MARGINAL COSTS, MARKET VALUE AND PRICES OF PRODUCTION.

I will use market values rather than rents to illustrate the conundrum of marginal costs.

This area of analysis properly belongs to Chapter 10 in Volume 3 where Marx first moves away from abstract labour, that is simple averages. Here he introduces the concept of weighted average labour time. He thus adds back what he has previously abstracted out, namely that individual (firms) costs of production vary as do their volume of production. As always, this is best explained in the form of tables. In both tables the average cost of production is 100 but the weighted average cost of production falls below or rises above the average cost of production depending on individual volumes of production.

Table 1.

company	**Individual cost of production**	**Volume of production**	**Assumed Value of individual sales**	**Simple average**	**Weighted average**
(1)	(2)	(3)	(4)	(5)	(6)
A	80	160	12,800		
B	100	100	10,000		
C	120	80	9,600		
TOTALS		**340**	**32,400**		
AVERAGES	**80+100+120/3=100**		**32,400/340=95**	**100**	**95**

Table 2.

Company (reverse order)	**Individual cost of production**	**Volume of production**	**Assumed Value of individual sales**	**Simple average**	**Weighted average**
(1)	(2)	(3)	(4)	(5)	(6)
C	120	160	19,200		
B	100	100	10,000		
A	80	80	6,400		
TOTALS		**340**	**35,200**		
AVERAGES	**120+100+80/3=100**		**35,200/340=105**	**100**	**105**

The reason for this variation is the volume of production found in each table. Using Marx's favoured term, in Table 1 there is a *preponderance* of production sited in the lowest cost producer, A. A produces almost half of the volume of output whereas the highest cost producer, C, produces less than a quarter. In Table 2 the opposite is the case, now the *preponderance* of production is found in the highest cost producer C. Total value rises to 35,200 as a result. In Table 1, the weighted average labour time falls to 95 (highlighted) compared to the simple average of 100, and in Table 2 the weighted average labour time rises to 105.

Why is the weighted average labour time so important? It is important for it alone yields the total labour time expended in producing these commodities when it is multiplied by the volume of production. In the case of Table 1; 95 times 340 yields 32,400 whereas if we multiplied that 340 by the simple value of 100 the yield would be higher at 34,000 which is clearly wrong.

If we were to assume further that the social requirement or demand for the goods produced in the two tables were 32,400 and 35,200 respectively then in each case the market prices would be set by the market values at 95 and 105 respectively. Here we are of course talking about demand and supply being in equilibrium. In this case all the labour expended would be paid for.

But what if demand fell in both cases? Let us say by 10%. As a result, Table 1 would only receive 29,160 compared to 32,400 before, and in the case of Table 2 it would only receive 31,680. In both cases the market price would be depressed below market value. Market prices would fall to 86 and 93 respectively (I have rounded off the figures). Before proceeding it is important to note that the numerical fall is higher in Table 2 at 12 (105 – 93) then it is in Table 2 at 9 (95 – 86). I add this in because it throws some light on the greater impact recessionary conditions have on industries that are less efficient or what is the same thing industries which are populated by higher cost producers.

More relevant to your comment is the opposite situation where demand exceeds supply. Here we will only be concerned with Table 2. The following question will be posed, by how much must demand rise so that the market price is equivalent to the cost of production in found in producer C. We know its cost of production to be 120. We know that the total volume of production to be 340. By multiplying the two figures we arrive at 40,800. In other words demand would have to rise by 16% from 35,200 to 40,800 for the actual cost found in C to say act as the "marginal cost".

If it rises more than 16% or less than 16% the market price will rise above or fall below the actual cost found in C. Thus no longer would the cost found in C, act as the marginal cost. Thus even in this uncomplicated world the use of marginal costs are problematic for it assumes an exquisite correlation. This would be highly exceptional meaning that the exception no longer proves the rule. (We will deal with prices of production further on.)

