

# **Biomass Business in Vietnam**



**erex Co., Ltd.**

**2023\_07\_10**

**1**

**Progress on 14 New Construction Projects for PDP8**

**2**

**Progress on Fuel Conversion of Existing Coal-Fired Power Plants**

**3**

**Carbon Market (Environment Part)**

**1**

# **Progress on 14 New Construction Projects for PDP8**

# 1.1 Progress on 14 New Construction Projects for PDP8

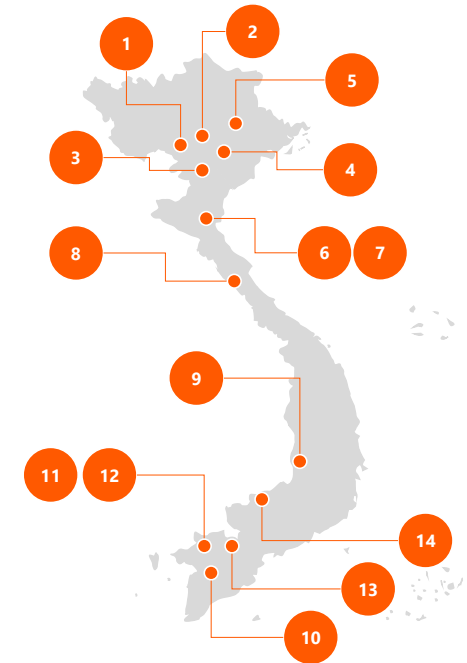
## Progress

- ① erex Group is focusing on activities to secure biomass fuel (woody residues) with 2 projects in Yen Bai and Tuyen Quang provinces as priority projects. As a result, erex Group is **on track to secure the amount needed to operate the power plants.**
- ② Prior to the start of power plant operation, **construction of a pellet plant to process the secured woody residues into pellets is scheduled to start.** (The groundbreaking ceremony for the YB province is scheduled for July 6, and for the TQ province, the groundbreaking ceremony is expected to be held this summer).

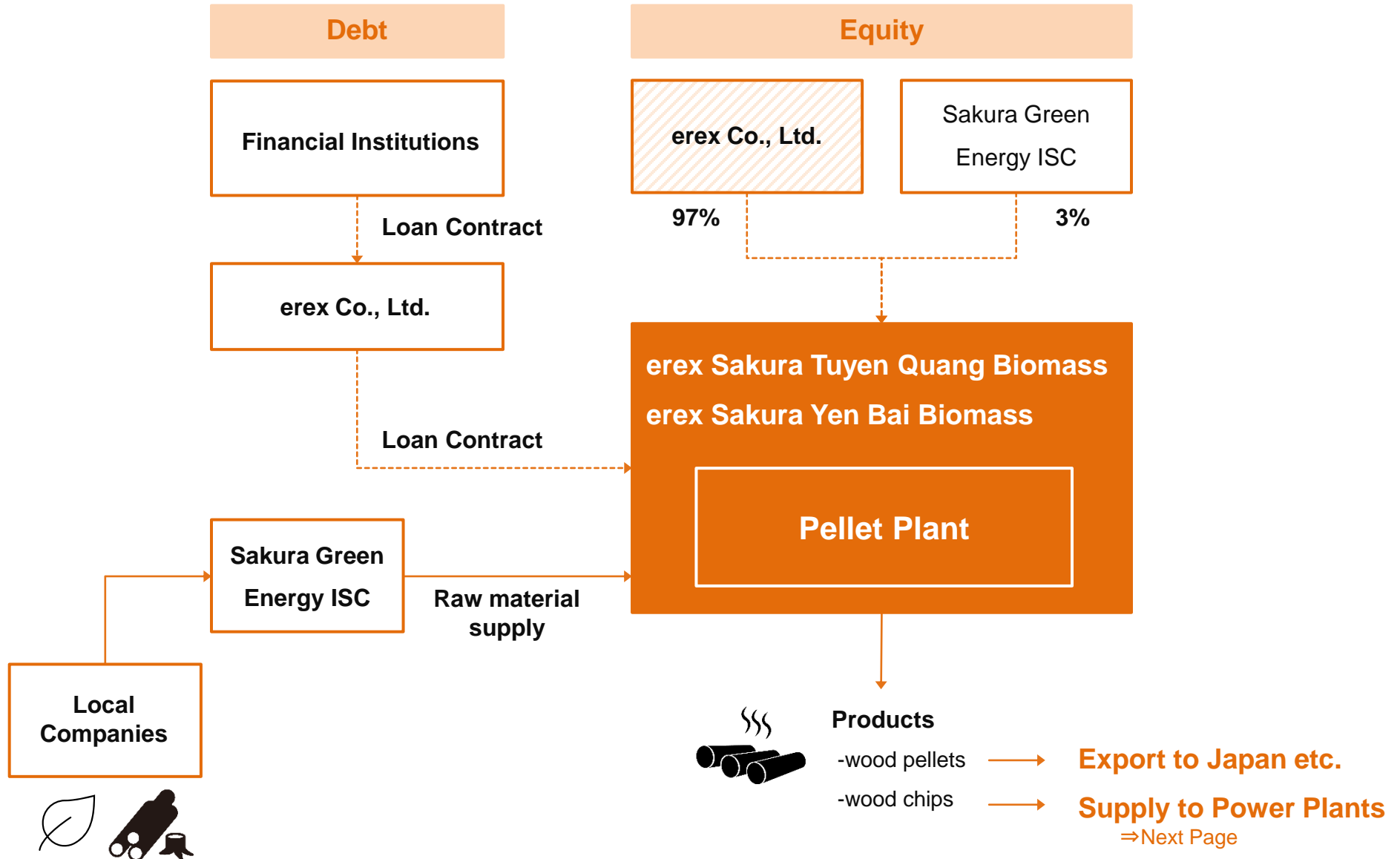
## Overview of the 14 new construction projects

