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TTIP: Engineering, including Machinery

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TTIP: Engineering, including Machinery

DIRECTORATE GENERAL FOR INTERNAL POLICIES
POLICY DEPARTMENT A: ECONOMIC AND SCIENTIFIC POLICY

The Transatlantic Trade and Investment Partnership (TTIP): Challenges and Opportunities for the Internal Market and Consumer Protection in the Area of Engineering, including Machinery

STUDY

Abstract

The European Engineering industry, by far the biggest exporter of goods to the US, suffers from a range of TBTs (Technical Barriers to Trade) when exporting to the US. After two decades of trying – in vain - to reduce the costs of these TBTs, TTIP should address them, yielding significant economic gains. US standards, relevant for US safety regulation, are very rarely international standards from ISO and IEC, in sharp contrast with the EU. This is costly for EU exporters. Conformity assessment issues related to OSHA requirements (US regulator) should be resolved as EU exporters suffer from a triple cost disadvantage. The US insistence of 'mutual recognition of standards' is not a solution at all, undermining the EU single standard environment and 'trading in' a first best (world standard) solution for a second-best one, if not worse. Over time globalisation increases the pressure to find effective US/EU solutions.

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LIST OF ABBREVIATIONS

ATEX	Equipment Operating in an Explosive Environment
CAP	Conformity Assessment Procedures
CEN	European Standards Body for Non-Electric Goods
CENELEC	European Standards Body for Electricall Goods
CETA	Comprehensive Economic and Trade Agreement (EU/Canada)
EC	European Communities
FDI	Foreign Direct Investment
GSM	(Specific) mobile telecoms technology
FTA	Free Trade Agreement
ICT	Information and Communication Technology
IEC	International Electrical Committee
IECEx	Scheme for testing products used in an explosive environment
IECEE-CB	Multilateral private recognition agreement between accredited testing houses for electrical and electronic products
ILAC	International Laboratory Accreditation Corporation
IPR	Intellectual Property Rights
ISO	International Standards Organization
ME	Mechanical Engineering
MMA	Metalworking and Metals Sector
MRA	Mutual Recognition Agreement
NAFTA	North American Free Trade Agreement
NEMA	National Electrical Manufacturers Association (US)
NLF	New Legislative Framework (of the new approach of the EU)
NRTL	National Recognized Testing Laboratory (US)

NTB	Non-tariff Barrier to trade
NTTAA	National Technology Transfer and Advancement Act (US)
OMB	US Office for Management and Budget
OSHA	Occupational Safety & Health Administration (US)
PSTN	Public Switched Telephone Network
FTA	Free Trade Agreement
SDoC	Suppliers Declaration of Conformity
SITC	Standard International Trade Classification
SME	Small and Medium Enterprises
TAA	Trade Agreements Act (US)
TBT	Technical Barrier to Trade
TTIP	Transatlantic Trade and Investment Partnership
UNECE	United Nations Economic Commission for Europe
VDMA	German Association for Engineering Industries
WLAN	Local Area Network
WTO	World Trade Organization

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EXECUTIVE SUMMARY

Background

The present study provides the background, rationale and technical details of what market access barriers (in particular, TBTs) ought to be addressed in a TTIP chapter on the very large Engineering sector. For this competitive and innovative EU industry, the reduction of the costs of TBTs when accessing the US market is of both direct importance when exporting to the US and of indirect importance for the smooth operation of the industry's global value chains.

Aim

The very large and (mostly) globally competitive engineering sector is important for growth and jobs in manufacturing in Europe. It expects a healthy growth in the medium run and its export situation worldwide and towards the US is favourable. The aim in TTIP is to address some lingering and costly TBTs when accessing the US market, after earlier attempts in the late 1990s (in the 1998 MRA with the US) and in the period 2008-2010, failed. It will be shown that TTIP offers new and possibly more effective opportunities to address these costly TBTs, to an extent in a dedicated Engineering chapter (as proposed by the EU), in combination with the broader TBT chapter, and more gradually in the 'living agreement'. The latter seems the most practical given the distinct regulatory philosophies in the US and the EU for the relevant product categories within Engineering hit by these TBTs.

Table 1: Main Results

1. What are the main EU interests in Engineering in TTIP ?
• The overall offensive interest of the EU, also critical in the light of upcoming competition of emerging economies, as well as given the pivotal role of global value chains in this huge sector, is that this EU industry can genuinely exploit its competitive advantage in a market as critical and sizeable as the US. Long-standing and costly TBTs prevent the EU sector from seizing many opportunities in the US, even when its competitive position is favourable. For SMEs (and Engineering has many thousands of resilient and innovative SMEs), the TBTs are a particularly problematic feature, frequently leading to disappointments or an avoidance of exporting products suffering especially from these TBTs.
• One specific offensive interest consists of removing or reducing a set of TBTs reflecting the very poor US record in using international ISO and IEC standards (for reference) in US risk regulation, in particular by the relevant US regulators. In contrast, European standards show massive overlap (indeed, identity) with IEC standards – some 72 % - and to a considerable extent with ISO ones, too [31 %]. This set of TBTs may lead to rather costly adaptations. The very poor US record is partly caused by mere reliance on standards once developed in the US (and never adjusted to IEC or ISO), partly by local deviations of ISO/IEC standards, thereby denying their very nature and purpose.
• Another specific offensive interest consists of addressing a set of TBTs about conformity assessment procedures, the fine details of which result in what the EU believes are unnecessarily cumbersome and unjustified barriers (this language is from the WTO TBT Agreement, and such barriers are forbidden). The details also generate and bolster some anti-competitive practices by UL which not only has a de facto monopoly [in the assessment of electrical safety of electrical goods and machinery for the workplace] but to some extent a legalised one as well (e.g. nearly

30 US States simply require conformity assessment by UL, for the goods at stake, although there are a number of other conformity bodies officially recognised by OSHA as a regulator).

- An important defensive EU interest has to do with single European standards in the single market. In TTIP, the EU has to respond properly, and with full appreciation of the potential impact, to the (not officially published, yet well-known) US insistence to come to 'mutual recognition of standards' used for supporting compliance with EU (and US) risk regulation. Whereas mutual recognition of regulatory *objectives* (and main regulatory instruments) may well be considered, if safety objectives are equivalent, this is not the case for *standards* used for compliance. There is a risk of unravelling the accomplishments of the new approach (including a single standard in the EEA), whilst allowing US standards not having complied with a range of requirements under Reg. 1025/2012 (on European standardisation) which is both unfair and distortive. However, for market access to the US, such mutual recognition would provide no advantage whatsoever to EU exporters (since US regulators fix a single, compulsory standard); here, mutual recognition without an equivalence regime is an empty shell.

2. Would recent trade agreements be instructive for TTIP ?

- The US insists (e.g. in the US / Korea FTA of 2010) that 'international standards' are *solely defined* by a set of principles once agreed by the WTO TBT Committee, principles of course also adhered to by the EU and other WTO partners. The problem is: "solely" defined, which is an extreme and artificially legalistic interpretation hardly or not shared by 150-plus WTO partners. The EU and practically all WTO partners take the view that international technical standards (relevant for Engineering) are ISO and IEC standards. However, the US maintains that, if a US standard body adheres to these principles, and has some (even slight) international membership (some foreign firms), its standards are 'international'. A consequence is that Korea (and other countries) are persuaded to sign up for such provisions in FTAs with the US, and not with the EU and other partners. This US positioning is not shared by the EU and TTIP will not incorporate the clause, but nevertheless the insistence is slowing down the inevitable future adoption of true international standards by the US, which is a drawback for the EU Engineering sector.
- The Korea/EU, Singapore /EU and Canada / EU FTAs all address TBTs to a considerable, though different degree. All three tackle market access problems for Engineering. In various ways, these agreements demonstrate that it is really the US having an idiosyncratic problem with TBTs in the Engineering sector.

3. Opportunities and challenges

- In Engineering, TTIP is an opportunity because its ambition (e.g. to reduce TBTs) is much greater than ever before. What failed before might work this time, if carefully approached and staged over time. TTIP should seek a sophisticated combination of a separate chapter on Engineering, a forceful TBT chapter and a gradual but committed process in the 'living agreement' via sectorial and horizontal regulatory cooperation. One must accept that the US has to be granted time – without reneging on commitments, though – for the deep-seated differences in regulatory approaches to be softened and accommodated sufficiently, in particular with respect to the question

of international standards. On the technicalities of conformity assessment, accommodation might well be 'easier' if, and only if, regulator-to-regulator cooperation is developing in a spirit of mutual respect and mutual commitment.

- Seizing this opportunity is encouraged by recent developments in the US. In the US, one can observe an emerging appreciation that global value chains and other aspects of globalization (e.g. selling brands worldwide) inevitably force globalization of technical standards and internationalized recognition of quality conformity assessment bodies onto the US as well. One sign is the recent understanding between NEMA (US industry) and Orgalime (the EU Engineering industry association) that the future path for globalisation is the recognition and use of ISO and IEC standards, without local deviations as a rule.
- Another hopeful sign are two incipient reforms in the US (on the OMB Circular A-119 and the improvement programme of OSHA for its conformity assessment bodies) which offer valuable opportunities to lower the costs of the TBTs in conformity assessment, and, in the process, might provide greater use of international standards (for conformity assessment) as well. These reforms are ongoing and should be linked to TTIP without delay.
- One challenge includes the formulation of a productive EU response to the US suggestion of mutual recognition of standards (used for compliance with EU risk regulation). On the one hand, the rejection of this idea has to be fully and properly explained so that the systemic costs and risks for both the EU (risk of single market unravelling) and the US (slowing down of adopting, or of turning to, more and more IEC/ISO standards in times of global value chains) are clarified. On the other hand, cooperation of US and EU standards bodies needs to be intensified and new ways have to be found to facilitate market access problems linked to standards.
- Another challenge consists of benefitting from ongoing US reforms. In particular, the modernized rules in the proposed new OMB Circular – on selecting standards by US regulators for compliance with US risk regulation – might still favour a single referred standard for sectors such as engineering. However, the present author suggests that EU industry should be able to make use of a (new) substantiated request procedure for 'equivalence', hence (once equivalence is accepted) allowing for such European standards, significantly reducing TBT costs.

1. INTRODUCTION

This study makes the case for a separate chapter in TTIP (in 2.1) and provides some empirical evidence of the economic performance of the mechanical engineering and electro-technical goods as two major segments of the Engineering sector (2.2). The annex includes more statistics and an analysis of the third segment of the sector, the metal-working and metals industry, because in the recent Commission TTIP proposal for Engineering, this third segment has not been included. Section 2.3 recalls the published demands from the EU Engineering industry, followed by a detailed analysis of earlier attempts of the EU and the US to reduce TBTs in Engineering.

Section 2.5 presents recent joint industry initiatives in the TTIP context to address the TBTs in the longer run. Two recent (and still ongoing) US reforms matter as they may support or strengthen options to reduce TBTs; they are dealt with in section 2.6 as they can be linked to TTIP. The EU TTIP position paper on Engineering is described in section 2.7. Section 3 checks whether one may find possible inspiration from approaches in three recent FTAs signed by the EU: EU/Korea, EU/Singapore and EU/Canada (CETA). Section 4 lists the opportunities and challenges, with a brief explanation. Part II contains the conclusions.

2. OVERVIEW OF INDUSTRY, TRADE, TBT AND TTIP PROPOSALS

KEY FINDINGS

EU Engineering is a very large and successful sector, with the partial exception of electronic goods. For decades the EU has attempted to move the US to lower the TBTs which render access to the US market for these EU products so expensive. The 1998 MRA comprised electrical goods (including machinery) but it failed for these goods. A separate TTIP chapter on this huge sector and new attempts to tackle these TBTs - both via a special engineering chapter, combined with the TBT chapter, and in a 'living agreement' – are justified. Ongoing US reforms and a change of attitude in US industry offer some hope that this time (in TTIP) results might be obtained, improving effective market access for EU industry.

2.1. Why an engineering chapter in TTIP?

There are two important reasons why 'Engineering' should have a separate chapter in a TTIP agreement. The first reason is about sheer size, whether in output, jobs or trade and investment.

In 2012, one third of the total EU goods exports volume to the US consisted of goods from the EU engineering sector. Such a high share for one sector is a-typical. One explanation for this exceptionally large share is that 'Engineering' as customarily defined, comprises three closely related and indeed interacting sub-sectors, each of them large by itself: mechanical engineering, electrical engineering [more often denoted as 'electro-technical goods' or simply electrical and electronic goods] and metalworking and metals. Other sectors known as large economically, such as chemicals and automotive products, do not come even close to this share. Although the EU has a trade surplus in engineering goods, it should be realised that EU imports of engineering products from the US are also large. This immediately clarifies the great economic importance of the sector in a TTIP context. In addition, there are considerable foreign direct investments both ways.

The second reason is about costly TBTs. Of course, one might argue that the regulatory barriers in regulated sectors like chemicals and automotive, or cosmetics and pharmaceuticals, are high as well as complex and likely to require a strong treaty-based framework to address them. It is, more often than not, implied that engineering products, falling under the relatively light and successful New Approach (now, New Legislative Framework, NLF) with voluntary standards, do not need such intrusive regulatory attention. This is mistaken. Whereas in the EEA the engineering sector benefits from a meanwhile solid and well-tested framework, there are and have long been serious market access problems with the US due to complicated and costly TBTs. That the EU engineering sector has succeeded in being and remaining competitive in the US despite these barriers is a testimony of its agility and competitiveness. Nevertheless, many business opportunities are foregone, not least for the numerous SMEs the sector comprises, and trade is surely below potential. With such an ambitious Atlantic Partnership in trade and investment, the long-standing and costly TBTs in this sector should receive the attention they deserve, so that one of Europe's more competitive industries can enjoy far better market access, boost existing exports and undertake new initiatives. The economic gains foreseen, once TTIP is in place, would come in no small degree from the reduction of TBTs in these types of goods.