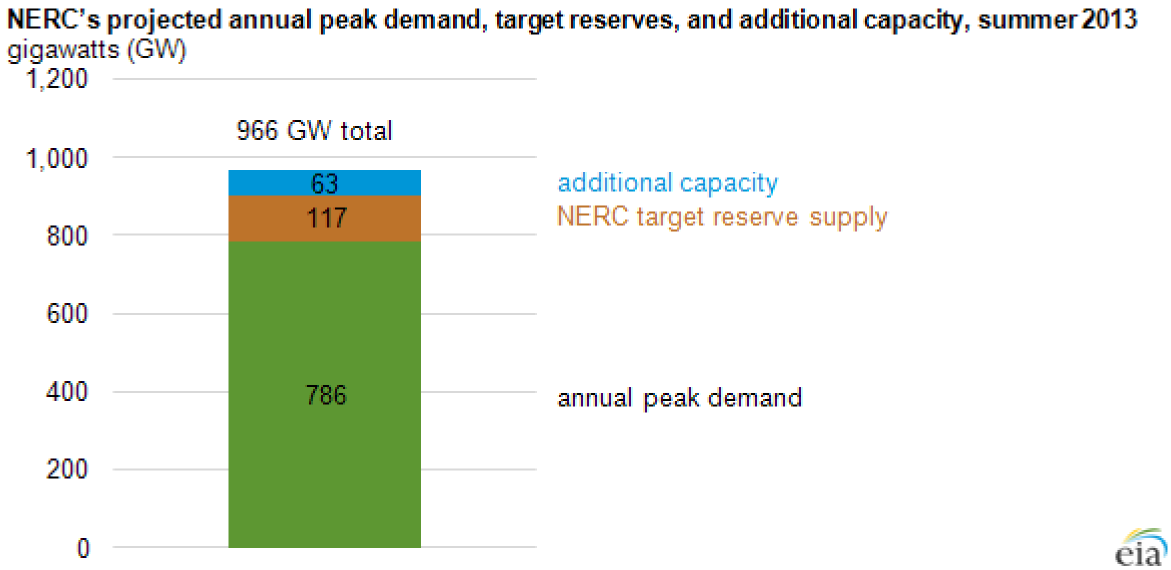
Electricity prices.

Moving closer to reality, a further problem is found. In the case of electricity where demand cannot exceed supply. If it did there would be brown-outs and likely black-outs. In that event the economic damage exacted would far exceed the profits made in the electricity industry. Currently (get it) there is much debate and speculation in the media whether or not electricity is going to have to be rationed over winter to prevent black outs. Large users have been approached and incentivised to reduce their consumption during peak periods. Here we are not talking about the shortage of capacity, but the energy to power that capacity.

But let us put this to the side and ignore the consequences of the war in the Ukraine.

Our theorem holds; under normal circumstances the demand for electricity will in all cases fall below its supply. Here is a graph taken from the US Energy Information Administration or EIA. It is typical for most countries despite the chronic underinvestment in this industry which has undermined the quality of that capacity. Here we find a reserve of 117 GWH and an emergency buffer of 63 GWH adding up to 19% of total capacity. In other words even at peak times, supply should exceed demand by 19%.

Thus the electricity industry is an exceptional industry. No other industry has a planned capacity excess. Instead other industries have unplanned excess capacity which is largely governed by the phasing of the industrial (business) cycle. To view the economic wide volatility in capacity follow this link.



We can now return back to Table 1 having suitably modified it by adapting it to the electricity industry.

Table 3.

Energy provider	Individual cost of production	GWH capacity	Assumed Value of electricity sales	Simple average	Weighted average
(1)	(2)	(3)	(4)	(5)	(6)
wind	80	160	12,800		
nuclear	100	100	10,000		
gas	120	80	9,600		
TOTALS		**340**	**32,400**		
AVERAGES	**120+100+80/3=100**		**32,400/340=95**	**100**	**95**

This is in line with the Graph 1 in the main post provided by *Statista*. Wind is the cheapest and gas is the most expensive producer of electricity. If hourly demand falls below 9,600 then using the marginal costing method used by regional clearing houses (wholesale markets) the market fix at that time will be 80 per GWH because wind generation now satisfies the demand without the use of nuclear or gas. But should demand rise marginally to say 10,000 so that 400 GWH is now needed to be supplied by nuclear, then the market fix will jump to 100 per GWH and wind will receive a bonus of 20. So the mere increase of 4% in demand is sufficient to lever up the clearing price by 25% from 80 to 100. Should demand rise above 19,600 requiring gas generation then the price fix will be 120. Wind will receive a bonus of 40 and nuclear a bonus of 20 per GWH.

