Scaling Up of The Load Cycle Test Method To District Biomass Heating Systems

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Elevator Pitch

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- **Test methods**
  - Standardized test method
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Standardized Test Method

- Boiler efficiency and emissions are usually determined by standardized boiler tests like EN 303-5
- Stable state operational emissions and efficiency at full and part load are measured
- Seasonal efficiency:

  $85\% \eta_{FL} + 15\% \eta_{PL}$

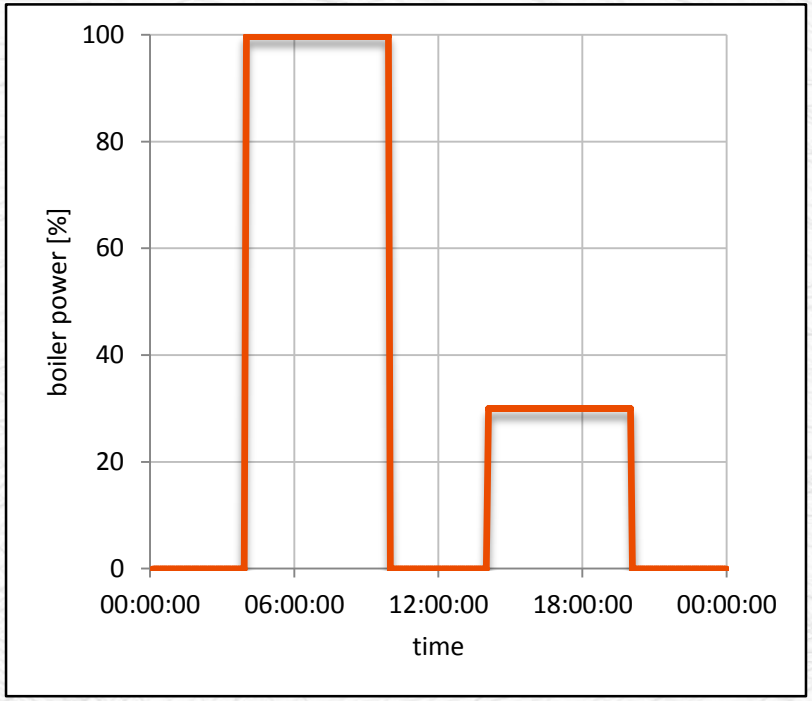

Fig. 1: Example of test cycle of EN 303-5

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Real Life Operation

- Boiler starts-up, modulates and shut downs
- Emissions are usually high and efficiency are low under these operations
- These phases are not taken into account by EN-303-5 type test

