

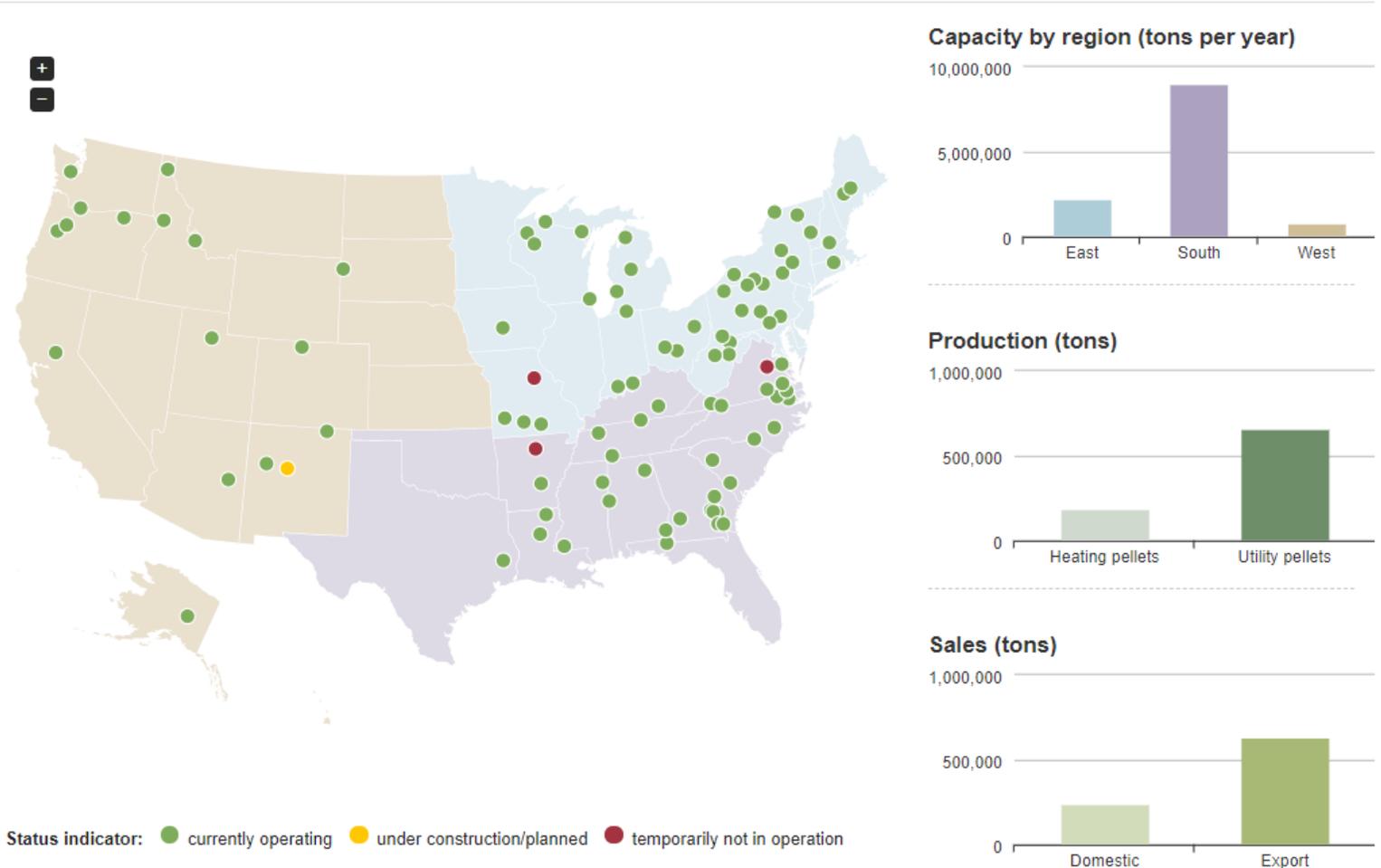
# Biomass Markets in Japan and So. Korea



