



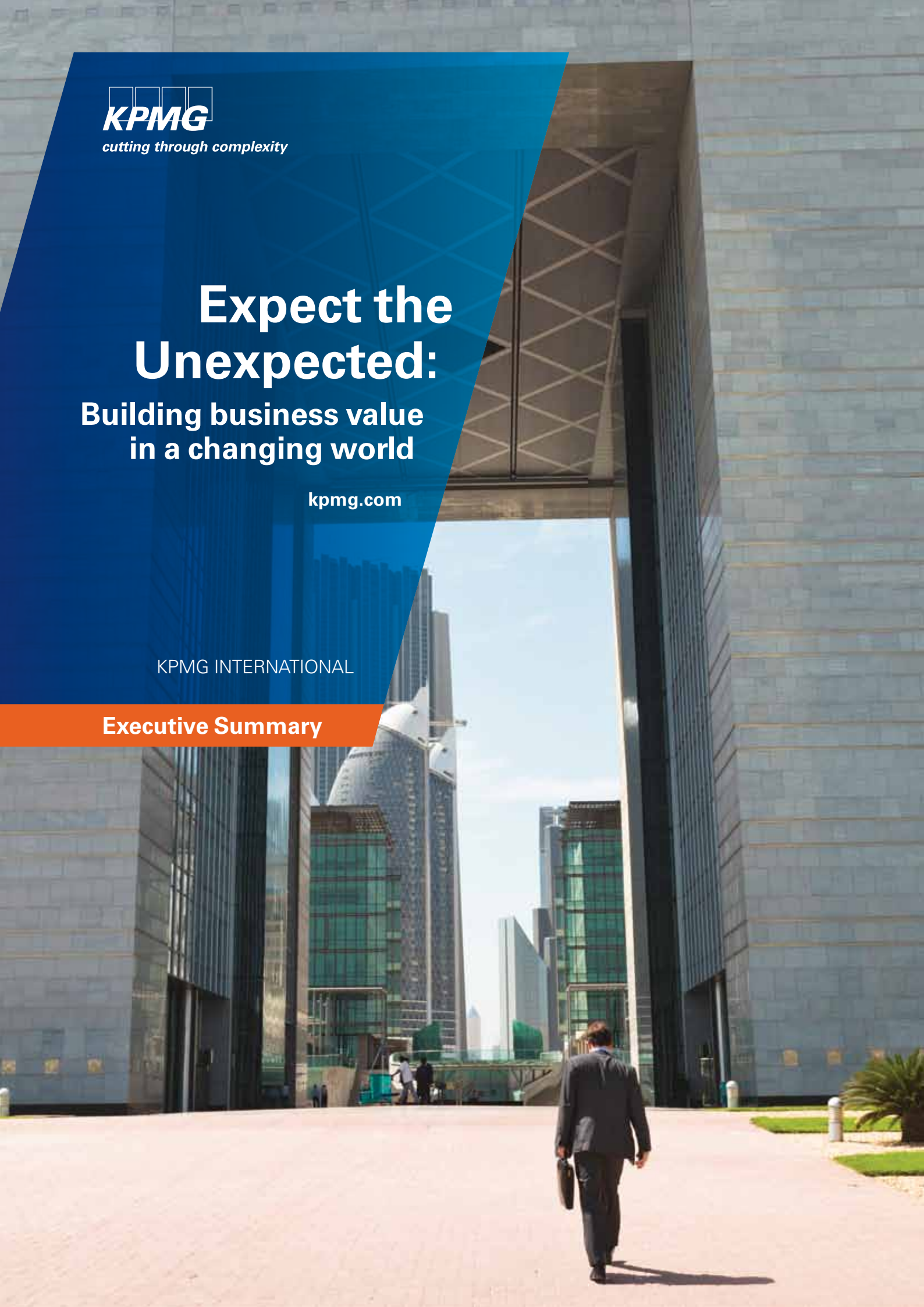
cutting through complexity

Expect the Unexpected: Building business value in a changing world

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KPMG INTERNATIONAL

Executive Summary



In this report, KPMG's network of firms analyzes a system of ten sustainability megaforges that will impact each and every business over the next 20 years. These forces do not act alone in predictable ways. They are interconnected. They interact.

Disclaimer:

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Introduction

For 20 years or more the world has recognized that the way we do business has serious impacts on the world around us. Now it is increasingly clear that the state of the world around us affects the way we do business.

The resources on which business relies are becoming more difficult to access and more costly. Increasing strain on infrastructure and natural systems is likely as patterns of economic growth and wealth change. Physical assets and supply chains will be affected by the unpredictable results of a changing climate. And businesses can expect an ever more complex web of sustainability legislation and fiscal instruments.

But this is not the whole story. The central challenge of our age – decoupling human progress from resource use and environmental decline – can also be one of the biggest sources of future success for business. More corporations are recognizing that there is value and opportunity in a broader sense of responsibility beyond

the next quarter's results; that what is good for people and the planet can also be good for the long term bottom line and shareholder value.

In this report, KPMG's network of firms analyzes a system of ten sustainability megaforges that will impact each and every business over the next 20 years. These forces do not act alone in predictable ways. They are interconnected. They interact.

It is important for business leaders to understand this system of forces; assess the implications for their own organizations; and devise strategies for managing the risks and harnessing the opportunities. We can never know the future. But it is good business sense to be prepared for the possibilities: to expect the unexpected.

This report cannot provide all the answers, and does not set out to, but it does suggest approaches that we at KPMG believe will help to build business value in a changing world.



Global sustainability megaforges will affect the future of every business

“For this report dozens of forecasts have been analyzed to identify the changes that will have the greatest effects on business.”

Over the next 20 years businesses will be exposed to hundreds of environmental and social changes that will bring both risks and opportunities in the search for sustainable growth. For this report dozens of forecasts have been analyzed to identify the changes that will have the greatest effects on business.

The result is a set of ten global **sustainability megaforges** that we believe will impact every business over the next two decades. They are:

- **Climate Change:** the one global megaforge that directly impacts all others discussed in this report. Predictions of annual output losses from climate change range between 1 percent per year, if strong and early action is taken, to at least 5 percent a year if policymakers fail to act.
- **Energy & Fuel:** fossil fuel markets are likely to become more volatile and unpredictable because of higher

global energy demand; changes in the geographical pattern of consumption; supply and production uncertainties; and increasing regulatory interventions related to climate change.

- **Material Resource Scarcity:** as developing countries industrialize rapidly, global demand for material resources is predicted to increase dramatically. Business is likely to face increasing trade restrictions and intense global competition for a wide range of material resources that become less easily available. Scarcity also creates opportunities to develop substitute materials or to recover materials from waste.
- **Water Scarcity:** it is predicted that by 2030, the global demand for freshwater will exceed supply by 40 per cent.¹ Businesses may be vulnerable to water shortages, declines in water quality, water price volatility, and to reputational

¹ United Nations Environment Programme. (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*.

challenges. Growth could be compromised and conflicts over water supplies may create a security risk to business operations.

