www.susplan.eu

Development of regional and European-wide guidelines for more efficient integration of renewable energy into future infrastructures.

What is SUSPLAN? Introduction

SUSPLAN (PLANning for SUStainability) is a project initiated in 2008 under the European Union's 7th Framework Program, and is sponsored by the Directorate General Transport and Energy (DG-TREN). SUSPLAN seeks to bring awareness to and solutions for the coming environmental and energy challenges facing the European community. In doing such, SUSPLAN will focus heavily over the next three years on developing strategies, recommendations, and benchmarks for the integration of renewable energy sources (RES) by 2030-2050 within a Europe-wide context. To this aim, SUSPLAN exercises a multi-dimensional approach by assembling policy, business, economic, environmental, and energy professionals together towards addressing the following objectives:

- Develop grid-based RES integration scenarios for regional and transnational (European) levels. A region is defined in SUSPLAN as a physical area which may be (part of) one single country or (parts of) several countries. The system boundaries are either geographically defined or designated by specific energy infrastructures;
- Evaluate and compare results from each scenario to identify the optimal path for RES integration into future infrastructures, with consideration for security issues and economic competitiveness;
- Establish implementation strategies for decision makers at a regional and transnational level by generalising results and experiences from the RES integration scenario studies;
- Establish a knowledge base on which to implement subsequent SUSPLAN findings or recommendations; and
- Publish SUSPLAN work for decision-makers and related professionals at the regional, national and European levels via workshops, reports, and online resources.

Why SUSPLAN? Energy Challenges and Opportunities

In consideration of strategic climate change, energy security, and economic competitiveness goals, the EU Parliament and the Council passed the Directive 2009/28/EC including a binding target of 20% renewable energy consumption in the EU by 2020. This target is comprehensive and includes energy generation, transport, heating and cooling sectors. As of 2005, the share of renewable energy in the primary European energy supply stood at 6.4%. Meeting the 20% renewable energy objective will require massive changes regarding the production, transmission, and consumption of energy in the European community. This (re-)development of the energy system will not stop in 2020, but has to continue further towards 2050 and beyond.

Over the past century, the European electricity system developed based on a national utility perspective which heavily emphasized large, centralized coal-, hydro-, nuclear- and more recently, gas-fired power production. Expectations are that bioenergy sources and electricity from on- and offshore wind will represent the largest increases of RES in Europe by 2020. Broader policy-oriented objectives, such as EU targets, are formulated at the national and European levels. However, investment decisions for new energy infrastructure and technology typically are made at the national, regional and local level. SUSPLAN bridges this gap by conducting regional case studies to connect regional implementation of energy infrastructure with national and European strategic aims.

Regional Studies

SUSPLAN will conduct 9 individual regional RES integration scenario studies in different geographical regions across Europe (see map). The following case studies are selected to give a broad representation of different regions in Europe:

1. Islands (Island of Lewis, North West Scotland)
- Isolated/weak grid connection
- Large share of renewables (e.g. marine, offshore wind)
- Low demand

2. Northern Europe (Scandinavian Region)
- High electricity demand
- Deregulated electricity market
- Cold climate
- Large share of renewables
- High prosperity and environmental consciousness

3. Central/Western Europe (Rhine-Neckar Region)
- Dense population
- Multiple infrastructures of electricity/heat/gas
- High prosperity
- High environmental consciousness

4. North-Eastern Europe (Pomeranian Region in Northern Poland)
- Growing prosperity
- Multiple infrastructures of electricity/heat/gas
- Coal dependent electricity supply
- Expected massive investment in modernization energy infrastructure from 2007-2015

5. South-Eastern Europe (Romania)
- Centralized energy system with multiple, obsolete infrastructures
- Poor efficiency, poor environmental performance and poor security of supply
- Low prosperity
- Deregulation at early stage
- Significant RES potentials
- Investments in modernization of energy infrastructure

6. South-Western Europe (Iberian Peninsular & Pyrenees/France)
- Large-scale wind generation
- Weak transmission grids
- Warm climate (growing cooling demand; summer peak)
- Deregulated electricity market

