

## Dynamic modelling of cost systems applied to energy efficiency

**AUTHORS:** Clément Morlat<sup>1</sup>; Kleber Pinto-Silva<sup>2</sup>

**TOPICS:** Market instruments for energy efficiency; Sustainable communities and citizen-led activities

### OVERVIEW

The energy transition must integrate the qualitative and quantitative demands of efficiency in development modes. Such demands bring an obligation to decouple value production, energy consumption and pressures on the environment and society. To finance the transition, a specific accounting culture and tools will favour the development of a circular and regional finance system that serves the local economy. Energy transition covers a range of issues and there are many strong structural correlations between its various facets. The energy mix issue must be linked to the industrial policy issue, in turn directly associated with competitiveness and employment. Furthermore, use and behaviour with regard to energy consumption can influence a country's capacity to implement an ambitious energy and environmental policy. More generally, failing to taking into account the specific characteristics and connections of each facet of energy transition holds back competitiveness, social well-being and preservation of the environment. Two conditions are therefore required for an energy transition to increase competitiveness. The transition should be a chance to modify the scope of project value analysis, and the legal and economic setups must make sure this value is recognised by the market. Increasing the visibility of qualifiable, quantifiable and possibly monetisable benefits promotes this recognition.

Evaluating the overall value of a transition project means listing the financial and extra-financial advantages and costs at different regional scales, aiming for a comprehensive list of changes in the use values generated for each player. The spatial scale to which the concept of value is applied is particularly discriminating. Indeed, the scope of potential payers (stakeholders, obligors, sponsors) governs the capacity to establish business models founded on additional financing from new contracts and financing. To encourage ambitious projects (or make them more profitable), managers are therefore justified in seeking support from various local or regional players that benefit directly or indirectly from energy projects. The energy transition economy must become circular, as part of an approach that prevents the "dissipation" of production and financing capacities. The relationship to production must be transformed among all players in a region. To support a change in their willingness to pay for the direct and indirect external effects of energy transition operations, shared references need to be recognised. The shift towards circular business models must be supported by transposable and participative tools that make the implicit needs of the players in a region explicit, thereby permitting the formulation of economic signals.

### METHODS

A value management system for energy transition projects shall be organised around:

- Local value co-production groups, structured around energy transition projects (focused notably on energy and thermal renovation projects for buildings). *Aim*: to quantify, valorise and account for energy savings and non-energy-related positive effects (productivity, health, environment, employment, social links, etc.);
- Legal-economic benchmarks, produced by a transnational panel of experts to provide a framework for realising the potential of additional financing present locally. *Aim*: to identify the practical conditions needed to ensure that ambitious projects exceed the financial profitability threshold;
- Knowledge organisation and distribution systems to facilitate recognition of the implicit and explicit needs of players in a region. *Aim*: to foster the development of a regional cooperation asset suitable for aligning information systems and emerging business models.

### RESULTS

<sup>1</sup> Lecturer, Université de Versailles Saint Quentin en Yvelines/Laboratoire de Recherche en Economie Ecologique et Développement Soutenable), tel +33 6 61840883 clement.morlat@uvsq.fr

<sup>2</sup> Associate Professor, Université de Versailles Saint Quentin en Yvelines/Laboratoire de Recherche en Economie Ecologique et Développement Soutenable, tel +33 1 30940443, kleber.pinto-silva@uvsq.fr

An energy transition benchmark must allow managers to understand three levels of decoupling as distinct yet convergent elements simultaneously<sup>3</sup>. The *MDSC-EE* tool<sup>4</sup> (Morlat and Pinto-Silva, 2013) supports the energy transition of organisations. It provides a reading of their energy and non-energy-related impacts, gains and dependence. The 1<sup>st</sup> decoupling level (final use / production of energy) links the strategy of accounting amortisation with the impacts of energy consumption; the 2<sup>nd</sup> decoupling level (product valorisation / final use of energy) records the goodwill associated with the virtuous use of energy; the 3<sup>rd</sup> level (sustainability of the activity / product valorisation) accounts for the advantages of understanding how the organisation depends on its internal and external environment.

To support transactions via this accounting approach, organisations and regions must capture and analyse a large volume of extremely varied data. *BIG DATA* and *ICT* make it possible to gather socioeconomic and societal data at an acceptable cost. The availability of these data makes it possible to design setups that are less restricted in terms of stakeholders and capital vision, as well as a sensitive approach to interactions between activities and cooperation assets. The *DATAROUND*<sup>5</sup> model (Morlat, Auclair and Veillard, 2014) can be used to cover the multiple value dimensions of energy transition projects; identify potential stakeholders (activity and interest in the project); set a beneficiary profile for each party (benefits, additionality, magnitude, perception, impression); compare this profile with the availability of complementary forms of valorisation; *monetarise* information<sup>6</sup> (through stakeholder estimation of the cost associated with their lack of availability); *monetise* the realisation of economic advantages<sup>7</sup> (conversion into *cash-flow* for additional financing of virtuous projects); smooth the data to jointly guide the *social ROI* and the *ROI* (for operators, stakeholders in the setup and local or regional players collectively); align intra- and inter-organisational information systems (IS) with broader business strategies and organisational structures.

## CONCLUSION

Valorising the benefits of energy transition projects by objectivising economic relationships creates a cache of information that could be considered a regional energy capability asset. The networks of regional players must be strengthened to consolidate patterns of additional financing. Knowledge communities (whether formal or informal) can also develop shared social norms by rendering explicit their convergent interests in realising benefits. Knowledge organisation and distribution systems will make it possible to strengthen the quality of player and community knowledge networks by a process that spreads a shared culture of benefit monetarisation.

## BIBLIOGRAPHY

- MORLAT C., PINTO-SILVA K. (2013). «Principes de gouvernance et de modélisation d'un projet d'efficacité énergétique du bâtiment», in Diemer A., Figuière C., Pradel M., *Ecologie politique vs écologie industrielle, quelles stratégies pour le développement durable ?*, pp 271-289, ed. Oeconomia
- MORLAT C., AUCLAIR P., VEILLARD M., (2014). « Développer l'Analyse Territoriale pour l'Aménagement, la Rénovation, et l'Organisation Urbaine, grâce au Nivèlement des Données », Institut de la Monétarisation, response to the world innovation competition « Innovation 2030 »

<sup>3</sup> This decoupling must be absolute on a regional scale. Indeed, a region that increased its number of production units but failed to reduce their impact could show decreasing environmental intensity per unit of added value, while actually generating greater overall impacts.

<sup>4</sup> MDSC-EE: *Modélisation Dynamique des Système de Coûts appliquée à l'Efficacité Energétique* (Dynamic modelling of cost systems applied to energy efficiency)

<sup>5</sup> DATAROUND: *Développer l'Analyse Territoriale pour l'Aménagement, la Rénovation, et l'Organisation Urbaine, grâce au Nivèlement des Données* (Developing regional analysis for construction, renovation and urban organisation through data smoothing).

<sup>6</sup> *Monetarisation* = expressing the value of positive externalities in currency units, for internal use only of an organisation.

<sup>7</sup> *Monetisation* = expressing the commercial market value of positive externalities to be traded on the markets against the main world currencies (euro, dollar, etc).