# Overview of RECs and their role in promoting renewable energy: lessons learned from selected countries and recommendations

Ministry of Industry and Trade

Hợp tác Đức
DEUTSCHE ZUSAMMENARBEIT

Implemented by
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# Overview of RECs

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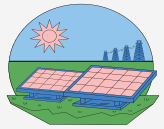
# What is REC?

Renewable Energy Certificates (RECs) are virtual certificates that track the renewable attributes of electricity from generation to consumption (environmental attribute)



**1 MWh**

unique **RE** electricity

=

**1 REC**

THE INTERNATIONAL REC STANDARD

This Redemption Statement has been produced for

LIXIL GLOBAL MANUFACTURING VIETNAM CO., LTD.

by

TEPCO ENERGY PARTNER INTERNATIONAL THAILAND CO LTD

confirming the Redemption of

15 000.000000

I-REC Certificates, representing 15 000.000000 MWh of electricity generated from renewable sources

TIGR TRADABLE INSTRUMENTS FOR GLOBAL RENEWABLES

TIGR REGISTRY CERTIFICATE OF RETIREMENT

APX, Inc., in its capacity as operator and administrator of the TIGR Registry, hereby certifies that the following Renewable Energy Certificates ("RECs") have been retired in the TIGR Registry on behalf of:

Company A Pte. Ltd.

Total RECs Retired: 1,020

Retiring TIGRs Account Holder: Asiarecs Pte. Ltd.
Retirement Reason Details: Meet Overall Sustainability Goals
Additional Details: To offset FY22/23 Energy Consumption

| VINTAGE YEAR | PROJECT TYPE | RETIREMENT DATE | QUANTITY |
|---|---|---|---|
| 2023 | Solar Photovoltaics | March 3, 2022 | 1,020 |

APX

- RECs allow customers to purchase the environmental attributes associated with renewable energy generation ***without directly buying the electricity***.
- Used to reduce ***Scope 2*** emissions.
- Reported and recognized: disclosures to CDP, RE100, and other stakeholders based on best practice guidelines.

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# Uses for RECs

## Compliance RECs

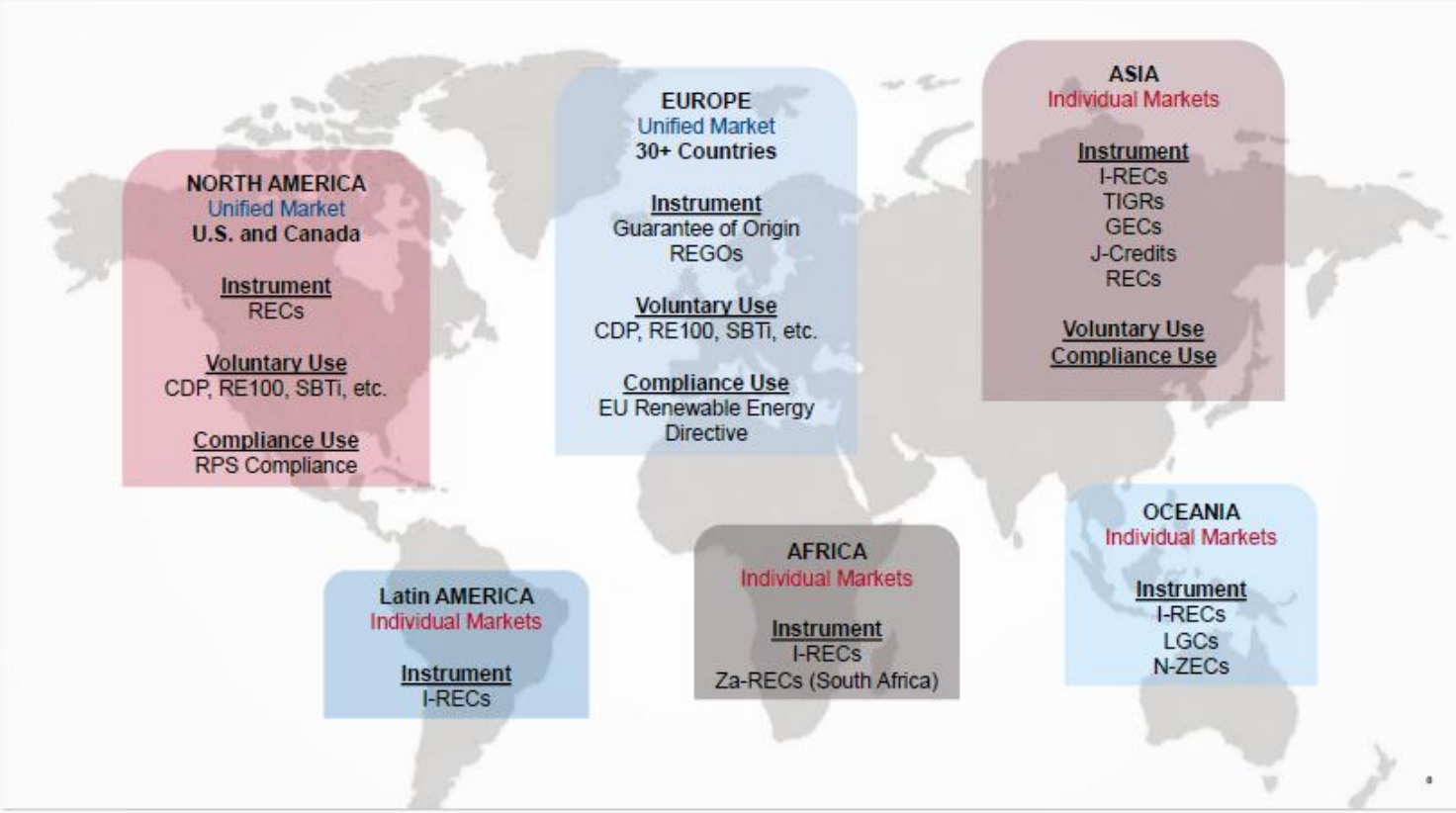
A market in which laws, regulations or policies require entities to purchase RECs

