INCREASE – *Increasing the penetration of renewable energy sources
in the distribution grid by developing control strategies and using ancillary services*
D6.5 Organization of kick-off event where DREAM, EvolvDSO and IDE4L will take part

INCREASE

INCREASING THE PENETRATION OF RENEWABLE ENERGY
SOURCES IN THE DISTRIBUTION GRID BY DEVELOPING
CONTROL STRATEGIES AND USING ANCILLARY SERVICES

6.5   Organization of a kick-off event where DREAM,
EvolvDSO and IDE4L will take part

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1. Summary

This deliverable concerns the organization of a kick-off event where not only INCREASE, but also the other projects within the same call (DREAM, EvolvDSO and IDE4L) and external stakeholders will take part.

2. Aim of the conference

The aim of the conference is twofold:

- It is the first time that the different projects and their partners meet each other, which is why it was decided to start with a project presentation first. Each project was presented by the different project coordinators, so all the participants know what each project is about and where the similarities/differences are.
- EvolvDSO and INCREASE are at a crucial point in time where input from other stakeholders is necessary for the definition of their constraints and requirements. Different cases were presented and feedback/input was provided by the audience.
- IDE4L and DREAM also presented their projects and asked for input to the public for certain challenging issues they are encountering.

3. Date and location of the conference

The conference took place in Living Tomorrow, Vilvoorde, Belgium on the 2nd and 3rd of December 2013. It was organized partly in cooperation with the International Smart Grids Conference of Smart Grids Flanders.

4. Agenda

Date + Venue	Time	Subject	Responsible
02-12-2013			
Living Tomorrow, Indringingsweg 1, 1800 Vilvoorde	10.00h-10.15h	Welcome	Joachim De Vos (Living Tomorrow)
	10.15h-11.15h	Smart energy: The cutting edge of breakthrough capitalism	John Elkington (Volans,

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			SustainAbility)
	11.15h-12.15h	Behavior change in demand-side management: From theory to practice A view on tomorrow's energy landscape The impact of smart grids on smart buildings in 2030	Ruth Mourik (Dune Works, IEA) André Jurres (NPG Energy) Kris van Daele (President Smart Grids Flanders)
	12.30h-13.15h	*Lunch*	
	13.15h-15.15h	WP1: progress, challenges and next steps	Prof. Andrej Gubina (UL), Dr. Ir. Bart Meersman (UGent), all
	15.15h-15.45h	*Coffee Break*	
	15.45h-17.15h	Preparation meeting kick-off conference	Dr. Ir. Bart Meersman (UGent), all
	17.15h-17.45h	Final conclusions, questions, next steps and meetings	Dr. Ir. Bart Meersman (UGent)
	19.30h	*Diner: De Drie Fonteinen* *Location: Beneluxlaan 32,* *1800 Vilvoorde*	
03-12-2013			
Living Tomorrow, Indringingsweg 1, 1800 Vilvoorde	9.00h-9.10h	Welcome, introduction, tour de table	Prof. Dr. Ir. Lieven Vandevelde (UGent)
	9.10h-10.30h	Project presentation, knowledge exchange, input collection and Q&A session EvolvDSO	Carlos Francisco Costa Rausa (Enel)
	10.30h-11.00h	*Coffee break*	
	11.00h-12.00h	Project presentation, knowledge exchange, input collection and Q&A session DREAM	Raphael Caire (Grenoble INP)
	12.00h-12.30h	Conclusions and discussion	
	12.30h-13.30h	*Lunch*	
	13.30h-15.00h	Project presentation, knowledge	Sami Repo (Tampere

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		exchange, input collection and Q&A session IDE4L	University of Technology)
	15.00h-16.30h	Project presentation, knowledge exchange, input collection and Q&A session INCREASE	Dr. Ir. Bart Meersman (UGent)
	16.30h-16.45h	Final conclusions of the day	Dr. Ir. Bart Meersman (UGent)

5. Overview of the participants

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6. Conference conclusions

6.1 Minutes 2/12/2013

6.1.1 WP1 discussion

6.1.1.1 General WP1 issues

A lot of information is still missing to come to a detailed report (D1.1 and D1.2).