- **Population Growth:** global population is predicted to be 8.4 billion by 2032 in a moderate growth scenario.² This growth will place intense pressures on ecosystems and the supply of natural resources such as food, water, energy and materials.³ Businesses can expect supply challenges and price volatility as a result. This is a threat, but there are also opportunities to grow commerce, create jobs, and to innovate to address the needs of growing populations.
- **Wealth:** the global middle class (defined by the OECD as individuals with disposable income of between US\$10 and US\$100 per capita per day)⁴ is predicted to grow 172 percent between 2010 and 2030.⁵ The challenge for businesses is to serve this new middle class market at a time when resources are likely to be scarcer and more price-volatile. The advantages many companies experienced in the last two decades from “cheap labor” in developing nations are likely to be eroded by the growth and power of the global middle class.
- **Urbanization:** in 2009, for the first time ever, more people lived in cities than in the countryside.⁶ By 2030 all developing regions including Asia and Africa are expected to have the majority of their inhabitants living in urban areas;⁷ virtually all Population

Growth over the next 30 years will be in cities. These cities will require extensive improvements in infrastructure including construction, water and sanitation, electricity, waste, transport, health, public safety and internet and cell phone connectivity.

- **Food Security:** in the next two decades the global food production system will come under increasing pressure from megafactors including Population Growth, Water Scarcity and Deforestation. Global food prices are predicted to rise 70–90 percent by 2030.⁸ In water-scarce regions, agricultural producers are likely to have to compete for supplies with other water-intensive industries such as electric utilities and mining, and with consumers.
- **Ecosystem Decline:** historically, the main business risk of declining biodiversity and ecosystem services has been to corporate reputations. However, as global ecosystems show increasing signs of breakdown and stress, more companies are realizing how dependent their operations are on the critical services these ecosystems provide. The decline in ecosystems is making natural resources scarcer, more expensive and less diverse; increasing the costs of water and escalating the damage caused by invasive species to sectors including agriculture, fishing, food and beverages, pharmaceuticals and tourism.

“These cities will require extensive improvements in infrastructure including construction, water and sanitation, electricity, waste, transport, health, public safety and internet and cell phone connectivity.”

- **Deforestation:** Forests are big business. Wood products contributed \$100 billion per year to the global economy from 2003–2007 and the value of non-wood forest products (mostly food) was estimated at US\$18.5 billion in 2005. Yet forest areas are predicted to decline by 13 percent from 2005 to 2030, mostly in South Asia and Africa.⁹ The timber industry and downstream sectors such as pulp and paper are vulnerable to potential regulation to slow or reverse deforestation. Companies may also find themselves under increasing pressure from customers to prove that their products are sustainable. Opportunities may arise through market mechanisms and incentives to reduce the rate of deforestation.

² United Nations, Department of Economic and Social Affairs, Population Division, (2011). *World Population Prospects: The 2010 Revision*.

³ Behrens, A. et al. (2007). The material basis of the global economy. *Worldwide patterns in natural resource extraction and their implications for sustainable resource use policies*. Ecological Economics 64.

⁴ Kharas, Homi. (2010). *OECD Development Centre Working Paper No. 285: The Emerging Middle Class in Developing Countries*. January 2010.

⁵ Ibid.

⁶ UN Habitat. (2009). *Global Report on Human Settlements 2009: Planning Sustainable Cities*. London, UK and Sterling, VA, USA: United Nations Human Settlements Programme (UN-Habitat).

⁷ UN Habitat. (2010). *State of the World's Cities 2010/2011 – Cities for All: Bridging the Urban Divide*.

⁸ Oxfam International. (2011). *Growing a Better Future: Food justice in a resource-constrained world*.

⁹ OECD. (2008). *OECD Environmental Outlook to 2030*



The systems approach to sustainability: planning for change

Existing projections provide some insights about a possible future, but should not be relied upon to provide the whole story. Many predictions extrapolate current rates of change without taking full account of the fact that sustainability megaforces reinforce, compete with, or balance the effects of others.

For example, increasing wealth and the growth of the global middle class will accelerate demand for consumer goods and services, putting further pressure on the natural and material resources needed to produce them. Regional freshwater availability could struggle to keep pace with the agricultural production necessary to feed the growing population. Urbanization predictions generally do not account for the potential impacts of climate change refugees migrating from areas where water and food scarcity hit hardest. Food production projections rarely factor in deteriorating soil quality and the competing demands for agricultural land.

Trend projections prepared without consideration of the entire system of sustainability megaforces no longer provide an adequate basis for strategic business decisions.

Systems thinking around sustainability embraces the entire structure of megaforces rather than its individual constituents. It is an important way to assess and manage new risks and uncover risks that were previously unidentified. For example, a company may understand its direct dependency on water, but may not have thought about how the supply of its material resources could be impacted by increasing water scarcity.

Companies may already be using systems thinking, for example in strategic planning, revenue management or supply chain planning but in KPMG's view it should be applied as part of a proactive sustainability strategy.

“Trend projections prepared without consideration of the entire system of megaforces no longer provide an adequate basis for strategic business decisions.”

The nexus approach

The nexus approach has been widely used by the World Economic Forum and others to explore the driving forces behind the challenge of water security.

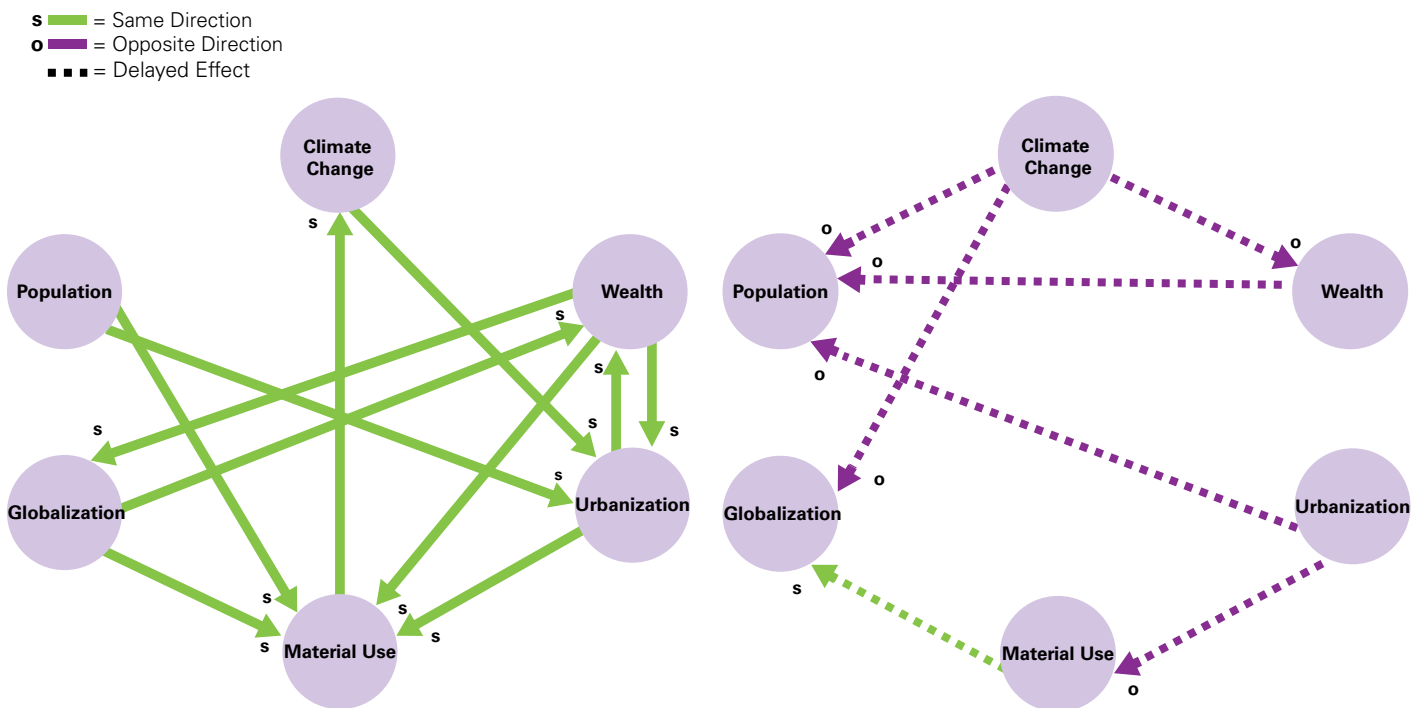
For the purposes of this report we have developed three nexuses which together represent the challenges of sustainable growth. KPMG believes companies will benefit from exploring these nexuses in their own organizational context.

