High-Level Expert Group on
Key Enabling Technologies

KETs
for a competitive Europe

Embargoed document until the European Council on industrial competitiveness of March 2014

Preface

Dear European Commission Vice-Presidents and Commissioners,

The forthcoming European Council on industrial competitiveness of March 2014 is a unique opportunity for Europe to accelerate the recovery of economic growth and jobs, propel Europe to global leadership and competitiveness, achieve the ambitious objectives of a European industry contribution up to 20% of EU GDP by 2020 and meet the European Union Energy and Climate package targets towards a low-carbon economy. Given the important contribution of Key Enabling Technologies towards achieving these European targets, it is my pleasure to present to you, on behalf of the High Level Commission Expert Group on Key Enabling Technologies, this contribution to your debate and reflection on the European industrial competitiveness.

Key Enabling Technologies have a significant impact on how Europeans will live and work, and on how European industries and economies will grow to provide sustainable employment for its citizens. KETs are indispensable technology building bricks underpinning a wide range of product applications in strategic European value chains, and increasing the competitiveness of European industries in sectors like automotive, aeronautics, engineering, space, chemicals, building and infrastructures, luxury goods and pharmaceuticals, where European industry is a world-leader.

After consideration of the High Level Group on KET recommendations in 2011, the European Commission elaborated in 2012 a European strategy on KETs development and deployment, identifying Key Enabling Technologies as a priority area of the EU industry policy.

However, European manufacturing and Key Enabling Technologies, still face a "tsunami" of competitive and industrial threats from both Asia and the US.

The Council of the EU has repeatedly acknowledged the systemic importance of KETs for the whole economy. In view of the on-going competitive urgency, the High Level Group on KETs now invites the European Council to:

- acknowledge that KETs-based technologies and products are instrumental to meet the EU Industry policy, and Climate and Energy package targets.
- provide political support to the European Commission in the rapid elaboration of a favourable European KETs innovation landscape along with a competitive European KETs-based manufacturing industrial policy.

The European Council is invited to declare KETs as a key priority of the European Union, by launching a political process in connection with relevant stakeholders, to pave the way for a massive integrated action in the EU, to put in place the necessary favourable landscape, and dramatically step up investment to develop and deploy KETs for the reindustrialisation of Europe.

The High Level Group on KETs takes this opportunity to reiterate its commitment to continue to engage with European Union institutions in ensuring a competitive and innovative Europe with global industrial leadership.

Yours sincerely,

Jean Therme
President of the High Level Group on Key Enabling Technologies

Table of contents

Chapter 1:

Europe must invest in KETs based manufacturing to build and sustain economic growth p.7

Chapter 2:

European bottlenecks that must be addressed to ensure a competitive and independent industrial key enabling technologies capability in Europe p.10

Chapter 3:

The way forward: joining forces between political leaders and private stakeholders for the reindustrialisation of Europe? p.15

Appendix 1

Cornerstones of the European KETs based manufacturing policy p.17

Appendix 2

Membership of HLG KET and Sherpa Group p.19

Chapter 1:

Europe must invest in KETs based manufacturing to build and sustain economic growth

The European Council, together with other European Union (EU) institutions, have put in place ambitious policies to maintain the competitiveness of the EU in a globalised world and ensure high-quality jobs for its citizens. However, Europe remains mired in a protracted economic crisis with several of its Member States in recession. In 2013, unemployment in the EU-28 climbed to a record level of 12.2% corresponding to over 26.5 million unemployed persons[1]. In a very short time frame, between the first quarter of 2008 and the end of 2012, over 3.8 million jobs representing 11% of total European employment have been lost in manufacturing in the EU (more than in the US and Japan cumulated)[1]. Whilst industrial production in competitor regions has recovered back to pre-crisis levels, European competitiveness in the manufacturing sector has been significantly weakened[2]. There is no longer any European nation in the top three countries ranked by share of global manufacturing[3], headed by the US and Asian economies (China and Japan), as shown in Figure 1.

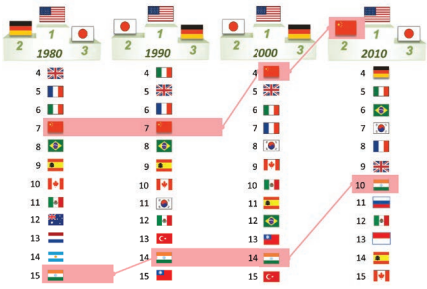

Figure 1. Top 15 Manufacturers by share of global manufacturing nominal gross value added

Successful investment in key technologies and their rapid deployment is a prerequisite for the long-term competitiveness, productivity, and sustainability of job creation of any nation's industry. Key technologies are required to address national needs and solve societal challenges such as energy independence and efficiency, food, transport, health care, security and defense. This has already been recognised by the US, as reflected in the new manufacturing policy's agendas of several US States[4], which have identified cross-cutting technology areas (robotics, nanotechnologies, advanced materials,…) for attention as "*they are pivotal in enabling manufacturing competitiveness*".

