Energy Transition policies &
Tracking energy efficiency indicators

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Energy transition policy

by the end of 2025

Renewable expansion ↑ RE generation 15.1%

Gas augmentation Gas-fired 50%

Coal reduction Coal-fired 27%

Nuclear elimination ↓ Decommissioned

Annual Implementation Reports
https://energywhitepaper.tw/

能源轉型白皮書
Energy White Paper
110年度
執行報告

No	Indicators	Dara Sources
1	Reduce energy import rate	Bureau of Energy (BOE)
2	Increase power supply adequacy ratio	Taipower company
3	Improve energy efficiency	Bureau of Energy Taipower company
4	Promote renewable energy development	Bureau of Energy
5	Promote green economic growth and prosperity	Industrial Development Bureau, MOEA（IDB）
6	Reduce electricity carbon emission factor	Bureau of Energy
7	Reduce pollutants on the overall power system	Environmental Protection Administration（EPA）
8	Boost the uptake of electric vehicles	Ministry of Transportation and Communications (MOTC)
9	Reduce reliance on nuclear power	Taipower company
10	Raise the public awareness on energy	Bureau of Energy
11	Speed up AMI construction	Bureau of Energy Taipower company

- 11 indicators for tracking energy transition

- Developed through public and private sector collaboration

- Easy to understand the key points of energy transition and to track the effectiveness of policies

Indicator 1: Reduce energy import rate

98.06%

98.02%

97.90%   97.79%

97.73%

2017   2018   2019   2020   2021
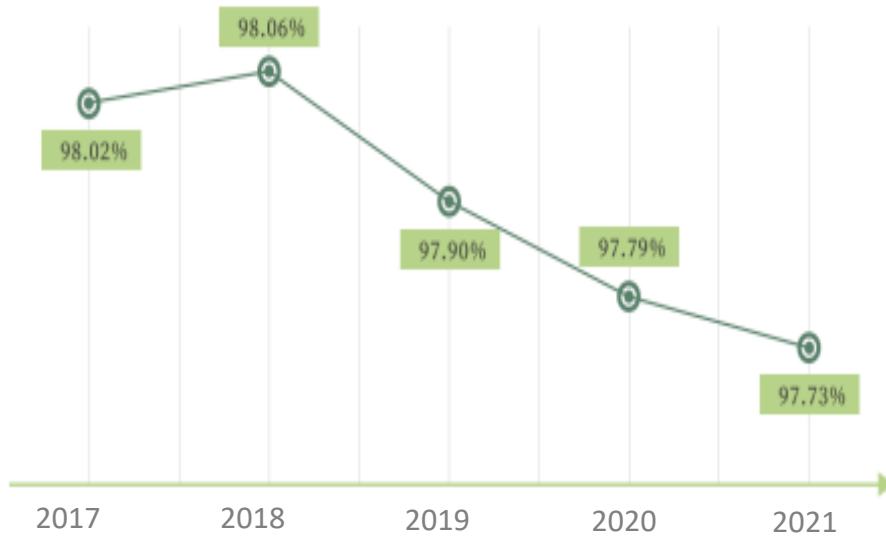
The energy import rate has generally declined in the past five years, mainly due to the promotion of green energy policies.

Formula

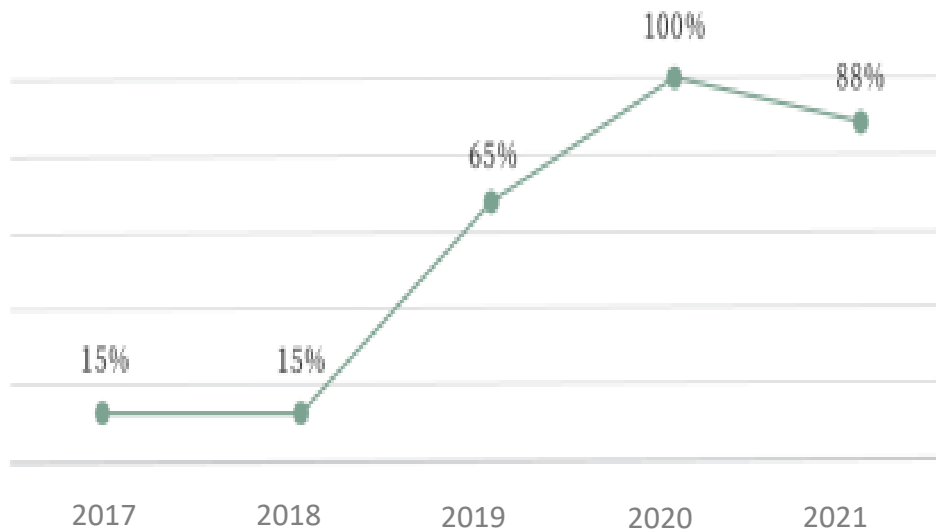Imported Energy / Total Energy Supply
(Indigenous + Imported Energy)

