



**International Workshop on  
Optimum Utilization of CMM/CCBM in India  
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Ranchi (Jharkhand) India**

# CMM for LNG Production and Gas-fired Chillers

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## Located in the industrial heartland of Europe

- 5 existing coal mines in Poland
- 3 coking plants
- headquartered in Jastrzębie-Zdrój, Poland
- located 100% in OECD nations

## Coking coal focused

- **#1 independent, not integrated coking company in EU**
- Holds 14% of the global coke trade market

## Long mine life

- 30–40 years expected life of mines

## Strong share price performance in FY 2017

- JSW share price up by 43%
- FTSE 350 mining Index up by 27%

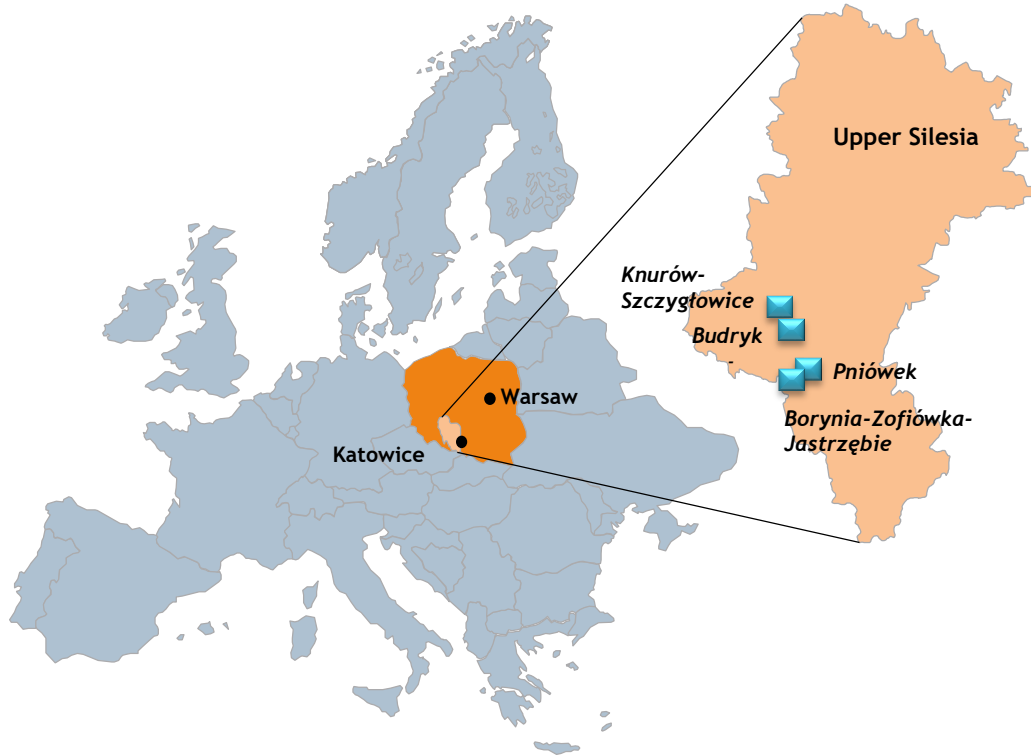
## Solid total resources and reserves

- Total resources of approx. 5.497 billion tonnes
- Reserves of 0.952 billion tonnes







