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The "greening" of industrial policy, headwinds and a possible symbiosis

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The "greening" of industrial policy, headwinds and a possible symbiosis

Policy Paper no 3

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Socio-economic Sciences and Humanities Europe moving towards a new path of economic growth and social development - Collaborative project

Karl Aiginger

The "greening" of industrial policy, headwinds and a possible symbiosis*

Keywords: New industrial policy, climate change, carbon leakage

JEL: L5, O32, O44, Q3, Q4, Q5

Abstract

The importance of manufacturing for industrialized countries has been reappraised, specifically in the wake of the financial crisis and of China's rise to world no 1 in manufacturing. A "new industrial policy" should bolster reindustrialization, different from the old selective and interventionist one, with proposals by academia, by the European Commission and many national policy makers in the US, United Kingdom and France. It should be pro competitive, in line with societal needs, integrated with innovation and regional policy building on competitive strength and with "sustainability at centre stage". Environmental standards should no longer be considered as an obstacle to competitive manufacturing but could constitute a driver of green growth. Europe sets targets for increasing energy efficiency, increasing shares of renewable and cutting emission first for 2020 and then for 2050, demanding the reduction of greenhouse gases by 80%-90%, based on new technologies and prices of carbon dioxide of 250 €/t.

Headwinds to this ambitious path come from low gas prices specifically in the US, based on a new extraction technology and from the breaking down of the European emission trading. The question now raises whether Europe has to cope with low gas prices as to prevent carbon leakage, or whether Europe can stick to the goals of the envisaged integrated and systemic industrial policy as to raise energy efficiency as well as to reduce carbon emissions by new technologies. A "new industrial policy" would match the US cost advantage in energy by closing the technology deficit, improving skills and going for excellence in energy efficiency and clean technologies.

1. Outline and objective

Industrial policy has become a major issue in industrialized countries again. We analyze in the next section why this happened and to which extent a "new industrial policy" should be different from the old discredited one, which often tended to decelerate structural change.

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Academia (*Aghion et al.*, 2011; *Aiginger*, 2007, 2012) as well as policy documents (*European Commission*, 2010, 2011, 2012; *OECD*, 2012) supply different concepts of "integrated" or "systemic" industrial policy with common elements stressing that it should be based on new technologies and supporting long-run targets of the society, inter alia those of fostering energy efficiency, clean technologies and preventing climate change. We discuss in section 3 the argument that an ambitious climate policy in industrialized countries and specifically in Europe would lead to carbon leakage, i.e. the relocation of energy intensive industries into countries with lower standards. These arguments limit the greening of industrial policy, and the headwinds are surmounting due to decreasing prices of gas specifically in the US and the collapse of European emission trading. Section 4 discusses the challenges of low energy prices and the enticement of a low road answer to this new competitive advantage of the US, while the next section elaborates elements of a more sophisticated answer, which could be superior in the long run. A higher road answer connects industrial policy with innovation and the climate strategy, thus supporting the long-run goals of the society based on the long-run competitive advantage of rich countries in the globalizing world.

2. The resurrection and "greening" of Industrial Policy

From the bottom to the top position of the agenda

For a long time industrial policy was landed with a born loser image. All too often governments intervened to preserve old structures or national interests. "Old" industrial policy served to decelerate structural change, as well as employment and technology advancements (including green technologies) while sheltering ecologically disastrous large enterprises (from petrochemicals companies in many industrial countries, US Steel in the last century up to steel plants in Southern Italy today). Industrial policy was ineffective, since its goals conflicted with other policies (competition or employment policy) and was not supported by or in synergy with innovation, education or climate policy. "No industrial policy is the best industrial policy" was the conclusion in the US and "horizontal industrial policy only" became the mantra of Germany first, and then gradually the EU. Today industrial policy is back on the agenda in Europe and the US.

Table 1: Share of manufacturing and the dynamic of industrial production

	Share of manufacturing at current prices							Increase of production index	
	1990	1995	2000	2009	2010	2011	2012	2000/2008	2008/2012
	In %							% p.a.	
Germany	-	22.0	22.3	19.5	21.5	22.6	22.3	2.3	-0.1
Ireland	-	22.7	25.8	21.9	21.7	21.7	-	4.4	0.2
Greece	-	-	10.9	8.9	9.9	9.2	9.7	-0.6	-7.0
Spain	-	-	17.9	12.2	13.0	13.5	13.3	0.1	-6.0
France	17.6	16.1	15.2	10.6	10.3	10.1	-	-0.1	-2.4
Italy	22.5	21.5	20.1	15.8	16.5	16.3	15.5	-0.2	-5.2
Austria	21.5	19.4	20.1	17.8	18.4	18.7	18.7	4.0	0.8
Portugal	-	18.1	17.1	12.6	13.4	14.0	14.3	-0.9	-3.6
United Kingdom	20.1	19.2	15.6	10.5	10.7	10.9	10.7	-0.7	-2.9
USA	16.9	16.4	14.2	13.1	12.7	12.3	-	0.5	0.4
EU-15	-	-	18.4	14.1	14.9	15.2	14.9	0.8	-2.2
Euro area (17 countries)	-	-	19.1	14.8	15.7	16.1	15.8	1.2	-2.1
EU-27	-	-	18.5	14.5	15.2	15.6	15.3	1.2	-1.9

S: National Accounts by 10 branches - aggregates at current prices [nama_nace10_c]; http://www.bea.gov/iTable/index_industry.cfm

Why the sudden attraction of industrial policy

A renewed interest in industrial policy first arose after 2000 and additionally in the wake of the financial crisis, as countries with a larger industrial base and a positive external balance managed to make up for output losses more quickly. Politicians, as well as policy documents are now calling for a new industrial policy in countries from the US to the UK or France. The wave has gained momentum from the fact that China is becoming the world's No. 1industrial power. The share of manufacturing in GDP decreased in most industrialized countries and its size was surpassed by that of the financial sector in some of those countries; unemployment is higher and output lower today than before the crisis in most European countries. Government budgets were used for bank rescues and for financing unemployment and pensions, but were not directed towards employment and growth in the real economy.