The Footprint Nexus

The forces behind mankind’s escalating “footprint” on the planet are interlinked through a complex network of relationships. The Footprint Nexus is a useful planning tool to help business leaders envision the future world and market conditions they will be operating in and to develop appropriate strategies.

“For the purposes of this report we have developed three nexuses which together represent the challenges of sustainable growth.”

Figure 1: The Footprint Nexus



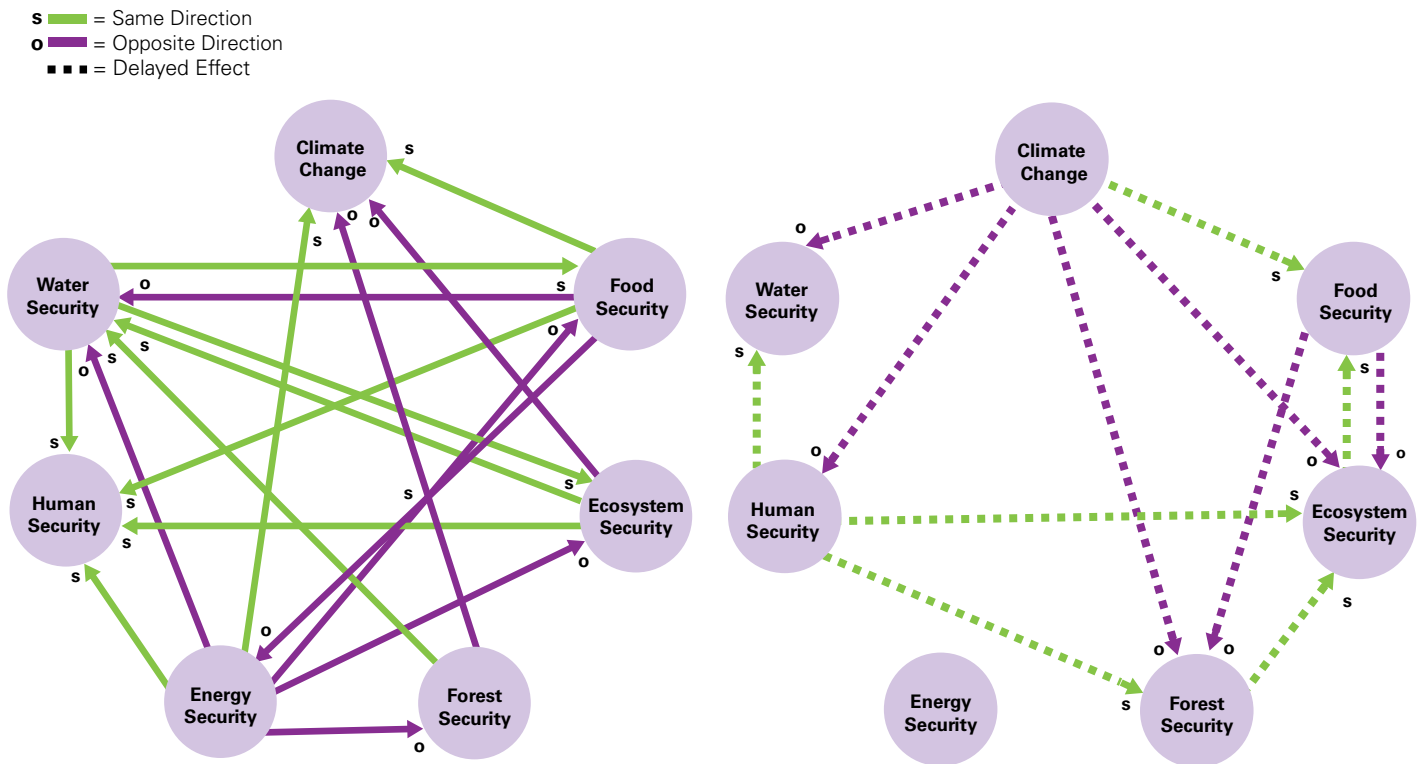
Source: KPMG (2012). *Expect the Unexpected: Building business value in a changing world*

The Erosion Nexus

The Erosion Nexus helps executives to explore in greater detail the many challenges and opportunities their businesses could face as a result of

the interactions between sustainability megaforges. By considering the full system of megaforges, executives are more likely to avoid sustainability “quick fixes” that can result in unforeseen problems and greater risks later on.

