



European electricity grid infrastructure: barriers for further development and recommendations

Nadejda Komendantova, Patricia Brtnik, Anthony Patt, Antonella Battaglini

International Institute for Applied Systems Analysis (IIASA), Potsdam Institute for Climate Impact Research (PIK)

Introduction

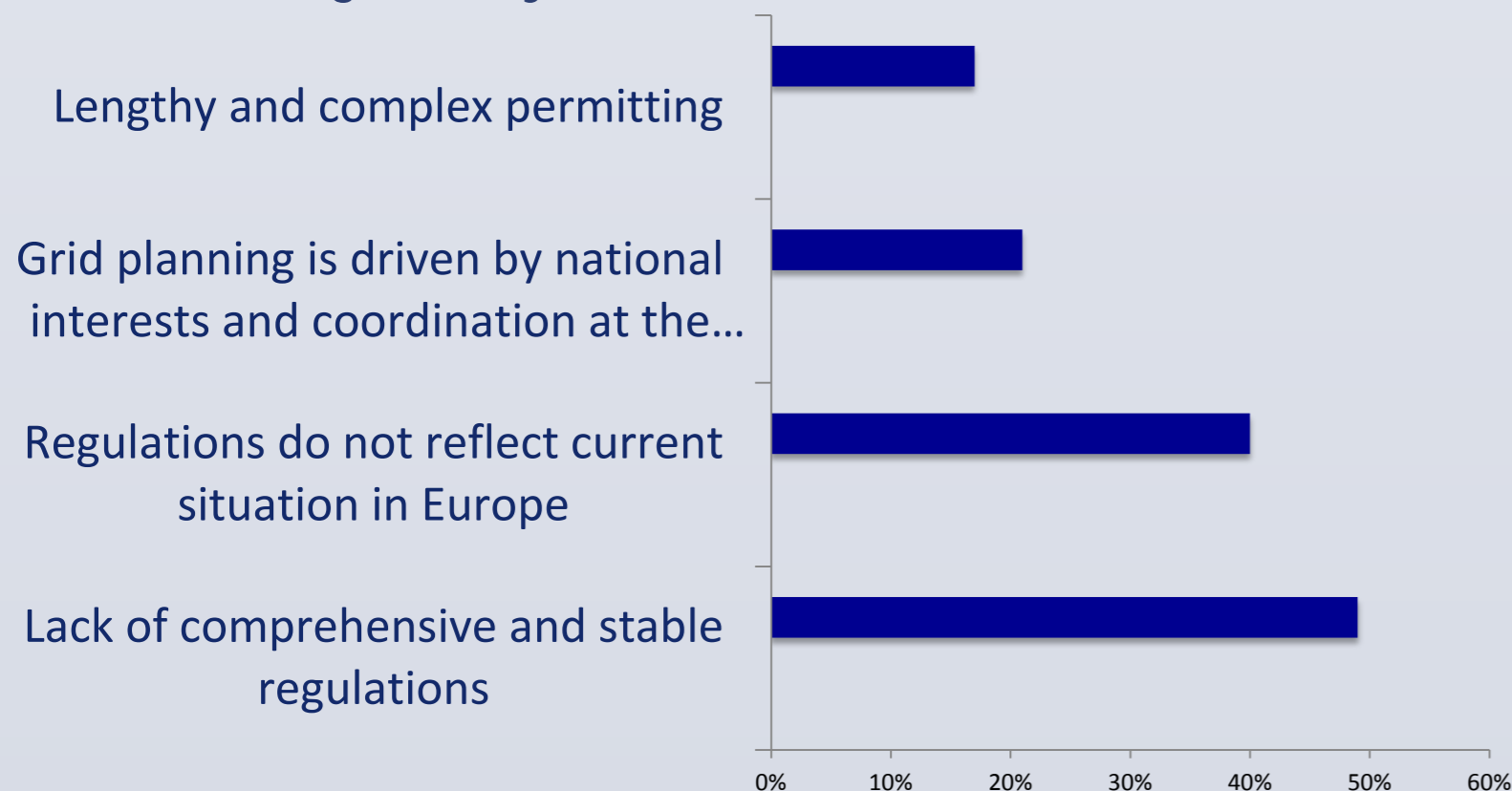
The European electric grid infrastructure was designed to satisfy national electricity needs, based on fossil and nuclear generating plants located near load areas. Climate change and energy security concerns changed landscape of energy generation and requirements on transmission grid. Already today the existing European electricity grid is inadequate to cope with increasing volumes of renewable electricity, which is generally concentrated in regions with low load, and then needs to be transmitted to high load and storage sites. The majority of grids is 30-40 years old, and needs to be replaced, upgraded and expanded, especially in the case of cross-border interconnectors. Considering the existing studies, two main questions remain unanswered, both in the context of super grid developments, and in terms of additional infrastructure needed for "smart grid" integration of more distributed renewable power generation. First, and most importantly, is the question of whether the current regulatory systems are sufficient. Do stakeholders view the current regulatory barriers to be associated with poor implementation of existing laws and rules, or are the existing laws and rules themselves the problem? Could improved or amended regulations also influence the public acceptance issues? Second, and closely related to the previous question, is the need to understand what the solutions could be at scales from local to European.

