BITOLA DISTRICT HEATING WITH THERMAL ENERGY FROM TPP BITOLA

Presenter:

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CONTENT OF THE PRESENTATION

- Project team
- Introduction to project
- Some technical aspects
- Heat vs electric power
- Some energy and environmental benefits
- Estimated investment cost
- Financial parameters
- Conclusion and recommendations

PROJECT TEAM

- ELEM - TPP Bitola
  - Mr Jani Radivchev
  - Ms Daniela Mladenovska
  - Mr Goce Nikolovski
- Municipality of Bitola
  - Mr Goran Nedelkov
- Senior experts
  - Prof. Ilija Petrovski
  - Prof. Risto Filkoski
- J. consultant
  - Mr Igor Mishevski
- Norsk Energi and CCC
  - Mr Hans Borchsenius
  - Ms Ann Iren Glimsdal
  - Ms Bojana Stanojevska

INTRODUCTION TO PROJECT

VERY IMPORTANT: THIS IS NOT A NEW IDEA!
Several initiatives undertaken from the early 80-es, including a project developed by Bitola engineers in the middle 80-ties

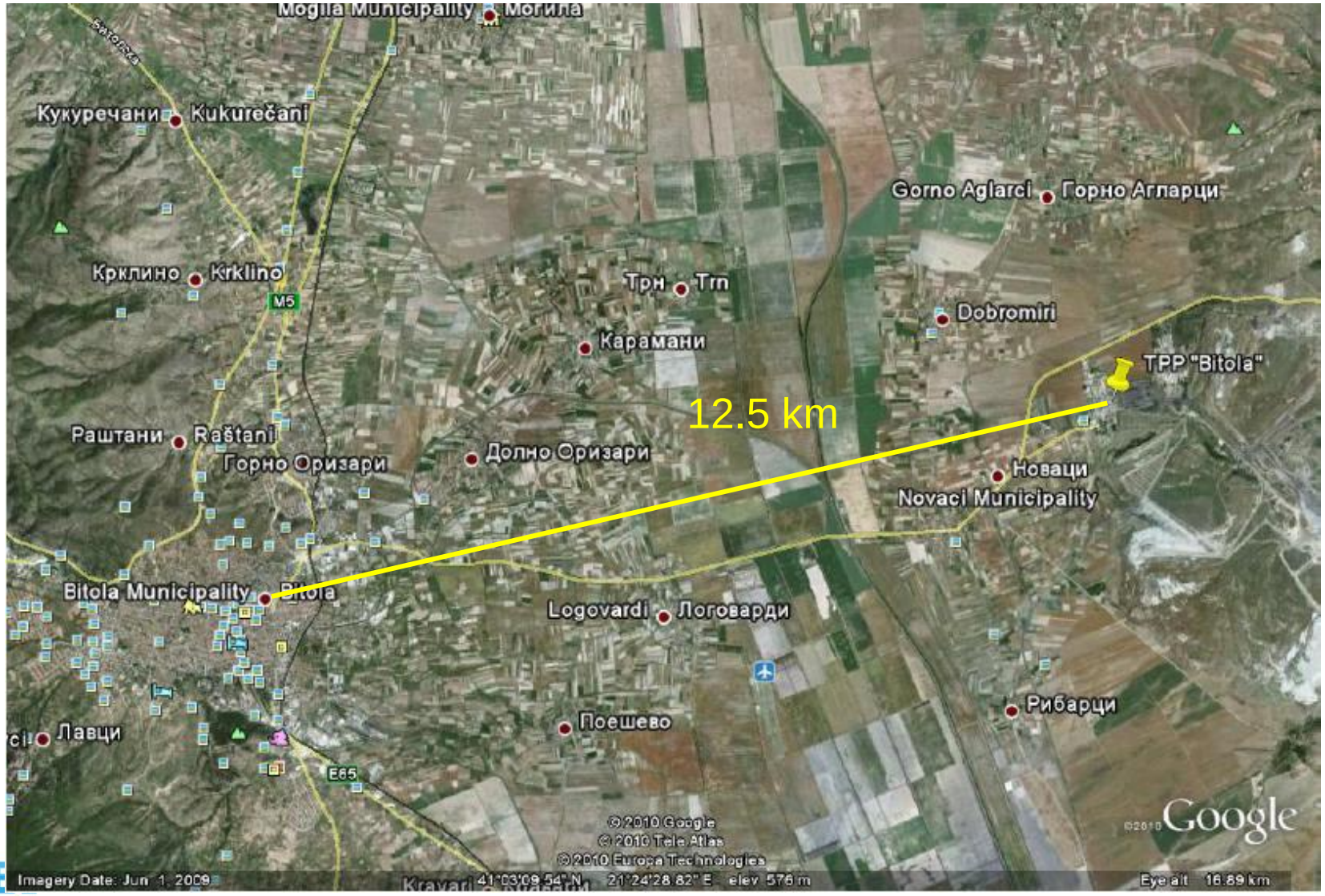
❑ SUBJECT OF THE PRESENT STUDY

- Analysis of the possibilities for distant heating of Bitola and greenhouses in the area of Novaci and Mogila
- The main point – to remind the authorities (local and central) and the population concerning such an opportunity!

❑ SCOPE OF THE PROJECT

- Utilisation of thermal energy from the TPP Bitola for distant heating: technical, environmental, financial-economic, social and other aspects
- Analysis of effects and benefits that would be achieved by implementation of such project

Aerial view of the terrain



SOME TECHNICAL ASPECTS

- **TECHNICAL POTENTIAL**
  - TPP Bitola is a potential efficient source of thermal energy for heating of households, public sector, services and industry in the town of Bitola and for greenhouses in the area of Novaci and Mogila
  - The turbines (IM and LP) in two out of three units are suitable for reconstruction to operate in CHP mode – Must be done immediately!
  - Heat exchanging and pump station (HEPS) with auxiliary equipment should be installed in the plant
  - Possible to supply thermal energy for district heating and agriculture production with capacity of 2 x 200 MWth

- **TEMPERATURE REGIMES**
  - Primary hot-water two-pipelines system: 130-135^{o}C/75^{o}C
  - Secondary network: 90^{o}C/70^{o}C (or as decided in detailed design phase)