Figure 2: The Erosion Nexus



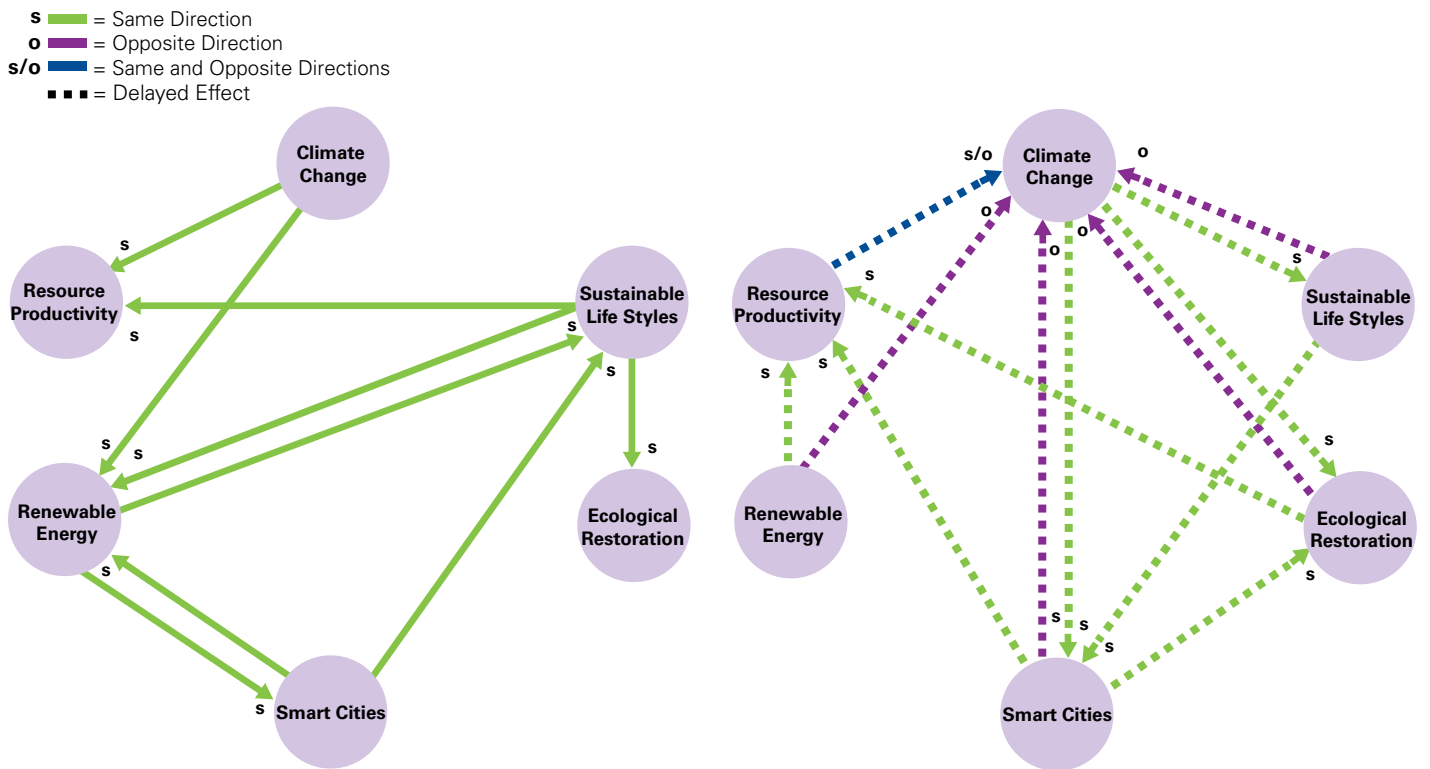
Source: KPMG (2012). *Expect the Unexpected: Building business value in a changing world*

The Innovation Nexus

The Innovation Nexus is an example of how executives can use the systems approach to develop business opportunities by innovating solutions to sustainability problems. This example

suggests that sustainable lifestyles, ecological restoration, renewable energy, resource productivity, and the use of ICT to create “smart” cities, are among the key innovations required to avoid dangerous levels of climate change.

Figure 3: The Innovation Nexus



Source: KPMG (2012). *Expect the Unexpected: Building business value in a changing world*



Global Sustainability Megaforges: A sectoral view

“It is prudent for companies to expect to pay in the future a rising proportion of their external environmental costs.”

Over the next 20 years there is likely to be increasing pressure for the price of resources, products and services to reflect the full cost of their production including the cost of environmental impacts. Such pressure is likely to grow as governments address the effects of sustainability megaforges.

Possible futures include the removal of subsidies on input commodities (such as fossil fuels and water) and the wider introduction of mechanisms to increase the cost of environmentally damaging outputs.

It is therefore prudent for companies to expect to pay in the future a rising proportion of their external

environmental costs which today are often not shown on financial statements.

Costs of environmental impacts are doubling every 14 years

- Data provided by Trucost and analyzed for this report suggests that the external environmental costs of 11 key industry sectors (including upstream supply chain) rose by 50 percent between 2002 and 2010, from US\$566 billion to US\$854 billion.¹⁰

¹⁰ For the purposes of this report, Trucost, an independent environmental research agency, has provided a data set based on the operations of over 800 companies between 2002 and 2010 (2010 being the most recent available data) and representing 11 sectors. In this analysis Trucost converts 22 environmental impacts into financial value, drawing upon current environmental-economic research. They include greenhouse gases, water abstraction and waste generation. Together these 22 indicators represent the bulk of the environmental footprint for most companies. The physical totals of these inputs and outputs are converted into financial values and aggregated to achieve a total environmental cost value. These costs, which for the most part do not appear on corporate financial statements, are known as **external environmental costs**. EBITDA data come from independent financial data providers and are checked by Trucost analysts against company financial statements.

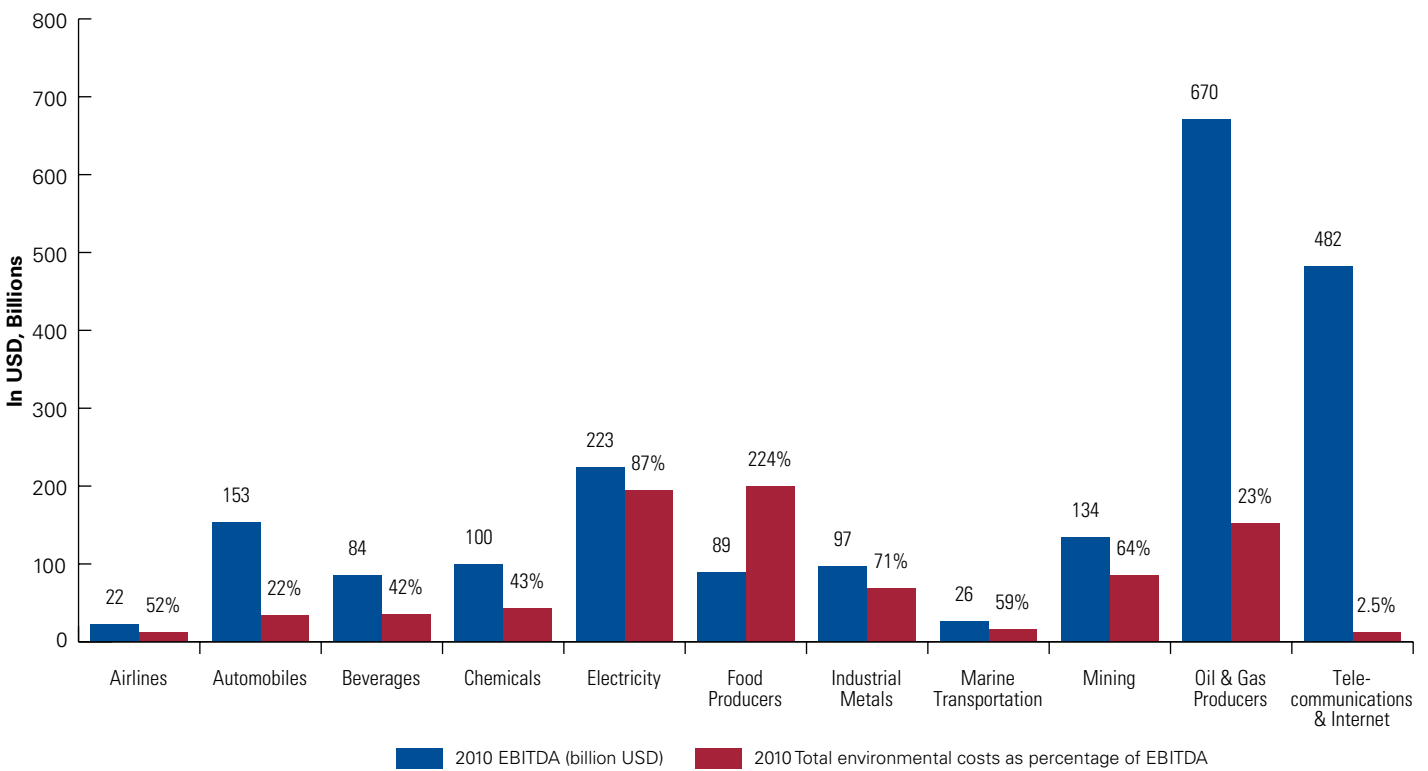
The conversion of environmental impacts into dollar sums of external environmental cost is a relatively new practice but one that is gaining momentum. The data is not yet 100 percent exact and for this reason the analyses should be taken as indicative rather than absolute.