Elements of a "New Industrial Policy"

Industrial policy, which had previously been of mixed success, should be different this time (see *Aghion et al,* 2011, *Rodrik*, 2004, *Aiginger*, 2012).

"New" industrial policy is claimed to (i) support market forces instead of counteracting them, (ii) increase competition instead or favouring individual large firms, (iii) foster broad technologies instead of picking single winners, and to (iv) support long-term government targets in clean energy and health (*Aghion*, 2011). New policies should be based on innovation and education and connected with competition and regional policy to shape a "systemic industrial policy" (*Aiginger*, 2012). In this way you avoid a single policy strand which often conflicts with other specific policies. Industrial policy should be horizontal but contain

industry specific elements (EU matrix approach; see *Aiginger – Sieber*, 2006). It should rely on clusters, should be regionally based, follow smart specialisation trends and emerge from dialogues and cooperation between business and government, instead of being solely planned and designed by government. And it should be closely connected with issues of sustainability and climate goals.[1]) Summing up the "new industrial policy" should be forward looking, pro competitive, supporting long term societal needs. Above all, it should not be an isolated policy strand in conflict with regional policy or energy policy, but it should be an integrated or systemic policy.

The need for integrating climate and industrial policy

The systemic character of industrial policy can be illustrated by the interface between industrial policy and energy policy. Placing sustainability on the centre stage suggests that environmental standards are no longer seen as an obstacle for a competitive manufacturing sector, but as potential drivers of growth.

The extent of the challenge of climate change is shown by the *Stern Report* (2006) or in IPCC[2]) documents which predict that temperatures will rise by five degrees by the end of the century, if carbon dioxide emissions are not curtailed dramatically and quickly. The rise in temperature could be restricted to approximately only two degrees if greenhouse gas emissions are reduced by 80-95% by 2050. The EU has reacted with a short-run strategy up to 2020 (the so called 20/20/20 goals)[3] which sets the goal of reducing the emissions of greenhouse gases by 20% compared with the 1990 levels. Furthermore, the EU has started to discuss long run emission reduction strategies to be achieved by 2050 (see *European Commission*, 2011). Simulations with the energy system model PRIMES shows that this very ambitious target is in principle feasible without reducing economic growth, but would need radical technological innovations (energy efficiency improvement way above the historical trends) and de-carbonisation initiated by a carbon price of 250 €/t (*European Commission*, 2011; *Kupers,* 2012; *Schleicher – Köppl*, 2013).

Reducing greenhouse gas emissions, increasing energy efficiency as well as changing the energy mix from carbon based to "clean" energy (solar/wind) have become top priorities in the EU and the US and these endeavours take on many different forms, examples of which are: the Kyoto protocol, emission trading regimes, research programs, the subsidization of firms and households, energy taxes as well as taxes on the carbon content and joint research

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[1] Apart from these positive characteristics of a New Industrial Policy, a small anti-globalization touch (plus disguised protectionism and China bashing) has sometimes been included e.g. in France and in the US. The European Commission developed just such a new industrial policy in "Communications" first calling for an "integrated industrial policy with sustainability at centre stage" (European Commission, 2010), and then for a "stronger European Industry" setting the target to raise the manufacturing share in GDP from 16% to 20% (European Commission, 2012).

[2] Intergovernmental Panel on Climate Change.

[3] 20% renewable energy sources in gross final energy consumption; 20% emission reduction compared to 1990; 20% improvement in energy efficiency compared to the growth path without policy change ("business as usual" scenario). The last goal does not rank the same as the first two.

programs e.g. for ultra low carbon steel in Europe[4], fighting the "big city problem", as well as carbon targets in 200 cities in China (FT April 15th, 2013). All these measures were implemented in different countries and regions.

Operational efforts

In two communications the European Commission puts first "competitiveness and sustainability" on the "centre stage" of its new industrial policy agenda (*European Commission*, 2010) and then defines a sustainable industrial policy as focusing "explicitly on opportunities for sustainable growth and job creation while making the transition to more resource efficiency across industry as a whole" (*European Commission*, 2010, p. 20). It defines six key enabling technologies (among them biotechnology), and proclaims a third industrial revolution based on the internet and new energy. One flagship initiative of the EU-2020 strategy presents a very ambitious strategy for a resource efficient Europe (*European Commission,* 2011). Clean technologies are an essential element of the "soft industrial policy" strategy of the OECD (*OECD*, 2012), the formerly fiercest critic of the old industrial policy. The discussion in the US is labelled as the "remaking" or the "second spring" of manufacturing, with highlights such as the General Electric CEO declaring "outsourcing as the most outdated model", and all applauding Lenovo for restarting the production of computers in North Carolina as well as General Electric for returning production of washing machines in Kentucky.[5]

Progress so far in energy reduction and resource use

Progress so far is however significantly at odds with the shift in the technology and growth path needed. Nowhere has borne witness to an *absolute* decoupling of energy or resource growth from output growth over a longer period and specifically not for growth rates compatible with low unemployment. A *relative* success is that energy elasticity now differs from one ("1.0") implying that growth rates of inputs are *somewhat lower* than growth rates of output but far from zero or from turning negative. Within the energy inputs, the clean technologies gained two digit shares in a few countries (with better performance of countries relying on hydro energy, which however cannot expand greatly due to increasing water shortage). Some success has been seen in China which became a leading producer in solar and photovoltaic devices (but still needs lots of new carbon or nuclear energy based plants each year).

