



PROJECTS APPROVED

23

TOTAL BUDGET (€M)

45

Burgundy Nuclear Partnership

MECHANICAL AND METAL INDUSTRIES FOR NUCLEAR POWER PLANT CONSTRUCTION

MAIN INTERESTS

- Metals, processes, materials
- Surface and interface treatment
- Control and non-destructive control

120 MEMBERS

38 companies: Alstom, Areva, BNP Paribas, Bureau Veritas, Electricité de France (EDF), Endel (a subsidiary of GDF Suez), Saint-Gobain, Segula Technologies, Spie Batignolles, Vallourec, etc.

including 6 foreign companies: Industeel Creusot (a subsidiary of Arcelor Mittal, a company operating under Dutch law), KPMG (Switzerland), Metalscan (a subsidiary of Tecnomat Group, Spain), Salzgitter Mannesmann Stainless Tubes (Germany), etc.

56 SMEs

15 centers of excellence: French Atomic Energy Commission (CEA), *École Nationale Supérieure des Arts et Métiers* (ENSAM), University of Bourgogne (with university technological institutes in Chalon-sur-Saone, Le Creusot and Dijon-Auxerre), Cemef, Armines, etc.

R&D WITHIN THE CLUSTER

N/A RESEARCHERS

21 PROJECTS FINANCED

€N/A STATE AID

€N/A FROM THE IF ⁽¹⁾

€2.06M FROM THE NRA ⁽²⁾

NUMBER OF PATENTS FILED IN 2007 BY APPROVED PROJECTS: 0

(1) IF: INTERMINISTERIAL FUND

(2) NRA: NATIONAL RESEARCH AGENCY

EXAMPLE PROJECT

ENERPOUDRE

Project owner: Areva

Budget: €3 million, €1.2 million of which from subsidies (€855,056 from the State and €397,532 from local authorities).

The aim of this project is to develop a metal or alloy superposition process by compressing powders to gain time, improve controllability and limit constraints, all on large parts. This will make it possible to complete in a single step what was previously performed in several stages, thereby speeding up the construction of nuclear power plants.

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CLUSTER STRENGTHS

→ **Number of employees at cluster members: 10,000**

→ **France's nuclear industry is currently the most extensive and the most experienced in the world.** To illustrate, while many other countries were withdrawing from nuclear power, France safeguarded, maintained and improved what is the largest set of nuclear facilities in the world.

→ **The Burgundy Nuclear Partnership cluster offers a unique concentration of expertise in its sector:** from high-precision steel works, metal works and mechanics to general engineering, training and research, every component of the nuclear industry is established within a 40-mile radius of Dijon, a "one-stop shop" in the heart of Europe, offering industrial production potential like no other in the world, just as the nuclear power market enters its revival.

→ Key Figures

- Demand could exceed 20 facilities by 2016 and 60 facilities by 2030. Currently, the cluster can manufacture heavy components for 3 to 4 plants per year.
- 78% of power generation in France comes from nuclear power (vs. 17% in the rest of the world)
- 96% of nuclear fuel is recycled (into power) and 4% becomes waste

INTERNATIONAL OUTLOOK

Weak

→ Cooperation with foreign clusters

- None

→ Participation in European programs

- The hot extrusion project approved by the cluster has been selected to be one of the European Regional Development Fund programs for 2007-2013 and will receive €274,500 in funding from Europe

→ Involvement in international projects

- Involvement at international level is selective and based on which countries are making real investments in the nuclear sector
- Participation in French-Indian nuclear energy conference in 2008 and 2009
- In contact with a number of key decision-makers in the English nuclear industry. Hosted teams in 2009
- Missions to and/or participation in trade shows: Platts and, since 2009, PowerGen (nuclear power)
- Barcelona ITER Meeting
- Creation of International Nuclear Academy

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PROJECTS

PROJECT	PARTICIPANTS	DESCRIPTION
FILAGE À CHAUD	DMV Stainless	<p>This program was designed to extend the expertise of DMV Stainless, a company specializing in solderless superalloy tubes.</p> <p>The first stage of research began at the university of Bourgogne's Institut Cartno. Its purpose is to further understanding of the rheology (branch of mechanics that focuses on the flow of matter) of glass paste, which is the lubricant used in the hot extrusion process.</p>
THERMIDE	Creusot Forge, Industeel, Transvalor, École nationale des arts et métiers de Cluny, École des Mines de Sophia-Antipolis, university of Bourgogne €1.08 million in financing provided by the NRA (Total budget €2.2 million)	<p>The aim of this project is to achieve the best geometry and properties required for future large parts needed by nuclear plants during forging.</p> <p>The research program consists of modeling the ideal process, validating it in a laboratory environment, then gradually forging the intermediate parts, up to the full-scale operation.</p>
HEXAFORMS	Valinox Nucleaire, M2M, Provea, V&M France, Areva NP, CEA, Cemef, Femto-ST and LICB laboratories	<p>The total cost is €3 million over a three-year period, including €1.7 million from the IF and local authorities.</p> <p>The purpose: to pave the way for an industrial formatting and test chain for complex section tubes.</p> <p>A number of innovative processes are under consideration for tube formatting as part of this project: determining the optimal tube development process, lowering use of polluting lubricants, adapting to the complex geometrics of non-destructive testing tools and developing resources for characterizing residual constraints using DRX. The project's first applications will focus on formatting 20cm hexagonal tubes in cluster shells intended for 4th-generation civil nuclear reactors.</p>
TOCATA	Co-approved by Astech Snecma, Messier-Dowty, Dassault Aviation, Areva, CEA, École des Mines de Paris €5.5 million in budget over a four-year period, including €2.4 million from the IF and local authorities	<p>The purpose of this project is to develop automatic surface flaw and crack detection using an optical method combined with topological analysis (electromagnetic method, with Foucault currents and photothermal methods).</p> <p>The purpose is to set up tools and methods to automatically control metallic parts, so as to ultimately replace penetrant testing, which is a costly and high-polluting technique.</p>

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