



## WP3

### Modelling and analyses to develop relevant business models

The main objective of WP3 is to investigate where and how balancing as a service may enter the markets and connect to the energy system, and assess the resulting economic opportunities for investors. The secondary objectives are as follows:

- Identify existing and future markets and assess relevant business models for hydropower capacity expansion and pumped storage projects.
- Analyse the expected payback for investors and the expected share of payback from different markets using existing simulation models for some specific cases.
- Simulate the operation of some specific hydropower plants subject to the most relevant business models.

#### Task 3.1 – Identification of markets

Identification of existing and future markets that can create payback options for hydropower investors. The current and expected future market structures in the relevant power markets will be reviewed in order to define suitable business models. Our analysis will also include an investigation of European prices in different market types (DA, ID, procurement & activation of different reserve qualities) and the operation of hydropower in future scenarios for integrated European power markets with increased Norwegian generation- and transmission capacity.

#### Task 3.2 – Analyses of payback

Analyses of the expected payback for the investors and the expected share of payback from the different markets will be performed. This task will depend on the identified market options in Task 3.1 and use the scenarios developed in WP1 to define specific cases to analyse. The analyses will be based on state-of-the-art models for hydropower scheduling, notably the ProdRisk model. In order to arrive at a flexible methodology, the work flow will be systemized. This subtask should also address the appropriateness of using a sequential approach for deriving the supply for each market, as opposed to a possible integrated approach.

#### Task 3.3 – Simulation of reservoir operations

Operation of specific hydropower plants and reservoirs will be simulated, based on the analyses carried out in Task 3.2. Major emphasis will be placed on discharge and reservoir utilisation. Expected water flows and reservoir head variations are important input to WP4 for assessment of the case-specific environmental impacts.