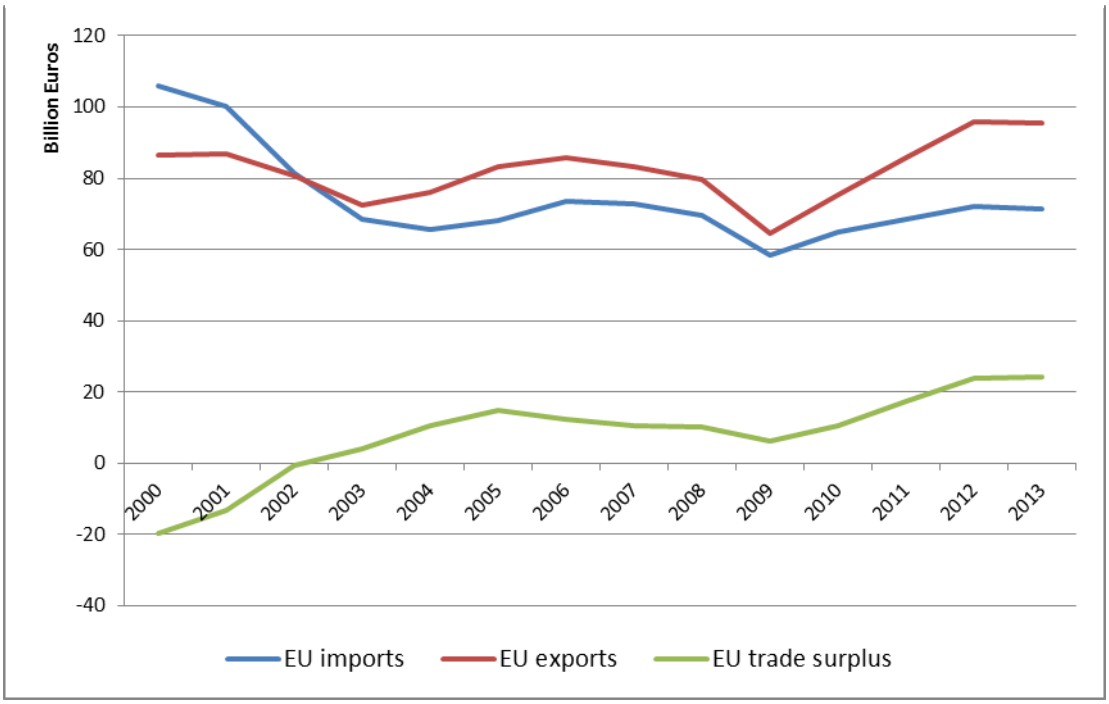
2.2. EU engineering: economic performance, trade and investment

2.2.1. The European Engineering Industry

The European engineering industry is a very large group of sectors. It consists of mechanical engineering (ME), electrical and electronic goods (electra), and the metalworking and metal articles (MMA) industries. Together, they are of critical importance to the EU's manufacturing performance, in terms of absolute value, but also as 'enabling industries' to the other sub-sectors in manufacturing (Vieweg 2012). As the MMA industry is not part of the TTIP negotiations, its industry overview is not included in the current chapter, but in Annex 2 instead. It should be noted, however, that, in economic simulations by Francois *et al.* (2013) for the Commission, the metals sector would enjoy considerable economic gains from TTIP. Additional information, data and figures on the sector are included in Annex 1.

The EU engineering industry produced over EUR 1800 billion in output in 2011, and a value added of over EUR 500 billion in 2010. Over 500.000 companies employ almost 12 million people. Mechanical engineering and electrical and electronic goods perform well in international trade, capturing 37.2% and 21% of the 2010 *global* market respectively. EU engineering trade with the US accounted for exports well over EUR 95 billion and a trade surplus of EUR 24 billion in 2013 (Ecorys 2011; Eurostat 2015; Orgalime 2012; Vieweg 2012). Figure 1 shows the trends in EU/US trade over 14 years from 2000 to 2013 inclusive.

Figure 1: EU-US engineering trade



Source: based on data from Eurostat (2015)

On average, the trend in EU exports to the US (in euros) is slightly positive, albeit with considerable fluctuations. This volatility is due to the cyclical nature of capital goods, and the 'machinery part' of the sector are, of course, capital goods par excellence. The trend of US exports to the EU, however, is clearly downwards, with some stabilisation after the crisis. The EU began to run an export surplus in 'Engineering' products with the US in 2002 and, ignoring some inevitable fluctuations, this has widened to no less than EUR 24 billion in 2013.

The United States is the largest investment partner of the EU, both in terms of overall outward and inward FDI. In 2011, the EU investment position in the US was over EUR 124 billion in MMA and machinery and another EUR 63 billion in computer, electronic and optical products. In return, the US had an investment position of EUR 35 billion and EUR 12 billion in the EU in these respective sectors (Eurostat 2015).

2.2.2. Mechanical Engineering

The European mechanical engineering (ME) industry is a large sector and one of the most competitive industries of European manufacturing. Its inclusion in TTIP with a separate chapter (together with electro-technical engineering) should enable more effective and less costly access to the US market, a clear offensive interest of the Union.

As an industry, it employs around 3.2 million persons in approximately 91,800 companies. The goods and services produced by ME accounted for EUR 502 billion in 2010, with a gross value added of around EUR 157.5 billion. This leading industry is thus responsible for around 9.1% of all European manufacturing output and around 11.5% of the value added of total manufacturing. Over the next ten years, the mechanical engineering sector is expected to grow at an annual average rate of 3.8% (Vieweg 2012).

To bolster its position vis-à-vis emerging low-cost competitors, the industry is increasingly offering services to complement its production of capital goods and materials. Services include, among others, the installation of manufacturing systems, training, maintenance and repair. This expansion into services allows the sector to keep increasing productivity and value-added (Vieweg 2012).

The comparative strengths of European engineering notwithstanding, the industry faces fierce competition from the US, Japan and China. Labour productivity in ME is significantly lower in the EU, compared to both the US and Japan. Although the differences in productivity are significant, European ME companies nevertheless tend to outperform their competitors in the global market. Between 2000 and 2010, the EU ME sector excelled in terms of increasing its market share: (1) it increased its already unusually high share in global trade from 33.8% to 37.2%; (2) it increased its market share in the US market from 5 % to 10%; and (3) it increased its market share in China (the world largest market for ME products) with 9 percentage points, to an impressive total of 37% (Vieweg 2012).

2.2.3. Electrical and Electronic Goods

The production of electrical and electronic goods, in terms of output, value added and employment is even more important for the EU than the mechanical engineering industry. In 2008, the 4.3 million people working in this industry generated a total output of some EUR 320 billion and a value added of over EUR 220 billion, which, in 2009, was good for over EUR 210 billion worth of exports (Ecorys 2011).

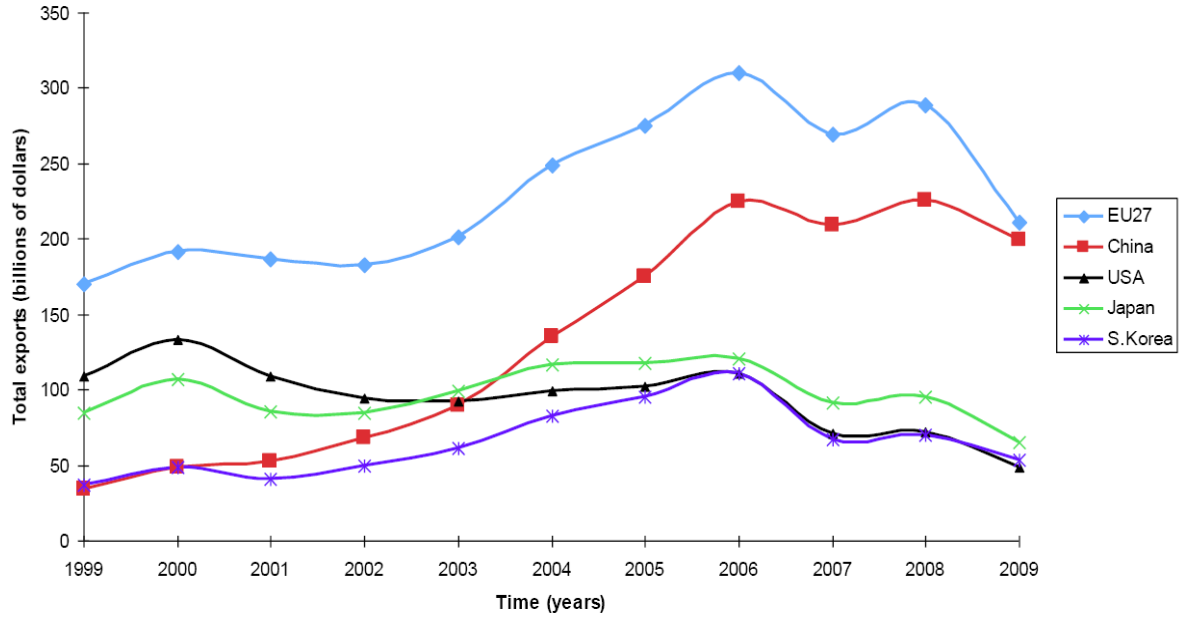
Although usually discussed as one single sector, the European performance in electrical and in electronic goods contrasts sharply. The EU is a global leader in electrical goods. It has a large global market share, has the highest value added worldwide (by far) and employs over 3.68 million persons. Europe's position and market share in electronic goods, however, is markedly smaller (Ecorys 2011).

Within the EU, the electrical and electronic sector plays a crucial role in product and process innovation, and as a provider of high-technology inputs for other industries such as ME, transport, health, chemicals and ICT. The industry has a huge growth potential due to the ongoing focus on increasing energy efficiency. Like ME, companies increasingly focus on the provision of additional software and services to accompany their traditional products.

Conservative estimates suggest such services to amount to about a quarter of total industry output (Orgalime 2008).

As with ME, the EU faces a productivity challenge in electrical & electronic goods, due to shorter work weeks than in the US and Japan, and due to the product mix of the industry. The value added is 45% in the EU, falling much short of the 63% companies manage in the US. However, only the EU managed to increase its value added of electrical goods between 2000 and 2008, whereas its American and Japanese competitors experienced a decline over the same period. At the same time, the EU also managed to increase both market share and production with an impressive 12% points each. Total output in the electronics goods sector, however, remained well behind in the EU and even decreased in said period (Orgalime 2008).

Figure 2: World exports of electrical and electronic goods: EU and four countries



Source: Ecorys (2011) Study on the competitiveness of EU electrical and electronics good markets.

Including intra-union trade, the EU is the largest world exporter of electrical and electronics goods, which is solely due to its global leadership position in the electrical goods sector. Europe actually has a comparative disadvantage for the two sectors combined, while China, Japan and South Korea have a comparative advantage. The EU's leading position will thus soon be taken over by China, which has been catching up over the previous decade. However, this should be well understood : Figure 2 relies on traditional trade (sales) statistics. If not traditional trade statistics are employed, but genuine value-added (in other words, not counting e.g. imported inputs for assembly, which, for China, is most of the sales price) trade flows, the Chinese position is far less impressive (as China imports so many inputs). For the electrical goods sector in itself, however, the EU maintains a clear and significant advantage over its global competitors. In electronics, both the EU and the US have a comparative disadvantage vis a vis their Asian counterparts (Ecorys 2011).

The EU had a trade surplus with the US, Brazil, Russia and India in both 2005 and 2010, while it had deficits with Japan and China. Within this five-year bracket, trade with the US and Japan remained stable, but the trade surplus with Brazil, Russia and India increased by some 60%, while the deficit in traditional trade statistics with China doubled (Orgalime 2012).

2.3. The Published Demands from the EU Engineering Industry

Orgalime, the European Engineering Industries Association[1], has published three position papers on TTIP[2] so far. The Association is clearly in favour of TTIP, mainly because the Trans-Atlantic economic relationship has unexploited potential. It stresses the critical economic importance of Trans-Atlantic trade and investment relations for its sector, a point that is confirmed in our economic survey of the sector in section 2.2 and the Annexes to this study. Its demands and concerns can be divided into two main areas: TBT related and 'other' wishes related to other chapters of TTIP. There can be no doubts that Orgalime's principal concerns are in the area of TBTs, often highly specific issues, and in the related regulatory cooperation whether in the TBT chapter or horizontally. They include several offensive interests. We shall also identify several offensive interests in non-TBT areas.

2.3.1. The broader demands of Orgalime in non-TBT areas

Orgalime insists on nine priorities outside the domain of TBTs and regulatory cooperation. They are:

1. Elimination of tariffs; this is easily understood because the sector only suffers from so-called 'nuisance tariffs' which do not give any protection but generate (costly) nuisance for business. EU import tariffs vary between 1.5 % - 3 % and US tariffs between 2% and 4.5%, so that their elimination would hardly or not matter for competitiveness. A rough estimate of tariff savings follows below.
2. Trade facilitation, in particular with respect to customs procedures and border enforcement. Customs processes are not sufficient standardised and electronic customs procedures should be enhanced, not least with a view to the sector's participation in global value chains.
3. Expansion and protection of investment, although this position is not worked out.
4. Protection of IPRs, again without further elaboration.
5. Transparency and opening up of US public procurement in a number of ways, in particular at states' level; Orgalime protests against the fact that 13 US states do still not apply the WTO Agreement on Public Procurement; this is a highly complex area in the US and it is most instructive to refer to an authoritative overview of public procurement issues in TTIP by Woolcock & Grier (2015).
6. The removal of the extra-territorial application of US regulations on the export of dual-use goods ; also this is a complex area ; Orgalime points out that the chilling effect of this extra-territoriality is very damaging to business and stands in the way of inter-firm cooperation in several subsectors.
7. Rules of origin; Orgalime insists on rules-of-origin based on the EU model if only because they are simpler and usually less restrictive (e.g. consider NAFTA origin rules).
8. TTIP should aim to ensure the facilitation of short-term entry of company personal for business purposes and temporary assignments e.g. for after-sales services and repairs.
9. Orgalime favours enhanced Trans-Atlantic cooperation on the recognition of professional qualifications.

