

## Best Polish Practices in Energy Management- Intelligent Heating Networks.

### An example of MPEC S.A. in Tarnów



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„Intelligent energy systems and energy storage by example of hospital buildings.”

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## MPEC Tarnow in numbers – data for 2014



Installed heating power - **153,7 MW<sub>t</sub>**



Ordered capacity– **163,6 MW<sub>t</sub>**



Installed electric power - **3,75 MW<sub>e</sub>**



Heat sale– **885 998 GJ**



The heating power purchased in Grupa Azoty  
- **25 MW<sub>t</sub>**



Surface heated with the system heat– **2 048 924 m<sup>2</sup>**



The length of heating network  
- **102,1 km**



Number of buildings heated with the  
district heating system - **965**



Individual indirect heat exchange centres  
- **819 (142,4 MW)**



Number of flats heated with the district heating  
system – more than **26 000**



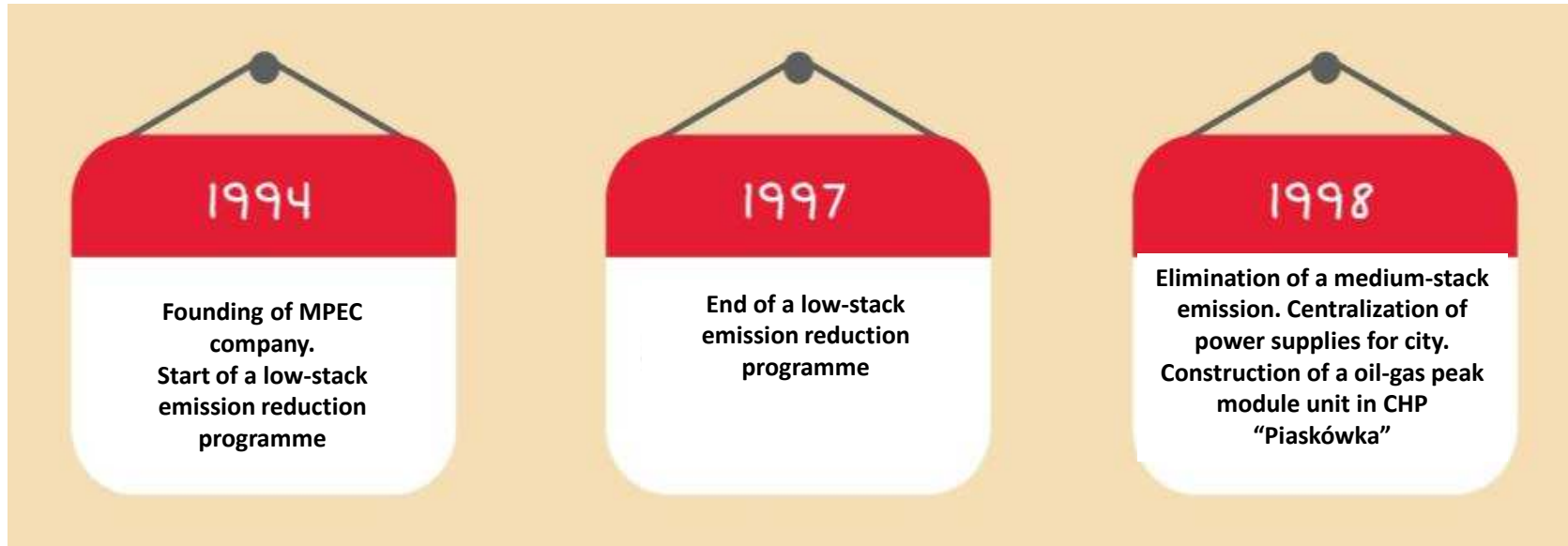
Group heat exchange centres – **20 (18,1 MW)**

