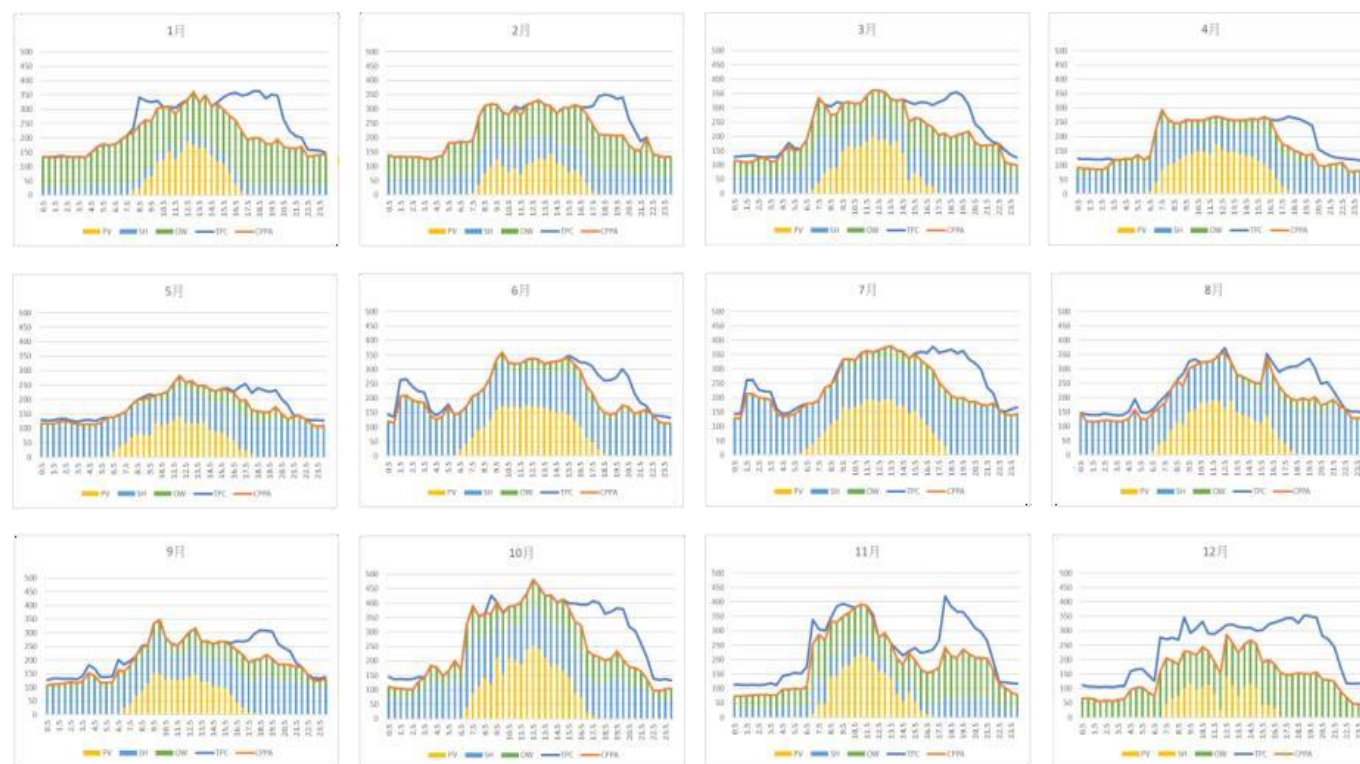


CPPA RE Wheeling Software Simulation

The RE Wheeling Simulation Program can set different requirements for energy source and consumption sites, **simulate the optimal RE procurement portfolio**, including **RE procurement volume, surplus electricity, RE ratio** and **average electricity fee**.

