PROJECT SMILES
Sustainable Key Technologies for water and energy savings in EU industrial laundries

1. Introduction

SMILES is the acronym for '**S**ustainable **M**easures for **I**NDUSTRIAL **L**aundry **E**XPANSION **S**TRATEGIES: **SMART Laundry-2015'**.
EU project SMILES no. 217809-2 will be started in September1, 2008; it has duration of 3 years and will be completed at November 30, 2011.

Project SMILES will **investigate, further develop and implement 16 new sustainable technologies** for **water and energy savings** and **CO_2 reduction** of **EU industrial laundries**.
The evaluators of the European Commission (EC) have stated that project SMILES:
  a) has a very high relevance for the objectives of the European Community;
  b) is excellent by its good and clear focus on scientific and technological issues;
  c) is well balanced in expertise.

Project coordinator '**Federatie van de Belgische Textielverzorging vzw (FBT)**' has submitted the project proposal. It is targeted for SME Associations in the Theme FP7-SME-2007-2. The Consortium of the project consists of **16 project participants** from **8 EU Members States** (Belgium, Croatia, Denmark, France, Germany, Netherlands, Poland and Slovenia): **5 European AGs** (Industrial Associations) including their members, **3 individual SMEs** (small and medium enterprises) and **8 RTDs** (research performers); see Table 1.

Table 1: Participants EU project SMILES

Participant type	Participant name	Country
1. SME-AG 1 (Coordinator)	FBT	Belgium
2. SME-AG 2	URBH	France
3. SME-AG 3	SPP	Poland
4. SME-AG 4	CCS-MT	Slovenia
5. SME-AG 5	CCE-ITD	Croatia
6. RTD 1	Hogeschool Gent	Belgium
7. RTD 2	Schieke BVBA	Belgium
8. RTD 3	CTTN-IREN	France
9. RTD 4	wfk-CTRI	Germany
10. RTD 5	ITEK-UM	Slovenia
11. RTD 6	TTF-UZ	Croatia
12. RTD 7	PROMIKRON 3	Netherlands
13. SME 1	Stomerij Zeekant	Netherlands
14. SME 2	Kreussler & Co	Germany
15. RTD 8	ACT	Netherlands
16. SME 3	VASK	Denmark

The project has a **well-planned management structure** for the cooperation of these organisations. The project management team (PMT) consists of **Ing. Walther A. den Otter, Mr Maarten Van Severen and Dr. Helmut Eigen**.

Figure 1. Kick-off Meeting of the SMILES Consortium at the head office of project coordinator FBT in Brussels (BE)

2. Purpose

The EU-27 industrial laundry sector, with 11.000 establishments (more than 90% SMEs), washes 2,7 billion kg of soiled textiles per year (wet weight) employing 168.000 workers and utilizing **42 million m^3** of wash water and **60 PJ** of energy per year. It generates similar quantities of waste water, to be treated, and substantial CO_2 emissions (**3,8 million tons CO$_2$/year**).

The annual turnover of the sector is 5,1 billion euro, which can be doubled if all disposable textile articles were replaced by environmentally friendly reusable items.

Focused and coordinated research to develop and improve innovative technologies can greatly enhance the performance of the industrial EU laundry sector. Conventional laundry processes are characterized by large enthalpy destructions and resource inefficiencies.

It is the purpose of project SMILES to design the **SMART LAUNDRY-2015** through research, further development and adaptation of 16 sustainable key technologies with its practical utilisations (*combined for green sites or individual for existing plant augmentation*). These include water reduction, energy savings, green fuel substitutions for CO_2 reductions, new energy systems and improved sequencing of the processes, greater textile hygiene.

A choice of many new technologies instead of a selected few was made for different situations in EU industrial laundries. Substantial savings have to be obtained with different production capacities, washing packages and grades / types of soils. It is like playing the piano: with 1 or 2 you notes one can't play a melody as one needs numbers of notes! The selected key technologies enhance each other's effect (*combined technologies for green sites or individual technologies for existing plant augmentation*); see Table 2.

