

DERIVING LOCAL VALUE FROM RENEWABLE ENERGY CAPACITY AND CREATING A GREEN HYDROGEN VALUE CHAIN FOR THE BENEFIT OF THE LOCAL TERRITORY IN THE COUNTIES UCKERMARK AND BARNIM IN GERMANY

A Policy Learning Platform peer review
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FINAL REPORT

1. Hydrogen Region Uckermark-Barnim

The Uckermark-Barnim region with a population of around 304,000 is located in the northeast of Brandenburg and covers an area of about 4,530 sq km. While Barnim is one of the most densely populated counties in Brandenburg (approx. 130 inh./ sq km), Uckermark ranks up on the other end of the scale. Uckermark borders on Poland in the east whereas Barnim borders on the federal capital Berlin in the south. The surrounding area of Berlin is clearly characterized by suburbanization processes. This is reflected in the working and living situation of cities and communities in the surrounding area: increasing population and commuting flows, a transportation infrastructure at its limits and an increasing population density. With increasing distance to the capital, on the other hand, population as well as population density are decreasing. A transnational transport corridor runs through the region, consisting of large-scale and supra-regional road and rail connections that connect Berlin and its metropolitan area with the Baltic Sea coast including the Scandinavian countries.

In statistical terms, considerable more electricity (especially from wind turbines) is already being generated in the Uckermark-Barnim region than consumed regionally. The Uckermark-Barnim region has grid shares in the high-voltage grid with a top voltage of 220 kV. A further line with a maximum voltage of 380 kV is planned intended for creating an opportunity for making the regions massive amounts of wind energy available to southern parts of Germany. The extra-high voltage lines run in a north-south direction through Uckermark-Barnim.

The storage capacity of the region is 5 MW, of which 1.6 MW are in the County of Barnim and 3.4 MW in Uckermark. Additional 7.2 MW in storage capacity are still planned.

Both counties' concern for securing an affordable and reliable energy future for their inhabitants go back quite a number of years. This concern has not just been a focus of the administrations but also shared and promoted by both county parliaments and its members. It therefore came as no surprise that both parliamentary bodies in 2021

mandated the respective chief administrator to formulate a strategy for the increased generation of green hydrogen in the region and regional use of it. Both administrators then signed an agreement committing themselves to the pursuit of a “H2 Project Uckermark-Barnim”. This agreement states that the project is intended to make the region an innovative business location for the production, storage and use of green hydrogen. The project also aims to increase the value added in the region and beyond in all of eastern Germany.

There are some pilot projects planned or working in the transport (busses, trains, garbage trucks) and storage sector as well as in the field of filling stations. But a clearly defined strategy for hydrogen is still missing.

Knowing that other countries in the European Union already have years of experience in the field of hydrogen production, storage and use, the aim is to benefit from this knowledge and to avoid mistakes in our own approach. A Policy Learning Platform peer review seems to be the appropriate tool for this.

2. Specification of the policy challenge encountered

According to the latest survey of the Hydrogen Compass (a research and roadmap tool project grown out of the National Hydrogen Strategy) one of the most important impediments delaying the further expansion of renewable energies is the limited availability of suitable sites for their generation. High capital requirements and running costs intercept investors and trade. An attractive mix of well-coordinated and flexible instruments is needed to further promote the generation, transport and storage of renewable energies. There are possibilities for citizens to participate in related energy projects. In some German regions civic involvement is a key to bearing finance capital costs for regional value chains and to raise the acceptance of, e. g. wind parks.

The Uckermark-Barnim region is home to more than 700 wind turbines that together produce a lot more electricity as the region statistically consumes. None of these wind turbines are owned by municipalities or publicly owned utilities. Those companies that do own the wind turbines see them as lucrative investments, in part because they have long-term contracts with the utilities guaranteeing a set price for every kW they generate. Furthermore, companies owning the wind turbines in the region typically are based outside the region and only maintain a small if any staff locally for service and maintenance.

Wind turbines, thus, contribute only marginally to the local, or regional, value added. Only legislation adopted nationally very recently may mandate wind companies to regularly pay a yearly reimbursement to the municipality on whose territory the wind turbine actually stand. However, for a growing number of the existing turbines, the initial long-term contracts with electric utilities have run out or are about to run out shortly. Thus, their owners are put in a situation in which they to carefully consider how and on what basis to carry on with the operation of their turbines.

This financial framework has caused much civil unrest during the last years. Many residents are not willing anymore to, on the one hand, accept the construction of ever more wind turbines while, on the other hand not benefitting at all from the renewable energy they generate. Furthermore, and adding to the grief felt, high voltage power

lines have to be built in order to direct the wind energy to those places in Germany where electricity consumption is high but production low.

If the region's set goal to use its abundant wind energy for the production of green hydrogen is ever going to have a chance it makes it necessary to access this amount of wind energy and put it into use regionally. In practical terms, such a strategy would make it necessary to devise a set of incentives that work so effectively vis-à-vis the owners of the wind turbines that they would sell the electricity that their turbines generate to consumers in the region so that hydrogen may be produced. Even this scenario assumes that is legally possible for the turbine owners to get out of their contracts with utilities and find other buyers for their electricity.