Result

PV installations increased by 518%
Newly Installed offshore wind power 237MW

Future

Steady increase the share of RE to move towards energy independence

Indicator 2: Increase power supply adequacy ratio

100%

88%

65%

15%   15%

2017   2018   2019   2020   2021

The ratio dropped to 88% in 2021 due to the Covid-19 pandemic, extreme weather, and two power outages caused by system accidents in May.

Formula

Number of days with sufficient power supply/ 365 Days

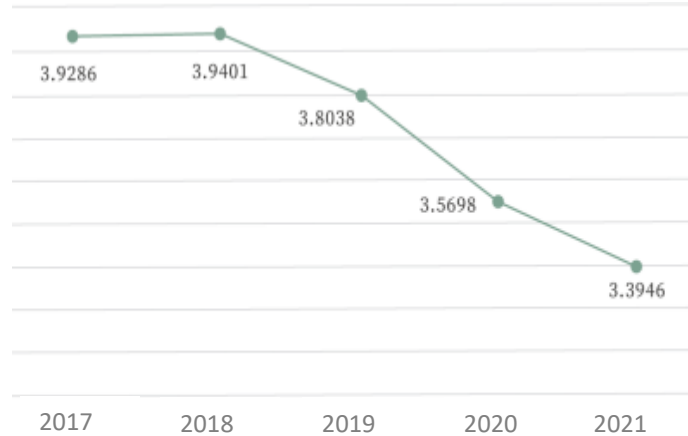**Result**

The ratio reached 100% in 2020

Future

Strengthen the reliability and resilience of power system to achieve stable power supply
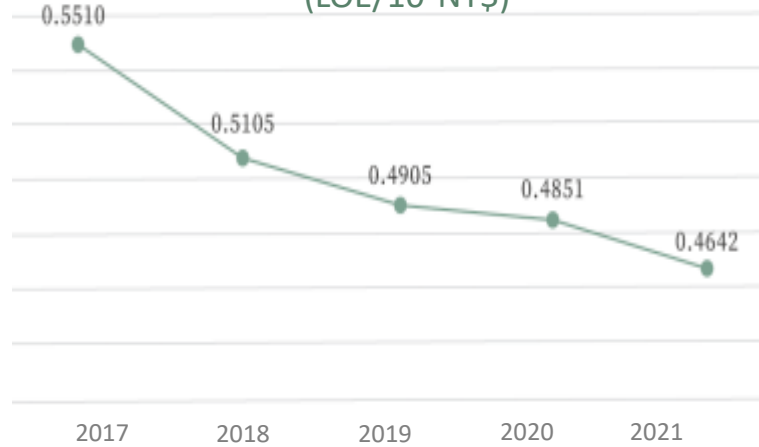
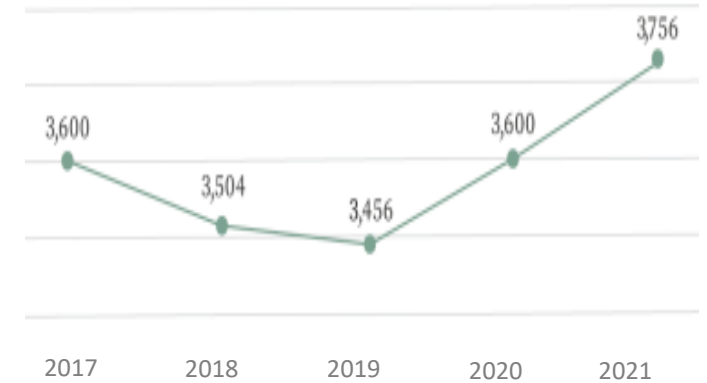# Indicator 3: Improve energy efficiency

(Energy consumption/activity data)

Industrial Energy Intensity
(LOE/10³NT$)

3.9286
3.9401
3.8038
3.5698
3.3946

2017   2018   2019   2020   2021

Service Energy Intensity
(LOE/10³NT$)

0.5510
0.5105
0.4905
0.4851
0.4642

2017   2018   2019   2020   2021

electricity consumption per household (kwh)

3,600
3,504
3,456
3,600
3,756

2017   2018   2019   2020   2021

| Average annual growth rate		
Industrial energy consumption 1.7%	Service energy consumption -1.1%	
Industrial GDP 5.6%	Service GDP 2.8%	
Industrial energy intensity -3.8%	Service energy intensity -3.7%	

Energy efficiency has been improved.

