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The Energy Crisis: Manage Quantities and Avoid Burdening The Tax-Payer

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SUMMARY

Supply disruptions, in particular the reduced supply of gas following the Russian invasion of Ukraine, has triggered the major energy crisis across all of Europe. This threatens a severe economic downturn with substantially reduced real incomes, widespread business closures and – especially in the UK with its heavy reliance on natural gas for domestic heating – many households pushed into 'fuel poverty', choosing between adequate nutrition and heating for their homes.

This note discusses the economic mechanisms driving this crisis and the policy tools available to address it. The principal message is that in a crisis such as this *quantities matter*. The new UK government is introducing a near complete suspension of price mechanism in domestic energy markets, freezing both household and wholesale prices. Government across Europe will take similar measures. These seem necessary to protect households and businesses. But they are only sticky plasters. There is a near-binding constraint on the overall supply of gas in Europe. Without prices allocating supply, further measures are needed to decide who gets how much gas.

So, the policy response must address quantities, turning to administrative management of the physical flows of gas, to secure supply and reduce demand (through public appeal, voluntary proposed consumption reductions and where unavoidable rationing). In practical terms this means, going beyond the price caps (i) negotiating, bilaterally, with Norway as the principal supplier of gas to Europe to ensure energy security, obtaining allocations of gas at below elevated wholesale market prices; and (ii) within the resulting envelope of supply, implement standing plans e.g. in the UK those of BEIS and the National Grid, for allocating limited energy resources in a supply crisis.

From the policies announced and discussed so far it appears that the UK government, and its counterparts across Europe, believe that the *physical* deficit of energy in Europe can be closed by spending unlimited amounts of money. But the underlying problem is a shortage of physical supply. Spending more money, without controlling quantity, drives prices ever higher. This policy stance is reminiscent of the Major government in Black Wednesday 1992. Like that policy it is not sustainable.

Turning to administrative management of the quantities of gas deals directly with the supply deficit and will bring the cost of energy closer to normal levels. This is not without economic costs. Low priority consumers will consume less gas than they would like to purchase. Imports of liquid natural gas LNG must still be paid for at a premium price. But much less money than currently announced is needed for protecting households and businesses. No need to burden the taxpayer.

Key words: demand compression, demand destruction, electricity demand, electricity supply, energy prices, energy poverty, gas demand, gas supply, managed energy demand, natural gas, Russian gas, Russia-Ukraine war, pecuniary externalities

JEL numbers : E65, G01, H12, H23, L9, Q41, Q43, Q48

1. Introduction

This paper is an analysis of the policy options to deal with the current gas energy supply deficit in Europe, triggered by supply disruptions, most importantly lower than expected output from nuclear and hydro-electricity as a result of the European wide drought and a sharply reduced supply of Russian gas following the Russian invasion of Ukraine.[1]

These developments have triggered a major energy crisis across all of Europe, with European level wholesale gases rising to more than six times their normal levels before the supply disruptions and remaining highly volatile. This note offers a narrative for understanding the economic mechanisms of this crisis and the policy tools available to address it.

The economic mechanisms are well understood.

(i) elevated energy market prices are a signal of a shortfall in supply relative to demand, i.e. an anticipated energy supply deficit; but ultimately supply must equal demand and this deficit closed, by some combination of reduced consumption, increased production and imports.

(ii) In the short term – over the next two years – there are only limited opportunities for increasing production and imports, requiring a substantial short-term reduction of energy consumption;

(iii) however, for most energy consumers this reduction in consumption is extremely costly (in terms of reduced household welfare or firm profits) i.e. in the short-run both demand and supply are price-inelastic. Therefore, if price based, the necessary short-term reduction in consumption requires extraordinarily high price increases, large enough to impose very substantial costs and so forcing households and firms to substantially reduce their use of energy.

(iv) The policy tools available to respond to the crisis are less well understood. In most countries of Europe, especially the UK, the focus of policy discussion is on the use of government transfers and subsidies to protect households and businesses from higher energy prices.

