

Callux, fuel cell for domestic households – practical test

Callux – leading the way to the market

ene.field general assembly | 10.09.2015

Erik Schumacher

From laboratory to practical test to market

2002

Prototype development (laboratory)

2008

Field test with prototype

2012

Demonstration project with pre-production appliances

2016

Market launch with mass-produced appliances

Market preparation

The situation at the start of the Callux project 2008

Technology

- Not fully developed
- Too expensive

Technicians

- Not trained
- No experience with CHP

Infrastructure

- No energy management of micro-CHP
- No **standard** interface for remote operation

Customers

- Not ready for micro power plant in the home
- Integration into home utility system not tested

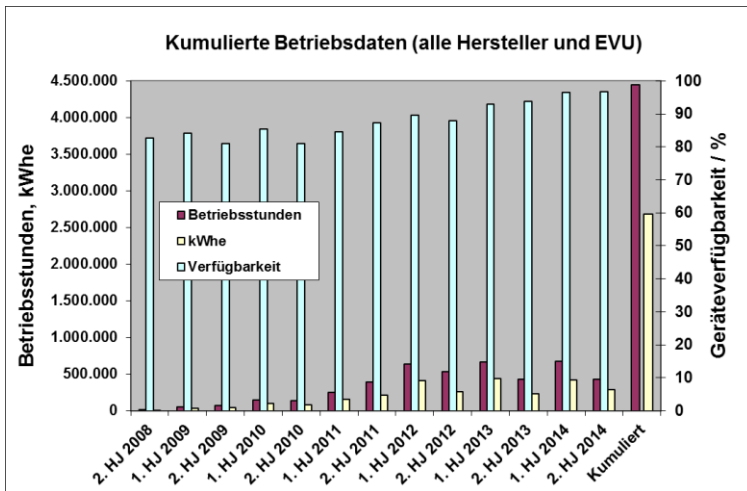
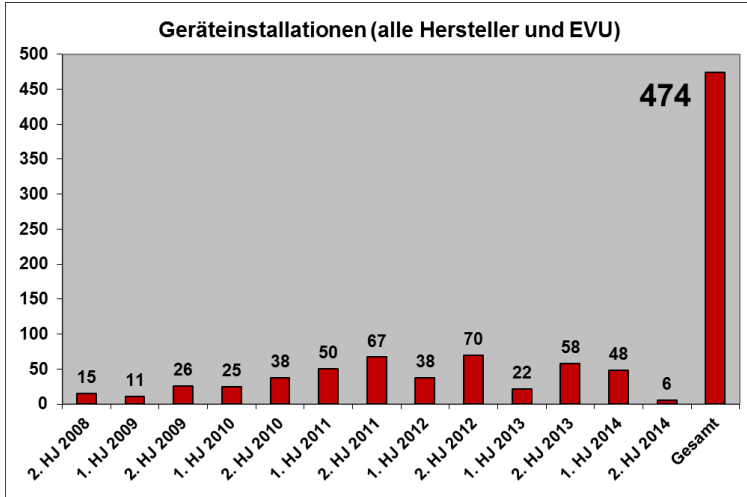
The practicals of a practical test

- Contracts with partners
- Search for suitable properties
- Contracts with customers
- Site inspection and planning
- Installation of appliances
- Maintenance and repair
- Evaluation of operational data
- Replacing appliances with next generation
- Coordination etc., etc., etc.



