



# The Dow Chemical Company Advanced Manufacturing Plan for Europe

## WHAT IS IT?

With its Advanced Manufacturing Plan for Europe (AMPE), Dow wants to help drive competitiveness and restore growth and prosperity to Europe. The AMPE looks at the European Union (EU) policy context, particularly the objectives of the pivotal EU2020 framework, from the perspective of a major global chemicals manufacturer with a third of its sales and a quarter of its workforce in Europe. This individual perspective is complementary to that of the chemical industry as a whole and aims to help deliver smart, sustainable and inclusive growth for Europe.

Manufacturing is sometimes mistakenly seen as an undynamic sector, rapidly moving out of Europe, or as a poor relative to high-tech industries such as biotechnology or nanotechnology. In fact, enhancing and invigorating manufacturing is critical to the EU's competitive success in a globalized market because of its inter-linkage with a multitude of other sectors. No area of manufacturing is more vital than chemicals, which act as enablers and building blocks for a plethora of high-value products and whose applications drive a diverse range of industries from high-tech to automotive. The ability of the chemical sector to spur innovation and growth across the economy is recognized in the EU2020 Industrial Policy, which singles it out for a sector-specific approach.

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Dow strives in its daily operations to bring to bear advanced technologies, innovation and crucial value chain connections in order to perform effectively as part of Europe's Advanced Manufacturing base. The AMPE takes these elements and other key aspects and pulls them into a coherent policy approach. Through dialogue and discussion, we hope to encourage the EU to adopt some of the plan's concepts, consider some of the suggested actions and above all join the dots to form a holistic and actionable policy for Advanced Manufacturing in Europe.

The AMPE is a practical roadmap to help realize these objectives, providing recommendations across a range of inter-linked policies and legislation.

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## WHY ARE WE CREATING IT?

Dow fully supports collaborative action to realize the EU2020 vision. We advocate a progressive approach focusing on creating markets around the world for innovative, sustainable products and practices. In this way, rather than by restricting the marketplace with additional regulation, we will minimise the environmental footprint of economic activity and ultimately de-link economic development from environmental degradation.

Europe is facing a moment of transformation. Given that the economic crisis has reversed the growth of the past decade, clear vision and decisive action are now needed to safeguard Europe's position in the global economy. Against this backdrop, manufacturing is central to a revitalized and competitive Europe, and the chemicals industry can be harnessed to stimulate innovation and growth across the entire manufacturing sector.

Innovation and sustainability underpin Dow's business globally, and our stated mission combines these core elements through all we do. We believe that our vision and practical experience of combining these critical aspects in processes, applications and with our customers and other parts of the value chain can help to inform EU policy formation.

Through the EU2020 process, the EU has identified Europe's key challenges and begun articulating the necessary policy responses. With many vital details of EU2020 yet to be defined, the AMPE offers Dow's vision and experience to help plug these gaps and facilitate Europe's shift to a new model of growth. Now is also the time to ensure all the elements work in harmony together. Policy is often formed in different or competing domains without full integration or appreciation of the knock-on impacts across related sectors. The AMPE is built upon concrete understanding of these impacts and aims to offer practical suggestions to combine all elements into a sustainable policy framework.

Dow is committed to showing leadership on efforts to take the global economy out of the crisis. The Advanced Manufacturing Plan for Europe will sit alongside our AMPs for other regions, ensuring we contribute constructively to the policy debate wherever we operate. We will work with policymakers and legislators across the EU and its Member States as they take the decisions that will make the EU2020 vision a reality.

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## HOW WILL WE USE IT?

The AMPE will serve as a resource for policymakers across Europe, both at EU and national level. It aims to link up practical policy solutions and business strategies into a roadmap toward a prosperous and sustainable future.

We realise our contribution is only one of many, and we recognise that in dialogue with policymakers and with others who have important interests and contributions, the picture must evolve. Nor do issues stand still. The AMPE will therefore be a living document, regularly under review and updated to ensure that our knowledge and recommendations keep pace with a changing world.



## Advanced Manufacturing Plan

# Policies & Recommendations to Enhance European Manufacturing

### THE NEED FOR A STRONG EUROPEAN MANUFACTURING SECTOR

Within manufacturing, the chemical industry is unique. It provides the basic building blocks for virtually every other sector of society. Chemical products enable innovation across global value chains, as the EU2020 strategy recognises, and are therefore integral to the development of new products and markets worldwide.

Europe has a rich tradition of manufacturing. Since its beginnings in Europe in the 18th century during the Industrial Revolution, modern manufacturing has been a cornerstone of European society. Today, the European Commission estimates that manufacturing generates 25% of all private sector jobs in the EU, 80% of private sector R&D, and 75% of exports. In other words, Europe's strength and prosperity depend upon a vital, resilient manufacturing sector.

Europe's manufacturing sector needs a more holistic approach from policymakers if it is to continue to flourish. Strengthening of the European single market and better alignment of internal and external policies will be essential to enable Advanced Manufacturing within Europe. However, Europe has a complex political environment, and different policy actors will play different roles in this process. The EU institutions will have responsibility for setting the overall policy and legislative agenda, but the national governments of EU Member States continue to have authority in many crucial areas. Advanced Manufacturing must be underpinned by a policy framework that reflects this reality. Nevertheless, the EU's 2020 strategy should be the blueprint to drive overall European growth. This AMPE sets out a complementary roadmap to maximise the contribution of manufacturing to this process.

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## THE CHALLENGES FACING EUROPEAN MANUFACTURING

A combination of the following key areas poses critical challenges for manufacturing:

- Energy and resource scarcity
- Global competition
- Over-regulation
- Ageing population and changing consumption patterns
- Fragmentation in the value chain
- Interdependence of components in the value chain

The clear lesson from the crisis is that growth strategies cannot be built around inward-looking protectionist policies, but need measures to seek out new global markets for high-value European goods and services. Free and open global markets are a prerequisite to enable European manufacturers to shine on the global stage. Closure of the Doha Round, trade agreements with global partners and, where necessary, action to ensure a level playing field with overseas companies and governments are essential components of an Advanced Manufacturing policy.

As part of this effort, coordinated action is needed to ensure adequate supplies of energy and natural resources, the lifeblood of manufacturing. Resource efficiency, identified as a top priority for the EU, is an area where new products and processes enabled by advanced chemistry can give European manufacturers a competitive edge.

Action is also needed to transform the European Union into a genuine Innovation Union that fosters and promotes entrepreneurship and new ways of doing business. Increasing investment in research, joining up fragmented research systems and enhancing connectivity along value chains are all ways to enhance Europe's competitive position.

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## WHAT CONSTITUTES ADVANCED MANUFACTURING POLICY?

Manufacturing remains the engine of the European economy, but strong action is needed to tap its full potential.

This AMPE sets out a framework for sustainable manufacturing growth focusing on added-value products and processes and job creation in an energy- and resource-challenged environment. Dow believes the heart of this framework to be:

- Innovation
- Competitiveness
- Resource efficiency
- Energy and climate
- Water
- Trade

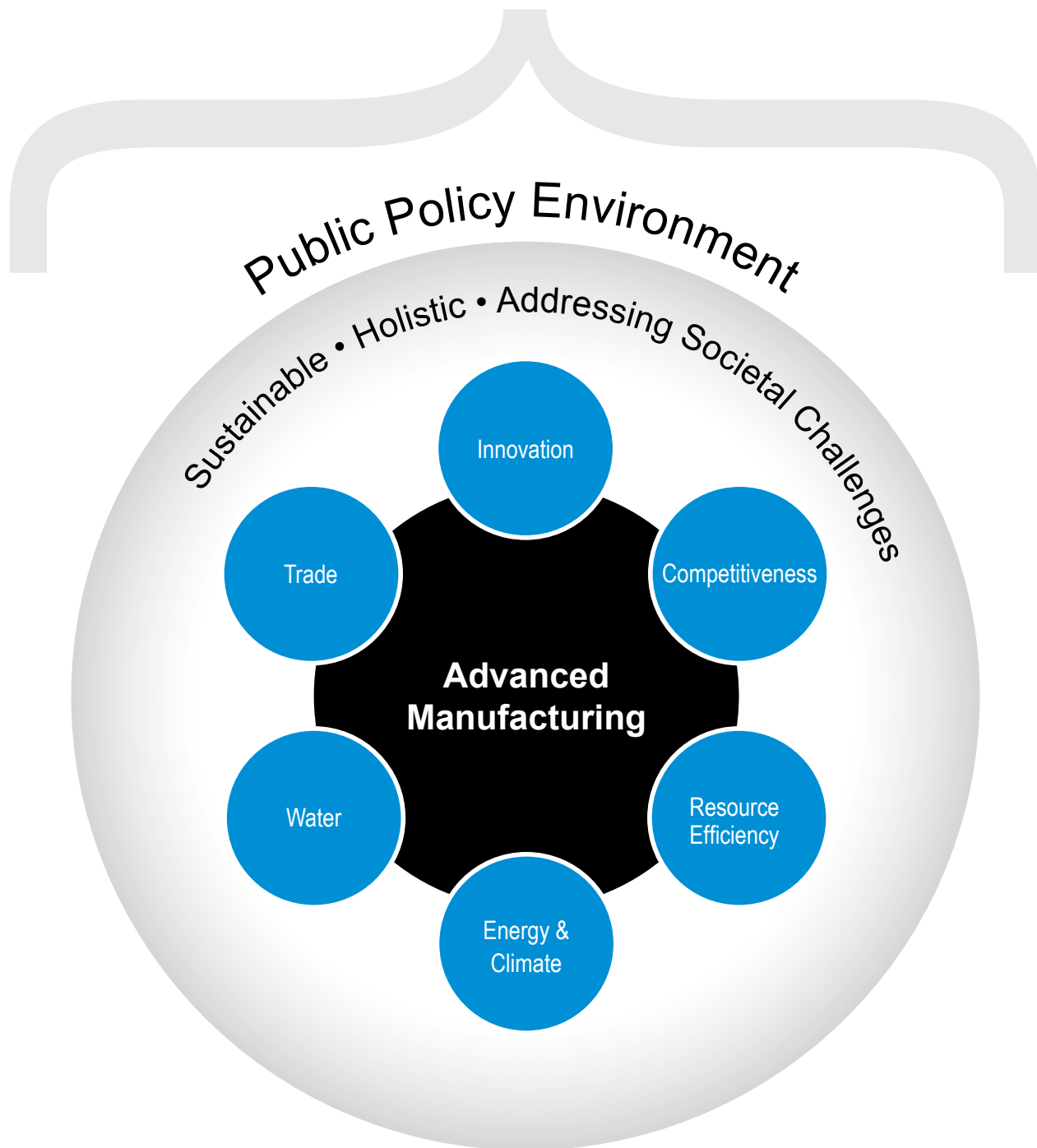
Many of these challenges are global in nature and will not be solved by any one region alone. However, by demonstrating leadership, the EU can help drive global adoption of truly Advanced Manufacturing Policies.



# Advanced Manufacturing: Addressing Europe's Priorities

## EU2020

A Strategy for Smart, Sustainable and Inclusive Growth





# Innovation

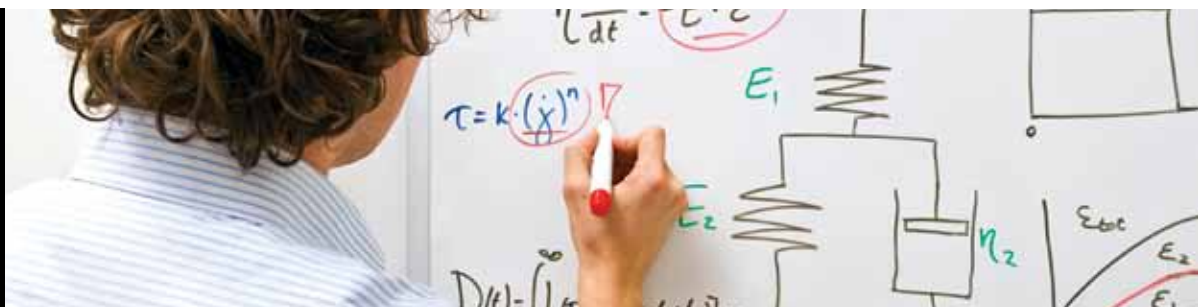
## CONTEXT

Innovative Production Clusters: Dow has long engaged in the “value park” concept as a means to highlight the positive role of the chemical industry for downstream users. A value park is a form of “Industrial Ecology” that shows major sustainability benefits such as enhanced eco-efficiency and reduced transport and CO<sub>2</sub> emissions. The concept includes the notion of industrial symbiosis, incorporating the thinking that waste from one process may be used as a raw material for another. Other benefits include an integrated approach through co-siting of all relevant elements in one location to make optimal use of their synergies.