- Renewable Portfolio Standard/Renewable Portfolio Obligation
- Trade Agreements
- Cross Border Electricity Sales

## Voluntary RECs

A market in which entities choose to purchase RECs

- Corporate Sustainability /Disclosure
- Green Tariff Offering



# RECs and Voluntary Sustainability Frameworks

I-REC STANDARD

- *Founder: International REC Standard Foundation*
- *Established: 2014*
- *68 Countries*
- *Total volume issued 2014-2025: 1,26 Billion kWh*

TIGR

- *Founder: APX*
- *Established: 2016*
- *12 Countries*
- *3.78 million certificates/year (2022)*

**GO (Guarantees of Origin)**

- *Famework: EU*
- *Established: 2001 (EU Renewable Energy Directive)*
- *Market: EU + Norway, Switzerland…*

Green-e

- *Founder: Center for Resource Solutions*
- *Established: 1997*
- *Market: United States (voluntary REC market)*

***Common RECs***

CLIMATE GROUP RE100

- **Over 400 members**
- **Total annual revenue exceeding USD 2.75 trillion**
- **More than 30 global Fortune 500 companies**

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

***RECs Demand***

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# How RECs Work?

## REC functional flow of operations

**1. Generation**
Generators produce 1 MWh RE

**2. Registration**
Registration for REC issuance

**3.Verification:**
Issuer audits data


**4. Issuance:**
Registry creates digital REC


**5. Transaction:**
REC sold to end-user


**6. Claim:**
End-user retires REC for ESG/RE100

## REC Structure System

**Registry Operator**
*(I-REC: Evident)*

**Verification Body**
*(I-REC: DNV, Bureau Veritas,..)*

**Issuing Body**
*(I-REC: GCC, local issuers,..)*

**Trading Platform**
*(I-REC: 14 platform operators)*

**Market Participants**
- Generators
- Buyers
- Traders/Brokers

# Case Studies

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# China

## Pilot program: Voluntary Market

**2017 – 2019**

**Launch of GEC (China's REC system) as a voluntary mechanism + I-REC**

***Objectives:***

- Reduce FiT subsidy burden
- Provide additional revenue for renewable projects

***Main buyers:***

- Multinationals (RE100, ESG commitments)
- A few large corporations

## Introduction of Mandatory RPS

**2020– 2022**

***Obligated entities***

- Grid companies (TSOs/DSOs)
- Electricity retailers

## Strengthening & Expansion

**2023– 2024**

***Obligated entities***

- Extended to large electricity consumers:
  - Steel
  - Cement
  - Aluminum
  - Data centers