- **Biomass at 14 sites planned in 12 provinces (Total 1,060 MW)**
- **Plans to utilize "woody residue" in the north and "rice husks" in the south**

	Project Name
1	Yen Bai
2	Tuyen Quang
3	Hoa Binh
4	Phu Tho
5	Bac Kan
6	Thanh Hoa 2
7	Thanh Hoa 1
8	Quang Binh
9	Dak Lak
10	Can Tho
11	An Giang 1
12	An Giang 2
13	Long An
14	Binh Phuoc

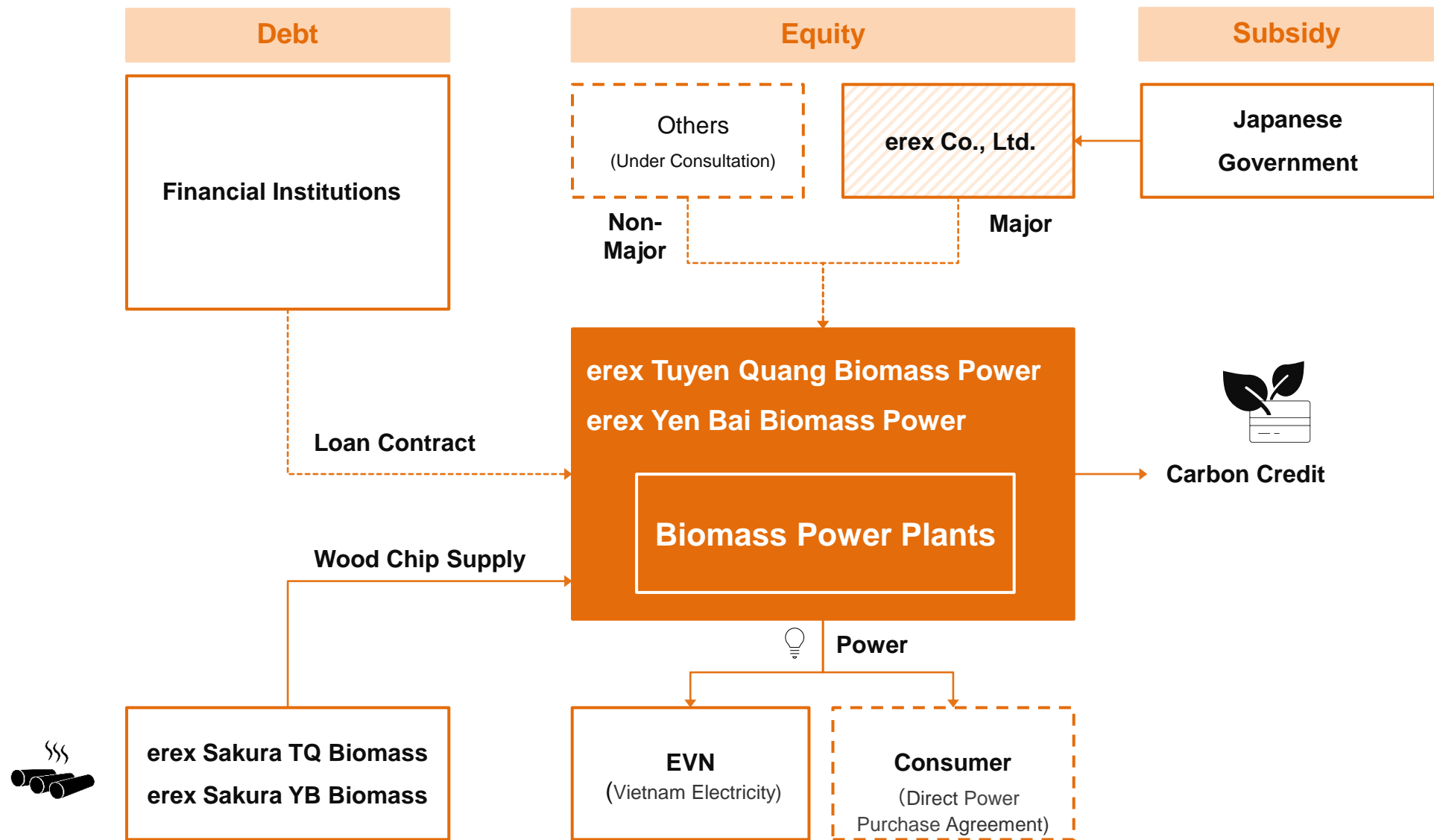


## 1.2 Overview of Pellet Plant Business Model





# 1.3 Overview of Newly Constructed Biomass Power Plant Business Model



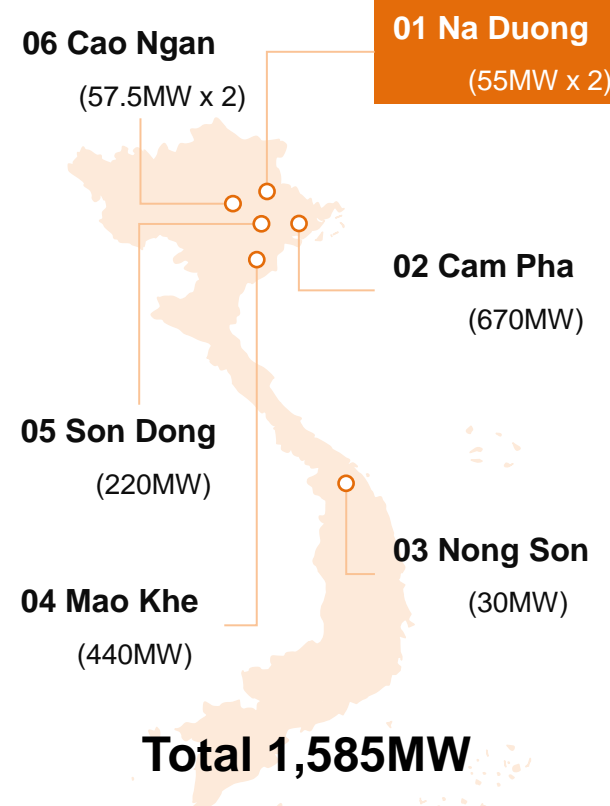
# 2

## Progress on Fuel Conversion of Existing Coal-Fired Power Plants

## 2.1 Conversion Trial Plans for This Summer

Trial Location	Na Duong Thermal Power Plant (55MW x 2)
Implementation Period	Scheduled for August-September 2023 (approx. 1.5 months)
Fuel Used	Wood chips (approx. 6,000 t)
Test Contents	Conduct co-firing tests with co-firing rates of 5 ➡ 10 ➡ 15 ➡ 20%, and evaluate the impact on the boiler and conveyance system.
Issues, etc.	<p>erex Group is in discussions with IE and Vinacomin Power for this summer's trial, and while there are no critical issues, the schedule does not allow for much leeway.</p> <p>Discussions with EVN and other related parties are required, since the conditions for purchase at the time of co-firing have not yet been determined.</p> <p>At this time, erex Group is unable to make specific future proposals, as no numerical targets for co-firing have been specified.</p>