# European Export Pellets

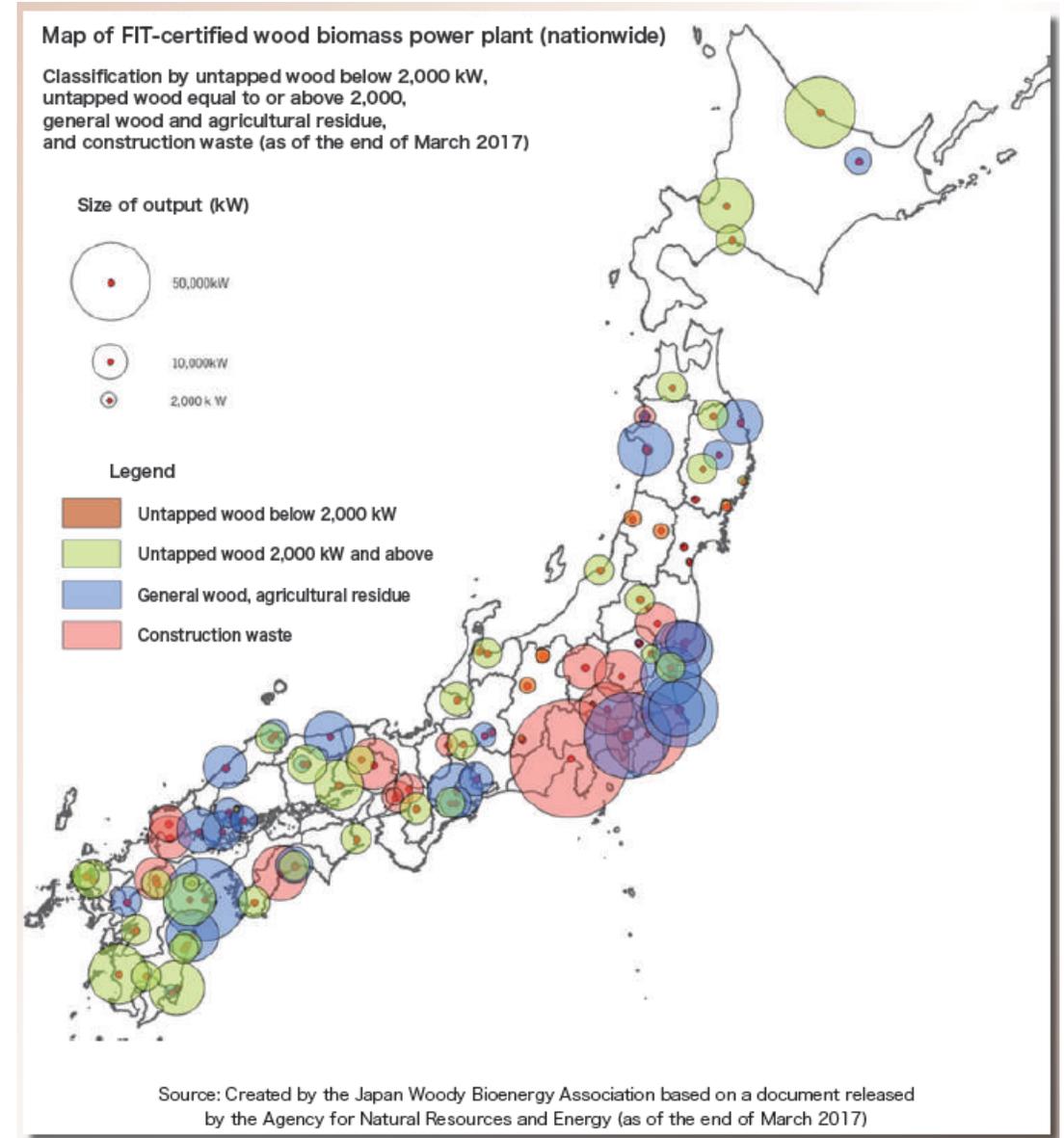
- Europe's carbon policies drive US demand
  - 35 wood pellet plants operating in US SE
  - Approx \$160 ton
  - 9.4 mil tons capacity
  - Co-fire with coal and 100% biomass use

Manufacturing facilities with capacity and status, September 2019



# Asian carbon policies

- Japan
  - Feed in Tariff policy
  - 3.2 GW of biomass-fired capacity approved
  - 500+ MW already commissioned
  - Canada is largest pellet supplier
  - Wood faces competition from palm kernel shells (PKS)
- South Korea
  - RPS requires utilities to increase renewables
  - Consuming 3.4 mil tons of wood pellets/year
  - Vietnam is largest supplier
  - Wood faces competition from palm kernel shells (PKS)



