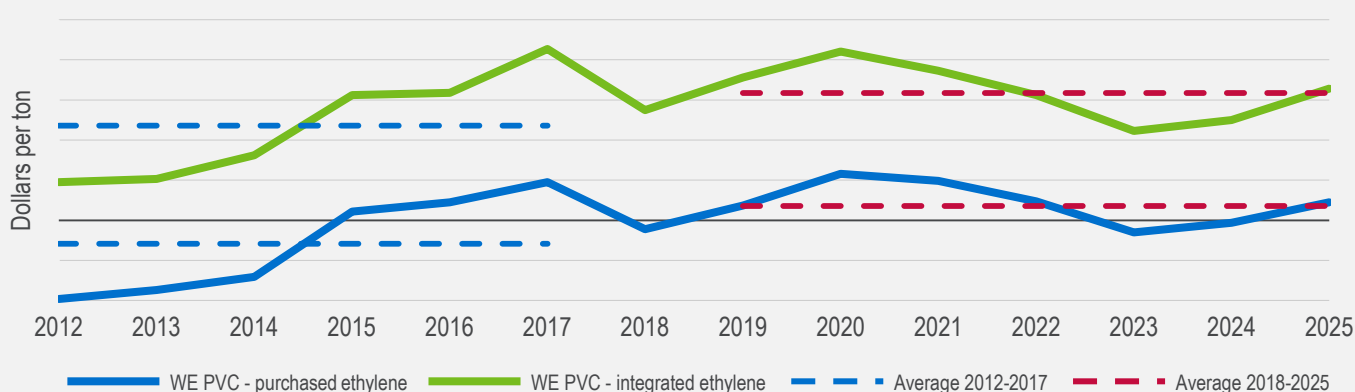


PVC in Europe – Good times ahead?

Following a period of depressed demand, European PVC producers are set to experience more favourable market conditions – leading to increases in plant utilisation and margin growth.

But there are some potential headwinds which could scupper this improved profitability – such as competition from low cost producing regions (mainly the USA) and economic uncertainty in key export markets such as Turkey. But as is seen across the chemicals industry – there will be some players who are better positioned than others to respond to these challenges and to benefit from this more positive landscape.

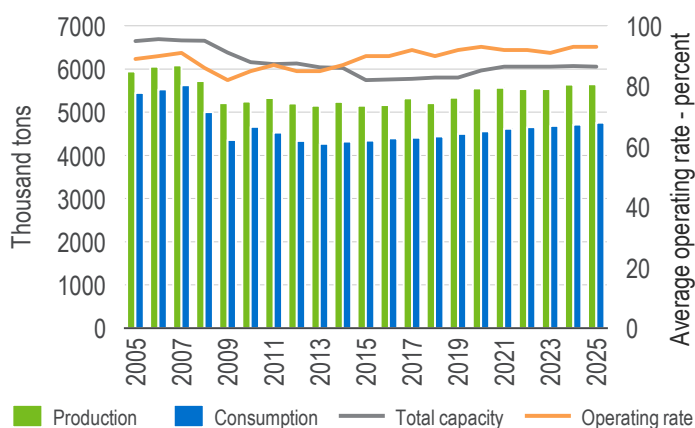
Cash cost margin – Western European PVC producers (2012 – 2025)



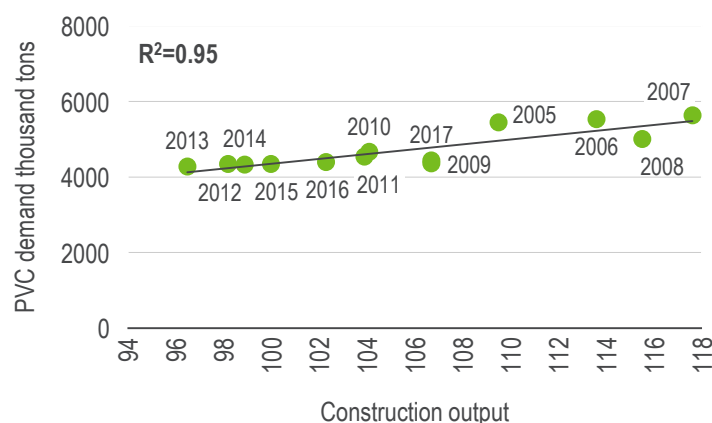
European supply and demand position:

After the demand destruction experienced during and after the financial crisis – PVC demand in Europe is expected to experience sustained growth – albeit at a relatively low rate. Over this same forecast period, only limited new capacity is expected – resulting in slightly higher average regional plant utilisation. Whereas, over the previous ten years, Europe saw quite significant capacity rationalisation.