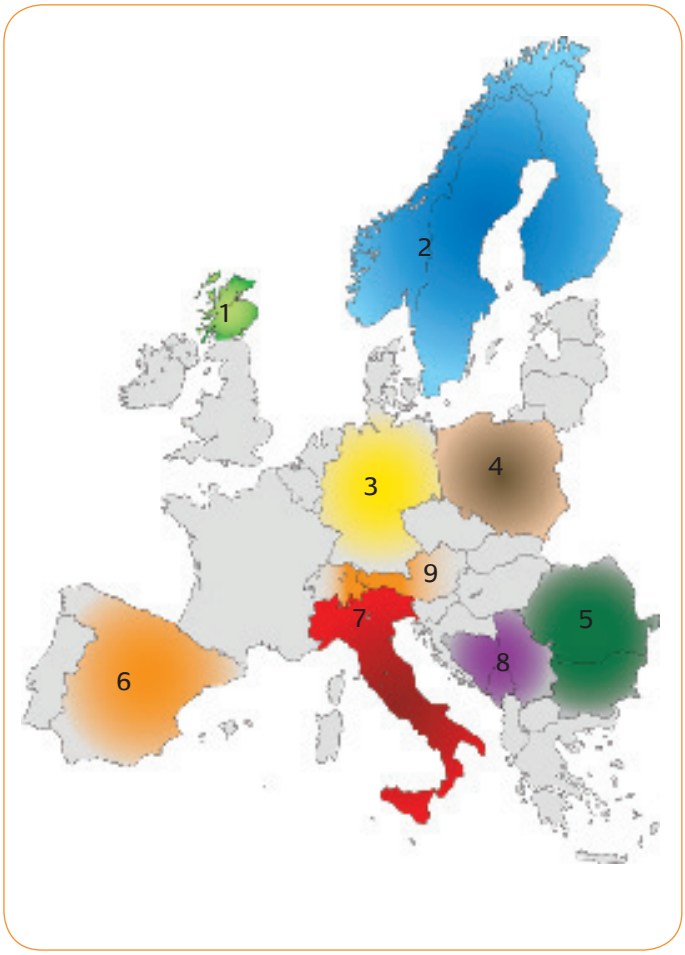
7. Southern Europe (Italy)
- Import dependent energy system
- Candidate for important gas-hub (LNG) in Europe
- Certificate system for RES support (difference from Spain)
- Warm climate (growing cooling demand; summer peak)
- Deregulated electricity market

8. Western Balkan Countries
- Region supposed to be part of the EU in the future
- Poor energy infrastructure
- Growing demand
- Ongoing market liberalization
- Significant RES potentials
- No support to renewable energy

9. Alpine Region (Western and Eastern Alps)
- Same characteristics like Central/Western Europe
- Significant storage option due to pumped hydro storage power plants
- Significant electricity hubs North/South

Regional partners and stakeholders will assist with the case studies. Analyses will account for strengths and weakness in each of the regional energy systems, recognizing technical, market, socio-economic, legal, policy, and environmental issues. The role of various grid characteristics (electricity, gas, heat, etc.) will receive particular focus and be analyzed with computational quantitative modeling tools.

The 9 individual regions



Most likely the energy system in Europe in 2050 will be quite different from the system we know today. A share of RES of 20% of the total energy consumption in 2020 and maybe 50% in 2050 can be reached by reducing demand, by increasing the volume of RES in the energy production or by a combination of these two factors. SUSPLAN will establish future pictures (scenarios) that cover different combinations of changes in demand and increased volume of RES, in order to give recommendations regarding necessary harmonized strategies to decision makers in EU.

In the future, much more of energy production will be based on local or regional resources, and many consumers may also become energy producers feeding into the infrastructures. Huge amounts of new resources located far away from the consumers, like for instance offshore wind, will be utilized. Stationary energy demand may on one hand be reduced by much more effective use of energy (better isolation of buildings, more energy efficient equipment etc), but on the other hand demand may increase e.g. by a large deployment of electric vehicles. These changes will require very different infrastructures than today.

Lack of infrastructure capacity is already a barrier for further deployment of RES based energy production in some regions in Europe. The amount of time necessary to establish new energy infrastructures is much longer than the time needed to develop new RES-based production capacity. Experiences were made where it took 10 years to establish new infrastructure while it took only 3 years to establish new RES based production. To be able to integrate all possible sources of RES production in the period leading up to 2050, it is necessary to start preparing for development of the infrastructures already today.