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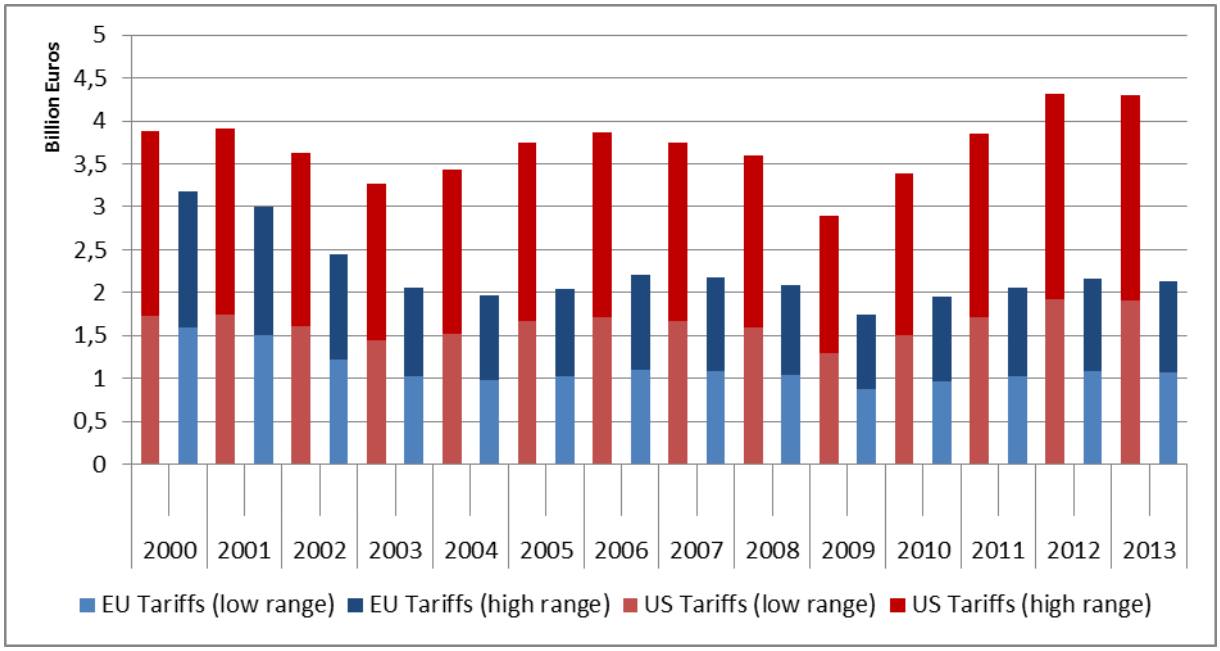
[1] Speaking for 37 trade federations. See www.orgalime.org.

[2] Position Papers of 5 Oct 2012, Orgalime priorities for the upcoming EU-US trade and economic negotiations; of 29 May 2013, Orgalime position paper on the negotiations of the comprehensive TTIP ; of 8 May 2014, The TTIP negotiations – a way forward.

Clearly, some of these demands might not be too difficult (e.g. tariff elimination for their sector) but some other ones are cumbersome to achieve (dual goods) or amount to a long-term initiative (e.g. professional qualifications). Of the nine items, three consist of general positioning without any elaboration (investment protection, IPRs and professional qualifications). Another four of them are elaborated a little but they concern more horizontal issues (procurement, trade facilitation, short-term entry for business staff) and are not specific to the sector, or, relate to only a few sectors (including Engineering) but involve foreign and security policy questions (extra-territoriality in case of dual-use goods). This leaves two : tariffs and rules-of-origin. Although rules of origin can sometimes be tailor-made to sectors or even goods, this is usually not attractive leading to complexity and can reflect protectionist attitudes. If interpreted more horizontally, this study is not the place to go into this issue.

Tariffs are always specific to sectors, indeed, to fairly disaggregated product groups. In a FTA, one should expect bilateral tariffs to go to zero, certainly amongst developed countries, except perhaps in a few agricultural goods if very sensitive. It is undoubtedly the intention of TTIP partners to accomplish zero tariffs and the case for doing so when tariffs only cause 'nuisance', is even stronger than otherwise. Orgalime seems not to have calculated the savings when going from today's tariffs to zero ; the association speaks of 'several hundreds of millions of euro'. In this study it is too time-consuming to calculate tariff revenues in detail. However, in Figure 3 a rough estimate of the range of tariff revenues for the two partners has been made, based on simplifying assumptions about average tariffs (and ignoring that some product groups might already have zero tariffs). Lower bound tariffs are resp. 1.5 % (EU) and 2 % (US), whereas the higher bound is 3 % (EU) and 4.5 % (US). Figure 3 shows that the roughly estimated amounts of tariff revenue are much higher than several hundreds of millions of euro: the lower bounds for EU exports to the US hoovers around EUR 1.5 billion, recently up to EUR 1.9 bn, and for US exports hoovers around EUR 1 billion since 2003 (and higher before, as US exports to the EU declined). The higher bounds range from EUR 2.1 bn to no less than EUR 4.3 bn. The main reason that tariff revenues turn out to be far from trivial is simply that the sector trades a lot over the North Atlantic.

Figure 3: Estimates for US and EU engineering tariffs between 2000-2013



Source: Own calculations based on Eurostat (2015) SITC classes 69-77 and 87-88 and Orgalime (2014).

It can therefore be concluded that, besides some TBT issues, also tariff elimination is an offensive interest, but probably shared by US industry.

2.3.2. The TBT-related demands from the sector

In TTI, Orgalime aims for a high-quality regulatory dialogue, to help approximate legal requirements based on common regulatory objectives in their sector. Although harmonisation of regulations tends to be very difficult, even when it promises to eventually result in global standards, Orgalime points out that UN-ECE has been successful in various ICT hardware (such as GSM, peripherals, WLAN, PSTN, Bluetooth) as well as in ATEX[3] equipment. The explicit idea would be to enhance the joint regulatory influence on third markets as well.

Apart from this broader preference, typical for the 'living agreement', the two offensive interests of Orgalime are about longstanding TBTs. It is not exaggerated to say that they have caused stubborn frictions with the US: one on different technical standards and one on very costly conformity assessment procedures for (mostly) electrical goods, including machinery, used in the workplace. The sector emphasizes that addressing these TBTs by means of mutual recognition would seriously disadvantage the European side, as US electrical goods and machinery only need SDoCs (self-certification, declared via a Supplier's Declaration of Conformity) to get into the EU market, whereas EU goods undergo costly and rather special third party certification under rigid OSHA rules and problematic certification procedures by its designated CABs (called NRTLs)[4]. In terms of horizontal regulatory cooperation, it suggest three elements to mitigate (and partly pre-empt future) regulatory divergences and 'incoherence': (a) early consultations between the US and the EU on the trade impact of new regulation or major reviews, (b) setting up of regulator-to-regulator cooperation and careful procedures for it, and (c) enhance transparency in the broad sense of open and predictable procedural requirements, facilitating regulatory comparisons and solid impact assessments.

The first major issue for Orgalime, the most prominent supporter of European technical standards as well as of ISO and even more IEC, is the extremely poor US record of adopting international standards as understood by the EU and most of the world: ISO and IEC standards. In IEC standards it is 134 IEC standards in the US versus more than 4000 in the EU. TTIP should overcome this enormous discrepancy. One way to do that is to set up a similar arrangement at regional level (alone or with NAFTA partners) attempting to write a US standard at the same time as the relevant ISO or IEC one and with the same experts, if none exists in the first place [5]. At the moment, there are quite a few US standards based on ISO or IEC ones but with local deviations and technical restrictions which violate the well-known slogan : 'one standard, one test, accepted everywhere', once advocated by the Trans-Atlantic Business Dialogue [that is, by leading US companies as well]. It is anything but clear what compelling reasons exist to deviate from ISO and IEC standards so frequently, or plainly ignore them and continue to use idiosyncratic standards, whereas the EEA countries (plus Switzerland and Turkey) see no problem – indeed, see advantages and deeply invest in helping to write such standards. Decades ago, the US or ANSI (the standardisation platform in the US representing the US in ISO and IEC) used to complain that the EEA had many votes in Geneva and the US only one[6]. This was (and strictly

[3] ATEX equipment refers to the ATEX directive on equipment used in explosive atmospheres.

[4] National Recognised Testing Laboratories.

[5] In Europe, this is done in the so-called Dresden and Vienna agreements.

[6] Although USTR Mike Froman said on 30 September 2013 in Brussels, "…yet the only bodies the EU recognizes as producing international standards are those in which the EU member states cast the bulk of the votes".

spoken still is) correct, although it does suggest that standards are often decided as compromises, rather than on technical merit. However, technical merit is frequently decisive. In any event, ISO and IEC are nowadays truly internationalised organisations where the EEA votes are not and cannot be decisive, even where choices have to be made: ISO has 163 members and IEC 83 (23 as associate members).

The issue of transparency plays a role in another long-standing debate, namely, whether the EU or the US standardisation system is 'open and transparent'. Americans and Europeans tend to advocate opposite views on this, with an inclination to exaggerate. Orgalime holds the classical European view that European standardisation is an open process and that the use of standards for regulation (via Commission mandates, derived from 'essential requirements' in directives) is transparent. For Americans, it is not transparent because standards are written in technical committees appointed solely by European national standard bodies in CEN/CENELEC (so only having non-Europeans when expertise is needed) and decided by voting of these national bodies jointly as the ones making up CEN and CENELEC. Americans do not see this system as open and accessible for those having expertise and a clear interest. Only when the 'public inquiry' period is initiated and the draft standard can be commented on, is consultation possible. This positioning is at least exaggerated: as noted, since more than two decades, the overwhelming majority of CENELEC standards are written simultaneously with IEC standards, using the same experts where possible, and this process is entirely open for Americans (and others) – stronger, not seldomly it is even chaired by American experts. The overlap with ISO standards is less far-reaching but many joint exercises are initiated every year, again open to Americans. Moreover, the argument is further diluted by the fact that many US firms can and do join standard writing in the European system for the simple reason that they get involved via national standards bodies. And finally, the voting by the higher organs in CEN/CENELEC has the great virtue that national bodies must withdraw any competing (national) standard – hence, it is entirely understandable, if not logical, that they wish to be in control of the new common standard before having to withdraw their own standards.

The 'decentralised', or better 'scattered', US standardisation 'system' is, in principle, open to any firm or expert to help draft standards, hence also for European firms, but in actual practice, it tends to be costly to find out what new standards are being prepared in the US and by whom, and one might sometimes have to buy standards from more than one source. This argument should also not be exaggerated as only 9 bodies in the US (like ASTM, IEEE, etc.) are responsible for practically all standards used for compliance with US risk regulation. And becoming a voting member in ASTM costs a mere EUR 50 for European SMEs. There is nonetheless some confusion caused by the unstructured US 'system' of standardisation with hundreds of smaller or specialised bodies, at times without full adherence to basic principles and/or not member of ANSI. Orgalime favours a system of transparency and predictability, similar to the one in Europe, including a single source of information, also for planning of new standard projects. Once standards are used to support compliance of US regulation, US and EU regulators should commit that only standards developed in 'close connection' with ISO and IEC could be used for this purpose.

When it comes to conformity assessment, another offensive interest, there are two closely related issues to be addressed. The general problem that Orgalime discerns (with good reason) is that, in sectors such as the very broad Engineering one, the US and the EU have completely different regulatory philosophies. Therefore, Orgalime advocates a 'living agreement' arrangement, following a basic TTIP treaty, which should be able to generate

As the text above shows, this statement is rooted in the past and is simply no longer correct by any measure. See http://iipdigital.usembassy.gov/st/english/texttrans/2013/10/20131 p. 3.

mutually satisfactory solutions in a gradual process. The US, basically because regulators such as OSHA (responsible for occupational health and safety) interpret their mandate from Congress in a strict fashion (also given the potential pressure from court cases in the US), imposes a heavy and costly form of conformity assessment, third party certification, by designated Conformity Assessment Bodies (here, called NRTLs)[7]. A closer look at the TBTs at stake reveals that there are actually two reasons why this certification is costly and sensitive: (a) the costs of third party certification by a NTRL; (b) the difference with the lower market access costs for US competitors exporting to the EU (hence, disadvantage vis a vis their US competitors, entering the home ground of EU producers, with self-certification only – SDoCs). SDoCs have two competitive advantages – it is usually cheaper and it is almost always much faster and easier for planning, hence, "time-to-market" is shorter and predictable, a much appreciated feature. However, factor (a) is actually costlier than one would expect. In principle, there is a free choice between NRTLs but what happens is that, once NRTL Y has certified components and parts [the sector works worldwide with value-chains, so components come from many places], the certification of the entire device or appliance or machine incorporating these components has to be re-done, in most cases. This is so because UL is very dominant in that segment of the certification market, and it holds that liability grounds justify this prudence. Moreover, UL has been assigned as the sole certifier by some 30 US states and a number of other sub-federal governments. Not only does this cause fragmentation of the US internal market – only due to conformity assessment, not regulation of safety itself -, it amplifies the dominance of UL in the market even further. Orgalime has shown in an alarming position paper[8] how this has led to excessive pricing in a number of UL's services. So, the EU exporters suffer from a triple cost disadvantage: (i) their SDoCs from the EU are not accepted and they have to seek third party certification; (ii) that third party certification is duplicated in many cases due to the dichotomy between an entire machine [usually, UL, often by law] and components; (iii) when done by UL, services are priced far higher than the same services by other NRTLs. Item (ii) should not be underestimated, given the nature of mechanical or electronic engineering in various sub-segments. A 'machine' is not a mass product in most cases, like hand tools are. Machines are made for specific uses and customised in B2B deals. In Europe, the estimate is that there are some 80.000-plus types of machines; even when well-defined, the customer might still have specific demands which alter the features somewhat. In other words, the components may have (some, or major) economies of scale, but machines rarely are produced in large series. When series are small or highly customised, the fixed costs of (duplicative) certification is spread over few pieces only, hence, the average extra costs per machine are high. Duplication of certification in this industry is therefore causing a genuine competitive disadvantage! Nonetheless, the EU industry has done well in the US (see section 2.2) and has enjoyed a trade surplus since 2002 despite the relatively high euro exchange rate (until very recently). There can be little doubt that a reduction or removal of this serious cost differential in conformity assessment[9] would significantly enhance the cost competitiveness of EU exporters in the relevant US subsectors.

