



WORLD ENERGY COUNCIL
CONSEIL MONDIAL DE L'ÉNERGIE
For sustainable energy.

2015 World Energy Issues Monitor

Energy price volatility: the new normal

WORLD ENERGY COUNCIL

CONSEIL MONDIAL DE L'ÉNERGIE



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Christoph Frei

Secretary General

2015 World Energy Issues Monitor

World Energy Council

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Foreword by
Christoph Frei,
Secretary General
of the World
Energy Council

What keeps Energy Leaders awake at the dawn of 2015?

In 2014 Energy Ministers of the G7 signed a joint statement in Rome on energy security. The fundamental principle they subscribed to was that energy security is a common responsibility. To state that one country's energy security relies on that in neighbouring countries and on coordinated solutions is no new insight. The mere fact that G7 addressed the issue in 2014 illustrates the once more heightened importance of geopolitics for energy security in all regions.

The energy transformation is the backdrop of a changing energy map. Large amounts of unconventional oil and gas are produced outside of OPEC countries, notably in North America; the renewables supply is building up in the sun-rich Middle East and Africa; the global demand centre is shifting from OECD to Asia; and, technology at competitive costs is produced in countries with low labour costs including China and other emerging economies. This changing energy map has profound regional and geostrategic implications. International institutions related to energy, trade, or safety need to adapt or will fail to credibly pursue the tasks they were created to fulfil.

In the oil market we are seeing the lowest prices in over 5 years as a result of oversupply and weak demand (from Europe and China). 2015 has begun with oil prices below \$50/barrel, significantly below the critical \$70 mark seen as the 'survival threshold' for many high-end-cost producers in the US and Canada, as well as for the state budget of oil export dependent economies, including Nigeria, Mexico, Russia and Venezuela. 2014 may well be remembered for the start of a new 'price war' in which OPEC's capacity to control prices has not materialised other than in voluntarily letting prices slip in order to let the market address competition.

We are seeing a greater emphasis on the need for new electricity market design in order to respond to the greater unpredictability of supply resulting from the increasing adoption of solar and wind power in the electricity mix. Incentives to deliver the required storage and back-up capacity are not strong enough in traditional electricity market design, which has led to a patchy introduction of different capacity incentive models. While the discussion is most intense in Europe and parts of the US the issue will also gain relevance in many other countries with third party access to electricity markets and independent power producers. Further upstream, the changing dynamics and structure of the electricity market will also affect the supplying of natural gas infrastructure as illustrated by the shutdown of dozens of natural gas power plants in Europe.

I hope, at last, we will see access to energy taking its rightful place as a UN Development Goal. The UN Sustainable Energy for All process has declared the objective to provide universal access to electricity by 2030, recognising that access to energy is a fundamental enabler for economic development and prosperity. However, our World Energy Scenarios have highlighted that unless drastic measures are taken the number of energy poor will only decrease from today's 1.2 billion figure to between 300 to 500 million in 2050, with most of the energy poor expected to reside in the African continent.

Political risk is still the key concern for investors in energy. The challenge of uncertainty in the sector facing policy makers and business leaders alike is measurable in the World Energy Council's latest Trilemma Index. The number of triple-A rated countries has decreased from five to three in the latest index published in November 2014, with one of the remaining AAA rated countries on negative watch (United Kingdom). The ongoing energy infrastructure expansion, renewal, and transformation require every single country to mobilise large amounts of capital with an estimated global total of \$48 trillion required over the two next decades and another 10% if the 2 degree Celsius climate change objective shall be reached. Investors see political and regulatory risk as the major factor preventing the mobilisation of the capital required.

As we look to a new climate agreement later this year we have seen a significant landmark in the climate negotiations with the US–China ‘climate deal’. Taken together with the UN Secretary General’s first Climate Summit it is a demonstration that leaders neither of the ‘G2’ nor the UN want to leave at status quo the climate negotiations ahead of Conference of the Parties meeting (COP21) in Paris. The latest IPCC report and also our own World Energy Scenarios illustrate that if we accept status quo, using current technologies, known policies and constant rates of innovation, the world will fail the 2 degree Celsius climate objective.

High volatility has become the new normal that energy leaders face and in which we expect them to take investment decisions at an unprecedented scale. The developments highlighted in this Issues Monitor sketch out a context of continued greater uncertainty and dynamic change in which the latest analysis has been undertaken. For the first time participation exceeded 1,000 Energy Leaders including Ministers and CEOs from nearly 80 countries and I would like to thank all of them for having taken the time to respond to the World Energy Council’s issues survey. The survey covers 40 issues and provides a “helicopter perspective” on the latest changes in the energy sector – illustrated as the World Energy Issues Monitor.

In conclusion, we see that while being concerned about the impact of geopolitics, particularly in the Russian context, energy leaders are prudently optimistic that we are getting out of the recessionary downside spiral. However, they remain most concerned about energy price volatility, climate framework uncertainty and also stop and go energy subsidies. The quest to finance the transition to a more sustainable energy system keeps energy leaders most busy at work, whilst there is a growing acknowledgement that decentralised systems, storage innovation and regional interconnection will be key parts of the solution. Along with the emerging need to better manage data, and a greater exposure to cyber risks, these developments challenge current market designs and lead to changing and emerging new business models. This has already been illustrated by utilities such as E.ON where fundamental shifts around the role of technology and the ‘prosumer’ have led to restructuring around different business units. Nuclear is among the issues with the biggest divergence of perspectives while the erosion of trust in CCS seems to continue.

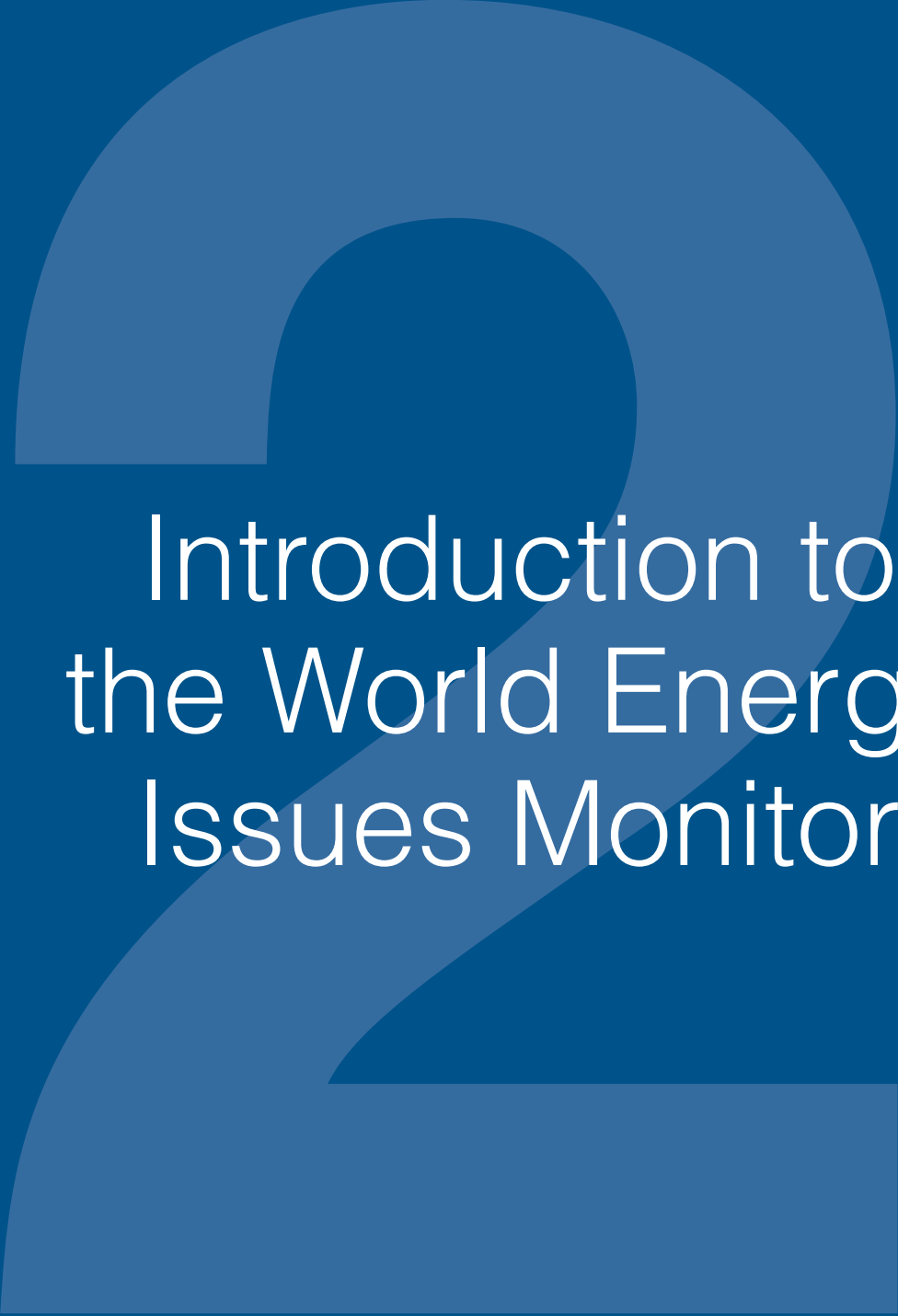
The unprecedented uncertainty, the need to redefine infrastructure resilience on the basis of emerging risks, the expectation of changing market designs and evolving business models, as well as the changing geopolitical balance as a result of the shifting energy map all place energy among the top geostrategic issues globally for at least the decade to come. Clearly, energy is a game that no country can afford to lose, cards are not evenly distributed and where cards are weak, the need to play smart is even greater. It is now time to reassess ones own cards, evaluate opportunities, and get on top of smart policy options and innovation strategies – such as balancing the ‘Energy Trilemma’.

The 2015 World Energy Issues Monitor helps us to understand what keeps Energy Leaders awake at night and orient our activities. The World Energy Council will continue to develop its World Energy Trilemma, Scenarios and Issues Monitor into ever more meaningful dialogue and decision tools for Energy Leaders in both the public and private sector as they work towards sustainable energy for the greatest benefit of all. We look forward to working with you in 2015, in our study groups, knowledge networks, and Energy Leaders’ communities.



Christoph Frei

Secretary General, World Energy Council



Introduction to
the World Energy
Issues Monitor

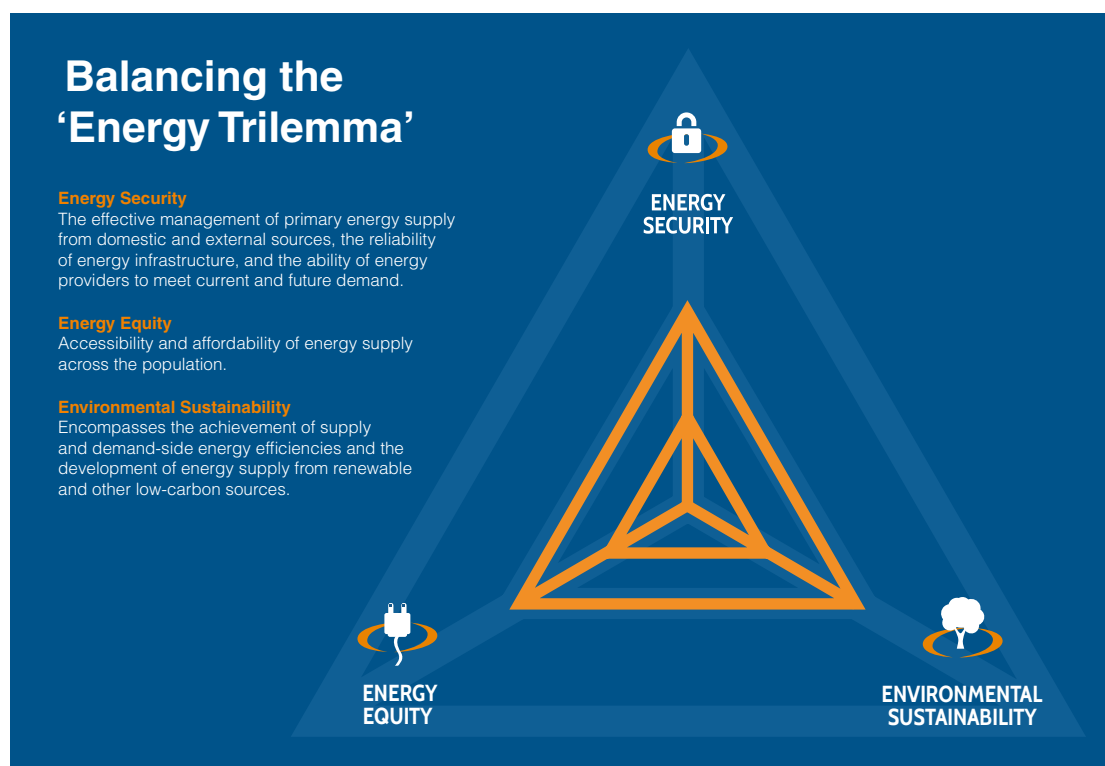
Introduction to the World Energy Issues Monitor

The World Energy Issues Monitor provides a snapshot of what keeps energy leaders awake at night in nearly 80 countries. The monitor helps to define the world energy agenda and its evolution over time. It provides a high-level perception of what constitute issues of critical uncertainty, in contrast to those that require immediate action or act as developing signals for the future. As such, it has developed into an essential tool in understanding the complex and uncertain environment within which energy leaders must operate, and a tool through which we can challenge our own assumptions on the key drivers within the energy landscape.

This seventh iteration of the monitor, builds on the national assessment undertaken by 24 countries in 2014, to provide nearly 30 monitors across six regions to highlight differing regional and national priorities. These insights enable the World Energy Council (WEC) to facilitate the dialogue among energy leaders on the critical issues affecting the global energy agenda; for example, through action-oriented frameworks such as the energy trilemma (Figure 1) – enabling policymakers to reassess, evaluate options and deliver smart policy strategies to create a stable environment for long-term investment.

Figure 1: The energy trilemma

Creating a policy framework that simultaneously delivers secure, affordable, and environmentally sustainable energy – a sustainable energy system – is one of the most important challenges facing governments today. This triple challenge is known as the ‘energy trilemma’.



Methodology

The World Energy Issues Monitor is based on an annual survey, comprising 40 issues across four categories: macroeconomic risks, geopolitics, business environment and energy vision and technology. The survey is completed by ministers, chief executives and leading experts in nearly 80 countries that are members of the WEC. The 2015 monitor is based on insights from 1045 energy leaders from 79 countries.

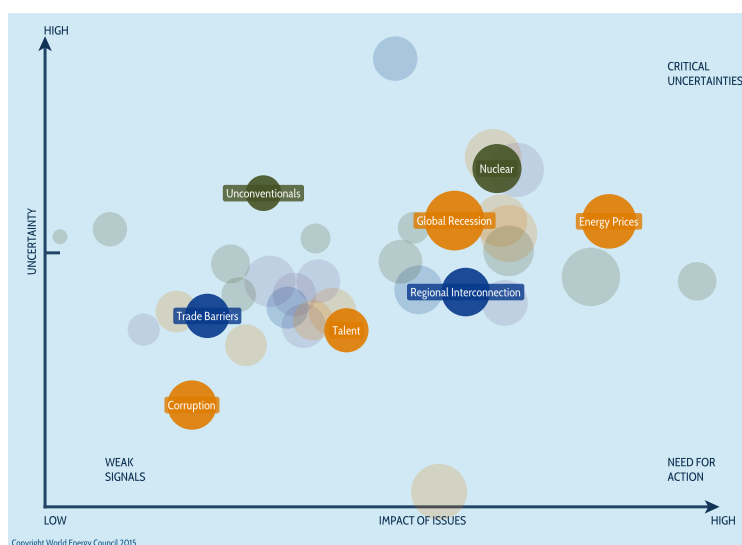
The data for the 2015 World Energy Issues Monitor is input and normalised using statistical software in order to enable direct comparisons across regions and of different years. The data is normalised by the mean to give a central weighting and standard deviations to give the spread. The resulting Issues Monitors are then further contextualised by the analyses of WEC national committee chairs and their broader national networks.

How to use the Issues Monitor for your own company or executive team

Tailored Issues Monitors can be used to benchmark your own understanding of the energy agenda against your regions of activity and to inform and engage government and policymakers regarding the critical issues in your country. If your company or national committee are interested in looking at a bespoke monitor and debriefing with your board or executive team, please contact John Bourne by emailing bourne@worldenergy.org.

The Interactive Energy Issues Monitor

Tailor monitors with the issues most important for you; explore the evolution of critical issues across years and in different regions; and download the results in the interactive Issues Monitor on www.worldenergy.org/data.



How to read the Issues Monitor

Categories and individual issues:

- ▶ The World Energy Issues Monitor assesses 40 issues in a high-level overview, covering four categories, each of which is represented by a different colour:
 - macroeconomic risks (orange)
 - geopolitics (purple)
 - business environment (blue)
 - energy vision and technology (green)
- ▶ See Table 1: The world energy issues

Dimensions/Axes:

- ▶ The responses are translated into issue monitors with the three assessed dimensions:
 - The impact of an issue on the energy sector – this forms the x axis
 - The degree of uncertainty related to its impact – this forms y axis.
 - The urgency with which we need to address the specific issue – this is represented by the proportional size of the issue bubble, where a larger size corresponds to a higher degree of urgency.

Zones within the Monitor:

- ▶ **Critical uncertainties:** Issues with high uncertainty and high impact (in the top-right quadrant) are the ‘critical uncertainties’ with no clear path of action which keep energy leaders most awake at night. These issues need to be part of the energy leaders’ dialogue and scenario analysis.
- ▶ **Action priorities:** The issues in the high-impact and low-uncertainty space are those which keep energy leaders most busy (bottom-right, ‘action issues’).
- ▶ **Weak signals:** The low-impact and low-uncertainty issues (bottom-left quadrant) include those of perceived lesser importance or those that are still not fully understood and need further investigation.

Time-tracking Issues Monitors:

- ▶ In addition to the critical uncertainties, issues of particular interest for dialogue include those with rapid evolution over time and those with large differences across regions. The arrows on time-tracking Issues Monitors illustrate the evolution of selected issues over the past five years.

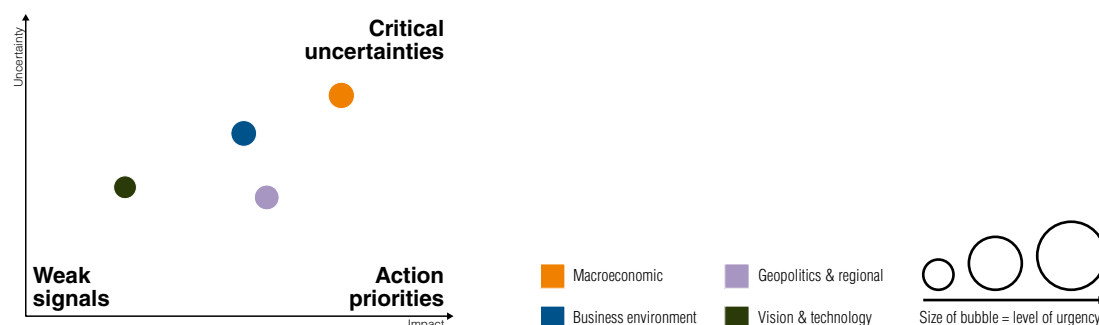


Table 1
The World Energy Issues

Macroeconomic risks and vulnerabilities	
Global climate framework uncertainty	Uncertainty on the outcome and time-horizon of global climate negotiations, i.e. the question of whether there will be a global / regional price on CO ₂ and if so, at what level that price would be.
Large-scale accidents	Post-Fukushima nuclear disaster and Macondo oil spill: the possibility, and implication, of potential further energy-related large-scale accidents and cost impact on risk insurance.
Global recession	Ongoing implications of recession, including pressure on growth rates, margins and economic security.
Capital market constraints	Difficulty in the mobilisation of capital to deliver energy infrastructure in a context of high political, market and technology risks.
Commodity prices and volatility	High prices, volatility & inflationary risk
Energy prices and volatility	High volatility, relative price movements between technologies and regional differences in price levels ('security of demand' concern) – affecting competitiveness & business models.
Currency uncertainty	Exchange rate, insolvency and currency devaluation risks negatively impacting energy operations and investments.
Energy-water-food nexus	Energy-water (-food) nexus exposing energy supply chain to risks regarding changing water availability (including those to combat hunger).
Talent scarcity	Succession risk and shortage of experienced engineering or other energy relevant skills negatively affecting energy infrastructure development and expansion.
Energy poverty	1.2 billion people are still without access to electricity, 87% in rural areas; new entrepreneurial models, creation of financing mechanisms, focused government policies to deliver solutions.
Energy affordability	High or increasing energy prices weighing on household budgets and increasing social concern ('fuel poverty').
Extreme Weather Risks	Increased frequency and severity of extreme weather events (e.g. floods, storms) and the impact on energy systems and infrastructure design and resilience.
Cyber Threats	Increased cyber vulnerability of energy systems due to increasing interconnectedness (e.g. through data farming, smartening of infrastructure and hacking sophistication).
Corruption	Slowing down the development of effective policies and distorting the competition.
Terrorism	Physical risks affecting energy systems, infrastructure and markets.
Energy policies and business environment	
Trade barriers	Constraining or enabling green growth (e.g. through technology transfer, tariffs on green goods and services, local content requirements, border tax adjustment).
Regional interconnection	Ability to overcome unequal distribution and ineffective allocation of energy resources, through development of regional energy infrastructure and institutions (e.g. interconnectors, pipelines, trade platforms).
Innovative market design and policies	New market designs and policies securing back-up and storage capacity in electricity markets with increasing intermittent renewable energy shares; fragmented regulation leading to ineffective solutions.
Energy subsidies	Uncertainty over subsidy sustainability.
Decentralised systems	Systems being driven by increased social activism, difficult financing of large-scale projects, increasing population density and new technology opportunities.

Energy geopolitics and regional issues

China/India growth	Furthering role as the centre of global energy demand, technology influence and global governance.
Brazil realising its potential	Importance of reform in order to realise its potential as a regional driver for energy integration.
Russia energy diplomacy	Implications of the situation in Crimea for regional and global gas markets. Ability to adapt to shale gas context and maintain its importance in the natural gas sector.
EU cohesion	Potential of converging to a common energy policy, particularly in the context of critical market design elements (e.g. fixing ETS- Emission Trading Scheme, capacity and storage incentives).
Middle East/North Africa fragility	Ability to successfully manage transformations in the political, employment (youth) and energy context (e.g. domestic gas, renewables, nuclear, fossil fuel subsidies and energy efficiency).
US trade and policy influencing global energy markets	US driven innovation and policy influencing global energy trade, market dynamics (gas, coal, oil) and relevant institutions (e.g. COP, IMF, OECD).

Energy vision and technology

Sustainable cities	Realising resource efficient urbanisation at scale.
Energy efficiency	Overcoming barriers to implementation and achieve its potential.
Coal	The future role of coal – cheap coal vs. an uncertain coal future.
Carbon capture and storage (CCS)	Overcoming barriers to achieving scale, potential of innovative solutions to make projects viable regarding costs and public attitude.
Renewable energy	Maintaining traction to achieving scale.
Biofuels	Overcoming barriers to realising potential.
Smart grid	Innovative business models for demand-side management taken to scale.
Electric vehicles	Innovative transportation concepts, new modes and fuel sources including electric vehicles and natural gas vehicles.
Electricity storage	Price and scalability of batteries, 'power to gas' technology and storage as an enabler for greater integration of renewables.
Nuclear	Future of nuclear – the ability to adjust to a new normal (centre of gravity in non-OECD, increased safety and governance requirements and greater pressure on costs).
Hydropower	Overcoming barriers to realising potential (in particular social activism).
Unconventional fossil fuels	Shale gas, oil shale and other unconventional realising potential, altering global oil & gas market dynamics.
Liquefied natural gas (LNG)	LNG's potential to drive convergence of regional gas prices and help globalise the gas market, as well as the tapping of potentially stranded deposits.
Hydrogen economy	Advancing to an achievable incremental vision.

A large, light blue, stylized number '9' is centered in the background of the slide. The number is composed of a thick, rounded top curve and a vertical stem that curves into a circular bottom loop. The text is overlaid on the center of the number.

The global energy agenda

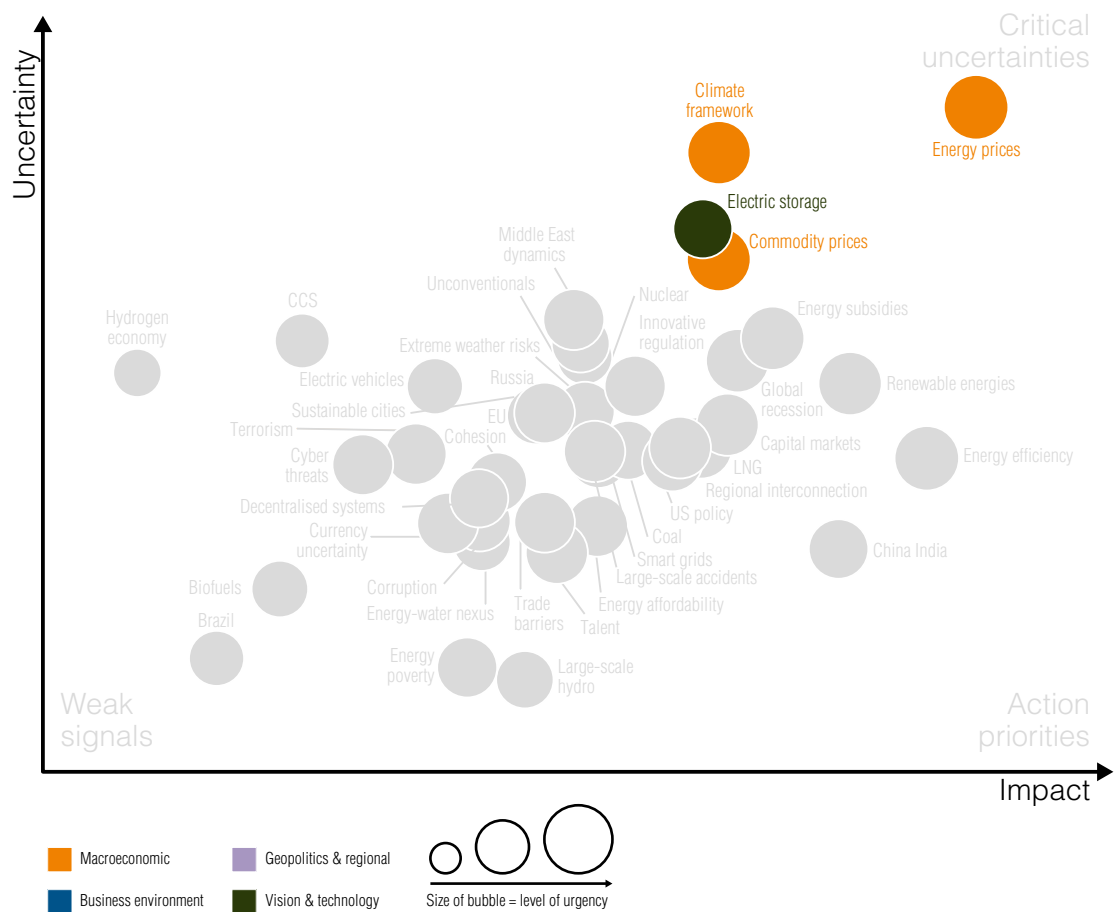
legacy of the large-scale accidents however still plays an important role in the countries that were, and continue to be, most directly affected, as visible in the national deep-dives.

The geopolitical developments and regional issues around the world (e.g. EU cohesion, Russia, Middle East and North Africa conflicts, and territorial disputes in the South China Sea) are perceived with much controversy across the regions. This divergence of opinion is reflected by the issues being grouped around the centre of the map in this latest edition; a trend particularly noticeable with regards to **Russia** which takes on a central position in 2015 but which was perceived to be a weak signal by the international community in 2014. The **Middle East and North Africa** issue similarly takes on a central position in 2015, having gradually moved away from a critical uncertainty in 2011/2012, reflecting both a perceived reduction in the level of uncertainty as well as the varying importance attributed to the dynamics in the region across different geographical zones.

Energy vision and technology issues are spread out across the map, reflecting the systemic effects the issue groups can have within the global energy market, despite their ties to local/national regulation, where specific technologies appear as locally preferential or effective for the national context, as highlighted throughout the report.

Top critical uncertainties in 2015 include energy and commodity prices, climate framework and electric storage (Figure 3).

Figure 3
WEC's 2015 Global Energy Issues Monitor: Highlighting issues of critical uncertainty (energy prices, climate framework, commodity prices and electric storage)



What keeps energy leaders awake at night?

Energy prices/volatility has been a critical uncertainty since 2009, when the Issues Monitor was first launched, which highlights the issue's long-lasting importance to energy leaders. The positioning of the issue as the most critical uncertainty for energy leaders at the start of 2014 reinforced the potential stresses within the system and the perceived impact that such dynamics could have. In 2015, price volatility remains a key concern, demonstrated by the more than 50 percent drop in price over seven months where a barrel of crude oil (Brent) was priced at \$108 in January 2014, reached its peak price of \$112 in June before falling below the \$50 benchmark in early 2015.

