Histories of Transitions

Until recently, the study of "energy transitions" had been modelled on the shift from traditional energy sources such as wood, biomass, muscular force, wind, and water power to fossil fuels, nuclear, and renewable energy sources that started in eighteenth century Britain and is still underway in some African and Central American countries. The realization, however, that fossil fuel combustion and the massive release of CO_2 into the atmosphere has increased greenhouse gas concentration to the point where climate and natural systems might be irreversibly affected has opened a new and urgent agenda: The downscaling of fossil fuel consumption to attain the most efficient exit pathway from this pattern of energy production. How to get from here to there? To achieve a "low carbon economy," CO_2 emissions must be either radically reduced, captured, and stored safely underground, or mitigated by other technologies.

> The original exhibition features an interactive gallery of items from the Environment & Society Portal's multimedia library with a focus on the history of transitions. View the items on the following pages.

Gallery 1: Histories of transitions

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.
Chapter: Histories of Transitions
Source URL: http://www.environmentandsociety.org/node/7783
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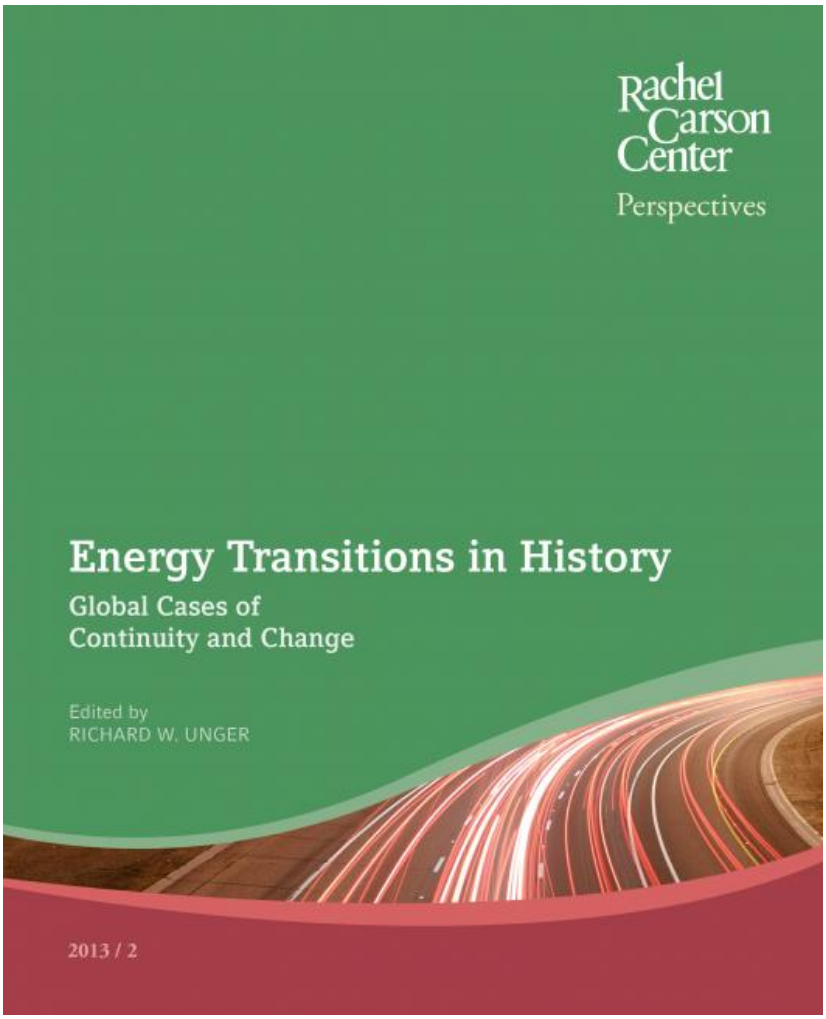

Allen, Robert C., "Energy Transitions in History: The Shift to Coal," in "Energy Transitions in History: Global Cases of Continuity and Change," ed. Richard W. Unger, *RCC Perspectives* 2013, no 2: 11-15.

Cover, *RCC Perspectives* 2013, no 2.