Manufacturing makes a disproportionately large contribution to job creation, innovation and exports. In term of job creation, manufacturing has important spillover effects on employment in other sectors. Manufacturing generates 70% of exports in major economies. In term of innovation, manufacturing contributes on average 77% of the private sector R&D spend (in certain sectors up to 90% of business R&D spending). It is now accepted that if you lose manufacturing, you lose R&D[3].

Moreover, it has been recently shown that as the complexity of the production process (advanced manufacturing) increases, the industries' need for innovation pushes companies towards co-locating R&D and production[3]. Therefore, as manufacturing moves to competitor nations, European R&D capability will inexorably follow.

Europe has world-class research capability. However it is not as successful in bridging the gap

1- Eurostat, news release, 31 May 2013.
2- Industrial Performance Scoreboard. A Europe 2020 Initiative. European Commission staff working document, 2013 edition.
3- Based on "Manufacturing the future: the next era of global growth of innovation". McKinsey Report November 2012.
4- «Making» our future - What States Are Doing to Encourage Growth Manufacturing through Innovation, Entrepreneurship, and Investment, National Governors Association Policy Academy Report, January 2013.

between its research and product commercialization through manufactured products and processes[5]. This has resulted in a European "valley of death" on the road to economic success. This analysis is particularly relevant in the area of Key Enabling Technologies (KETs), identified by the EU as "*a key source of innovation as they provide indispensable technology bricks that enable a wide range of product applications, including those required for developing low carbon energy technologies, improving energy and resource efficiency, boosting the fight against climate change or allowing for healthy ageing*"[7]. (See box 1)

Box 1: Key Enabling Technologies

The European Commission selected in its 2009 Communication[5] six KETs for Europe. The first High Level Commission Expert Group on Key Enabling Technologies (HLG KET) was launched on the 13th of July 2010, tasked with the elaboration of a coherent European strategy to develop and deploy six KETs in Europe and bring them most effectively to the market. These KETs are photonics, industrial biotechnology, nanotechnology, advanced materials, micro-/nanoelectronics and advanced manufacturing systems. The Commission based this selection following the screening of the common high-tech areas and strategies at Member State level. The selection criteria included their economic potential, their value adding and enabling role as well as their technology and capital intensity regarding R&D and initial investment costs.

«KETs are knowledge and capital-intensive technologies associated with high research and development (R&D) intensity, rapid and integrated innovation cycles, high capital expenditure and highly-skilled employment Their influence is pervasive, enabling process, product and service innovation throughout the economy. They are of systemic relevance, multidisciplinary and trans-sectorial, cutting across many technology areas with a trend towards convergence, technology integration and the potential to induce structural change"[6].

In particular KETs have two specific characteristics that separate them from other "enabling technologies": they are embedded at the core of Europe's innovative products and they underpin strategic European value chains.

Over the past decade, Europe's strong R&D base has championed all six KETs, maintaining a leading position with 32 % of the global patent applications between 1991 and 2010. Europe remains firmly in competition with both the US and Asia for all KETs cumulated patents. A previous analysis comparing the top ten EPO/PCT patents ranking for R&D organisations based on the number of patents between 2000 and 2007 demonstrably showed that Europe has leadership in five of the six KET R&D rankings[8].

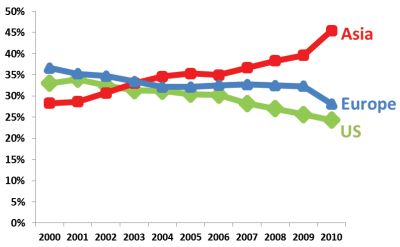

Figure 2. Share of EPO/PCT patents by region (all KETs cumulated) 2000-2010

5- European Commission Communication « Preparing for our future: Developing a common strategy for key enabling technologies in the EU». COM(2009) 512/3.
6- Source: Commission Staff Working Document (SEC(2009)1257): «Current situation of key enabling technologies in Europe». See also European Competitiveness Report, Brussels, 28.10.2010, SEC(2010) 1276 final, Commission Staff working document accompanying the communication. An integrated Industrial Policy for the Globalisation Era.
7- European Commission Communication "A European strategy for Key Enabling Technologies - A bridge to growth and jobs" COM (2012) 341
8- Source: Report 2010, European Competitiveness in Key Enabling Technologies (TNO/ZEW), TKM analysis, February 2013.