These dynamics have set the precedent for an anticipated low price environment, the start of which we have seen with an effective price war between OPEC and North America as the focus shifts from OPEC price control to that of maintaining market share. The implications, should this continuance of an oversupplied market be sustained, will be broadly felt – from both the business side, as further project completion bringing additional supply to market and exploration and production budgets are re-evaluated, as well as for governments, especially those with a high degree of dependency on oil export revenues.

Commodity price and price volatility are consistently perceived to have a high impact across the world, which highlights the link between both energy and non-energy commodities (e.g. oil or gas) and the issue of pricing and its relative importance to energy leaders.

The costs of non-energy commodities are falling in line with plunging energy prices, reflecting the weaker demand from China and the trend of oversupply found with regards to a number of energy markets. This is perhaps seen most notably for those countries and industries with the strongest links to this relative slowing demand, for example in Australia the price of iron ore fell by more than 49 percent during phases of 2014 and in South Africa where **commodity prices** are the second highest uncertainty issue.

Climate framework has been featuring in the top right quadrant of the global Issues Map since it was first introduced in 2009, including for this latest 2015 iteration, whilst a number of the macro-economic issues have reduced both in terms of perceptions around the level of impact and uncertainty. With COP21 approaching, uncertainty with regards to the future of a universal, legally binding climate agreement is once again high on the agenda.

The US–China 'climate deal' marks a change in the positions of two of the largest greenhouse gas emitters, increasingly putting pressure on other large emitters not bound by targets, such as India, which may additionally contribute towards the uncertainty perceived in association with the issue. The extent to which such rhetoric will be transformed into action, with meaningful effect for national policy and industry implications, will be an important issue for energy leaders over the coming months.

There is however a strong regional split with regards to the extent the issue is perceived to have an impact on the sector. While Africa perceives climate frameworks to have a low impact on the sector, North America and other OECD countries perceive the impact to be large on the sector, which reflects the historic and expected degree of commitment to legally binding climate targets. For Europe the issue of coal displacement from the US has raised renewed questions of priorities, while gas powered generation remains increasing idle.

Electric storage is a top critical uncertainty and high change issue on the global map, having increased in impact and uncertainty compared to 2014. The increasing shares of

intermittent energy sources at a global scale, which is expected to quadruple by 2035 is further driving the need for storage facilities to secure the supply of energy.

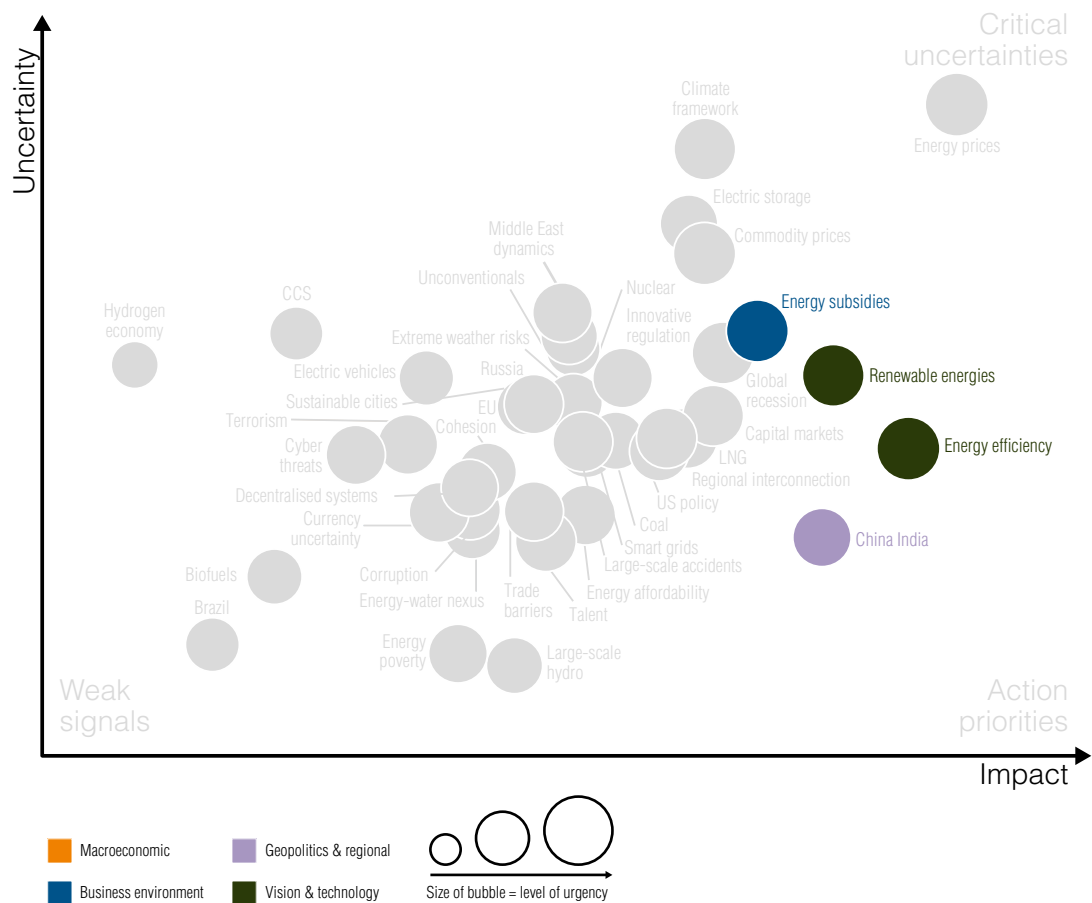
The role of electric storage to secure the supply of electricity becomes even more important in combination with the recent commitments towards energy security (G7) and access to energy (UN development goal). At the same time, incentives to deliver required storage and back-up capacity are not strong enough with traditional market designs, which is a driving factor of uncertainty.

In this context **energy subsidies**, a key need for action issue in the 2015 map, play an important role as key pillar of current market design. The International Monetary Fund estimates that in 2012 alone, \$2 trillion of government spending/lost revenue was allocated to subsidies fossil fuels globally. According to the World Energy Council Trilemma Report 2014 this amount could cover the necessary annual investments into the energy infrastructure to establish a sustainable energy system across the globe. However, both the role of governments in choosing preferred solutions and the political sensitivity associated with the issue still present major barriers to changes in approach.

What keeps energy leaders most busy

Figure 4

WEC's 2015 Global Energy Issues Monitor: highlighting issues of most important action priority (energy efficiency, renewables, energy subsidies, growth in China/India).



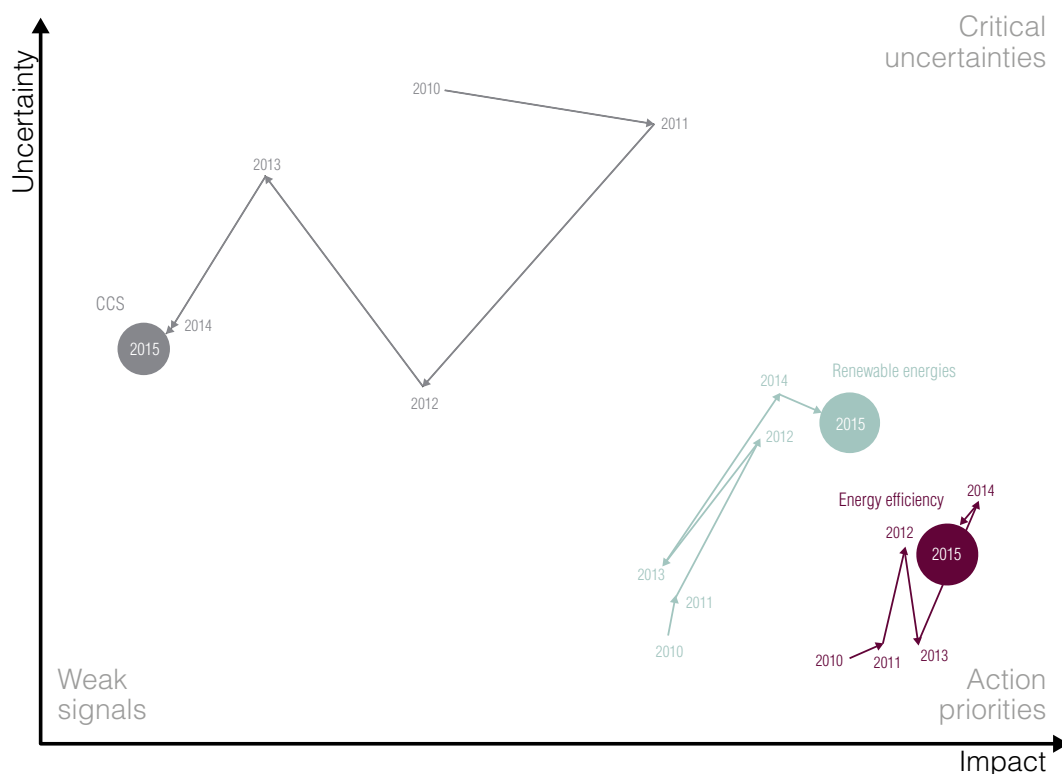
Besides energy subsidies; renewable energies, energy efficiency and China/India are the top need for action issues for energy leaders worldwide (Figure 4).

Renewable energies and **energy efficiency** have consistently been need for action issues in 2014 and 2013 (Figure 5). They play an important role towards fulfilling climate targets and commitments towards energy security and access to energy (G7/ UN development goals). This is particularly important in view of rising long-term energy demand due to increasing wealth and population growth.

The need for investment continues to grow – **capital markets** is a high change issue, having moved from a top uncertainty in 2014 to a key need for action issue in 2015. The WEC World Energy Trilemma report 2014 estimates that energy efficiency investments of \$1.7 trillion will be necessary, in addition to existing requirements on the energy infrastructure side, in order to achieve a sustainable energy supply in future. According to the trilemma study, the necessary capital could be made available under the right conditions. The higher need for action around this issue in 2015 reflects both the increased recognition of the availability of capital and the need to realise the delivery of financing for investment at a large scale; however, political and regulatory risk is still a major concern for projects where life cycles may span more than 20 years.

Figure 5

WEC's 2015 World Energy Issues Monitor: highlighting the most rapidly moving issue (CCS) versus robust action issues (energy efficiency, renewables)

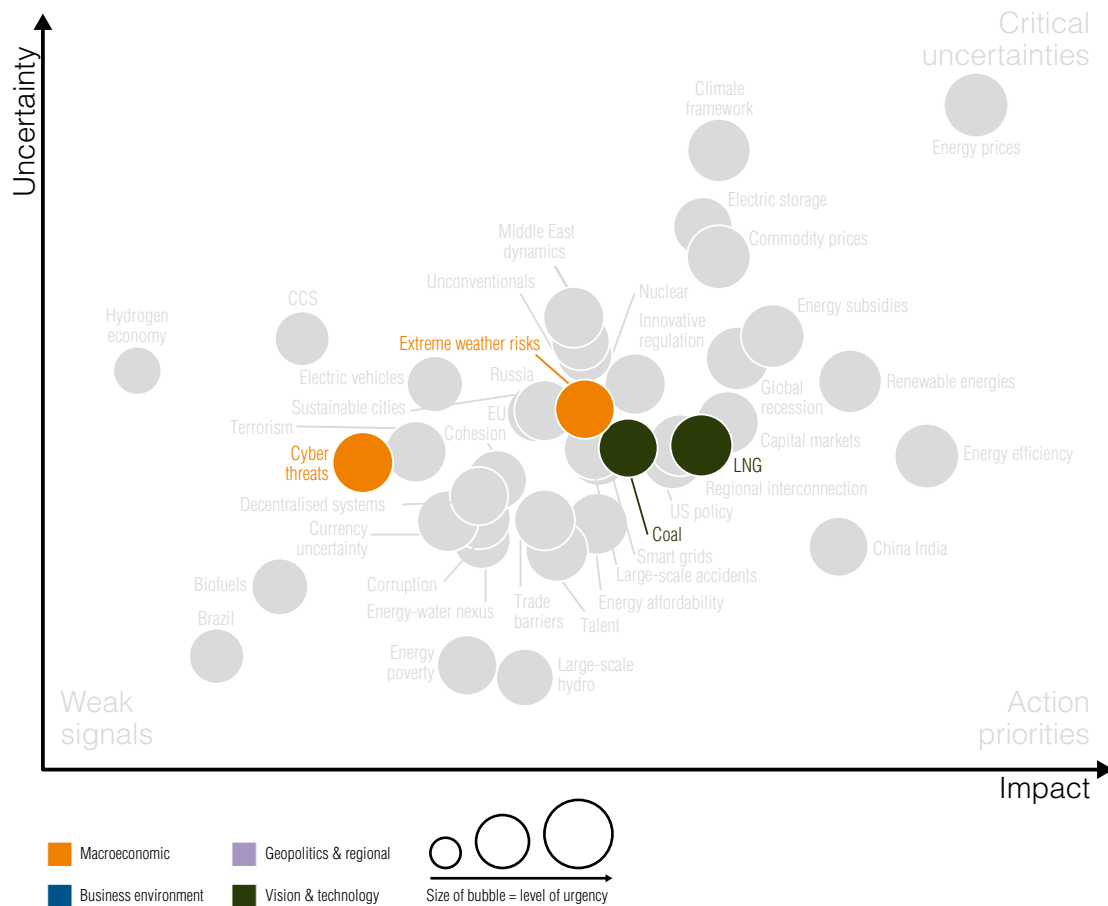


China/India is an issue with a lasting high perceived impact across the world. Key factors that determine the position of the issue differ across regions; for Africa the investment and trade relations as well as technology transfers with China are a key driver for the perceived impact. In 2012 the Chinese foreign direct investment (FDI) stock in South Africa, Nigeria and Sudan, amounted to approximately \$19.8 billion, making up approximately half of Chinese FDI stock in Africa. In North America and other OECD countries on the other hand, China's economic development, energy demand and its effects on energy prices plays a crucial role in the perceived impact associated with the issue.

New Issues

New issues for the Issues Monitor in 2015 demonstrate strong regional differences around the perceived impact for both coal and LNG. Further understanding around extreme weather risks and cyber threats is needed to move the issues from their current positioning as an uncertainty on select national agendas to one of increasing importance at the regional and global level.

Figure 6
WEC's 2015 World Energy Issues Monitor: highlighting new issues (coal, cyber threats, extreme weather risks and LNG)



The 2015 Issues Monitor features four new issues: coal, cyber threats, extreme weather risks and LNG. The central position which **coal** takes reflects the geographical variance associated with the issue. In Asia and North America coal is a key need for action issue, which reflects the regions coal demand, where Asia is the world's largest consumer with a 63% share of total use and North America is the world's second largest consumer with a 14% share of total use, including the export basis for the latter as we continue to see the displacement of relatively cheap coal from the US to Europe. For the Middle East and North Africa, a key hydrocarbon producing region, coal presents a competing fuel, which explains why it is perceived to be a key uncertainty in the region.

There is a similar geographic split in the perceived impact associated with **LNG**. North America is the largest unconventionals producer worldwide with a huge potential for additional development of operations, whilst high regional gas market differentials have driven the need for action associated with the issue of potential increased exports. In line

with the dominant uncertainty around energy prices, the potential for changes in both the dynamics of shale oil and gas production due to increasing pressures on margins as well as potentially reduced opportunities for arbitrage will make the LNG due to come to market in 2015 an important issue in the months ahead.

Globally, **cyber threats** is positioned in the weak signals area, while selected national maps including the UK and Switzerland perceive the issues as an emerging risk, where the issue is featured in the high impact zone.

With energy systems increasingly becoming modernised, automated and interconnected, and with greater awareness of the resulting cyber threats, the issue is likely to gain impact in the coming years. For energy infrastructure, the risk relates particularly to potential vulnerability along the entire value chain, through Industrial Control Systems (ICS) and Supervisory Control and Data Acquisition Systems (SCADA).

For **extreme weather risks**, there is a strong geographical split in both the perceived impact and uncertainty relating to the issue; whereby a higher positioning makes it an issue of particular concern for energy leaders in Africa and Asia where dense populations in urban areas exasperate resource stress. However, with growing fluctuations in weather patterns and increasingly visible infrastructure damage, extreme weather patterns become a greater concern for the global community. Given the necessity for the mobilisation of large-scale investment in energy infrastructure, as highlighted by the World Energy Trilemma Report 2014, the ability to quantify and understand the robustness and recovery to risks, in both existing and emerging centres of demand within the energy system, becomes increasingly important in relation to both sudden events as well as the long-term damage from increasingly severe weather patterns.



The regional energy agenda

The regional energy agenda

The following Issues Monitors build on the network of the World Energy Council to address the importance in understanding the energy agenda at a more localised level by providing the view from each WEC region, building upon the themes of the global Issues Monitor with a more in depth assessment of the specific challenges for respective energy leaders.

Regional break-down of countries contributing to the Issues Monitor:

▶ Africa

Botswana
Cameroon
Chad
Congo (Democratic Republic of)
Cote d'Ivoire
Ethiopia
Gabon
Ghana
Kenya
Namibia
Niger
Nigeria
Senegal
South Africa
Swaziland
Zimbabwe

▶ Asia

Australia
China
Hong Kong
India
Indonesia
Japan
Kazakhstan
New Zealand
Pakistan
Philippines
South Korea
Sri Lanka
Thailand

▶ Europe

Austria*
Belgium*
Bulgaria*
Croatia*
Czech Republic*
Estonia*
Finland*
France*
Germany*
Greece*
Hungary*
Iceland
Italy*
Latvia*
Lithuania*
Poland*
Portugal*
Romania*
Russian Federation
Serbia
Slovakia*
Slovenia*
Spain*
Sweden*
Switzerland
Turkey
United Kingdom*

▶ Latin America and the Caribbean

Bolivia
Brazil
Chile
Colombia
Ecuador
Paraguay
Peru
Trinidad and Tobago
Uruguay
Venezuela

▶ Middle East and North Africa

Algeria
Egypt
Israel
Lebanon
Libya
Morocco
Qatar
Saudi Arabia
United Arab Emirates

▶ North America

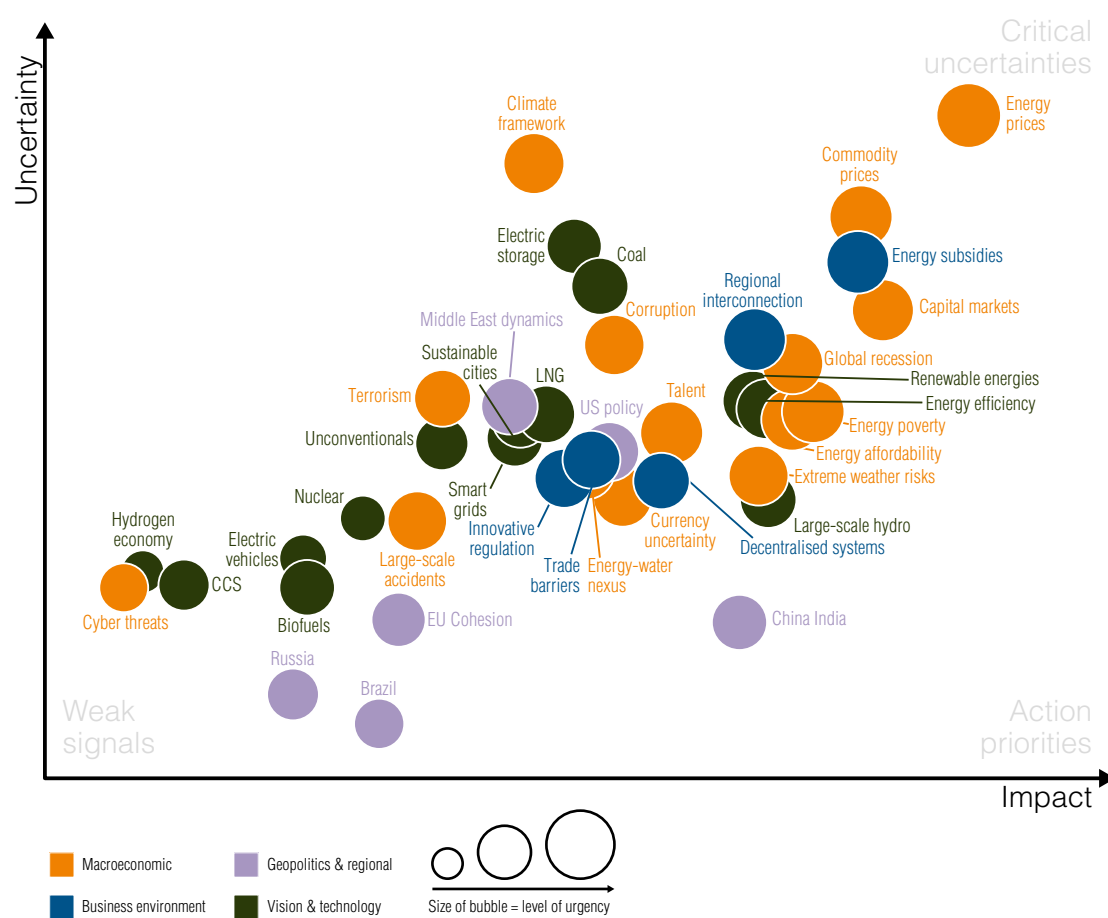
Canada
Mexico
United States of America

* = EU member states

AFRICA

The main contextual observations for this year's Issues Monitor in the region, demonstrate that Africa's economy is successfully weathering the global recession, and is taking tentative steps towards a more sustained growth. The US is showing growing interest in Africa, scaling up the *Power Africa Initiative*, and endorsing a series of public-private-partnership (PPP) deals to boost trade and investment. Furthermore, Africa's potential and prospects for further oil and gas discoveries remain largely positive and can offer huge opportunities. The Ebola outbreak in three countries in West Africa and the related health crisis are negatively impacting the local social and economic development and could have lasting consequences in affected countries and beyond.

Figure 7
WEC's 2015 World Energy Issues Monitor: Africa

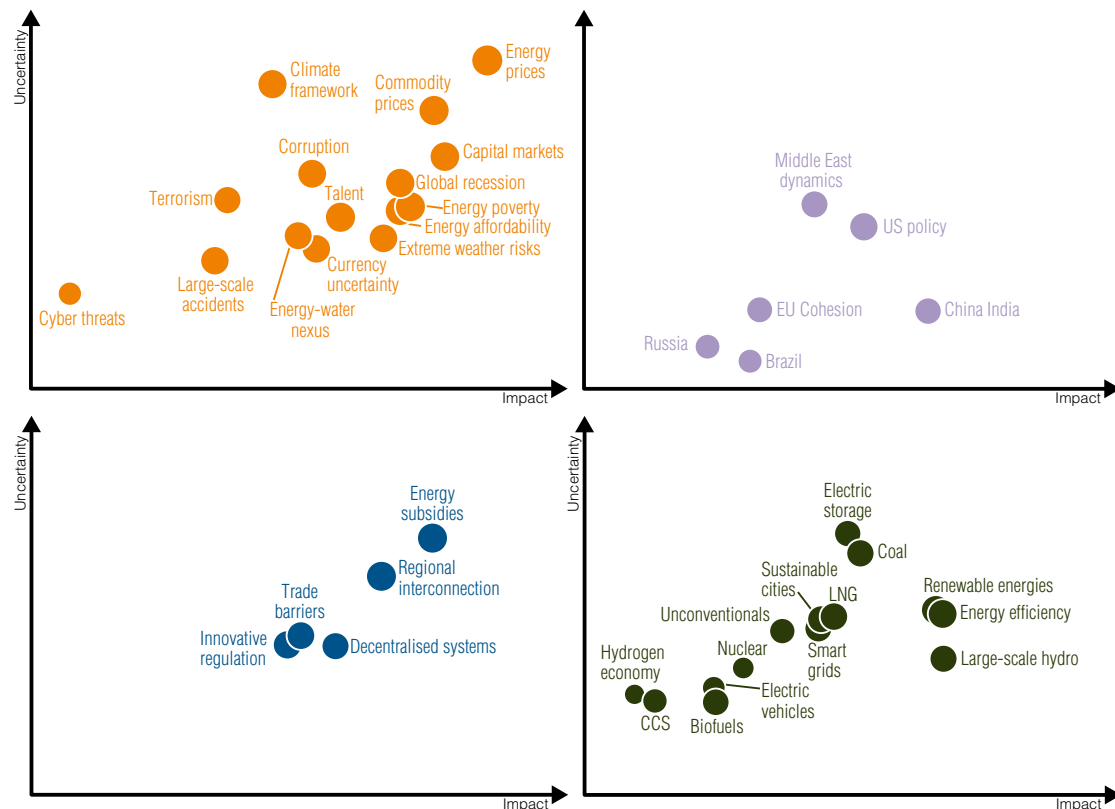


The top critical uncertainties in 2015 are: **high energy price** and **commodity price volatility**, **energy subsidies** and **capital markets** (Figure 7).

Energy and **commodity prices** continue to be volatile, adding to the uncertainty of global market behaviour. Budgets of low-income households are affected and **energy affordability** has become a serious concern. Consequently, governments of some countries, facing growing public pressure, resort to subsidies to mitigate social concerns. Recourse to the capital market is becoming increasingly crucial to finance urgent and growing needs of infrastructure projects.

Large-scale hydro, **extreme weather risks** and **China/India** are the most important need for action issues to be tackled for the African region; while **energy poverty** is still looming and remains unsolved (Figure 8).

Figure 8
WEC's 2015 World Energy Issues Monitor: Africa



Africa has always displayed its strong inclination for **large-scale hydro**, but there is still much to do – only 7% of the potential is developed. Bold actions, sound public policies and an effective business environment are all required in order to finally allow the sustainable development of these infrastructures. The immediate interest of Africans, with regard to climate change, is rather focusing on its visible disastrous consequences including **extreme weather events**, instead of uncertain and complex global climate negotiations. Furthermore, the mutual interest of strengthened China – Africa partnership grows over the years and begins to bear fruit for both sides.

Whilst a number of the above issues went through relative change, year-on-year to move towards the top of energy leaders' agendas in Africa, a number of issues did undergo a lower relative change over time. This mostly related to those which remain critically uncertain, such as **energy prices**, **capital markets**, **energy poverty** and **energy efficiency** – but also, some high impact issues, such as **talent**, **large-scale hydro**, **trade barriers** and **energy-water nexus**, and **China/India**, because there is still much to do by energy leaders to push them forward with bold actions and stronger policy support.

In terms of the overview in the movement of issues for energy leaders in Africa: **renewable energy** is more prominent and action-oriented, with less uncertainty. **Large-scale hydro**, at the top of Africa Union's political agenda, is clearly gaining more impact. **Energy efficiency** maintains its position as an indispensable and critical tool for the energy system, requiring

pressing and bold actions. **Nuclear**: after some positive signs of confidence that emerged the last year, this issue is moving again into the weak signals area. **Unconventionals** continue to deliver weak signals. Due to the absence of sustained achievements in recent years to support their wide deployment, expectations with regards to **biofuels** are diminishing and they are again relegated into the weak signals.

When comparing the Africa region as a whole to the maps of the non-OECD countries, it appears that there are similar views and a strong correlation with regards to most relevant issues. In comparison to the global perspective there are however stronger differences. Against non-OECD countries, the main differences appear with regards to **decentralised systems, climate framework, LNG** and **sustainable cities**.

On the geopolitical side, **US Policy** is again gaining ground this year as the US indeed reaffirmed their strong commitments to play a further role and gain an important part in the growing trade opportunities with Africa. Furthermore, **Middle East dynamics** reflected the positioning that although some MENA countries continue to be affected by political instability and social unrest, there is a general move towards an improvement of economic activities going forward (with the exception in Libya, where a lasting civil war takes its toll).

Climate framework and all the political global debates around the search for a global agreement became a less immediate concern for Africans. Rather, **extreme weather events** / patterns, with severe and frequent growing risks, are tangible and immediate threats, mostly impacting Africa which is one of the most vulnerable continents.

Renewable energies, albeit from a low base and still relatively expensive overall, have become an unavoidable option for Africa. Bold actions must be taken to strengthen their place in the energy mix of the continent.

