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The dark side of coal - some historical insights on energy and the economy

Posted by Ugo Bardi on April 12, 2010 - 3:41pm in The Oil Drum: Europe
Topic: Environment/Sustainability
Tags: coal, european wars, river transportation [list all tags]

Detail of Telemaco Signorini's masterpiece "The Riverbank" ("L'alzaia"), painted in 1864. It shows the hard work of five men pulling a heavy barge against the current along the Arno river, near Florence, in Italy. Most likely the barge was loaded with coal. In this post, I start from this image to tell the story of coal in Italy and how the fortunes of the country went in parallel with those of coal well until mid 20th century. (Click on the image for the full painting.)

I have a special emotional relationship with Telemaco Signorini's painting "The Riverbank." The area shown in the panting has changed very little from the time when the painting was made - mid 19th century - and, today, I could take you to exactly that place, in Florence, Italy. It is not far from where I was born and raised; it is the area where my family used to live for generations. Everytime I see that painting (and I have seen the original twice, in two different expositions) I can't avoid the sensation that those men, so hard working, could be ancestors of mine.

"The Riverbank" is correctly considered a masterpiece; just look at it and you'll see that it is truly exceptional. Not only the composition of the figures is original; think of the contemporary French impressionists. None of them, great masters as they were, ever painted anything like that. They never seemed to be worried about the social problems of their time as, instead, Signorini was. So, he shows us the tremendous effort of these five men pulling something unseen, but that can only be a heavy barge. Almost certainly that barge was loaded with coal. It was coal from England that had been unloaded in the port city of Livorno and that was slowly making its way up to Florence.

When "The Riverbank" was painted, in 1864, the age of coal was in full swing. Already in medieval

times people had started using coal as fuel but the 19th century saw an enormous expansion of production. It was in 1866 that William Stanley Jevons said in his "The Coal Question" that, *"Coal in truth stands not beside but entirely above all other commodities. It is the material energy of the country — the universal aid — the factor in everything we do. With coal almost any feat is possible or easy; without it we are thrown back into the laborious poverty of early times."*

But coal had a problem: it was not easy to transport. Coal is heavy; it is unthinkable to cart it for long distances on roads. For this reason, the first railroads were developed in early 19th century expressly to transport coal. But rails were expensive, prone to failure, and the first steam engines were so inefficient that they would use up most of the coal transported unless the distance covered was really short. These early railroads could be used only to move coal from mines to river ports, where coal was loaded on sailing ships called "colliers." Only using waterways it was possible to transport coal over long distances. Gradually, railroads and steam engines became more efficient, but wherever sea and canal transportation was available, it remained always the cheapest way of transporting coal.

In the early times of the coal age, the cost of transportation set a limit to coal diffusion. Only those mines which were near waterways could produce coal and only those areas which were accessible by waterways could use coal. That condition held in most of Northern Europe and it was there that the use of coal grew most rapidly, fueling what we call the industrial revolution. More coal extracted meant more industries, and more industries meant more coal extracted. More coal meant also more steel, and more steel meant larger and more efficient armies. Coal was the origin and the fuel of the British Empire, but Britain's production was so large that there was coal available for export. With British coal, and later German coal, the industrial revolution spred all over Europe, even to countries which had no coal mines. With imported coal, waterways were the necessary and sufficient condition for having industries. But most of Southern Europe and North Africa were cut off from the coal revolution: too dry or too mountainous for waterways.

The southernmost limit of waterways in Europe in 19th century was Tuscany, where the River Arno connected the main city, Florence, to the port city of Livorno. Already in the 18th century, the Arno River had been artificially transformed into a waterway. With this vital line, Tuscany could import coal in large amounts from England and start her own industrial revolution. It was a small revolution compared to that of the Northern European countries, but manpower in Tuscany was cheap, and it attracted capital from the rest of Europe. Just as today manufacturing is exported in the poorest areas of the world, by mid 19th century, Tuscany had become a manufacturing center--with industries mostly created and managed by Northern European businessmen.

