

TAKING COOPERATION FORWARD

2ND LOCAL TRAINING (PL) Webinar | 19. March 2021



Biomass DH in Austria - Quality is the key

QM Heizwerke - Quality Management for Biomass District Heating Plants

ENTRAIN | AEE INTEC | Christian Ramerstorfer

DEVELOPMENT OF BIOMASS DH IN AT





Development of biomass district heating plants in Austria

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STATUS QUO IN AUSTRIA





QM HEIZWERKE BACKGROUND STORY



- Austria's first biomass heating plants built in the 1980ies
 - Pioneers and idealists
 - No experience, no standards/guidelines
 - Limited technology
 - High investment subsidies
 - No quality criteria
- Development of know-how and technology
- Great variety of plant concepts and economic viability
 Evaluation of plants by government in 2003
 - heat production costs higher than expected
 - Quality of technical design is essential for economic success!

⇒Quality management suggested by evaluators



WHY QUALITY MANAGEMENT?



- Long-term infrastructure projects with high investments
- Planning significantly influence project success
 - Dimensioning of plant and network
 - Efficiency / fuel demand
 - Plant durability and operating costs
 - Development of supply area
- Avoid stranded investments
 - Ensure effective public funding

Consequent monitoring and optimization

- Technical, economical and administrative
- Don't make the same mistakes again and again
 - Use proofed (Austrian!) technology and concepts
 - Ensure state of the art / state of knowledge

IÜRGEN GOOD

Engineering office Verenum, head of the Quality Assurance Wood Combustion:

"Biomass heating plants with heating networks are long-term projects with high investment needs. Thus, a professional project and quality management is essential in order to realize and operate plants successfully."



WHERE DOES IT COME FROM?



Made in Switzerland

- invented 1998
- Since 2005 development supported by Austria, Germany

https://www.qmholzheizwerke.ch

Dr. Jürgen Good Ingenieurbüro Verenum juergen.good@verenum.ch

New members are welcome!

New member from Italy





WORKING GROUP Quality Assurance Wood Combustion

Switzerland:

--- Holzenergie Schweiz, with financial subsidy of the Federal Authority for Energy



Germany:

- College for Forestry in Rottenburg
- C.A.R.M.E.N. (Centrales Agrar-Rohstoff-Marketingund Entwicklungs-Netzwerk e.V.)

Austria:

- --- AEE Institute for Sustainable Technologies (AEE INTEC)
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QM HEIZWERKE - WHAT IS IT ?



- Nationwide quality management program for biomass district heating plants
 - Improve the quality and efficiency of biomass district heating plants and networks
 - Optimisation of existing plants
 - Know-How-Transfer
- More than 800 plants (>1.800 projects) in Austria guided by QM Heizwerke
 - Obligatory to get investment subsidies (nominal boiler load ≥ 400 kW and/or district heating net length ≥ 1000 m)
- Program management: AEE INTEC (assigned by Austrian Federal Ministry of Climate Action, Environment, ...)



Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology



QUALITY MANAGERS



- Quality Managers (Q-Managers) guide and supervise biomass DH projects
 - from the feasibility study to the first operating phase
- 50 Q-Managers in Austria
 - experienced experts
 - trained by AEE INTEC
 - obligatory to attend annual workshops
- Their main role...
 - supervise the project engineer
 - report to the plant owner
 - ensure that technical and economical requirements are fulfilled
 - guarantee that differences are recognised and corrected
 - feedback to QM-management





QUALITY MANAGEMENT PROCESS





Fernwärme Mariazell



Some say...

... it's too much effort!

• We say...

... a serious planning comprises all data and documents required by QM!

