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The global outlook for wood pellet markets

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The Outlook for Wood Pellets – Demand, Supply, Costs and Prices

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BIOMASS & PELLETS — MARKETS — INVESTMENTS — LEGISLATION

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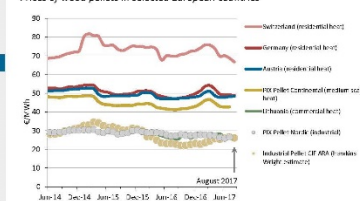
US exports of heating pellets to Italy resume, while commissioning of EPH's Lynemouth has been delayed

Tightness in the spot industrial pellet market and further depreciation of the dollar have pushed pellet prices up again in August. Our estimate of the dollar price of industrial pellets has therefore increased to \$143-148/t. Although three major buyers were said to be looking for spot cargoes for Q4 in recent weeks, no deals appear to have been concluded. The upcoming commissioning of EPH's Lynemouth plant and RWE's Amer #9 unit, and downtime at Drax's converted units have all brought uncertainty into the short term supply demand balance for industrial pellets.

Given the tightness in the market, KOEN's recent tender for 1.5Mt/y of pellets for delivery in 2018 and 2019 (see p.7) seems challenging, at best. The required specification is likely to exclude Vietnamese producers from participating, and delivering substantial volumes in containers (as per KOEN's request) would be extremely difficult - and expensive - for suppliers in North America. To put it in context, delivering 600kt/y of pellets in 20ft containers equates to 2,272 containers per month. The logistical challenges associated with achieving this would, obviously, be huge.

In the shorter term, planned maintenance of Drax's unit #1 has now begun and will run until 6 November. The company's other two converted units

Prices of wood pellets in selected European countries



Sources: See the footnotes beneath the price indications table, page 3.

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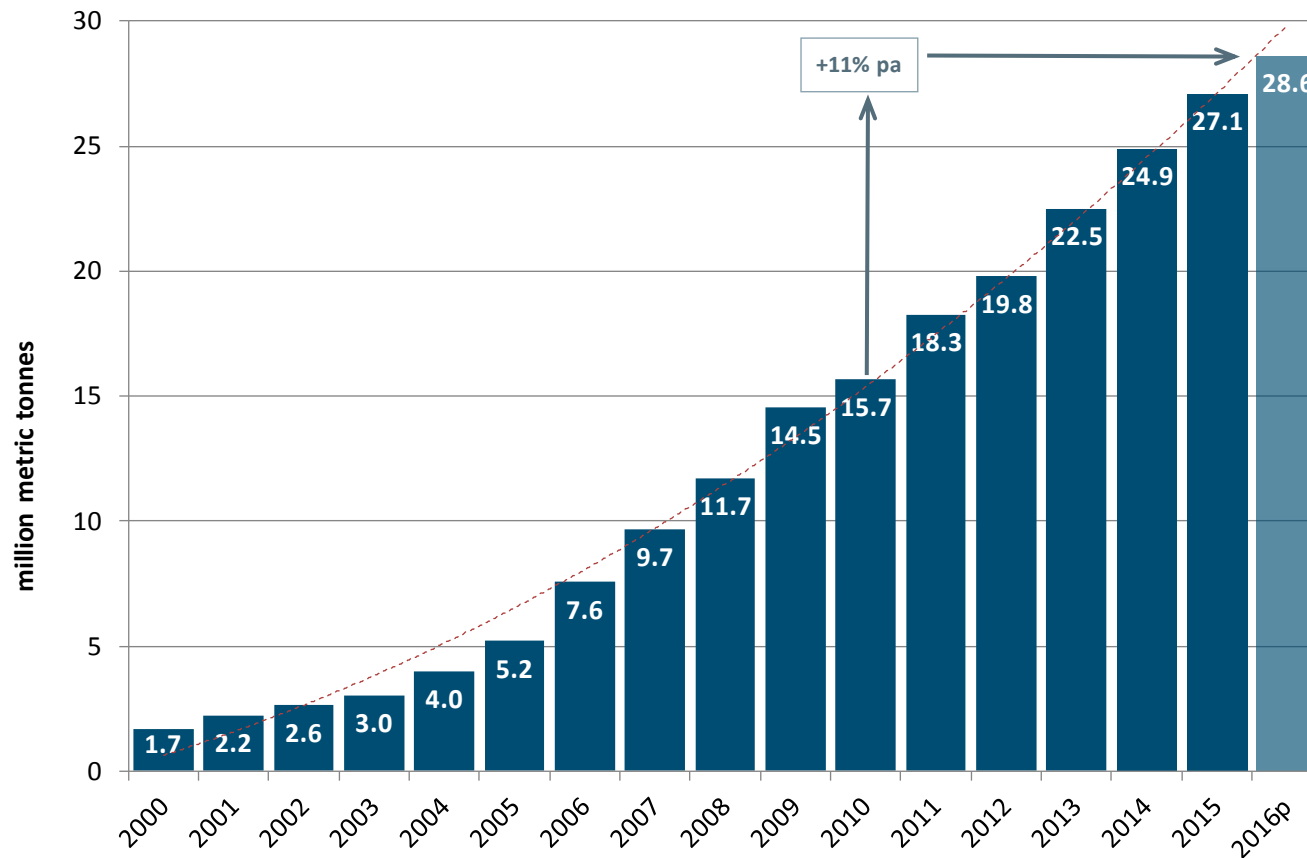
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Global market overview