Innovation and chemistry are inextricably linked. Together they form a catalyst for the new products, processes and innovative business models that will ultimately deliver sustainable growth to Europe. Considered to be the innovative industry a century ago, the chemical sector still has a significant potential and capacity to re-invent, providing materials and products for practically every part of the economy. In this way, it drives innovation across the entirety of European manufacturing.

Innovation applies not merely to products and applications but to processes and delivery across the entire value chain. Innovation opportunities are found at all stages of the lifecycle of a product, whether raw material extraction, production, distribution, uses or end of life. Dow’s business depends on its ability to innovate with and through the customers across these tracks, innovating to create new products and chemical applications to suit customers’ needs. Another large factor in success is finding not only improvements in products but genuine innovations in processes and engineering. Innovation based on refinement of an existing process or substance is an important part of the process, but must be matched by efforts to develop new paradigms to address the broader societal challenges.

In policy terms, it is critical that an enabling framework is put in place covering these tracks. Dow welcomes the fact that the EU has identified boosting innovation as one of the flagship initiatives to help achieve the EU2020 vision. Transforming the EU into an “Innovation Union” is an ambitious yet achievable objective that should foster the development of a long-term Advanced Manufacturing base in Europe.



# Research and Development (R&D)

## OVERVIEW

Dow Venture Capital (VC) invests in promising start-up companies in Europe, North America and Asia. It has invested over 350 million dollars (260 million Euros) in businesses based on Life Sciences & Biotechnology; Communications & Information Technology; and Physical Sciences. Dow VC supports a portfolio with capital, technology and a global network of potential development partners. It is active in sustaining these companies throughout their early critical years, from seed to later stage investment. Resources like these are usually vital to a young company's progress.

Europe has great R&D potential, particularly in sectors crucial for a strong manufacturing base, with its excellent universities and the highest number of scientific publications worldwide.

Research models have changed. Large corporate research laboratories running the entire R&D process for a single company are a thing of the past; the costs and risks of research are simply too great. Companies depend on cooperation with customers, academia, research institutes, value chain partners such as Small and Medium Enterprises (SMEs) and government to find new solutions. This is why effective R&D policy is so vital for business.

The EU2020 flagship initiative for an Innovation Union should help to overcome the fragmented R&D landscape. A primary purpose of doing so is nurturing and rewarding excellence and enhancing publicly funded research serving the public. The focus on societal challenges (energy security, transport, climate change and resource efficiency, health and ageing, environmentally friendly production methods and land management) represents an innovative approach to creating broad cooperation along the entire value chain, rather than the individual-sector model of the past, and mirrors Dow's own approach to R&D.

At a micro level, Europe has a number of innovation-focused instruments covering both the private and public sectors. The current research framework programme (FP7) is the largest R&D funding programme worldwide, investing more than 50 billion Euros over seven years, and the EU's Technology Platforms have helped to identify and define the research needs of European industry. Dow has been a member of the Sustainable Chemistry Technology Platform since its foundation. A new EU research framework programme (FP8) is under development. While the financial scope is likely to remain the same, it will be underpinned by a new focus on the major societal challenges of the Innovation Union. These challenges will be addressed through European Innovation Partnerships (EIPs) in which Dow is committed to play an active role.

The EU High Level Group on Key Enabling Technologies is a promising new platform to focus R&D on technologies that can really make a difference in boosting European innovation. This targeted approach should enable fast industrial deployment of these technologies and increase EU's competitiveness.

## WHAT MORE IS NEEDED

Rapidly growing R&D investment in Eastern Asia poses a significant challenge to the EU's ambition to retain a leading global position in industrial R&D. However, it is not only the growing competition that challenges these ambitions; changes are also needed in the EU's own R&D system.

The EU is still short of its R&D spending target of 3% of GDP set under the Lisbon Agenda in 2000 and reiterated in the EU2020 Strategy. Private sector R&D investment is considerably lower than in the US or Japan, while public money is often spent inefficiently due to a highly-fragmented research landscape that leads to duplication of efforts.

R&D funding also needs to be re-directed towards the demonstration and the deployment of promising technologies. Streamlining research funding instruments is one crucial way to make R&D funding more effective. For a high-quality science base in Europe to benefit the economy, it is paramount to ensure a seamless flow of people and ideas between academia and business across borders. Current programmes aim at facilitating the exchange of ideas, but these efforts are hampered by the huge associated administrative

A collaboration between Dow Europe and Europe-based machine manufacturers has enabled the development of a novel machine technology for compression blow forming. HDPE Bottles of less than 200 ml are produced weld line-free without waste generation and with 25% less energy consumption.

burden. The private sector will not participate to the required extent if this means a big up-front investment of human resources and money.

The fact that most R&D investment takes place at national level further reduces the impact of EU funding.

R&D tax credits have proven an effective tool to help stimulate R&D investment. While taxation is a national rather than European prerogative, the EU should look to benchmark best practices in tax credit systems (promoting the most effective and least bureaucratic schemes) and incentivise Member States to adopt similar schemes nationally.

To bridge the gap between R&D and the commercialisation of inventions, the EU must invest much more in the later stages of the innovation chain: demonstration and deployment. Far too often, promising ideas leaving research labs do not reach the market. More can be done to help entrepreneurs and businesses overcome this crucial obstacle. Facilitating access to finance through instruments under the Competitiveness and Innovation Programme (CIP) and the European Investment Fund is a step in the right direction.

## RECOMMENDATIONS

- Ensure the EU2020 target of increasing R&D investment to 3% of GDP is met as soon as possible; do not decrease the target, even in times of recession.
- Increase investment in the crucial later stages of innovation, in particular for demonstration projects.
- Strengthen innovation clusters that facilitate cooperation across sectors and across borders, as they provide a great opportunity to overcome the innovation gap.
- Put in place favourable frameworks for business investments in innovation to support and enable research investments in innovative materials and processes that provide more sustainable and energy-efficient solutions. The administrative burden for the participation in R&D funding programmes and for the commercialisation of inventions must be lowered. New instruments, in particular the Innovation Partnerships, should not only involve the EU and Member States but also the private sector.
- Base R&D funding decisions primarily on excellence in achieving innovation rather than on cohesion policy.
- Prioritise completion of the European Research Area.
- Further promote and enhance researcher mobility.
- Continue development of a European Patent; although Dow recognises the many challenges this would pose, from the perspective of a multinational corporation operating in Europe this patent would enhance companies' competitiveness.
- Redirect existing funds and resources to achieve the objectives of a broader cross-border venture capital fund, should one be set up.
- Further explore the potential of High Level Groups and EU Technology Platforms such as SusChem (Sustainable Chemistry) in identifying research needs based on societal needs and catalysing funding for product/process and technology development at pre-competitive stages.

## DOW'S CONTRIBUTION

Dow supports the approach of the Innovation Union and the European Research Area, which focus on coordinating national research efforts to tackle societal challenges.

In 2009, Dow invested almost 1.6 billion dollars (1.2 billion Euros) in R&D despite difficult times in the chemical industry. However, our goal is to be the most productive rather than the biggest spender. Dow has a well-established commitment to making Europe a global hub for innovation, marrying the power of chemistry with, amongst others, precision mechanics, advanced electrical engineering and modelling/computation.

Dow has two major hubs and a range of medium-sized application development centres in Europe, with the key focus areas involving energy efficiency and light-weighting, environmentally friendly infrastructure construction and rehabilitation, functional fluids and additives, advanced packaging and food technologies, and agrosociences.

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Dow spends a significant fraction of its external R&D budget with European partners and has an extensive network of interactions with value chain partners including OEMs (Original Equipment Manufacturers) and machine manufacturers who recognise that working with Europe's technology leadership is essential for success. Dow's areas of focus are largely aligned with the societal challenges identified within the Innovation Union, and we look forward to being part of the solution through active involvement in the forthcoming framework programme and expanding on our strong participation in FP7.

Dow welcomes the focus on the upcoming FP8 research framework programme including its proposed focus on simplification and innovation.

Dow intends to continue to provide knowledge and expertise to respective relevant High Level Groups and EU Technology Platforms as they are formed.



# Education, Skills and Jobs

## OVERVIEW

Dow Europe targets annually an estimated number of 50-80 university students from 14 key European universities to undertake a 2-12 months internship and approximately 150 apprentices from technical education, taking place in different Dow sites in Europe. This initiative aims to give students the opportunity to learn how a multinational company operates and to acquire national or international work experience, additional skills and competence in specialised areas. This objective is aligned to the Company's global philosophy to foster educational and innovation projects and hire and retain the most talented workforce.

Education is a cornerstone of Europe's success and is increasingly important in determining the future growth and competitiveness of the European economy. Without a skilled workforce, investments in other resources, such as new technologies and infrastructure, will collapse.

Skills have never been more important to Europe's economic health. The global economic crisis has placed huge pressures on governments and businesses to cut costs. The EU and its Member States need to view spending on education as an investment to generate sustainable long-term growth. The bold decision would be to continue boosting education budgets and focus them on delivering a solid and modern background, mainly in science, technology, engineering and mathematics (STEM) disciplines where there are smaller proportions of graduates.

In the EU2020 flagship initiative for an Innovation Union, the European Commission is calling for "increasing the amount of world-class universities in Europe, raising skill levels and attracting top talent from abroad." This requires the right level of investment in Europe's intellectual infrastructure as a priority, supported by a strong commitment to re-direct the interest of European students towards STEM subjects. This will bring a multitude of benefits: improving innovation, supporting growth and job creation, and reinforcing Europe's competitiveness.

### A Growing Skills Gap

Europe's skills issue is not a question of the calibre of applicants, nor of the number of graduates and trained individuals. Europe's education systems are among the world's best, and access to education has significantly increased in recent years. For example, Finland, Belgium, the Netherlands and Estonia all produce a larger proportion of top performers in their student populations than the US. Rather, the problem is one of matching what education systems produce with what industry and society need.

Europe is starting to face a human resource crisis in STEM disciplines. One key factor is demographic: The total population of 18-year-olds within the 27 EU countries is expected to decrease by 22% from 1993 to 2020. In the chemical industry, the sector's workforce is structurally older than other sectors, creating potential skills gaps, mainly for the more technical functions. Another major factor is the diminishing interest among younger generations in pursuing STEM education, especially among girls.

Moreover, Europe's changing demography means that the number of young people entering employment will fall in the coming years, causing a significant increase in the proportion of older people in the workforce. A more skilled workforce with a balance of maturity and youth (and diversity) can best respond to the rapidly changing circumstances associated with globalisation.

## WHAT MORE IS NEEDED

The education system needs significant reform at all levels to ensure the talent pipeline is filled and that innovation is driving forward society as a whole. Although industry is doing a lot to meet its labour market needs internally, a strategic policy approach to align skills with labour market needs is needed externally, built around collaboration between industry, academia and policy makers.

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The Innovation Union recognises the education challenge and focuses on promoting excellence in education and skills development. Dow supports the vision of creating an “excellent, modern education system in all Member States” and addressing significant weaknesses in science teaching. The chemical industry offers attractive, societally valuable careers, but needs skilled and talented individuals to fill them.

However, skills take a long time to build, both by the formal education sector and by companies. This skills gap needs to be tackled with efforts that target all relevant levels of Europe’s education systems, focusing various levels of actions.

1. Identify precisely where the gaps are.
2. Bolster the interest in STEM studies among young Europeans (with special emphasis on gender issues) and develop the relevant skills.
3. Increase the quality of education, mainly in mathematics and science.
4. Create an environment that attracts top talent from abroad and encourages local talent to stay in Europe.
5. Provide the appropriate tools to generate a talent pool for global knowledge-based competition and innovation (including internships, apprenticeships, mobility programmes).
6. Enhance the acquisition of soft skills.

### **An Ageing Workforce**

Dow, like other employers, will benefit from the ageing workforce, provided the right frameworks are put in place to ensure effective re-training and life-learning programmes. Europe’s ageing workers have great potential to remain highly skilled and capable of contributing, to adjust to technological change with new patterns of work organisation and to upskill younger generations, thus helping close the intergenerational gap.

