Roadmap on the Development of District Heating in Azerbaijan until 2020
INOGATE Technical Secretariat & Integrated Programme
Klaus Fafner

BUILDING PARTNERSHIPS FOR ENERGY SECURITY

Klaus Fafner 2 DH Company
Workshop at Azeristiliktechizat

Topics for discussion

Sustainability
- Towards a Sustainable Company
- Present Situation for Company?

Technical Improvements
- Modern Building Installations
- Modern Building Heat Substations
- Network Modernization
- Water Quality
- Heat production Improvements
- Technical Administrative Systems
Sustainability

Social

Bearable

Equitable

Environment

Sustainable

Viable

Economic

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Towards a Sustainable Company

A: OUR CUSTOMERS
To provide our customers with services in the most efficient and sustainable manner.

B: OUR STAFF
To create and sustain a business where the staff is motivated and skilled in system operation and customer relations.

C: OUR COMMUNITY
To cooperate with government bodies and other service entities towards common goals.

D: OUR LEGACY
To ensure that the business fulfils its responsibility in utilizing the energy efficiently and in a environmentally sound way.

E: OUR FINANCES
To develop the business so that financial viability is achieved.
Present Situation for Company?

Institutional technical and economic challenges

OUR CUSTOMERS

OUR STAFF

OUR FINANCES

OUR LEGACY

OUR COMMUNITY

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Modern Building Installations

TRV – Thermostatic Radiator Valves
PIBV – Pressure Independent Balancing Valves (as flow limiter)
AT – Pipe Thermostat
HCA – Heat Cost Allocator
Modern Building Heat Substations

Prefabricated building substations in the basement or in an annex besides the building.
From fixed to variable flow regime

New technology is enabling control of the heat at demand side.

Heat control at demand side will introduce variable flow and together with frequency converters at the circulation pumps it will decrease the power consumption.

Better heat supply quality: Very short response time. The heat is at the demand side immediately when needed.

Temperature is regulated moderate at the supplier, but not as the main capacity regulation.
Network Modernization

Renewal of the Distribution Network

Priority of pipe replacements:
- In the short term
- In the longer term

Benefits:
Heat losses in the network is decreased.
Water losses in the network is decreased.
Fault detection: copper wires are placed embedded in the isolation.
Pre-insulated Steel Pipes

Construction of the pre-insulated bonded pipe
Конструкция предизолированной связанной трубы

The diffusion barrier
- Aluminium foil
- (optional)

dиффузионный барьер
• алюминиевая фольга
• (выборочно)

The service pipe
- Steel P235 GH

Рабочая труба
• Сталь P235 GH

The insulation material
- Polyurethane (PUR)

This configuration:
- $T_{\text{continually}}$: 140°C
- $T_{\text{peak}}$: 150°C
- $P$: 25 bar
High Water Quality

Softening plant or demineralization plant

pH dosing system with NaOH: pH = 9,6 – 9,8

Feed water thermal de-aeration < below 0.02 mg oxygen per litre.

Partial flow filter cleaning continuously 5-15% of the circulating water. Bag filter particles > 0.01 mm and magnetic filter < 0.01 mm.

Chemical additives that are oxygen-reductive and corrosion inhibitors.

Clean of sulphur bacteria bio-film (chemical cleaning, temperatures > 150 degree C, or pH > 10,2-10,3 in 1-2 weeks)

_Precondition: Minimization of water leakage and illegal discharge: Color agent “Uranine” for leakage detection._
Recommended Water Quality

For feed water:

<table>
<thead>
<tr>
<th>Feed water</th>
<th>Softened/ deaerated water</th>
<th>Demineralised/ deaerated water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity µS/cm</td>
<td>approx. like raw water</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Hardness dH°</td>
<td>&lt; 0,1</td>
<td>-</td>
</tr>
<tr>
<td>Oxygen content mg/l</td>
<td>&lt; 0,02</td>
<td>&lt; 0,02</td>
</tr>
<tr>
<td>Free carbon dioxide mg/l</td>
<td>-</td>
<td>&lt; 10</td>
</tr>
</tbody>
</table>

For circulating water:

<table>
<thead>
<tr>
<th>Circulating water</th>
<th>Softened/ deoxygenated water</th>
<th>Completely desalinated/ deoxygenated water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductivity mS/cm</td>
<td>approx. like raw water</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Hardness dH°</td>
<td>&lt; 0,5</td>
<td>0</td>
</tr>
<tr>
<td>pH- value</td>
<td>9,5 - 10,0</td>
<td>9,5 - 10,0</td>
</tr>
<tr>
<td>Appearance - sludge</td>
<td>clear and sludge-free</td>
<td>clear and sludge-free</td>
</tr>
<tr>
<td>Oil content</td>
<td>oil-free</td>
<td>oil-free</td>
</tr>
<tr>
<td>Oxygen content mg/l</td>
<td>oxygen-free</td>
<td>oxygen-free</td>
</tr>
</tbody>
</table>

Hardness definition: 1 dH° = 10 mg CaO/liter (German definition)
Heat production Improvements

More efficient gas boilers:
- New better burners
- Flue gas condensation
- Automatic supply temperature control

Interconnection of networks:
- Most efficient boilers as base load.

Utilization of surplus heat:
- Industrial surplus heat
- CHP

New heat production technology:
- Heat pumps
- Waste incineration.
Technical Administrative Systems

Central database

- Mobile GIS
- SCADA
- WEB GIS
- Analyses, new design
  Decision-making
- Pipe and components
  data for maintenance
- Statistics and billing
- GIS for others
  municipality, companies, customers

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**SCADA**

*SCADA = Supervisory Control and Data Acquisition*

Central supervisory and control system

Remote terminal units at local meters and control devices
Central Inventory Database

Inventory Database for the management of spare parts and maintenance.

All data on the network in one place with access for all employees.
Meter Reading and Billing System

The system can communicate with the trucks on a daily basis and collects consumption data.

- **Garbage truck**
- **Meter with radio module**
- **Mobile data transceiver**
- **GSM**
- **Automatic Meter Reading**
- **Billing system**
- **Customer information**
  - Internet
  - Smartphone
  - Mail SMS

- Monthly data
- Actual data
Thank you for your attention!

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