KPMG

Offshore Wind Market of Taiwan

Government and Infrastructure Advisory

September 2018

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KPMG Intro

KPMG—The Clear Choice for Renewable Energy

KPMG has end-to-end capabilities in delivering solutions that help our clients address their needs and challenges across the renewable energy value chain and throughout the project lifecycle. KPMG can provide you with advisory, tax, audit, legal, accounting and compliance related assistance through the life of your projects and programs, or as a fundamental part of your business. Our professionals can bring you the benefits of their extensive local and global experience advising government organizations, contractors, operators and investors.

KPMG SERVICES

Strategy & Planning → Pre-feasibility → Structuring & Financing → Procurement & Construction → Operations

	Strategic & Transaction Advisory		Project Execution & Management		Project Execution & Management	
	Strategy, Growth & Development	Organizational Readiness	Structuring & Financing	Delivery & Construction	On-going Value Creation	Divestment and cash cycle
Infrastructure Advisory	• Feasibility study • Procurement strategy • Tariff analysis • M&A and JV/ Partnership Strategy	• Commercial framework analysis • Risk management • Regulatory management • HR/IT capabilities	• Project structuring • Financing • Tender process / Bid advisory • PPP advisory • Financial modeling	• Contract management • Project monitoring & control • Dispute & claims • Procurement execution	• Hedging strategy • Power contract management • Operating model • Accounting & reporting	• Exit strategy & asset divestment • Valuations • IPO advisory • Restructuring and refinancing
Deal Advisory	Commercial Due Diligence& Potential Targets Identification		Fund Raising& Potential Investors Shortlisting	Deal Structure Planning & Deal Management		Potential Investors searching & Deal Management
Tax	Analysis on Tax Burden Tax Structure Optimization		Tax Due Diligence	Tax Opinion	Tax Optimization Tax Filing Tax Concession Application	Analysis on Tax Burden Tax Advisory for Asset Disposal
Audit		Accounting/Financial Reporting Issue Analysis		Fund Examination	Assurance Service Green Bonds Assurance Service	Accounting Issue Analysis for Asset Disposal
Legal Services	Regulatory Compliance Service	Regulatory Difference Analysis	Legal Due Diligence Certificates Application	M&A/Deal Advisory Financial Contract	General Corporate Practice	Regulatory Issues Analysis & Negotiation
CC&S			Green Financial Instrument/ Strategy Consulting			

KPMG Integrated Renewable Energy Support

Audit & Assurance	Tax & Investment			Advisory			
Financial Information Audit and Assurance	Dispute Resolution & Controversy Services	China Tax Advisory Services	Financial Services Industry Tax Consultation Services	Management Consulting	Risk Consulting	Deal Advisory	Industry-Specific Consulting
Capital Market Services	International tax	Japanese Tax Services	Legal Services	Strategy & Operation Business Performance	Financial Risk Management	Buying a Business	Data and Analytics Digital Transformation
Internal Control (Audit)Services	Global Transfer Pricing Services	Investment and Registration Services	Family (Individual) Estate Tax Advisory Services	Customer and Growth	Internal Audit, Risk and Compliance	Selling a Business	Government & Infrastructure Advisory
Accounting Project Advisory Services	Global Mobility Services	Accounting, Tax, and Payroll Outsourcing Services		Financial Management	Accounting Advisory	Funding a Business	Technology, Media & Telecom Advisory
Other Assurance and Attestation	Tax Management Consulting	BEPS and VCM Advisory Services	Tax Agent Services for Foreign Institutional Investors	People and Change	Forensic	Partner	Healthcare Transformation & Strategy Services
				IT & Business Systems Advisory	Climate Change and Sustainability	Fixing a Business	

KPMG - A trusted financial advisor in the renewable energy space

We have a strong network with major solar players worldwide

Selected recent government and private sector clients in the energy sector

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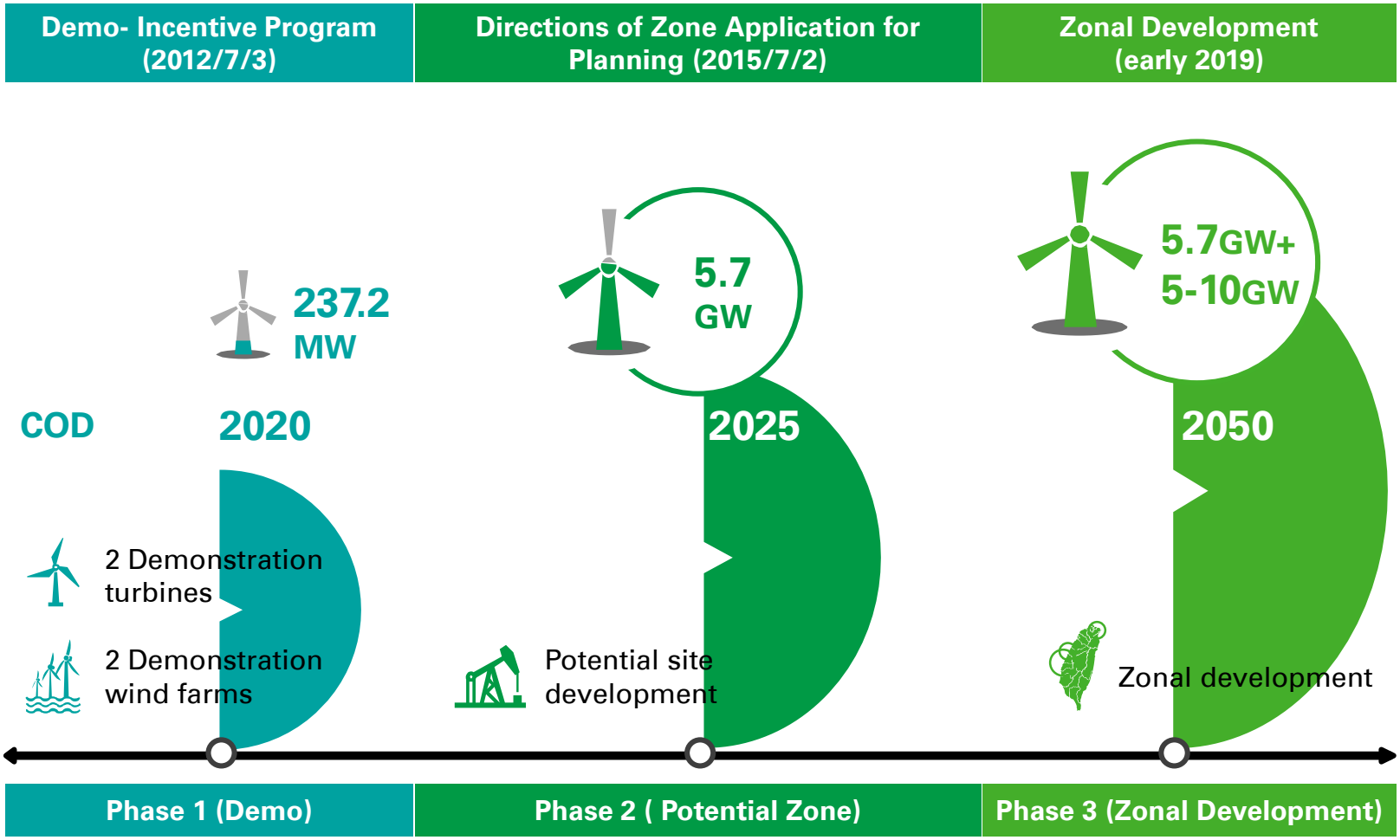
TW Offshore Wind Policy

