What is claimed is

1. An apparatus comprising:

a tuyere including a tubular chamber having an internal wall;

a plasma torch assembly including a plasma torch positioned to inject hot gas into the tuyere and having a tubular structure that extends along an axis of the chamber and includes an end positioned adjacent to the outlet end of the chamber;

the plasma torch assembly further including a shroud head configured to inject a shroud gas between the internal wall of the chamber and the tubular structure of the torch;

a pipe positioned around at least a portion of the chamber forming a plenum; and

a plurality of nozzles in the chamber internal wall configured to inject a combustible material ~~into the tuyere for combustion of the combustible material within the tuyere~~ from the plenum to a space between the internal wall of the chamber and the tubular structure of the torch, wherein the plurality of nozzles deliver the combustible material upstream of a plasma plume produced by the torch allowing premixing of shroud air and the combustible material prior to ignition by the plasma plume.

~~2. The apparatus of claim 1, further comprising:~~

~~a first plenum positioned around at least a portion of the tuyere, and in fluid communication with the plurality of nozzles.~~

~~3. The apparatus of claim 1, further comprising:~~

~~a second plenum configured to inject shroud gas adjacent to a wall of tuyere.~~

~~4~~ 2. The apparatus of claim 1, further comprising:

a liner of refractory material positioned adjacent to at least a portion of ~~a wall of the tuyere~~ the internal wall of the chamber adjacent to ~~an~~ the outlet end.

~~5~~ 3. The apparatus of claim 1, further comprising:

a cooling coil positioned around at least a portion of the tuyere.

~~6~~ 4. The apparatus of claim 1, wherein the ~~tuyere~~ the internal wall of the chamber is tapered adjacent to ~~an~~ the outlet end.

~~7~~ 5. The apparatus of claim 1, further comprising:

a reactor vessel, wherein the tuyere is positioned adjacent to a charge bed in the reactor vessel.

~~8. The apparatus of claim 1, wherein the plasma torch is positioned adjacent to the outlet end of the tuyere.~~

~~9. The apparatus of claim 1, wherein the plurality of nozzles deliver the combustible material upstream of a plasma plume produced by the torch allowing premixing of shroud air and the combustible material prior to ignition by the plasma plume.~~

~~10. The apparatus of claim 1, wherein the plurality of nozzles deliver the combustible material downstream of a plasma plume produced by the torch resulting in nozzle mixing and combustion of air and the combustible material by the plasma plume.~~

~~11~~ 6. A method comprising:

injecting a combustible material into a plurality of tuyeres in a wall of a reactor vessel, each tuyere including a tubular chamber having an internal wall, and a plasma torch assembly including a plasma torch positioned to inject hot gas into the tuyere and having a tubular structure that extends along an axis of the chamber and includes an end positioned adjacent to the outlet end of the chamber, the plasma torch assembly further including a shroud head configured to inject a shroud gas between the internal wall of the chamber and the tubular structure of the torch, a pipe positioned around at least a portion of the chamber forming a plenum, a plurality of nozzles in the chamber internal wall configured to inject a combustible material from the plenum to a space between the internal wall of the chamber and the tubular structure of the torch, wherein the plurality of nozzles deliver the combustible material upstream of a plasma plume produced by the torch allowing premixing of shroud air and the combustible material prior to ignition by the plasma plume;

using ~~a~~ the plasma ~~torch~~ torches to inject hot gas into the tuyeres to ignite the combustible material; and

directing heat from combustion of the combustible material into the reactor vessel to preheat the reactor vessel.

~~12~~ 7. The method of claim ~~11~~ 6, further comprising:

using shroud air to cool walls of the tuyeres and to supply sufficient air for combustion of the combustible material.

~~13~~ 8. The method of claim ~~12~~ 7, wherein shroud air is introduced into the tuyere prior to injecting the combustible material.

~~14~~ 9. The method of claim ~~12~~ 7, wherein the combustible material flow rate is set in accordance with an amount of shroud air.

~~15~~ 10. The method of claim ~~11~~ 6, wherein flue gas composition is monitored for verification of combustion up to an auto ignition temperature of the combustible material.

~~16~~ 11. The method of claim 15, wherein calculated oxygen and carbon dioxide based on shroud air and combustible material inputs is compared to measured values in the flue gas.

~~17~~ 12. The method of claim ~~11~~ 6, wherein the plasma torch is turned off when an auto ignition temperature for the combustible material is reached in the chamber.

~~18~~ 13. The method of claim ~~12~~ 7, wherein shroud air is injected in a tangential direction for mixing of the shroud air with combustible injected gases.

~~19~~ 14. The method of claim ~~12~~ 7, wherein the tubular structure of the torch ~~body~~ is positioned in the tuyere to increase the velocity of the shroud air in an annular space formed between the torch and the tuyere.

~~20~~ 15. The method of claim ~~19~~ 14, wherein increased velocity enhances cooling of the tuyere and enhances mixing of the combustible material.