
Open Gateway Energy Management Alliance (OGEMA)

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Fraunhofer Institute for Wind Energy and Energy System Technology

Bremerhaven and Kassel

Advancing Wind Energy and Energy System Technology

Research spectrum:

- Wind energy from material development to grid optimization
- Energy system technology for all renewables

Foundation: 2009 Annual budget: approx. 30 million euros

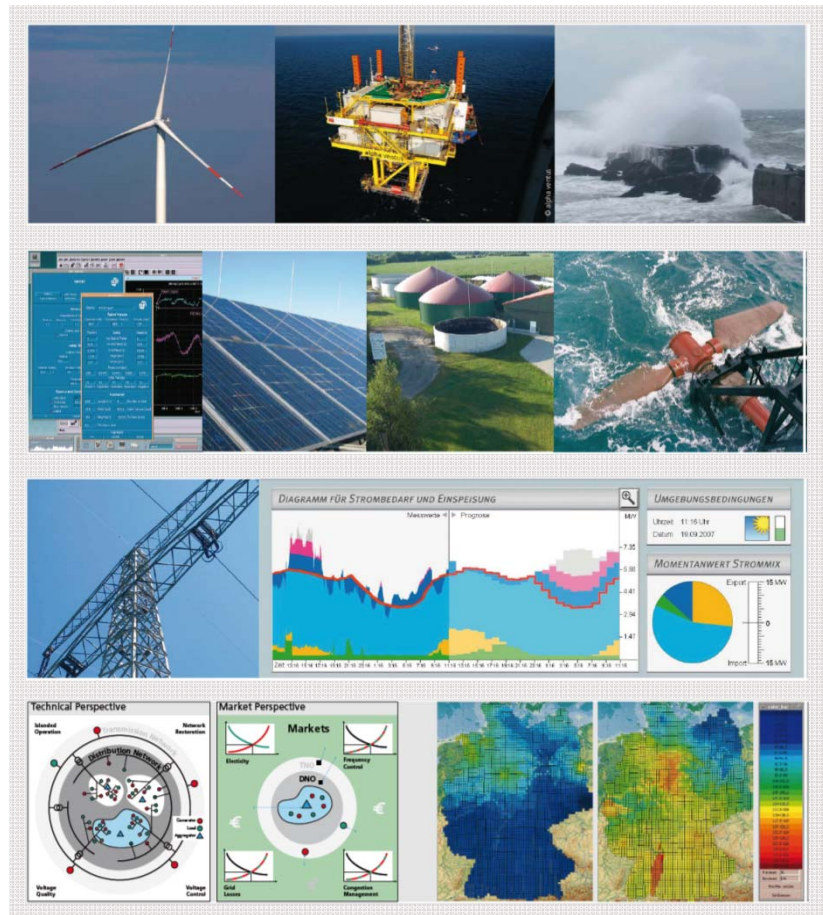
Personal: approx. 500

Directors: Prof. Dr. Andreas Reuter, Prof. Dr. Clemens Hoffmann

Formerly:

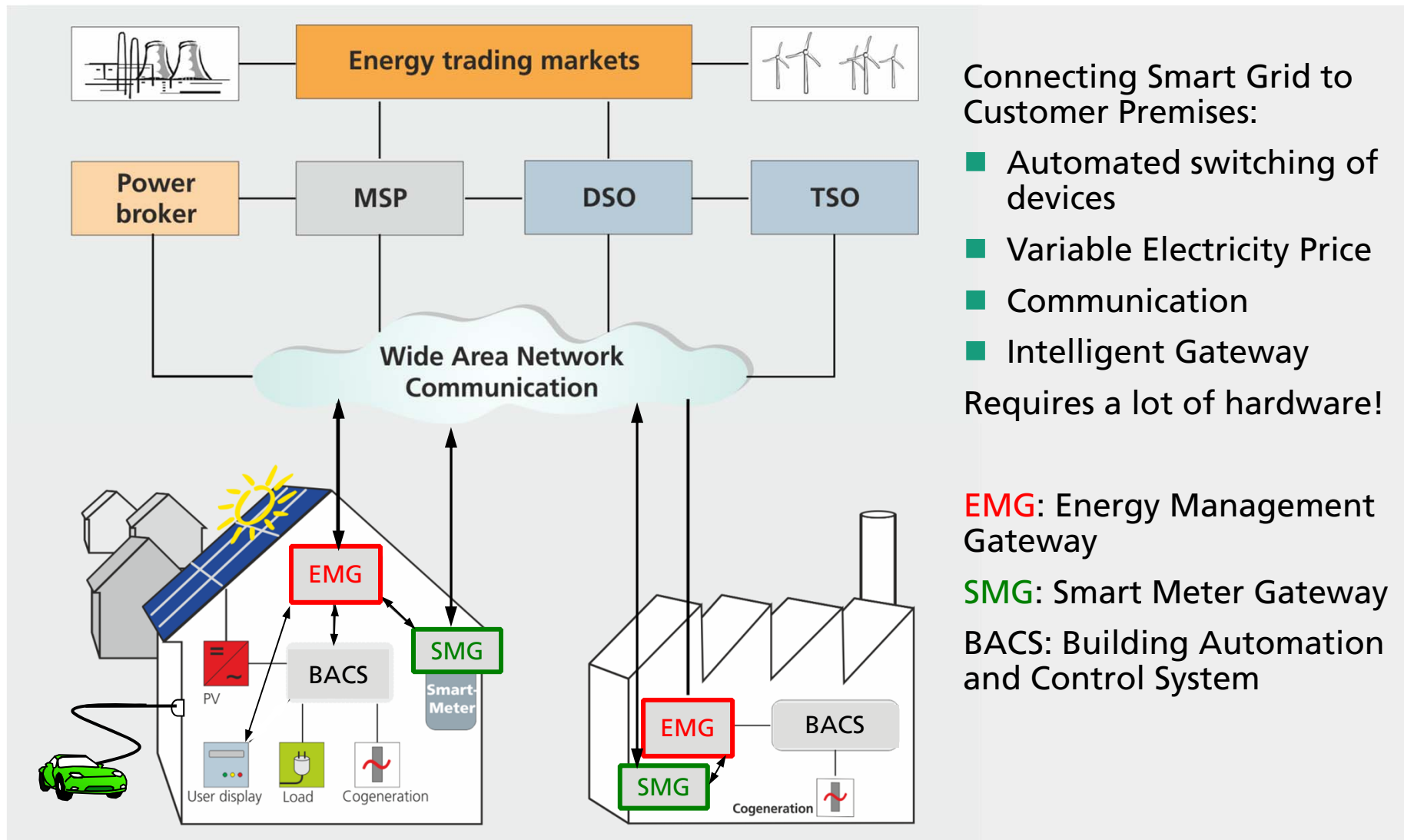
- Fraunhofer-Center für Windenergie und Meerestechnik CWMT in Bremerhaven
- Institut für Solare Energieversorgungstechnik ISET in Kassel

Fraunhofer Institute for Wind Energy and Energy System Technology Business fields Kassel

