

# **Biomass Power as Major Power Source**

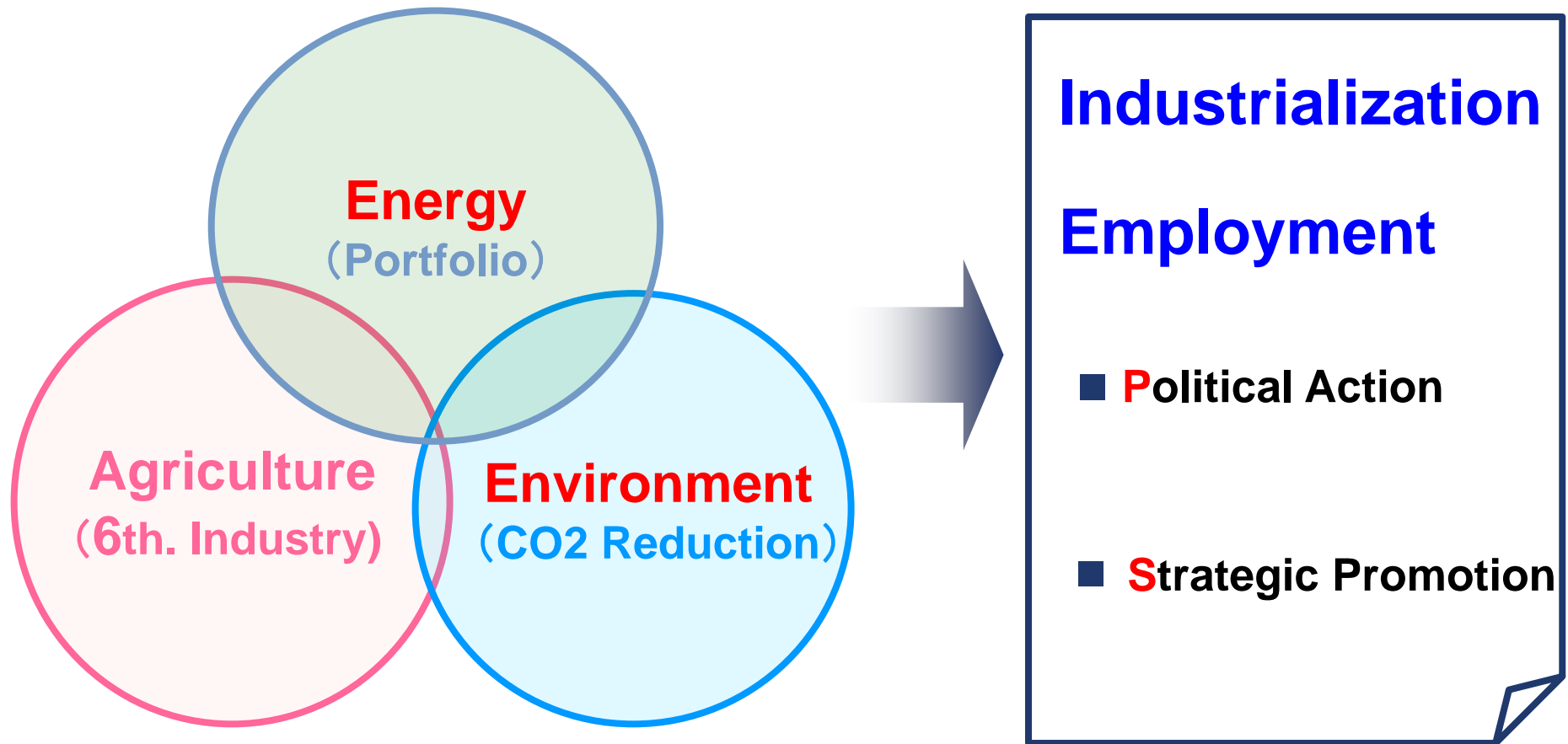
**~ Creation of Asia Biomass Community~**

**September 6<sup>th</sup>, 2018**

**Issei Sawa**

**President , NEED**

# Driving force to create Biomass Energy Industry



# Biomass Energy Policy EU & U.S. vs Japan

Policy	EU & U.S.	Japan
Energy	<ul style="list-style-type: none"> <li>● As Energy Security</li> <li>● As Energy Portfolio</li> <li>● Last Resort of Renewable Energies</li> <li>● Ambitious Target ⇒ Industrial Scale</li> <li>● Creation of Large Market</li> </ul>	<ul style="list-style-type: none"> <li>● Minority among Renewable Energies</li> <li>● Limited Target ⇒ Small Market</li> <li>● Small Scale</li> </ul>
Agriculture	<ul style="list-style-type: none"> <li>● New Application of Agro and Forest Product ⇒ New Market , New Industry</li> <li>● Creation of New Industry (6th. Industry) in Agro and Forest Industry.</li> <li>● Increase Farmer and Forester's Income</li> </ul>	<ul style="list-style-type: none"> <li>● Tech. development project by Engineering Co.</li> <li>● Small scale Demo Projects subsidized by Government are recognized as "Not economically viable"</li> </ul>
Environment	<ul style="list-style-type: none"> <li>● Effective solution for GHG Reduction.</li> <li>● BECCS (carbon negative) concept introduced by IPCC.</li> </ul>	<ul style="list-style-type: none"> <li>● Not recognized as GHG Reduction solution</li> <li>● Too much attention on Food vs Fuel and Bio Diversification issues</li> </ul>
Industry	<ul style="list-style-type: none"> <li>● Promote as Strategic Industry</li> <li>● New Employment Opportunity</li> <li>● Sustainability Rule ⇒ Global Competition</li> <li>● Subsidy · Tax Incentives ⇒ Obligation</li> </ul>	<ul style="list-style-type: none"> <li>● Projects based upon Governmental Subsidy (Tech. Development or Small Scale Demo Projects)</li> </ul>