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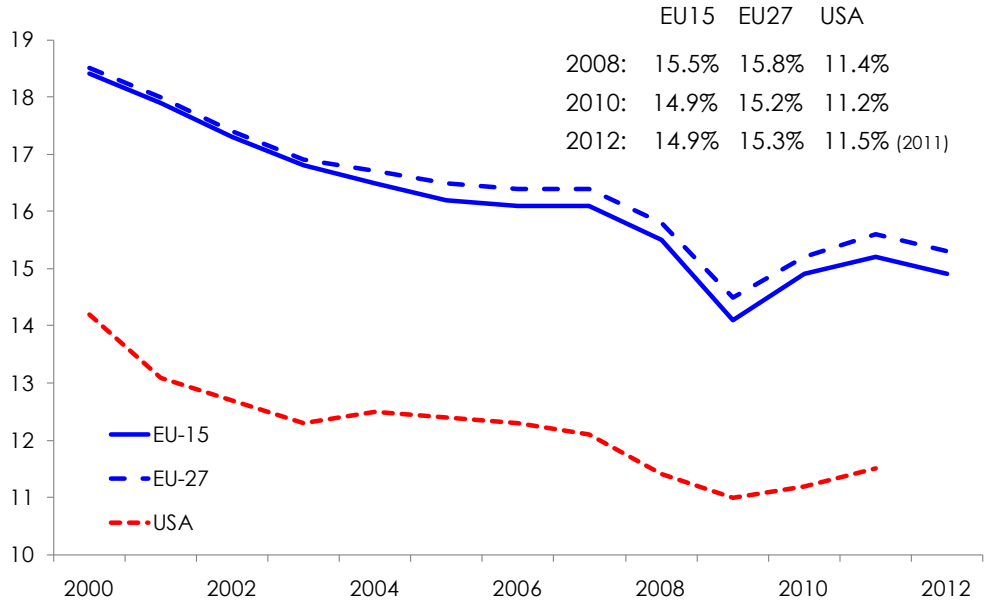
[4] This joint research program proved rather successful, but the partners could not agree on a pilot planned afterwards, which is not surprising after the breakdown of the European Emission Trading.

[5] Notice that these popular examples are not related to energy prices but to qualified labour in the US or to wage increases in China.

Figure 1: Share of manufacturing (nominal value; in % of GDP)



S: Eurostat (AMECO), U.S. Department of Commerce (Bureau of Economic Analysis).

3. The carbon leakage argument and other headwinds

Though the main objective of the new industrial policy e.g. of the European Commission, is to exploit the potential of "green" technologies for employment and exports, the focus of industrial policy on sustainability has raised opposition of the energy intensive industries. The opposition does not originate from any industrial policy documents per se, but rather is probably rooted in fears about the goals of the energy strategy of the EU. Firstly, the short-run 20/20/20 strategy, secondly the consideration that it may be feasible and advisable to increase the 20% goal for emission reduction to 30%, and finally the ambitious plan to reduce greenhouse gas emissions by 80% to 95% by 2050.[6] All scenarios show that, in particular the latter ambitious goal is only achievable via a strong increase in carbon prices (up to 250€/t). Currently the carbon price in emission trading has declined to less than 5€/t. An initiative to bolster the price by temporarily reducing the permits (backloading) was rejected by the European Parliament (with a majority split between representatives demanding a stricter or a softer proposal).

Carbon leakage

The ideal solution would be to install an ambitious climate policy in all regions of the globalized world. Industrialized countries should go ahead because they are the largest emitters and they possess or can at least develop technologies emitting less greenhouse

[6] A resource efficient Europe – flagship initiative under the Europe 2020 strategy, COM, 2011(21).

gases. The strongest and most popular argument against an ambitious lead by industrialized countries and specifically by Europe is the carbon leakage argument. It runs as follows: If industrialised countries and specifically Europe sets high standards or prohibit, regulate or tax emissions, production of emission intensive industries would relocate to countries with less resource efficiency, thus increasing the overall emissions. This argument is used specifically by the energy intensive industries to oppose any higher energy prices or emissions standards in Europe. The argument has been accepted by policy makers insofar as emission intensive industries receive permits for free until 2020.

The argument is neither wrong in the short run, nor convincing in the long run. Actual shifts of production and the overall impact on emissions depend on strategies, innovative efforts, spillovers and policy measures. A forward looking systemic or integrated industrial policy strategy embedded in the EU 2020 strategy may square the circle.

But let us start with arguments why carbon leakage might not be so important in the long run and how the eventual short run negative effects of an ambitious strategy in one region can be reduced.