This can be shown in the table below. Here we assume demand progressively rises, crossing the thresholds of 9,600 followed by 19,600, each time spooling up more expensive means of producing electricity.

Table 4.

Energy provider	Individual cost of production	GWH capacity	demand	Fixed price	Max Priced output
(1)	(2)	(3)	(4)	(5)	(6)
gas	120	80	over 19,600	120	<40,800
nuclear	100	100	up to 19,600	100	<22,000
wind	80	160	up to 9,600	80	<9,600
TOTALS	**Average 100**	**340**	**32,400**		

Now we can see the malign effect of marginal costing. The total price fix for electricity on this basis could price the total output of electricity at 40,800 (highlighted) versus the average weighted labour time of 32,400 highlighted in Table 3. (We have encountered this figure of 40,800 earlier.) This 25% differential would then be passed on to consumers and energy users of all types. It is a recipe for super profits to be made by the lowest cost producers. It is important to note of course, that it does not require a demand of 32,400 to trigger a price of 120 per GWH, anything over 19,601 will do it, something market values would prevent.

Prices of production.

It could be argued that the simple solution is to price fix each GWH at 95 the weighted average, regardless of who is providing the power. However, this would means that wind would make an above average profit and gas a below average profit regardless of demand. Under these circumstances gas could even be making a loss because 95 may be below its cost price. This would topple the industry.

However, when we are talking about modern pricing, or more accurately, pricing after the industrial revolution, we are talking about prices of production forming market prices replacing market values which we have used above. So what would happen in the realm of prices of production? Here we make a final assumption, the composition of capital of gas, nuclear and wind are similar, though there operating costs may differ. All three are capital intensive, that is to say their compositions of capital is above average.

In the realm of prices of production the movement of capital tends to average out rates of profit or as the capitalists like to call it rates of return. If we were to assume the economy average is 10% then in a regulated electricity industry, the one Europe is moving towards, each kind of producer could be guaranteed a 10% return on their capital. This can be done in the price or more efficiently via tax and subsidy. If it is based on price it would be biased against wind and biased in favour of gas because it is likely that wind would be used more often than gas when set against their respective capacities. Or an average price could be set, with wind being more heavily taxed and the funds so provided used to subsidise gas. In all cases, the unit price of electricity will be well below the prices yielded by high frequency marginal costing.

Both examples above would provide an average rate of return. In this case an investor will have no more of an incentive to invest in wind as in gas, so additional incentives would need to be deployed. But this is by and by, what we are doing here is to show, only, that marginal costing on the basis described in this attachment necessarily leads to higher electricity prices because the more expensive producers aka gas will always dominate. This is shown in Graph 2 of the main post. There, there is a close correlation between electricity prices and gas prices despite the fact that the share of renewables grows each year which should be drawing the price of electricity below that of gas.

In the end the issue is a technical one, not primarily an economic one. In pursuing renewables governments imbued with neo-liberalism have relied on fossil base load stations, rather than clean storage to compensate for the vagaries of the wind. Had these governments not been dominated by market forces, aka the fossil industry, they would have invested in water and chemical based storage for excess electricity and utilised transnational DC power lines to even out nature. On this basis the dependency of fossil and nuclear base load producers would have been minimal or dare we say it, these base load providers would have been marginalised. But outside of war the capitalists are unable to plan their way out their front gates never mind out of global warming due to the competing interests pushing and pulling them, disorientating them and crashing their horizons.

I hope this clarifies the difference between marginal costs, market value and prices of production.