

Renewable energies for today and tomorrow



Renewable Energy Hamburg Cluster
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RENEWABLE ENERGIES FOR TODAY AND TOMORROW

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EDITOR

Erneuerbare Energien Hamburg Clusteragentur GmbH

Wexstraße 7 · 20355 Hamburg

Germany

Phone: + 49 (0)40/694573-10 · Fax: -29

www.eehh.de

Jan Rispens

CONTACT IN THE HAMBURG MINISTRY OF ECONOMICS, TRANSPORT AND INNOVATION

Department 1

Innovation and Structural Policy, Medium-size Businesses

and Hamburg Port

Section IT

Innovation, Technology and Clusters

Andreas Richter, Head of Section

Phone: + 49 (0)40/42841-1464

Email: andreas.richter@bwvi.hamburg.de

Section IT2

Cluster Regulation and Support

Rüdiger Hintze, Head of Section

Phone: + 49 (0)40/42841-1861

Email: ruediger.hintze@bwvi.hamburg.de

Katja Boscheinen

Phone: + 49 (0)40/42841-3398

Email: katja.boscheinen@bwvi.hamburg.de

www.bwvi.hamburg.de

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ANNUAL REPORT 2016


RENEWABLE ENERGY HAMBURG CLUSTER

FOREWORD



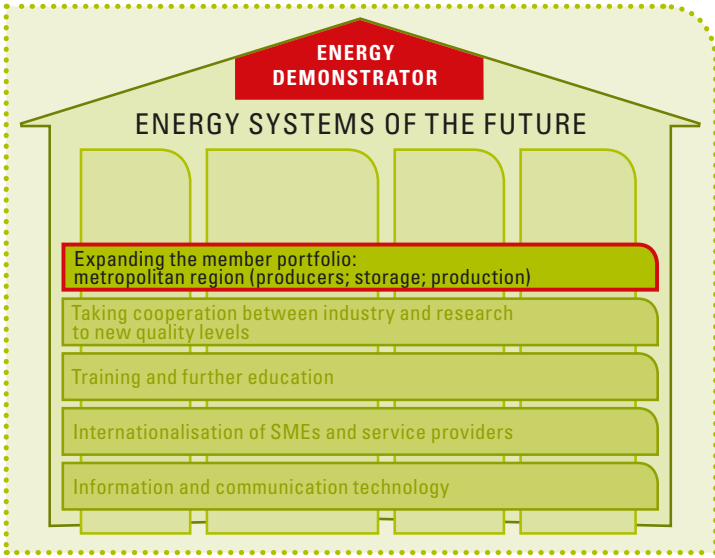
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> Wind turbines on the "Energieberg" in Georgswerder

 2016 was an exciting year for the Renewable Energy Hamburg Cluster. Following a cluster evaluation conducted during 2015, the cluster has further developed and presented its strategy until 2020. Alongside the familiar focal areas of the renewable energy fields – in particular wind energy – the network will also focus in the future on energy system competence. For the Renewable Energy Hamburg Cluster (REH), this means that there will be a stronger emphasis on the sector coupling between the electricity sector and the heat and mobility sectors.

Politicians worked intensively on the Renewable Energy Sources Act, through which tenders are in large part to be submitted for the pricing for wind energy onshore and offshore, and for photovoltaics. For many players in our network, this means entering a new era, which is likely to entail a strong cost depression, as well as important challenges in terms of operative implementation.

For the Renewable Energy Hamburg Cluster, the year was also characterized by a sector consolidation with increasing cost pressure on all players.



> Renewable Energy Hamburg Cluster strategy building 2016

Despite this difficult environment and considerable challenges, we are happy to report that the number of members in the Cluster remained stable at 180. Not least, during 2016, WindEnergy Hamburg became the leading trade fair in the industry worldwide, with the Renewable Energy Hamburg Cluster represented with a shared stand covering 150 m², as well as a broad range of activities.

In 2016, the proportion of renewable energies in the electricity sector in Germany was 33%. In the north

German flatlands of Schleswig-Holstein and Mecklenburg-Vorpommern, the share was even considerably greater than 100% on average. Calculated over all economic sectors and private households, the proportion of renewable energies for final energy consumption was just 12%, however. The challenges are based here but also the opportunities, of the energy transition: making increased use of electricity from wind and solar farms for supplying heat, for sustainable mobility and for industrial processes.

