New district heating.

Quick steps for phasing out natural gas and oil in Denmark in 2023-2028.

Solutions & processes

Tyge Kjær
Roskilde University
tk@ruc.dk

RUC Roskilde Universitet
Roskilde University

New decisions I DK … and EU

BSAM Project Final Meeting & Cross-border Seminar

New District Heating

Gdansk-Warsaw • 17-18 April 2023

Introduction

Topics:

1) New decisions in Denmark and the EU
2) Terms and conditions for conversion of the heating area
3) The renewable energy sources
   Where do we get the heat from?
4) Recommendations

NEKST: Den nationale energikrisestab
The National Energy Crisis Staff

Ensure the fastest possible transition to renewable energy and ensure independence from Russian gas

RUC Roskilde Universitet
Roskilde University

New decisions I DK

BSAM Project Final Meeting & Cross-border Seminar

New District Heating

Gdansk-Warsaw • 17-18 April 2023

Three tracks

1) Projects in place: Planning

The municipalities must designate the areas which receive district heating and which are currently heated with natural gas. Around 60% were appointed by 2022; the remaining are expected to be identified in 2023.

2) Effective rollout of district heating

District heating for the designated areas must be established by the end of 2028.

3) Green individual or small heat supply solutions.

Around 30% of the gas-fired houses cannot have district heating, but must have individual or small shared heating solutions.

The potentiel for district heating differs

Exampels for three Danish municipalities

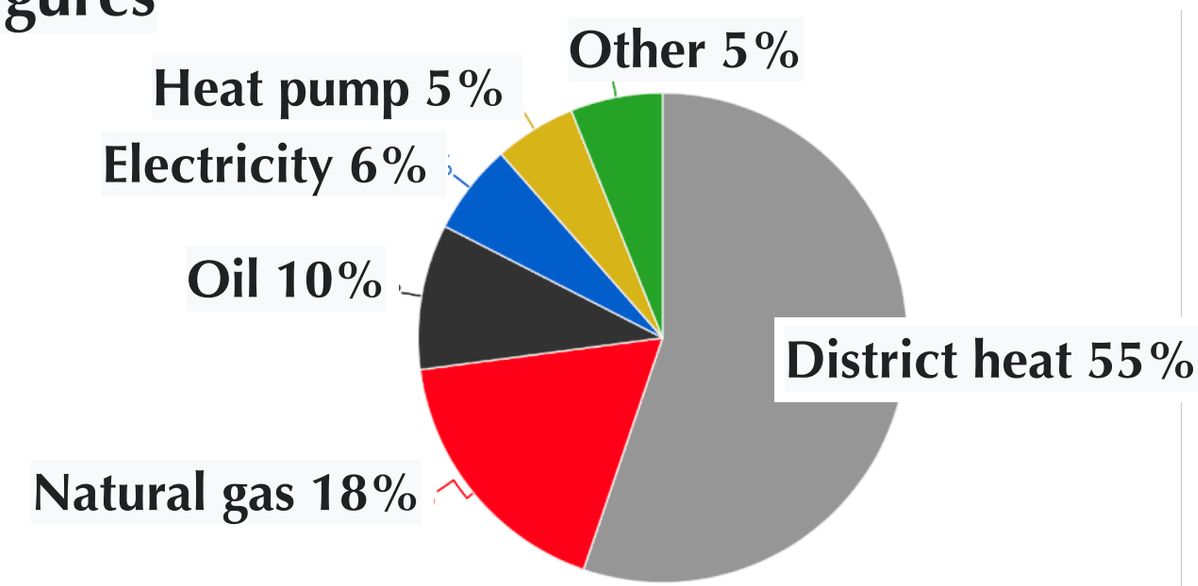
Køge Municipality
- Already DH 50%
- New DH 32%
- **Total DH 82%**

Slagelse Municipality
- Already DH 28%
- New DH 38%
- **Total DH 66%**

Lolland Municipality
- Already DH 48%
- New DH 9%
- **Total DH 57%**

Number of houses	Existing district heat	New district heating	Individuel solutions	**Total**
Køge	9.172	5.871	3.181	18.224
In percent	50,3%	32,2%	17,5%	100,0%
Slagelse	8.232	11.274	10.234	29.740
In percent	27,7%	37,9%	34,4%	100,0%
Lolland	12.096	2.332	10.561	24.989
In percent	48,4%	9,3%	42,3%	100,0%

