EUROPEAN REGULATION AND INNOVATION FORUM – POLICY NOTE 36

ADDRESSING NEGATIVE REGULATORY OUTCOMES THROUGH BETTER REGULATION:

CONSIDERATIONS FROM ERIF

March 2024

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FOREWORD

As the EU seeks to deliver its ambitious socio-economic goals in the face of powerful economic and political challenges, there is an increasing interest amongst policy-makers in further strengthening Better Regulation and in considering examples of adverse regulatory outcomes.

The regulatory framework is one of the most important factors that determines where capital is allocated and the extent and form of investment in innovation. Delivering a greener, more strategically resilient and prosperous future for the citizens of Europe depends on attracting capital primarily from the private sector, and the development and application of all forms of innovation.

Utilisation by decision-makers of good regulatory practices and principles plays a vital role in achieving these goals. Their use helps ensure that regulatory interventions are both effective and legitimate. In turn, this contributes to creating and sustaining societal consent.

The European Regulation and Innovation Forum (ERIF, www.eriforum.eu) is an independent Brussels-based think tank focused on the advancement of Better Regulation in the European Union. We are pleased to offer our input to this debate.

This ERIF Policy Note draws on nearly twenty-five years of research. It sets out the purpose and characteristics of Better Regulation. It recognises that learning from examples of poor regulatory outcomes helps improve the design and effectiveness of future and existing government actions. The Note, therefore, focuses on seven core adverse regulatory outcomes and provides concrete examples drawn from our members across the 'material' economy. They illustrate, moreover, that many of the causes of regulatory failings are neither product nor sector specific: they are 'horizontal' and structural. Finally, the Note provides a set of recommendations designed to address these regulatory failings. These focus on allocation of capital, competitiveness, scientific integrity and Better Regulation.

Howard Chase
Chairman, European Regulation and Innovation Forum
March 2024

1. BETTER REGULATION – A CRITICAL GOVERNANCE CONCEPT

Throughout the OECD area, Better Regulation has become an important philosophy of governance. It seeks to strengthen consent to law-making and to the actions of the State needed to implement legal requirements. The EU is a world-leader in the application of Better Regulation principles and tools. As such, it is ideally placed to use this expertise to help deliver the ambitious socio-economic goals of the EU, whilst avoiding negative unintended consequences and sustaining the support of citizens.

Better Regulation programmes seek to ensure that laws, and the actions taken to implement them, are:

1. *Necessary, effective, and proportionate;*
2. *Based on credible evidence, particularly science, that supports the use of the powers of the State;*
3. *Informed by a transparent understanding of costs and benefits, particularly dynamic impacts, such as risk-risk;*
4. *Demonstrate that benefits justify costs;*
5. *Developed using transparent decision-making processes; and*
6. *Reviewable over time and subject to appeal and redress mechanisms.*

Tools such as stakeholder consultation, impact assessment, standards of scientific integrity, and ex post evaluation, supported by institutionalised oversight, political commitments, and laws of administrative procedure, are among the means by which the goals of Better Regulation are delivered.

Used well, Better Regulation provides a way of thinking about making and implementing law, that helps governments ensure predictability, avoid regulatory failure, and sustain legitimacy. It is at its most relevant for good governance when governments set out to deliver complex and far-reaching new policies that require extensive legal and regulatory decision-making, such as the European Green Deal.

However, the importance of Better Regulation for the effective delivery of the EU's ambitious goals is greater than this. It is a critical means of sustaining consent: a necessary pre-condition for policies that pursue widespread economic and social change. Alongside this, Better Regulation provides a set of tools and a conceptual approach that helps policy-makers overcome many of the challenges of policy and legislative design and implementation, that are embedded within the socio-economic goals of the green transition, strategic resilience and greater prosperity.