The plan is to spread around a questionnaire to the other stakeholders (other projects and external) and collect their answers and ideas/suggestions.

A lot of questions were formulated during the meeting:

  * Who pays for the investment for the connection of a power plant into the grid at every voltage level?
  * Do you do the calculations for the connection of a power plant »in advance« or only on the basis of actual problems in the grid?
  * Above which installed capacity a central circuit breaker is needed for a power plant?
  * Can the DSO prescribe an interface for real power reduction and access to the other measurements?
  * What kind of reactive power control mechanisms integrated in the power plant can the DSO prescribe?
  * What is the stipulated power factor range? Are there any control curves that can be stipulated by the DSO?
  * Do the investors in the Renewables have to pay the grid connection fee?

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  * Do the investors have to pay for the grid access allowance (like 60 EUR)?
  * Which contracts are prepared with the investors (grid connection allowance, grid access contract, etc.)?
  * What is the maximal capacity of a single phase power plant? Are there other solutions for preventing voltage-unbalance problems?
  * How do you consider the single-phase inverters in the planning process?
  * Are there any requirements on frequency dependable reduction of real-power?
  * Are there any requirements for real-power reduction dependent on measurement voltage?
  * Are there any requirements for the protection equipment?
  * What is the maximal power (PV vs. Hydro) for certain transformer/line thermal capacity (e.g. what is the maximal capacity for a 100 kVA transformer)? What is the strategy in this regard?
  * In the network planning do you do only worst-case scenario analysis or also consider the load when planning the connection of renewables in the grid?
  * Please provide some links to the your grid planning rules/laws etc.
  * How do you define penetration level?

Andrej will select the most prominent ones and add more and spread around the questionnaire. This must be done quickly in order to receive input on time.

6.1.1.2 Task 1.3: Requirements for increased DER with ancillary services

Mitko explained his study about unbalance. (see presentation WP1)

- On-off oscillations: immediately turn it off, then voltage droops, then turn it on again because level is ok, then again off, etc.
- Elektro Gorensjka:
    o Already has a strategy when controlling. They first control the voltage level and then the unbalance. They cannot control the unbalance first.
    o Their highest priority is given to the voltage level. They do not focus on unbalance because of the 3-phase-invertors.
    o Fast control of the inverter: when the system goes up, the lowest point in the network has reserve, increase the complete network by the transformer.
    o There are also voltage regulator algorithms in the transformer.
    o 700.000 switches in a lifetime: it is important that this is also taken into account.
- Austria:
    o Calculations: they take the voltage level, single phase: 6x U0 to calculate the single phase characteristics. Then they look at the unbalance. Both factors are taken into account to do the study.
- Network analyzers: RMS values every 10 minutes.
    o It is not clear in which direction the current goes.
- Penetration levels: in terms of minimum actual passive load. Penetration level of wind parks is only 200 → 30% of the lower load…

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These differences between DSOs need to be described in the deliverable.

6.1.1.3 Task 1.5: Definition of the simulation toolset framework and architecture

- What is measured by the DSOs? This can be very interesting for the study about the measurements.
- CONTROL SCHEMES:
    o **Local control:** immediate, based on local measurements (voltage at terminal, input power).
    o **Fast control:** agents control the voltage, congestion… within minutes (10 to 15), more components communicate with each other (tap settings). The input of the fast control to the invertor will have a higher priority than the local control input.
    o **Slow control:** hours to days. The whole network is modified, it concerns a larger area: optimization of the system, forecasting, DSM, RLR, etc. everything is involved.
- TU/e is responsible of naming the different agents:
    o Aggregator: for the market.
    o Supervisory agent: agent bringing everything together.