```
CALL GENERATORS_TO_CUSTOMERS_WHEELING_DYNAMIC(MONTH_PER_YEAR, HALF_HOUR_PER_DAY, &
NUMBER_OF_GENERATORS, NUMBER_OF_CUSTOMERS, GENERATION, &
WEEKDAY_POWER_CONSUMPTION, SATURDAY_POWER_CONSUMPTION, SUN_OFFPEAK_DAY_POWER_CONSUMPTION, &
WEEKDAY_CPPA_POWER_PURCHASE, SATURDAY_CPPA_POWER_PURCHASE, SUN_OFFPEAK_DAY_CPPA_POWER_PURCHASE, &
WEEKDAY_CPPA_SURPLUS_POWER, SATURDAY_CPPA_SURPLUS_POWER, SUN_OFFPEAK_DAY_CPPA_SURPLUS_POWER, &
WEEKDAY_SURPLUS_POWER, SATURDAY_SURPLUS_POWER, SUN_OFFPEAK_DAY_SURPLUS_POWER, &
WEEKDAY_TPC_POWER_PURCHASE, SATURDAY_TPC_POWER_PURCHASE, SUN_OFFPEAK_DAY_TPC_POWER_PURCHASE)

CALL WHEELING_ELECTRICITY_EXPENSE_MONTHLY_SETTLEMENT_03(&
MONTH_PER_YEAR, HALF_HOUR_PER_DAY, NUMBER_OF_GENERATORS, NUMBER_OF_CUSTOMERS, &
CONTRACTED_CAPACITY, GENERATION, &
MONTHLY_WEEKDAY, MONTHLY_SATURDAY, MONTHLY_SUNDAY_OFFPEAKDAY, &
NON_SUMMER_CONTRACTED_CAPACITY_TARIFF, SUMMER_CONTRACTED_CAPACITY_TARIFF, &
WEEKDAY_SUMMER_HALF_HOUR_TARIFF, WEEKDAY_NON_SUMMER_HALF_HOUR_TARIFF, &
SATURDAY_SUMMER_HALF_HOUR_TARIFF, SATURDAY_NON_SUMMER_HALF_HOUR_TARIFF, &
SUN_OFFPEAK_DAY_SUMMER_HALF_HOUR_TARIFF, SUN_OFFPEAK_DAY_NON_SUMMER_HALF_HOUR_TARIFF, &
WEEKDAY_SUMMER_HALF_HOUR_TARIFF_BLOCK, WEEKDAY_NON_SUMMER_HALF_HOUR_TARIFF_BLOCK, &
SATURDAY_SUMMER_HALF_HOUR_TARIFF_BLOCK, SATURDAY_NON_SUMMER_HALF_HOUR_TARIFF_BLOCK, &
SUN_OFFPEAK_DAY_SUMMER_HALF_HOUR_TARIFF_BLOCK, SUN_OFFPEAK_DAY_NON_SUMMER_HALF_HOUR_TARIFF_BLOCK, &
CPPA_TARIFF, TPC_CONTRACTED_CAPACITY, TPC_CONTRACTED_CAPACITY_REDUCTION, &
WEEKDAY_POWER_CONSUMPTION, SATURDAY_POWER_CONSUMPTION, SUN_OFFPEAK_DAY_POWER_CONSUMPTION, &
WEEKDAY_CPPA_POWER_PURCHASE, SATURDAY_CPPA_POWER_PURCHASE, SUN_OFFPEAK_DAY_CPPA_POWER_PURCHASE, &
WEEKDAY_CPPA_SURPLUS_POWER, SATURDAY_CPPA_SURPLUS_POWER, SUN_OFFPEAK_DAY_CPPA_SURPLUS_POWER, &
WEEKDAY_SURPLUS_POWER, SATURDAY_SURPLUS_POWER, SUN_OFFPEAK_DAY_SURPLUS_POWER, &
WEEKDAY_TPC_POWER_PURCHASE, SATURDAY_TPC_POWER_PURCHASE, SUN_OFFPEAK_DAY_TPC_POWER_PURCHASE, &
WEEKDAY_CPPA_POWER_PURCHASE_MODIFIED, SATURDAY_CPPA_POWER_PURCHASE_MODIFIED, &
WEEKDAY_SURPLUS_POWER_MODIFIED, SATURDAY_SURPLUS_POWER_MODIFIED, &
WEEKDAY_TPC_POWER_PURCHASE_MODIFIED, SATURDAY_TPC_POWER_PURCHASE_MODIFIED, &
SUN_OFFPEAK_DAY_CPPA_POWER_PURCHASE_MODIFIED, &
SUN_OFFPEAK_DAY_CPPA_SURPLUS_POWER_MODIFIED, &
SUN_OFFPEAK_DAY_SURPLUS_POWER_MODIFIED, &
SUN_OFFPEAK_DAY_TPC_POWER_PURCHASE_MODIFIED, &
SUPPLUS_POWER_PERCENTAGE, TOTAL_CPPA_POWER_PURCHASE_EACH_CUSTOMER_PERCENTAGE, &
TOTAL_CPPA_POWER_PURCHASE, TOTAL_SURPLUS_POWER, TOTAL_TPC_POWER_PURCHASE, &
CPPA_TOTAL_ELECTRICITY_EXPENSE, TPC_TOTAL_ELECTRICITY_EXPENSE, AVERAGE_WHOLE_POWER_PRICE, &
AVERAGE_WHOLE_CPPA_POWER_RATIO, .FALSE. ) ! .TRUE. or .FALSE.