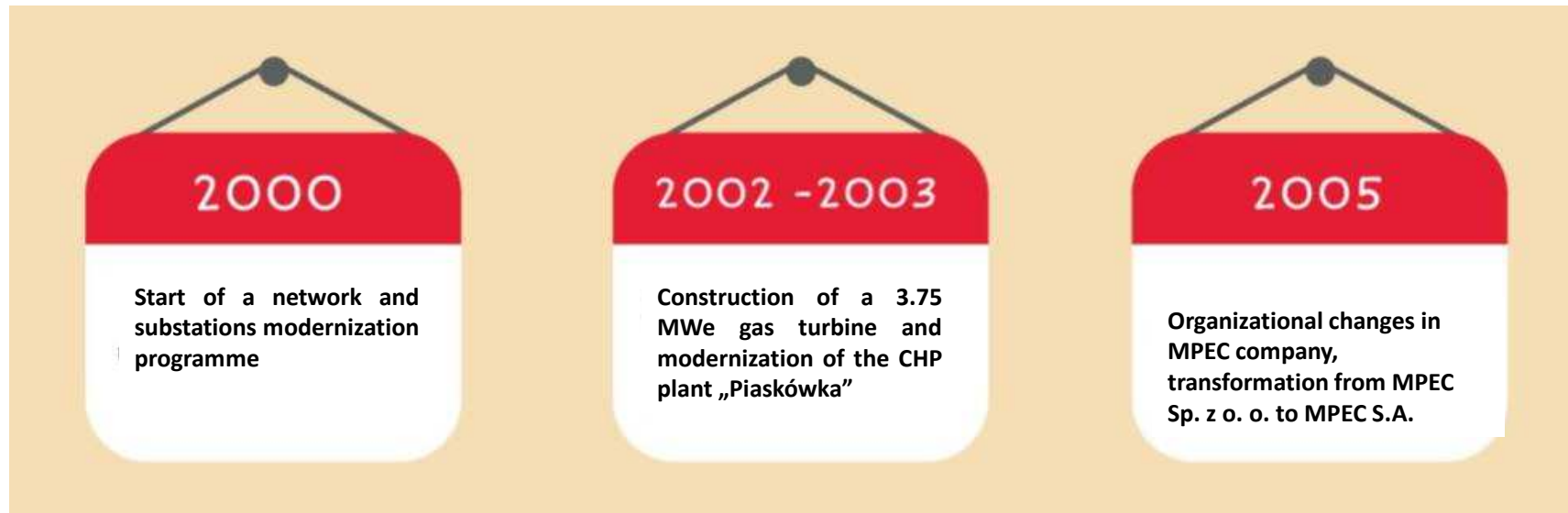


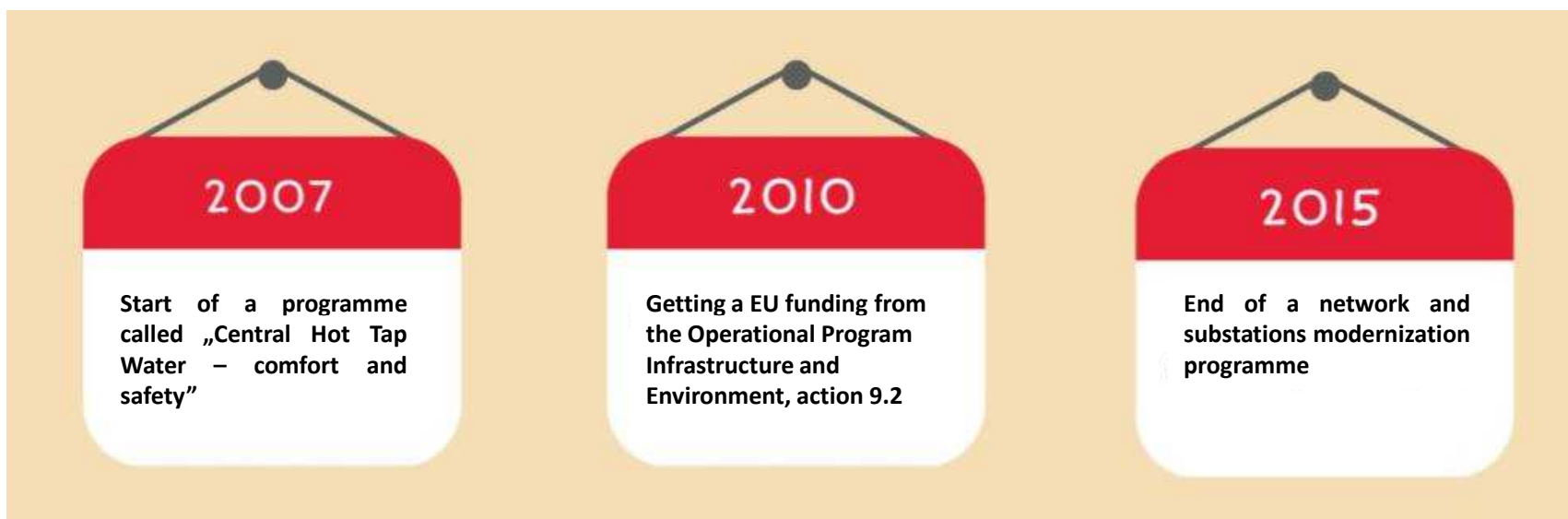
Number of Tarnów residents using the district heating  
system – nearly **80 000**