Clear OWF development plan



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Main Players

Phase 1 Demo Incentive Award List

- To kick-start Taiwan offshore wind power development, an incentive program was launched in 2012 to offer government subsidy of 250 million NTD per demonstration project.
- 3 awarded developers were selected to build 4 demonstration turbines (Phase I) by 2015 and 3 demonstration farms (Phase II) by 2020.

Company	Shareholders	Location	Capacity (MW)	Turbines	COD Date	Investment Amount (NTD)
Formosa Wind Power Co., Ltd	• Swancor Industry Co., Ltd • Ørsted • Macquire Capital	Zhunan Township, Miaoli	**129.6**	**34**	• **Phase I (2 pilot turbines, 8MW)** Dec 2016 • **Phase II (30 pilot turbines, 120MW)** Est. Dec 2019	**20 - 22 Billion**
Fuhai Wind Farm Corp., Ltd	• Taiwan Generations Corporation • CSBC Corp • Century Iron Steel Industrial Co., Ltd	Fangyuan Township, Changhua	**108**	**30**	• **Phase I (2 pilot turbines)** Dec 2017 • **Phase II** Dec 2018	**15 -16 Billion**
Taiwan Power Company	• Government	Fangyuan Township, Changhua	**108**	**22 - 36**	• **June 2020**	**19.5 Billion**

EIA Failed

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Phase 2 Selection Stage Award List

7 developers
10 projects

localization

End of April		End of June
2020	2021-2025	Price Auction
0.738GW	3.098GW	5.5GW-3.836GW= 1.664GW

WPD
- Liwei #2 350 MW
- 13 MW

ACC
- Chufeng #4 450 MW

Swancor
- Haineng #5.6 378 MW

Ørsted
- Da-Changhua Northwest #12 598 MW
- Da-Changhua Northeast #13 560.7 MW
- Da-Changhua Southwest #14 294.8 MW
- Da-Changhua Southeast #15 605.2 MW
- 337.1 MW

Swancor
- Haiding One #11 475.1 MW
- Haiding Two #16 558.5 MW
- Haiding Three #17 516.8 MW

NPI
- Hailong III #18 512 MW
- Hailong II #19 300 MW
- 232 MW

Taipower
- Taipower #26 300 MW
- 420 MW

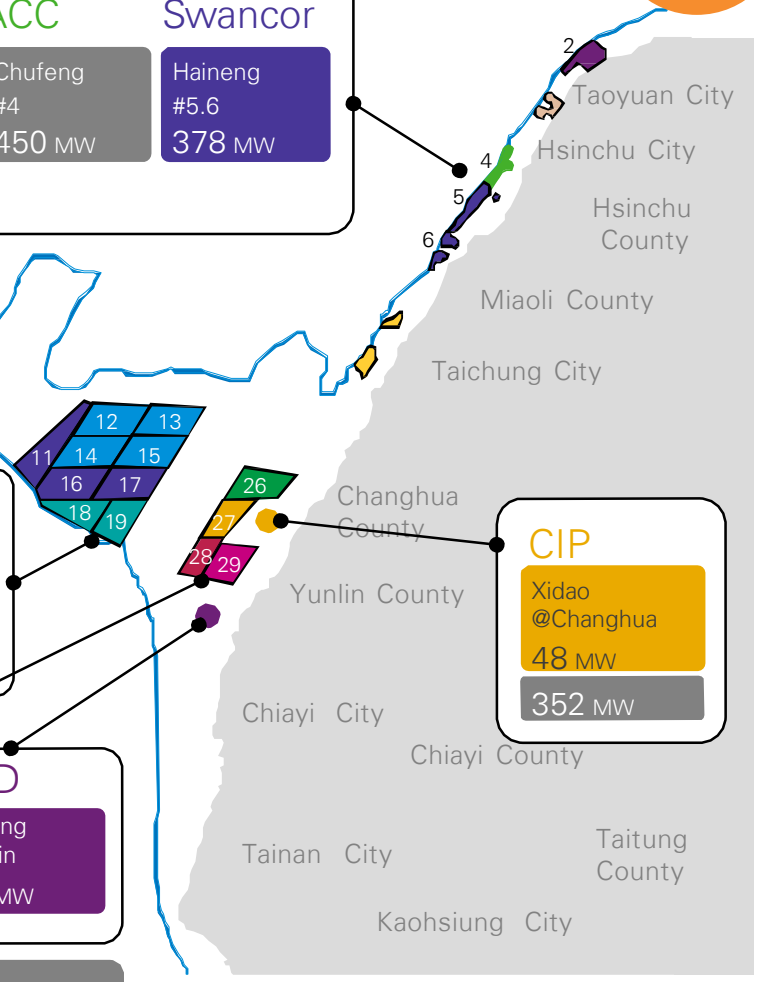
CIP
- Changfang #27 552 MW

LEALEA
- Haixia #28 500 MW

China steel
- Chongneng #29 300 MW
- 180 MW

WPD
- Yunneng @Yunlin 708 MW

CIP
- Xidao @Changhua 48 MW
- 352 MW



▶ Second stage auction around 5,706.2 MW

Source: BOE,

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Phase 2 Auction Stage Award List