HEAT vs ELECTRIC POWER

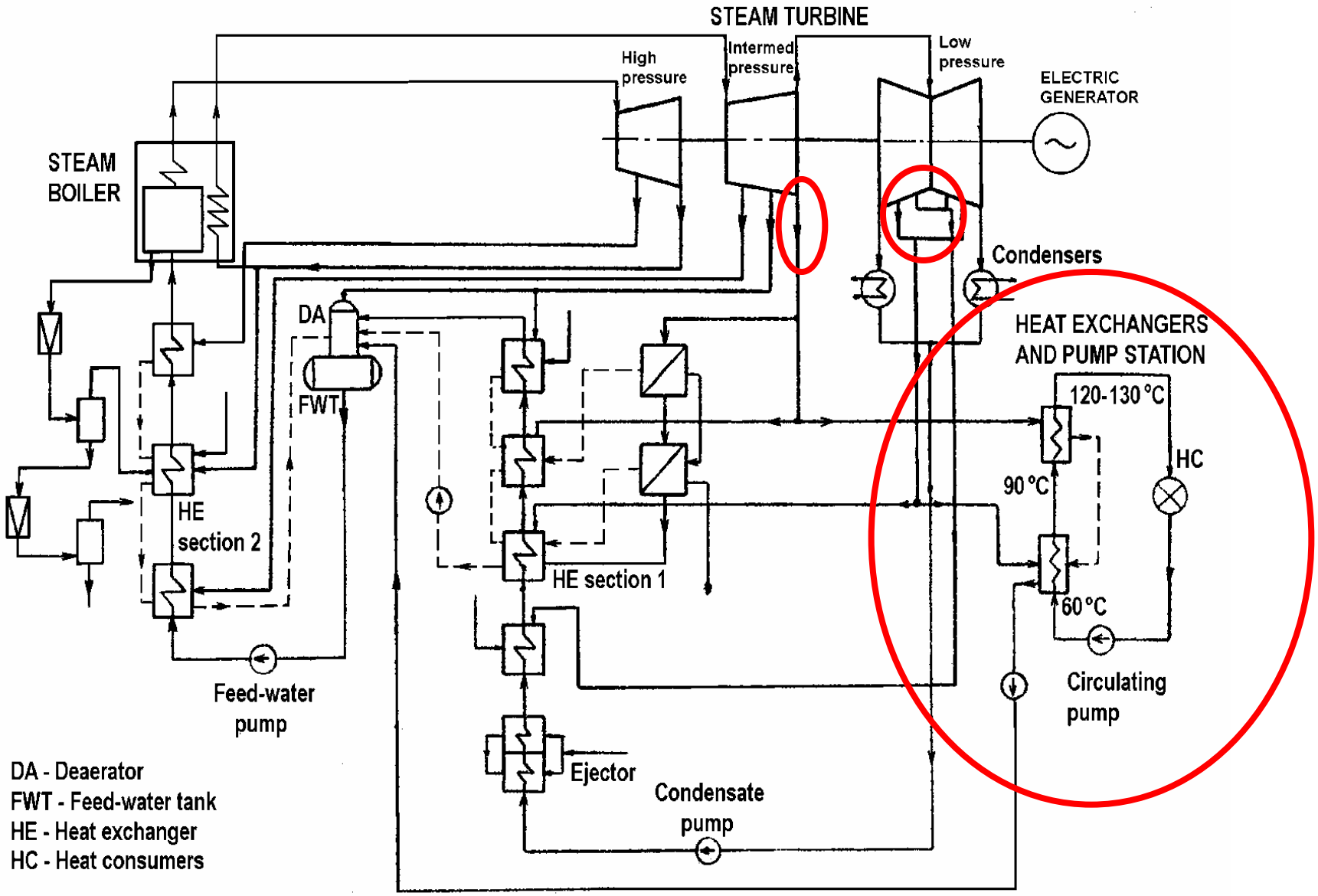
❑ CHP MODE vs ELECTRICITY GENERATION MODE

- Steam extraction at low pressure for heating in this type of power plant means loss of approx. 0.18 MW electric power per 1 MW thermal power
- Heat demand of 60 MW thermal power, as it is assessed for the first phase of the project implementation, would result in approx. 11 MW electric power reduction in heating season

