



Business intelligence solutions for Smart Grid data management

Emmanouil Valsomatzis (supervisors: Katja Hose, Torben Bach Pedersen)

Department of Computer Science, Aalborg University, Denmark

{evalsoma, khose, tbp}@cs.aau.dk



What is my research about?

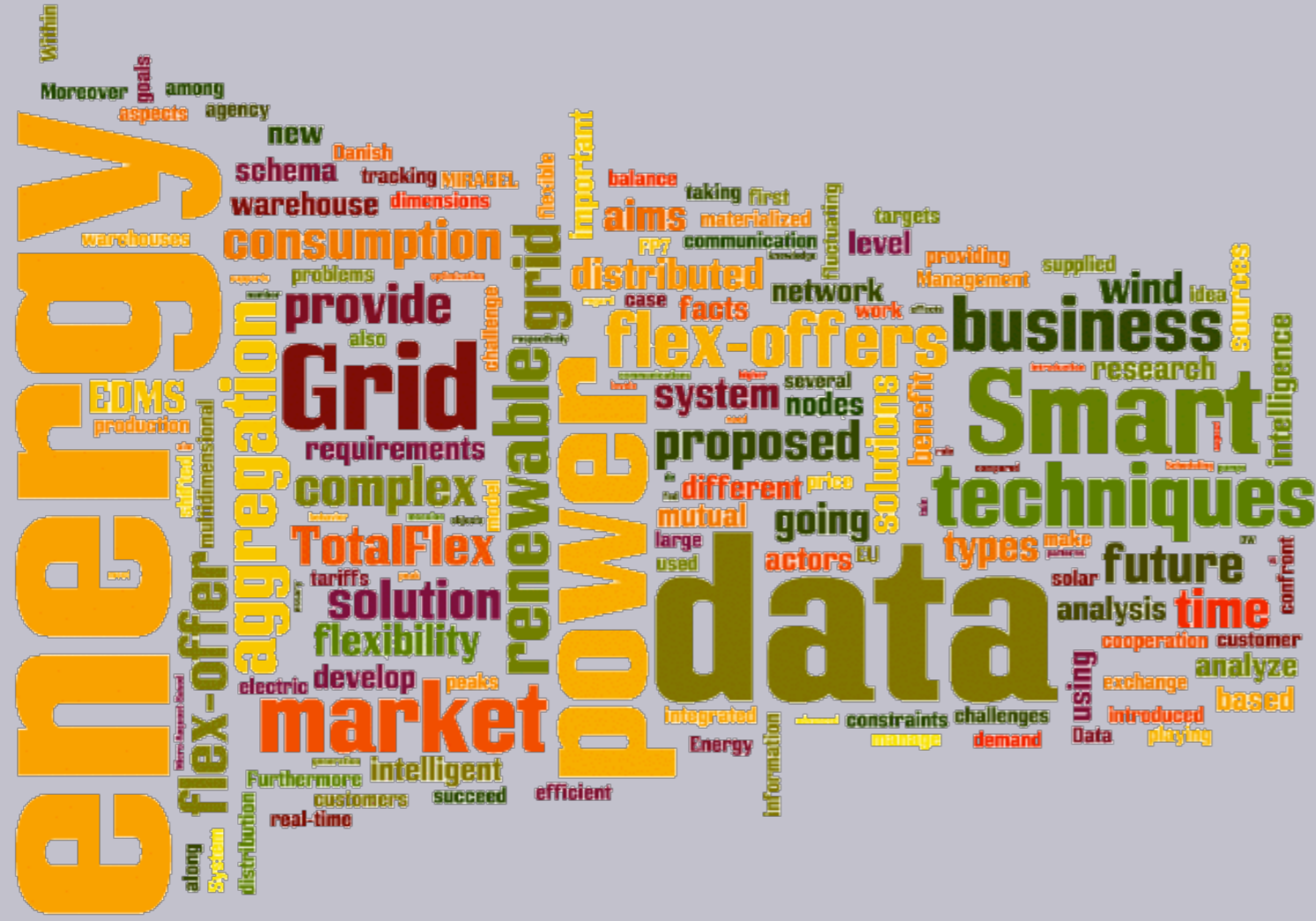


Fig. 1: My Ph.D. project

Objectives

- ▶ A multidimensional data warehouse to handle and store energy data
- ▶ ETL process methods for real-data multidimensional analysis and techniques to confront the communication overhead of a distributed multidimensional data warehouse.
- ▶ Efficiently aggregate large amounts of data along specific dimensions
- ▶ Advanced multi-perspective analysis for the several actors of the Smart Grid

Aggregation

Why aggregation?