2 developers
4 projects

End of April — End of June

2020 0.738GW | 2021-2025 3.098GW | Price Auction 1.664GW

WPD

Liwei #2 13 MW

ACC

Chufeng #4 450 MW

Ørsted

Da-Changhua Northwest #12 582.9 MW @2.5481NT$/kwh

Da-Changhua Northeast #13 560.7 MW

Da-Changhua Southwest #14 337.1 MW @2.5480NT$/kwh

15.1 MW

Swancor

Haiding One #11 475.1 MW

Haiding Two #16 558.5 MW

Haiding Three #17 516.8 MW

NPI

Hailong III #18 512 MW @2.5025NT$/kwh

Hailong II #19 232 MW @2.2245NT$/kwh

Taipower

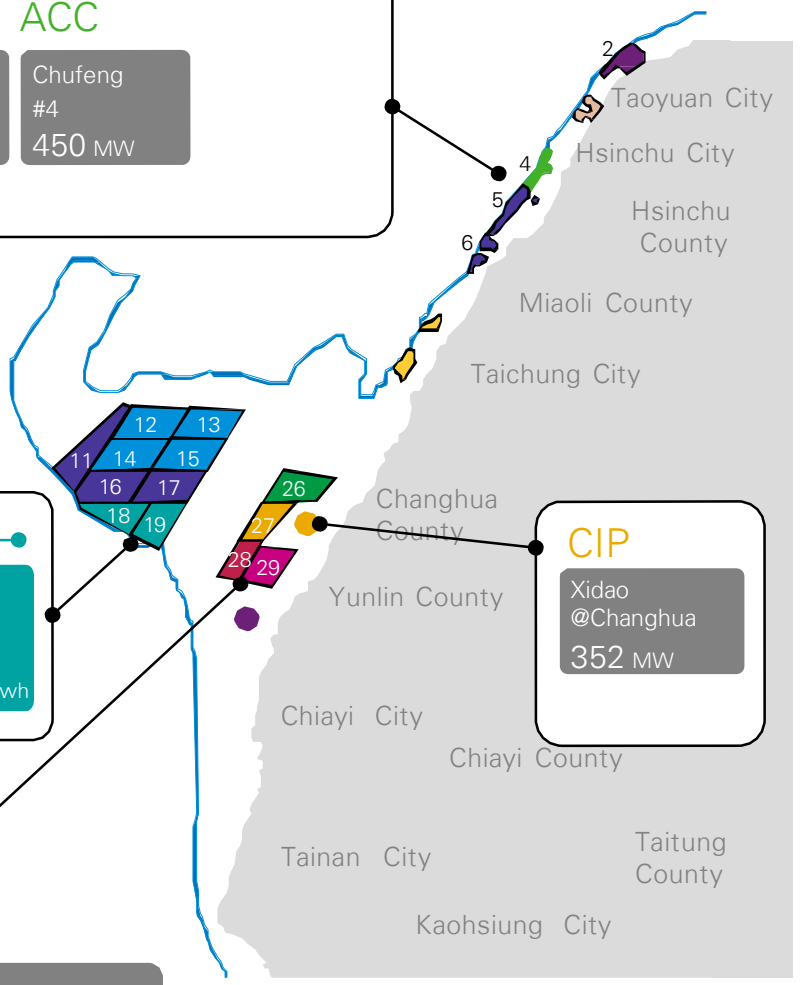
Taipower #26 420 MW

LEALEA

Haixia #28 500 MW

China steel

Chongneng #29 180 MW



CIP

Xidao @Changhua 352 MW

▶ After auction still have 4,041.2 MW left over

Source: BOE,

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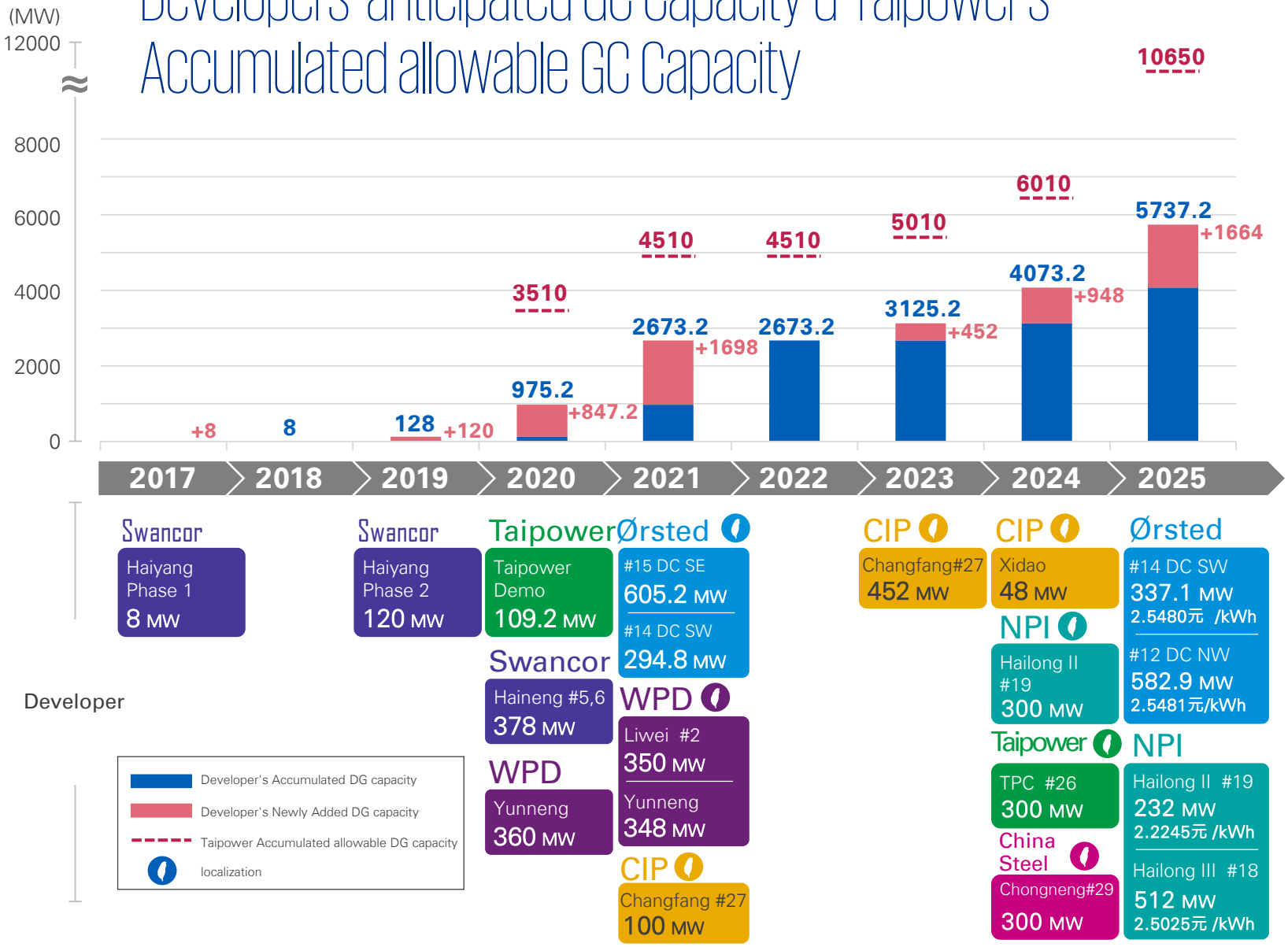
Developers' anticipated GC Capacity & Taipower's Accumulated allowable GC Capacity