A renewed and comprehensive life-learning strategy is a key component for achieving the objectives of the EU agenda for new skills and jobs. The current and future workforce must be equipped with the right skills for the right jobs. Adding new skills to existing competences can contribute to the creation of a more versatile and adaptable workforce. The so-called “soft” skills (entrepreneurship, communication skills, Information and Communications Technology (ICT), literacy, multilingualism, changes adaptation, flexibility, versatility, life-long learning, innovative mindset) need to be fostered at educational and industry levels.

Strengthening collaboration between the different actors (governments, industry, academia) to identify the current workforce demand and supply mismatches and to anticipate upcoming professional skills needs and shortages can help to adapt the educational system. For example, the introduction of sustainable development concepts at primary school would foster future working generation’s mindset to provide sustainable solutions.

The EU2020 Strategy has identified ageing population as an important societal challenge for the efficiency and sustainability of pension systems. They must be modernised and adapted to the new and future reality in Europe. One key aspect is to support pension mobility within the EU. Pensions play an important role in the success of EU work mobility, as one of the ways to enhance the active labour market in Europe.

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## **RECOMMENDATIONS**

- Stimulate young people’s interest in mathematics and science and careers in engineering, information and communications technologies through the identification, scale-up and replication of successful public-private initiatives and partnerships.
- Re-focus public funding for training, re-training and life-long learning towards the chemical and manufacturing industry as sectors most likely to contribute to Europe’s future competitiveness.
- Establish a strategic policy approach to align skills with labour market needs, built around collaboration between industry, academia and policy makers.

- Encourage skills mobility and cross-fertilisation, both within Europe and with other parts of the world, through fast and flexible programmes and solid funding (e.g., reducing the administrative and costs barriers for intra-corporate transferees).
- Foster innovative approaches to education, including through e-learning and distance learning to ensure general training accessibility, mainly for disadvantaged societal groups.
- Carefully examine all aspects involved in the EU initiative for pension mobility to ensure a balanced approach to promoting workers' mobility while avoiding additional costs for employers.

## DOW'S CONTRIBUTION

Dow has a longstanding commitment to education (mainly STEM) through charitable contributions, partnerships with key educational centres (universities, technical schools), sponsorship (schools' science projects, equipment) and its own initiatives at both pan-European and national levels. Dow engages in continuous dialogue with academic institutions, emphasising those skills that are vital to our continuing efforts across all specialisations. Dow also directly supports deserving individuals via targeted efforts including apprenticeships, internships and direct funding of PhD-level studies. Below is a selection of Dow's initiatives.

- With Dow's European Sustainable Development Chairs, we partner with two key universities in France and Spain to support strategic projects: the "Ecole Supérieure de Chimie, Physique, Electronique" (CPE Lyon – Chemistry-Physics-Electronic) of Lyon in France and the "Rovira I Virgili University" (URV) of Tarragona in Spain. By sponsoring these Chairs, we increase knowledge and raise social awareness about the meaning of "being sustainable" among academia and students.
- Dow Deutschland in Stade (Germany) has supported the Himmelpforten Kindergarten in constructing a "Dorf des Wissens" ("Village of Knowledge") with know-how, muscular strength and a significant donation. The objective is to enable children to confront natural-science questions in a playful manner. The Chemical Industry Association North (VCI-Nord) has awarded this joint project its Special Prize.
- The Dow Chemical Iberica in Tarragona (Spain) has proactively engaged in a regional dual vocational and practical education programme, inspired by the German standard technical apprenticeship system for the chemical industry. Dow Iberica has signed a five year agreement with the regional government and a technical vocational centre to partner in this dual education apprenticeship programme for "chemical plant operators." Every year, the 20 most talented students of the cluster "chemical industry" at the technical centre are selected to follow this apprenticeship including both academic and practical training. The best students completing the full programme get a contract with the Company. This initiative matches local labour market needs with a modern and targeted technical education and a better qualified workforce. In addition, this site organises short-term apprenticeship programmes for professors of vocational centres to improve and complement their teaching and curriculum contents.
- Dow Benelux in Terneuzen (the Netherlands) participates in JetNet (Youth and Technology Network Netherlands). This is a joint venture between government, companies and pre-college schools in the Netherlands to enhance the appeal of school's science curriculum and help students to better understand their future career prospects in industry and technology. Dow works together with de Rede and Zeldenrust in Terneuzen and Nehalennia in Middelburg.



# Innovation Along the Value Chain

## OVERVIEW

Manufacturing is often considered to be moving out of Europe and much is said about the ease with which technology know-how is transferred to non-EU markets. The chemical industry delivers the building blocks for broader manufacturing and has so far maintained its position of strength and sophistication in Europe. Over half of Dow's strategic customers are headquartered in the EU.

Finding ways to strengthen this chemical manufacturing ecosystem is linked to maintaining the integrity of the whole value chain in Europe. Protecting and retaining the mechanisms by which the technology is delivered and produced forms just as integral a part of the protection of innovation as funding and materials polices. Advanced Manufacturing for Europe is founded on these pillars.

Innovation goes well beyond R&D. Within the chemical sector, innovation is increasingly based on joint cooperation with customers and other industries. Companies with a strong focus on innovation are usually less affected in a downturn. A lesson from the 2008-2009 global economic crisis must therefore be that bolstering innovation will both underpin economic growth and decrease vulnerability to shocks. With the global economy in turmoil, the understandable reaction can be to prioritise short-term fixes to restore growth. The harder, but ultimately more beneficial, solution is to pursue a long-term strategy built around stimulating and supporting innovation.

Europe is embarking on the path to greater competitiveness from a position of strength. Already, a number of Member States are world leaders in manufacturing, creativity, design, aerospace, telecommunications, energy and environmental technologies. The EU is also characterised by strong traditions in social innovation and should continue to build on this asset.

## WHAT MORE IS NEEDED

Dow Construction Chemicals, working together with leading European construction materials companies and the LCPC Institute in Paris, has developed a new range of cellulose-based additives tailored for use in cement bound systems. These new products result in a 15-20% labour cost reduction and an improved sustainability profile, due to both the use of lower GHG carbon cement types and less rework due to reduced crack formation upon curing.

Innovation along the value chain does not come naturally but rather needs to be enabled and facilitated. For this reason, innovation clusters/models that Dow believes facilitate cooperation across sectors and borders should be strengthened because of their effectiveness and sustainability. Business models with increased value chain connectivity (closer networks within industry and with customers) can bring major benefits in terms of heightened resource-efficiency, reduced CO<sub>2</sub> emissions and improved environmental performance. This integrated approach also enables greater flexibility to move production to meet demand in Europe and to adapt to the increasingly sophisticated requirements of industry.

Europe should also recognise the critical role played by energy-intensive industries such as the chemical sector for Europe's economy. Our products enable other industries to innovate and develop energy- and resource-efficient products for consumers. For example, Dow leverages European industry's superior blend of expertise in the intelligent processing and machinery of thermoplastic and thermoset plastics to generate more sustainable and energy-efficient options across a range of industrial segments, including automotive, construction, packaging and appliances.

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Additionally, it should also be understood that the basic chemical industry is the building block for the specialty chemicals areas. If it moves away from Europe, so will the specialties and the conversion industry over time. Politicians should take into consideration that if the basic building block manufacturing industries invest outside Europe, it will be very difficult to keep and expand the specialty areas in Europe.

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## RECOMMENDATIONS

- Enable and facilitate increased value chain collaboration by creating the necessary platform and dialogue mechanisms at EU level to meet societal needs.
- Deliver commitments from the EU and Member States to include the basic and specialty chemical industries and a petrochemical and chloralkali base in Europe. Dow wishes to underscore the positive role the chemical industry plays for downstream users through the concepts of value chain engagement and, if and where appropriate, public-private partnerships.
- Strive for improvements in several areas: securing R&D financing, establishing a single European research area, reforming education, supporting social innovation, and facilitating simplified standardisation processes, to name but a few.
- Utilise EU High Level Groups as a policy instrument to foster value chain innovation.

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## DOW'S CONTRIBUTION

The above elements create the framework for Dow and others to deliver the innovation agenda in practice, based on daily operating experience.

Connectivity and flexibility across the value chain are important elements of Dow's success worldwide, especially in Europe. This approach should be recognised as best practice and encouraged further in Europe as a model for all new industrial projects. Dow's efforts in Europe are focused on areas which will leverage the region's skills and bolster its competitiveness. We seek continuous cooperation with academia, public laboratories and value chain partners to generate technologies to implement in Europe or to export to other regions.

### High Throughput Research in Dow Terneuzen

Dow is the world leader in high throughput research. This allows thousands of experiments to be conducted every day. The time from idea to execution and results can be reduced by a factor of 20. Since 2006, Terneuzen has had a unique High Throughput Lab (HTR-lab), where all heterogeneous catalysis research for Dow worldwide takes place. Thanks to robot technology and special software, almost everything is automated, enabling research to be accelerated by a factor of up to 500.

### Chemical Leasing

New innovative business models such as the development of a service/leasing economy can help improve resource efficiency. At Dow, we have pioneered the development of Chemical Leasing whereby performance rather than chemicals and service are sold. With our Chemical Product Service model (CPS), companies are invoiced for chemicals used per square metre or time unit rather than the actual material. This aligns incentives for both service provider and client and can result in big savings and greater efficiency.



# Competitiveness

## CONTEXT

The European Commission estimates that one in four private sector jobs in the European Union are in the manufacturing sector, and at least as many jobs in the services sector depend upon manufacturing as a supplier or client.

Future European prosperity will not be built around high-tech or as-yet-undiscovered sectors but by strengthening its traditional powerhouse, manufacturing. This is not just the belief of the chemical industry but of the European Commission, which has nominated Industrial Policy as its EU2020 flagship initiative to enhance European competitiveness. By identifying strategic European industrial interests and creating a coherent policy framework to support them, the new Industrial Policy takes a dynamic, innovative and forward-looking approach to further strengthening the manufacturing sector.

Dow's Advanced Manufacturing Plan for Europe mirrors the new Industrial Policy's dual focus on promoting both innovative production processes and products. In terms of production, actions to facilitate coordination of global value chains in key sectors such as chemicals are essential, a fact recognised in the Industrial Policy. It is particularly welcome that the Commission has recognised energy-intensive manufacturing industries as world leaders in energy and resource efficiency, driving reductions in energy and resource consumption and emissions further down value chains. On the product side, advanced materials that enable more resource- and energy-efficient products are one of European manufacturing's major innovation success stories, and some are highlighted within the Industrial Policy as a Key Enabling Technology to be leveraged on a global level.

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## WHAT MORE IS NEEDED

To ensure the new Industrial Policy framework will achieve the EU2020 goals, a number of specific barriers will need to be addressed. While a number of these barriers have been addressed elsewhere in this Advanced Manufacturing Plan, there are some that have not.

The pan-European flagship initiatives proposed by the EU should reinforce each other in achieving the EU2020 vision. Member State initiatives should be mutually reinforced to support the alignment at the pan-European level.

There should be further articulation of the policy instruments needed at pan-European level to achieve this mutual enforcement and to ensure a global level playing field for European manufacturing.

Measures to address Europe's fragmented infrastructure and transport systems are overdue. A patchwork of national policies and inadequate or inconsistent investment decisions have combined to create a major barrier to efficient operation of the internal market.

Regulatory reform is also an important agenda. The impact assessment process is crucial in this regard to ensure industry's views are heard and impacts on competitiveness are adequately considered. Consistent enforcement of regulation across borders is another major issue within Europe and an important impediment to cross-border economic activity.

Corporate liability is an area where Member States ultimately have decision-making power. Policies are under development to harmonise the operation of civil justice mechanisms at the European level. This is to be welcomed, but caution is needed to ensure consistency with existing national regimes.



# Infrastructure and Transportation

## OVERVIEW

Every day 7,500 kilometres of European highways are blocked by traffic jams. Congestion on roads and at airports adds 6% to the EU's fuel bill.

Globalisation is changing the worldwide flow of products and materials. The transportation and infrastructure needs of the 21st century are complex. Ensuring the flow of commerce through safe, efficient and sustainable transportation is critical to efficient manufacturing and the distribution of materials. European manufacturers are increasingly reliant on imports from the Middle East, China and other emerging regions.

However, across Europe, transportation policies and investment in infrastructures and maintenance have been driven by national governments, leading to fragmentation. The lack of integration, harmony and strategy in addressing this situation requires urgent action from European policymakers.

## WHAT MORE IS NEEDED

The inland waterway network is under-used, although it is considered safe, reliable, quiet and energy efficient. Because a single barge can carry the same load as 110 trucks, goods transportation via inland waterways could provide part of the answer to road congestion and inadequate or inefficient rail infrastructure.

