Test plan support

The competition already defines the general scope and deadline for the testing process, which usually goes into a test plan. For Phase II, the function of a single distributed embedded energy converter needs to be demonstrated in laboratory conditions with external actuation. The testing process can happen anytime for the purpose of the test report (to be submitted May 07, 2024), but the testing (or a subset thereof) needs to be repeated for a live virtual demonstration to the Prize administration.

The bulk test plan needs to be defined by the prize participants and could contain the following sections, which are oriented by the requirements for the test report presented in Table 13. The examples are by no means comprehensive and are made up for demonstration.

1. Objectives
   1. Generally, you want to show how your innovation can be useful to the community.
      1. Refer to Table 3 for parameter ranges found in a ocean wave environment.
      2. Refer to Table 4 for parameter ranges expected at an individual DEEC. Those can vary for your innovation!
      3. Refer to Table 13 "Explanation of the physics represented in the testing process" for more detailed requirements for the test report which will help you formulate a test objective and the test variables.
   2. The actual objective will be submission specific.
      1. Example 1: Demonstrate the ability of an individual DEEC to convert external linear-oscillatory actuation into electricity.
      2. Example 2: Demonstrate the ability of an individual DEEC to convert external uniform fluid flow into electricity
      3. Example 3: Demonstrate the ability of a subcomponent to convert external actuation into output actuation that is favorable for energy conversion into electricity with a certain type of DEEC.
2. Test variables
   1. Objective specific
      1. Example 1:
         1. Input: Linear displacement amplitude and frequency
         2. Output: voltage and current
      2. Example 2:
         1. Input: Volumetric flow and pressure
         2. Output: voltage and current
      3. Example 3:
         1. Input: Linear force amplitude and frequency
         2. Output: Altered linear force amplitude and frequency
   2. Ranges of input variables are submission specific.
      1. Provide reasoning to how you derived the desired input ranges.
         1. Example 1:
            1. Wave amplitude of 1m --> 50 DEECS per meter --> 2cm linear actuation amplitude per DEEC
            2. Wave frequency of 0.1Hz --> same for DEEC
3. Hardware requirements
   1. Describe the actuators / equipment needed to achieve your input variables.
   2. Describe the apparatus holding the DEEC in place.
4. Instrumentation
   1. Description how inputs and outputs are measured, including instrumentation, sensors, changeover time, run duration(s), and overall timing of the test.
5. Test procedure
   1. Step-by-step outline of the planned test and how variables are varied.
      1. Example:
         1. Power on measuring instruments
         2. Activate DEEC
         3. Power on actuator
         4. Start data logging
         5. Supply input signal
            1. Gradually increase actuation in the beginning
            2. Gradually decrease actuation towards the end
         6. Note behavior /observations in test log.
         7. Repeat 5-6 with different input signals.
         8. Repeat 5-7 with different DEEC control parameters (e.g. priming voltage / pretension)
6. Data collection
   1. Any post-processing and/or filtering?
7. Performance criteria
   1. What ideal outputs would you like to see?
8. Safety measures
9. Documentation
   1. Maintain test log with experiment setup, time, and results.