2017-2019   -> downward trend

Since Covid-19 -> reversely increased

Promote a variety of energy-saving activities to encourage people to save energy in their daily lives.

Indicator 4: Promote renewable energy development

RE Installed Capacity
(MW)
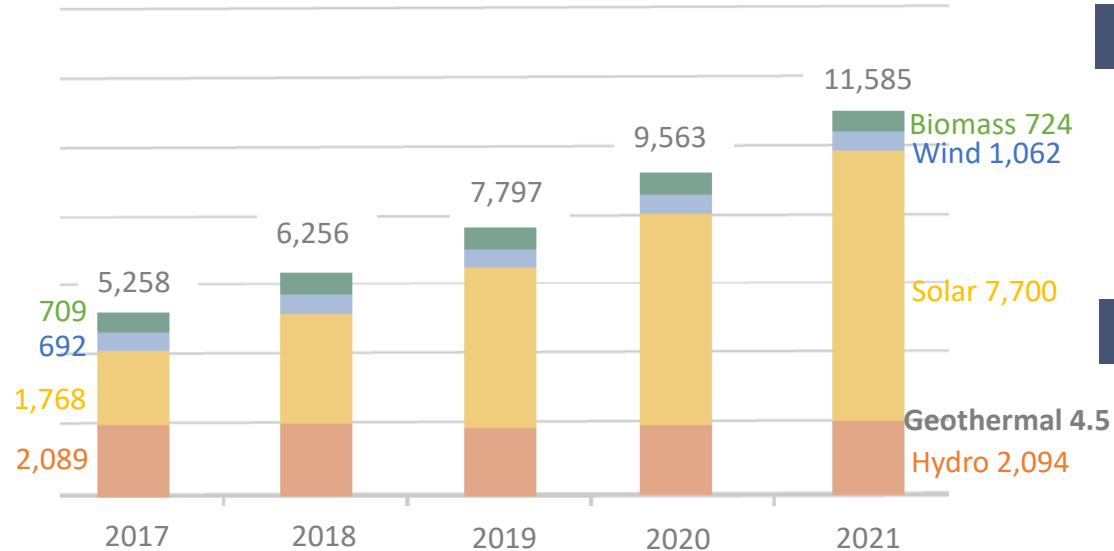
The installed capacity of solar PV and wind power steadily grew in the last five years while others remained almost the same.