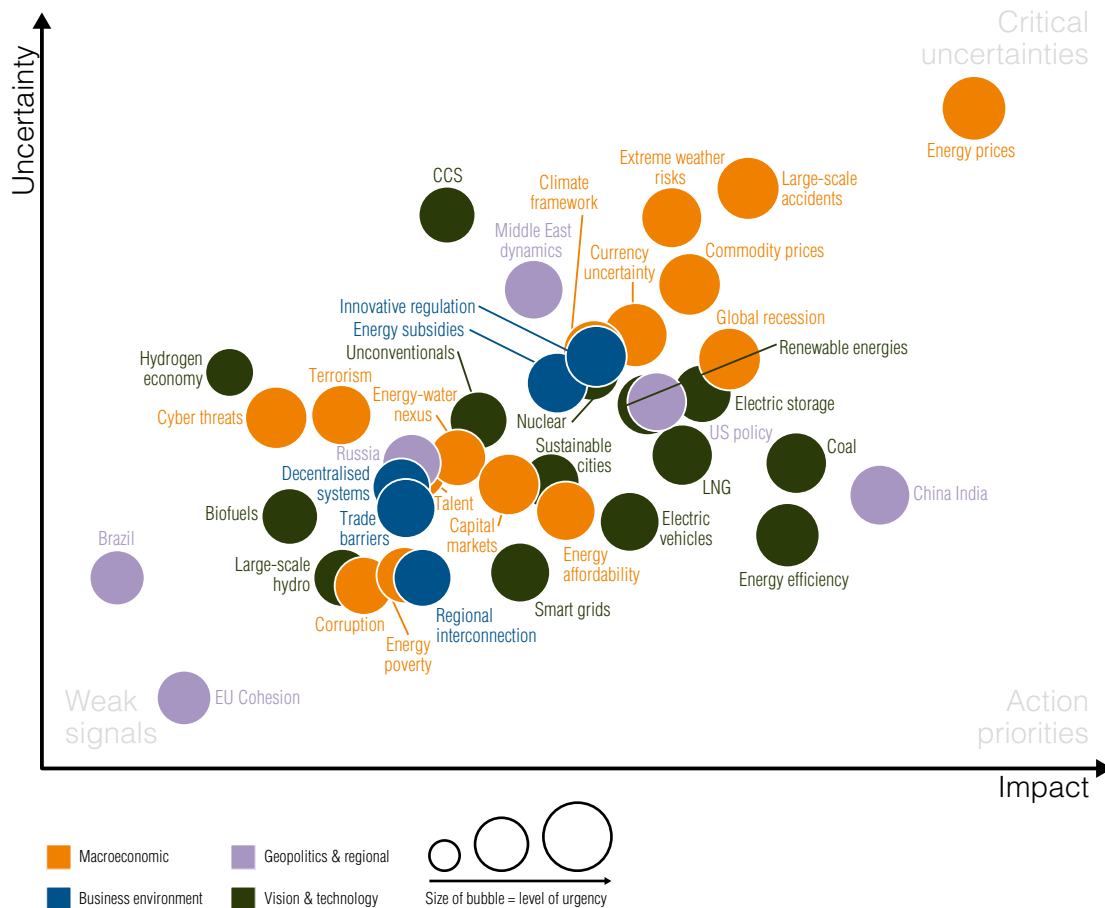
Regional interconnection remains high in the agenda and a key priority of African energy leaders and the African Union. The PIDA has been initiated to facilitate its achievements and to get the Priority Infrastructure Projects on track.

Finally, on the technology side – **biofuels**, after gaining momentum the last year, is again pushed into its 2012 position among the weak signals while **CCS** continues to see little potential and prospects to deploy this technology in the near term.

ASIA

The emerging economies in the Asia region remain as the world's leading growth centre. Their energy consumption is also increasing at a remarkable rate, and the gap between the amount of domestic energy production and consumption has been widening. The self-sufficiency rate in energy is decreasing as a result.

Figure 9
WEC's 2015 World Energy Issues Monitor: Asia

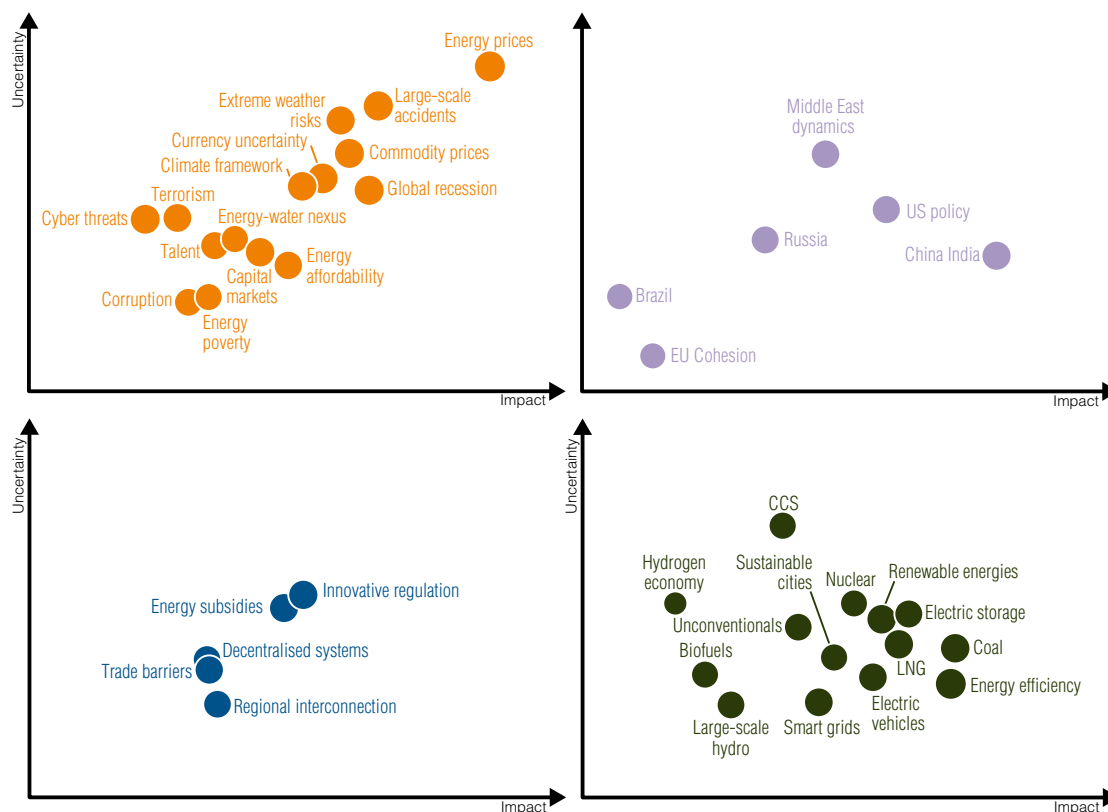


The OECD countries in the region, namely Japan and Korea, are poor in domestic fossil fuel endowments and they have been suffering from a low energy self-sufficiency rate. This is particularly the case in Japan because the operation of all the nuclear power plants has been suspended since September 2013 as a consequence of the Fukushima accident. Thus the region as a whole has been increasingly becoming more susceptible to the global energy market and trade. Furthermore, with the rapid growth of energy demand or decrease in supply capacity, the region is struggling to secure the stable supply of energy.

Energy prices was unquestionably the top critical uncertainty in 2014, and even more so in this the Issues Monitor this year. With the improving standard of living, the progress of motorisation and the importance of crude prices, or with the policies and measures to curb CO₂ emissions such as Feed-in-Tariff and emission trading, **energy prices** is understandably the most critical uncertainty that keeps energy leaders in this region awake at night. The second critical uncertainty is **large-scale accidents**. During the last couple of years, **large-scale accidents** had moved towards the centre of the map, suggesting the diminishing

impact of the Fukushima nuclear accident; however, this year, its level is comparable to that of 2011, the year the nuclear accident occurred. This move may reflect the tremendous damage typhoon Haiyan did to the Philippines in November 2013 – an assumption corroborated further by the positioning of **extreme weather risks** as high in the critical uncertainty space both in itself and compared to the world average.

Figure 10
WEC's 2015 World Energy Issues Monitor: Asia



China/India growth is the most important need for action issue, which is not a surprise, considering the ever-increasing impact of these two countries particularly in this region. However, what may be noteworthy is the fact that, although this issue had been in the critical uncertainty space in the past, it has become less uncertain and entered the need for action zone for the first time this year, with a gradually increasing magnitude of impact. In addition this issue is increasingly perceived as less urgent. These signals indicate that the growth and impact of these two countries have become given conditions, which the energy leaders in this region take for granted.

Another need for action issue is **coal**. When compared to the world map, coal is perceived to have much greater impact in this region. This is reinforced by considering the fact that China alone accounts for half of the world coal consumption, and in terms of coal imports, Asia holds all top five positions (China, Japan, India, Korea and Chinese Taipei).

One of the highest (and surprising) change issues is **climate framework**. This issue used to be one of the top critical uncertainties and indeed it is still so in the world map, but its position is near the centre of the Asia map this year. Similarly, issues such as **renewable energies**, **sustainable cities** and **energy efficiency** have all become weaker (i.e. moved toward the weak signal quadrant) this year. Whether the underlying reason of this trend

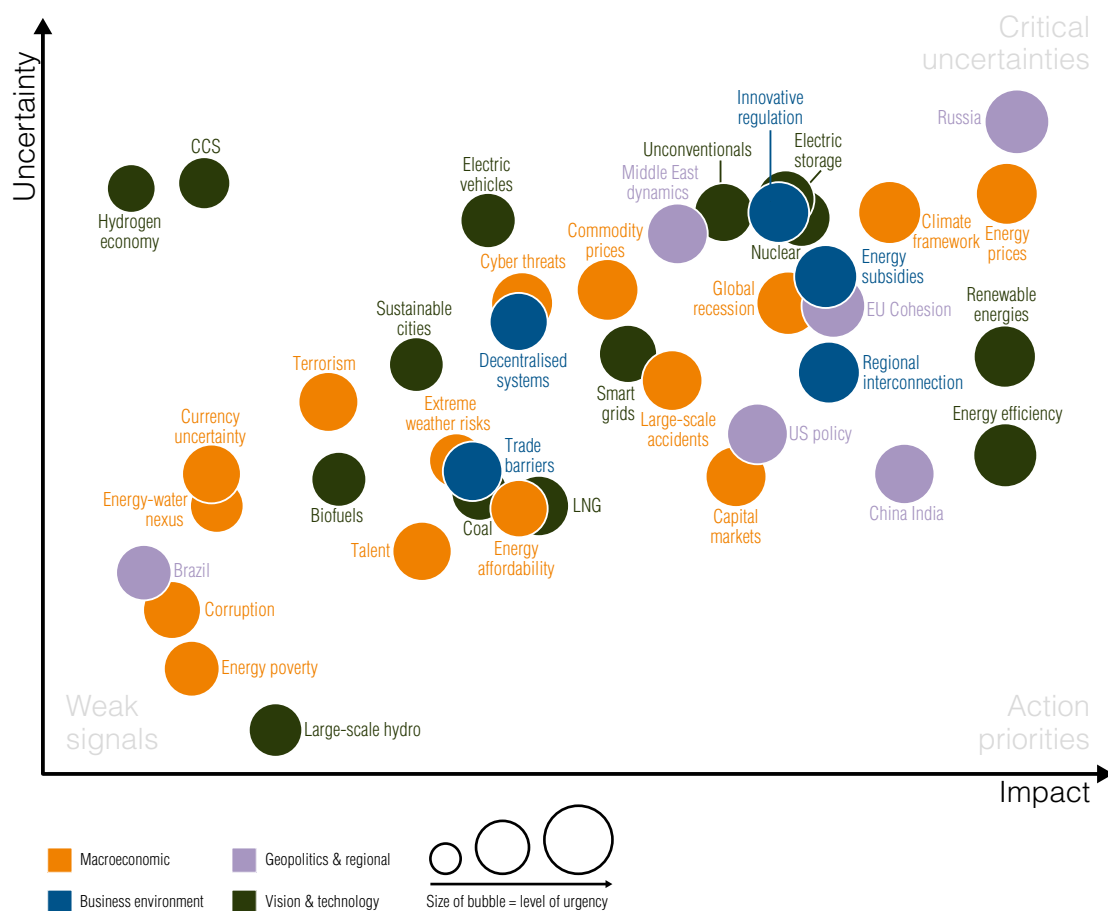
is the people's changing perception about environmental issues, or the changes in the constituency of this survey would need further analysis. **Electric vehicles** has made fairly big strides from a subdued, uncertain and limited impact position toward need for action in Asia in contrast to the world map where the issue has slightly moved in the opposite direction. This may be an indication of both public and private sectors' enthusiasm for the research, development and diffusion of the electric vehicles in this region.

In comparison to the global map, the additional issues which show significant differences include the positions of **energy subsidies**, **regional interconnection** and **currency uncertainty**. Although **energy subsidies** seems to have less of an impact in Asia than in the world, the situation differs greatly from country to country. Indonesia and Thailand, for example, recognise this as one of the top critically uncertain issues. The impact of **currency uncertainty** is perceived to be much bigger in Asia than the world as a whole, which may reflect the ever-increasing dependence on imported energy.

EUROPE

Using the EU as a proxy for Europe – and we have to be aware that not all European member committees are part of the EU – certainly the 2030-discussion was the main driver in the last months of 2014. Due to the elections of the EU-parliament and consequently the new EU commission there are still some questions open regarding the new 2030 energy and climate package. Outstanding questions address the final EU-2030 package, whether it will have more than one binding target and if so, how the interference between additional targets and a GHG target will be solved. This leads to rather peculiar European uncertainties in comparison to other regions, and especially covers the three pillars of the 2030-package (Figure 11): EU emissions trading scheme, renewable policy and energy efficiency.

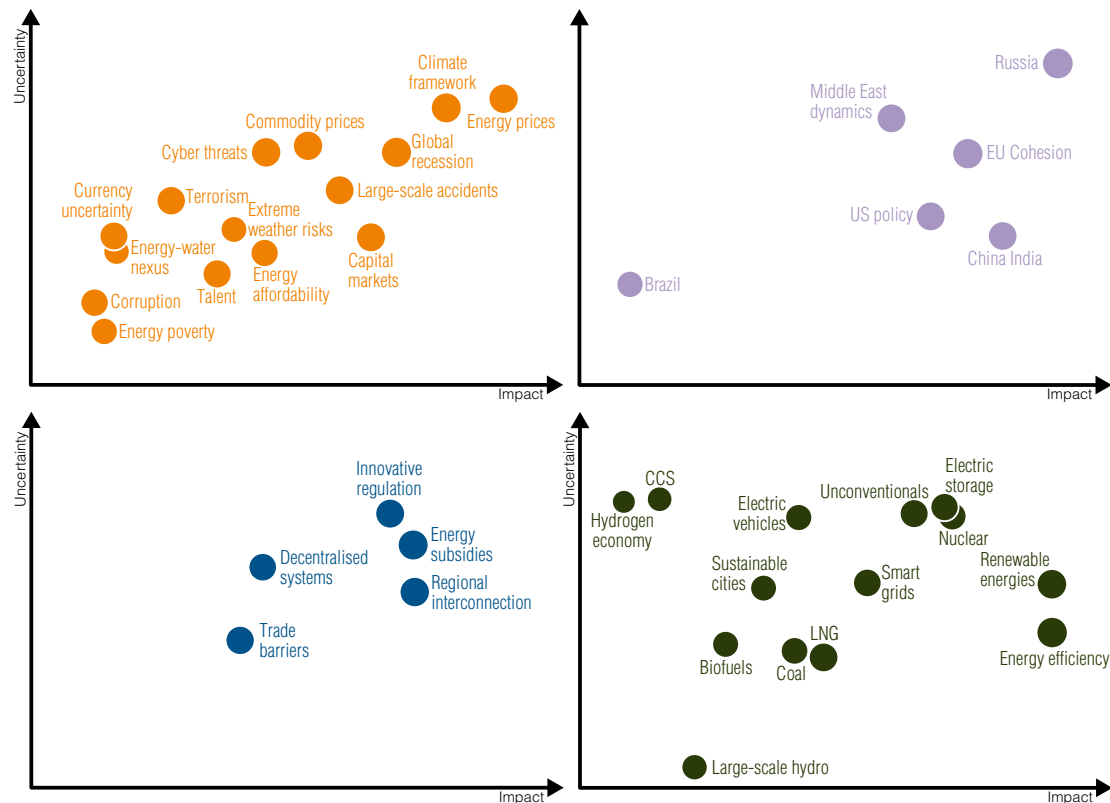
Figure 11
WEC's 2015 World Energy Issues Monitor: Europe



Russia – a main exporter into many European countries of natural gas, oil and coal – certainly reached new levels of attentions in the past months due to the ongoing intense tensions between Russia and Ukraine. Since the Russian and the European economy are strongly interwoven, this hits Europe much more, also the sanctions against Russia are mainly a burden for European companies. The development raised concerns about security of supply, especially since at the same time the production rate of natural gas in some European countries is declining. As solutions to reduce the import dependency, energy efficiency and renewable energy were mentioned as well as a broader import basis with LNG as a focus.

The top two critical uncertainties are closely linked to the contextual observations, i.e. **Russia** and the **climate framework** (Figure 12). In addition **Energy prices** are a critical uncertainty. Two of these three critical uncertainties were also top in 2014: **energy prices** and **climate framework**. **Russia** has now replaced global recession in the top tier three.

Figure 12
WEC's 2015 World Energy Issues Monitor: Europe



Energy prices was already an issue in 2014. During the last year the competitiveness of industry prices has become a more relevant topic. Firstly, because there was increasing pressure to allocate the steeply rising bills for climate action more upon the industry. Secondly, because the non-competitiveness of energy prices, mostly driven by taxes and levies, became evident in comparison with other regions.

Energy prices mainly concern industrial customers: **affordability** is rated significantly lower; however its position has moved from a weak signal in 2014 to a need for action issue in 2015.

With energy efficiency and **renewable energies** there are two borderline topics right between need for action and critical uncertainty. In both cases selected business opportunities are present, but overall there is uncertainty about what will drive the development in the medium and long term. In the case where the EU (with 28 European Union member states a dominant player in Europe) will go for mandatory and binding targets for renewables and energy efficiency, a tendency for regulated solutions might occur – whereas in the case of indicative, non-binding targets on EU-level, market based solutions will prevail both issues.

The biggest year-to-year change can be found in perceptions towards **decentralised systems**. Though, the impacts of decentralised systems to the energy system are still considered to be moderate, the understanding about their potential impact has clearly moved up in the agenda. It remains to be seen how it develops in coming years.

The two biggest changes were experienced by **global recession** and by **Russia**. **Global recession** has lost its threat to European countries – partly, because they now show improving economic data, partly because they got used to the situation. **Russia** became much more prominent in the discussion due to the strong developments of the conflict with the Ukraine in a very short period of time.

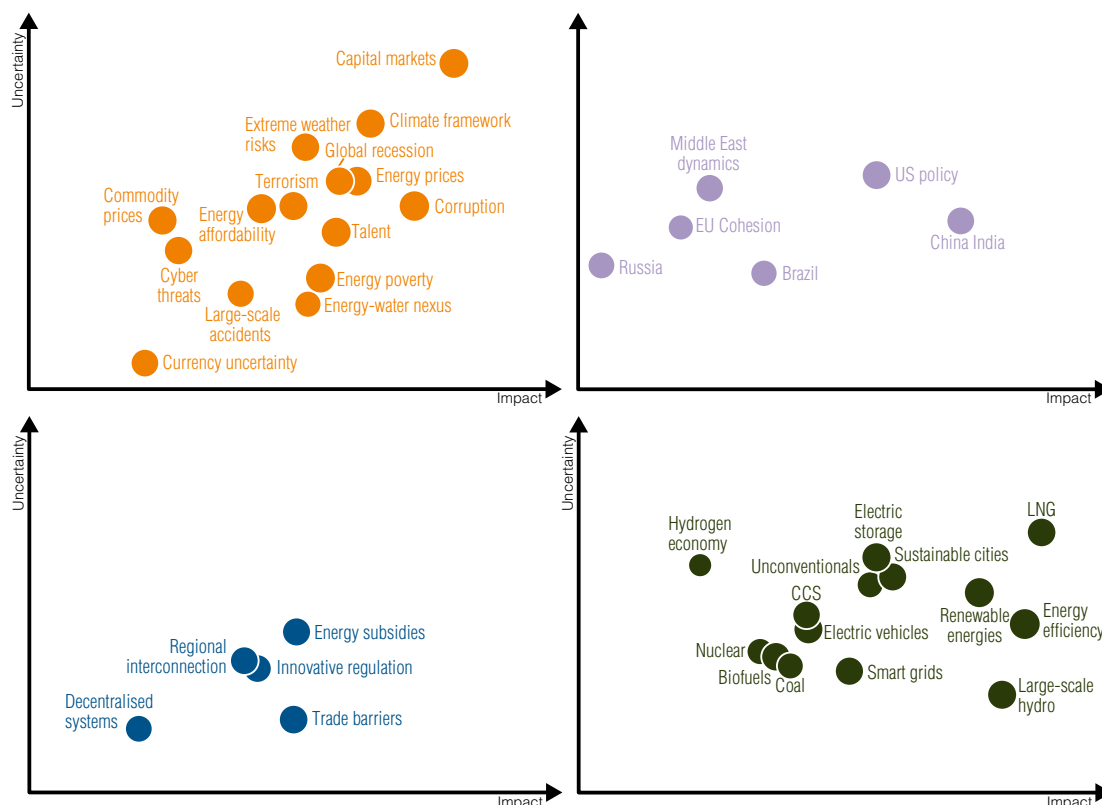
Rather low changes were seen for **renewable energies**, **energy efficiency** and **regional interconnection**. These issues already showed open questions last year which still remain unanswered.

While **energy prices** and **climate framework** are also seen as important critical uncertainties globally, **Russia** is not seen as critical uncertainty globally. This illustrates the strong economic relationship between Europe and Russia and highlights the importance of Russian energy deliveries to other European countries.

The similarities in the position between the EU and global map with regards to **climate framework**, **energy efficiency** and **renewables** also demonstrate that these topics are set in Europe mainly by the existing EU-2020 and the upcoming EU-2030 agenda. In contrast to other regions of the world these three pillars are influencing the energy sector due to a strong and constant political agenda.

LNG entered the survey as a new topic – and immediately shows up in the need for action area. This is certainly a consequence of the security of supply discussions within Europe: **LNG** is seen as an excellent way to improve the supply basis by having access to many additional gas exporting countries. Also the strong growth of the **decentralised systems** can be considered as slight surprise.

Figure 14
WEC's 2015 World Energy Issues Monitor: LAC



Energy subsidies play an important role in countries like Argentina, Bolivia, Chile, Ecuador and Venezuela. This issue has shown a huge increase in impact compared to the 2014 monitor, taking it to the critical uncertainty zone. The different elections and political activity going on in the region this year may explain this movement. However, it is interesting to note that a closely related issue, **energy poverty**, has a much lower impact and uncertainty in the map; the lack of attention given to this issue may explain why LAC continues to have low scores under the energy equity dimension of the Trilemma Sustainability Index 2014.

LNG is a new issue on the map, where compared to the global agenda, LAC leaders see the issue to be much more important and uncertain. Panama Canal improvements in 2015 will allow LNG tankers to go through, increasing LNG trade not only within the region but also with Asia. This, together with investments in Trinidad and Tobago and Peru on LNG liquefaction facilities portray the potential impact this can have in the near future.

Latin America has the potential to develop **unconventionals**; Argentina has the second largest reserves in the world. However there is still huge uncertainty around the issue not only in regulatory terms but as well regarding social acceptance.

LAC is one of the richest regions in the world in terms of water resources, where many countries generate more than half of their electricity with hydropower. However **extreme weather risks**, **energy-water-food nexus** and social activism against large hydro, among others, show that energy systems cannot be so dependent on this resource and countries need to start diversifying.

The map clearly shows how all these issues are much more relevant in the LAC region than in the global map, clearly marking them as need for action. This is complemented by **renewable**

energies also being classified in the need for action area; many countries are already taking this to their agenda and investing in renewable resources to diversify their matrix.

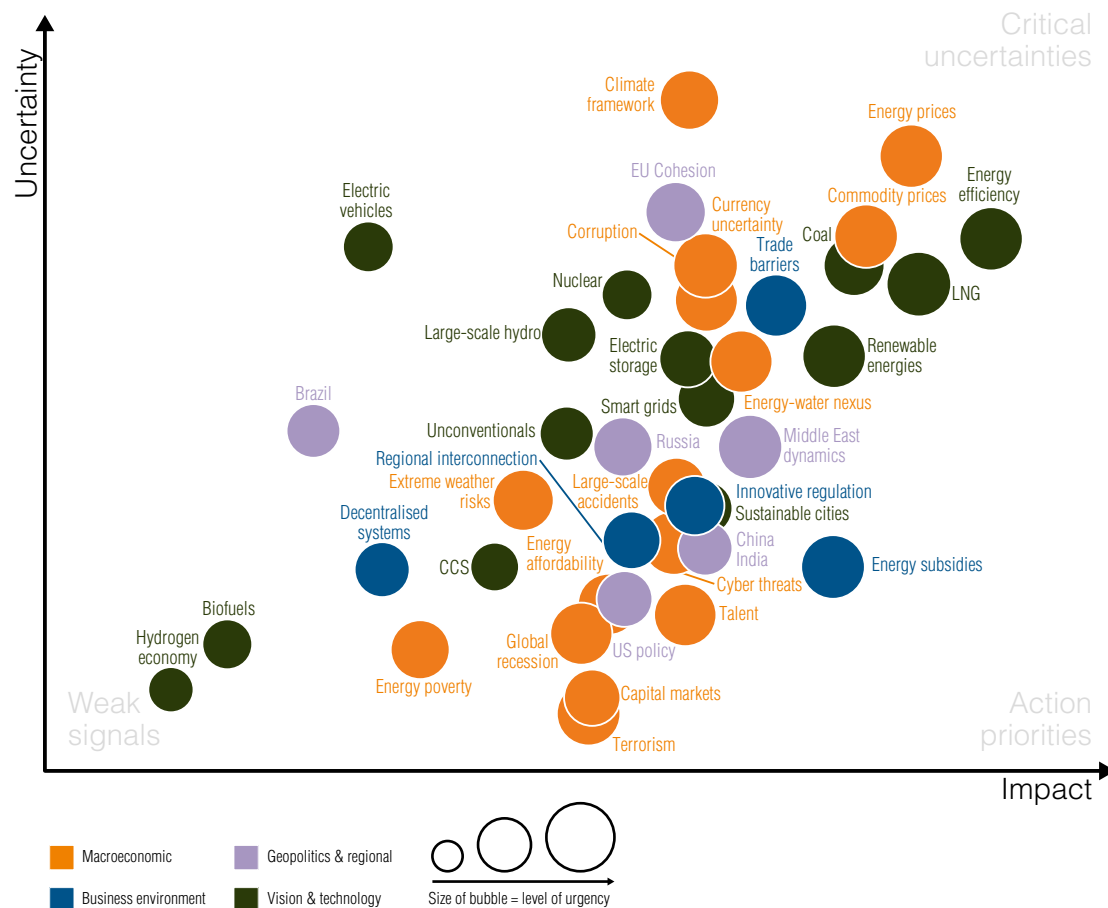
When comparing the global agenda with the regional agenda, **energy prices**, **energy efficiency**, **energy subsidies**, **innovative regulation** and **commodity prices** have similar standings on the map. However, issues like the **global recession**, **nuclear**, **LNG** and **Middle East dynamics** have much lower importance in the region. Most of the geopolitical issues don't seem to have a big impact on LAC, instead macroeconomic issues do play an important role.

It is very clear that LAC needs to address many of the issues in order to pursue a balance on the trilemma. **Regional interconnection** is a key aspect to be able to achieve trilemma benefits; however, this issue must be complimented with stable long term energy policy and regulatory framework. Leaders must not forget that all three dimensions on the trilemma must be addressed, and issues like **energy poverty** should be expected to move towards the need for action field.

MIDDLE EAST AND NORTH AFRICA (MENA)

The 2015 Issues Map in the Middle East region reflects a growing awareness of key global issues. As the number of respondents has increased, there is a more accurate reflection of the views and concerns of the region, thereby strengthening the credibility of the position of the issues reflected in the map.

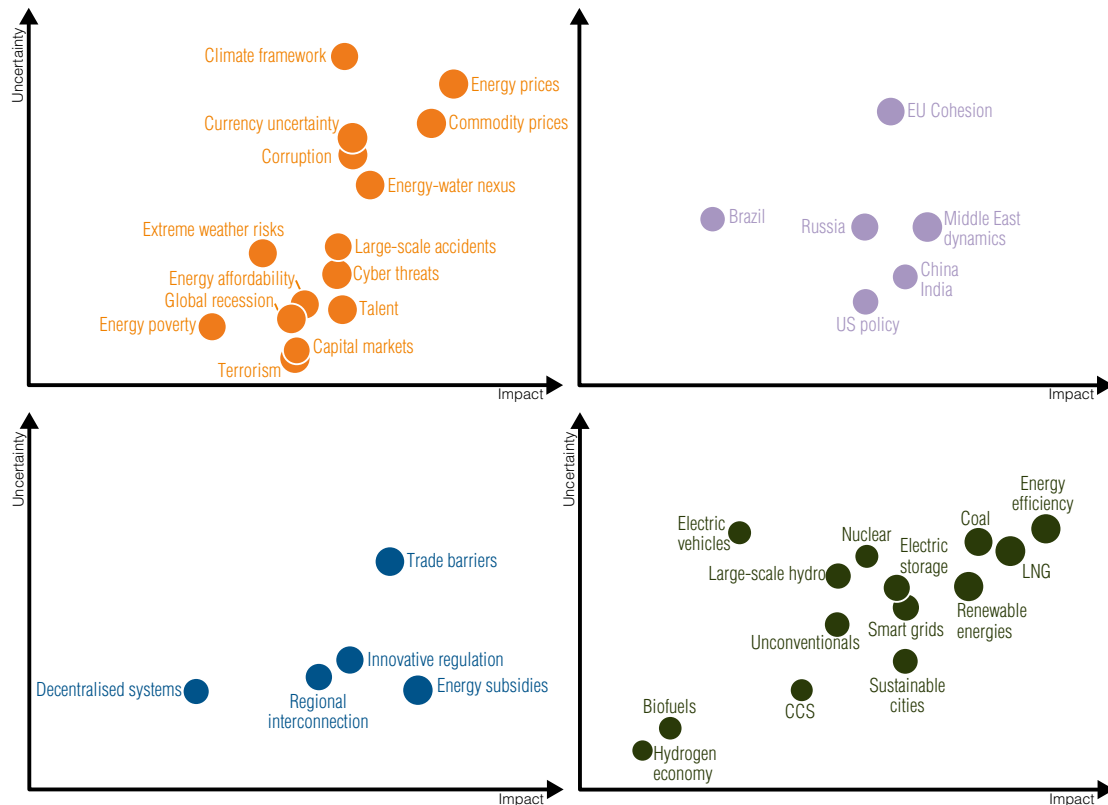
Figure 15
WEC's 2015 World Energy Issues Monitor: MENA



Even though the survey was undertaken at a time of relatively high oil prices, initial signs of a fall in energy prices had an early impact on the Issues Map. **Energy/commodity prices** showed greater uncertainty and reflect an anticipation that prices could continue falling, which in reality happened in the months subsequent to the closure of the survey (Figure 16).

