CLAIMS

1. A method for converting carbon dioxide in flue gas into natural gas using dump energy, the method comprising:

1) performing voltage transformation and rectification on dump energy that is generated from renewable energy generation ~~and is difficult for storage or grid connection~~, introducing the dump energy into an electrolyte solution to electrolyze water therein to H_2 and O_2, and removing the water from H_2;

2) purifying industrial flue gas to separate CO_2 therein and purifying CO_2 trapped therefrom;

3) transporting H_2 generated from step 1) and CO_2 trapped from step 2) to a synthesis equipment comprising at least two fixed bed reactors, so that a high-temperature mixed gas with main ingredients of CH_4 and water vapor is generated through ~~strong~~ exothermic methanation reaction between H_2 and CO_2;

4) employing the high-temperature mixed gas generated from step 3) to conduct indirect heat exchange with process water to yield superheated water vapor;

5) delivering the superheated water vapor generated from step 4) to a turbine to generate electric energy, and returning the electric energy to step 1) for voltage transformation and rectification and water electrolysis; and

6) condensing and drying the mixed gas in step 4) cooled through heat exchange~~, until natural gas with CH_4 content up to the standard is obtained~~.

2. The method of claim 1, characterized in that the renewable energy is selected from solar energy, hydroenergy, wind energy, or a combination thereof.

3. The method of claim 1, characterized in that the electrolyte solution is potassium hydroxide solution with a density of 1.2-1.4 kg/m^3, and a reaction temperature of the electrolyte solution is controlled at 90 ± 2°C.