Formula

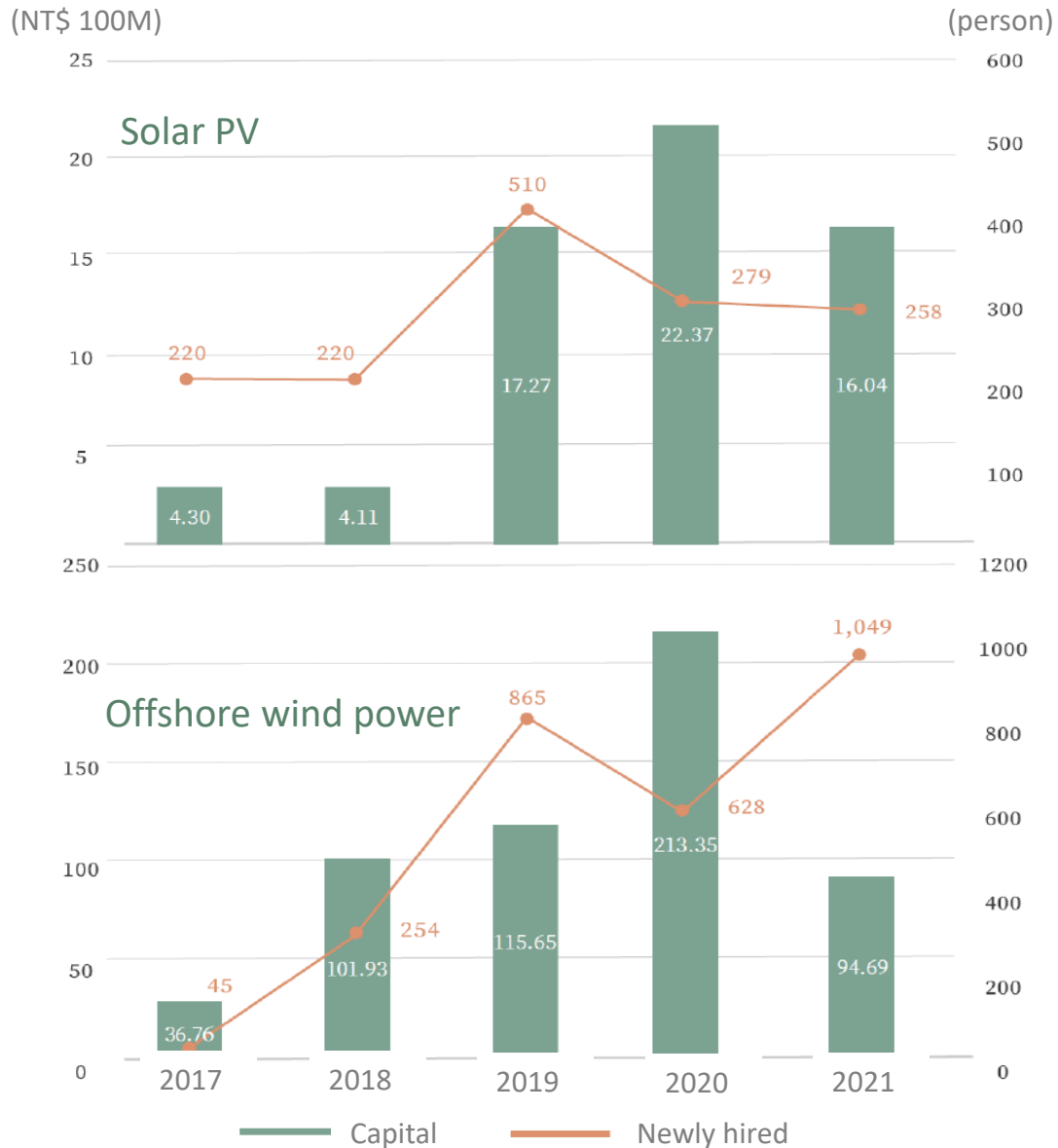The overall installed capacity of renewable energy (29 GW by 2025)

Result

The overall capacity in 5 years has more than doubled
Multiple types of power generation—Geothermal

Future

Accelerate the installation of solar PV (20 GW) and offshore wind power system (5.6 GW)

Indicator 5: Promote green economic growth and prosperity

(NT$ 100M)

Solar PV

Year	Capital	Newly hired
2017	4.30	220
2018	4.11	220
2019	17.27	510
2020	22.37	279
2021	16.04	258

(person)

Offshore wind power

Year	Capital	Newly hired
2017	36.76	45
2018	101.93	254
2019	115.65	865
2020	213.35	628
2021	94.69	1,049

━━ Capital   ━━ Newly hired

Formula

Capital invested in green industry
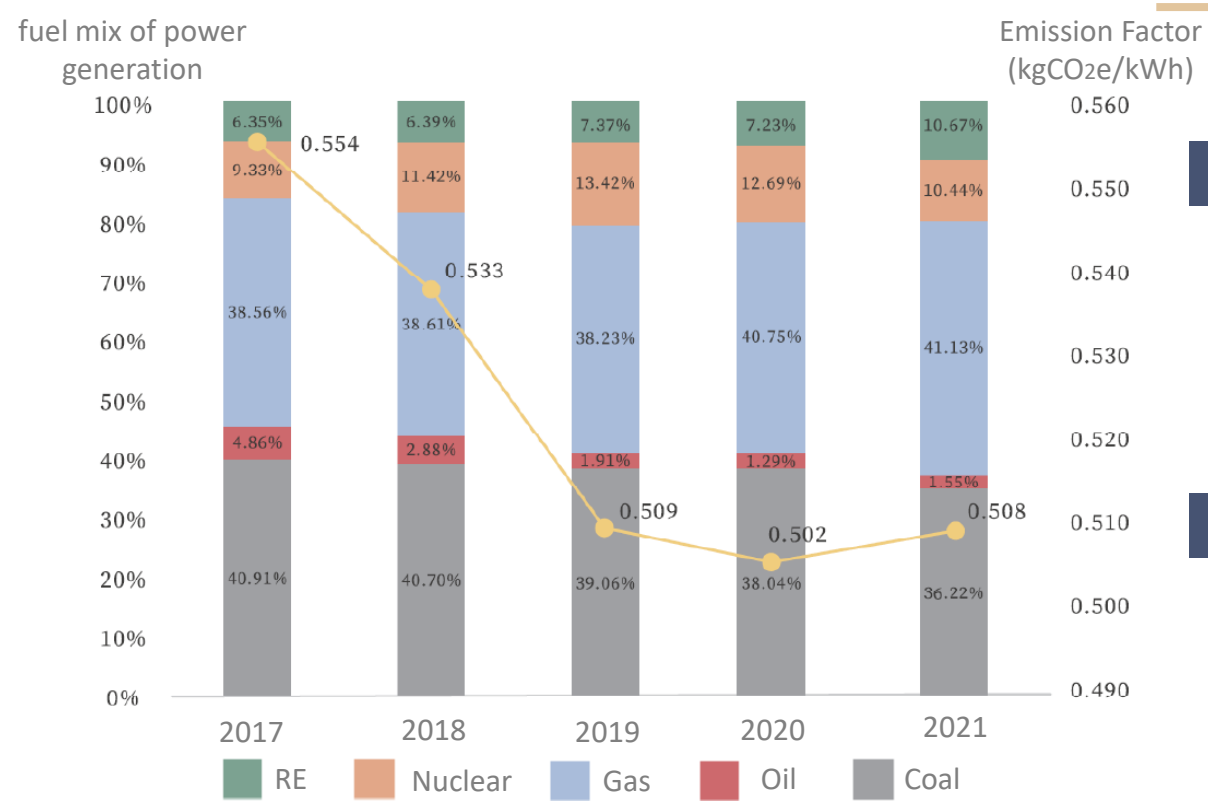**Number of labors employed** in green industry