As climate change issues rise in the global agenda following the publication of the Intergovernmental Panel on Climate Change (IPCC) reports from Working Groups 2 (adaptation) and 3 (mitigation), COP Lima and in the run up to COP Paris, the survey showed that the Middle East region sees the **climate framework** as an area of greater uncertainty and greater impact compared to 2014. Increasingly, hydrocarbon producers are aware that climate change discussions could undermine traditional export markets as global greenhouse gas emission caps impact on the burning of fossil fuels. Likewise, climate change could impact on fragile environments in the Middle East with an adverse effect on both production and domestic consumption of energy.

Figure 16
WEC's 2015 World Energy Issues Monitor: MENA



Concerns about the future of **coal** and **LNG** also rise in the scale of both uncertainty and impact. Coal is a competing fuel for hydrocarbon producers in the Middle East and continues to make inroads in Europe and the Far East, competing against oil in two key markets. For its part, LNG is the subject of concern because of competition from coal, on one hand, but primarily because of the prospect of increased production from new gas-producing provinces in Australia and East Africa.

Unconventionals, an issue that was at the top of the agenda in previous years, falls in terms of uncertainty and impact as the Middle East region begins to understand and accept the phenomenon. As oil prices continue to fall and undermine the economics of such high-cost resources, the issue is likely to continue to reduce in both uncertainty and impact.

Renewable energy is little changed but is still regarded as an important issue with the potential for impact. For the Middle East region, this issue reflects the potential of renewables to contribute towards a widening of the domestic energy mix. Plentiful supplies of solar energy mean that the region is increasingly harnessing renewables in order to supply the domestic market, releasing more hydrocarbons for export.

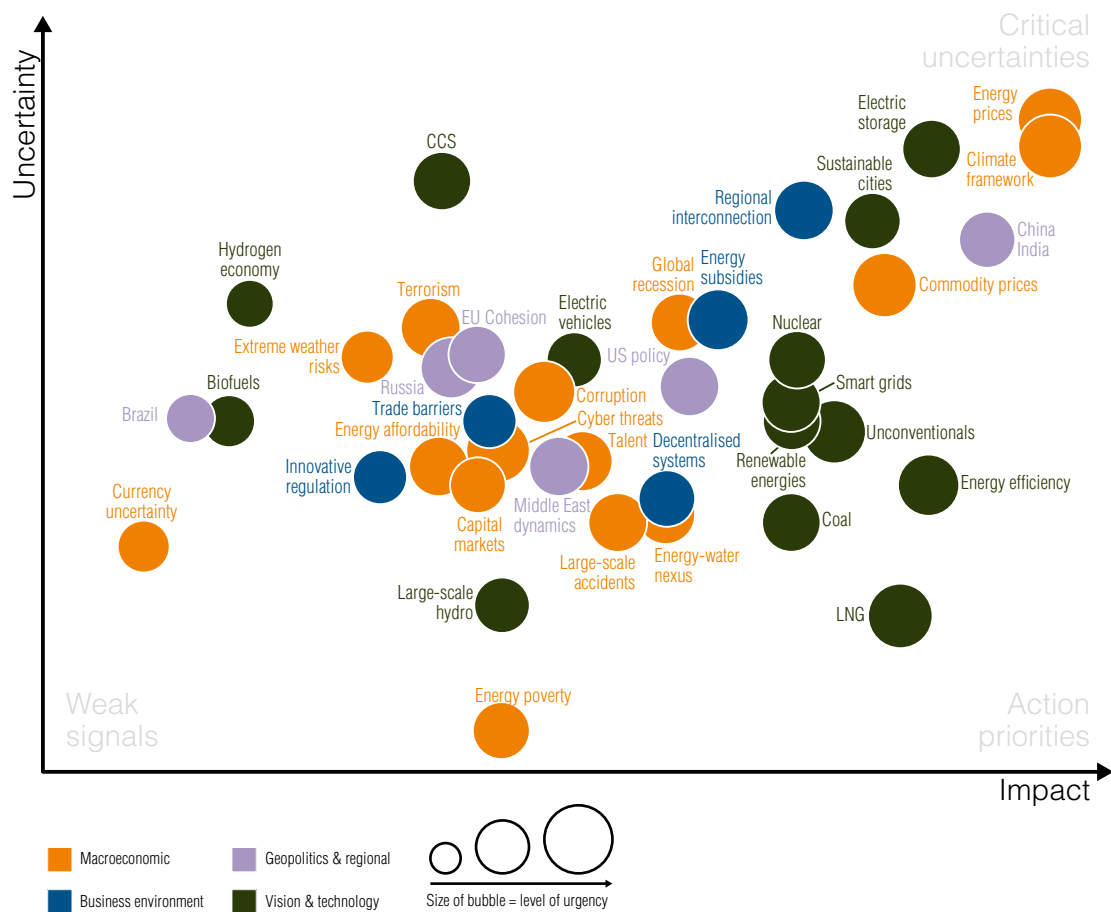
Carbon capture and storage (CCS) is providing weaker signals despite a number of pilot projects in the region. Overall, it reflects a lower level of interest in the technology as a measure to mitigate climate change. If anything, the region sees carbon injection as an interesting method to enhance oil recovery rates.

Likewise **global recession** and **large-scale accidents** are becoming weaker. The global economy is showing signs of tentative recovery and energy consumption continues to grow – even if at a modest rate. Safety culture in oil-producing regions remains strong and the Issues Survey shows that the region has moved on from Fukushima.

NORTH AMERICA

Across North America various forces are shifting the energy market landscape. Though not reflected directly in the 2015 World Energy Issues Monitor regional map, slow or stagnant demand growth for energy in the U.S. and Canada has coincided with a surge in the production of shale gas and other forms of hydrocarbons. Despite a rise in global demand for oil and natural gas, a limited ability to bring the surging production of oil and gas to the market clouds future development. Furthermore, in Mexico we see the creation of a new competitive energy market, and the shift from a highly carbon-dependent sector to one in which renewable energy plays a much larger role in the industry's activity.

Figure 17
WEC's 2015 World Energy Issues Monitor: North America



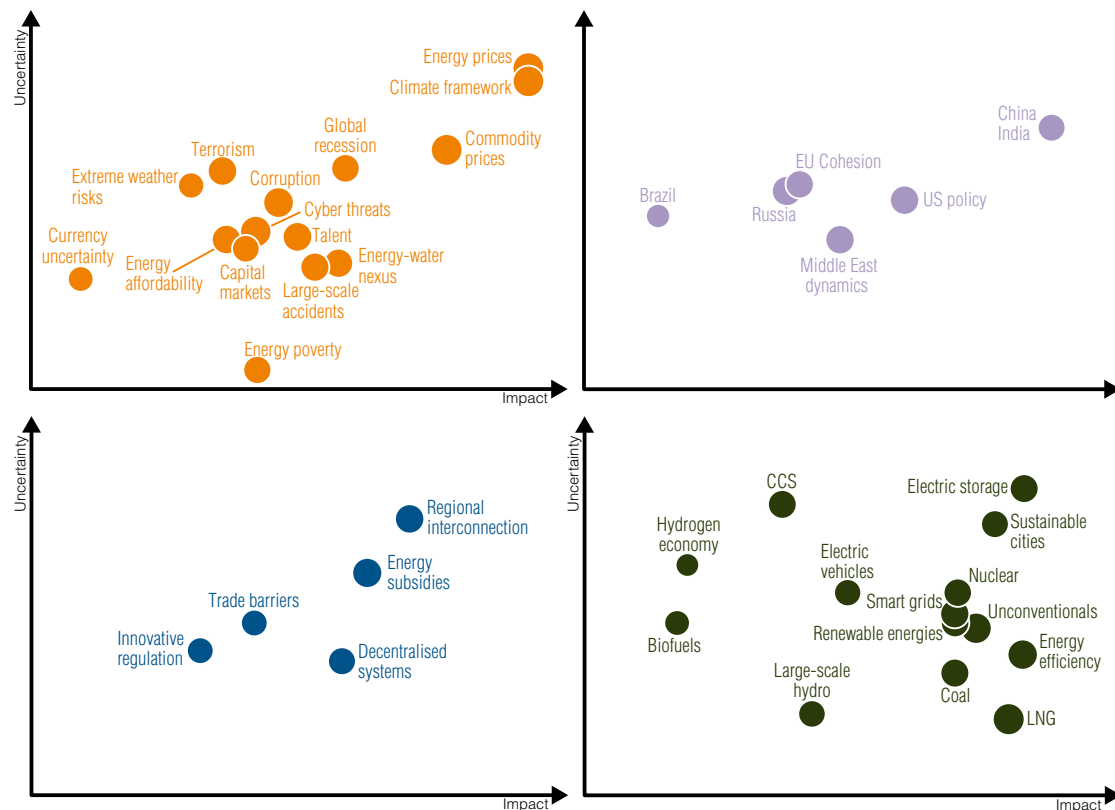
Without question, uncertainty over **energy prices** looms as the key concern across North America. Before the late year plunge that drove oil prices to their lowest level since December 2010, U.S. and Canadian producers expressed concern that low prices for oil, gas and bitumen may not be adequate to sustain additional exploration and production. In addition, dispatched electricity prices in competitive U.S. power markets, spurred by low-cost gas generation, is forcing the retirement of significant levels of coal and single-unit nuclear generation capacity.

In Mexico, the government's fiscal income is closely tied to the oil production of PEMEX. However, new international investment opportunities have been created with the bill that enables the liberalisation of the Mexican energy sector which came into effect in December 2013. Low energy prices both highlight and accelerate the need for investment in the

sector. There is however hope that increased production from a competitive marketplace will help stabilise revenue, while the new legal framework will help to minimise concerns over corruption that could distort the marketplace.

Based on this year's data, the need for action on a climate framework represented one of the most comprehensive issues facing the industry, as well as one of the most dramatic shifts from one year ago. The absence of a climate framework impacts long-term industry planning, and in Canada and the U.S., the future role of coal in light of climate regulations is becoming an area of significant concern with a need for action.

Figure 18
WEC's 2015 World Energy Issues Monitor: North America



Though the particularities of each nation are unique, the role of energy exports is an issue of growing immediacy across the region. U.S. energy producers seek opportunities to access international crude oil markets and speed LNG export development, yet are prohibited by federal law (crude) and lengthy regulatory processes (LNG). Much of Canada's developing oil and gas assets are located far from the coast and require transport to shipping and processing facilities. However, significant barriers exist to transportation infrastructure development, particularly along the West Coast; a region ideally suited to serving fast-growing Asian markets. For Mexico, market reforms could significantly increase oil and gas output creating opportunities for greater participation in international markets. In addition, the potential exists to produce electricity for export to Latin America via the Central America Electricity Interconnection System for Latin Central (SIEPAC) should financial terms be suitable.

Among the areas of greatest/least change from 2014, **energy prices** represented the most high-profile area of uncertainty. While U.S., Canadian and Mexican manufacturing and industrial users benefitted from low prices, by mid-October, questions began to arise about

the sustainability of some North American shale oil producers as prices fell below \$80 a barrel – further pressure continued in this regard through to the year end. Carbon Capture Storage (CCS) technology also shifted dramatically to the weak signals quadrant as cost overruns and schedule delays reflected challenges with its implementation.

Reflecting its ongoing importance, the position of **smart grids** remained in the need for action quadrant. But, the absence of a clear catalyst indicated smart grids capital investments have more of a ‘nice to have’ view than ‘have to act’ outlook. This despite significant international focus on its role in resiliency planning, the rise of data analytics, and large-scale ‘Smart’ technology advertising campaigns.

Though identified as the most critical concern in both the world and North American Issues Monitor maps, energy prices were likely chosen for different reasons. In North America, energy prices are falling and considered low, where in the rest of the world energy prices are rising and considered high. In contrast, a noticeable variance exists between North America and the world concerning climate framework. As one of the primary impact areas of the summer-autumn hurricane season, a framework to address climate change is a key concern of the Mexican energy industry. Interestingly, in the United States, a path set forth by the EPA and supported almost in its entirety through a U.S. Supreme ruling has recently added greater clarity to the environmental landscape.

The links between **electric storage**, **renewable energy** and **energy efficiency** underscore a fundamental change impacting the electric industry. The rapid growth of distributed generation has begun to complicate the traditional utility model as flexible regulation trails the innovation of the marketplace. This will be an area to watch, particularly in mature energy markets.

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The national energy agenda

The national energy agenda

The following monitors build on the global and regional perspectives, to provide an insight into the priorities and critical uncertainties for energy leaders at the national level. Building on from the six WEC national member committees who undertook this process in the last edition of the World Energy Issues Monitor, we now explore the uncertainty and context in which crucial decisions must be taken, for 27 individual countries in 2015.

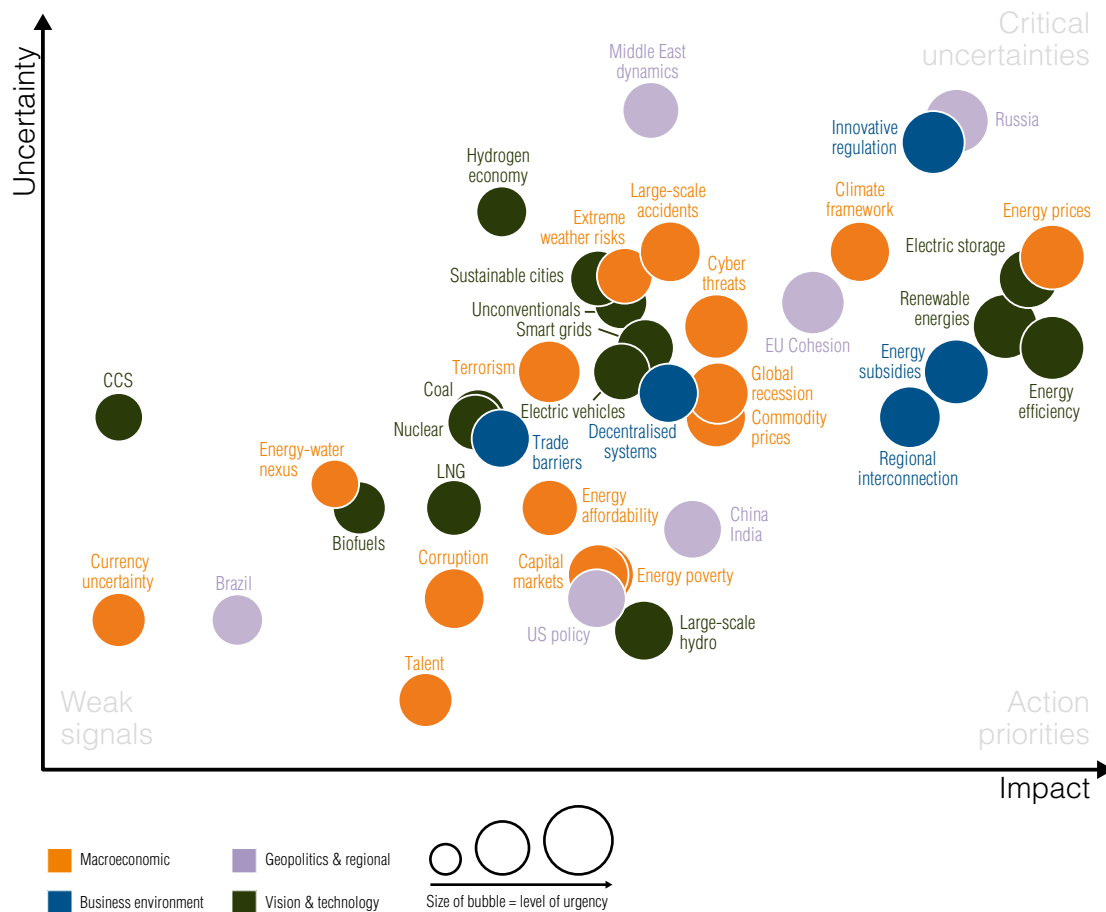
The following national member committees of the WEC have undertaken the country level assessment for this latest World Energy Issues Monitor 2015 report:

- ▶ Austria
- ▶ Belgium
- ▶ Canada
- ▶ Colombia
- ▶ Estonia
- ▶ France
- ▶ Germany
- ▶ Hungary
- ▶ India
- ▶ Indonesia
- ▶ Italy
- ▶ Japan
- ▶ Latvia
- ▶ Lebanon
- ▶ Lithuania
- ▶ Mexico
- ▶ Namibia
- ▶ New Zealand
- ▶ Nigeria
- ▶ Poland
- ▶ Portugal
- ▶ Romania
- ▶ South Africa
- ▶ Spain
- ▶ Switzerland
- ▶ Thailand
- ▶ United Kingdom

AUSTRIA

Among the most important current topics influencing the context of the Austrian Issues Map of 2015 are the aspects of security of gas supply, the development of energy prices and its costs, both energy and climate policies for the time period after 2020 and a new design of the electricity market. The similarities between the European regional map with regards to these issues thereby shows that Austria is faced by similar concerns as the European community.

Figure 20
WEC's 2015 World Energy Issues Monitor: Austria



In comparison to the global map, we can observe a consensus regarding questions such as energy affordability, a future climate framework convention or the further development of renewables in connection with the future design of subsidy systems. The uncertainties associated with Russia represent a European/Austrian specific issue and are to be evaluated under the careful consideration of Austria's dependence on Russian gas imports.

Electric storage, a key uncertainty in Austria (Figure 20), is given a higher significance in comparison to the world or Europe, which could be related to the fact that Austria benefits from a wide number of storage and pumping power plants and sees itself as a battery for the Central and West European region. While storage and pumping power plants are needed for a successful energy transition, these power plants are facing increasing economic pressure because of the current market situation of an oversupplied energy market and high price volatility.

Both **innovative regulation** and the energy dependence on **Russia** are two aspects considered to be high uncertainties. Concerning these issues, urgent action is needed.

With regards to **innovative regulation**, the Austrian electricity market design and the future perspectives of the electricity industry are currently discussed in detail, which may be driving the uncertainty associated with the issue. The Austrian electricity industry is being confronted, among other things, with uncertain energy and climate policy frameworks, low profitability margins as well as a lack of predictability of investment.

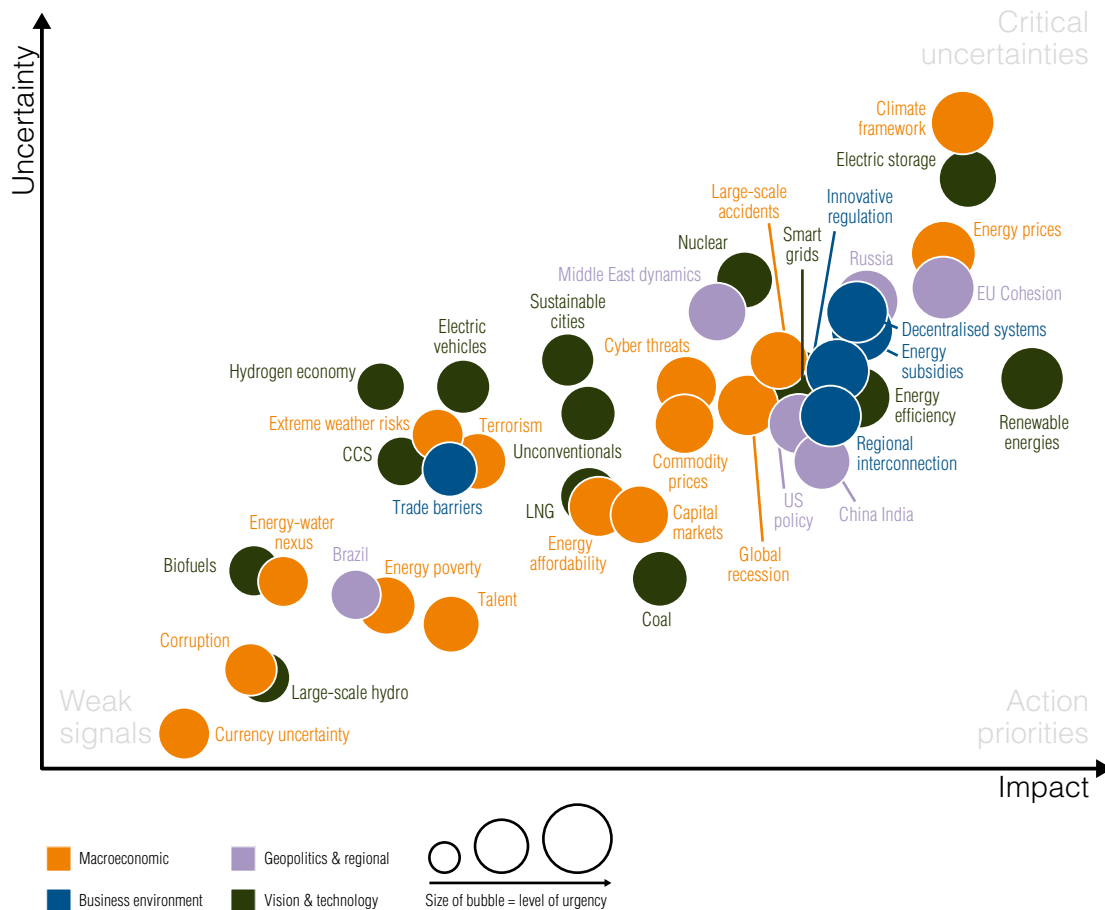
In this context it is extremely important to stronger coordinate and to harmonise the design of the energy system at the European level, which explains the need for action perceived with the **interregional connection** issue in Austria. The CO₂ market should be the control system needed to achieve the energy transition and to support the planned expansion of its renewable or low-CO₂ generation technologies, which explains the need for action associated with **energy efficiency** and **renewables**. **Renewables** should be incorporated in the competitive market as soon as possible whereby any **subsidies** shall be limited the moment renewables have reached the market maturity. To ensure the security of electricity supply, the expansion of the power grid is essential. Moreover, the removal of market barriers (peak load pricing, cancellation of non-market compliant, long-term gas supply contracts linked to the oil price, etc.) is urgently to be tackled.

With regards to **Russia**, the societal and political developments in Ukraine are perceived with high levels of concern in Austria. Austria covers four-fifths of its gas demand through imports and almost all originate from Russia. At the same time Austria is an important transportation corridor for Russian gas.

Concerning the issue of **climate change**, high value is placed on a successive agreement to the Kyoto Protocol expiring in 2020. However, if there are no global climate protection efforts amongst the most important competing countries after 2020, that are comparable in the extent to the Kyoto Protocol, then careful thoughts should be given to the continuation of the EU climate protection policy in order to avoid the further weakening of Europe as a business location. The US–China climate deal thereby already presents an important step in setting this as an issue for the months ahead.

BELGIUM

Figure 21
WEC's 2015 World Energy Issues Monitor: Belgium



For Belgium, much of the context is dominated by European circumstances. A major concern is the continued economic downturn and a 'hesitating' financial sector. Also, important influencing factors in Europe are around the regulatory uncertainty. Market players have difficulties understanding the next steps in energy policy. On top of that, system-integration aspects were forgotten, leading to unanticipated effects. Examples are the absence of a current CO₂-cost signal through the ETS and the uncertainty for the future (such as the EU's hesitations for setting targets in 2030), the over-subsidising of renewables leading to too rapid growth of zero-marginal cost investments, the changes in subsidy policy, the on/off decisions on nuclear energy in Belgium, as well as the decreasing wholesale electricity prices in North-Western Europe so that the crucially needed balancing thermal gas-fired units are no longer competitive and are mothballed. In contrast, the end-user electricity prices are increasing, especially because of the increasing distribution costs, strongly affected by the passing on of the costs for renewables support. Although the VAT for electricity of end consumers has been decreased from 21% to 6%, expectations are that end-customer prices will continue to increase because of a backlog of RES-support costs and doubts about the sustainability of the low VAT charge.

On the gas side, the **US shale-gas** revolution increases the difference of European and US gas prices considerably, with competitiveness concerns for heavy industry. Indirectly, these shale-gas prices imply low world-market steam-coal prices, which combined with the low

CO₂-cost gives priority to coal-fired electricity generation compared to gas-fired CCGTs also in Europe. Second, there are the tensions with **Russia**. Since Belgium has no gas resources, supply diversity has always been the rule in Belgium. Its gas-contract portfolio is not very sensitive to the sort of political tensions, at least not in the short run. However, with a currently scheduled **nuclear** phase out by 2025 and a mono-fuel electricity generation mix based on gas, it is important to remain vigilant for a balanced gas portfolio.

As to security of supply of electricity, 2014 was characterised also by the shutting down of two 1 GW nuclear units because of so-far unexplained phenomena related to hydrogen flakes indications detected in the reactor vessels. Together with the aforementioned balancing needs from gas-fired units and the too low wholesale prices, this leads to tensions and uncertainties on the supply side, whereby problems may occur in case of a long-duration cold spell during the winter 2014-2015.

The results of the Belgian issues map reflect more or less the above concerns.

The critical uncertainties are the **climate framework, electrical storage, energy prices** and **EU cohesion**. Electrical storage reflects the realisation that a solution on that issue would resolve many thorny aspects of electricity-balancing. EU cohesion reflects the regulatory-uncertainty feeling.

The most important need for action (the issues that keep energy leaders busy at work) are **renewable energies, energy efficiency, decentralised systems** and **Russia**, although issues like **innovative regulation** and **energy subsidies** also require full attention.

Interesting to mention are the most controversial issues (out of a set of 64 answers). **Russia** divides the Belgian respondents in those who fear worse to come, and those who wish to have good relationships to foster business relations with Russian gas suppliers. The **hydrogen economy, unconventional** and **cyber threats** likewise divide the respondents, but without clear reasons – except perhaps the optimists versus the pessimists.

Good agreement by the respondents is found for the **business cycle, currency uncertainty**, the **climate framework** and the **global recession**.

We mention some important differences with the European issue map. **Russia** keeps European leaders more awake than the Belgian ones. **Energy efficiency** and **EU Cohesion** are higher on the European action list than on the Belgian one. Belgians, on contrast expect a lot from **electricity storage** and are more concerned about a **global climate framework**. **Energy prices** and **renewables** are roughly equally important for Belgians and Europeans.