### List of Vinacomin Power's Coal Fired Power Plants





## 2.2 Views on Fuel Conversion in Vietnam

### Conversion Plans for PDP8

- ① Power plants that have been in operation for 20 or more years **need to be converted to biomass or ammonia** if there are price advantages.
- ② Power plants that have been in operation for 40 or more years need to be **shut down** if fuel cannot be converted.
- ③ **No fuel conversion is required** for existing thermal power plants to be shut down in/before 2050

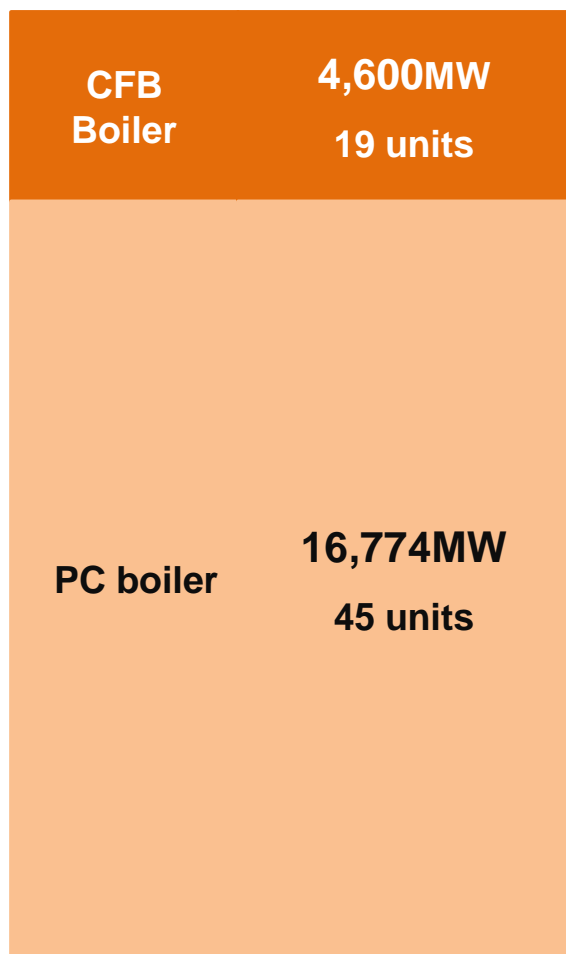
- Power source composition in 2030  
Coal-fired: 19% (30,127MW)
- Power source composition in 2050  
Coal-fired: 0% (0 MW)  
Biomass, ammonia co-firing: 5% (25,632 MW)

### erex Group's Recognition of Challenges

- ① Vietnam's bio-resources are abundant, but in order to make the conversion specified in the PDP8, **it is necessary to promote the development for the utilization of bioresources as soon as possible.**
- ② If the response is delayed, a large amount of ammonia will be needed due to the shortage of biofuels. However, there are still challenges in terms of cost, technology, and quantity of ammonia. In some cases, 2050 CN will not be achieved.
- ③ In the future, there may be options that do not exist today, including technological innovations such as nuclear power, batteries, etc. However, considering the current power shortages, **it would be desirable to provide policy support for biomass development and to promote investment in biomass.**
- ④ **Priority should be given to CFB**, which does not require major modifications.

