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Water Footprint Assessment of Coal-based Fuels in China: Exploring the Impact of Coal-based Fuels Development on Water Resources

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2 **China: Exploring the Impact of Coal-based Fuels**

3 **Development on Water Resources**

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8 **Abstract:** During the last decade, and despite the fact that energy consumption and
9 GHG emissions still remain today the focus of many alternative fuel life cycle
10 assessments, water scarcity issues have increasingly received attention. This study is
11 intended to evaluate the life-cycle water footprints (WF) of coal-based fuels including
12 direct coal to liquid (CTL) fuels, indirect CTL fuels, coal-based methanol, and coal-
13 based dimethyl ether (DME). Furthermore, the impacts of coal-based fuels'
14 development on the local water resources were also estimated. The results indicated
15 that the life cycle WF of direct CTL, indirect CTL, Methanol and DME were 2.59
16 kg/MJ, 2.97 kg/MJ, 4.13 kg/MJ and 3.22 kg/MJ, respectively. Grey WF accounted
17 for more than 80% of the total life cycle WF for these coal-based fuels. It is estimated
18 that the total water demand is 6,177 million cubic meters if 90.6 million tons of coal-
19 based fuel production capacity is fully achieved in China. Regional analyses revealed
20 that Coal-based fuel development in provinces such as Ningxia, Inner Mongolia,
21 Shaanxi, Guizhou and Shanxi could have a significant impact on local water supply
22 and potentially displace other users, especially for Ningxia province, which suffers
23 from extreme water shortage. Xinjiang have appropriate water resources and capacity
24 for future development of coal-based fuel production. Waste water treatment, strict

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