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## **The Wicked Problem of Promoting Sustainability by Means of Enhanced Biomass Utilization**

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### **Abstract**

Promoting sustainability by boosting projects enhancing biomass utilization turned out to be a nested type of a wicked problem for the EU, if only for the unbalanced competition for (productive) land and diverse biomasses. Within the EU-scheme of Interregional collaboration it boiled down to develop a coherent set of very regionally specific projects each with a lasting sustainable impact. How to manage it? The EU promoted project development by using a combination of first top-down stratified invitations, and second bottom-up self-organization by the interested parties, backed up with light EU-coaching and basic facilitation, while requiring regional co-funding. It resulted in the ARBOR-project, which comprises of 15 actions, ranging from the realization of gas-grid injection from highroad-verges grass biogas-plants, via synergy park development, till of a city center biomass hub for woodstoves heating system.

**Keywords:** Biomass valorization, stakeholder engagement, Interreg, biofuels

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## Introduction

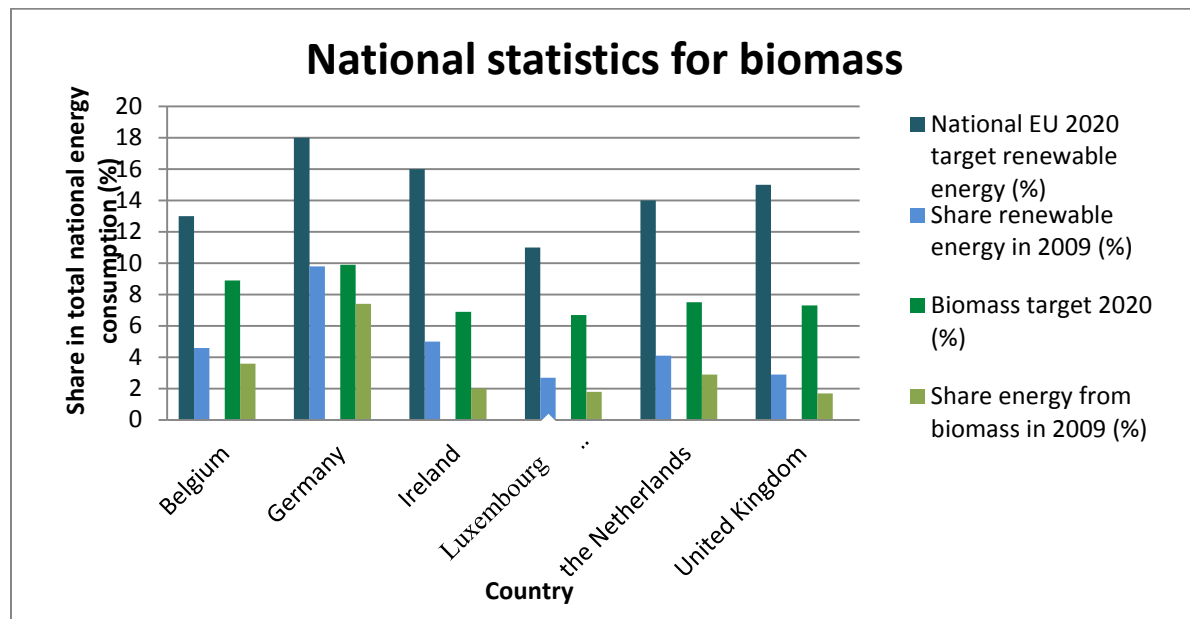
ARBOR is an interregional project in North-West Europe (NWE), set up Its mission is to foster and accelerate sustainable development by enhanced usage of biomass in NWE, to facilitate the achievement of EU 2020-energy objectives and to make the European Union a world-class center for biomass utilization ([www.arbornwe.eu](http://www.arbornwe.eu)). ARBOR comprises of 13 partners from the United Kingdom, Flanders (in Belgium), Saarland (in Germany), Luxemburg, the Netherlands, and Ireland. The project has received public funding via the European Interreg IV-B, and is co-funded by regional authorities in the respective countries. ARBOR was one of potentially six Strategic Initiatives of Interreg: Each tailored to realize a specific lasting impact. In an endeavor to strategically promote sustainable biomass utilization, ‘thriving in a world of wicked problems’ (Waddock 2012), the initiators had to deal with two layered wicked problems: First, relating sustainability positively to biobased energy is a wicked problem in itself; second, to realize such an ambition using the format of an Strategic Initiative with a project timespan of five years (maximum) created a wicked project design problem. What are the quintessential wicked problems? And, how did the initiators try to deal with these problems?

First, promoting sustainability by boosting biobased energy goes far beyond straightforward mathematics: The cause-and-effect relationships are difficult to define, it allows fundamentally different frames, and requires multi-stakeholder collaboration to bridge key interests (Dentoni, Hospes, and Ross 2012). For long the EU applauded and promoted the long term trend in energy provision from coal, nuclear and fossil fuels to wind, solar, geothermal, and biomass. In 2003 (respectively 2006) the European Union had the targets for biofuels substitution set at 5.75% (10%) by 2010 (2020). But bio-ethanol and biodiesel were held accountable for the 2007-‘08 price spikes in food commodity markets, causing food riots, protests and market interventions in over 20 countries, varying from Mexico to Egypt and Indonesia. Soon, the frame of low net energy efficiency of bio-fuels from North-West European arable crops dominated the farmer’s support, reduced fossil fuel-dependency and advancing biomass valorization (Talamini, Dewes, Padula and Wubben 2013).

