Claims

1. Apparatus (10) for generating evaluation data of one or more facilities (1a, 1b, 1c) and/or one or more projects comprising:

one or more first interfaces (2) configured to automatically receive measuring data from the one or more facilities (1a, 1b, 1c) via a network (11); and

one or more evaluation units (3), connected to the one or more first interfaces (2), including:

one or more data storages (4) configured to store the measuring data of the one or more facilities (1a, 1b, 1c),

one or more calculation units (6a, 6b, 6c) configured to calculate performance parameters based on the measuring data of the one or more facilities (1a, 1b, 1c) for evaluating the one or more facilities, and

one or more aggregation units (7) configured to combine the calculated performance parameters according to a predetermined combination as aggregated project data for evaluating the one or more projects, wherein

the one or more evaluation units (3) are configured to calculate the performance parameters and to aggregate the project data on distributed computer resources,

wherein the apparatus (10) is configured to store the measuring data, calculation instructions of the performance parameters and processing instructions of the aggregated project data as well as the calculated performance parameters and the aggregated project data in a blockchain, and

the apparatus (10) further comprises:

a plurality of peers (12, 12a to 12g) each including the one or more evaluation units (3), wherein the one or more evaluation units are configured to execute a smart contract including the calculation instructions of the performance parameters and the processing instructions of the aggregated project data; and

an ownership controller (14) configured to define a participation of each peer to one or more channels according to their participation to one or more projects, and to define peers for executing the smart contract.

2. The apparatus (10) according to claim 1, wherein the one or more evaluation units (3) are configured to encrypt the measuring data, the performance parameters and the aggregated project data.

3. The apparatus (10) according to claim 1 or 2, wherein the ownership controller (14) is configured to choose a first group of peers (12, 12a to 12g) for performing a smart contract execution when new measuring data is received by the first interface (2), wherein the measuring data is allocated to one or more channels.

4. The apparatus (10) according to claim 3, wherein the ownership controller (14) is configured to choose the first group of peers (12, 12a to 12g) according to information about the calculation instructions and/or the processing instructions included in the smart contract of each peer (12, 12a to 12g).

5. The apparatus (10) according to claim 3 or claim 4, wherein the ownership controller is configured to choose all peers (12, 12a to 12g) participating in the one or more channels to which the measuring data is allocated to as a second group of peers (12, 12a to 12g), wherein the first group of peers (12, 12a to 12g) is larger than the second group of peers (12, 12a to 12g) and the second group of pears (12, 12a to 12g) is included in the first group of peers (12, 12a to 12g).

6. The apparatus (10) according to claim 5, wherein peers (12, 12a to 12g) which are included in the first group but not in the second group of peers (12, 12a to 12g) are configured to delete results of the smart contract execution when a data confirmation in the blockchain is completed, and

   peers (12, 12a to 12g) which are included in the first and the second group of peers (12, 12a to 12g) are configured to store the results of the smart contract execution in the database (4) when the data confirmation in the blockchain is completed.

7. The apparatus (10) according to any one of the preceding claims 1 to 6, configured to store data of a last block of the blockchain or statistics about projects in an off-chain database (14).

8. The apparatus (10) according to any one of the preceding claims 1 to 7, further comprising:

one or more second interfaces (8), connected to the one or more evaluation units (3), configured to receive a request from one or more user interfaces (9) for generating a report based on a set of evaluation data including the performance parameters and/or the aggregated project data, and

to output the requested report from the one or more second interfaces (8) to the one or more user interfaces (9) via the network (11).

9. A system for generating evaluation data of one or more facilities (1a, 1b, 1c) and/or one or more projects comprising:

the apparatus (10) according to any one of the preceding claims 1 to 8;

one or more facilities (1a, 1b, 1c) connected to said apparatus (10) via a network (11) and configured to automatically send measuring data to the apparatus (10) in predetermined time intervals; and

one or more user interfaces (9) connected to said apparatus (10) via the network (11) and configured to request and receive automatically generated reports based on a set of evaluation data including performance parameters and/or aggregated project data.

10. The system according to claim 9, wherein the one or more facilities include one or more edge servers (100a, 100b, 100c) configured to pseudonymize and/or anonymize the measuring data.

11. A method for generating evaluation data of one or more facilities (1a, 1b, 1c) and/or one or more projects comprising the steps:

automatically receiving measuring data from the one or more facilities (1a, 1b, 1c) via a network (11) by one or more first interfaces (2);

storing the measuring data of the one or more facilities (1a, 1b, 1c) by one or more data storages (4) included in one or more evaluation units (3);

calculating performance parameters based on the measuring data of the one or more facilities (1a, 1b, 1c) for evaluating the one or more facilities; and

combining the calculated performance parameters according to a predetermined combination as aggregated project data for evaluating the one or more projects, wherein

the calculation of the performance parameters and the aggregation of the project data is performed by the one or more evaluation units (3) on distributed computer resources,

wherein the measuring data, a calculation instruction of the performance parameters and a processing instruction of the aggregated project data as well as the performance parameters and the aggregated project data are stored in a blockchain, and

the method further comprises:

executing a smart contract including the calculation instructions of the performance parameters and the processing instructions of the aggregated project data by one or more evaluation units, each included in a peer (12, 12a to 12g); and

defining the participation of each peer to one or more channels according to their participation to one or more projects, and defining peers for executing the smart contract by an ownership controller (14).

12. The method according to claim 11, wherein the measuring data, the performance parameters and the aggregated project data are encrypted by the one or more evaluation units (3).

13. The method according to claim 11 or 12, further comprising the steps

choosing a first group of peers (12, 12a to 12g) by the ownership controller (14) for performing a smart contract execution when new measuring data is received by the first interface (2), wherein the measuring data is allocated to one or more channels, and wherein the first group of peers (12, 12a to 12g) is

chosen according to information about the calculation instructions and/or the processing instructions included in the smart contract of each peer (12, 12a to 12g); and

choosing the peers (12, 12a to 12g) belonging to the one or more channels the measuring data is allocated to as a second group of peers (12, 12a to 12g) by the ownership controller (14), wherein the first group of peers (12, 12a to 12g) is larger than the second group of peers (12, 12a to 12g) and the second group of pears (12, 12a to 12g) is included in the first group of peers (12, 12a to 12g).

14. The method according to claim 13, wherein,

when a data confirmation in the blockchain is completed,

results of the smart contract execution are deleted by peers (12, 12a to 12g) which are included in the first group but not in the second group of peers (12, 12a to 12g); and the results of the smart contract execution are stored in the database (4) by peers (12, 12a to 12g) which are included in the first and the second group of peers (12, 12a to 12g).

15. The method according to any one of the preceding claims 11 to 14, wherein data of a last block of the block chain or statistics about projects are stored in an off-chain database (14).

16. The method according to any one of the preceding claims 11 to 15, further comprising the steps:

receiving a request from one or more user interfaces (9) for generating a report based on a set of evaluation data including the performance parameters and the aggregated project data by one or more second interfaces (8), connected to the one or more evaluation units (3); and

outputting the requested report from the one or more second interfaces (8) to the one or more user interfaces (9) via the network (11).

17. A computer program product storable in a memory comprising instructions which, when carried out by a computer, cause the computer to perform the method according to any one of the preceding claims 11 to 16.