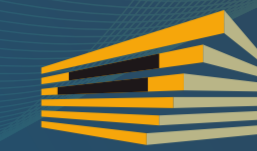


## Numerical simulation and computational calculation solutions, based on data analytics for renewable energies and environment engineering projects



### TYPE OF RESULT

New technology  
 New product  
**[ New service ]**  
 New knowledge or skill



### COMMERCIAL MATURITY LEVEL

Conceptual idea  
 Proof of concept (design)  
 Validated in a controlled  
 environment  
 Validated in a real environment  
**[ Successfully implanted ]**



### PROTECTION LEVEL

Non- applicable  
 Patent  
**[ Software ]**  
**[ Know - how ]**  
 Utility model

### Technology description

When designing and sizing correctly a large renewable energy production facility (wind, photovoltaic or hydrogen energy), a crucial element to be considered is the possibility of carrying out numerical simulation and computational calculation studies allowing to recreate and optimise the conditions in which such facility will work and, thus, assess its optimal performance regimen. This way, future behaviour can be assessed, and any difficulties arising from its implementation and further performance can be foreseen, which subsequently would save costs. For this purpose, CEANI staff owns several computer solutions that allow to carry out studies on different types of projects such as the following:



- Simulation of turbulence flows for determining optimal location of wind turbines in an aerogenerator system.
- Calculation of flow velocity for wind map generation.
- Facility modelling for ensuring ventilation and thermal comfort.
- Operational modelling of a hexageneration plant by using renewable sources (wind or sun) and sea water, allowing the simulation of such plant's operation, adjusting each pro-

cess according to the available energy resource.

The solution to be transferred consists of specialised technical support for carrying out accurate simulation studies that are necessary for designing, sizing and optimising energy production facilities in large renewable energy engineering projects.

### Fields of application

This service is particularly targeted to those engineering areas where accurate simulation studies are required for designing energy production facilities based on renewable sources, using for this purpose big data analytics and efficient complex methods for simulation and optimisation. It also may be of interest for those areas in which environmental calculation is needed such as in monitoring pollutant dispersion in the sea, marine currents maps, etc.

Some of the business sectors that may be interested in these services are: engineering and architecture firms; technology consulting companies; construction companies or small developer companies specialising in the installation of renewable energies systems, as well as public institutions.

### Market opportunity / needs

The technological thrust towards hydrogen and green ammonia as a feasible solution for transport decarbonisation, as well as the determined commitment to use renewable energy in order to reduce energy dependence on fossil fuels will allow the rise of new agents, and may thus increase the generation of "clean" energy production facilities in a less centralised energy model. This step towards energy transition may be also motivated by the availability of funding sources, both public and private, for developing new projects.

### Competitive advantage and innovative aspects

The main competitive advantage lies in the high level of scientific-technical content, supported by the extensive experience owned by the multidisciplinary CEANI staff in subjects such as planning and energy management; numerical simulation for the environment; as well as in different energy generation technologies based on renewable sources (photovoltaic, wind or hydrogen).

In addition to this, an innovative feature is available: a numerical simulation and computational calculation software, that has been developed by this research group. This software has been tested in numerous R&D projects at national and European level. Some of said projects have been recognised with innovation awards and special mentions (such as in the case of a project for fighting against oil spills in the sea).

### Resources needed to be implemented

Data about the engineering project to be developed are necessary.

### Related equipment

Own software

### Application references

In companies such as Ports of the State and consulting companies as Técnicas Reunidas, Inerco, etc.

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