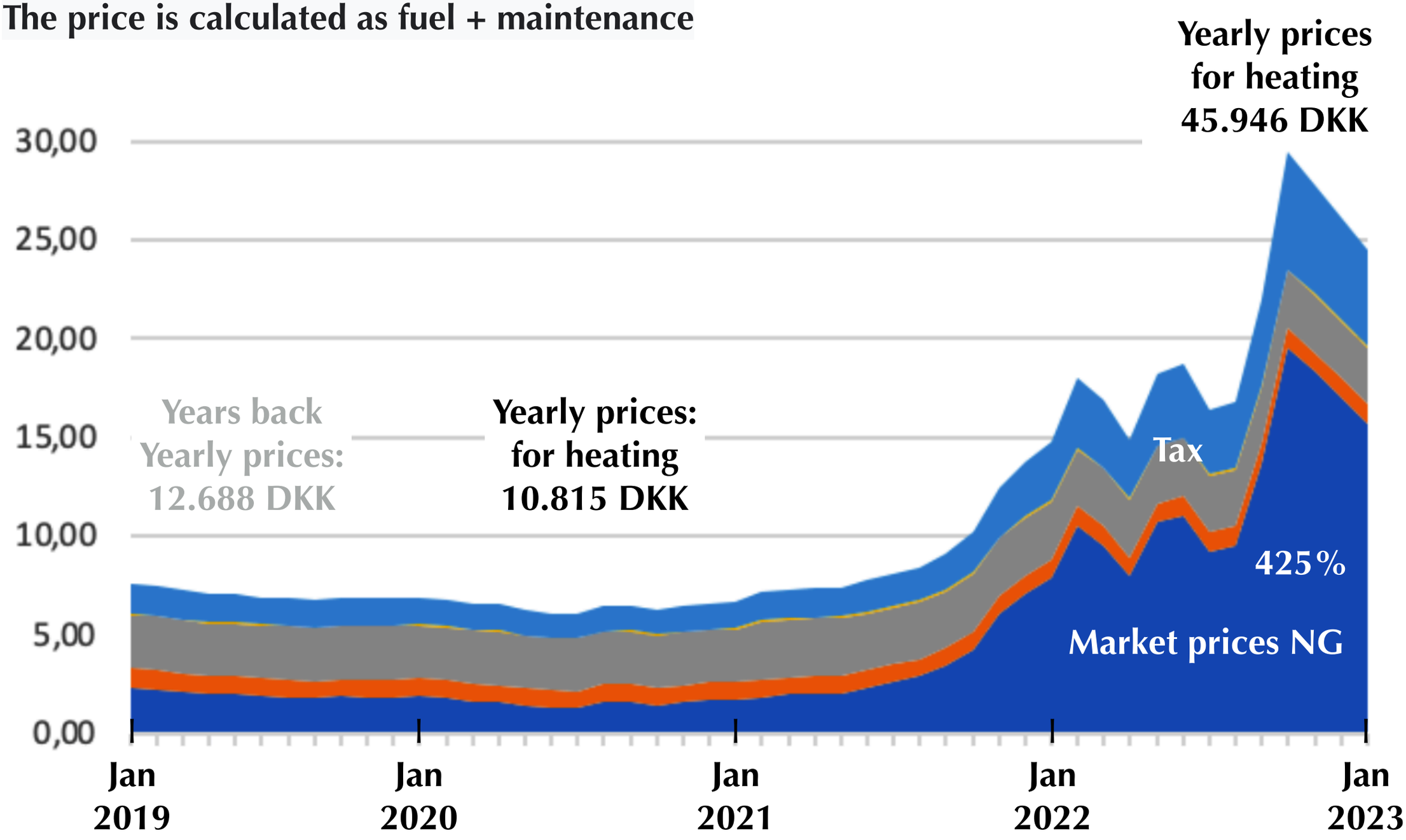
National figures



The prices for heating - DK natural gas prices

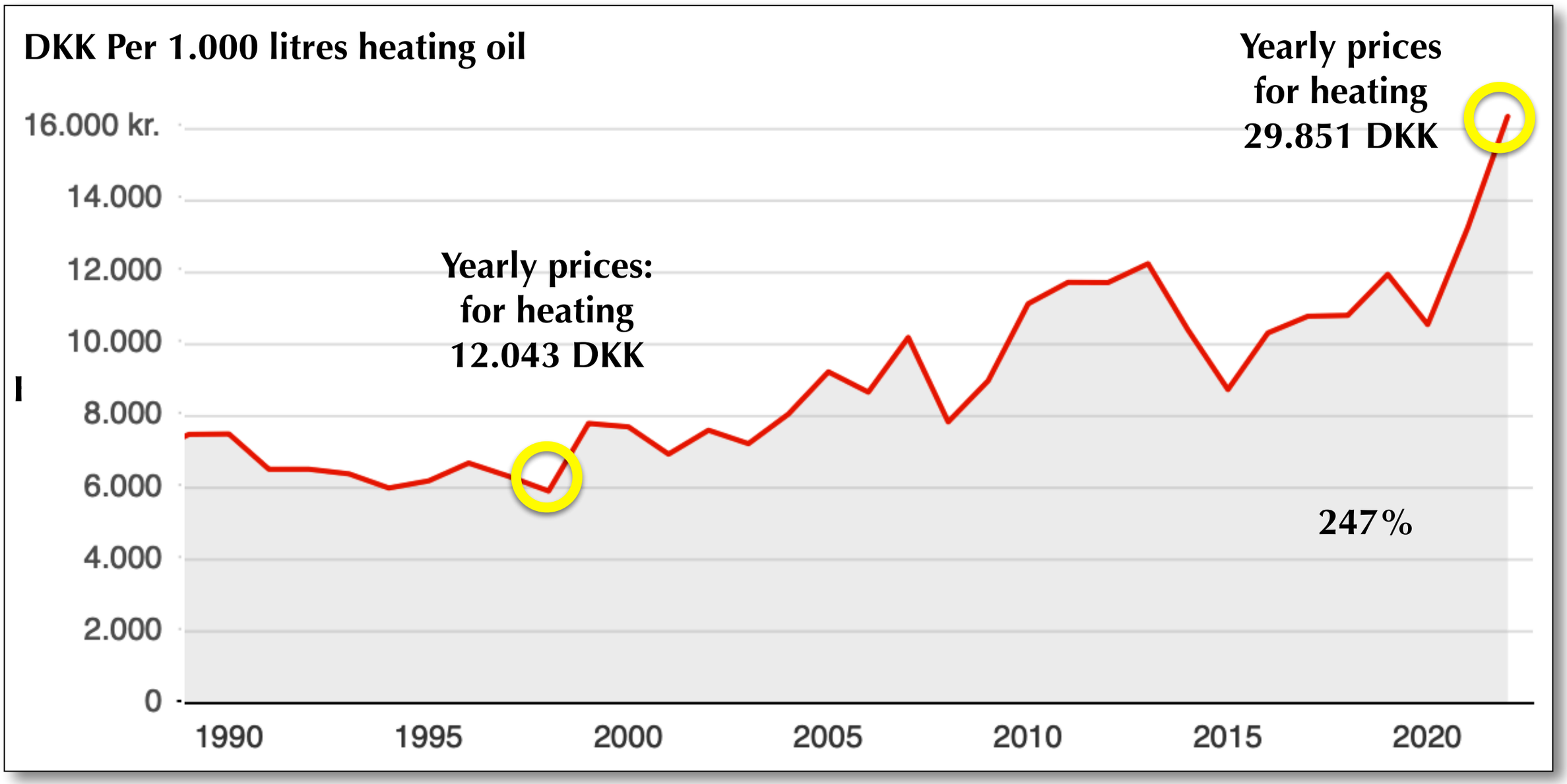
Heating prices for a standard house of 120 m2 heated area - 14,5 MWh