Result

The capital invested in both solar and offshore wind power industries increased significantly in 2020

Future

Create more jobs and cultivate talents by localizing supply chain

8

Indicator 6: Reduce Electricity Carbon Emission Factor

fuel mix of power generation

Emission Factor (kgCO$_2$e/kWh)

Year	RE	Nuclear	Gas	Oil	Coal	Emission Factor
2017	6.35%	9.33%	38.56%	4.86%	40.91%	0.554
2018	6.39%	11.42%	38.61%	2.88%	40.70%	0.533
2019	7.37%	13.42%	38.23%	1.91%	39.06%	0.509
2020	7.23%	12.69%	40.75%	1.29%	38.04%	0.502
2021	10.67%	10.44%	41.13%	1.55%	36.22%	0.508

Legend: ■ RE ■ Nuclear ■ Gas ■ Oil ■ Coal

The emission factor dropped considerably in the last five years while the fuel mix of power generation has gone through a transition. The share of coal has moved to gas and RE.

Formula

GHG emissions of **electricity sold to Taipower** / electricity sold to Taipower
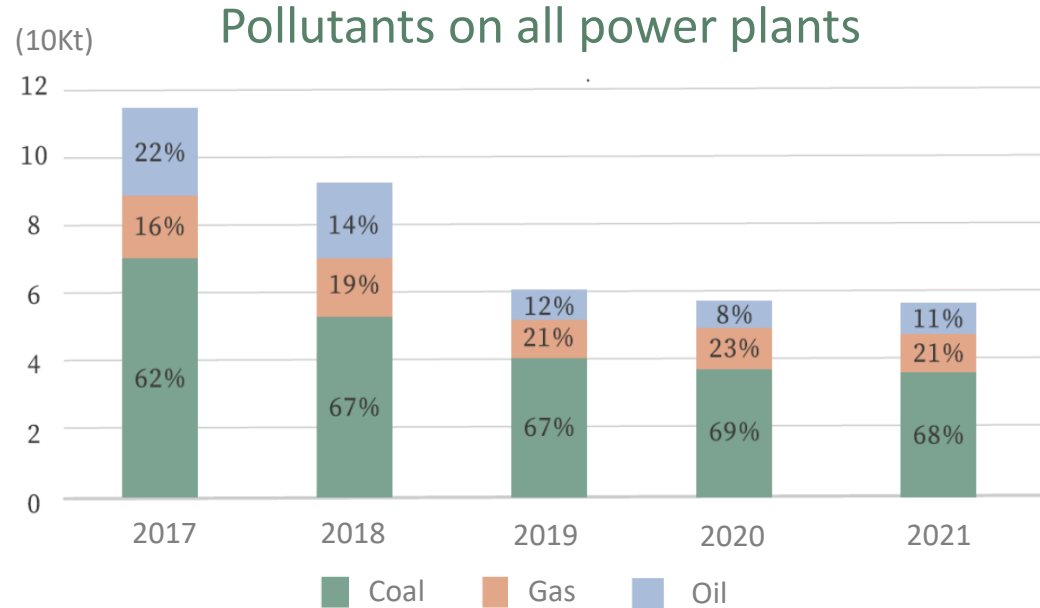
Result

The emission factor dropped to the lowest at 0.502 kgCO$_2$e/kWh in 2020

Future

Continuously maximize NG-fired generation and strengthen integration of RE into the grid

Pollutants on all power plants

(10Kt)

The pollutants on the overall power system dropped from 112,257t in 2017 to 52,776t in 2021.