Western European supply and demand balance



Correlation between construction activity and PVC demand in Western Europe



Source: Eurostat

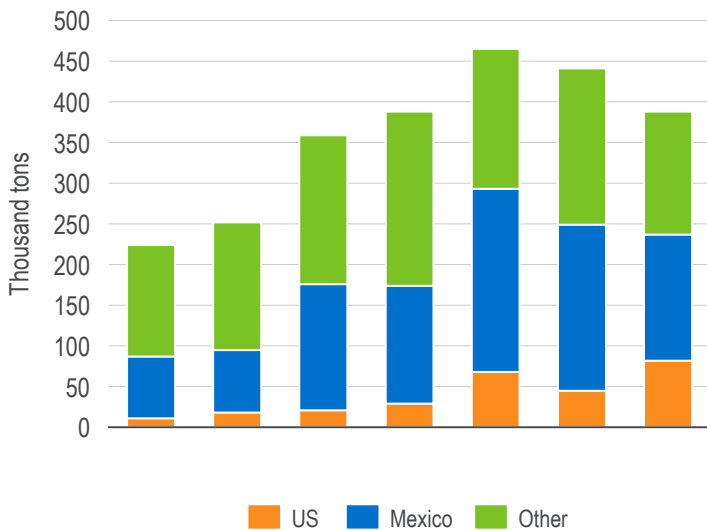
⚡ CAPACITY SHUTDOWNS

- INEOS ChlorVinyls Schkopau, Germany
280 kta in 2015
- INEOS ChlorVinyls Runcorn, UK
105kta in 2014
- Arkema Martorell, Spain
96 kt in 2011

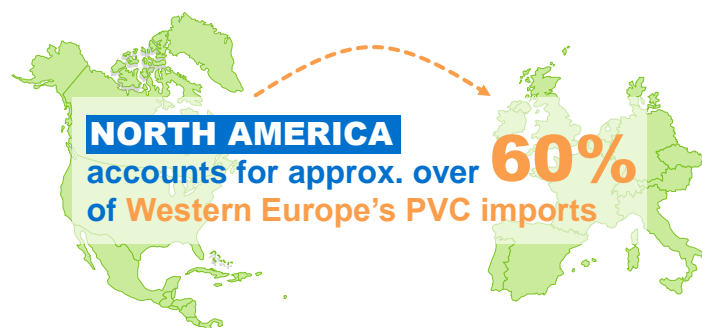
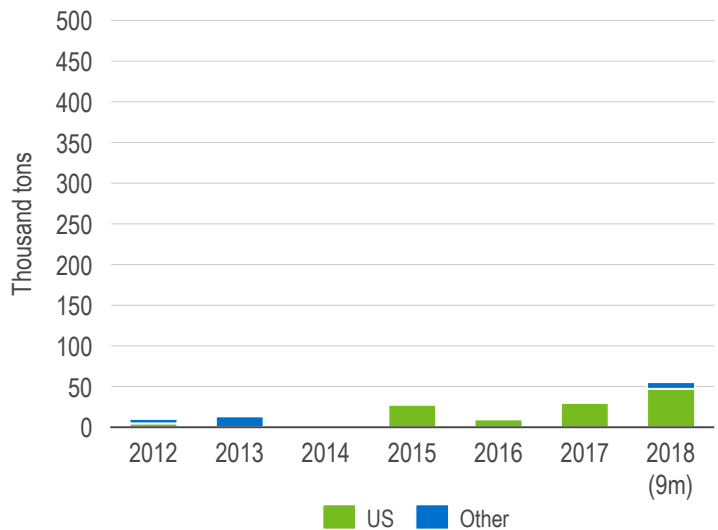
Reflecting PVC's use in window and door profiles, pipes and fittings etc., PVC demand shows a close relationship to construction activity. Construction output in Western Europe is expected to perform better in the near-term (growing annually between 1 to 2 percent on average) than the previous ten years – supporting modest growth in PVC consumption.

Impact of US cost advantage:

Imports of PVC into Western Europe (EU 19)



Imports of EDC into Western Europe (EU 19)



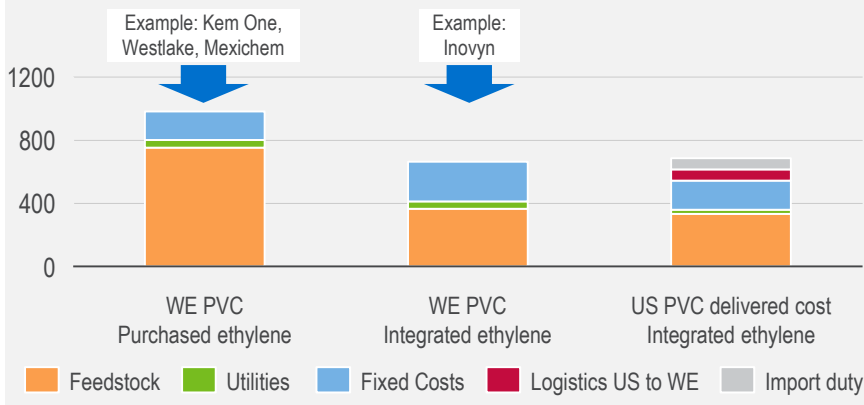
North America accounts for approximately 60% of Western Europe's PVC imports (or 6% of the region's total demand). Following the acquisition of Vinnolit and Vestolit in 2014 by Westlake and Mexichem respectively, these imports have grown. This is likely partially attributed to supply chain optimisation and improved market access following the North American producers' European acquisitions.