## Strategic objectives

Competitive system heat supplied year round from the intelligent heating network through the individual indirect heat exchange centres to a conscious recipient managing the demand.





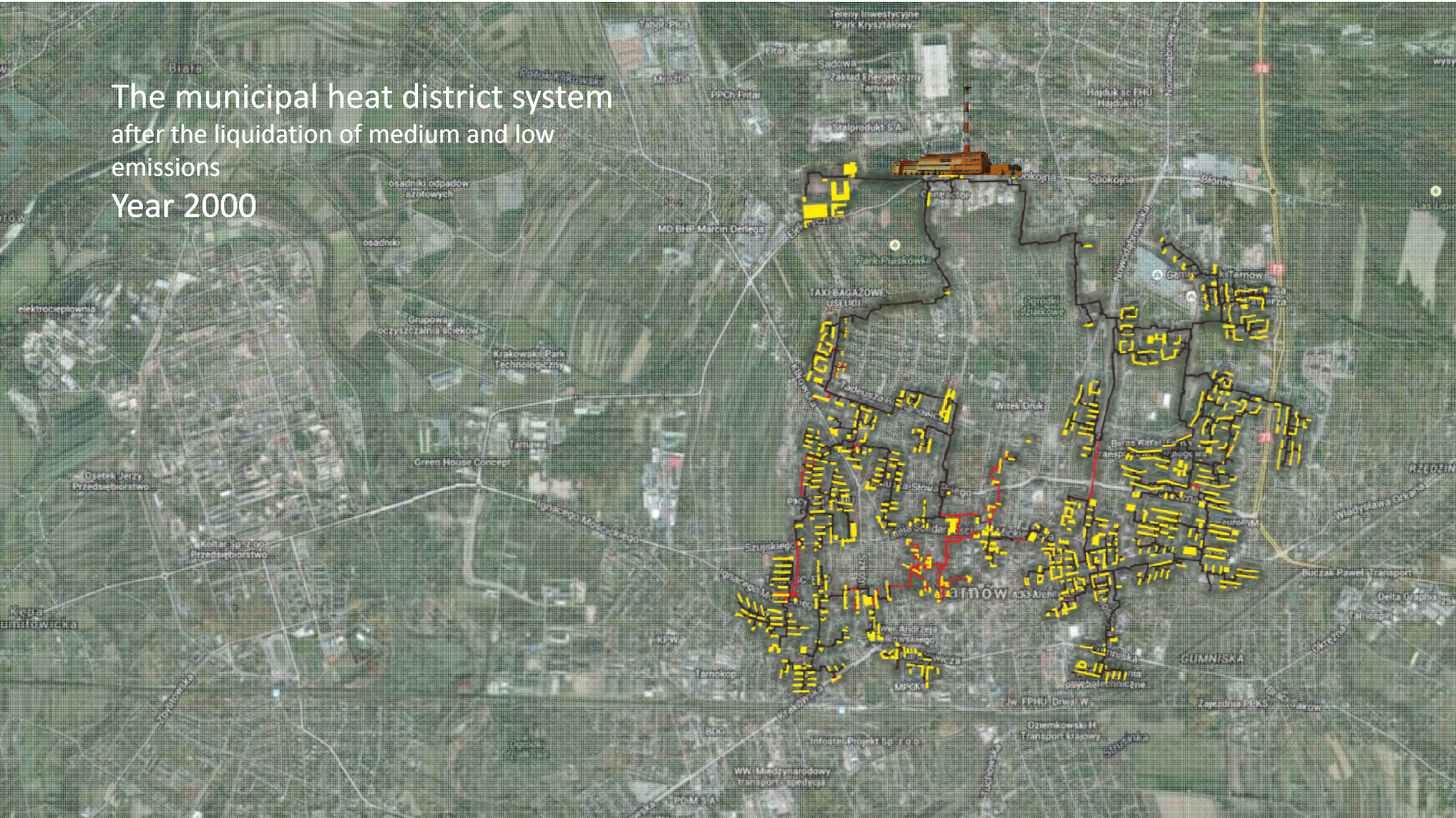


## Important decisions:

- ▶ Market activity area
- ▶ Scope of deliveries of central heating supplied hot tap water
- ▶ Scope of supplier's responsibility
- ▶ Liquidation of group exchangers
- ▶ Supply model, hydraulic parameters
- ▶ Heating system operating parameters
- ▶ Network routes, diameters, technology
- ▶ Shut-off valves, alarm systems
- ▶ Construction of the metropolitan fibre optic network
- ▶ Construction of a primary network operation supervision system and heat distribution substations



The municipal heat district system  
after the liquidation of medium and low  
emissions  
Year 2000





## Network modernization - preparatory activities:

### ➤ Analysis of the original status:

- ▶ survey of the high- and low- parameter network
- ▶ reliability analysis
- ▶ the demand for heat and network load
- ▶ hydraulic analysis

### ➤ Construction of the heating system model:

- ▶ specification of reserves in individual directions
- ▶ connections and expansion plan/schedule
- ▶ determining the manner of supply
- ▶ analysis and optimization of the heating pipeline
- ▶ supply model and carrier parameters
- ▶ pumping station and substation operation model
- ▶ hydraulic operation model (operation in the heating season and outside the heating season)
- ▶ selecting the rated diameters
- ▶ selection and location of the shut-off valves
- ▶ selection of the execution / construction technology
- ▶ failure monitoring system
- ▶ the concept of construction of the metropolitan fibre optic line

## Network modernization - preparatory actions :

### ➤ Analysis of the original status :

- ▶ heat exchange centre and their equipment stock-taking
- ▶ analysis of the heat demand in facilities
- ▶ evaluation of the heat control capacities
- ▶ analysis of the heat exchange centres reliability

### ➤ Construction of the heat distribution model:

- ▶ projected order capacity of the supplied facilities, effect of actions thermal modernisation actions of the users
- ▶ selection of the heat exchange centres in consideration of the experience with the used capacity (particularly for the purpose of the waterworks water heating)
- ▶ selection of the size of reservoirs in two-function heat exchange centres – heat accumulation level determining the heat supply standards
- ▶ defining the primary heat distribution centre supervision electronic system
- ▶ determining the process standards and distribution centre equipment
- ▶ determining the technical and operating supervision model, dispatcher services and technical emergency service
- ▶ selection of the data transmission system (fibre optic lines, copper lines, wireless)
- ▶ selection of the visualisation and data archiving software,