- ▶ Trade on the market “macro” flex-offers
- ▶ Preserve as much of the energy flexibility as possible while reducing flex-offers amount

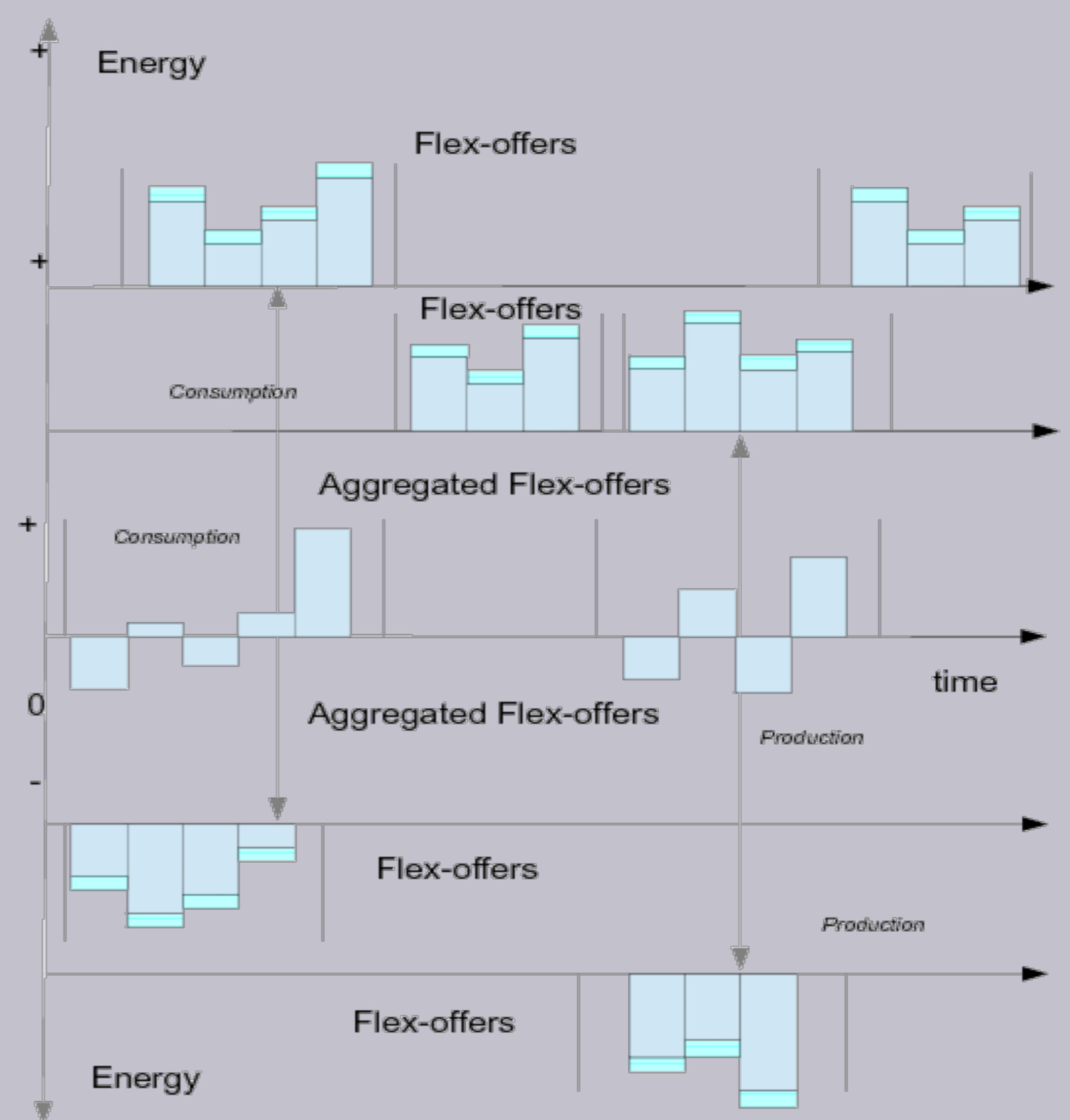


Fig. 3: Aggregating mixed flex-offers

Background Information

- ▶ Smart Grid ^a of the future will be a power system with a strong power grid characterized by flexible generation and a high level of renewable energy
- ▶ Danish national power goals: 50% of electricity consumption being supplied by wind power (2020)
- ▶ The TotalFlex project aims to provide an alternative, cheaper and environmental solution using the flex-offer concept