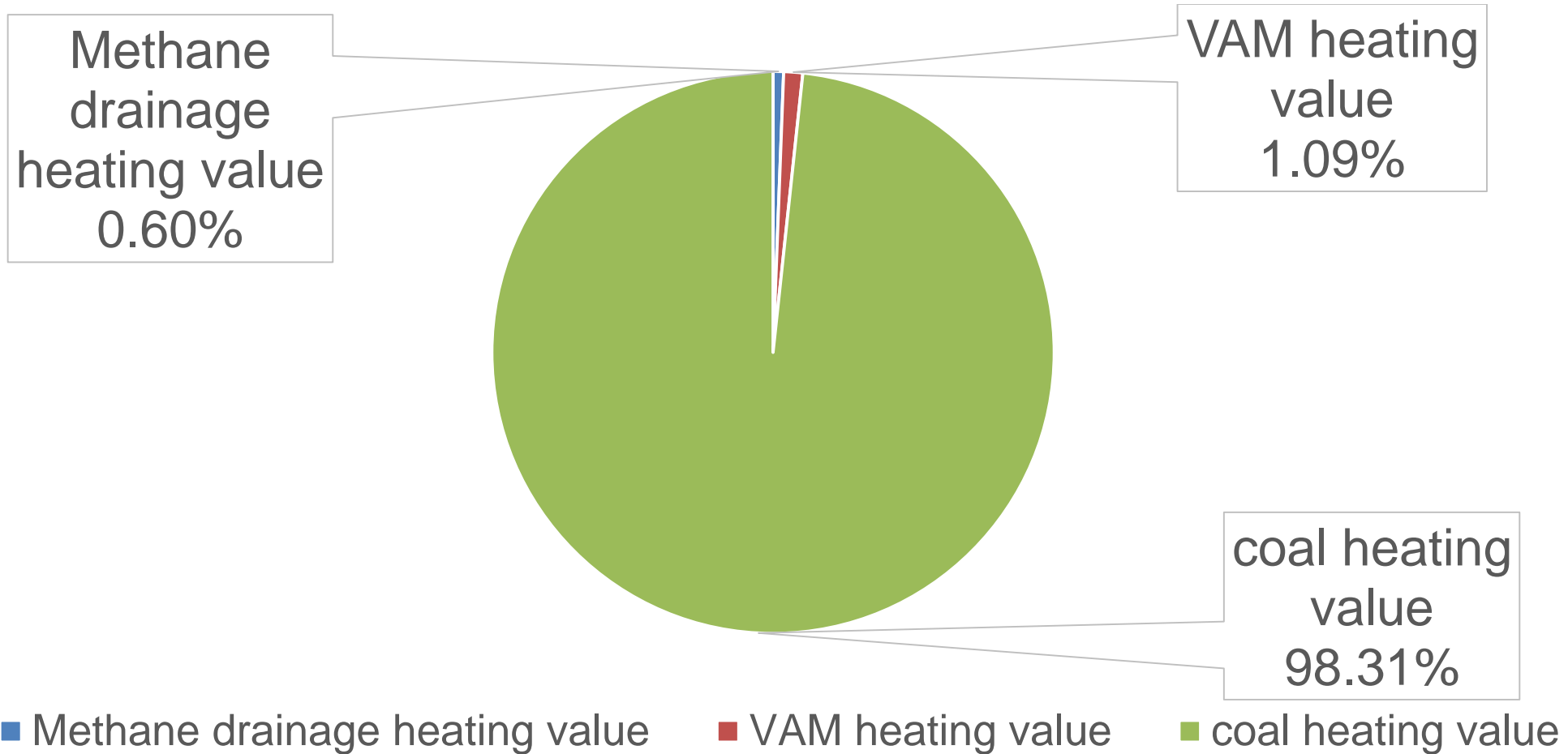
JSW Group Key Financials

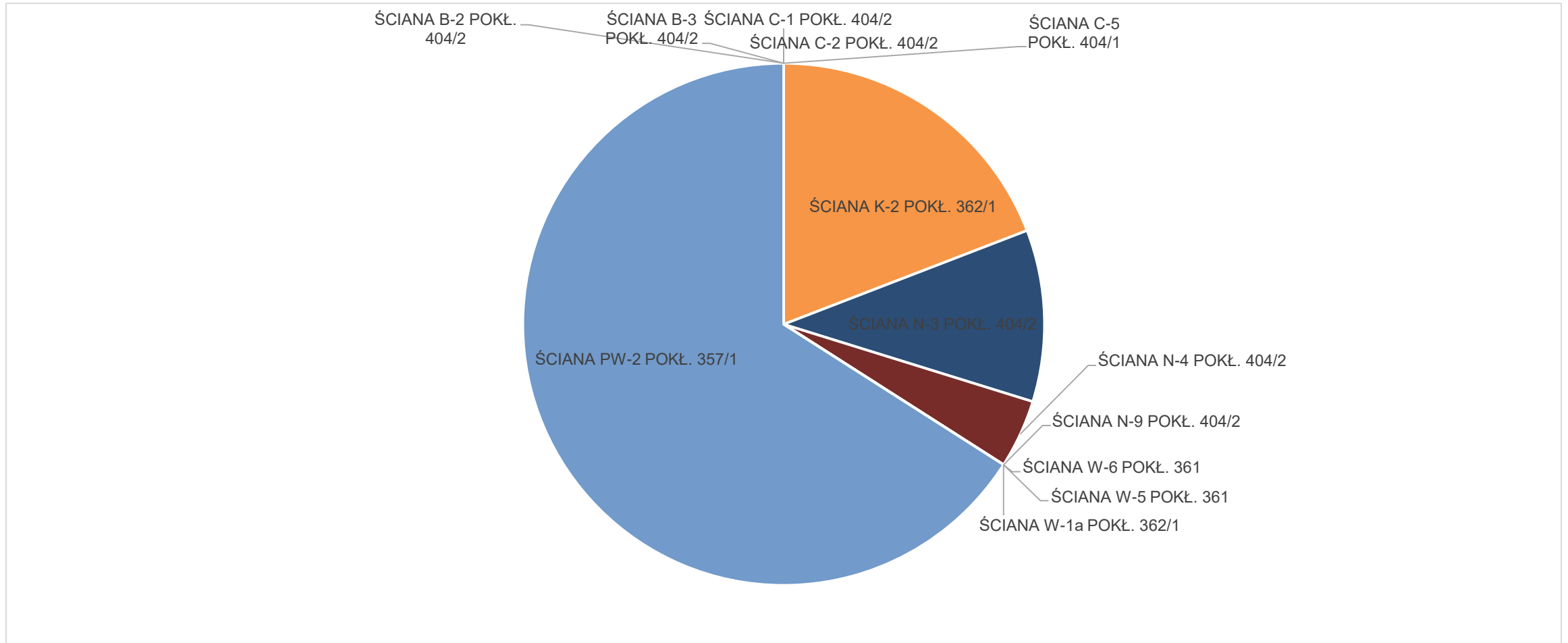
EURm	2012	2013	2014	2015	2016	2017	2018
Revenue	2 114	1 812	1 627	1 657	1 538	2 091	1 164
EBITDA	569	333	126	-605	243	928	417
EBITDA margin	26,9 %	18,4%	7,8%	-36,5%	15,8%	44,4%	35,8%
Net Income	237	19	-157	-785	1	599	256



