WE CLAIM:

1. A method for operating a waste-water treatment plant (WWTP)(110), the method comprising:

receiving, by a processor (202), waste-water treatment plant related data, water demand data and solar data;

obtaining, by the processor (202), one or more data prediction models comprising at least one of: a solar profile prediction model, an energy profile prediction model, an effluent profile prediction model, and a water demand prediction model;

determining, by the processor (202), an energy usage of the WWTP (110) using one or more objective functions (310, 340) derived based, at least in part, on the one or more data prediction models; and

determining, by the processor (202), one or more control parameters for operating the WWTP (110) based, at least in part, on the determined energy usage of the WWTP (110).

2. The method as claimed in claim 1, wherein a first objective function (310) of the one or more objective functions is associated with a first set of parameters related to at least: a solar energy profile, an energy demand profile, and a water demand profile for maximizing use of solar energy.

3. The method as claimed in claim 2, wherein the solar energy profile for a day is predicted by the solar profile prediction model based on the solar data; and

wherein the energy demand profile for a day is predicted by the energy profile prediction model based on at least WWTP component data; and

wherein the water demand profile for a day is predicted by the water demand prediction model based on at least: a storage capacity in the WWTP (110), amount of waste-water and the water demand data.

4. The method as claimed in claim 2, wherein the first set of parameters are determined based on a first set of constraints related to at least water storage constraints and water demand constraints.

5. The method as claimed in claim 1, wherein a second objective function (340) of the one or more objective functions is associated with a second set of parameters related to at least: an influent flowrate, a returned sludge flow, a pH of effluent, an average temperature, an average airflow rate, and an effluent profile for minimizing pollutants in the effluent and minimizing overall energy used by the WWTP (110).

6. The method as claimed in claim 5, wherein the effluent profile is predicted by the effluent profile prediction model based on influent data and effluent data.

7. The method as claimed in claim 5, wherein the second set of parameters are determined based on a second set of constraints related to an amount of dissolved oxygen and effluent concentration.

8. The method as claimed in claim 1, wherein a third objective function (360) of the one or more objective functions is associated with a third set of parameters related to at least: a solar energy profile, an energy demand profile, a water demand profile, an influent flowrate, a returned sludge flow, a pH of effluent, an average temperature, an average airflow rate, and an effluent profile for efficiently utilizing energy by the WWTP (110).

9. The method as claimed in claim 1, wherein the one or more control parameters for operating the WWTP (110) comprises at least one of: a schedule for operating components of the WWTP (110), a number of components of the WWTP (110), a rate of operating the components of the WWTP (110), and water quality control points.

10. The method as claimed in claim 1, wherein a performance of each data prediction model of the one or more data prediction models is evaluated at a predefined time and compared with a threshold to determine a deviation in performance.

11. The method as claimed in claim 10, wherein the data prediction model of the one or more data prediction models with deviation in the performance is updated to meet the threshold.

12. The method as claimed in claim 1, wherein the waste-water treatment plant related data comprises at least: influent data, effluent data, and WWTP component data; and

wherein the one or more data prediction models are generated based, at least in part, on the waste-water treatment plant related data and the solar data.

13. A system (150) for operating a waste water treatment plant (WWTP) (110), the system (150) comprising:

a memory (204) configured to store instructions (205); and

a processor (202) configured to execute the instructions (205) stored in the memory (204) and thereby cause the system to:

receive waste-water treatment plant related data, water demand data and solar data;

obtain one or more data prediction models comprising at least one of: a solar profile prediction model, an energy profile prediction model, an effluent profile prediction model, and a water demand prediction model;

determine an energy usage of the WWTP (110) using one or more objective functions derived based, at least in part, on the one or more data prediction models; and

determine one or more control parameters for operating the WWTP (110) based, at least in part, on the determined energy usage of the WWTP (110).

14. The system as claimed in claim 13, wherein a first objective function (310) of the one or more objective functions is associated with a first set of parameters related to at least: a solar energy profile, an energy demand profile, and a water demand profile for maximizing use of solar energy.

15. The system (150) as claimed in claim 14, wherein the solar energy profile for a day is predicted by the solar profile prediction model based on the solar data; and

wherein the energy demand profile for a day is predicted by the energy profile prediction model based on at least WWTP component data; and

wherein the water demand profile for a day is predicted by the water demand prediction model based on at least: a storage capacity in the WWTP, amount of waste-water and the water demand data.

16. The system (150) as claimed in claim 14, wherein the first set of parameters are determined based on a first set of constraints related to at least water storage constraints and water demand constraints.

17. The system (150) as claimed in claim 13, wherein a second objective function (340) of the one or more objective functions is associated with a second set of parameters related to at least: an influent flowrate, a returned sludge flow, a pH of effluent, an average temperature, an average airflow rate, and an effluent profile for minimizing pollutants in the effluent and minimizing overall energy used by the WWTP (110).

18. The system (150) as claimed in claim 17, wherein the effluent profile is predicted by the effluent profile prediction model based on the influent data and the effluent data.

19. The system (150) as claimed in claim 17, wherein the second set of parameters are determined based on a second set of constraints related to an amount of dissolved oxygen and effluent concentration.

20. The system (150) as claimed in claim 13, wherein a third objective function (360) of the one or more objective functions is associated with a third set of parameters related to at least: a solar energy profile, an energy demand profile, a water demand profile, an influent flowrate, a returned sludge flow, a pH of effluent, an average temperature, an average airflow rate, and an effluent profile for efficiently utilizing energy by the WWTP (110).

21. The system (150) as claimed in claim 13, wherein the one or more control parameters for operating the WWTP (110) comprises at least one of: a schedule for operating components of the WWTP (110), a number of components of the WWTP (110), a rate of operating the components of the WWTP (110), and water quality control points.

22. The system (150) as claimed in claim 13, wherein a performance of each data prediction model of the one or more data prediction models is evaluated at a predefined time and compared with a threshold to determine a deviation in performance.

23. The system (150) as claimed in claim 22, wherein the data prediction model of the one or more data prediction models with deviation in the performance is updated to meet the threshold.

24. The system (150) as claimed in claim 13, wherein the waste-water treatment plant related data comprises at least influent data, effluent data, and WWTP component data; and

wherein the one or more data prediction models are generated based, at least in part, on the waste-water treatment plant related data and the solar data.