Specification

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1 Introduction

The traditional power grid is changing more and more over time. Due to increasing sensititization for the use of renewable and reliable sources of energy instead of nuclear power sources, there is an increasing accomodation of renewable energy. To fullfill our daily energy need only with such energy sources is quite difficult and needs lot of planning and simulation. In this work we build a smart energy system to simulate a smart grid.

A smart grid is an energy efficient system with information and communication technology, automation and awareness of energy consumtion. There are many different actors and technologies which are connected to each other and interoperate to optimate the grid.

A smart energy systems creates the bridge between a power grid and a resilient and reliable smart grid. Users can simulate reliable energy sources, as well as different kinds of energy consumers, e.g. homes or offices. Simulation of distributed energy sources and automation of processes build an energy management system. Through this microgrids we can possibly rely completly on renewable energy sources in the future. This can be checked with our smart energy system.

2 Difference between kW and kWh

W is a messuring scale for energy applied per timeinstance. There are different possibilities to describe W in common terms. A pretty graphic one is the movement of mass. $1W$ equals $1kg$ of mass moved by 1 meter in one second: $1\frac{kg*m^2}{s^3}$. Or in electrical terms: $1W$ equals 1 Ampere of electrical power with a voltage of 1 Volt. Both of those formulas are equal to a much simpler Term for Watt: $1W = 1J/s$. In simple terms, 1 Watt is the same as one Joule of energy applied over 1 second. For completeness, $1kW = 1000W$.

Wh are the common term for messuring energyconsumption/-production. $1Wh$ is $1W$ applied continuously over 1 hour. $1Wh = 1W * 1h = 1J/s * 3600s = 3600J$. For a scientific context the Wh therefore is simply not used, instead the common SI standard J is used.

In comparison, Wh is the total amount of energy used. W is how much energy is used in a specified timeslot (mostly 1 second).

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A2

A3

Userstories instead of requirements.

A4

System architecture Diagram

A5

add weather component

A6

reliable and responsive system

A7

three-tier system architecture