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## Perspectives

How to cite:

Mavhunga, Clapperton Chakanetsa. "Energy, Industry, and Transport in South-Central Africa's History." In: "Energy (and) Colonialism, Energy (In)Dependence: Africa, Europe, Greenland, North America," edited by Clapperton Chakanetsa Mavhunga and Helmuth Trischler, *RCC Perspectives* 2014, no. 5, 9–17.

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Rachel Carson Center for Environment and Society  
Leopoldstrasse 11a, 80802 Munich, GERMANY

ISSN 2190-8087

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Clapperton Chakanetsa Mavhunga

## Energy, Industry, and Transport in South-Central Africa's History

In 1885, two events occurred that had significant implications for energy, industrial, and transportation infrastructure development in South-Central Africa. One was the European discovery of gold in the Witwatersrand highlands of Gauteng, South Africa. The other was Belgian monarch King Leopold II's occupation of Congo. A scramble to grab the lands in-between ensued, pitting the Portuguese, British, Germans, and Boers against each other. Through chartered companies, the Portuguese took Angola and Mozambique, the British seized Southern Rhodesia and Northern Rhodesia, and Leopold founded the Congo Free State.

Three chartered companies played a critical role in the energy-industry-transport connections discussed in this essay. Two had orchestrated the occupation and creation of colonies: British South Africa Company (BSACo) in the two Rhodesias, and Companhia de Moçambique in Sofala and Manica province. Both Rhodesias were landlocked. Southern Rhodesia had the region's largest known deposits of high-grade coking coal, in Hwange (Wankie). BSACo administered the territory through which the primary railway line passed, as well as Rhodesia Railways, the only rail service in the Congo, Northern Rhodesia, South Rhodesia, and Mozambique. Congo's Katanga province had limitless deposits of copper, and Sofala had the best and most convenient port facilities in Beira, jointly owned by BSACo and Companhia. Katanga needed Wankie's coal; BSACo and Companhia needed Katanga's copper business. In 1906, BSACo partnered with Belgian capitalists to found the *Union Minière du Haut Katanga*, which obtained a charter from King Leopold II to mine copper in Katanga province until 1990.

In return for the supply of Wankie coal, BSACo secured rights to ship Katanga's copper on its 1,600-mile railway line to Beira, in Companhia territory (Warthin 1928, 307; Birchard 1940, 432). Despite having shorter options via Benguela, the 1906 agreement bound Union Minière to the Beira route and Wankie coal throughout the colonial period (Katzenellenbogen 1974, 66; Lunn 1992). BSACo itself administered two landlocked colonies, and needed Companhia to find an outlet for its railway traffic to the sea and global markets; Companhia of course needed the rail shipping business (Hance and van Dongen 1957, 308).

Southern Rhodesia's significance to these energy-industry-transportation connections lies in the BSACO's role as the principal railway developer in South-Central Africa. Rhodesia Railways' headquarters was in Salisbury; its engineering workshop was in Bulawayo, where three railway lines (the Mafeking line, the Wankie-Zambia-Congo line, and Salisbury-Umtali-Beira line) converged. Prior to 1936, the Katanga-Beira network was under four different authorities, each controlling its own stretch: Mashonaland Railways (Elizabethville to Victoria Falls), Rhodesia Railways (Victoria Falls to Salisbury), and the Beira Railway (Salisbury to Umtali, Umtali to Beira). Thereafter,

Rhodesia Railways Ltd. took over the entire Northern and Southern Rhodesia railway systems; in 1947, it became a state-owned company. Throughout the period, copper business and coal fuel were inseparable from the traffic connecting Katanga, the Rhodesias, and Beira (see Figure 1 for all references).

Figure 1:  
Map of South-Central Africa, showing the railway from Katanga, through Wankie colliery to Beira, and the many ships that used to dock there. Source: National Archives of Zimbabwe, *British South Africa Annual 1925–26*, 144.



This essay argues that energy must be seen in interaction with transportation and industry in order for its role in South-Central Africa to be fully understood. All three—energy, industry, and transportation—are themselves always socialized and at the whim of human-engineered mobilities.