- The sectors analyzed were: Airlines; Automobiles; Beverages; Chemicals; Electricity; Food Producers; Industrial Metals & Mining; Mining; Marine Transportation; Oil & Gas; Telecommunications & Internet (defined in line with the Industry Classification Benchmark system).¹¹
- The data suggests that the external environmental costs of business operations are doubling every 14 years: a rate that is unlikely to be sustainable even in the medium-term.

Value at stake: sectors could see profits lost

- External environmental costs could account for a considerable proportion of earnings (EBITDA) and thus represent significant business value potentially at stake: across the 11 sectors, the average external environmental costs per dollar of earnings would have been approximately 41 cents in 2010.

Figure 4: 2010 EBITDA vs external environmental costs



Source: Trucost 2012

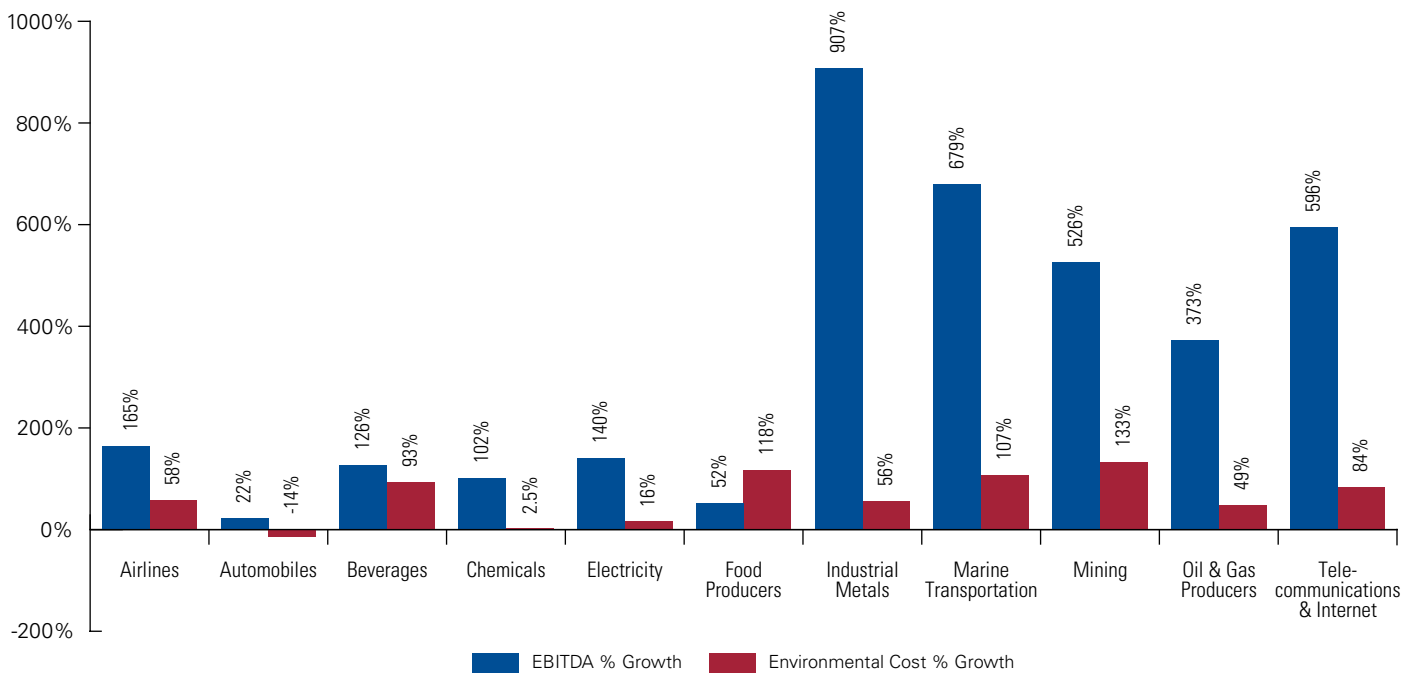
¹¹ See <http://www.icbenchmark.com/>

- According to the data, Food Producers had the largest external environmental cost footprint of the 11 sectors in 2010 at US\$200 billion, followed by Electricity at US\$195 billion and Oil & Gas at US\$152 billion.
- External environmental costs of the Food Producers could outweigh the sector's entire earnings. For five other sectors (Electricity, Industrial Metals, Mining, Marine Transportation and Airlines) environmental costs could account for more than half of earnings.

Exposure reduced but driven mostly by rise in earnings

- For most sectors covered in this report, earnings rose far more steeply than external environmental costs over the period 2002-2010, thereby reducing the proportion of EBITDA at risk (average external environmental costs across the 11 sectors would have accounted for 91 cents for every US dollar of earnings in 2002 vs 41 cents in 2010).