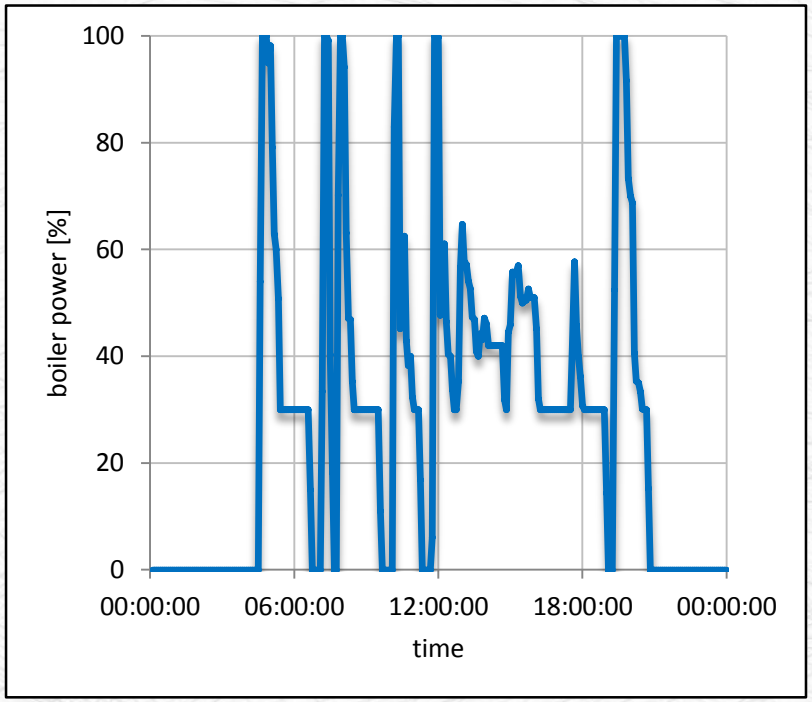

Fig. 2: Example of boiler operation in real life

BioMaxEff developed Load Cycle Test

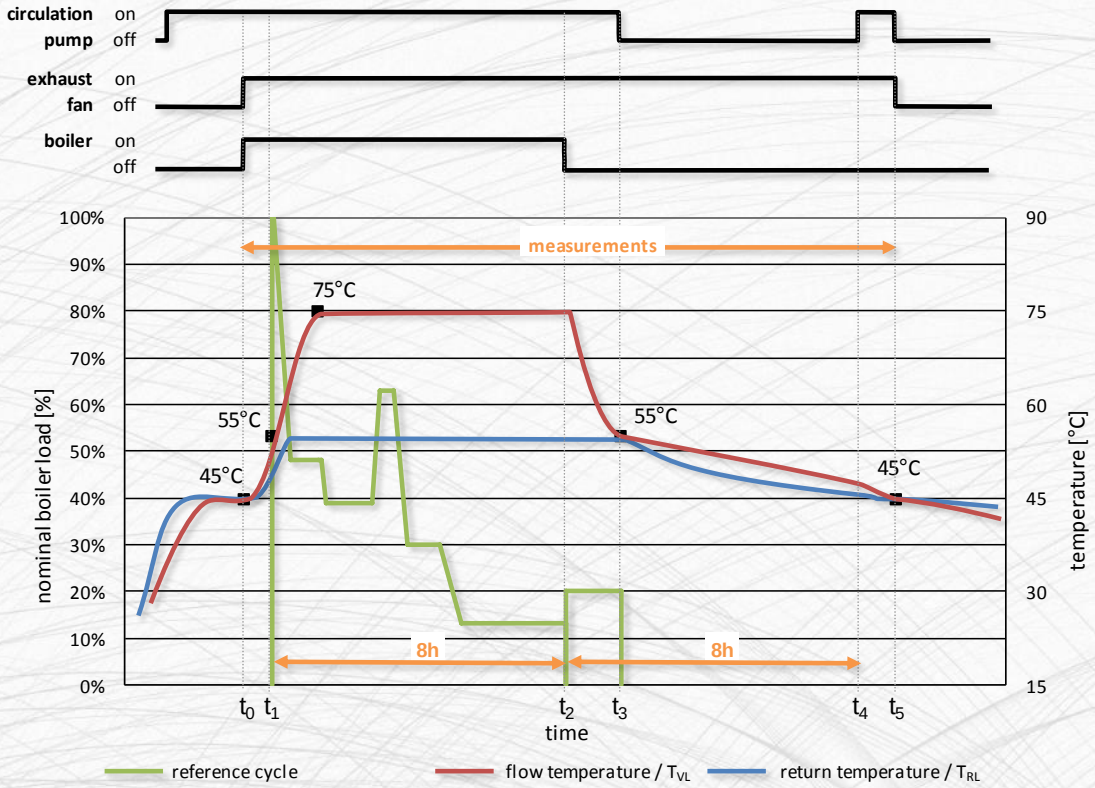

Fig. 3: Boiler operation according to the LCT method

- A method to determine **real life performance** of biomass boilers on a test bench
- Method capable of predicting real life operational eficiency with **less than 5% deviation**.
- Method might be a part of either EN303-5 type test or stand alone type test method

Report: www.bioenergy2020.eu/app/webroot/files/file/ISEB_4_Endbericht_publizierbar.pdf