# FIT (Feed in Tariff) for Biomass Power Generation

**FIT** was introduced on **July 1, 2012** by METI.

		<b>Unutilized Wood</b> (1)	<b>General Wood</b> (2)	Waste Materials Sewage sludge	Recycled Wood
Cost	Power Plant Cost	¥ 410,000/kW	¥ 410,000/kW	¥ 310,000/kW	¥ 350,000/kW
	Annual O& M Cost	¥ 27,000/kW	¥ 27,000/kW	¥ 22,000/kW	¥ 27,000/kW
Expected IRR (before tax)		<b>8%</b>	<b>4%</b>	<b>4%</b>	<b>4%</b>
<b>Original FIT Rate</b> (¥/kWh)		<b>32</b>	<b>24</b>	<b>17</b>	<b>13</b>
<b>Revision</b>		<b>40 (3)</b>	21(4) <b>⇒ Bid (5)</b>	No change	No change
Duration		<b>20 years</b>			

(1) Forest residues

(2) Wood Chips , Pellets etc. **including imported one** (even PKS, Palm Oil)

(3) Applicable for **less than 2MW** Projects since April 1, 2016

(4) After Oct. 1, 2017 for more than 20MW

(5) **After April 1, 2018** for **more than 10MW** (**180MW** in 2018 **including co-firing with coal**)

# Energy Mix. of Power Generation in 2030

▪ Oil	:	31.5 Bill. kWh	3%
▪ Coal	:	281 Bill. kWh	26%
▪ LNG	:	284.5 Bill.kWh	27%
▪ Nuclear	:	231.7~216.8 Bill.kWh	22~20%
▪ <b>Renewable</b>	:	236.6~251.5 Bill.kWh	<b>22~24%</b>
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<b>Total</b>	:	1,065 Bill.kWh *	100%

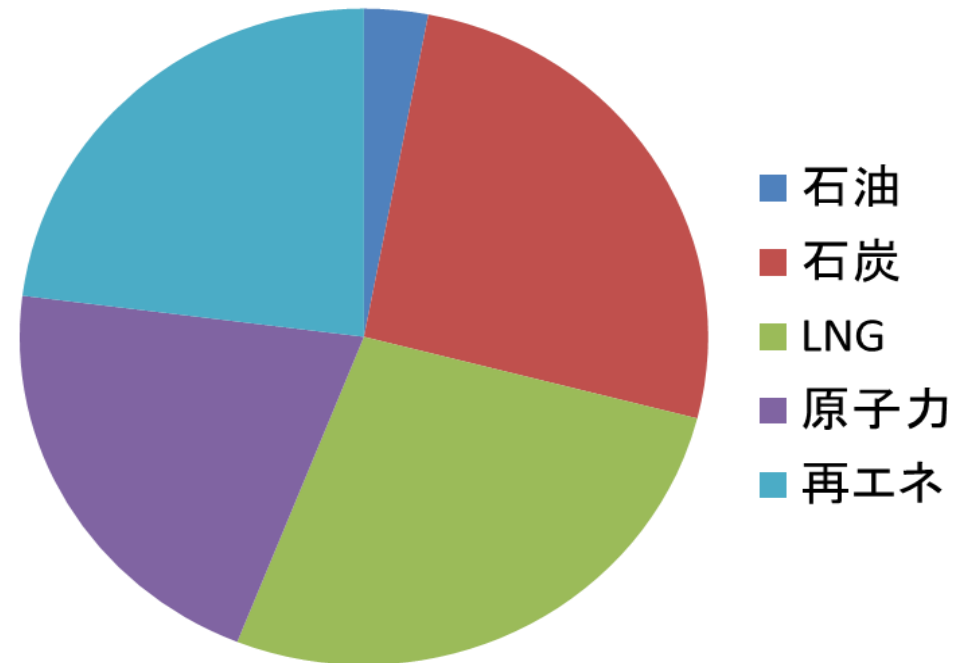
(\*As assumption that electricity consumption shall be 980.8 Bill. kWh after 17% energy saving from current)

## Breakdown of Renewable Energy (Ratio\*\*)

▪ PV	:	74.9Bill.kWh	7.0%	(30%)
▪ Wind	:	18.2Bill.kWh	1.7%	( 7%)
▪ Geothermal	:	10.2~11.3Bill.kWh	1.0~1.1%	( 5%)
▪ Small Hydro	:	93.9~98.1Bill.kWh	8.8~9.2%	(39%)
▪ <b>Biomass</b>	:	<b>39.4~49 Bill. kWh</b>	<b>3.7~4.6%</b>	<b>(19%)</b>

(\*\* Upside case )

比率



**GHG** Reduction Target in 2030

⇒ **▲ 26%** from 2013

# Advantage of Biomass Power over VRE

1. Biomass PS is **Stable** base-road power source and **Controllable** like thermal PS  
⇒ • Considered as Coal-Fired PS Substitution.  
• play a role as a **carbon free regulator** for VRE (PV/ Wind)
2. High Capacity Factor  
(Biomass **80%** , PV13% , Wind 20% )
3. Power Source (Bio Fuel) can be **transportable**  
⇒ Bio Fuel can be produced at different locations.