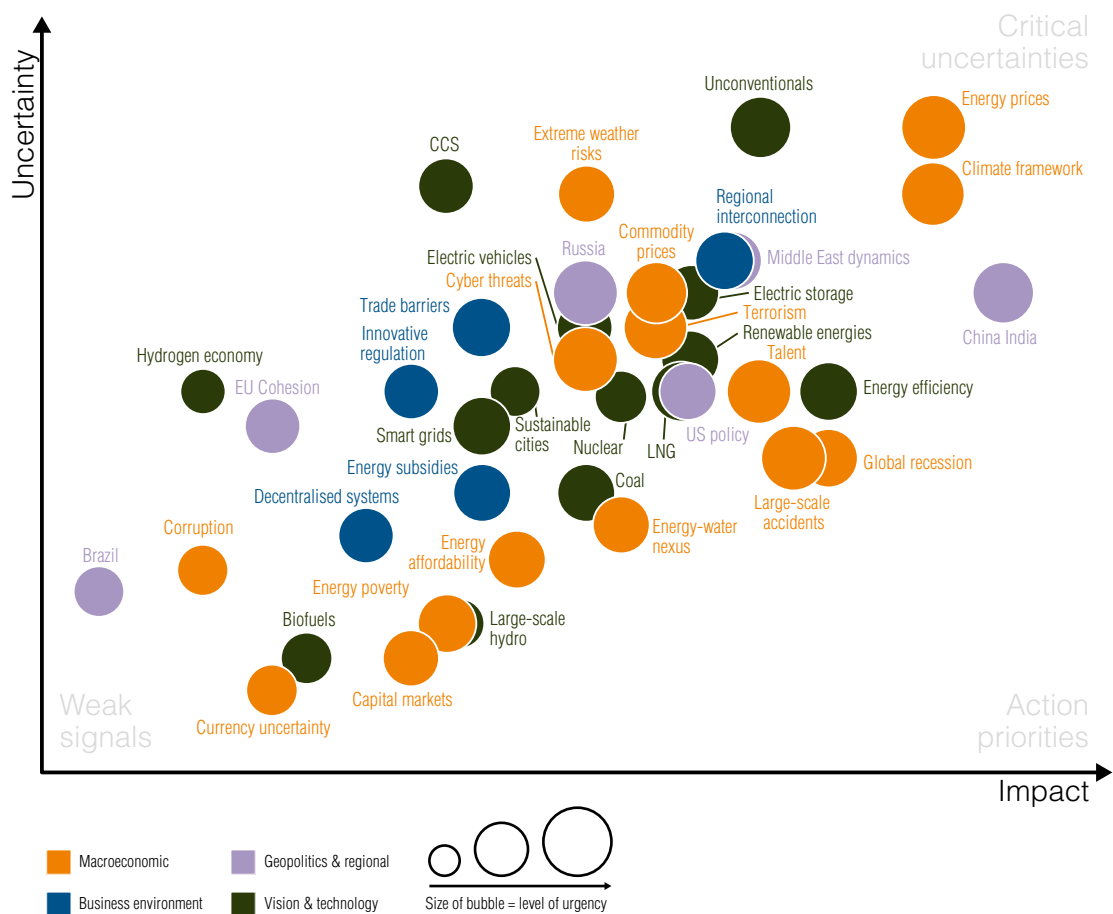
CANADA

There are three overarching themes that influence the responses depicted in the 2015 Canadian energy Issues Monitor map. The first are the shifts in the North American supply situation brought on by unconventional oil and gas. The prospect of our largest energy market, the US, becoming self-sufficient makes it critically important to find new markets in order to continue the economic prosperity derived from the energy sector. In 2013, the energy sector accounted for roughly 10% direct contribution to our GDP and over CAD500 billion in major projects.

The second theme is the challenges Canada faces getting its energy to market. New and re-purposed pipelines face significant hurdles associated with earning public support. The alternative to pipelines is sending crude oil on rail. Following the Lac-Mégantic disaster in 2013, there is uncertainty regarding the continued social licence, availability and cost of risk transfer and changes in regulations. The issue of **regional interconnection** is also important for the power industry as Quebec and Ontario are exploring increased electricity trade (Figure 22).

The third theme is the global economy. WEC's *Jazz* and *Symphony* energy scenarios project long term growth in energy demand, but the shorter term demand cycles are influenced by fluctuations in the strength of various economies. The IMF's most recent World Economic Outlook publication in October 2014, titled *Legacies, Clouds and Uncertainties*, suggests that many economies projected GDP growth will slow. This ultimately plays into the global supply demand balance and **energy prices**, which is a critical uncertainty.

Figure 22
WEC's 2015 World Energy Issues Monitor: Canada



Clearly one of the most important issues in the critical uncertainty category for North America and Canada is the **global climate framework**. There are no clear signals as to how this framework will develop and thus how it will impact the economic value of the assets that are already in place.

The concerns about **China and India** are relevant as both a prospective export market for Canada and as a driver of global demand for energy.

Energy prices is a critical uncertainty on all the issue maps. As demand softens, the viability of many projects is drawn into question as the price of crude declines. The big question is whether we have reached a new normal or whether this is just a temporary downturn. Likewise, the concerns expressed by the issue of **unconventionals** reflect the increased supply in our largest export market, the US.

Regional interconnection as a critical uncertainty reflects the challenges we are having with the Keystone XL pipeline, the Northern Gateway and Energy East pipeline proposals, and also the opportunities for inter-provincial and international electricity trade.

Stepping back and comparing Canada to the 2015 World Issues map raises two contrasting situations. Over the last four years, **CCS** has moved around on the Issues Monitor; in 2011 it was a critical uncertainty on the global map. Since then, the impact level associated with **CCS** has decreased every year. The Canadian issue map shows that **CCS** is having a larger impact but with somewhat more uncertainty compared to the world map where **CCS** is seen as having a much lower impact. This reflects Canada's expectation that **CCS** will actually be viable in mitigating our carbon emissions. Canada has recently taken a significant step forward with the opening of the world's first commercial scale carbon capture coal plant.

Finally, compared to both the world and North American maps, Canada views the **talent** issue as significantly more urgent and impactful. The competition for labour in both the trades and in the professions is intense due to the number of energy projects that are ongoing and planned in Canada. The competition for personnel comes not only from within Canada, but also from the global project pool that can offer attractive expat packages to both Canadians and to the global talent pool that we compete in.

The Canadian Issues map was developed from 19 respondents in government and industry across Canada.

COLOMBIA

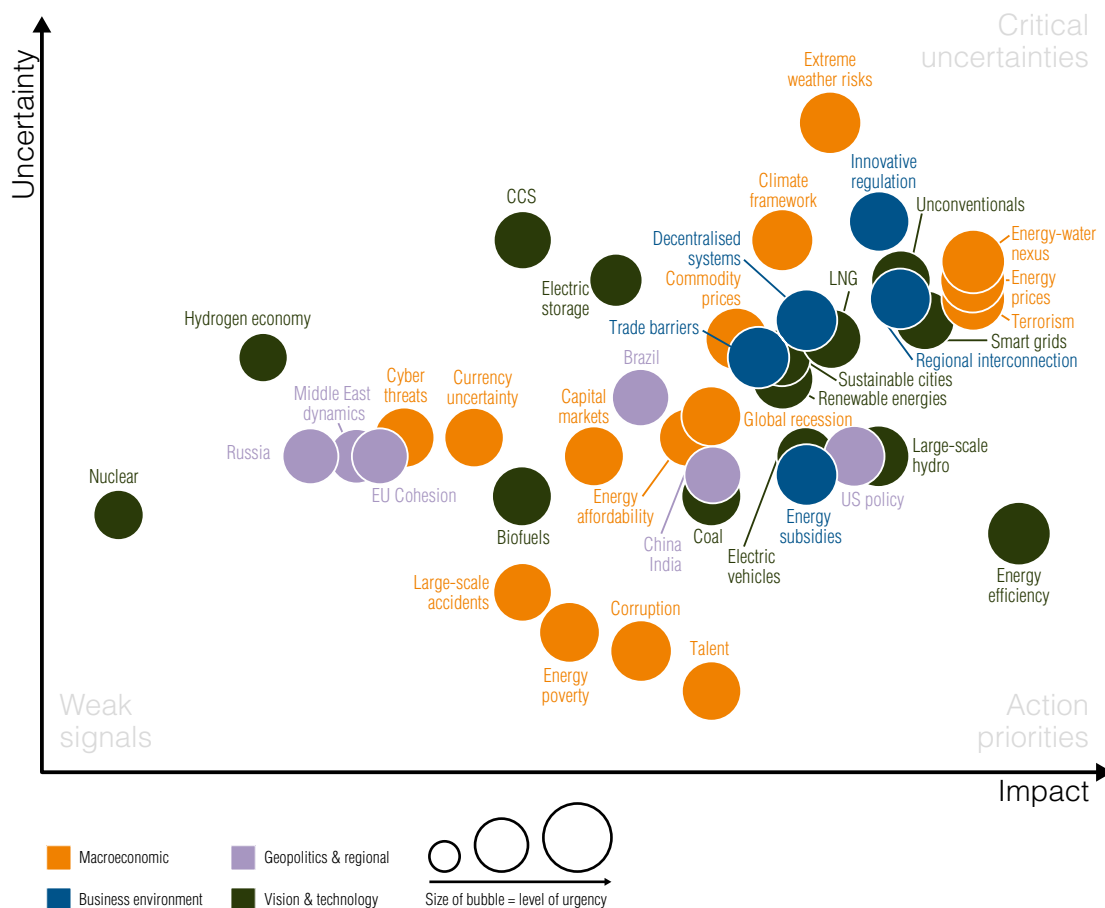
Renewable energies, found in the critical uncertainties quadrant (Figure 23), are a topic of great interest in Colombia. The 1715 law of 2014 regulates the integration of non-conventional energies, mainly renewable energies into the national energy system and promotes the efficient use of energy resources and the diversification of the electricity production mix in the country. In this context, **energy efficiency** remains a need for action issue, where companies increasingly focus on getting the benefits that are offered through certifications, standards, events as well as through greater development from the demand side.

While the 1715 law focuses on non-conventional renewable energy sources, it is expected that the 1715 law can help to improve the availability and security of energy supply through the promotion of unconventional fossil fuels. This possibly explains why **unconventionals** are a topic of interest with high uncertainty in the country.

Topics related to the 1715 law including energy efficiency, renewable energies and unconventionals are issues with a high impact which changed least compared to the 2014 Colombian map. In comparison to the regional Latin American Map, energy efficiency and renewable energies are placed in similar positions, indicating that Colombia is following the regional trend towards a more efficient and diverse energy system.

Colombia has a strong commitment to achieve better results with strong support from government and private companies. Progress is being made to ensure that these commitments are put into action as demonstrated through the 1715 law.

Figure 23
WEC's 2015 World Energy Issues Monitor: Colombia



Colombia has considerable water resources, providing opportunities to develop large hydropower projects, making **large-scale hydro** a need for action issue for Colombian energy leaders. This issue takes on a similar position to the regional Latin America map, reflecting the region's water abundance and hydro potential.

The construction of large hydroelectric projects is an issue of high importance to ensure energy supply for the coming years at competitive prices. However, as noted in the Latin American regional analysis, energy systems should not be highly dependent on hydro power as the development of new hydroelectric projects is causing increasing opposition from the public due to its potential environmental, social and cultural impacts. The tensions between the potential of hydropower as an energy source and the resulting negative impacts make the energy-water nexus a top critical uncertainty and high change issue on the Colombian map, having moved from a weak signal in 2014.

Trade barriers is a high change issue, having moved from the weak signals half of the map to the high impact half. This change could be driven by the regional difficulties to develop an efficient electricity market. It is however interesting to note that trade barriers still feature in the weak signals half of the Latin American regional map, which indicates that the difficulties to develop a regional electricity market are perceived to have a higher impact in Colombia compared to the rest of the region.

Terrorism is an area of concern in relation to energy infrastructure of oil wells, transmission and distribution towers, oil pipelines and gas pipelines. Compared to the Latin American regional map, terrorism is perceived to have a higher uncertainty and impact in the Colombian map. Colombia is highly susceptible to terrorism attacks. Between June and mid-July 2014 alone, the National Liberation Army carried out 10 attacks on the Colombian energy network, increasing energy leaders' awareness of terrorism right before the study was carried out.

In Colombia gasoline and diesel have been subsidised since 1983, resulting in a burden on the government budget and unequally distributed benefits. Previous attempts to eliminate the subsidies have not been successful leaving **energy subsidies** with a need for action.

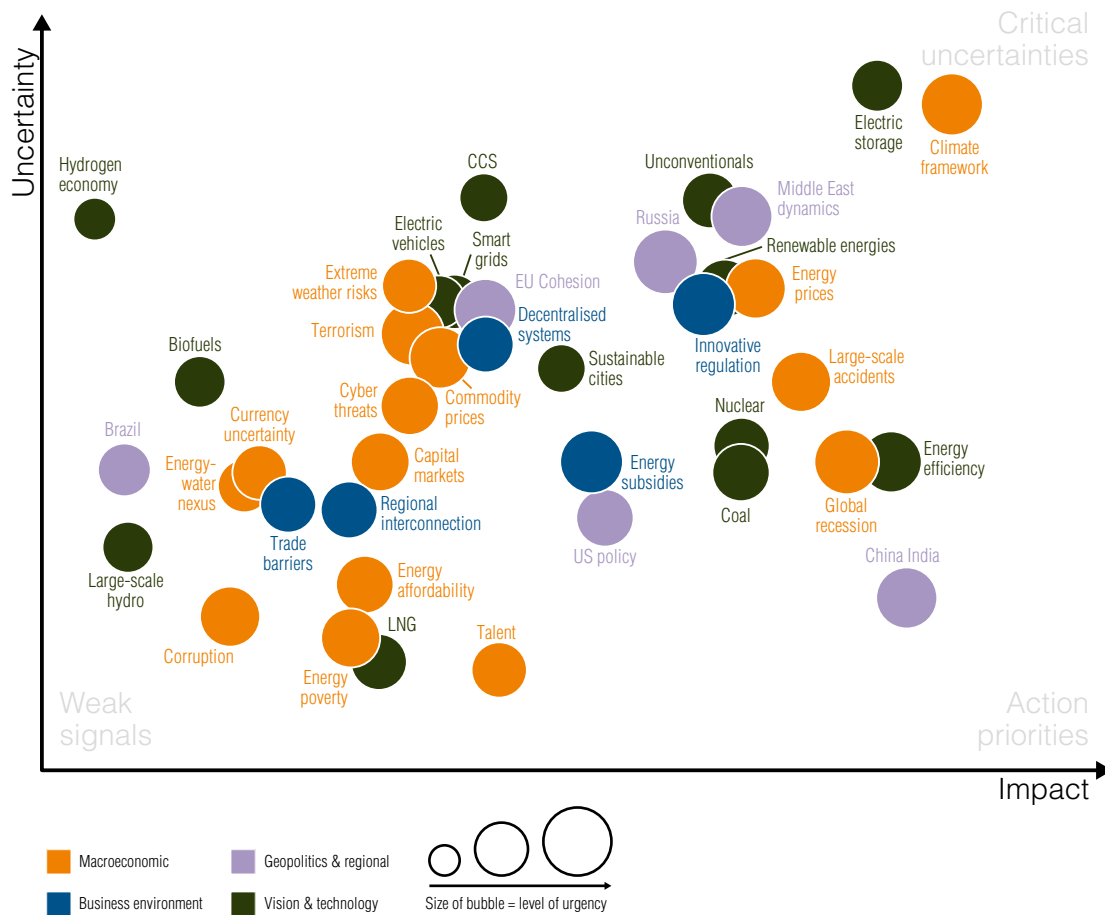
unconventionals and **regional interconnection** stand out more on the Estonian Issues Monitor. This is largely due to the fact that Estonia is of sorts, an energy island in Europe thus the need for enhanced regional interconnection is clear. Interconnections are especially important for new gas supplies, as all three Baltic countries are dependent on one supplier for natural gas. LNG-terminals are being developed to solve this issue. For **unconventionals** the logic is even clearer, Estonia is the leading country in the world when it comes to oil shale and shale oil production.

The Issues Monitor for 2015 also shows some surprising results. For example it is unexpected to see **energy affordability** decrease in impact. Last year was the first year the Estonian electricity market was completely liberalised and this year's map might show that liberalised prices were not as bad as expected and that people generally believe market based prices for energy will be tolerable in the future. Overall, the Estonian Issues Monitor fits nicely in the broader European context, reflecting both a consensus in a number of areas as well as some of the individual characteristics at the national level.

FRANCE

In the latest results for 2015, the critically important issues, which create uncertainty and keep energy leaders awake at night, are shown at the top-right corner of the chart. The **climate framework** issue is the biggest cause of insomnia for stakeholders, closely followed by the technological challenge of **energy storage**. **Energy prices** and their effects on competitiveness, as well as geopolitical developments in the **Middle East and North Africa**, are close behind.

Figure 25
WEC's 2015 World Energy Issues Monitor: France



Other issues are characterised by impacts that are major but which are also more certain: at the bottom right of the chart, these relate to a high level of activity in the energy sector. This area of the chart covers the global economic and financial crisis, geopolitical concerns such as the development of **China and India** and **American energy policy**, as well as technological factors such as **energy efficiency**, whose impact outweighs those of nuclear power and coal.

The left-hand side of the chart corresponds to issues of lesser importance – an area of relative calm for stakeholders in the energy sector. Here we find technological developments such as **hydrogen** and **biofuels**, the potential role of **Brazil** and the **energy-water-nexus**.

Looking from one year to the next, the availability of results from the two successive years in which the study has been undertaken enables an assessment of how the opinion of French stakeholders has changed. First, generally the evaluation of the various issues has remained

stable. This is understandable as from one year to the next the fundamentals of these different factors may not have changed significantly.

Nevertheless, there are some clear changes regarding specific issues: on the geopolitical side, there is a predictable change regarding the role of **Russia**, with a greater and more uncertain impact stemming from events in Ukraine.

In contrast, the **European Union's** role is perceived as having a lesser impact on energy matters – and with less uncertainty.

Turning to macroeconomic issues, the importance of **energy prices** is slightly lower, yet with much more uncertainty, and competitiveness features once again among the top priorities in the energy sector.

The price of raw materials, on the other hand, appears to be less significant. The impact of the **economic crisis** was emphasised slightly less in the latest map for France. Whereas the issue of the skills required in the sector has become more prominent, the opposite is true for energy poverty, which is now in the “calm” zone.

In politics, the issue of **subsidies** is having a greater impact, with more uncertainty. On this point, the consensus in France is similar to that in Europe as a whole.

There is relative stability as far as technologies are concerned, with the notable exception of **carbon capture and storage**, which seems once again to have become an issue with major consequences, and with continuing uncertainty.

There has also been a significant increase in the impact of **renewable energy**.

The positions of nuclear power and energy efficiency are remarkably stable. **Unconventional hydrocarbons** are still having a major impact, now marked by more uncertainty, which might reflect an appreciation of the situation in France.

The issues on which there is the greatest consensus include **climate**, the **economic crisis** and the roles of **China and India**. Unsurprisingly, the issues where there is least consensus include some of those where there has been a high degree of change, such as **talent**.

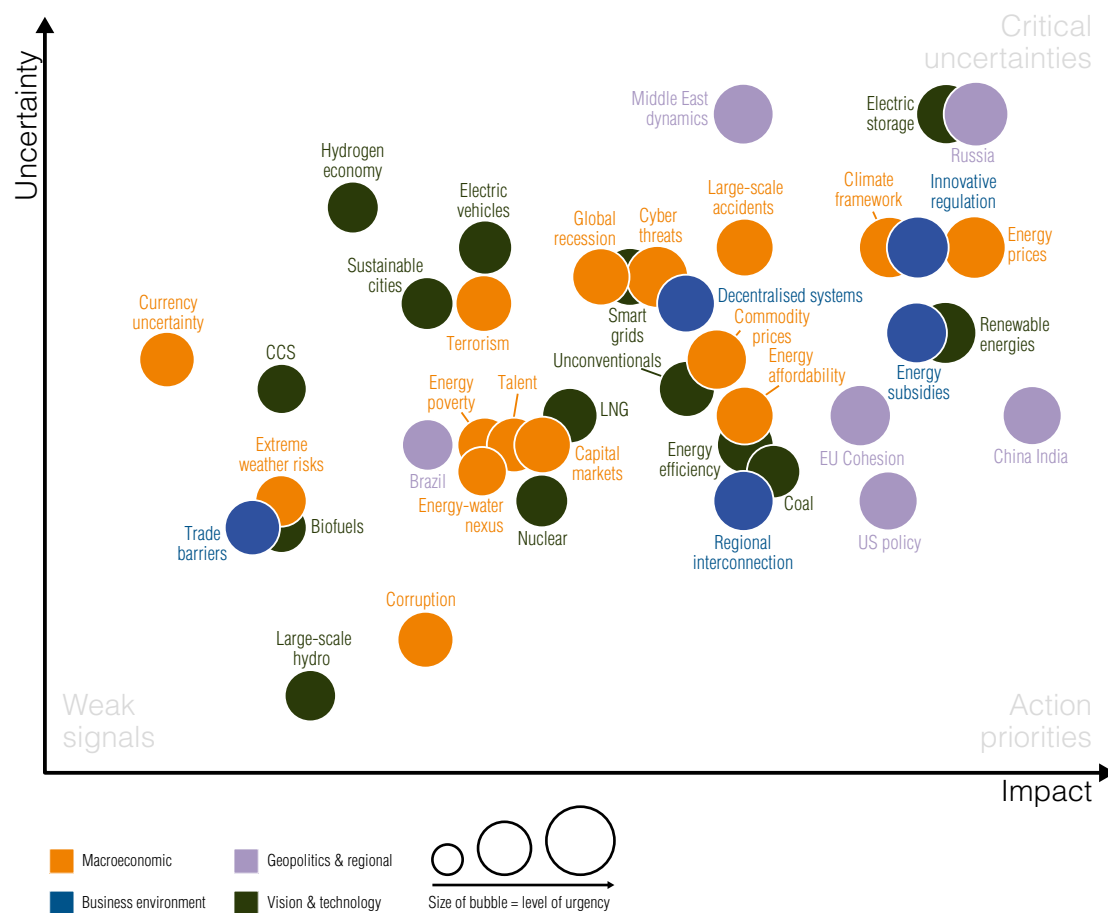
GERMANY

The German energy landscape was strongly influenced by two developments in the first half of 2014: One was the long-awaited amendment of the Renewable Energy Act (EEG). The amendment had become necessary as the EU commission had started proceedings against Germany for illegal subsidies in relation to the EEG and the exemptions for the energy intensive industry. Moreover it became necessary to stop a further cost increase, to closely control the expansion of renewable energies and to better integrate them into the market. However, the amendment only brought minor changes to the cost side, whereby all existing generation facilities received a grandfathering of their status and their compensation. For wind and photovoltaic, lower expansion trajectories were defined and the compensation continues to decrease. Eligible biomass was also reduced. The biggest change in principle was the switch from feed-in tariffs to direct marketing of renewable power, though with high thresholds to spare smaller facilities. Producers of power who consume the power themselves will have to pay a share of the EEG levy and in case of prolonged periods of negative power prices, no compensation will be paid to the renewable energy generators. All of this led to little change in the amount of the EEG levy which continues to hover around 62 €/MWh. This is almost twice the actual price of the power commodity and keeps energy leaders worrying about the competitiveness of the German industry (Figure 26).

The other main development was the geopolitical conflict between Russia and Ukraine. In March 2014, just one month before the survey was sent out to the energy leaders, Russia annexed Crimea and since then the military conflict has continued between the two countries. Not only does this lead to a political destabilisation of the region, but also raises fears about a disruption of the natural gas supply from Russia to Europe. The Russia – Ukraine deal, where gas supply to Ukraine was secured over the winter 2014/2015, may however have temporarily alleviate these fears.

In line with these two developments, the biggest critical uncertainty for German energy leaders is **Russia**, on the one hand, which generates uncertainty around geopolitics and security of natural gas supply which greatly influences energy prices. Over one third of German natural gas imports are from Russia and our neighbouring countries in the East show an even higher dependency on Russian natural gas. Compared to the 2014 survey, Russia is also the issue that increased the most both in uncertainty and impact in the opinion of the energy leaders and is also the issue with the highest level of urgency of all.

Figure 26
WEC's 2015 World Energy Issues Monitor: Germany



On the other hand, the biggest critical uncertainties gravitate around **energy prices**, closely aligned with electric storage, renewable energies and innovative regulation. This is due to the fact that the German *Energiewende* continues to rattle the energy markets in Germany and its neighbouring countries. From the perspective of German managers, the increasing amount of renewable energies being generated on an intermittent basis by wind and photovoltaic require smart grids which still need to be developed, flexible power plants, demand side management and in the longer term electric storage. The latter is surrounded with the highest uncertainty as technologies are not yet available on the market and a regulatory framework is not yet in place. The current power prices keep power generators worrying as they do not cover the variable costs during many hours of the year. Therefore a discussion about a new market design in Germany using **innovative regulation** is in full swing.

The issues that call for action and therefore keep German energy leaders busy are China/India, energy subsidies, the US policy and the EU cohesion. **China and India** is a need-for-action issue with a high impact not only from a German perspective but also from a global and a European view. Unlike in former times where this issue was looked at from a competitive perspective, uncertainty now stems from sustainable growth rates as China and India are becoming pace setters for the world economy. There is less uncertainty surrounding **energy subsidies** though they still remain a high impact as more is known about the position of the EU commission on this issue and the new EEG has addressed these concerns. The **US policy** is also considered a need-for-action issue as the United States has been unusually cautious in the conflicts in Ukraine and the Near East. The

outcome of the TTIP agreement and the LNG export policy also remain unclear. The self-sufficiency of North America with respect to oil and natural gas has already caused crude oil prices to drop and markets to reorganise. The issue of **EU cohesion** has fortunately passed the acute rescue mission of the financial system and must now focus on creating a real common energy market. A study of the WEC Netherlands and the WEC Germany has come to the conclusion that up to several billion euros per year can be saved by improving the cooperation and coordination in energy matters between these two countries alone. The common energy market has finally got to be rolled out and the urgency level is considered high by the German energy leaders.

Energy efficiency in the latest national map, has been scored as having a lower impact in comparison to the other regions, including Europe and the world, but also compared to Germany in 2014. This is remarkable as energy efficiency is considered an important part of the *Energiewende* and has become part of the EU 2030 targets. The reason behind this could be that the German industry already reaches top values in specific energy efficiency thus shifting the focus of the energy experts to other issues.

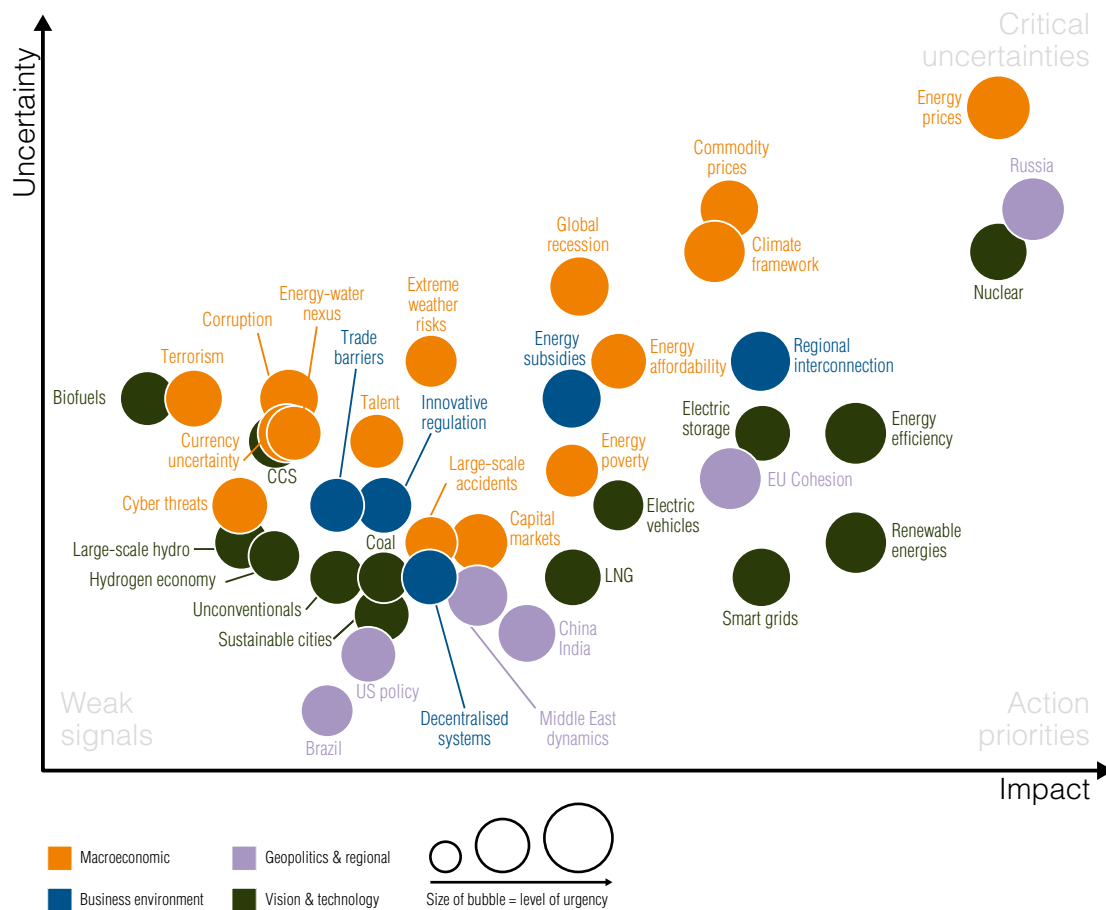
Besides Russia, the biggest discrepancies in opinion between Germany and the rest of the world are the issues of **large-scale hydro** and the **hydrogen economy**. Large scale hydro is rated as having a smaller impact in Germany than in the world because hydro power traditionally has only a small share of around 3% to 4% in the German power generation mix and an expansion of hydro power in Germany would probably fail due to geographical conditions and public acceptance. The hydrogen economy however, is seen by Germany as having a higher impact and a higher uncertainty compared to global perspectives. This is due to the fact that the conversion of excess renewable power to hydrogen (and subsequently to methane) is seen as a possible solution for power storage (Power-to-Gas).

To summarise, similar to previous findings, energy prices are again considered a critical uncertainty by German energy leaders. This year however, Russia and electric storage have been added as critical uncertainties both of which address another dimension of the energy trilemma: energy security. With somewhat less uncertainty but a traditionally high impact the issue of renewable energies addresses the third axis of the energy trilemma: sustainability. China/India has increased in impact and is now considered the biggest action priority by German energy leaders.

