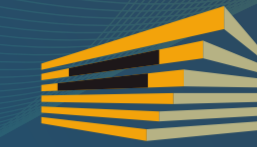


Multi-objective optimisation models based on evolutionary algorithms and artificial intelligence for efficient planning and enhancement of energy production facilities using renewable energies



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

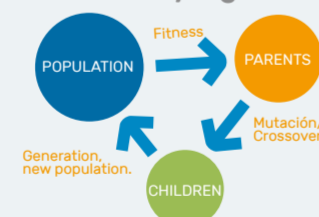
Technology description

Often, there is no unique solution satisfying all the restrictions and variables in engineering projects; therefore, there is no definitive optimal solution that led to an answer to the difficulties found in such projects. Moreover, the different goals to be met or alternatives to be considered can be mutually exclusive. In such cases, we are talking about **multiobjective problems**.

When talking about multiobjective problems, optimal solutions may be vague, since a solution satisfying all restrictions and responding all the preferences and considerations from the decision maker cannot be found. For this reason, different scenarios are considered among the feasible solutions that are optimal, which are called Pareto optimisation.

The software will be built by modules that can be associated to more or less productive processes raised by this project; resulting in the optimal option during the global management.

Evolutionary algorithms



Among the different optimisation models for resolving existing multiobjective problems, the model applied in this technology offer is based on artificial intelligence and uses evolutionary algorithms as well. Such algorithms have proved very high performances when solving problems that take into consideration different objectives simultaneously with different solution purposes.

The service here offered is a specialised technique for planning and improving energy production facilities based on renewable sources (photovoltaic, wind and hydrogen), including also support to facilities sizing in order to optimise the investment.

Moreover, technical support also includes planning and improving energy and water efficiency in a building, or a set of buildings, optimising this way electricity, thermal and desalination systems.

For this purpose, CEANI (Division of Evolutionary Computation and Applications) has developed a software (modular) that comprises optimisation algorithms; requiring therefore a first programming stage for adapting to the project and the type of system in which is going to be applied, as well as for an estimation of the demand, which is vital for working efficiently in each situation.

Fields of application

This service is especially targeted to those engineering fields requiring optimisation studies for complex solutions and investment optimisation on energy production facilities based mainly on renewable sources.

Engineering and architecture firms, technology consulting companies, construction companies or small developer companies specialising in renewable energy production facilities are the business sectors that may be interested in these services.

Local public administrations may also be interested in these services in regards of viability and planning studies before any public investment is made.

Market opportunity / needs

The determined commitment to a change in energy model and replacement of fossil energy production facilities by renewable sources (photovoltaic, wind or hydrogen energy); the improvement in solutions and construction techniques and systems; as well as the possible availability of both public and private funding sources for the development of new projects will allow to boost the energy transition and the energy efficiency in the territory.

Competitive advantage and innovative aspects

The main competitive advantage lies in the high level of scientific-technical content and experience owned by the CEANI staff in subjects as planning and energy management, as well as in different renewable sources technologies (photovoltaic, wind or hydrogen).

In addition to this, as an innovative feature is available: a modular optimisation software, that is based on algorithms that have been developed by the CEANI staff and that has been tested in numerous R&D projects at national and European level.

Resources needed to be implemented

Detailed data about the installation to be optimised are imperative.

Related equipment

- Own software.

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