Formula

The **pollutants** emitted on the overall power system

(sulfur oxides + nitrogen oxides + particulate matter pollution)

Result

The pollutants have been reduced by more than half in five years

Future

More coal will be pushed out of the power grid in favor of natural gas, and more RE will be introduced into the system

Indicator 8: Boost the uptake of electric vehicles

The uptake of electric vehicles

(Vehicle) / (%)

Chart data:
- 2017: 0.95%
- 2018: 1.36%
- 2019: 2.23%
- 2020: 2.85%
- 2021: 3.51%
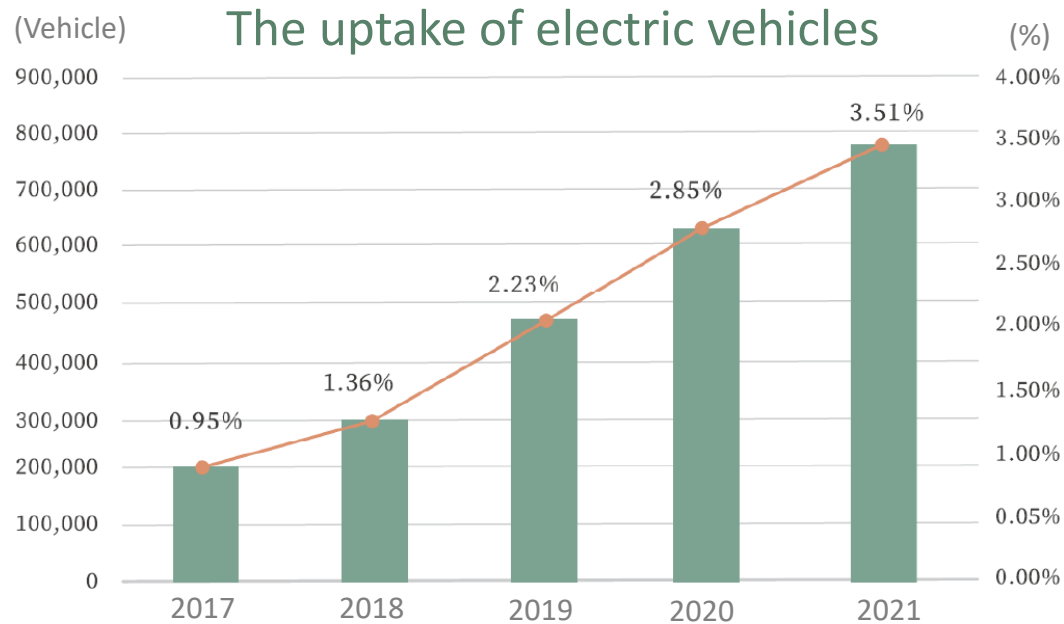
The ratio kept increasing to 3.5% in 2021 while the total number rose to around 794 thousand electric vehicles.

Formula

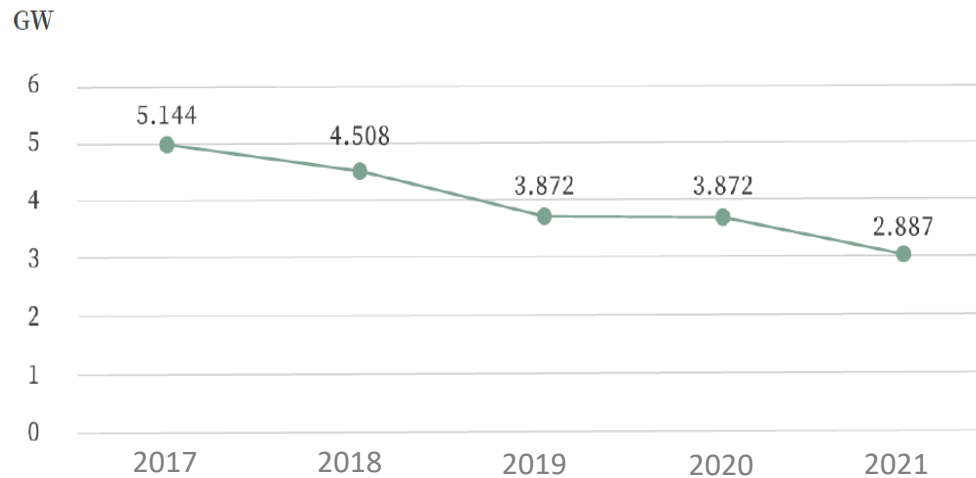Number of electric vehicles/ number of all kinds of vehicles

