



CISTER

Research Center in
Real-Time & Embedded
Computing Systems

Technical Report

Virtual Market of Energy: A SOA-based Approach

Christos Chrysoulas

Luis Lino Ferreira

Michele Albano

Per Petersen

Petr Stluka

Arne Skou

CISTER-TR-140103

Version:

Date: 1/29/2014

Virtual Market of Energy: A SOA-based Approach

Christos Chrysoulas, Luis Lino Ferreira, Michele Albano, Per Petersen, Petr Stluka, Arne Skou

CISTER Research Unit

Polytechnic Institute of Porto (ISEP-IPP)

Rua Dr. António Bernardino de Almeida, 431

4200-072 Porto

Portugal

Tel.: +351.22.8340509, Fax: +351.22.8340509

E-mail: check@isep.ipp.pt, llf@isep.ipp.pt, mialb@isep.ipp.pt, , ,

<http://www.cister.isep.ipp.pt>

Abstract

Virtual Market of Energy: A SOA-based Approach

Christos Chrysoulas, Luis Lino Ferreira, Michele Albano, Per Petersen, Petr Stluka, Arne Skou
{chech, llf, mialb}@isep.ipp.pt, pdp@neogrid.dk, Petr.Stluka@Honeywell.com, ask@cs.aau.dk



Motivation

- Liberalization of the Energy Market
- Gradual implementation of the Smart Grid concept
- Creating an open system using Service-Oriented Architectures (SOAs), thus enhancing interoperability and management
- Providing an architecture for the communication between the Prosumers and the Market of Energy
- Resource and service representation, allocation and management for dynamic, heterogeneous and distributively owned resource and service environments

Flex-offer Concept

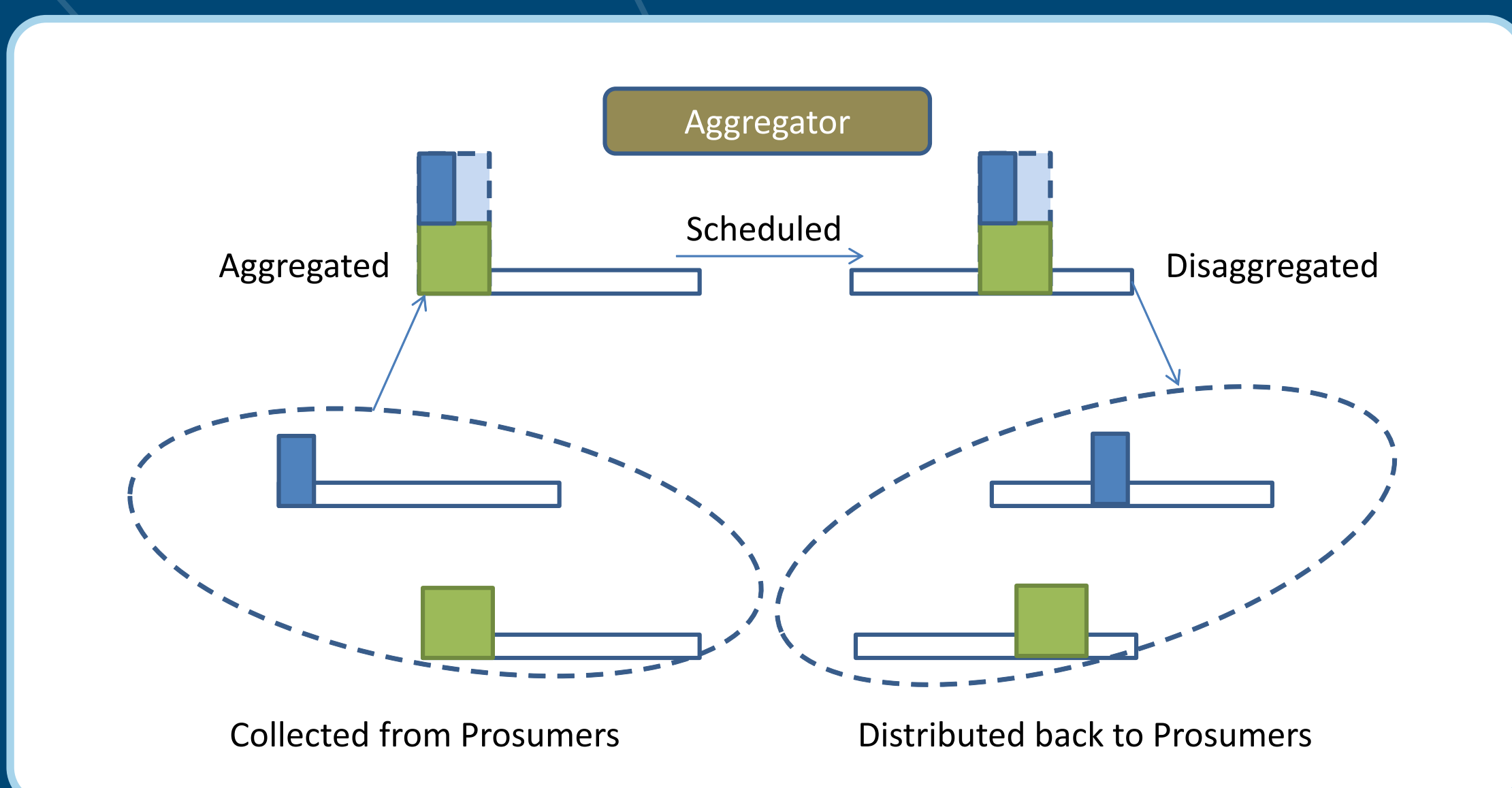
A flex-offer is a request for demand or supply of energy with specified time flexibilities, e.g.:

- Flex-offer is generated by the Prosumer, which defines the period of time when he is available to consume energy and its power requirements
- The Aggregator processes all flex-offer and sends an aggregated version of them to the market
- The Aggregator receives a reply from the market and schedules the Prosumer consumption start and end times
- The Prosumer performs its energy consumption according to the schedule given by the Aggregator

A Use-Case Scenario

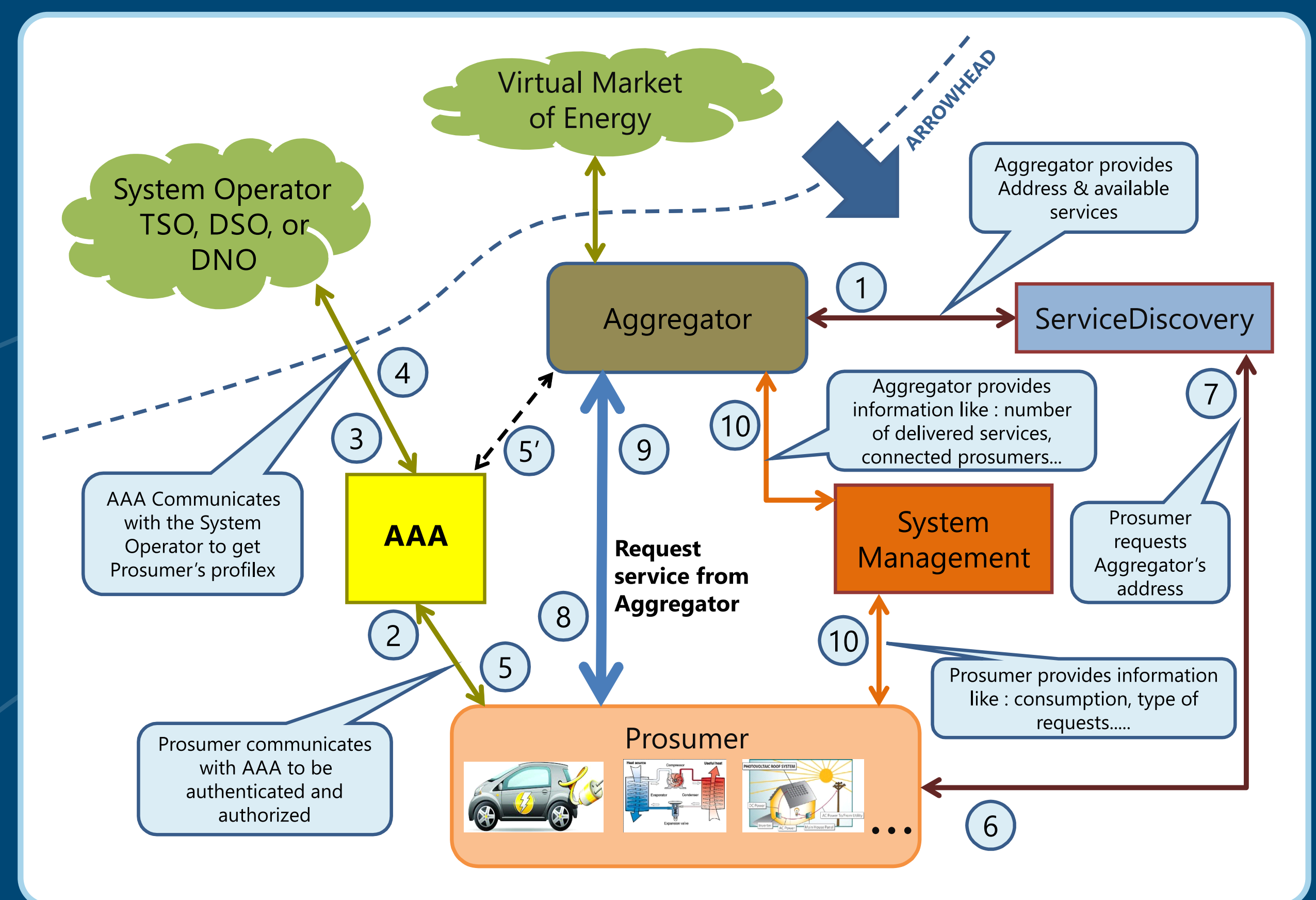
The Aggregator:

- aggregates the two micro flex-offers into a macro flex-offer
- in day-ahead will typically make a spot price optimization of the flex-offers so the cheapest energy for the coming day can be bought
- disaggregates into two operation schedules executed on charging the EVs

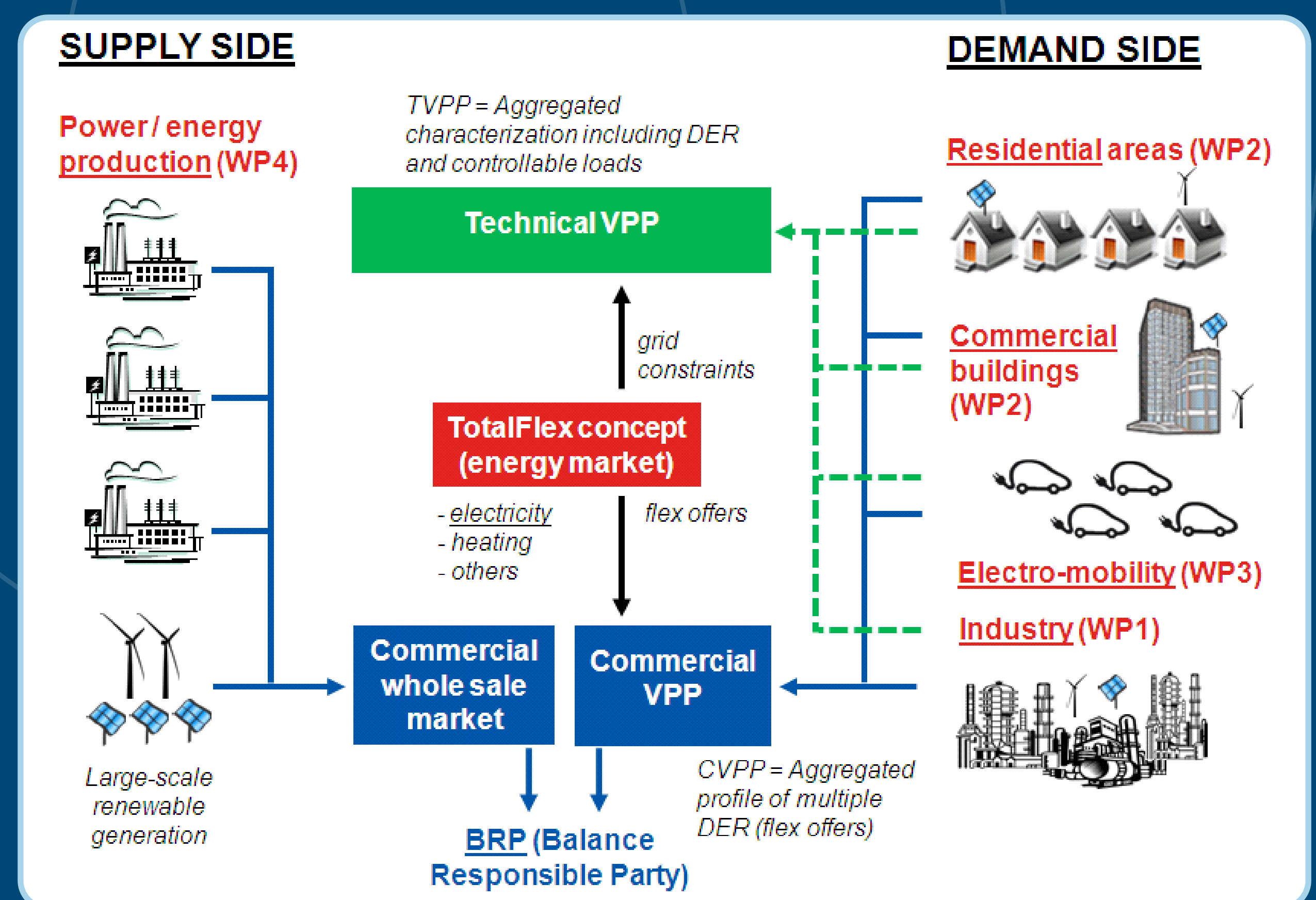


Power requirements from two EVs (the green and the blue) and their time flexibility (in white).

Proposed System Architecture



Flex-offer Usage



ARTEMIS Call 2012 Project
332937