- If a firm is forced to reduce emissions due to emission pricing or legal restrictions, its first option is to introduce a new technology with fewer emissions. It is feasible to assume that this new technology also engenders cost reductions and productivity increases along other production factors (e.g. high labour productivity), thus compensating for a part of the extra costs.[7]

  Over the medium or longer term perspective this push towards faster innovation may dominate the static short-term loss of changing the input mix as a result of policy measures.
- A specific incentive scheme promoting the reduction of emissions (by innovations) while keeping costs down even in the short run would be a bonus system for excellence in clean technology. Emissions are taxed (producers are forced to buy emission permits), but the three or five best firms get an extra reduction (e.g. half price per ton emitted). They would then get a double dividend from innovation: lower costs from an advanced technology plus a lower price for the remaining smaller emissions. Furthermore research funds like those in the current EU framework program can concentrate on technologies specifically reducing emissions in energy intensive industries (such as the programs to develop a technology of ultra-low carbon emissions in steel production; a joint consortium has already developed a technology, but the site for a pilot plant remains undecided and has actually been delayed longer than intended).
- Carbon leakage can further be prevented if firms located in industrialised countries could be urged to apply the best available technology for plants in countries with lower

[7] Innovations motivated by the objective of more efficient energy use or the switch to a renewable energy source lead to an overall increase in total factor productivity (also boosting labour and capital productivity). In most cases a new "vintage" of machines or plants has lower costs, which could compensate or overcompensate for the cost increase from shifting the share of energy to other production factors from its formerly optimal point.

standards. Incentives range from moral persuasion and stakeholder activism to rules in international trade or investment agreements. A minimum requirement would be that applicants for an investment permit abroad would have to report plant specific emissions for all plants belonging to that enterprise.

- Theoretically a tax or import duty could be levied according to the difference between emissions using optimal technology and actual investment (this needs some international backing). Proposals exist to tax imports from developing countries (import duties and anti-dumping procedures) according to the emissions (border adjustment schemes), but should however be treated carefully, since all duties reduce trade and tend to invoke counter duties.
- Taxes levied on countries producing with "dirty technologies" (border adjustments) are a subsidiary strategy at best. They would be difficult to implement and open to protectionist misuse. And it will be heavily opposed by the producer country (the "South") which will argue that the industrialised countries profited from similar technologies when they were at the same stage of development. The more preferable option would be to monitor or request that enterprises from industrialized countries (the "North") which invest in developing countries use the best available technology. Technology transfer and developments in newly industrialized countries can be subsidized by "climate funds" financed by emission trading or a financial transaction tax accelerates the global diffusion of the best technology.

The carbon leakage argument has some merits in the decision of a firm, where to locate a new plant at a given point of time, but it is questionable in the long run. The long run dynamics of emissions depends first on the technological progress in the frontier countries and secondly on the speed of global diffusion of clean technologies. High prices and standards in the frontier countries will determine the technological path, and trade and investment policies (and political, legal and moral pressure) will determine the speed of diffusion of optimal technologies to developing countries together with incentives provided by "climate funds". Remember that total subsidies for fossil energy are estimated to be 400 bn €[8], and at least a part of these subsidies could be used to boost technology transfer. A strategy to decelerate technological progress via lower energy and emission prices in the countries with leading technology will very probably increase worldwide emissions in the long run[9]. A green industrial policy looks different in industrialized and developing countries, but both a "new industrial policy" in developing countries plus a systemic integrated industrial policy in industrialised countries will dynamically "push all countries up" on the environmental quality ladder.

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[8] This is six times as much as the subsidies for renewable energy sources, a large share of it the subsidies are spent in developing countries (IEA 2012).

[9] Carbon leakage element is restricted to a few industries. Only four industries have energy costs of 10% of total costs, for the majority of industries the energy costs are between 1% and 2% of total costs (*Aiginger*, 2013).

Five arguments used to limit ambitious energy policy goals

While carbon leakage is the dominant argument against an ambitious ecological policy in industrialized countries, there are other arguments put forward on very different levels of the debate.

SS1: Absolute decoupling is downgraded as "not necessary": In spite of a growing academic consensus some scientists maintain, that the temperature increase is not manmade, not as high as forecast, not as dangerous as claimed; furthermore adaption strategies already existed. These are different lines of arguments to reduce the efforts and to downgrade the necessity of policy shifts. Such messages are often accompanied by declaring the EU 2050 strategy for sustainability as unnecessary and utopian. It is asserted that sources of higher energy and resource efficiency have been exhausted and technical limits for emission reduction (e.g. of carbon dioxide in steel production) have been reached already.

SS2: Technological uncertainty: This argument builds on the insufficient knowledge about future technologies. One example is that some experiments in bio energy have proven to be dead ends, specifically if resources are used which compete with food production, thus increasing food prices and poverty worldwide.

Another line of argument stresses that clean electricity use is limited and increasingly expensive, once the low easily obtainable "fruits" are reaped. Clean energy production is often decentralised, needs higher net capacities (grids) and destabilises supply. Transport is costly from north to south and from the coast to the mainland.

Electric cars are still extremely expensive and we do not know whether this is the best technology, with hybrid combustion techniques or hydrogen technology as alternatives. Favouring electric mobility may be a fashion which will subside. Governments should not subsidize a specific technology since this may lead to a "lock in position" in the wrong technology.