Global wood pellet production



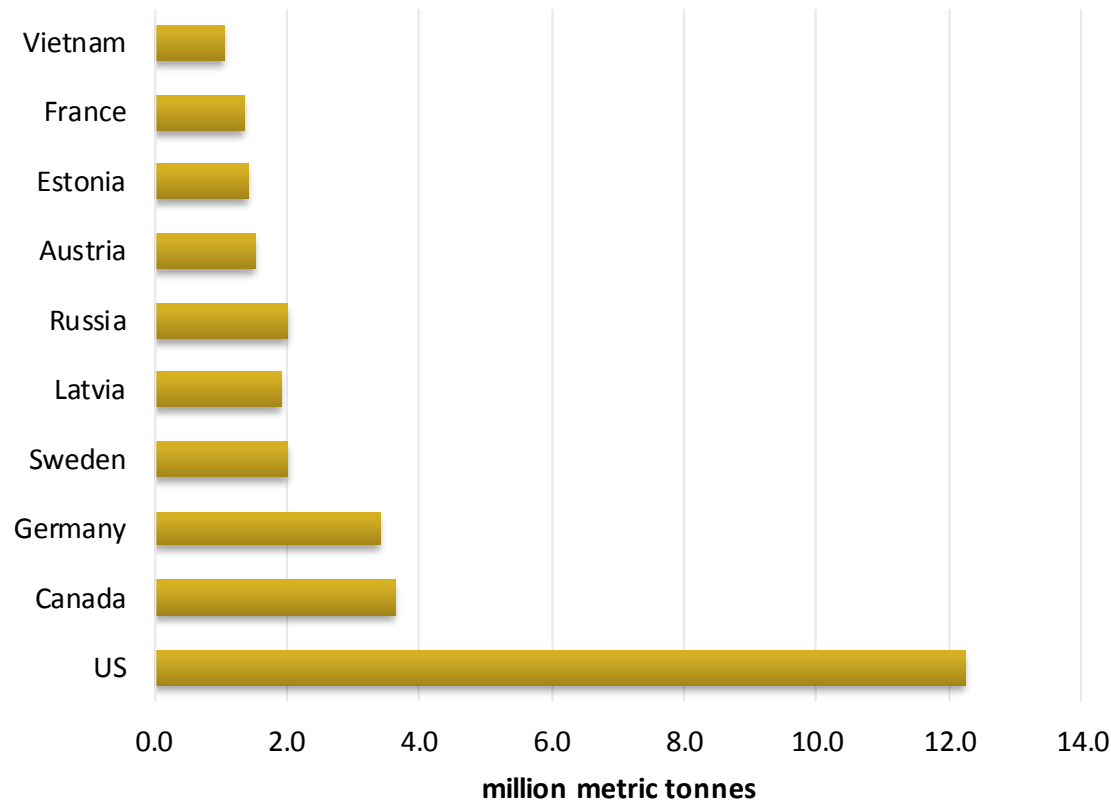
- 2016 saw the lowest ever year-on-year growth (+6%)
- This resulted in closures and low capacity utilisation at many pellet mills
- However low-cost production capacity did grow in Asia

Sources: REN21, FAO and Hawkins Wright

Note: All figures are in million metric tonnes (Mt)



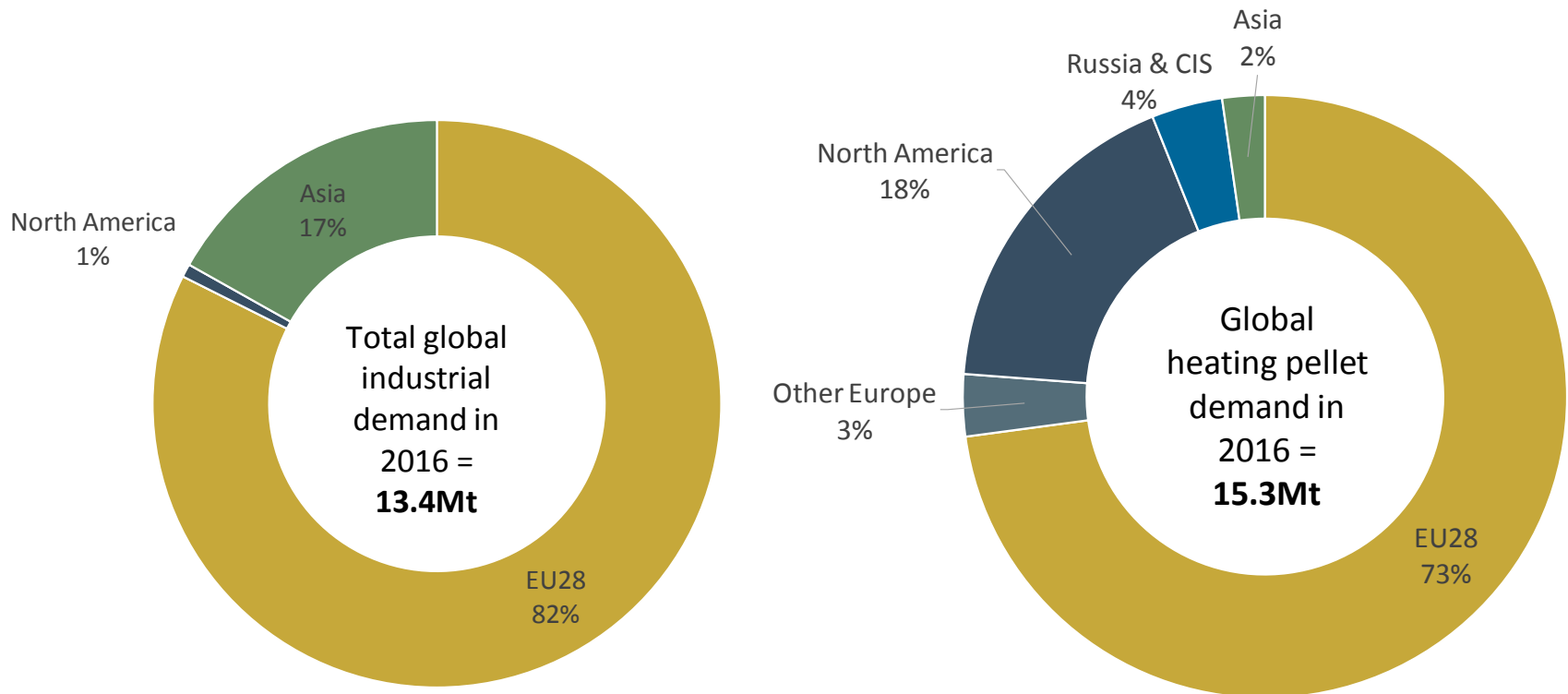
Global wood pellet production capacity, Q2 2017