### Energy-Industry-Transportation Connections in Deep Time

The colonial period was only one moment in a longer trajectory of industrialization in Zimbabwe. Many centuries before colonization, local Africans had already distinguished themselves in industrial pursuits such as mining, agriculture, hunting, and local and international trade (Chirikure 2010). From 1 AD onwards, various communities had utilized indigenous technologies to process gold, iron, and copper (Miller 2002; Summers 1969). Disused mines, smelting sites, collapsed furnaces, *tuyeres*, and remnant ores in places such as Karanda, Copper Queen, and Mupfure area near Chegutu all point to deep histories of metallurgy, which nineteenth century European travelers bore witness to and

documented (Mauch 1971; Baines 1877; Selous 1893; Chirikure 2006). These combustion processes clearly show the role of forest hardwoods like the *mupani* in smelting.

Such industry did not exist in isolation from the outside world, but rather was deeply involved in and mutually shaped it. Thus in the ninth century, merchants from Arabia traveling in dhows were drawn to this industry, established coastal market settlements, and assimilated and intermarried with Africans to create Swahili communities. Until their displacement by Portuguese incursions into the interior around 1500, the Swahili acted as interlocutors between the hinterland and Arabic and Indian maritime commerce for five centuries (Mudenge 1988). Indeed, Arabian and Portuguese travelogues extensively document trade and industrial activity on the Zimbabwe plateau. They also clearly show the role of Africans as caravans or porters connecting sites of production in the interior and coastal markets like Inhambane, Sofala, and Delagoa Bay. From the east coast, commodities sailed off to India, Britain, Portugal, and Holland.

The exports were quite diverse. Apart from metals, a highly specialized ivory hunting industry supplied the maritime trade network (Mudenge 1988; Mavhunga 2014). Grain and other crops fed locals and incoming ship crews. VaShona metal workers of Nyanga in particular made significant innovations in water management and agrotechnology composed of furrows, ditches, and terraces, all intended to tame steep, fast-draining mountainsides into flat, water-holding crop-fields (Soper 2000). Nineteenth century travelers saw Barotse and vaTonga people along the Zambezi valley utilizing the alluvium and water that the river spilled into valley plains to produce an impressive array of crops (Livingston 1854, 1861; Holub 1881). Tobacco, cotton, sorghum, millet, and maize (a Portuguese introduction from the Americas) thrived, and animals like cattle, goats, and sheep were kept in tsetse fly-free areas (Mavhunga 2014). If we consider rivers like the Zambezi as energy-producing (through gradient, water currents, and floods, and as transport carrying water and alluvium deposited locally), then hydropower—as water for irrigation, as a transport for nutrients that gave energy to soils—had been already harnessed for a long time. The exact same thing could be said of the Nyanga terraces, designed to save water that might flow rapidly downward, and channeling it instead into agricultural value. The choice of where to settle depended on the fertility of the soils, the availability of water, and the presence of usable natural resources. Interestingly, when Europeans colonized the country, they chased away Africans and settled on their lands, then—through heavy taxation, pass

laws, land dispossession, and force—pushed them onto the white settler farms where they continued to apply their indigenous knowledge and energy for the white man’s enterprise.

The same is also true for mining. The writings of the first mineralogists that European companies dispatched to “the Northern Goldfields” of “Zambesia,” for example, demonstrate beyond doubt that what was later called “exploration,” “prospecting,” and “discovery” of gold was a clear case of intellectual property theft. The writings of Thomas Baines, Karl Mauch, and Selous show clearly that “European prospecting” was merely a ploy of such mineralogists to get Africans to show them their mines, now derisively called “old native workings” and “slag,” remnants of furnaces that used tons of hardwood to smelt and separate gold (and iron) from rocks mined from underground (Baines 1877). The archaeologist Roger Summers (1969) plotted the distribution of pre-European mining and metalworking on the Zimbabwe plateau on a map, confirming that virtually every deposit that European miners exploited in the twentieth century had been worked prior to colonization. Knowing that Africans could still continue engaging in what has nowadays come to be known as *kukorokoza* (small-scale mining and/or gold panning), the colonial government criminalized all unlicensed mining of any mineral. As a rule, no black person could be issued a license. Instead, Africans were, through heavy taxation, land dispossession, and draconian laws, forced to seek employment in the mines, where some of them extended their indigenous knowledge of mining and ironworking. Therefore, the “colonial moment” was more a junction of technological cultures than a rupture marking the end of the “pre-industrial” and the beginning of “industrial society,” contrary to some Marxist scholars (Marks and Atmore 1980).