The price is calculated as fuel + maintenance



The prices for heating - DK Oil prices

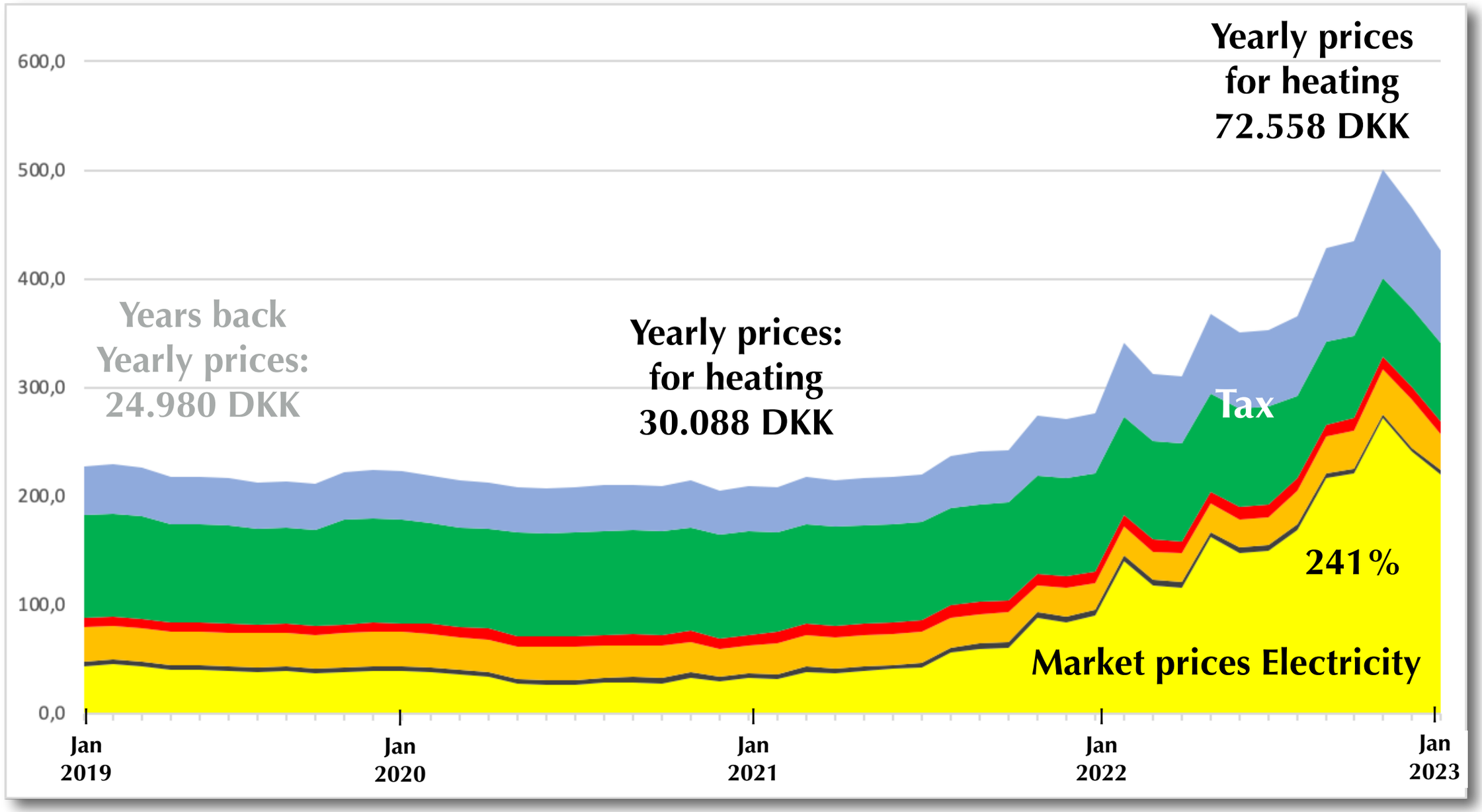
Heating prices for a standard house of 120 m2 heated area - demand on 14,5 MWh/Year