2. EXAMPLES OF ADVERSE REGULATORY OUTCOMES

Appendix I (attached) provides tangible examples of adverse regulatory impacts identified by ERIF's research, including insights provided by our members. These are drawn from ERIF's recent report on Novel Regulatory Polices in the European Union and from a previous report on the EU Administrative State.[1] These adverse impacts have been grouped under seven headings:

- Increased net risk to man and nature – "Risk-risk" tradeoffs
- Loss of critical technologies – Erosion of concept of 'safe use'
- Systemic uncertainty
- Diversion of resources away from innovation and competitiveness – 'Defensive R&D'
- Reduced incentives to innovate – 'Time-to-market'
- Structural damage to SMEs – Weakened economic ecosystem
- Disruption of value chains – Less competitive Upstream and 'Formulator' industries

3. RECOMMENDATIONS

In order to address these adverse outcomes, we recommend a policy and regulatory focus on the four key areas of allocation of capital, competitiveness, scientific integrity and Better Regulation.

3.1. Allocation of Capital

Investment is the sum of capital allocation decisions made by individual economic actors. Capital allocation decisions are made in the context of strategic risk, framework conditions, and risk adjusted rate of return relative to cost of capital. Investor expectations are strongly influenced by the fiduciary duty to investors and are set by global norms and alternative opportunities. Capital will consequently be allocated where risk adjusted rates of return are strongest, allowing for strategic risk and framework conditions.

Regulatory overload in the EU increases strategic risk, makes framework conditions more complex, and reduces risk adjusted rates of return. Capital allocation processes are consequently acting to allocate capital outside of Europe.

We strongly recommend that:

a) EU policy making needs to more deeply understand and to take account of the micro-economic factors driving capital allocation; and
b) All EU regulation should be subject to a Capital Allocation Test.

For more details, please see the ERIF Report on *Allocation of Capital, Novel Regulatory Philosophies and Better Regulation*.

3.2. Competitiveness Test

We see the three primary drivers of competitiveness as: Innovation, Operating Efficiency and Structural Adjustment. Regulatory overload, poor regulatory design and lack of coherence weighs negatively on all three of these areas. These failings need to be tackled systemically. We see an opportunity for the European Commission to unequivocally and consistently signal that competitiveness is the key to prosperity, resilience and transition.

[1] ERIF (2023), *Novel Regulatory Philosophies in the EU: Directions, Implications and the Role of Better Regulation*, Monograph, and ERIF (2019), *Risk Management and the EU's Administrative State: Implementing Law through Science, Regulation and Guidance*, Monograph.

We strongly support:

a) A Competitiveness Test that explicitly addresses the impact of regulation (both new and existing) on these three drivers;
b) A clear political commitment that Regulation not advancing competitiveness should be presumed not in line with EU objectives; and
c) The appointment of a senior Vice President of the Commission with an overarching mandate for competitiveness.

For more details, please see the ERIF Report on *Competitiveness Test and Better Regulation*. We also commend recent OECD work highlighting the policy interventions most likely to drive competitiveness (Appendix II).

3.3. Scientific Integrity

Our well-being as European citizens comprehensively depends on science and technology. This will be even more true in the future than the past. It is consequently of crucial importance that the best quality of available science is used in policy and administrative decision making.

We strongly recommend:

a) Common standards for scientific integrity in all regulatory decision making
b) Formal oversight mechanisms to enforce the use of common standards
c) Independent scientific appeals mechanism
d) Restated understanding that our shared social goal is effective management of risks and not elimination of hazard (which is neither feasible nor desirable)

For more details, please see attached ERIF Report on *Scientific Integrity, Novel Regulatory Philosophies and Better Regulation*.

3.4. Better Regulation

We believe that the EU has developed a global competitive advantage in the application of Better Regulation principles, policies and tools. We see a continued opportunity for the European Commission to lead the development of Better Regulation in the four key areas of: Regulatory Policy, Law Making Processes, Implementation Standards and Due Process Standards.

We strongly believe that the European Commission and other EU institutions should:

a) Develop and adopt a comprehensive Law of Administrative Procedures
b) Enhance the focus of regulators on the dynamic impacts of interventions
c) Restate the meaning and use of the Proportionality Principle in regulation
d) Strengthen networking with Member States
e) Strengthen the mandate of the RSB to assess the opportunity costs (benefits foregone) of regulatory proposals and not only the direct administrative cost burden

For more details, please see the ERIF Report on *Better Regulation, Prosperity, Transition and Resilience – Ideas for the New Commission*.

