Claims

1. Method for processing a torrefaction gas (202), generated by the torrefaction of solid recovered fuel pellets (117), wherein the solid recovered fuel pellets (117) are generated from municipal waste, in which the torrefaction gas (202) is substoichiometrically oxidized in a burning chamber (402) with an oxygen rich gas (404) comprising at least 95 Vol.-% oxygen and a fuel gas (403) by which larger hydrocarbon molecules which originate from the torrefaction gases (202) and/or the fuel gas (403) are thermally cracked generating a syngas (407, 401).

2. The method according to claim 1, wherein the syngas (407) is quenched by bringing the syngas (407) in contact with a recycled syngas (406) stream having a temperature smaller than the syngas (407).

3. The method according to claim 2, wherein the quenched syngas (406) is provided to a heat recovery system (410), in which at least one of the following heat transfers is performed:

a) heating a thermal carrier (411);

b) generating high pressure steam (413) from boiler feed water (412); and

c) superheating low-pressure steam (415).

4. The method according to claim 2 or 3, wherein the quenched syngas (409) is cleaned in a wet scrubbing system (417).

5. The method according to claim 4, wherein a first part of the cleaned syngas (420) is used as the recycled syngas (406).

6. The method according to claim 4 or 5, wherein a remaining part (424) of the cleaned syngas (420) is brought into contact with water for cooling and washing.

7. Plant (1) for conversing solid recovered fuel pellets (117) to a product gas stream comprising hydrogen (601), including a torrefaction unit (200) which is in fluid connection to a torrefaction gas processing unit (400) for processing the torrefaction gas (202) generatable by the torrefaction unit (200), the torrefaction gas processing unit (400) comprising a burning chamber (402) having a first inlet (436) for introducing an oxygen rich gas stream (404), a second inlet (437) for introducing a fuel gas (402), and a third inlet (438) for introducing the torrefaction gas (202), wherein the burning chamber (402) is suited and intended for a substoichi-

ometric oxidization of the fuel gas (403) and the torrefaction gas (202) generating a syngas (407, 401), wherein the solid recovered fuel pellets (117) are generated from municipal waste in a pelletizing facility (100).

8. The plant according to claim 7, wherein the torrefaction gas processing unit (400) can be used according to one of claims 1 to 6.

9. The plant (1) according to claim 7 or 8, wherein the burning chamber (402) is in fluid connection with a mixing chamber (408) via a burning chamber exit (405) , wherein the mixing chamber (408) comprises a quench zone (439) with inlets (440) for providing a recycled syngas (406) for quenching the syngas (407).

10. The plant (1) according to claim 7 to 9, wherein the mixing chamber (408) is in fluid connection with a heat recovery system (410), comprising at least one of the following heat exchangers:

a) a first heat exchanger (441) for heat exchange between the quenched syngas (409) and a heat carrier (411);

b) a second heat exchanger (442) for heat exchange between the quenched syngas (409) and boiler feed water (412); and

c) a superheater (443) for superheating a low-pressure water steam (415) by the quenched syngas (409).

11. The plant (1) according to claim 10, wherein the heat recovery system (410) is in fluid connection with a wet scrubbing system (417) for cleaning the syngas (409) exiting the heat recovery system (410).

12. The plant (1) according to claim 11, further comprising a water washing cooling column (422) which is in fluid connection with the wet scrubbing system (417) for cooling and washing the cleaned syngas (420) downstream of the wet scrubbing system (417).

13. The plant (1) according to claim 12, wherein a sump (419) of the water washing cooling column (422) is in fluid connection with a heat pump (427).