To avoid the costly CCS[1], our dual gasification (of coal-lignite/NG) approach (see https://www.setvision.org/sg_petrochems.html) will be particularly useful in expanding a nation's decarbonized base-load power generation on the CCR[2] platform. Extraction of $H_2$ from coal-lignite reserves and available NG supply, which is then fired in IGCC gigawatt power generation units will allow *continued use* of abundant carbonaceous fuels while producing decarbonized power.

Based on the UN table on fossil fuel properties (below), on average, lignite gasification directly yields 5 percent of lignite weight as hydrogen gas. As indicated in the EmeraldCarbon® Carbon Capture & Recycle flowchart (see https://www.setvision.org/many-ec-recycled-products.html) , this small amount is indirectly augmented by a far greater quantity of hydrogen ($H_2^{DWC}$) derived from the action of our proprietary Dissociation Water Carbon (DWC) Process on carbon monoxide (CO) gasifier output that is 92 percent of lignite feed (by weight). Consequently, it's felt our coal-lignite gasification plus DWC (GDWC) method yields significant enough blue[3] hydrogen output to justify the proposed inclusion of an intermediate lignite gasification step rather than the traditional direct lignite firing in power generation. Thus the GDWC treatment of the nation's abundant lignite reserves together with natural gas reforming may provide substantial blue hydrogen contribution to a nation's developing decarbonization program.

Also, within the framework of CCR, preparation of $H_2$/CO feed for the traditional Fischer-Tropsch (FT) reforming process, in the required proportions, is subtractive of carbon monoxide rather than additive of hydrogen; consequently, our method obviates the need for Water Gas Shift (WGS) in FT reforming of hydrocarbons, thereby reducing the cost of the procedure. Under CCR, the surplus CO is simply recycled along with $CO_2$ to value-added carbon products such as carbon fiber (see https://www.setvision.org/ec_carbon-fiber.html).

**GENERAL CHEMICAL AND FUEL PROPERTIES OF A RANGE OF FOSSIL FUELS**

**UNITED NATIONS (source Lindström 1980)**

| | | Coal | Lignite | Peat | Wood |
|---|---|---|---|---|---|
| **Chemical composition** | | | | | |
| Carbon (C) | weight % | 76-87 | 65-75 | 50-60 | 48-55 |
| Hydrogen (H) | weight % | 3.5-5.0 | 4.5-5.5 | 5-7 | 6-7 |
| Oxygen (O) | weight % | 3-11 | 20-30 | 30-40 | 38-43 |
| Nitrogen (N) | weight % | 0.8-1.2 | 1-2 | 0.5-2.5 | <0.6 |
| Sulphur (S) | weight % | 1-3 | 1-3 | 0.1-0.4 | 0.02-0.06 |
| **Fuel properties** | | | | | |
| Volatile matter | weight % | 10-50 | 50-60 | 60-70 | 75-85 |
| Ash | weight % | 4-10 | 6-10 | 2-15 | 0.1-2.0 |
| Melting point of ash | °C | 1100-1300 | 1100-1300 | 1100-1300 | 1350-1450 |
| Bulk density | $kg/m^3$ | 728-880 | 650-780 | 300-400 | 320-420 |
| Effective calorific value of dry substance | MJ/kg[1] | 28-33 | 20-24 | 20-23 | 17-20 |

[1] 1 MJ/kg = 239 Kcal/kg
1 MJ/kg = 430 Btu/lb

[1] CCS: Carbon Capture Sequester $CO_2$
[2] CCR: Carbon Capture Recycle CO/$CO_2$
[3] Blue hydrogen: $H_2$ produced by reforming methane into $H_2$ and $CO_2$, as distinct from green $H_2$ derived from electrolysis of water.