fenix
Flexible Electricity Networks to Integrate the eXpected 'energy evolution'
... a step towards the future of electricity network

Bulletin 4
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The Economics of FENIX Virtual Power Plant

Editorial

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FENIX work package 3

Welcome to the fourth edition of the FENIX project bulletin. FENIX is an EU co-funded Integrated Project. Work package 3 sets out to yield evidence of the economic viability of FENIX Virtual Power Plant concepts. These concepts stress the deployment of distributed energy resources (DER) – flexible supply or demand entities or energy storage facilities, connected to a distribution network - through flexible operational aggregation. This work package encompasses:

• Scenario studies providing pictures of the possible general conditions enabling application of FENIX concepts in Southern Europe, notably, Spain and Northern Europe, notably, the UK. These studies refer to background conditions that might prevail around year 2020 with special reference to the two FENIX demonstrations.

• Analysis of the policy and regulatory frameworks as well as contractual arrangements that will help FENIX concepts to penetrate in the future liberalized market place.

•Cost-Benefit Analysis of FENIX concepts, focusing on the ones that are being applied in the Southern and Northern demonstrations by work package 4.

Jaap Jansen, ECN

Economic analysis of the FENIX concepts

For the assessment of the economic viability of the FENIX concepts the approach of cost-benefit analysis (CBA) case studies is adopted. Point of departure is the existing electricity market.
The current market design is mainly predicated on the delivery of electricity by large power plants feeding into the transmission grid. A simple value chain can be presented from fuel (or ambient) energy source, through generation, transmission, distribution, and supply.

Yet this picture is too simple for analysis of the value of FENIX virtual power plant (VPP) concepts. Also distributed generators are playing a role of increasing importance. Figure 1 provides a general overview of the transactions taking place in current EU electricity supply systems, including DER.

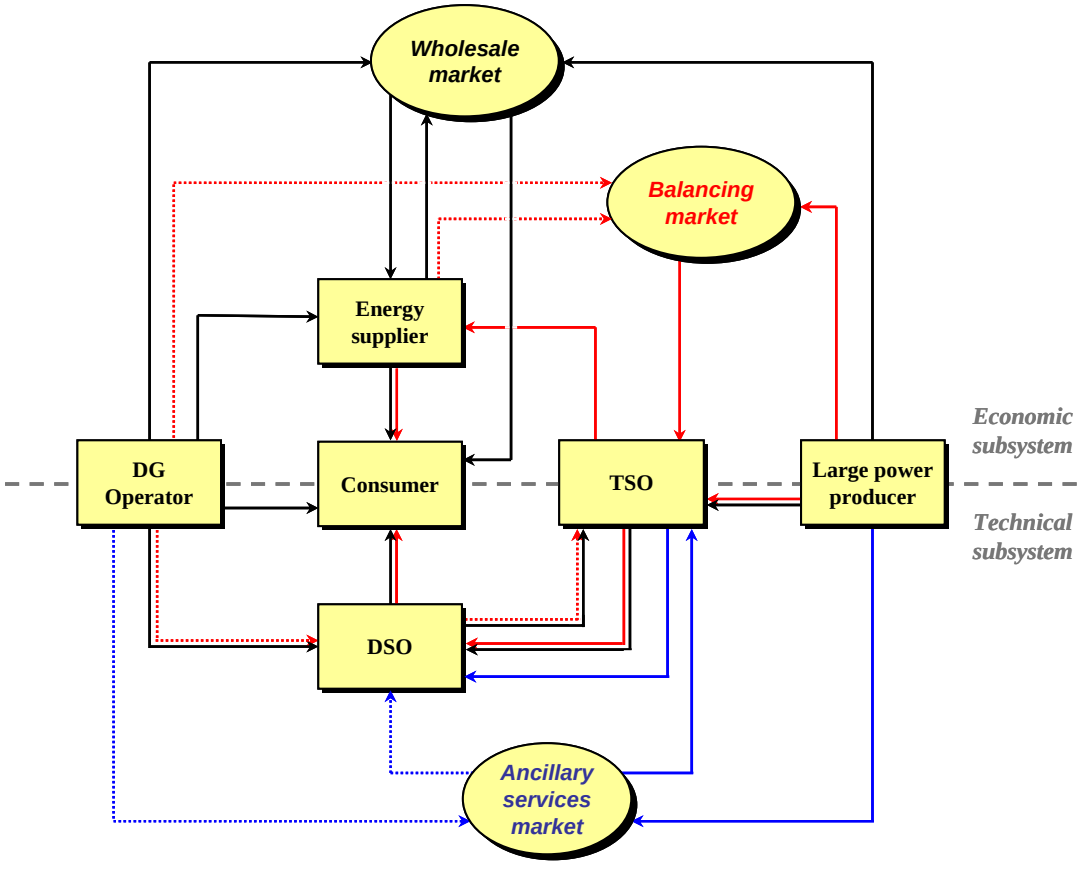

Figure 1: Transaction scheme of the electricity market

CIRED Seminar 2008: SmartGrids for Distribution
23 - 24 June 2008, Frankfurt, Germany

Stop-press: FENIX will be present at CIRED Seminar 2008 „Smartgrids for distribution"

Where: Frankfurt / DE
When: June 23-24, 2008
Info: www.ciredsmartgrids.org

Side event: 1st meeting of FENIX Stakeholders Advisory Group
June 24, 2008 afternoon

Mark your diary !!!