The Grand-Duke of Tuscany of that time, Leopoldo the 2nd, was praised by everyone as a good man. He was also a politician and, as such, he tended to promise gifts to his constituency. One of these gifts was the public lighting of Florence. Already in 18th century, a public lighting system based on oil lamps had been installed, but it was dim, limited to a few places, and the lamps ran out of fuel by midnight. In 1845, things changed with the first gas lamps. Those lamps were fueled by a "gasometre", a giant tank where coal reacted with steam to form "town gas" that then was piped all the way to each street lamp (that old gasometre still stands, nearly forgotten, in a public garden in Florence). It was bright light that lasted all night; a revolution. So, thanks to coal, Florence was beautifully lighted at night. But coal had also a dark side: those people whom Telemaco Signorini shows to us laboriously pulling a heavy coal-loaded barge upstream. With time, barges were gradually superseded by the railroad. It is likely that, by the first decades of the 20th century, very few people were still pulling heavy loads upstream. But the nature of the problem had changed: coal was not infinite.

In the 19th century, coal for Italy came mainly from Britain and the commerce of coal was a strong link that connected the two countries. The Italian state had been created in 1861, uniting the statelets which had been ruling the Italian peninsula. It had been, in part, the result of the

work of British diplomacy. There were evident advantages for Britain in having a strong Italy as counterweight to the French ambitions of expansion in North Africa. But the creation of Italy had not been just a cold political calculation. There was a genuine liking of the British for Italy and for Italian traditions. In some ways, Italy was a daughter country to Britain. Over the years, the British flocked to Italy; they loved the climate, the people and the relative freedom of the place. Some Italians also moved to foggy Britain, although not as tourists. The invention of fish and chips is claimed sometimes by Italians from the Tuscan town of Barga, who had emigrated to the British islands.

But the relationship of Italy and England went sour with peak coal in England, in the early 1920s. After the first world war, Italy desperately needed coal to rebuild her industries. But Britain could no longer provide coal as liberally as before. Italy started importing coal from Germany, but that was not sufficient: coal consumption in Italy stayed flat between the two world wars. Italy's economy was also dragged down by war debt, and it never really recovered after the trauma of the first world war. All that had political consequences. The sympathy for England and for everything English evaporated in Italy and the Italian press started vituperating Britain and complaining about "the coal issue". D.H. Lawrence, in his "Sea and Sardinia" (1921) tells us that the coal problem was one of the main subjects of conversation among Italians. In 1922, Mussolini and the Fascist party took power, in large part also exploiting the resentment of the population for the bad economic situation.

It is said that Mussolini made the trains run on time. Perhaps it is true, but he could do nothing to create coal that wasn't there. The crisis of 1929 was a bad hit on the Italian economy and - perhaps as a reaction - the government tried to vent the nation's frustration by invading Ethiopia in 1935. There were several official justifications for the invasion - the most common one was that Italy needed "a place in the sun" - a curious justification from a country which has plenty of sun anyway. But, clearly, the invasion was meant to be a slap in the face for Britain. It was a way to tell to the British that the Italians could have their empire, too, that they could do that alone, and that they didn't need no damned British coal for that.

It was a mistake; a colossal mistake. Mussolini hadn't understood that it was coal that made empires, not the reverse. No coal, no empire; it was as simple as that. Conquering Ethiopia, Italy had dissipated immense human and material resources and had gained a bad reputation as the rogue country of the time. All that for a piece of a dry land and the dubious honor for the King of Italy of taking the title of "Emperor of Ethiopia." That land was also strategically impossible to defend, as it would be seen just a few years later.

Britain reacted to the invasion of Ethiopia by stopping the exports of coal to Italy. That, and other international economic sanctions, pushed the already crippled Italian economy on the brink of collapse. The government reacted furiously, pushing a series of measures called "autarchy," the use of national resources only. It was mainly propaganda and some ideas that never worked, such as trying to make shoes out of cardboard and clothes out of fiberglass. The attempt to develop new coal mines could not work as a substitute for imports. The *Sulcis* mine in Sardinia was the main national source of coal, but it could never produce much more than 10% of of Italy's consumption between the two wars. The lack of coal and the strain of the Ethiopian war weighted on Italy's economy with almost 25% of the state budget dedicated to supporting the costs of the military occupation of the overseas colonies.