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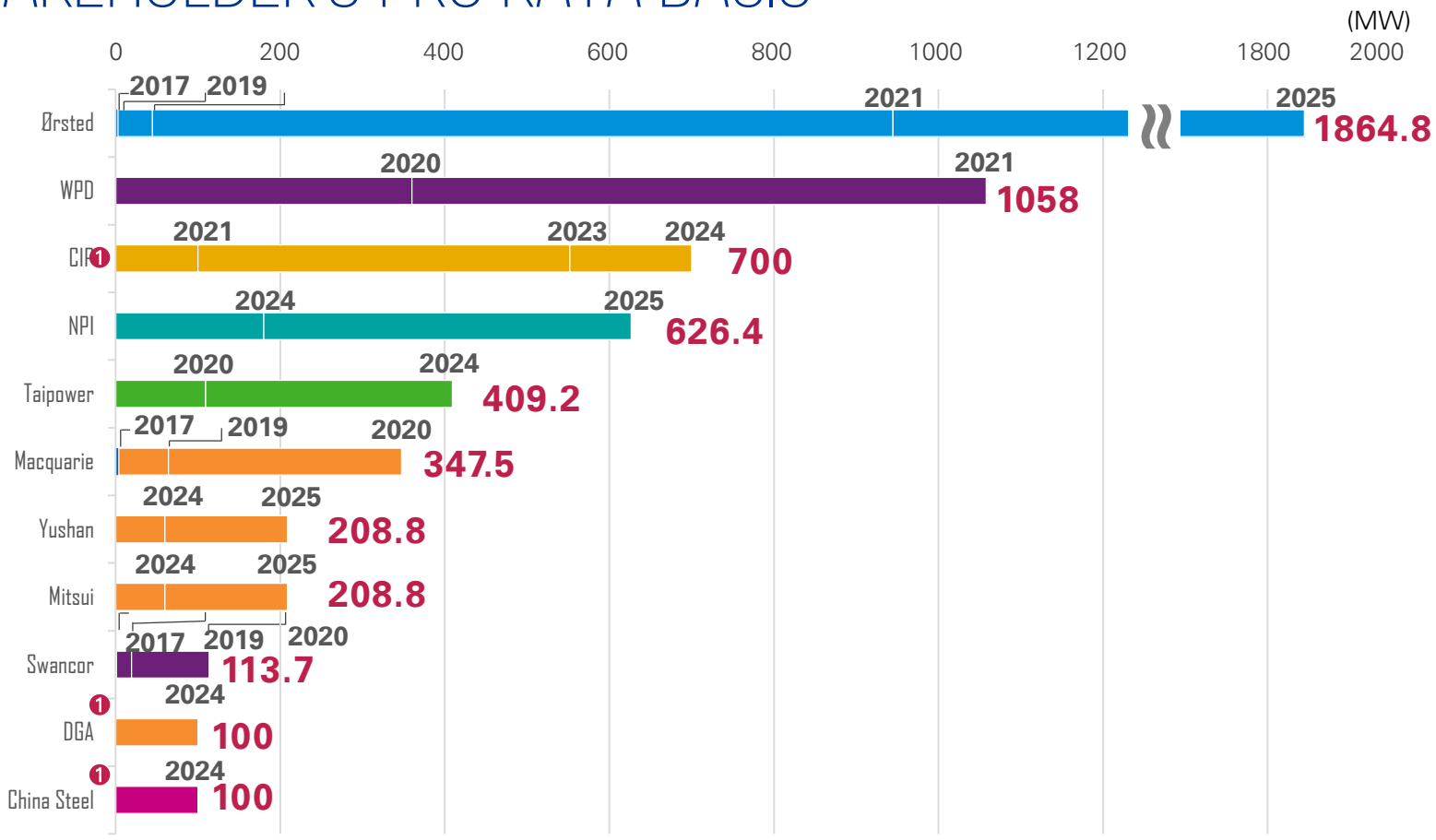
DEVELOPER'S ACCUMULATED GC CAPACITY ON A SHAREHOLDER'S PRO RATA BASIS



Note : 1 Zhongneng Project hasn't announced it's shareholder ratio. In this bar chart, we assumed that the three developers which is China Steel, CIP, DGA would take 1/3 of the share ratio.

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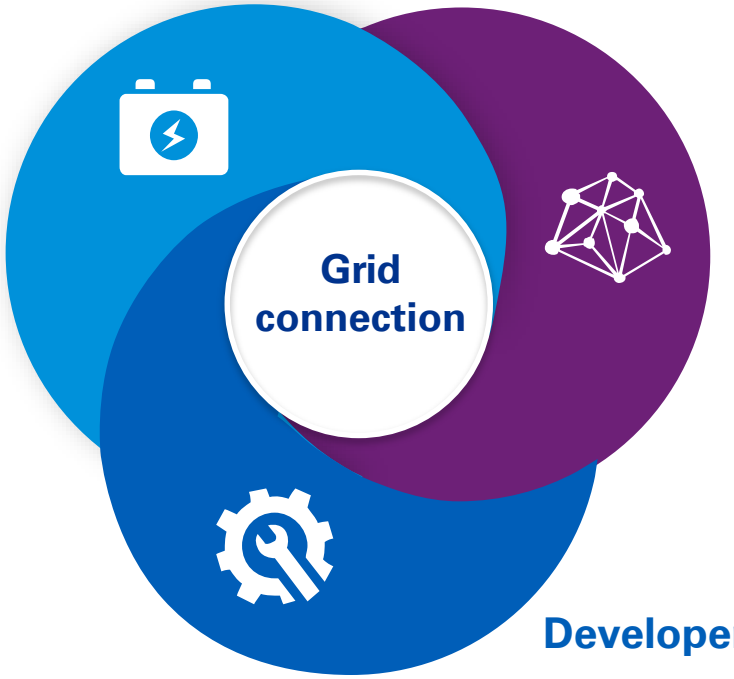
Key Issue - Distribution

Energy storage

Ørsted develops a pilot storage project in Changhua to test how a battery-based system can support the grid.

The pilot will be at least 1MW — the first MW-size storage facility in Taiwan.



Smart Grid

Construction left behind the schedule.

Developer Coordination

Renewable energy developers to coordinate with each other creating a centralized center.