The key point developed here is that *such transfers do not resolve this crisis.* Transfers are needed. Left unchecked, the massive distributional impact of the current high level of wholesale prices, will push large numbers of households in fuel poverty and force closure of many viable businesses. But the underlying problem is a shortage of supply. This can only be addressed by polices that focus on quantities, as well as prices. First, governments asserting their market power, negotiating discounted supplies from Norway as the key European gas supplier. Second, employing *non-price* based administrative measures to reduce energy consumption – including public appeal, campaigns to support energy efficiency, directed recommendations on energy usage and where appropriate energy rationing. These measures will both directly reduce the cost of fiscal transfers and lower European wholesale energy

[1] This paper draws on "An Economic Narrative for better managing the European energy crisis." a more detailed analysis published on August 30th, 2022. The main addition here, not in the longer paper, is discussion of the required reductions in gas consumption in the UK and the possibility of bilateral negotiation with Norway. I am grateful for thoughts from George Magnus and Paul Hallas, but any errors of facts and analysis here are my own.

market prices. Thus, the fiscal burden of the government transfers and subsidies used to protect households can be much lower than is currently anticipated.

This does not mean ignoring the market. It means using additional negotiation and administrative and measures to support responses to the market price signal of a major energy deficit.

Importantly this can be viewed as part of the necessary solidarity of wider Europe (EU and non-EU) in the face of Russian aggression in Ukraine. The case can be put to Norway to provide an important share of their energy resources at below elevated market prices (though above normal price levels), to limit the fiscal impact of the European energy crisis.

The note is arranged as follows. Section 2 looks at the impact of recent supply shocks on European energy markets. Section 3 explains how managed reduction of consumption can be implemented, building on existing emergency response arrangements. Section 4 discusses the possibility for negotiating security of supply with Norway. Section 5 concludes with a short discussion of the political context and the need for European solidarity in the face of Russian aggression in Ukraine.

A longer background paper "An Economic Narrative for better managing the European energy crisis." provides more discussion of the underlying economics, discussing the role of price inelasticity of both supply and demand in raising wholesale prices and how 'pecuniary externalities' provide an economic rationale for interfering in market price-based allocation of scarce energy resources.

2. Why Europe is particularly exposed and why it is a European wide problem.

Higher energy prices are hitting Europe much harder than the rest of the world. The principal reason is the reduced supply of gas from Russia, which has provided around one half of European gas imports and one-quarter of gas consumption (consumption of around 500 to 550 billion cubic meters (bcm) for all European countries including those outside the EU such as the UK and Switzerland). The impact is European wide because the close integration of European gas markets that has developed over the past thirty years and the limited integration with gas markets elsewhere in the world. North-Western Europe is effectively a single market with gas provided from Russia and Norway redirected to wherever prices are highest resulting in very similar wholesale prices across the region. Other areas of Europe are also closely linked, with pipelines connecting for example the countries of South-East Europe to supplies from Azerbaijan as well as Russia and Italy and Spain to supplies from North Africa. Across Europe a further source of gas is the global market for liquified natural gas LNG.

Gas, in contrast to oil, is relatively difficult to transport without investment in specialised transport infrastructure – pipelines and regasification facilities for LNG. As a result, gas prices are effectively set in European wide wholesale markets, with only relatively small variations in price as long as capacity remains to reroute additional supplies from lower to higher priced locations. These prices can though depart substantially from prices outside of Europe when capacity constraints bind. Unlike oil there is no global gas market. So, it is Europe that is bearing the brunt of this supply shock.

A further reason for an exceptionally large rise of energy prices in Europe is the key role of natural gas in electricity generation combined with supply disruption to other forms of electricity generation. Across Europe fossil fuels are used for around 40 % of electricity generation with around half of this from natural gas. Renewables are about one third of electricity generation and nuclear around one-quarter. Overall, something close to one quarter of the total European consumption of natural gas is used for generation of electricity, not for residential, industrial or other business or government use.

Fossil fuels remain essential for providing the necessary balancing of energy supply and demand especially at periods of peak demand, even when the bulk of generation is nuclear and renewable; as a result while the use of coal in electricity generation has declined substantially over the past thirty years (from around 45% to 20%) the use of gas has correspondingly increased (from 5 % to around 20%). The 2022 drought across much of Europe has substantially reduced both hydro and nuclear electricity generation, further increasing the demand for gas. With generation of electricity from natural gas relied on across much of Europe to bridge gaps between supply from other forms of electricity generation and demand, the consequence have been large increases in wholesale electricity prices alongside wholesale gas prices.