### **Colonial Transcontinental Connections**

By displacing African modes of industry and taking away the means of African industrial production (mines, land), European presence and the capitalist mentality of large-scale manufacturing needed tools capable of mass production, of the kind that Africans never needed. This section is concerned with three key sites of colonial energy consumption.

The first is *the white commercial farm*, the destination of production equipment manufactured abroad. The windmills on most farms and game reserves in the Rhodesias came from Flint & Walling MFG. Co., from Kendallville, Indiana, USA. They were mostly used to pump water to dry-land paddocks and conservancies, and not for electricity. Most of the farm trucks came from the Dodge Brothers of Auburn Hills and the Ford Motor Corporation (both from Michigan). They were used not only for carrying farm supplies and produce to the market, but also as transport for farmworkers, along with the tractors. William Bain & Co. Ltd from Scotland was the principal supplier of haymakers. Tractors and farm machinery generally came from Ford, Deere & Company, or John Deere from Illinois, USA, and Massey-Harris Company, Limited, from Brantford, Canada.

The farm in Southern Rhodesia was easily the most cosmopolitan site of technological convergence, where the American “steel belt” met the best of Canadian and British manufacturing. But it is also a place where a new type of energy (petrol and diesel) was burnt to power machines, to do work that Africans had done using muscular, food-fueled exertion. Ships coming from the Arab world anchored and offloaded oil at the Beira port; from there the petroleum products were transported inland by rail (later on roads and through a pipeline for refining at Feruka), and distributed by road to petrol stations, where they were purchased by farmers who carried them to their own farms.

The second site is *the railroad*, stretching from the Congo via the two Rhodesias to the Mozambican port of Beira. The train engines that sustained the Rhodesia Railways system and carried Katanga’s copper came mostly from the UK and the US. British suppliers of locomotives include: Robert Stephenson & Co. (Newcastle-upon-Tyne), Nasmyth, Wilson & Co. (Patricroft), Beyer, Peacock & Co. (Manchester), Kitson & Co. (Leeds), Neilson Reid (Queens Park), Dübs & Co. (Warrington, Lancashire), and North British (Glasgow), which supplied steam locomotives; and English Electric (Lancashire) and Brush Traction (Leicestershire), which delivered diesel locomotives. The American steam engine suppliers whose locomotives trolled the Rhodesian railways were HK Porter of Pittsburg, Baldwin of Philadelphia, and General Electric of Erie (all from Pennsylvania), while Davenport Locomotive Works (Davenport, IA) supplied locomotives powered by diesel. Until the introduction of diesel engines and of electric engines after 1945, imported locomotives in Rhodesia Railways’ service were powered by coal from Wankie, and the visible high carbon footprint testifies to the idea of a railroad as a high energy consumption and pollution site. The railroad was also the site of energy consumption at another level: of

Africans as the human machines that colonial regimes and corporations used, by force at little or no wage, to build such infrastructures.

The third site is *the road*. An overwhelming number of the cars were American—for example, General Motors (Chevrolet and Buick), Ford, Plymouth, Chrysler, and Hudson Motor Car Company (the Terraplane), all from Michigan, as well as the Studebaker Corporation from Indiana. Those from British automakers Austin (London), Willys-Overland (Stockport), Vauxhall (Luton), and Morris (Oxford) were significantly fewer in number. Government statistics show that 1,722 private motorcars were registered in 1934. Of these, 1,407 were American and 308 of them were British-made (“More Motor Cars” 1936, 21). Like the farm, the road and service stations are interesting and original places to study as a venue for petrol and diesel consumption.