European Regulation and Innovation Forum
March 2024

Richard Meads and Lorenzo Allio, the Rapporteur and the Senior Policy Analyst at the European Regulation and Innovation Forum, wrote this Policy Note. However, the views and opinions expressed in this paper do not necessarily reflect or state those of the European Regulation and Innovation Forum (ERIF) or its members.

APPENDIX I – NEGATIVE REGULATORY OUTCOMES: ILLUSTRATIVE EXAMPLES

This Appendix consolidates examples from a number of different business sectors, grouped around the seven negative impacts mentioned above, namely:

- Increased net risk to man and nature – "Risk-risk" tradeoffs (section 1.0.)
- Loss of critical technologies – Erosion of the concept of 'safe use' (2.0.)
- Systemic uncertainty (3.0.)
- Diversion of resources away from innovation and competitiveness – 'Defensive R&D' (4.0.)
- Reduced incentives to innovate – 'Time-to-market' (5.0.)
- Structural damage to SMEs – Weakened economic ecosystem (6.0.)
- Disruption of value chains – Less competitive Upstream and 'Formulator' industries (7.0.)

Principal Sources:

— ERIF (2023), *Novel Regulatory Philosophies in the EU: Directions, Implications and the Role of Better Regulation*, Monograph.

— ERIF (2019), *Risk Management and the EU's Administrative State: Implementing Law through Science, Regulation and Guidance*, Monograph.

1.0. Increased net risk to man and nature – "Risk-risk" tradeoffs

In a number of instances, the imposition of regulatory requirements has led to an increase in net risk. This has occurred for a number of reasons. Mandatory substitutions or restrictions on usage have led to the use of less safe replacement technologies or products. High costs of complying with safety testing have triggered the removal of existing substances or products creating new risks or reducing mitigation of existing ones. And, the cost of replacement technologies has triggered behavioural change and subsequent increases in risk.

- In the case of **veterinary medicines** over 70% of existing products have been withdrawn from the market since 1991 because of the costs of meeting new safety requirements. In most cases they have not been replaced because of the small size of markets and the high level of capitalised costs of product development, due, in part, to regulatory requirements. As a result there is a medicine availability crisis for many animal species and gaps in the armoury of products needed to protect against zoonotic diseases. *[cfr. EU Admin. State Monograph, Exhibit 18]*

- There is a similar problem with **biocides**: a range of speciality products that are essential to protect human life and property from pathogens. Since the mid-1990s, the number of actives has fallen from 1100 to less than 250, and almost none have been replaced. This loss of actives, particularly when faced with the need to combat biological mutation, poses major risks to human health. *[cfr. EU Admin. State Monograph, Exhibit 18]*

Another form of risk-risk emerges when proposed regulatory interventions restrict the use of technologies that currently limit negative health or environmental impacts. For example, exploitation of material technologies, and their complex properties, plays a major role in delivering the political goals of the green transition. They are of critical importance, for example, for mobility, energy storage, new and renewable forms of energy, transmission of energy, reduced emissions and environmental damage, greater circularity and facilitating changes in consumer and user behaviour. New regulatory initiatives will, if implemented without reform, may make it more difficult to continue to exploit these technologies.

- **Polycarbonates** are complex speciality plastics with unique properties. They are fully recyclable mechanically or chemically and are a material of choice in applications important for strategic resilience, such as automotive, electrical and electronics, building and construction and healthcare. In healthcare, for example, polycarbonate materials are of critical importance for the effective treatment of kidney disease via dialysis. Their environmental impacts are also significant. For example, polycarbonate technology is used in automotive components to reduce weight, thereby cutting energy consumption without compromising safety. LED lighting can withstand high temperature deviations and harsh conditions thanks to polycarbonates. Battery casings in Electric Vehicles (EVs) use polycarbonates. The sector is also highly innovative, creating new carbon neutral materials for example. *[cfr. NRP Monograph, Exhibit 17]*