- Total (industrial + heating) wood pellet capacity = **41.2Mt**
- EU = 19.5Mt
- US = 12.3Mt
- Canada = 3.6Mt
- Asia = 1.8Mt



Global wood pellet demand, 2016

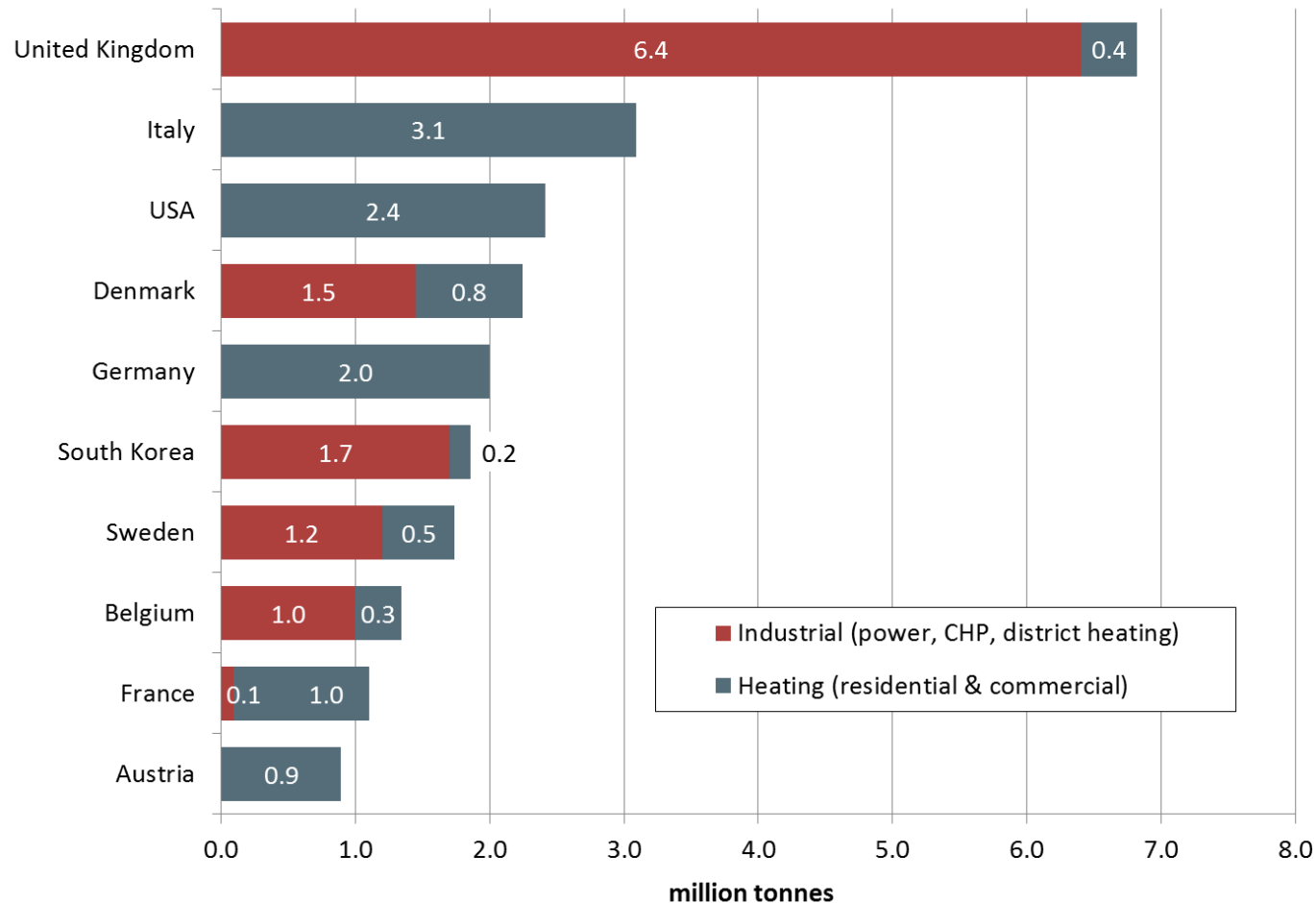


- **Total global demand in 2016 = 28.6Mt**
- Annual global demand growth of +6%
 - +26% in Asia
 - +2% in EU28

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Top ten wood pellet consuming countries, 2016