However, this "window of opportunity" has narrowed over the last years, as shown in Figure 2, where the relentless rise of Asian competencies in the KETs domain is highlighted. Given the vital importance of KETs for growth and competitiveness, competing regions such as the US, Asia, Russia and India, have all made heavy investments in key enabling technologies, that have led to a massive shift of technology development, patent exploitation, and related advanced manufacturing outside the EU[9].

In particular, the US has launched a "Reshoring initiative"[10] aimed at recovering manufacturing leadership by bringing back key manufacturing industry and jobs to the US (See box 2). President Obama emphasized this political action, in his State of the Union Speech of February 2013 stating that "*After shedding jobs for more than 10 years, our manufacturers have added about 500,000 jobs over the past three. Caterpillar is bringing jobs back from Japan. Ford is bringing jobs back from Mexico. After locating plants in other countries like China, Intel is opening its most advanced plant right here at home. And this year, Apple will start making Macs in America again*". He also acknowledged the importance of manufacturing to the nation's economy highlighting that "*our first priority is making America a magnet for new jobs and manufacturing.*"

Box 2:

«More than half of U.S.-based manufacturing executives at companies with sales greater than $1 billion are planning to bring back production to the U.S. from China.» The Boston Consulting Group. Press Release. September 2013.

In summary, European manufacturing and KETs-related industries face a perfect storm: a resurgent US focused on both creating manufacturing jobs in the US and reshoring jobs back to the US; an Asian bloc leap-frogging up the global manufacturers ranking; and finally, reflecting years of under-investment in technological research at European Commission, Member State and regional levels; a deteriorating KETs IP scenario[11] as shown by the increasing exploitation of public funded EU research into growth and jobs outside Europe.

It is therefore essential to retain research, technological and manufacturing expertise in Europe and engage the rapid implementation of a fully-fledged and coordinated KETs based industrial manufacturing policy at EU level.

9- Manufacturing Europe's future. Bruegel blueprint series. 2013
10- http://www.reshorenow.org/
11- "Innovation Union Scoreboard 2013" European Commission report shows an average growth of license and patents revenues from abroad rising up to 6% in 2012 while it was only 0.3% in 2010.

Chapter 2:

European bottlenecks that must be addressed to ensure a competitive and independent industrial key enabling technologies capability in Europe

The first High Level Commission Expert Group on Key Enabling Technologies (HLG KET) was launched on the 13th of July 2010, tasked with the elaboration of a coherent European strategy to develop and deploy KETs in Europe. This first HLG KET identified the weak link in KETs-related European innovation chains, namely that of translating its science and knowledge into products on global markets. It called this gap the KETs "valley of death". In its report on the 28th of June 2011[12], the HLG KET proposed a three-pillar bridge concept to pass across the valley of death, focusing on developing technological research, stimulating industrial pilot lines across Europe, and putting in place a globally competitive manufacturing landscape.

KETs policy landscape in the EU

The recommendations of the High Level Group on KETs were considered in the European Commission (EC) communication «*A European strategy for KETs - A bridge to growth and jobs*» of June 2012[13]. The strategy marked a first step away from specific action towards a coordinated European Commission's approach across different policy fields with the aim to cross the "valley of death" and boost the manufacturing of KETs-based products and processes in Europe. The strategy aims to restore growth in Europe, create jobs in industry, keep pace with the EU's main competitor blocs, and at the same time, address Europe's major societal challenges.

The importance of KETs in delivering sustainable growth, creating high-value jobs and solving societal challenges was also underlined and reinforced in the EC Industrial Policy communication[14]. Three of the six priority areas identified in the communication relate to Key Enabling Technologies[14].

The implementation of the European strategy for KETs, supported by a second HLG KET Status Implementation Report published on the 16th of July 2013[15], is now ongoing, with progress made in adapting and aligning European instruments and policies in support of KETs. More precisely, KETs are now a priority under the new research and innovation program Horizon 2020, with a dedicated budget of 5.9 billion euro[16]. Horizon 2020 priorities for KETs have been rebalanced towards closer-to-market research and innovation projects as pilot lines and demonstrators. The selection criteria and the implementation modalities have been adapted to facilitate industrial participation in Horizon 2020. In addition, KETs are a priority[17] for the European Structural and Investment Funds. Moreover, combining Horizon 2020 and ESIF funding sources has been made possible to allow combined public support for more ambitious industrial projects. KETs have also been identified as a priority by the European Investment Bank (EIB), as reflected in

12- HLG KET Report. Published by the European Commission. June 2011.
13- COM(2012) 341, A European Strategy for Key Enabling Technologies – A bridge to growth and jobs
14- COM(2012) 582, A Stronger European Industry for Growth and Economic Recovery. The three priorities are Key Enabling Technologies, Advanced Manufacturing technologies for clean production and Bio-based products
15- Status Implementation Report. European Commission. July 2013.
16- The KET budget has remained stagnant compared to the Seventh Framework programme KETs allocation.
17- Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006, Article 5 (1) (b)

the signature of a Memorandum of Understanding on KETs with the European Commission in February 2013.