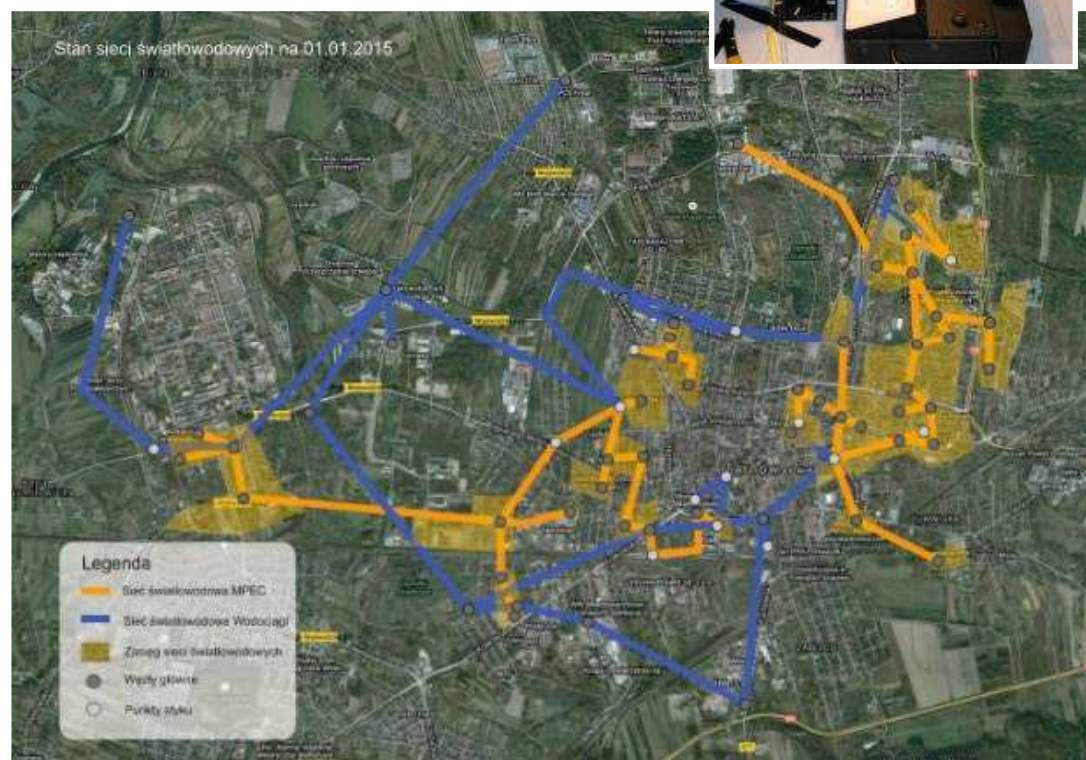
## Metropolitan fiber-optic network

### CONSORTIUM



The consortium operates:

**157 km** of optical fiber network (including 116 km of MPEC Tarnow)  
 The fibre optic networks are used by MPEC and Tarnowskie Wodociągi [Tarnów Waterworks] for telemetric network operation monitoring as well as by the services monitoring security in Tarnów, health services and self-government units. The network resources are also used by the multimedia service operators in Tarnów (providing the residents with the Internet, TV, and telephone services). **MPEC revenue** in 2014 from the rent of the fibre optic lines amounted to **PLN 274 000**.



## Optimization of Tarnów heating system - Implementation of a „intelligent e-heat programme”

- ▶ In the current year, the Joint Stock Company completes the fundamental process of modernization of the district heating system Tarnow (97% modernized heating system and 90% of heating substations).
- ▶ The finalization of the technological modernization means the optimization of the technical and economic operation of sources, district heating system and substations - implementation of the intelligent e-heat programme (“inteligentne*e-ciepło*”).

## Elements of implementation of the intelligent e-heating programme (1)



**Software ensuring comprehensive communication, visualisation and data archiving.**

Wonderware System Platform is a software package enabling efficient development and upgrading of the industrial applications on multiple information management levels.

The software enables creation and setting up corporate standards with respect to HMI/SCADA/MES class systems. It allows to reduce the costs, brings cohesion and quality as well as reduces the occurrence of potential errors due to different interfaces. Wonderware System Platform provides structure which enhances development, maintenance and administration of dispersed applications for the management of the industrial data.