By 2009 public opinion in the EU had turned against biofuels from arable crops, while advanced biofuels were not yet developed. Autumn 2009 Interreg organized a multi-stakeholder meeting to launch the Strategic Initiative ‘Biomass Energy Development’ The project brief was blank on the potential for developing alternative (advanced) technologies and for furthering so-called biomass-cascades in the 5 year project window. Each Strategic Initiatives effectively combined a strategic top-down perspective with the bottom-up involvement of key actors. Stratified invitations (top down) by regional authorities brought together over 30 stakeholders, especially development agencies, public authorities, universities/research institutes, and interest groups. Self-organization (bottom-up) by the interested parties, together with coaching and some facilitation by the Strategic Initiatives Working Group (top down) stimulated project development. The need for fifty percent complementary funding helped skeptical stakeholders to join drop outs, preventing delays and blockades (Wubben & Isakhanyan 2011) during the project design. Next to this self-selection process also the risk of a negative verdict helped to speed up joint decision-making, stimulated stakeholders’ alignment, and raised project expectations. The verdict on acceptance or rejection for the Interreg-funding would come from another, neutral committee, using the regular systems and procedures as with other Interreg-calls.

The attribution- and causality-issues in this sustainability problem made interested parties to go beyond speculative grand designs and instead opt for a multitude of smaller, location specific projects that suit local interests. Next to regional/local needs and funding opportunities, also the fundamental spatial and political disparities had to be taken into account. For example, Ireland has hardly any woodland to harvest from, while Germany wants to build on its longstanding policy in stimulating alternative energy sources, subsidizing feed-in tariffs for the electricity-grid. The coaching by the Working Group prevented fragmentation by orienting partners towards five strategic interests of Interreg, namely: transnationality, innovativeness, partnership (coverage, levels), leverage effects, and communication. The project development process resulted in the objective to foster and accelerate development and use of biomass to facilitate the sustainable achievement of the EU 2020-energy objectives, and sharing the lessons learned across the countries. The ARBOR proposal comprised of 15 actions under three prime work packages: 1) Production, collection and preparation of biomass material; 2) Conversion and utilization of biomass; and 3) Socio-economic strategies for improved biomass supply chain management. The accepted project stimulates activities on industrial and agricultural biowastes, including manure, utilizing buffer strips, set aside lands, grasslands, and (wasted) woodlands, to grow and harvest SRC, and other biomasses. With 13 participants, knowledge diffusion was secured by linking up 6 observers and convening implementation-relevant stakeholders in national and transnational advisory boards.

Figure 1 presents the variation in ambitions for bio-energy production in 2020 and the 2009-baseline positions across different countries. Germany is the most advanced in realizing its biomass ambitions, whereas the United Kingdom presents the strongest contrasts between baseline data and the 2020-ambitions.



**Figure 1.** Shares of renewable energy (e.g., biomass) in total national energy consumption in 2009 versus 2020-targets for renewable energy (biomass) (in %). Source: POM, 2012.

The proposal brought together some 15 actions under three prime work packages: 1) Production, collection and preparation of biomass material; 2) Conversion and utilization of biomass to energy; and 3) Socio-economic strategies for improved biomass supply chain management.

The partners in ABROR arrived at the following set of prime activities:

- A benchmark-report of biomass for bio-energy initiatives and projects;
- Pilot and demonstration projects;
- A market analysis of biomass equipment providers, manufacturers and investors;
- A technology watch on biomass conversion technologies and valorization options;
- An analysis of political and legal frameworks and conditions for bioenergy utilization;
- An triple-P assessment of the innovative schemes developed within ARBOR, and
- The bioenergy strategy development for the ARBOR pilot regions.

The coaching promoted the orientation on delivery and implementation, utilizing regional assets, earlier projects, existing pilots and technologies. For example, the Province of Utrecht (NL) develops a pilot for the digestion of grass from highroad verges, upgrading the biogas to standardized gas quality, to be injected in the national gas grid. In contrast, the city of Stoke-on-Trent (UK) wants to realize a biomass hub in the city center situated at the crossroads of canals, where trees can deposited shipped from regional woodlands. Wood chips will be used in new woodstoves in their municipal buildings. ARBOR partners prefer to delegate stakeholder selection to the regions. For example, to change the regional system of organic waste handling in Saarland requires the participation of ministries, municipalities, non-governmental organizations, and firms. But to promote nutrient recovery in Flanders requires active participation of small and medium-sized enterprises, technology suppliers, authorities and a manure bank. ARBOR acknowledged the enormous variety of key stakeholders dependent on the different regional settings and activities.

Almost halfway the project, substantial investments are already made in the different regions, both for temporary projects, such as pilots on marginal lands, as for strategic projects, such as the woodstoves heating systems, the SRC, and the highroad grass biogas-plant. Further formalization of the multi-stakeholder interaction is expected as the projects progress implementing solutions to the wicked problem of promoting sustainability by means of enhanced biomass utilization.

The take away is that working on wicked problems may benefit from using a transparent combination of top-down environmental and social goal-setting and decentralized bottom-up participation, with the aim of local implementation. Other factors worth pondering may be the stratified invitations, process- and goal-oriented coaching, decision-making split between central financiers and decentralized funders. The fundamental lack of knowledge and unstable public opinions may lend policy makers to develop more of such initiatives promoting a diversity of trials and implementation trajectories.

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