It appears now that Russian gas supply to Europe will cease over the winter of 2022-23. Thus, over the next twelve months, assuming no resolution of the conflict in Ukraine, Russian gas supply will fall by at least 140bcm (billion cubic metres) compared to 2021-22. There are only limited possibilities of increasing production from European sources (Norway, the UK and the Groningen field in the Netherlands, the latter being a low calorific gas that requires different burning equipment). Some additional pipeline gas can be obtained from Azerbaijan. To a limited extent coal can be substitute for gas in electricity generation. While some increased LNG (liquid natural gas) imports from around the world are anticipated, this is limited by

import capacity (not enough 'regasification plants') in Europe. Over the summer of 2022 European gas storage has been replenished and is close to 90% full. But all these sources together can supply no more than and additional 50bcm to offset the loss of Russian supplies. A reduction in gas consumption across Europe of around 90bcm or 15% of total consumption. If the winter of 2022/23 proves to be a cold one the deficit will be even larger.

What forms of consumption will be affected? The consumption uses of gas vary across European countries. The UK and the Netherlands are unusual with natural gas providing more than 60 percent of residential energy. Gas is widely used in industry and also for providing heat for non-residential buildings and services. In many countries, particularly Italy, Spain and Portugal electricity generation is a large share gas consumption, but this also important in Germany and the UK especially to meet peaks in energy demand. As a consequence of their reliance on natural gas for electricity generation Italy is the third largest gas consuming country across Europe after Germany and the UK. France in contrast with its large nuclear capacity uses much less natural gas for generating electricity).

There is considerable scope to alter gas consumption in response to higher prices over the longer term, for example through better insulation of buildings or developing improved technology based control of usage (e.g. smart meters). Technology also offers opportunity for at least partial substitution of the role of gas in providing flexible electricity generation capacity, for example with projects for storage of water with the potential for hydro-generation and increased use of battery technologies. These developments, together with increased import capacity for LNG, can replace Russian gas over a horizon of two to three plus years.

In the short term however, the scope for adjustment is very much more limited.

As a result, the market is allocating gas supplies to the highest bidders. This is the reason why wholesale European gas prices have risen more than three times since last year, because few consumers of gas, households, industry or electricity generators, can easily reduce their levels of consumption. There is risk of substantial further rise in prices, during the period of peak winter demand should Europe experience a cold winter. Forward prices for the winter of 2022-23 (which are volatile) have on recent occasion climbed to as much as 10 times normal levels, reflecting both the anticipated supply deficit and the risk that this deficit might be even higher than expected.

Similarly, the key role of natural gas in electricity generation and in bridging electricity supply deficits is also leading to an accompanying rise in wholesale electricity prices in many countries. There is country variation here – some are better placed than others to employ alternative sources of fuel for electricity generation which can help reduce the increase in wholesale electricity prices, although using for example coal is controversial because of the concerns about impact on global warming.

3. A better response: combining protection of the vulnerable with managed energy demand.

Demand management in theory

This point, that impact of the crisis on households and businesses can be mitigated by intervention that reduces demand hence lowering energy prices, can be illustrated in a diagram (Figure 1).

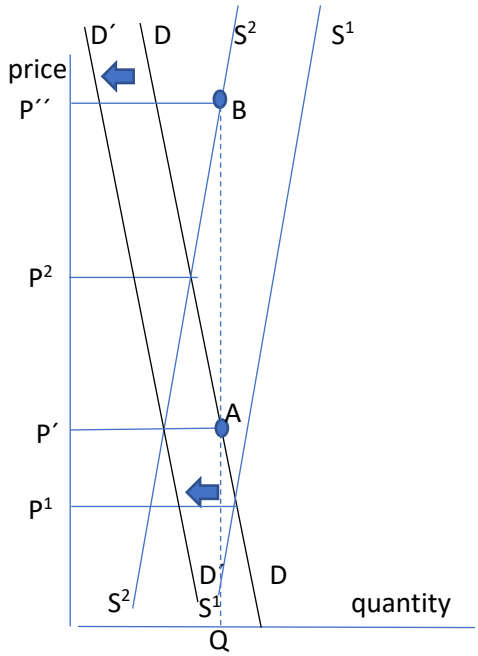

Figure 1 : Illustrating the potential price impact of energy management measures. The original price is at P^1, the intersection of supply curve S^1S^1 and the demand curve D^1D^1

The supply shock moves the supply curve to S^2S^2 and raises prices from P^1 to P^2, the intersection with D^1D^1.