[7] National Recognised Testing Laboratories.

[8] Orgalime (2011), EU manufacturers suffer from malfunctioning of the US certification market: potential abuse of dominant position, 24 Oct.

[9] Note, that it only applies to B2B exports, that is, professional electrical equipment used by workers ; consumer electrical goods do not fall under OSHA and are basically not regulated (other than the US Consumer Protection watchdog and product liability).

2.4. Earlier attempts to reduce US TBTs in Engineering

Two attempts have been undertaken to reduce the costs of US TBTs in the sector. Both were concerned with conformity assessment. On differences in standards, and in particular the huge gap in adhering to world standards (with the occasional exception), very little has been achieved so far.

The first attempt consists of the EU/US Mutual Recognition Agreement [MRA] of 1998[10]. The MRA covers six sectors, one of which is electrical goods. Art. 3 of the treaty says that the US (EU) 'shall accept or recognise results of specified procedures used in assessing conformity to […] provisions of the US (EU), produced by the other party's CABs and/or authorities'. Once the transition periods have been successfully completed, such CAPs (=Conformity Assessment Procedures) for this purpose assure conformity 'equivalent to the assurance offered by the receiving party's own procedures'.

The EU saw the electrical safety annex as an imbalanced set-up because US exporters had relatively easy access – in terms of compliance costs and time-to-market – to the EU market given the Low Voltage directive (with SDoCs), whereas EU exporters faced regulatory reviews and approvals by OSHA. But OSHA was unsatisfied by the way the EU filled in the designation procedure in 1999/2000: the EU accepted, without significant review, applications from the 15 EU Member States, largely in languages other than English[11]. Once the MRA had been agreed, OSHA insisted to conduct on-site reviews – which, for the EU, went against the spirit of the MRA - and began asking a fee in October 2000, given the cost burden of the process. In fact, there are signs that there was little actual co-operation at all in the joint sectorial committee. Perhaps, with a greater degree of willingness and co-operative spirit, the EU CABs could have been capable without any effort to submit applications in English! On the other hand, section VI of the electrical safety annex says clearly that "… CABs from the EC shall be designated by the EC authorities …" and "OSHA shall rely on the EC designating authorities… for conducting on-site reviews at the respective Member States' CABs". The upshot was that OSHA rejected a number of applications on the basis of languages and incompleteness, typically issues that could have been addressed in a properly functioning sectorial committee. This refusal was threatening not only this specific sectorial MRA, and indirectly that of telecoms equipment (as electrical safety plays a role), but the entire MRA for reasons of 'imbalance' and a lack of trust. The designation of European CABs by OSHA was of course critical, given the regulatory regime for electrical goods in the US. But the acrimony ran much deeper because both the Commission and European industry felt strongly that the heavy approval system of OSHA was an unnecessarily burdensome and (by virtue of the low risks of these goods) unjustified barrier to market access. After all, the EU experience showed that using SDoCs worked well and this was usually cheaper whereas time-to-market was much less problematic. Strictly spoken, all this is no issue in a MRA, which by definition takes the two regulatory regimes as given, and solely focuses on avoiding duplicative conformity assessment. However, the WTO TBT Agreement rules that, if TBTs are unnecessarily burdensome and unjustified, they are forbidden and ought to be replaced by a justified and less burdensome regulatory regime. For the EU electrical goods industry, having – at the time - a structural trade surplus despite the market access barriers, even a successful resolution of the designation-of-CABs by OSHA would have been considered only as a minor success. Business opportunities would be much greater if self-certification of low-voltage electrical goods[12] would be allowed by OSHA, just as it was in the EU for many years. Apart

[10] The following draws from an in-depth study of the MRA and its aftermath, see Pelkmans & Correia de Brito (2015) and interviews.

[11] Shaffer (2002). There were 11 EU official languages in the late 1990s.

[12] Which, for OSHA, includes electronic equipment as well.

from a few quotes in Shaffer (op. cit.) and Devereaux et al. (2006), suggesting that this deeper issue of distinct regulatory regimes for electrical goods was a bone of contention even when not formally part of the MRA, there is no evidence that attempts were undertaken to better appreciate each other's regulatory regimes, as a first step to come to possible solutions, including the eventual recognition of SDoCs from companies operating in the EU under the Low Voltage directive and related (European, and indeed often world [IEC]) standards. All that emerges from the literature is the repeated remarks from OSHA officials about the Commission's failure to understand that this issue is one of occupational health and safety – that is, for US workers – and not 'the' market in general without distinction between workers and consumers, as was customary in the EU given low risks. In any event, the upshot was that the MRA in electrical goods failed and was even suspended in 2003 by the Commission.

A second attempt to address these issues was undertaken after a revival in Atlantic economic relations had led to the TEC, the Transatlantic Economic Council in 2007. When the TEC was established, suggestions were included in press releases that regulatory cooperation would be re-invigorated.

In 2008 the Commission submitted a proposal to OSHA to accept SDoCs for electrical goods falling under the Low Voltage directive. In 2010, a rather elaborate analysis was published by OSHA[13] of the Commission proposal to accept SDoCs, instead of third party certification solely by NRTLs[14], for low-risk electrical goods. This lengthy document is interesting as it sheds light on what it takes to achieve effective regulatory cooperation with such agencies. What is positive in the approach is the maturity and analytical nature of the exchange between OSHA and the Commission, as well as other EU stakeholders, in sharp contrast with the acrimony of the late 1990s. Reducing the TBT that the Commission perceives – i.e. heavy and restricted third party certification instead of SDoCs – for market access of electrical goods to the US market cannot be 'negotiated away': it can only be the result of an analysis of whether domestic regulatory obligations in the law (here the US OSH Act) are not negatively affected or undermined by allowing SDoCs of companies exporting from Europe. OSHA rejected the request from the EU. It based its decision (after two years of seeking a profound understanding of how the EU system works and what its health and safety records are) on two complementary assessments: one statistical (is there "a direct correlation between the method of protection and low rates of illness or injury"?) and one qualitative (assessing "the operation, attributes and elements of the [EU] system to determine whether it is likely to provide a high level of protection"). The present study cannot do full justice to the reasoning and analysis of the OSHA Notice. But a few points can be made. First, in two ways the OSHA approach is more ambitious than is customary in the EU with respect to the Low Voltage directive: (a) OSHA insists on 'hard' statistical proof and found that the statistical data submitted falls short (in several ways) of providing substantive empirical evidence in favour of SDoCs; (b) OSHA must guarantee a 'high level of worker protection' (similar to what the EU treaty objective is) but it recalls US case law holding that OSHA is allowed to "deviate only modestly from the stringency required by section 6 (b) (5) for health standards"[15], and then adds (on its own account) "which must eliminate significant risk [as in the EU, the author] or reduce that risk to the maximum extent feasible". It is the last part of the sentence that would seem to disregard a cost-

[13] Notice: Nationally Recognised Testing Laboratories: Suppliers Declaration of Conformity, OSHA, Washington DC, December 17, 2010; Federal Register Number 2010-31695 (ID : OSHA-2008-0032-0099).

[14] OSHA 3rd party certification must be conducted by Nationally Recognised Testing Laboratories, legally spoken, but in actual practice or given nearly 30 US States' laws, by UL.

[15] In the US, here, standards mean 'regulatory requirements'.

benefit approach or a sense of proportionality. It is well-known in the economics of regulation that the marginal costs of avoiding risks 'to the maximum extent possible' can be very steep indeed, with only minimum extra benefits obtained. Of course, this is a societal choice given the 'right to regulate' of every country. However, it is good to understand that it is plainly impossible to impose such rules for too many goods and services as it would become unpayable. There is always a risk remaining anyway and cost-benefit perspectives help one to realise whether it is worthwhile to engage in risk reduction for good x 'to the maximum extent feasible' or better spend these additional resources for other purposes. Since Low Voltage electrical goods tend to be low-risk goods, the question is therefore whether much, if anything, is gained by imposing very costly regulatory regimes including conformity assessment by NRTLs or UL instead of SDoCs. Hence, what for OSHA is prudent risk regulation coupled to strict conformity assessment plus regular inspections, amounts (for the EU) to a TBT 'unnecessarily' hindering market access for EU exporters. Add to this the fact that, on the whole, EU electrical goods are competitive, with a structural trade surplus with the US for decades even with the higher access costs, and the contours of a profound disagreement in bilateral regulatory trade policy are sketched.

The OSHA Notice goes deep into the statistical evidence offered by EU stakeholders in order to substantiate the good EU record in electrical safety of these goods and the Agency finds the empirical evidence wanting on a number of plausible grounds. It also recalls samples of two subsectors in the EU where compliance had turned out to be bad, and used it against the EU (absent other reliable statistical information for all subsectors). Although compliance failures often consisted of (inappropriate) paperwork, not technical failures, a non-trivial share also showed technical failures. Relevant injuries and accidents statistics were compared and no clear evidence in favour of the EU system was detected. This led Europeans to complain that these statistics are either weak or incapable of identifying why such accidents happen: is it equipment failures or conduct of workers or consumers or for other reasons? The point here is that the light EU regime (because electrical goods are seen as low risk) does not invite heavy and systematic investment on accident statistics and across-the-board statistics from market surveillance; indeed, there is no culture of permanent (re)justification based on evidence that regulation for such low risk goods works well. This means that the EU is at a disadvantage vis a vis a (US) regulator with huge resources and the power to impose third party conformity assessment (also yielding better statistics). Subsequently, OSHA assesses the SDoC as a 'reactive' system. Although the Agency has the tendency to reason in favour of the eventual rejection, the weaknesses of the SDoCs, the problems in EU markets arising from a lack of annual inspections and the limitations of EU Member States' market surveillance are nevertheless revealed systematically. A number of partial alternatives to the OSHA /NRTL system are discussed and eventually rejected. Finally[16], OSHA becomes a little defensive when it points out that, even when it were to grant SDoCs as a proof of compliance, it would need to massively invest in market surveillance (it suggests no less than USD 360 million annually)[17] and acquire additional powers e.g. for recalls. The Notice shows very well what it takes to overcome the more stubborn (perceived or actual) TBTs in TTIP. This does not mean that alignment or regulatory convergence is impossible but, rather, that one has to invest in the case for 'equivalence' based on hard arguments and empirical evidence and one might, perhaps on both sides, have to be prepared to introduce selected reforms to render alignment acceptable for risk regulators. This is not impossible for electrical goods.

[16] It also rebuts the notion that the OSHA system is a TBT whereas it holds that the EU is less 'free' in market access than the EU asserts.

[17] Here one ought to realise that the OSHA regime is only covering electrical goods for professional use; the massive consumer market in the US is not covered at all (unlike in the EU). The huge sum for market surveillance only for professionally used electrical goods therefore looks suspiciously like a convenient excuse.

2.5. EU/US joint business initiatives

Before TTIP started in earnest, the two negotiation teams together organised a massive hearing in Washington DC in April 2013 where business could present their demands or positions. Business was encouraged to submit joint EU/US positions. One observes that NEMA (US electrical manufacturers) and Orgalime did not manage to merge their positions into a joint submission. NEMA stressed the prevention of barriers for emerging sectors but stated that it does not seek harmonisation of regulations. It also argued that an international standard is one 'used in more than one country', a most curious concept, a definition which would – if accepted and pursued by all countries - result in a chaotic functioning of global value chains and costly fragmentation. NEMA assumed the classical US position that CEN/CENELEC lacks transparency as membership is closed to US companies [18]. Interestingly, NEMA states that it is not against SDoCs. Orgalime assumed (elements of) its position mentioned above. In addition, the German member of Orgalime (VDMA) underlined in Washington DC that expert discussions on the mutual recognition of materials used in engineering and plant construction be re-invigorated, as this is yet another extra obstacle causing higher costs and delays.

However, the pressures of globalisation are particularly great in the electrical goods sector, and its components, as brands are practically all depending on global value chains. This trend is inescapable and tends to get more and more countries interested in simple global solutions of electrical safety. The IEC approach is therefore becoming more and more prominent. Put differently, in more and more product groups, US standards might hinder the competitiveness of the US sector in international markets. Probably as a consequence, one can notice that IEC standards are in fact more frequently adopted in the US, as ANSI/UL standards for example, but invariably with local deviations. It is increasingly difficult not to see a kind of shielding (sophisticated protectionism?) of the sector in such moves. These presumably defensive moves might lead to higher costs, but they cannot, in the longer run, be the proper answer to globalisation.

In an interesting statement, NEMA and Orgalime have begun finding common ground in October 2014 [19]. Rather than assuming the NEMA position (e.g. not to harmonise) as in Washington DC, now it says to strive "to minimise as far as possible the existing differences in the respective regulations and the number of competitive standards for the same product, notwithstanding the long history of investment in infrastructures that took place before regulatory cooperation even began." The associations believe "that the systematic use of, or at least, alignment with international standards from ISO and IEC would provide an excellent path for the reduction of technical barriers to trade between the EU and US." The slogan "one standard, one test, accepted everywhere" …" would mean having fully transposed international standards, without regional or national deviations, that are applied globally".

[18] This is true, strictly spoken, because only national standard bodies are members. As noted before, above, US companies are often in national bodies and hence do participate in European standards writing. Moreover, with 72 % of CENELEC standards being identical to IEC standards (where US companies via ANSI take part) and 31 % of CEN standards identical to ISO ones (idem), the US complaint loses a great deal of its power. See section 2.3.2.

[19] Orgalime & NEMA (2014), TTIP: joint statement by EU and US industry associations Orgalime and NEMA, 23 Oct. See www.orgalime.org.