- **Adhesives and Solvents** are products based on these advanced formulations provide bonding and sealing solutions to a significant part of the EU's industrial economy. These include major environmental benefits. Their properties facilitate energy efficiency, material efficiency, repairability, durability and recycling. In the automotive sector, for instance, they enable the use of composite materials, reducing weight and fuel consumption. Similarly, they enable the use of composites for wind turbine blades, making renewable energy generation more economically feasible. In the construction sector, the widespread use of adhesive and sealant products helps improve material efficiency through less waste and more advanced construction methods, as well as cutting energy use and reducing GHG emissions by up to 80% through improved thermal insulation. *[cfr. NRP Monograph, Exhibit 17]*

- The properties of **cobalt metallic technologies** are of critical importance for the green transition. Batteries used for energy storage, mobility, building and construction, digital infrastructure and consumer electronics, rely upon cobalt technology for properties such as safety and longevity. Cobalt compounds are used as catalysts to improve the quality of fuels and to reduce GHG emissions from thermal engines. Complex alloys containing cobalt and exploiting its properties are used in wind turbines, jet engines, process pipes and valves, as well as high wear applications in nuclear energy production and defence. Cobalt in hard metal enables some of the most efficient cutting and drilling tools used across industrial and professional applications. Cobalt technologies also contribute to health, as a micro-nutrient in animal feed and in many medical devices, such as orthopaedic implants. (Cobalt is also one of thirteen critical and strategic raw materials identified by the EU in the Critical Raw Materials Act.) *[cfr. NRP Monograph, Exhibit 17]*

- **Silicone chemistry** – these unique materials, offering important properties including heat resistance, durability and thermal stability, play an indispensable role in the transition to a more sustainable economy. In building and construction, for example, silicone chemistry is used in structural glazing, improving energy performance. It is also widely used in the generation of renewable energy, for example in encapsulants for solar panels and in lubricant additives that improve the power generation of wind turbines by up to 8%. In the nuclear sector, silicone chemistry provides coating and encapsulation of electrical and electronic applications in nuclear power plants. *[cfr. NRP Monograph, Exhibit 17]*

2.0. Loss of critical technologies – Erosion of the concept of 'safe use'

Downstream manufacturers and users rely upon the properties of complex materials or investments in innovation provided by upstream producers. These are platform technologies. The effective functioning of these upstream "motors of innovation" is distorted by poor quality implementation of risk management laws, particularly interventions that erode or remove the concept of 'safe use' of materials based on likelihood of harm.

For example, extensive restriction of the use of the properties of durability or persistence is neither desirable nor possible, without major economic damage and a significant deterioration in public health or safety. Loss of technologies because of disregard of “safe uses” jeopardises ‘controlled persistence’ and durability, two highly valued and strategic properties of substances and products. Over many hundreds of years they have been widely, and safely, used throughout the material economy, contributing to high standards of protection, public health and prosperity. These benefits will continue to be highly valued by societies. In the future, these properties will critically contribute to the green transition and greater strategic resilience.

- **Silicone chemistry**, for example, is a critical enabler of the Green Deal. It provides unique benefits of durability and resistance to weathering and high temperature, that extend the life span of EVs, batteries, solar panels wind turbines, modern buildings and electrical devices. In turn, this reduces demand for primary materials, increases the efficiency of new technologies and reduces environmental emissions. *[cfr. NRP Monograph, Exhibit 9]*

- Other forms of complex chemistry also offer important benefits of durability and persistence that facilitate prosperity and make a vital contribution to public health. **PFAS technologies** are a good example. They are used in more than 12,000 applications, many of which are little known. Their functional properties of long duration, effective sealing and lack of reactivity are used throughout upstream chemicals processing industries in membranes and diaphragms, often where there are no substitutes. Used in gaskets, membranes, filters and hose inserts, for instance, these properties enable EU-based vaccine, veterinary medicine and human pharmaceutical facilities to comply with global manufacturing standards, protecting the safety of users and facilitating exports. PFAS technologies are also widely used in critical equipment within major research and development facilities. *[cfr. NRP Monograph, Exhibit 9]*