Europe suffers from capacity constraints across most transportation modes, including ports and terminals, rail, road, air and pipelines. At the same time, investments in replacing and expanding infrastructure lag behind what is required to meet future needs. Insufficient or inappropriate investment by countries directly affect the chemical sector's ability to provide products to the market and limit companies' ability to apply chemistry to solve some of the world's most pressing challenges.

Highly congested seaport areas such as Rotterdam and Antwerp and crowded intermodal terminals have challenged the EU manufacturing sector for some time. Bottlenecks of road and rail infrastructure remain common right across Europe.

To address these challenges, private investment should be encouraged, and shippers and service companies need to be more creative in the design of European logistics processes and structures to cope with the infrastructure bottleneck situations in the future. Incentives for innovation and technology investment by the service companies can support and accelerate the necessary improvements.

### Workforce and Enabling Capabilities

Multi-modal transport chains rely on a skilled workforce to maximise their effectiveness. Increased transportation volumes, the effects of an ageing population and work-hour regulations mean that Europe is faced with an acute structural shortage of trained truck drivers. The logistics industry is grappling with labour shortages and struggling to attract high-quality people. Enhanced employment conditions across Europe and a harmonised approach with regional neighbours will provide a level playing field for low-cost transportation models.

Intermodal transport represents a small proportion of goods transportation in the EU—currently between 2-4%—but it is increasing by about 10% per year.

### Port Congestion and Hinterland Connections

Investment in new quality infrastructure and in infrastructure expansion and maintenance across all transportation modes is essential to ensure effective flow of goods across Europe, particularly in the light of growing import volumes from the Middle East, China, India and other emerging regions. The focus must be on taking concrete actions to unblock the congested transport infrastructure in Europe.

### Intermodal Infrastructure

The development of an intermodal infrastructure system across Europe is essential to fulfill the transportation needs of manufacturers from, to and within Europe. Dow fully supports the EU efforts to improve the performance of each transport mode to make each option safer, more efficient and more environmentally sustainable. However, it is critical that the full range of interconnected transportation modes remain available across Europe including central, eastern, western, northern and southern Europe, and also with other trading areas.

## RECOMMENDATIONS

- Prioritise development and expansion of the southern European ports to facilitate connection with the Middle East and Asia, decongestion of northwest European ports (Hamburg, Antwerp, Rotterdam) and new port options for expansion (Bremen, Bremerhaven and Wilhelmshaven).
- Move forward with development of inland waterways and a freight-oriented rail network to improve movement from ports to the areas of consumption.
- Ensure the European Commission serves as the coordinator for Member States to develop a sustainable pan-European logistics infrastructure.
- Commission an independent study to examine how the intermodal infrastructure can be expanded, developed and combined to cope with future growth at regional and country level in a pan European context. This should include standardisation of equipment, processes and technology.
- Commission an additional study to quantify the professional shortfall, including a cross-industry comparison of professionals and the need for additional trained staff by skills category.

## DOW'S CONTRIBUTION

The complexity of Dow's integrated supply chain is unparalleled. We purchase more than 450 million tons of raw materials and feedstocks from more than 1,000 suppliers, produce 3,200 products, and serve 45,000 customer ship-to locations in 160 countries. To serve our customers, we manage more than two million shipments each year, more than 20% of which cross borders, from more than 150 manufacturing sites in 37 different countries.



# Regulatory Reform

## OVERVIEW

A proportionate and effective regulatory framework is essential to promote and nurture a vibrant manufacturing sector. Regulation should serve to protect the environment and ensure the health and safety of workers and the general public in a way which does not unnecessarily penalise those companies which are held to compliance. This is particularly important in Europe, where a combination of stringent regulation and uneven or inconsistent enforcement across different countries has a major influence on the competitiveness of the manufacturing sector.

The chemicals management regulation REACH (Registration, Evaluation and Authorisation of Chemicals) is one example of legislation with significant impact on the manufacturing sector. The declared objectives of REACH are to ensure the safe use of chemicals in Europe, improve innovation and enhance the competitiveness of the European chemical industry. Dow fully endorses these objectives and the responsibility that legislation places on all members of the value chain to protect human health and the environment. These objectives are fully aligned to Dow's commitment to sustainability and its 2015 Sustainability Goals.

## WHAT MORE IS NEEDED

The European Commission now requires an Impact Assessment for all new legislation. Dow believes Impact Assessments should be expanded to include the assessment of alternatives or compliance options that might be more cost-effective whilst still being consistent with the goals of the legislation. This approach is endorsed in the new EU Industrial Policy, which recommends an explicit and thorough "competitiveness-proofing" of new legislation. This integration of competitiveness impacts is critical to an effective overall regulatory framework and the ongoing vitality and strength of Europe's manufacturing sector.

This process will be particularly crucial in the 2012 review of REACH by the European Commission. Dow will remain actively engaged through national and regional industry associations to ensure the continued implementation of a workable regulation that enhances rather than stifles innovation.

Dow welcomes the focus in the new Industrial Policy on ensuring that legislation is predictable, proportionate and provides the necessary legal certainty to encourage longer-term investments, taking into account factors including life cycle cost-effectiveness, investment cycles and the purchasing behaviour of enterprises and consumers.

Legislation is frequently developed by independent administrative and legislative bodies in a way that creates overlapping regulation and *inconsistent enforcement*.

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## RECOMMENDATIONS

- Ensure consistent enforcement among Member States of complex legislation with significant regulatory burdens (such as REACH). Minimising the administrative burden and confusion through harmonised enforcement will improve levels of compliance by making regulatory requirements more clearly defined. With specific reference to REACH, three considerations are crucial:
  - It must be applied equally to manufacturers and importers.
  - No additional or unnecessary requirements are created.
  - It must be enforced uniformly among Member States.
- Ensure strong industry involvement in the legislative process. Compliance with regulatory requirements is an obligation that the manufacturing industry accepts among its highest priorities. However, in order to ensure compliance, industry must be involved from the start of the legislative process so it can both contribute to high-quality legislation and develop a proper understanding of clearly written regulatory requirements.
- An effort must be made to find simple and clear regulatory requirements, consistent with other requirements applicable in the same area and proportionate to the goals intended by the legislation. The Industrial Emissions Directive, for example, focuses on harmonising implementation of existing legislation rather than developing new requirements.
- Where appropriate, regulations should be oriented towards performance standards rather than setting prescriptive and rigid requirements, allowing industry to develop the most effective method of meeting the intent of the regulation. This is especially important in a multicultural and multijurisdictional context such as the EU, where there are a variety of effective manufacturing traditions and companies with very diverse resources.
- Promote regulatory cooperation underpinned by a common set of scientific thresholds, building on the OECD's work in this area.

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## DOW'S CONTRIBUTION

Dow supports efforts to encourage countries to elevate environmental standards and practices, including safe chemicals management, via the most appropriate international forum. Within the UN Strategic Approach to International Chemicals Management (SAICM) umbrella, Dow is co-leading industry's implementation and promotion of the Global Product Strategy (GPS) with the aim to promote the safe use of chemical products worldwide. Dow is also actively leading capacity-building efforts and communication to internal and external stakeholders, including governments and the downstream value chain. To that effect, Dow has published over 330 Product Safety Assessments (PSAs) written in non-technical language and covering basic hazards, risk and risk management.



# Corporate Liability

## OVERVIEW

In Europe, the principles and mechanisms applicable to corporate liability are normally defined nationally. They are part of national civil justice systems that reflect a specific legal culture and a national political balance. In every case, public enforcement by competent local authorities is a cornerstone of the system. The construction of the European Single Market has provided a unique opportunity to standardise these principles and enhance the mechanisms that exist in every national jurisdiction. However, it is important that the development of EU principles and mechanisms affecting corporate liability are consistent with both the various national legal systems and the public enforcement culture that underpins these systems.

## WHAT MORE IS NEEDED

### Collective Redress

The European Commission is currently considering a legal framework that would allow large numbers of individual claimants to seek recovery for legal violations in areas including competition law, consumer rights, financial services and environmental claims.

There is reason to be concerned that the “collective redress” initiative could eventually lead to a US-style class action system that creates tremendous financial burdens on the companies sued and provides very little practical return for consumers. A fair system of compensation for legitimate claims is critical, but it should not be driven by US-style class actions that often result in large settlements based solely on the size of the damage claim. There are strong doubts that a US-style class action system could prove workable in Europe, given the strong public enforcement culture and the multi-jurisdictional Member State legal framework. The most likely outcomes would simply be to add enormous pressure and confusion to the current EU legal system.

The Commission has publicly recognised the flaws of the US class action system and stated its intention not to repeat certain practices in Europe. However, the mechanisms offered as a way to avoid meritless collective redress lawsuits (such as Alternative Dispute Resolution or ADR) may not be adequate. There is a plethora of ADR systems throughout the EU’s 27 Member States, comprising over 700 different mechanisms. These varied procedures require careful assessment before any pan-European ADR mechanism could be crafted. ADR can be a viable alternative to a court-based approach, provided sufficient safeguards are applied that include limitations of funding mechanisms. Dow would suggest that European policymakers give careful consideration to the inefficiencies and economic costs associated with US class action laws before establishing a similar system in Europe.

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### **Contingency Fee Awards**

Contingency fee awards are the largest single contributor to lawsuit abuse in the United States. Calls have been made for approval of contingency fees in Europe as part of the collective redress discussions. Dow believes most legal systems in Europe have it right: Access to the court system is available to individuals who have a meritorious claim. Frivolous lawsuits are discouraged based on a system where the losing party in a lawsuit pays the legal fees. Contingent fees, especially in the context of a collective redress, encourage meritless lawsuits, which in turn clog the courts and tax public and private resources.

### **Corporate Liability Standards**

Corporate liability standards and the criminalisation of corporate conduct are being increasingly strengthened by national legislation and the day to day decisions of European courts. However, we are concerned about the over-criminalisation of corporate conduct where multiple standards and requirements often result in inconsistent enforcement, and unfair penalties. The area of environmental liability, and in particular the slow implementation of the Environmental Liability Directive, is a good example where some of those risks are increasing.

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## **RECOMMENDATIONS**

- Any collective redress system adopted by the EU should be narrowly drawn and consistent with the mechanisms already in place in most EU jurisdictions. A European-wide collective redress system that repeats the mistakes of the US class action system would not benefit consumers and would place dramatically increased cost burdens on both the public and private sectors.
- Create and develop corporate liability standards in a harmonised manner, consistent with national legal systems in order to avoid duplication and confusion.
- Develop EU legislation that is consistent with the public enforcement culture that exists in Europe and does not encourage frivolous lawsuits.



# Resource Efficiency

## OVERVIEW

Dwindling natural material resources combined with increasing prices and adverse environmental conditions have highlighted the need to improve the efficiency of resource use across the European economy. For Advanced Manufacturing this applies to the use of all natural and material resources in the production process, where innovations such as technology clusters help get the most from material inputs along value chains, and to products, where advanced materials and other innovations can significantly increase overall resource efficiency. Greater resource efficiency underpins Advanced Manufacturing by delivering lower costs for commodities, products and services. The positive correlation between resource efficiency and competitiveness should be an added incentive for every sector to take action.

Strong collective action on resource efficiency is needed within Europe. Today's largely linear material use (mine, refine, manufacture, use and dispose) in Europe endangers the availability of natural resources and security of their supply. The global economy needs redirecting away from systemic overuse of ecosystems and resources. As the world's largest economic zone, the EU has to take a strong lead to enable its economy to become resource-efficient—and therefore more sustainable and competitive internationally.

The EU2020 Strategy identifies more efficient use of resources and ultimately decoupling resource use from economic growth as a crucial strategic objective, to be delivered through a flagship initiative on "Resource Efficiency." The public-private partnership on Resource Efficient Industry will be the first initiative bringing together all actors along the full value chain within the processing industry—from feedstock through to industrial transformation and intermediate or end-products. It seeks to reduce the environmental footprint of industry sharply by doing more with less and finding viable reuse and recycling technologies to conserve material inputs. The chemical industry will play an essential role in this partnership by providing smart, sustainable contributions towards resource efficiency, both within its own sector and across other manufacturing sectors.

## WHAT MORE IS NEEDED

The EU's focus on resource efficiency and resource productivity is a relatively new and holistic approach. None of the EU's previous policy measures to protect the environment have effectively addressed the resource efficiency challenge. The upcoming Roadmap for a Resource Efficient, Low-Carbon Economy should fill this gap.