Apparently, the two associations are now seeking broader support for this 'breakthrough' position which could be the beginning of a long-run trend to have a far more productive regulatory cooperation and rapprochement of standards[20].

2.6. Can US domestic reforms be linked to TTIP to lower costs of market access?

Recently, two potential regulatory reform initiatives are being undertaken in the US, precisely in the area of TBTs the present study is concerned with.

The first reform is related to OMB Circular A-119 which governs the way the US government and its Federal Agencies select and use voluntary standards for purposes of conformity with US risk regulation (i.e. driven by Safety, Health, Environment and Consumer Protection, or, SHEC regulation). To be precise, the laws underlying this include the 1996 NTTAA (National technology Transfer and Advancement Act) and the 1979 Trade Agreements Act and they form the foundation for this policy. The NTTAA "directs federal agencies to use…. Standards developed by voluntary consensus standards bodies to achieve public policy and procurement objectives" and the TAA "… requires federal agencies to take into consideration international standards"[21]. Further guidance is contained in Circular A-119 from the US Office of Management and Budget (OMB): 'Federal participation in the Development and use of voluntary consensus standards and in conformity assessment'. The Circular instructs agencies to use voluntary consensus standards in lieu of government-unique ones. Such chosen standards are included with a 'reference' in legal text, and are therefore called 'referred standards'. Bodies that promulgate such standards must abide by the following principles: openness, balance of interests, due process, an appeals process and consensus. It should be noted that, in contrast with the EU NLF (New Legislative Framework), the chosen standard becomes a compulsory one, hence, part of a regulatory requirement. For this reason, European standards (if not selected; such selection is possible but very rare) are excluded from showing their 'equivalence' in ensuring the same level of SHEC. This can have severe consequences for European exports, especially (but not only) in engineering products. It leads to adjustment of production runs to the chosen non-European standard and it might also make conformity assessment more costly. All this is made worse by the fact that the probability that a US standard, when chosen (which is frequently the case), is not based on or identical with an ISO/IEC standard, is extremely high, as very few ISO and IEC standards are adopted in the US. Whereas in Europe, these percentages of identity with ISO and (even more) IEC ones are very high indeed, therefore, rarely fitting US requirements for regulation or procurement. Nonetheless, often European standards would lead to a similar level of SHEC!

The Circular, now used, dates from 1998 and is in need of revision[22]. Its revision can be exploited in TTIP or otherwise to insist on a number of changes which would increase opportunities for European business due to better information and more possibilities for European standards to be 'referenced'; besides, some conformity assessment reforms may be included in the Circular as well. It is probable that the reform will be introduced before TTIP has delivered a treaty. Therefore, TTIP negotiations should find a way to link the

[20] Interviews confirm that several associations have meanwhile committed to support the position, including CEMA (agricultural machines), CECE (construction machinery), FEM (European Materials Handling Federation) and one US one (MHI, material handling industry).

[21] This is quoted from an authoritative overview produced by a task force for the US-EU High Level Regulatory Cooperation Forum in 2009: Report on the use of voluntary standards in support of regulation in the US. http://gsi.nist.gov/global/docs/Voluntary_Standards_USRegs.pdf.

[22] For the proposed revision and 'notice and comments', see http://www.regulations.gov/#!documentDetail;D=OMB2014-0001-0001 and https://www.whitehouse.gov/sites/default/files/omb/inforeg/revisions-to-a-119-for-public-comments.pdf.

domestic US reform to TTIP in one form or another. CEN/CENELEC[23] has proposed a series of adaptations which, together, would amount to an effective improvement (lower costs) of market access for European exporters. It is probable that the proposals are supported by the Engineering industry. Such reform proposals include:

- The Circular should also be used a reference guideline for sub-federal governments, as in this respect there is little coherence inside, if not fragmentation of, the US internal market.
- 'Indirect referencing' is preferred to 'direct' referencing; indirect means that the reference is made in a separate document (referred to in the regulation) which can easily be adapted or updated [and updating has proven to be a problem with such referred standards]; direct reference is more rigid but still better than having the standards in the law in full.
- The US is strongly advised to improve its information and transparency about (referred) standards; also coherence is an issue, e.g. where different versions of a standard are referred to, causing confusion and liability questions.
- An 'open public call' for a selection process (in the Federal Register) leading to equal access and fair competition, is much to be preferred to an in-Agency selection process.
- Link the conformity issues (also included in the Circular) to TTIP; this will be dealt with as the second issue below.

The author has proposed in another study for the IMCO Committee (on 'Standards', in fact all TBTs), that one can usefully go beyond this reform as follows [24]. 'Perhaps a standardisation request procedure, derived from a TTIP commitment, might be established where a European standard is shown by European stakeholders to be a proper option. This would have to be allowed if justified based on technical merit and the satisfaction of the relevant SHEC objective in the US regulation'. Allowing several 'equivalent' standards boils down to 'recognition'. The task of TTIP negotiators, now or in the 'living agreement', would be to lay down the basics for a domestic obligation to carefully and explicitly deal with a substantiated request from a European stakeholder, presumably in the Circular or a related Guidance document. Unfortunately, in the revision proposal (p 29), Agencies are advised not to consider more than one standard too easily : "…in the areas of health, safety and environmental protection, it may be preferable for an agency to allow the use of only one standard" but no rationale is provided. Of course, if a European standard would be allowed according to this request procedure, it should be recognised by sub-federal Agencies as well.

The second reform undertaken is of even more specific importance to the engineering sector than that of the Circular. OSHA has decided to undertake a NRTL improvement programme[25] and this may provide opportunities to address a number of problems in conformity assessment of mainly electrical goods and machinery. The core of the reform intended is "… completely rewriting its NRTL directive and aligning it with international standards" in four ways:

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[23] See CEN/CENELEC (2014), Position paper – CEN and CENELEC comments on the proposed revision of US OMB Circular A-119. May, see www.cencenelec.eu.

[24] Jacques Pelkmans (2015), The TTIP: challenges and opportunities for the internal market and consumer protection in the area of standards, forthcoming May, Study EP for the IMCO Committee, section 3.3.2.

[25] OSHA (2014) Nationally Recognised Testing Laboratory Program Improvement Project, see https://www.osha.gov.nrtlpi/draft_nrtl_directive_extract.pdf and http://.www.regulations.gov/#!documentDetail;D=OSHA-2013-0028-0001.

- Alignment of policies and guides with ISO/IEC 17025 (competence of testing & calibration labs) and ISO/IEC 17065 (competence of conformity assessment bodies), which is an important step forward.
- This includes its 'independence requirements' (that is, no conflicts of interest, a suspected problem in a few NRTLs so far).
- Greater precision in audits, again aligned with the two ISO standards; this would (probably) lead to clarity about separate component testing as a part of later testing of an entire machine (a complaint about duplication from Orgalime for years); it would also incorporate the IECEx scheme (products used in an explosive environment, another demand of the European engineering industry.
- Improvements in staff qualification requirements.

Orgalime[26] has submitted comments to OSHA. It goes without saying that the sector welcomes this reform. However, it points out that the alignment with world standards is made problematic by further management and general policies which undermine harmonisation. One objection is the rigidity of not using a risk-based approach with respect to factory visits, for example, pushing up costs. Orgalime points out that the logic of using ISO standards inevitably leads to mutual recognition of product tests, certifications and approvals. It also would level the playing field in that competition between NRTLs in the US would become equal; costs would reduce, too. Also, OSHA could (when conforming to ISO 17011) join the world quality network of accreditation bodies ILAC and the mutual recognition arrangement (MRA) of ILAC, implying acceptance of lab data and inspection results. In the end, all NRTLs (i.e. also UL) should accept inspection reports coming from IECEE-CB or IECEx but that is not what the draft text of the Program Directive now suggests. To re-affirm or build on this reform in TTIP directly or indirectly would be most precious.

2.7. The EU position paper on Engineering

The EU is in favour of a separate chapter (or annex) on Engineering for the simple reason that TBTs have played and still play a major role in effective market access to the US market. For the US there are complaints as well, in particular their difficulty in participating fully in European standardisation for 'European harmonised standards' used for the application of EU risk regulation, though not de jure mandatory. Engineering is defined in a more narrow fashion than the sector itself does, in several ways:

- The MMA subsector is not included in the EU Factsheet and EU position paper[27] ; no explanation is provided but one can surmise that the market access problems with TBTs in MMA are far less serious than in machinery and electro-technical products. Without MMA the sector still accounts for some 25 % (!) of bilateral trade in goods. As noted, however, the economic gains from TTIP in MMA may well be considerable.
- The electronics and ICT equipment issues are left out as well ; in electronics the EU has lost competitiveness as shown in section 2.2, and the predominant reason is not found in the market access issues in the US ; also, in ICT equipment some successes in agreeing on world standards (e.g. in the UN-ECE relevant Working Group) have reduced the urgency to make it a priority in TTIP. There is a less visible

[26] Orgalime (2014), Position paper, Orgalime's comments on the OSHA's draft version of the technical areas of the NRTL Program Directive, 18 Nov. 2014, www.orgalime.org.

[27] EU Position paper: TTIP regulatory issues – engineering industries, published on 7 January 2015, on www.trade.ec.europa.eu under TTIP negotiations ; idem for the Factsheet.

aspect here, in that in Reg. 1025/2012 (on European standardisation) an ICT exception has been introduced for reference in national public procurement to ICT standards *not* having gone through the careful CEN/CENELEC procedures as obligatory in this regulation (but drafted in global ICT consortia or groups). What apparently happens at the moment is that (US) ICT companies exercise pressure on the Commission and/or in the ICT multi-stakeholder platform under the regulation, to widen this ICT exception for purposes of regulation more generally. Presumably, such issues do belong to TTIP and are better not dealt with outside it.

The EU proposes a range of initiatives, but all have to do with regulatory issues of one kind or another and all are about market access [but not at the border, dealt with in other TTIP chapters, like tariffs etc.]. It is mostly about lowering the costs of TBTs. The proposals include:

- Promoting regulatory convergence and international disciplines; the main vehicle consists of regulator-to-regulator cooperation, with mechanisms like exchange of information on regulatory plans (and the opportunity to provide comments and get feedback), a commitment to closely cooperate in the development of international disciplines and, where feasible, joint initiatives in international organisations, and, finally, cooperation for 'the review of conformity assessment procedures' with a view to ensuring proportionality to the risk they intend to address. The suggestions made above, in section 6, fit perfectly in this proposal and could be used right away.
- Cooperation between standard setting organisations, both on new and existing technologies; this should include collaboration in international standardisation organisations. Of course, a strong encouragement is all that can be accomplished as standard bodies are private organisations, be it with a link to regulation in selected cases.
- Cooperation in market surveillance and enforcement; in the electronic sector an informal cooperation between the US, Canada and the EU is now under way, and the EU would like it to become formalised, as well as other new initiatives.
- There are transparency and fragmentation issues in the US market which the EU would like to see addressed. The industry, above all SMEs which are numerous in the sector, regard the lack of transparency and difficulty finding out various (often distinct) rules at state level as a serious barrier of access to the US market.

Finally, industry is encouraged to come up with specific proposals to be taken up in TTIP. Some of the considerations in sections 3 and 6 may be helpful here. Moreover, in an extremely useful though highly technical contribution by VDMA (German member of Orgalime)[28], a large number of specific proposals for such regulatory cooperation are made. They include targeted suggestions on mechanical safety, electrical safety, pressure equipment, explosion protection, food contact machinery and public procurement, all areas where TBTs play a significant role. The suggestions specify US standards, and propose a range of technical and regulatory solutions in the short, medium and longer run, dependent on the case. It reads like an agenda for years of work. If supported at high level and via TTIP clauses, concrete results might be harvested.

[28] VDMA (2013), VDMA on TTIP, August, www.vdma.org.

3. CAN SINGEU, CETA AND KOREU SERVE AS INSPIRATION?

Neither the Singapore / EU FTA (not yet ratified), nor the Canada /EU FTA (CETA, not yet ratified) one, nor the Korea / EU one, contain a chapter or annex on Engineering. This might be seen as a signal that the necessity to address TBTs in the sector under the three FTAs can be effectively pursued under the more general TBT chapter and /or specific arrangements in addition to the TBT chapter, be it horizontally and/or a dedicated Protocol (as in CETA). Some relevant TBT aspects of these agreements are briefly recalled below, because they help to address possible TBTs in the engineering sector and are therefore relevant in the comparison with the US. One should be aware that these three FTAs differ with respect to TBTs and therefore do not signal exactly the same message. However, when studying the TBT chapters and related provisions in the three FTAs, it becomes clear that it is really the US which has some idiosyncrasies with respect to the engineering sector. That is why some references to KORUS (the US / Korea FTA, the 'template' for US negotiators) will be made as well. All three FTA partners of the EU – South Korea, Singapore and Canada - have agreed to fairly strong and relatively clear provisions which largely pre-empt or at least address the kinds of TBT issues in engineering as described in sections 2.3 and 2.4 above.