Terms and conditions

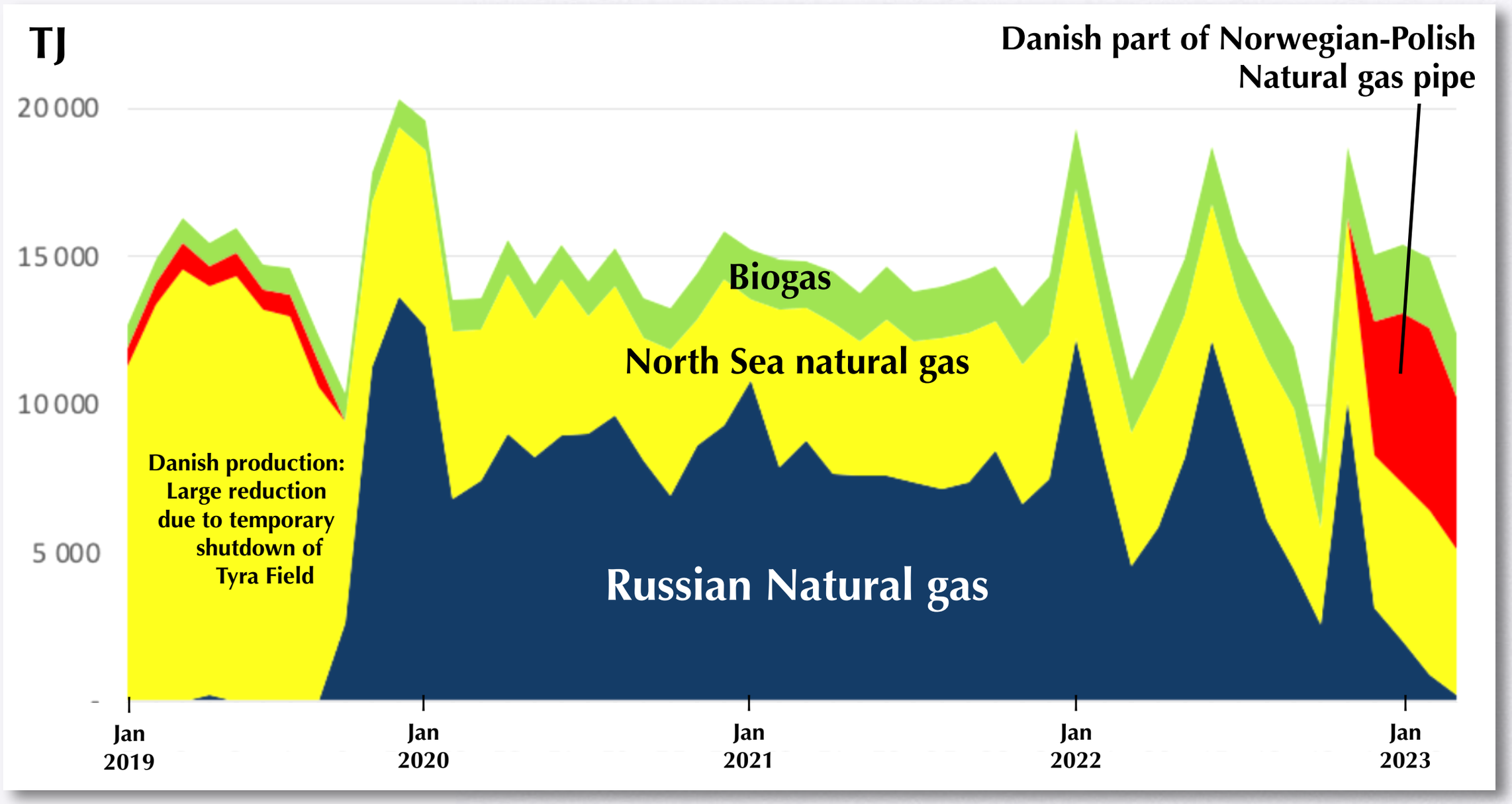
The prices for heating - DK Electricity prices

Heating prices for a standard house of 120 m2 heated area - demand on 14,5 MWh/Year



Import dependency in DK (and EU)

NEKST: »…Denmark must be free of Russian gas. A broad majority of the parliamentary parties agree that phasing out Russian gas for heating is central to reaching the goal«.