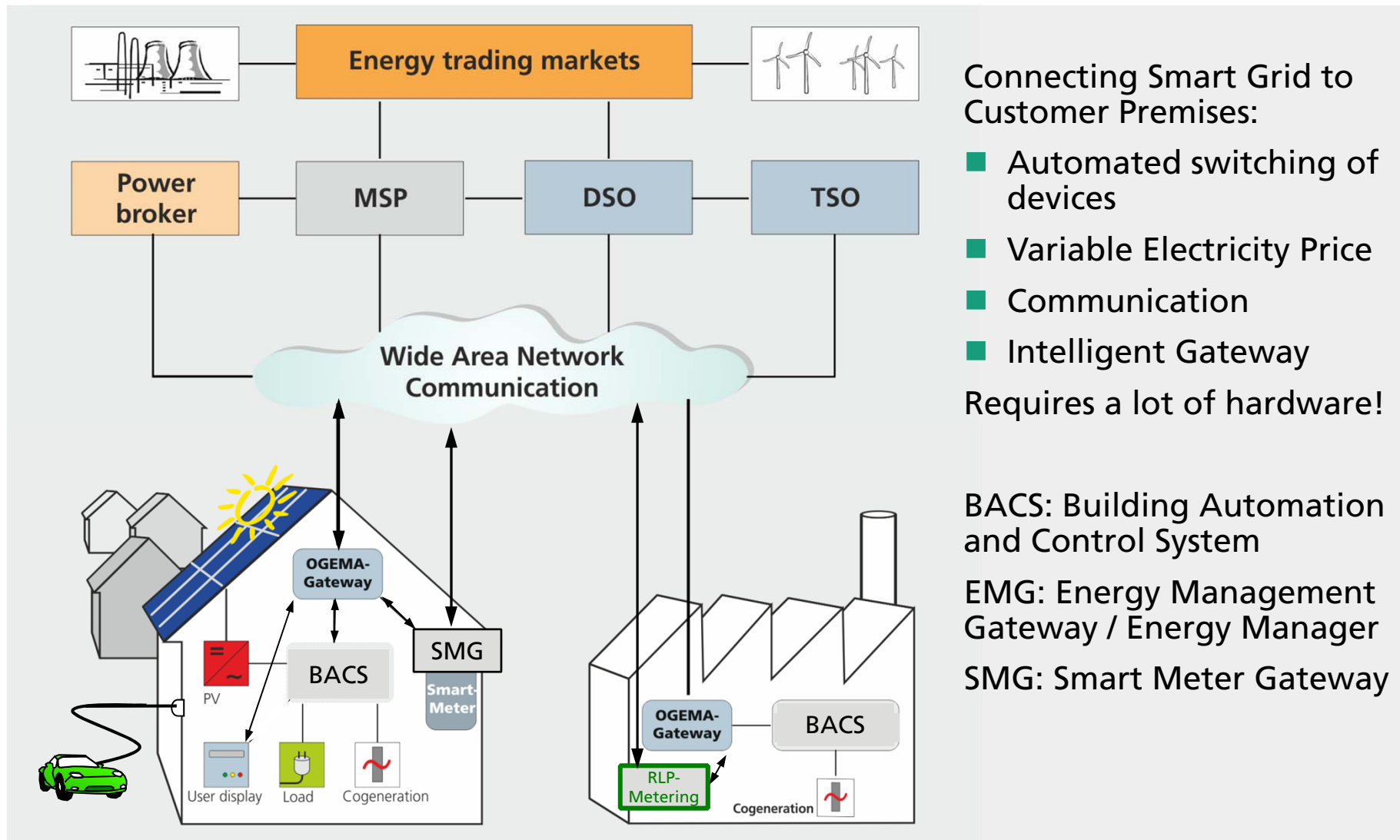


- Environmental analysis for wind and ocean energy
- Control and integration of decentralized converters
- Energy management and grid operation
- Energy supply structures and systems analysis