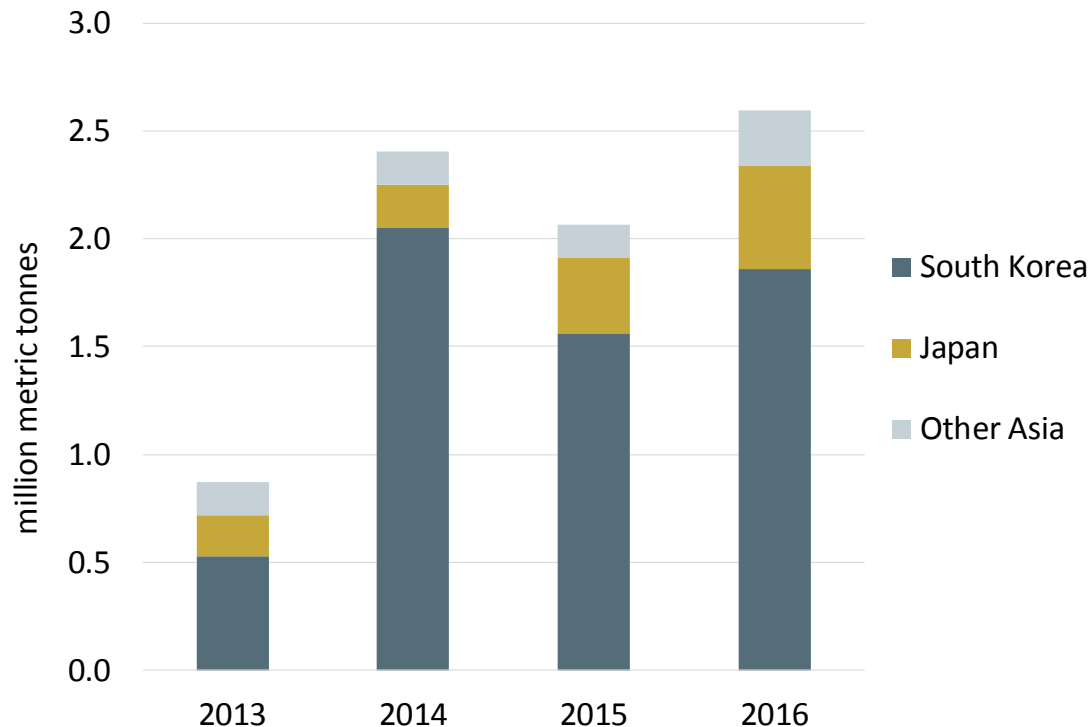


Source: Hawkins Wright, the Outlook for Wood Pellets, Q2 2017

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Asian wood pellet demand



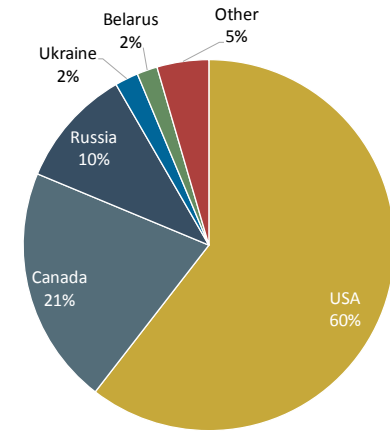
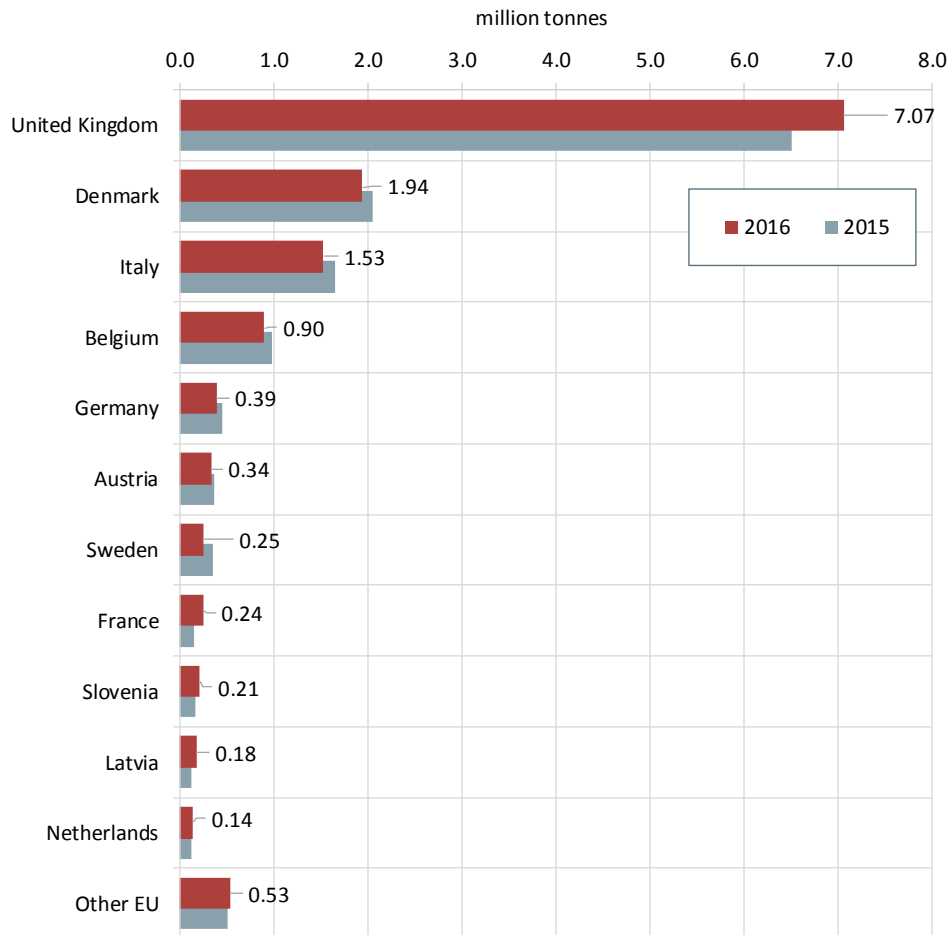
- Wood pellet demand in Asia grew by +26%, (+0.5Mt) in 2016
 - > +19% in South Korea
 - > +37% in Japan
- Projects in Asia are getting bigger
 - > Gunjang Energy began operating in 2016, requiring 0.35Mt/y
 - > KOEN's Yeongdong unit #1 conversion began operating this year, requiring 0.5Mt/y of pellets



Wood pellet trade



European wood pellet imports, 2016



- Imports from outside the EU = 8.1Mt (of which Canada supplied 21%)
- Imports from within the EU = 5.6Mt
- Net imports rose to 7.3Mt in 2016 (+14%)