In the Hamburg metropolitan region, we have now already achieved the electricity supply forecast for Germany as a whole for 2025. The Renewable Energy Hamburg Cluster wants to use the opportunities that this creates to develop solutions and competencies which can later be marketed and implemented throughout Germany and internationally. To this extent, the “Energy systems of the future” claim that we have developed as a branding phrase within the scope of the Cluster strategy, is a promise that the Renewable Energy Hamburg Cluster will not remain satisfied with the status quo, but will continue to pursue new and innovative ways forward.



Dr. Rolf Böisinger
Hamburg Ministry of Economics, Transport and Innovation, Supervisory Board Chairman of the Renewable Energy Hamburg Cluster Agency



Michael Westhagemann
Chairman of the Board of the Association of the Promotion of the Renewable Energy Hamburg Cluster



Jan Rispens
Managing Director Renewable Energy Hamburg Cluster Agency

GERMAN RENEWABLES AWARD PIONEERING SPIRIT & INNOVATIONS



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> The winners of the German Renewables Award 2016

Presentation of the German Renewables Award 2016

30 years of influential wind turbine development, fast energy storage facilities for decentralised energy systems, optimisation of turbulence properties in wind farms – the three winners of the 2016 German Renewables Award work tirelessly for the success of the energy transition. **Sönke Siegfriedsen**, Aerodyn Engineering; **Norbert Hennchen**, Freqcon GmbH, and **Nils Gerke**, HAW Hamburg (University

of Applied Sciences Hamburg), were awarded with the Renewable Energy Hamburg Cluster Award at the WindEnergy Hamburg 2016.

Lifetime Achievement in Wind Energy

50 patent families, 27 wind turbines – wind pioneer **Sönke Siegfriedsen** can look back on a unique success story. The founder of Aerodyn Engineering from Rendsburg already built his first wind turbine on the roof of his University of Applied Sciences in 1979.



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> Michael Westhagemann, Chairman of the Management Board of the Association for the Promotion of the Renewable Energy Hamburg Cluster

Today, he focuses on floating offshore turbines with two rotor blades, for use in particular in South-East Asia, a region plagued by typhoons. He was presented with the "Lifetime Achievement in Wind Energy" German Renewables Award for his outstanding contribution to the development of wind energy technology worldwide.

GERMAN RENEWABLES 2016 AWARD TECHNOLOGY | SYSTEMS | MARKET

Product innovation

Stable electricity grids in spite of a high percentage of electricity from renewable energy sources – that is precisely what the Ultracapacitor Grid Stabilizer by Freqcon GmbH, winner in the category "Product Innovation of the Year," achieves. **Norbert Hennchen** and his team developed an innovative energy storage system based on dual-layer capacitors, which guarantees a rapid grid frequency measurement with a time resolution of roughly one millisecond

and an extremely rapid and high-performance energy transfer when required. The storage system can be installed both in inverters for wind turbines and PV systems. Overall, ten companies competed in this section.

Student Paper on Wind Energy

In his master's thesis, **Nils Gerke** from the University of Applied Sciences Hamburg evaluated measurement data from wind farms to calculate wake turbulences. Wake turbulences are defined as trailing winds slower than the wind upstream of the turbine. As part of his thesis, he developed a method to exactly evaluate the wind measurement data from a wind farm using a SCADA system. This has earned him the German Renewables Award in the "Student Paper of the Year on Wind Energy." Six students applied in this category.

The Renewable Energy Hamburg Cluster has presented the German Renewables Award as a prize from and for the sector since 2012. Individuals, projects and products are awarded which increase the potential for further developing renewable energies.



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> Dr Rolf Bösing, Chairman of the Supervisory Board of the Renewable Energy Hamburg Cluster Agency

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WINDENERGY HAMBURG 2016 INTERNATIONAL LEADING TRADE EXHIBITION & REGIONAL NETWORK



> Renewable Energy Hamburg Cluster shared stand in hall A2

EEHH GmbH/Juan Brandes

The EEHH-Cluster at the WindEnergy Hamburg 2016

With 35,000 visitors from 48 countries and 1,400 exhibitors from 34 countries, the second WindEnergy Hamburg trade fair exceeded the results of its premiere in 2014 by far. The Renewable Energy Hamburg Cluster was also represented, together with 18 companies – 16 sub-exhibitors and two logo partners – in Hall A2, with 150 m² of exhibition space.