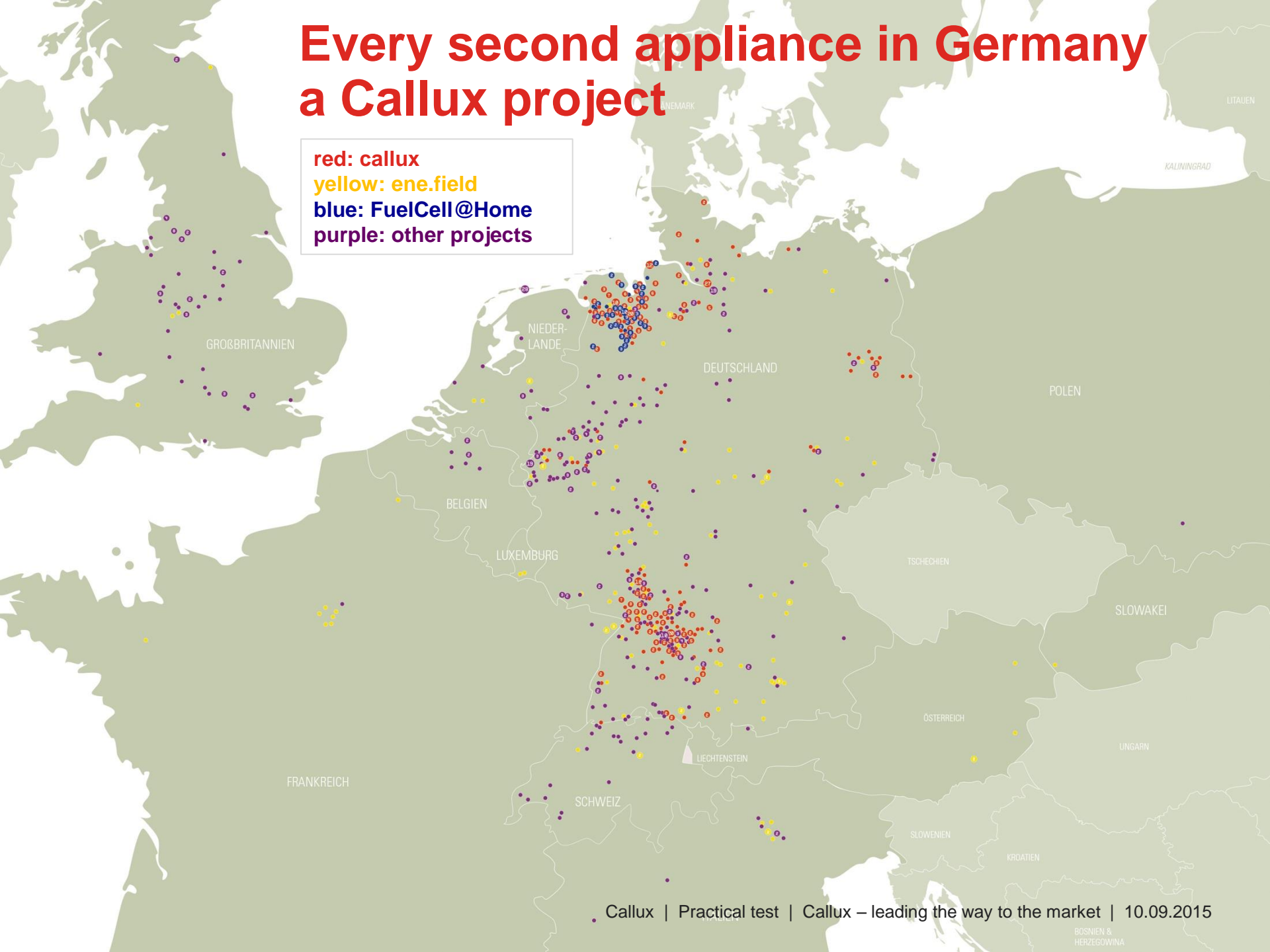
The fleet (01.07.2008-31.12.2014)

- Almost 500 systems
- Around 4.5 million operating hours
- Availability > 97 per cent
- 2.5 million kWh fed in
- Stack running times over 20,000 h



Every second appliance in Germany a Callux project

red: callux
yellow: ene.field
blue: FuelCell@Home
purple: other projects



Callux work packages for market preparation





Convincing market partners of the technology

Most sales in the heating appliance market happen through technicians. Callux has:

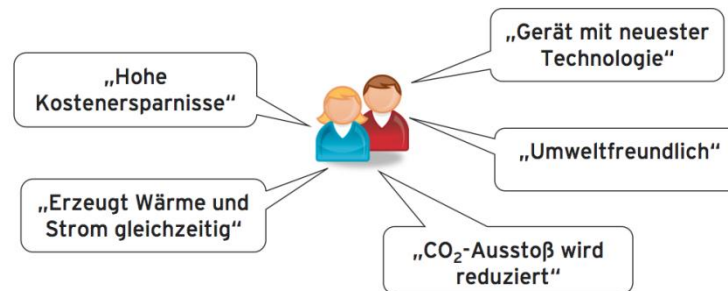
- Incorporated fuel cells into vocational training
- Trained technicians in the practical test
- Developed training material such as the online information programme
- Published articles in trade magazines

What makes customers tick, what makes the market tick?

