WHAT IS CLAIMED IS:

1. A range extender vehicle, comprising wheels (11) and a vehicle frame (12), wherein the range extender vehicle further comprises:

a turboshaft engine (1) arranged on a chassis of the vehicle frame (12); a turboshaft engine controller (2); a generator (3); a battery pack (4); a battery controller (5); driving motors (6), a battery radiator (7), a gasholder (9), a thermal energy recycling device (13); a thermal energy transmission pipe (14) and a compressed air heater (15);

a signal end of the turboshaft engine (1) is connected to the turboshaft engine controller (2), a transmission shaft of the turboshaft engine (1) is connected to a rotation shaft of the generator (3) and is configured to drive the generator (3) to produce electric energy;

the generator (3) is configured to output the produced electric energy to the battery pack (4) and the driving motors (6); the battery pack (4) is connected to the driving motors (6), and a signal end of the battery pack (4) is connected to the battery controller (5);

a power transmission shaft of each of the driving motors (6) is connected to a driving shaft of the corresponding wheel (11);

a cold-air channel of the battery radiator (7) is connected to the battery pack (4);

a gas-transmission pipe of the gasholder (9) is connected to a gas-inputting pipe of a combustor of the turboshaft engine (1), for providing gas to the turboshaft engine (1);

the thermal energy recycling device (13) is arranged at a tail end of the combustor of the turboshaft engine (1), for absorbing thermal energy produced by burning gas in the turboshaft engine (1);

an input end of the thermal energy transmission pipe (14) is connected to the thermal energy recycling device (13), and an output end of the thermal energy transmission pipe (13) is connected to the compressed air heater (15);

two branch pipes are arranged at an output end of the compressor air heater (15), a first pipe of the two branch pipes is connected to an inlet of the combustor of the turboshaft engine (1), for heating gas entered into the turboshaft engine (1), and a second pipe of the two branch pipes is connected to a warm-air outlet of the vehicle, for vehicle heating.

2. The range extender vehicle according to claim 1, further comprising:

a central controller (10);

wherein a signal end of the generator (3), the signal end of the battery pack (4) and signal ends of the driving motors (6) are connected to the central controller (10), and the generator (3) is configured to output electric energy of rated power to the battery pack (4) and the driving motors (6) according to a control ratio provided by the central controller (10).

3. The range extender vehicle according to claim 1 or 2, further comprising:

a battery thermal energy management system (8);

wherein the battery thermal energy management system (8) comprises a temperature sensor and an actuator, the temperature sensor is connected to the actuator via a signal line, the temperature sensor is arranged at a surface of the battery pack (4), and the actuator is connected to a switch of the turboshaft engine (1).

4. The range extender vehicle according to any one of claims 1 to 3, wherein the thermal energy recycling device (13) comprises a fin typed heat-exchanger.

5. The range extender vehicle according to any one of claims 1 to 4, comprising two or four driving motors (6).

6. The range extender vehicle according to any one of claims 1 to 5, wherein the turboshaft engine comprises:

a combustor (1-1), a pressure-regulating nozzle (1-2), an intake turbine (1-3), an outtake turbine (1-4), a tailpipe (1-5) and a transmission shaft (1-6);

wherein the intake turbine (1-3) employs a first turbine rotor with suspension rotation mode on which first guide vanes are arranged, and the first guide vanes are mounted at an inlet of a gas-inputting pipe of the combustor (1-1), and the first guide vanes are configured to guide gas to the gas-inputting pipe;

an inlet of the combustor (1-1) is connected to the gas-inputting pipe, and a tail end of the combustor (1-1) is provided with the transmission shaft (1-6) and the outtake turbine (1-4).

7. The range extender vehicle according to claim 6, wherein the outtake turbine (1-4) employs a second turbine rotor with suspension rotation mode on which second guide vanes are arranged, wherein an outlet of a cavity where the second guide vanes are located is connected to an inlet of the tailpipe (1-5); the pressure-regulating nozzle (1-2) is arranged at the front of the inlet of the combustor (1-1), to regular a gas pressure for entering into the combustor (1-1).

8. A method for charging the range extender vehicle according to any one of claims 1 to 7, comprising:

a static charge mode: when the driving motors (6) are not in operation, controlling, via the central controller (10), the generator (3) to charge the battery pack (4) slowly or quickly;

a moving charge mode: when the driving motors (6) work under a standard power, controlling, via the central controller (10), the generator (3) to supply power to the battery pack (4); when the driving motors (6) work under an extra-high power, controlling, via the central controller (10), the generator (3) and the battery pack (4) to supply power to the driving motors (6) together;

when the battery pack (4) is exhausted and it is required a high performance of driving, controlling, via the central controller (10), the generator (3) to directly drive the driving motors (6) with a huge power and not charge the battery pack (4); when power consumption is reduced such that the driving motors (6) work under the standard power, entering to the moving charge mode; when the vehicle is stopped, entering the static charge mode automatically.