16 sub-exhibitors were represented at the WindEnergy Hamburg fair at the Renewable Energy Hamburg Cluster shared stand

The sub-exhibitors and logo partners included: cms@wind, Fichtner Water & Wind GmbH, Fraunhofer ISIT, Görg Partnerschaft von Rechtsanwälten, Graf von Westphalen, Hanseatic Power Cert, University of Applied Sciences Hamburg, Helmut Schmidt University of the Federal Armed Forces Hamburg, Kaiserwetter Energy Asset Management GmbH, Marlière & Gerstlauer executive search, Norton Rose



> Visit by Hamburg senators Frank Horch and Jens Kerstan

Fulbright, Osborne Clarke, PriceWaterhouseCoopers AG, Thüga Erneuerbare Energien GmbH & Co. KG, the Technical University Hamburg, the Universität Hamburg, and Adios Patent GmbH and Get A Head AG.

seminar with EE.SH, the focus was on “Innovations in northern Germany”. For example, **Professor Werner Beba** from HAW Hamburg (Hamburg University of Applied Sciences), presented the joint project “North German Energy Transition 4.0”. Young scientists from the member higher scientific institutions of the Energy Research Network Hamburg presented their research papers on recruitment day at the WindEnergy Hamburg 2016 exhibition.



> Professor Peter Dalhoff from Hamburg University of Applied Sciences greets the Economic Senator Frank Horch and the Environmental Senator Jens Kerstan

A wide-ranging trade fair supporting programme

A joint export workshop with the Canadian Chamber of Commerce from Montreal/Toronto discussed export opportunities to Canada. During the joint



> Public panel discussion at the WindEnergy Hamburg 2016 (for details, see page 11)

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REH MEDIA CAMPAIGN CREATIVE MINDS & TECHNICAL INNOVATIONS



> Visit to the autonomous Köhlbrandthöft power plant in April 2017

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Media campaign in the run-up to WindEnergy Hamburg

Floating wind turbines, power-to-heat plants – the media campaign of the Renewable Energy Hamburg Cluster 2016 highlighted current renewable energy projects from the Hamburg metropolitan region, and presented the people behind them. In the months running up to the WindEnergy Hamburg 2016 fair, the editors of JDB Media together with the Renewable Energy Hamburg Cluster presented innovations

from cluster companies and other enterprises in eight press releases.

Reader magnets: technical innovations

The most successful report was “Floatings – revolutionary floating power stations on the high seas”, about a current DNV GL project in Norway, followed by “North Germans are the strongest advocates of the energy transition – a survey on the degree of support for the energy transition in northern Ger-



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> Visit to the energy campus at Hamburg University of Applied Sciences

many". In summary, it remained the case that topics on technical innovations were by far the most popular, and the media was very happy to make use of the information provided as it was well prepared. Representatives from Renewable Energy Hamburg Cluster companies and higher education institutions were perfectly placed as experts.

"The Hamburg year of renewable energies"

In parallel to the media work, the Renewable Energy Hamburg Cluster organised five open-door days at renewable energy sites in the Hamburg metropolitan region, including at the energy campus of HAW Hamburg in Bergedorf, at the autonomous power station in Köhlbrandthöft, and at the Uniper power-to-gas plant in Reitbrook. "The Hamburg year of renewable energies" generated a high level of interest among the general public. Around 200 people took part, with a show rate of around 85%.

Huge flags on the central Jungfernstieg and Spitalerstrasse announced that "The wind is in the city" – and the beginning of the WindEnergy Hamburg 2016 trade fair week. The public panel discussion,



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> Visit to the power-to-gas plant in Reitbrook

"The energy transition: nothing more than hot air or a German success project", with well-known guests – **Professor Timo Busch**, University of Hamburg; **Gunnar Groebler**, Vattenfall Europe Windkraft; **Senator Jens Kerstan**, Environmental Senator of the Free and Hanseatic City of Hamburg; **Lars Bondo Kroogsgard**, Nordex SE, and **Michael Westhagemann**, Siemens AG, – marked the climax and the final event of the campaign, and attracted a huge amount of media attention, to the great satisfaction of the Cluster and its members.