^aDansk Energi & Energinet.dk: Smart Grid i Danmark, 2011

Flex-offer Use Case

- ▶ An electric car that adapts its charging patterns to balance out fluctuating wind power (upper case)

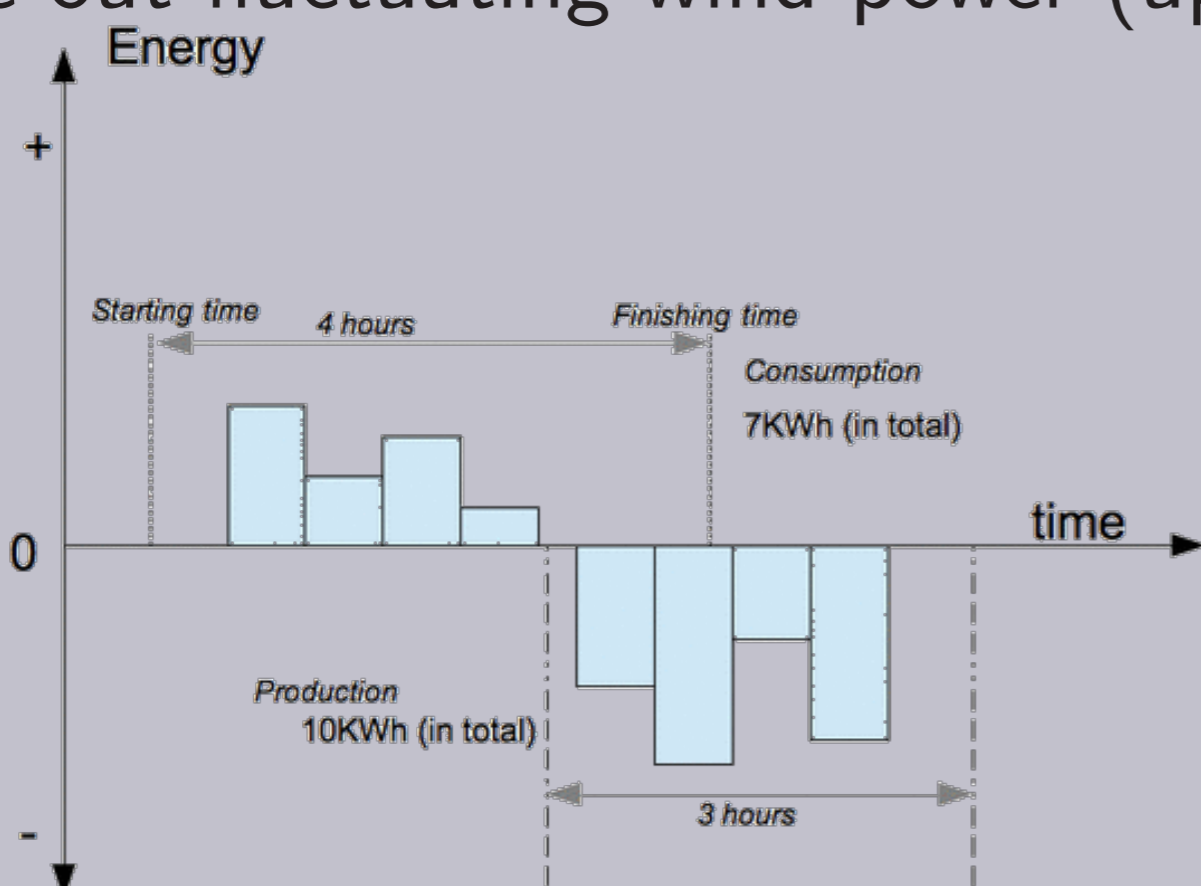


Fig. 2: Production & Consumption flex-offers

Summary

The flex-offer concept and the solution that this Ph.D. project will provide, refers to household’s flexibility, but can all be used to further confront scheduling problems corresponding to business administration requirements.