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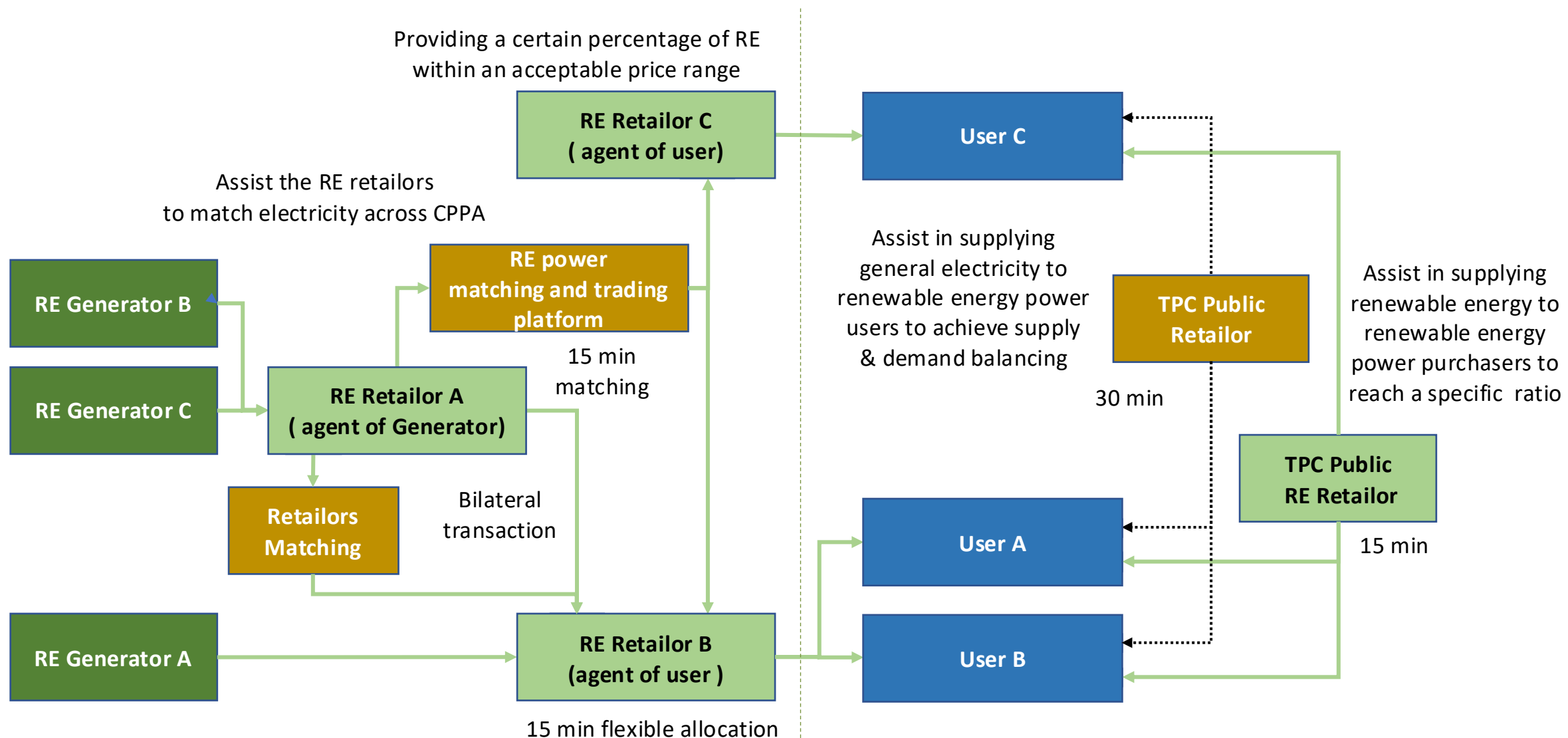


Optimal RE Procurement Simulation

**How time-matching issuing
Model of T-REC could
support 24/7**

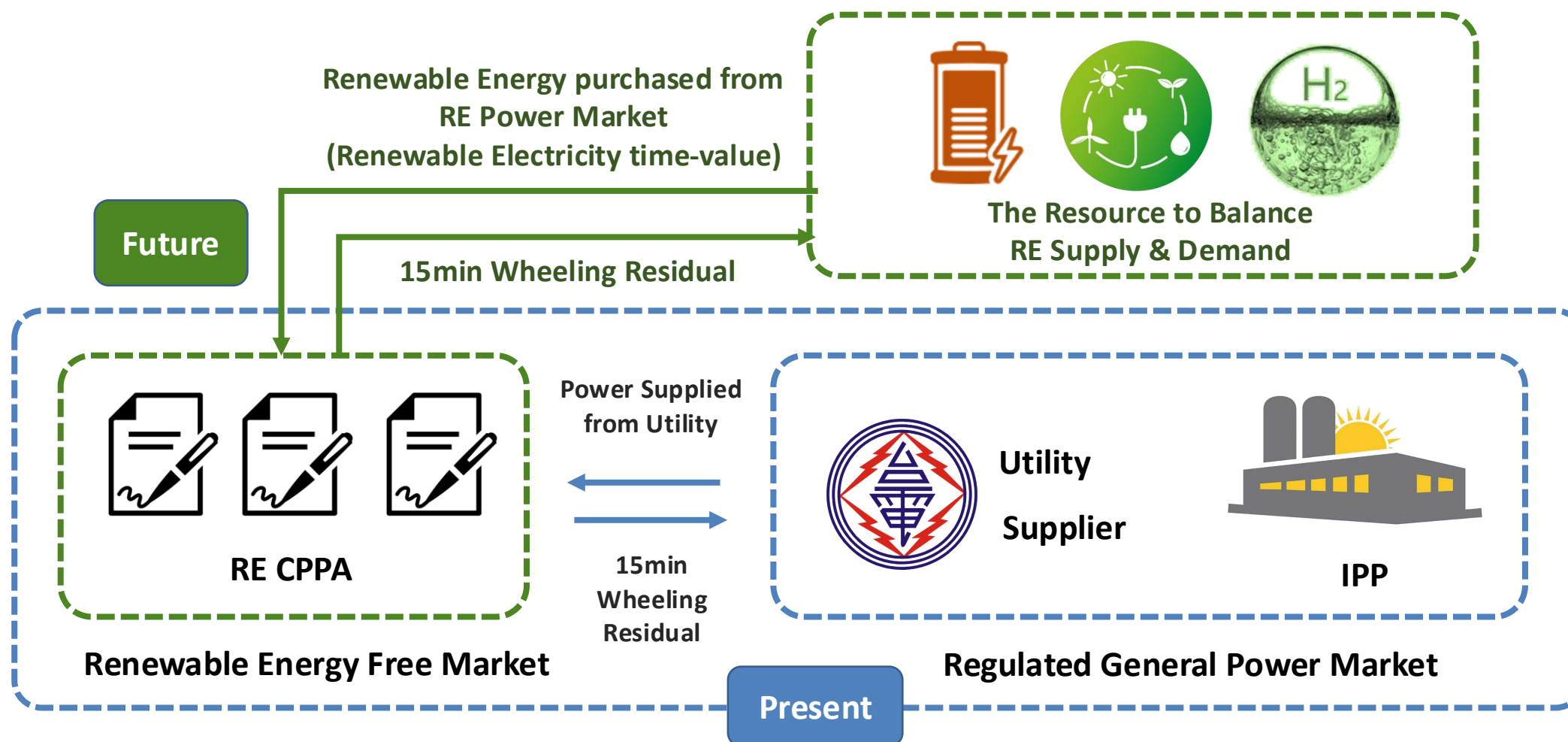


Taiwan's future RE market for 24/7 concept