Much of the shift to coal happened in England prior to the Industrial Revolution. In his paper **"Energy Transitions in History," Robert C. Allen** presents the long history of coal's diffusion within the private domain. This new fuel was not only very different from firewood and charcoal but also required the adoption of a new style of housing construction along with the transformation of family habits. Throughout the modern period, unheralded innovators strove to improve chimney design, narrowing their flues, installing hoods above the fire to capture the smoke, improving fireplace enclosures and confining combustion within metal chambers. This energy transition thus took shape in a decentralized manner through collective adaptations that were then copied whenever they accrued advantages such as upgrading heat conservation or reducing smoke and fuel consumption.
Allen, Robert C., "Energy Transitions in History: The Shift to Coal," in "Energy Transitions in History: Global Cases of Continuity and Change," ed. Richard W. Unger, *RCC Perspectives* 2013, no 2: 11-15. http://www.environmentandsociety.org/node/6216

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.
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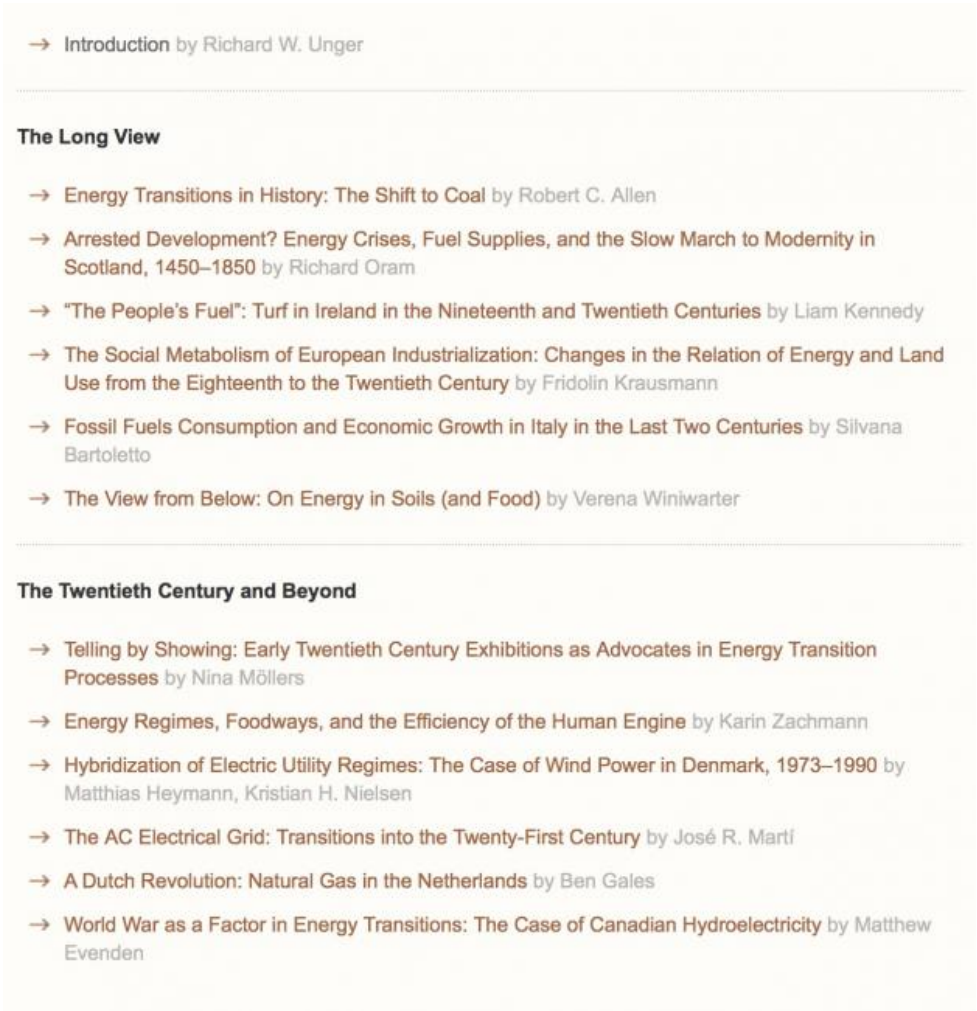

Unger, Richard W., ed. "Energy Transitions in History: Global Cases of Continuity and Change." *RCC Perspectives* 2013, no 2.

Table of Contents, *RCC Perspectives* 2013, no 2.

Humans have come to rely on ever-increasing quantities of energy. In this volume of RCC Perspectives on **"Energy Transitions in History: Global Cases of Continuity and Change,"** scholars from around the world consider the nature, causes, and future of our changing relationships to energy.