Result

The ratio has more than tripled in five years

Future

Continuously foster electric scooter industry and popularize electric buses

Indicator 9: Reduce reliance on nuclear power

Installed capacity on operational nuclear fleet

GW

5.144 4.508 3.872 3.872 2.887

6
5
4
3
2
1
0

2017   2018   2019   2020   2021

The installed capacity has steadily reduced as established nuclear facilities have been gradually decommissioned over the past few years.

Formula

The installed capacity of operational nuclear power plant

Result

The installed capacity reached to the lowest at 2.887GW in 2021

Future

Rely less on nuclear power and more on RE to both satisfy energy security and sufficiency

Indicator 10: Raise the public awareness on energy

Survey questions	Accuracy rate (%)	
	2021	2022
What is the main fuel for power generation in Taiwan?	52.5	47.7
Which fossil fuel produces the least carbon dioxide when generating electricity?	66.5	65.7
What percentage of energy is imported overseas?	6.9	10.1
How is our average residential electricity price compared to other countries'?	78.0	73.3
Are you aware our government has been promoting RE transition since 2016?	96.0	94.6
Do you know the government energy department is responsible for providing people and industries with carbon-free electricity and fuel in response to 2025 net zero emissions?	-	85.7
Average score	**60.0**	**62.8**

Formula

The overall accuracy rate on energy-related questionnaire survey for the public

Result

1,256 valid samples were obtained
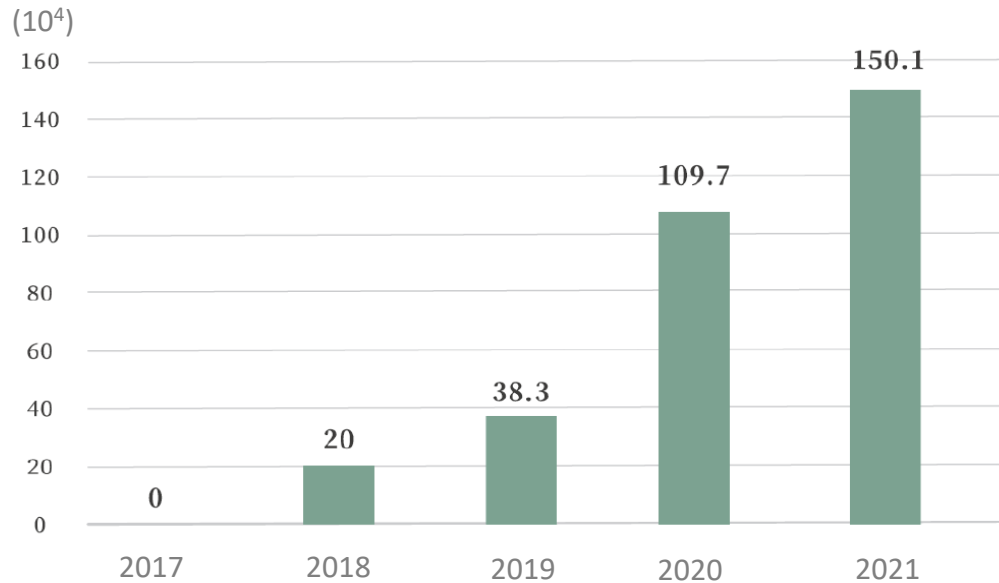The accuracy was only slightly improved

Future

Raise the public's interest in energy and enhance knowledge absorption through online and offline education

Indicator 11: Speed up AMI construction

Installed AMI units for low-voltage

(10^4)

Year	Value
2017	0
2018	20
2019	38.3
2020	109.7
2021	150.1

The number of installed smart meters grew fast, especially in recent three years.