# Target of Biomass Power Generation (2030)

Category	2014 .11	2030 Target (Ratio)	Additional Facility
1. Utilized Wood	30MW	240MW (8 times)	+ 210MW
2. Recycled Wood	330MW	370MW (1.1 times)	+ 40MW
<b>3.General Wood</b>	<b>100MW</b>	<b>2,740 ~4,000MW</b> (27.4 - 40 times)	<b>+ 2,640 – 3,900MW</b>
<b>Wood Biomass Total</b> (Sum of 1~3 )	<b>460MW</b> (3.2Bill.kWh)	<b>3,350 - 4,610MW (7 - 10times)</b> (22 - 31 Bill. kWh)	<b>+ 2890 - 4150MW</b> (+ 19 - 28Bill.kWh)
4. Blogas (Methane)	20MW	160MW (8 times)	+140MW
5. Waste	780MW	1,240MW (1.6 times)	+ 460MW
6. RPS	1,270MW	1,270MW	
<b>Biomass Total</b> (Sum of 1~6)	<b>2,520MW</b> (17.7Bill.kWh)	<b>6,020 -7,280MW(2.4-2.9times)</b> (39.4 – 49 Bill. kWh)	<b>+3,490 – 4,750 MW</b> (+21.7-31.3BillkWh)

# FIT Status as of Dec., 2017 (Certified & Operated)

	<u>Certified</u>	<u>Operated</u>	<u>Unoperated</u>
1. <b>General Wood</b>	<b>11.31GW</b>	<b>0.57 GW</b>	<b>10.74GW</b>
(1) <b>Dedicated</b>	<b>5.05 GW</b>	<b>0.57 GW</b>	<b>4.48GW</b>
(2) <b>Coal Co-fired</b>	<b>1.74 GW</b>	--	<b>1.74GW</b>
(3) <b>Palm Oil</b>	<b>4.51GW</b>	--	<b>(4.51GW)</b>
2. <b>Others</b>	<b>0.93GW</b>	<b>0.58GW</b>	<b>(0.35GW)</b>
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<b>Total</b>	<b>12.24GW</b>	<b>1.15GW</b>	<b>11.09GW</b>