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REH INTERNATIONAL GREEN POWER ELECTRONICS & NORTHERN CONNECTIONS



> Launch meeting of Green Power Electronics in Riga in the autumn of 2016



More efficient power electronics and innovative energy demonstrators

Two new EU joint research projects

Internationalisation and cross-border collaboration – the cornerstones of the high-export renewable energy industry. The Renewable Energy Hamburg Cluster is continuously initiating and becoming involved in projects within Germany and abroad, in order to strengthen Hamburg's role as a European centre for the energy systems of the future. Since 2016, the network has participated in the "Green Power Electronics" and "Northern Connections" EU projects. Both

focus primarily on promoting innovation and technology in northern Europe.

"Northern Connections" – Cooperation for innovative energy demonstrators in the North Sea region

Until 2020, the Renewable Energy Hamburg Cluster will participate in the "Northern Connections" EU Interreg project, which has been funded with around 5.3 million euros, and which is headed by the Danish municipality of Aalborg. Aside from the Hamburg network, there are 20 other partners from the region surrounding the North Sea. The aim is to develop a

platform for medium-sized companies, with the aid of which northern European innovation partnerships for sustainable energy systems will be created.

The solutions developed in medium-sized companies are intended to support cities and regions in handling their system transformation to sustainable energy. A key role will be played by combining the energy supply, households and transport sectors. Eight cluster initiatives, including the Renewable Energy Hamburg Cluster, will create the necessary framework conditions.



”*“The main objective for clusters is to bring companies together in order to widen their business network and also be a direct access to knowledge institutions to create innovation projects. Companies of the clusters get direct access to each other in workshops and seminars thus creating many opportunities for expanding their business.”*

Christina Folmand Knudsen,
international project coordinator from
the municipality of Aalborg

“Green Power Electronics” – competitive advantages through new materials for power electronics

Shorter innovation cycles and technology optimisation through new power electronics materials improve the competitiveness of wind turbines, electric

cars and intelligent building control systems. The EU-INTERREG Baltic Sea “Green Power Electronics” project, in which the Renewable Energy Hamburg Cluster is involved, is supporting the development of improved power electronics. Overall, 28 partners from science, business and the public sector are participating in the project, which has funds of 3.1 million euros.

The project arose from many years of collaboration between semiconductor research centres in the Baltic region, and is headed by the Mads Clausen Institut of the Southern Danish University in Sønderborg (SDU). The initiative’s main focus of research are the silicon carbide and gallium nitride compounds as materials for three pilot demonstrators.

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”*“The main goal of Green Power Electronics is to foster innovation in the Baltic Sea Region via distribution of knowledge and applicability of advanced power electronics to relevant companies and other stakeholders. Clusters are natural multipliers for best practice histories and allow for direct contact to the BSR energy ecosystem.”*

Prof. Horst-Günter Rubahn,
Director of the Mads Clausen Institut
at the SDU Sønderborg

REH FORA & WORKSHOPS

PROFESSIONAL EXCHANGE & NETWORKING

Networking in fora and workshops

Media, Financial & Legal Services and Heat are the three active fora currently offered by the Renewable Energy Hamburg Cluster for professional exchange between members. The network also frequently hosts themed workshops in cooperation with other cluster members, e.g. on energy coupling.

Financial & Legal Services forum

The “Offshore Wind Interface Management” manual, which was published in the autumn of 2016, is one impressive and visible result of the work of the Financial & Legal Services forum. Around 50 authors, particularly from cluster companies and from members of Maritimes Cluster Norddeutschland e.V., highlight unexploited optimisation potential and interface problems in the offshore industry. The forum meets three times a year to discuss various issues from a theoretical and practical perspective.

Heat forum

The supply of renewable heat is one of the new pillars in the Renewable Energy Hamburg Cluster’s strategy. Many players in the Hamburg metropolitan region offer outstanding competencies in this field. This new forum, which is headed by **Sebastian Averdung** from Averdung Ingenieurgesellschaft mbH, **Jörg Lampe** from Hansewerk AG and **Inge Maltz-Detlefs** from Sokratherm GmbH, was created by the network in 2016. The focus is on a constructive exchange of views on technical and economic issues.

Media forum

The members of the Media forum, who are mainly PR representatives of the largest member companies of the Renewable Energy Hamburg Cluster, discuss the goals and content of the JDB media campaign in the run-up of the WindEnergy Hamburg trade exhibition by JDB and REH.