The modernization of State Aid rules to support the implementation of the Europe 2020 strategy for growth has started. This modernization exercise is essential since the international competitive industrial landscape has changed beyond recognition over the past decades. The instruments of the Union in the areas of competition and industry need urgently to be adapted to be fit for purpose in this new global playing field. Finally, manufacturing skills will be addressed within a future action of the European Institute for Innovation and Technology starting in 2016.

Significant progress has been noted regarding the implementation of the HLG KET recommendations. However, additional initiatives are now required in order to create in Europe the successful conditions for KETs development and deployment with the needed impact and speed for Europe to remain in the global competition.

EU bottlenecks for a competitive European KETs based manufacturing framework

To achieve the full economic potential of Europe in a global industrial landscape, the following bottlenecks, with regard to KETs development, manufacturing, investment and economic and strategic independence remain to be addressed.

An international level playing field ?

KETs are capital intensive, with rapid innovation cycles, and face intensive global competition. The process needed to successfully bridge the "valley of death" is complex and risky. Competitor regions, notably the US and Asia, recognize the strong contribution of KETs to competitiveness and have launched focused policies and strategies based on public incentives which significantly impact the global level playing field. The European Commission recently reported that Europe's competitive position in the area of KETs is undermined by international market distortion[18]. However, trade retaliation in a KETs related sector has been initiated in just one case with limited impact[19]. It is therefore essential that Europe adapts its strategy, notably via State Aid and other relevant rules, as well as trade defense instruments, to level the playing field for European industry. In particular, whilst the current mandate of European competition policy is to ensure competition within the internal market, the external dimension of European competitiveness must now be considered.

Fragmented European policies on KETs

Owing to their strategic importance for the competitiveness of the European industry and economy, KETs have been identified as a technological priority in a broad range of European policies and programmes. However, individual EU policy initiatives are not mutually supporting and aligned in a common strategic approach. One example of this is the future launch of an European initiative on manufacturing skills within the European Institute of Innovation and Technology (EIT) in only 2016[20], whereas the industrial need and urgency would suggest immediate action today as highlighted in the report of the HLG KET of July 2013[15].

18- European Commission (DG Enterprise and Industry) study on the International Market Distortion in the Area of KETs : A case analysis.

19- Commission regulation (EU) No 513 / 2013 of the 4th June 2013 « Imposing a provision on anti-dumping duty on import fo crystalline silicon photovoltaics modules and key components originating in or consigned by the People's Republic of China and amending regulation (EU no182 / 2013) making these imports originating and / or cosigned from the People's Republic of China subject to registration".

20- Council of the European Union. Agreement on «HORIZON 2020»: the EU's research and innovation programme for the years 2014 to 2020. Brussels, 17 July 2013. 11985/13.

The coordination of policies at EU and national levels ?

The European research and innovation landscape is fragmented across EU and national policies. More consistency would help the EU to capture and deploy its research and innovation potential in all industrial sectors where critical mass is needed. Better coordination and complementarity would reduce duplication and focus resources collectively to research and innovation in Europe. At a time of severe constraints on public finances, KETs policy coordination between European, national and regional efforts is essential. In this regard, the whole potential of smart specialisation has to be captured by regions and, exploited to create synergies across regions to unleash the KETs potential in Europe.

Unbalanced European public investment in research and innovation?

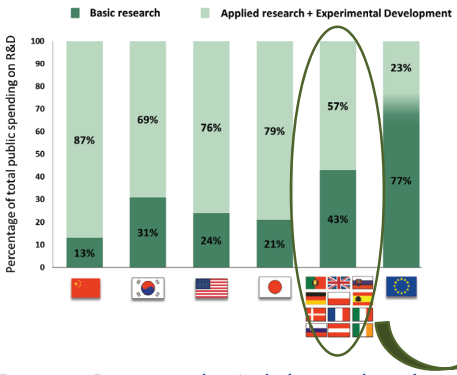

Figure 3. Basic research, Applied research and experimental development public R&D spending for China, South Korea, the US, Japan, European Member States panel and EC (FP7)