RUC Roskilde Universitet
Roskilde University

Terms and conditions

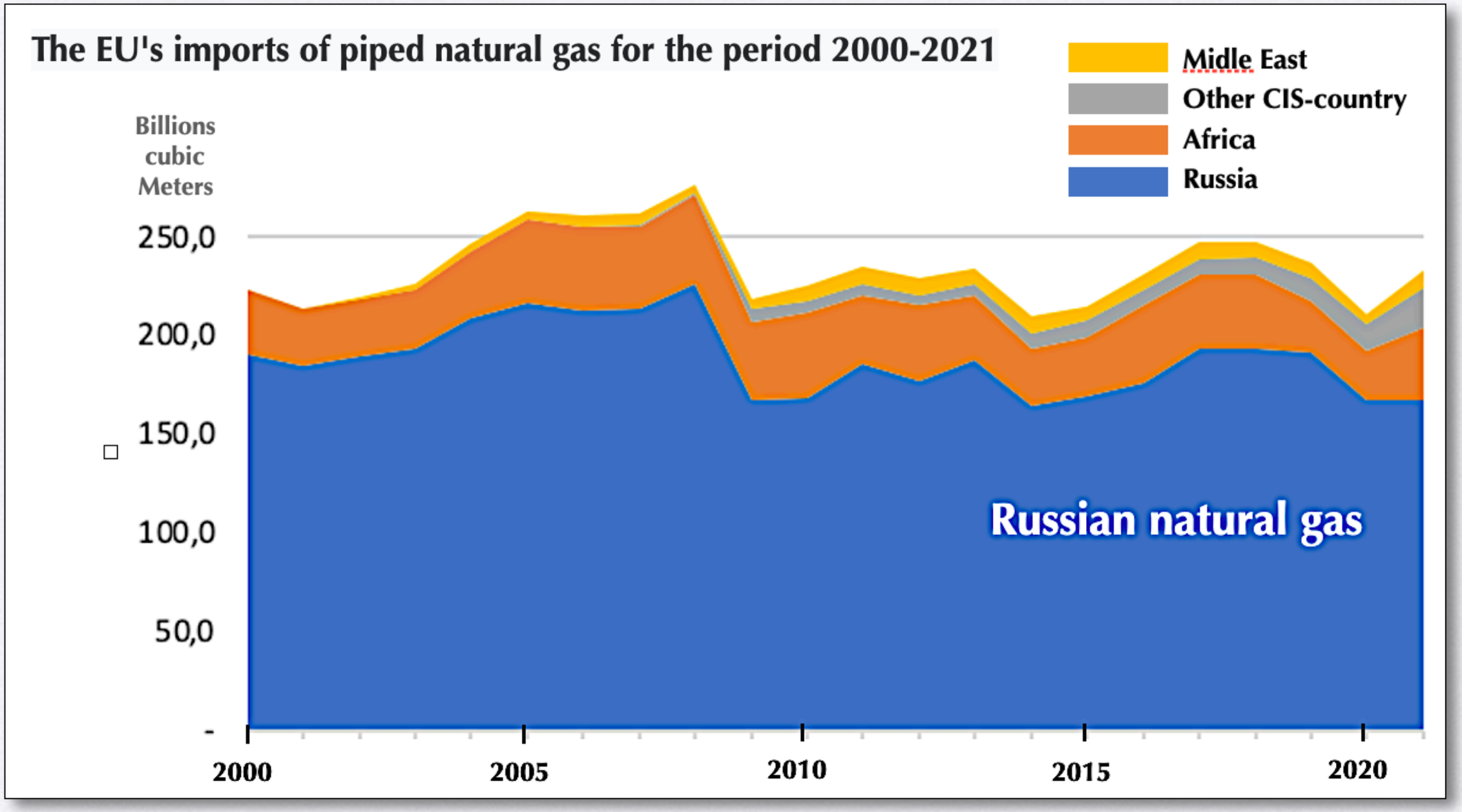
BSAM Project Final Meeting & Cross-border Seminar

New District Heating

Gdansk-Warsaw • 17-18 April 2023

Import dependency in EU

Import dependency: In total 86-88% of gas and 97-98% of oil consumed in EU is imported