Given the situation, events played out as if following a prophecy written down long before. Italy had to rely more and more on German coal and that had political consequences. You can read the story in these paragraphs written in 1940 by Ridolfo Mazzucconi, a popular Italian journalist and writer of the time. Mazzucconi, among other things, had popularized in Italy the concept of "perfidious Albion," that had originated in France at the time of the French revolution. (from the ASPOItalia blog.)

> England ordered, with a repentine action, the suspension of the shipping of German coal directed to Italy from Rotterdam. As a compensation, England offered to replace Germany in coal shipping. But this service was subordinate to conditions such that accepting them would be to be tied to the British political interests and grievously damage our war preparations. The Fascist government responded with suitable roughness; and German coal, which couldn't come any more by sea, found its most comfortable and short road via the Brennero pass.
>
> Ths matter of coal was a healty and clarifying crisis of the political horizon. On March 9 and 10 (1940) Ribbentrop was in Rome and the visit gave rise to a clear and precise statement. The axis was intact. The alliance of Germany and Italy was continuing. A few days later, on the 18th, Mussolini and Hitler met for the first time at the Brennero pass and then even the blind were forced to see and the dim witted to understand.

You can read the same story as it was seen from the other side of the Atlantic in this article in Time magazine titled, "Hot Coal". It shows, among other things, how the Allies had completely misunderstood the Italian situation of the time.

It is a tradition of fuel producers to use embargoes to try to gain political power over fuel importers but, usually, it doesn't work. In this case, Britain had tried to bully Italy into submission using the coal weapon. It was another colossal mistake that forced Italy to rely fully on German coal. It also fueled even more the resentment of Italians against Britain and that gave to Mussolini sufficient political leverage to push Italy into the war as an ally of Germany.

What followed was, perhaps, unavoidable, but it didn't have to be. It would have been enough to glance at the coal statistics for *"the blind to see and the dim witted to understand"* as Mazzucconi tells us. At that time, the size of a nation's economy could only be proportional to the amount of coal consumed and, by this measure, Italy couldn't even remotely match Britain. In 1940, despite having passed the peak, Britain still produced more than 200 million tons of coal per year and used most of it for its national economy and for that of the British Empire. Italy, instead, consumed just a little more than ten million tons of coal per year. The British economy was twenty times larger than the Italian one. The *"blind and the dim witted"* ones were all in the Italian government who grossly overestimated the military potential of the country. They were still thinking that a war was fought by peasants armed with bayonets. They had completely missed the dark side of coal.

It is said that history repeats itself; the first time it is a tragedy, the second is a farce. After the tragedy of the first world war, the second had some elements of farce. Mussolini often looked like a clown during the war and Italy took some truly farcical decisions, such as that of sending a small force of bombers and fighters to join Germany during the Battle of Britain. The absurdity of the idea wasn't so much in seeing outdated Italian biplane fighters desperately trying to battle Spitfires and Hurricanes, but in the very concept that Italy was trying to bomb a country that had been her traditional ally: Britain. There is a tradition for fuel importing countries to bomb exporting ones, but even Mazzucconi himself, with all his rethoric about the "Perfidious Albion" seems to be perplexed about this idea when he tells us of the *bella fratellanza* "good fellowship" between Italy and Britain. In the end, it didn't matter how clownish Mussolini looked and how stupid his military decisions were--there was nothing farcical in an unprepared army sent to its destruction and in a whole country destroyed and humiliated. It was the dark side of coal, again.

Time has passed; coal is not "king" any more. The countries destroyed during the second world war have rebuilt their economies using crude oil and natural gas. The dark side of coal, today, seems to play out more in terms of environmental damage: coal is the fuel that generates the most greenhouse gases for the same energy generated. Coal mining has also become a hugely destructive activity with "mountaintop removal" becoming a commonplace method to get at the

coal seams. But coal is not any more a global commodity that leads to wars, as it was until mid 20th century. That role has been taken over by crude oil. The descendants of those men who pulled coal-loaded barges upstream in 19th century now drive shiny cars powered by oil and work in front of computer screens. But the problem of oil is the same as it was for coal: it is not infinite and there is not enough of it for everyone. It is now crude oil that makes and destroys empires. History repeats itself again and it will do that until we have fossil fuels to burn.

