

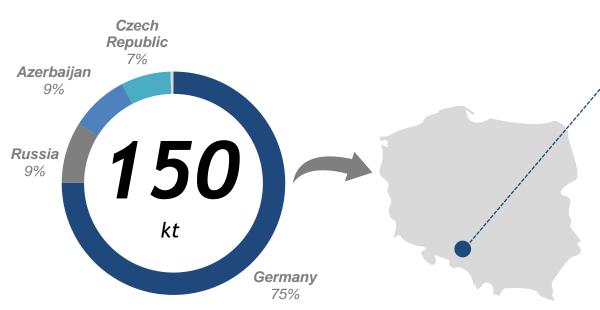
Powering Creation

Propylene production via propane dehydrogenation (PDH) Warsaw, 27 March 2015



Poland has a net deficit of propylene, with annual imports of ca. 150,000 tonnes. Most of this is purchased by Grupa Azoty Z.A. Kędzierzyn for the purpose of OXO alcohols production

Volume of propylene imported into Poland (2013)



Grupa Azoty Zakłady Azotowe Kędzierzyn

Grupa Azoty's plant in Kędzierzyn is one of the biggest propylene users in Poland

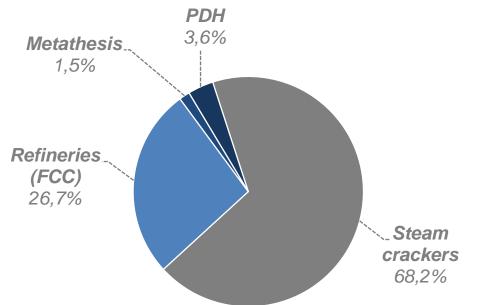
Volume consumed equals ca. 120 - 140 kt annually

Propylene is used for the production of OXO alcohols



In the coming years, a decrease of propylene production is expected in Western Europe. A new PDH unit will have a distinct advantage over other producers in the region

Propylene production in Western Europe



Currently, the deficit of propylene in Germany is close to 850 kt annually

PDH

Due to the shale gas boom in the USA, the **availability or propane increased**, which caused global **prices to fall**

Steam crackers

Most European crackers are fed with naphtha. The shift of feedstock to ethane requires substantial investment and considerably decreases propylene yields

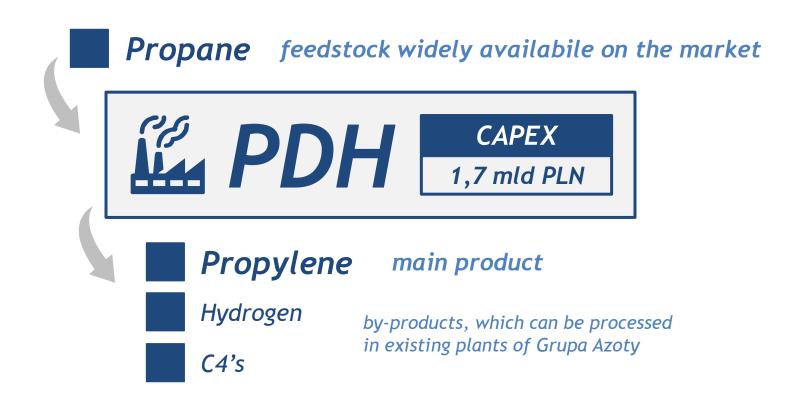
Refineries (FCC)

Since 2009, **15 refineries** have been closed in Europe. According to International Energy Agency's forecasts, in years 2013-2020 the throughput of oil will decrease by further 65 mln tonnes, i.e. 10%, causing **further drop of propylene output**



The construction of a propane dehydrogenation (PDH) plant will enable Grupa Azoty to fully cover its current propylene deficit and provide a basis for the development of next investment projects

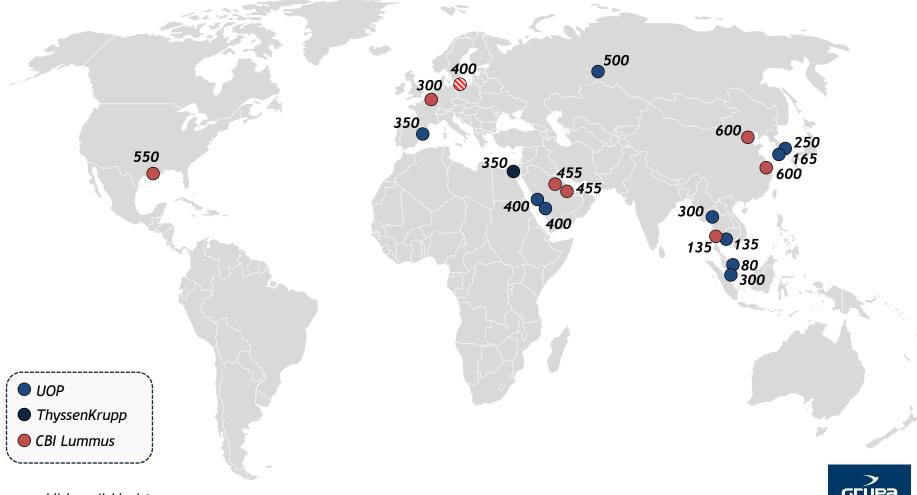
Simplified diagram of PDH plant (400 kt)





