18.04 **Wind powered *in situ* heating: CO_2 emissions, water consumption and wind clean fuel**

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The use of wind power to reduce CO_2 emissions and water consumption for electrically heated *in situ* shale oil and tar sand extraction methods is assessed. The analysis applies to the radio frequency (RF) and the *in situ* conversion process (ICP) methods. An example uses RF *in situ* heating of tar sands to extract bitumen for refinery feedstock. No CO_2 is produced if the power source is wind or photovoltaic solar. Assuming that power for a 10,000 bbl/day RF tar sand plant is purchased from various sources (and transmitted through the grid), a 33% efficient coal fired plant would emit 0.3 million tons of CO_2, a 50% efficient natural gas fired plant would emit 0.1 million tons of CO_2 and an all wind/photovoltaic solar source would emit 0.0 ton per year. Water consumption and CO_2 emissions for a 100,000 bbl/d RF oil shale plant are discussed for three situations: A) a surface retort, B) a coal fired plant with carbon capture, and C) a wind power source. The RF wind power combination consumes the least water and the coal fired plant with carbon capture consumes the most. Both combinations with carbon capture and with wind power inherently avoid CO_2 emissions. The CO_2 associated with fuel use in vehicles arises from several sources: 1) the CO_2 emitted to heat the resource and extract the fuel, 2) the combustion of the fuel in the vehicle, and 3) the CO_2 from plant operations, bitumen transport and refining operations that cannot be powered by wind. By using wind power about 35% of the CO_2 emission can be avoided. Without the other factors in item 3, the reduction would be closer to 50%. This wind-clean fuel produces the same gasoline and diesel fuel as today, and so can use existing infrastructure such as pipe lines, service stations and vehicles without modifications.