There are a lot of references that I used to compose this text. I'll give you here some extra data.

I published another paper on the subject of coal in Europe on the "ASPO neesletter" n. 73 of january 2007. You can find it here: http://www.energiekrise.de/e/aspo_news/aspo/newsletter073.pdf A figure taken from this paper shows the British coal production, here:

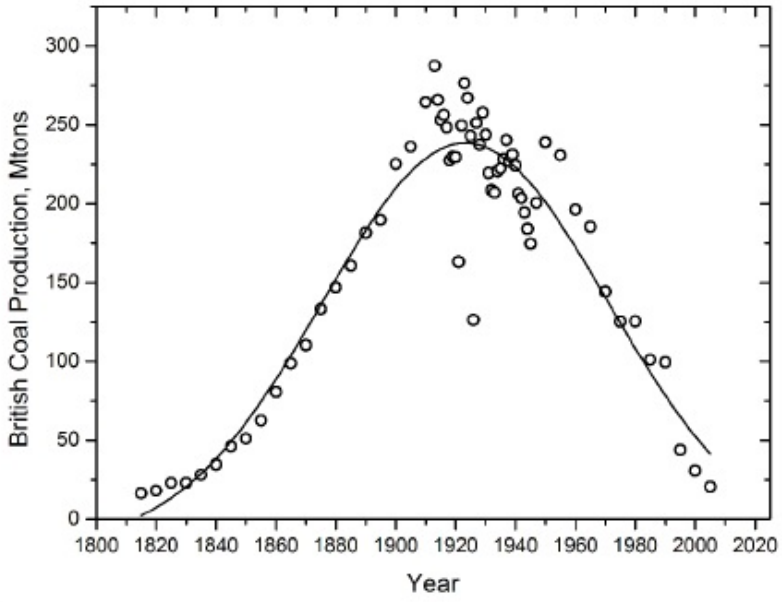
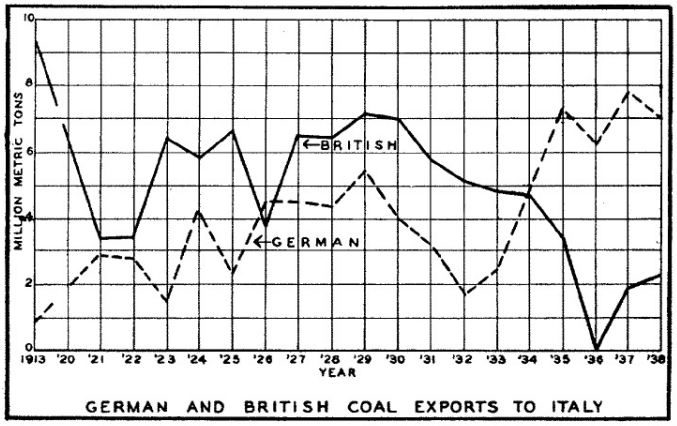


Figure 1. British coal production from 1815 to 2004. The data from 1815 to 1860 are from Cook and Stevenson, 1996. The data from 1860 to 1946 are from Kirby 1977; the data from 1947 up to present are from the British Coal Authority (accessed 2006). The production data are fitted with a Gaussian function which approximates the Hubbert curve. The maximum historical production is in 1913 with 287 M tons, the maximum of the fitting curve is in 1923.

A quantitative figure showing how coal imports to Italy varied over time can be seen here, taken from a paper by Walter H. Voskuil "Coal and Political Power in Europe" published in Economic Geography, Vol. 18, No. 3 (Jul., 1942), pp. 247-258



GERMAN AND BRITISH COAL EXPORTS TO ITALY

A post in Italian that I wrote on this subject can be found at http://aspoitalia.blogspot.com/2007/01/davvero-viviamo-in-tempi-oscuri.html . It is a discussion of the role of coal in Italy between the two wars. If you can't read Italian, you may find it interesting for the illustrations.

You can find data about coal production in the Sardinian Sulcis mines at this reference (In Italian). The fact that Italy spent 25% of its budget in maintaining her overseas colonies can be found at this reference