First of all, unlike the typical 'US template' for FTAs [US/Korea or KORUS], all three FTAs with the EU comprise provisions on technical regulations and on standardisation. It is good to emphasize this: it is exceedingly difficult to argue that a TBT chapter like in KORUS, not even attempting to address the costs of TBTs arising from divergent regulations and/ or standards, can be called ambitious ! In other words, if TTIP in TBTs is to be ambitious, the KORUS template cannot possibly be suitable. On 'marking and labelling', both KOREU and SINGEU comprise substantive provisions; CETA, however, barely goes beyond the TBT Agreement on marking and labelling. Also here, KORUS has simply no provisions at all. Only SINGEU is driven by a forceful *objective* to remove or reduce TBTs; the other two do not have this objective explicitly, though go quite far in other ways which, implicitly, confirm similar endeavours. KORUS does not contain a forceful objective driving the reduction of TBT costs. KOREU and SINGEU contain provisions on applying/using international standards but CETA does not. KORUS (art. 9.3) does have a provision on what international standards are, along the lines as discussed above in section 2.3.2. In other words, KORUS states that the six principles, reiterated in an old WTO TBT Committee statement, determine what an international standard is, reflecting the US position. KORUS does not explicitly draw the inference that the US draws from art. 9.3: ISO and IEC do not have a monopoly on international standards and many US standards might be regarded as 'international'. With respect to Conformity Assessment Procedures (CAPs) for electrical goods including machinery – the US CAPs being one bone of contention for the EU engineering industry – both Korea and Singapore undertake a gradual reform towards SDoCs based on a list of exceptions of products; for SINGEU this only concerns EMC, for Korea both EMC and electrical safety. However, in CETA, the former MRA with the EU which was not operational for electrical goods, will be superseded by a more ambitious Protocol (ch. 27 of CETA) which does include electrical goods and a number of additional sectors, with MRA-type arrangements for conformity assessment. What needs to be ascertained is whether and to what extent Canada is aligned with the relevant US standards which are rarely identical with ISO/IEC ones. In KOREU there is an electronics annex 2 –B: art. 2.1 says that ISO/IEC/ITU are recognised as the relevant international standard-setting bodies whereas art. 2.2 clearly states that 'the Parties shall use these international standards…. as the basis for any standard, technical regulation or CAP '. These provisions and some further details demonstrate that the US position and tradition deviates significantly from what is

customary in the world. However, on international standards, the omission about this important point in CETA probably signals that, more often than not, US and Canadian standards in engineering are the same, as technical working groups preparing standard proposals usually include both Canadian and US experts already for decades.

The three FTAs the EU has recently negotiated with other developed economies therefore show without any doubt that TTIP can and needs to set out a path over time to arrive at a similar set of principles and, where necessary, detailed and gradual transition provisions and listings of products perhaps. The US claims, so it seems, that the conformity assessment system of Canada is closer to that of the EU than to that of the US. To the extent this can be regarded as a critical difference, the TTIP 'living agreement' as well as the ongoing domestic reforms in the US (the Circular A-119 and the NRTLs reform, see 2.6) should offer opportunities in order to effectively promote regulatory convergence, with a view to lower the relevant TBTs in engineering goods, in particular conformity assessment.

4. OPPORTUNITIES AND CHALLENGES

The many, but inevitable, technicalities in the study render it difficult to fully appreciate the opportunities and challenges in the TTIP approach to the engineering sector. In the following, the opportunities and challenges will be re-iterated in summary form, hopefully helping the reader to evaluate the possibilities for engineering in TTIP.

TTIP is a great *opportunity* for the engineering sector in the EU. The core of TTIP is about lowering the costs of regulatory divergence. This highly general phrase applies particularly to EU engineering, a large and globally competitive sector, which nevertheless suffers from a series of costly TBTs when accessing the US market. The ambition of TTIP is strongly supported by the EU engineering industry because it provides possibilities to effectively facilitate market access to the US, following two earlier and failed attempts to lower TBT costs. However, given the lessons learned from these two experiences, it is critical to approach these stubborn TBTs carefully and staged over time. It is equally critical that regulators assume the lead in the efforts, not trade negotiators. TTIP should seek a sophisticated combination of a separate chapter on Engineering, a forceful TBT chapter and a gradual but committed process in the TTIP 'living agreement' via sectorial and horizontal cooperation. It is crucial to grant the US time given the deep-seated differences in regulatory approaches between the US and the EU in some areas of engineering. The above mentioned combination of three complementary processes can address the relevant TBTs in the sector, but with respect for one another's regulatory traditions whilst avoiding the rush for immediate 'results' (which has failed before). One has to realise that expecting the US to go for (truly) international standards (that is, from ISO and IEC) in engineering in thousands of cases is a change of course that cannot possibly go fast and needs to be stimulated by incentives. This is so because the adjustment is likely to be costly and might even have strategic disadvantages for the companies. TTIP as such cannot normally be expected to provide these incentives, but the powerful processes of globalisation of sales as well as their participation in or leadership of global value chains – which require more and more truly international standards for components and other inputs – does incentivise US corporations to consider greater internationalisation. This works quicker and more forcefully with respect to IEC standards, often for products and components in submarkets that are more globalised and/or require single solutions for compatibility issues, than for ISO standards. For the questions of conformity assessment, regulator-to-regulator cooperation should develop in a spirit of mutual respect and mutual commitment.

Seizing the TTIP opportunity for engineering is encouraged by several developments in the US. One is that the electrical goods industry in the US (NEMA) has recently abandoned its traditional position of sticking to US standards (often IEC standards, here, with local deviations); instead, it now supports going for IEC /ISO standards where possible and relevant. This shift is consistent with the point made above about globalisation as the leading incentive. Another consists of two incipient reforms in the US (one, on procedures to determine what standards will be used for complying with US risk regulation ; the other, on the conformity assessment rules and practices for OSHA) precisely in issue areas having been bones of contention between the trading partners for decades. These reforms are ongoing and should be linked to TTIP without delay.

The first *challenge* for the EU is how to effectively benefit from these ongoing two reforms in the US. There are suggestions in the draft US OMB Circular A-119 which once again point to a single product standard for SHEC objectives in US risk regulation. EU negotiators should be pro-active now and propose a 'standardisation request procedure' for equivalence. This procedure should be available for a European standard which is (shown to be) equivalent, hence allowed by US regulators, thereby significantly reducing

TBT costs. With respect to conformity assessment, the EU should insist on undistorted competition between NRTLs (conformity assessment bodies designated by OSHA), and acceptance of equivalence of conformity also at sub-federal level in the US.

Another challenge is about a productive response to the US suggestion of mutual recognition of standards. Unless the OMB Circular would introduce a very different reform, EU companies do not enjoy any benefit from such a mutual recognition, when it comes to compliance with US risk regulation. US regulators would simply stick to the one standard becoming compulsory for compliance, leaving one wondering what the mutual recognition would refer to in the first place. In the EU/EEA, mutual recognition of standards (not of objectives) is a misfit. The rejection of the idea should be carefully explained, emphasizing the systemic costs for the EU, given the unpredictable and uncontrollable risk that the single market for (mainly) new–approach goods would unravel gradually over time. Also for the US, mutual recognition of standards would entail a long-run cost in that it would tend to slow down its inevitable move towards truly international standards. TTIP is often presented as a response to the gradual shift of economic weight away from the Atlantic to emerging economies whereas mutual recognition of standards would incentivise a continued fragmentation of standards in the Atlantic arena. The only promising long-run route is to opt for greater cooperation between the standardisation bodies and, in the process, also help to facilitate market access on both sides.

5. CONCLUSIONS

KEY FINDINGS

The EU Engineering industry is by far the largest EU manufacturing sector, is competitive worldwide and has a trade surplus with the US since 2002. Nevertheless, in accessing the US market, it suffers from costly TBTs, problematic for all companies and particularly discouraging for SMEs. TTIP offers new opportunities to address these TBTs or at least lower their costs. The two types of TBTs are related to (i) the very poor US record of adopting and actually referring in US risk regulation to international standards (which EU companies generally rely on, for good reasons), and (ii) in unnecessarily cumbersome conformity assessment procedures and practices for electrical goods, including machinery. After two failed attempts to address these TBTs in the recent past, TTIP offers a new prospect to address the costly TBTs in a separate Engineering chapter, together with a firm TBT chapter, as well as in a 'living agreement', combining the previous two chapters with the principles from the horizontal regulatory cooperation chapter. Recent ongoing reforms in the US and a breakthrough 'understanding' between US and EU industry about the reliance on international standards without national deviations offer hope that TTIP will be able to address the TBTs effectively, within a longer time frame. This is reinforced by a closer look at three FTAs recently concluded with Korea, Singapore and Canada.

The EU engineering industry comprises three segments, each of them large in terms of turnover, trade and jobs: mechanical engineering, electrical and electronic goods, and metalworking & metals. Together, the industry generates no less than one-third of value-added in manufacturing in the EU/EEA, produced with nearly 12 million jobs in no less than 500 000 companies, including a large majority of SMEs. In world exports, it is a powerful player in its sector, with a global market share of around one-third ! This is also the case vis a vis the US : one-third of all EU manufactured exports to the US come from the engineering sector, with a 2013 trade surplus of some EUR 24 billion. Despite these favourable economic indicators, the sector – in particular the segments of mechanical and electrical engineering – suffers from costly TBTs when accessing the US market and likely raise costs in global value chains. These are costly for all companies and reduce their competitiveness inside the US market. The problems are especially discouraging for SMEs for two reasons : due to the very poor US record of adopting international standards (on which EU producers rely for 72 % of CENELEC standards in electrical goods and for 31 % of CEN standards in non-electrical goods), product and/or process adaptations have to be engineered which are costly, and often so much so that exports are in fact discouraged ; US conformity assessment practices (in some of these goods, in particular, electrical goods and machinery used in the workplace, where EU firms are strong) are unnecessarily cumbersome and hard to justify, and the fixed costs of these procedures cannot be spread over large sales, as typically such machines are tailored to customer needs.

Because TTIP will be a FTA, the industry on both sides would benefit from the elimination of bilateral tariffs and these savings may well run into several billions of euro. Clearly, this is welcomed by industry. The main offensive interest for the EU engineering industry, however, is to address the TBTs once and for all, even when this requires a long-run commitment in a TTIP 'living agreement'. The defensive interest is to maintain the integrity of the single market for new-approach goods (many of which belong to engineering) by firmly rejecting the US suggestion of 'mutual recognition of standards'. Such a mutual

recognition risks unravelling the single market over time and, in any event, would be a second-best solution, because there are literally thousands of carefully crafted 'international standards' from ISO and IEC available (and usually adhered to by the EU) which should be the basis for the first best solution. The latter is even more important in times of global value chains and globalisation. Although of course US experts have been involved in the writing of all these ISO /IEC standards, too, the actual adoption of such world standards in the US is extremely low (a few hundreds) or, when adopted, they are published and used with local deviations, with denies the very property of a world standard, and generates costs. In addition, mutual recognition has no effective meaning for improving EU access to the US market for regulated goods since US regulators tend to fix one single standard for compliance and make it compulsory (in other words, these regulators would not join the mutual recognition).

The main offensive EU interest should therefore be the focus of the EU. Orgalime (EU engineering association) advocates first of all 'horizontal regulatory cooperation' in three ways : early consultation on the trade impact of new or revised regulations, setting up regulator-to-regulator cooperation, and transparency (in the broad sense as discussed in TTIP). The association also advocates that the US (possibly with Canada) should set up a similar agreement with ISO/IEC as the Dresden and Vienna ones CEN/CENELEC makes use of for two decades, namely, that it is attempted to write (or revise) local standards together with ISO and/or IEC technical committees, with the same experts, thereby creating 'ownership' of such standards, hence, raising the number of truly international standards in the US over time. Also, once standards are used to support compliance with US risk regulation, US and EU regulators should commit that only standards developed in 'close connection' with ISO/IEC could be used for this purpose. On conformity assessment, Orgalime is in favour of a 'living agreement' because the regulatory philosophies are so different that this cannot be negotiated away in the basic TTIP agreement. Key issues include the requirement of third party certification by NRTLs in the US (certification bodies designated by OSHA) as against SDoCs (self-certification) in the EU, which is usually cheaper but in any case faster and predictable for 'time-to-market' ; the anti-competitive practices of UL as the super-dominant NRTL, leading to much higher assessment costs ; fragmentation of the US internal market due to numerous and distinct regulatory requirements at the state level or even counties.

Earlier attempts to address these issues have been made in the 1998 US/EU MRA but this failed with respect to electrical goods. Another attempt was made when the EU proposed to OSHA to accept SDoCs as is customary in the EU under the NLF (new approach). However, after a careful review, OSHA rejected the proposal in 2010. Lessons can be drawn from these two experiences and used for the present TTIP negotiations.

However, there are some encouraging signs for solving these questions. One is a breakthrough within the Atlantic engineering sector in October 2014. In a joint declaration, NEMA and Orgalime backed international standards (without local deviations !) as the way to go in future. One surmises that the joint position has everything to do with ever more forceful globalisation in many product markets in engineering, and even more so in global value chains. The other positive sign is found in two domestic reforms in the US: one concerns a revision of the OMB Circular A-119 instructing US regulators how to use standards for US risk regulation ; the other is a recent 'improvement programme' of NRTLs by OSHA, announcing the use of international standards for conformity assessment processes. The challenge is to link both ongoing reforms to TTIP without delay, in ways facilitating market access for EU engineering companies. For example, the final version of the Circular could introduce the option of a 'standardisation request procedure' for equivalence of a European standard with the chosen one by the US regulator, to be verified on technical merit. With respect to conformity assessment, the EU should insist on

undistorted competition between NRTLs and adherence by states and country regulators of the chosen OSHA standard (rather than deviations) as well as the acceptance of all NRTL assessments, not just UL.

The EU TTIP position paper published on 7 January 2015 focuses on mechanical and electrical engineering, where the main TBTs are. The proposal seeks to promote regulatory convergence and international disciplines, cooperation between standardisation bodies on both sides, cooperation in market surveillance and enforcement and, finally, on transparency and fragmentation issues in the US market. Some detailed and largely similar proposals have already been tabled by industry.

Three recent FTAs the EU has concluded with Korea, Singapore and Canada, though somewhat different in some details, clarify that it is really the US which has idiosyncrasies with respect to international standards and in conformity assessment of specific subsectors of engineering. One can observe, when studying the US / Korea FTA, serving as a template for US negotiators, that the TBT chapter is unambitious and avoids specific articles on cooperation in standardisation, on regulatory convergence, marking and labelling. In different (but at times also similar) ways, the three FTA partners have agreed to address TBTs in this area. They therefore offer a range of options on specific provisions in the TBT chapter and even for a special Protocol (in CETA) on recognition of the results of conformity. Only Canada has avoided to address the paramount question of the use of international standards, presumably because many Canadian standards relevant for the sector have been written in technical committees with both US and Canadian experts (given the far-reaching market integration via trade and FDI between the US and Canada). These options can play a role in TTIP negotiations. They also underscore that global value chains and globalisation of sales constitute a forceful undercurrent that may help TTIP negotiators to find solutions when given time in a 'living agreement'.