Renewable Energy Market Mechanism Support Renewable Energy Supply & Demand Balancing

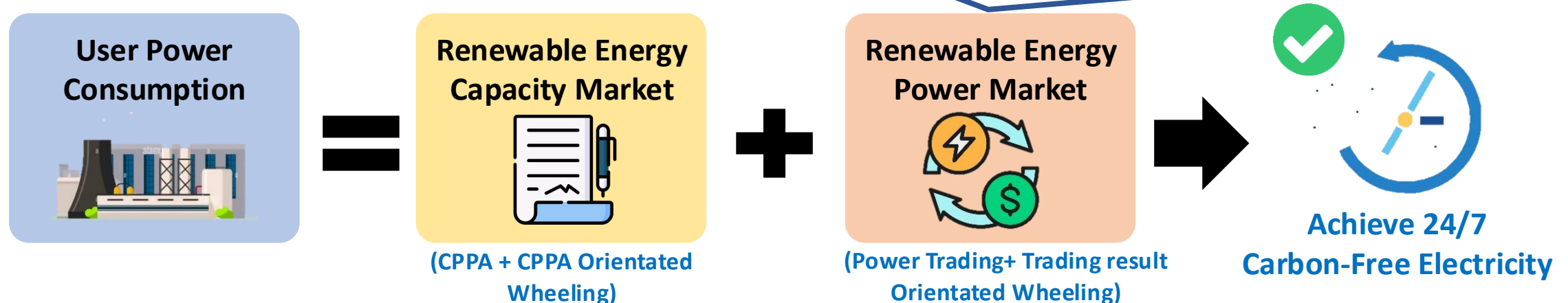
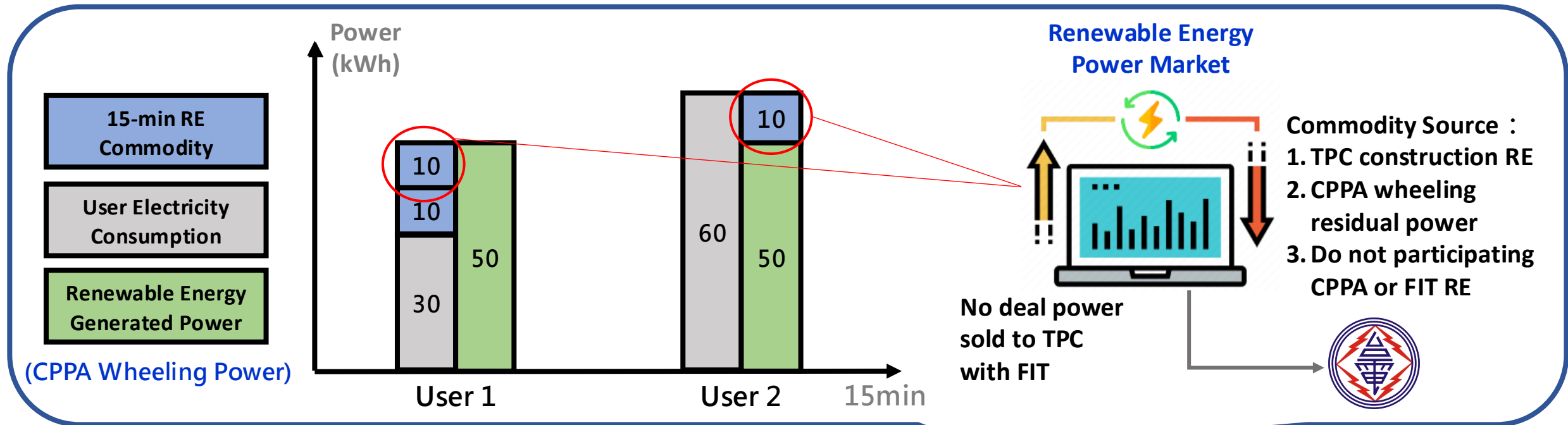
In the long run, the general power supply will diminish with the high penetration ratio, RE market mechanism support RE supply & demand market balancing.