- **Crop Protection** technologies help farmers deliver safe, affordable food, whilst limiting the use of scarce resources and reducing environmental impact. Some technologies use durability to provide slow and long-lasting release. This improves efficacy and reduces costs for farmers, helping to support a more sustainable economy. *[cfr. NRP Monograph, Exhibit 9]*

- All **Veterinary Medicine** products require mandatory regulatory approval before being placed on the market. This ensures that products meet regulated standards of quality, efficacy and safety, including an environmental risk assessment that helps to determine safe use. Persistent efficacy is a desirable characteristic for a number of veterinary medicine products. Long-acting, slow release products target parasitic diseases that affect livestock or control fleas and worms that infect companion animals, for example. More complex, slow release technologies allow farmers to reduce the number of doses, contributing to greater animal welfare by reducing stressful manipulation. *[cfr. NRP Monograph, Exhibit 9]*

3.0. Systemic uncertainty

When making allocation of capital decisions, investors initially assess potential strategic risks. This assessment takes place before considering framework conditions or investment economics. One of the most important potential sources of strategic risk is systemic uncertainty. The latter is caused by several poor regulatory practices, including unclear or missing definitions, exercise of administrative discretion, lack of scientific basis for decisions, inadequate proportionality and weak legal predictability. Whenever systemic uncertainty is identified, it makes it more difficult to justify the allocation of capital to a particular jurisdiction or activity.

For example, the progressive inclusion of the **“Essential Use Concept”** in policy and legislative initiatives and guidance documents as the principal factor determining market access is likely

to lead to politicised decisions and high levels of administrative discretion. This undermines predictability and compliance with due process standards. It also threatens norms of the commercial society and of the market economy. For instance, envisaged derogations on essentiality grounds weakens Intellectual Property Rights, thereby reducing incentives to allocate capital in innovative processes and technologies necessary for the green transition and strategic resilience.

4.0. Diversion of resources away from innovation and competitiveness – 'Defensive R&D'

Defensive R&D occurs when scarce resources must be disproportionately diverted, for regulatory reasons, into the defence of existing products or processes rather than into investment in new ideas. It encompasses the application of new regulatory requirements to existing products, substances or technologies, as well as the reformulation of existing products to retain efficacy and performance as a result of regulatory-induced changes. When faced with these requirements, companies tend to not allocate additional ('new') resources to innovation. There are, therefore, clear opportunity costs of any regulatory decision that creates Defensive R&D for companies. (The budget for research is only spent once.)

- The **agricultural machinery** sector provides a powerful example of this regulatory problem. For more than five years, manufacturers of agricultural machinery were forced to divert 70-80% of R&D to develop engine technologies capable of meeting emissions standards required of passenger vehicles, despite evident differences in risk. Overall expenditure on defensive R&D to achieve this regulatory requirement was more than €10 billion. Capital was diverted away from productive investment in new agronomic technologies; the cost of new vehicles was increased by 25%; and, industry restructuring was triggered. Additional risks were created as well. Older, more polluting vehicles were retained for longer, because of the increased cost of new vehicles, leading to higher rather than lower emissions. *[cfr. EU Admin. State Monograph, Exhibit 19]*

- In other sectors, high levels of defensive R&D have helped to restrict technological improvements, locking in old approaches and limiting the attractiveness of the EU as a location for innovation. Between 30-35% of R&D has been spent annually to keep old **veterinary medicine** products on the EU market since 1991. In contrast, veterinary medicine companies in the USA have spent only 15% of R&D annually on defence in the same period. *[cfr. EU Admin. State Monograph, Exhibit 19]*

- The situation facing producers of **biocides** in the EU is even more challenging. Almost 100% of annual R&D is spent keeping old products on the EU market, and no new active has been placed on the EU market since 2005. *[cfr. EU Admin. State Monograph, Exhibit 19]*

