

contrast, Alberta wetlands make up 139 000 km². Remediating the existing tailings ponds and minimizing their future use are essential, but grossly exaggerated claims of impact should not be credited by trained scientists.

Reference

1. Jacobs Consultancy and Life Cycle Associates, *Life Cycle Assessment Comparison of North American and Imported Crudes* (rep. prepared for Alberta Energy Research Institute), Jacobs Consultancy and Life Cycle Associates, Chicago (July 2009), available at <http://eipa.alberta.ca/home/lifecycle.aspx>.

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Integrated approach for efficient buildings

It is neither necessary nor constructive for Leon Glicksman to denigrate renewables to make the case for energy efficient buildings (PHYSICS TODAY, July 2008, page 35). Even without considering climate change, the projected energy gap between supply and demand means we need all fields to contribute. It does no one any service to repeat ridiculous unproven myths. For example, Glicksman says, "There are suggestions that wind-powered turbines numerous enough to meet a large fraction of our energy needs can seriously deplete global surface wind velocities and cause temperature increases."

Such suggestions are based on complete fabrication. Wind turbines can make a large contribution to electricity needs without their covering an excessively large area of land or sea. In fact, the area needed to meet all of the European Union electricity demand by using offshore wind energy is estimated to be 80 000 km², or less than 2% of Europe's sea area, not including the Atlantic Ocean. The turbine footprint, much less than 1% of the total area on land or offshore, allows many types of pre-wind-development activity such as farming to continue without hindrance.

On the first page of his article, Glicksman claims, "Today's cost of energy generation from most renewable sources is too expensive for widespread deployment," but his own article later reports that many forms of renewable

energy are directly cost-competitive with traditional fuels and are therefore not too expensive for wide-scale deployment, even in the short term.

Glicksman's comments regarding transportation fuel efficiency also should be put in context. Average fuel efficiency for vehicles in both Europe and Japan already exceeds 40 miles per gallon (http://ec.europa.eu/environment/enveco/policy/pdf/2007_automotive.pdf) compared with the EPA projection of 20.8 mpg for US cars in 2008 (<http://www.epa.gov/oms/cert/mpg/fetrends/420s08003.pdf>). That fact gives some perspective to the Obama administration plans to order automakers to increase the fuel economy of automobiles sold in the US to 35.5 miles per gallon by 2016 and suggests that rather more urgent action than "serious consideration" is needed.

Improved energy efficiency should be demanded in every forum, particularly for buildings. It is an uphill battle to persuade individuals and standard-setting bodies that even such simple measures as double glazing and better insulation are necessary and (over time) cost-efficient and that they provide a better quality of life inside buildings. Even assuming that battle can be won, replacing and improving building stock has a time frame significantly longer than developing large-scale renewable energy sources.

To provide clean, renewable, and cost-effective energy, we need to get away from competing for the "magic bullet" solution and instead work together using the best available technology in every area.

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Glicksman replies: Some important issues are raised by Rebecca Barthelmie. I couldn't agree with her more that the energy crisis requires an integrated approach comprising both environmentally acceptable supply options and substantial improvements in consumption efficiency. My major point was that most current efforts are heavily weighted toward supply-side solutions. Contrary to her assertion, many economic measures can be accomplished quickly to substantially improve the efficiency of existing buildings. For example, a number of programs to recommission commercial buildings, including actions as simple as reprogramming building controls, have resulted in 15–20% overall energy