## 2.3 Approaches to Coal Conversion in Vietnam

Coal Power  
Total **21,374 MW**

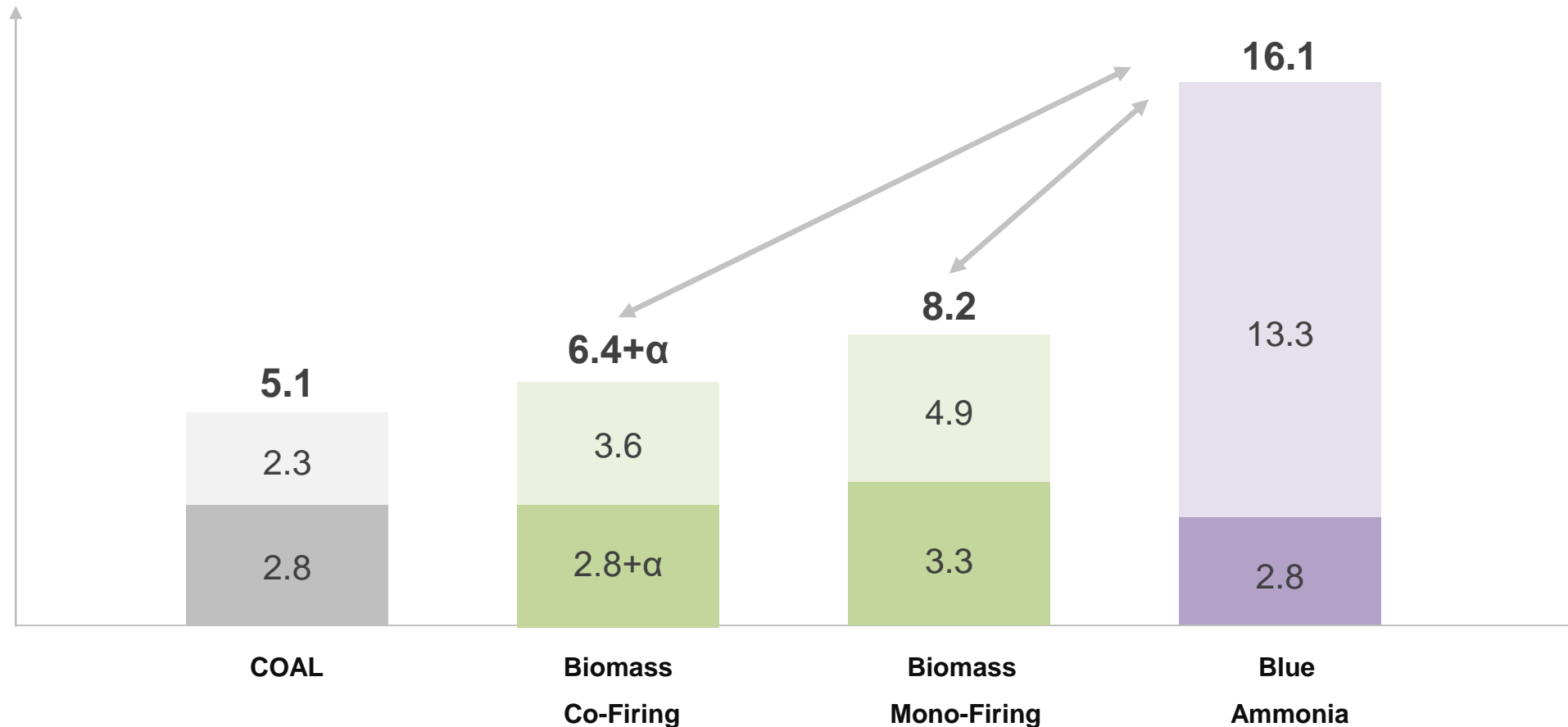


- **erex Group is working with Vinacomin Power**
- **Conversion can be achieved with relatively little modification of facilities and should be a priority.**
- Facility modification is required.
- In Vietnam, where power shortages continue, it is irrational to make a full-scale conversion for now.
- Priority should be given to fuel and technology developments, and it may be a good idea to implement measures in the future.

## 【Reference】 Price Comparison with Ammonia

**It is more reasonable to utilize biomass than to utilize ammonia**

US-cent/kWh



(Note) erex Group's calculations based on assumptions

**3**

## **Carbon Market (Environment Part)**

# 3.1 Global Trends of the Carbon Market

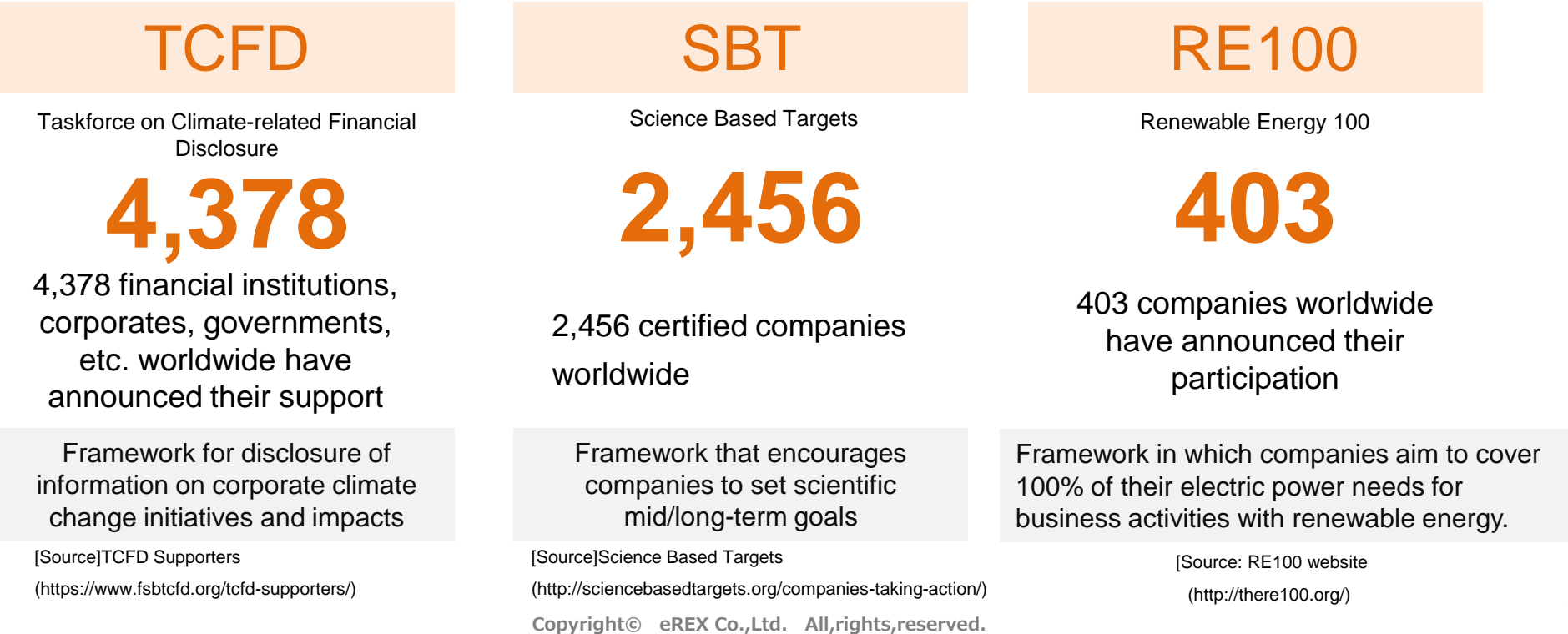


There is no doubt that addressing climate change is a critical issue for humanity.