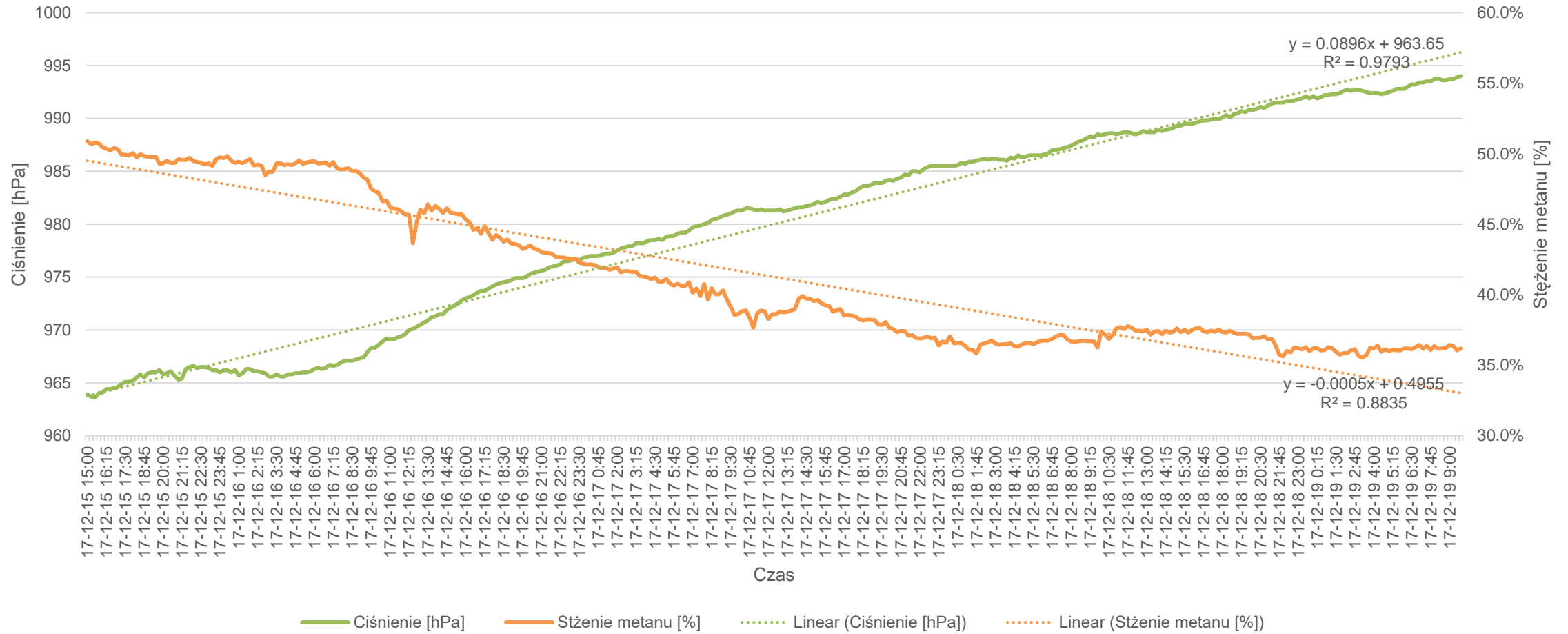
### JSW Coal Mining

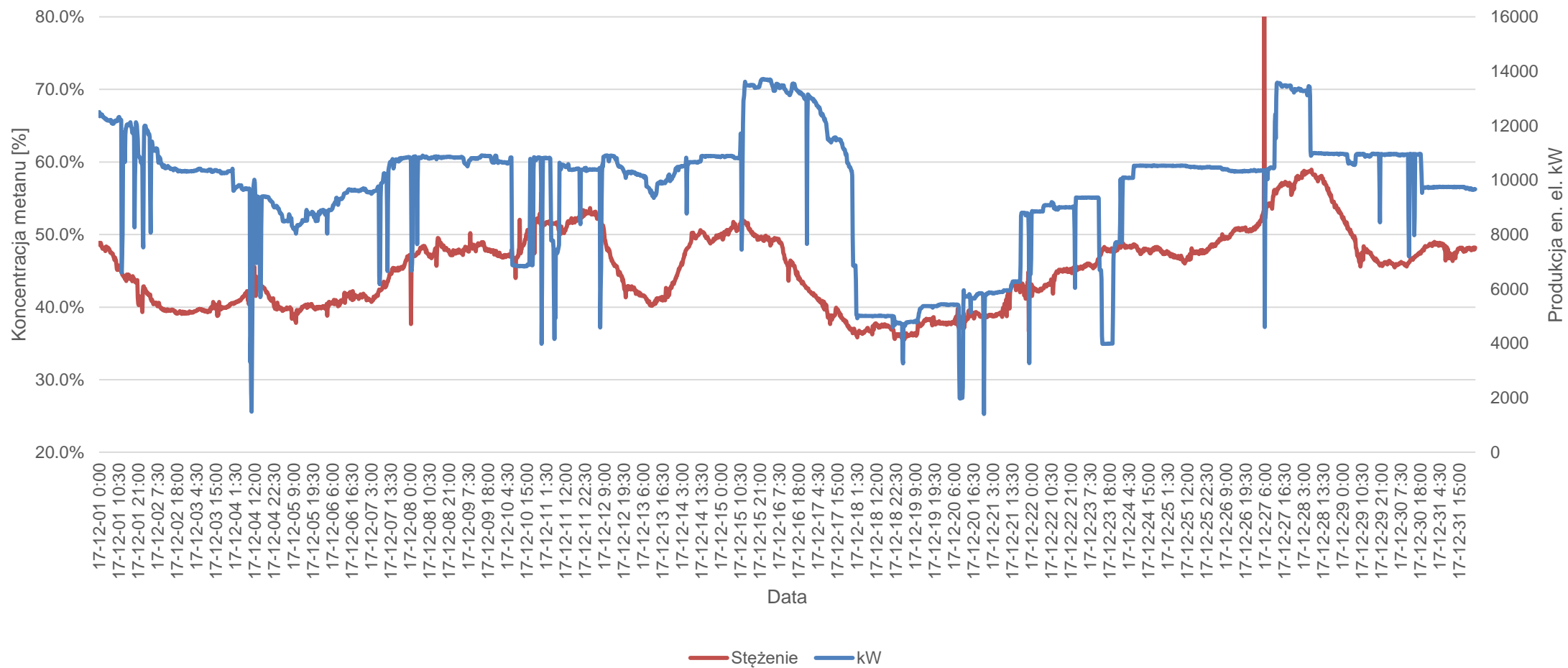
	Budryk	Pniówek	Borynia-Zofiówka-Jastrzębie	Knurów-Szczygłowie	Total
					
