



**Project Number: NMP-2012-CP-FP-310312**

**Project Acronym: RECYVAL-NANO**

**INNOVATIVE RECYCLING TECHNOLOGIES OF KEY METALS IN  
HIGH-TECH APPLICATIONS**

**Deliverable D9.1**

**Project Presentation (2-3 pages) in English, to be published in Internet as well as the required printed material for distribution by the Commission**

**Start date of the project: 1<sup>st</sup> December 2012**

**Duration: 4 years**

**Organisation name o lead contractor for this deliverable: Lurederra**

<b>Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)</b>		
<b>Dissemination Level</b>		
<b>PU</b>	Public	√
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

## **Summary:**

This deliverable includes the RECYVAL-NANO project presentation to be published on the internet.

## **Project presentation:**

The European project RECYVAL-NANO, that addresses the work program topic NMP-2012.4.1-2 within the Thematic Area 6, "NMP" of the 7th European Framework Programme for RTD, has already been launched. This collaborative project involves industrial and academic centres from five different countries. Its objective is the development of recovery processes in order to recycle the critical elements of the FPD and use them for the direct production of high added value nanoparticles.

Waste Electrical and Electronic Equipment is considered to increase drastically in the coming decades. WEEE contains considerable quantities of valuable components used in high-tech applications that currently are not recycled. Europe needs to improve and develop Recovery, Recycling and Reuse of critical materials in order to avoid the dependency on imports, high prices and risk of supply imposed by countries owning mineral reserves. RECYVAL-NANO project will develop an innovative recycling process for recovery and reuse of indium, yttrium and neodymium metals from Flat Panels Displays (FPD), one of the most growing waste sources. The project will be addressed not only to the recovery of these critical elements, but also the recycling process developed will result in the direct extraction of metallorganic precursors for direct reuse in the production of high added value nanoparticles that is ITO, Y<sub>2</sub>O<sub>3</sub>:Eu<sup>3+</sup> and Nd-Fe-B. The project will develop an integral study of the recycling process, starting with logistic issues of the waste collection, optimising mechanical sorting technologies and developing innovative ones for the recovery and concentration of smaller fractions containing indium, yttrium and neodymium, developing simplified solvent extraction routes based on tailored chemical extraction agents able to extract a 95 % of the key metal in a metallorganic extracted solutions, and using these extracted solutions as precursors in the direct production of advanced nanoparticles. RECYVAL-NANO will validate the recycling process developed through the construction, optimisation and demonstration of full pilot lines for mechanical recycling of FPDs (500 kg/h) and hydrometallurgical metal recovery processes (500 g/h). Finally, the demonstration of the superior performance application of ITO, Y<sub>2</sub>O<sub>3</sub>:Eu<sup>3+</sup> and Nd-Fe-B nanoparticles in electronic applications of transparent conductors, LEDs and permanent magnets respectively will complete the entire cycle of the project.

The consortium counts with eleven participants from five different countries, and it is complementary regarding participation of different European regions. The proponent consortium includes a Mediterranean country (Spain), one Central-European country (Netherlands), two Western Europe countries (United Kingdom and Ireland) and one Northern-European country (Sweden). The RECYVAL-NANO consortium gathers all the required manpower and knowledge required to tackle the addressed technical problem. In particular, this multinational cooperation will be essential in order to implement the rising requirements caused by the European industry in the area of key materials recycling and nanoparticle production and use.

The industrial companies participating in RECYVAL-NANO include COOLREC (Netherlands), expert in WEEE handling, recycling and logistics, that will lead the definition stages and the demonstration of the pilot lines constructed, and TECNAN (Spain), expert in industrial production of nanoparticles and nanodispersions, which will play a key role in the manufacturing of the nanoparticles and their modification for the

development of the final applications such as magnets. The SMEs involved in the project include, ABCR (Spain), expert in chemicals synthesis and precursors production, which will be responsible fundamentally for the synthesis of the tailored solvent agents for key metal extraction as well as in the production of required metallorganic precursors for posterior nanoparticle production, MOS (Netherlands), advanced company specialist in machines design and construction, which will be responsible for the development of the lab scale line and the pilot line to recover the valuable streams from FPDs, MEAB (Sweden), expert in hydrometallurgical techniques and solvent extraction, which will be in charge of the design, construction, optimisation and demonstration of the pilot line for extraction of key metal and production of precursors, EPILIGHT (Ireland), a developer of products and systems based on LEDs technology, which will incorporate  $Y_2O_3:Eu^{3+}$  nanoparticles into a LED and will perform a comparison analysis for evaluation of the advanced LED developed, and PQL (United Kingdom), a solution provider for coatings, which will be responsible for the application of the ITO recycled nanoparticles into a transparent conductor coating based on different substrates.

The group of research organisations participating in the project is also well balanced and focused in the key areas of development detected, counting with proven expertise in different and complementary areas which constitute the fundamentals for correct development of the RECYVAL-NANO project. The research organisation which will participate in the project include LUREDERRA (Spain), well known research organisation specialised in the field of nanomaterials, chemistry, which will be primary responsible for the production of nanoparticles from the recycled metallorganic precursors as well as in the treatment of nanoparticles for ease their incorporation in the final applications as well as the coordination of the project since it counts with a large experience in the Framework Programme, TWI (United Kingdom), expert in ionic liquids development as extractant agents, which will research and design the extraction route for key metals, , CHALMERS (Sweden), expert in solvent extraction processes for the recovery of key metals, which will also develop the extraction routes designing special tailored extractant agents, and TUDELFT (Netherlands), highly-skilled in materials separation and sensors technology, which will be one of the responsables of the development and optimisation of the selected technologies for each treatment module.

The RECYVAL-NANO project, supported by the European Commission under contract number NMP2-SE-2012-310312 has a total budget of 4.411.639,60 €. The project will have a whole duration of four years (December 2012 to November 2016) and the EC contribution amounts to 3.141.676,45 €.