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ANNEX 1: ADDITIONAL STATISTICAL INFORMATION ON THE EU ENGINEERING INDUSTRY

Annex 1 provides additional information to the industry overview presented in section 2.2 (EU engineering : economic performance, trade and investment) and is best read in conjunction with that section.

Mechanical engineering

Industry overview

Mechanical engineering is dominated by relatively small companies, although, on average, the companies are larger than their counterparts in other manufacturing sectors (Table A1). The larger companies, with around 1,000 to 2,000 employees, are still small compared with their global competitors.

Over time, ME has become increasingly important as an enabling industry. Innovation in ME often serves as a building block for key technologies and equipment used in other sectors. This characteristic is also reflected in the complex European network of specialised industrial clusters. The large EU internal market and favourable infrastructure conditions allow for a refined value chain and division of labour between (both old and new) EU member states (Vieweg 2012).

Table 2 : Key figures in manufacturing and mechanical engineering

Sector	Indicator	2010		Annual average growth rate in %			
				1995–00	2000–05	2005–08	2008–10
Manufacturing	Production, in current prices	€ bn	5,885	5.3	2.1	6.7	-5.2
ME[1)]			502	4.0	2.3	10.4	-8.4
Manufacturing	Gross value added, at 2010 prices	€ bn	1,504.0	2.1	0.0	1.5	-5.2
ME[1)]			157.5	2.4	0.3	6.0	-9.3
Manufacturing	Employees	1,000	30,063	-0.6	-1.3	-0.3	-4.8
ME[1)]			2,9001	-1.6	-2.2	1.8	-4.8
Manufacturing	Productivity[2)]	€ 1,000	50.0	2.7	1.3	1.8	-0.4
ME[1)]			54.3	4.0	2.6	4.1	-4.7
1) ME = mechanical engineering; - 2) Value added per capita and annum at 2010 prices.							

Source: Vieweg (2012) An Introduction to Mechanical Engineering.

Geographically, the stronghold of European ME is found in nine EU countries, with the biggest clusters comprising parts of the Netherlands, France, Germany, Poland, Austria, the Czech Republic, Italy, Spain and Slovakia. These clusters are strongly linked by cross border trade and investment, reflecting the operation of European value chains .

Productivity growth in ME tends to outpace that of total manufacturing, but due the cyclical nature of the industry, ME companies were hit hard by the global financial and economic crisis. The cyclical nature stems from the high dependence on investment activity of industrial customers in capital goods. As a result of the crisis, output growth has temporarily fallen below productivity growth, causing a reduction in jobs as well. Despite these cyclical pressures, the industry remains one of the most important providers of

employment in the EU. Over the next ten years, the mechanical engineering sector is expected to grow at an annual average rate of 3.8%. The upward trajectory indicates that the industry is well and truly escaping the downward pressures of the crisis. However, these expectations have yet to be met, due to prolonged low growth in the Union and much lower growth of world manufacturing trade than foreseen only a few years ago (DG Growth 2015; Vieweg 2012).

Competitiveness

When trying to appreciate the implications of TTIP for the engineering industry, one should first assess the competitiveness of the industry in both the European Union and the United States. Such an endeavour is complicated for ME as the sector is both large and very heterogeneous, with 20 subsectors each facing different market conditions. Given severe global pressures on European price competitiveness, European engineering instead builds on its innovative strength to compete on the global market.

In 2006, EU labour productivity reached EUR 59,500, which is roughly half that of the US (EUR 115,200) and more than 50% less than that of the Japanese (EUR 95,700). However, this may well be due to lower productivity levels in some or all of the new Member States, which tend to be reflected in lower wages than in Western Europe. As Table A2 shows, this is also linked to firm size, with both wages and gross value-added moving up with firm size. Research suggests, however, that high US productivity might not only be the result of efficiency gains, but also of closing down many marginal or non-productive workplaces (Vieweg 2012).

Table 3 : Performance in manufacturing and mechanical engineering (selected countries), according to firm size

Employees per enterprise	Per employee and annum[1] thsds. EUR				%		%	
	Wages		Gross value added		Gross operating rate[2]		Manufacturing depth[3]	
	Manu[4]	ME[5]	Manu[4]	ME[5]	Manu[4]	ME[5]	Manu[4]	ME[5]
1 to 9	12.90	18.82	30.55	43.47	19.1%	19.9%	33.1%	35.0%
10 to 19	20.34	25.20	38.59	48.10	15.8%	16.6%	33.3%	34.9%
20 to 49	23.06	27.84	44.00	51.87	14.3%	15.5%	30.0%	33.5%
50 to 249	25.78	30.79	48.71	56.83	12.5%	14.8%	26.7%	32.3%
250 or more	34.15	38.48	65.28	67.00	11.1%	13.0%	23.3%	30.6%
Total	26.81	32.86	51.87	59.50	12.4%	14.2%	25.7%	31.7%

[1] Average for 8 member states (CZ, DE, ES, FR, IT, PL, SK, UK); [2] (Value added-wages)/production) per employee; [3] Value added / production; [4] Total manufacturing; [5]Mechanical engineering.

Source: Vieweg (2012) An Introduction to Mechanical Engineering.

Although the differences in productivity are significant, European ME companies tend to outperform their American counterparts in the global market. The most impressive demonstration of this performance is that EU ME companies managed to increase their market share in the US market from 5 % to 10% in the relatively short period from 2000 to 2010 (Vieweg 2012).

Trade

The EU enjoys a strong trade position vis-à-vis the US in ME and electrical goods already for many years. For example, in 2010, the EU ran a trade surplus of EUR 72.1 billion in total manufacturing, of which EUR 9.6 billion can be attributed to ME alone.

Table 4 : EU-US mechanical engineering trade

Sector	Indicator	2010		Annual average growth rate in %		
				2000 - 05	2005-08	2008 - 10
USA	Domestic demand[1)] Mech. engineering	€ bn	207.8	-3.7	-4.6	-4.7
EU-27			374.2	1.4	9.7	-11.0
US global trade Total manufacturing	Imports	€ bn	1429.8	0.6	1.9	0.3
	Exports	€ bn	863.4	-2.9	6.6	1.1
US - EU trade Total manufacturing	Imports	€ bn	240.3	1.6	-0.3	-1.6
	Exports	€ bn	168.2	-4.0	4.6	-4.7
US global trade Mechanical engineering	Imports	€ bn	80.0	1.7	-0.4	-2.0
	Exports	€ bn	93.7	-2.6	6.2	1.4
US - EU trade Mechanical engineering	Imports	€ bn	27.3	4.3	3.2	-7.1
	Exports	€ bn	17.7	1.8	8.6	-5.6

Source: *Vieweg (2012) An Introduction to Mechanical Engineering*.

Thanks to their trade with the rest of the world, both the EU and the US run trade surpluses in ME, confirming the expectation that developed countries have a comparative advantage in the industry. Despite its difficulty with price competitiveness, the EU ME sector managed to increase its already unusually high share in global trade from 33.8% to 37.2% between 2000 and 2010. The EU market share in China, the world largest market for ME products, even increased even with 9% points to an impressive total of 37% (Vieweg 2012).

Electrical and electronic goods

Industry overview

The production of electrical and electronic goods, in terms of output, value added and employment is even more important for the EU than the mechanical engineering industry (see Table 5). In 2008, the 4.3 million people working in this industry generated a total output of some EUR 320 billion and a value added of over EUR 220 billion, which, in 2009, was good for over EUR 210 billion worth of exports (Ecorys 2011; European Commission 2012).

European companies perform particularly well in electrical goods, with three European companies (Electrolux AB, Bosch and Siemens Hausgeräte GmbH) ranking in the top five world manufacturers of household appliances, whilst Indesit SpA is in the top ten.

The dominance of European companies in electrical goods is also illustrated by its outperformance in terms of value added (Figure 4). The main competitors for the EU are the United States and Japan, but both countries only follow at a considerable distance.

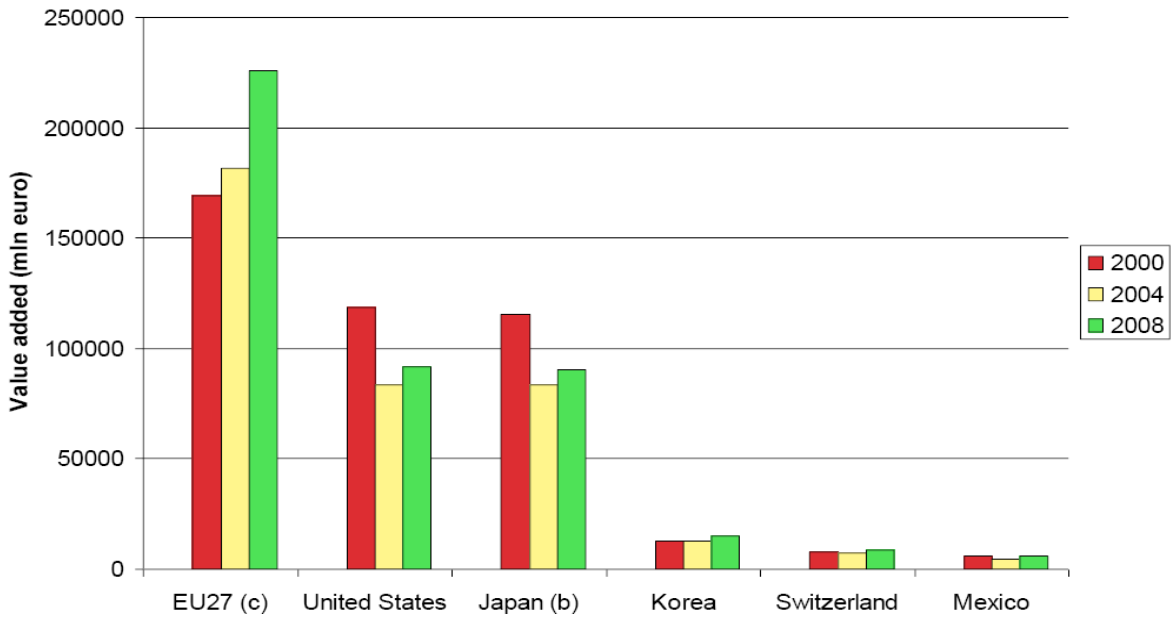
Since 2000, of the three, only the EU managed to increase is value added, whereas the US and Japan had their value added drop considerably. As of 2008, the value added in the EU is more than 2.5 times that of its competitors.

Table 5 : Industry overview electrical and electronic goods

	2005	2010
Market (billion €)	322	358
Production (billion €)	323	361
Exports (billion €)	361	388
Imports (billion €)	360	385
Share of total industrial production	9.3%	7.9%
Share of GDP	2.9%	2.9%
Employees (1,000)	2,845	2,841*

Source: *Orgalime (2012) Electra Report 2.*

Figure 4 : Value added for electrical goods for the EU and its main competitors



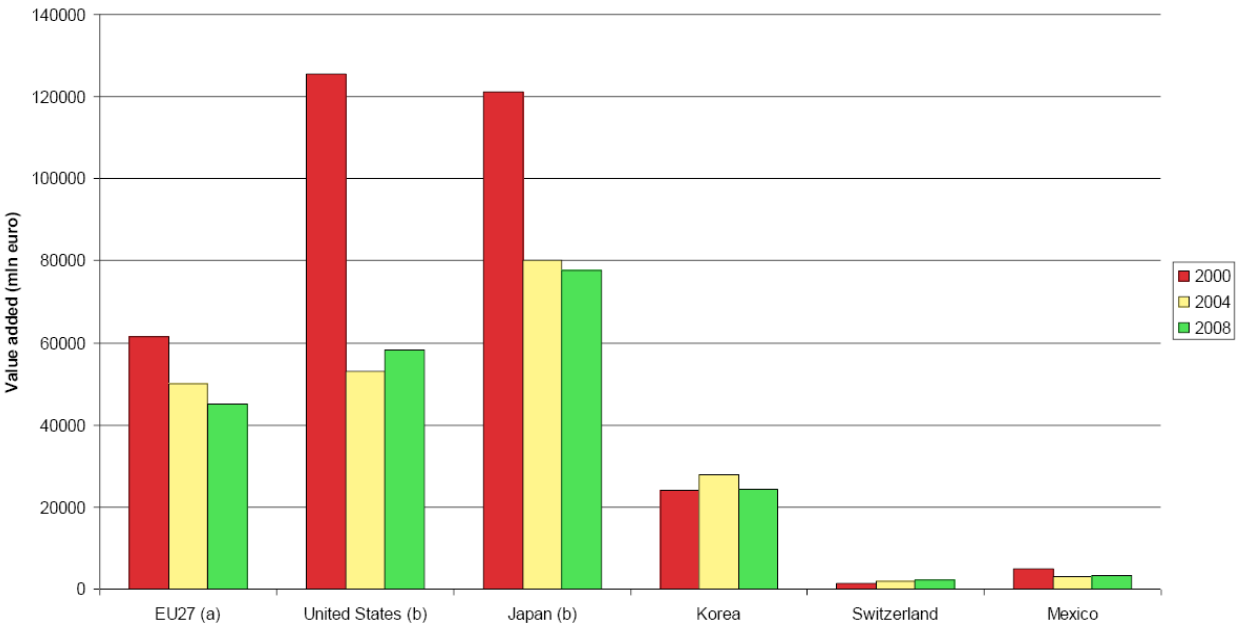
Source: Ecorys (2011) Study on the Competitiveness of EU Electrical and Electronics Goods Markets.

Figures 4 and 5 use value-added, which constitutes a major reason why China is not included. Although China is increasingly important in the sector, and seems dominant if one would only pay attention to turnover data, in terms of value added the Chinese share is still rather low. The principal reason is that much of what China exports has first been imported as high-value-added components and parts.