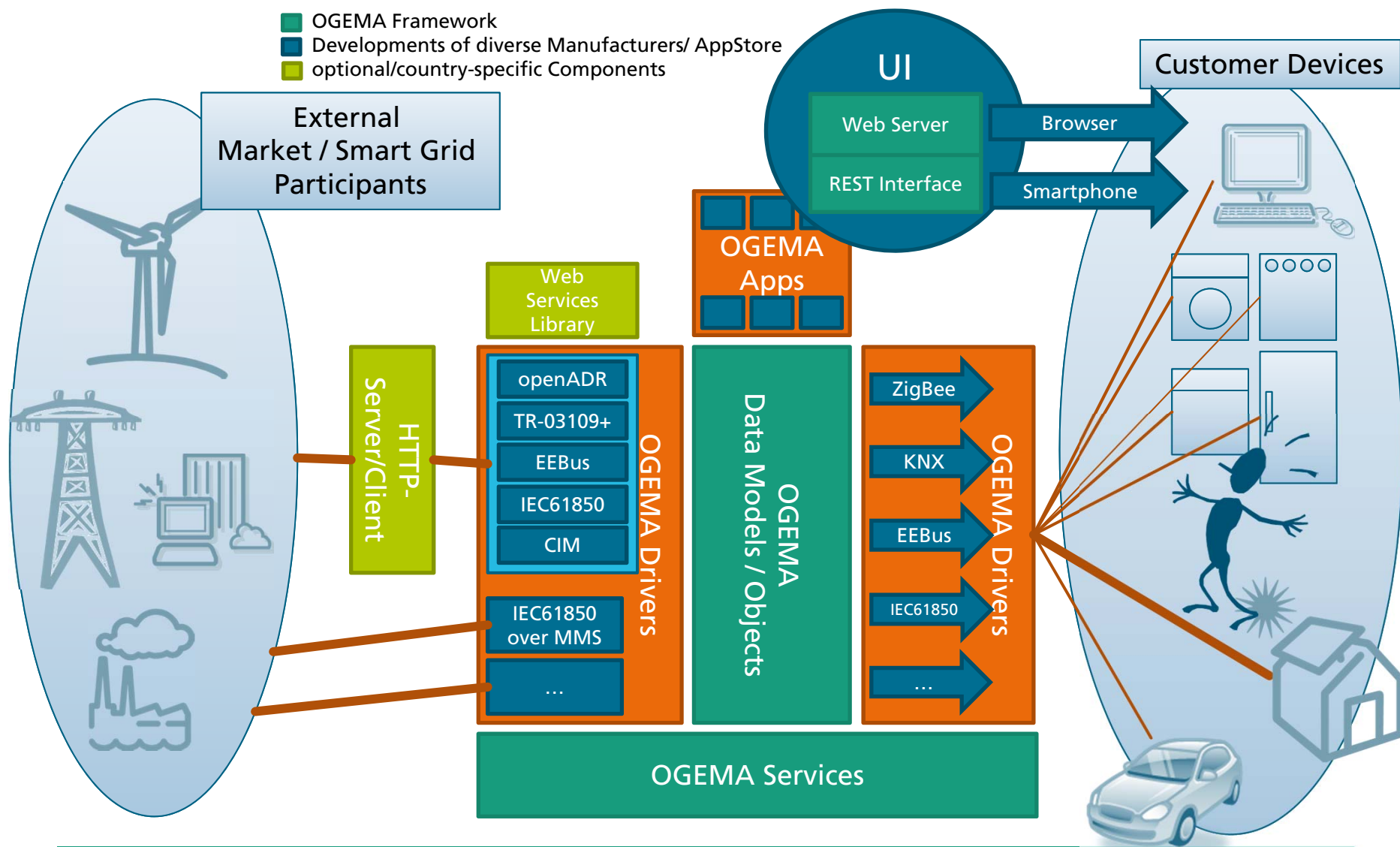
OGEMA in the Smart Grid



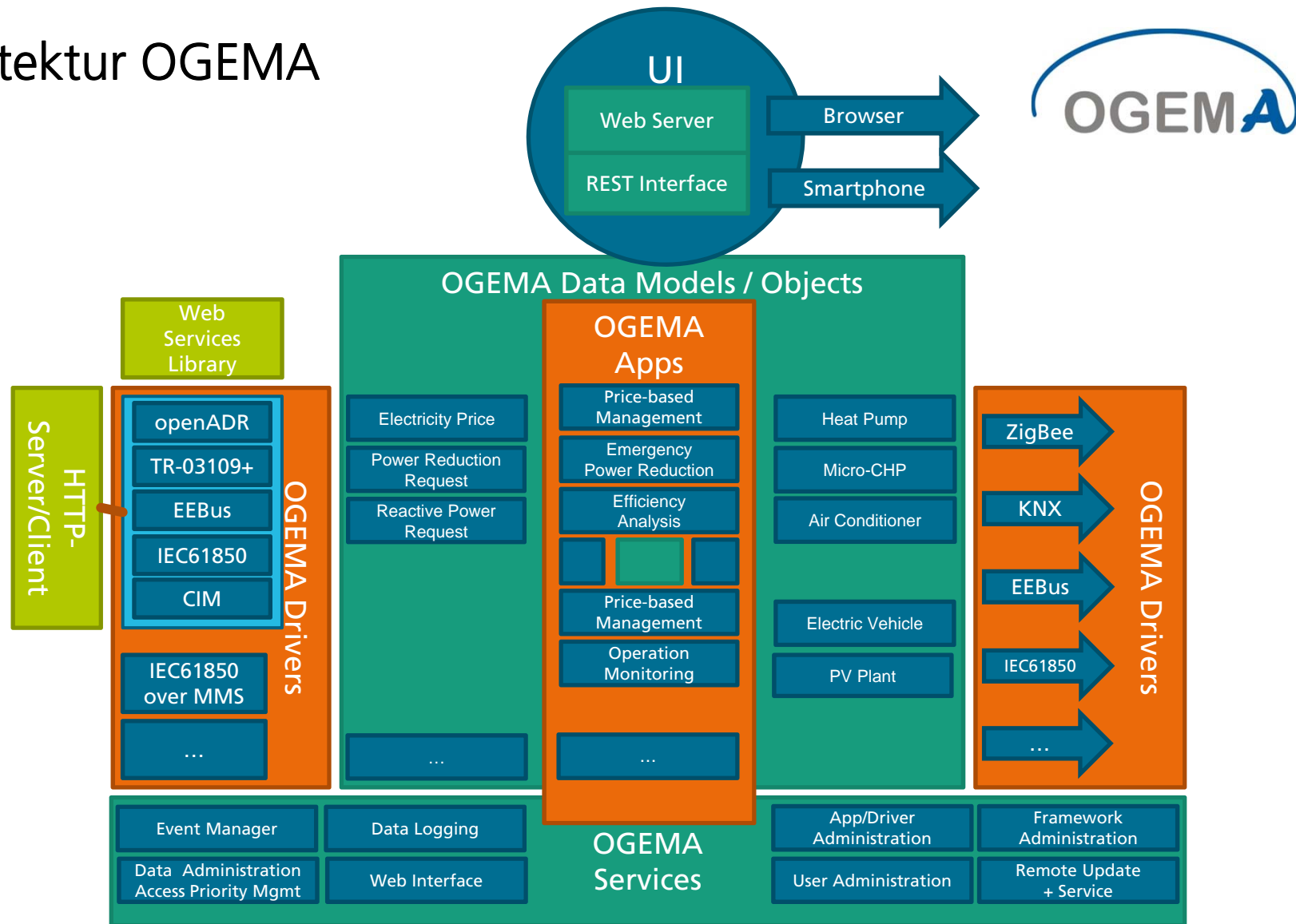
OGEMA in the Smart Grid



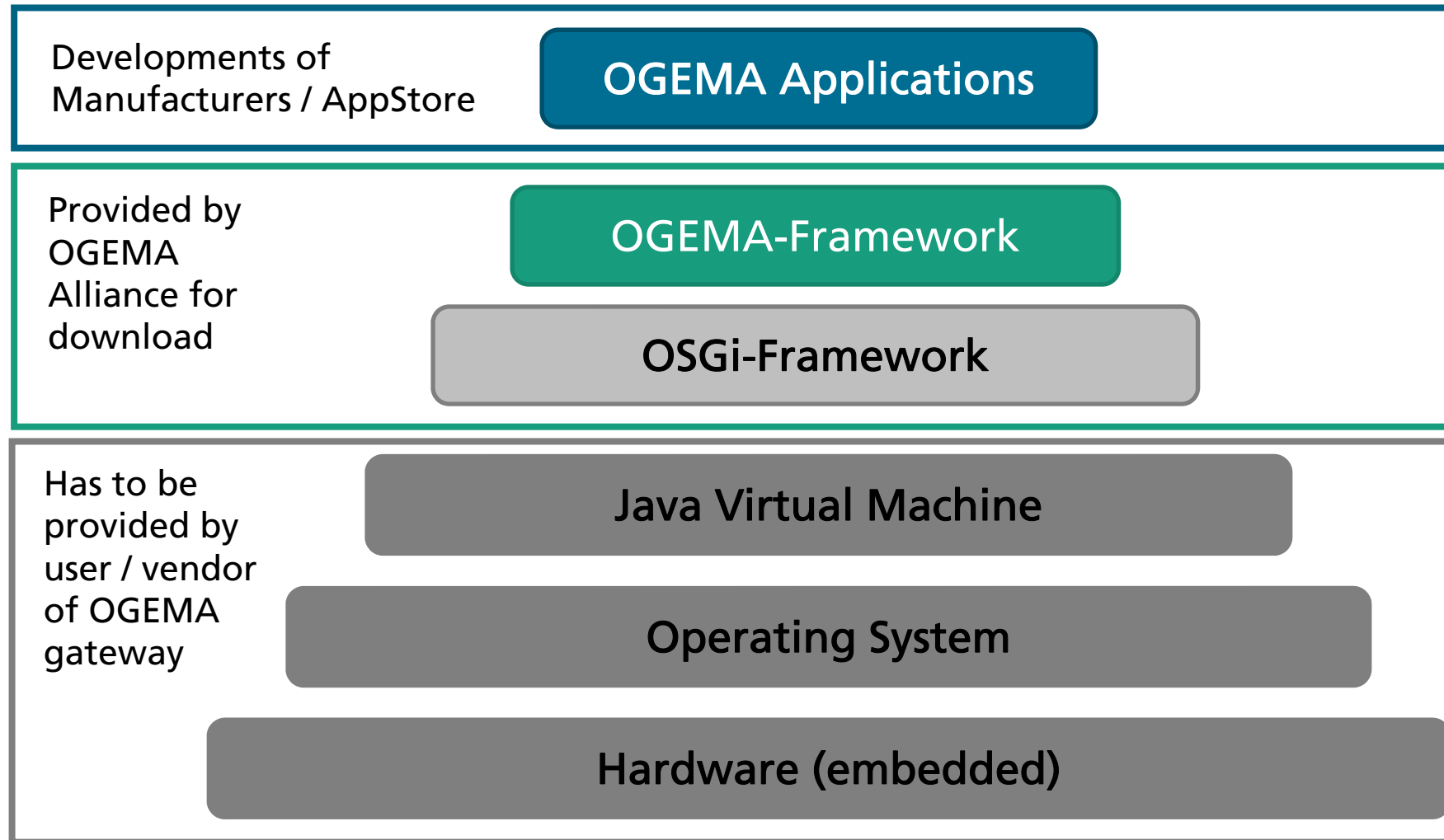
Architektur OGEMA im Smart Grid



Architektur OGEMA



Open Gateway Architecture

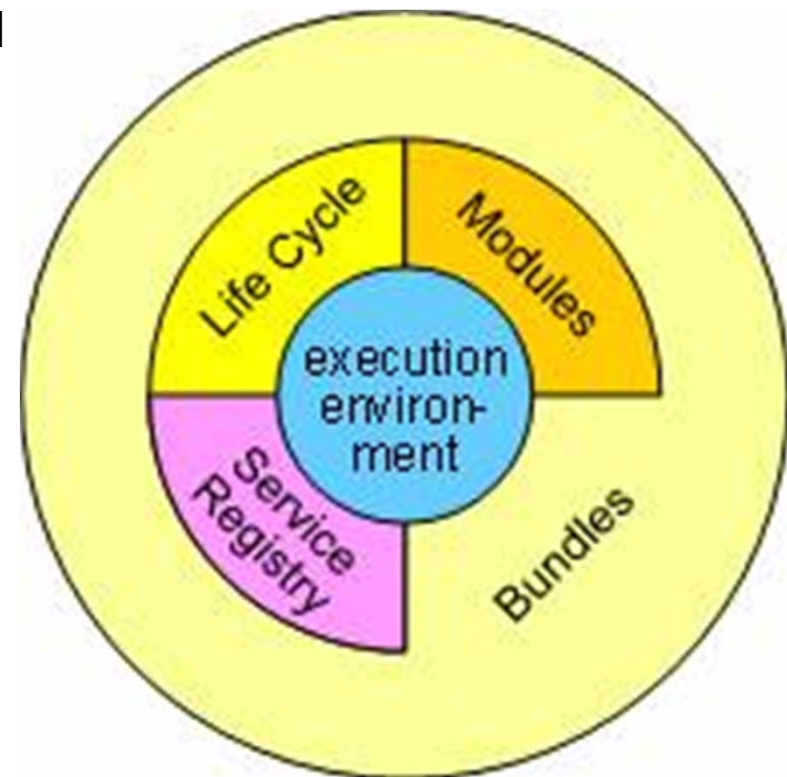


Java / OSGi



- Execution environment independent of operating system
- Various implementations of Java-virtual machine as well as OSGi frameworks
- Java: well established
- OSGi provides Multi-Application environment
- OSGi started as "Open Service Gateway Initiative" for Home Automation

