

# Resum de Tesi Doctoral



DNI/NIE/Passaport	<input type="text"/>
Nom i cognoms	<input type="text" value="Josep Maria Salas Prat"/>
Títol de la tesi	<input type="text" value="Technical and socioeconomic complexity of the energy transitions. A biomimetic approach to smart grids, the intelligent networks for power and information transmission."/>
Unitat estructural	<input type="text" value="Universitat Politècnica de Catalunya - BarcelonaTech"/>
Programa	<input type="text" value="Sostenibilitat, Tecnologia i Humanisme"/>
Codis UNESCO	<input type="text" value="531205"/> <input type="text" value="332200"/> <input type="text" value="630707"/> <input type="text" value="590208"/>

(Mínim 1 i màxim 4, podeu veure els codis a <http://doctorat.upc.edu/gestio-academica/impresos/tesi-matricula-i-diposit/codis-unesco>)

## Resum de la tesi de 4000 caràcters màxim (si supera els 4000 es tallarà automàticament)

This thesis is a interdisciplinary research in the field of sustainable energy systems with the falsifiable hypothesis "a necessary transition from a society highly dependent on oil to one based on the use of local resources and energies" and its social, economic and technological consequences.

Based on the analysis of the social and cultural context of the exploitation of fossil fuels is highlighted as the increased availability of energy, but above all power, allowing socioeconomic growth cycle so that is associated to the idea that "increased energy consumption implies a higher level of social progress." And vice-versa. It generates, thus, a social framework against any proposal of sustainability in the energy field.

Thus, the technical possibility of getting more in less time has governed the development of a society to a high level of expertise (e.g. electrical system), and has shaped a specific vision of the world and the relationship between our society and the nature. However, the appearance of limits, both the availability of the resource, such as the sink capacity of ecosystems to absorb wastes, and other externalities such geostrategic conflicts has challenged contemporary society: a transition from energy, but above all power, to non-fossil resources.

The complexity and implications of accepting this working hypothesis exceeds the current analysis framework and requires new epistemological approach that fuses sciences and humanities. The thesis analyses in depth the conceptual framework for the energy transition and condensed it in the "Principles of Biological Resources Management" from a biomimetic inspiration, that is, how nature manages the flow of energy, matter and information.

A nuclear and significant contribution is the reinterpretation of "Sustainability" based on the confluence of energy flows (energy and power) between ecosystems that sustain the complex life on the Earth, and those flows that we use for our social, cultural and economic activities.

The thesis goes from this conceptual point to reality in a technology, social, economic and ecological point of view. The analysis is global and focus in its implications in Catalonia, that supports an impact on about 5% of its GDP to pay fossil fuels imports and its financial consequences.

Finally, the results achieved are summarized. "My laboratory, the world", collects the energy field research did in recent years by interacting with different social, political and economic players in energy arena and a prolific communicator activity that allowed to validate the complexity of the energy transition.

On the one hand, the development of specific aspects of advanced machinery (from idea to market) inspired by nature for photovoltaic applications and the principles of a micro grid or Biogrid, which provides an innovative vision of the electrical system different to the current vision of smart grids. On the other hand, the dissertation analyses the non-technological barriers (cultural, economic, and especially regulatory) and their impact on energy transition, for example, the access to energy consumption data by citizens.

Therefore this thesis sum up the objectives of the doctorate Sustainability, Technology and Humanism, provides a cross-balanced vision of the energy issue and opens new lines of research.

Last, but not least, the thesis concludes with a summary of the scientific production based on international patents obtained, articles, proceedings, dissemination and research projects financed by European, state and national programs.

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