Administrative measures, beginning with public appeal, followed by requests for reduction and finally rationing of supply – reduce demand, with a shifting demand from D^1D^1 to D^2D^2. Prices fall from P^2 to P´

Because of inelasticity of supply and demand, a supply shock substantially raises prices, but also demand management substantially reduces prices.

This simple text-book diagram also reveals the fundamental flaw in policy based on control of prices, such as those now being announced by the incoming Truss administration in the UK, if there is no accompanying control of quantities. The new policy is very simple, fix prices at P´. But if nothing is done about demand then the price paid to suppliers of energy (in the UK this means for imports from Norway as well as LNG from around the world) must be much higher than the price P´ paid by consumers. Demand is represented by the point A at the fixed price P´ and quantity then demanded by Q. This government must pay for sufficient quantity of energy to meet this demand of Q, and the price they must pay is then P´´ determined by point B on the supply curve S^2S^2. The overall cost of the policy is then (P´´- P´) X Q which can be very large indeed.

Worse still, in Europe the short-run supply curve S^2S^2 after the supply shock is effectively vertical (with all physical sources of supply including LNG gas imports being fully used). *Thus, there is no limit to the subsidy* (P´´- P´). A further shock, e.g. a cold winter in Europe together intense competition between European countries for limited supplies of Norwegian gas, could dramatically raise the overall cost of using government resources to fix energy prices, pushing them beyond projected levels (below estimated for the UK as £60bn or 1.8% of GDP) to three, four, five or more times what is budgeted.

In practice ability to reduce demand is complicated by the fact that Europe is a collection of nation states not a single country. So, there is no overall authority to manage such an

adminstratied demand allocation. Still administrative measures are relevant even on an individual country basis, because consumption must fall to match reduced supply. So, it is necessary, now before the winter, to plan where reductions in consumption can be made with least economic and social damage.

Demand management in practice

How to put such managed demand into practice? The administrative mechanisms already exist. Legally valid emergency plans for such government directed reductions in energy consumption already exist. In the UK all that is needed, following governmental instruction, is dusting off measures that have been prepared to deal with an energy supply deficit. Detailed and ready to go in National Grid (2021) "Procedure for Network Gas Supply Emergency" and from BEIS,. Electricity Supply Emergency Code (ESEC) .

These emergency plans distinguish priority customers (for gas supply these are facilities such as hospitals where loss of access to gas might threaten lives and production facilities such as furnaces and glass works "which require time to be safely shut, down and would sustain serious damage (£50 million or more) if gas supplies ceased suddenly."; ESEC has somewhat looser criteria where supply is required for "a national or regional critical need; public health and safety issues; the potential for catastrophic damage to high value plant." BEIS maintains list of the protected customers.

In the UK the process for triggering a UK response to an energy emergency crisis begins with an assessment of Her Majesty's Government that an emergency situation exists or is imminent and thus justifying the establishment of an Emergency Response Team or ERT at the Department of Business, Energy and Industrial Strategy. ERT is then expected to work closely with the Civil Contingencies Committee at the Cabinet Office (usually referred to as COBRA) that is convened as required to handle matters of national emergency or major disruption. The legal framework in the UK then supports the implementation of a three-stage phased response based on ESEC and/or the gas procedure.

- The initial response is through public appeal for reduced consumption of energy
- This can then be followed by required reductions in consumption by larger non-priority users Civil Contingencies Committee that is convened to handle matters of national emergency or major disruption.
- Finally rationing of supply can be imposed, through rolling three-hour electricity supply of isolating and shutting down parts of the gas network, with arrangements as far as possible to maintain supplies to priority users. In the case of gas, the priority is maintaining continuity of supply to domestic customers.

Emergency powers of this kind, which exist in other countries as well as in the UK, have been developed to deal with a physical deficit of supply at national level, possibly prolonged, triggered for example by a breakdown in pipelines used for importing gas or cables for import of electricity.

The fact that this crisis is taking place at European not national level complicates matters. It is clear that if all the countries of Europe were to use such emergency powers to reduce energy consumption, this would substantially reverse the substantial current rise of market prices for European energy, triggered by the current supply shortages. But, how to decide how much reduction within each country? No government will easily take direct responsibility for resource allocation, accepting the verdict of 'the market' and avoiding emergency intervention

absolves them of responsibility and risk of political blowback. All will also have a temptation to "free ride" rely on the actions of other countries doing more to reduce demand than they undertake themselves. This is quite different from a physical supply disruption at national level, which establishes clearly how much demand reduction is required to maintain continuity of supply.

