



Biomass DH Plants

## Quality pays off

### Facts about the construction of a biomass heating plant

**Every owner of a biomass (district) heating plant expects basic quality objectives to be achieved:**

- reliable and low-maintenance operation
- precise and stable control
- highest possible degree of utilisation and low distribution losses
- low emissions in all operating states
- ecological and economic sustainability



**Without target-oriented quality management, these quality objectives cannot be achieved satisfactorily.**

The realisation of a biomass district heating plant is a challenging task. Most of these plants are close to the limit of economic viability. The investments are high, the payback periods are long. The complexity of the plants causes numerous risks.

Experience has shown that wood heating plants are often built with oversized heat generators or that the heat demand is lower than expected. The result is that the utilisation of the plant is too low. This has unpleasant consequences: technical problems, complaints due to unpleasant odours, lower yields, possibly even economic losses.



**Quality Management for Biomass District Heating Plants defines quality requirements and checks if they are complied with.**

Quality Management (QM) for Biomass District Heating Plants enables a professional design, planning and construction of the heat production plant and the district heating grid by defining quality requirements and consistently checking these requirements from the start of the project to the final inspection after one year of operation.

QM for Biomass District Heating Plants is the result of an international cooperation. It was developed by the working group for Quality Management for Biomass District Heating Plants, which is a team of experts from Switzerland, Austria, Germany and recently also Italy, which constantly develops and improves QM for Biomass District Heating Plants. The broad experience of the team is bundled and contributes to the realisation of new projects.

**For 1 to 2 % of the investment, the plant owner gets the quality he ordered.**

The investment in quality management pays off. The additional costs are significantly lower than the cost savings in investment and operating costs that are activated by applying QM for Biomass District Heating Plants.

## With QM for Biomass District Heating Plants it is possible to learn from the mistakes of others - also internationally.

The planning of a biomass district heating plant should always lead to a technically feasible, economically viable and ecological supply of heat. In recent years, a large number of successful projects have been realised in Switzerland, Austria and Germany. Besides numerous positive examples, also plants with shortcomings can be found. Poor planning also has a negative impact on the overall image of bioenergy.

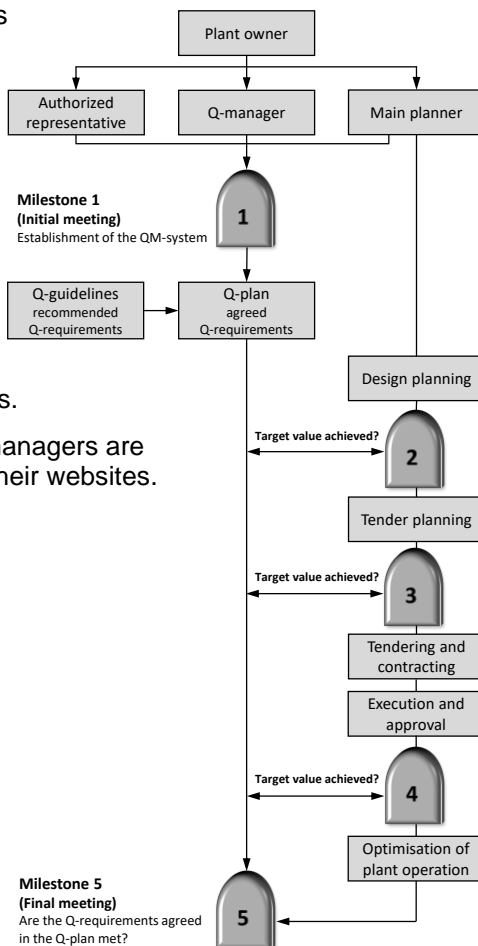
Studies in the above-mentioned countries have shown that most mistakes could have been avoided if more care had been taken in planning and implementation and if the existing experience of similar plants had been used. QM for Biomass District Heating Plants knows common issues and successfully prevents making the same mistakes again and again.

## Plant owner, main planner and Q-manager: three experts implement QM for Biomass District Heating Plants.

The plant owner commissions his authorised representative, the main planner and the Q-manager to implement QM for Biomass District Heating Plants. The Q-manager is an experienced expert who brings in a wide range of experience from many projects. He accompanies the project team from the beginning and provides a neutral second opinion. Together with the plant owner and the main planner, he defines quality requirements and records them in the Q-plan. During the planning and realisation of the biomass district heating plant, he checks corrective measures. Whether these recommendations are then actually implemented is determined solely by the plant owner.

Q-managers need to be approved by the working group QM for Biomass DH Plants or their national representatives.

Approved Q-managers are published on their websites.



## Quality is defined, controlled and checked at predefined milestones.

**Milestone 1:** At an initial meeting, the plant owner, the main planner and the Q-manager jointly define the quality requirements and the responsibilities in the Q-plan.

**Milestone 2 and Milestone 3:** When the design planning and later the tender planning are available, the Q-manager checks the quality of the planning and, if necessary, makes recommendations that the plant owner can accept or reject. He records the results of this check in an additional document.

**Milestone 4:** After commissioning and acceptance of the plant by the plant owner and the main planner, a concept for operational optimisation is to be prepared and submitted to the Q-manager.

**Milestone 5:** The final inspection by the Q-manager takes place at the earliest one year after the commissioning of the plant and after the implementation of the operational optimisation. The main planner and the supplier of the plant must prove that the agreed quality requirements are met.

