Offgridplanner Workshop

Set up user Account

Access the website at https://offgridplanner.org and sign up for an user account following the instructions (*Login/Sign Up -> Register here*). An activation email will be send to your provided email-address. In order to activate your account, you need to access your email and click on the provided link.

After your Account is activated, you will be asked whether or not you want to store a default example model in your account, please click yes.

Task 1 (This task is carried out step by step together with the presenters):

An off-grid system is to be planned for the Nigerian locality of Ikah Ichala (7.699508, 7.710631), to which

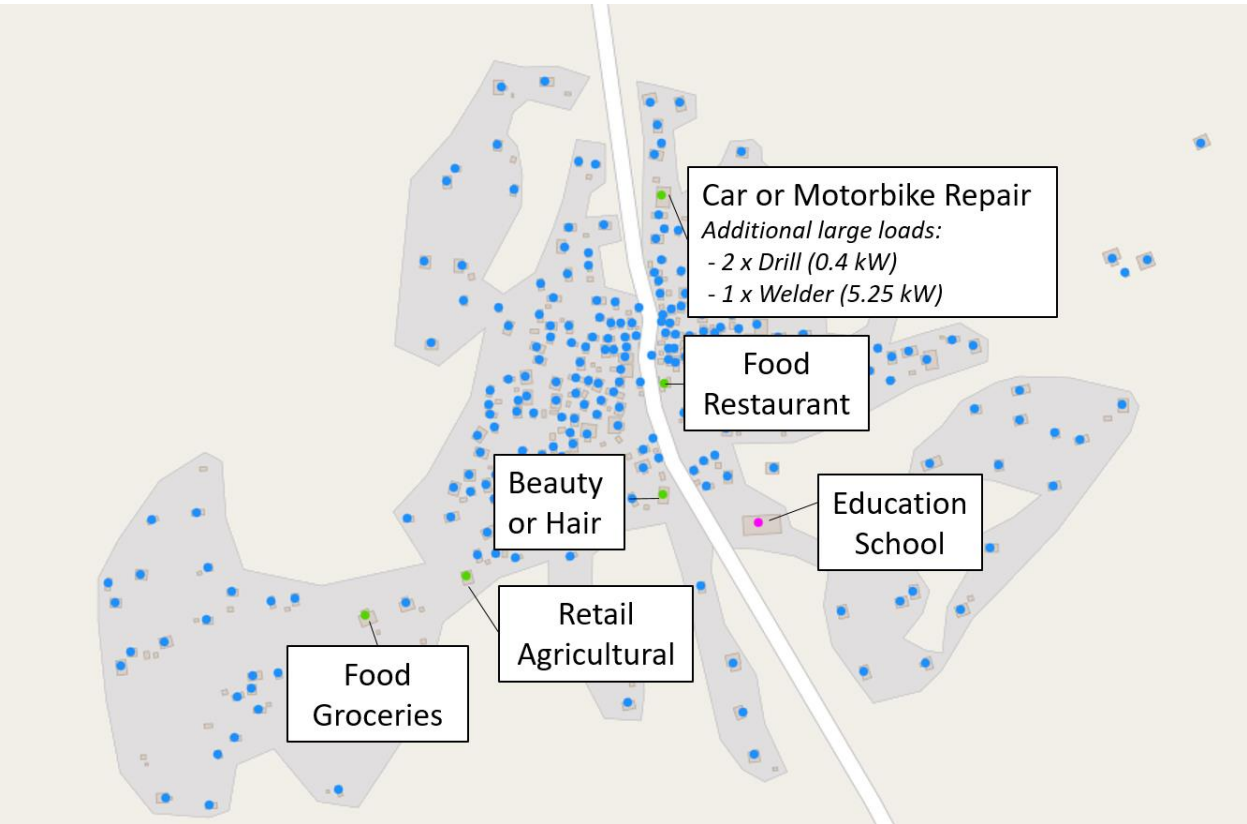


Figure 1: Specify enterprises and public services

all buildings in the village will be connected. The drawing tools are used to mark an area on the map where buildings are automatically identified as consumers. All consumers are defined as households by default. Change the consumer types to enterprise or public service for the consumers marked in Figure 1, and select the appropriate consumer categories.

On the demand estimation page, we will retain the preset value "national distribution", and on the grid design page, we will also keep the default values.

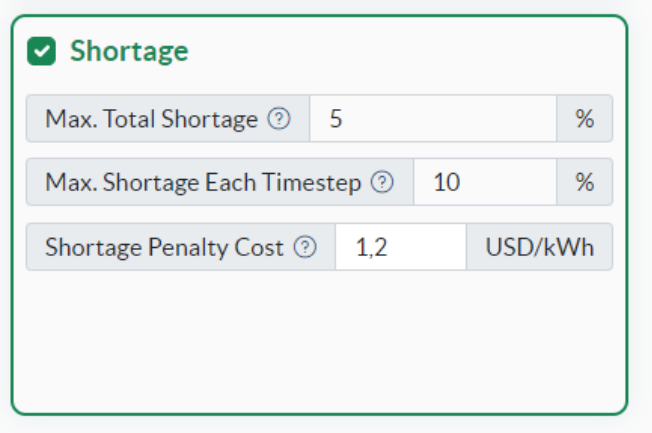
The power supply is to be equipped with a diesel generator and a PV system and should also have a battery system.

Task 2:

The model created in Task 1 should now be adjusted. To do this, we first create a copy of our existing project on our project overview page and then edit it. Currently, all buildings of the place have been connected to the grid. However, the tool *offgridplanner* also allows for the identification of consumers with high connection costs; these can optionally be equipped with solar home systems to reduce the cost of grid construction and thus the LCOE of the off-grids. For this purpose, the option *Solar-Home-System* is first activated under *Grid Design*, and then a value for the parameter *Max. Specific Grid Cost* is specified. This is initially set to 0.70 cents/kWh and then to 50. Observe on the result page how this affects the upfront investment costs of the grid as well as the LCOE.

Task 3:

Next, we want to make changes to the supply system. So far, we have not selected the "shortage" option on the Energy System Design page. This means that, up until now, the supply system had to cover the demand at every timestep. However, covering all peak loads can significantly increase the costs for an energy system. Therefore, we will now somewhat limit this requirement and allow an undercoverage of the demand of 5% over the year; at individual timesteps, an undercoverage of 10% is permitted. Observe the effects on the installed capacities and the LCOE.



Task 4

Until now, we had assumed that there are no existing power supply units on site and all components would need to be procured. However, since a 25 kW motor is already in place, the simulation mode of the diesel genset is now switched from design to dispatch under Energy System Design, and the capacity

is stated as per the existing motor. This implies that the optimization model will no longer determine the size of the diesel genset, as this is now user-defined. The model only identifies when the diesel genset will be deployed. Since the investment in the diesel genset has already been made, it is not included in the considerations; thus, the investment costs (CapEx) are set to zero.

Task 5

In the final task, we aim to explore the planning of an energy system solely equipped with PV and a battery system, excluding a diesel genset. To do this, we deactivate the diesel genset option on the Energy System Design page and execute the calculation again.

We observe that with the current settings, without a diesel genset, it is not possible to meet the condition of covering at least 90% of the demand at each timestep. To enable the solver to find a solution, we must allow individual timesteps where the demand cannot be met (setting Max. Shortage Each Timestep to 100%).

We experiment with different levels of total allowable shortage. Firstly, we set the Max. Total Shortage to 10% and execute the calculation to observe the impact on the energy system's design and performance. Then, we adjust the Max. Total Shortage to 20% and re-calculate to compare the outcomes.