The chemical industry is an energy-intensive industry that uses natural resources to produce and develop the chemical building blocks that nourish virtually all other sectors of the European economy, in the process contributing significantly to meeting society's resource efficiency needs. It devotes considerable efforts to improving the efficiency of resource use, from feedstocks through to production processes, to make them cleaner and leaner. We also use alternative energy sources and feedstocks when they are available and viable. Our products are the building blocks that allow other manufacturing sectors to develop products that use fewer resources both during their production and their useful life.

Continued improvements in manufacturing efficiency are clearly an important part of the overall challenge. However this must be tackled from a lifecycle perspective, reflecting the fact that energy-intensive industries such as the chemicals sector play a crucial role in enabling reduced resource consumption further down the value chain. Although Europe is already one of the most efficient manufacturing regions globally, more action is required to

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address resource consumption and sophisticated use in the value chain, and support ultimately decoupling resource use from economic growth. This is an area where political will has been lacking in the past, but where significant gains can be made by creating the right policy framework.

Enabling a full-scale production capacity for manufacturing new industrial and consumer products in Europe will bring economic value and contribute to job creation. Encouraging investment in Key Enabling Technologies (KETs) such as lightweight, composite and smart materials is therefore vital.

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## RECOMMENDATIONS

- Encourage and promote highly resource-efficient manufacturing in Europe by connecting the value chain; this requires investing efforts in awareness-raising and sharing of best practices.
- Support the concept of sustainable consumption and production which, at the global level, provides a mature policy framework to encourage efficient resource use.
- Reform subsidy regimes that deny manufacturers cost-competitive access to certain types of raw material inputs.
- Reduce or eliminate tariffs and quotas for all resources that serve as industrial inputs. For example, the integration of bio-based or renewable feedstocks into the processing industry can contribute to enhanced resource efficiency.
- Use market-based instruments to support innovative and resource-efficient manufacturing technologies; do so in line with investment cycles so that industry can amortize its investments.
- Integrate the concept of lifecycle thinking into policy-making.
- Identify ways to value Natural Capital and ecosystem services through instruments in support of decoupling resource use from economic activity.

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## DOW'S CONTRIBUTION

Dow strongly supports the objectives of the Resource Efficient Industry partnership and intends to play an active role in it.

Dow is reducing its environmental footprint through ever increased efficiency in its resource use, from feedstock and raw materials, to water use and ever increasing process intensification. Almost a century ago, Dow was a major investor in the invention of cogeneration (the simultaneous production of electricity and steam) as a resource efficiency tool. Cogeneration typically uses 20-40% less fuel than conventional power generation and is currently used to produce 75% of the electricity needed to manufacture Dow products worldwide.

Sustainable chemistry is Dow's "cradle-to-cradle" concept that drives us to use resources more efficiently, to minimise the Company's footprint, provide value to customers and stakeholders, deliver solutions for customer needs and enhance the quality of life of current and future generations. Dow's Sustainable Chemistry Goal is designed to drive breakthrough innovation, improving the sustainability profile of Dow's products and is at the root of all our chemistry. Dow is working with customers to improve aspects of durability, energy efficiency, waste reduction, safety—these are all examples of sustainable chemistry in action.

### **WRAP—Waste Reduction Always Pays**

In 1986, Dow launched the WRAP Award programme to promote the three Rs—reduction, reuse and recycling. Today's WRAP Award programme goes further to include reprocessing of waste into raw materials, enabling Dow to capture value while reducing waste. Since the programme began, Dow has given the WRAP Award to 395 projects and their sponsors. Worldwide, the projects account for the reduction of 230,000 tons of waste, 13 million tons of waste water and eight trillion Btus of energy. The value of all these projects totals roughly one billion dollars (~760 million Euros).



# Energy & Climate

## CONTEXT

Energy investments in the order of one trillion Euros will be needed in Europe over the next 10 years, according to the European Commission.

In modern societies energy is everywhere and, like chemistry, is an essential but invisible enabler of all facets of the manufacturing process. For the foreseeable future, economic growth without energy growth will not be feasible.

However, for both security of supply and environmental reasons, sustainable energy sources will need to feed this growing global appetite in order for growth to remain economically sustainable. This is the basis for the global goal of doubling energy supplies by 2050 while halving global greenhouse gas (GHG) emissions.

Since its origin under the first coal and steel treaty, Europe has expanded under a combination of national and regional energy policies. This has spawned a large and diverse set of energy policies, with an equally wide range of successes and failures at both national and regional levels.

In recent years the EU has taken on a significantly stronger role in driving forward a common European energy policy in response to a number of market, environmental and political challenges. The limited lifespan of some existing energy sources allied to supply disruptions has raised questions about Europe's long-term ability to meet its energy needs. Rising energy costs relative to competing regions have created major affordability challenges for industry. There is also an ongoing and long-term need to reduce greenhouse gas emissions associated with energy production and consumption.

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In November 2010 the European Commission launched a new energy strategy within the EU2020 framework, focusing on four principal areas:

- Achieving an energy-efficient Europe.
- Security of energy supply, including liberalisation measures and preparedness for upcoming shortages.
- Extending Europe's leadership in energy technology and innovation.
- Strengthening the external dimension of the EU energy market.

Importantly, this strategy also identifies consumer behaviour changes as a high-priority area with a major role to play in delivering Europe's energy objectives.

This version of the Advanced Manufacturing Plan focuses on four energy-related areas where European public policy can play a major role in enhancing manufacturing and promoting growth.

1. **Conserve** energy by aggressively pursuing efficiency.
2. **Optimise**, increase and diversify domestic energy and feedstock supplies.
3. **Accelerate** development of alternative clean/renewable energy and feedstock sources.
4. **Transition** to a low carbon economy.

These issues will be examined in-depth in a subsequent Dow Energy Plan for Europe. This chapter will therefore highlight some lessons that can be learned from Europe's policy approaches to managing energy, demonstrating why and how a sustainable energy policy is a prerequisite for an Advanced Manufacturing strategy.



# Energy Efficiency and Conservation

## OVERVIEW

Dow has set itself the target of reducing its global energy intensity by 25% between 2005-15. From 1990 to 2009, Dow reduced its global energy intensity by 38 percent, saving 1,700 trillion Btu.

While the overall chemicals production in Europe increased by 69% from 1990 to 2008, the industry's GHG emissions actually decreased by 42% during this period.

Energy efficiency has long been recognised as the most sustainable solution of all energy options. It is also often the most affordable alternative to the status quo. The EU has demonstrated improvements in its energy efficiency performance in recent years. According to the European Commission EU primary energy consumption peaked in 2005 / 2006 and actually reduced (in part due to the impacts of the financial crisis) in 2007 and 2008 to around 1,800 Mtoe. At the same time, EU-27 energy intensity (the ratio of energy consumption to GDP) has improved significantly, down from 187.3 in 2003 to 167.4 in 2008.

However, despite this progress efficiency investments are significantly under-exploited, particularly amongst certain groups and in specific regions. For example, according to the European Energy Agency, the energy intensity of European industry has improved significantly since 1990, while the energy intensity of European households has actually gotten worse. There are also substantive differences in national and regional approaches to energy conservation, with, for example, significant disparities in levels of building insulation across Europe.

The reasons why efficiency is not better exploited include:

- Financing challenges for the up-front investment costs.
- Inadequate prioritisation by most end-consumers.
- The lack of effective business models to deal with the pay-back periods involved.

The European Commission's new EU Energy Efficiency Action Plan should take account of the above so as to reinvigorate the drive for greater energy efficiency in Europe.

## WHAT MORE IS NEEDED

Europe must adopt an integrated policy approach addressing the entire energy chain from production to consumption if it is to advance its manufacturing capabilities based on next-generation levels of energy efficiency.

End-user consumption accounts for about two-thirds of total EU energy needs and is the area where market failures and behavioural challenges most urgently need addressing. Particular priority should be given to increasing energy efficiency in buildings, which account for around 40% of EU energy consumption. Specific policies are needed targeting consumers and homeowners to help drive improved energy efficiency in homes and private buildings. Prior to this a major initiative is needed to improve public buildings to provide policy makers the opportunity to lead by example. Transportation is another area where significant energy savings could be made. Appropriate policies would create market growth for energy-saving products, which would in turn stimulate investments by the producers of those materials.

The manufacturing sector can and will continue to invest efforts in improving its energy efficiency. While the EU chemical industry is today the most efficient amongst the major chemical-producing regions (for a range of reasons including its level of integration), a slowdown in investments is eroding this position. The right policy framework will help ensure the industry is in a position to make the necessary investments in energy efficiency.

This will in turn have knock-on benefits for EU manufacturing as a whole. The chemical industry supplies multiple elements that enable higher value manufacturing in the EU, delivering the ability to compete globally. This includes obvious factors such as the provision of basic building blocks under competitive supply conditions. There are also less obvious points such as the capability to make use of waste and by-product streams to assure the sustainability of supply chains. The chemicals industry is committed to working with its value chain to further develop products and materials that enable effective solutions to the energy efficiency challenge.

## RECOMMENDATIONS

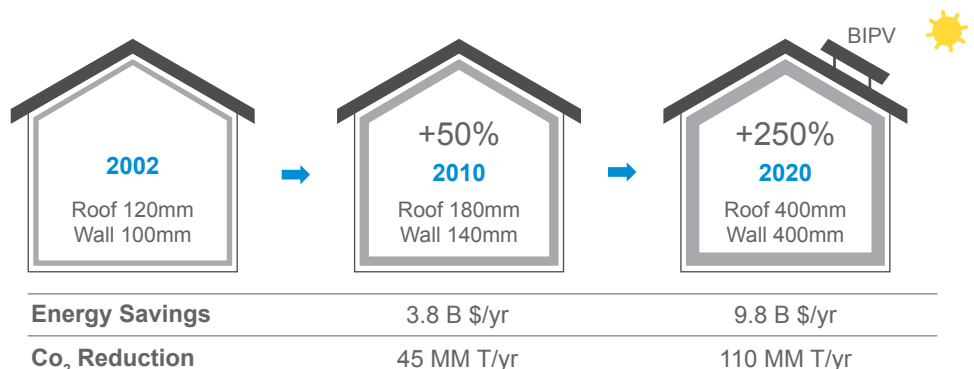
A 2010 peer-reviewed study by Denkstatt found that if every house in Europe were insulated with plastic insulation foams, the carbon balance score for the panels would increase to 9-15 by 2020. This means that for every tonne of GHG emissions generated during the manufacture of the foams, 12 tonnes would be saved over the product's lifetime.

- Initiate a major programme of refurbishment to substantively improve the energy efficiency of public buildings.
- Set specific efficiency goals at national or EU level for the general public as the final consumers of energy.
- Formulate more ambitious building efficiency codes with stricter enforcement programmes. These codes should be based on performance parameters and should not discriminate on the basis of materials used.
- Identify and target areas for improved energy efficiency in transportation, where more innovative approaches throughout the value chain offer major savings in both energy use and GHG emissions.
- Stimulate adoption across Europe of best practices in consumer-focused investment programmes. Examples of this include the financing packages put together by the KfW bank in Germany to fund efficiency investments during building renovation, and the system the UK has put in place to ensure efficiency investments are linked to the building and not the owner, and thus form part of the sales contract when homes are sold.

## CONTRIBUTIONS FROM CHEMISTRY

High performance synthetic materials underpin all transitions to higher resource and energy efficiency in both the production and consumption phases. High-efficiency polymeric insulation foams such as Dow's Styrofoam brand insulation provide a good example of the performance potential and financial benefits of effective long-term efficiency programmes.

## THE ENERGY-SAVING POTENTIAL OF BUILDINGS





## Fuel & Feedstock Diversity

### OVERVIEW

In 2008 EU energy imports accounted for over half (54.8%) of its energy consumption (source: Eurostat).

The energy import dependency of the EU has increased steadily in recent years, and despite various policy initiatives this dependency is set to grow further still. Energy supply demand balance has been and will remain very volatile. In an increasingly energy-hungry world, years of supply tightness will exceed years of over-supply by a significant margin. This means that for most fuel sources security of demand will not be an issue, whereas security of supply will be a major concern.

Currently, the EU does not make fully effective use of the range of energy resources and technologies at its disposal. It also lacks the infrastructure to ensure energy and electricity can flow where they are most needed. The EU has undertaken several waves of liberalisation to create a single market for energy, but the full benefits of this approach have yet to be realized.

Long-term Advanced Manufacturing requires access to components and building blocks that are not substantively more costly than those used by other major competing regions. This in turn requires access to energy at costs that are not materially higher. Addressing supply diversity and upgrading European infrastructure—both key elements of the EU2020 energy strategy—have a crucial role to play in delivering on this objective.