5.0. Reduced incentives to innovate – 'Time-to-market'

Market access rules and processes to restrict the introduction of new technologies and to retain existing one on the market seek to protect citizens and nature, as well as building consumer confidence. These goals are met when laws and administrative processes are science-based, proportionate, speedy, predictable, and globally-respected. Indeed the value for citizens of ensuring market access processes meet these standards, specifically for vaccines, has been demonstrated during the COVID-19 crisis. Poor regulation, by contrast, may unduly delay access to the benefits of technologies, increase the capitalised cost of developing new products and keeping old ones on the market, without enhancing protection, and reduce innovation incentives – this is the "Time-to-Market" regulatory paradigm

- The cash cost, excluding time-to-market and the cost of capital, of developing a new active for the **crop protection** sector has risen, in real terms, from US$150 million in 1995 to US$290 million in 2017, primarily because of increased safety and environmental testing requirements. Combined with the high regulatory costs of retaining existing actives, this increase in product development costs has contributed to a major reduction in the armoury of crop protection products available to Europe's farmers. Excluding naturals, the number of actives has fallen by 70% in twenty years limiting the availability of substances for certain speciality crops and creating the possibility of negative economic consequences. New advanced substances have not replaced these lost actives. Numbers of new actives approved and commercialised between 2011 and 2018 was approximately one per annum. *[cfr. EU Admin. State Monograph, Exhibit 20]*

- Evidence from the **veterinary medicine** industry reveals a similar story. Regulatory requirements increased the time and cost needed to develop a new product for a major livestock and companion animal species. Between 1991 and 2011, time increased by 7.5 years and costs by 229% for a major livestock species because of regulatory factors. The equivalent figures for a companion animal product were 4.0 years and 173% increase in costs due to regulatory factors. Moreover, these increases in capitalised costs have not been reduced subsequently. Such large, long-term changes, combined with the small size of animal health markets, have influenced investment decision-making. There has been a shift away from investing in new, innovative products and towards incremental improvements of existing technologies, and an overall reduction in annual expenditure on R&D in the EU from more than 10% of turnover to less than 8%. *[cfr. EU Admin. State Monograph, Exhibit 20]*

6.0. Structural damage to SMEs – Weakened economic ecosystem

Good regulation recognises that SMEs are structurally 'fragile', particularly when confronted by significant external challenges. They are small in scale, making it difficult to absorb major exogenous shocks, including new regulatory requirements. They lack access to public capital markets, depending on retained earnings, short-term bank borrowings and supplier credit for funding requirements. This makes it difficult to find additional resources to adapt to regulatory requirements or restrictions. They also lack managerial and technical 'depth', often relying on a very small cohort of managers (often restricted to the entrepreneur or general manager) to direct and undertake critical activities. Diversion of these scarce resources towards responding to regulatory impacts, erodes competitiveness and makes it more difficult to adopt safer and more sustainable products and processes. The capacity of SMEs to innovate, to operate efficiently and to adapt to change, is highly vulnerable to regulatory requirements that create Defensive R&D, restrict inputs or remove market applications. Two examples illustrate the complex contribution made by SMEs to the economic ecosystem of the EU. Both sectors face emerging regulatory challenges from existing and proposed regulations, particularly the adoption of Novel Regulatory Philosophies.

- A significant part of the **Adhesives and Sealants** sector, a group of platform technologies supporting major downstream applications in sectors such as automotive, packaging and building and construction, is dominated by SMEs. The overall sector is highly innovative, investing more than 10% of turnover in innovation, supplying 15,000 standard formulations and a further 10,000 customised ones. SMEs contribute nearly 20% of the turnover of the sector. They focus on specific markets, technologies and segments. They are often highly cost competitive and innovative, stimulating competitive intensity and dynamism. For some highly specialised applications, SMEs provide very high technology solutions for users. They form part of an eco-system of specialist suppliers that support the material economy in the EU and enhance its productivity and capacity to innovate. *[cfr. NRP Monograph, Exhibit 23]*

