recharge.green – balancing Alpine energy and nature

The Alps have great potential for the use of renewable energy. Thereby they can make a valuable contribution to mitigating climate change. This, however, means increasing pressures on nature. What could be the impact of such changes on the habitats of animals and plants? How do they affect land use and soil quality? How much renewable energy can reasonably be used? The project recharge.green brings together 16 partners to develop strategies and tools for decision-making on such issues. The analysis and comparison of the costs and benefits of renewable energy, ecosystem services, and potential trade-offs is a key component in this process. The project will last from October 2012 to June 2015 and is co-financed by the European Regional Development Fund in the Alpine Space Programme.

www.recharge-green.eu

Choose the level of potential:

Theoretical

In this step, the user can visualize the maximum power which can be exploited in the river. The calculation considers the natural discharge of the river (not considering existing plants) and the elevation of the terrain. Indeed, the theoretical power is the product of the water density, the gravity, the discharge and the gross head.

Legend:

Output: Potential map (kW)*

MFD

MFD means Minimal Flow Discharge. It is the amount of water which has to remain in the river according to the law. Each region has its legislation and method to calculate it. The user has the possibility to consider the MFD as a percentage of the natural discharge (not considering existing water uses). In this step, the MFD can be the current one according to the local legislation, 25% or 50% of the natural discharge.

Legend:

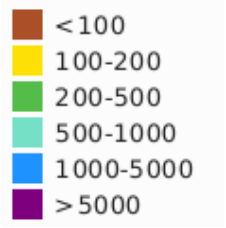
Output: Potential map (kW)*

Technical

In this step, the user can choose different length of the exploited segment. The segment is the one of the river which is not diverted, the structure (derivation channel and penstock) is computed but doesn't appear in the map (see info hydropower). The maximum plant length can be chosen between 100m, 400m, 800m or the longest possible length. The distance between plants is 10m for each case. The power calculated includes head losses in the structure, efficiency of the turbine and efficiencies of the shaft, alternator and transformer. The MFD considered can be the current one, 25% or 50% of the natural discharge.

Legend:

Output: Potential map (kW)*



Financial

After having computed the MFD and the technical structure, the user can assess the cost of each plant. It defines a Total cost that is the sum of the costs of compensation (ecological), excavation, supply and installation of pipelines and electro lines, grid connection, electro-mechanical, inlet and power station. The Net Present Value (NPV) is then calculated:

*NPV = depreciation rate * (Revenue – Maintenance cost) – Total cost*

The output are maps with the NPV according to different prices of energy (which increase the revenue): 0.1, 0.2 or 0.3 currency/kW. Thus, we can see which plant is feasible.

Legend:

Output: Net Present Value map (€)

* It is a mean power computer under several assumptions about discharge and with gross head depending on the DTM resolution. The data are an indication of the site potential that has to be verified with the current legislation and real data.