## Summary

One embodiment of the present ~~invention~~disclosure is a unique method for operating an engine. Another embodiment is a unique engine system. Other embodiments include apparatuses, systems, devices, hardware, methods, and combinations for engines and engine systems. Further embodiments, forms, features, aspects, benefits, and advantages of the present application will become apparent from the description and figures provided herewith.

In one aspect, there is provided a method for operating engine, comprising:

providing a combustion chamber of the engine with a fuel;

starting the engine using the fuel;

supplying an oxidant having an oxygen content greater than that of ambient air without using stored oxygen;

starting a reformer, wherein the reformer is configured to reform at least some of the fuel using the oxidant;

transitioning from the provision of fuel to the combustion chamber to a provision of reformed fuel; and

providing only reformed fuel to the combustion chamber.

In another aspect, there is provided a method for operating an engine, comprising:

supplying an oxidant having an oxygen content greater than that of ambient air without using stored oxygen;

operating a reformer to reform a fuel using the oxidant;

supplying a first portion of the reformed fuel to a combustion chamber of the engine during engine operation;

venting a second portion of the reformed fuel; wherein the first portion and

the second portion are supplied to the respective combustion chamber and venting location at a first ratio;

changing an engine operating condition; and

supplying the first portion and the second portion to the respective combustion chamber and venting location at a second ratio in response to the change in the engine operating condition.

In another aspect, there is provided an engine system, comprising :

an engine;

an oxidant system configured to provide an oxidant, and configured to provide an oxygen content of the oxidant having a value that exceeds the oxygen content of ambient atmospheric air, wherein the oxidant system is configured to provide the oxidant without the use of stored oxygen;

a reformer in fluid communication with the oxidant system and a source of fuel, wherein the reformer is configured to receive the oxidant and fuel received from the source of fuel, and to reform the fuel;

a cooler in fluid communication with the reformer and configured to reduce the temperature of the reformed fuel output by the reformer; and

a combustion chamber of the engine in fluid communication with the cooler, wherein the combustion chamber is configured to receive the cooled reformed fuel from the cooler.

In another aspect, there is provided an engine system, comprising:

an engine;

an oxidant system configured to provide an oxidant, and configured to provide an oxygen content of the oxidant having a value that exceeds the oxygen content of ambient atmospheric air, wherein the oxidant system is configured to provide the oxidant without the use of stored oxygen;

a reformer configured to receive the oxidant and a fuel and to reform the fuel using the oxidant;

a combustion chamber of the engine in fluid communication with the reformer, wherein reformed fuel is received into the combustion chamber; and

a valve system configured to transition between 100% unreformed fuel and 0% reformed fuel supplied to the combustion chamber and 0% unreformed fuel and 100% reformed fuel supplied to the combustion chamber.

In another aspect, there is provided an engine system, comprising:

an engine;

an oxidant system configured to provide an oxidant, and configured to provide an oxygen content of the oxidant having a value that exceeds the oxygen content of ambient atmospheric air, wherein the oxidant system is configured to provide the oxidant without the use of stored oxygen;

a reformer configured to receive the oxidant and a fuel and to reform the fuel using the oxidant;

a combustion chamber of the engine in fluid communication with the reformer, wherein reformed fuel is received into the combustion chamber;

an engine air intake; and

a valve in fluid communication between the reformer and the air intake, wherein the valve is configured to control an amount of flow of the reformed fuel to the combustion chamber by venting a portion of the reformed fuel.

In another aspect, there is provided an engine system, comprising:

an engine;

an oxidant system configured to provide an oxidant, and configured to provide an oxygen content of the oxidant having a value that exceeds the oxygen content of ambient atmospheric air, wherein the oxidant system is configured to provide the oxidant without the use of stored oxygen;

a reformer configured to receive the oxidant and a fuel and to reform the fuel using the oxidant; and

a combustion chamber of the engine in fluid communication with the reformer, wherein reformed fuel is received into the combustion chamber.

In another aspect, there is provided a method for operating an engine, comprising:

supplying an oxidant having an oxygen content greater than that of ambient air without using stored oxygen;

operating a reformer, wherein the reformer is configured to reform a fuel using the oxidant; and

providing reformed fuel from the reformer to a combustion chamber.