- The **Surface Engineering** sector provides a similar role for producers of components across all parts of the material economy. Coatings, many of which use metallic technologies, are added to components by a network of small specialist and highly expert service providers. Coatings deliver properties of durability, appearance, corrosion resistance, and complex engineering functionality. Indeed, almost all components require some form of coating. For example, a modern motor vehicle will contain more than 3,000 plated parts. The surface engineering sector serves a number of downstream industries, most prominently automotive, consumer durables, general engineering, aerospace and medical devices. Surface engineering is already widely used to support the generation of renewable energy, protecting blades and axles within wind turbines from wear and corrosion. Access to a vibrant and innovative surface coating sector is, therefore, a pre-condition for the green transition and greater strategic resilience. Almost all suppliers of surface engineering are SMEs. A typical business is a private, family-owned company with 30-40 employees, located on a single site and close to its customers and generating sales from its services of about Euro 3 million per year. It is also highly innovative, spending 15-20% of turnover on innovation. *[cfr. NRP Monograph, Exhibit 23]*

7.0 Disruption of value chains – Less competitive Upstream and 'Formulator' industries

The competitiveness of businesses is threatened when poor quality risk management decisions induce changes in market conditions that reduce demand, margins, returns on capital, and solvency; divert capital spending and increase operating costs due to disproportionate limits on emissions or exposures; increase material input costs because hazard classifications restrict use of waste or recycling; or, increase product development costs that trigger industry restructuring away from new ideas and towards retention of old ones. Problems of business competitiveness, created by regulatory interventions, often occur throughout the extensive value chains that characterise the modern material economy. Value chains link together upstream producers with formulator and assembly industries and intermediaries such as retailers delivering final products and services to B2B and B2C markets. A series of examples illustrates the importance of these value chains, including upstream producers, manufacturing, metallic technologies and formulator industries. Good regulation recognises these links and examines the impact of existing and proposed interventions on all parts of value chains.

- **Capital intensive upstream process industries** often involve facilities that are very large scale and integrate different processing activities and products on the same site. On the one hand, business streams, producing different product ranges or technologies, tend not to be easily separable. On the other hand, multiple applications and downstream customers are supplied from the same group of integrated processing activities. Facilities are highly capital intensive, with the gross current replacement cost of fixed assets can be as high as 90-100% of the value of sales while fixed costs, including fixed operating costs, financing charges and the costs of regular up-grading of plant and equipment to maintain operating efficiency, are likely to be 40-50% of sales revenue, reflecting the capital-intensive nature of the facility. Because capital returns are the ultimate determinant of continued investment in a facility, these are highly vulnerable to shortfalls in sales volumes. For example, a shortfall in output of 25% would lead to a 60% reduction in capital returns for an archetype, highly efficient, large-scale speciality metals processing facility. Loss of sales volumes, due to market or regulatory factors, does not lead to any significant reduction in fixed costs, particularly costs of financing and maintaining operating efficiency. Failure to recover financing costs leads to an erosion in business value and is assessed annually by investors using modern performance measurement techniques, exposing companies to pressures from capital markets. Global companies operate most upstream processing facilities. They 'benchmark' facility performance against similar facilities in other jurisdictions and

recognise that facilities must achieve after-tax risk-adjusted costs of capital determined by global capital markets. *[cfr. NRP Monograph, Exhibit 25]*

- Changes in the market dynamics of the **agricultural machinery** sector, triggered by requirements to match the emissions performance of passenger cars, illustrate part of this problem. Because of the high cost of achieving these new, disproportionate regulatory goals, market prices for new vehicles rose by 25% and demand fell by 45%. A combination of these market changes, and the damage to solvency caused by the cost of investing in new engine technologies, forced smaller European producers to leave the market (leading to job losses) or to be taken over by Chinese or Indian competitors. *[cfr. EU Admin. State Monograph, Exhibit 22]*