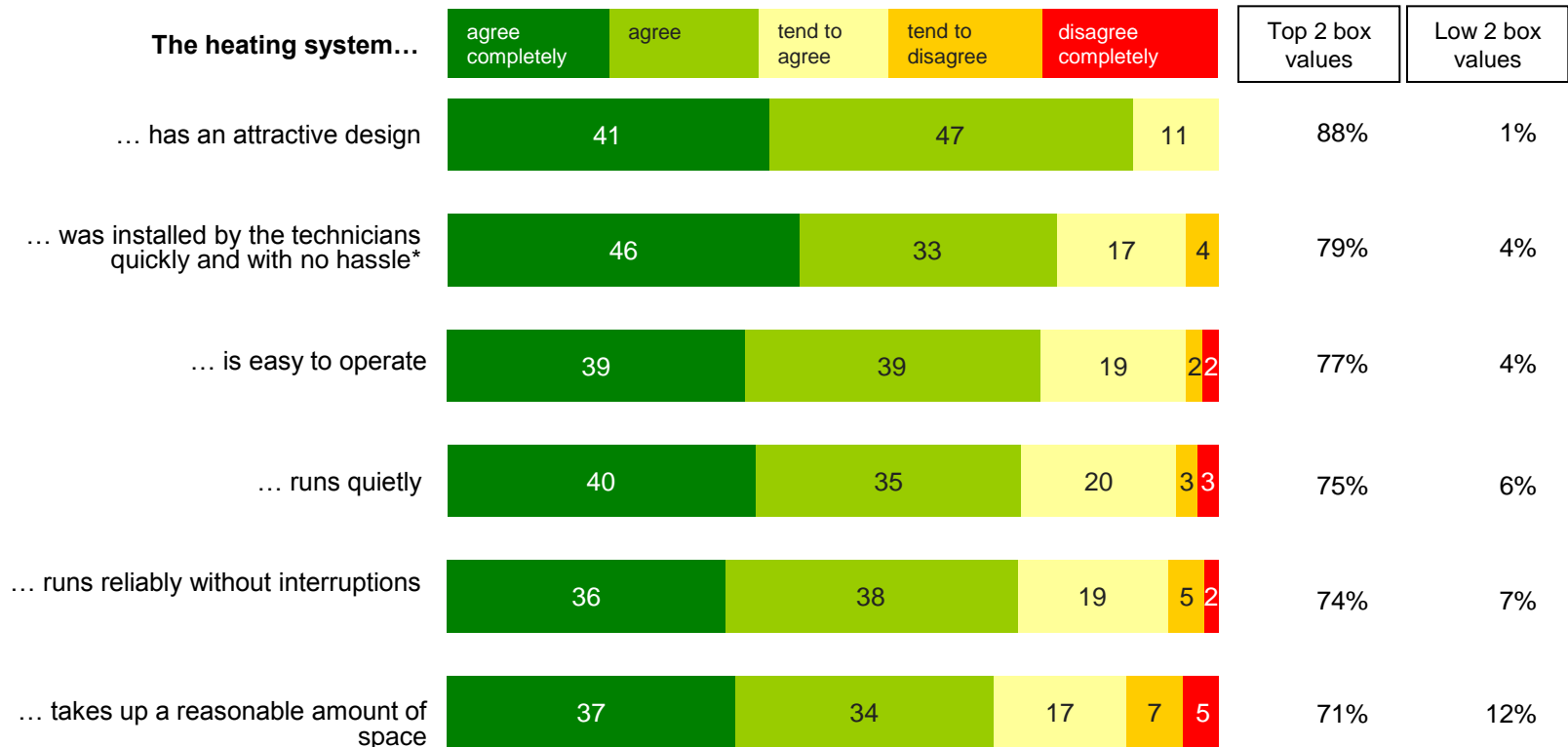


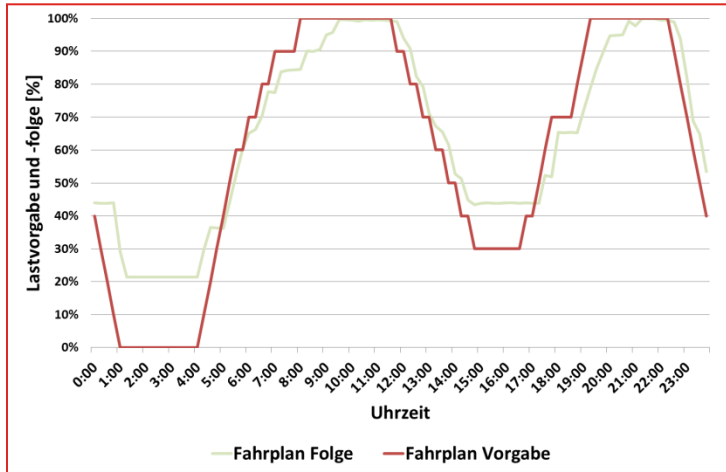
GfK has assisted customers and discovered, for example, that:

- 83 per cent of those tested are very satisfied with their appliance
- 86 per cent would recommend this technology
- 89 per cent are satisfied with their contract model



What do customers think about the heating systems?





Infrastructure for intelligent energy supply

Fuel cell heating appliances are partners for the energy turnaround. Callux has:

- Developed a communication interface for electricity-generating heating appliances: the Callux Box
- Data monitoring has been implemented with the Callux Box
- Timetables for operating virtual power plants have been tested with the Callux Box

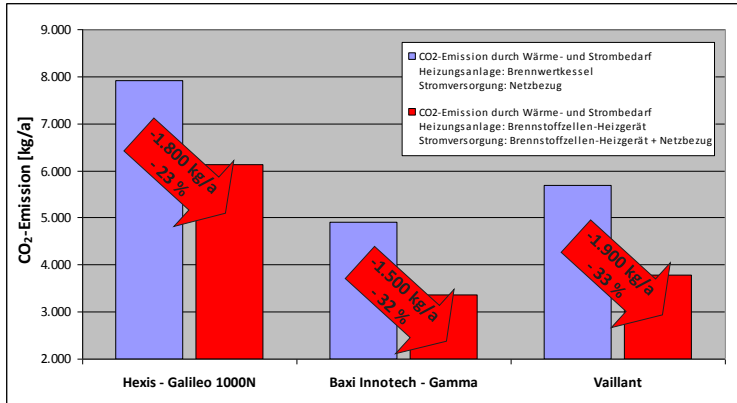




Transparent communication with regard to the market

Callux has provided information about the practical test, for example:

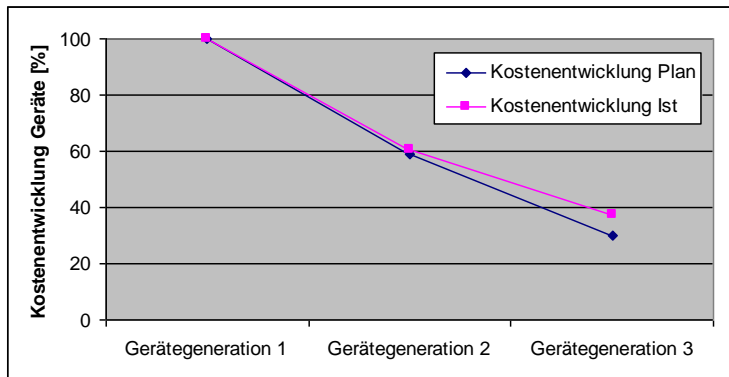
- All of the projects can be viewed online via a project map
- Presentations, press reports and newsletters provide information about the current project status
- Demand in the heating market has not been adversely affected (danger of reluctance to purchase because new technology is anticipated)



