

PPPs for Energy Efficiency and Environment



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Helmholtz Association of German Research Centers

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PPPs are a driving force for innovation in general and for energy efficiency in particular

Since 2005, where an EESC Opinion on

- *The role of the EIB in public-private partnerships (PPPs) and their impact on growth*

has been issued, the EESC has dealt with PPPs mainly in a broader context than energy efficiency, e.g. in its OPINIONS on e.g.

- *Cooperation and transfer of knowledge between research organisations, industry and SMEs – an important prerequisite for innovation, February 2009*
- *Private and public investment , October 2010*
- *Green Paper on the modernisation of EU public procurement policy, July 2011*

There exist several OPINIONS of the EESC on energy and energy efficiency, which address PPPs as an important instrument to be supported and used, including also SMEs.

These Opinions do not include/address/discuss single PPPs specific to energy efficiency .

In order to include such kind of specific PPPs in my presentation, I gathered some information on PPPs in Germany or with significant participation of German partners.

However, I am not informed about any support by the EIB.

PPPs for Energy Efficiency and Environment
cover the whole range of energy “production”,
conversion, transport, use and saving.

The public side is represented by Research Organizations
and their institutes like

- Helmholtz
- Fraunhofer
- Max-Planck
- Leibnitz

and by Universities (often supported by the Deutsche
Forschungsgemeinschaft and other governmental programmes)

The private side encompasses a broad spectrum of large
scale, medium scale and small scale companies

The public investments in Germany are guided by the “Energy Concept for an Environmentally Sound, Reliable and Affordable Energy Supply” of the German Federal Government.

Examples

- Efficient fossil fuel power stations
- Fuel Cells
- Solar energy – photovoltaics and thermal
- Power Grids
- Automobile engines
- Batteries
- Low-energy buildings
- Other energy storage systems
- Exascale computer technology

Some Specific Examples

- KW 21 (power stations for the 21. century), also supported by the Bavarian Research Alliance (see next page)
- Energy Efficient Buildings Association (E2BA) cooperating with Fraunhofer Building Innovation Alliance and Universities
- RWE Algae Project cooperating with Research Center Jülich
- Thin-Film- and Nanotechnology for Photovoltaics HZB (Helmholtz-Berlin) cooperates with industry
- Two cooperations by Research Center Jülich on Exascale computer technology (see later)
- EU Project Real-SOFC addresses ageing of Solid Oxide Fuel Cells (SOFC) in cooperation between European fuel cell industry and research institutions.
- The Institute for Combustion Engines of RWTH Aachen cooperates with KSPG-AG Automotive (Rheinmetall), FEV and other industry in the development of efficient car engines.

KW 21 - Partners from Science

- Forschungsstelle für Energiewirtschaft e.V.
 - FfE
- Friedrich-Alexander-Universität Erlangen-Nürnberg
 - Lehrstuhl für Technische Thermodynamik
- Karlsruher Institut für Technologie
 - Institut für Thermische Strömungsmaschinen
- KIT Karlsruher Institut für Technologie
 - Engler-Bunte-Institut, Bereich Verbrennungstechnik
- Technische Universität München
 - Lehrstuhl für Energiesysteme
 - Lehrstuhl für Energiewirtschaft und Anwendungstechnik
 - Lehrstuhl für Flugantriebe
 - Lehrstuhl für Fluidmechanik
 - Lehrstuhl für Thermodynamik
- Universität Bayreuth
 - Lehrstuhl Keramische Werkstoffe
 - Lehrstuhl Metallische Werkstoffe
- Universität Erlangen-Nürnberg
 - Lehrstuhl Werkstoffkunde und Technologie der Metalle WTM
- Universität Stuttgart
 - Institut für Feuerungs- und Kraftwerkstechnik
 - Institut für Luftfahrtantriebe
 - Institut für Materialprüfung, Werkstoffkunde und Festigkeitslehre
 - Institut für Thermische Strömungsmaschinen und Maschinenlaboratorium
 - Institut für Thermodynamik der Luft- und Raumfahrt ITLR
 - Materialprüfungsanstalt

KW 21 – Partners from Industry

- ALSTOM Power Systems GmbH, Mannheim
- ALSTOM Power Systems, Stuttgart
- Clariant Produkte (Deutschland) GmbH
- E.ON Energie AG
- E.ON Kraftwerke, München
- EnBW Kraftwerke AG, Karlsruhe
- EnBW Kraftwerke AG, Stuttgart
- ESYTEC Energie- und Systemtechnik GmbH
- Fa. Martin GmbH für Umwelt- und Energietechnik
- MAN Turbo AG
- MTU Aero Engines
- Siemens AG, Energy Sector
- Siemens Energy AG
- Siemens Power Generation
- UTP Schweißtechnik Bad Krozingen
- Voith Hydro Holding GmbH & Co. KG



Last example:

A possibly less well-known problem

High Performance Computers

High Performance Computing



JUGENE - Juelicher BlueGene/P (IBM)

10^{15} flop/s

Electrical energy consumption 2,2 MW

Exascale – the next generation of high performance computers (HPCs)

- Improving the performance of HPCs by another factor 1000 – from 10^{15} to 10^{18} flop/s) would need an electricity supply of the order of 1 GW per Computer when using present technology.
- Reducing this to a reasonable level needs extraordinary innovations and progress
- Research Center Jülich hosts two cooperation projects towards this goal:
 - Joint "Exascale Innovation Center" (EIC) together with IBM
 - Joint Exa-Cluster Laboratory (ECL) together with Intel and ParTec

Newest Development:

Europe invests in designing a new energy-efficient Exascale Machine

- The Mont-Blanc project brings together a purely European consortium gathering industrial technology providers and supercomputing research centres
- **Bull**, as the major HPC system vendor, **ARM**, as the world leader in embedded high-performance processors, and **Gnodal**, as interconnect partner that focuses its new product on scalability and power efficiency.
- Mont-Blanc unites the supercomputing centres from the four Tier-0 hosting partners in PRACE who have leading roles in system software and Exascale application development: **Germany, France, Italy, and Spain.**



Thank you for the attention