It is therefore unsurprising that to date the governments of only a few European countries – notably Germany and Austria -- have publicly discussed in any detail how emergency measures might be introduced to limit gas consumption. This is much larger than was envisaged in the May 2022 REPowerEU plan from the European Commission of around 10 bcm – but that was focused on the longer term transition, not dealing with the immediate crisis. It is though not totally unachievable, and even managing half this with say a 5% managed reduction in demand will have a major price impact. The relatively successful experience of Germany, with managed energy consumption in the first six months since the Russian invasion of Ukraine which is now expected to reduce consumption by at least 15% shows what is possible. Similar effort across wider Europe, amounting to some 60bcm per annum, together with higher LNG imports, would be enough for Europe to cope with a complete cut-off or Russian gas.

The European Commission has since attempted to find agreement on national level reductions in gas consumption, setting higher reduction targets than in May, but the current agreement announced on 26th July, is so far a voluntary reduction of 15% with many exceptions and no mechanism to ensure compliance. It is also limited to EU countries, not all European gas consuming companies, The agreement does envisage compulsory rationing in the event of a major crisis. and has run into political opposition about the proposal for these mandatory EU level limits on gas consumption, and because of many exceptions their target is a relatively limited 30-40 bcm against a shortfall of more than 60 bcm, even after allowing for increased LNG imports and build up of gas storage. More action will be needed and will presumably be forthcoming, with the latest development being that the the EU executive subsequently considering a further electricity demand-reduction plan

Where exactly are managed reductions possible. The breakdown of gas usage, quoted from statistics for the International Energy Authority for the EU heat and power generation 31.4%, residential 26.0%, industry 24.7%, commercial and public services 11.3%, and other 6.6%. The UK is not so different, but with higher levels of residential consumption and somewhat lower industrial consumption. These figures give some idea of where reduction in consumption might be required.

More analysis and discussion is needed, but a target to reduce household consumption by at least 10% could be pursued. Reductions could be further supported by aggressively pursuing programs of subsidised home insulation, especially for the most energy vulnerable.

There is additional scope in industry, once a clear distinction is made between demand compression and demand destruction. Demand compression is a short-term reduction in demand, for example from mothballing a plant, without adverse longer term impact, demand returns once gas is available. Demand destruction is more pernicious. This is when a short-term reduction in demand has damaging impacts, for example where it is not cost effective to start and stop a continuous manufacturing facility such as is found if industries such as fertilizers, metal fabrication and glass making.

Government and private sector services are a further target for managed demand reduction. Personal experience of this author attest to large scale wastage of energy in a large and

disparate organisations such as a university. Central planning style target reductions need to be set and vigorously pursued.

Similar demand reduction, should be sought in electricity consumption. The goal here would be to reduce reliance on gas for electricity generation by a relatively large amount, say 20% (more difficult for countries such as Italy particularly reliant on natural gas for generating electricity). Occasional electricity blackouts on a rolling basis cannot be ruled out.

4. Specific application in the UK

The basic challenge – UK must import much of its gas.

What does this mean for the UK? AS is now becoming clear that, alongside price caps on household bills, the incoming government is also developing a scheme for a freeze of UK wholesale gas prices (paid by UK energy suppliers). Similar policy measures are being discussed in the EU. These measures are understandable given the very wide impact of current high prices, on businesses, social care, local government. High energy prices are far from being just a household problem.

BUT – as discussed in the previous section, without further measures to both increase supply and reduce demand – this is just another sticking plaster. Not dealing with the underlying energy deficit. Measures to increase supply can only go so far.

Put another way, the UK has left the Single Market but *we are still a part of, and remain a major net importer from, a single European market for gas and electricity.* We rely on this market for around 50% of our gas, primarily from Norway (see illustrative numbers below) and unless we supplement price controls with administrative measures we will end up paying high European wholesale market prices for much of our gas, regardless of any controls inposed on UK wholesale gas price.