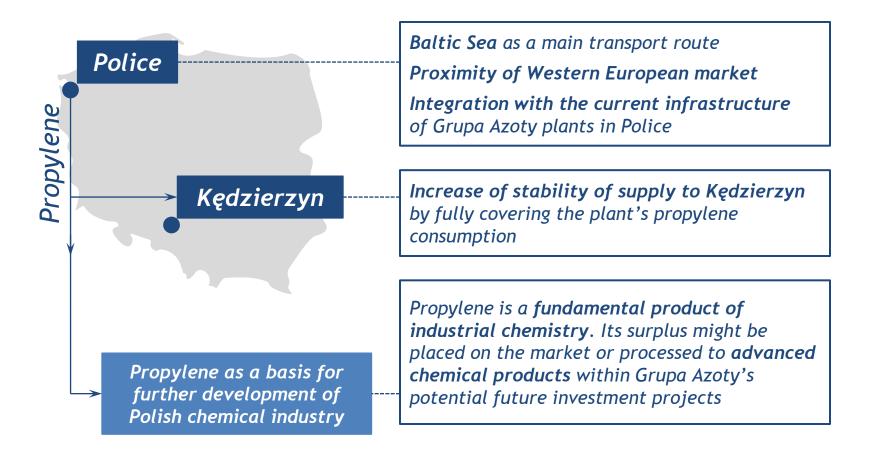
There are currently 18 operating PDH plants in the world

Existing propane dehydrogenation plants and their capacities (kt)



Source: publicly available data

The location of the investment in Police is optimal in terms of logistics and provides synergies with existing infrastructure





Propylene is a fundamental product of industrial chemistry, providing a basis for further processing into more advanced chemical products

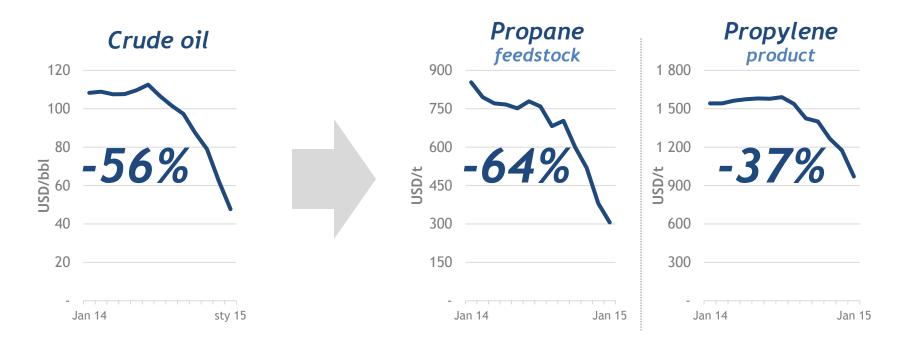


further products basen on propylene

Polypropylene	OXO alcohols	Propylene glycol	Epichlorohydrin
SAP	Phenolic resin	Bisphenol A	Polycarbonates
Butyl acrylate	Plasticizers	Polyacrylic acid	Polyacrylic acid
2EH acrylate	Propylene oxide	Acrylic acid	Acrylic plastics and fibres
Ethyl acrylate	Cumene	Acrylonitrile	ТРО
Methyl acrylate	Propylene glycol ethers	EPDM	Acrylamide
Polyols	HMDA	Phenol	



The recent changes in the oil market have an impact on prices of petrochemicals. However, they don't aggravate the prospects for Grupa Azoty's investment in PDH plant

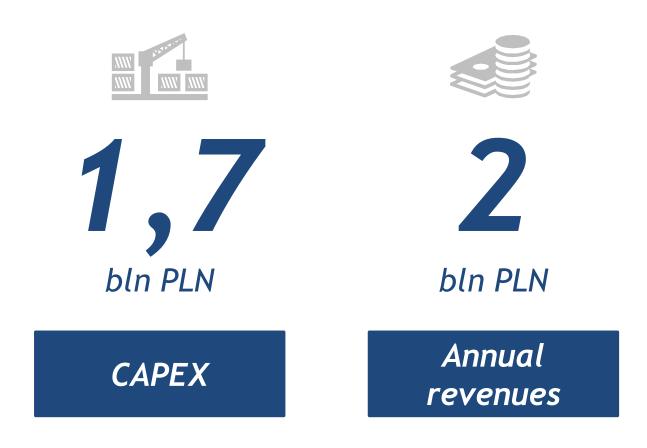


Last year, the fall in propane prices was more significant that the corresponding fall in propylene prices

Increase of PDH margin



Total investment expenditures are equal to 1,7 bln PLN. The plant will increase Grupa Azoty's annual revenues by around 2 bln PLN





The analyses of PDH technology have been conducted by Grupa Azoty for the last couple of years. Currently, we're entering the basic engineering phase

2008

Initial analyses of PDH plant by Grupa Azoty

2014 Feasibility Study of the investment

2015

Corporate decisions Selection of technology and basic engineering

2019

Planned start-up of the PDH plant



Reputable and reliable consultants with extensive experience in chemical and petrochemical industry have been engaged in the project





PDH plant - key facts

- Propylene is a fundamental product of industrial chemistry
- Poland has a high net deficit in propylene trade;
- Grupa Azoty ZAK uses propylene to produce OXO alcohols;
- Grupa Azoty's PDH project will be the biggest plant of this type in Europe (around 400 kt of propylene);
- PDH will make Grupa Azoty independent of external propylene suppliers;
- PDH will become a basis for further investment projects, processing propylene into more advanced chemical products
- Total investment of 1,7 bln PLN will increase Grupa Azoty's annual revenues by around 2 bln PLN annually
- Planned start-up 2019



Thank you for your attention!