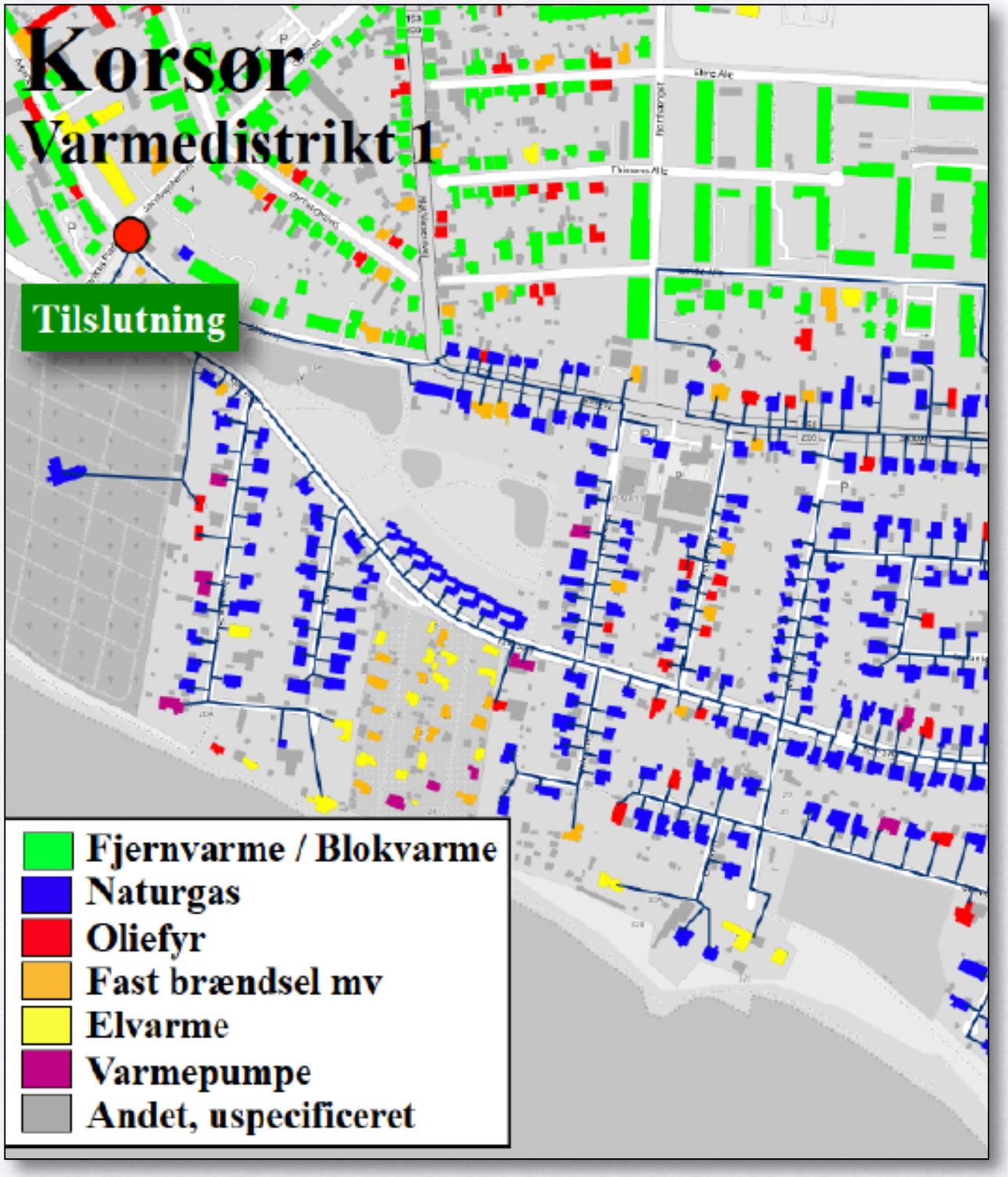
District heating

Three challenges for district heating

- **Stable prices:** Removing the heat supply from the energi world market and its ups and downs, i.e. local energy supply

- **Climate action:** Reduction of greenhouse gasses, i.e. use of renewable energy in the supply

- **Innovation:** Development of solutions that contribute to the new integrated energy system: *Sector integrated solutions.*