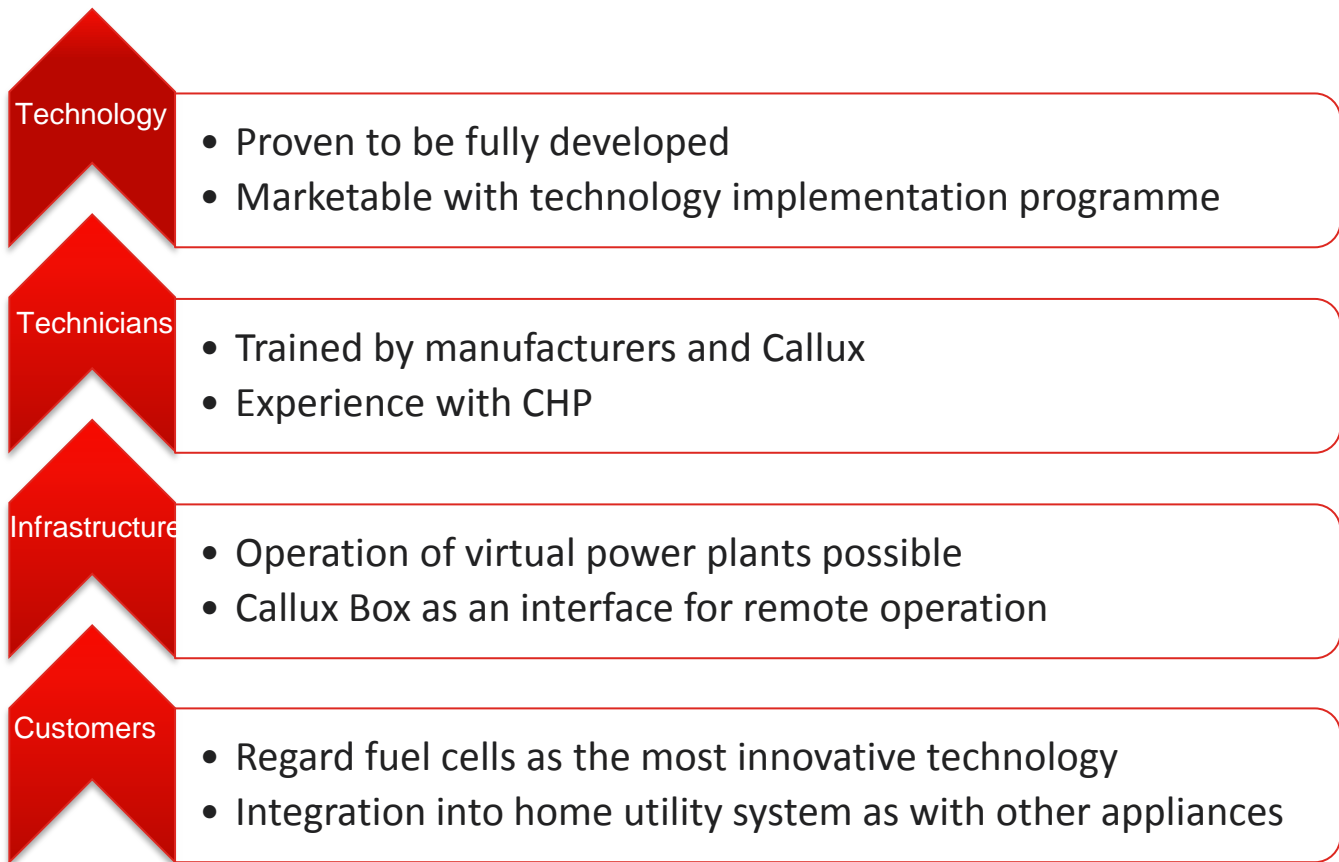
Shorter learning curves through Callux

The scientific involvement ensured that:

- Sufficient measurement results were made available promptly
- Appliance alterations could be implemented promptly
- Cost optimisations were addressed specifically
- Shorter intercompany learning curves materialised



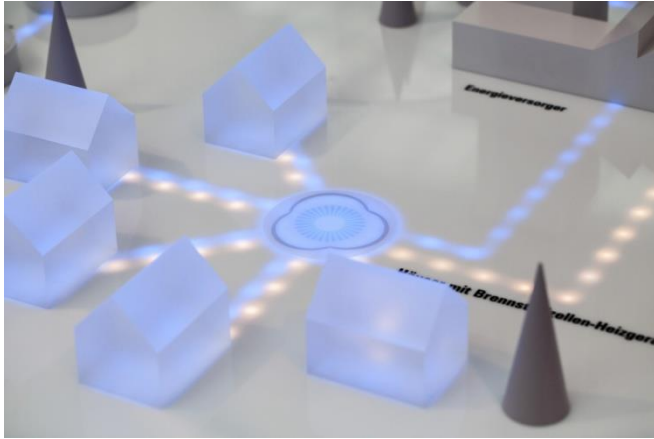
The situation at the end of the Callux project 2015/2016



Leading projects to success

Callux's success factors include:

- Professional project management by ZSW
- Strict and transparent organisation of the practical test and accompanying measures
- **Close cooperation** between heating appliance industry, energy industry and policy-makers
- Participants working together as partners



The future has begun

Following a successful practical test, the prerequisites for market entry are in place. The following steps are now necessary:

- Technology implementation programme
- Market launch communication by the manufacturers and IBZ
- Involvement in terms of technical regulations and norming