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# **Strategic Research Agenda**

## **Working Group 1:**

# **The new Distribution network**

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# The New Distribution network

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- q **Traditionally Distribution networks tend to be radial with mostly unidirectional power flows and “passive” operation hence energy delivery to end-users.**
- q **Distribution grids need to be active capable of accommodating bi-directional power flows**
- q **Gradually distributed generation shall displace a proportion of the electricity generated by large conventional plants, hence, gradually distribution networks shall become more active and share many of the responsibilities of transmission.**
- q **Revolutionary new technologies, products and services shall be available to create a strongly user-centric approach for all customers**



# A flexible, accessible and reliable plug and play distribution network

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- q **The NEW distribution network needs a set of plug and play modules using standardisation and modularisation, resulting in lower production costs, material use etc., leading to lower costs throughout the power delivery chain.**
- q **These plug and play modules should be environmentally friendly (e.g. easy to recycle) and have very little to none unwanted effects on citizens.**
- q **Multidirectional communication and control systems for horizontal and vertical integration facilitate participation of customers and DG to system operation and power quality and reliability at the connection point.**



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# What has to be resolved through this research agenda?

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- q **Derive optimized functionality structure / best practices for equipment**
  - q **New technical design methods and tools**
  - q **Agreement on a limited set of building blocks with programmable functionality / specification**
  - q **Software to be standardised using open architecture and accepted protocols**
  - q **Minimum technical requirements at connection point**
  - q **Intelligent , effective and efficient control of PQ and reliability at connection point**
  - q **Measure PQ, identify “pollution” sources**
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# Key deliverables

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- q **New technical design methods and tools (including simulation and testing) available for all manufacturers for testing and operating the new functional blocks.**
- q **Should offer a new planning and design methodology for network companies and consumers meeting the requirements of an acceptable and open architecture of the standardised functional blocks.**
- q **PQ indicators and measuring systems to be universally available to allow better share of responsibility and produce efficient signals for investment.**
- q **Demonstrate how self controlled grids can positively affect the power exchange layer.**



# Enablers

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- q **Required ICT technology to be available.**
- q **Agreement on a European scale on standard characteristics of system building blocks and system architecture.**
- q **Testing and measurement techniques facilitating simulation.**
- q **Adequate and effective electricity energy storage devices.**



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# Measure of success

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- q **Degree of acceptance and usage of open architecture solutions and protocols.**
- q **Effective and efficient use of sustainable and low carbon technologies.**
- q **New (modularized) equipment made available by manufacturers and accepted and incorporated in the network.**



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# Research themes

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- q **Multi-directional communication & control**
- q **Standardization of equipment and subsystems including connection protocols**
- q **Quality (and reliability) control at connection point**
- q **Make the network more intelligent / flexible / reliable / self-healing with advanced technology**



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**Thank you for your attention!**

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