ITÄ-SUOMEN YLIOPISTO

# FLEXe – Future Flexible Energy Systems

## Deliverable D1.2-1 Future Load Forecasts

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## Abstract

This is the document deliverable D1.2-1 “Future Load Forecasts” in WP1, Task1.2 of the FLEXe project. It describes the data, time series, capturing the change profiles in comparison to the year 2011. In particular, this document describes, which components have been included to the change profiles.

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## 1. Introduction

In this work, the objective was to forecast changes in electricity consumption for the years 2030 and 2050. The baseline was fixed to the year 2011. In addition, VTT compiled a scenario paper detailing the major factors to be considered for the years 2030 and 2050. The factors costs, included heat and electricity production technologies, as well as transmission and traffic changes.

We limited here the study to changes in traffic and housing, including heating technology and electricity production. Furthermore, we considered the changes only from customers' perspective.

Technically, the objective was to compute the future electricity consumptions as hourly time series capturing the change with respect to the year 2011. All in all, we produce six such time series; three for the year 2030 and three for the year 2050.

This document describes the data obtained as change profiles with respect to the year 2011. The deliverable D1.2-6 describes the materials and methods used for obtaining the change profiles. The actual data is in the accompanying file "D1.2-6b. future load forecasts.xlsx"

## 2. Change profiles for the year 2030

The subsections describe the components and ratios that were used in computing the change profiles.

### 2.1 Scenario A

Buildings: 228 000 new houses from which

- 10% use ground heat pumps
- 20% use air heat pumps
- 30% are connected to district heating
- 40% use direct electric heating

Heating technology changes:

- 140 000 oil heated houses are converted to use ground heat pumps.
- 60 000 houses using direct electric heating are converted to use air heat pumps

Solar heating: 190 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Solar energy: 57 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Electric vehicles:

- 260 000 new electric vehicles are introduced to Finland

### 2.2 Scenario B

Buildings: 228 000 new houses from which

- 10% use ground heat pumps
- 25% use air heat pumps
- 25% are connected to district heating
- 35% use direct electric heating

Heating technology changes:

- 180 000 oil heated houses are converted to use ground heat pumps.
- 100 000 houses using direct electric heating are converted to use air heat pumps

Solar heating: 380 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Solar energy: 66 500 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Electric vehicles:

- 300 000 new electric vehicles are introduced to Finland

### 2.3 Scenario C

Buildings: 228 000 new houses from which

- 10% use ground heat pumps
- 25% use air heat pumps
- 25% are connected to district heating
- 35% use direct electric heating

Heating technology changes:

- 180 000 oil heated houses are converted to use ground heat pumps.
- 100 000 houses using direct electric heating are converted to use air heat pumps

Solar heating: 285 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Solar energy: 171 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Electric vehicles:

- 300 000 new electric vehicles are introduced to Finland

## 3. Change profiles for the year 2050

### 3.1 Scenario A

Buildings: 468 000 new houses from which

- 10% use ground heat pumps
- 25% use air heat pumps
- 25% are connected to district heating
- 35% use direct electric heating

Heating technology changes:

- 300 000 oil heated houses are converted to use ground heat pumps.
- 200 000 houses using direct electric heating are converted to use air heat pumps

Solar heating: 390 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Solar energy: 78 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Electric vehicles:

- 546 000 new electric vehicles are introduced to Finland

### 3.2 Scenario B

Buildings: 468 000 new houses from which

- 25% use ground heat pumps
- 35% use air heat pumps
- 15% are connected to district heating
- 25% use direct electric heating

Heating technology changes:

- 300 000 oil heated houses are converted to use ground heat pumps.
- 300 000 houses using direct electric heating are converted to use air heat pumps

Solar heating: 429 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Solar energy: 234 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Electric vehicles:

- 624 000 new electric vehicles are introduced to Finland

### 3.3 Scenario C

Buildings: 468 000 new houses from which

- 25% use ground heat pumps
- 35% use air heat pumps
- 15% are connected to district heating
- 25% use direct electric heating

Heating technology changes:

- 300 000 oil heated houses are converted to use ground heat pumps.
- 300 000 houses using direct electric heating are converted to use air heat pumps

Solar heating: 351 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Solar energy: 312 000 new installations from which

- 10% are installed into houses using ground heat pumps
- 40% are installed into houses using air heat pumps
- 50% are installed into houses using direct electric heating

Electric vehicles:

- 624 000 new electric vehicles are introduced to Finland

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