Asian wood pellet imports

South Korea: Wood pellet imports

tonnes	2016	% chg 15/16
Vietnam	1,254,957	+23% ↑
Malaysia	199,077	+29% ↑
Russia	125,841	+50% ↑
Indonesia	75,854	+26% ↑
Canada	35,263	-60% ↓
Thailand	20,508	-42% ↓
Other	4,673	+1074% ↑
Total	1,716,172	+17% ↑

Japan: wood pellet imports

tonnes	2016	% chg 15/16
Canada	260,935	+79% ↑
Vietnam	62,441	+128% ↑
China	20,733	-64% ↓
Malaysia	1,418	+775% ↑
Thailand	503	+159% ↑
Indonesia	425	+40% ↑
USA	306	+29% →
Other	102	+89% →
Total	346,863	+49% ↑

- Asian wood pellet imports have risen +46% in H1 2017 v. H1 2016
 - > Japan = 0.23Mt
 - > Korea = 1.04Mt
 - > **TOTAL = 1.27Mt in H1 2017**
- Main suppliers are
 - > Vietnam (55%)
 - > Canada (12%)
 - > Malaysia (13%)
- Japanese buyers prefer security and sustainability of Canadian pellets
- South Korean buyers want lower cost pellets (i.e. Vietnamese)

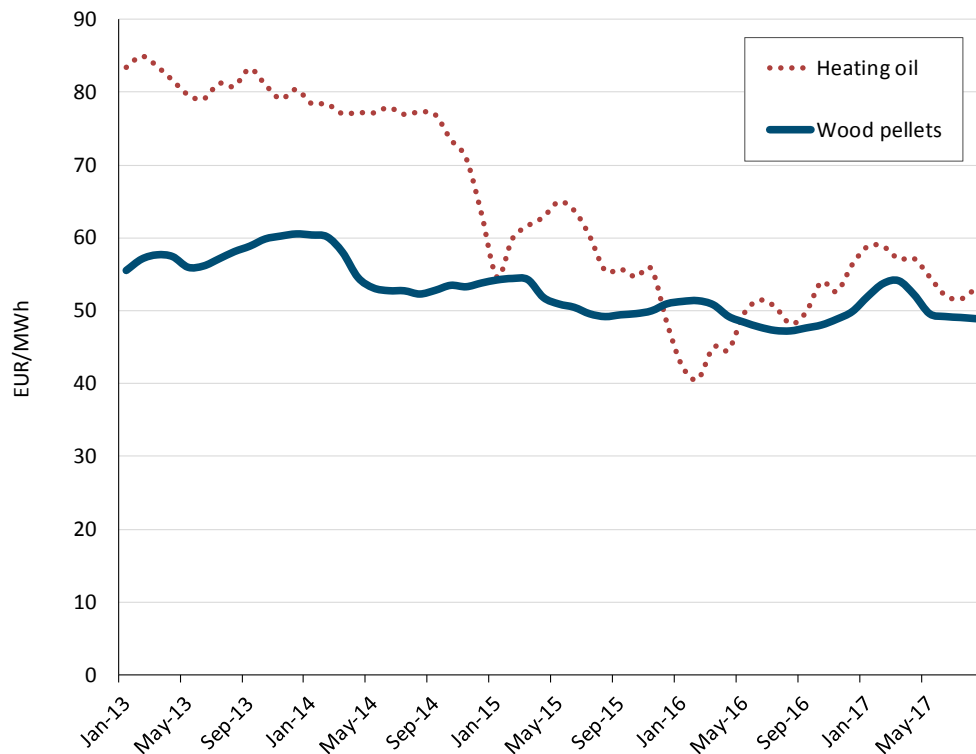


Recent market trends

The European heating market rebalanced more quickly than anticipated



Prices of heating oil vs pellets in Germany



Analysis based on delivered (retail) prices of heating oil and wood pellets, including taxes.

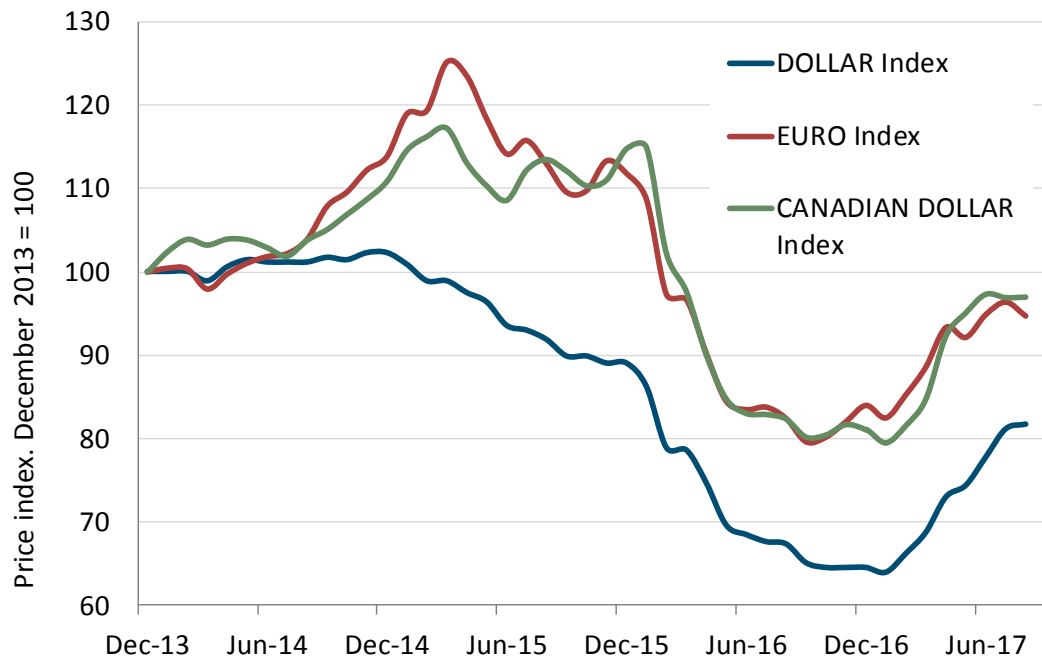
Sources: DEPV (pellets); EU Energy Portal (heating oil)