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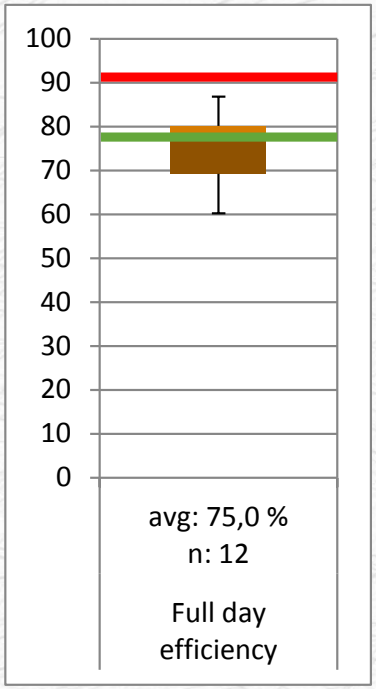
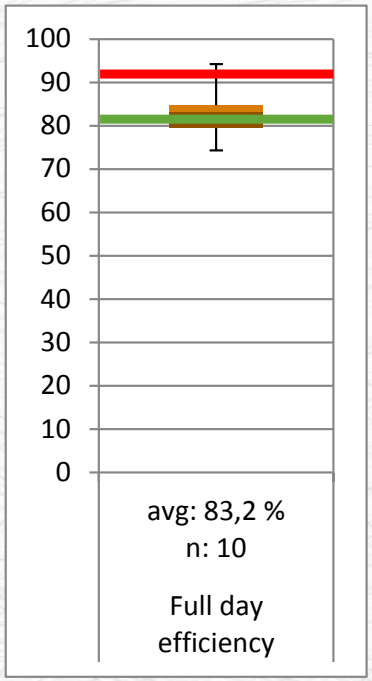
Test results





		VarioWIN		BioWIN2	
Parameter	Unit	Load cycle	Real life	Load cycle	Real life
CO	[mg/m$^3_{STP}$]	272	343	415	447
NOx	[mg/m$^3_{STP}$]	110	135	128	120
OGC	[mg/m$^3_{STP}$]	9	7	3	5
Dust	[mg/m$^3_{STP}$]	37	25	27	18
Efficiency	%	78,2	75	81,1	83,2
Annual Efficiency	%	-	**72,4**	**0**	**81,4**

12kW Pellet boiler

- Median: 77,5 %
- LCT: 78,2%
- Type test: FL: 91,3; PL 90,6

21kW Pellet boiler

- Median: 83,3 %
- LCT: 81,1%
- Type test: FL: 92,7; PL 92,5

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Project Idea: Goal and Benefits

- **Goal**
  - To apply LCT method to improve **real life** emission and efficiency factors of district heating systems
- **Target market**
  - District heating boiler manufacturers
  - Heat grid and heat storage system manufacturers
- **Benefits**
  - Boiler manufacturer: Improved efficiency and emissions factors under real life operations
  - End user: Reduction in heat price due to efficiency improvement
  - Heating grid/storage supplier: More accurate coupling between heat demand and supply systems i.e. improved efficiency
  - Society: Reduced emissions of pollutants and improved efficiency under real life operation i.e. improvement in environmental quality
- **We are Looking for**
  - Industrial Partners
  - Scientific Partners
  - Funding opportunities
    - http://ec.europa.eu/environment/life/funding/life2016/
    - Horizon2020, different calls

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Thank you for your attention!

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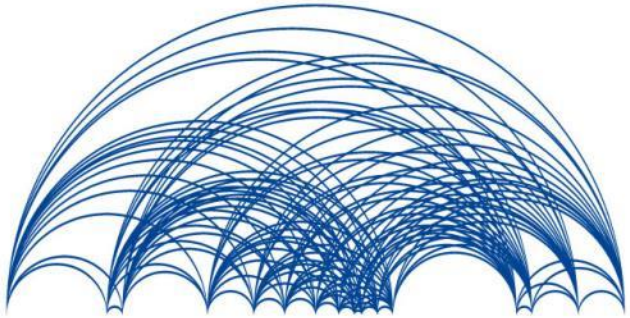

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