Results: Regulatory Barriers

To answer these questions, we conducted a survey, supplemented with qualitative interviews and focus group discussions. Altogether we received 108 complete questionnaires. The majority of stakeholders were from academia (22.1%), followed by energy supplier (13%), renewable energy sector (10.6%), consultancy (9.6%) and representatives of a variety of stakeholders from government, grid operators, NGO community and politics.

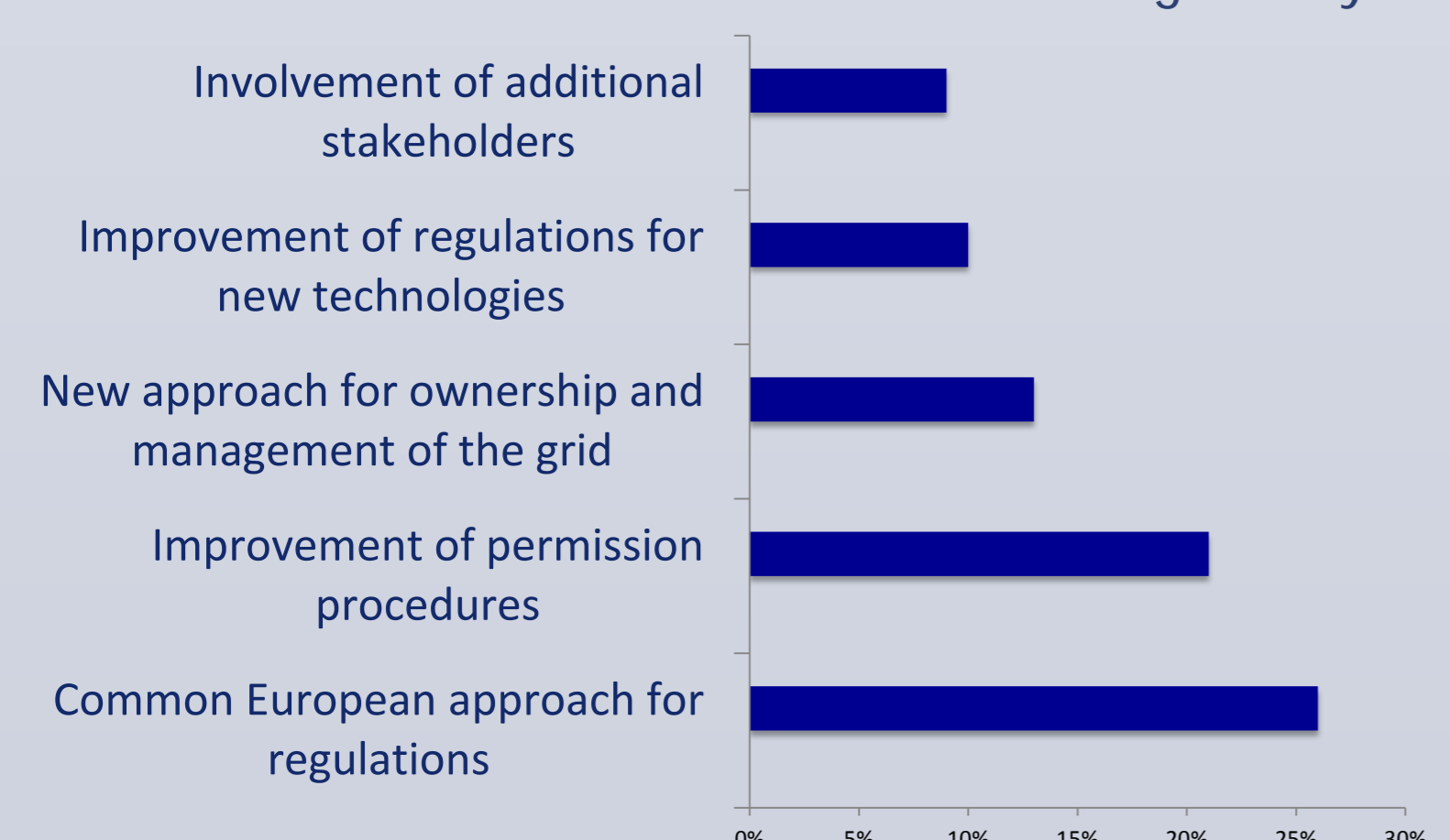
In terms of barriers, the two most listed categories pointed to the insufficiency or inappropriateness of current regulations, rather than to their poor implementation (table 1).