- Colder weather in late 2016 and early 2017 increased pellet demand for heating in Europe
- Persistently low, but volatile, oil prices weakened the economic argument for pellet heating and reduced customer confidence in 2015-16
- But this has improved over the past year. Pellets were 8% cheaper than heating oil in Germany on average over the last 12 months



The industrial market has also rebalanced in 2017

Indices of industrial pellet prices in different currencies



Analysis based on delivered (CIF ARA) spot prices of industrial-grade wood pellets in US\$ with currency conversion

Source: Hawkins Wright, Forest Energy Monitor

- After months of depressed spot industrial pellet prices, with little trans-Atlantic trade
- Upcoming new sources of industrial demand and reduced pellet capacity growth have rebalanced supply-demand and lifted pellet prices
- The depreciation of the US dollar has improved the fortune of US producers
- BUT – spot trades are still very infrequent, contracted volumes account for majority of the market



The outlook for demand



New sources of industrial pellet demand - Europe

Name	Location	Installed capacity, MW _e	Pellet demand, Mt/y	Status
Dong Energy, Avedøre 1	Denmark	250	~0.4	Began operating end-2016
Dong Energy, Studstrup	Denmark	245	0.5-0.8	Began operating end-2016
RWE/Essent, Amer 9	Netherlands	340	1.2	Due online Nov 2017
Uniper Maaslvakte MPP3	Netherlands	1100	0.5	Due 2018
RWE/Essent Eemshaven	Netherlands	1600	0.8	Due 2018
Engie Rotterdam 1	Netherlands	736	0.2	Due 2018
EPH, Lynemouth	UK	420	1.6	Due early 2018
MGT Power	UK	299	1.1	Due Q1 2020



New sources of industrial pellet demand - Asia

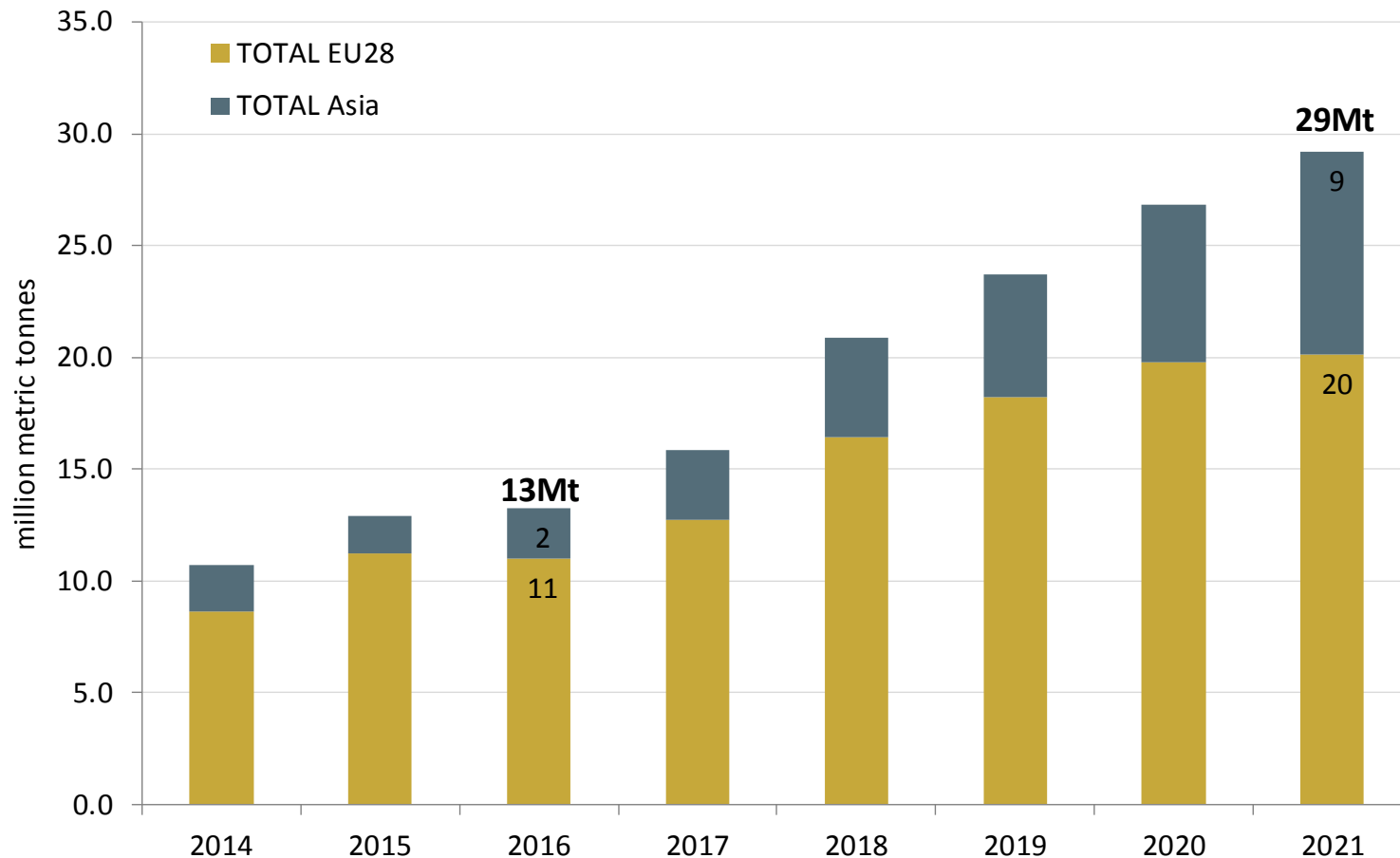
Name	Location	Installed capacity, MW _e	Pellet demand, kt/y	Status
KOEN Yeongdong #1	Korea	125	550	Began operating 2017
Hanyang/KNHP Gwanyang Energy	Korea	220	500	Due online 2020
KOEN Yeongdong #2	Korea	200	1,450	Planned for 2020
KOMIPO Gunsan Bio	Korea	200	800	Due online 2020
Nakayama Nagoya 2	Japan	110	125	Began operating 2017
Summit Energy Sakata	Japan	50	100	Due online 2018
IHI Kagoshima	Japan	49	250	Due online 2018/19
Aioi	Japan	200	650	TBC
J-Power Takehara	Japan	600	250	Planned 2020