6.1.1.4 Task 1.6: Definition of an energy architecture for the distributed control system for the MV grid

- LV measurements: data every 15 minutes; POC: online every 15 minutes.
- MV measurements: not yet in every cabin.
- Slovenia: PLC is not enough to pass information once a day. Eandis has installed filters to solve this, passive components.
- Benefit of receiving data every 15 minutes: depends on the business case: market based things, online measurements whenever you want to do voltage control.
- Idea to connect via the internet: good, be aware of security problems.
- How will we use this concept within INCREASE: it will be simulated.

6.1.2 Next steps

Nr	Task	Who	Deadline
1	Finalize questionnaire for other stakeholders	UL	Week December 16th 2013
2	Receive input from the stakeholders	UL	January 10th 2014
3	Telephone conference WP1 concerning D1.1 and D1.2	UGent	Beginning of January 2014
4	Follow-up meeting between UGent and TU/e	UGent, TU/e	February 11th 2014
5	2-weekly update of new available documents on Zephyr	UGent	Start week December 16th 2013
6	Monthly telephone conference WPL	UGent	January 2014 (doodle will be sent

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6.1.3   Future meetings

Nr	Meeting	Who	When	Where
1	INCREASE MC Meeting	All partners	18-19 March 2014	Eindhoven, NL
2	Advisory Board Meeting	All partners	18-19 March 2014	Eindhoven, NL
3	Smart Grids Conference Austria	All partners	19-23 May 2014	Graz, AT (SNG)
4	INCREASE MC Meeting	All partners	September 2014	Ljubljana, SL
5	INCREASE MC Meeting	All partners	March 2015	Graz, AT
6	INCREASE MC Meeting	All partners	September 2015	Thessaloniki, GR
7	INCREASE MC Meeting	All partners	March 2016	Graz, AT
8	INCREASE MC Meeting	All partners	July 2016	Kranj, SL
9	INCREASE MC Meeting	All partners	January 2017	Eindhoven, NL

6.2   Minutes 3/12/2013

6.2.1   Welcome & introduction

Prof. Dr. Ir. Lieven Vandevelde (UGent) welcomed all participants, did a tour de table and pointed out the objective of the conference: ideal opportunity to present each project (evolvDSO, DREAM, IDE4L and INCREASE) and exchange ideas amongst each other.

6.2.2   evolvDSO (Carlos Costa Rausa – ENEL and Daan Six – VITO)

6.2.2.1 Main objective

EvolvDSO focusses on finding a new role/service of the DSOs for the future.

The tools and methodologies necessary for the DSO to dispatch his grid will be defined during the project, also the necessary changes to regulation and market will be done.

Relevance:
- Link between telecom and electricity.
- Demand response.
- Increased PV penetration.

6.2.2.2 Q&A

- EvolvDSO has not decided yet which tool they will develop.
IDE4L makes use of existing technology to develop the tools for the DSO.
DREAM focusses more on balancing and introduces new technology.
INCREASE develops its own technology.
→ Technologies developed in other projects can be used as the evolvDSO solution.

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- IDE4L: focus is more on network management, the idea is to provide ancillary services to the DSO (using existing technology). These ancillary services are called (by them) flexible services.

- Time horizon for the different scenarios?
      - General point of view
      - Point of view regulator and market
      → completely different, depends on input given.

- Different perspectives from country to country?

- Impact of the massive role of PV:
The time horizon is very difficult to estimate. Some things will happen in any case.
      - Difficult to develop a framework as the conditions might still change a lot and unexpected things can happen. It needs to be proactive, which is very difficult. Different (under expected and over expected) scenarios need to be integrated in the tools,
      - DREAM: takes some distance from the traditional DSO approach and will focus more on ICT approaches.
      - IDE4L: no forecasting, they will continue as today and assume that the market stays the same, but with different players.
      - EvolvDSO: no prediction of the future, but focus on expectations. The market is for granted, you can work with that.

- How beneficial is the environment? Measurements? Are the tools going to offer services? How to offer services, determine the value, assume the degrees of freedom?
      - DREAM: ongoing discussion about the balancing market. Transient periods, actual structure is not necessarily the best.
      - INCREASE: will wait and see.