Figure 5: Growth in EBITDA vs growth in external environmental costs, 2002–2010



Source: Trucost 2012

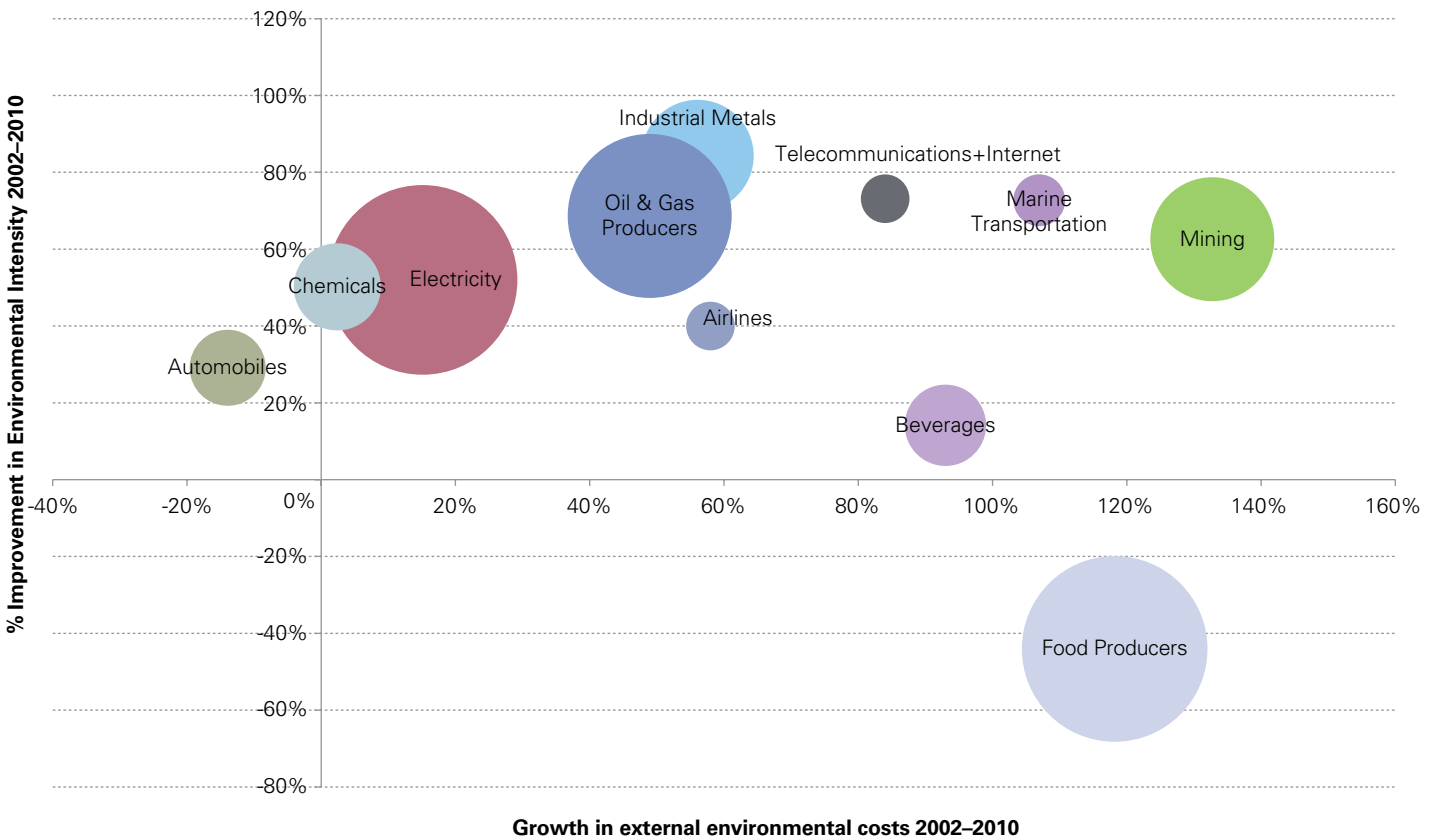
- The only sector of the 11 to demonstrate an absolute reduction in its external environmental costs over the eight-year period was Automobiles, which achieved a drop of 14 percent against an earnings increase of 22 percent over the period.
- Chemicals recorded a minimal rise in environmental costs of 2.5 percent. Electricity was the third lowest in terms of growth in environmental costs over the period, with an increase of 16 percent.

Environmental intensity: a clearer picture

- Relative performance of sectors was explored by calculating how their **environmental intensity** (external environmental costs per US dollar of earnings) has changed between 2002 and 2010.
- Industrial Metals has achieved the greatest improvement of the 11 sectors in terms of its environmental intensity, however the sector’s significant growth in earnings over the period helped it to gain this position.

Figure 6: Total external environmental cost 2010 vs growth in external environmental cost since 2002 vs environmental intensity improvement

Size of circle indicates the sector’s total external environmental costs in 2010 in USD



Source: Trucost 2012

“ Mining has achieved a similar improvement in its environmental intensity but has also recorded the largest increase of all 11 sectors in its external environmental costs. ”

- Mining has achieved a similar improvement in its environmental intensity but has also recorded the largest increase of all 11 sectors in its external environmental costs.
- A cluster of sectors – Automobiles, Chemicals and Electricity – have improved their environmental intensity while also achieving negative or low growth in the external environmental costs they incur. This suggests that these three sectors are coming the closest to decoupling their economic growth from environmental impact.
- Food Producers and Beverages have shown the lowest rates of environmental intensity improvement. Food Producers is the only one of the 11 sectors that, according to the data, has not improved its environmental intensity at all over the last eight years.

Perceptions of sectoral risks and readiness to deal with them

- KPMG has analyzed more than 60 sector reports and aggregated their findings on the sustainability risks

faced by individual sectors and the readiness of businesses to deal with those risks.¹² Given the methodology used, the risk exposure and readiness levels presented here are perceived, rather than actual and so findings should be taken as indicative not absolute.

- The two sectors perceived as being at highest risk from sustainability megaforges, but least ready are Food Producers and Beverages. This supports the findings of the environmental intensity analysis which shows they have made the least progress in reducing their environmental intensity while their exposure to environmental cost is growing rapidly.
- The Automobiles and Telecommunications & Internet sectors are perceived as being the least at risk and the most ready.
- The cluster of sectors in the center of the risk-readiness matrix indicates that perceived sustainability risk remains high for Oil & Gas, Electricity, Mining & Metals and Airlines. Electricity is seen as the most ready among these.

¹² The risk types assessed were: Physical; Competitive; Regulatory; Reputational; Litigation; and Social. **Physical Risks** include the risk of damage to physical assets and supply chains from climate change-related weather events and exposure to long-term environmental trends, such as variations in water availability or rising sea levels. **Competitive Risks** include the risk of exposure to cost increases or cost volatility of key input commodities such as energy, fuel, water and agricultural products as well as exposure to shifts in market dynamics. **Regulatory Risks** include the risk of increased costs and complexity for business from policies and regulations designed to limit the long-term effects of sustainability megaforges. Examples include carbon taxes, emissions trading systems and fuel tariffs. **Reputational Risks** include the risk of damage to corporate reputation and brand value among stakeholders when a company is perceived as failing to act appropriately in response to sustainability challenges. **Litigation Risks** include the risk of litigation over environmental damage or insufficient corporate disclosure on sustainability. **Social Risks** include the risk of serious disruption to business operations and supply chains due to the societal effects of sustainability megaforges. Examples include mass migration as “climate refugees” try to escape the worst impacts of climate change; conflicts over scarce resources such as water; and civil unrest driven by population growth and wealth inequality. The level of sector readiness was also assessed using data gathered for the KPMG International Survey of Corporate Responsibility Reporting 2011.