Resources <sup>(1)</sup> (mt)	996.6	889.4	1,869.5	1,741.8	<b>5,497.3</b>
Reserves <sup>(1)</sup> (mt)	222.3	188.3	219.2	323.0	<b>952.8</b>
Coal Type in Resources	63% HCC 37% Semi-soft	90% HCC 10% Semi-soft	79% HCC 1% Semi-soft 20% type 36-37	36% HCC 60% Semi-soft 4% Thermal	-
Expected Life of Mine	60 years	34 years	Bor.: 13 years Zof.: 34 years Jas-Mos: 5 years	Knurów: 54 years Szczygł: 60 years	-



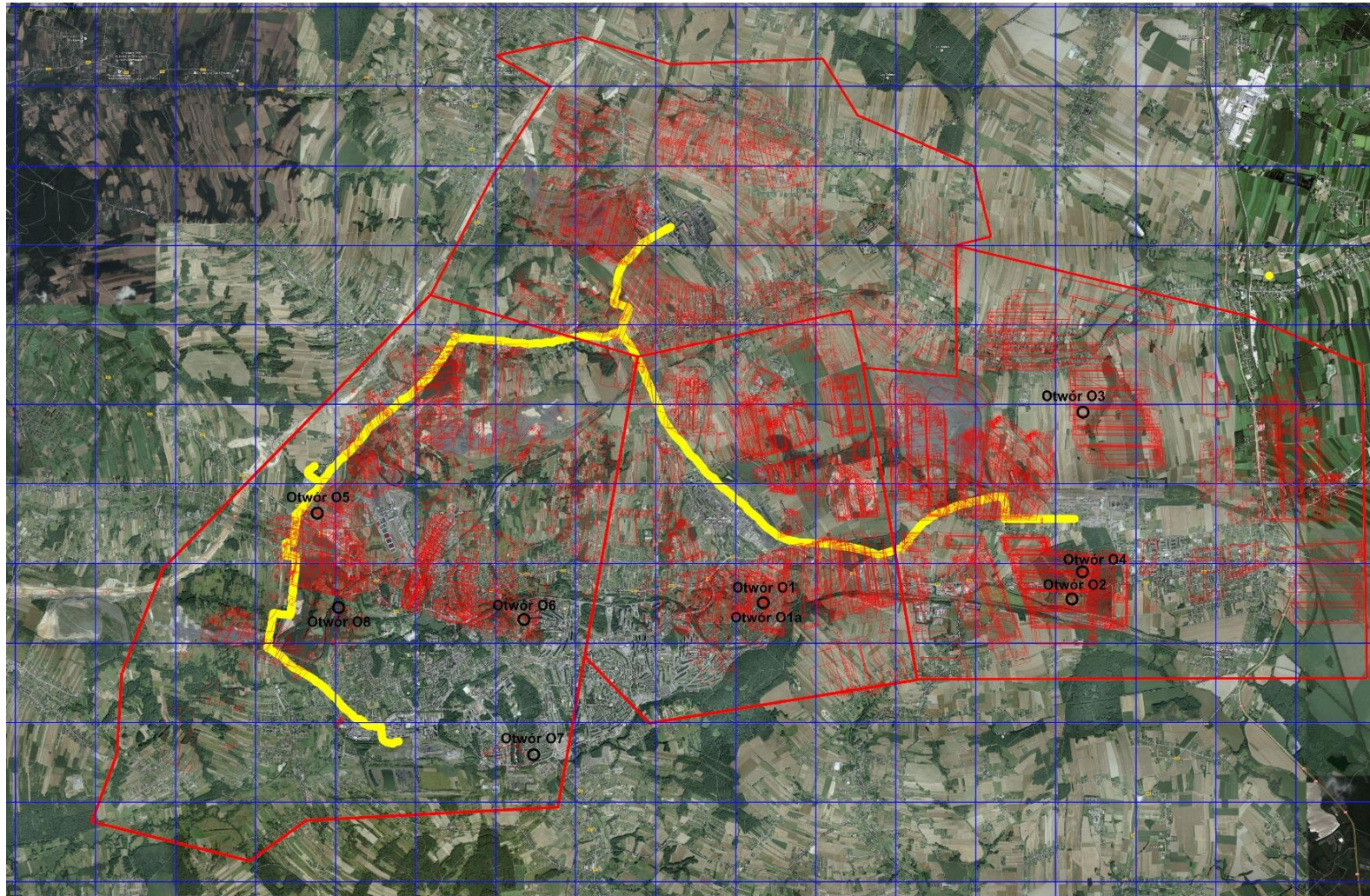
















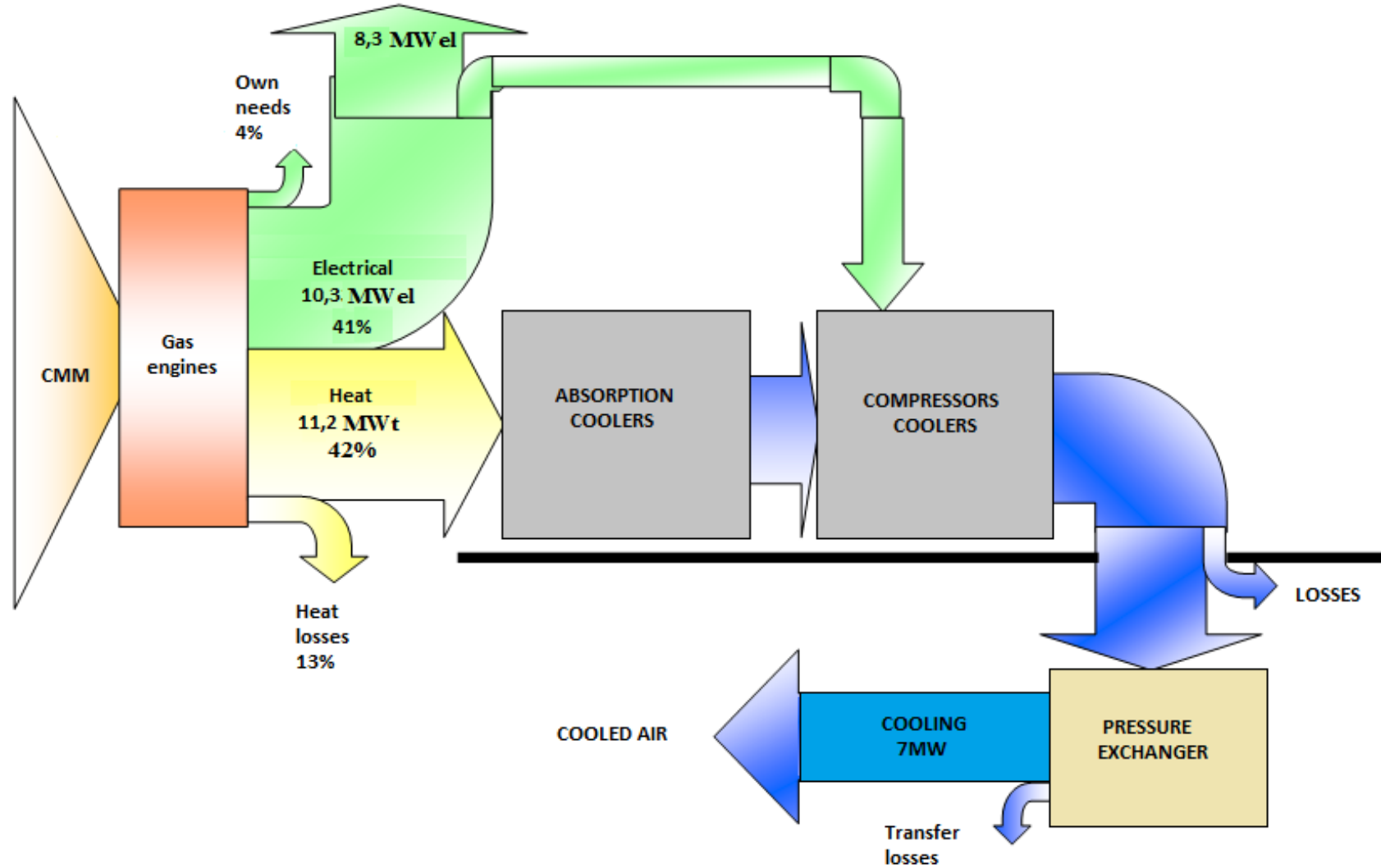
*cmpdi*  
A Mini Ratna Company



# CMM for Gas-fired Chillers

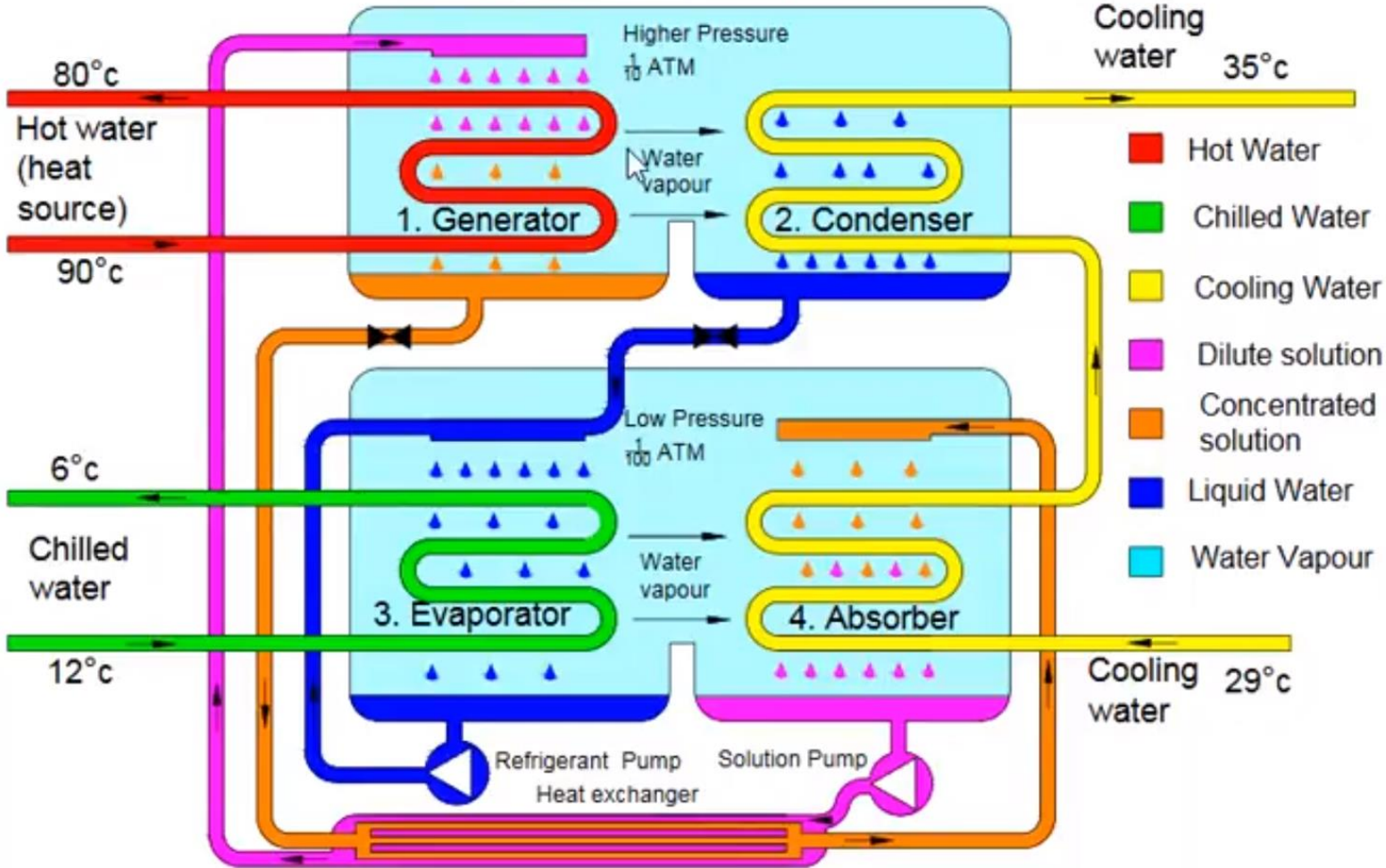