SS3: Reliability of energy supply (or cheap supply) should be as important as sustainability

Energy policy always has multiple goals: Higher efficiency in energy use, reliability of supply, efficient production, a shift from fossil energy to clean energy. In general renewable energies are suspected to reduce energy security (decentralized production necessitate stronger grids and long transport routes); and most alternative energy sources are not competitive at current market prices and need subsidies; these are often paid by the general tax payer or by increasing consumer prices. High prices of electricity due to a higher share of renewable sources or due to necessity to invest in grids (to maintain reliability of supply) are arguments used to limit or decelerate ambitious energy policies (see "Energiewende" – Energy Transition in Germany). After an ambiguous start in energy programmes prioritising energy efficiency and clean energy (green goals), energy policy tends to reemphasize grey goals (cheap energy, reliable supply). Without strong political priorities and policies, path dependency and competitive pressure sooner or later leads to the dominance of the grey goals.

SS4: No shortage of fossil energy: Peak oil and peak gas are deemed to be moving deadlines. The raw material shortage announced by the Club of Rome in the nineteen seventies was vastly exaggerated and all peak oil and peak gas forecasts thereafter have continuously shifted. Now they are again shifting with the extraction of shale oil and gas. In fact it is no longer improbable today that oil, gas and coal prices will decline over the next few decades (due to reduced energy imports of the US, to reserves in the Arctic, and new production technologies (shale gas and shale oil).

SS5: Emission pricing has failed: A powerful argument against an ambitious ecological policy is that emission trading - the favourite scheme suggested by economists - did not work. Emission trading was restricted to some industries and to some regions[10]. After some success at the start, emission prices (e.g. for CO2 certificates) are so low that they do not induce cleaner production. The undermining of this scheme was supported by the breakdown of industrial production in Central and Eastern Europe and more recently by the financial crisis, but was evident even earlier on. However, failures in implementation are responsible for the demise of emission trading, not the substance of the concept. The low price and the current oversupply is the result of large entitlements ("policy capture") and reduced growth in industrial production. The largest energy consumers got certificates for free up until 2020.[11] Other industries enjoyed lower costs than expected since the price per ton proved to be much smaller than anticipated and an excess supply of permits exist. Manufacturing in Europe consequently had few incentives to specifically invest in energy efficiency or to change the energy mix.

Assessing carbon leakage

Summing up, carbon leakage is assumed to be the consequence of an ambitious emission reduction effort in one region of a globalized world, not matched in other regions. It can however be mitigated using policies including trade and investment agreements, ambitious technology programs, incentives for best performers and the speedy dissemination of new technologies. In particular, a green industrial policy can bolster the positive employment and the export potential of new technologies which can be exported and which at the same time contribute to societal goals.

The "greening" of Industrial Policy is however very unlikely if

- the threat of climate change is downgraded ("not so fast", "adaption" is feasible)
- efficiency goals and changing the energy mix is "neutralised" by the equally important goals of security of supply and cheap energy as a competitive necessity
- fossil energy is thought to be far from peak (specifically gas)
- alternative technologies are uncertain and several alternative technologies are feasible (each with specific lock-in effects)

[10] The trading regime covers the EU plus Norway; it covers about fifty percent of greenhouse gas emissions.

[11] Electricity generators must pay for permits for 2013.

If energy policy pursues conflicting goals and the interface between energy policy and industrial policy is not well defined, then "New Industrial Policy" will be no different from the past: interfering in markets, with policies fluctuating irregularly dependant on the current pressure exerted by lobbies and national interests, such that there is a constant hopping from "green goals" to "grey goals" generating high costs under low results.

Empirically carbon leakage is limited by the fact that energy intensive industries are very capital intensive too and do not relocate quickly. As regards new investments only a small part of the value chain is relocated (e.g. reduction from ores to pig iron by direct reduction technique) and the location of a plant in this early low value added stage depends on the availabilities of ores and not on the costs of emissions. For the bulk of traded goods energy costs are below 1%.

Table 2: Energy intensity across countries

		Gross production	Energy input	Energy costs [1]
				Share of total costs
		1,000 €	1,000 €	In %
Top 10	*Energy intensive industries*	*25175184*	*2500279*	*11.0*
23.3	Manufacture of clay building materials	76274	16104	21.1
23.5	Manufacture of cement, lime and plaster	395046	76998	19.5
24.1	Manufacture of basic iron and steel and of ferro-alloys	8021441	1152796	14.4
20.1	Manufacture of basic chemicals, fertilisers and nitrogen compounds, plastics and synthetic rubber in primary forms	2219224	279681	12.6
23.2	Manufacture of refractory products	327702	32119	9.8
17.1	Manufacture of pulp, paper and paperboard	3995564	381406	9.5
23.6	Manufacture of articles of concrete, cement and plaster	1468092	93134	6.3
23.1	Manufacture of glass and glass products	1107602	67132	6.1
13.1	Preparation and spinning of textile fibres	221043	11708	5.3
19.1+19.2	Manufacture of coke oven products and of refined petroleum products	7343196	389201	5.3
Low 10	*Energy intensive industries*	*17352694*	*112862*	*0.5*
27.1	Manufacture of electric motors, generators, transformers and electricity distribution and control apparatus	5034615	34222	0.7
28.3	Manufacture of agricultural and forestry machinery	1294086	8986	0.7
28.4	Manufacture of metal forming machinery and machine tools	988306	6679	0.7
29.1	Manufacture of motor vehicles	7282520	52690	0.7
26.2	Manufacture of computers and peripheral equipment	71314	406	0.6
26.3	Manufacture of communication equipment	260017	1540	0.6
30.9	Manufacture of transport equipment n.e.c.	514166	2589	0.5
15.2	Manufacture of footwear	271963	1015	0.4
30.2	Manufacture of railway locomotives and rolling stock	1115951	3440	0.3
26.6	Manufacture of irradiation, electromedical and electrotherapeutic equipment	519756	1295	0.2
	Resource intensive industries[2]	38549372	2460481	6.4
	Engineering industries[3]	34071129	302218	0.9
	Total industries	*114987493*	*4012040*	*3.5*

[1]) Share as percentage of total production. - 2) NACE 16, 17, 18, 19, 24, 32, 38. - 3) NACE 27, 28, 29.