Over time we can build sufficient LNG and storage capacity to be independent of European gas and electricity markets (enabling us to meet our needs from the cheapest available supplies on world markets, Europe or elsewhere, as we already do for petroleum products). This is not possible for this autumn/ winter. So, we will still need this year to import substantial amounts of gas from Norway with no alternative supplier. This in turn means that, to limit the financial cost to the UK tax payer of importing from Norway (and to reduce overall demand for gas in Europe, helping limit would could be further spiral upwards in European gas prices) we must make substantial effort to reduce UK gas consumption.

In short, the laws of supply and demand have not gone away. As well as maximising alternative supply (North Sea, LNG imports*) if we freeze the wholesale gas price* , we still need to work out how, administratively, to manage gas demand. The previous section has described the administrative measures available in the UK to do this.

Some calculations, explaining why we need administrative control of quantities.

What is the cost to the tax-payer of a wholesale gas price freeze? Some back of the envelope calculations, ball-park correct assuming European wholesale prices remain roughly where they are now, is as follows.

a. UK gas consumption is around 100 billion cubic metres (bcm) or 10,000 terrawatt hours TWh per year, depending on the weather (lets pray that God is on our side, not Russia's, and gives us a warm winter this year)
b. Of this, at full production, around 40 bcm comes from the North sea. Using our LNG capacity to its fullest we can import around 20bcm annually, but our very limited storage capacity (only 1bcm) means we must reexport around 10bcm for storage in Europe (in summer) and repurchase at wholesale price (in winter). Net the LNG only provides around 10bcm per annum.
c. This means we need to import 50bcm (roughly 500 TWh) to maintain typical consumption levels.
d. Wholesale gas prices have risen from around £1.00 per therm normal pre crisis levels to around £6.00 per therm. A therm is around 30 kilowatt hours. So pre crisis gas prices were about £33mn per terawatt hours and have now risen around £200mn per terawatt hour
e. ERGO. Our import bill, if we could obtain sufficient gas at current market prices to maintain previous consumption levels will then be around 500 x £200mn = £100bn (if we could obtain, that's a big if). Since
f. If we freeze wholesale prices at £2.00 per therm then there will be some price induced demand compression, I assume this is 5% of total demand, or 5bcm. This means the UK must import 45bcm instead of 50bcm and pay (£6.00-£2.00)x£33mnx 450 TWh or £60bn to maintain the wholesale price level. This expenditure would amount to 1.8% of GDP

However, there are big caveats here.

First: Norway is able to provide only around 120bcm of natural gas in 2022-23 to all countries of Europe. It is far from certain that the UK will be able to obtain as much as £45bcm of this, as will be needed to match a fall in demand of only 5%.

Second: the allocation by Norway of its gas across Europe will likely be made on a competitive basis, but assuming there is no substantial reduction in demand across the continent, but this could then push Norwegian gas prices much higher than they already are now. They could end up well above £6.00 per therm to say £12.00 per therm. We will probably have to then make do with less than 45bn bcm , say 40bcm, but the cost will rise to (£12.00-£2.00)x£33mnx 400 TWh = £130bn or nearly 4.0% of GDP.

As argued in the previous section, usage across Europe has to fall, by something like 15% to replace the missing Russian supply and if the countries of Europe are all competing against each other to purchase the limited supplies from Norway, and constraints on imports of LNG from Asia, there is really no upper limit to the rise of wholesale prices. The UK government is effectively writing a call option on European energy prices for UK consumers and producers, but exposed to great risk because overall demand for Energy in Europe remains uncontrolled. To what extent will demand be reduced across France, Italy, Spain as well as in Germany? With populist government coming into power in Italy, with France acting quite independently, there is a possibility of wholesale prices rising even further than they already have. An increase to

say £11.00 per therm seems possible, which would then more than double the cost of implementing the wholesale price freeze for the UK

To illustrate further, in the event of a cold winter, with countries across Europe to compete with each other to purchase Norwegian gas, and without administrative measures to limit demand, an exchequer cost of 4% of GDP or more cannot be ruled out So, without any other policy changes, current projections of a UK budget deficit for 2022-23 of around 3% of GDP could rise as high as 7% of GDP, or even higher, yes, over time can be expected to fall to a more sustainable levels, but still a big headwind for the new administration.

