



Advanced Sensing Technologies for Paper Production (ASTEPP)

Programme area:	Energy saving and process optimization, applied to the Pulp & Paper industry
Coordinator:	Giovanni Cristini S.A. Giuseppe Cristini S.p.A., Italy E-mail: info@astepbycristini.it Tel: +39 035 715111
Partners:	-
Website:	www.astepbycristini.it
Benefits (max. 150 characters incl. space):	Consistent reduction of energy consumption (thus GHG emissions) & water usage through monitoring 24/7 the papermaking process with advanced sensors.
Keywords:	Energy saving, process optimization, reduction GHG emission
Sector:	Green Business
Type of solution	Process, technology, service.
Duration:	01/10/2014 – 30/09/2016
Budget:	€ 895.637 (EU contribution: 50%)
Contract number:	ECO/13/630333

Summary

The ASTEPP project targets the paper industry. It intends to introduce to the European Pulp & Paper industry a new generation of advanced sensors able to monitor the different phases of the paper production process. Such measurements will allow:

- Substantial **energy and water savings**
- **Accuracy and precision rate substantially higher** than any current available technology, contributing to **the reduction of material loss (paper)**

Paper production is an energivorous industry: it requires important amounts of water and energy. ASTEPP aims to optimize water usage, to reduce Green House effect Gases emissions, and to increase the energy efficiency of the process, bearing a substantial impact on those processes that make a very intensive usage of resources.

The project studies the technology adaptation to plants conditions and supports the commercialisation of the project. Targeting initially a population of 789 plants in Europe, it lays down the bases to its expansion beyond the Europe or small paper mills, and eventually to other production sectors for which adaptation or re-engineering of the solution might be needed.

The project started on Oct 1st, 2014 and will end on Sep 29th, 2016.

Expected and/or achieved results

The installation of the sensors in the European paper machines, and the use of targeted and dedicated data analysis software, will allow important saving and optimizations. The savings referred to the European paper machines in production up today will be:

- Reduction of Green House effect Gases emissions (GHG) by 5,5% or 1.590.739 m3 per year
- Reduction of water usage by 3,7%, or 34.547.436.000 m3 per year
- Reduction of energy consumption by 2.944.000.000 kW/h per year (equal to 12,8% of the total electric consumption)

In the tests in plant environment it has been demonstrated the possibility of reducing total energy (electric + thermal) and relative saving in GHG emissions.



Having the following targets, considering the 30% of the total number of paper machine in Europe (listed in table 1)

Indicators	Objective	Absolute impact target
Greenhouse gas emissions	Reduced CO2 emission	477.163 t Co2/y
Waste	minimization	82.000 t
Water	Reduction of consumption	10.364.230.800 lt/year
Energy	Reduction of consumption	898.200.000 kW/y

Table 1. Project indicators

it has been calculated the potential saving based on the average result achieved in the first 2 paper mills where our sensors have been installed (Table 2)

Indicators	Objective	Absolute impact target
Greenhouse gas emissions	Reduced CO2 emission	156.966 t Co2/y
Waste	minimization	NA
Water	Reduction of consumption	4.654.981.990lt/year
Energy	Reduction of consumption	1.076.216.871kW/y

Table 2 (estimation of the results based on the 2 trial in plant environment)

The results has been calculated by averaging the absolute saving of each mill and by proportioning this value to the 30% of the total number of paper machine in Europe.

Even if this table is indicative of the potential saving, on the other hand it does not reflect exactly the real potential. The results, in fact are achieved in one Tissue machine and one board machine.

The proportion between packaging production and Sanitary and Household is 6,26 to 1 (in 2015 , the share of packaging grade was 48,9% of the total production while the share of sanitary and Household only 7,8%). Anyway being the Sanitary and Household production more energy demanding and in the most of the case energy is produced by natural gas cogeneration power plants, we estimate the absolute impact to be higher than table 2 specially in Greenhouse gas emission.

The lower CO2 emission (156.966 vs the target of 477.163) is justified by the lower result achieved in the second mill (packaging) where the energy and the steam are produced in combination of biomass boiler (which has no impact in Co2 emission), gas burner and electricity purchased from power grid (low CO2 impact considering the average emission in France). In terms of energy saving, the results are above the expectation.

As far as reduced water consumption the results are below the expectation due to the optimized level of recycling of the water in the process in this 2 particular mills.

In the following table 3, we summarize the result achieved in each mill with relative impacts (saving relative to the single ton of paper produced).

Indicators	Objective	Relative impact target	XXXXX 01	XXXXX 01
Greenhouse gas emissions	Reduced CO2 emission	0.01725t CO2/t paper	0.02143 t CO2/t paper	+24%
Waste	minimization	0,09%	NA	
Water	Reduction of consumption	375 l/t	277 l/t	-26,1%
Energy	Reduction of consumption	32 kW/t	79.6 kW/t	+148%

Indicators	Objective	Relative impact target	XXXXX 02	XXXXX 02
Greenhouse gas emissions	Reduced CO2 emission	0.01725t CO2/t paper	0.00298 t CO2/t paper	-82.7%
Waste	minimization	0,09%	NA	
Water	Reduction of consumption	375 l/t	150 l/t	-60%
Energy	Reduction of consumption	32 kW/t	32 kW/t	+0%

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