Unger, Richard W., ed. "Energy Transitions in History: Global Cases of Continuity and Change." *RCC Perspectives* 2013, no 2.
http://www.environmentandsociety.org/node/5602

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.
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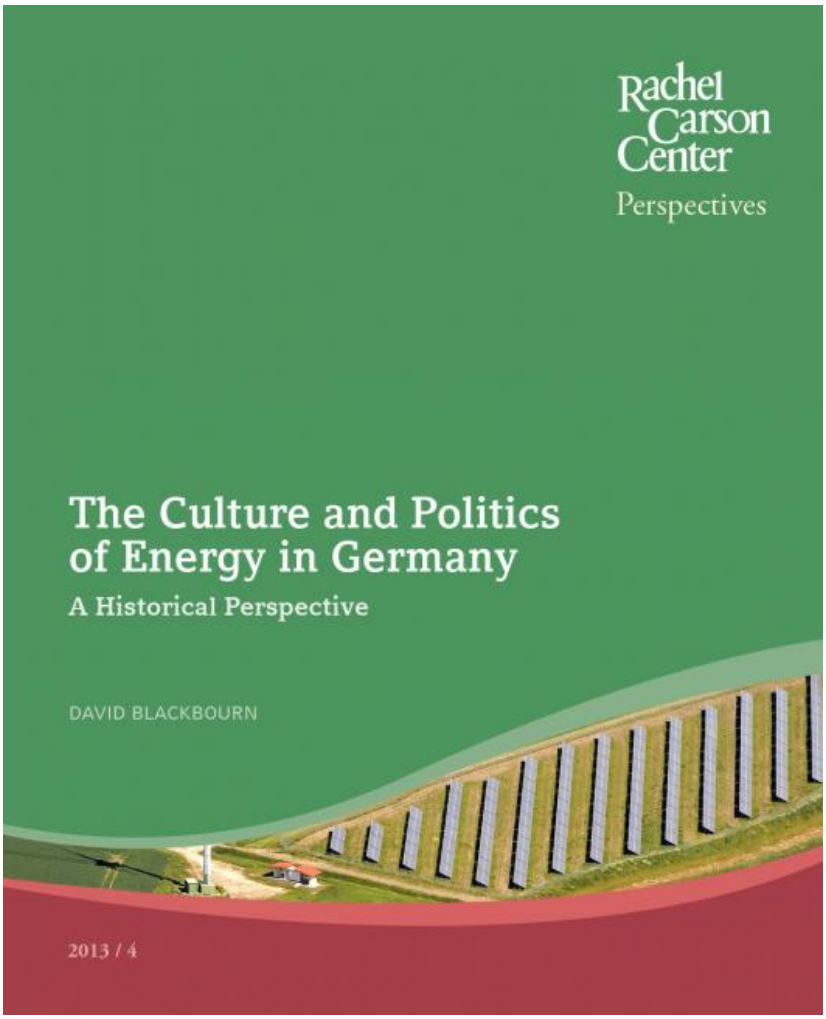

Blackbourn, David. "The Culture and Politics of Energy in Germany: A Historical Perspective." *RCC Perspectives* 2013, no 4.

Cover, *RCC Perspectives* 2013, no 4.

In a special issue of *RCC Perspectives on* ***"The Culture and Politics of Energy in Germany: A Historical Perspective" David Blackburn*** *traces the political, cultural, and economic contexts of German energy regimes over the past two hundred years—from wood and coal, to hydroelectricity and nuclear power, to renewable technologies.*
Blackbourn, David. "The Culture and Politics of Energy in Germany: A Historical Perspective." *RCC Perspectives* 2013, no 4.
http://www.environmentandsociety.org/node/5624