The Concept of RE Market Mechanism Support

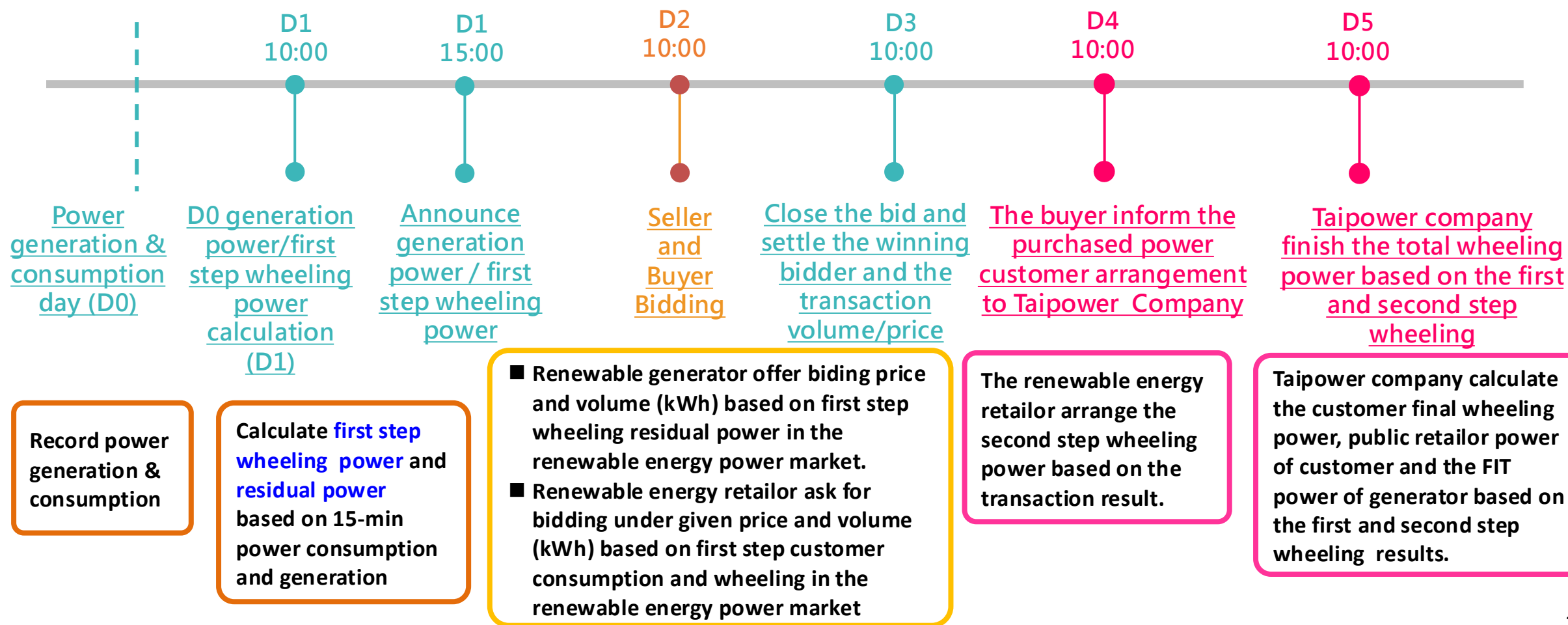
RE Supply & Demand Balancing

Wheeling Residual Power Double Auction Matching



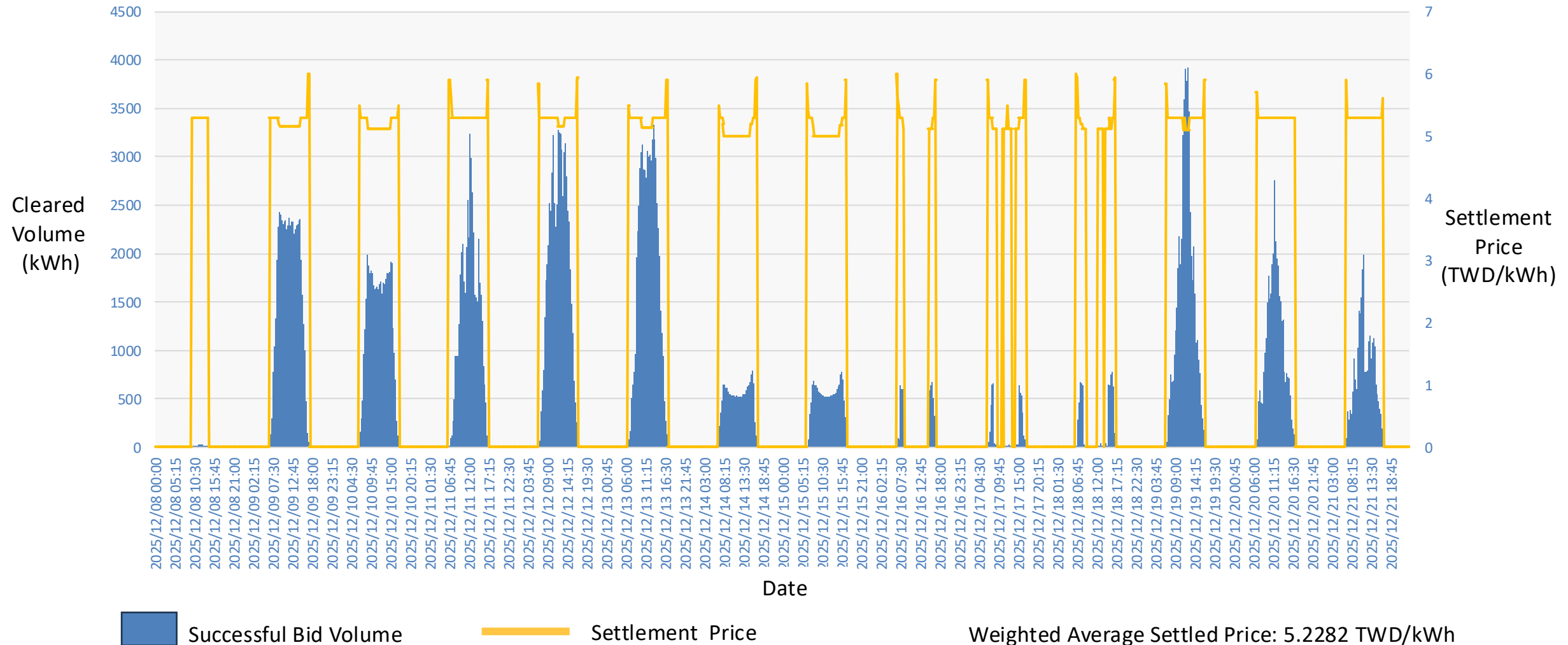
Transaction Process of 15min Wheeling Residual Renewable Energy Power in Renewable Energy Power Market

The renewable energy generator sign CPPA & wheeling contact. Using 15min Wheeling Residual Renewable Energy Power (which is calculated in the first step 15-min wheeling matching) to joint the renewable energy power market.



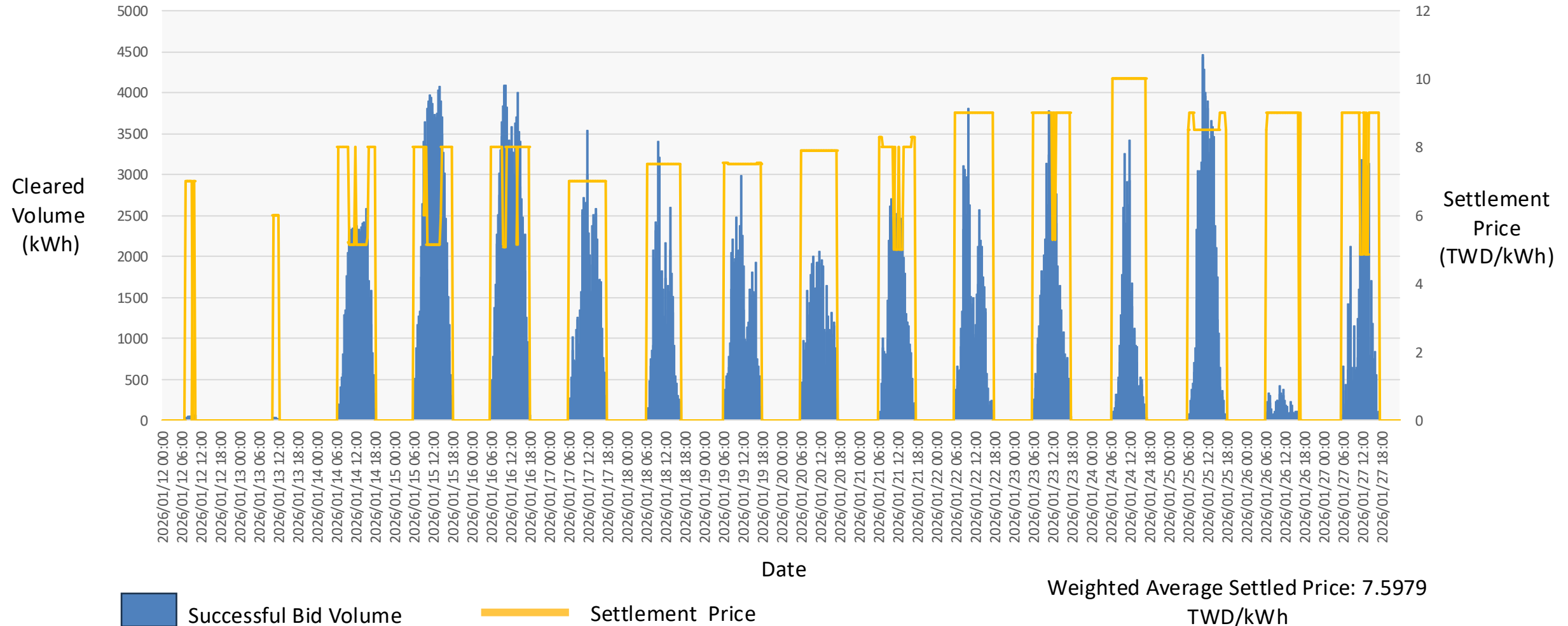
Pilot Platform: December Trading Overview

December Market Clearing Price and Volume Chart



