Claims:

1. A method (100) for establishing and/or improving a simulation model (2) of an electrolyzer plant (1) comprising at least one electrolyzer, wherein the simulation model (2) is configured to map one or more variables (3) that characterize an operating state (1a) of the electrolyzer plant (1) to one or more performance indicators (4) of the electrolyzer plant (1), the method comprising the steps of:
   - predicting (110), using the simulation model (2), for a given operating state (1a) of the electrolyzer plant (1), one or more prediction values (5#) of at least one quantity (5);
   - obtaining (120) one or more measurement values (5*) of the same at least one quantity (5) that relate to the same given operating state (1a) of the electrolyzer plant (1);
   - determining (130) at least one deviation (Δ) of the one or more prediction values (5#) from the respective measurement values (5*);
   - determining (140), from the deviation (Δ) and the simulation model (2), a contribution and/or an adjustment (2a) to the simulation model (2); and
   - applying (150) the contribution, and/or the adjustment (2a), to the simulation model (2).
2. The method (100) of claim 1, wherein the given operating state (1a) and the measurement values (5*) are acquired (121) during normal operation of the electrolyzer plant (1).
3. The method (100) of any one of claims 1 or 2, wherein the electrolyzer plant (1) is steered (122) into a given operating state (1a) that is not part of the normal operation of the electrolyzer plant (1), and the response of one or more measurement values (5*) to this steering is determined (123).
4. The method (100) of claim 3, wherein voltage and/or current fluctuations are introduced (122a) into at least one electrolyzer cell of the electrolyzer plant (1), and the response of the current through the at least one electrolyzer cell, and/or of the voltage over the at least one electrolyzer cell, to these voltage and/or current fluctuations is measured (123a).
5. The method of any one of claims 3 to 4, wherein only one of multiple variables (3) that characterize the operating state (1a) is varied

(122b), and the response of the at least one quantity (5) to this variation is measured (123b).

6. The method of claim 5, wherein the temperature of at least one electrolyzer cell of the electrolyzer plant (1) is chosen as the variable to be varied.

7. The method (100) of any one of claims 1 to 6, wherein the performance indicator (4) comprises: a production quantity of hydrogen, and/or a degradation state of at least one electrolyzer cell of the electrolyzer plant (1), and/or an energy efficiency of the electrolyzer plant (1), and/or an amount of waste heat generated by the electrolyzer plant (1).

8. The method of any one of claims 1 to 7, wherein the quantity (5) comprises (111) the performance indicator (4), and/or at least one physical quantity that the simulation model (2) uses for the computation of the performance indicator (4) from the variables (3).

9. The method (100) of any one of claims 1 to 8, wherein the contribution, and/or the adjustment (2a), to the simulation model (2) comprises (141) one or more of:

- a change to parameters in a parametrized function of the variables (3);
- a change to the set of variables (3);
- a change of a function of the variables (3) to a function of a different degree and/or type, and/or to a different function;
- a change to a level of complexity of the simulation model (2); and
- a change to a set of physical effects that are considered or neglected by the simulation model (2).

10. The method (100) of any one of claims 1 to 9, wherein the determining (140) of the contribution, and/or the adjustment (2a), comprises (142) fitting at least one function of the variables (3), and/or of a computation result derived from the variables (3), to a plurality of measurement values (5*).

11. The method (100) of claim 10, wherein, during the fitting (142), the measurement values (5*) are weighted (142a) according to one or more of:

- the frequency with which they occur;
- their age; and
- an estimate of their accuracy.

12. The method (100) of any one of claims 1 to 11, further comprising:
    - tracking (160) the evolution (2a') of a contribution and/or adjustment (2a) to the simulation model (2) over time; and
    - evaluating (170), from said evolution (2a'), a degradation behaviour (1b), and/or an abnormal operating state (1c), of the electrolyzer plant (1).

13. A computer program, comprising machine-readable instructions that, when executed on one or more computers, cause the one or more computers to perform the method of any one of claims 1 to 12.

14. A non-transitory storage medium, and/or a download product, with the computer program of claim 13.

15. One or more computers with the computer program of claim 13, and/or with the non-transitory storage medium and/or download product of claim 14.