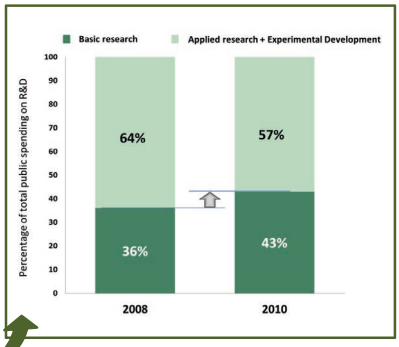

Figure 4. Evolution of Member State R&D&I public funding between 2008 and 2010

The EU, the US and Asia continue to be the strongest regions for R&D&I spending with a combined total of nearly 92% of all global investment[21]. However, Europe's competitor regions focus on translating basic research into advanced products, goods and services through significant investment on applied research and experimental development[22], as shown in figure 3. Recent OECD data has confirmed these trends: "*China's emphasis on applied and product-development research means that funding for basic science remains low: only 5% of the country's total R&D is devoted to this, compared with 15–20% in other major OECD nations.*"[23]

However, to date, the European Commission and Member States have maintained a singular position, with more than two thirds of EC and up to 43% of Member States funding on R&D&I activities focused on basic research. This has resulted in industrial participation in EU programmes declining continuously for fifteen years[24], from 39% in Framework Programme 4 (1994-1998) to 31% in Framework Programme 6 (2002-2006) and was less than 25% at the mid-term of the Seventh Framework Programme (2007-2013). This unbalanced European support is also significantly reflected in that of European Member States as shown in figure 4. This lack of focus on applied technological R&D&I financing contributes to reducing the attractiveness of Europe for private investment.

21- Science, Engineering, Indicators Digest. National Science Board. NSF. January 2012.
22- According to the OECD Frascati agreed taxonomy for classifying public investment in research and innovation. Frascati Manual. OECD. 2002.
23- R. Van Noorden, "China tops Europe in R&D intensity". Nature, vol 505, p144.
24- Interim Evaluation of the Seven Framework Programme Interim. Report of the Expert Group. European Commission

A systematic rebalancing of the public investment of European Commission and Member States resources towards applied research and product development is therefore necessary to meet future competitiveness challenges.

A systematic market pull from European and national policies ?

There is a unique opportunity to address the current absence of a systematic market pull from EU policies. EU authorities are currently implementing a series of policies in societal challenge areas such as the low carbon economy, smart cities, green transport, health and security, etc. These policies are primarily based on a sectorial approach and therefore do not unleash the true potential of the EU manufacturing base and its KETs strengths. Political leadership to support the integration and manufacturing of KETs into these policies would lead to faster market uptake of European technologies by combining technology push and market pull.

In parallel, public procurement accounts for up to 19% of GDP in the EU, representing in 2013 a total potential market of 2.5 trillion euros, and offers huge potential markets for innovative products and services[25]. This has been most recently recognized in a communication of the European Parliament[26]. Pre-commercial procurement and procurement of innovative technologies are more widely used in competitor regions as a strategic tool to stimulate demand and markets for innovation; in the US (20 times higher than in Europe[27]) and South Korea (16 times higher than in Europe[27]). In turn, this explains a large part of the respective R&D investment gap with respect to Europe. In this regard, the European Round Table of Industrialists (ERT) has recommended to EU Member States and regions to earmark 2% of public procurement for pre-commercial technologies and innovative solutions[27]. This requires a crucial mind shift for public procurers and hence support by flanking measures (e.g. government sponsored procurement insurance scheme, awareness raising, guidance and training for public procurers). This 2% target would, alone, help bridge approximately half of the R&D investment gap between the US and Europe.

Targeted public procurement could accelerate market uptake of European KETs enabled innovative products and services across the Union. The EU and its Member States must capture this opportunity.

An integrated policy at EU level to respond to the skills shortage and mismatch in the KET industry ?

The rapidly growing markets in KETs-related sectors require an increasing number of competences at all levels and in different disciplines. The 2013 Global Manufacturing Competitiveness Index[28], a study based on the input of 400 CEOs and senior manufacturing executives worldwide, identified that talent-driven innovation and therefore access to talented workers, are the major drivers of a nation's competitiveness in attracting manufacturing, above the cost of labor and materials. In this respect, the HLG KET report[15] has repeatedly noted that Europe is facing a damaging shortage of skilled labor, qualified to master the multi-disciplinary nature of KETs. Despite this, a European Commission EIT response on manufacturing skills is only scheduled for 2016. Europe must now urgently address both the existing shortage of skilled KET labor and the mismatch between supply and demand of skills in critical KET-related industries. In addition, it must identify the interdisciplinary competences required for future industrial needs. The various European instruments dedicated to education and skills, including the European Institute for Innovation and Technology, European Social Funds, the European

25- International Monetary Fund, World Economic Outlook Database, April 2013 edition.
26- Directive of the European Parliament and of the Council on public procurement (COM(2011)0896 – C7-0006/2012 – 2011/0438(COD))EP communication. 15 January 2014.
27- ERT Priorities for an EU Innovation Policy, 7 March 2013.
28- The 2013 Global Manufacturing Competitiveness Index. Deloitte.

