Intriguing properties of microalgae-based direct combustion energy system

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Microalgae have attracted a considerable interest as biodiesel feedstock owing to their outstanding lipid productivity. However, 'biodiesel from microalgae' has recently raised debates on its practical CO_2 reduction because it requires complex downstream processes which generate additional CO_2, thereby negating the net CO_2 abatement. The presentation, therefore, suggests the reconsideration of direct combustion of microalgae as a practicable renewable fuel system. We emphasize the benefits of the microalgae-derived solid fuel with: (i) the solid-fuel-chain shows energetic advantages over conventional extraction-based liquefaction strategy and (ii) the dried biomass itself exhibits great performance as a solid fuel, even outdoing already commercialized woody fuel. Despite the promising properties, the use of microalgae as a solid fuel has been overlooked so far because it accompanies thorough dehydration process, being regarded as a primary driver of its prohibitively high price. Our assessment reveals that, however, the 'harvesting-to-boiler' energy consumptions can be immediately lowered to the commercially-available-levels if a preferably designed dehydration were exploited.