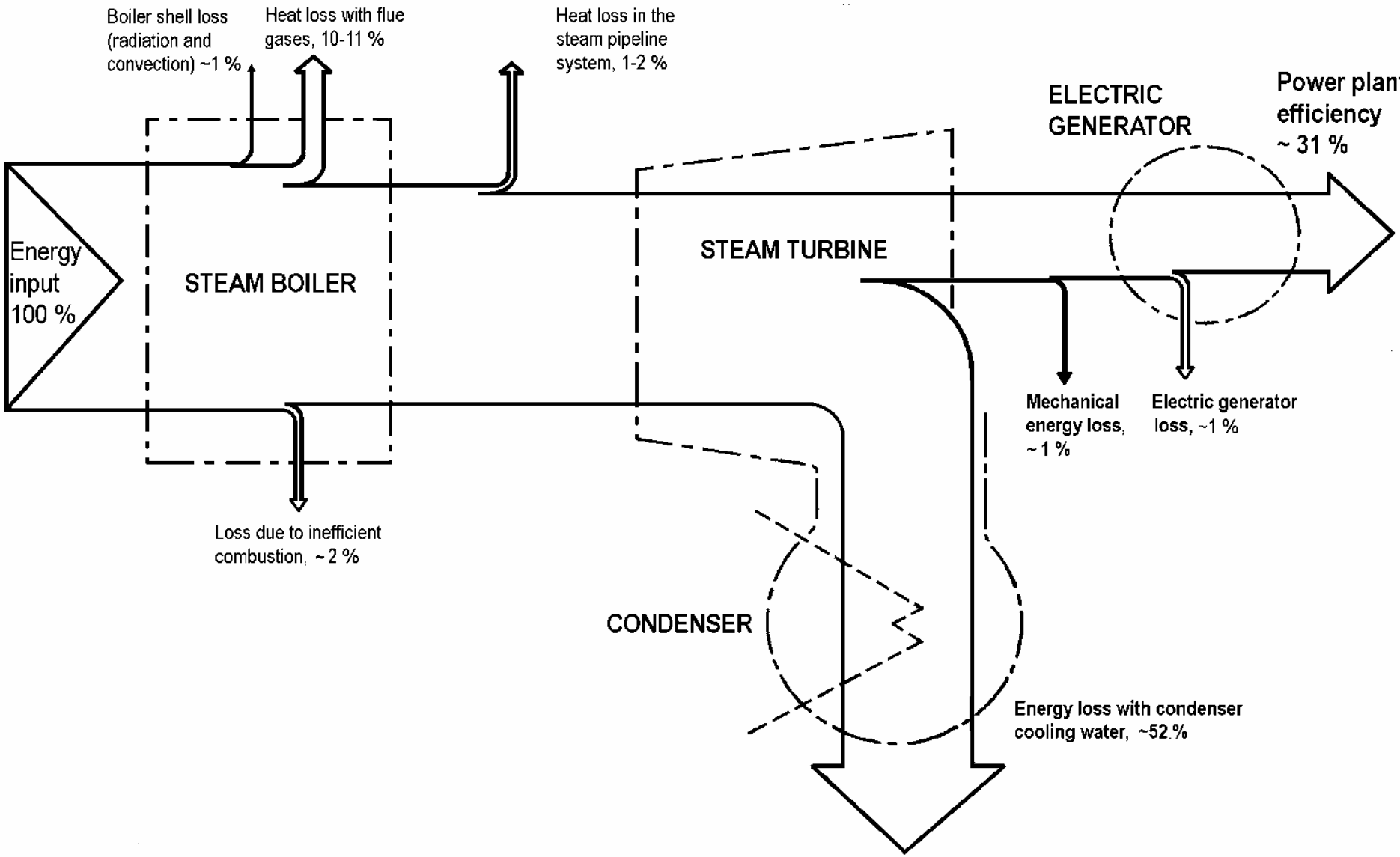
❑ SIMILAR PROJECTS IN THE REGION

- Pozarevac district heating system, TPP Kostolac, Serbia – very similar equipment, distance, heat demand
- Kozani DHS, TPP Kozani – Ptolemaida, Greece (very close to Bitola), distance between TPP and the town 18 km
- Srebrenjak, TPP Tuzla, BH – in progress