HUNGARY

Hungary is highly dependent on Russian oil and gas imports with 80% of its supply being delivered by Russia. This is making the country vulnerable to supply shortages arising from geopolitical disputes related to the Russia/Ukraine crisis. It is therefore not surprising that **Russia** features as a key issue and uncertainty in the Hungarian map (Figure 27).

Figure 27
WEC's 2015 World Energy Issues Monitor: Hungary



Hungary is working towards reducing its import dependency through a number of measures including energy efficiency and renewable energy targets and the upscaling of nuclear capacity. In this context a number of key concerns for Hungary appear as expected in the high impact half of the map including regional interconnection, energy efficiency, renewable energies and nuclear.

Energy efficiency and **renewable energies** are key need for action issues for Hungary's energy leaders, which are primarily driven by energy security concerns. The energy efficiency strategy aims to achieve energy savings across the top energy consumers in Hungary. The greatest energy savings potential thereby lies in the retrofitting of residential and public buildings. Due to budget constraints, third party-financing (ESCO) should be promoted, highlighting the need for action in this area.

Following the EU directive, Hungary established an ambitious renewables action plan, whereby approximately 15% of the primary energy demand should be covered by renewable

energies by 2020. However, caps to the wind power capacity due to fears that the energy system cannot cope with intermittent energy sources, present a barrier towards the achievement of the targets.

The concerns related to the grid's capacity to deal with intermitted energy may thereby explain why **electric storage** and **smart grids** are perceived as high impact need for action issues in Hungary. On a short term basis the issue of energy storage (i.e. natural gas storage) may however overshadow the issue of electricity storage to ensure a reliable energy supply despite uncertainties related to Russia. Natural gas storage facilities in Hungary exceed 50% of the country's yearly natural gas demand and contribute towards the regions supply security. Ensuring that the storage capacities were filled before the onset of the winter in 2014 was thus a key priority for Hungary prior to the natural gas supply agreement between Russia and the EU in October 2014.

Nuclear, a top critical uncertainty in Hungary, is the most important contributor towards the electricity supply in the country, providing 33% of domestic electricity demand. The high level of uncertainty related to this issue can be explained by plans to build two new reactors, which are planned to be financed by Russia. The political tensions between Russia and the Ukraine, in addition to the fact that the project is still subject to approval by the European Commission may further explain why **EU cohesion** is perceived to be a need for action issue with a high degree of urgency.

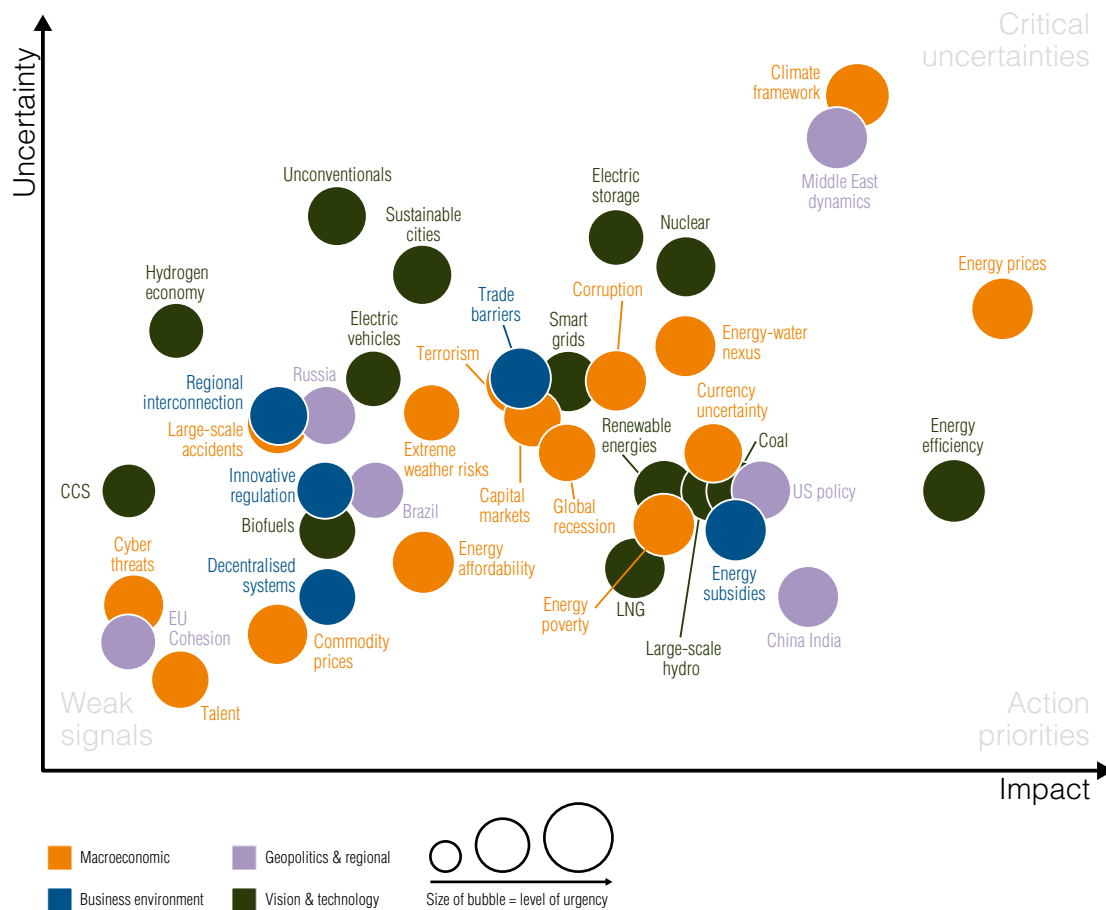
In comparison to the regional European map many similarities exist with the Hungarian map: Russia and energy prices feature as top uncertainties and energy efficiency and renewable energies are perceived as top need for action issues in both maps. This indicates that Hungary is confronted with similar issues compared to the rest of Europe.

INDIA

India is one of the largest energy consumers in the world after China, the US and Russia. Its energy demand continues to rise with a yearly growth rate of 2.8%, mainly resulting from its continuous economic growth. The country has therefore proved to be relatively resilient to the impacts of the global financial crisis, with an annual average growth rate of approximately 7% since 2000.

The Indian economy additionally benefits from the 'Modi dividend' with surging economic activity following the election of India's new Prime Minister Narendra Modi. It is therefore not surprising that the perceived impact of the **global recession** is relatively small compared to the rest of Asia or the world map (Figure 28). India's new government is thereby a feature that noticeably influenced this year's map, not only with regards to the global recession.

Figure 28
WEC's 2015 World Energy Issues Monitor: India



Top critical uncertainties in India include climate framework, Middle East dynamics, and energy prices. Coal is a high impact issue that lies between critical uncertainty and need for action.

Uncertainties related to **climate frameworks** could be linked to the China-US agreement to cut carbon emissions that was struck between the two parties in November 2014. China's move towards a more concrete carbon reduction target is putting pressure on India, the world's third largest carbon emitter to commit to halting carbon emissions too. Additional pressure stems from the US which is taking active steps to ensure that India contributes

towards securing the final UN climate treaty in 2015, which may help to explain why US policy is perceived to be a need for action issue for India.

Middle East dynamics is an issue that moved from a borderline weak signal issue in 2014 to a high impact, high uncertainty issues in 2015, making it one of the highest change issues in this year's map. India sources 62% of its petroleum and other liquid fuels from the Middle East. Continuing geopolitical instability in the region could therefore significantly affect the energy supply of India, potentially explaining the high uncertainty linked to this issue. India's import dependency from the Middle East and recent bilateral energy consultations between Saudi Arabia and India, which could lead to increased cooperation, trade and joint energy efficiency measures, could additionally explain why the MENA issue plays such an important role in the Indian map but not in the regional Asia map.

In the India map, **coal** is perceived to be an issue at the borderline between high uncertainty and need for action. Coal is a major energy source for India, accounting for 44% of energy consumption in India whereby energy production accounts for approximately 70% of the country's coal consumption. Due to the energy sectors' heavy reliance on coal, supply shortages are a main reason for shortfalls in electricity generation, resulting in widespread blackouts.

While India has the 5th largest coal reserves in the world, the coal sector is largely run by two government-owned companies, making it one of the most centralised sectors in India. In order to provide enough energy to fuel the country's growing energy demand, there is a need for competition and investment. Modi's 'Make in India' initiative, which promotes international investment and participation in the markets thereby presents initial steps in this direction.

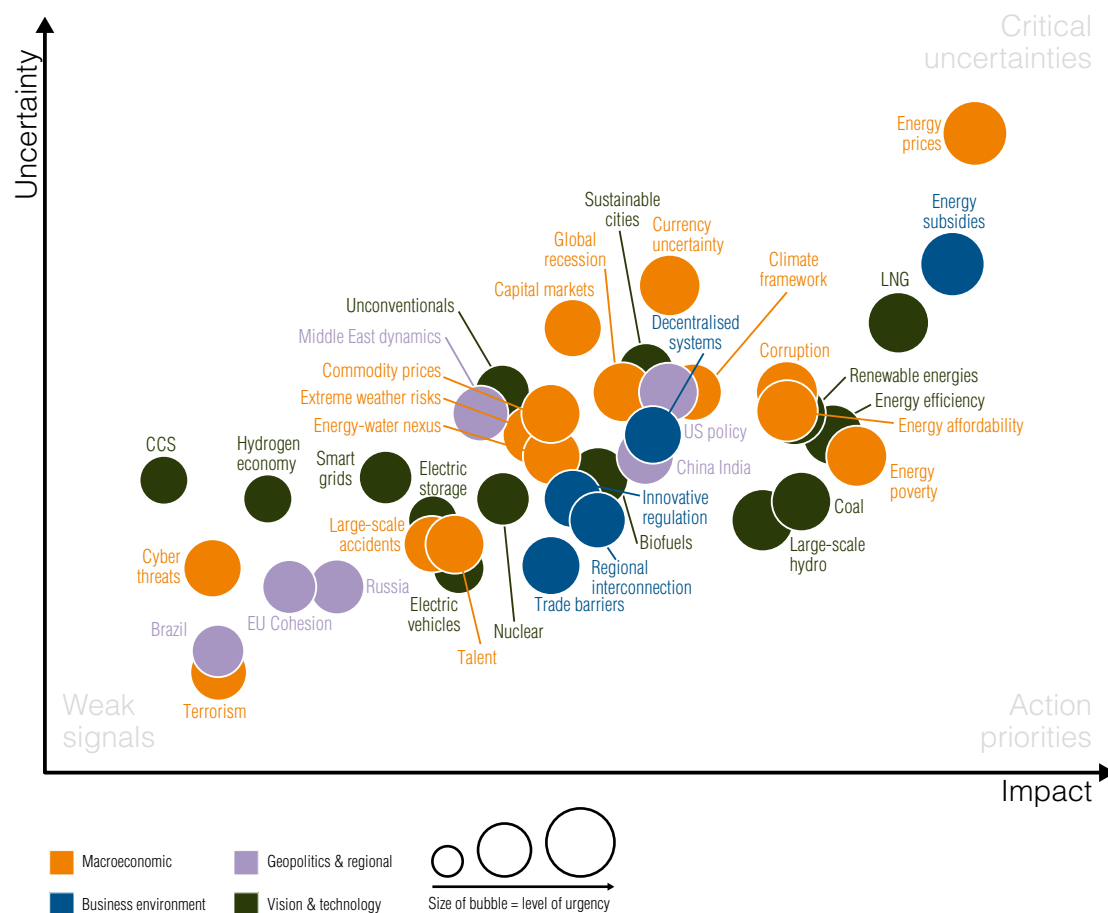
At the same time there is high uncertainty related to the coal issue. This position could be explained by the uncertainty related to potential restrictions to its use due to the climate change negotiations in 2015 and increasing international pressure to commit to carbon targets. These uncertainties may be causing an unfavourable investment environment, potentially undermining the efforts taken to promote the development of the coal infrastructure and supply.

Besides coal, top need for action issues include **energy subsidies** and **energy efficiency**. Energy subsidies, perceived to be a critical uncertainty in 2014, now have moved towards the need for action quadrant of the map. The drop in uncertainty could be explained through the decision of the Modi government to continue with the diesel subsidy reforms initiated through the previous government. The cost of energy subsidies in India are planned to decrease to less than 0.5% of Indian GDP by 2016. Hence there is a need for action to ensure that planned changes are being implemented accordingly.

Energy efficiency is a key player in India's plans to secure the country's energy supply in the long run, whereby there is a need for action with regards to energy efficiency in urban areas within India. Economic activities within cities account for approximately 62% of its GDP and building stock is expected to triple by 2031. In this context the Indian government is discussing policies to promote the construction of energy efficient buildings which is in line with Modi's policies to promote the building of smart cities. The close link between energy efficiency, sustainable cities and the need for **smart grids** thereby could also explain the renewed interest in smart grids, which is one of the highest changes issues, having moved from the weak signal area to a critical uncertainty.

INDONESIA

Figure 29
WEC's 2015 World Energy Issues Monitor: Indonesia



The Indonesian economy uses a large amount of energy, heavily dominated by industrial and transportation sectors. In maintaining a balance between energy supply and demand, Indonesia still depends on fossil fuels which conflict with environmental priorities.

Managing the energy system, while ensuring a sustainable energy development, is one of the key roles of the government. As the demand for energy grows, maintaining energy security and energy independence will require the use of domestic energy sources, the management of national reserves, increased use of renewable energy and the expansion of a reliable energy infrastructure.

Overall the Indonesian Issues Map is largely consistent with that of 2014. Many of the top issues remain the same; with critical uncertainties including energy prices, energy subsidies and LNG, while top need for action issues include energy poverty, energy efficiency and coal.

Two issues that are newly introduced in the 2015 issues map; LNG and coal, both feature in the high impact half of the map, which highlights the relevance of the new issues to Indonesian energy leaders.

Energy price has been a key uncertainty in 2014 already. As in the previous year, the main concern is related to the price volatility rather than absolute energy prices. This can be

explained by the country's economic activity being strongly linked to the energy sector and the government's dependence on fossil fuel use as a source of revenue. Energy prices, which send market signals to encourage changes in energy supply and demand, as well as helping to enable market conditions that attract long-term investments, present a high priority for energy leaders.

Corruption is continuing to be a top priority for Indonesian energy leaders. As identified in the 2014 analysis, concerns that corruption may hinder sound decision making may be driving the uncertainty associated with the issue. The negative impacts of corruption on investments in the sector and policy making may additionally influence the issue's position on the latest map. The work of the Corruption Eradication Commission is thereby essential in creating higher levels of accountability in the energy sector management. The new Energy Minister has also appointed a special taskforce to reform the governance of the oil and gas sector, which reports directly to him.

Energy poverty (i.e. access to energy) and **energy affordability** are key need for action issues for Indonesian energy leaders. While energy affordability has been an important issue in 2014 already, energy poverty has increased strongly with regards to its perceived impact. Energy poverty/access to energy is an important issue for Indonesia with an electrification rate of 80.51% in 2013 and 33% of total energy consumed in 2013 stemming from fuel. The national electrification target is approximately 100% by 2020. This is in line with the national programme to increase accessibility of electricity supply across the population and to maintain the reliability and security of the electricity supply through additional capacity expansion and transmission and substation developments across regions of Indonesia. These measures will ensure a balanced supply and demand of energy and thereby prevent power disruptions.

At the same time energy affordability plays an important role, particularly with respect to the end consumers. In line with the announcement by the government of Indonesia at the end of December 2014, the prices of premium oil were reduced in early 2015 to Rph. 7,600.00 per litre when the international oil prices hit about US \$50.00 a barrel. Further reductions to around Rph. 6,600.00 per litre, which also includes the prices of solar oil from Rph. 7,250.00 to Rph. 6,400.00 per litre, are planned if international oil prices hit around US \$40.00 per barrel benchmark.

Following the trend of international oil prices, this can create an opportunity to increase the level of strategic reserves for national use and will decrease the national energy subsidy level and increase energy affordability. However this opportunity is still under highest critical uncertainty since the unstable path of the international energy prices still exists. With regards to this condition of uncertainty, energy subsidies and energy affordability in the country are still the long-standing issues of the government as the main focus to achieve national sustainable energy development.

It is therefore not surprising that **energy subsidies** are a key issue in the country, having moved from a key need for action issue in 2014 to the highest critical uncertainty in 2015. Between 2009 and 2013 Indonesia spent over 714 trillion rupiah on fuel subsidies, thereby exceeding the combined amount spent on infrastructure and social-welfare - two budget positions that are due to benefits from the cuts. Fuel subsidies present a challenge to the Indonesian government and economy as they create market distortions, making it difficult for alternative energy sources such as gas or renewables to compete in the energy market.

With rising energy demand and reduced fossil fuel production capacity, the country is increasingly dependent on energy imports. **Energy efficiency** and **renewable energies** therefore play an important role with regards to the country's energy security, access to

energy and environmental targets, which is reflected by the high impact and need for action associated with the issues.

In 2014, the government of Indonesia had issued the Government Decree No. 79 on National Energy Policy to promote energy efficiency and increase the role of new and renewable energy. The Decree No. 79 stipulates an economy-wide target of a 1% per year reduction in final energy intensity up to 2025, and that the country's share of new and renewable energy in the energy mix should be at least 23% by 2025. There is thus a need for actions to ensure that the targets are reached by 2025.

Two new issues featuring in the map are **coal** and **LNG**. Both issues are highly relevant to the map which is demonstrated through the high impact that is perceived with the issues.

Coal is perceived to be a need for action issue by the Indonesian energy leaders. With Indonesia being the world's largest thermal coal exporter, this resource plays an important role to the country's economy and energy sector. Currently the country is exporting approximately 73% of the coal produced. However, with increasing domestic energy demand the government of Indonesia is restructuring the coal sector to ensure domestic demand is met.

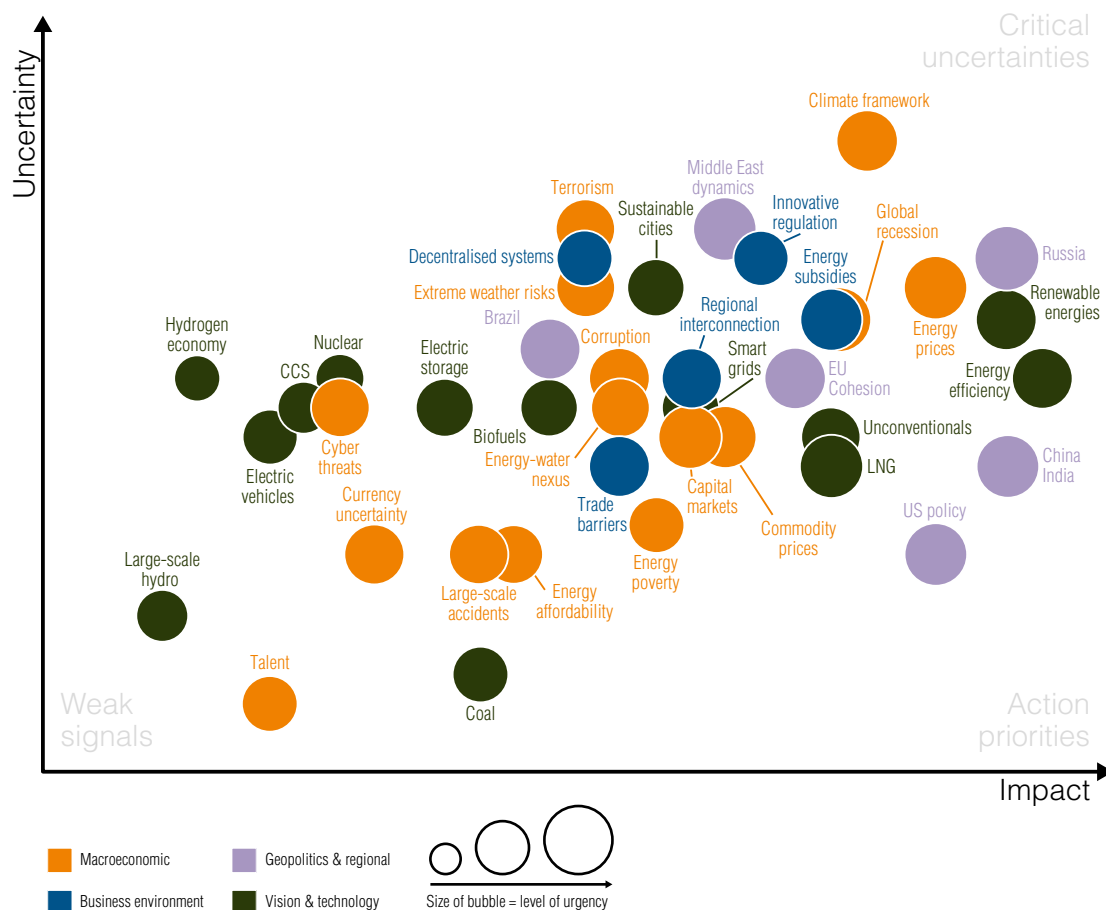
LNG by contrast is perceived to be a top uncertainty in the country. In the 1990s, Indonesia accounted for approximately 33% of worldwide natural gas exports, which has reduced to approximately 7% today due to increasing national demand and reduced production capacity. Higher gas demands from the power generation and the national industry are the main drivers for the increasing domestic demand, which is increasing Indonesia's dependency on imported fuels. In order to address these uncertainties, the government needs to prioritise domestic gas consumption, gradually reduce the export of gas and further develop the gas infrastructure in order for it to cope with the energy demand. The high uncertainty associated with the issue may be related to Chevron delaying its \$12 billion Indonesia Deepwater Development (IDD), which was expected to supply the national oil company by 2016. The delay is expected to exacerbate the demand for imported LNG in the short run, which additionally may be adding to the uncertainty associated with this issue. The tension around the volumes of the Domestic Market Obligation (DMO) of Indonesian gas projects further add to the uncertainty. Although the Indonesian gas / LNG market is increasingly willing to pay close-to-international market prices, the domestic LNG price is still trading well below the international market. In combination with increasing costs of LNG projects, uncertainty around how much of the gas will be used domestically or exported increases.

ITALY

The present Italian economic context continues to be difficult. After ten years of slow growth and the continuing recession, the Italian energy sector is experiencing a continuous reduction in final energy consumption, which is strongly affecting the energy sector. This situation has led to an overcapacity in energy supply chains, power generation, regasification and refinery.

In this context **energy prices** present a critical uncertainty for Italy (Figure 30). Italy's energy prices for industry and residential use, especially electricity prices are amongst the highest in the EU, mainly because of the increase in 'taxes/levies' and 'network' components of electricity bills, and notwithstanding the slight decrease in the 'energy supply' component. The uncertainty associated with the issue is thereby additionally aggravated due to Italy's energy import dependency. In 2013 for example, Italy imported 1.1 million barrels of petroleum and other liquids, making it the second largest importer in Europe after Germany.

Figure 30
WEC's 2015 World Energy Issues Monitor: Italy



In this regard, the Italian government recently approved several measures to address energy bill increases and to improve the exploitation of domestic energy resources. Within these measures, the review of the incentive scheme for **renewable energies** is one of the most relevant issues, making renewable energies a top uncertainty in the country. The uncertainties over the regulatory and market contexts for renewable energies are holding investors back. At the same time many renewable energies no longer need high incentives and this calls for a serious reflection on incentive and market design needed in order to

better integrate renewables in the Italian energy mix and to achieve the European target, which is reflected by the position of innovative regulation in the high impact half of the map.

It is crucial to Italy to reduce the uncertainties surrounding the EU-**Russia** and **MENA** relationships as Italy holds strong industrial, technical and commercial partnerships with Russia and North African countries. The majority of crude oil for example is imported from Libya, Azerbaijan, Saudi Arabia and Russia, making the country's energy security vulnerable to political instability in Russia and the MENA.

Energy efficiency is both the most important need for action and uncertainty for Italy and represents an important option for producing energy at a competitive cost and lowering the dependence on imported sources. The Italian government addressed this issue producing the new 'PAEE' National Action Plan on Energy Efficiency that sets efficiency goals to 2020 and policies in development for achieving them.

In addition, the disproportionate competition from countries like **China** and **India**, which are not obliged to comply with the stringent European level of commercial, safety and environmental rules, and from the United States that, thanks to the boom of shale gas, can benefit of a great availability of cheap domestic energy resources, calls the EU and Italy for urgent actions to be able to recover its competitiveness.

The most relevant change between the 2014 and the 2015 Italian map is the entrance of the **LNG** issue in the need for action square. That is mainly due to the increasing interest associated with the use of LNG as a fuel. The decrease in the demand (power and heating) for traditional natural gas thereby presents an opportunity for the use of the alternative liquefied methane. In addition, Italy holds first class technologies and industrial experiences on road transportation fuelled by natural gas and several initiatives are being implemented by Italian energy companies, shipowners and shipbuilders for the use of LNG as marine fuel.

The most significant difference between the world and the Italian Issue Map is about the perceived high impact of the **Russia** issue. This is mainly due to the historical industrial relationship between the two countries and the composition of the Italian energy mix, where natural gas from Russia plays an important role. In addition, the weak signal for the **talent** (skilled workers) issue indicates a low confidence towards the individual capabilities in solving macro-problems in Italy.

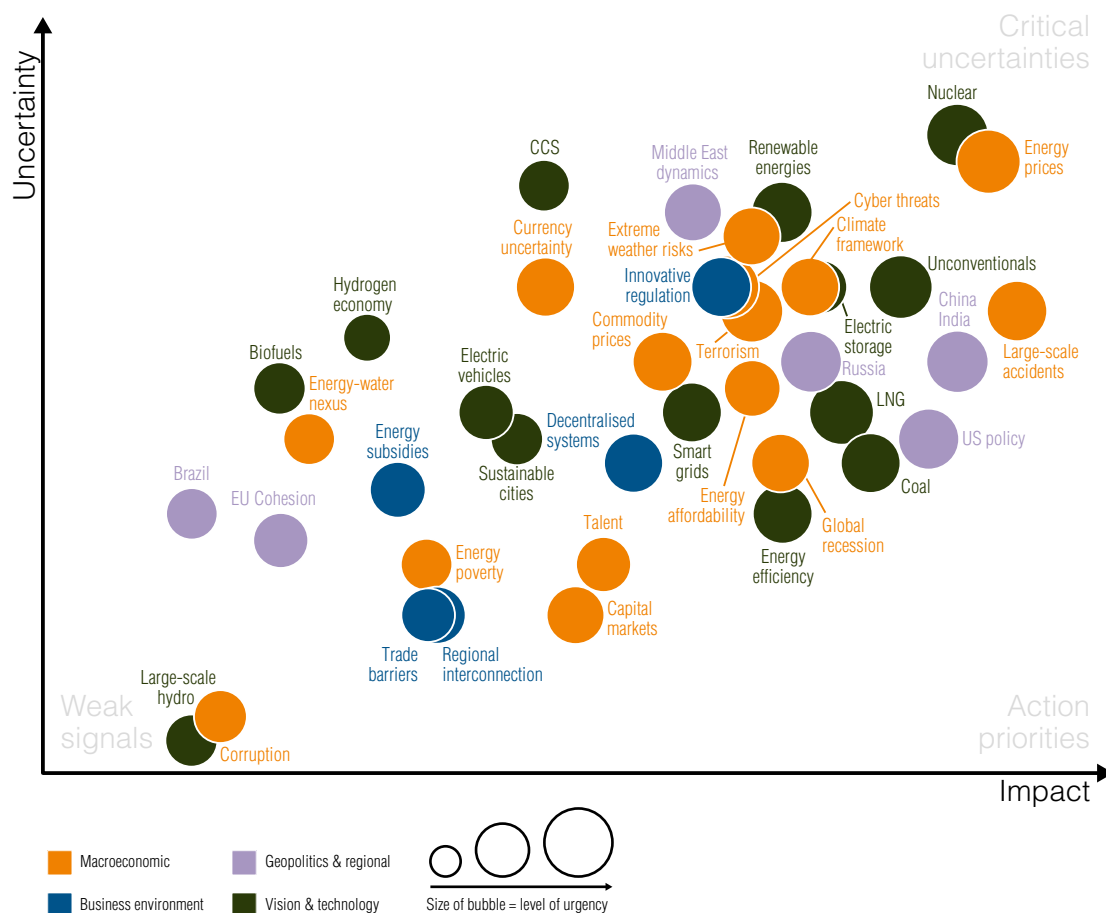
Among the technologies recognised as low impact and uncertain, **electric storage** is certainly a surprising one. In recent years, Italian institutions and energy companies have been involved in improving the renewable energies quota within the national energy mix and energy storage is certainly a key and necessary technology to optimise their use.

JAPAN

In April 2014, the Abe government, which was organised in December 2012, formed the 'Basic Energy Plan' and positioned nuclear power as an important base-load power source, reversing the previous government's policy of abolishing it by 2030. The plan also heavily focuses on promoting renewable energy sources. However, the problem is that the 'Basic Energy Plan' does little to reduce the uncertainty over future energy policy in Japan, given that numerical targets for the energy mix will not be determined until the prospects for nuclear re-starts becomes clear.

