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<b>PU</b>	Public	X
<b>PP</b>	Restricted to other programme participants (including the Commission Services)	
<b>RE</b>	Restricted to a group specified by the consortium (including the Commission Services)	
<b>CO</b>	Confidential, only for members of the consortium (including the Commission Services)	

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## 1. INTRODUCTION

This is the first newsletter of ADINE-project. The project team will publish these brief summaries in six months periods to keep interest groups updated about the proceeding.

ADINE comes from words Active Distribution Network, which summarises the idea of the whole project. Components in electricity distribution networks should be intelligent enough to interact with each other. The network should be active and alive as an intelligent machine which has no problems in plugging in any kind of distributed generators or loads.

We have a serious intention to demonstrate that with Active Network Management (ANM), it is possible to save money in investments and at the same time get more out from the network without compromising in reliability and safety.

This first newsletter explains the basic ideas of the project. The research teams have started to do their job together with company partners and hopefully in the next newsletter we are able to tell about first results.

Partners in the project are:

- Technology Centre Hermia Ltd, Finland
- Tampere University of Technology, Department of Electrical Energy Engineering, Finland
- ABB Oy Distribution Automation, Finland
- Lund University, Department of Industrial Electrical Engineering and Automation , Sweden
- Compower AB, Sweden
- Nokian Capacitors Ltd, Finland
- Nokian Capacitors GmbH, Germany

## 2. PROJECT GOALS AND STRUCTURE

### **The problem - need for the project**

Considerable amount of renewable energy in Europe represents distributed generation (DG). However, the distribution networks have been designed without considering interconnection of DG. One of the main barriers to the penetration of DG at the distribution network level is the complexity of the interconnection process of DG into the network. Each planned interconnection requires accurate modelling, simulation and analysis to tackle potential problems concerning stability, protection and voltage control in the network. The main cause of complexity is the present methods for managing distribution networks as well as the features of the different DG components themselves which are not designed to enable an easy interconnection. Also customers' expectations for extreme reliability and quality of power are increasing simultaneously with an increasing diversity of power generation methods. Therefore significant investments will be needed in the coming decades. It is now time to reconsider traditional network solutions in order to secure the efficiency, security and reliability of networks in the long run.

### **The solution developed in the project**

ADINE develops, demonstrates and validates a new method for the active management of a distribution network and the enabling solutions to support it. The solutions operate as active components in managing the network to enable an easy interconnection of different DG units. The solutions cover the protection of the network, planning and information systems, and voltage and reactive power control.

The extraordinary feature of this project is to develop and demonstrate the active network management method and the enabling solutions simultaneously. Either one alone would not solve the problem described above. When interacting with each other according to the active network management method, the over all system operates better than it would by letting individual solutions interact randomly – which is the common practice today.

As the result ANM is increasing the security of distribution grids, improving the stability of the grid in fault situations and enhancing the optimal management of network. This adds value at European level by increasing the potential for renewable energy and by enabling more efficient management of distribution network assets for network owners.

**The work flows from basic planning to demonstrations and monitoring** so that best knowledge of the partners is involved in each stage. The results from the demonstrations of solutions are combined together in SP5 into one integrated simulation environment in order to demonstrate and validate ANM method.

#### Sub projects

SP1-Project management and dissemination

SP2-Protection of distribution network including distributed generation

SP3-Voltage control of distribution network including distributed generation

SP4-Flexible STATCOM for distribution network

SP5-Development of Active Network Management method

The seven participating partners are technology providers and international research institutes from Germany, Sweden and Finland. Two local distribution network owners are providing test sites and infrastructures for demonstrations. The third demonstration site will be decided by end on 2008. It will be either a wind park or an industrial end user.

### **3. NETWORK PROTECTION SOLUTIONS**

ABB Distribution Automation in Finland is leading subproject 2, which consists of four work packages related to new protection systems of the electric distribution network. The development and demonstration work is based on products or prototypes from ABB. Requirements for the protection of distribution networks are changing considerably due to the increased share of DG. Protection schemes and practices designed for unidirectional power flow may become ineffective. Unnecessary trippings as well as undetected faults or delayed relay operations may occur due to the penetration of DG. The operation sequence of protection devices during a fault is therefore of great importance. DG may also disturb the automatic reclosing. Furthermore, the loss-of-mains protection for DG units is a challenging task. Due to

DG, the existing methods used in fault location could become inappropriate. Thus the development work must be done both on the relay application and in control centre levels.