## Consolidation of Mandatory Market

**2025– Now**

- GEC becomes the sole official REC system
- Phase-out of: I-REC (2025)

# China

**CERTIFICATION INSTRUMENT**: Green Electricity Certificates (GEC)
*(Previously included I-REC, but it has been excluded since March 31, 2025)*

**GECs from FiT-supported projects**

→ **higher prices** (*since selling RECs leads to a reduction in equivalent subsidies*)

**Non-subsidized GECs**

→ purely market-based, typically **cheaper**

## PENALTIES:

- Public reprimand and disclosure
- Restrictions on operations and investment
- Mandatory shortfall payments

## MANAGEMENT STRUCTURE

### The Primary Policy Setters

- *National Development and Reform Commission (NDRC)*
- *the National Energy Administration (NEA)*

**Issuance** **Registration System** **Data Publication**

*The NEA's New Energy and Renewable Energy Department*

### Trading Platforms

*The Beijing and Guangzhou Power Exchange Centers*

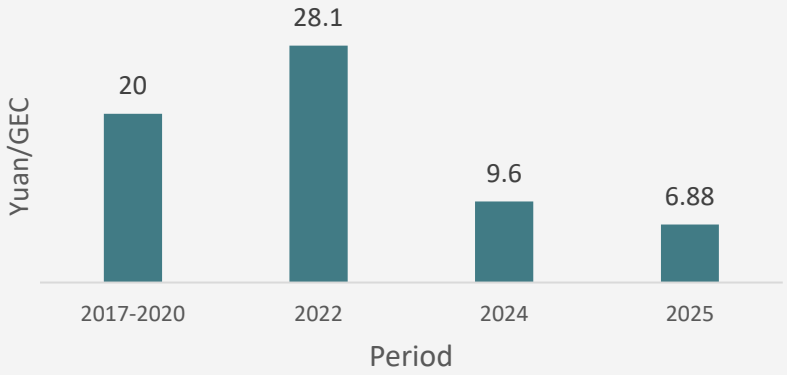
# China

**473.4M**
GECs issued in 2024

**13.7%**
Of national RE generation

**1.607B**
GECs issued Jan-Jun 2025

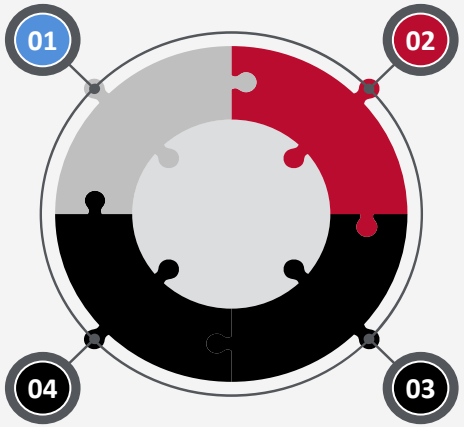
*GEC Price Trend*




## Effectiveness of meeting objectives

### Strong demand & shift to compliance

- Rapid growth of voluntary market (**446M GEC** traded in 2024 – global record)
- Demand driven mainly by manufacturing (~70%)
- Transition to mandatory consumption (RPS) in energy-intensive sectors will drive future demand




### Global recognition & integration

- Recognized by RE100 (2025) after system reforms
- Enables use of GEC for Scope 2 reporting globally

### Reducing subsidy burden

- **~RMB 4.28 billion (~USD 600M)** revenue generated in 2024
- Creates market-based income for generators

### Supporting decarbonization targets

- Central tool for achieving China's dual carbon goals (2030/2060)
- Key market mechanism in national climate strategy
- Effectiveness will become clearer in the next 5 years

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# Australia

## RET

### Renewable Energy Target

**A mandatory certification system - 2001**

***REC Types***

- ***LGCs:*** Certificates for large-scale RE projects (wind, solar farms, hydro > 100kW).
- ***STCs:*** Certificates for small-scale systems (<100kW), converting future generation into upfront ***financial support***.