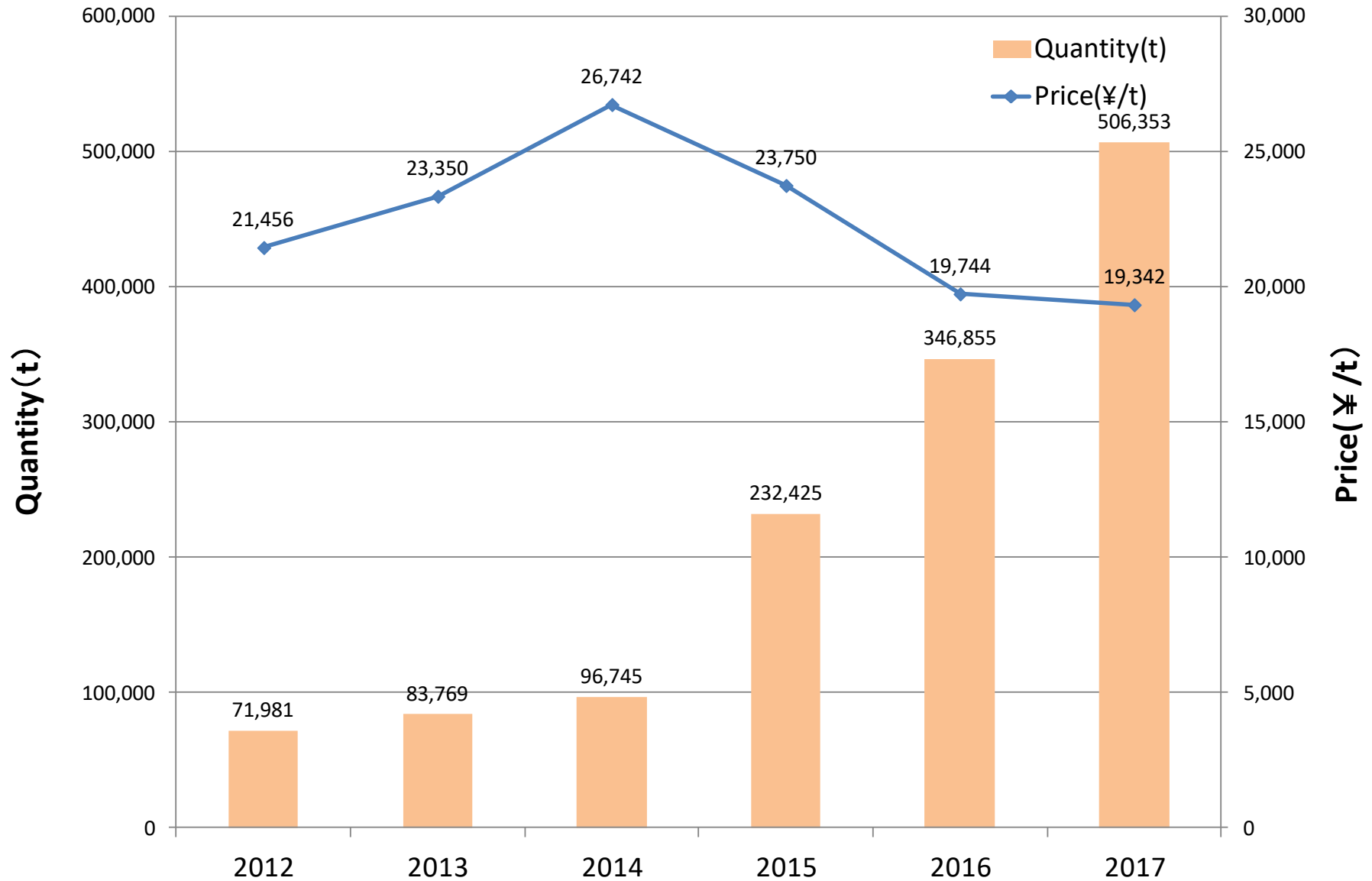


# Assumption of Practical FIT Certified Projects

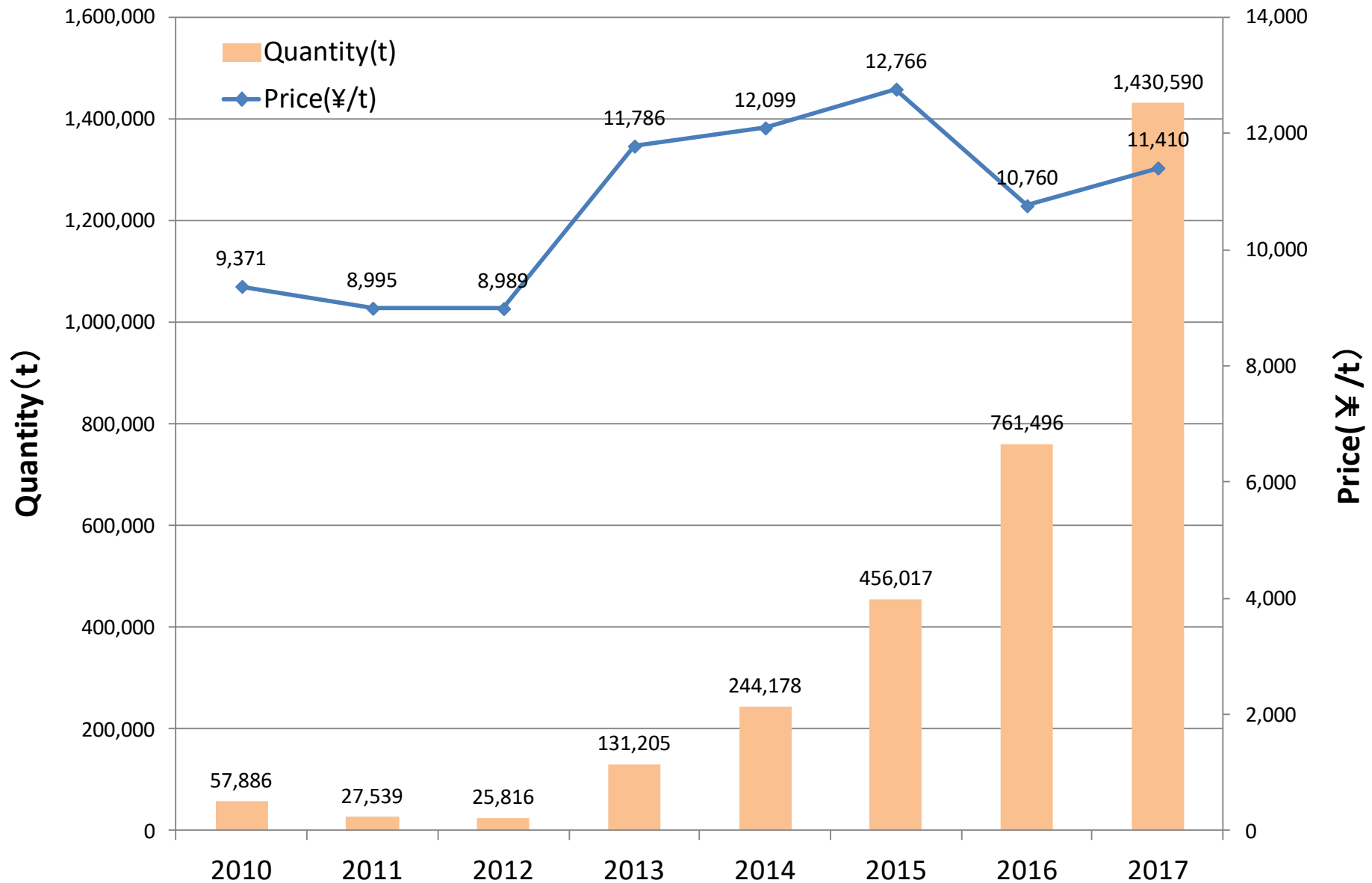
(based on FIT Status as of Dec., 2017)

1. Assumption of Operation : **1.77 ~ 2.21GW**
  - (1) **20~30%** of Dedicated 4.48 GW : 0.90GW~1.34GW
  - (2) **50%** of Wood Coal Co-fired 1.74GW : 0.87GW
  
2. Biomass Operated : **3.46GW**
  - (1) FIT newly Certified : 1.15GW
  - (2) Before FIT : 2.31GW (including RPS→FIT 1.12GW)
  