All of this makes clear that, if we freeze the wholesale price, we will need further administrative measures, to achieve bigger reduction of consumption of perhaps around 15% (something similar to what Germany is now achieving through administrative measures), lowering the gas the UK imports from Norway to around 35bcm. Assuming wholesale prices remain at around current levels, because we are not competing aggressively with other countries of Europe, this lowers the exchequer cost to around £47bn or 1.4% of GDP; and the cost would be lower still if adopted by other countries of Europe.

We can go further , securing gas for UK consumption at relatively low cost to the taxpayer.

To understand this point, let us start with a fairy tale (please suspend disbelief for the moment).

A consistent approach – avoiding the costs to the exchequer of subsidising imports that could rise to 4% of GDP or more -- is to freeze the prices in wholesale market for gas for not just in the UK but across all of wider Europe, non-EU as well as EU and to reach a continent-wide agreement on levels of gas consumption.

In economics jargon the countries of Europe would be acting as monopsonists (monopoly buyers). The power, if co-ordinated, is almost unlimited, they could push prices for Norwegian gas back down to pre-crisis levels or even lower, if the acted sufficiently aggressively (the only Norwegian response then being to keep the gas in the ground, so it becomes a bilateral bargain over price and quantity).

Or, equally a fairy tale, but please bear with this one as well, there could be a continent-wide agreement with the marginal supplier Norway, to no longer sell gas to the highest bidder or at current market prices in line with existing long-term contracts. Instead Norway might agree to accepting a fixed price – at say £2.00 per therm, so double what they receive in normal times – and allocate Norwegian gas on a non-price basis. Effectively then, Norway becomes the arbiter of which country in Europe gets how much gas.

How would they decide? A simple and crudely equitable arrangement would be every country reducing its gas consumption by 15%, . This would allow countries of Europe to obtain a secure supply of gas, albeit at much lower levels than before the crisis, at comparatively low prices. It would then effectively eliminate a large part of the costs to the exchequer of freezing the wholesale gas price. This would also have to take into account capacity for import of LNG from outside of Europe.

In practice of course the squabbling countries of wider Europe will never reach this level of agreement. Even within the EU agreement is close to impossible.

This matters less than one might at first suppose. The financial pressures are such, and the need to resist Russian aggression in Ukraine so great, that eventually all the countries of Europe will be forced to come to Oslo and ask for discounted gas supplies. Norway is a Western European country, in no way a sympathiser with Russia, it is in its own long-term interests for Europe to survive the present crisis without excessive economic damage and it will in any case wish to express its solidarity with Western democratic countries.

Therefore, it is entirely possible to reach much the same outcome on a bilateral basis as in an ideal world would be achieved collectively. The UK can take a lead, reaching out to reach agreement with Norway on a non-price based purchase of gas at say £2.00 per therm, still a healthy profit for Norway, limiting in the case of the UK the purchase to £35bcm of Norway's total 2022/23 exports of £120bcm. There will be bargaining and no doubt the other countries of Europe will, quickly, leap to be around the bargaining table as well. But this is not such a fairy tale. It is an outcome that can be realistically achieved.

The taxpayer burden of pegging the domestic UK wholesale price at £2.00 per therm, at least as far as purchase from Norway is concerned, is then eliminated. The cost of household support is also dramatically reduced, no need to do much more beyond the measures announced buy the previous administration in May 2022. It just needs Liz Truss, as a priority, to make her first foreign visit to Oslo and negotiate security of our gas supplies.

This does not eliminate all costs to the tax payer. Europe must continue to import as much LNG as it can, a significant source of supply, especially for the UK which has import around 20bcm annually (though due to limited storage capacity the UK can only absorb this in the winter months and must re-export around 10bcm annually across Europe), The net 10bcm of UK LNG imports will not be available at a discounted, rate, and so an exchequer subsidy will be needed to bridge the difference with the capped UK price of wholesale gas. But this is less than one quarter of total UK gas imports, so affordable at cost to the exchequer of perhaps around £15bn per annum.

The downside, if it is one, that we then must face up to reality, not engage in simplistic analysis about buying our way out of this crisis and solving the energy deficit by using government borrowing alone. This does not address the central question of who gets how much gas. Once we have agreed level of imports, then we will know how much gas will be available to the UK for 2022-23. On the analysis explored in this paper, this would be a reduction in overall supply of 15%, leaving the UK with the need to reduce consumption from around 100bcm to around 85bcm. With prices capped across the board, there is then no alternative but to turn to administrative measures, of the kind outlined in the previous section, to determine priority access to this gas for households, industry and for energy generation.