In July 2013 the Nuclear Regulation Authority (NRA) started to accept applications from nuclear operators to undergo safety examinations based on the new standard which added severe accident management and measures against risks such as terrorism attacks or a volcano eruption. On September 10, 2014, NRA announced that the first two PWR nuclear units passed the safety examinations. However, the future composition of Japan's energy sector, especially the future of nuclear power, is still unclear as it is not easy to get agreements on the restart from neighboring municipalities and prefectural governors.

Figure 31
WEC's 2015 World Energy Issues Monitor: Japan



Critical uncertainties and urgent need for action issues in Japan are **nuclear, energy prices, large-scale accidents, unconventionals** and **US policy** (Figure 31). All of these are mutually linked through the occurrence of Great East Japan Earthquake and the complete shutdown of nuclear plants after the Fukushima accident. The burden of the nuclear shut-down is growing,

and the effects of the nuclear shut-down are felt strongly. The additional fossil fuel required to compensate the lost nuclear generation has led to the fuel import bill rising steeply. Payment for fossil fuels for power generation has more than doubled – from 3.7 trillion yen in the 2010 fiscal year to 7.8 trillion yen in the 2014 fiscal year. Japan faces a formidable challenge as it has recorded a trade deficit for 26 straight months, as of August, 2014. Its inevitable consequence has been a hike in electricity rates as utilities grapple with rising fuel costs, exacerbated by the depreciation of the yen. Electricity rates for large industrial consumers have risen by 15%–17% while a typical household is paying around 20% more.

Along with the above mentioned issues, **China/India** and **coal** are positioned as urgent need for action issues. This is because many countries in the world, especially these two emerging countries are increasing the consumption of coal owing to its low cost and these two countries' total coal consumption accounts for about 60% of global coal consumption in 2012.

One of the highest change issues is **terrorism**, reflecting recent activation of terrorist activities in the world including laying areas of gas and oil pipeline. In addition, **Russia** is another highest change issue, caused by its conversion of energy policy that emphasises Far East Asia as an export destination of natural gas under the economic sanctions of US and EU countries.

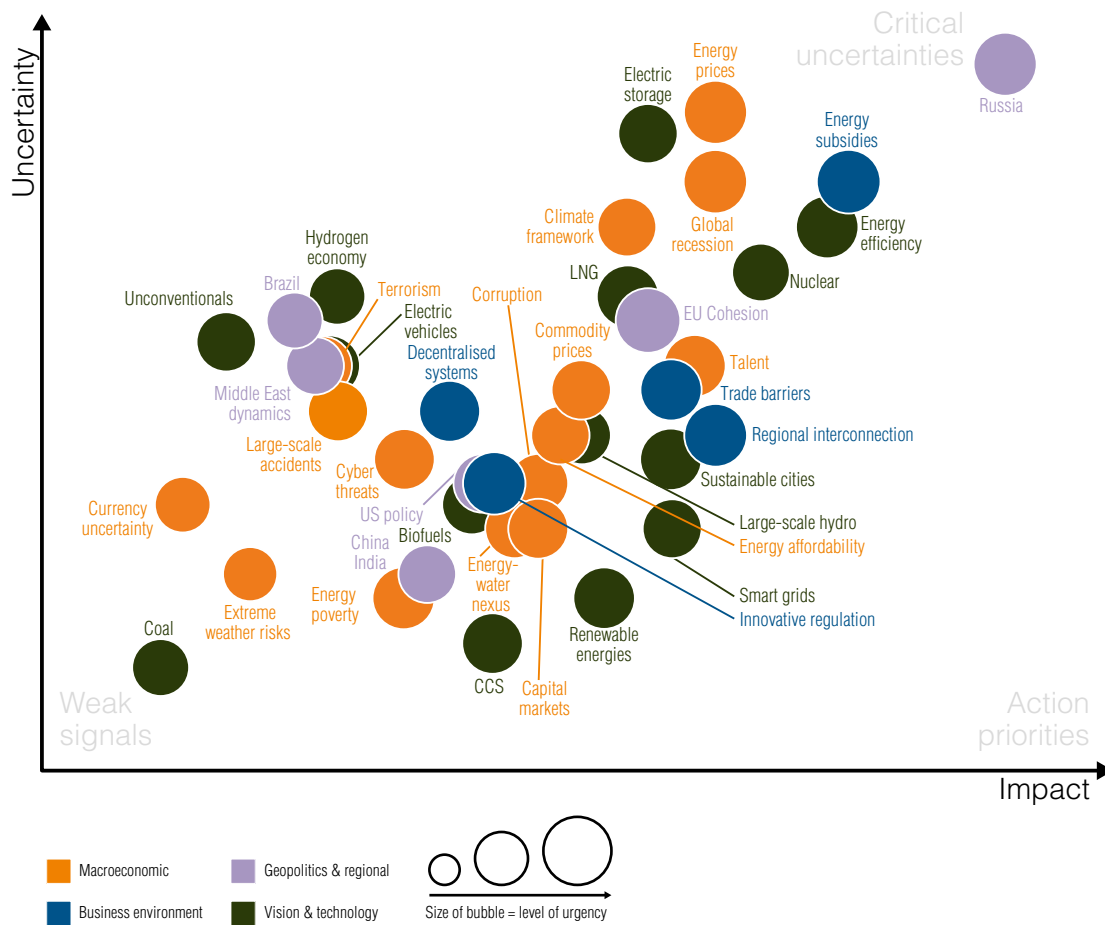
Compared to the world map, **large-scale accidents** and **nuclear** are top priority need for action issues which is unique for Japan. On the contrary, **renewables** and **energy subsidies** are not perceived to be hot issues in Japan. The main reason is that Japan already introduced a Feed-in-Tariff (FIT) in 2012 which resulted in an unexpected volume of PV installations. It is estimated that if all of PV installations currently certified to connect to the grid (approximately 69GW) should be installed, the levy on them will reach 2.4 trillion yen and the burden on the people will be huge. Thus, the discussion to review FIT has already started. **Energy efficiency** is also low-key in Japan. This might be because Japan has already achieved the world highest energy efficiency both in the supply side and demand side. However, further efforts for efficiency improvement, such as building insulation or air-tightening, are still underway, while increasing the kind of equipment in the Top Runner Program under the Energy Saving Act.

It is noteworthy that the public opinion in Japan still shows its excessive preference to the renewable energy rather than nuclear after Fukushima accident. One of the reasons might be insufficient communications and outreaches of energy issues to the public. Availability of electricity is mostly taken for granted. More effort is, thus, essential to seek people's better understanding of its benefits and importance.

LATVIA

This year's Issue Map for Latvia (Figure 32) is strongly influenced by the recent geopolitical developments in the area: the Russia/Ukraine crisis, the EU's economic sanctions imposed against Russia and Russia's counter measures. In this context the top critical uncertainty for Latvia is **Russia**, which is also its highest change issue, having moved from the most insignificant position in the 2014 map to the far end of the critical uncertainties quadrant in 2015.

Figure 32
WEC's 2015 World Energy Issues Monitor: Latvia



The geopolitical changes related to Russia are having a wide ranging and strong impact in the region including on Latvia. This is due to the fact that Latvia is highly dependent on Russian gas supplies, as currently no alternative natural gas suppliers exist. There is therefore an urgent need to identify alternative gas suppliers. In March 2014 the Latvian Parliament has approved amendments to the Energy Law proposed by the Ministry of Economy to gradually open the natural gas market in 2017. The amendments aim to reduce dependence on Russian gas supplies and free the use of the gas transmission infrastructure for any gas supplier. The wide ranging changes, combined with the unpredictability of the future developments and the need to identify alternative gas suppliers, involve changes to **energy prices** and **energy subsidies**.

The geopolitical changes are for instance affecting energy prices in Latvia. This is because it may not necessarily be economically profitable to produce electric energy – even with the most up-to-date combined-cycle gas power plants in condensation mode, which may be causing the uncertainties perceived in relation with these issues.

Latvia moreover has to implement projects for the diversification of the gas supplies through **LNG** supplies, new connections of the gas pipelines and infrastructure development.

In order to ensure the reliability of the energy supply, while preserving a balance between the costs and the gains, it is necessary to implement projects across the region. The Visagina Nuclear Power Plant (Lithuania) may thereby present a possibility for collaboration between Latvia and Lithuania.

The Estonia – Latvia Programme, which aims to promote sustainable development and economic competitiveness in the region, is another project that can contribute towards building a reliable and competitive energy supply in Latvia. It is therefore not surprising that **regional interconnection** and **nuclear** are the most important need for action issues in Latvia.

Besides the Russia issue, uncertainty has also increased with regards to **energy efficiency**, making it a high change issue. This is related to the new EU Energy Efficiency Directive and the Directive on SEG Emissions Restriction, and the resulting impact to energy prices. It is necessary to introduce financial instruments to promote energy efficiency in order to increase access to the state support for the provision of energy efficiency of private and public buildings, particularly in the regions of Latvia. The minimum energy efficiency requirements should be raised for energy production equipment and building structures.

Currency uncertainty, Brazil, terrorism and **energy-water nexus** are low change issues in the weak signals half of the map due to the fact that these factors have little impact on Latvia, and respectively Latvia affects these issues little.

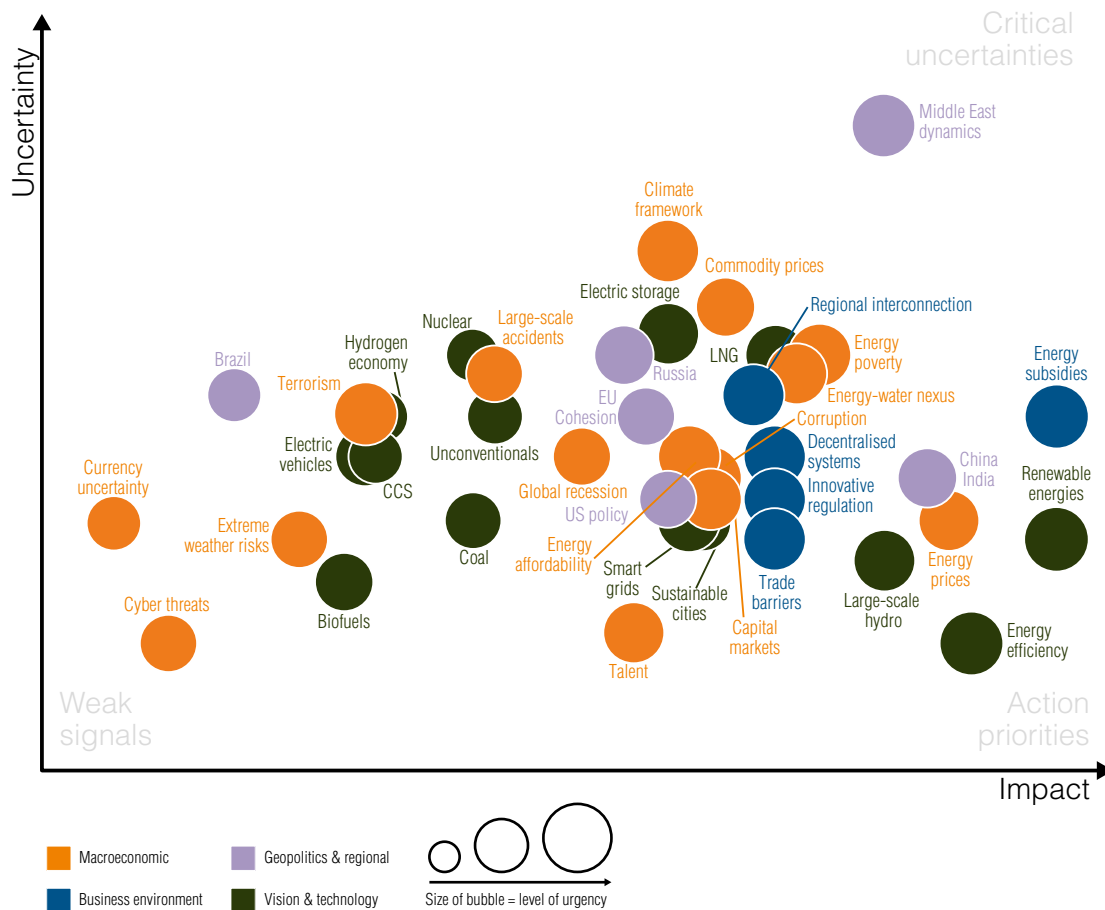
Similarities between Latvia and the world in uncertainty and a need for action issues exist with regards to a range of issues including **LNG, energy efficiency** and **renewable energies**. This highlights that the world responses towards fulfilling climate targets and commitments towards energy security and access to energy (G7/ UN development goals) further translate to the national level in Latvia.

Differences between the Latvian and world map are present in **CCS, coal, China and India**; reinforcing the fact that issues that are closer to the border with direct impact such as **Russia, regional interconnection** and **EU politics** overshadow issues that are of broader importance at the global scale.

LEBANON

One of the most prominent issues influencing the context of the 2015 Lebanese Issues Map (figure 33) is the continued geopolitical instability in the Middle East. In this context **Middle East dynamics** is a key concern for Lebanon and by far the most uncertain issue in the 2015 map which reflects the political instability of the region.

Figure 33
WEC's 2015 World Energy Issues Monitor: Lebanon



The high impact associated with the issue can be explained by the effects the regional conflicts (Syria crisis, Libya crisis, Islamic State Militants) can have on the energy security in Lebanon. The country is heavily reliant on energy imports. In 2010 for example, 90% of the energy consumed in the country was imported, mostly from the Middle East.

In particular the Eight Country Interconnection Project poses a risk to energy security in the country with persisting instability in the region. The project integrates the electricity grids of Lebanon, Egypt, Iraq, Jordan, Libya and Palestinian territories. However due to recent conflicts, a number of countries have been excluded from the network, which may present a risk to the country's electricity supply.

The regional instability has also led to a tightening of overland natural gas deliveries via the Arab Gas Pipeline from Egypt via Jordan and Syria, additionally explaining the uncertainty and large impact associated with the Middle East dynamics.

An ongoing dispute between Lebanon and Israel over the shared maritime territory additionally causes uncertainty over potential offshore developments of reserves of 1.7 billion barrels of oil and 122 TcF of natural gas, which could contribute towards securing the country's energy future.

Energy subsidies are a recurring energy issue for Lebanon with high uncertainty. The subsidies, mostly going to the country's electricity sector provider Electricite du Liban, thereby present the government's largest spending positing, amounting to 4.5% of GDP. This is adding to the national debt of Lebanon, which is already a country with one of the largest debt to GDP ratios.

It is however expected that energy subsidies will decline over the next years with increasing electricity capacities under the National Energy Efficiency Action Plan (NEEAP). The NEEAP comprises of 14 national initiatives to achieve a 12% renewable energy share by 2020. It moreover outlines initiatives to promote energy efficiency standards in households and commercial buildings, whereby a 5% reduction in the electricity consumption growth rate should be achieved by 2020. In order to achieve the goals the planned measures need to be implemented, which explains the need for action with regards to renewable energies and energy efficiency.

Climate framework is perceived to have a lesser impact and uncertainty in Lebanon compared to the world map, while the perceived impact and need for action of renewable energies and energy efficiency is greater in Lebanon compared to the world. This disparity could be explained by the **renewable energy** and **energy efficiency** targets being driven by energy security rather than by environmental concerns. Alternatively, the disparity may be explained by the proactive stance that Lebanon is taking with regards to the NEEAP, where a new climate framework is not expected to have a large impact on the country.

As part of the NEEAP an additional 140GWh/years of hydropower capacity shall be installed by the end of 2015. Much of this is expected to be done through the support of existing large plants and new micro-hydro plants and the more efficient exploitation of water resources. This strategy, which avoids new mega projects, may cause less public resistance which may explain why **large-scale hydro** is perceived to be more of a need for action issue rather than an uncertainty.

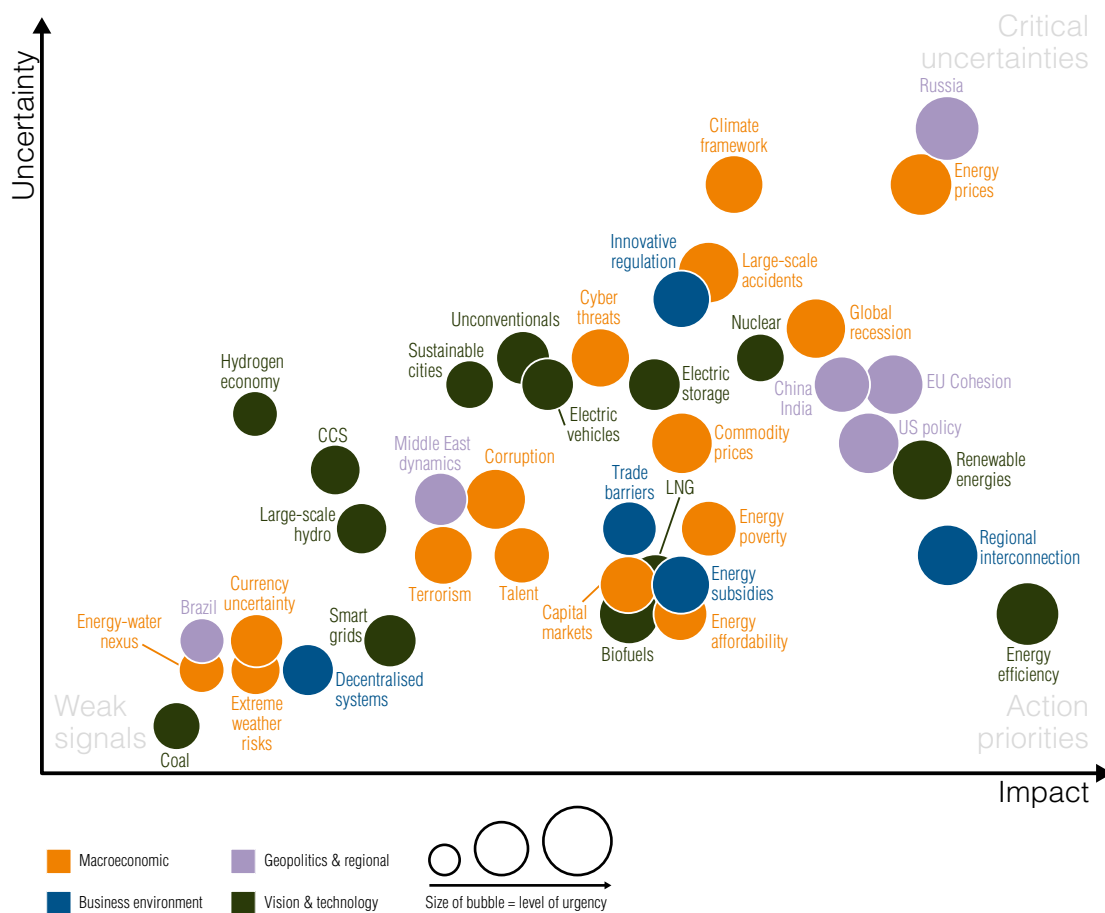
In this context the **energy-water nexus**, which was a weak signal in 2014 and is a top uncertainty now, may reflect the huge potential for a more efficient water use if NEEAP plans are implemented. A more efficient use of water resources for energy production may thereby contribute towards reducing the risks related to the energy-water (food) nexus.

The position of **energy prices** in Lebanon is particular because most countries featured in the Issues Monitor perceive the issue to be an uncertainty rather than a need for action issue which is reflected through the regional and world map.

LITHUANIA

In Lithuania the highest uncertainty is related to **Russia**, which is explained by the energy import dependency, whereby 80% of energy imported in Lithuania stems from Russia. Geopolitical uncertainty in Russia/Ukraine and high import prices for Russian gas therefore pose a threat to the country's energy security. Lithuania is therefore seeking to secure its energy supplies by diversifying its energy mix, reducing its import dependency and improving energy efficiency, which becomes evident in the 2015 Issues Map for Lithuania (Figure 34).

Figure 34
WEC's 2015 World Energy Issues Monitor: Lithuania



Lithuania has already started operating a **LNG** terminal in Klaipeda as a means of diversifying its gas supply. In this context **US policy** has moved from a low impact to a high impact and need for action issue which is related to expectations of increasing LNG imports from the US. The terminal presents an opportunity for the country to establish a competitive gas market. The LNG terminal is however also strategically important for the whole region as it can contribute towards reducing the energy dependence on Russia. It is therefore not surprising that **regional interconnection** is perceived to be a high impact need for action issue in the country.

Unconventionals and shale gas could potentially provide further opportunities for Lithuania to diversify its energy supplies. In late 2014 the Prime Minister travelled to the U.S. to attract foreign investors after Chevron ended its shale gas exploration tender in 2013. However,

regulatory uncertainty in the country was a major barrier to international investment. As a result a legal base was adopted in order to effectively increase domestic fuel supply. The weak impact associated with the issue could thus reflect the pessimistic views of the energy leaders with regards to future exploration activities. Due to the government's efforts to promote shale hydrocarbon explorations and its possible extraction, it may be possible that unconventional will move towards the need for action quadrant in the coming years as and when further progress is realised, thus is an interesting issue to be watched.

Energy efficiency and **renewable energies** are both high impact need for action issues. For Lithuania, situated in a relatively colder climate environment, renewable energy, in particular biofuels are most relevant for heat. The use of biofuels, peat, waste and local fuels are thereby viewed as opportunities to additionally diversify Lithuania's energy mix. The country relies on EU policies to ensure further development of energy efficiency and renewable energies in a manner which goes hand in hand with other European states.

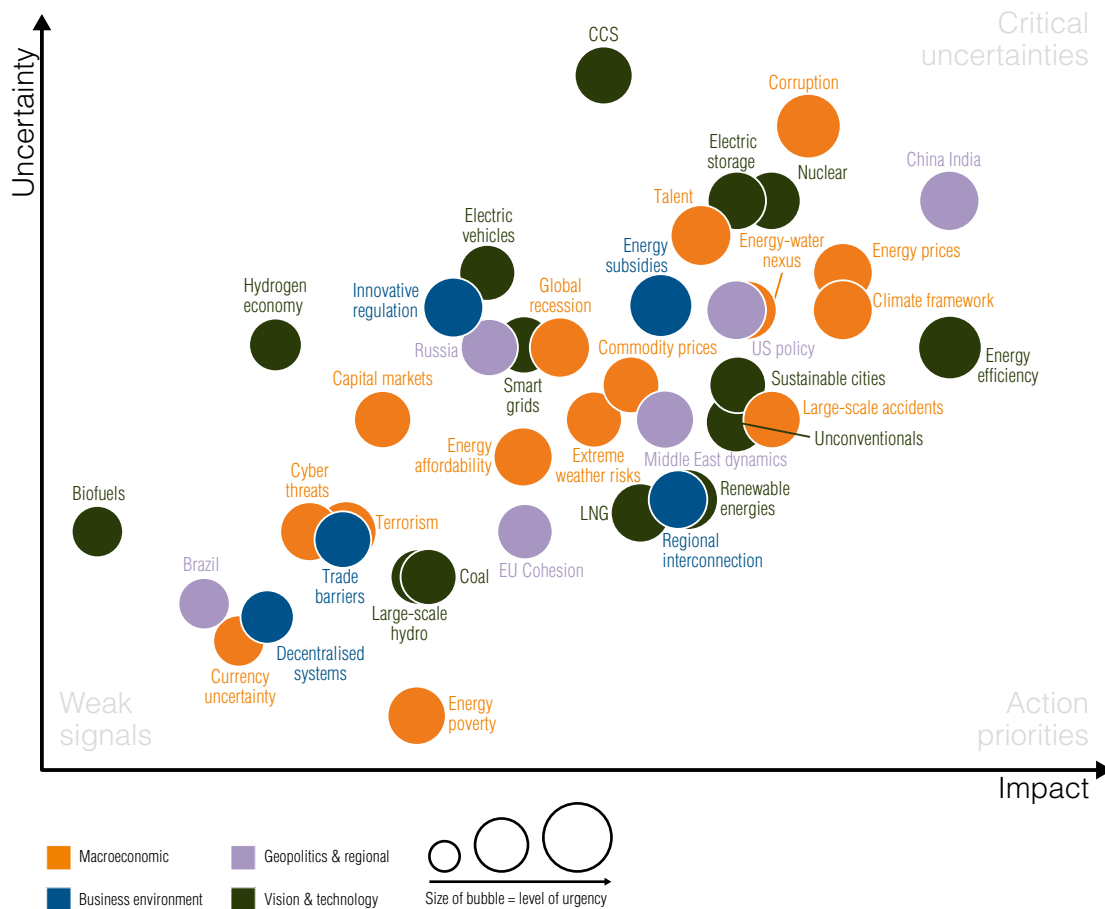
Nuclear is also a very important issue for Lithuania due to the construction of the new Visaginas Nuclear Power Plant (NPP) and the decommissioning of the Ignalina NPP. Prior to the closing of the Ignalina NPP in 2009, approximately 77% of total net generated electric power in Lithuania was generated from nuclear sources. With an active NPP in 2009, Lithuania exported approximately 58% of total generated electricity, making it its greatest export commodity, which may help to explain the both the perceived impact and uncertainty related to nuclear as displayed in the national map.

Energy affordability is a high change issue, which has moved from a critical uncertainty with a high impact to a need for action issue with a lower impact, which may be related to the decreasing oil prices. The new LNG terminal in the country and the establishment of an LNG market is additionally expected to have positive impacts on the energy affordability within the country.

Finally, it is of note that select issues, such as the sustainability of **China/India** demand are less relevant in the context for Lithuania in comparison to both the regional and global aggregates, in this case largely due to the geographical distance and weak direct relations.

MEXICO

Figure 35
WEC's 2015 World Energy Issues Monitor: Mexico



Two simultaneous transitions are taking place in México. By far the most transcendental ones are the Constitutional modifications and the corresponding by-laws recently enacted by Congress. These by-laws eliminate the State Monopoly in the overall energy business, allowing private and foreign investments in the oil, gas and electricity industries. They moreover promote competition along the complete chain of operations from oil and gas exploration to the gas station, as well as in power generation and the development of a new competitive electricity market. The second one is the transition from a fossil energy dependent economy to a low carbon economy. These are the most relevant developments shaping the Mexican Issues Monitor for 2015.

The slower growth of the large emerging economies (**China and India**) coupled with growth stagnation in the EU, are viewed by many as the key contributors for the fall in oil prices since June, 2014. Such oil price volatilities create serious uncertainties related to the successful opening of the Mexican exploration and production oil sector to private investors.

About one third of government taxes stem from the revenues of oil enterprise PEMEX, the former state agency which has recently transformed to a stated owned productive industry. The dependence of the government's budget on the revenues from the energy sector cannot be overstated, as it presents a major challenge to the establishment of a healthy energy market.

Energy prices and **subsidies** ruled by political decisions also generate uncertainties. As an example, in México the prices of petroleum products keep going up, as previously planned by the Ministry of Finance, in spite of the recent significant decrease in world crude oil prices.

Corruption was recently highlighted by several incidents such as the disappearance of 43 students, the apparent murder of 22 supposed drug gang members by the armed forces, as well as several cases of exposed dubious business transactions by members of the highest political levels. These incidents cast some doubts on the success of the energy sector reforms.

Regarding the **climate change** issue, a framework for climate change mitigation legislation has been enacted. Formal strategies and government programs have set quantitative goals, which, in principle include nuclear energy, electricity storage and carbon capture and sequestration. For example, the Ley General de Cambio Climático (Climate Change General Law) calls for 35% of the electricity generation to be from clean energies (non-emitting GHG technologies) by 2024. On the other hand, México has installed only a relatively small amount of renewable energy power plants (approx. 2,500 MWe by December 2014) and no decision has been made about additional new nuclear power plants, raising concerns about the possibilities of achieving the above stated goal. In addition, by the end of 2014, no formal strategies have been established in the areas of energy efficiency and energy conservation due to the fact that the energy consumption per capita is still quite low in México. The perception is that public policy is very much emphasising supply over demand to tackle climate change issues.

The five issues that differ significantly with the world Issues Map are innovative regulation, coal, nuclear, the energy-water-nexus, and corruption. As far as **innovative regulation**, the present grand effort is related to developing the competitive market regulation to ascertain the success of the recently enacted energy reforms, analysing what has happened with past experiences in other countries. **Coal** is not and has never been an important primary energy source in México, so it is not perceived as a problem. The **nuclear** issue is present because most energy experts are convinced of its need to tackle the climate change program but the decision makers are basically silent on it, apparently for political reasons. Finally the **energy-water** issue in México is very important since most of the country has semi-arid characteristics and the majority of the underground water reservoirs are already overexploited. At the same time water needs in the energy sector are increasing significantly due to the fact that most projections show a large increase in new energy installations, both in the electrical and in the oil and gas sectors, which will require large amounts of water to operate. The corruption issue in México, as mentioned before, has become a highly visible issue due to recent cases that have been made public in other sectors of the economy. If similar cases were to occur in the process of the implementation of the energy reforms this could be the source of serious political and economic problems.