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.
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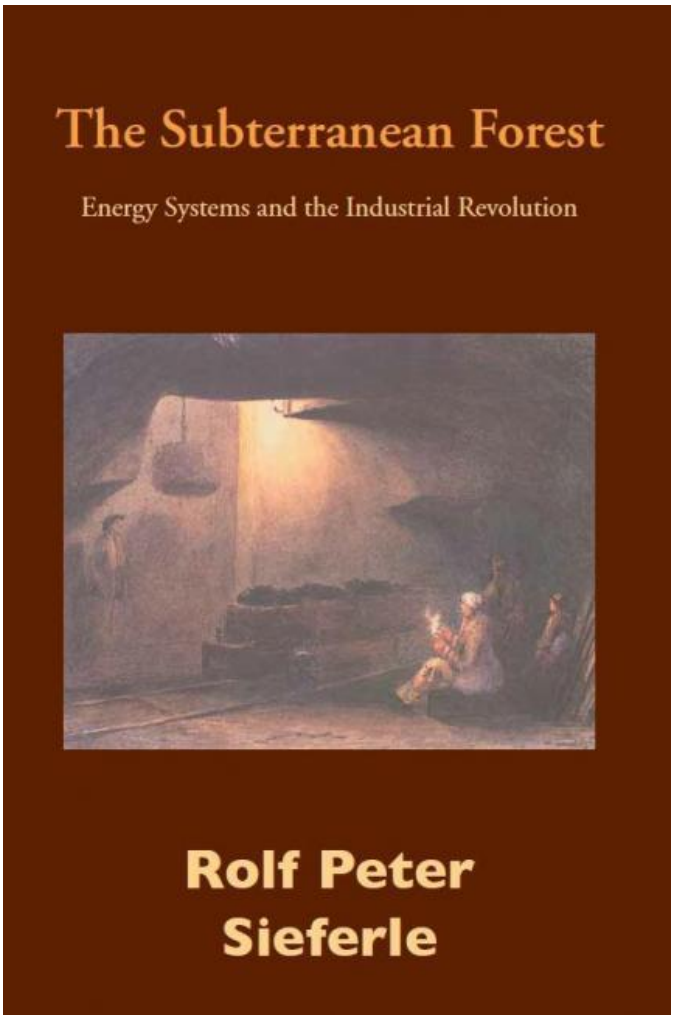

Sieferle, Rolf Peter. *The Subterranean Forest: Energy Systems and the Industrial Revolution.* Translated from the German original by Michael P. Osman. Cambridge: The White Horse Press, 2001.

Cover, *The Subterranean Forest: Energy Systems and the Industrial Revolution.*

In ***The Subterranean Forest,*** **Peter Sieferle** explains industry's switch to coal. The trades faced a scarcity of wood combined with burgeoning pressure for large amounts of industrial heat for salt making, limestone burning, and metal processing, brewing, pottery, brick-, and glassmaking. At the close of the eighteenth century, the agrarian solar energy system, based on the concentration of diluted solar energy through photosynthesis and the mass consumption of wood, verged on exhaustion. Sieferle highlights this turning point in humanity's history as the drive towards a new type of "forest": the subterranean forest. Instead of biomass fed by solar energy, industrializing nations began drawing on resources from the bank of stored energy formed by deeply buried vegetation slowly transforming into carbon.

Sieferle, Rolf Peter. *The Subterranean Forest: Energy Systems and the Industrial Revolution.* Translated from the German original by Michael P. Osman. Cambridge: The White Horse Press, 2001. http://www.environmentandsociety.org/node/3487

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.

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Niepytalska, Marta, "Interview with John McNeill I: An Environmental History of the Industrial Revolution." *Carson Fellow Portraits.* Directed by Alec Hahn. Filmed August 2011. MPEG video, 3:13.

Screenshot, "Interview with John McNeill I: An Environmental History of the Industrial Revolution."

In **this short interview, John McNeill** argues that the classical energy transition mostly proved an environmental and ecological transformation.

Niepytalska, Marta, "Interview with John McNeill I: An Environmental History of the Industrial Revolution." *Carson Fellow Portraits.* Directed by Alec Hahn. Filmed August 2011. MPEG video, 3:13. http://www.environmentandsociety.org/node/3565/ .

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.

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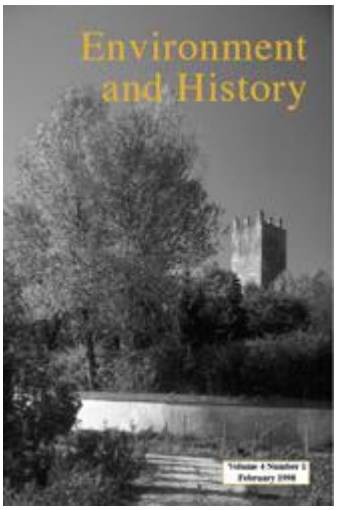

Cioc, Mark. "The Impact of the Coal Age on the German Environment: A Review of the Historical Literature." *Environment and History* 4, no. 1 (1998): 105–124. doi: 10.3197/096734098779555754.