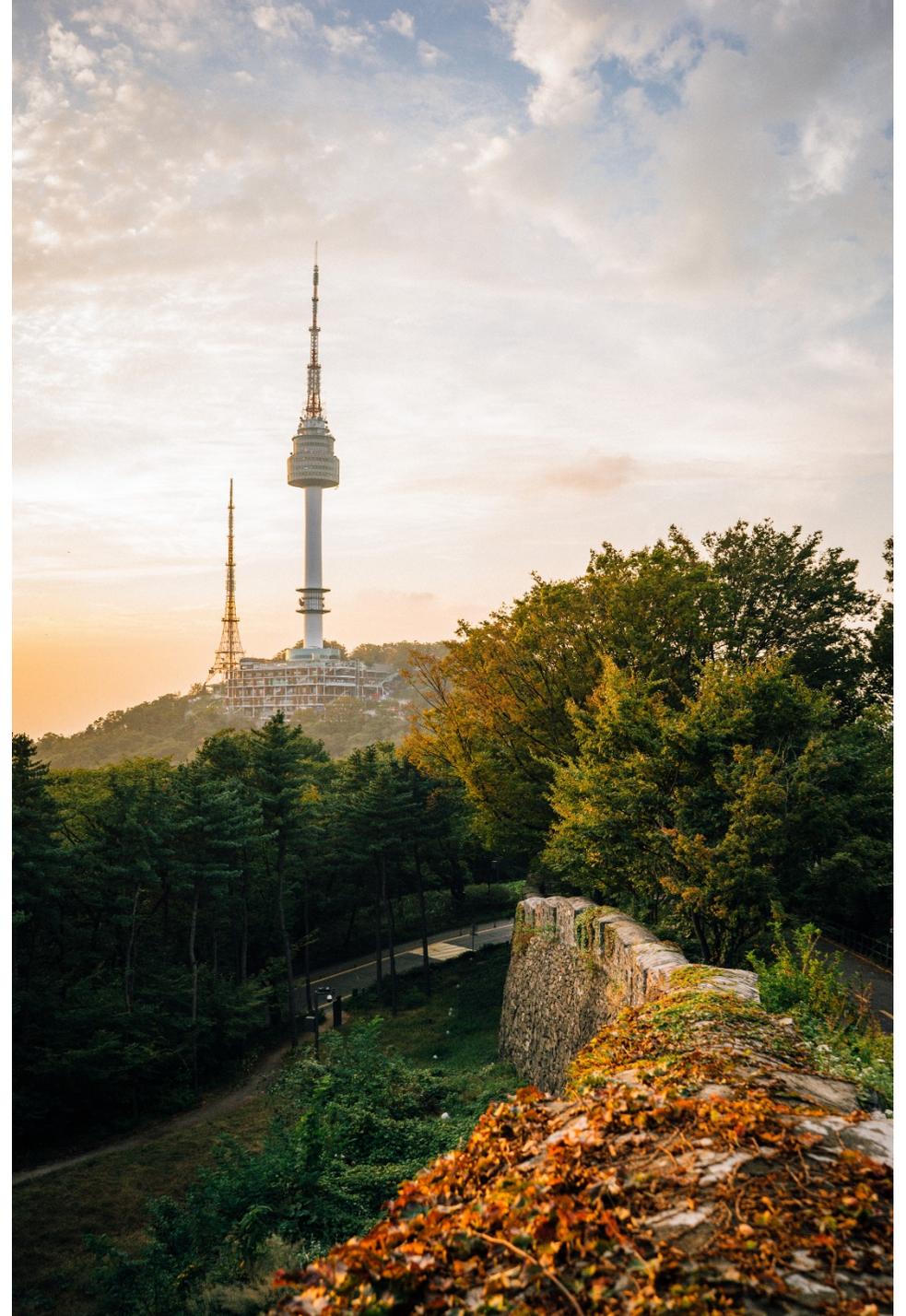
# Japanese Biomass Market

- 2018 biomass topped 1 mil tons
- 63% imports came from Canada
- 32% from Vietnam
- Feed in Tariff (FiT)--fixed price and long contract length (10-20 yrs)
- Strong counter-parties, like Canada and USA are preferred by most Japanese buyers.
- Continued rapid expansion expected.
  - Estimates range between 4.5 to 7 mil tons per year by 2024.