The intention is to develop and demonstrate in real life situation

- New protection solutions and devices
- Application of communication based relays at distribution networks
- Fault location taking into account the influence of DG
- Coordinated protection planning to adopt the easy interconnection of DG

For more information contact Mr Matti Karenlampi, [first.last@fi.abb.com](mailto:first.last@fi.abb.com)

#### 4. VOLTAGE CONTROL OF DISTRIBUTION NETWORKS

University of Lund in Sweden is leading subproject 3 dealing with new voltage control solutions.

The negative impact of DG on voltage regulation makes it one of the key barriers to the integration of DG in large volumes. This subproject demonstrates how voltage regulation in distribution networks can be improved through decentralized control of DG units and through centralized control of tap changers and shunt capacitors. Work with these two means is organized in separate work packages since they are demonstrated at different geographical locations.

The demonstrations will focus on

- Droop control of as a plug-and-produce solution for DER interconnection will be demonstrated in test site in Sweden, where small-scale microturbine will be connected to the network
- Centralized voltage control of a medium voltage network will be demonstrated in test site in Finland

The two separate demonstration networks will be combined together in subproject 5, where active network management method will be developed.

For more information on these issues contact Mr Olof Samuelsson, [first.last@ulund.se](mailto:first.last@ulund.se) or Mr Anders Malmquist, [amalmquist@compower.se](mailto:amalmquist@compower.se).

#### 5. FLEXIBLE STATCOM FOR DISTRIBUTION NETWORK

Nokian Capacitors GMBH in Germany is leading subproject 4 with the focus on studying and demonstrating the intelligent solutions required for compatibility of new generation STATCOM converter with ANM method. The efforts are put on developing the flexibility of encapsulation, flexibility in the selection of control methods, the design of control system and development of alternative communication methods for remote surveillance. The basic use of STATCOM is to filter harmonics of the distribution network, eliminate flicker and compensate reactive power. The compatibility with ANM means, that on top of these the STATCOM can participate in

recovering the network from line faults and in controlling the voltage level of the distribution network.

In this subproject some basic studies, definitions and simulations are done first followed then by the STATCOM control system tests using RTDS real time simulator together with HMI of STATCOM. After passing the RTDS tests the controller is tested with power electronics part in laboratory. The final test is done in real-life demonstration. Test site will be selected during this year and demonstration take place in year 2010.

For more information contact Mr Ralf Jessler, [first.last@nokiancapacitors.de](mailto:first.last@nokiancapacitors.de).

## 6. DEVELOPMENT OF ACTIVE NETWORK MANAGEMENT METHOD

Tampere University of Technology, Department of Electrical Energy Engineering is leading the subproject 5, where Active Network Management method is developed and demonstrated.

The objective is to create and demonstrate the viability of Active Network Management method by combining the results of other subprojects from the network operation perspective in an integrated realtime simulation environment. In the integrated simulation environment of RTDS and dSPACE the demonstrations of other subprojects are interacting with each other and ANM method is developed to change the random interaction into controlled interaction to benefit the operation the network. First the basics of the ANM method are set for developing the required tools for defining and demonstrating the ANM. Secondly the interactions between the demonstrations are studied to define and demonstrate viability of the ANM method.

For more information contact Mr Sami Repo, [first.last@tut.fi](mailto:first.last@tut.fi).

## 7. DISSEMINATION OF THE RESULTS

ADINE wants to show that distribution networks could be managed in a more intelligent way than at present. Intention is to tell about the findings and results as early as possible to let other specialists in the field to contribute and refine ideas further. We try to gain attention in two arenas:

1. Research groups working in the same field around Europe
2. Distribution network owners and operators around Europe

At least following interfaces are arranged to allow easy information flow in and out of the project:

- [www.adine.fi](http://www.adine.fi) – project public web pages including all public materials at any time in any location
- project mailing list, which anyone can join from [www.adine.fi](http://www.adine.fi). We will send short alerts about public deliveries, workshops etc to this list.
- presentations in conferences and seminars
- project workshops in Portugal, Spain and UK. First round of workshops for DSOs in these countries will be arranged between May and September 2008. The focus is in

introducing the new ideas to real operators letting them to contribute and give feedback. Later on, when the demonstration results are in hands, we will gather same persons together to discuss how the results should be adopted to the market.