3. Above 1 + 2 : **5.23 ~ 5.67GW**

# Quantity & Price of Imported Wood Pellet (Japan)

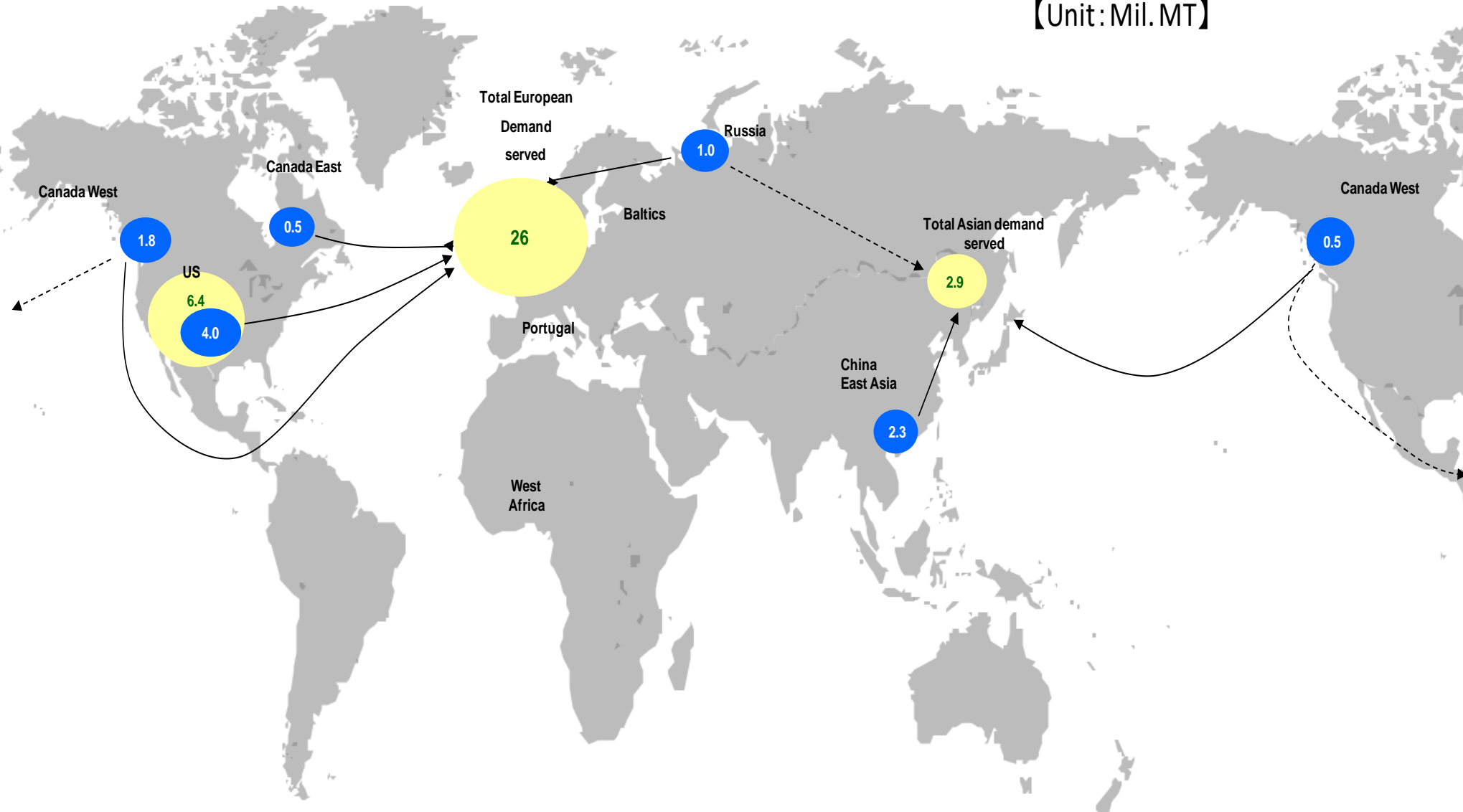


# Quantity & Price of Imported PKS (Japan)



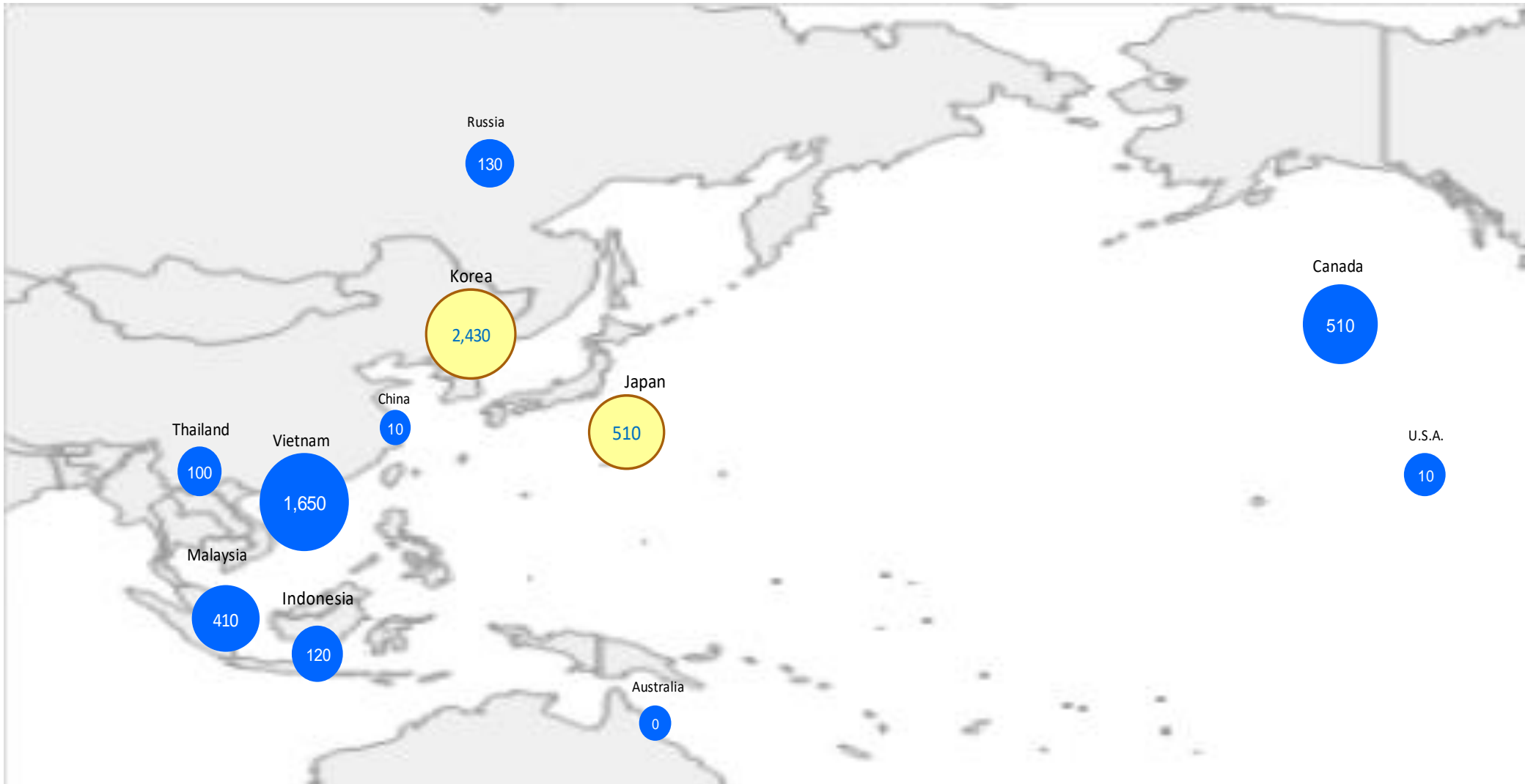
# Global wood pellets trading volume (2017)