Australia is planning to shift its certification system to a **voluntary guarantee of origin** scheme (REGO)

## Obligated entities

**Electricity Retailers:** Purchase large volumes of electricity from the wholesale market and sell it to end-users.

**Large Direct Users (Obligated Entities):** Large consumers that buy electricity directly from the grid (*without retailers*) and exceed a specified consumption threshold.

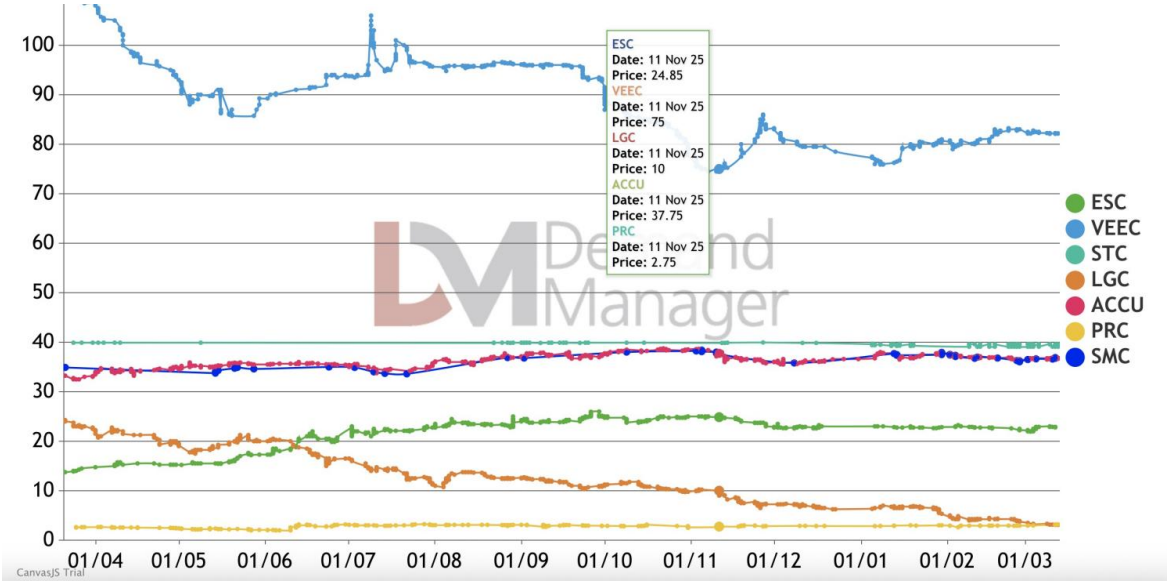
## Penalties

**Shortfall Charge: AUD 65** per certificate (per MWh), *indexed to inflation and not tax-deductible.*

## Administrative entities

**Clean Energy Regulator (CER):** an independent Australian government agency established in 2012

# Australia




**Overall Success:** The scheme was a success in transforming the energy mix, driving renewable energy generation to 102 TWh in 2024.

**%RE** : 2001: ~8,5% → 2024: **36%**

# South Korea

Korea Renewable Energy Certificate (K-REC) system
Operational since **2012** *(a compliance market established through the implementation of an RPS)*

## Suppliers

**Eligible technologies**: new and VRE sources such as solar, wind, biomass, waste-to-energy, geothermal, ocean energy, and small hydropower.

**Excluded technologies**: Existing large-scale hydropower plants.

## Buyers

**Obligated entities** (RPS compliance):Power generators using fossil fuels with installed capacity ≥500 MW (including KEPCO subsidiaries and IPPs).

**Voluntary buyers**: Corporate buyers (e.g., Samsung, Hyundai, LG) seeking to meet RE100 or other ESG targets can purchase surplus K-RECs.