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FiT Trend

The backbone policy for developing offshore wind

Renewable Energy Development Act (RED Act)

Element 1

20-year power

Guaranteed 20-year power purchase agreement

Element 2

The feed-in tariff

is reviewed by a dedicated committee annually

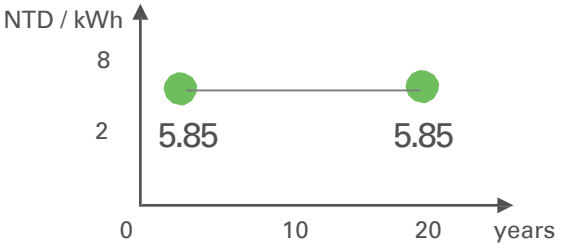
option 1

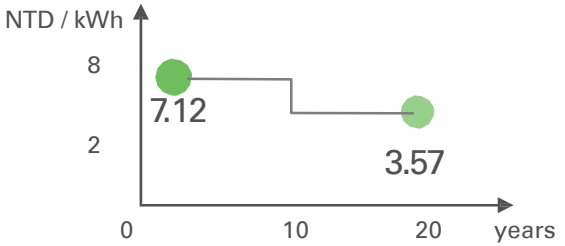
20 Year fixed rate

option 2

Step-down rate (10 years / 10 years)

2018





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FiT Variations in recent years

2010 Feed-in-Tariff (NTD/kwh)

Solar	Capacity	Y2010
Onshore Wind	1~10kw	7.2714
Onshore Wind	>10kw	2.3834
Offshore Wind	-	4.1982

Our observations

As the technology advances and the auction price of the offshore wind becomes lower, the FiT of offshore wind continues to go down.

Source:BOE Website

2016-2018 Feed-in-Tariff

Solar	Capacity	Y2016	Y2017	Y2018
Onshore Wind	1~20kw	8.5098	8.9716	8.6685
Onshore Wind	>20kw	2.7763	2.8395	2.7315
Offshore Wind	Fixed rate	5.7405	6.0437	5.8498
Offshore Wind	2 stages rate	7.1085 / 3.4586	7.4034 / 3.5948	7.1177 / 3.5685

Source:BOE Website

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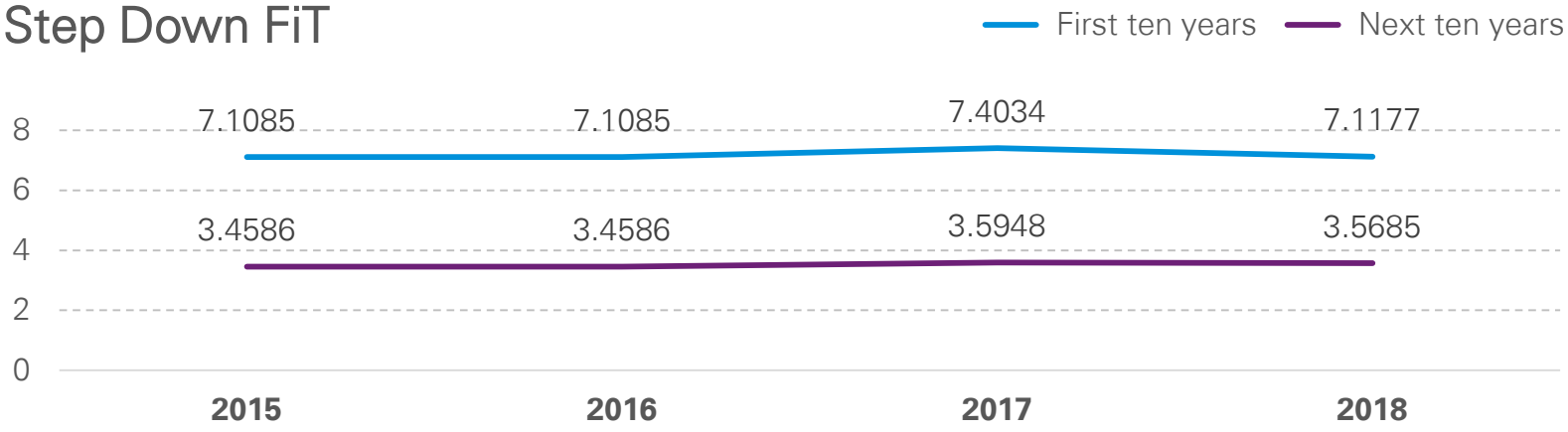
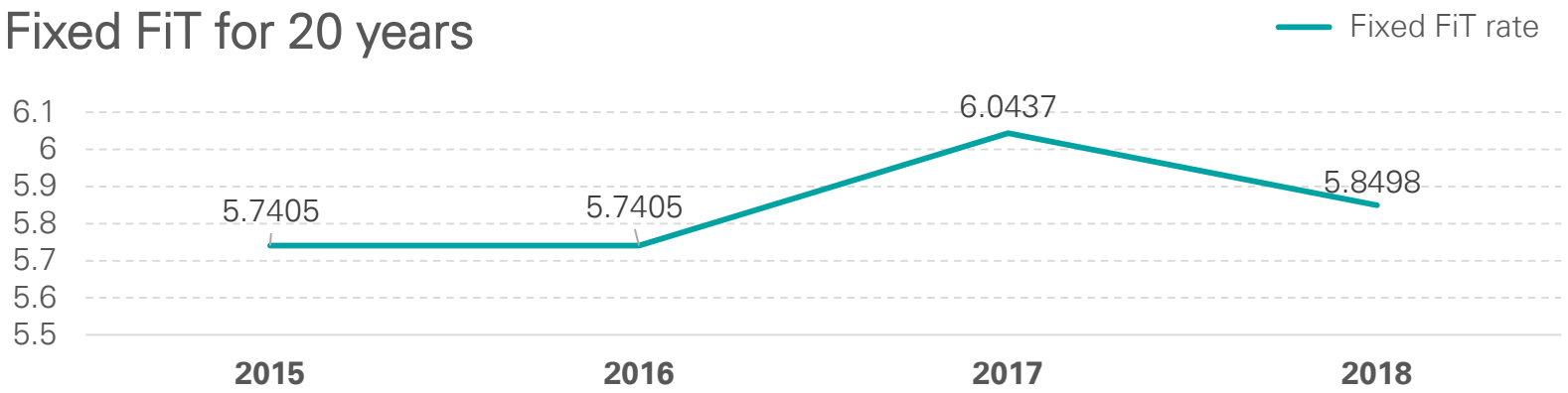
Off-Shore Wind - FiT Trend

Step Down FiT



Fixed FiT for 20 years



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FiT Calculation Element - (2018) 1/4 Formula

$$\text{FiT} = \frac{\text{Initial Cost} \times \text{Capital Recovery} + \text{O\&M/per year}}{\text{Sales of electricity per year}}$$

$$\text{Capital Recovery} = \frac{\text{WACC} \times (1+\text{WACC})^{20}\ ^{[1]}}{(1+\text{WACC})^{20}\ ^{[1]} - 1}$$

$$\text{O\&M/per year} = \text{Initial Cost} \times \frac{\text{O\&M/per year}}{\text{Initial Cost}}$$