OSGi concept:



Source: OSGi Alliance

Technology Summary: OGEMA Key Facts

- OGEMA defines gateway core specification
- Environment for parallel execution of different applications with access to smart grid data and devices (e.g. controllable loads)
- Standardized data models and services for different home automation systems
- Support of different in-house and smart grid communication systems
- OGEMA defines a public open standard
- Public (open source) reference implementation for quick start



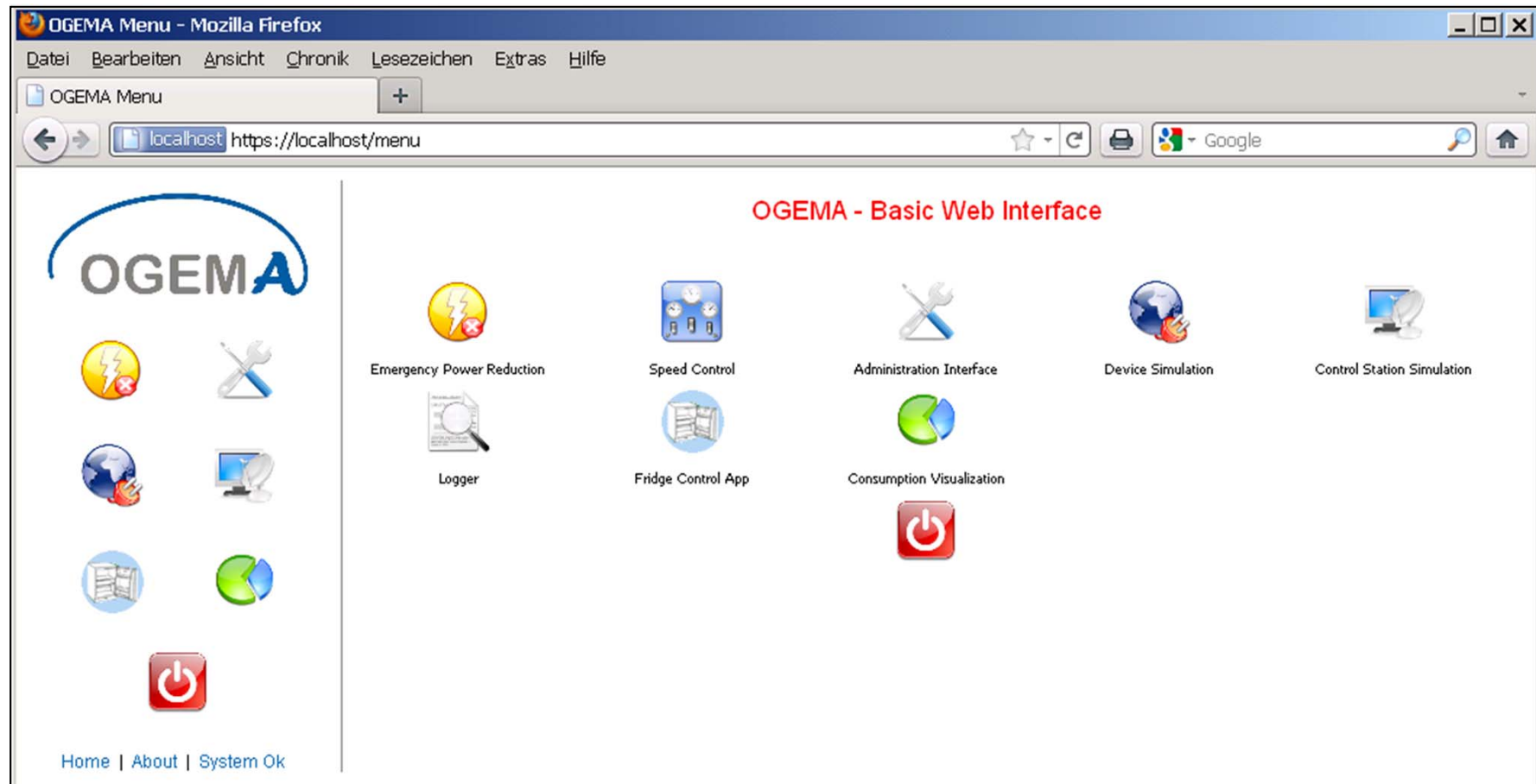
Representation of devices and common services by public data models