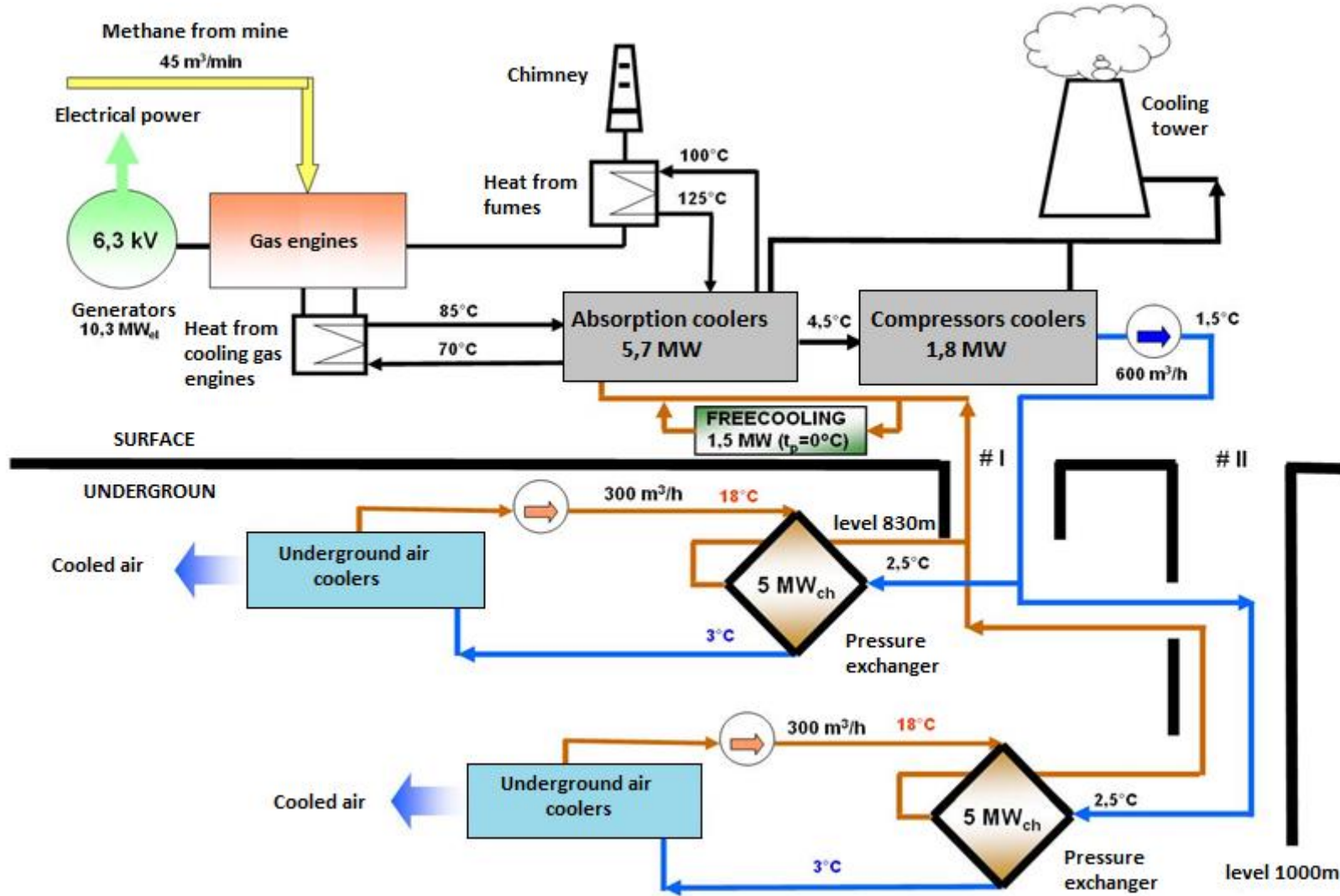
For the needs of air conditioning on the Pniówek coal mine a unique in the scale of Europe pilot installation for the combined electricity, heat and cold production was made. The installation consists of two almost identical modules (construction phases), consisting of connected in series two absorption chillers and one compressor chiller that guarantee the underground cooling capacity of approx. 7,5 MW in cold water with the supply and return temperatures of 1,5 and 18°C respectively. Heat for absorption chillers is produced power and heat generators powered by methane gas from the coal mine of electric capacity of approx. 10,3 MW. The electricity produced by the generator is used to cover facilities' own energy consumption and approx. 4 MW is supplied to the electricity network in the coal mine. The air conditioning has been working since September 2000.





### Absorption Chiller - Hot Water Fired









Gas engines





Absorption coolers





Thermal and pressure exchanger



# CMM for LNG Production





LNG installation built in Suszec based on methane obtained from Krupiński coal mine belonging to JSW. Production capacity is 16 tons of LNG per day. The resulting fuel is distributed using specialized cryogenic tanks at minus 160 degrees Celsius. The recipients of the LNG sold by the company are enterprises from the food industry, hotels and SPA facilities. LNG is more expensive fuel than network gas however, is a competition for heating SYSTEMS using oil or LPG as a fuel. There are many industrial plants that do not have access to gas, even those located in large urban agglomerations. LNG supplies are an alternative for them.



Cooling device





Cryogenic tank

Mobile systems







Thank you