- The **fragrance blend** industry provides an indication of the potential importance of upstream innovation for the prosperity and competitiveness of downstream users. Its complex blends are an essential part of our lives, delivering functional and emotional benefits, such as masking the smell of malodours, helping consumers' adhere to hygiene habits and adding pleasant smells to enhance our well-being and sense of cleanliness. Increasingly they also provide an important means of differentiation, product performance and enhanced consumer satisfaction. Supplying up to 60,000 complex blends that draw on a palette of almost 3,000 ingredients, the fragrance industry has become a "motor of innovation" supporting the competitiveness of its downstream users. A small specialist industry with EU turnover of €2.2 billion, the distinctive contributions of fragrance technologies supports Gross Value Added (GVA) of more than €63 billion. Through annual investments in innovation of 15-18% of turnover annually the fragrance blend industry combines artistry, science, and consumer understanding to create unique fragrance combinations that allow the Fine Fragrance, Beauty, Household Care and Personal Care producers to create new products, to improve existing ideas, to differentiate, and to deliver value added. *[cfr. EU Admin. State Monograph, Exhibit 21 & NRP Monograph 24]*

- The **Household Care and Professional Cleaning and Hygiene** industry is an example of a major formulator industry. For consumers, the industry focuses on laundry care, hand and automatic dish wash, surface cleaners and air care. These complex products touch the lives of every European, every day. In the home, they meet, at low costs, needs for protection from disease and infection, for comfort, appearance and pleasure, for longer-lasting consumer durable and for less onerous lifestyles. Indirectly, they benefit Europeans extensively through the provision of complex cleaning and hygiene products, along with technical advice and equipment, to commercial and industrial customers. As a result, food and drink is safer and cheaper; offices, factories and schools are cleaner and more pleasant place to work; hospitals pose a lower risk of infection to patients; and enjoyment of hospitality facilities is greatly enhanced and safer. Overall, the technologies and products of the Household Care and Professional Cleaning and Hygiene industry support a value chain that generates Gross Value Added (GVA) of approximately Euro 25 Billion per year and, directly and indirectly, more than 360,000 jobs in Europe alone. In addition, the professional cleaning and hygiene technologies supplied to business users enhance the productivity of a substantial part of the EU's economy. Overall, the productivity of more than Euro 600 billion of the EU's private sector GVA, supporting over 19 million direct jobs, is significantly enhanced by the products, services and equipment supplied by the industry. The most important sectors affected are food and drink processing, pharmaceuticals, hospitality and contract cleaning. *[cfr. NRP Monograph, Exhibit 24]*

- **Non-ferrous metals** illustrate a similar relationship between upstream platform technologies and downstream users. The distinctive contribution of nickel technologies, for example, support GVA of more than €50 billion in a complex downstream value chain including alloy producers, metals plating, and manufacturers of gas turbines, medical equipment, jet engines, and specialist equipment for food, chemical, and

hydrocarbon production. They are also essential for the performance of modern batteries, and hence have the potential to contribute to the EU's sustainability goals. To achieve this, however, it will be important for implementation decisions, particularly those involving metallic chemicals, to recognise these complex value chain impacts. *[cfr. EU Admin. State Monograph, Exhibit 21]*

APPENDIX II – COMPETITIVENESS-FRIENDLY POLICY INTERVENTIONS: KEY FEATURES

Recent research by the OECD highlighted the characteristics of policy interventions that are likely to have the greatest impact on improving economic competitiveness. They include:

- Strengthen the framework conditions that influence decision-making by the private sector;
- Recognise the importance of the regulatory framework in creating incentives and obstacles for innovation, allocation of capital, operating efficiency and structural adjustment;
- Use economy-wide measures focused on prosperity, rather than seeking to promote specific technologies or social missions;
- Employ incentives rather than restrictions, prescription or direction;
- Strengthen competitive intensity;
- Improve the functioning of markets for capital, labour and products;
- Support property rights;
- Support the development and availability of critical inputs, most notably human capital, knowledge and finance; and
- Target support within the accepted framework of corporate investment decisions, particularly improvements in expected after-tax outcomes from individual projects.

Sources:

— OECD (2022), *An industrial policy framework for OECD countries*; OECD Publishing.

— OECD (2022), *Are industrial policy instruments effective?*, OECD Publishing.

— ERIF (2023), *Competitiveness Test and Better Regulation*, Highlights Note 22.