### Energy-Industry Synergies

What kinds of energy transitions were required to host and fully utilize these incoming machines? Here I shall focus on the transitions and overlaps involving African labor, wood fuel, coal, and hydroelectric power, and the transportation systems involved. In the Belgian, British, and Portuguese territories, colonized subjects (Africans) were treated as animate forms of (mechanical) energy alongside oxen, donkeys, and horses. For example, by 1954, half a million Africans were employed in the mining and agriculture industries of Southern Rhodesia. Of these, half were foreigners, composed of one-quarter, one-sixth, and one-tenth of able-bodied African men from Nyasaland (now Malawi), Northern Rhodesia (Zambia), and Mozambique, respectively (Scott 1954, 29). Besides having their own means of transportation by walking, African men were transported from the Nyasaland, Mozambican, and Rhodesian countryside to mines, farms, and factories using state- and company-owned automobiles (buses and trucks), barges, and trains. In turn they cut (with axes and machetes) and carted (using ox-drawn carts) the wood fuel that powered the first gold and iron furnaces, tobacco curing kilns, and pre-coal trains. They also mined the coal that replaced firewood, and from 1955 built the Kariba Dam, the hydroelectric power (HEP) dam and power station meant to supply unlimited power to industries that had until then depended on coal-fired power plants. A larger project beyond this essay investigates the effects of taking manual labor critical to communities in the African countryside to provide mechanical energy in the mines.

The special role of coal in Rhodesia's industrialization and as an industry in itself was such that an entire international transportation system was crafted around it. Coal also powered isolated thermal stations that supply individual industrial or municipal grids, for example Umniati (120 megawatts), Bulawayo (148 megawatts), Salisbury (153 megawatts), Shabani (31 megawatts), Umtali (16.5 megawatts), Gwanda (15 megawatts), Chipinga (0.4 megawatts), Wankie (18.5 megawatts), Chirundu (1.7 megawatts), Kamativi Mine (1.6 megawatts), and Gadzema (0.5 megawatts). Not only did Wankie have the best coal in Southern Africa; it also powered the entire region's transportation, mines, agricultural plant (especially tobacco curing barns), and industries barring South Africa.

Interestingly, even after the switch to coal was made, high costs, strikes, work stoppages, and the financial and infrastructural challenges of moving coal meant that the mines and smelters still deferred to wood fuel (Hance and van Dongen 1957, 329). Apart from illustrating the dependency of energy transmission on rail transportation, Wankie coal also shows an energy system vulnerable to traffic congestion, labor unrest, and inadequate haulage capacity. It is ironic that in the 1950s, the Southern and Northern Rhodesian governments went back to HEP after having abandoned it for coal-fired plants. For example, a plan to put generators in the path of the Mosi oa Tunya (Victoria Falls) waterfalls in 1906 had been abandoned in favor of coal-fired steam-driven power stations located at individual mines and industries. The transition to HEP matters because none of the countries discussed here have moved away from hydropower since they made that turn in the 1950s through the 1970s; in fact, the future of the subregion is hydro-bound.

Particularly striking are the techniques and technological developments adopted in energy use with each transition to a new energy source. From an engineering and technological perspective, I place the excavation equipment imported from overseas in the hands of the Africans who mined, moved, and burnt coal to smelt or power steam engines. Here, mobility calls attention to the movement of ore from underground, to the surface, to steam engines, to furnaces, to power plants. Even before mining, mobility enabled a systematic exploration of prospecting and surveying of a mine and the work that white and black people did, along with race, skill, and other considerations that determined their roles.



## Conclusion

The *longue durée* approach to industry in South-Central Africa suggests a potentially fecund avenue into the place of energy in African history, one that has never before been attempted. It can potentially help us understand the energy factor so far silent in the accounts of indigenous mining and metallurgy, while explicating the environmental impacts of mining, smelting, agriculture, and other activities over time. It has been shown that energy is not merely coal, firewood, or electricity, but also embodied and human, inseparable from the transport functions of the body, and especially of the body at work, engaged in industry. The petrol- and electric-powered machine today elides a reality of human labor-intensive production before and typical of much of the colonial moment. In both mining and agriculture, the first colonial infrastructures were built upon preexisting African ones. The most significant shift was that whereas Africans had made their own tools and satisfied their own manpower-intensive modes of production, Europeans relied on machinery from the US, Canada, and Europe for transport, mining, and agriculture. These machines demanded the command of new, larger-scale sources of energy than previously envisaged, both in human and fuel form.

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