## Elements of implementation of the intelligent e-heating programme (2)



Wonderware  
**Historian**



### **Database**

Wonderware Historian is a solution intended for collection and analysis of the process data. It is intended for all the users who want to track, supervise, analyse and optimise the production. It enables overall viewing of the production process and a very detailed analysis of an interesting part of the production as well as the use of the data registered in other systems operating in the company for example in corporate/business systems such as ERP.

## Elements of implementation of the intelligent e-heating programme (3)



GIS, assets management and investment.



TERMIS - static and dynamic simulation of heating systems.

## Elements of implementation of the intelligent e-heating programme (4)

Administrator: Tarnowska Spółdzielnia Mieszkaniowa  
 Powierzchnia ogrzewana: 6174,75 m<sup>2</sup> Nazwa profilu od Administratora budynku  
 Zużycie ciepła w roku: 2965,2 GJ

### Portal [analizy.mpec.tarnow.pl](http://analizy.mpec.tarnow.pl)

Raporty:

podstawowy    temperatury           

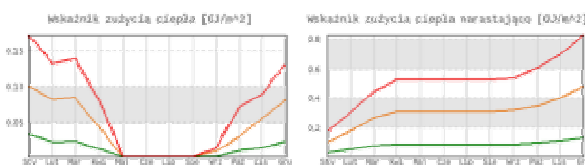
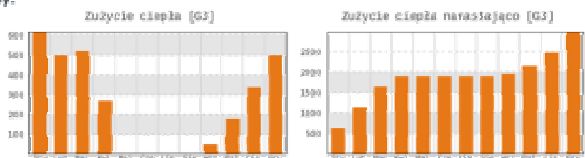
Rok: 2011 2012 2013 2014

Miesiąc	styczeń	luty	marzec	kwiecień	maj	czerwiec	lipiec	sierpień	wrzesień	październik	listopad	grudzień	Razem
Zużycie ciepła [GJ]	816,8	497,4	319,0	268,0	0,0	0,0	0,0	0,0	49,7	177,9	336,7	498,9	2965,2
Wskaźnik efektywności [GJ/m <sup>2</sup> ]	0,133	0,081	0,054	0,043	0,000	0,000	0,000	0,000	0,002	0,029	0,055	0,081	0,483



awarded by the medal of consumer rights

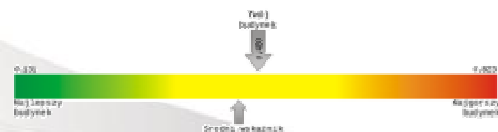
Wykresy:



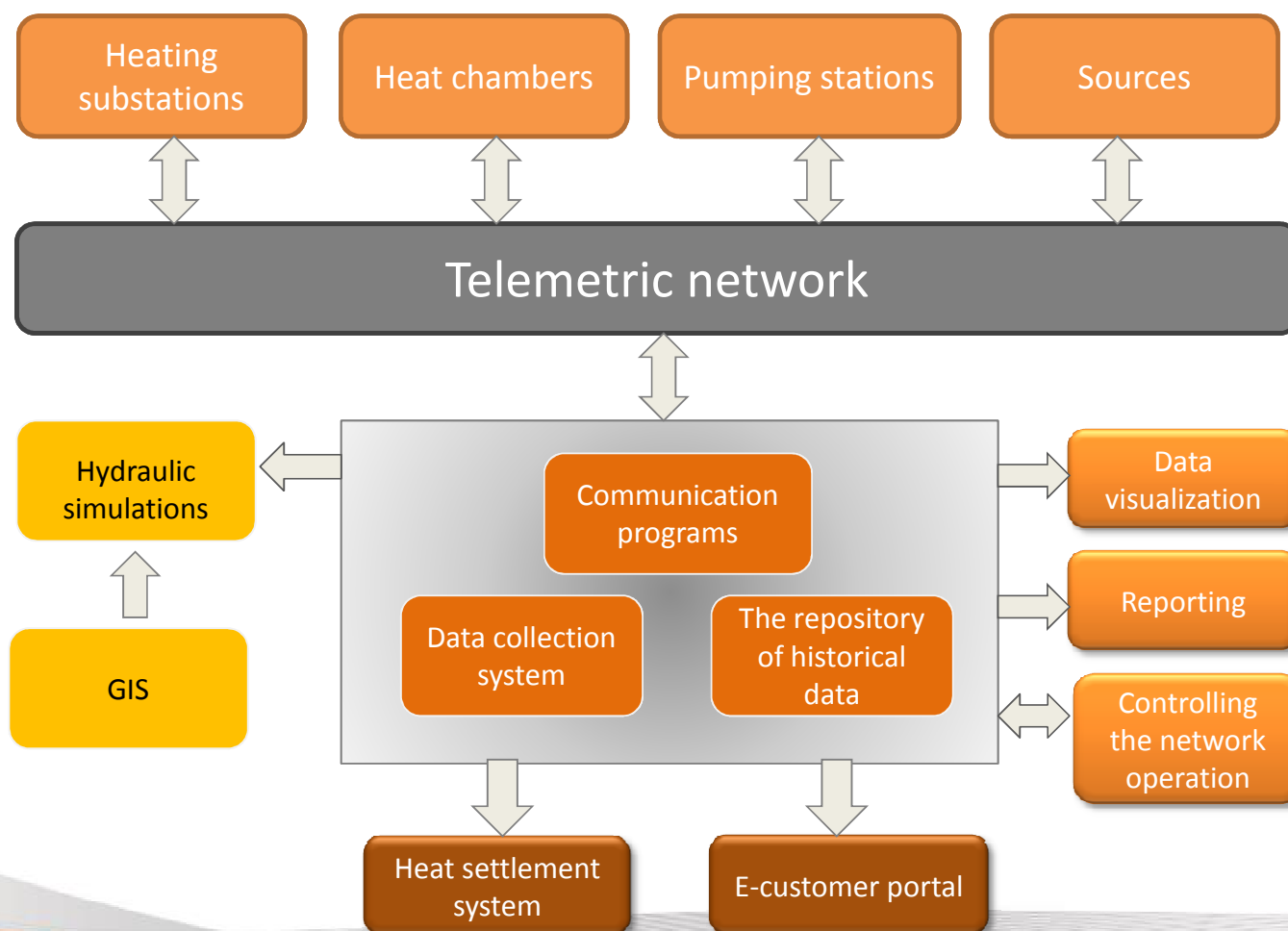
— zużycie budynku    — zużycie budynku    — zużycie budynku