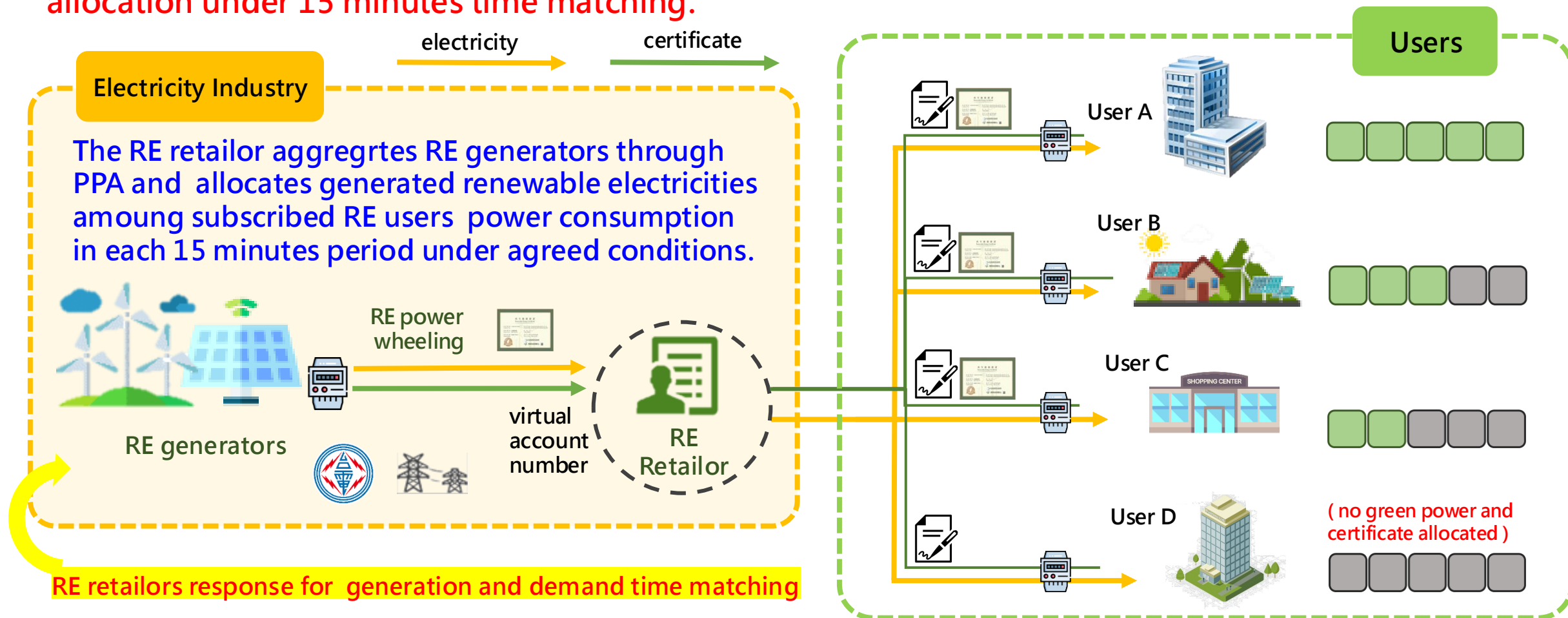
Pilot Platform: January Trading Overview

January Market Clearing Price and Volume Chart

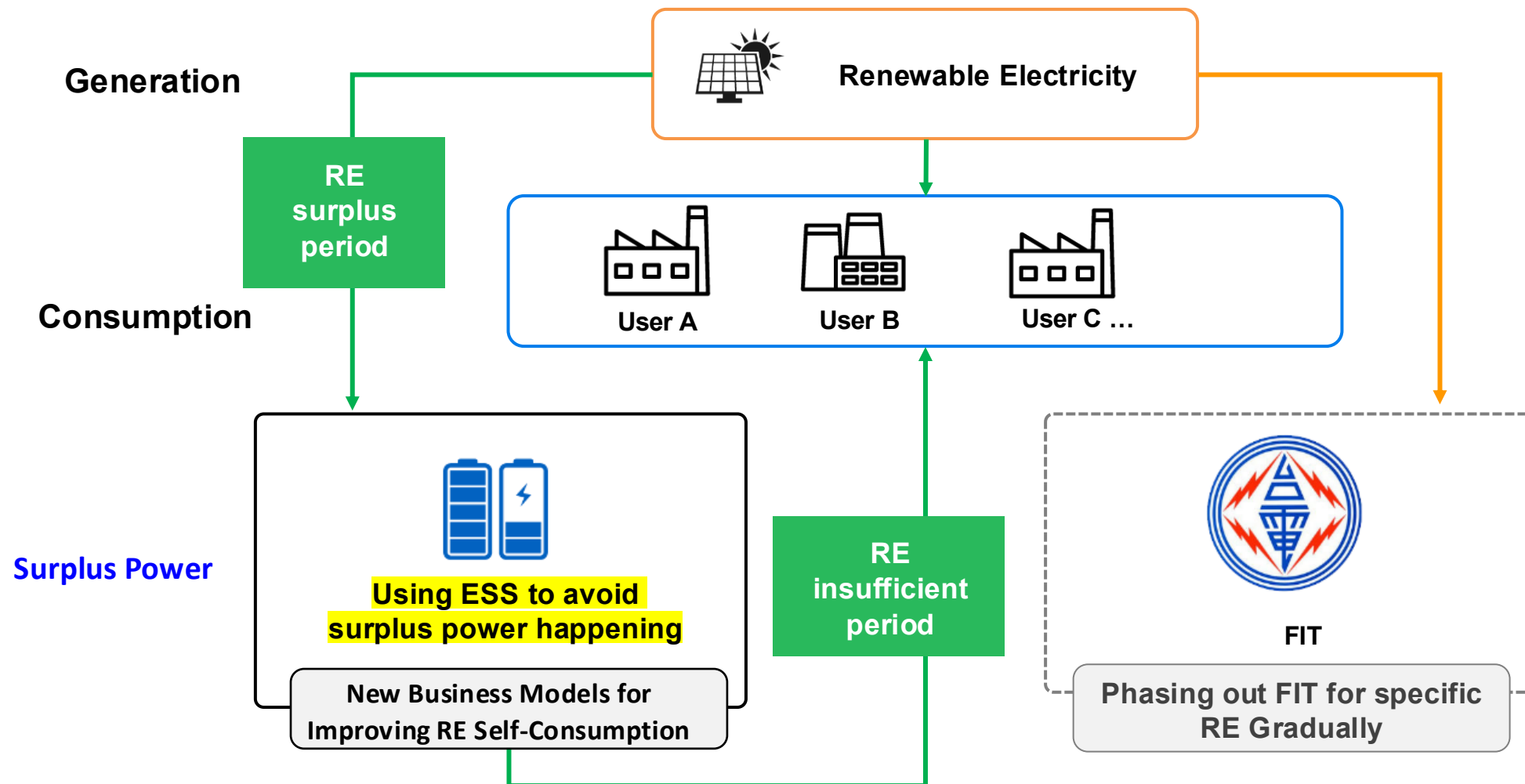


15 Minutes Renewable Electricity Flexible Delivery Allocation

Renewable electricity retailer as an energy pool to support the wheeling power flexible delivery allocation under 15 minutes time matching.



Before-Meter (Off-site) Renewable Energy ESS Wheeling Mode

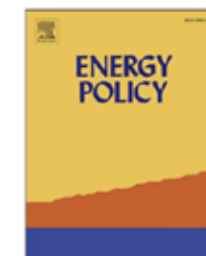




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Renewable energy certificate mechanism and markets in Taiwan: The evolution and characteristics

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ABSTRACT

With the world striving to achieve net-zero emissions by 2050, carbon-free energy systems must accelerate. This study examines how Taiwan's renewable energy certificate (T-REC) assists Taiwan-based global enterprises in meeting supply chain requirements and establishing a renewable energy certification and initial market system with reliability and validity. The analysis examines several critical dimensions, including government-led initiatives, the voluntary nature of the program, the design of bundled certificates, and their integration with the national greenhouse gas registry. From an institutional perspective, it can be affirmed that the institutional design of the T-REC aligns with the fundamental purpose of energy attribute certificates in promoting the development and utilization of electricity derived from renewable sources. The reliability of the T-REC can be strengthened through government-led governance. Furthermore, the T-REC tracking system is integrated with the national greenhouse gas registry platform to prevent the double-counting of environmental benefits. From a market perspective, the design of the T-REC shapes the quality and operational regulations of the initial renewable electricity trading market.

Question ?