Research Council, must rapidly coordinate their activities to address current gaps.

Speed of policy decisions in bringing innovation to the market ?

Societies have different behaviors in accepting new innovative technologies and products. Europeans tend to take a more cautious approach with regards to the balance between risks and benefits. However, the European debates on innovation opportunities and safety issues can sometimes take place in separate fora. The resulting uncertainties and delayed decisions are often a barrier to bring innovation to the market within the speed needed in a global competition.

Chapter 3:

The way forward: joining forces between political leaders and private stakeholders for the reindustrialisation of Europe?

Strategic importance of Key Enabling Technologies for Europe

The European Council has repeatedly acknowledged the systemic importance of KETs for the whole economy[29]. KETs are now recognised as vital for the future economic prosperity growth and strategic independence[30] of Europe.

The EU has also identified KETs as a priority area and as an essential pillar in achieving the ambitious objectives of an European industry contribution up to 20% of EU GDP by 2020[31]. Beyond the driving role of KETs for EU industrial competitiveness, it is also recognized that KETs can significantly contribute to EU Energy and Climate package objectives, and in particular, to the «20-20-20» target towards a low-carbon economy.

Towards a European KETs-based manufacturing industrial policy

In a context of accelerating global competition, we are now at a stage where further progress and significant actions are required to overcome the barriers and bottlenecks highlighted in the previous chapter. In response, the full commitment and involvement of both political leaders and private stakeholders is urgently needed.

The High Level Group on KETs therefore invites the European Council to **provide a political impetus to the implementation of a favorable European KETs innovation landscape along with a competitive European KETs-based manufacturing industrial policy**, built on the following cornerstones[32]:

- Prioritise a KETs innovation and manufacturing policy and related public investment in the Union
- Modernise European Commission State Aid policy and promote and accelerate the execution of "Important Projects of Common European Interest" in strategic KETs related industrial sectors
- Create market pull for KETs by systematic integration of the KETs based manufacturing policy in all EU policies
- Increase investor and public confidence in new technologies
- Increase the talent pool and skills supply in KETs-related sectors

29- Conclusions of the European Council, 28 and 29 June 2012, part 3, "The contribution of European policies to growth and employment", point e).
Conclusions on Key Enabling Technologies and the European Innovation Partnership on Raw Materials (11 October 2012).
30- Conclusions of the European Council of December 2013 on the Common Security and Defence Policy European Council Conclusions, point 1. C) Strengthening Europe's defence industry, 18. Research, dual use.
31- International Monetary Fund, World Economic Outlook Database, April 2013 edition.
32 - Further details are provided in the appendix 1.

European Council to provide a political impetus to achieve competitive KETs-based manufacturing in Europe.

Given the vital importance of KETs and their manufacturing for the whole of the EU economy, the European Council is invited to take leadership in launching a political process supporting the European Commission in the strengthening of a European KETs innovation framework and in the implementation of industrial policy on KETs-based manufacturing. This political process would send a clear signal demonstrating that Europe is, and will, remain an attractive location for innovation and manufacturing.

The High Level Group on KETs therefore respectfully invites the European Council to call for the rapid implementation of a KETs-based manufacturing industrial policy. Such political action should build on the potential of KETs and consolidate the significant efforts made to date by the European Union and its Member States for the future economic competitiveness and strategic independence of Europe.

Industrial support for an integrated KETs-based manufacturing policy in Europe

European industry is ready to further engage to shape a KETs-based manufacturing policy in Europe. It will participate as a partner in Horizon 2020 collaborative research and innovation activities and will ensure that successful pilot lines and demonstrators are followed by commercial investment in Europe into new products and processes, to trigger job creation. Industry's investment in Europe will provide an important complementary leverage to that of the public sector and have a significant impact on growth, competitiveness and jobs.

Appendix 1:

Cornerstones of the European KETs based manufacturing policy

The cornerstones of the European KETs based manufacturing policy would be the following:

• Prioritise a KETs innovation and manufacturing policy and related public investment in the Union.