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The scheme can be modified to the specific national situation of an EU member state. We will not enter into the details of this generalised transaction scheme, but note that the upper half shows the "front office" market transactions in electricity as a commodity and the lower half the "back office" physical transactions that are necessary to endorse electricity market contracts. The transactions scheme provides a systematic description of the type of transactions taking place between one actor and his business partners. Each type of transactions has a provider of a certain good or service and a procuring counterpart, based on a certain remuneration as defined by a contract. FENIX adds operational flexibility intelligence which might be used by a commercial virtual power plant (CVPP) or by a distribution system operator (TVPP: technical virtual power plant). In the case of FENIX concepts new transactions will appear and existing transactions may change.

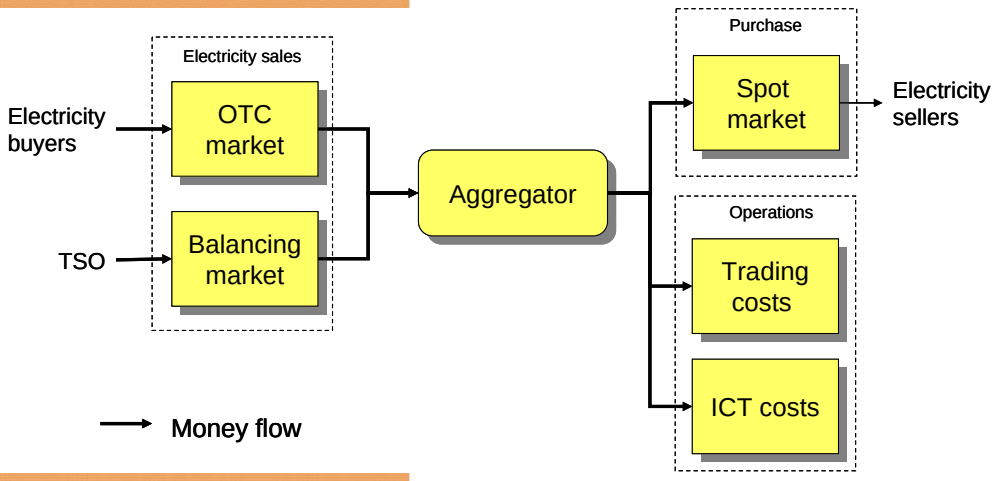

Figure 2: Business model of an aggregator

Business models

Zooming in on one type of actor permits to analyse his underlying business model through which the actor envisages to create value added.

For instance, Figure 2 depicts the business model of an aggregator of energy who sells electricity on forward markets and electricity balancing services on the TSO-organized balancing market and, in turn, procures the energy commodity from producers, such as providers of DER, or traders as well as trading-endorsing services. This commercial aggregator might be a traditional aggregator of just financial contracts or an aggregator applying FENIX intelligence to flexibly operate DER facilities to co-optimise additional value that can be extracted from FENIX value drivers. Also distribution system operators may use the flexibility of DER for cheaper provision of system services than they do without using DER flexibility.

Cost-benefit analysis case studies

The cost-benefit analysis case studies will be simulations of the business models for distinct FENIX actors and the consolidated business case for all actors considered over the 10-year period around year 2020.

For the Southern Scenario case studies considered include the application of FENIX intelligence for:

- DER offering reserves (MW) and balancing services (MWh) to the TSO
- DER offering reactive power services (MVAr) to the DSO

The Northern Scenario encompasses the following FENIX case studies:

- Improved DER access to wholesale (forward, day-ahead) energy markets
- DER to provide services to TSO-organised intra-day and real-time balancing market
- DER to provide intra-day balancing to balancing-responsible parties
- DER to provide tertiary reserve services to TSO (availability and, when called, energy).

Analysis in 8 steps:

Per case study notably the following steps are undertaken:

1. Case study definition including the rationale of the FENIX value creation proposition.
2. Definition of the baseline, simulating the business environment under present regulatory frameworks.
3. Definition of the FENIX regulatory framework, simulating the business environment that evaluates towards a FENIX compatible scenario.
4. Setting up the baseline and FENIX transaction scheme + a transactions table covering the distinct electricity market players.
5. Construction of separate baseline and FENIX business model and the associated two tables of financial transactions for each of the four distinct actors: DER operators; Commercial aggregator (VPP); DSO (Technical VPP); TSO.
6. The differential FENIX cash flows with respect to baseline cash flows is then determined for each of the four actors.
7. CBA of the consolidated FENIX business case aggregating the cash flows for all four categories of distinct actors. This will provide indications of the attractiveness of the FENIX concept considered for the electricity system as a whole: e.g. does FENIX create economic efficiency gains for the whole system?
8. To derive the societal impact of a FENIX business case the FENIX application is scaled up to national level and external benefits are determined. If social cost-benefit analyses yields robust positive net present values this will provide a strong case to adjust the current regulatory framework in FENIX-compatible ways.

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Next FENIX bulletin

The next bulletin will return to the FENIX scenarios mentioned above. The main topic of be **The FENIX Scenarios – Part 2, The Southern Scenario** to be issued in fall 2008.

Have a nice summer!

Your FENIX Bulletin team

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