**In the Q-Guidelines, QM for Biomass District Heating Plants defines the quality requirements according to the state of the art.**

The procedure of QM for Biomass DH Plants and the quality requirements (Q-requirements) are defined in the Q-Guidelines by the international working group according to the current state of the art.

The standard procedure for biomass heating plants with a thermal output of 500 kW (400 kW in Austria) or more is called QMstandard. In addition, QM for Biomass District Heating Plants offers the QMmini procedure for monovalent systems with a smaller output.

**With QM for Biomass District Heating Plants, the plant owner ensures that he gets a system according to the quality requirements he ordered.**

During the kick-off meeting (Milestone 1), the Q-requirements are defined under the direction of the Q-manager together with the plant owner and the main planner and agreed upon in the Q-plan for the specific project. If the plant owner wishes to deviate from individual Q-requirements, which may make sense in certain cases, e. g. due to economic considerations, this must be explicitly agreed in the Q-plan. This is not possible for Q-requirements that are mandatorily prescribed by funding agencies.

Examples for Q-requirements:

The annual heat demand, the therewith related heat output capacity and the temperature demand must be comprehensibly determined and justified within the scope of a demand assessment; a corresponding thermal load characteristic and annual load duration curve must be presented.

The heat output of the individual heat producers and their share in the heat supply must be justified on the basis of the annual load duration curve.

The biomass boiler must achieve the highest possible utilisation rate, i. e. the highest possible number of annual full load operating hours.

A proven standard configuration according to QM for Biomass District Heating Plants is to be used for the hydraulic and control solution.

The fuel storage must be dimensioned to cover a defined demand.

The selection of biomass fuels must be defined on the basis of the detailed fuel classification of QM for Biomass District Heating Plants.



**Based on the monitoring data of the operational optimisation, it must be proven that the Q-requirements agreed at the beginning are fulfilled.**

After the biomass boiler has been commissioned, QM for Biomass District Heating Plants foresees a systematic operational optimisation. For this purpose, various measured variables must be recorded and evaluated. The effort involved is manageable. During one week each in the cold heating period, in the transition period and, if necessary, during summer operation, the most important data are recorded. The main planner then evaluates these data and interprets the results. This is the basis for proving that the system actually operates according to the Q-requirements agreed at the beginning.

## Quotes

Martina Schuster, Austrian Ministry of Environment, Head of Dept. for Energy and Economic Policy:

“Efficient biomass heating plants contribute significantly to energy transition. The challenge is to keep up with the technological development and the changes on the heat market.”

Johann Hafner, BC Regionalwärme Krumpendorf GmbH:

“Quality management guarantees that the plant is an example for high-quality planning and technical implementation.”

Harald Kaufmann, nahwaerme.at - Energiecontracting GmbH:

“A high-quality planning and execution, conscientious operation, open-mindedness towards technological development in combination with long-term experience and a strong local anchoring are the key elements for the success of our heating plants.”

Hans Reicht, Bioenergie Hitzendorf reg GenmbH:

“The efficiency of the plant must constantly be increased in terms of profitability. A regular monitoring and evaluation of operational data and quality management are therefore the basis.”

Jürgen Good, Verenum AG, head of Quality Management for Biomass DH Plants:

“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.”

## Translated with support from



CE INTERREG project  
**ENTRAIN** - “*ENhancing renewable heaT planning for improving the aiR quAlity of commuNities*”

**ENTRAIN** project aims at building-up and increasing skills and knowhow of public authorities and key stakeholders in 5 EU target regions (from IT, DE, HR, SI and PL) to develop effective local strategies and action plans for enhancing the use of local renewable energy sources in district heating networks. This will lead to fossil fuels and CO<sub>2</sub> emission reduction, improvement of local air quality and socio-economic benefits for local communities.

For further information see <http://www.interreg-central.eu/Content.Node/ENTRAIN.html>

The collected knowledge is published in **German as series of publications “QM-Holzheizwerke”**. **English versions of selected volumes are available.**

Band 1: Q-Leitfaden (mit Q-Plan)  
ISBN 978-3-937441-91-7

Band 2: Standard-Schaltungen – Teil I  
ISBN 978-3-937441-92-4

Band 3: Muster-Ausschreibung Holzkessel  
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Band 4: Planungshandbuch  
ISBN 978-3-937441-94-8

Band 5: Standard-Schaltungen – Teil II  
ISBN 978-3-937441-95-5

Band 6: Ratgeber zur Biomassekessel-ausschreibung (Version Österreich)  
ISBN 978-3-937441-89-4

## English versions:

Volume 1: Q-Guidelines

Volume 2 and Volume 5: Standard hydraulic schemes (worksheet templates only)

Volume 4: Planning Guidelines

can be downloaded or requested under [www.qm-biomass-dh-plants.com](http://www.qm-biomass-dh-plants.com)

## Working group Quality Management for Biomass District Heating Plants in Switzerland

Holzenergie Schweiz with the financial support of the Swiss Federal Office of Energy  
[www.qmholzheizwerke.ch](http://www.qmholzheizwerke.ch)

## Austria

AEE - Institute for Sustainable Technologies  
[www.klimaaktiv.at/qmheizwerke](http://www.klimaaktiv.at/qmheizwerke)

## Germany

Baden-Württemberg: University of Applied Forest Sciences Rottenburg  
Bayern: C.A.R.M.E.N. e.V.  
[www.qmholzheizwerke.de](http://www.qmholzheizwerke.de)

## Italy

APE FVG - Agenzia per l'Energia del Friuli Venezia Giulia  
[www.ape.fvg.it](http://www.ape.fvg.it)

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