Note: [1] [FiT period: For off shore wind, the FiT period is 20 years.]
Source: [BOE FIT validation meeting 2017/12/24]

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FiT Calculation Element - (2018) 2/4
Initial & Annual O&M Cost

Initial Cost
173,500 NTD/kW

Domestic input

Customs Import data 64,050 NTD/kW

Fishing Compensation 1,407 NTD/kW

Foreign Input

- Proportion of wind turbine in initial cost **37.09%**
- **2010 ~ 2017 England data of initial cost 175,324**NTD/kW
- Decommissioning cost **4,000** NTD/kW
- Cost Decrease rate per year: **1.79** %

Annual O&M Cost
5,735 NTD/kW

Foreign Input

2014 ~ 2016

Foreign input

5,735 NTD/kW

initial cost

3.31%

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FiT Calculation Element - (2018) 3/4
Sales of electricity

Sales of electricity per year
3,600 kW/year

Domestic input

2002 ~ 2016 Average Annual Energy Production

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FiT Calculation Element-(2018) 4/4
WACC

Parameter	Final ratio	Reference
Equity ratio	**30%**	**Domestic Inputs** • Demo phase developer's financial section in bidding document. • Confirmation letter from financial institution. **Foreign Inputs** • Green Giraffe (2017) • TKI Wind op Zee (2015)
Debt Ratio	**70%**	
Risk-free rate of interest	**1.12%**	**Domestic Inputs** • 2015-2017 Average10-Years Government Bonds Interest Rate
α risk	**2.75%**	**Foreign Inputs** Gemini (2014), Navigant Consulting (2014) New York State Energy Research and Development Authority (2015), Green Giraffe (2015), NREL (2015), DIA-CORE (2016), Green Giraffe (2017)
β risk	**7.27%**	**Foreign Inputs** Navigant Consulting (2014), New York State Energy Research and Development Authority (2015), UK Trade & Investment (2015), DIA-CORE (2016),

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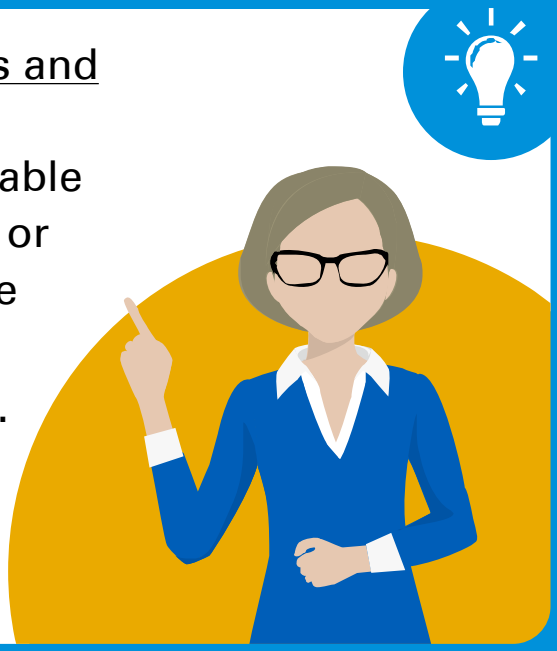
How do developers deal with decreasing FiT?

As the technology advances and the price of the offshore wind becomes lower, the FiT of offshore wind continues to shrink.If the developer has exclusively customer with TPC , the developer can only accept the decreasing FiT that will cause huge profit lost.

<u>The supply of green energy directly to consumers and the restructure of the state-owned Taiwan Power Company (TPC).</u> The Act requires that non-renewable energy generators only sell electricity to retailers or the grid operator, not directly to users; Renewable energy generators are not bound by this limit.

- Potential Buyer: RE 100 and RE 100's suppliers.
- Revenue Structure:
  ① Bundle
  ② Unbundle



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Pricing Scheme

Feed-in Tariff, FIT

- Off-taker TPC
- Electricity Price

Contract Years 20

NTD **2.2~2.5***/kWh

*reference from auction price

Capacity Contract/ Demand Contract

- Off-taker corporates

Basic Fare : Capacity Contract

	Summer Period (6 ~9)	Off- Summer Period (10~5)
Capacity Contract	137.50	137.50
Household / month	105.00	105.00

Basic Fare : Demand Contract

Saturday Semi- peak period	Summer Period (6 ~9)	Off- Summer Period (10~5)
off peak period	47.20	34.60
Off Summer Contract	N/A	173.20
Demand Contract	236.20	173.20
Per Household	262.50	262.50

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Policy for REC & Carbon Credit

Applicable Laws and Statutes

Background : Taiwan is heavily dependent on imported energy. In 2016, the government has announced to phase out nuclear power plants completely before 2025 and to reach its target of 20% renewable energy supply by 2025.

Sustainable Energy Policy Convention

The Electricity Act	Green house Gas Reduction Act	Renewable Energy Development Act	Energy Management Act	Energy Tax (Draft)
Bureau of Energy	Environmental Protection Administration	Bureau of Energy	Bureau of Energy	Ministry of Finance

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Unbundling Electricity market

Electricity Act (the "Amendment", 2017)

- The Electricity Transmission and Distribution Enterprise may not engage in the generation or retailing of electricity. Cross holdings of shares of the Electricity Generation and Retailing Enterprises is prohibited.
- The first paragraph of this Article is effective in 6 years after the amended articles of the Act were promulgated on January 11, 2017.
- However, the electricity industry regulatory authority may submit to the Executive Yuan a request for a postponement (max 3 years in total) of the effect date based on its assessment of the development and condition of the electricity market.

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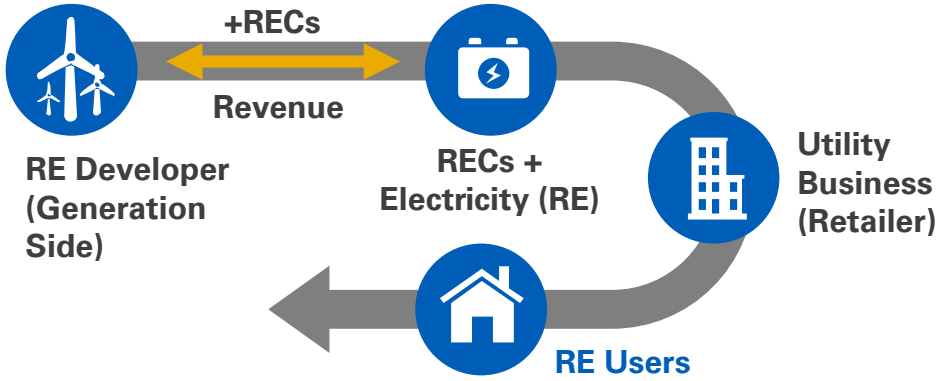
General Principle of REC-Mechanism & Voluntary Market