This is just a selection of the biggest pellet-fired projects, there are numerous other projects planned in Asia (Over 12GW_e of biomass power capacity is certified under Japan's Feed In Tariff and recent policy changes in Korea could result in greater renewable energy deployment)

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Source: Hawkins Wright, the Outlook for Wood Pellets

The outlook for industrial wood pellet demand in the EU and Asia



- Asian demand expected to account for 31% of industrial market by 2021

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The outlook for supply

Additions to global wood pellet production capacity



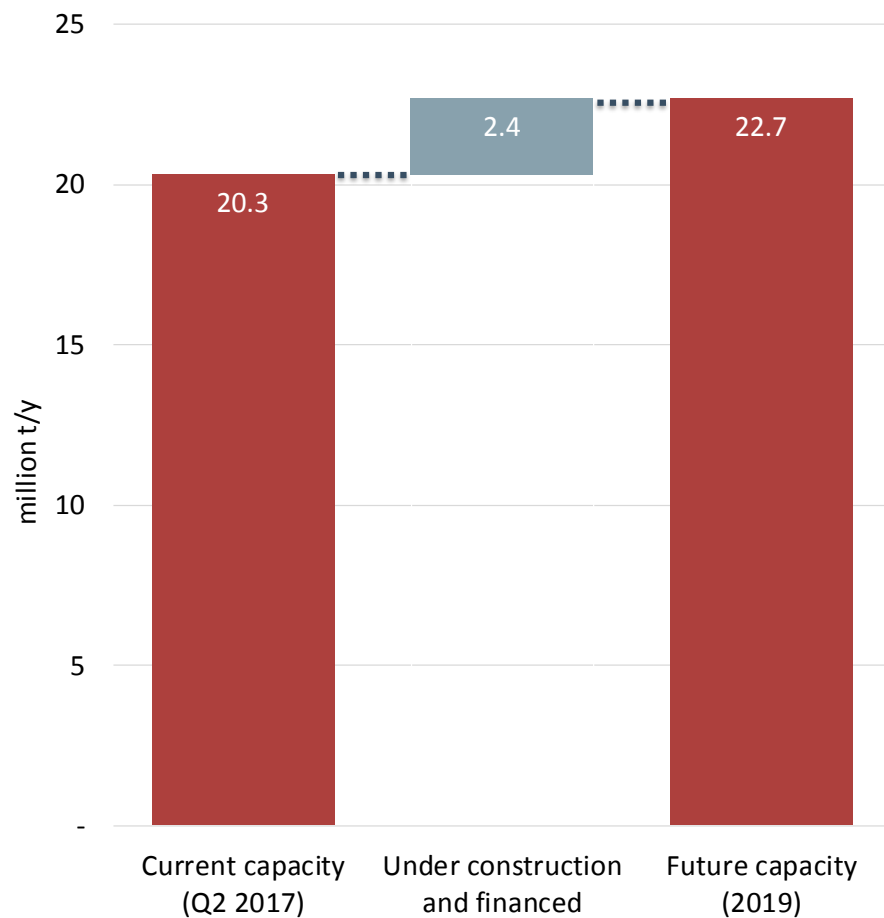
Company	Country	Production capacity, kt/y	Status
Tanac	Brazil	400	Commissioning
SY Energy	South Korea	500	Commissioning
Plantation Energy	Australia	250	Restarted Q3 2017
Highland Pellets	United States	150 (4th line at existing mill)	Due online Oct 2017
Drax Biomass, Amite and Morehouse	United States	150 (75kt/y capacity expansions at each mill)	Due late 2017
Graanul, Broceni and OÜ Osula Graanul	Latvia	150 (new mill at Broceni) 110 (expansion)	Under construction, due 2017
An Việt Phát	Vietnam	200 (expansion at existing mills)	Under construction
Enviva, Hamlet	United States	600	Due late 2018
Pinnacle, Entwistle	Canada	400	Due late 2018
Drax LaSalle	United States	500	Due to restart 2018

Source: Hawkins Wright, the Outlook for Wood Pellets, Q2 2017

Note: All figures are in thousand metric tonnes per year (kt/y)