Table 2: Interaction of SMILES Key Technologies

Impacted technology	Effector technology															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.Water reduction	0	+	0	+	+	0	0	0	0	+	+	+	+	+	0	+
2.Water reuse	+	0	-	+	+	0	0	0	0	+	+	+	+	+	0	+
3.Water disinfection	-	+	0	0	-	0	0	0	0	+	+	+	+	+	+	+
4.Gasification	+	+	0	0	0	0	0	0	0	0	0	0	0	+	0	+
5.LT washing	+	+	+	0	0	+	0	0	0	+	+	+	+	+	+	+
6.Gas Heated	+	+	0	+	+	0	+	+	+	+	0	0	0	0	0	+
7.New textile drying	-	-	0	+	+	+	0	+	+	+	0	0	0	0	0	+
8.CHP	+	+	0	+	+	+	+	0	0	+	0	0	0	0	0	+
9.CO$_2$ reduction	+	+	-	+	+	+	+	+	0	+	0	+	+	+	+	+
10.Energy buffers	+	+	+	+	+	+	+	+	0	0	+	+	+	+	+	+
11.Chemicals	+	+	+	+	+	+	0	0	0	0	0	+	+	+	+	+
12.Cleavables	+	+	+	+	+	+	0	0	0	0	+	0	+	+	+	+
13.Electrobleaching	+	+	+	+	+	+	0	0	0	0	+	+	0	+	+	+
14.Ultrasonics	+	0	0	+	-	0	0	0	0	0	+	+	+	0	+	+
15.Textile hygiene	+	+	+	+	-	0	+	0	0	-	+	+	+	+	0	+
16. Design	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	0

3. Target

It is expected that full implementation of the 16 key technologies of Smart Laundry-2015 will reduce the annual water consumptions by at least 10,4 million m^3 (30% water savings), the energy consumptions by 27,5 PJ (45% energy savings) and the overall CO_2 emissions by 2,3 million tons CO_2 per year (60% CO_2 reduction) at 100% market penetration in all EU Member States in the year 2015; see Table 3.

Table 3: Future annual energy savings and CO_2 emissions reduction of EU industrial laundries at 100% market penetration in the year 2015

T*	Energy savings (in PJ)		CO_2 emissions reduction	
	Single WP	Combined WPs	(Oil)***	(NATURAL Gas)****
LTW	5 PJ	4 PJ	0,29 MT CO_2	0,22 MT CO_2
GHL	10 PJ	5 PJ	0,36 MT CO_2	0,27 MT CO_2
AD	14 PJ	6 PJ	0,44 MT CO_2	0,33 MT CO_2
CHP	5 PJ	5 PJ	0,36 MT CO_2	0,27 MT CO_2
CO_2			0,50 MT CO_2	0,50 MT CO_2
ER	10 PJ	7,5 PJ	0,55 MT CO_2	0,41MT CO_2
Total		27,5 PJ	2,50 MT CO_2	1,92 MT CO_2
Total combined**		Δ 45%	2,3 MT CO_2 (Δ 60%)	

  * T = Key Technology
  ** Calculated future fuel utilisation of 60% oil and 40% natural gas in EU-27
  *** Conversion factor for oil: 0,073 MT CO_2/PJ
  **** Conversion factor for natural gas: 0,055 MT CO_2/PJ

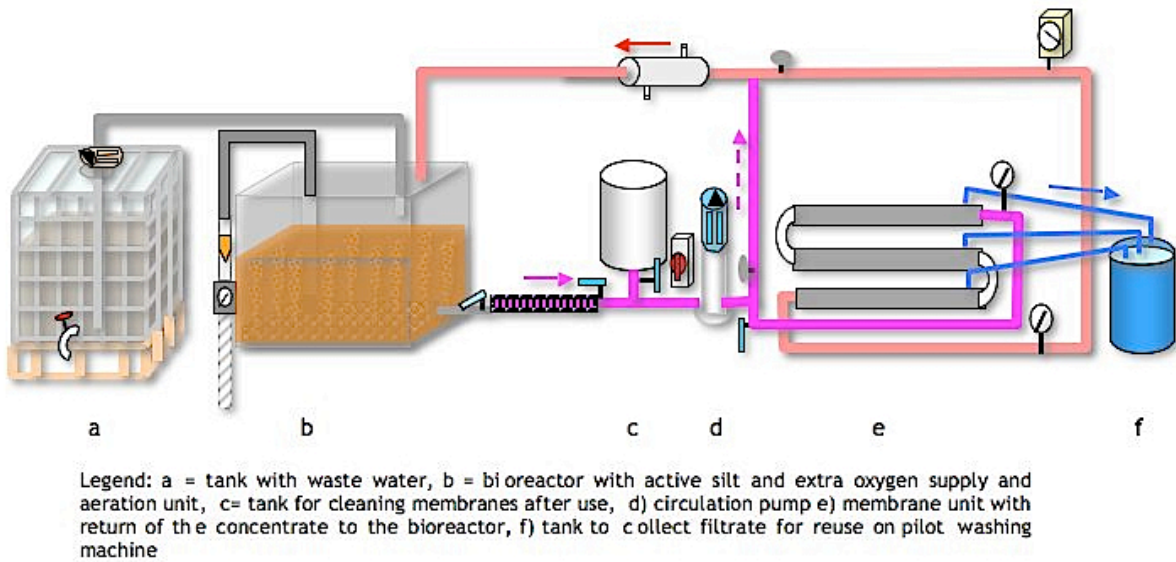**4. Objectives and Key Technologies**

The 3 general **Objectives** in SMILES are:

1. to **develop and design** the Smart Laundry-2015 **through RTD** resulting in lower water and energy usage and CO_2 emissions.
2. to **communicate and disseminate** the research findings and the design of the Smart Laundry-2015 to the SME-AGs, key commercial equipment suppliers and early adopting SME end-users in the EU-27.
3. to **implement** the project results of the Smart Laundry-2015 in the EU-27 through **training and demonstration** projects.
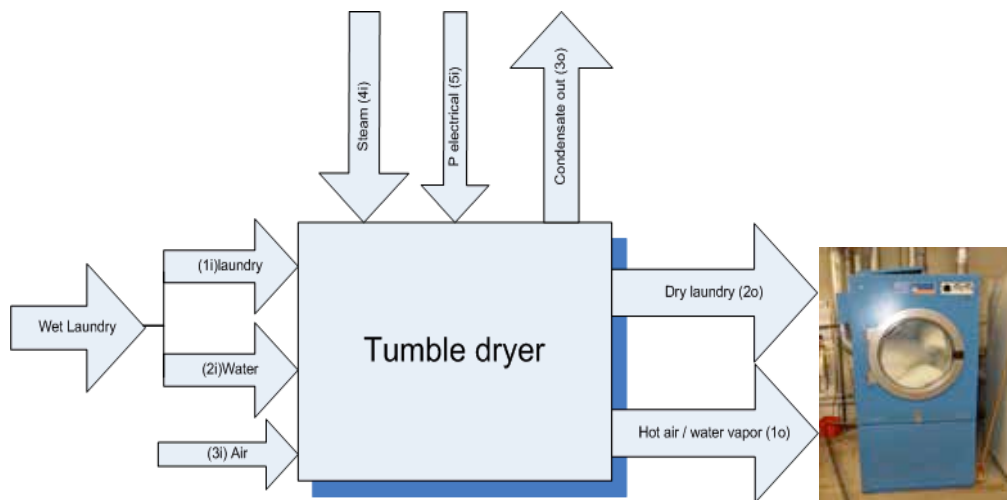
The 16 **Key Technologies** that will be investigated, further developed and implemented:

1. Water reduction
2. Water reuse / membranes
3. Water disinfection
4. Supercritical gasification
5. Low Temperature Washing with adequate hygiene
6. Direct gas heated laundries (steamless industrial laundry)
7. Textile drying techniques (AD-ID-UD-MD)
8. Combined Heat Power
9. Lowered CO2 emissions
10. Energy buffers
11. Chemicals reduction
12. Cleavable detergents and additives
13. Electrochemical bleaching
14. Ultrasonic cleaning
15. Textile hygiene
16. Synthesis for SMART LAUNDRY-2015

The 16 Key Technologies will be investigated at pilot scale level and subsequently integrated in a unified design.

Legend: a = tank with waste water, b = bioreactor with active silt and extra oxygen supply and aeration unit, c= tank for cleaning membranes after use, d) circulation pump e) membrane unit with return of the concentrate to the bioreactor, f) tank to collect filtrate for reuse on pilot washing machine

Figure 1: Pilot MBR system with external membrane for water reduction

Figure 2: Calculation model tumbling dryer

5. Benchmarking and innovation monitor

A parallel benchmarking and innovation monitoring will validate both the actual energy demand and the potential of energy savings of the future innovations.