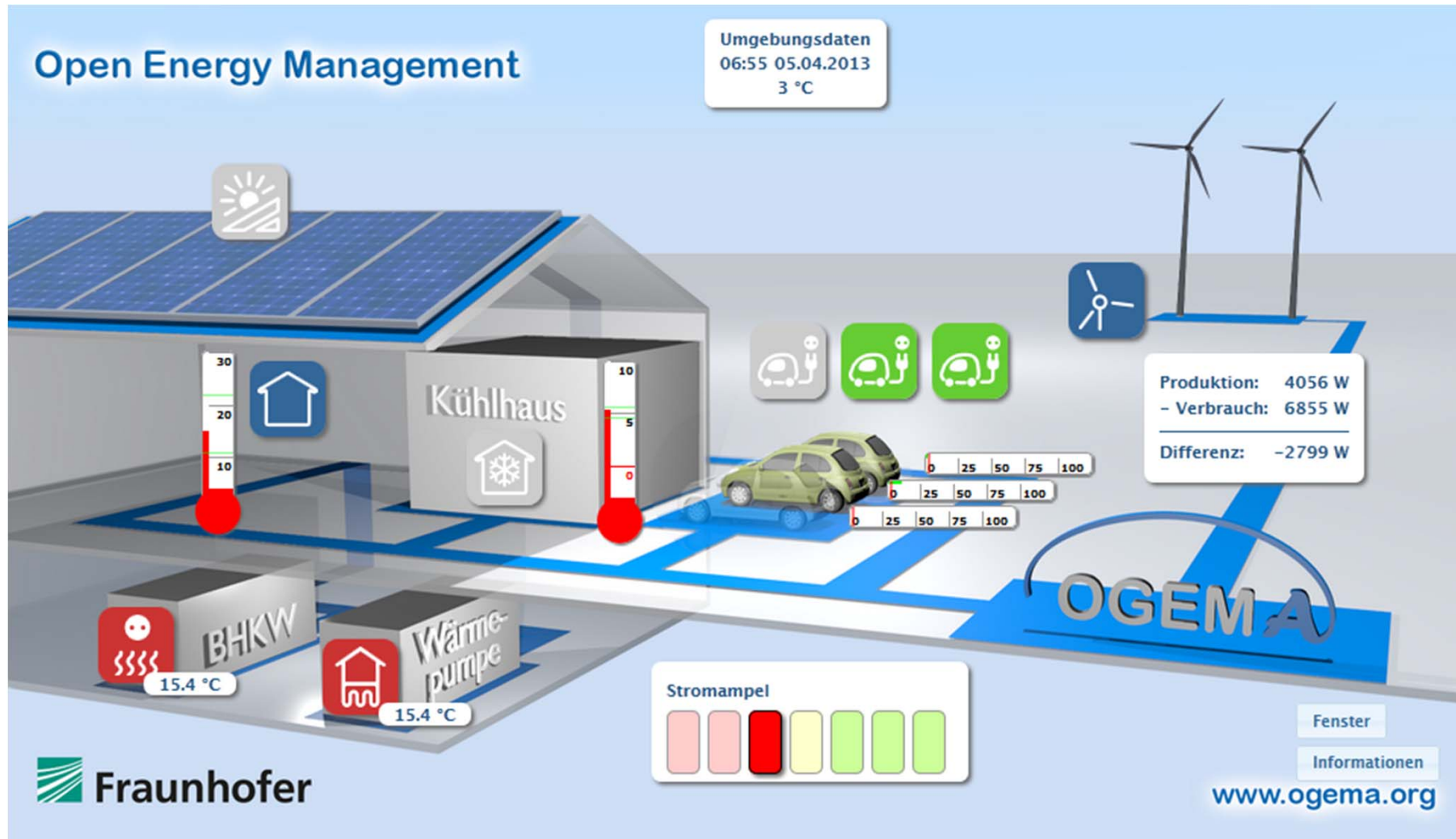
- New devices and new application parameters can be added by new data models
- Simple usage (fixed physical units, standard modeling language: Java)
- Extensive documentation of each value
- Optional elements as separate data models added as Decorators

```
22  /** Electricity Price for generation from CHP (including biomass fired
23      * if no other price is specified)<br>
24      * Note: If price schedules for CHP and biomass are available, but no
25      * schedule for biomass fired CHP, usage of the correct schedule shall
26      * be up to an agreement between the operator of the plant and the
27      * buyer of the electricity. In case no agreement is available the
28      * operator shall have the right to choose whether the generation
29      * system shall use pricing for CHP or for Biomass.*/
30  public static class PriceElectricityCHP {
31      /** name of price schedule for consumption in persistent data
32          * storage
33          * unit: currency/kWh*/
34      @Resource public SchedResRef schedule;
35  }
36
37  /** Electricity Price for generation from biomass*/
38  public static class PriceElectricityBiomass {
```

Applications bring their own web page(s)



OGEMA GUI (Commercial Energy Management)



Application of OGEMA in Field tests

- E-Energy Project “Model City Mannheim”
 - E-Energy Project “Model Region Harz”
 - EU-Project Smart House – Smart Grid
 - Hessian Project “Farmer Education Center Gut Eichhof”
 - German Project “PINTA”
 - E.ON Mitte AG “REV2020”
 - further Projects under preparation
- ➔ About 1000 Energy management interfaces have been field tested
- ➔ Different Devices: Refrigerators, Freezers, Dryers, CHP, PV Systems, Heat Pumps, Agricultural Mills, ...
- ➔ Variable Tariff, Ancillary Services, Peak Shaving, Energy Efficiency, ...