【Unit: Mil. MT】



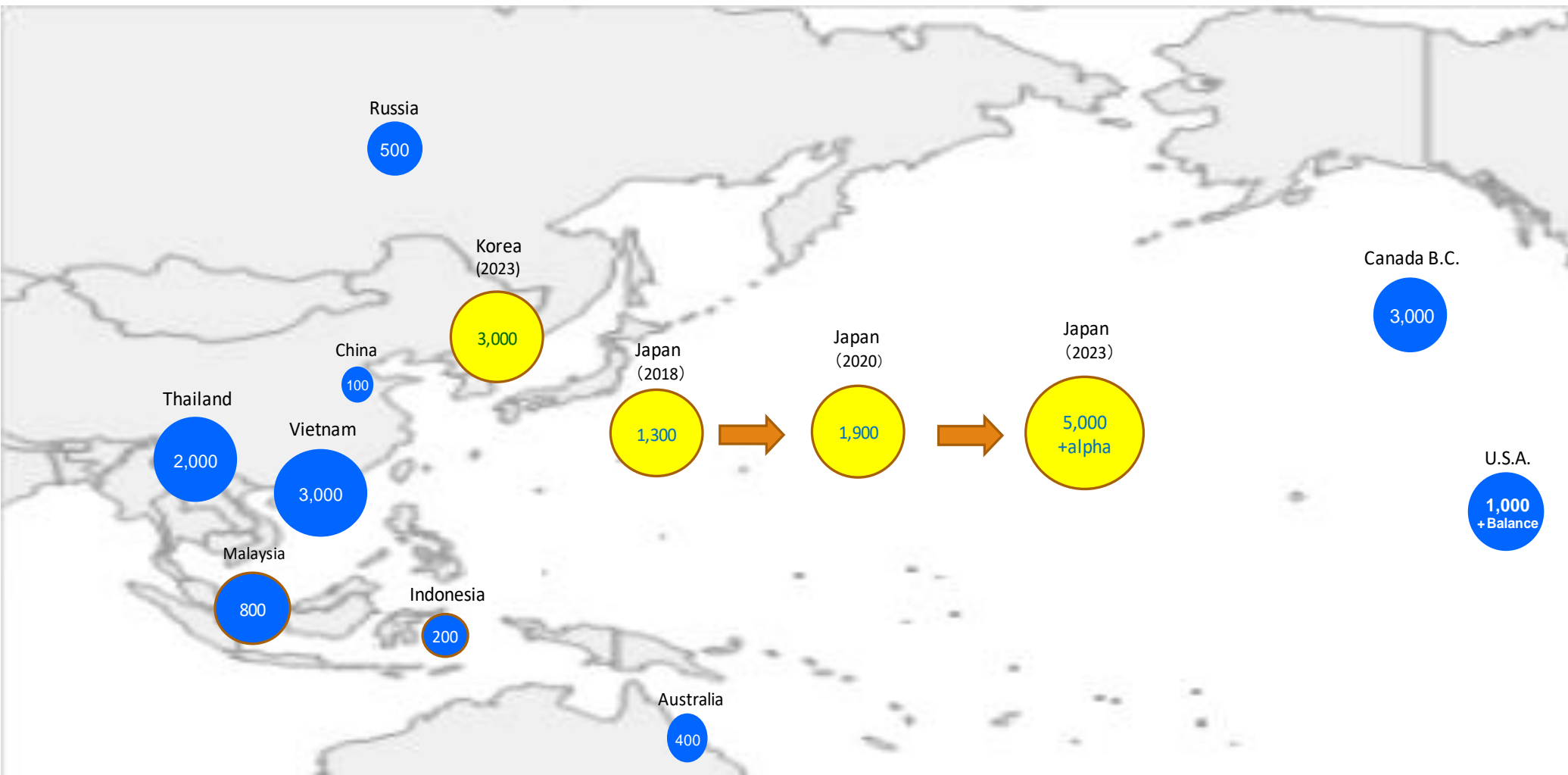
# Pellets Trading in the Far East 【2017】