Benchmarking

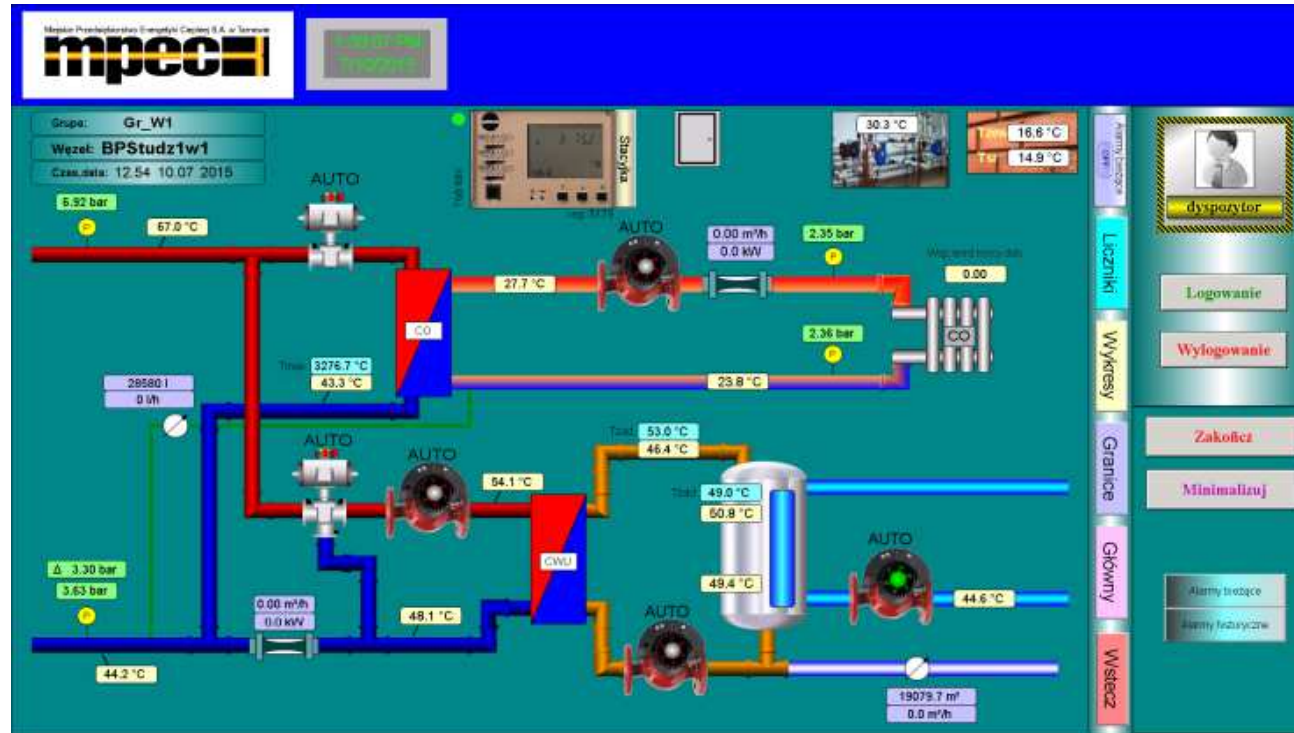
Porównanie zużycia ciepła do innych budynków:



# „Intelligent e-heating” („Inteligentne ciepło”)



# Dual function substation



## Key tasks of the "Intelligent *e-heating*" programme realized on the operator's side

- ▶ remote control and control of the heat exchange centre operation – minimizing the personal and general costs of transport (reduced number of visits to the facilities, remote diagnosing),
- ▶ quick failure location – reduced time of the potential heat supply disruptions,
- ▶ optimization of the operation of the heat network
  - ▶ minimization of the transmission heat loss
  - ▶ minimization of the pumping costs
  - ▶ minimization of the refilling and loss of the network water
- ▶ supporting Zakład Przesyłu i Dystrybucji Ciepła [Heat Transmission and Distribution Plant] in the decision-making process linked with the network services,
- ▶ optimization of the operating parameters, dynamic management of the source parameters,
- ▶ generating reports related to parameters and heating network operation -use in the operating, renovation and upgrading decision-making processes,
- ▶ support of the thermal hydraulic analysis, connecting new recipients, reconnecting the supply directions, network operation modes during the failure and at different loads (winter, summer).

## Key tasks of the "Intelligent *e-heating*" programme realized between the operator and recipient

- ▶ continuous supply quality parameter monitoring and commercial parameters,
- ▶ remote setting the weather control systems– edge outdoor temperature, heat curves, parameter lowering schedules,
- ▶ data archiving, historic data repository used in the consideration of the complaints
- ▶ remote heat meter reading,
- ▶ heat use settlement using the e-klient system.

## Key tasks of the "Intelligent *e-heating*" programme realized in the field of heat consumers

- ▶ heat use analysis – a generally available portal,
- ▶ an early warning system concerning reception installation failures,
- ▶ possibility to receive the analyses of the use of heat or on-going monitoring of the commercial parameters,
- ▶ use of the data and analyses in the area of energetic efficiency.

## Welcome to the web sites of MPEC S.A. Tarnow

[www.mpec.tarnow.pl](http://www.mpec.tarnow.pl)

The official website of the Company

[www.ctg.tarnow.pl](http://www.ctg.tarnow.pl)

Website of MPEC Heating Technology Center Tarnow

[www.ue.mpec.tarnow.pl](http://www.ue.mpec.tarnow.pl)

Website of the modernization project of the heating system

[www.analizy.mpec.tarnow.pl](http://www.analizy.mpec.tarnow.pl)

Website of Tarnow portal for the heat consumption analysis



Thank you for your attention