CLAIMS

1. A system comprising:

a reformer configured to reform ammonia (NH_3) at an ammonia flowrate to generate a reformate gas comprising hydrogen (H_2) and nitrogen (N_2), wherein the reformer includes a catalyst therein;

an electrical heater configured to heat the catalyst to a target temperature that is at least about 400 °C;

a combustion heater configured to combust at least a first part of the H_2 in the reformate gas to heat the catalyst to maintain the target temperature;

a fuel cell configured to process at least a second part of the H_2 in the reformate gas to generate electricity for an electrical load;

a battery configured to provide power for at least part of the electrical load in response to the electrical load being greater than the electricity generated by the fuel cell; and

a controller programmed to perform one or more of the following steps in response to a state of charge of the battery being less than a charge threshold: increasing the ammonia flowrate, or limiting the electrical load.

2. The system of claim 1, wherein the controller is further configured to perform one or more of the following steps in response to the electrical load being less than the electricity generated by the one or more fuel cells: charging the battery, or decreasing the ammonia flowrate.

3. The system of claim 1, wherein the system further comprises an ammonia storage tank configured to store the NH_3.

4. The system of claim 1, wherein the system further comprises an ammonia storage tank configured to store the NH_3 as a liquid at a temperature greater than about 15 °C to less than about 30 °C and at an absolute pressure greater than about 7 bar and less than about 12 bar.

5. The system of claim 1, wherein the system further comprises an ammonia storage tank configured to store the NH_3 as a liquid at a temperature greater than about -40 °C to less than about 20 °C and at an absolute pressure greater than about 0.5 bar to less than about 9 bar.

6. The system of claim 1, wherein the electrical load includes a motor of a vehicle.

7. The system of claim 6, wherein the vehicle is a maritime vehicle.

8. The system of claim 7, wherein the maritime vehicle is a ship.

9. The system of claim 6, wherein the vehicle is a terrestrial vehicle.

10. The system of claim 9, wherein the terrestrial vehicle is an automobile, a tractor, or a truck.

11. A method comprising:

electrically heating a catalyst in a reformer to a target temperature that is at least about 400 °C;

contacting ammonia (NH_3) with the catalyst to reform the NH_3 at an ammonia flowrate to generate a reformate gas comprising hydrogen (H_2) and nitrogen (N_2);

combusting at least a first part of the H_2 in the reformate gas in a combustion heater to heat the catalyst to maintain the target temperature;

processing at least a second part of the H_2 in the reformate gas in a fuel cell to generate electricity for an electrical load;

providing power from a battery for at least part of the electrical load in response to the electrical load being greater than the electricity generated by the fuel cell; and

performing via a controller one or more of the following steps in response to a state of charge of the battery being less than a charge threshold: increasing the ammonia flowrate, or limiting the electrical load.

12. The method of claim 11, further comprising performing via the controller one or more of the following steps in response to the electrical load being less than the electricity generated by the one or more fuel cells: charging the battery, or decreasing the ammonia flowrate.

13. The method of claim 11, further comprising flowing the NH_3 to the catalyst from an ammonia storage tank configured to store the NH_3.

14. The method of claim 13, wherein the ammonia storage tank is configured to store the NH_3 as a liquid at a temperature greater than about 15 °C to less than about 30 °C and at an absolute pressure greater than about 7 bar and less than about 12 bar.

15. The method of claim 13, wherein the ammonia storage tank is configured to store the NH_3 as a liquid at a temperature greater than about -40 °C to less than about 20 °C and at an absolute pressure greater than about 0.5 bar to less than about 9 bar.

16. ‘The system of claim 11, wherein the electrical load is a propulsion device of a vehicle.

17. The system of claim 16, wherein the vehicle is a maritime vehicle.

18. The system of claim 17, wherein the maritime vehicle is a boat or a ship.

19. The system of claim 16, wherein the vehicle is a terrestrial vehicle.

20. The system of claim 19, wherein the terrestrial vehicle is an automobile, a tractor, or a truck.