



Innovation type:
Scenario toolbox

TRL: # 3

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Target group:

Actor/ purpose	X
DSO, TSO	X
Technology provider	X
Member organisation	X
Market operator	X
Research/ Consultancy	X
Teaching	X

Scenarios for the future electricity distribution grid

A repository of mini scenarios and four scenarios for the future electricity distribution grid are developed in a foresight process through workshops with the main stakeholders (DSOs, TSO, technology providers, market operator, authorities, and membership organisations and associations).

Challenge

A robust strategy is needed for a cost-efficient transition to the future flexible and intelligent grid. For this purpose, it is necessary to make presumptions about the future and which aspects to be considered. The complex interaction between technological, economic, organisational and human factors related to the grid need to be addressed in a holistic and coordinated way to support the system innovation and the transition to the future grid. These challenges demand a multidisciplinary strategic approach, here based on Foresight.

Solution

To better understand the complexity of the future distribution grid, the driving forces for distribution system innovation have previously been identified and structured. Based on the driving forces, about 100 mini scenarios are developed and collected in a repository. Four scenarios for the future electricity distribution grids in Norway anno 2040 are built in a two-dimensional system of coordinates, where the horizontal axis describes the grid customers (consumers, power producers and prosumers) and to which degree they contribute with flexibility in the grid. The vertical axis describes the degree of digitalisation and automation of the grid and grid management.

Potential

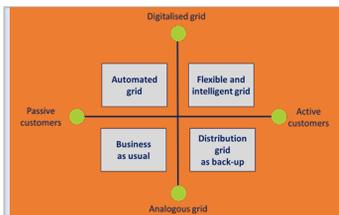
The scenarios span different futures in a Norwegian context, making it possible to manage the risks and prepare for an uncertain future. This knowledge will help stakeholders to develop robust and coordinated strategies contributing to the system innovation and robust transition strategies given different credible futures.

Reference in CINELDI

Vefsnmo, H. M., Hermansen, T. S., Kjølle, G., Sand, K.: [Scenarios for the future electricity distribution grid anno 2030-2040](#), CINELDI-report no 01:2020 (in Norwegian)

Kjølle, G., Sand, K., Gramme, E.: Scenarios for future electricity distribution grid, paper accepted for CIRED 2021, Geneva, September 2021

Mini scenarios [repository](#) (in Norwegian)



Four scenarios: **Automated grid, Flexible and intelligent grid, Distribution grid as backup, Business as usual.**

From peak power to stable loads

"Increased electrification of ferries causes power challenges to the grid due to fast charging. The ferry companies make large investments in onshore battery packages. This results in a stable load from the grid side, and possibilities for the ferry companies to provide flexibility/grid support in high load periods and fault situations."

Mini scenario