S: Statistik Austria.

4. The upshot of the counter attack: go for cheap energy to rescue European competitiveness

Currently emissions permits are extremely cheap, and energy prices are decreasing. The former is due to the breakdown of European emission trading, the latter to the new resources

of gas found in the US and as a result of new exploitation techniques (shale gas; extraction by fracking or horizontal drilling). Gas prices in the US have fallen to one third of their peak. The tendency of falling energy prices spills over into Europe. Coal prices decline as a consequence and the US starts to export coal to Europe.

The policy conclusion seems foregone: Europe has therefore to follow the US strategy of lowering energy prices. This should be done by shifting from the goals of "efficiency increases" and "changing the input mix" to a strategy of increasing the supply of energy and making it as cheap as possible. A gradual shift from "green" goals (efficiency rises, reduction of carbon based sources) to "gray goals" can be seen by the attentive observer from month to month in policy documents and in statements by national governments. Lobbying groups are using each press event, industry dialogue or sectoral council to reframe the discussion.

Only two years ago energy experts discussed, whether digging for oil in the deep ocean should be stopped due to the number and scale of accidents (Deepwater Horizon etc.) and whether the exploitation of shale gas should not be forbidden due to the danger from fracking for ground water. Today cross-country pipelines are built in the US to bring gas to the South and the coast, and facilities designed for imports are rebuilt as export hubs.

Table 3: Gas & electricity prices (EU vs. US 2000/2012; US$/MWh)

		2000	2008	2011	2Q2012
Natural gas					
	Finland	11.24	32.01	45.19	46.39
	France	15.31	52.22	51.52	50.56
	Germany	16.16	57.21	54.37	50.55
	Poland	11.44	45.72	42.57	44.33
	Spain	15.08	41.84	37.72	43.83
	Europe [1]	*13.85*	*45.80*	*46.27*	*47.13*
	United States	14.70	31.93	16.96	10.66
Electricity					
	Finland	38.62	96.88	113.64	103.64
	France	35.76	104.82	121.54	114.95
	Germany	40.55	128.95	157.23	146.83
	Poland	36.89	119.27	121.77	111.36
	Spain	42.58	125.15	148.77	..
	Europe [1]	*38.88*	*115.01*	*132.59*	*119.20*
	United States	46.00	68.28	69.57	66.74

[1]) Unweighted average over countries above.

S: International Energy Agency.

While cheap energy prices in industrialized countries can be seen as a short-term reprieve for industries under competitive pressure from new low cost countries, they have negative consequences in the long run. Innovation efforts for increasing resource efficiency will be dampened, and investment into clean energy will prove to be less profitable. Gas is a

welcomed "transitional" energy up to the point of time when renewable energy is available at a large scale. It can reduce greenhouse gases if it is substituted for coal (the climate impact is half that of coal), but nevertheless it is a fossil energy contributing to global warming. If it decelerates the transition to alternative energy or current investments into renewable break down, cheap gas will have a long run negative effect on the climate.

Europe has a competitive advantage in clean technology. Energy efficiency is high, and Europe has a trade surplus in technology driven industries. The new industrial policy strategy of the European Commission intentionally builds on these strengths.

5. The alternative strategy: to reduce the costs of innovation and skills

The ability to compete worldwide is a vital goal for Europe. Refocusing on the manufacturing sector after the rise and demise of the financial sector and the overemphasis on services as an employment generator makes sense. Before trying to delineate a strategy for Europe let us mention that Europe is in general in a better situation than the US: The Eurozone, EU-15 as well as EU-25 have no deficit in the current account and its manufacturing sector is larger relative to GDP; it enjoys a higher share in world exports and lower declines in its world market position. But looking forward to new challenges is nevertheless important.

The optimal answer of Europe to the lower energy costs in the US should be in general to increase investment into innovation and education and specifically to increase energy efficiency and innovations in ultra low carbon technology. The European Commission has initiated research programs e.g. for ultra low carbon technology in steel, the research looks promising, but the partners could not agree on a pilot plant. In general, Europe still lags behind the US in R&D expenditure, has never reached its Lisbon goal of 3% of GDP; and it trails in the efficiency of universities. Closing this gap will lower the unit labour costs by increasing productivity. Any cost difference in energy prices can be more than compensated by reducing the costs of skilled labour or innovation.

Industrial countries in the long run can compete only in skill intensive products. Competitive advantage is created by innovation; specialization occurs in skilled technology intensive products. A forward looking industrial policy boost Europe`s competitive advantage and resists the temptation to be set off course by a short run decline in energy prices.