RUC Roskilde Universitet
Roskilde University

Renewable heat sources

BSAM Project Final Meeting & Cross-border Seminar

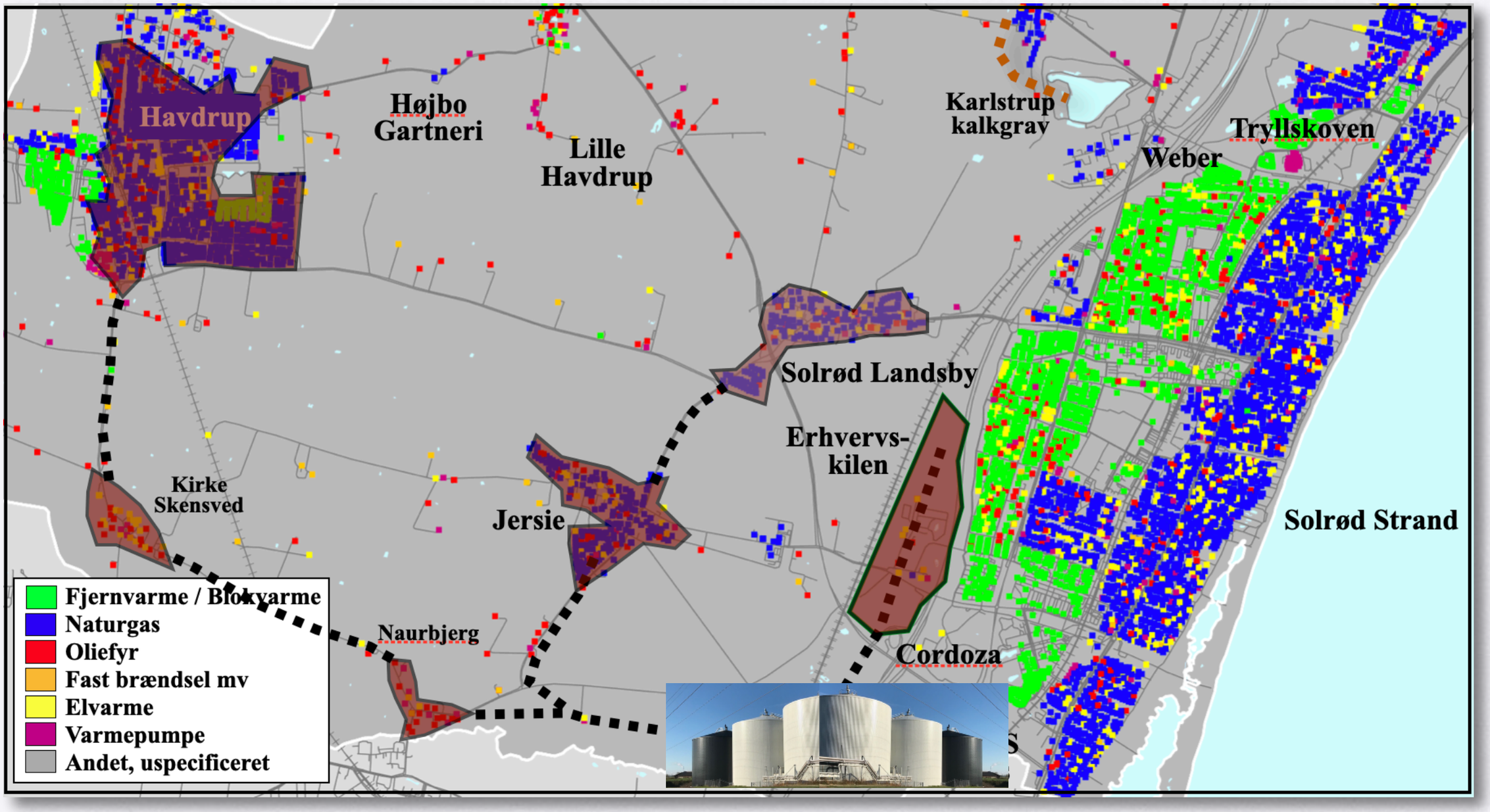
New District Heating

Gdansk-Warsaw • 17-18 April 2023

Sectorintegrated solution (1) - heat pump

Surplus heat from cooling degassed residuals from biogas plant - high COP value

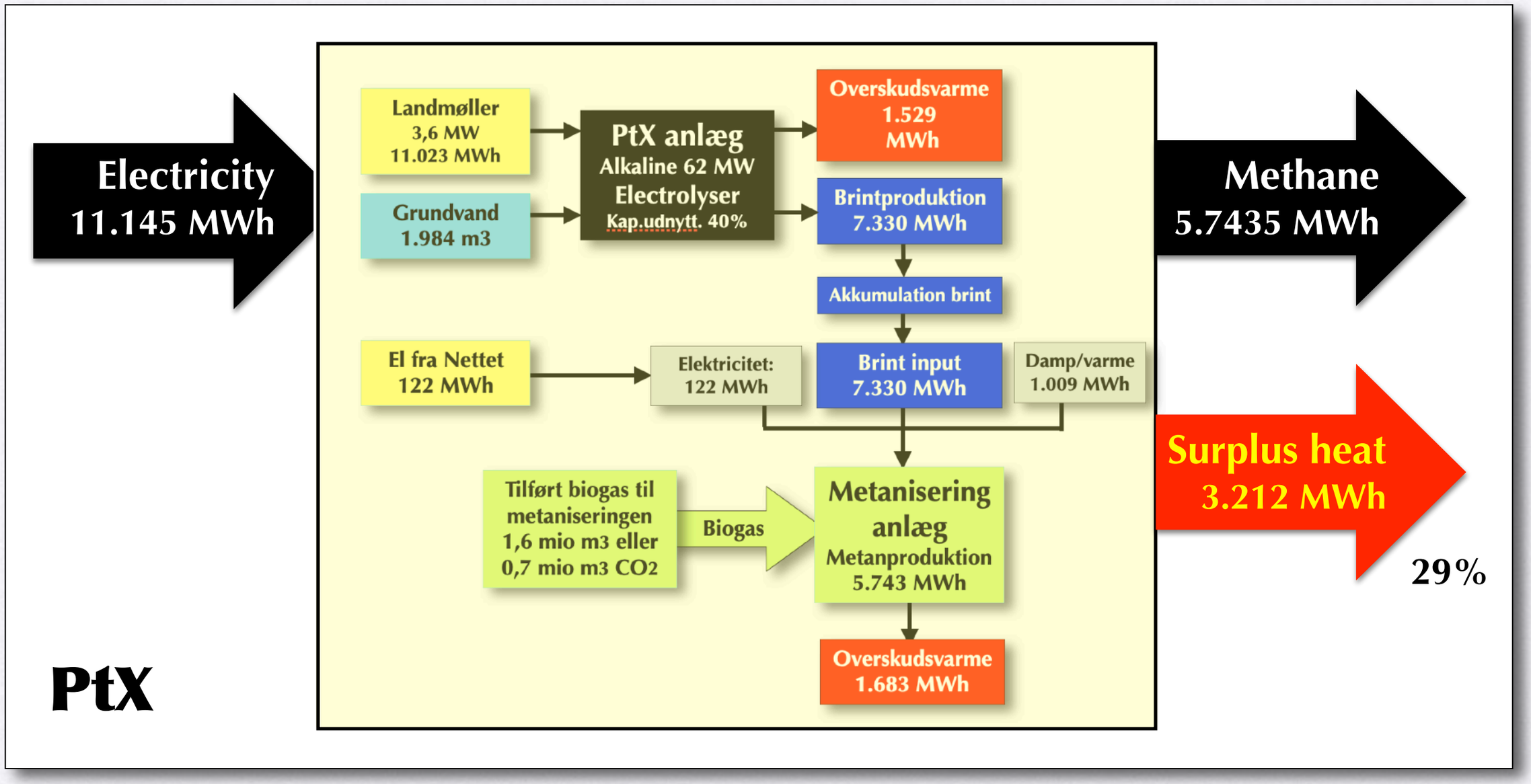
Benefit: Heat source and reduction of ammonia and methane losses from degassed residuals