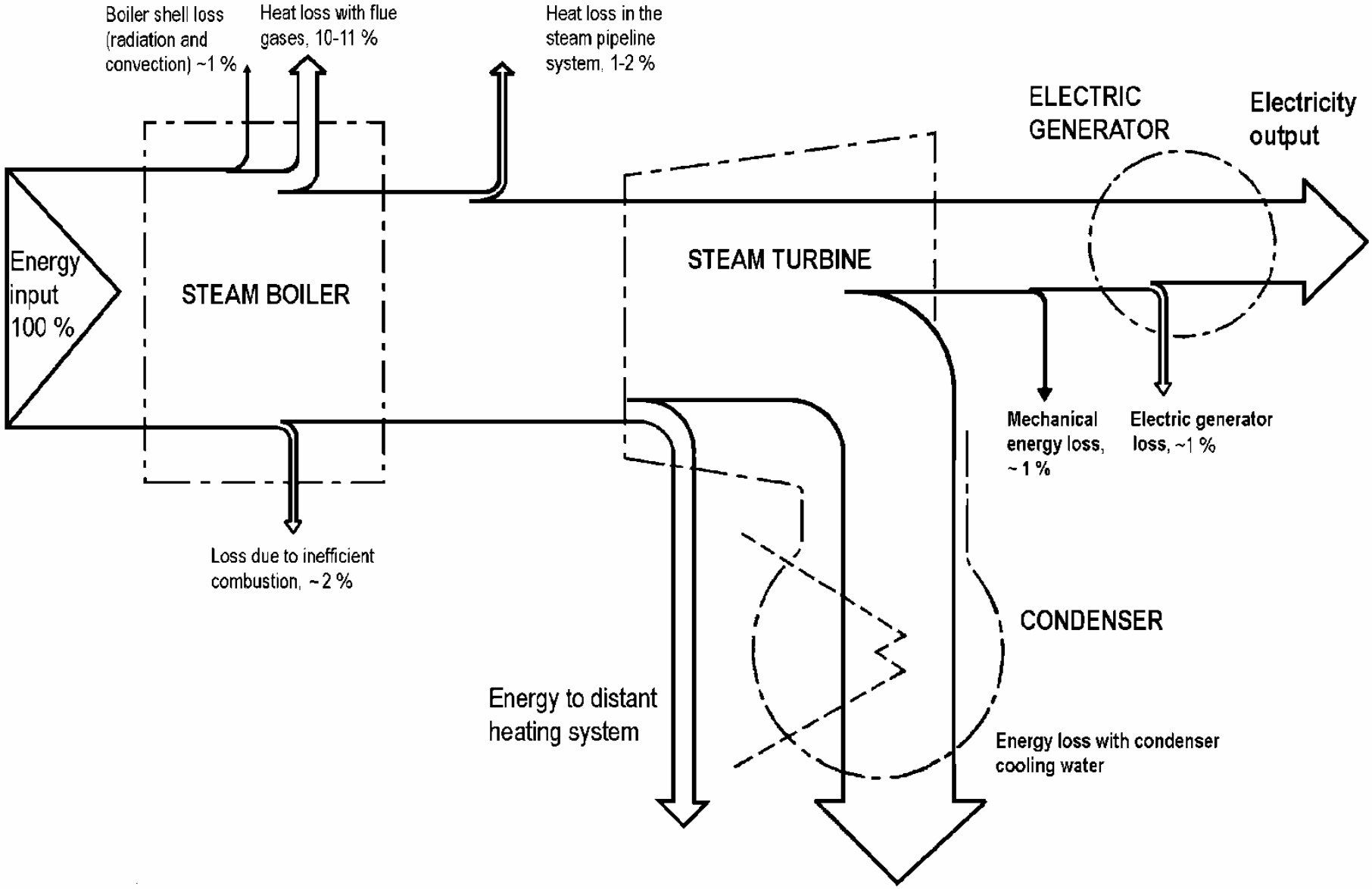
Schematic presentation – TPP Bitola as CHP unit



Rough energy balance – TPP in actual operation mode



Rough energy balance – CHP mode



ENERGY AND ENVIRONMENTAL BENEFITS

- Today Bitola is heated in decentralised manner: fire-wood, oil and electricity
  - Electricity consumption during heating season (October-March) is 20-30 % larger than in the period April-September
- Important consequence of project implementation: Partial substitution of fire-wood, fuel oil and electricity for heating
- Reduction of local air pollution
  - Reduced smoke concentration in winter
  - Reduced SO_2 concentration
- Reduction of GHG emission

ENERGY AND ENVIRONMENTAL BENEFITS

- Example of some environmental benefits: Kozani District Heating System (Northern Greece)
  - Reduced smoke concentration in winter from 50-60 $\mu g/m^3$ to below 20 $\mu g/m^3$
  - Reduced SO_2 concentration from 160-180 $\mu g/m^3$ to 10-15 $\mu g/m^3$
  - Reduced CO_2 emission by approx. 54000 t/year