An automated energy management system controlling and monitoring input and output savings assure the resource reductions.
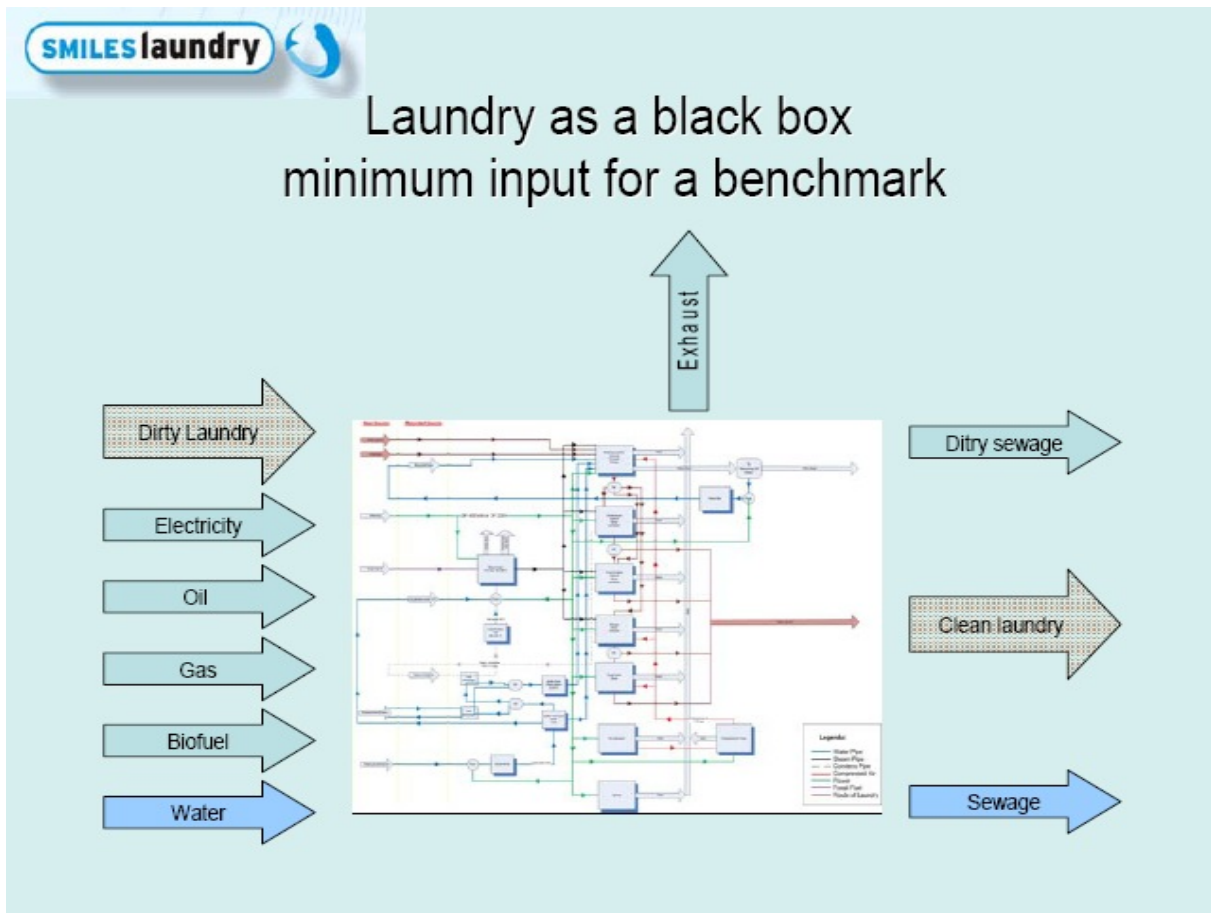
Figure 3: Industrial laundry as a black box

7. Project execution

The SMILES RTD activities for the 16 Key Technologies will be executed in **6 Work Packages** (WPs):

   WP1: Water reduction

   WP2: Energy savings and CO2 emissions reduction

   WP3: Chemicals reduction

   WP4: Quality improvement

   WP5: Integration/ and dissemination of project results

   WP6: Project management

The potential impact of the project is huge as it could reduce the water consumptions by 1/3 and energy consumptions and CO_2 emission by about 1/2.

Improved laundry services with the 16 Key Technologies and practices will enhance reusable textiles and can reduce the throwaways and disposables by 20%.

The exploitation of the developed technologies is outlined in the exploitation plan.

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Future economic gains from SMILES are projected at 1,020 million EUR in the next 10 years.

8. Education and training

An important component of project SMILES is the **educational effort and training** of key staff members and hands-on workers of industrial laundries to assist in the introduction of the Smart Laundry-2015. The project also encompasses the writing, production and dissemination of key materials by a **special website** to national associations and to all SMEs in the EU sector. Finally the resource reductions in the industrial laundry processes are assured by an **automated energy management system** controlling and monitoring **input and output savings**.

9. Contact

Further details can be received by contacting the Project Management Team:

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