As KETs are highly important assets contributing to the EU growth and jobs agenda and industrial competitiveness, the European Council is invited to acknowledge and declare KETs a major priority of the Union. A resulting KETs-based manufacturing policy should pursue the following objectives:

- promote the development and deployment of KETs;
- foster the manufacturing of KETs-based product in Europe across key value chains;
- ensure security and availability of critical KETs supply in the Union and;
- promote a global level playing field for European KETs-based manufacturing.

In addition, the European Council is invited to encourage the European Commission and Member States to rebalance their resources and objectives to overcome the KETs "valley of death" including investment in closer-to-market activities. This would help Europe to translate its leading knowledge base into competitive products manufactured in Europe, and secure EU-wide growth, employment and sustainable living standards.

• Modernise European Commission State Aid policy for R&D&I activities and promote the execution of "Important Projects of Common European Interest" in strategic KETs-related industrial sectors

The European Council is asked to invite the European Commission to modernize its State Aid policy to cope with the global competitive landscape. In addition, in line with the priority areas defined by the EC communication on Industry Policy, the European industry and Member States should exploit existing instruments and use Article 107.3(b) TFEU to promote and accelerate the execution of "Important Projects of Common European Interest" in strategic KETs-related industrial sectors.

• Create market pull for KETs by systematic integration of the KETs based manufacturing policy in all EU policies

The European Council is invited to:

- recognize and promote pre-commercial procurement and procurement of European innovative technologies as a strategic tool to stimulate demand and markets for innovation in the Union.

- ask the European Commission to create market pull for KETs by systematically integrating the manufacturing policy with other EU policies.

• Increase investor and public confidence in new technologies

The European Council is asked to invite the European Commission to foster an integrated approach on the benefits and risks of new technologies in order to bring innovation to the market within the speed needed in a global competition.

• Increase investor and public confidence in new technologies

The European Council is asked to invite the European Commission to address the current KET skills deficit in a comprehensive and integrated manner across all technical levels and in the different KETs domains. A Europe wide education and training plan should be put in place. The European Commission has been requested to support individual excellence in KETs related technological research by increasing up to 15% the share of ERC budget dedicated on this thematic. The European Social Fund should be mobilized to improve KETs employment and job opportunities in European regions, in particular amongst Europe's young talent pool. Finally, the European Commission should ensure a pool of skilled technologists on strategic multi-KETs fields through its Future and Emerging Technologies Programme (FET).

Appendix 2:

Membership of the HLG KET

President

Mr Jean THERME (CEA Tech CEO, Executive VP of Renewable Energies, CEA, Member of the Academy of Technologies)

Members

Prof Luigi AMBROSIO (President, European Society for Biomaterials)

Mr Markus ASCH (Vice-Chairman, Alfred Kärcher GmbH & Co. KG, President EUnited, Representative Sustainable Process Industry PPP)

Dr André-Jacques AUBERTON-HERVE (Chairman & CEO, Soitec, Vice-Chairman SEMI)

Ms Catia BASTIOLI (CEO, Novamont)

Mr David BALDOCK (Executive Director, Institute for European Environmental Policy, IEEP)

Dr Jean J. BOTTI (CTO & Member of the Executive Committee, EADS)

Mr Carlo BOZOTTI (President & CEO, STMicroelectronics, Chairman, European Round Table of Industrialists, ERT)

Ms Kristina DELY (Head of Office, Covenant of Mayors)

Dr Javier EGUREN (Representative of CECIMO, European Association of the Machine Tool Industries)

Prof Fabio FAVA (Professor of Industrial & Environmental Biotechnology, University of Bologna, Chair, European Federation of Biotechnology)

Mr Philippe de FONTAINE VIVE (Vice-President, European Investment Bank)

Mr Emmanuel FOREST (Executive Vice-President, European and Institutional Affairs, Bouygues, Representative Energy Efficient Building PPP)

Mr Klaus HELMRICH (CTO & Member of the Managing Board, Siemens AG)

Dr Dirk HOHEISEL (Member of the Management Board, Robert Bosch GmbH)

Mr Ejner Bech JENSEN (Vice President Research & Development, Novozymes)

Prof Erkki LEPPÄVUORI (President & CEO, VTT)

Dr Ing Massimo MATTUCCI (Representative of EFFRA, Factories of the Future PPP)

Mr Jan MENGELERS (President, TNO)

Mr Marco MENSINK (Deputy Director General, Confederation of European Paper Industries, Representative Bio-based industries PPP)

Dr Michael MERTIN (President & CEO, Jenoptik AG)

Dr Drew NELSON (President & CEO, IQE, President, European Photonics Industry Consortium)

Prof Reimund NEUGEBAUER (President, Fraunhofer-Gesellschaft)

Prof Wolfgang PLISCHKE (Member of Management Board, Bayer AG, Vice-President of European Chemical Industry Association, CEFIC)

