



# Installation of the Ecotube System at Megatem, Lublin, Poland

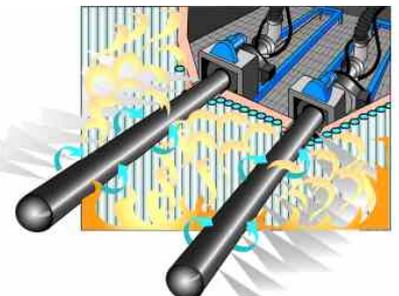


The K1 boiler unit at the Megatem EC plant in Lublin, Poland, was upgraded with an Ecotube-System in 2015 in order to reduce emissions of NO<sub>x</sub> and also to reduce and stabilize emissions of CO. K1 is a coal fired travelling grate CHP boiler dating from 2008 and is used primarily to supply the city of Lublin with district heating but also electricity. One Ecotube was installed just before the furnace exit in the first pass and supplies the furnace with directed high pressure air jets to create a mixing and burnout zone beneath the Ecotube. Improved mixing and turbulence in the furnace means that boiler O<sub>2</sub> can be reduced without increasing emissions of CO and therefore reducing formation of NO<sub>x</sub> from and above the boiler grate. As a last step to comply with current IED limits a small amounts of water based NH<sub>3</sub> solution (24,9%) is supplied via internal Ecotube SNCR injection nozzles spread across the length of the Ecotube. Primary and secondary air to the furnace is heated via air/water heat exchangers located on the Ecotube water cooling circuit.

In order to meet a broader boiler load span, the Ecotube can supply the SNCR reagent either upwards or downwards depending on boiler load and current combustion conditions.

|                                |   |
|--------------------------------|---|
| <b>Plant:</b>                  | Lublin  |
| Plant owner:                   | Megatem EC-Lublin   |
| Boiler:                        | K1  |
| Purpose of installation:       | NO <sub>x</sub> and CO Reduction                                  |
| Year of installation:          | 2015  |
| Operating time:                | 5000-7000 hours/year  |
| Steam output:                  | 30-58 t/h   |
| Fuel:                          | Coal  |
| <b>Pre Ecotube Emissions*</b>  | * All values correspond to mg/Nm <sup>3</sup> @ 6% O <sub>2</sub> |
| NO <sub>x</sub>                | 350-450   |
| CO                             | <200  |
| O <sub>2</sub>                 | 5-6%  |
| <b>Post Ecotube Emissions*</b> |   |
| NO <sub>x</sub>                | <180  |
| CO                             | <100  |
| O <sub>2</sub>                 | <3%   |

The Ecotube system optimizes the combustion process in boilers. Ecotubes are retractable lances which penetrate the boiler furnace wall and are equipped with injection nozzles. The Ecotube system supplies a small proportion of the combustion air under high pressure through the high velocity nozzles. Injection of high velocity air streams creates radically improved **mixing** of the partially burned combustion products, so enabling efficient completion of combustion and significantly reduced emissions of pollutants like NO<sub>x</sub> and unburned components – CO, VOC (Volatile Organic Compounds), particles etc. Improved mixing enables the boiler to run at a lower air/fuel ratio, thus resulting in a higher thermal efficiency. Another important feature is the opportunity to increase thermal output of the boiler.



**ECOTUBES can also supply either solid or liquid urea, anhydrous or liquid ammonia for DeNO<sub>x</sub> or limestone for DeSO<sub>x</sub>.**

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