- Information exchange from TSO to DSO is very important. The TSO always needs to work via the DSO. How this works is not completely clear.
      - Technical requirements will come from this exchange.
      - Implementation in field tests.
      - Make the DSO more active: it is not possible to say the DSO needs to do this and this. New actors need to be integrated well. There is a very large potential for a cooperation between DSOs and TSOs.

6.2.3 DREAM (Raphael Caire – IPG)

6.2.3.1 Main objective

Smart decisions: you need to measure and know and act on the basis of these results. DSO can change his role a little bit. Bottom-up approach.

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They focus more on MV level.

Example:
Congestion:
First: they try to solve the problem locally. If that does not work, they expand the area by aggregating the up/downstream MV elementary cells.

They have an interesting field trial at MV level.

They take into account fault passage indication (self-healing ability).

6.2.3.2 Q&A

Q: Planning to put some intelligence, but this will affect the traditional control principles. How will you take that into account? How will you determine who participates and how many? A: WP3 → aggregate measurements of active and passive loads. Integrate this in the invertor. Will reactive power remain free of charge? That is the reason why the reactive power also needs to be measured and determined. Reactive power is not free because the invertors need to be adjusted. There need to be incentives to convince the people. Who uses ancillary services? The one who uses AS must give something. What or how much is still to be determined. May other measures are also a possibility. It still needs to be determined where ancillary services will be offered. how can we make a DSO more attractive? Every customer will know the cost of reactive power. They will know what the conditions are for the DSO to accept reactive power.

Q: Island low-voltage grid. Assume problems with the voltage profile. Which measurements need to be implemented first to solve this problem?

A: On load tap changer provides the most possibilities to solve LV problems. Approach in real time: you know who is connected to the grid.

 Q: Independent agents: are there scripts foreseen? Are they completely autonomous?

A: It depends of the way they are interconnected. You could also use other agents. Especially in the case of self-healing, then also the probability and the reliability of the measurements can be taken into account and how you will use them. It also depends of the problem. Congestion: script. Reconfiguration: script but also with the best solution. A lot depends of the local optimum. EC is looking at the wireless communication. Maybe these standards can also be used for the communication within the agents. The intelligence of the agents depends of and is based upon the functionality that will be necessary and the place in the grid where the agent will be placed.

Q: One system instead of several systems? (although different point of views: market, technology, etc.)

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A: The scripts attached to the same device: different software, the correct one will be addressed at the correct moment.   Does this have an effect on the architecture? INTEGRAL: developing the self-healing, fault location, isolation, restoration,…

Q: fulfill 4 basic requirements: one is cheap. Can it be cheap? Compared to the traditional approach?

A: Common ICT infrastructure for the different elements. Save money: common infrastructure for every actor: use the communication network that already exists. All LV customers receive the same.

Q: Who owns the system then?

A: EU: These tools are owned by maybe the DSO, ownership is related to the service that will be covered. DSO: reliable networks. You cannot trust a public, because in that case you will lose control. The EU is against this and will fight it. It is too expensive. Maybe it will be a mix.

6.3.4   IDE4L (Sami Repo – UT)

6.3.4.1 Main objective

Main tasks in IDE4L are:
- Fault Location Isolation and Supply Restoration (FLISR)
- Congestion management and voltage control
- Interactions between DSOs and TSOs

An interesting collaboration might be possible between IDE4L WP2 and INCREASE task 1.6 (hands-on manual).

6.3.5   General cooperation

- Links and logos of the different projects on the different websites.
- Agreement on dates for future events and summer schools.
- Ad hoc communication concerning possible cooperation or providing of input.

7. Conclusions

The joint kick-off conference where the different projects participated (INCREASE, evolvDSO, DREAM and IDE4L) reached its main objectives with success:
- Getting to know one another and the different projects.
- Exchange ideas and know-how.

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Contacts have been established for the future project months and since the conference a lot of communication has been going on between the different projects.

Two more joint conferences will follow during the coming 32 months and a summer school will also be organized together with all the different projects.