### WHAT MORE IS NEEDED

The optimal way to tackle this challenge is via enhanced programmes to diversify energy supply sources, transportation modes and supply options. Diversity of supply should also be linked to a long-term strategy that takes due account of both national circumstances and broader EU interests. In this respect, the recently announced plans to increase interconnectors for both gas and power supplies are a welcome development.

As importing an increasing share of energy needs will come at a cost, it will become even more important to deliver that energy via an advantaged infrastructure. While some progress has been made and future plans look promising, most infrastructures need considerably more investment to achieve this global leadership goal. These requirements are generally well-known and include:

- Alternative gas pipelines to ensure regional conflicts will not block supplies into the EU.
- Sufficient import and regasification terminals to make sure the EU can make optimal use of LNG supplies from global sources.
- Gas and electricity inter-connectors with sufficient capacity and flexibility to handle regional variances, seasonality, and increasing availability of intermittent power sources.
- Regional CO<sub>2</sub> transit hubs so that in selected regions of Europe fossil fuel-based power generation with CCS can remain a commercially viable alternative for the long-term.

In many instances plans to tackle these points have been proposed. However, progress has often been slow, and improving the implementation speed is the area requiring substantive improvement.

All energy decisions must be taken from a global perspective, which means using more of the right fuel in the right location. This includes relying more on solar and wind where those resources are most abundant. It also means using bio-based solutions where they

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can be produced most sustainably and only stimulating their export once local needs have been catered for. Over-aggressive promotion of bio-based energy has in certain instances created unsustainable production in the source country. The net negative GHG impact of land use changes from some first generation bio-fuels is a classic example of this. Similar negative indirect consequences will occur if unsustainable plans are proposed for the use of biomass in power production.

Alternative low carbon options like nuclear should also be used more in those regions best placed to do so. For nuclear, this includes factors such as the availability of appropriately trained engineers, safe storage and transit capabilities, as well as more local factors such as the availability of cooling water.

The increasing global impact of unconventional gas needs to be addressed. Gas availability is improving, and its lower CO<sub>2</sub> emissions (compared to other fossil fuels) make its increased use in power production logical. This is a well-established and mature market that will not require government support to further stimulate demand. However, if the dash to gas is too fast and too big it will undermine supply security and contribute to increased regional price volatility.

When economically viable, CCS should be developed to ultimately cover all fuels used for power generation, including natural gas. This is an area where government support is needed, primarily targeted at the areas where the market is least able to cope (transportation infrastructure and storage). It is important to note that CCS is a long-term option. It is presently in an early stage of development, and it is not yet clear when this technology will be cost competitive. If and when it does see adoption, wide-scale use of CCS in Europe should only occur in parallel with comparable actions in major competing regions of the world.

Overall there is sufficient diversity in Europe to justify using all fuel sources and all forms of distribution, but it would be sub-optimal for every country to have this as an objective.

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## RECOMMENDATIONS

- Speed up implementation, especially with respect to increased investments in more efficient and effective infrastructure.
- Link EU energy infrastructure investment programmes to further liberalisation plans. Better infrastructure will improve physical availability and market liquidity. Excess distribution capacity is the first step to allow new innovative supply solutions to be developed and should be factored into any infrastructure investment supported by public funding.
- Make use of every fuel source in the energy mix including nuclear, gas, coal and renewables.
- Focus public funding on driving down technology costs rather than increasing deployment of (frequently inappropriate or over-costly) technologies.
- Avoid encouraging use of natural gas in highly priced elastic areas such as transportation to avoid aggravating price volatility.
- Ensure all new uses for combusting fossil fuels have a long-term sustainability option that can enable them to be close to zero in GHG emission.

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## CONTRIBUTIONS FROM CHEMISTRY

Chemical products and technologies contribute to multiple points in the supply chains that are essential to long-term energy security. Examples include the widespread use and increasing innovations in the use of Dow epoxies and polyurethanes to coat transportation pipes. Dow's advanced amines technology is also being used to capture CO<sub>2</sub> from fossil-fuelled power plants. By assuring the long-term sustainability of coal we are improving the security of supply regionally within the EU and more broadly on a global basis.



# Alternative, Cleaner and Renewable Energy and Feedstocks

## OVERVIEW

The EU has set itself a binding target of 20% of final energy consumption to come from renewable energy sources by 2020. For 2007, the most recent year where comprehensive data exist, the EU was less than half-way towards meeting this target (with 118 Mtoe of energy generated from renewable sources). A new energy technology typically takes about 30 years to achieve 1% global market share. Different strategies are required to promote renewables and alternatives depending on their stage of development.

The EU has an established track record in developing renewable and alternative sources of energy. Best practice examples include a number of cases of first-mover initiatives in solar and wind, as well as the nuclear programme in France. While renewables and low carbon alternatives are generally more expensive than the fossil fuels they compete with, typically they have lower variable costs and higher up-front investment costs. Hence where needed, support from public authorities should aim to help bridge this investment gap.

## WHAT MORE IS NEEDED

Technologies in an early stage of development need policies that primarily focus on driving down costs as opposed to increasing penetration. Examples in this category include CCS and offshore wind. Public policy has often focused too strongly on building a market for renewable energy technologies, when resources would have been better utilized in ensuring that EU manufacturers can supply that market.

Much of the recent EU legislation to promote renewables has also added burdens to an already relatively costly manufacturing base, creating a further competitive disadvantage for EU manufacturers. Driving down costs throughout the supply chain must be a priority for both renewables support programmes and other initiatives (such as research and technology) that can improve competitiveness.

As the goal is to optimize energy security, environmental protection and economic sustainability, targets to drive uptake of renewable energy should reflect this need for integrated approaches. To be effective, targets must be technology and fuel-source neutral. Badly designed targets may actually mitigate against achieving the stated policy objectives.

In general, programmes should aim to address both environmental sustainability and security of supply. Viable long-term solutions also require adequate consideration of economic sustainability. This has not always been the case and resulted in credibility-damaging corrections during the life of the programme.

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## RECOMMENDATIONS

- Utilise well-designed investment grants to make more effective use of public money as opposed to an over-reliance on FiTs (Feed-in-Tariffs).
- Evaluate the effectiveness of the subsidy compared to an investment in efficiency that would achieve the same policy aim. Set Euros spent per ton of GHG avoided as a standard measure of programme effectiveness.
- Develop long-term transition plans for alternative and renewable energy technologies that clarify when and how they will achieve cost parity with existing energy forms, in order to facilitate planned phase-out of subsidies.
- Where subsidies for renewable and alternative energy sources are necessary, ensure they are used to bridge the up-front investment challenge rather than simply driving increased consumption.

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## CONTRIBUTIONS FROM CHEMISTRY

Chemical technologies underpin many of the high performance materials that will be essential to the ultimate goal of producing cost effective renewable and alternative energies. For example, Dow products enable solutions to the massive engineering challenges behind offshore wind:

- Epoxy resins to provide the strength and rigidity for composite wind turbine blades.
- Coatings that protect the steel structure against corrosion.
- Lubricants that increase output efficiency under extreme operating conditions.

A material increase in battery power is required both to enable wide-spread electric transportation, but also as a means of storing the intermittent power that most renewables deliver. The Dow Kokam joint venture to produce lithium-ion batteries is therefore another example of how our Company is also indirectly contributing to the more efficient use of alternative energy sources.



# Lower Carbon Economies

## OVERVIEW

The global climate goal envisages a 50% reduction in greenhouse gas emissions by 2050. While Europe's greenhouse emissions have declined (already down to 89% of 1990 levels for the EU-27 by 2008), global GHG emissions are continuing to rise at an increasing rate.

The final consumer cannot distinguish between low- and high-carbon forms of energy and electricity, other than through the fact that low-carbon energy supplies generally cost more. Thus the transition to a lower carbon economy will require some form of a carbon price or cost to make low-carbon energy commercially viable. Carbon pricing policy must, however, take full account of the global context to avoid unintended consequences such as carbon leakage.

Europe is ahead of most other regions of the world with both its carbon reduction targets and policy measures, through tools such as the EU Emissions Trading System (ETS). Ultimately, the transition to a low-carbon economy must be global, so the external dimension of the EU2020 energy policy is a welcome development, although concrete actions must urgently follow.

## WHAT MORE IS NEEDED

The first step must be to slow the global rate of increase ahead of deployment of effective and sustainable measures to reverse global GHG emissions. The 20% GHG reduction target between 1990 and 2020 already represents the most aggressive target amongst Europe's main competitors.

Certain aspects of de-industrialisation in the EU have actually increased the net level of global GHG emissions. Shifting the manufacture of GHG-intensive building blocks such as chemicals from Europe to other regions with more carbon-intensive energy mixes (in many cases to make products that are then exported back to Europe) is one such example. In several areas, including chemicals, the EU is a much more efficient producer in terms of output per ton of CO<sub>2</sub> produced than other global regions. Policies that actively enhance manufacturing in Europe will therefore reverse this unintended impact of indirect global GHG growth. Conversely, any increase in Europe's target without comparable absolute reductions by all other major economies would exacerbate the problem and only serve to increase net global emissions. Resolving this is the next leadership issue that the EU must tackle.

This situation impacts policy options in multiple areas including:

- Carbon pricing, both in the short- and long-term. In particular, a lower-than-anticipated regional carbon price should not be a major concern, as a price that is currently too low will be compensated by a higher-than-anticipated future price. It is always the relative as opposed to the absolute carbon price that impacts competitiveness and carbon leakage.

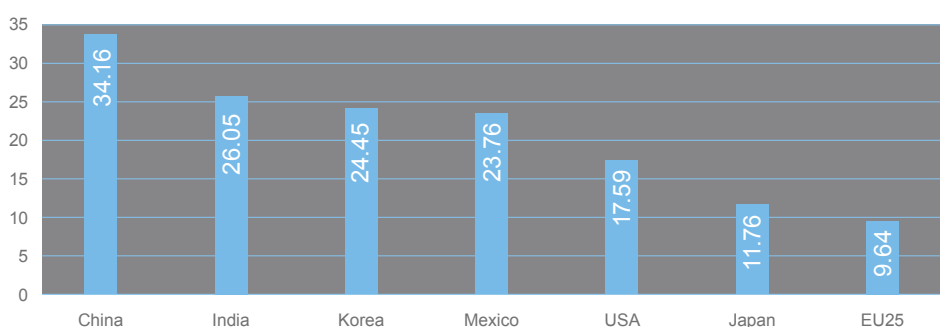
- The need to tackle sustainable consumption as well as sustainable production. This will also help to address the problem of the higher embedded carbon in imports.
- Taking due account of the value of making GHG-intensive products in GHG-efficient regions of the world.

This in turn means that policy measures like the ETS will require more robust transitional exemptions as the EU is likely to face higher carbon prices relative to its competitors than initially envisaged.

Ultimately, resource-efficient manufacturing is the first step towards a low-carbon economy. As much of this efficient manufacturing will rely on high-performance synthetic materials, a virtuous improvement cycle can be created with the right policies.

Ultimately the value of genuine EU leadership will be to demonstrate more cost effective processes for the transition to a lower carbon economy, demonstrating that this can be made the best economic option.

### ENERGY CONSUMPTION PER SALES IN THE CHEMICAL INDUSTRY IN SELECTED COUNTRIES



Sources: IEA (2007) "Tracking industrial energy efficiency and CO<sub>2</sub> emissions", Eurostat and Cefic

### RECOMMENDATIONS

- Develop a differentiated plan to tackle the options where some form of public funding or support for low-carbon alternatives is required. This will include governments taking on more of the risks for the earlier stage alternatives and being a more proactive supporter of enabling infrastructure and accelerating demonstration for the more developed options where the private sector will primarily drive deployment.
- Ensure that in the short-term policies aim for low-carbon prices but seek to spread carbon costs as broadly as possible. The goal is to have everyone join the carbon club, and this is best achieved via low entry prices. This also has the advantage of ensuring that at least initially there is a strong focus on lower cost efficiency solutions as the first priority.
- Focus on improving the relative GHG intensity of manufacturing at EU manufacturing sites rather than reducing European output and exporting the problem to less efficient regions.

### CONTRIBUTIONS FROM CHEMISTRY

Catalysis, which is the foundation for the chemical industry, is the ultimate example of resource efficiency and thus a perfect example of how the chemical industry and its customers can increase production while decreasing carbon emissions.