The basic condition for (price) competitiveness is that *total costs* have to equal *total productivity*[12]. This implies that if some cost component is more expensive in Europe (than in the US) it is important to have another component which is cheaper.

If energy prices are higher in Europe, it is a feasible strategy to reduce costs of skilled labour in Europe (better education, better retraining, and better match of supply and demand) or to

[12] In an advanced discussion ("Beyond GDP" goals, costs) should equal productivity after taken???? Something is missing here.... into consideration external or societal costs. For an evaluation of the term competitiveness under these new perspectives see *Aiginger – Sieber – Vogel* (2013) and WWWforEurope homepage: http://www.foreurope.eu/ in general.

promote innovation (better universities, quicker technology transfer, compensation of external costs by tax credits). Cheaper means less costly relative to output, which can be achieved by lower costs or even more preferable by higher productivity in the innovation or education system.

The first intuitive reaction to the lower energy costs of the US competitor is to decrease your own energy costs. The superior alternative, however, is to boost energy productivity and - if this strategy eventually has decreasing returns - to reduce the costs of skilled labour and to boost the productivity of the innovation system.

Which of the two reactions is chosen – to match low energy prices or to boost (input and productivity of) skills and innovation has significant impacts on the economic structure of the economies and of the traded goods and thus any decision needs to be well thought through. The cost component which is cheaper will be used more intensively. If energy is the factor with lower prices in a region, production will be energy intensive; if skills are available ("abundant" in terms of trade theory) production will be skill intensive.

6. Synergies between industrial policy and climate policy

A green industrial policy fostering innovations will increase the competitiveness of European manufacturing, by reducing costs and lowering energy inputs in the bulk of industries in which industrial countries are specialized and where it can increase market shares dynamically.

In energy intensive industries the effect of new technologies to reduce emissions should be specifically encouraged. If technical progress is not enforced by incentives but by high prices, the effect of high energy or emission prices should to some extent be capped (this is already occurring today since energy intensive industries receive free greenhouse permits until 2020 and in some cases are exempt from rising energy prices imposed by the cross subsidizing of clean energies e.g. in Germany). Research for ultra low emission technologies should be subsidized (as is already the case in European Research Programs). Diffusion of best technologies should be encouraged in international trade and investment agreements.

Subsidies for fossil energy which amount currently to 400 bn €[13] should be reduced, specifically for those related to coal. This would again reduce the short-run effect of the few plants which are effectively shifted from countries with ambitious to those with lax environmental policies.

[13] 523 bn $ (six times the subsidy of renewables) see *OECD - IEA* (2012).

Table 4: External position of Europe and the USA

	EU 15		US	
	1999	2011	1999	2011
	Bn €		Bn €	
Goods and services				
Exports	2629.2	4922.5	928.2	1504.5
Imports	2538.2	4777.2	1174.2	1912.6
Balance	91.0	145.3	-245.9	-408.1
Manufacturing				
Exports	688.0	1597.8	593.5	770.6
Imports	634.5	1345.4	862.5	1138.4
Balance	53.4	252.3	-269.0	-367.8
Current account	-0.04	34.6	-207.2	-357.6

[1]) S: Eurostat (AMECO), WIFO database.

Cheap gas (due to fracking or horizontal drilling) should be used as much as possible to substitute coal. Gas could be the "interim energy" looked for in ambitious climate policy strategies. Most studies show that an interim technology is needed up to point when alternative energy technologies are able to cover the lion's share of energy consumption.

Energy can be more expensive in Europe, if at the same time innovations in energy efficiency and innovation and education in general become cheaper and more efficient. In the long run technological progress - together with the speed of diffusion of the best technology - is the true deciding factors as regards the dynamic effect of emissions.

For total manufacturing in industrialized countries innovation and human capital decides competitiveness and growth. Low energy prices have the consequence – aside from global warning – of engendering energy intensive production techniques and a high share of energy intensive industries. Increases in innovation and human capital on the other hand engender skill intensive and technology intensive industries. Europe is lagging behind the US and well behind its own goals for R&D input and investment into tertiary education. Trying to reduce these deficits will be much more important in the long run than short term low energy prices. And energy costs are lower for most traded goods than innovation expenditures and training. In particular promoting green technologies can create synergies between innovation and climate policy. Carbon leakage should not be used as argument against putting sustainability on the centre stage of industrial policy. It should be used to initiate emission reducing technologies and policies to accelerate the global diffusion of new green technologies.

Table 5: Sector balances and export shares in Europe and in the USA

	EU				US			
	1999	2011	1999	2011	1999	2011	1999	2011
	Trade in bn €		Shares of exports		Trade in bn €		Shares of exports	
Energy intensive industries								
Exports	77.7	247.4	11.3	15.5	57.3	123.1	9.7	16.0
Imports	64.1	216.9	9.3	13.6	79.0	106.0	13.3	13.8
Trade balance	13.6	30.5	2.0	1.9	-21.7	17.1	-3.7	2.2
Technology driven industries								
Exports	252.1	530.9	36.6	33.2	280.0	246.3	47.2	32.0
Imports	250.1	436.8	36.3	27.3	371.1	424.3	62.5	55.1
Trade balance	2.1	94.1	0.3	5.9	-91.1	-178.0	-15.3	-23.1
Resource intensive industries								
Exports	76.1	192.2	11.1	12.0	50.2	76.0	8.5	9.9
Imports	72.0	198.1	10.5	12.4	121.6	116.2	20.5	15.1
Trade balance	4.1	-5.8	0.6	-0.4	-71.4	-40.1	-12.0	-5.2
Engineering industries								
Exports	365.1	767.8	53.1	48.1	379.7	367.9	64.0	47.7
Imports	328.5	580.8	47.7	36.3	490.7	576.3	82.7	74.8
Trade balance	36.6	187.0	5.3	11.7	-111.0	-208.5	-18.7	-27.1

S: Eurostat (AMECO), WIFO database.