# South Korea

## MANAGEMENT STRUCTURE

### The Primary Policy Setters

*Ministry of Trade, Industry and Energy*

**Issuance** **Registration System** **Auctions**

*Korea Energy Agency New and Renewable Energy Centre*

### Spot Market Platforms

*Korea Exchange*

## K-REC MARKET MECHANISM

**1. Auction mechanism (long-term)**

- IPPs bid fixed REC prices for **12–20 year contracts**
- Lowest bids selected → assigned to obligated buyers

**2. Spot market**

- Traded twice monthly on centralized exchange
- Price determined by supply–demand
- Used to cover RPS shortfalls

**Price differentiation**

- Auction (long-term): ~98,000–104,000 KRW/MWh
- Spot market: ~60,000–80,000 KRW/MWh

**Long-term prices are more stable, while spot prices are lower and more volatile.**

# South Korea

## Challenges faced

1. ***Grid constraints***
   - Grid expansion lags behind RE growth
   - Causes curtailment & connection delays
   - Weakens financial certainty despite long-term contracts

2. ***Price volatility (no cap/floor)***
   - No price ceiling/floor → high volatility
   - Shift from oversupply → certificate shortage → rising prices

3. ***Exclusion of on-site generation***
   - Initially excluded behind-the-meter (e.g., rooftop solar)
   - Fixed in 2025 via I-REC adoption

## Effectiveness of meeting objectives

| | |
|---|---|
| Year of implementation | 2012 |
| % RE in power mix in that year | 2% |
| % RE in power mix in latest year | 10.6% in 2024 |

1. **Limited improvement in energy independence**: After 12 years of RPS, renewables account for only ~10.6%

2. **Successful in attracting private investment:** The fixed-price auction mechanism reduces risk and effectively mobilizes private capital into the power sector.

3. **Limited impact on decarbonization**: RE growth remains insufficient for net-zero goals, with early low RPS targets slowing progress; although higher targets (25% by 2026) signal stronger ambition, they face constraints such as grid limitations.

# Thailand

**1. Centralized system:** Managed by Electricity Generating Authority of Thailand as the sole local issuer under the I-REC Standard Foundation

**2. Suppliers**

**Eligible technologies**

- Solar, wind, biomass, biogas, hydropower

*Biomass dominates supply; solar is fastest growing (corporate-driven)*

**Old vs new assets**

- Both existing and new projects can issue I-RECs
- Emerging split:
  - "New assets" (≤15 years) → preferred by RE100 buyers
  - "Older assets" → serve less stringent demand

## 3. Thailand REC Market – Key Structure

**No mandatory RPS**: Market is fully demand-driven, led by corporate ESG goals

**Voluntary (bilateral market):** IPPs and corporates trade I-RECs directly; price driven by supply–demand

**Regulated mechanism (UGTs – 2025):** Utilities sell bundled green electricity at regulated pricesI-RECs are retired on behalf of buyers → simplifies procurement

*Thailand combines a voluntary REC market with a new utility-led mechanism to support easier corporate access to green electricity.*

# Thailand

## 4. Pricing mechanisms

### OTC voluntary market

Bilateral trading (no centralized exchange)

### Regulated UGT premium

- Bundled electricity + REC at regulated price
- Premium set by regulator (~USD 0.0018/kWh)
- Acts as a price benchmark / ceiling for low-value RECs

Utilities such as Electricity Generating Authority of Thailand, MEA, and PEA play a **central intermediary role** in the UGT mechanism.

- Purchase renewable electricity and I-RECs from generators
- Resell them to customers as **bundled green electricity products**

When customers participate in UGT:

- Utilities **retire the I-RECs on their behalf**, ensuring valid renewable energy claims

# Thailand

## Challenges faced

1. **Slow DPPA implementation**
2. **UGT distorts voluntary market**: Reservation of low-cost hydro RECs reduces open market supply → creates price instability
3. **Single-buyer model inertia:** State utilities control grid → slows market liberalization (DPPA, competition)
4. **Grid bottlenecks:** Insufficient transmission investment → constrains renewable expansion
5. **Technology & vintage mismatch:** Oversupply of legacy RECs (hydro/biomass) → weak support for new solar/wind projects

