

Methane Emissions from Hydroelectric Dams

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D. Bastviken *et al.*'s reply (1) to S. Li and X. Lu (2) on the question of methane emissions from reservoirs ignores the major points raised, indicating that Bastviken *et al.*'s Brevia ("Freshwater methane emissions offset the continental carbon sink," 7 January 2011, p. 50) greatly underestimated the impact of hydropower development, such as ignoring emissions by degassing from water passing through the turbines.

A large pulse of methane invariably occurs in the first few years after a reservoir is formed because easily decomposed carbon stocks in leaves and soil are converted to methane under anoxic conditions at the bottom of the reservoir. After the pulse of emission from initial carbon stocks, a lower but still-significant emission can continue indefinitely from renewable carbon sources such as periodic flooding of soft vegetation that grows in the drawdown zone.(3–6) The resulting total methane emission is not small, as indicated by calculations for Amazonian dams (7–9).

Bastviken *et al.* conclude their E-Letter (1) by calling for evaluating hydropower projects "based on their long-term effects on net carbon and GHG [greenhouse gas] emissions and savings." This is a formula for downplaying the impact of hydropower. Hydropower creates a very large emission in the first few years, followed by an indefinitely sustained emission at a lower level, whereas electrical generation from fossil fuels emits gases at a constant rate over time. This makes the time horizon and any weighting given to the value of time the key elements in comparing these two energy sources. A long-term horizon, say, of 100 years, without any discounting for time over this period, will inevitably favor fossil fuels, even if any benefit for climate would emerge 40 years or more in the future (9). Major impacts from global warming on a much shorter time scale than this makes such logic untenable as a representation of the interests of human society.

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