Figure 5 compares the same countries in terms of value added for the electronic goods industry. This clearly illustrates the relative weaker position of the EU. The performance of the EU companies has even weakened since 2000. The figure also illustrates the relative strength of the Asian economies in this sector. European R&D expenditure, at 11% of value

added, is also significantly lower than the 24% of the US, and the 17% of Japan (Ecorys 2011).

Figure 5 : Value added for electronic goods for the EU and its main competitors

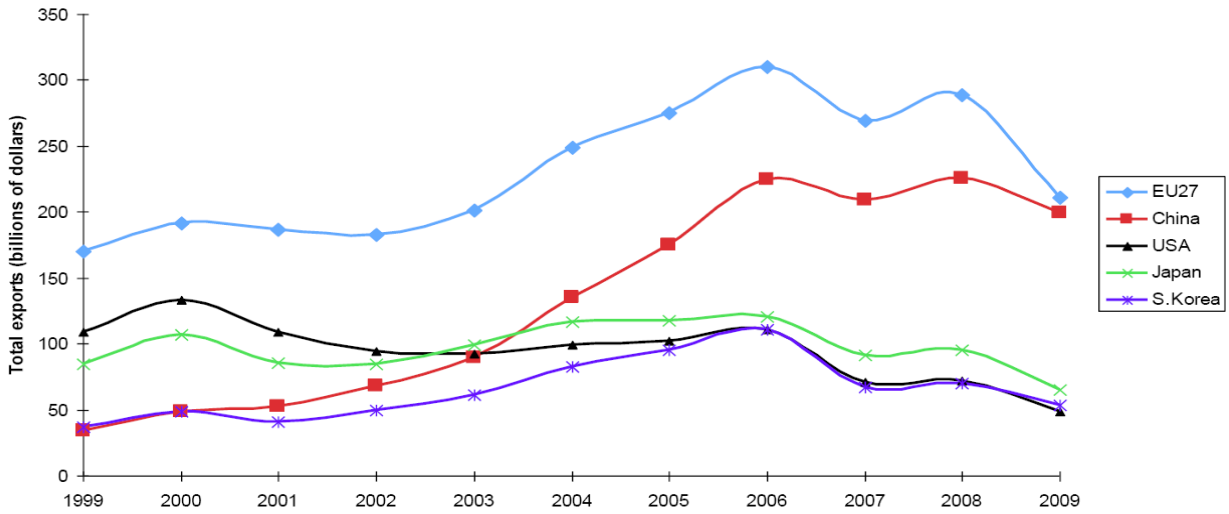


Source: Ecorys (2011) Study on the Competitiveness of EU Electrical and Electronics Goods Markets.

In contrast to mechanical engineering, where relocation or outsourcing is quite difficult, the electronics sector has witnessed significant relocation of production. The more innovative elements of the value chain, such as R&D, however, usually remain in Europe. Lower wages have made the new EU member states a preferred location for final assembly activities, while the rapid development of East Asia, both in terms of production and the size of its consumer market, caused production also to be relocated further east. Despite these market pressures, the EU managed to increase both market and production with an impressive 12% each (Ecorys 2011).

Trade

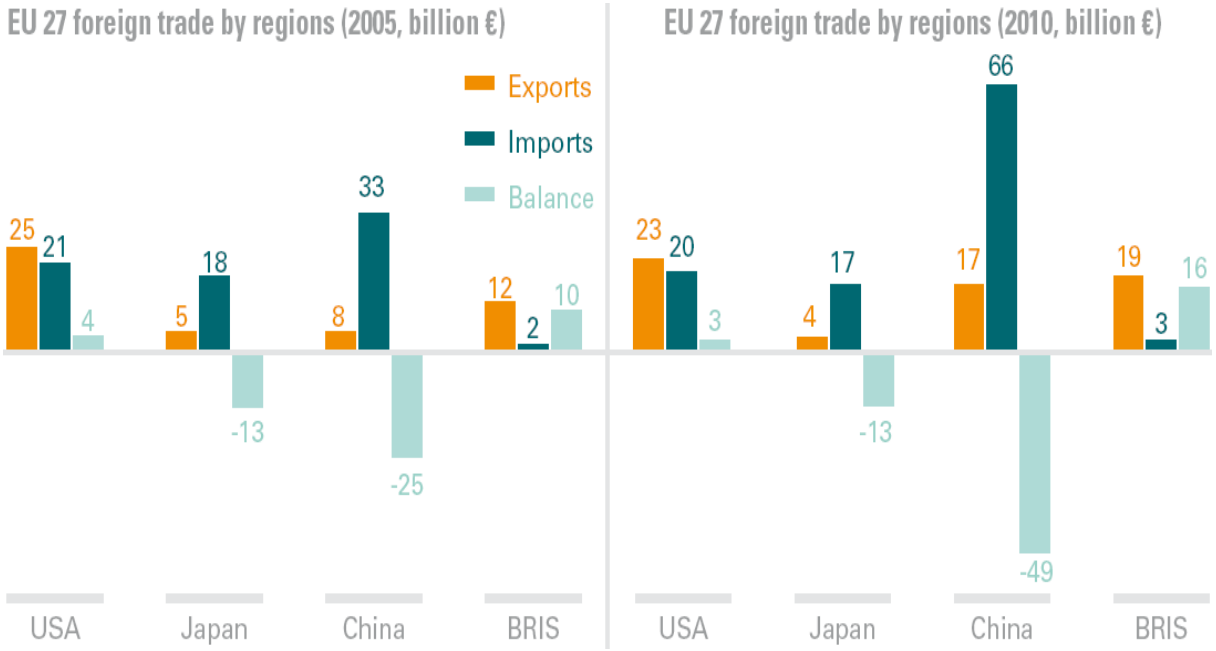
Figure 6 : Total exports for the electrical and electronic goods sector



Source: Ecorys (2011) Study on the Competitiveness of EU Electrical and Electronics Goods Markets.

The global market for electra is, with a total value of EUR 1.5 trillion, one of the largest product markets in the world. The EU accounts for 21% of this market, trailing behind China (30%), but ahead of the US (19%) and Japan (19%). The EU, however, still leads in terms of exports, although China is soon expected to take over. The gap between production and value-added figures for China, however, remains considerable (Orgalime 2008).

Figure 7 : EU trade balance in 'electra' with selected countries



Source: Orgalime (2012) Electra Report 2.

The EU had a trade surplus with the US, Brazil, Russia and India in both 2005 and 2010, while it had deficits with Japan and China. Within this five-year bracket, trade with the US and Japan remained stable, but the trade surplus with Brazil, Russia and India increased by some 60%, while the nominal trade deficit with China doubled (Orgalime 2012).

ANNEX 2: METALWORKING AND METAL ARTICLES INDUSTRIES

Industry overview

The metalworking and metal articles (MMA) industry constitutes the third subsector of the European engineering industry. Employing over 4.2 million people (12.5% of all manufacturing) in over 400,000 companies (20% of all manufacturing) it is the EU's largest manufacturing employer. Combined, these companies produce 7.4% of all manufacturing output and 10% of its total value added. The basic metals industry, which is closely integrated with the MMA sector, is good for an additional 5% of manufacturing output (Ecorys 2009; Orgalime 2010).

A subsector breakdown of the industry shows that 41% of all companies are active in metal processing, 30% in constructional metalwork, 25% in metal products and the remaining 4% in boilers, containers, and packaging (Ecorys 2009).

The industry is predominantly composed of small to medium sized, family-owned enterprises, of which 95% employ less than 50 people and 80% of those less than 10 employees. Given their small size, MMA companies are found everywhere in the EU, most often close to their customer base (Orgalime 2010).

Like the ME industry, MMA is important as an enabling industry. It has an essential role in the supply chain between raw materials suppliers and end-product industries, such as the automotive, aerospace, engineering and transport industries. Being a sub-supplier to other sectors, and given the very small size of companies, the MMA industry is often branded as an 'invisible' sector. It plays, however, a key role in the good functioning and competitiveness of EU manufacturing as a whole (Orgalime 2010).

Competitiveness

The nature of the MMA industry - in that it is labour intensive and primarily composed of SMEs - makes that it encounters problems in terms of competitiveness. Labour productitivity in MMA is below overall manufacturing productivity in the EU (at EUR 42,000 in 2006, it was only 83% of that of manufacturing as a whole). Due to their small size, companies struggle to invest in R&D, and product and process design. Investment per worker is therefore 27% below that of manufacturing as a whole (Ecorys 2009).

The small size of active companies allows them to be flexible to demands of their clients, focus on niche markets and develop close relations with end users. Geographic proximity is important for supply chain partners. These factors hinder the ability of the sector to consolidate. Only less than 1% of all companies can be classified as large. They are, however, responsible for around 25% of industry turnover (Ecorys 2009; Orgalime 2010).

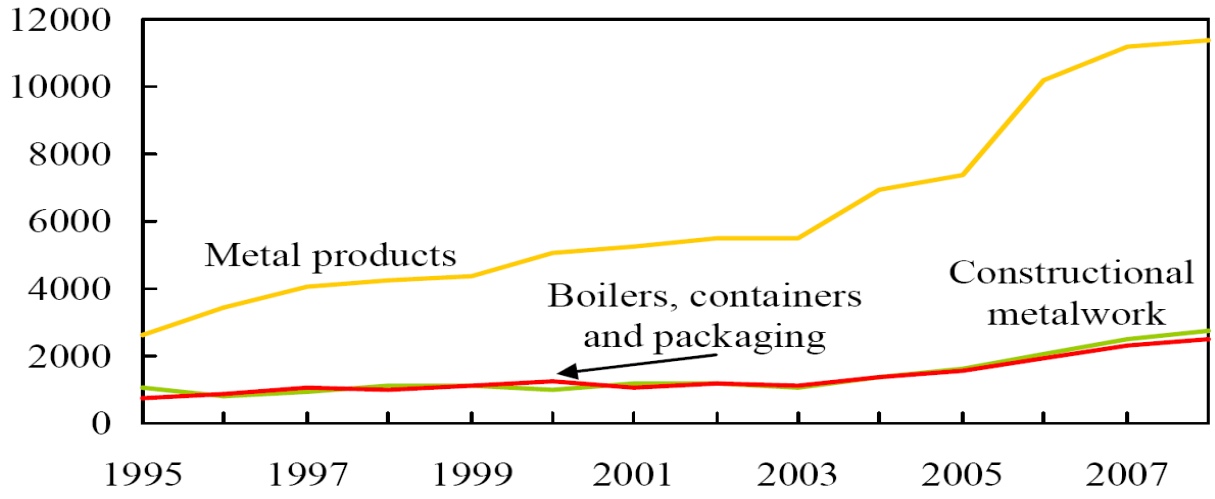
While labour productivity is lower than the manufacturing average, the MMA sector does appear to outperform other manufacturing sectors. The shares of MMA value added and operating surplus are larger than its share in total manufacturing output. The profitability of the sector was 27% higher than that of average manufacturing in 2006 (Ecorys 2009).

Productivity shows large disparities within the EU, but all countries are struggling to compete with low cost production in emerging economies. Companies increasingly experience competitive pressures from Asian economies, such as China, Japan, Vietnam and India (Ecorys 2009).

Trade

Thanks to a significant increase in the value of metal products, the exports of MMA has grown considerably over the years.

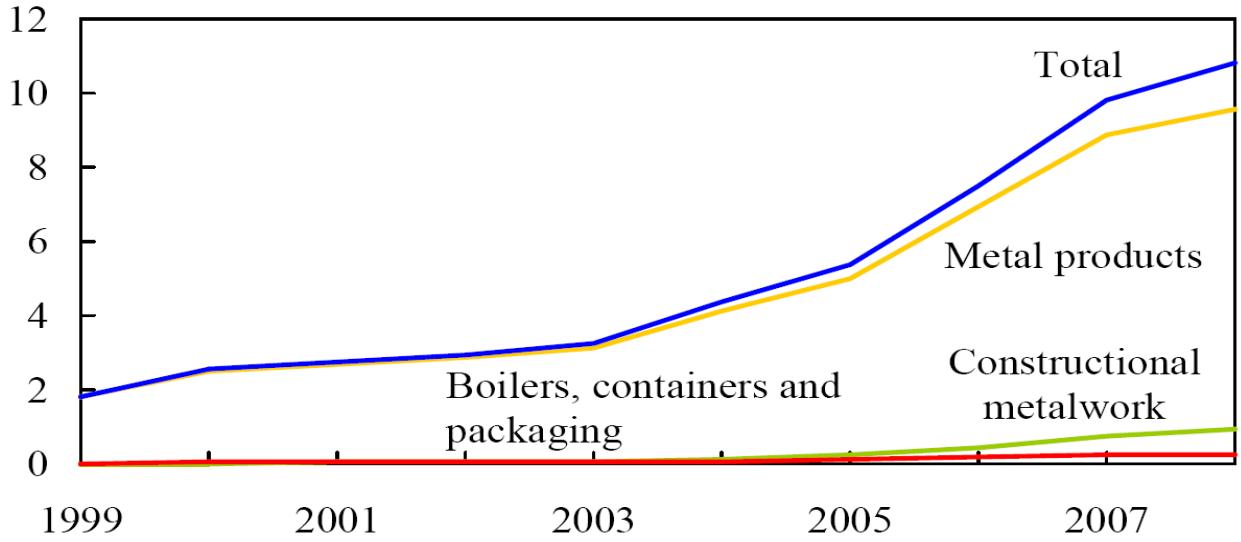
Figure 8 : EU MMA export values by sector (in million euros)



Source: Ecorys (2009) FWC Sector Competitiveness Studies - Competitiveness of the EU MMA Industries

Imports, however, have also grown significantly, from roughly EUR 4 billion in 1995, to over EUR 17 billion in 2008. The increase in imports can almost completely be traced to Chinese exports. Figure A6 shows that total MMA import values from China to the EU have increased more than fivefold between 1999 and 2008. China has become such a competitive threat because of lower production costs, its access to raw materials and its strong foothold in the world's production of steel (a major part in China itself).

Figure 9 : EU MMA import values from China by sector (in billion euros)



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NOTES

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