Cover, *Environment and History* 4, no. 1 (1998).

A detailed account of its impact on water pollution, air pollution, noise, human health and landscape degradation forms the basis of the panoramic perspective of **Mark Cioc's article "The Impact of the Coal Age on the German Environment."**
Cioc, Mark. "The Impact of the Coal Age on the German Environment: A Review of the Historical Literature." *Environment and History* 4, no. 1 (1998): 105–124. doi: 10.3197/096734098779555754. http://www.environmentandsociety.org/node/2961

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.
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Schanze, Jens. *Otzenrath 3° kälter [Strange Homeland].* Munich: Mascha Film, 2007. Super 16 mm, 81 min.

Screenshot, *Otzenrath 3° kälter [Strange Homeland].*

In the film **Strange Homeland by Jens Schanze** documents the launch of open-pit brown coal mining operations near 700-year-old village in North Rhine-Westphalia and its impact of the relocated residents.
Film profile of *Otzenrath 3° kälter [Strange Homeland].* Directed by Jens Schanze. Munich: Mascha Film, 2007. Super 16 mm, 81 min.
http://www.environmentandsociety.org/node/3435

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.
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Wang, Ruohan. "Mining." Environment & Society Portal, Multimedia Library, 2014.

Comic, "Mining."

The final frames of the graphic sequence **"Mining" by Ruohan Wang** warns about the consequences of coal mining in a color palette of gray, cinnamon, and chestnut brown.
Wang, Ruohan. "Mining." Environment & Society Portal, Multimedia Library, 2014.
http://www.environmentandsociety.org/node/6649/
Published in Hamann, Alexandra, Reinhold Leinfelder, Helmuth Tischler, and Henning Wagenbrett, eds. *Anthropozän – 30 Meilensteine auf dem Weg in ein neues Erdzeitalter.* München: Dt. Museum, 2014.

Often considered a single event drawn out over 50 to 150 years, the classical model of energy transition proves to be a constellation of multiple independent but mutually reinforcing events. What was previously regarded as a single substitution process of older and less efficient power sources by modern equipment with higher efficiency ratios (input–output conversions) and energy densities (amount of energy per unit mass), is actually a process driven by the search for additional, better, and cheaper services associated with the deployment of new energy sources and new technologies.

Take, for example, the classic commodity of coal. Every time a technological advance promised an energy service

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innovation, coal diffusion took off. First, domestic consumption in hearths and "fire-cages" spread the use of good-quality bituminous coal in spite of the disadvantages (filling the house with smoke and soot). Simple reverberatory furnaces also consumed coal for smelting non-ferrous metals. During the eighteenth century, the discovery of a method for using coke in furnaces to make small cast iron objects provided a stepping stone for wide industrial use. Later, coke was adopted as the feedstock for finery forges in the final stages of iron production and more broadly in larger blast furnaces. From here, coal's expansion was swift. The steam engine extended coal's applications as a general source of industrial power as railways and steamboats took fossil fuel demand to new heights, particularly after 1840. Meanwhile scientists discovered that coal could be distilled in a "retort" so as to give off carbureted hydrogen (methane) and hydrogen, together with other gases. After being washed, the gases could be stored, purified, and distributed through pipes to feed local networks of lighting-gas customers. Known as "urban gas," this distilled coal further amplified demand for fossil fuels.

Websites linked in image captions:

- https://www.environmentandsociety.org/perspectives/2013/2/article/energy-transitions-history-shift-coal
- https://www.environmentandsociety.org/perspectives/2013/2/energy-transitions-history-global-cases-continuity-and-change
- https://www.environmentandsociety.org/perspectives/2013/4/culture-and-politics-energy-germany-historical-perspective
- https://www.environmentandsociety.org/mml/subterranean-forest-energy-systems-and-industrial-revolution
- https://www.environmentandsociety.org/mml/john-mcneill-environmental-history-industrial-revolution
- https://www.environmentandsociety.org/mml/impact-coal-age-german-environment-review-historical-literature
- https://www.environmentandsociety.org/mml/otzenrath-3deg-kaelter-strange-homeland
- https://www.environmentandsociety.org/node/6649/

Madureira, Nuno Luís. "Energy Transitions." Environment & Society Portal, *Virtual Exhibition* 2016, no. 2. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/7780.
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