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Rethinking the role of scenarios: Participatory scripting of low-carbon scenarios for France

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HIGHLIGHTS

- The article develops a 'process-oriented' low carbon scenario for France.
- Stakeholders define a set of sectoral and fiscal 'acceptable' climate policies.
- These policies are integrated within a technico-economic model Imaclim-R-France.
- Economic impacts and CO_2 emission reductions are computed.
- The co-development methodology favors joint production of solutions and shared vision-building.

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ABSTRACT

This article considers the usefulness of low-carbon scenarios in public decision-making. They may be useful as a product-oriented trajectory. The scenarios on the agenda of the 2013 Energy Debate in France belong to this category. But a scenario may also be process-oriented, in the sense that its scripting process helps build consensus and a minimum level of agreement. We have scripted scenarios using a codevelopment method, involving about 40 stakeholders from the private and public sectors, and from the state: NGOs, consumer groups, trade unions, banks and local authorities. They selected policies they considered acceptable for achieving 75% greenhouse gases emission reductions in 2050. These policies were then integrated in the Imaclim-R-France technico-economic simulation model, as part of a high or moderate acceptability scenario. In the first case emissions were cut by between 58% and 72% by 2050; in the second case by between 68% and 81%, depending on the energy price assumptions. All these measures benefited jobs and economic growth, swiftly and durably cutting household spending on energy services. This offers a solid basis for gaining acceptability for low carbon trajectories; the process constitutes also a framework for consolidating collective learning centering on the acceptability of climate policies.

1. Introduction

The energy trajectories for achieving France's Factor-Four (F4) target – a fourfold cut in greenhouse gas (GHG) emissions by 2050 compared with 1990 – have prompted lively debate. As part of the energy debate in France in 2013, the second working group (Arditi et al., 2013) was tasked with comparing and assessing existing scenarios in order, if possible, to define a trajectory for energy transition. About 15 scenarios, developed by very diverse bodies[1] with sometimes very conflicting interests, were tabled. It proved impossible to reconcile their respective views so these exercises were of little use to public decision-makers and had only limited value for raising awareness of the need for energy transition.

Starting from this observation, the present article seeks to review the usefulness of low-carbon scenarios. They may serve a

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[1] See the list of scenarios and their authors in Appendix A and their results in Fig. 4.

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wide range of goals, which fall into two main categories: product-oriented or process-oriented scenarios (Wilkinson and Eidinow, 2008; Hulme and Dessai, 2008; O'Neill et al., 2008; O'Neill and Nakicenovic, 2008). In the first case, the prime objective is the scenario itself and its content in terms of a technology and energy trajectory. In the second case, what matters is the process itself used to bring about the scenario, the aim being to achieve consensus, minimum levels of agreement or at the very least a common understanding of the stakes.

The scenarios debated in France in 2013 were tabled as finished products and belong to the first category. Framed by energy experts and engineers they focus largely on the technological aspects of transition (Mathy et al., 2011), about which the advocates and opponents of many 'low-carbon' technologies are in dispute. Controversy centers on wind power (Nadaï and Labussière, 2009), biofuels, nuclear energy (Bonneval and Lacroix-Lanoë, 2011), shale gas (IFOP, 2013), carbon capture and sequestration (Ha-Duong et al., 2009), and even electric vehicles (Thiel et al., 2012). Furthermore, a large number of low-carbon scenarios are based on the assumption of seamless penetration by the relevant technologies, guided when appropriate by a single, cross-the-board carbon price (Söderholm et al., 2011).

Technological solutions are necessary but not sufficient to meet long-term low-carbon targets (Edenhofer et al., 2010). Far-reaching shifts in energy demand are also needed, involving measures to control energy demand and improve energy efficiency, but also changes in urban planning. The price of carbon on its own cannot drive this transition and a mix of policies will be required (Fischer and Newell, 2004; Lécuyer and Quirion, 2013). Yet these too raise issues of acceptability which must be taken into account when assessing low-carbon trajectories, because poor acceptability can slow down deployment of such policies: witness the carbon tax (Hourcade, 2012), renewable-energy support mechanisms (Bökenkamp et al., 2008), demand-response policies (Wolsink, 2012) or restrictions on the use of private motor vehicles (de Groot and Steg, 2006), among others.