The Energy Research Network Hamburg and the “Forschungskontaktstelle” (“Research Contact Centre”)

The Energy Research Network Hamburg of the five major state Hamburg institutes of higher education cooperates closely with the Renewable Energy Hamburg Cluster, particularly through the use of the “Research Contact Centre”. The aim is to promote research activities in the field of (renewable) energy research in Hamburg, and to facilitate and provide ongoing support for cooperation/projects between representatives of the higher education institutes and industry. The person to contact is **Astrid Stichnoth**.

Expert groups

The Renewable Energy Hamburg Cluster has established expert groups focussing on issues from the fields of “Personnel & Qualification” and “Research & Development”, which can respond to current requirements.

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> The energy bunker in Wilhelmshurg is a model renewable energies project that combines several components

Today, Northern Germany is already far further in terms of its proportion of renewable energy power supply sources than the entire German Federal Republic will be in the year 2025. The many wind farms onshore and increasingly offshore, the bioenergy plants and solar power systems in north Germany can already fully cover the power consumption on many windy, sunny days. Even so, energy is still be transported to central and southern Germany.

Northern German Energy Transition 4.0

The “Northern German Energy Transition 4.0 – NEW 4.0” project, in which the Renewable Energy Hamburg Cluster is participating, along with over 50 other industrial partners, higher education institutions and multipliers, offers a huge opportunity for developing concepts, solutions and products for the next stage of the energy transition. How to create a trade platform in order to also use power produced regionally for local industrial companies?

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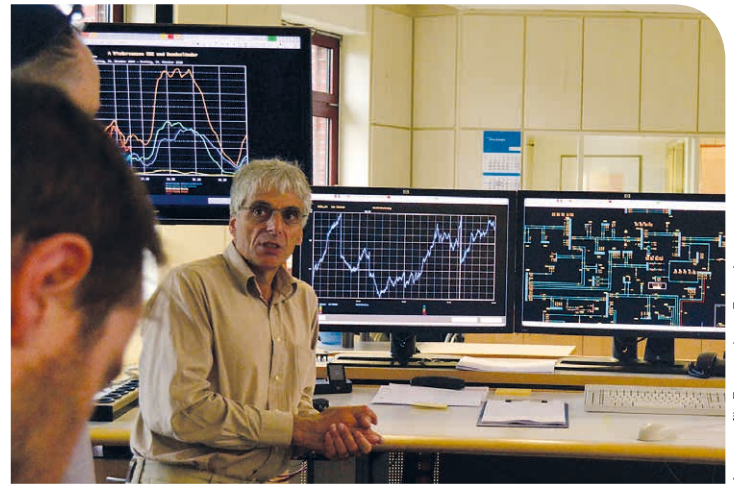
Agentur für Erneuerbare Energien

> Visit to the Uniper power-to-gas plant in Reitbrook as part of the NEW 4.0 press tour

What algorithms can I use to control energy storage facilities for power, heat or hydrogen gas in such a way that they are commercially profitable and at the same time make an optimum contribution to system stability? How can industry adjust their production methods in such a way that they are well suited to the availability of wind or solar power? These are the issues that NEW4.0 will tackle. Over the coming four years, studies will be conducted on a very practical level in Hamburg and Schleswig-Holstein as to how the local energy consumption can be sufficiently flexibilized to ensure that the load on the energy networks leading to Southern Germany is reduced.

For the Renewable Energy Hamburg Cluster, the task is to communicate the results of the NEW4.0 consortium in the specialist public field, both nationally and internationally. This is an exciting challenge, which we expect will also stimulate important ideas for our Cluster. Not least, we also hope to

trigger Christian effects in the region, so that the NEW4.0 becomes a catalyst for the next stage of the energy transition in the region. Our new claim, "Energy systems of the future" will here become visible in a very practical way.



Agentur für Erneuerbare Energien

> Central office of the Neumünster municipal utilities

Successfully shaping the future with innovations

Over the coming years, innovations will trigger emulation effects in the region, so that NEW4.0 play an important role for the energy transition. As the Renewable Energy Hamburg Cluster, we, together with the Energy Research Network Hamburg and the higher education institutions in the metropolitan region, aim to initiate a large number of new research and development projects. The energy transition is one of the biggest, long-term innovation projects in today's society. We regard support for the important interplay between companies and higher education institutions as being one of the core tasks of the Cluster. We are looking forward to it!