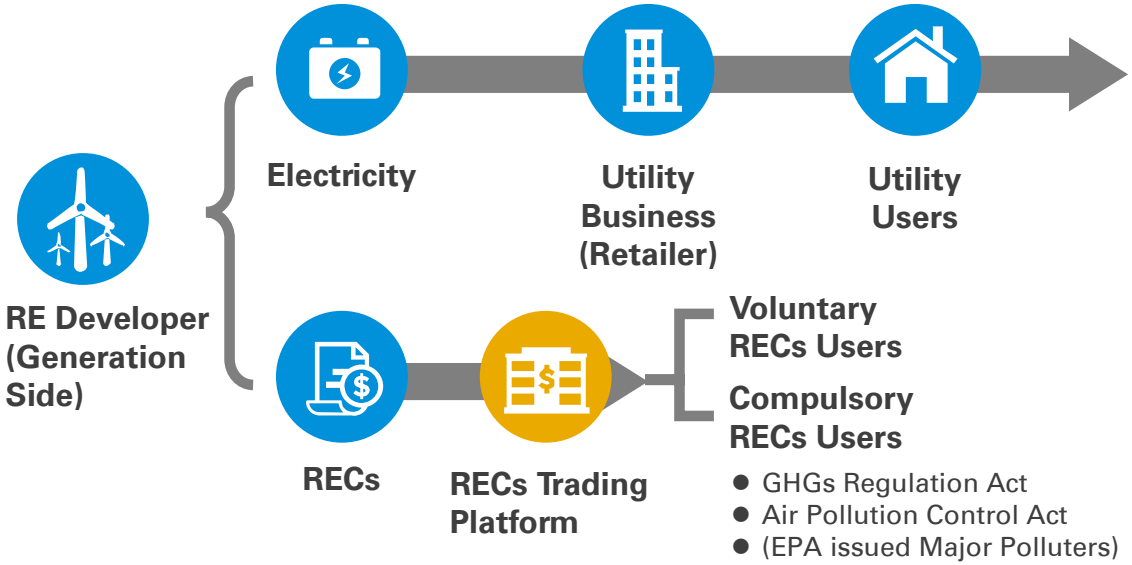
Bundled Program

- Global brands / enterprises preferred (RECs+RE)
- Users negotiate / sign PPAs with RE developers
- No price info on Tracking System, and PPAs will need matchmaking / negotiating process



Unbundled Program

- More attractive to small business and users
- Utility as general electricity while RECs enter into trading market.
- Price info on trading platform and available for trading or booking (by aggregators / users)



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RE 100

Global Trend

① More than 100 influential businesses committed to 100% renewable electricity

② Companies joining RE100 set a public goal to source 100% of their global electricity consumption from renewable sources by a specified year. They disclose their electricity data annually, and RE100 reports on their progress.

Domestic Trend

Apple urges the suppliers to use renewable energy 100%

23 out of more than 200 suppliers are already committed to 100% renewable energy usage.

------- 20180411 - Chinatimes

Google energy manager, Marsden Hanna, claims that 100% renewable energy goal should be achieved by purchasing local energy.

REC could avoid double counting issue and can certify the energy is 100% green. Google hopes that it could sign long-term PPA with newly established RE power plant, with capacity more than 50 MW.

------- 20170413 - TEIA

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RED Act-Central Government

RED Act Draft Amendment

Related Article ------ Article 12.1

The electricity contract signed by users when the contract capacity is above a certain amount. The place should set up a certain capacity of renewable energy power generation equipment, energy storage equipment or an amount of Renewable Energy Certificate (REC). If users failed to follow regulations have mentioned, one shall pay the deposit to authority for the purpose of renewable energy development.

The authority shall determine contract capacity, equipment capacity, amount, the type of renewable energy power generation equipment, the type of energy storage equipment, the payment and calculation method of the deposit, the processing period and other related topics.

Local governments enact stricter self-governance regulations about types of renewable energy power generation equipment, construction schedules and deposit payment standards.

Legislative Procedure

Jan.11.2018

Cabinet passed Renewable Energy Development Act draft amendments

Pending in Legislative Yuan

Legislators pass the third reading procedure

After passing enabling statute. The law will complete and announce within 6 months.

Minister of Economy legislate sub-law (About Contract capacity、green energy device capacity、Amount、Power Generation Type、Deposit)

Depends on county's schedule

Local Government

- Self-governance articles adjustment

Source:https://www.ey.gov.tw/News_Content2.aspx?n=F8BAEBE9491FC830&s=3025B4143B2955E9

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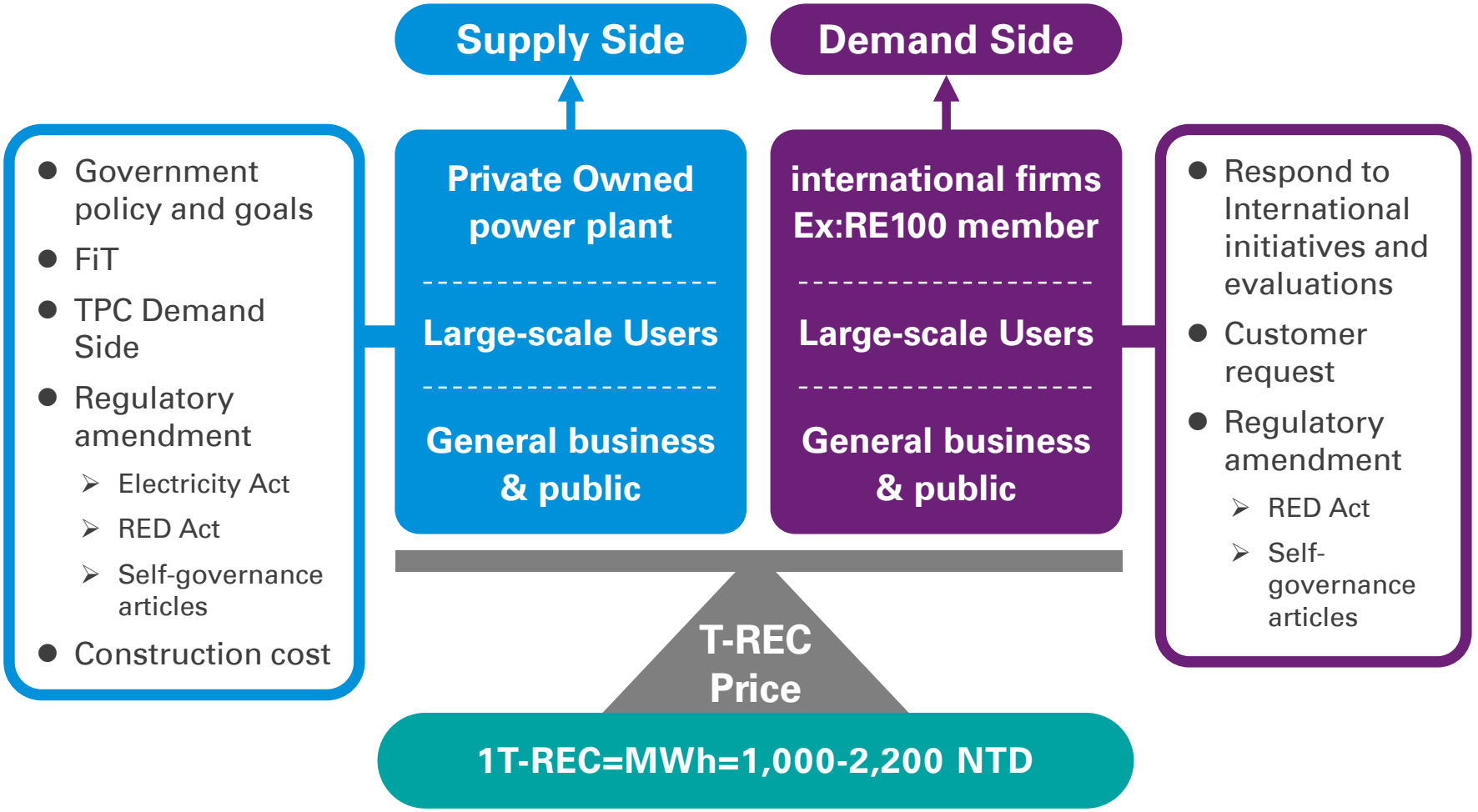
Taiwan T-REC Affect