ECONOMIC, SOCIAL AND OTHER BENEFITS

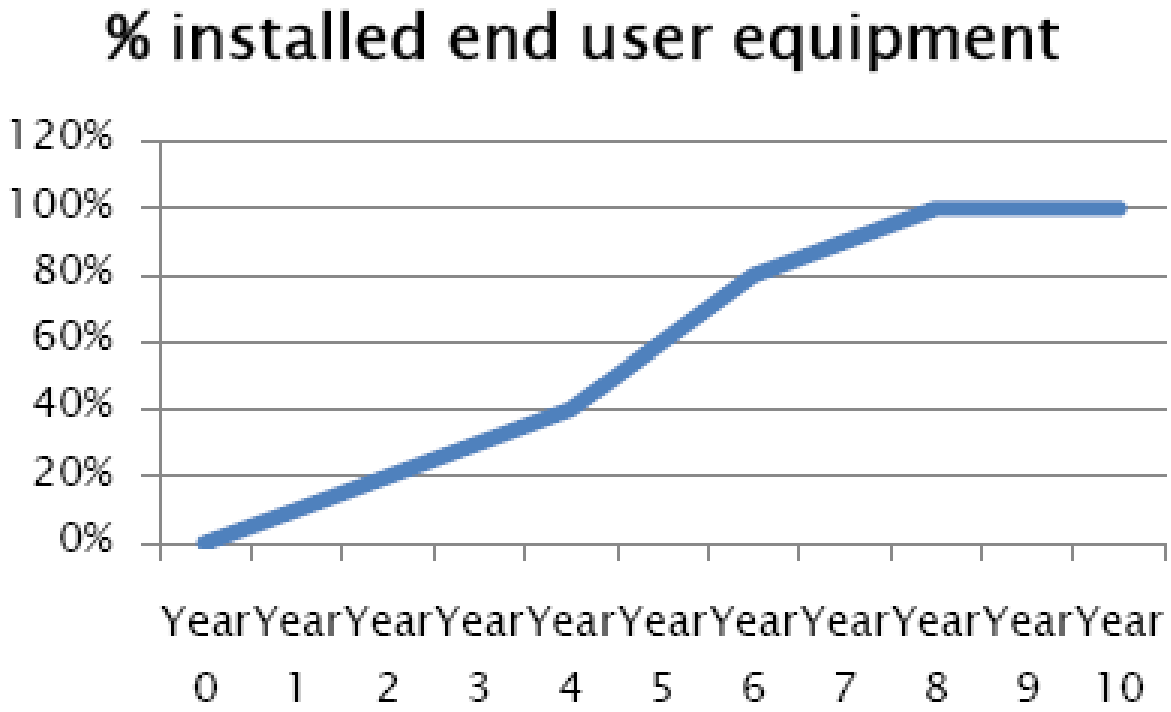
- Increase of employment, permanent and temporary
- Engagement of local companies in construction of the system
- Better conditions for businesses, incl. agriculture
- Improved living and working comfort
- Other benefits

ESTIMATED INVESTMENT COST

No.	Activity, equipment	Production Mil. €	Supply Mil. €	Total Mil. €
1	Investigation / research works, studies, basic design works	0.5	0.5	1.0
2	Buying land for pipeline tracing		1.0	1.0
3	Construction works, incl. terrain preparation	1.0	4.0 – 5.0	5.0 – 6.0
4	Energy equipment, facilities – procurement and installation			25.0 – 27.0
4.1	– Reconstruction of turbines	2.0		
4.2	– Heat exchanger & pump station	4.0 – 5.0		
4.3	– Hot-water pipeline (from TPP to the town and part of the town network)		15.0 – 17.0	
4.4	– Pump station for maintaining pressure level		2.0 – 3.0	
5	Electrical equipment	1.0	1.0	2.0
6	Other	1.0	2.0	3.0
	Total	10.5 – 11.5	24.5 – 28.5	35.0 – 40.0

SOME FINANCIAL-ECONOMIC PARAMETERS

- **Production price at threshold of TPP 0.4 – 0.74 MKD/kWh (with included gross margin)**
- **Total investment 40 Mil. €**
- **Income 14 Mil. € / year (after 8 years)**
- **Economic lifetime 20 years**
- **Real interest rate 4.5 %**
- **IRR 11.03 %**



CONCLUSION AND RECOMMENDATIONS

- **Multiple benefits from the project implementation**
- **Complex project – substantial decisions in ELEM and the respective municipalities should be made**
- **The Municipality of Bitola should take the lead in developing the distribution side of the project**
- **Technical part in TPP Bitola must be IMMEDIATELY initiated, due to necessary specific reconstruction works on turbines**
- **Organisational and management issues should be resolved! Public-private partnership – a possible solution**
- **The project is feasible and profitable**