Figure 7: Risk and readiness matrix



Source: KPMG (2012). *Expect the Unexpected: Building business value in a changing world*



Call to action: Business strategies & policy formation

“Without action and planning for the complex future that lies ahead, risks will multiply and opportunities will be lost.”

With potentially far reaching impacts on the horizon as a result of global sustainability megaforces, businesses and policymakers together must take strategic decisions now and promote changes in long term thinking. Without action and planning for the complex future that lies ahead, risks will multiply and opportunities will be lost.

Sustainable growth requires action from both economic sides: supply and demand. The supply side must make more with less, increasing resource efficiency and minimizing the environmental footprint of processes and operations. The demand side must make less do more, managing growing demand for goods and services, while addressing pressure on dwindling natural resources.

Recommendations: the essentials of business action

Global sustainability megaforces will mean constraints, complexity and risks for business. But business leaders can do much more than simply survive the risks. With foresight and planning they can turn risks into new opportunities and pioneer actions to prepare for an uncertain future:

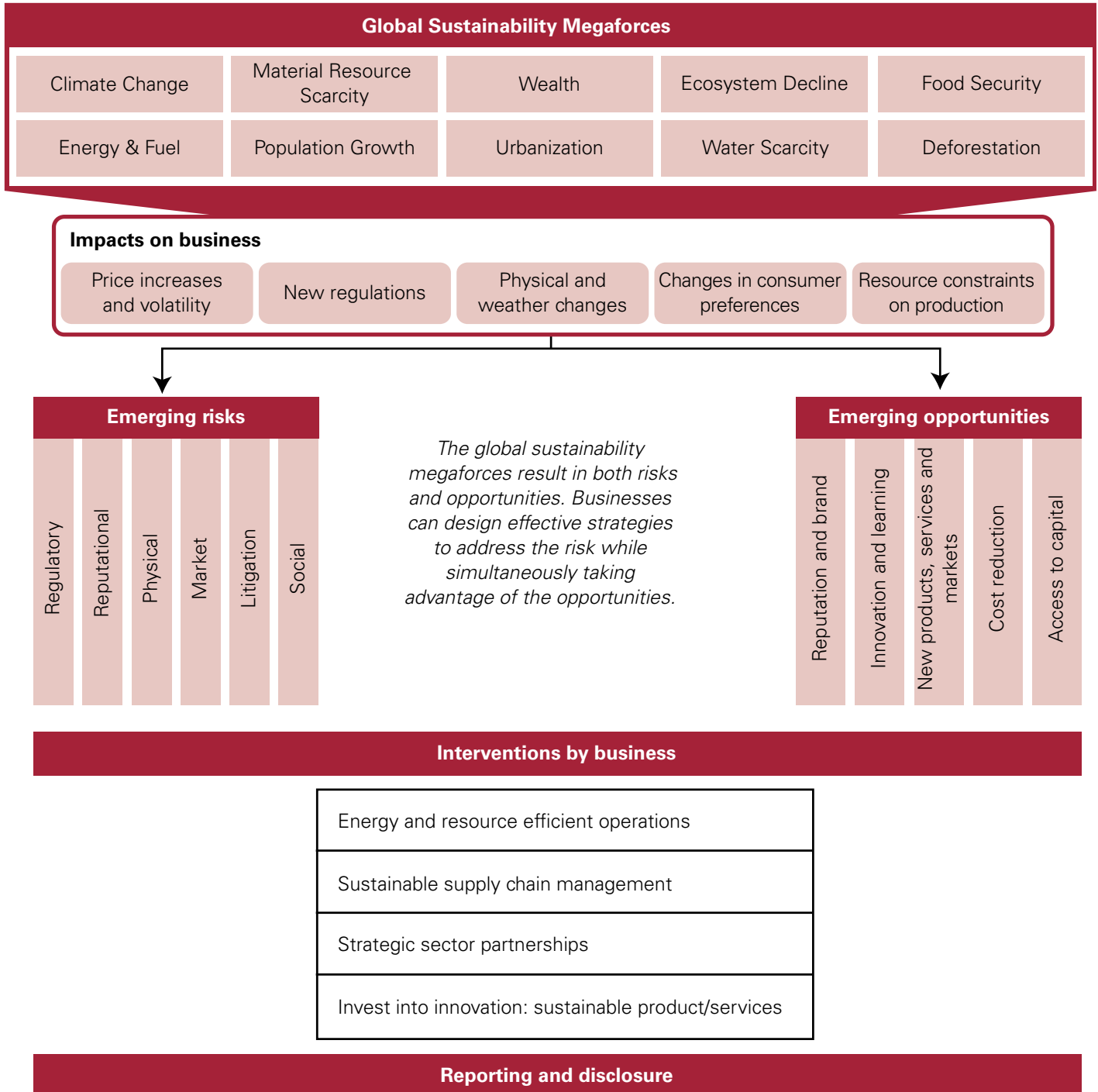
- **Understand and assess risks.** Businesses are advised to use Enterprise Risk Management tools and sustainability systems thinking to a) assess and understand future risks from sustainability megaforces and b) define responses to deal with them through efficiency, substitution or adaptation.
- **Use integrated strategic planning and strategy development.** Strategic planning for sustainability requires

the involvement of the business management and should encompass a wide range of corporate functions.

- **Turn strategic plans into ambitious targets and actions** for energy and resource efficiency, sustainable supply chain management, innovation and access to new markets for greener products and services. Explore tax incentives tailored to alternative energy, energy efficiency and other areas related to sustainability.¹³
- **Measure and report on sustainability.** Sustainability reporting, although largely still unregulated, will become increasingly important in the future. Integrated reporting, where sustainability information is included in the full picture of the company's business performance, is a growing trend. For integrated reporting companies need to build a framework for sustainability reporting processes, stronger information systems and appropriate governance and control mechanisms on a par with those currently used in financial reporting.
- **Seek collaboration with business partners on sustainability issues.** This will be critical to increase leverage and improve the cost-benefit ratio of action.
- **Build strategic partnerships:** seek opportunities for genuine dialogue with the governments and demonstrate new and innovative approaches to Public-Private Partnerships. Improved dialogue could focus on economic instruments and market barriers that could be reduced to make sustainable business operation easier.

¹³ KPMG (2011). *KPMG International Survey of Corporate Responsibility Reporting 2011*.

Figure 8: Global sustainability megaforces – Addressing the risks while realizing the opportunities



Source: KPMG (2012). *Expect the Unexpected: Building business value in a changing world*

“Policymakers are urged to deliver the overarching policy goals that will be crucial for business to make a timely transition towards a sustainable society.”