Even if the 197 countries that signed the Paris Agreement in 2015 fulfill their commitments, they will not be able to meet the agreement's goal of limiting temperature increases due to climate change to 2 degrees Celsius above pre-industrial levels.

Therefore, erex Group believes that the world will accelerate the de-carbonization movement to further reduce emissions.

## ■ Expansion of efforts toward de-carbonization management



## 3.2 Vietnam NDC/ETS

### ■ Status of NDC declarations of Vietnam

#### 2030 Target

- 15.8% reduction in greenhouse gas emissions compared to BAU (business-as-usual)
- If international support is received, the goal is to reduce greenhouse gas emissions by up to 43.5% due to the expected increase in reduction efficiency

#### 2050 Target

- Aiming for virtually zero greenhouse gas emissions (Carbon Neutral)

Note: Prepared by erex Group from NDC2022 expressed at COP26.

### ■ Initiatives to introduce ETS

- In November 2020, the revised Environmental Protection Law was passed to legalize emissions trading
- Trading market is scheduled to start in 2025

#### ► GHG EMISSIONS, 2016

SECTOR.	Mt CO2e	SHARE
Energy	205.8	58%
Industrial processes	46.1	13%
Agriculture ,forestry and other land use	83.6	23%
Waste	20.7	6%
TOTAL	356.2	100%

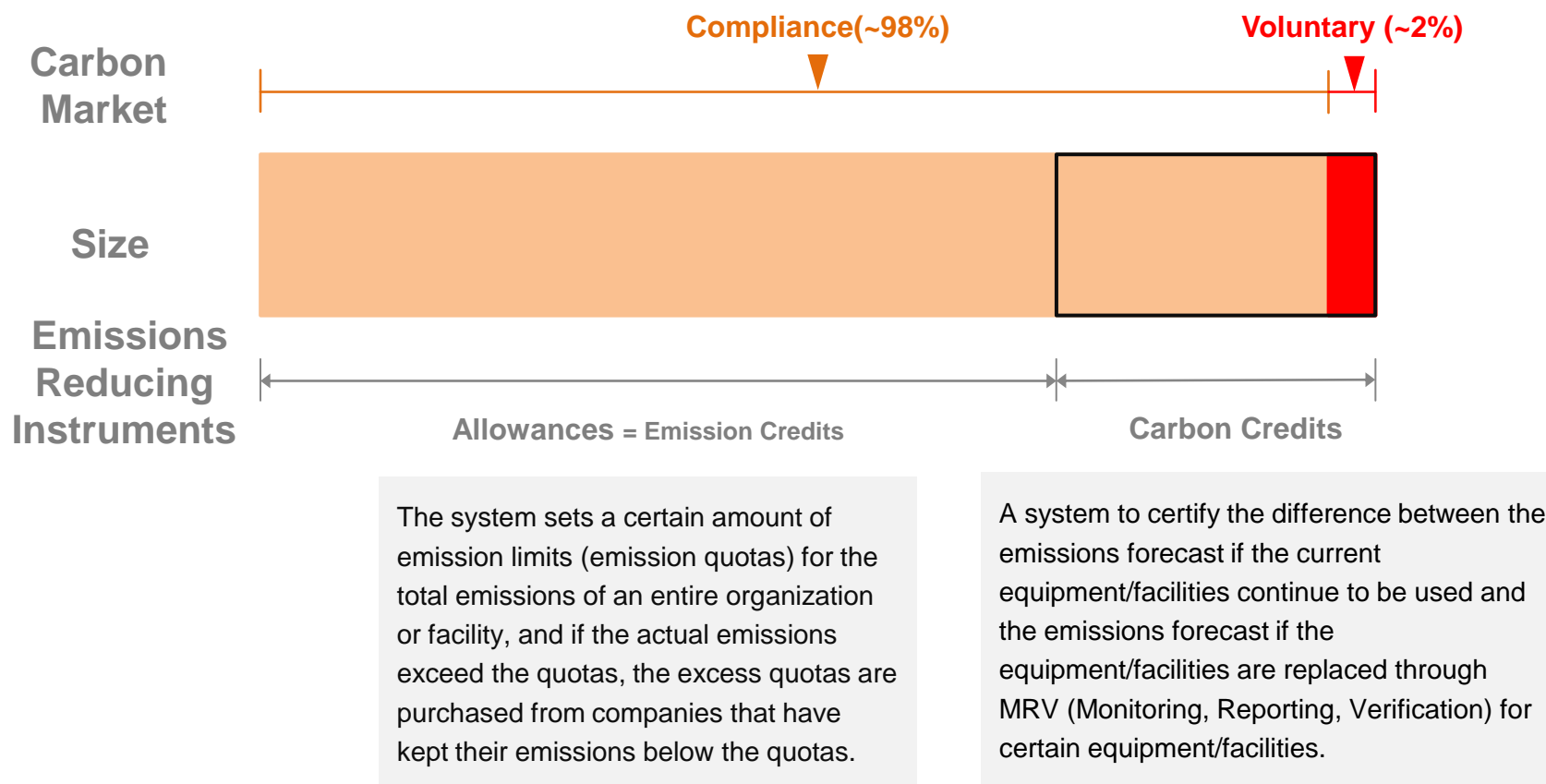
#### REGULATORY FRAMEWORK

- Law No. 72/2020/QH14 on Environmental Protection, 133-139'20/OG
- Decision No. 896/QD-TTg dated July 26, 2022
- Decision 01/2022/QD-TTg
- Decree 06/2022/ND-CP