【Unit : thousand MT】



# Pellets Import to the Far Eastern Market 【2023 Forecast】

【Unit : thousand MT】

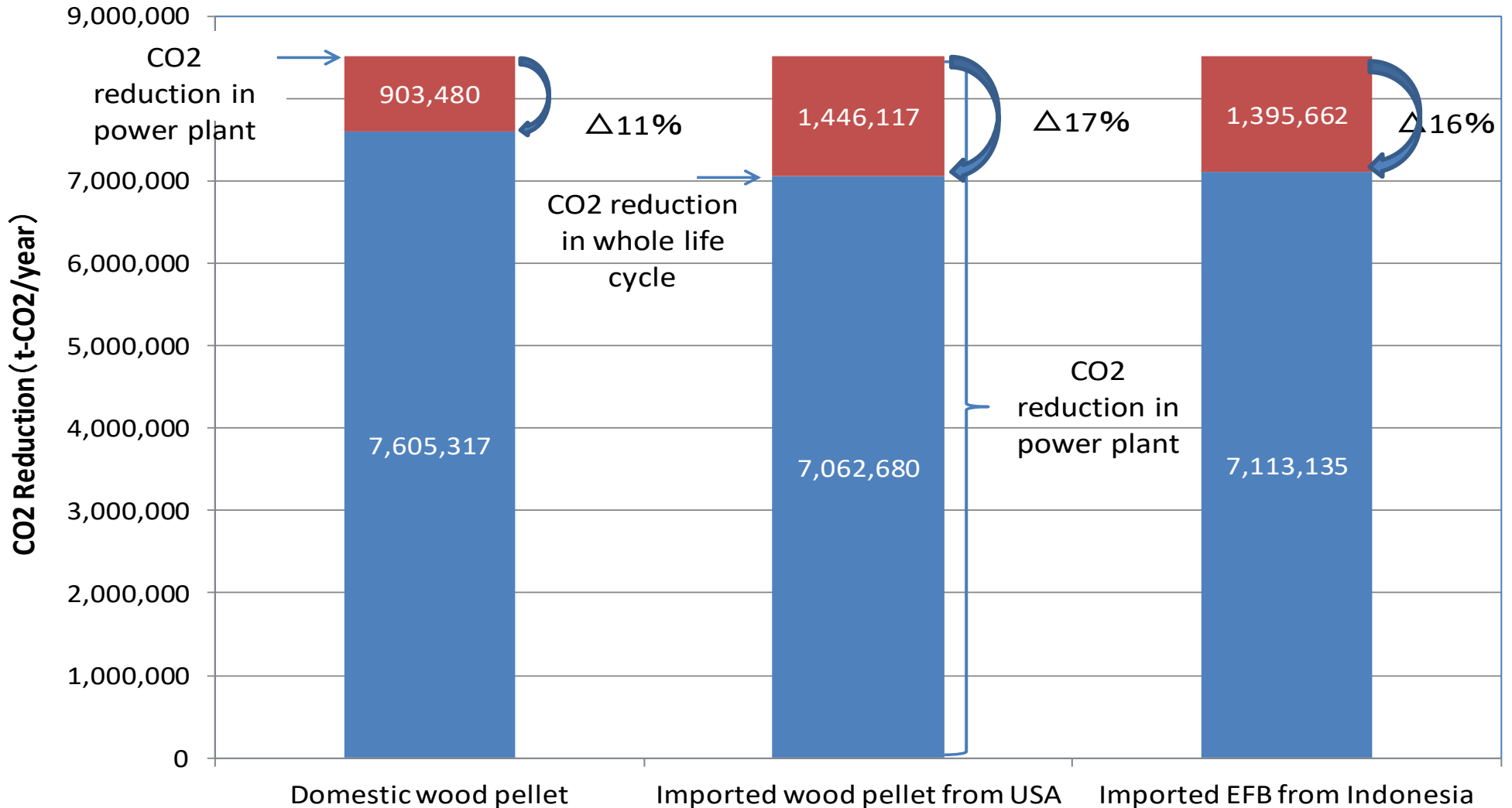


Source : KBLT

# Comparison of LCA - CO2 Reduction for Import vs Domestic Wood Pellet

CO2 reduction of biomass power plant compared with coal fired power plant ( t-CO2/year )

■ CO2 reduction in whole life cycle ■ CO2 increase in process other than power plant



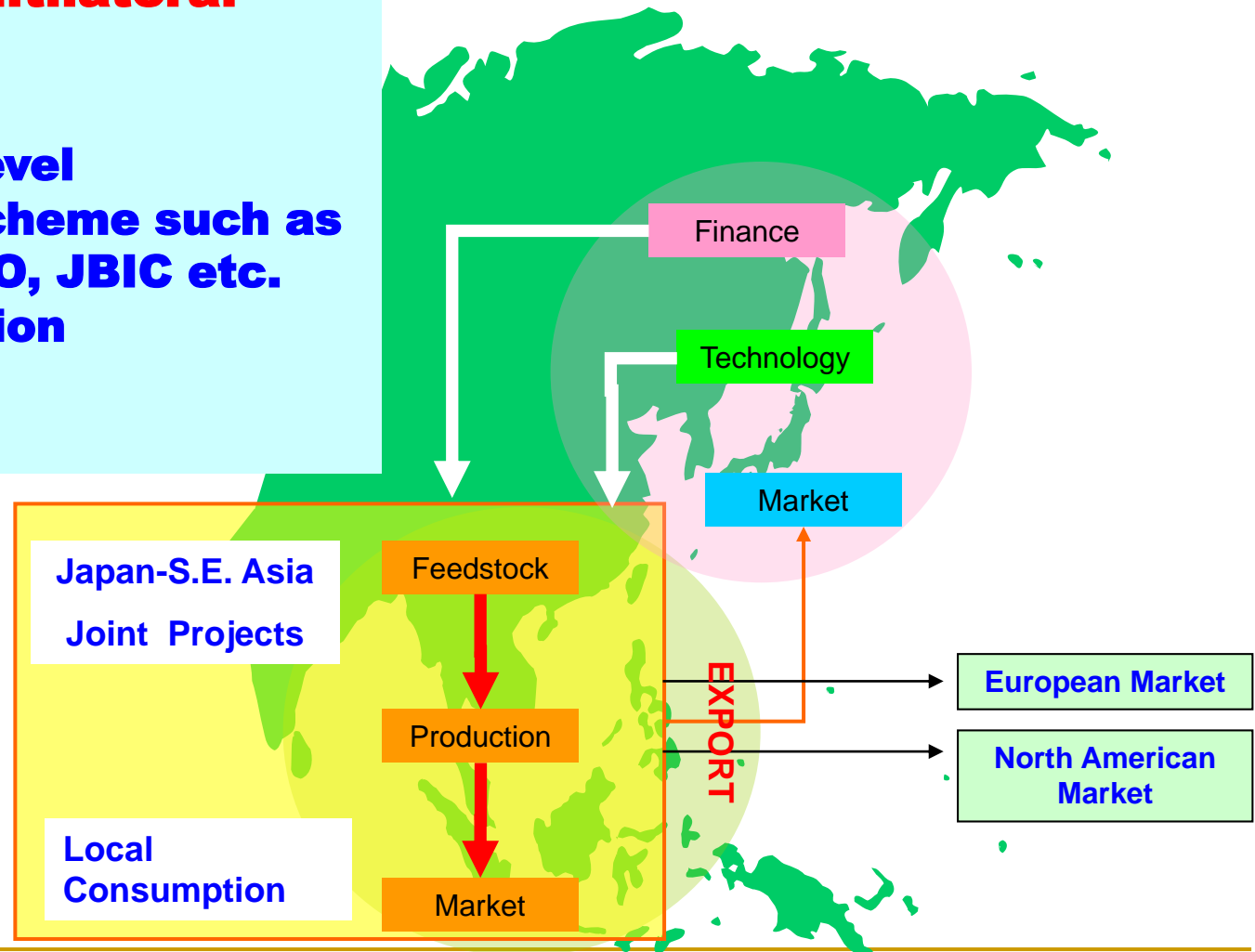
# Creation of “Asia Biomass Community”