All advanced material production relies on a chemical feedstock or uses chemicals during its production processes. Any low-carbon economy will therefore require an increasing quantity of such products. The chemical industry will continue to produce such products offering higher and higher performance while in parallel producing products with a lower carbon footprint.



# Water Policy

## OVERVIEW

The chemicals sector reduced water abstractions across Europe by 8% between 2003 and 2006 through the use of water recycling, changes in processes and efficiency improvements. By adopting a water-efficient culture, Dow has reduced the amount of water used per pound (equivalent to 454g) of product by 35%.

Water is the single most important chemical compound for human survival. Yet today, more than a billion people across the globe lack access to safe drinking water. Water is also one of the key enablers of the creation of wealth and a pivotal element of the manufacturing process. Managing these twin needs must be the overarching objective of European water policies.

While Europe is largely considered to have adequate water resources, water availability problems are increasingly prevalent. Differing climates and economic situations mean that some Member States are more severely affected than others, and this situation will be further exacerbated by climate change.

## WHAT MORE IS NEEDED

20-40% of Europe's available water is being wasted, according to the European Commission, through problems such as leakages in the supply system, inadequate use of water-saving technologies, unnecessary irrigation and dripping taps.

Technology provides solutions to a number of water challenges through purification and distribution of water. Regulatory barriers exist to more widespread deployment of water purification technologies, such as multiple national systems for product registration. Nevertheless, technology alone will not solve this potential crisis; it will require a sound strategy incorporating water management, infrastructure, investment, agricultural / industrial / domestic use and education. The primary driver for success in dealing with these challenges is the willingness of the private and public sectors to work together using an integrated approach that goes beyond technology to include the will and commitment of all stakeholders.

The right to water entitles everyone to a sufficient amount of accessible and clean water to cover basic needs. Business is part of society and has a legitimate need for water, just like other stakeholders. As an industrial user, Dow has a strong appreciation of water as a valuable resource, and believes that all users—including business and industry—must be willing to pay a fair price for water. At the same time, we recognise that the right to water cannot be separated from the mechanisms to make the price affordable. Incentives should be used to encourage investment in more water-efficient irrigation technologies, industrial processes and household appliances. As the EU moves towards adoption of the Blueprint to Safeguard European Water, industry will look to actively participate in a dialogue involving all stakeholders, which will lead to the necessary infrastructure and ecosystem policies. Additionally, in July 2010 the United

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Nations adopted a standard on Human Right to Water calling for greater efforts to provide safe, clean, accessible and affordable water and sanitation. All economic sectors require water in order to operate. Government, business and civil society must therefore work together to provide affordable access to water to cover basic human needs.

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## RECOMMENDATIONS

- We—industry—want to participate in processes involving all stakeholders that will lead to the necessary infrastructure and ecosystem policies to safeguard Europe's water.
- Promote technologies and a water-saving culture that lead to lower infrastructure costs and greater transmission efficiency, recognising that the chemical industry is a significant part of the solution.
- Provide lead markets and incentivise product uptake of innovative solutions that help provide drinking water at low cost.
- Adopt pan-European regulations for product registration of mobile water purification solutions in order to reduce unnecessary red tape associated with the regulatory patchwork throughout the EU.

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## DOW'S CONTRIBUTION

- In Stade, Germany, Dow recycles wastewater generated from propylene oxide production back to the brine mining operation. This results in 10 million cubic metres per year of freshwater conserved and, correspondingly, about 10 million cubic metres per year of wastewater not discharged.
- Dow Water Solutions has started construction of its Water Technology Development Centre at the Dow facilities in Tarragona, Spain. The centre is a key component of Dow development and component testing, which is designed to accelerate the commercialisation of Dow's water treatment technologies, which helps to enable the production of clean drinking water from various water sources, including seawater.
- Dow has partnered with RS Technik to propose an innovative trenchless pipe rehabilitation system with which water authorities will be able to extend the service life of existing infrastructure by 50 years.
- Dow's Benelux site in Terneuzen, the Netherlands, uses the community's wastewater in manufacturing plants and again in cooling towers before releasing it as water vapor. This process re-uses 9.9 million litres of water per day and uses 65% less energy.
- Dow's reverse osmosis and ultrafiltration membrane technology combined with ion exchange resins are driving energy efficiency and cost savings in municipal and industrial wastewater reclamation processes. One example of this is in the treatment of produced water in oil and gas extraction, which through the use of Dow elements is preserving the environment and reducing demand on fresh water.



# Trade Policy

## CONTEXT

Present in 20 European countries with 64 manufacturing locations, Dow Europe represents approximately one third of the Company's total global sales (\$15,4 billion in 2009).

When freely and fairly applied, global trade liberalisation is one of the most powerful forces for global economic development, underpinning the path to sustainable development for both developed and developing countries. Thoughtful trade and investment policies help to raise standards of living, expand consumer choice and increase global prosperity.

It is no exaggeration to say that Europe's global competitiveness is built on trade. The EU is the biggest global actor in international trade, with its 27 Member States collectively accounting for 19% of the world's imports and exports. European Commission figures show that Europe is the world's largest exporter of manufactured goods and services and provides the biggest export market for more than 100 countries. Some 36 million jobs in the EU depend, directly and indirectly, on trade, representing 18% of the total European workforce, according to Commission figures.

Liberalised trade is at the heart of the EU2020 post-crisis growth strategy. It is widely recognised that protectionism is not the answer to the challenges presented by the crisis and that maintaining open markets is crucial to delivering renewed growth globally. The Commission estimates that the EU economy could increase by up to €150bn, or 1% of GDP, through the completion of trade deals already under negotiation and through effective engagement with the EU's strategic trade partners. Yet, many barriers remain to the realization of this potential. The EU2020 trade strategy sets out a number of positive measures for overcoming these hurdles, including the need to ensure and enforce reciprocity from Europe's trade partners in opening their markets.

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For European manufacturers operating in global markets, an open trade agenda is essential. Open markets are particularly crucial to the competitiveness of the EU chemical industry, delivering access both to feedstocks (raw materials used in the manufacturing of chemicals) and to new manufacturing customers and environments. The industry's globalised supply chains also require open markets to thrive. Around two-thirds of the EU's imports are inputs to other products. As a result, free trade policy helps embed local companies in global production chains, making them more competitive and creating jobs in Europe.

Export sales to the world market are an important element of the industry's competitiveness. Key emerging markets like China, India, Brazil, Russia and ASEAN are projecting annual growth rates up to three times greater than that of mature markets such as the US and the EU. To facilitate access to these rapidly expanding domestic markets, it is essential for the EU to promote fair, reciprocal access through commitments to the rules-based trading system, tariff reduction and the removal of non-tariff barriers.

Maintaining the competitiveness of European manufacturing requires a level playing field globally, built around free and fair trade relations with key EU trading partners. All parties should be productive contributors to the multilateral rules-based trading system and should benefit from transparent and efficient mechanisms for dispute resolution. The goals of this process should be reciprocal market conditions with zero to low tariffs, high legal and investment standards, the reduction and/or removal of non-tariff barriers, and commitments to protect and enforce strong intellectual property rights.



# Free Trade Agreements & Strategic Partnerships

## OVERVIEW

Maintaining the competitiveness of European manufacturing requires a level playing field globally, built around free and fair trade policies with key EU trading partners. The EU is a leader in promoting and maintaining a largely open-access market, and its policies have consistently supported strategic and aggressive multilateral, bilateral and regional initiatives.

Trade liberalization through a substantial reduction, or elimination, of tariffs will yield tremendous benefits for Europe's manufacturers and broader economy.

Commercially meaningful trade negotiations and strategic partnerships are essential to both secure market access and enable strong and sustained economic growth in both developed nations and emerging economies. The chemical industry is firmly supportive of and actively involved in promoting this approach, but much remains to be done.

## WHAT MORE IS NEEDED

Elimination of world-wide tariffs on chemicals would save Dow \$170 million per year—funds that could be used for capital investment, innovation or research.

Dow welcomes EU efforts for a clear mandate and more coherent approach by the EU institutions and Member States. Equally critical are an enhanced regulatory dialogue, competency building and other forms of economic and trade cooperation with new and traditional strategic trading partners such as Russia, China and the US.

Dow would support the establishment by the European Commission of formal industry advisory groups, including business and NGOs—similar to the recently formed Market Access Advisory Committee—to provide data input into the trade negotiation process.

### Multilateral Trade Agreements

The EU, as a leading partner in the World Trade Organization (WTO), is actively engaged in the Doha Development Agenda (DDA) negotiations, which support efforts to open new markets in developing countries and to integrate their economies into the global marketplace. A proposal backed by the EU and the US to eliminate tariffs in all advanced chemical-producing countries is on the table in the DDA.

### Bilateral/Regional Trade Agreements

Bilateral and/or regional free trade agreements (FTAs) focus primarily on tariff reductions but increasingly also address non-tariff barriers, including customs processes, bureaucracy, discriminatory investment, corruption, intellectual property rights and regulatory cooperation.

The EU has 30 FTAs and economic partnership agreements, including its landmark FTA with South Korea and deals with Colombia, Peru and the Central American region, all concluded in 2010.

The EU is negotiating another eight FTAs with such leading economic partners as India, Canada, Mercosur (Brazil, Argentina, Uruguay, Paraguay) and the 10-country Association of Southeast Asian Nations (ASEAN). Within ASEAN, it is targeting Singapore, Malaysia and Vietnam for potential high-quality bilateral agreements. Effective and efficient conclusion of these negotiations will deliver a significant boost for European manufacturers.

### Strategic Partnerships

The EU2020 trade strategy outlines a commitment to a more coherent, cooperative inter-agency approach (including the European Parliament and the new European External Action Service) to working with key trading partners such as Russia, China and the US.

Dow welcomes the adoption of this high-level agenda with coordinated positions on critical issues including trade, the environment and energy. The Transatlantic Economic Council (TEC) is an example of high-level dialogue that would benefit from prioritization of key commercial issues.

## RECOMMENDATIONS

For Dow, the EU-India Free Trade Agreement would result in tariff savings worth \$32 million annually, if all chemical tariffs came down to zero.

### Multilateral Trade Agreements

- Secure agreement on the chemical sectoral tariff elimination proposal under consideration within the DDA that would include all advanced chemical producing countries (with over \$3 billion in chemical production), especially the US, the EU, Brazil, China, India and South Africa.

### Bilateral / Regional Trade Agreements

- **India:** Push for improvements to India's investment climate and full tariff liberalisation on chemical goods, including aggressive liberalisation of all sectors covering products identified on India's "black list."
- **ASEAN:** Focus on Thailand, Vietnam and Indonesia—all key investment destinations for chemical producers—to build a high-quality, rule-of-law commitment to the market and to support increased customer production and exports into the EU.
- **Mercosur:** Ensure a comprehensive agreement, particularly with Brazil and Argentina, to achieve zero duties for EU imports and to support market access for European inputs.
- **Gulf Cooperation Council:** Promote access to key raw materials, especially feedstocks, and establish strong rule-of-law precedents for chemical producers to leverage these fast-growing markets and support development of high-quality regulatory infrastructure.

### Strategic Partnerships

**Russia:** Russia's accession to the WTO on commercially meaningful terms should be actively promoted as a means of building capacity, assuring the rule of law and extending investor protections. Upon WTO accession, negotiating the renewal of the EU-Russia Partnership and Cooperation Agreement should be a priority as it could lead to a comprehensive EU-Russia FTA. In this context, the continuation of the EU-Russia Regulatory Cooperation Dialogue is a vital forum to advance regulatory cooperation on trade policy and chemicals management.

**China:** Industry welcomes EU efforts to develop a more integrated and proactive China strategy. This should continue to be coupled with positive dialogue and regulatory cooperation aimed at resolving key policy issues in order to create a more open investment environment and a level playing field. Critical issues for European manufacturers include improved access to the government procurement market and the establishment and promotion of innovation policies that do not discriminate between foreign and domestic suppliers. Innovation policy needs to incorporate best practices related to intellectual property rights (IPR), encompassing acceptance of foreign-owned IP irrespective of source or location. This will ultimately allow the European chemical industry to contribute global technologies to Chinese customers – in manufacturing, services and in agriculture – and will be a key contributor to mutual growth. An improved IPR regime, including reinforced customs control and border management, will also support the Chinese domestic market. Many companies also face counterfeiting problems in China. For example, 30% of agricultural chemical products sold in China are counterfeit, according to CropLife International. These products and trademark counterfeiting issues both threaten China's agricultural industry and undermine its domestic regulatory procedures.