In addition to PVC trade – EDC can also be traded from regions with lower cost ethylene and electricity (resulting in lower cost chlorine production). However, Western Europe is fairly balanced in its EDC supply and therefore import volumes are fairly limited. Also, integrated EDC/VCM/PVC plants have better economics, further limiting EDC trade flows to Europe.

Imports of EDC and PVC from the US to Western Europe increased in 2018, but this was due to particularly low ethylene prices observed in 2018 in the US.

- Oversupply of ethylene in the United States depressed prices in the United States to a 15 year low in 2018, widening the regional price spread between Europe and the US to over \$500 per ton.
- The US PVC cost advantage will continue in 2019, although it is not expected to be as pronounced, as ethylene prices in the US are expected to increase from the historical low observed in 2018 as more ethylene derivative units come on-stream. The growth of ethylene prices will be further supported by the expected higher US ethane price.

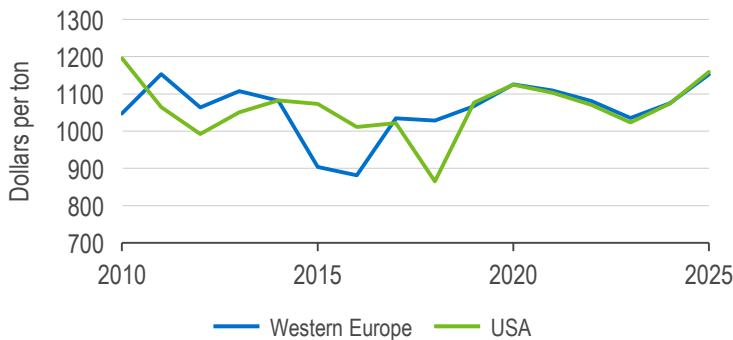
Western European producers' cost of production vs USA delivered cost for PVC (based on 2018 Q1 prices)



The delivered cost position for US PVC to Western Europe is competitive to local producers due mainly to the region's lower ethylene price. However, the largest European producer of PVC (Inovyn) is fully backward integrated to ethylene and also has an additional cost benefit from cracking ethane imported from the US – therefore, at least **35 percent of WE PVC capacity has a slight cost advantage** versus North American imports.

In addition, three US players own PVC businesses in Western Europe and therefore are less likely to compromise their own WE PVC sales. Several of the European producers also make **emulsion grade PVC** which is valued for specific applications and tailored to customers – shielding it from lower cost of production commodity grades.

Regional PVC prices

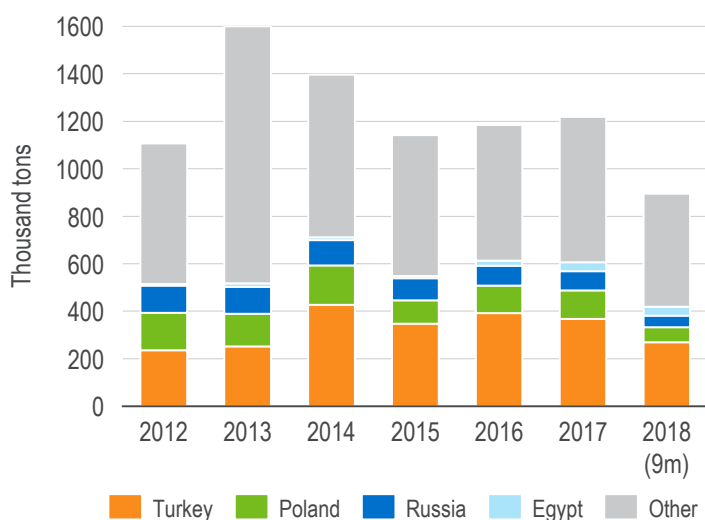


Another factor shielding Europe from US PVC imports is **regional pricing differences** – historically prices in the US have been in-line or above the WE PVC price, making US PVC exports to WE less attractive.

Also, US producers have historically targeted their PVC exports at emerging markets, which are easier to penetrate and show higher demand growth.

What are Europe's main export countries?

Exports of PVC from Western Europe (EU 19)



Western Europe's single largest export country for PVC is Turkey. Exports to Turkey have reduced following the introduction of economic sanctions and the country's slowing economy and weakening currency. However, Europe's trade to Turkey is aided by the Turkey-EU Customs Union and anti-dumping tariffs placed on imports from the United States. Overall, exports of European PVC to Turkey accounted for just 7% of European production in 2017.

Overall, the European PVC market is in a more positive position than it has been – giving those producers with the best cost positions and product portfolios an opportunity for margin growth

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