### 3.3 Overview of the CO2 Market

- erex Group believes that the value of the CO2 reductions produced should be highly appreciated for Vietnam
- Specifically, it is important to recognize the framework of the certification process and the market in which it is sold

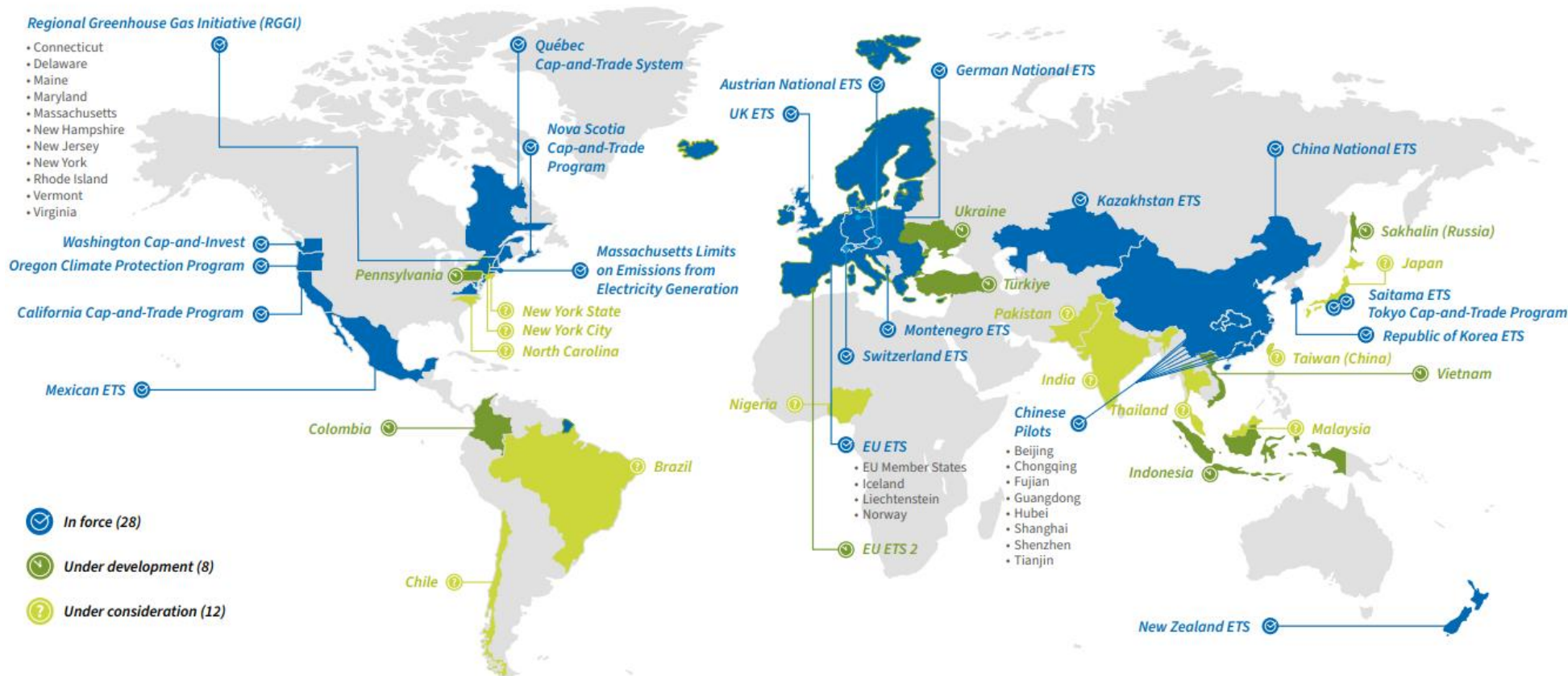


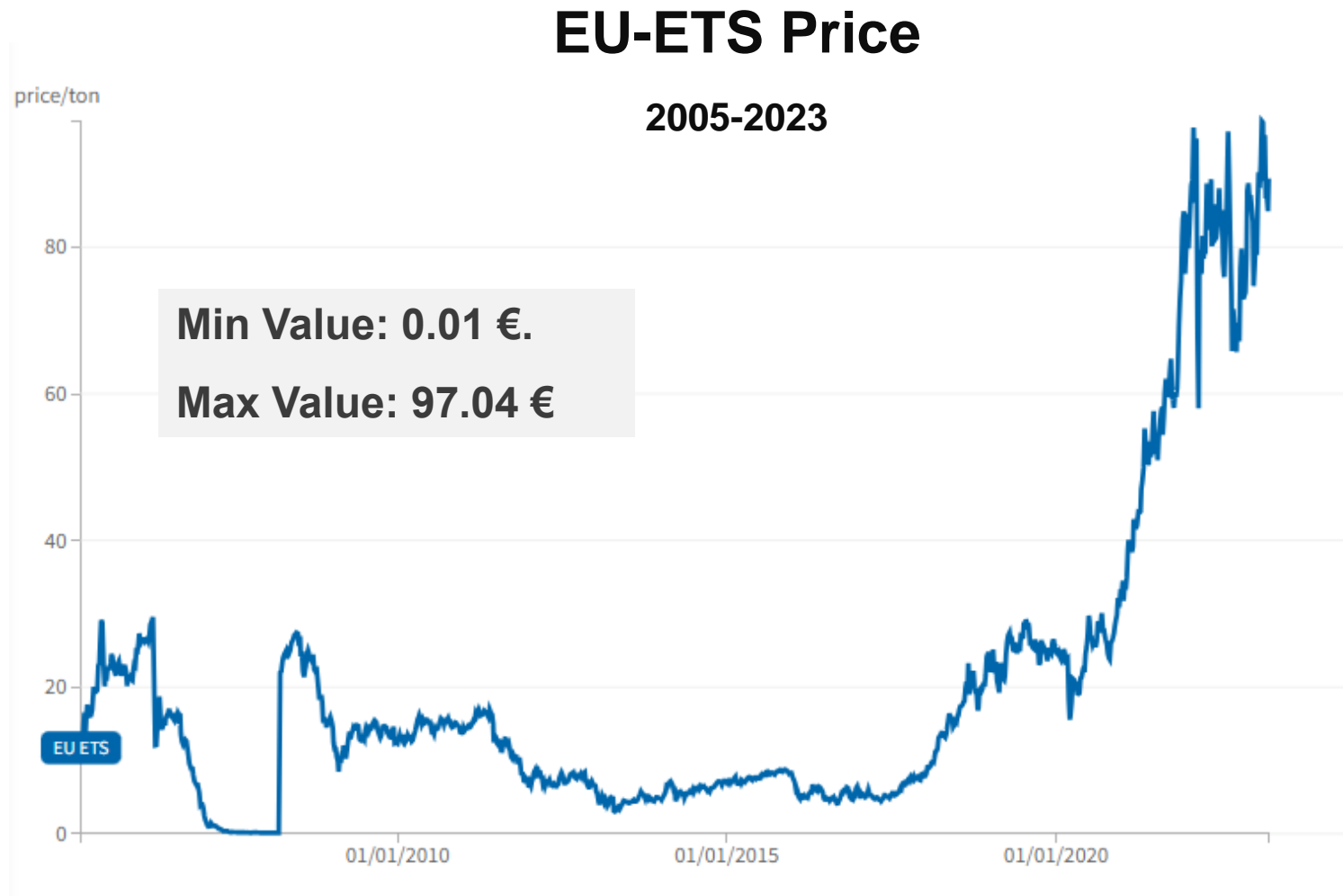
Prepared by erex Group with reference to "The voluntary carbon market: 2022 insights and trends" reported by shell and BCG