The concept of acceptability is based on individual factors, linked to psychology and value (Steg et al., 2005), but also institutional and procedural factors (Devine-Wright, 2008). Its scope may be enlarged by a better understanding of the subject, by co-development, compensation or redistribution systems. Greater transparency in the decision-making process is a pre-requisite, through participatory approaches involving the general public and stakeholders. These practices have developed in many fields of environmental protection (Renn, 1999; Van Asselt and Rijkens-Klomp, 2002; Wilcox, 2003; Hulse et al., 2004; Pahl-Wostl, 2002; Patel et al., 2007) particularly energy and climate change (Dorfman et al., 2012).

As recommended by Garb et al. (2008), we propose here to use a co-development method to script low-carbon scenarios with stakeholders, focusing on the issue of the acceptability of policies and technologies. All the policies identified as being acceptable are then aggregated in the Imaclim-R-France general-equilibrium model, for quantitative economic and environmental assessment. Only a few examples of methodologies combining stakeholder panels and economic modeling exist and either they do not focus on climate policy acceptability (Schmid and Knopf, 2012) or there is no direct link between the participatory process and economic modeling (EC, 2011; de Perthuis et al., 2011).

Section 2 presents the methodology developed and the Imaclim-R-France model. Section 3 presents results concerning (i) the acceptable policies considered by stakeholders, (ii) the scripting protocol to define a 'high-acceptability' (HA) scenario and a 'moderate-acceptability' (MA) scenario, and (iii) the quantitative assessment of the two scenarios. Section 4 discusses the way in which the process could evolve towards a set of acceptable policies of broader scope, more likely to achieve the Factor-Four target. Section 5 summarizes the main results, presents policy implications and concludes with a review of the pros and cons of the participatory process.

2. Methods

2.1. Collaborative scenario-scripting process

Three days of consultations (for residential, transport and electricity) sought to gauge the degree of acceptability of low-carbon climate and technology policies for the various stakeholders. The priority when selecting the latter was to engage stakeholders with sufficiently diverse and contrasting positions. Diversity is critical for enhancing learning processes on complex issues so it was important that a variety of perspectives, including marginal views, should be presented in a balanced way.[2] The selection process was based on the grid developed by Mendelow (1991), mapping their level of interest in action against their power, the aim being to bring together players from each of these sectors actively involved in deciding, implementing and funding policies, or in upholding end-user interests. As this approach cannot be applied in complete isolation, interviews with professionals from each sector were used to endorse the resulting matrix. Stakeholders included representatives of local authorities, consumer groups, professional federations, public and private operators, banks and NGOs.[3] As the aim was to enable each of the stakeholders to have a say, an upper limit of 15 participants was set for each workshop. The list of stakeholders is available in Appendix B. No document apart from the description of the project was sent to stakeholders before the workshop. Debate was fueled by a presentation of the stakes for changing patterns of energy consumption and GHG emissions, with sector-specific studies of policies capable of altering existing dynamics. Drawing on a review of the scientific literature the project team selected measures and technologies to frame sector-specific questionnaires. The aim of these questionnaires was to assess the acceptability level of measures or technologies for each player but panelists had the opportunity to suggest measures outside these lists and other design options. Each measure was extensively debated and design options were discussed in such a way as to overcome obstacles for acceptability if possible. It was important that stakeholders should not see the concept of acceptability with a professional bias, but rather in a socially pro-active light: would a policy, depending on the yet-to-be-decided design options for its deployment (scope for compensation, for instance), have acceptable impacts for economic players and consumers in order to achieve the Factor-Four target? It is nevertheless hard to be certain that everyone's answers reflected this stance. Given the number of stakeholders it was not possible to subject the answers to econometric processing, but the degree of agreement between stakeholders on the acceptability of the various measures was calculated. This was assessed by the proportion of stakeholders supporting a measure. Two levels were selected: high-acceptability with 75% stakeholder support; and moderate-acceptability, with 50% support.

2.2. The Imaclim-R-France hybrid model

Imaclim-R-France[4] is a computable general-equilibrium model belonging to the Imaclim family of models developed by Cired (Waisman et al., 2012a; Sassi et al., 2010; Crassous et al., 2006). It is a hybrid model which represents, year by year from 2004 to

[2] For example, for the power sector, stakeholders as contrasted as Electricité de France (incumbent operator) and the CLER (NGO promoting renewables) were part of the process.

[3] The same categories of stakeholders took part in the Grenelle de l'Environnement, an innovative political process initiated in 2007 in France in order to frame long-term decisions for the environment. It hosted discussions on ecology and sustainability between all the relevant social stakeholders.

[4] Further information on the model is given in Supplementary material.