



H2020-EE-2015-3-MarketUptake



WaterWatt

Improvement of energy efficiency in industrial water circuits
by online self-assessment, benchmarking and economic decision support

Project Title: Improvement of energy efficiency in industrial water circuits using gamification for online self-assessment, benchmarking and economic decision support

Acronym: WaterWatt

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Deliverable Title	<i>List of representative industrial water circuits</i>
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1. Executive Publishable Summary

In the frame of 10 case studies in the water intensive industrial branches of metal, chemical, paper, food and ceramic industry the following representative circuits were identified:

- Open cooling circuits with contact to product and/or atmosphere up to 1800 m³/h,
- Closed cooling circuits up to 100 m³/h,
- Flow through cooling with surface water up to 75 m³/h,
- Gas washing circuits up to 4500 m³/h
- Process water circuits up to 2000 m³/h,
- District heating circuits,
- Condensate circuits.

The most widespread and important energy consumers were open cooling and gas washing circuits. In the coming months measuring campaigns and detailed studies of the circuits will be performed. Benchmarks will be calculated and transferability of the results will be evaluated.

2. Introduction

For the planned study and modelling of energy consumption in water circuits of various industries a choice of representative circuits is crucial. Case studies have shown that at industrial plants there are from one to several dozen water circuits supporting various production processes. Representative circuits were chosen on basis of

- their function (cooling, gas washing, ...),
- flow,
- pressure,
- installed power and
- abundance in the industry.

The aim was to cover the most widespread cases with high energy demand. This deliverable (1.1) provides a joint basis for further studies in WP1 and WP2.

3. Representative industrial water circuits

The case studies have been conducted in metal, chemical, paper, food and ceramic industry. An overview of the relevant circuits identified is shown in Table 1.

Table 1: Overview of identified representative circuits in case studies

Industry	Case study	Origin	Representative circuits	Flow in m ³ /h	Installed power in kW
Metal	Stainless wire processing	DE	Open cooling circuit (rolling mill) with sand filtration	1800	550
			Closed cooling circuit (furnace)	60	37
	Stainless plate production	DE	Open flow through cooling	75	30
	Carbon steel production	DE	Open gas washing circuit (blast furnace and basic oxygen furnace)	4500	4200
	Carbon steel production	NO	Open cooling/quenching of rebar rods and wire coils	780	315
	Manganese production	NO	Closed cooling circuit (furnace)	350	170
Open gas washing circuit			250	110	
Chemical	Glue factory	FR	No relevant circuits	-	-
	Pharmaceuticals	DE	Open cooling circuit 1	2100	1300
			Open cooling circuit 2	700	450
			District heating circuit		
Condensate circuit					
Paper	Paper factory	PT	Paper machine process circuit		
	Paper recycling	DE	Paper machine process circuit	2000	800
Food and beverage	Sugar factory	PT	Fresh water supply		
			Cooling circuit		
Cement and ceramic	Tile factory	FR	No relevant circuits (<10 m ³ /h)	-	-

4. Conclusion

In the frame of 10 case studies in the water intensive industrial branches of metal, chemical, paper, food and ceramic industry several representative circuits were identified. The most widespread and important energy consumers were open cooling and gas washing circuits. The energy was needed for pumping of large volumes of water over long distances and/or through filters and for the operation of cooling tower fans.

In the coming months measuring campaigns and detailed studies of the circuits will be performed. Benchmarks will be calculated and transferability of the results will be evaluated.

5. Knowledge Created

KNOWLEDGE - 3. Representative industrial water circuits / Responsible Person Pavel Ivashechkin	
Owner(s)	BFI, SINTEF, ISQ
Nature	report
Registration / protection	not applicable
Description	<p>In the frame of 10 case studies in the water intensive industrial branches of metal, chemical, paper, food and ceramic industry the following representative circuits were identified:</p> <ul style="list-style-type: none"> - Open cooling circuits with contact to product and/or atmosphere up to 1800 m³/h, - Closed cooling circuits up to 100 m³/h, - Flow through cooling with surface water up to 75 m³/h, - Gas washing circuits up to 4500 m³/h - Process water circuits up to 2000 m³/h, - District heating circuits, - Condensate circuits. <p>The most widespread and important energy consumers were open cooling and gas washing circuits. We expect that approaches developed for the reduction of energy demand of such circuits will be transferable throughout the industrial branches.</p>
	Engineering Background is required to use the created Knowledge