**US:** As the world's largest trading partnership and jointly champions of free trade, the EU and the US should work together towards a more cohesive approach to providing leadership in the closure of a commercially meaningful WTO Doha Agreement. Furthermore, they should reinvigorate the TEC, a forum with the capacity to bring together high-level political leadership, on priority issues including:

- Encouraging global standardization of customs processes and mutual recognition of customs security standards, such as the European Authorised Economic Operator (AEO) and the US Customs Trade Partnership Against Terrorism (CTPAT).
- Securing a path forward for regulatory cooperation, with a goal of avoiding differing or conflicting policy approaches, including on energy efficiency, substitutes for raw materials, bio-economy and ICT.
- Assessing and promoting development of priority incentives to enable car producers to promote electric cars.



# Advanced Trade Policy

## OVERVIEW

The EU's advanced knowledge-based economy bestows a strong competitive advantage in the global marketplace, particularly in sustainable technology markets such as chemicals. By the same token, Europe's high-standard regulatory system can also confer benefits on European manufacturers, provided European trade and economic partnerships effectively promote higher standards of engagement by third countries.

The EU2020 trade strategy rightly highlights the benefits of trade and access to open markets for Member States, key industries and consumers. Advanced Manufacturing policy should seek to pursue a trade liberalisation agenda in parallel with efforts to ensure enforcement of commitments to international standards and principles of environmental and social practice, complementing the specific expertise of multilateral for such as the International Labour Organization (ILO).

## WHAT MORE IS NEEDED

The movement of goods across the EU's external border amounted to 183 million customs declarations in 2007. Each year, more than 40,000 suspect shipments are stopped at customs.

### Non-Tariff Barriers

Next-generation trade agreements are an important mechanism for broadening the standard trade template and creating a more coherent approach to removing non-tariff barriers, such as customs inefficiencies, bureaucracy, discriminatory import-licensing schemes, opaque and/or arbitrary regulatory requirements and standards, or discriminatory investment conditions:

- Local regulation and standards can de facto represent market access barriers. Dow supports the European Commission's position in the new EU Industrial Policy that "the ultimate aim [should be] the convergence of rules and standards at the international level whenever possible," and that "rules and standard-setting should be based on better regulation principles and thus be as cost-effective as possible."
- Discriminatory use of import licenses applied to foreign but not domestic operators hinders the import of inputs necessary for local manufacturing by foreign investors.

### Intellectual Property

Even with good laws, there are significant problems enforcing intellectual property rights in third countries. The EU makes ongoing efforts on this issue, but more needs to be done.

### Trade Facilitation

A critical component of the advanced trade policy template is a strengthened focus on trade facilitation, particularly reform, standardization and harmonization of customs treatments. Customs agencies' traditional focus has expanded in recent years to include the implementation of new political priorities such as national security, contributing to a decline in speed and efficiency. Standardization would enable manufacturers to implement appropriate supply chain security measures and minimise the time and resources needed to trade across borders efficiently.

### Preferential Rules of Origin

Determining the origin of a product is increasingly difficult for both customs administrations and manufacturers. Preferential origin confers tariff benefits on goods traded between countries with either a bilateral agreement or autonomous preferential arrangements, such as the Generalized System of Preferences (GSP).

The EU's proposed reforms aim to simplify administration and introduce new procedures that could be extended to all EU bilateral free trade agreements. The Commission's enhanced proposal for the preferential rules of origin, issued in September 2010, includes a sectoral exception for chemicals in the GSP based on value-added, change

## Trade and Environment

Under the Doha Development Agenda (DDA), the EU and US proposed a tariff elimination package for “environmental goods and services.” With the outcome of the DDA negotiations uncertain, the EU and the US are suggesting that the agreement could be a stand-alone, voluntary set of commitments among governments to increase the availability of such technologies in key parts of the developing world.

However, no acceptable definition of “environmental goods and services” has yet been established, and the impact of such a tariff elimination package remains unclear. Indeed, the current proposal could discriminate against chemically produced goods by failing to recognise their often superior performance across the entire life cycle. To prevent these unintended but potentially severe consequences, this liberalisation process should go hand-in-hand with a chemicals tariff elimination agreement.

## Trade Sustainability Impact Assessments (SIAs)

Effective use should also be made of SIAs, policy tools that analyse the economic, social and environmental implications of a trade negotiation. The new EU trade strategy will reinforce this practice, with broad consultation with all stakeholders (including industry) and a full analysis of the impacts of trade agreements for Europe before signing.

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## RECOMMENDATIONS

### Non-Tariff Barriers

- Ensure even stronger use by the European Commission of the Market Access Advisory Committee to resolve market access issues with key EU trading partners, while also pursuing more binding commitments within trade negotiations.

### Intellectual Property

- Increase capacity-building efforts to educate the judiciary on IP infringement precedents in key manufacturing territories to ensure fair, efficient and strong standards of application of IP law.
- Preserve and promote strong data exclusivity requirements for patent and regulatory submissions.
- Eliminate agricultural-chemical counterfeiting as a priority. Initiate outreach programmes to local regulators to support enforcement of domestic regulation and help create local government support for more effective anti-counterfeit measures.

### Trade Facilitation

- Implement a uniform system of standardised customs processes, efficient customs clearance and mutual recognition of customs and security-related standards.

### Rules of Origin

- Harmonise rules of origin regionally and globally.
- Promote and support initiatives to effectively ensure that all ports of entry within a country treat imports in the same way.

### Trade and Environment

- Ensure that any “environmental goods and services agreement” incorporates a chemical sectoral agreement within the WTO, reducing tariffs to zero over a specific time period and covering all major chemicals producer countries including China, Brazil and India.
- Promote regulatory cooperation underpinned by a common set of scientific thresholds (building on the OECD’s work in this area) to reduce the disparities between currently diverging national health and environmental regulations.

### Sustainability Impact Assessments

- Continue to maintain a balance between all three pillars of sustainability in SIAs and ensure that relevant environmental and social provisions—such as chemicals management or labour standards—are dealt with in the appropriate multinational fora.

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## DOW'S CONTRIBUTION

Dow takes proactive leadership among European manufacturers and importers committed to contributing to the EU Market Access Advisory Committee. With specific regard to Russia, this includes advocating for:

- An appropriate customs clearance infrastructure and capacity at the Russian borders and in the Moscow region (including its metropolitan area).
- Proper staffing of customs posts and training for customs officials.
- Maintaining commercially relevant checkpoints in Russia so that importers can continue to be competitive in supplying value-added products to the Russian market.



# Access to Raw Materials

## OVERVIEW

The OECD has demonstrated that over half of WTO members applied export duties to raw materials between 2003 and 2009. In late-2009 the European Commission identified 1200 export restrictions for raw materials facing the EU.

The European chemical industry relies upon a variety of raw materials, frequently sourced along global supply chains. Efficient, predictable and cost-effective access to these materials is essential to the overall competitiveness of European manufacturing. Today, many barriers exist, requiring comprehensive reform of both the external and internal policies of the EU.

The external dimension concerns export restrictions or domestic policies imposed by Europe's trading partners, which are increasingly used to restrict access for EU manufacturers.

The internal dimension relates to EU policies that create difficulties for manufacturers in accessing certain types of raw materials at world market prices, through mechanisms such as the Common Agricultural Policy (CAP), renewable energy support schemes and the upcoming reform of the Generalized System of Preferences (GSP).

## WHAT MORE IS NEEDED

### Access to Rare and Critical Raw Materials

Innovative, resource-saving technological developments in key European manufacturing sectors depend upon the use of mostly imported rare metals, minerals and other critical raw materials, including tin, antimony, cobalt, gallium, cerium, indium and magnesium. These materials are used, for example, as components in formulations for the production of consumer and electronic goods such as mobile phones, LCD displays and automotive components.

Dedicated policy efforts to ensure cost-competitive access are essential for the overall health of European manufacturing. EU authorities have addressed this issue through the Raw Materials Strategy. In 2010, the European Commission identified 14 critical raw materials for the EU's high-tech and eco-industries that require supportive policy measures. Equally, the EU2020 trade strategy has proposed actions to address the issue of countries that hoard raw materials and energy sources.

The chemicals industry welcomes the Commission's actions to date, but further significant barriers exist that must be addressed.

### Energy-Related Raw Materials

Dow operates at the nexus of energy and manufacturing, using energy and energy-related feedstocks as basic building blocks for the production of modern materials.

There is growing competition for renewable raw materials for food/feed, energy and industrial goods. Chemical companies and policy-makers support greater use of renewable materials as manufacturing feedstocks; today, renewables make up 5-10% of total feedstocks used by Europe's chemicals industry. However, without an appropriate framework behind this effort, it will be challenging to raise this threshold.

The European chemical industry increasingly lacks access to renewable feedstocks at world market prices. This places the industry at a significant competitive disadvantage against their international counterparts. A number of distorting policies are driving this trend. They include renewable energy support schemes, which result in import barriers and in subsidies for the use of certain renewables for energy production but not for industrial inputs, as well as the fact that many renewables fall under the CAP, leading to high tariffs or quotas and correspondingly high prices in Europe.

### Generalized System of Preferences (GSP)

The GSP supports economic growth in developing countries by granting certain countries duty-free access to Europe. At present, the EU unilaterally grants preferential market access for products from 176 developing and emerging countries. For many European manufacturers, the GSP is an opportunity to import key inputs at a lower cost.

The GSP system is under review in order to ensure that advanced developing countries—which may have competitive industries or a higher per capita income than some EU Member States—are not unnecessarily benefitting from “development” status. However, reform measures should safeguard European manufacturers’ access to certain vital materials at low or zero tariffs.

## RECOMMENDATIONS

In 2009, the EU and the US launched WTO action against China for restricting exports of certain industrial raw materials, including bauxite, coke, fluorspar, magnesium, manganese, silicon metal, yellow phosphorus and zinc.

### Access to Rare and Critical Raw Materials

- Utilise bilateral and multilateral agreements with trade partners to secure open markets for critical raw materials.
- Continue consultation with the manufacturing industry to ensure the most important raw materials—beyond the ones included in the 2009 joint EU/US WTO settlement case against China—receive highest priority.
- Trade in raw materials should be in compliance with WTO rules. Partner countries have the right to decide on the use of their own natural resources, but both domestic and foreign customers should have access to these raw materials.
- Where third country export restrictions are in place, the EU should make use of the WTO dispute settlement mechanism where all other options have been exhausted.

### Energy-Related Raw Materials

- Make renewable raw materials for chemical production in the EU available at world market prices.
- Reduce or eliminate tariffs and quotas for all (renewable) resources that serve as industrial inputs.

### GSP

- Liberalise trade with emerging countries through multilateral and bilateral trade agreements. Where agreements are delayed or not yet being negotiated, and particularly with developing countries, preferential access should be deployed as long as it is focused on promoting development without inhibiting European domestic competitiveness.
- Incorporate sector-specific product reviews into GSP reform to ensure that graduation of countries does not distort competition globally and that European manufacturers can continue to import critical inputs at low or zero tariffs.

## DOW'S CONTRIBUTION

Dow is committed to continuing to diversify its options for feedstocks, including increasing the use of renewables for industrial production and pursuing alternative energy sources. As part of its 2015 Sustainability Goals, Dow aims to have renewable energy provide 10% of Dow's global electricity demand in 2004 (Dow's base year for 2015 Sustainability Goals). In line with this, Dow recently announced that its largest manufacturing facility in Brazil, the Aratu Complex, will add biomass to its portfolio of clean energy sources by the end of 2012. Upon project completion in December 2012, Aratu will be more than 75% sourced for power and steam through hydropower and eucalyptus cogeneration.



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[http://epp.eurostat.ec.europa.eu/portal/page/portal/europe\\_2020\\_indicators/headline\\_indicators](http://epp.eurostat.ec.europa.eu/portal/page/portal/europe_2020_indicators/headline_indicators)

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[www.chemistry2011.org](http://www.chemistry2011.org)

ROSE (Relevance of Science Education) project:  
<http://roseproject.no/>

Global Product Strategy, under the umbrella of the UN Strategic Approach to International Chemicals Management (SAICM):  
<http://www.dow.com/productsafety/>

JetNet (Youth and Technology Network Netherlands): <http://www.jet-net.nl/?pid=76>

Use of renewables at Dow's Aratu complex:  
<http://www.businesswire.com/news/dow/20101201005165/en>

Business Award to student winners of Spanish National Chemistry Olympics:  
<http://www.dow.com/facilities/europe/spain/iberica/noticias/20101217a.htm>