MODELLSTADT MANNHEIM



SmartHouse/SmartGrid

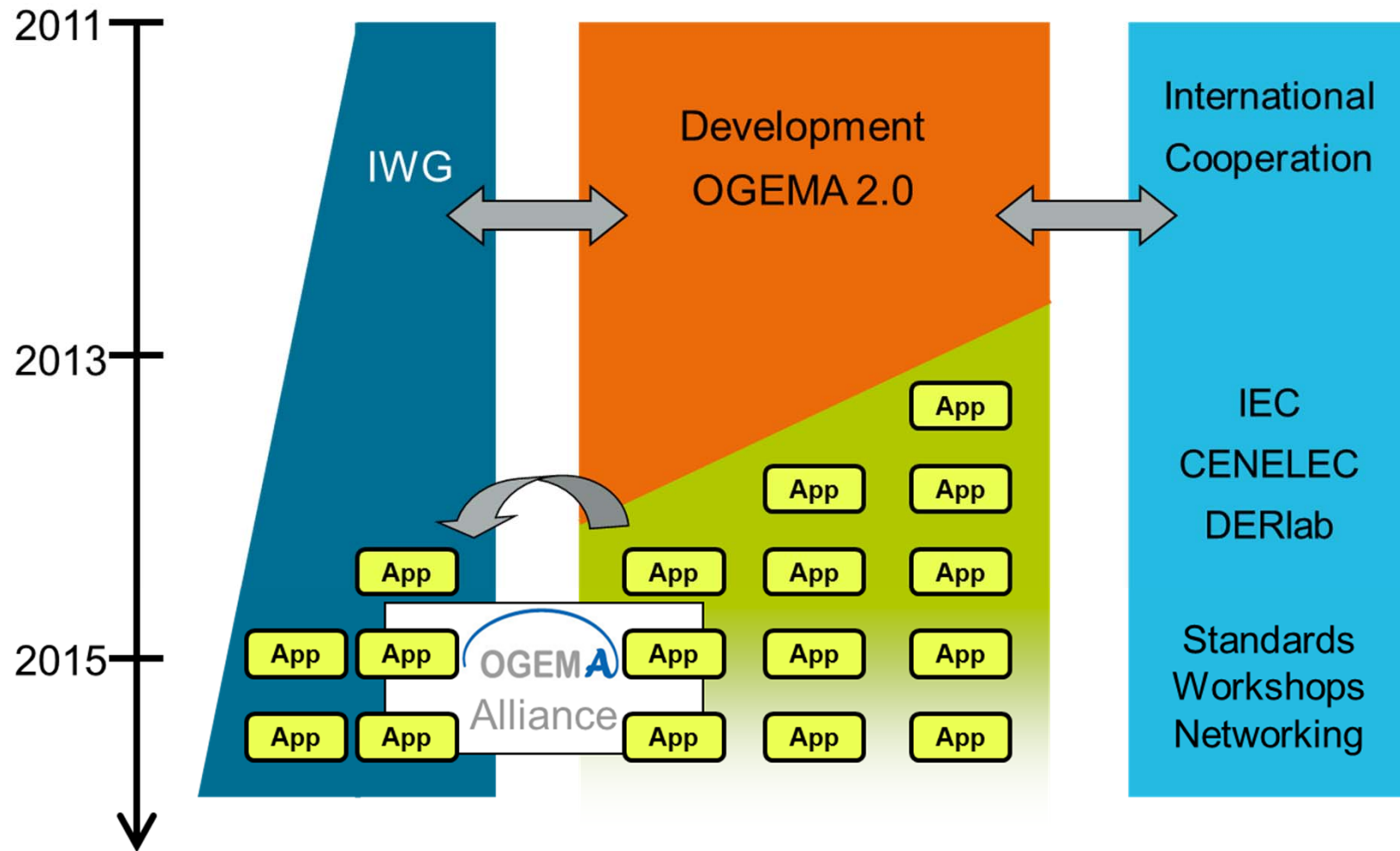


OGEMA products and services



- Framework Specification (Public)
- Reference Implementation of management agent (Open Source)
- Reference Applications (Open Source)
- Reference communication driver (Open Source)
- OGEMA Quick-Start-Guide and Training
- Applications (offered by suppliers)
- Communication Systems (offered by suppliers)
- Certification (planned)
- OGEMA Contact Point
- OGEMA Website

OGEMA Alliance Development



OGEMA Contact Point at Fraunhofer IWES:

<http://www.ogema.org>

Dr. David Nestle

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