Table 1: Regulatory Barriers



In terms of recommendations to overcome the barriers, the four most frequent categories suggested the need for new regulations, while only the fifth and least frequent sets of answers, involving more stakeholders, left open room for improved implementation of the existing architecture (table 2).

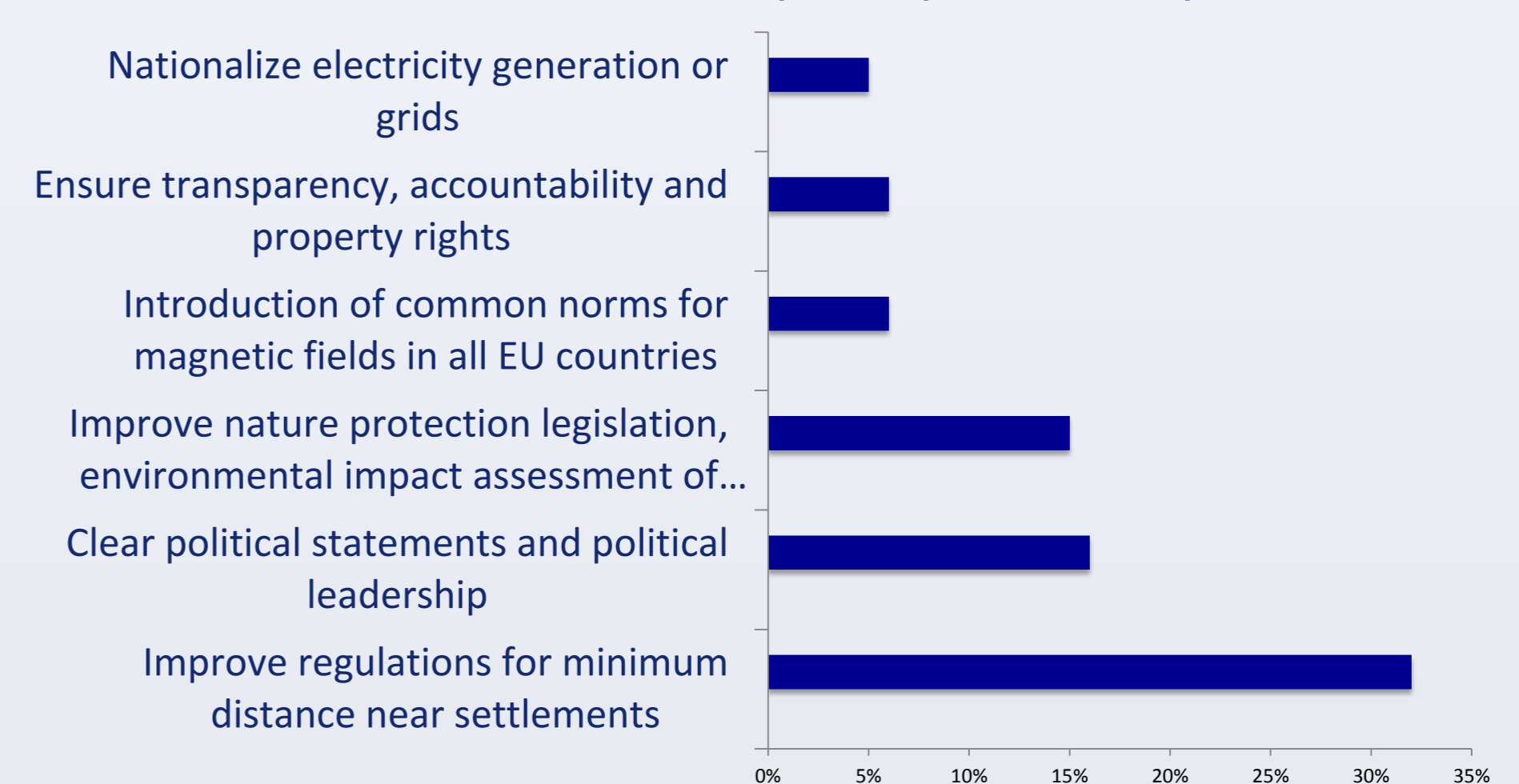
Table 2: Recommendations to overcome regulatory barriers



