Coal and the Peak of World Carbon Emissions
Greg Croft and Tad Patzek

Abstract

There are two quantitative approaches to estimating future coal production. One is to divide published reserves by production to estimate reserve life and the other is to fit a Hubbert curve to past production. The depth of working underground mine faces is a qualitative indicator, but it appears to support the Hubbert results. The value of an alternative approach is that it provides a reality check on the magnitude of carbon emissions in a business-as-usual scenario. The resulting base-case is significantly below 36 of the 40 carbon emission scenarios from the Intergovernmental Panel on Climate Change. The global peak of coal production from existing coalfields is predicted to occur close to the year 2011. The peak coal production rate is 160 EJ/y, and the peak carbon emissions from coal burning are 4.0 Gt C (15 Gt CO2) per year. After 2011, the production rates of coal and CO2 decline, reaching 1990 levels by the year 2037, and reaching 50% of the peak value in the year 2047. It is unlikely that future mines will reverse the trend predicted in this scenario.

This research has been published in the August 2010 issue of Energy (Elsevier) and has been cited by National Geographic and the New York Times

The Authors

Dr. Greg Croft holds a BA in geology from the University of California Santa Barbara, an MS in geophysics from Stanford University and a PhD in civil and environmental engineering from the University of California Berkeley. After completing his MS, he worked in oil and gas exploration for Chevron Overseas Petroleum, Harrods Energy and as an independent consultant. During this time he published a number of articles on the oil resources of the Middle East and Venezuela. His research on global coal resources was part of his 2009 doctoral dissertation and has been published in the August 2010 issue of Energy (Elsevier Publishing). Dr. Croft teaches geology at Saint Mary's College and is a frequent public speaker on mineral resource assessment issues. He has previously presented Regional Trends in World Oil Production to the NCGS. (Dr. Croft will be speaking).

Dr. Tadeusz W. Patzek is a professor and chair of the Department of Petroleum and Geosystems Engineering at the University of Texas at Austin