Recommendations: the essentials of government action towards sustainability

The global sustainability megaforces of the coming decades will bring shocks and surprises. As governments in all regions will be called upon to take more steps to limit or reverse negative environmental and social impacts, businesses will be confronted with an ever more complex web of sustainability-related fiscal instruments and legislation. Policymakers are urged to deliver the overarching policy goals that will be crucial for business to make a timely transition towards a sustainable society.

- **Continuity and coherence in policy:** Clear, well planned and secure government policies are crucial for scaling-up investment and facilitating the transition to green economy. Strong collaboration across governmental bodies and ministries on sustainability issues will be key.
- **Reducing complexity in policy:** Reducing regulatory complexity and improving transparency is another key area for action, as businesses frequently cite regulatory complexity as one of the main sources of risk and uncertainty surrounding sustainability.
- **Coordinated international collaboration:** Multilateral coordination across countries and regions, particularly for carbon markets and any future climate treaty, is needed to reduce regulatory complexity.
- **Creation of enabling “green” investment environment:** Policymakers need to remove barriers to green investment and establish the essential enabling conditions in all areas: national-level regulations, policies, subsidies,

incentives and legal frameworks, as well as international market, legal infrastructure, trade protocols and development aid measures. In creating an enabling environment, governments must seek to use a variety of policy tools – including taxation.

- **Increased collaboration with private sector through Public Private Partnerships (PPPs):** If properly designed, PPPs can provide an effective architecture for promoting sustainability in a way that mobilizes private sector finance, rather than relying on public funding alone.

Business and government working together: Public-Private Partnerships as a tool for green growth

To achieve their strategies, governments need corporations to provide low-carbon and green technology, the skills to deploy and operate it, and the funds of financiers to invest in delivering it. Given that many national budgets remain stretched as a result of the global financial crisis, the conditions seem ripe for the wider introduction of PPP structures using private finance.¹⁴

KPMG has engaged in many PPPs over the past 15 years. Based on this experience, the key points for developing successful PPPs are:¹⁵

- The PPP process cannot be rushed – it takes time to develop properly;
- PPPs sometimes require significant upfront costs, but meeting these costs will make it much more attractive, particularly if investors can see that the right resources have been applied;

¹⁴ United Nations Framework Convention on Climate Change Secretariat (2007). *Investment and Financial Flows to Address Climate Change*. Bonn.

¹⁵ KPMG (2011). *Insight – Urbanisation: The massive challenge facing cities and innovative ways it's being addressed*

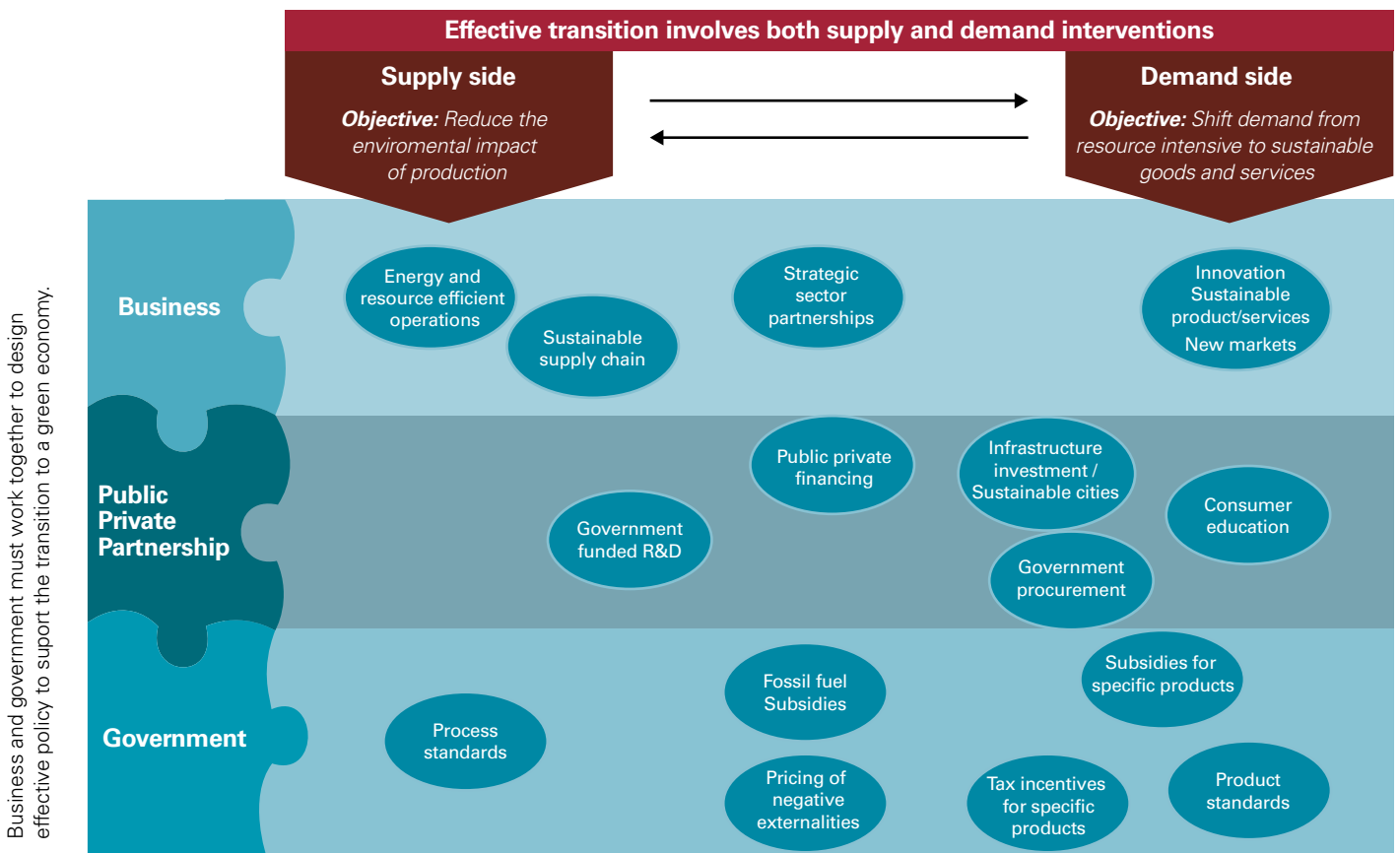
- Governments must play an active role in monitoring and regulating the project;
- PPP structures must be designed to include clear and formal methodologies for reviewing contracts over the term of the project (particularly those that last 10 to 30 years or more);
- A single-minded focus is essential for developing transparent and competitive procurement procedures.

Imperatives for achieving sustainable growth

The transition to a sustainable economy is possible, but it requires widespread global support from businesses, governments and civil society. This transition requires solutions that address both how and which goods and services are produced. Both the public and private sectors have a vital role to play and a coordinated approach holds the key to success.

“The transition to a sustainable economy is possible, but it requires widespread global support from businesses, governments and civil society.”

Figure 9: Imperatives for concerted action on sustainability



Source: KPMG (2012). *Expect the Unexpected: Building business value in a changing world*

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