## 3.4 Overview of the ETS Market

As of January 2023, there are 28 ETS systems in effect worldwide.

Furthermore, 8 ETSs are expected to be in effect, including 1 in Vietnam.





From: <https://icapcarbonaction.com/en>

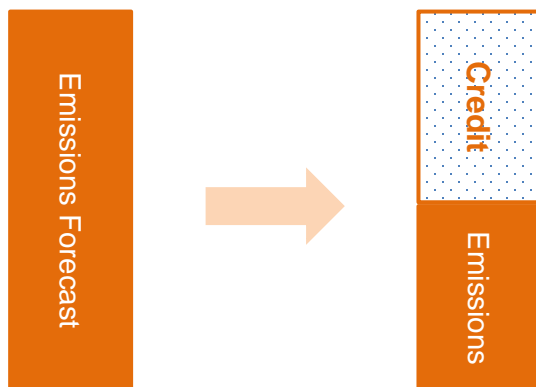
## 3.5 Carbon Credit Overview

In general, carbon credits are defined as, when actual emissions are less than projected emissions (baseline), those that certify the difference as credits through MRV (monitoring, reporting, and verification)

### Cap-and-Trade Method

A system under which the government sets the total amount of greenhouse gas emissions (total emission quota), allocates it to individual entities as emission quotas, and permits the partial transfer (or acquisition) of emission quotas among individual entities.

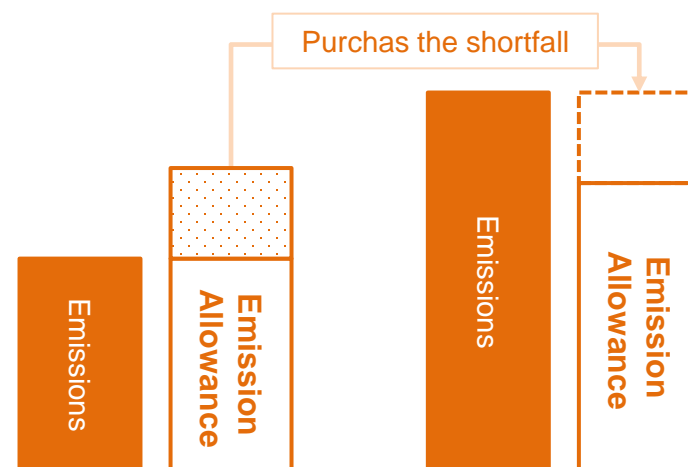
#### CAP & TRADE



### Baseline & Credit Method

A system that allows trading of credits for emission reductions achieved by a GHG reduction project compared to what would have been achieved in the absence of the project. Baseline credits do not set emission quotas for individual entities.