5. Conclusion: energy prices at a time of war

This note has pointed out a remarkable irony. The policies of the most free-market anti-statist government in the UK since Robert Peel abolished the corn laws, are being developed by the civil service and within days of taking power this government is contemplating what may be a quite unnecessarily large expenditure of at least £60bn or 1.8% of GDP, possibly rising to 4% or even more to subsidise gas imports.

This outcome can be avoided by focusing not on prices but on quantities. We can negotiate our security of gas supply for the coming year with Norway, at a reasonable but not excessive price here suggested as £2.00 per therm, compared to £1.00 per therm pre crisis. Norway can be expected to agree, so as to maintain the solidarity of Western democracy at this time of war, provided we equally agree to reduce our gas consumption through administrative measures, if necessary through rationing, by an achievable amount, suggested here as 15% of usage compared to the previous year. Norway is not our only source of gas imports. Alongside perhaps obtaining 35bcm (billion cubic meters) of gas from Norway, we will also want to important for UK use at least 10bcm of LNG from around the world, gas for which we cannot avoid paying premium prices. But the costs of this will be more like £15bn than £60bn, so less than 0.5% of GDP.

Even for those of a more pro-statist perspective (this includes the present writer) a voluntary and unnecessary transfer of 1.3% of GDP from the good citizens of the UK to the good citizens of Norway seems unnecessary, more than sufficient recompense for the much-valued Xmas tree they provide us with each December for display in Trafalgar square.

Negotiated security of gas imports combined with administrative allocations, including if necessary in the event of a cold winter rationing, are also critical for ensuring that the UK does not compete unnecessarily with other European countries, so causing market prices to spiral upwards and magnifying costs to the exchequer. We need to establish at an early stage how much gas we are likely to have and think carefully about how consumption of this gas will be allocated. This is a necessary policy response by the UK government to the present energy crisis, in order to avoid chaotic shortages and supply interruptions in the coming winter,.

There are three main objections to this line of argument, the last most serious.

The more cynical reader will still be concerned about the implied degree of European collaboration. Past-experience of European collaboration at times of crisis is not encouraging, most countries then find it easier to support their own perceived national interests than to co-operate for the broader good. The experience of management bank failures in the global financial crisis is a clear example. What reason to think that such co-operation will work this time around to address the European energy crisis?

The cynical reader has a point– countries will find it easier to sign up to pledges of managed energy demand reduction, harder to put them into effect. Always politically easier to rely on the efforts of others. Free riding will take place.

But here is no need for European wide political agreement, all that is required is a bilateral approach. For the UK government this is comparatively straightforward, arguably a benefit of being outside the EU, they can approach the Norwegian government, who have always acted in the global interest witness (their primary role in peace keeping exercises around the world) to establish security of UK energy supply at some below market but generous price level.

The moral argument, of resistance to Russia, is strong enough to win the day. These are not normal times, they are times of war initiated by a common foe. While no European country, other than Ukraine, is directly participating in this war, all are impacted and morally involved.

A second objection, politically central but economically invalid, is that the citizens of the UK will not accept administrative allocation and potential rationing of energy. In her campaign for Conservative party leadership the new prime minster Liz Truss (ignoring the political imperative, never say never) voiced this view, ruling out any policy of energy rationing in the UK. But as discussed here, given the major supply deficit and uncertainties about demand and supply, this is actually a choice to prefer the possibility of unplanned chaotic supply disruption to planned and carefully managed rationing that protects the most essential users of gas. The lesson here – while such optimism is understandable, indeed part and parcel, of political campaigning – once in office our politicians should not be afraid to talk about difficult choices. On the contrary, it is their responsibility to prepare politically for the possibility that difficult choices may have to be made.

The final and most serious but technical objection is that this will mean riding roughshod over many existing contracts between private buyers and sellers. Legislation may well be needed in both Norway and in the UK to bring such negotiated provision of gas supplies at below market prices But, this just a matter of dealing with the practical details as a legislative priority.

In short, while gas consumption will have to be guided by government emergency planning arrangements and gas and electricity consumption may have to be rationed, we can devote much less public money than the new UK government is contemplating on subsidising gas prices. At at the same time we must focus on the task of working out how best to managing the limited supplies, employing for this purpose the emergency energy arrangements already prepared for dealing with an energy crisis .

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