Formula

The number of installed AMI units for **low-voltage** (It has 100% installed for high-voltage)

Result

It reached 1.5 million installations in 2021

Future

Expedite progress to meet the goal of having 3 million installations by 2024

Decomposition Analysis

Decompose energy consumption changes
into three effects

$\Delta E_{tot} = E_T - E_0 =$

$$\Delta E_{act} + \Delta E_{str} + \Delta E_{int}$$
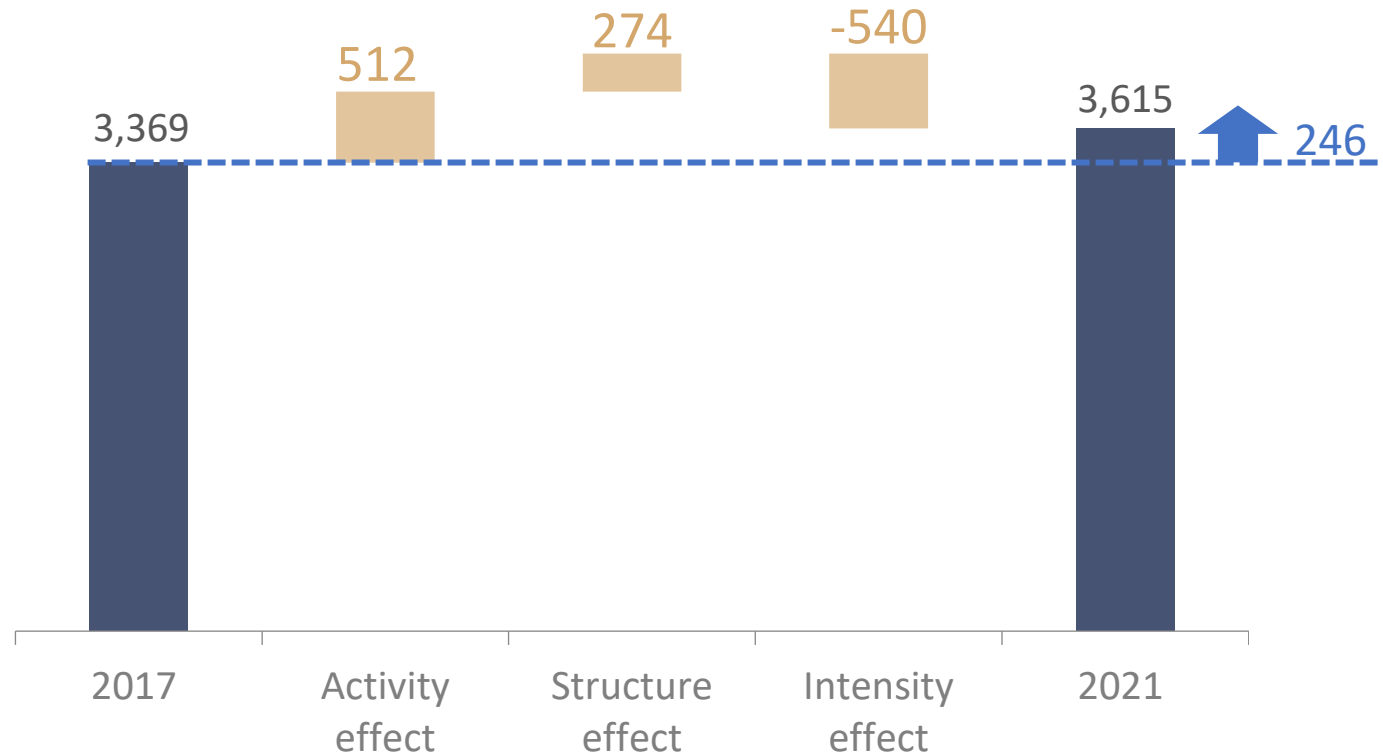
Activity Effect   Structure Effect   Intensity Effect

Note: Decomposition method represented by Logarithmic Mean Divisia Index (LMDI)-I Formula by B.W. Ang

Decomposition of Energy Consumption in Industrial Sector (10⁴KLOE)

- **Activity**
  Industrial GDP growth

- **structure**
  Had a tendency to shift to
  energy-consuming industries

- **Intensity**
  Energy efficiency has improved
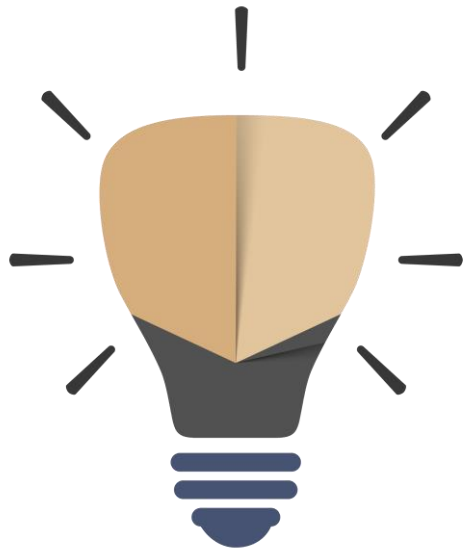
Thank you for your kind attention!

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