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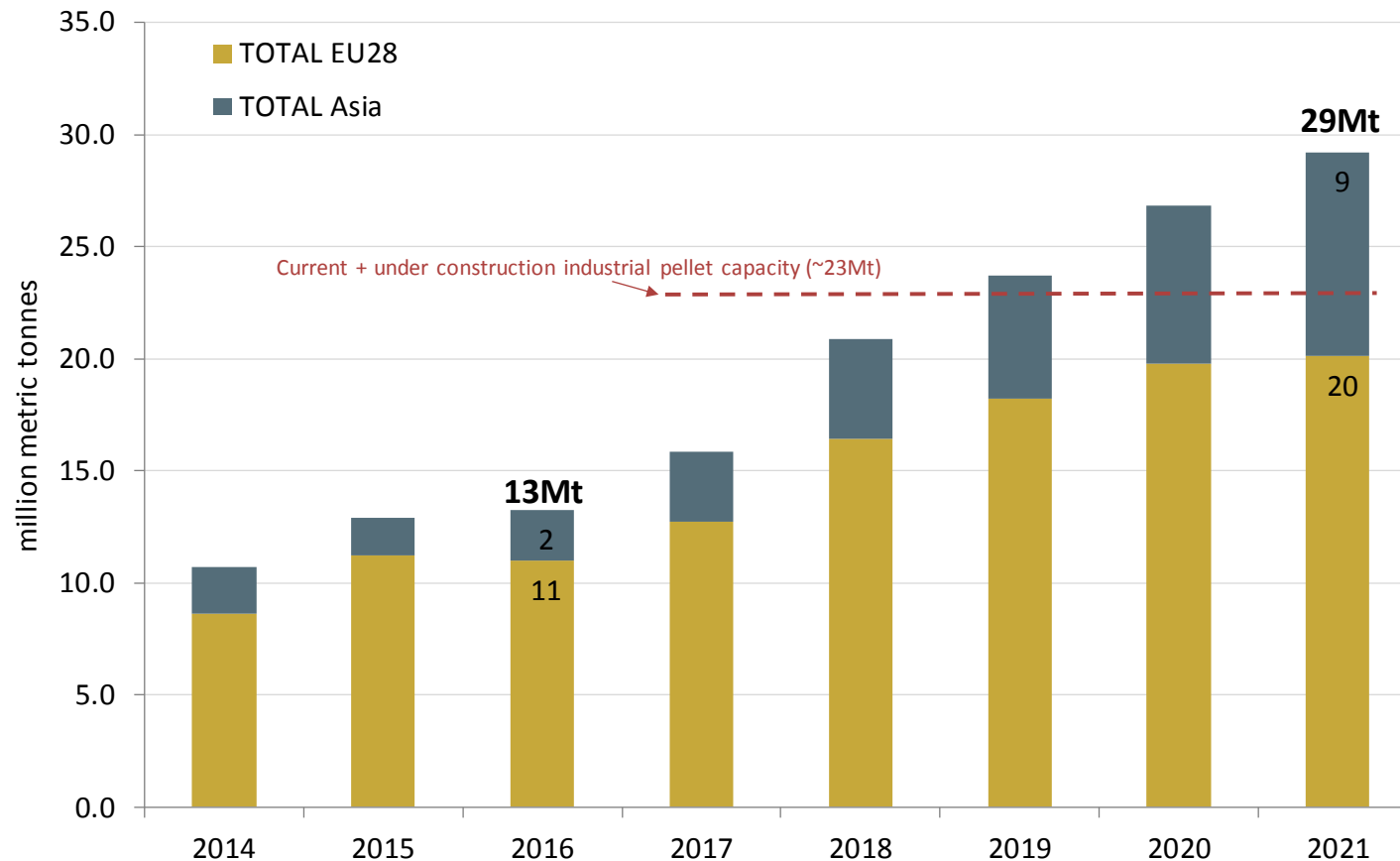
Additions to global industrial pellet production capacity



- Net capacity additions have slowed in the past year
- Some recent capacity closures or reductions
- Investment environment challenging: fewer projects reaching financial close
- From 2019, further volumes will need to be sought to meet industrial demand forecasts – either via transfer from heating pellet market or through new industrial-focused capacity additions



Industrial pellet supply-demand balance

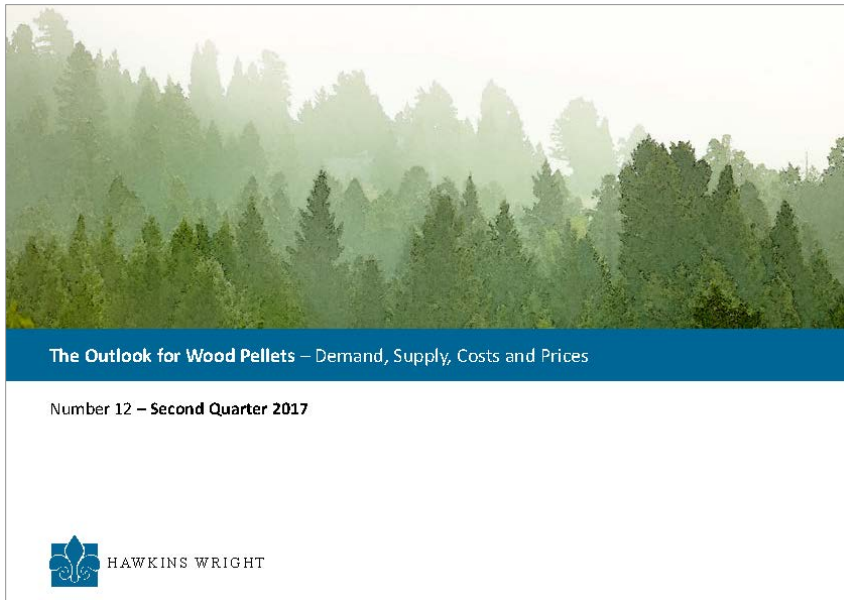


- Approx 6Mt/y of new pellet supply will be needed by 2021 if demand is to rise as expected



Conclusions

- After a difficult couple of years, supply and demand are now more balanced
 - > New demand is coming online
 - > Production capacity growth has slowed
 - > Fewer spot volumes are being produced (pro or con?)
- Activity in the Asian market is ramping up fast, but how will this demand be satisfied?
 - > Korean tenders are extremely challenging (logistics, price, specification)
 - > Japanese buyers are diligent (long term supply security, sustainability, bankability)
- The market may noticeably tighten as new demand comes online
 - > Significant additional pellet capacity will be needed if demand is to grow as expected
 - > Lower inventories in the heating market (and/or cold temperatures) may mean smaller volumes available for transfer to industrial market



The Outlook for Wood Pellets

Demand, supply, costs and prices

A multi-client service comprising regularly updated forecasts of the wood pellet market's development

- Two 'main' reports (Q1 & Q3)
- Two 'update' reports (Q2 & Q4)
- Workshop or presentation meeting
- Charts and background data on request
- On-call response to ad hoc queries

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