## Enhance the Multilateral partnership

### ■ Governmental level

- Governmental scheme such as ODA , JCM, NEDO, JBIC etc.
- Biomass Plantation

### ■ Private level





# Phase-1 Production of Biomass Fuel in Asia and Biomass Power Generation in Japan

**Pellet Production in Asia**  
under JCM scheme  
(JV with Local Co.)

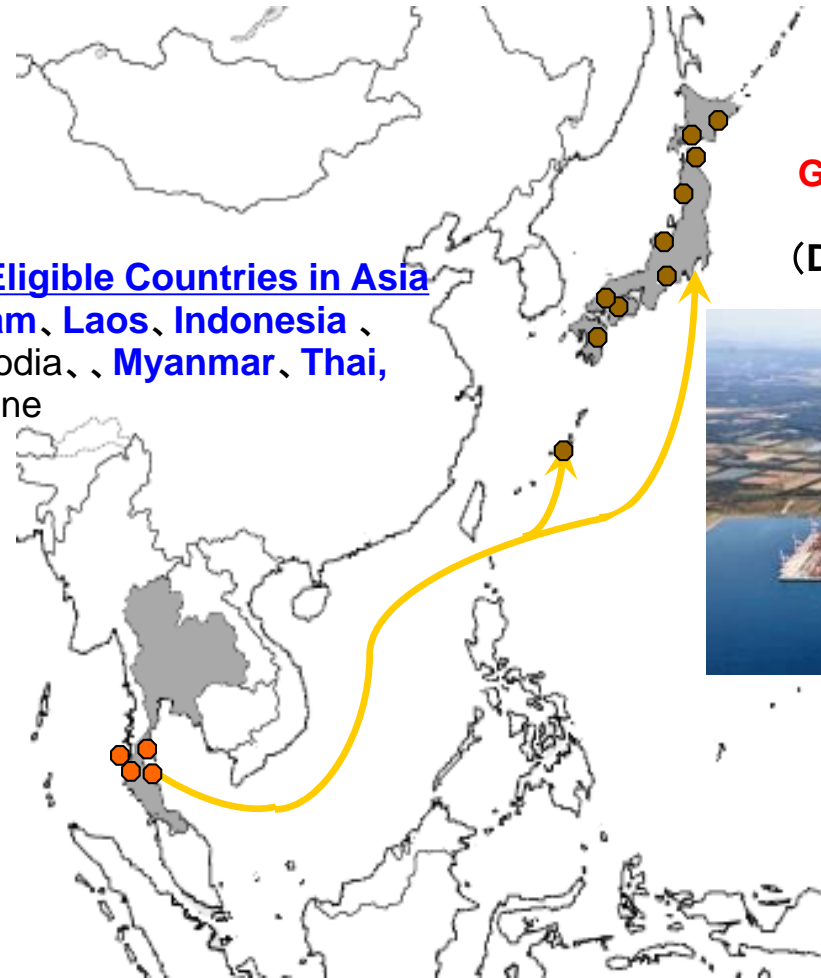


**JCM Eligible Countries in Asia**  
Vietnam, Laos, Indonesia, Cambodia, Myanmar, Thai, Phillipine



Wood Pellet

➔ **Torrefaction**



**Biomass Power Generation in Japan**  
under FIT  
(Dedicated, Co-fired)



# Phase-2 Biomass Power Generation and Production of Fuel in same location in Asia under JCM Scheme

**Pellet Production in Asia  
under JCM scheme  
(JV with Local Co.)**



**Biomass Power Generation  
under JCM scheme  
(JV with Local Co.)**



Wood Pellet

→ **Torrefaction**



# Establish Sustainable Biomass Industry

## Biomass Plantation

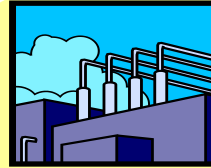


- Next Generation Agriculture and Forestry “Contract Farming & Afforestation for Various usages”
- Biomass Plantation under ODA.
- Improvement of Yield
- Mechanization
- Infrastructure
- Logistics

Feedstock Management  
(Stable Supply · Cascade Usage)



## Biomass Refinery



- Biomass Industrial Complex
- Bio Ethanol (Cellulosic)
- Bio Pellet (⇒Torrefaction)
- Bio Jet Fuel (at existing Petrochemical Refinery)
- BDF (⇒High Quality)
- Biomass Power Generation
- Bio Chemical
- Feed, Fertilizer

Industrialization  
(Co-Production · Co-Location)



## Market



### Stable & Matured Market

- Local Consumption
- Export to Japan
- Export to the other countries
- Long Term Offtake Agreement
- Reasonable Sales Price

Establish Relationship with Buyers  
(Utilities, Industries, Others)



**Creation of Sustainable Supply Chain of Industrial Complex**

# Thank you for listening !!

**NEED** (Nippon Environmental Energy  
Development Co. ,Ltd.)

HP: <http://need.co.jp>