Europe currently imports a large share of energy it consumes. Increased share of RES will contribute to a secure and sustainable energy supply and will reduce dependency on energy imports. However, important RES sources like wind and solar are of variable character. Future development of the energy infrastructures will meet this challenge by enabling the use of different types of storage and by integrating large resources that can balance the variability like for instance hydropower. The two level approach of SUSPLAN (regional and transnational) will make it easier to meet the variability challenge.

How does SUSPLAN reach project objectives?

Building upon previous RES integration projects, such as PIP, TEN-Energy-Invest, or the dena-Grid Study, SUSPLAN conducts comprehensive analyses and parallel case studies based on three fundamental elements:

1. Scenarios for future electricity, heating, and gas infrastructure will be assessed simultaneously;

2. The timeframe for SUSPLAN scenarios and analyses extends into a broader period until 2050; and

3. SUSPLAN evaluates the relationship between regional and trans-national infrastructures across Europe for RES integration.

Structure of SUSPLAN

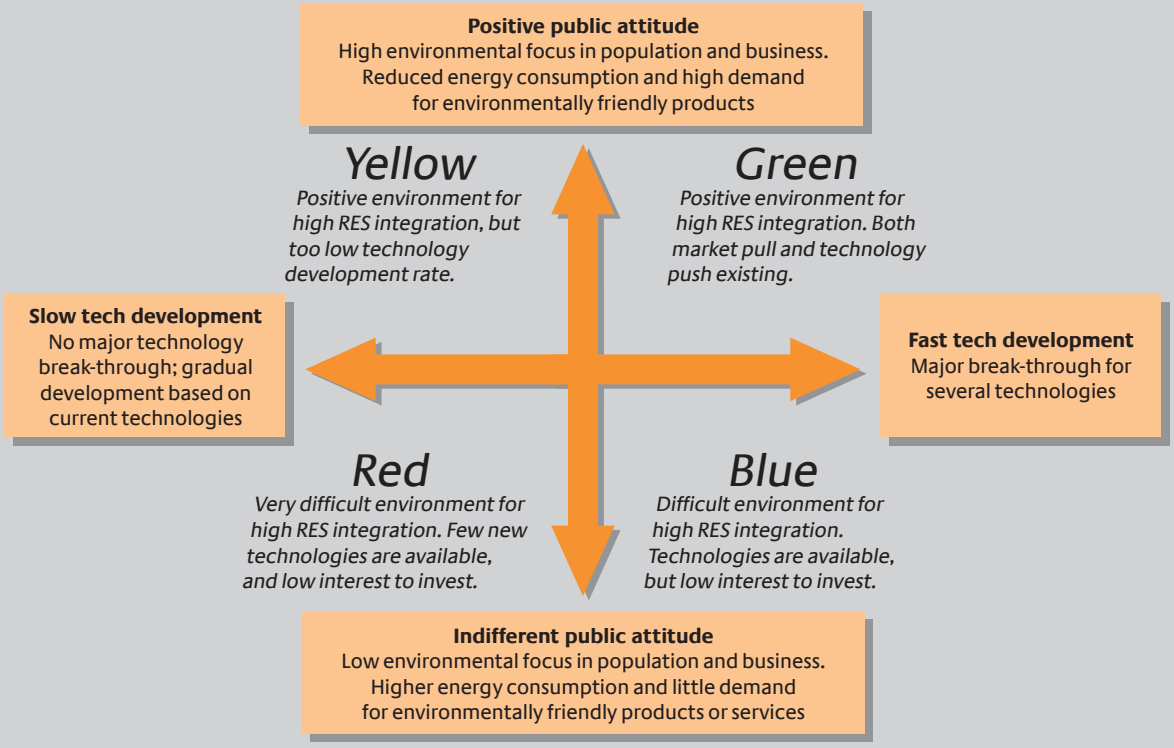
SUSPLAN consists of three primary project tracks. Each track is responsible for a specific phase of analysis and collaboration, as follows:

Track 1 Scenarios: Conducts regional and Europe-wide case studies and other predictive scenarios for chosen European regions in close cooperation with decision-makers. Existing energy systems are closely evaluated. Scenario results are reported separately and made available via online resources and related project workshops.