Dr Reinhard PLOSS (CEO, Infineon Technologies AG, Representative ENIAC JTI)

Ms Ulrike RABMER-KOLLER (Policy Vice-President, Chair Sustainable Development Committee, UEAPME)

Mr Stefano RIMONDI (President Assobiomedica)

Ms Bernadette SEGOL (General Secretary, European Trade Union Confederation)

Mr Eamonn SINNOTT (General Manager, Intel Ireland)

Ms Pascale SOURISSE (Board Chairman, Telecom-Paristech, Senior Executive Vice-President International Development, THALES)

Dr Giuseppe TARTAGLIONE (Chairman Corporate Relations Italy, Volkswagen Group)

Prof Tadeusz UHL (President, EC Grupa)

Prof Luc VAN DEN HOVE (President and CEO, IMEC)

Dr Marc VAN SANDE (Executive Vice-President, UMICORE)

Membership of the Sherpa Group

Chairman

Prof Gabriel CREAN (Vice-President for Technology, Director Europe, CEA Tech, CEA, Member of the European Academy of Science and Arts)

Members

Mr Frederic BOYER (Officer Energy Cities, Covenant of Mayors)

Dr Patrick BRESSLER (Director, Fraunhofer Gesellschaft Brussels)

Ms Camille BUREL (Manager for Innovation Affairs, Roquette)

Mr Brendan CANNON (Corporate Affairs Director, Intel Ireland)

Mr Paul CARTUYVELS (Director European Affairs, Bouygues)

Prof Roger DE KEERSMAECKER (Senior Vice-President Strategic Relations, IMEC)

Mr Laurent Zibell (Policy Advisor, European Trade Union Confederation)

Ms Joanna DUPONT (Director for Industrial Biotechnology, EuropaBio)

Mr Patrick DUVAUT (Director of Research, Telecom-Paristech)

Dr Andrew FARMER (Director of Research and Head of Industry, Waste and Water Programme, IEEP)

Mr Filip GEERTS (Director General, CECIMO)

Dr Alfred HOFFMANN (Vice-President, Public Authorities & Associations, Infineon Technologies AG)

Prof Nicolas KALOGERAKIS (Vice-President of Governing Council of Technical University of Crete, Dept. of Environmental Engineering)

Dr Nelly KERNEVEZ (Director of Strategic Partnership, Soitec)

Dr Gernot KLOTZ (Executive Director of Research & Innovation, CEFIC)

Prof Krzysztof Jan KURZYDLOWSKI (Director, National Centre for Research and Development)

Mr Rudolf LICHTMANNEGGER (Deputy Head Economic Policy Department, Advisor Research & Innovation Policies, Austrian Federal Economic Chamber)

Mr Carlos LEE (Director General, EPIC – European Photonics Industry Consortium)

Ms Cecilia MAINI (Life Sciences Platform Coordinator, Aster)

Dr Paul MIJLEMANS (Director External Science and Technology, UMICORE)

Mr Gunnar MUENT (Head of Division Projects Directorate, European Investment Bank)

Mr Željko PAZIN (Executive Director, EFFRA)

Mr Jean PERROT (Vice-President, Head of R&T Institutional Affairs, EADS)

Mr Lionel PLATTEUW (Executive Director of EUnited - European Engineering Industries Association)

Dr Leena SARVARANTA (Vice-President, EU Affairs, VTT)

Prof Egbert-Jan SOL (Director of Innovation High-Tech Systems, TNO)

Prof Wolfgang STEIGER (Director of Future Technologies, Volkswagen Group; Chairman of the European Green Vehicle Initiative Association)

Ms Giulia GREGORI (Director of Strategic Planning and Corporate Communication, Novamont)

Mr Thierry TINGAUD (Corporate Vice-President, CEO ST France, STMicroelectronics)

Ms Luisa TONDELLI (Department of Chemical Science and Materials Technology, CNR)

Dr Peter VAN STAA (Vice-President, Robert Bosch GmbH)

Dr Walter WEIGEL (Siemens Corporate Technology Vice President External Cooperations)

Mr Markus WILKENS (Laser and Optics Research, Photonics21 Secretariat)

HLG KET Secretariat:

CEA:

Ms Katia DIDAOUI (European Affairs Manager, CEA Tech, CEA)

Dr Aziz ZENASNI (European Affairs Manager, CEA Tech, CEA)

European Commission, DG Enterprise:

Mr. Michel CATINAT (Head of Unit Key Enabling Technologies and ICT, DG Enterprise)

Mr Michael BERZ (Policy Officer, DG Enterprise)

Ms Heidi MOENS (Policy Officer, DG Enterprise)