**We encourage you all to contact ADINE team members to discuss about new ideas.**

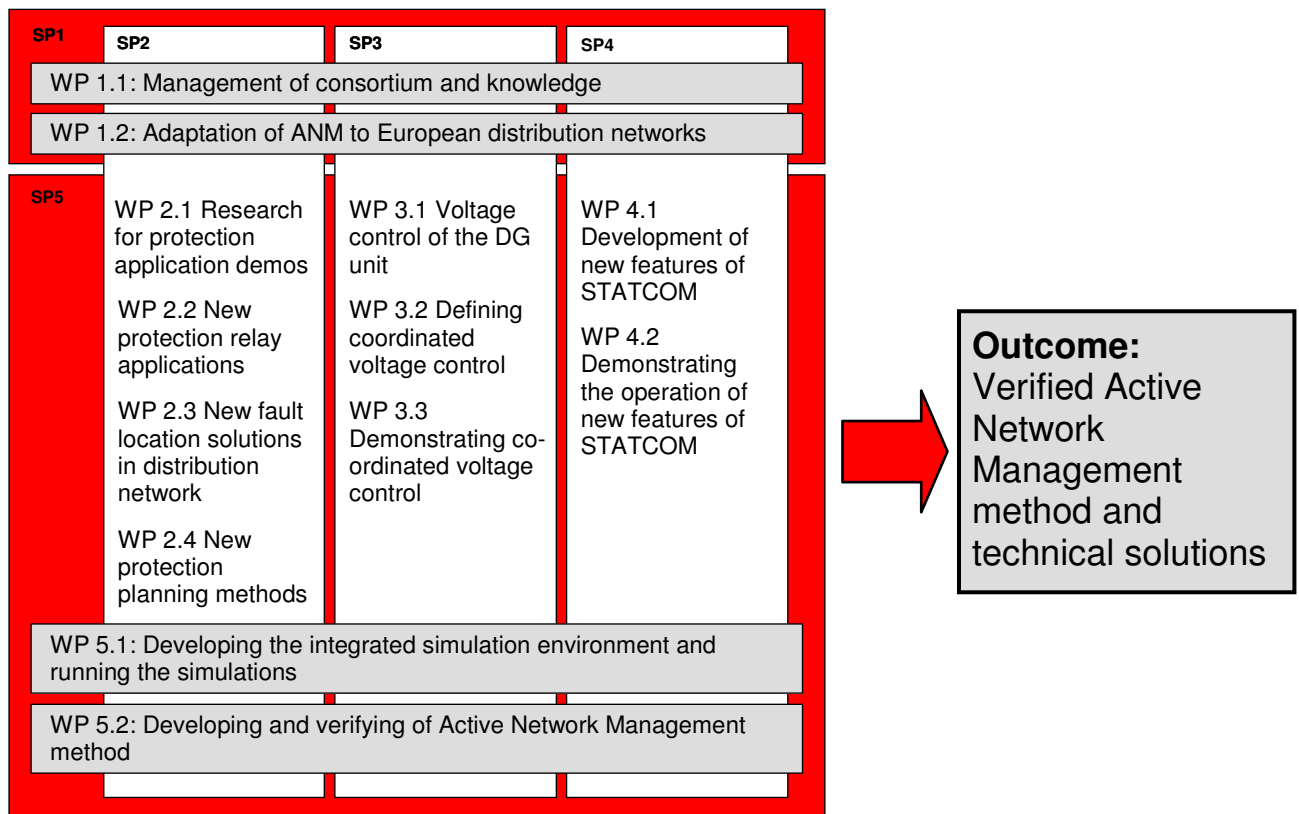


Figure 1. Structure of the project