Source : [National Renewable Energy Certification Center]
https://www.trec.org.tw/%E6%9C%80%E6%96%B0%E6%B6%88%E6%81%AF/%E5%9C%8B%E5%85%A7%E5%86%8D%E7%94%9F%E8%83%BD%E6%BA%90%E6%86%91%E8%AD%89%E5%B8%82%E5%A0%B4%E4%BA%A4%E6%98%93%E8%BC%94%E5%B0%8E%E7%A4%BA%E7%AF%84%E8%A8%88%E7%95%AB

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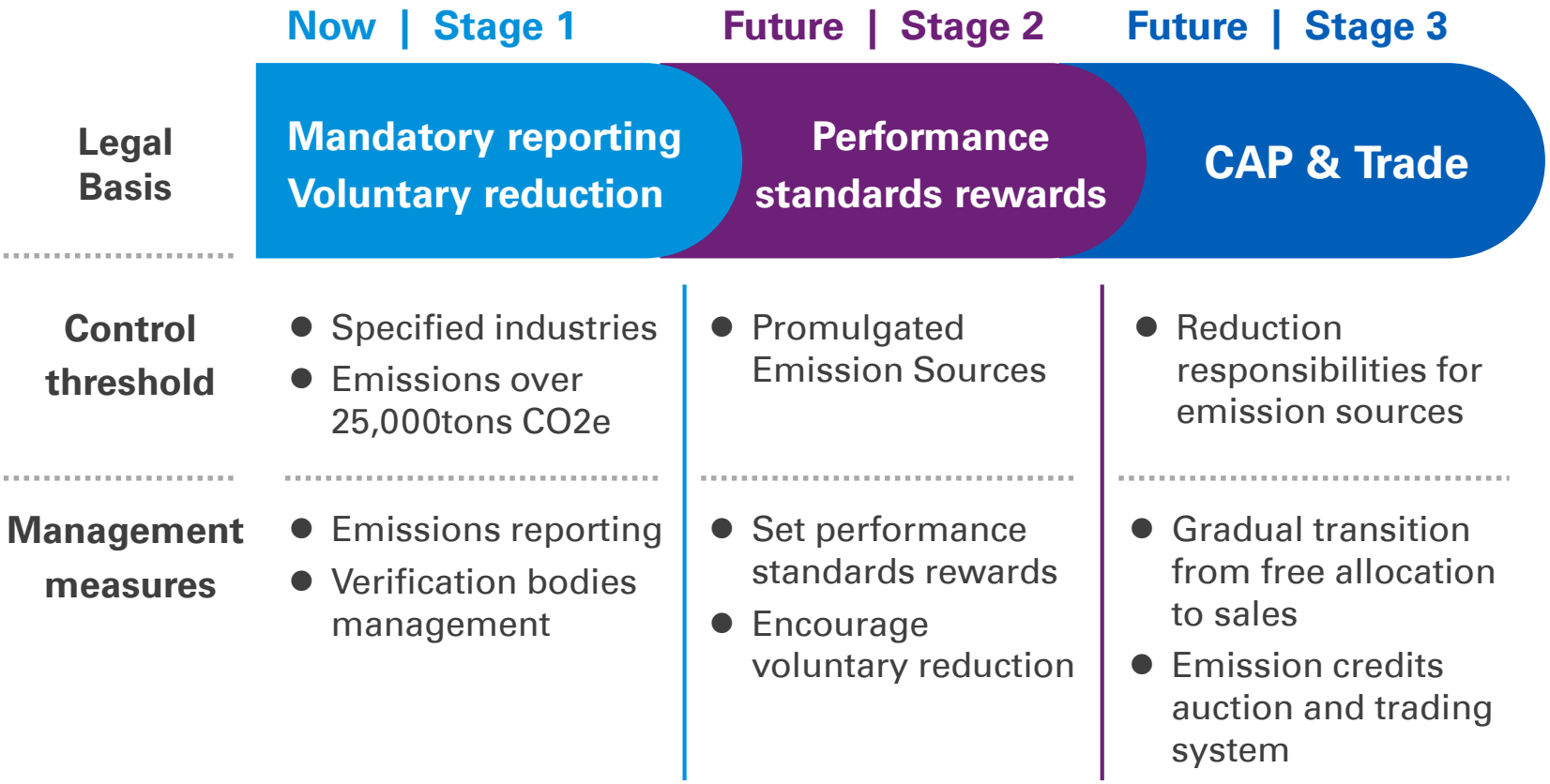
Taiwan GHG Regulations

GHG Reduction and Management Act



Source: Taiwan Environmental Protection Administration website : http://www.epa.gov.tw/mp.asp?mp=ghgact

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Recall

2050

At zonal development phase, a prediction of 5-10 GW growth will reach accumulated capacity to 10-15GW by 2050.

Distribution problems rely on developers' coordination and assistance on energy storage technology.

Face a step-down Feed in Tariff (FiT) strategy : Carbon credit, T-REC

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