Documentation is necessary and important

- to check scope of delivery, planning, control strategies,...
- optimisation, enlargement, refurbishment
- in case of malfunctions !
- authorities, funding,...
- Costs for Q-managers are funded
 - and mostly negligible (in the range of about 1 2 % of the investment)



QUALITY MANAGEMENT COUPLED WITH FUNDING SCHEME







AUSTRIAN FUNDING SCHEME FOR BIOMASS DISTRICT HEATING PLANTS



- Investment subsidies 25 30% (35%) of total investment
 - Engineering + quality management
 - Boiler house + components
 - Piping and electricity
 - Fuel storage
 - District heating network + substations

Subsidies for

- New plants and networks
- Enlargement of existing plants/networks
- Plant optimization
- Further funding options (e.g. "changing boilers", heating plants without DH, heat pumps, thermal solar, ...)



Source: qm database



TECHNICAL REQUIREMENTS



- Quality guidelines of QM Heizwerke are defined in technical handbooks
- Publication series of QM Holzheizwerke[®] developed by the working group Quality Management for Biomass District Heating Plants
 - Q-Guidelines (with q-plan)
 → defines QM process + requirements
 - QM planning handbook
 → support for planning (revision & translation ongoing)
 - Standard hydraulic schemes part 1 and part 2 (integral part of the QM process)
 - Standard tender for wood boilers
- Lots of additional supporting documents, checklists, tools, ... TAKING COOPERATION FORWARD 13



Holzheizwerke

QM HEIZWERKE PROJECT DATABASE



- Web based internet platform
 - Upload and export functions
- Coordinates the QM process
 - central point of access for all parties
 - specific access/user rights
- Documentation of the project and quality process in each project phase
- Status quo:
 - 1.800 projects 804 plants
 - Data of 61.100 heat consumers
 - > 100.000 PDF-documents

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Source: qm database

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HEAT GENERATION COSTS



Heat generation costs higher than expected



Heat generation costs compared to heat prices (blue columns ... averaged heat prices incl. basic and energy charge); Evaluation by AEE INTEC

HEAT GENERATION COSTS



More than 2.100 reports

- Annual operating reports are uploaded to the QM database after the end of the QM process (Milestone 5)
 - Contains basic operating data
- Feedback to funding authority, plant operator, ...
- Enables benchmarking



TYPICAL WEAK POINTS OF BIOMASS DH

- Overestimated heat demand/sale
- Large networks with low heat sale
- Insufficient engineering/design
- Unsuitable plant concept
- Overestimated dimensioning
 - Boilers
 - DH network pipe diameters
- Problems with plant control strategy
 - incl. instrumentation and operating data recording
- Insufficient knowledge/education of operators
- Missing documentation

 \Rightarrow High investment, operation and maintenance costs TAKING COOPERATION FORWARE







WHAT DOES ALL THAT HAVE TO DO WITH IMPROVED AIR QUALITY?



- Biomass DH replaces individual boilers/heating systems
 - Significant improvement compared to (inefficient/old) biomass/coal furnaces
 - Compared to new boiler/heating systems it is challenging!







Source: QM Heizwerke

We don't want that !!

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ADVANTAGES OF DISTRICT HEATING IN TERMS OF AIR QUALITY

- Significantly reduced start/stop + low load operation
 - Thus, real operational emissions are lower
 - If plant configuration, dimensioning and control strategy are suitable!
 quality management !
- Effective flue gas cleaning applicable
 - Electric precipitator / dust filter
 - (flue gas condensation)



- DH makes "non-emission" heat sources accessible
 - Thermal solar
 - Waste heat
 - Environmental heat, ...





CURRENT AND FUTURE CHALLENGES



- Decreased heat demand
 - Climate warming
 - Thermal refurbishment of buildings
- Planning mistakes
 - It is hard to correct them!



- New plant concepts / increased complexity
- Insufficient marketing/costumer service/public relation
- Best areas are already occupied (in Austria)
 - A lot of potential in other countries !!
- Higher ecological pressure
 - emission limits, regional/sustainable/certified wood, ...
- Still low cost fossil fuel and missing political commitment



THANK YOU!





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