# Korean Biomass Markets

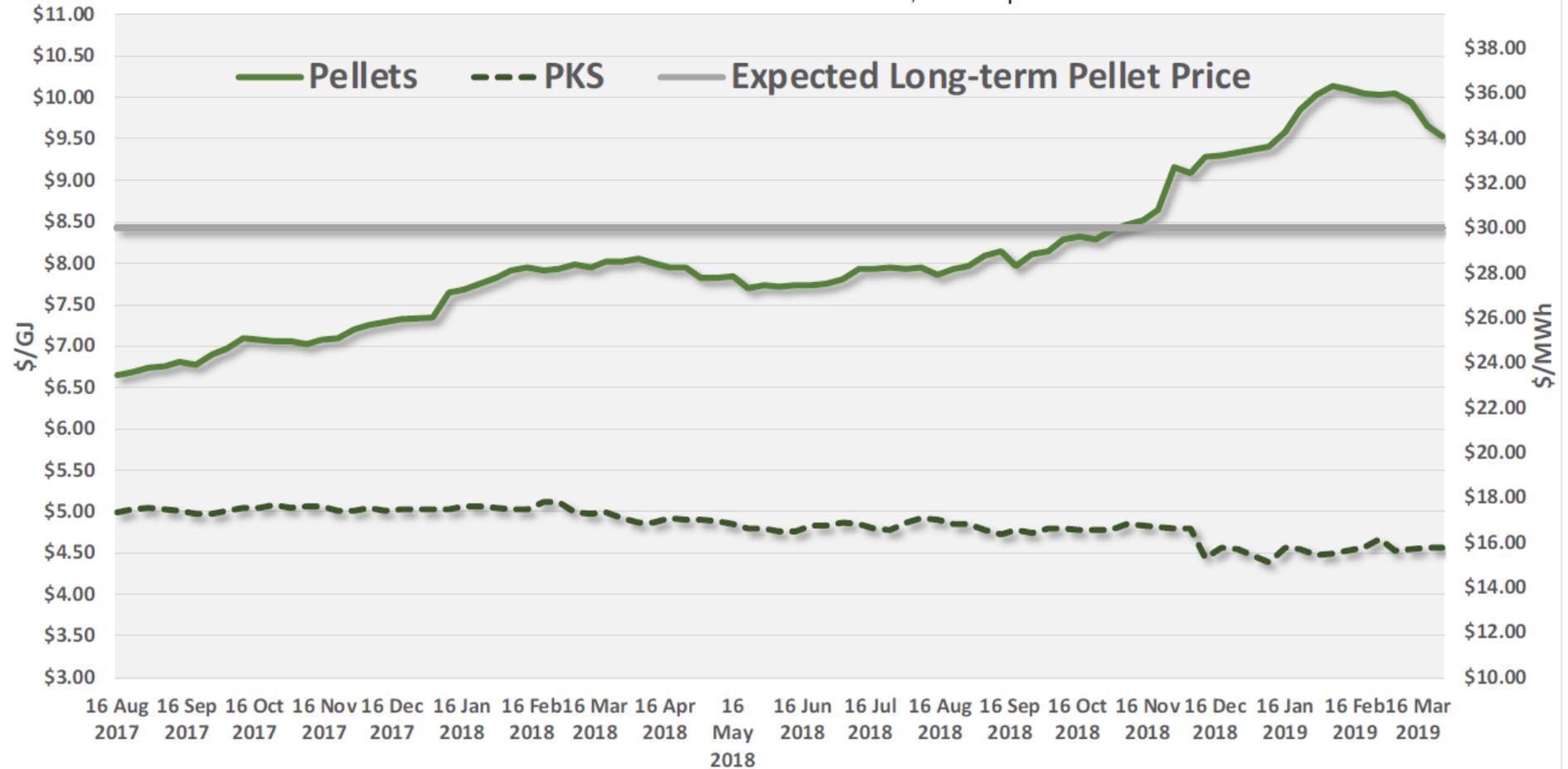
- South Korea—driven by Renewable Portfolio Standard and RECS
- So. Korean utilities very price sensitive
  - short-term tenders, use of spot market
- So. Korean demand led to rapid development of wood pellet production capacity in Southeast Asia
- In 2018, South Korea's wood pellet imports reached 3.4 million tons
  - 95% of that volume coming from Southeast Asia



Japan pellets price: mostly up, recent downturn

### US Dollars per Gigajoule and per MWh (Argus Spot Prices - FOB\*)

Based on a net of 15.8 GJ/MT for PKS, 18.0 for pellets



\* Pellets are Argus FOB Canada. PKS are Argus FOB Indonesia.

source: Argus; Analysis by FutureMetrics

# The competition has the edge

- From Canada: wood pellets
- From Indonesia and Malaysia: palm kernel shells
  - 1.26 mmt in 2018, mostly from Malaysia
  - Japan considering more stringent sustainability requirements on PKS which could curtail Japanese imports
- From within US: wood pellets
  - Enviva shipping wood pellets out of existing mills in Gulf States
  - BC –based Pinnacle building a 360,000 ton/year pellet mill in Alabama

# Dynamic policy environment

- US wood pellet exports expected to exceed 3 MMT by 2025
- FiT only applies to electrical generation, not heat
- FiT adjusted annually, some renewables have seen lower subsidies
- Biomass moving toward tenders or auction in 2019
  - Co-firing not supported in tenders
- Capacity market coming on in July 2020



Oregon  
Torrefaction  
co-locating at  
Malheur Lumber  
Co. in John Day,  
Ore.



# Restoration Fuels, LLC

- Subsidiary of US Endowment for Forestry & Communities
- Approx. \$18.5 mil build
- 18-20 employees
- Construction is over 50% complete
- 100,000 tons finished product
- 150,000 green tons forest biomass
- Co-fire with coal
- Seeking customers in Japan



# Regional Collaboration Ideas

- Data sharing
  - LCA efforts
  - policy developments
  - business developments
- Communications/Public relations
  - Pool resources
- Reverse trade missions
  - Potential Japanese visit to PNW this spring



Thanks!

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