Therefore the first question to be worked out during the peer review should be how to find access to the producers of renewable energy (especially wind energy) and make them interested in supplying the energy generated by their wind turbines for the production of hydrogen in the Uckermark-Barnim-Region.

Hydrogen is increasingly seen by many as a form of energy for multiple uses, to quite an extent replacing fossil sources of energy, i.e. coal and gas. Uckermark-Barnim is the region where the first hybrid power test plant was built. Currently it is still a region that does not have sizable production sites for green hydrogen. If such production facilities are to be set up, it should be clear at the forefront that much of this green hydrogen will in fact be consumed in the region. Apart from identifying the most suitable production sites given, among others the substantial quantities of water that have to be available on site, the regional demand for green hydrogen that can effectively be generated has to be stimulated.

As pointed out earlier, several projects are already underway in the region in order to use hydrogen in the transport sector. Although this may be a promising start, the demand generated by these initiatives may very well fall short of the quantities needed to make the construction of hydrogen production an economically sound and sensible undertaking.

Despite all the potential that the region offers for the production and consumption of green hydrogen, it has to be taken into account that the production processes of producing this gas and to transform it back to electricity for further use both lose a lot of the original energy input along the way. It, thus, makes a lot of sense to also look for other gases and opportunities for their production and consumption in the Uckermark-Barnim region. Methane, for instance, may very well be used as a partial replacement for natural gas that is regionally used for heating purposes. Despite the current energy crisis and the substantial pressure to find alternative sources that people may use for heating their homes, it will take years before natural gas will have become obsolete, at least for this purpose.

The question, therefore, is two-fold:

- what other (end) uses for green hydrogen may represent feasible options for the Uckermark-Barnim region?

and

- are there other kinds of gases on a sustainable basis that may be produced and consumed in the region?

3. Participants

List of participants in the peer review:

Members of the beneficiary organization

- Dr Wilhelm Benfer, Director of the Department of Structural Development, Cadastre and Surveying, County Administration Barnim
- Mareike Haas, Head of Structural Development, County Administration Barnim
- Nicole Schwarz, Project Manager Peer Review, Regional development, County Administration Barnim
- Susanne Drasdo, Project Manager Peer Review, EU-Coordinator, County Administration Barnim
- Stefan Them, County Development, Energy and Climate Protection, County Administration Uckermark

Local stakeholders involved

- Detlef Bröcker, CEO, Niederbarnimer Eisenbahn Betriebsgesellschaft mbH
- Dr Tilman Dombrowski, Board Member, Bürgerenergiegenossenschaft Barnimer Energiewandel eG
- Claudia Henze, CEO, Regionale Planungsgemeinschaft Uckermark-Barnim
- Sven Herrmann, Project Manager, Hydrogen Region Uckermark-Barnim (H2UB)
- Stefan Israel, Assistant to the CEO, Barnimer Busgesellschaft mbH
- Jens Jankowsky, Officer for Innovation, Technology, Energy, Industrie- und Handelskammer Ostbrandenburg
- Lennart Kehlenbeck, Project Manager Energy Transition, Wirtschaftsförderung Land Brandenburg GmbH
- Heike Lewin, Officer for Municipalities in Uckermark and northern Barnim, E.DIS Netz GmbH
- Leonie Ohle, Scientific Officer, IKEM Institut für Klimaschutz, Energie und Mobilität
- Max Schenkluhn, Head of Project Development Power-to-Gas, ENERTRAG SE
- Matthias Schilling, Mayor, Municipality Uckerland
- Bernd Skudelny, CEO, Wirtschafts- und Tourismusentwicklungsgesellschaft mbH des Landkreises Barnim
- Detlef Stöbe, CEO, Stadtwerke Bernau bei Berlin
- Dr Johannes Wagner, Referent, Landkreistag Brandenburg
- Ralph Wittwer, CEO, Bauernverband Barnim
- Marko Buchta, Officer INTERREG EUROPE, Ministerium der Finanzen und für Europa des Landes Brandenburg
- Mieszek Jagiello, Officer for EU Financial and Economic Policy, Coordination of EU Funding, Innovation, Ministerium der Finanzen und für Europa des Landes Brandenburg

Peers

- Fernando Palacin, Director, Hydrogen Foundation Aragon, Spain

- Julien Jimenez, Deputy Director - Energy and Climate Department– Regional Government Nouvelle-Aquitaine, France
- Nikolaos Ntavos, Co -Founder and Manager, CluBE-Cluster of Bioeconomy and Environment of Western Macedonia, Greece - Interreg Europe team
- Kevin Schalk, Group Leader, Fraunhofer Institute for Wind Energy Systems & deputy chairman of the Bremerhaven local hydrogen chairman of the Bremerhaven local hydrogen network "H2BX, Germany
- Florian Widdel, Officer for Digitalisation, Sector Coupling and Grids, German Renewable Energy Federation BEE, Germany