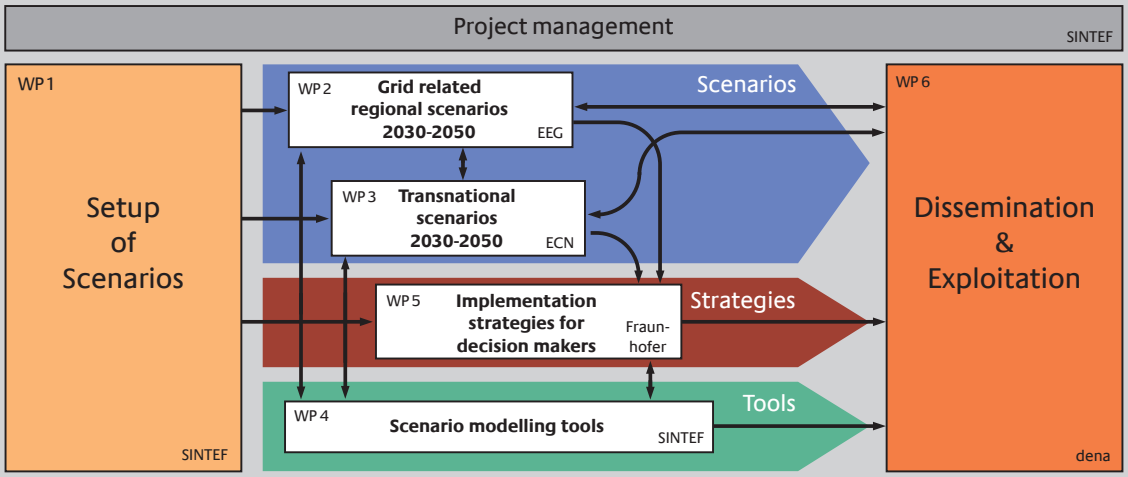
Track 2 Strategies: Develops guidelines and implementation strategies for decision-makers for more efficient integration of renewable energy sources into future infrastructure. This represents the multi- dimensional scientific and policy oriented value of SUSPLAN. Track 2 builds on the results of Track 1 findings by presenting possible scenarios and/or recommendations for integration of RES in the European Community.

Track 3 Toolbox: Supports regional and transnational case studies by focusing on developing and maintaining analytical resources for Tracks 1 and 2, such as computational or other quantitative modeling tools. The different modeling tools will be accessible through SUSPLAN partners, but will not be further maintained after SUSPLAN is completed. In addition, Track 3 will establish a database to make the results from Tracks 1 and 2 available online.

Susplan will work along different storylines. As shown in the figure there are two axis. The horizontal axis represents the technical development. It will be distinguished between a slow and a fast technological development. The vertical axis represents the public attitude. Here it will be distinguished between a positive and an indifferent attitude towards RES and environmental-friendly development. These two axes combined show four different quadrants. Quadrant A is the most positive future development to meet ambitious RES-targets.



Structure of SUSPLAN Work Packages



Partners

SUSPLAN is coordinated by SINTEF Energiforskning AS.

Other project partners include the following :

EEG, Technische Universität Wien, Austria
Fraunhofer ISI, Germany
ECN, Netherlands
UHI Millenium Institute, UK
Verbund-Austrian Hydro Power, Austria
MVV Energie, Germany
Enero, Romania
EC BREC IEO, Poland
Statkraft Western Balkans, Serbia
Comhaire nan Eilean Siar, UK
ENVIROS, Czech Republic
ERSE, Italy
Black Sea Region Energy Centre, Bulgaria
UP Comillas, Spain
dena, Germany

Contact and further information

Dr. Bjorn H.Bakken
Tel.: +47 73597445
E-Mail: bjorn.h.bakken@sintef.no
www.susplan.eu

Funding

SUSPLAN is performed In response to call ENERGY.2007.7.3.5: „The research leading to these results has received funding from the European Community's Seventh Framework Programme FP7/2007-2013 under grant agreement no 218960".

Publisher:
Deutsche Energie-Agentur GmbH (dena)
German Energy Agency
Chausseestr. 128a, 10115 Berlin, Germany
Tel.: +49 (0)30 72 61 65 - 600
Fax: +49 (0)30 72 61 65 - 699
E-Mail: info@dena.de

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Berlin, February 2009

Funded and supported by
SEVENTH FRAMEWORK PROGRAMME