## Effectiveness of meeting objectives

| | |
|---|---|
| Year of implementation | 2012 |
| % RE in power mix in that year | 5.4% |
| % RE in power mix in latest year | 7.9% in 2024 |

1. **Limited impact on energy transition:** Renewable share increased only from 5.4% (2017) to 7.9% (2024)
2. **Partial success in FDI & ESG, but lacks real supply:** fails to provide sufficient physical renewable electricity.
3. **Limited climate impact**: Enables “green claims” but does not deliver real emissions reductions due to lack of additionality.

# Recommendations

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# Proposed Roadmap for the Implementation of RECs in Vietnam

## Phase 1
***(2026–Q2 2027)***

- Legal definition of REC in law
- Establish national registry, local issuer (VN-REC)
- Define REC ownership & unbundling rules
- Resolve REC vs. carbon credit boundary

**Foundation & Nationalization**

## Phase 2
***(Q3 2027–Q4 2028)***

- National registry operational; I-REC/TIGR transition begins
- DPPA-REC linkage codified
- Voluntary corporate adoption program
- REC product codes promulgated

**Structured Voluntary Market**

## Phase 3 Pilot
***(2029)***

- Indentifine RPS compliance entities: Generators (>1,000 MW), electricity distributors, and selected industries.
- Transition to a national REC system (phase-out of I-REC/TIGR)
- Trading platform pilot

**Sector-Specific Mandates (Pilot)**

## Phase 4
***(2030)***

- Economy-wide RPS with REC compliance
- All international standards phased out or harmonized
- REC trading on centralized exchange
- Penalties for non-compliance enforced

**Full Mandatory Market**

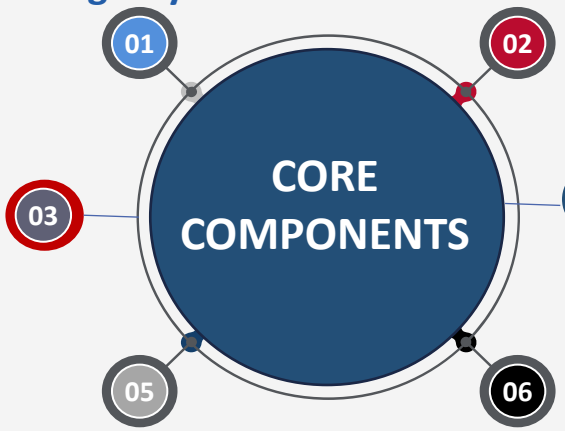
# Proposed Core Components

- Option 1: Co-locate with national carbon registry system
- Option 2: MOIT develop and operation REC registry system

**Centralized National Registry + Tracking System**

(Existing energy regulator)

**Issuing Body**




**Verification & Audit Entity**

(Local verification bodies or via international standards)

**Trading Platform**

(HNX infrastructure)

**Data, Metering & Compliance Infrastructure**

(MOIT/EVN)

**Alignment with I-RECs and TIGRs**

# Critical Risks and Implementation Considerations

| | Risk | Recommendations |
|---|---|---|
|  | **Double counting risk**: RECs and carbon credits may be double counted | → require a clear “one attribute – one claim” rule. |
|  | **Transition from I-REC/TIGR**: Abrupt transition could disrupt the market | → require a clear roadmap and dual-system transition period |
|  | **Oversupply & price collapse**: REC oversupply (especially hydro) depresses prices | → require eligibility limits and vintage restrictions |
|  | **Institutional coordination**: Multiple agencies may cause fragmentation | → require a unified registry and inter-agency coordination mechanism |
|  | **Tax inconsistency**: Unfavorable tax treatment reduces REC attractiveness | → require legal clarification and VAT reduction/removal. |
|  | **International recognition risk**: Lack of global recognition limits demand | → require alignment with GHG Protocol and engagement with RE100/CDP |
|  | **Implementation delays**: Policy delays weaken market effectiveness | → require clear timelines and linkage with ETS rollout |

# THANK YOU FOR YOUR ATTENTION!

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