Interreg Europe team

- Astrid Severin, Thematic Expert Circular Economy and Resource Efficiency, INTERREG EUROPE Policy Learning Platform
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- Thorsten Kohlisch, Project Manager, INTERREG EUROPE Policy Learning Platform
- Soroush Brandenburg, Thematic Assistant, INTERREG EUROPE Policy Learning Platform
- Verena Priem, Senior Policy Officer - Low-carbon economy, INTERREG EUROPE Joint Secretariat

4. Policy Recommendations

General recommendations

1. Have your own strategy within the frame work of national or EU level.
2. Have a strategy consisting of short-term (1-5 years), mid-term (up to 2030) and long-term (2040/2050) goals and initiatives starting with pilot projects in the transport sector and getting bigger with increasing experience.
3. Strong role of public funded projects in short term to cover the high risks.
4. A permanent structure is needed.
5. Sharing knowledge and learning from others in whole Europe helps being successful.
6. Collaborations with other Hydrogen regions. Use European projects to acquire public funding.
7. Collaboration within the region: Bring the topic H2 to the companies and the people. Communication and education must go hand in hand with the developing projects. Skill availability has strong impact on speed of implementation. Participatory processes.
8. Communication strategy: Branding your region; Once lighthouse projects are done use them as examples for good story telling. Use early projects (H2 train) to start talking about H2; Positive communication: H2 brings new jobs and opportunities to the region; Change the picture (away from negative connotations related to wind); Create positive connotation of H2, stress regional benefits, use new visuals: 'Working for H2 is cool'; But: manage expectations: H2 won't bring sudden prosperity to the region, it's a long process.

9. Regulatory authorities should be brought on board from the start – it's a new area for them and they will need confidence and time
10. H2 is not the solution for all. Where electrification is possible this should be the first choice due to loss of efficiency.
11. Integrate the hydrogen strategy in the overall decarbonization efforts

Recommendations according sector coupling:

(While regulatory frameworks are not adapted, such a model will probably not emerge)

1. Definition of green hydrogen not clear. In the meantime, we can label it «regional wind hydrogen»
2. Costs of use of onsite produced electricity (EEG charges)
3. Operating the electrolyser only on excess wind won't be sufficient (too little operation hours!). There must be correlation between RES production and hydrogen production.
4. Private PPA with wind operator is possible: Operators would probably accept a direct 10-year PPA with wind farms that have fallen out of the EEG (after 20 years) with a remuneration covering the costs + a premium for sale to the electrolyser. The region will need a dealer to broker this agreement!!!
5. New RES capacity built especially to power electrolysers could see the new models first

Recommendations according end-use options

1. Focus on heavy transport and industry; both are hard to electrify or decarbonise otherwise
Public transport: trains and buses (good to start, short term)
Shipping vessels: sea and inland shipping (good in the mid term)
New industry might move to centres of future hydrogen production / availability (Standortfaktor!)
2. Hydrogen solutions might be too expensive and complex for farmers in the short term
3. The 1MW electrolyser model presented is interesting: decentralised and close to RES capacity
Think about one or few pilots in the short term. Not suitable for large rollout in short term (140 electrolysers); costs still must come down. Currently electricity is expensive, too. CAPEX will go down through scaling up effects. Currently no automated plants, they are being hand-assembled (expensive).
In the long term, it might be different (when H2 infrastructure is ready and prices have come down)
4. Mixing H2 into gas grid is problematic because it won't allow the correct (higher) remuneration for H2 that would be required to produce H2 profitably. Separate pipelines for H2 needed in the long-term.

5. Possible calendar of implementation

One of the lessons learnt out of the peer review is that becoming a hydrogen region is a long-term process due to many different and partly at higher level not yet decided

impacts. For this long way laying before the Uckermark-Barnim region a hydrogen strategy up to 2040/2050 including education and communication concepts is needed.

As this strategy has to be developed a plan of actions is only feasible for about one year. Plans for the following years are to be made within the development of the hydrogen strategy. The plan of actions for 2023 is visualized on the following page. It shows very clearly that there is a lot of initial work is to be done before getting into the implementation process.

6. Conclusions

The peer review brought new respectively new interpreted information to the region. It brought the confirmation that not only a hydrogen strategy is needed for the region, but all the more a green energy strategy, which has to fit in higher level strategies. Hydrogen cannot be the solution for all. But to examine the gap to zero emissions that might possibly be closed by hydrogen the zero-emissions-strategy of the county Barnim has to be evaluated.

One result of the peer review showed that the policy challenge discussed is barely feasible with existing wind farms and existing electrolyser technologies. This requires new considerations for future opportunities for example in thinking about citizen cooperatives. The region of Nordhessen matched to the region of Uckermark-Barnim afterwards the peer review could be a good practice to stay in contact with. A possible application for Interreg Europe funding in 2024 will be discussed in the follow-up process.

Eberswalde, January 10, 2023