Sectorintegrated solution (2) - symbiosis

Using surplus heat from the new PtX-plants, illustrated with a methanization process

Requirements: Location of the facility near an adequate heating market



Nature based solutions (3)

Every year, 600,000-700,000 m3 of water is pumped to avoid flooding in the area.
The water has a suitable temperature. Plan: Install a heat pump for local heat supply.

RUC Roskilde Universitet
Roskilde University

Renewable heat sources

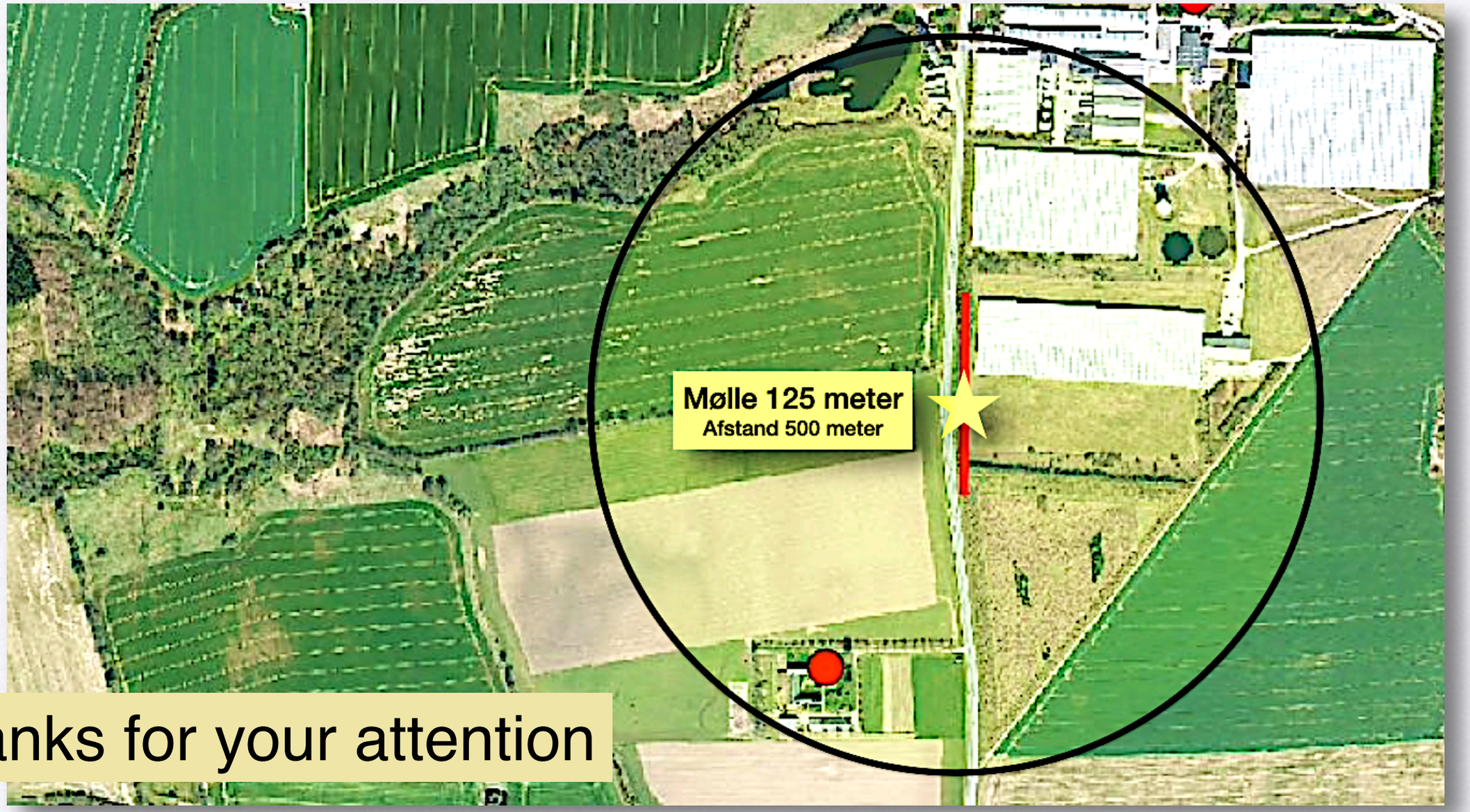
BSAM Project Final Meeting & Cross-border Seminar

New District Heating

Gdansk-Warsaw • 17-18 April 2023

Citizen energy communities

One or two wind turbines will be established, which will supply power to a small local district heating network. The electricity cost will be very low, as there is neither a transport tariff nor taxes on the electricity.



Thanks for your attention