Results: Public Acceptance Issues

Public resistance is currently one of the major barriers for further development of grids. Suggested solutions to deal with public acceptance issues clearly indicated the need for improved implementation of existing regulations, although the most frequent category did call for additional and new regulations concerning sitting (table 3).

Table 3: Recommendations to improve public acceptance



Discussion

The results of the survey deliver two core findings: 1) there is a need for better, simplified, and standardised regulations; and 2) these regulations should provide the basis for a strong and transparent consultation process in all stages, from early planning to realisation. Our results suggest that technology availability and maturity is not problematic for further development of the European electricity grid. In the presence of a suitable regulatory framework, neither the cost of technology, nor access to capital are considered problematic. Rather, the lack of regulations and acceptance for overhead lines are the major bottlenecks. The inability to properly address public acceptance issues causes enormous delays.

Upcoming legislation on permitting, recently published by the European Commission (COM 2011 658 final), begins the process of pan-European regulatory reform. The recent establishment of ENTSO-E and ACER begins to provide the institutional support for this to occur. Moreover, developments on the ground show a clear interest of stakeholders to move towards the realization of these recommendations. In October 2011, the European Commission has proposed legislation for speeding up the permitting process. All of these could prove to be important political steps, and could begin to provide the necessary regulatory framework to enable stakeholders to fully act and sufficiently address public concerns. More research will need to evaluate their effectiveness, and the needs for additional policies over the coming years.

Acknowledgment and Contact

The authors would like to thank the European Climate Foundation as well as the Smart Energy for Europe Platform (SEFEP), which generously supported the research and writing of this paper. We are also very grateful to several experts, who found time to participate in stakeholders' interviews and the focus group and were generous with their information and recommendations. We also would like to thank the SuperSmart Grid and the Renewable Grid Initiative, which facilitated contact and identification of experts.

Contact

Nadejda Komendantova, IIASA, Risk, Policy and Vulnerability Program
Schlossplatz 1, A-2361 Laxenburg, Austria Email: komendan@iiasa.ac.at