Economic theory tells us that

- in the long run high income countries can compete only in skill intensive products. In the short run they may enjoy low energy prices, but this may distract from future priorities and lead to some kind of "Dutch disease"[14]: economies relying on a cheap factor which cannot be cheap in the long run decelerate structural change and growth rates will eventually decline.
- Skill intensive industries and those with high R&D input grow faster than energy intensive industries, and these are the industries creating a large share of employment in industrialised countries in the long run.

Boosting manufacturing is a priority but this cannot be done by lower energy costs for high income countries in a finite world. High income countries can compete only with better skills and innovation.

Energy prices have always been lower in the US relative to Europe and this gap will probably increase over the next year. This should be compensated for by abolishing the gap in R&D and the performance level of universities and education in general, and by implementing a technology strategy boosting ecological (and social) innovations and not by matching low energy prices. The increasing supply of gas is to be welcomed as it is a "transitional" technology to be used up to the point of time in which alternatives to fossil (and nuclear)

[14] The Dutch disease argument refers to the fact that raw material resources are first an advantage for developing countries, but eventually if wages have risen without adequate increases in skills they can become a curse. Though energy intensive sectors do not produce a large part of the output of industrialized countries, it should still serve as a reminder.

energy are available on a large scale. The climate factor of gas is much lower than that of coal. But the abundance of cheap gas in the short run has to be prevented from discouraging the investment in clean technologies. And the current subsidies for fossil energies (estimated to amount to 400 bn €) should be curtailed as fast as possible.

7. Summary

A new industrial policy should support long run societal goals; it will make synergies out of conflicting policy strands and prevent energy policy to turn back from green goals (renewables, energy efficiency) to grey goals (cheap and reliable supply). Industrial policy should promote a competitive advantage of Europe by fostering new, clean energy technologies, ultra low carbon technologies and higher energy efficiency. This is the superior strategy in the long run. A new industrial policy has to be integrated, i.e. solve problems jointly. If, on the one hand there was an industrial policy calling for innovation and skills, and on the other hand an energy policy calling for cheap and reliable energy, there would in short be no cross over between the policy strands, and we would be witnessing old style industrial policy. In a systemic industrial policy the synergies between policies are developed in order to make the individual policy strands more efficient and furthermore, societal goals can be attained.

In short, it makes sense for Europe to base higher growth on a strong manufacturing sector, and Europe should try to become the technology leader in sustainability. It makes sense for the US to close its current account deficit by "re inventing manufacturing". But it may even be problematic for a resource-rich country like the US to base the rejuvenating of its industry on low energy costs. For resource scarce Europe this holds even more: if industrial policy and climate policy have different goals, neither will reach its objective and we will be back to square one of the old, isolated industrial policy decelerating structural change and reducing economic growth.

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Annex 1: The analogue between carbon leakage and "wage setting in Beijing".

A parallel argument to the carbon leakage argument was that under unfettered globalisation the US wages would have to decrease to the Chinese level if production should not shift to China. Shifting production to China - due to high or rising wages in the US - would reduce welfare in the US and take to its upmost consequence, increase child and forced labour, thus deteriorating "average working conditions" or increasing "exploitation".

"Wages are set in Beijing" was a popular slogan first formulated and then disproved in trade theory. Industrialized countries can maintain or increase their wage level by shifting production from labour intensive industries to those were skills and innovation decide about competitive advantage. Within industries industrialized countries specialize in the upper market segment. Empirically the wage differences between Europe and China are reduced, but more by increases in wages in China, than by reducing them in Europe. The US has stagnant median incomes and wages in manufacturing, but this strategy could not close the large trade deficit with China.

Some difference between the "Wages are set in Beijing" argument and the carbon leakage argument exists since the overall emissions of the world economy are a better monitored indicator, while overall "exploitation" of labour in the Marxian sense, or overall profit margins (producer surpluses) as its mirror image are less easy to measure.

But the answers to the question and the instruments available to prevent carbon leakage are similar to those preventing negative effects of wage increases in high-income countries. Some strategies for extra low labour costs in developing countries are forbidden e.g. child labour, some exports of low cost countries based on "unfair labour costs" are either taxed or familiar candidates in anti-dumping procedures. Labour standards, social standards, trade unions gradually spread from high income countries to low income countries and wages in developing countries are catching up. And high income countries specialize on skill and innovation intensive goods or market segments. Wage increase pushes rich countries up the quality ladder and increases productivity, and this enables poor countries increasingly to participate in the world trade and to combat poverty. Preventing wages increases in high wage countries would not increase welfare, neither in rich countries, nor in poor countries and least worldwide.

Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs a change: The financial crisis has exposed long neglected deficiencies in the present growth path, most visibly in unemployment and public debt. At the same time Europe has to cope with new challenges ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundations for a new development strategy that enables a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four year research project within the 7th Framework Programme funded by the European Commission started in April 2012. The consortium brings together researchers from 33 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). Project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

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