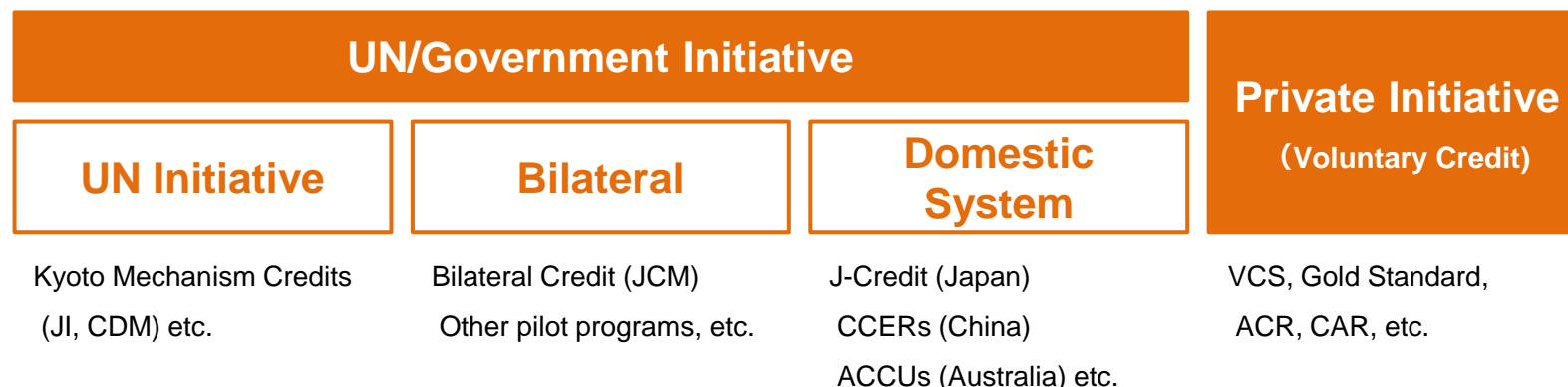
#### BASELINE & CREDIT



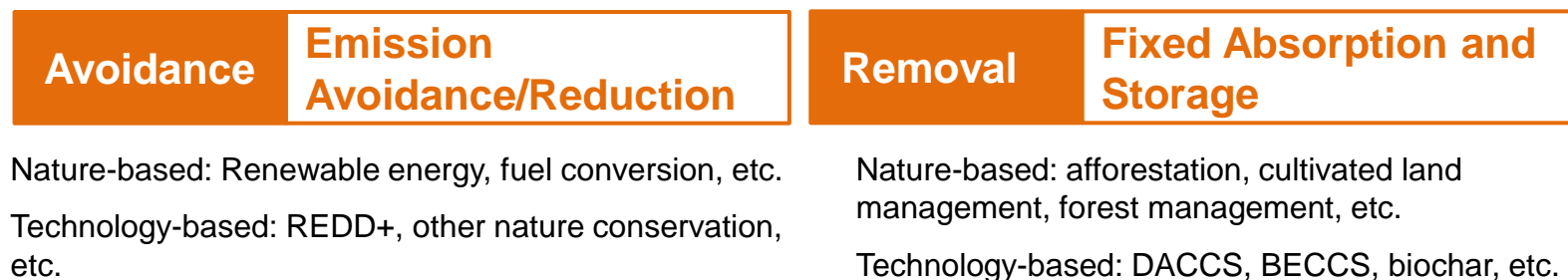
## 3.6 Types of Credits

There are two types of credit systems: those initiated and managed by the United Nations and governments, and those initiated and managed by the private sector. The latter are called "voluntary credits" because they are issued and utilized on a voluntary basis, regardless of regulations and policies.

### ■ Rough Classification of Credits

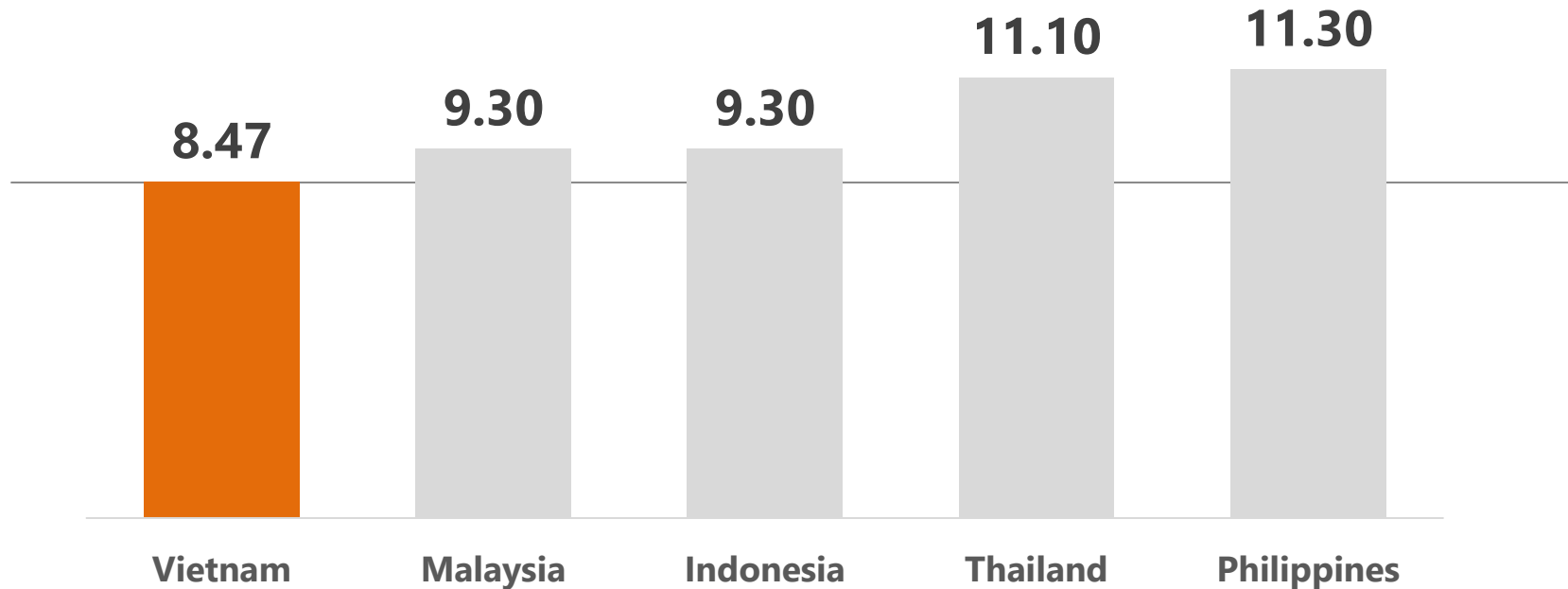


### ■ Types of Credits



## 【Reference】 Comparison of FIT Price of Each Country

### ■ FIT Price for Biomass Power Generation (UScent/kWh)



### ■ Purchase Price for Coal Conversion

erex Group understands that the terms of purchase for coal-fired conversions will be discussed in the future.



**erex**

**ENERGY RESOURCE EXCHANGE**