Energy affordability and regional interconnection are top need for action issues for Namibia because domestic electricity production does not meet domestic demand. In 2010/2011, 63% of electricity supplied in Namibia was imported from its neighbouring countries, the majority thereof from South Africa. Due to rising electricity demands in Namibia's supplier countries regional interconnection plays an increasing role to secure electricity trade despite the electricity supply shortages in its neighbouring countries. With increasing electricity demand in Namibia and supply shortages from abroad, electricity prices are expected to increase by 46% (with the best case scenario) compared to 2012/2013 electricity prices. Electricity affordability as part of energy affordability is therefore a key concern for Namibia's energy leaders.

Nuclear and large-scale accidents are high change issues, having moved from the high impact half of the map to weak signals from 2014 to 2015. This movement is relevant for Namibia as uranium exports are a main contributor to the economy, whereby the country provides 5% of the global uranium demand. With the renewed interest in nuclear as a power source after the Fukushima incident, the country may feel more optimistic with regards to its uranium export potential, resulting in a lower degree of impact associated with the issues.

With this regulatory sledge hammer as a back-drop, **energy affordability** became an urgent critical uncertainty with the highest need for action. Despite this, energy executives were not convinced that increases in energy prices reflected an uncompetitive market and were the cause of affordability problems. While remaining one of New Zealand's highest critical uncertainties, energy prices became less uncertain relative to its positioning for New Zealand in the 2014 map. Other factors such as income levels, transmission investments and access to capital to purchase energy efficiency devices seem to be more likely related to affordability. This seems to be at least partially corroborated with the lift in urgency and the need for action of **energy efficiency**.

Energy price concerns seem more driven by volatility – the impact of the myriad of uncertain signals (including carbon), relative energy price and the risk of asset stranding. Similar to the rest of the world, this risk appears to be playing out in New Zealand.

The industry's response to the regulatory threat is to address **energy affordability** and energy price risk by innovation and the early adoption of technology, not by dismantling the market. The clustering of the technologies of **smart grid, electric storage** and **electric vehicles**, combined with innovative regulation, provides a clear signal to policy makers for the need to keep up with developments in order to adapt business models and compete to ensure prices reflect costs.

This approach reflects a deep industry attachment to the benefits of a liberalised market framework. Consistent with this, subsidies sit firmly buried in the bottom left hand weak signals quadrant.

Interestingly, **renewable energies** have become an issue increasingly in need of action; however, at 78% renewable electricity in the June 2014 quarter the extent of concern is low. Wind and geothermal are now commercial but we are clearly thinking more about how we get the next tranche and whether it will be solar or marine.

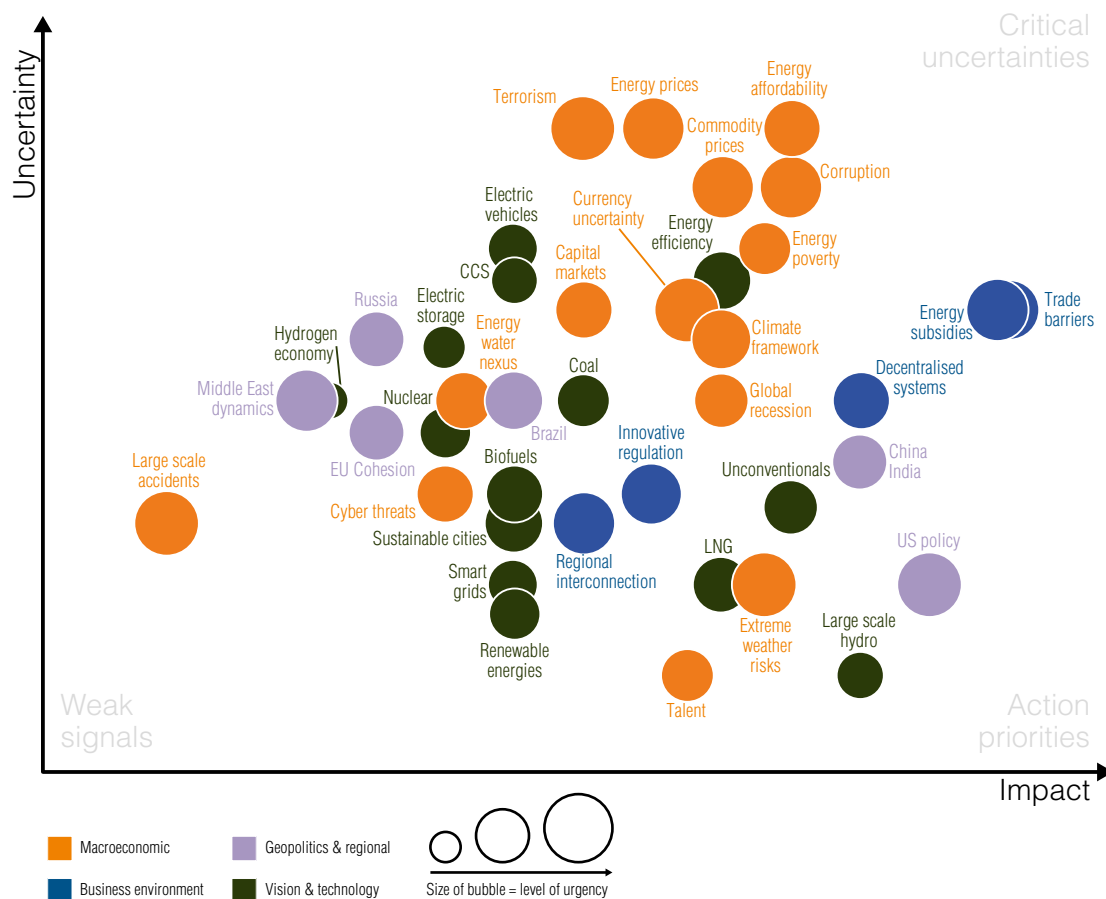
The **energy-water nexus** is much higher in New Zealand than in the global map. Although well-endowed with water and without neighbours pinching or polluting it, we are already seeing conflicts between using water for food, energy or leisure.

Finally, this year energy executives appear to have discovered the urgency button. While the size of bubbles last year was uniform, this year a different picture emerges – with a better correlation between the criticality of the issue and its level of urgency.

NIGERIA

Energy affordability and **energy poverty** (i.e. access to energy) are recurring top critical uncertainties for Nigeria's energy leaders (Figure 38). Domestic energy use is largely dependent on traditional biomass and wastes, which make up 83% of Nigeria's primary energy consumption. The high rate of traditional biomass use highlights the country's poor electrification rate, leaving nearly 85 million out of the country's 170 million people without access to energy.

Figure 38
WEC's 2015 World Energy Issues Monitor: Nigeria



The Obama power initiative, which aims to increase access to energy within selected African states, provides an opportunity for Nigeria to secure large-scale investments into energy infrastructure. It is therefore not surprising that – as in the regional Africa map – **US policy** is perceived to be a high impact need for action issue in Nigeria.

Energy subsidies is a high change issue, having moved from the weak signal quadrant to a top critical uncertainty in 2015. Energy subsidies present a large burden on the government's budget, accounting for approximately 30% of government expenditures (in 2011). At the same time low energy prices are putting additional pressure on the government's budget as 70% of the nation's income are from crude oil and LNG exports.

The high impact and uncertainty for energy subsidies in 2015 could be related to two key factors. Firstly, the continuing market distortions caused by the energy subsidies are increasingly leading to insufficient maintenance and reinvestment into Nigeria's energy network, exacerbating Nigeria's energy access and supply reliability challenges.

Secondly, the high uncertainty may be related to the plans announced by Nigeria's President Goodluck Jonathan in late 2014 to cut fuel subsidies by 50%. The upcoming general elections in 2015 and the related uncertainties with regards to the future of the suggested subsidy cuts may thereby contribute towards the perceived energy subsidy uncertainties.

Trade barriers has persistently been a high impact, high uncertainty issue in Nigeria, which is not surprising given the importance of energy exports for the country's economy. Nigeria is the largest oil producer in Africa with the second largest proven oil reserves and the largest natural gas reserves in Africa.

Unconventionals, a top need for action issue in 2015 moved from the weak signals quadrant in 2014 to the need for action quadrant in 2015. The push for shale gas in the United States, formerly Nigeria's largest LNG importer, may present a serious challenge to Nigeria's competitiveness in the LNG market. Although the export of LNG in the United States is currently restricted, a bill to expedite the LNG export process was passed by the House of Representatives in June 2014. The changes in US law may therefore additionally contribute towards the need for action perceived with relation to the **US policy**.

Currency uncertainty, presents a high change critical uncertainty in the 2015 map, having moved from the weak signal quadrant in 2014. The attention that this issue has received in the 2015 map, particularly expressed through its change in position and high level of urgency, can be explained through pressure on the local currency which went down by almost 4% against the USD in the last one year alongside the plunge in oil prices.

Corruption is a key issue for Nigeria, ranked as a top uncertainty in 2014 and 2015. Compared to the regional map, corruption is perceived to have a higher impact in Nigeria which needs to be addressed with a high level of urgency. Corruption is a critical issue that yet needs to be solved which is demonstrated through its continuous position on the map.

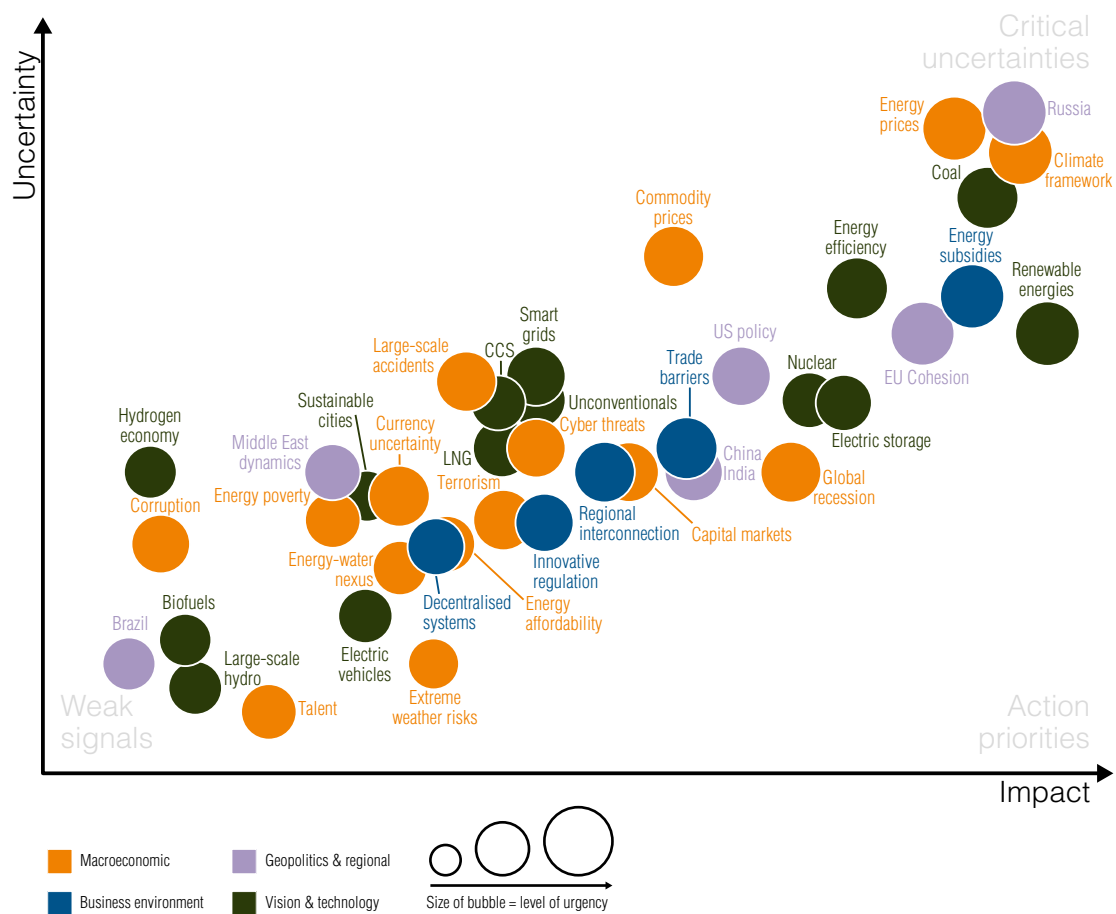
Large-scale hydro is perceived to be a high impact need for action issue in Nigeria, which corresponds to the position in the regional Africa map. Nigeria plans to quadruple its hydroelectricity capacity (compared to its 2012 level) by 2020. The increase in hydroelectricity generation capacity is thereby planned to stem from the construction of new plants and the upgrade of existing plants. These plans are thereby supported by the Chinese government which has already agreed to cover 75% of the costs of Zungeru Hydropower Project. Generally, China's Foreign Direct Investment stock in Nigeria amounted to approximately \$13.5 billion in 2012, making Nigeria a top investment priority for China, which explains why the **China India** issue is perceived to be a need for action issue with a high potential impact.

POLAND

In 2014 the Polish energy sector was influenced by four main regional and national factors. The first regional factor was the Ukrainian crisis and general geopolitical situation in Eastern Europe. The second international issue, which had a substantial impact on the sector, was the negotiations on the 2030 frameworks for climate and energy policies on the European Union level.

At the national level, two legislative oriented concerns were in the spotlight – the development of the new Polish Energy Policy to 2050 and Renewable Energy Sources Act. All four developments are reflected in the 2015 Issue Monitor Polish map (Figure 39).

Figure 39
WEC's 2015 World Energy Issues Monitor: Poland



Critical uncertainties in the Polish map include: **Russia, energy prices, climate framework** and **coal**. These issues are fully consistent with the context described above and are inextricably linked. Russia refers to the Ukrainian conflict and the risk in ensuring security of gas supply. The three remaining issues – energy prices, climate framework and coal – are directly connected with negotiations of the new European climate and energy targets for 2030. **Energy prices** in Poland will depend on the new targets because these will determine the scope and cost of required investment in electricity generation assets. At the same time climate targets will have an impact on the coal sector because the change in fuel mix may heavily affect this industry – more than 80% of installed capacity is based on coal. Regardless of the new climate targets, the global coal market is still under stress because of oversupply and decreasing prices.

Three issues that keep energy leaders most busy at work are: **renewable energies, EU cohesion** and **energy subsidies**. In terms of renewable energy Polish legislators have been working on the new Renewable Energy Sources Act which is to establish a revised subsidy mechanism for renewable energies. The final design of this mechanism will depend on European bidding targets concerning the share of renewable energies in the energy-mix. The Act is crucial to ensure stable investment frameworks in renewable energies in the medium and long term.

The Polish map is very consistent with the regional (European) map. Six of seven critical uncertainties and need for action issues are perceived exactly the same in Poland and in Europe. These are: Russia, energy prices, climate framework, renewable energies, EU cohesion and energy subsidies. Coal is the only issue that is perceived with a substantial difference. This is an effect of coal resources and the strategic meaning of this fuel for Poland – both in the energy sector and the economy as a whole.

PORTUGAL

Figure 40
WEC's 2015 World Energy Issues Monitor: Portugal



Most of the critical issues identified by the Portuguese respondents are those, that impact economic growth, much required to consolidate the country's recovery from a financial crisis.

Global recession in particular has been identified to be a critical issue, which strongly affects the country's exports. **EU cohesion** and **energy prices** are also recognised as critical uncertainties due to the monetary and economic integration that affect industry costs and the national budget. This is particularly important as approximately 75% of Portugal's energy demand is still covered by energy imports, notwithstanding the raising share of renewable energy in primary energy supply. In this context, **energy affordability** is an issue that moved from weak signals in 2014 to the uncertainty zone in 2015, recognising the lower income from households due to economic slowdown.

Although Portugal's energy supply is not entirely dependent on either Russia, or the Middle East, events in these regions are considered to be critical, as they may impact the energy supply, not only in Europe but worldwide, causing energy prices volatilities and slowing trade which are factors that would affect the country's economy.

Renewables and **energy efficiency** are issues that appear in the need for action area and are receiving high attention from both the government and companies' management. Renewable electricity, mainly from hydro and wind, already represents more than 60%

of installed capacity and may account for more than 50% of consumption depending on the weather. Energy efficiency, which has room to improve significantly, in line with high consumption intensity in areas around transport, buildings and households, is being improved according to an established governmental action plan.

Large-scale hydro, even though it already represents a large share of the installed capacity, plays a significant role in the storage of excess renewable generation. This issue stands between weak signals and need for action, as construction work is ongoing in several sites as part of the implementation of the electric dams plan that seeks to seize the hydro capacity potential.

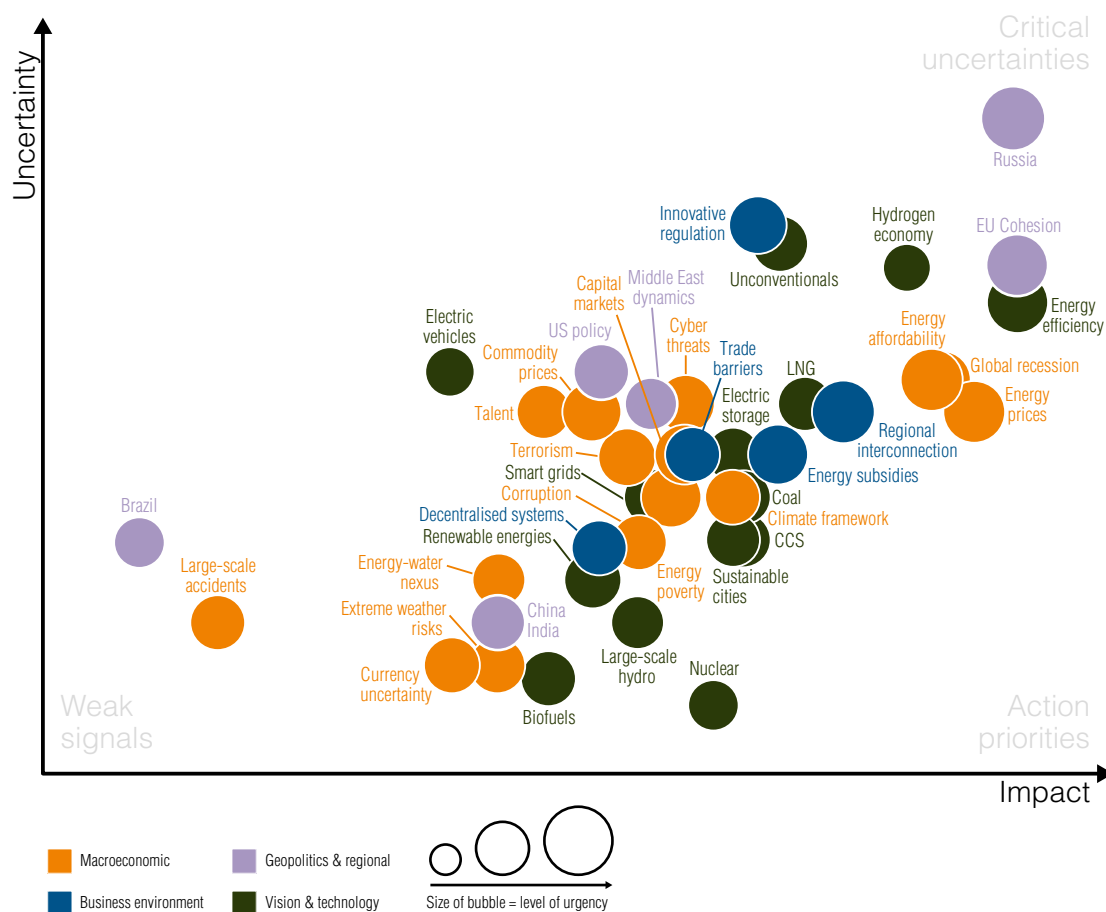
Electric storage and **electric vehicles**, which in 2014 appeared clearly in the critical uncertainties sector, both moved to a much lower expected impact and uncertainty, which may reflect the ongoing building progress in the electric dams plan. Electric vehicles, another aspect linked to electric storage, is now more closely aligned with the rest of Europe, having moved away from previous years' expectations of rapid development in the country. The present lower interest goes hand in hand with the lower levels of interest displayed towards electric vehicles.

Nuclear, CCS and hydrogen economy, as in previous years, are not perceived as issues requiring action or having great impact in the country in the long term. On the other hand, **regional interconnection** remains a critical uncertainty, as the reinforcement of connectivity between Iberia and France is felt as a condition to a more integrated market and as a prerequisite to potentiate Portuguese renewable electricity exports to European countries. This is an issue that is receiving strong political attention from the Portuguese government in order to reach an EU commitment to interconnections' minima: indeed it is striking that the perceptions almost overlap in Portugal and Europe issues charts.

ROMANIA

A number of developments have occurred in the region over the course of the past year, which affect the Romanian energy sector. Many of these changes have developed over the medium term, such as the Romanian market liberalisation and their continuing integration in the region especially in the European energy markets. Other changes have developed overnight as a result of the unexpected geo-political behavior, notably regarding that of Russia in the region. It is therefore not surprising that **Russia** and **EU-Cohesion** present as the top critical uncertainties for Romania (Figure 41).

Figure 41
WEC's 2015 World Energy Issues Monitor: Romania



The recent developments also highlighted a series of basic uncertainties concerning energy security in the region and in Romania such as the country's competitiveness and ability to provide affordable energy services to its citizens. These uncertainties are reflected in the map with the **global recession, energy affordability** and **energy prices** clustering in the top right quadrant. This has resulted in issues around access to necessary quantities of energy sources (both domestic and in the region) as well as increased uncertainty and volatility around pricing as the market mechanisms are superseded by political decisions. Furthermore, because of the energy shortages in the Ukraine and Republic of Moldova, the Romanian role in the region has become more important resulting in a more acute need for action. The regional map describes this situation correctly.

In this context, many issues still remain unresolved, such as important investments to strengthen the Romanian energy sector, new **interconnections** both with EU countries

and with the Republic of Moldova, clear decisions on unconventional gas (shale gas) exploitation, development of the new off-shore deposits as well as decisions on a possible LNG terminal in Constanta.

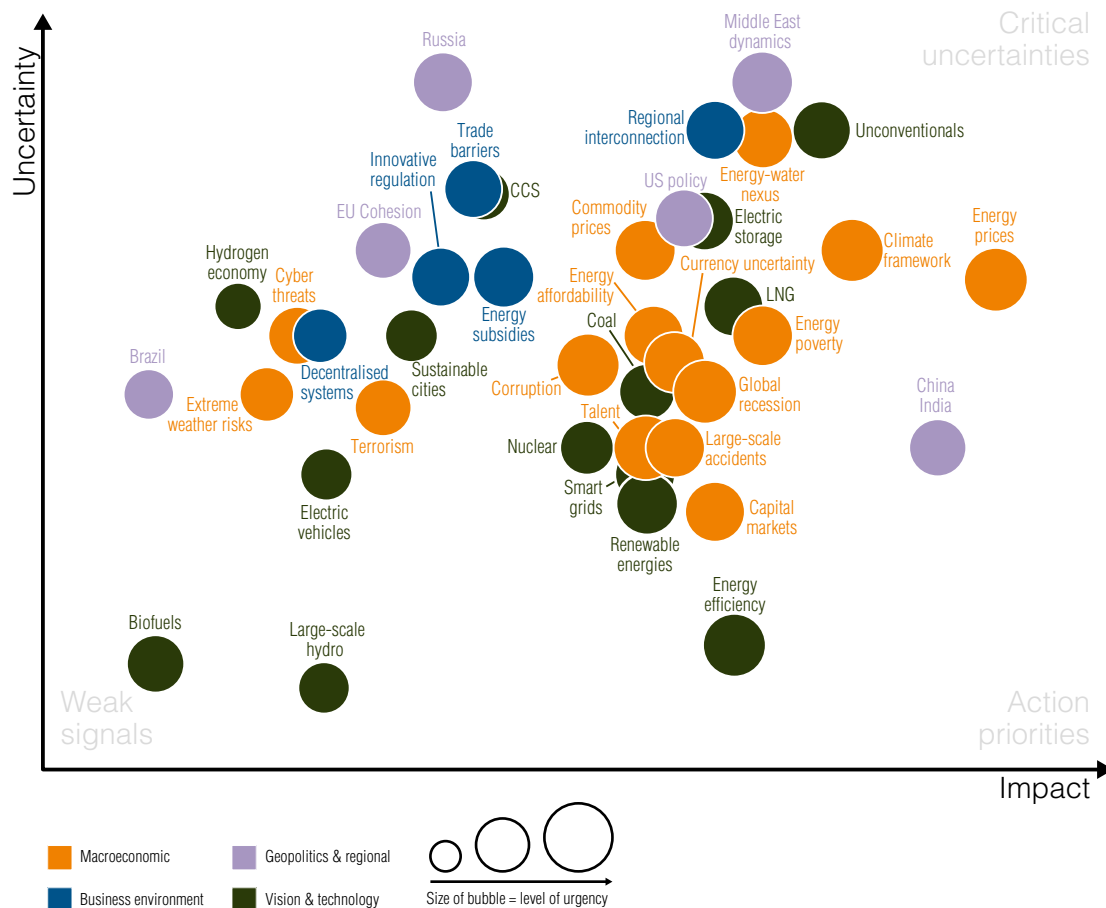
Renewable energy sources (especially wind and sun) are well developed in Romania, but raised a number of problems concerning system balance and end consumer prices. That imposed a series of regulatory measures to compensate the negative effects and moved the energy markets liberalisation further down the agenda. However, biomass and biogas can be considered as future renewable sources for Romania without doubt and may be considered in the future action plans. **Energy efficiency** also plays an important role in the country's plans to further develop a stable energy sector.

Concluding, we consider that the regional and Romania maps describe properly the energy situation. However, an important issue that Romania is confronted with – **unconventional gas** – has to be better underlined as an uncertainty and need for action issue in relation with the new geo-political developments.

SOUTH AFRICA

Energy prices, climate framework and **unconventionals** have been identified as the energy issues that have the greatest impact and most uncertainty for South Africa (Figure 42).

Figure 42
WEC's 2015 World Energy Issues Monitor: South African



South Africa has a relatively high energy intensity and the high energy prices (both electricity and liquid fuels) continue to impact negatively on business performance and consumers' disposable income.

South Africa is one of the few developing countries that has made commitments to meet global emission reduction targets, subject to support from the developed nations. Many energy practitioners are concerned that it will be difficult for South Africa to meet its commitments without a significant impact on the economy. Furthermore, regarding unconventionals, shale gas is anticipated to have a significant impact on the economy and job creation, but concerns around environmental and social impacts create significant uncertainty.

China/India, Energy efficiency and Energy poverty are the Issues that need action. In this regard, South Africa's membership of BRICS nations leads to greater comparison with the performance of these partners. In particular **China and India** are potential developing country role models. Energy leaders continue to believe that **energy efficiency** represents a high impact and low uncertainty opportunity, although delivery to date has been disappointing. On **energy poverty**, the issue has moved to a more prominent position, more

closely aligned with the rest of Africa, and reflects the increasing concern around service delivery in South Africa.

A number of other issues that have changed significantly in the year to year perception of energy leaders within South Africa. In this regard, **biofuels** has decreased in both uncertainty and impact due to the lack of progress made in implementing the policy. **Renewables** are being connected to the power grid without discernible negative impact, thus reducing the priority of **electric storage**. The market uptake for **electric vehicles** is not strong, leading to lower uncertainty and lower impact.

Large-scale accidents whilst remaining a low uncertainty have moved up on the impact scale. The impacts of the major accidents in the energy field are now better understood and better appreciated. The **trade barriers** issue has risen in uncertainty but it remains at a fairly low impact. The inability of South Africa to finalise the discussions around trade agreements has driven the uncertainty up.

Finally of note is the shift in the position of **US policy** to reflect an increased uncertainty and increased impact. This is most likely due to President Obama's Power Africa initiative. Although not directed at South Africa specifically it is anticipated that it could have some benefits for the national manufacturers, contractors and consultants.

The high degree of uncertainty and impact of **climate framework** for the country might be a reflection of the effect of the new 2030 EU Energy Package on the level of competitiveness for the European industry, and its proposal of external involvement in the EU-ETS, as this might create uncertainty, instability and market distortion.

Among the most important need-for-action issues, **energy efficiency** and **renewable energies** are both top priorities, in a similar way positioning to both the European and Global maps. The Spanish government is boosting energy efficiency as a key element to enhance growth, sustainability and decrease the national energy dependence rate.

LNG has also appeared as one of the main concerns with the highest impact on the Spanish map. The high development grade of LNG infrastructure in the country and the creation of an Iberian natural gas hub could easily increase the efficiency of the natural gas sector in Spain, fostering wholesale and retail competition and improving the security of supply for the European region.

The **China and India** topic continues to maintain the same priority as a key need for action issue. This reinforces the potential of growth and development in the relationship of energy related Spanish companies with these countries.

The issues that have experienced a higher movement towards the high uncertainty/need for action area over the last period have been **Russia, regional interconnection** and **trade barriers**. Regarding the last one, its position on the Spanish map reflects the European priorities, since international trade is undoubtedly a force for economic development for the country.

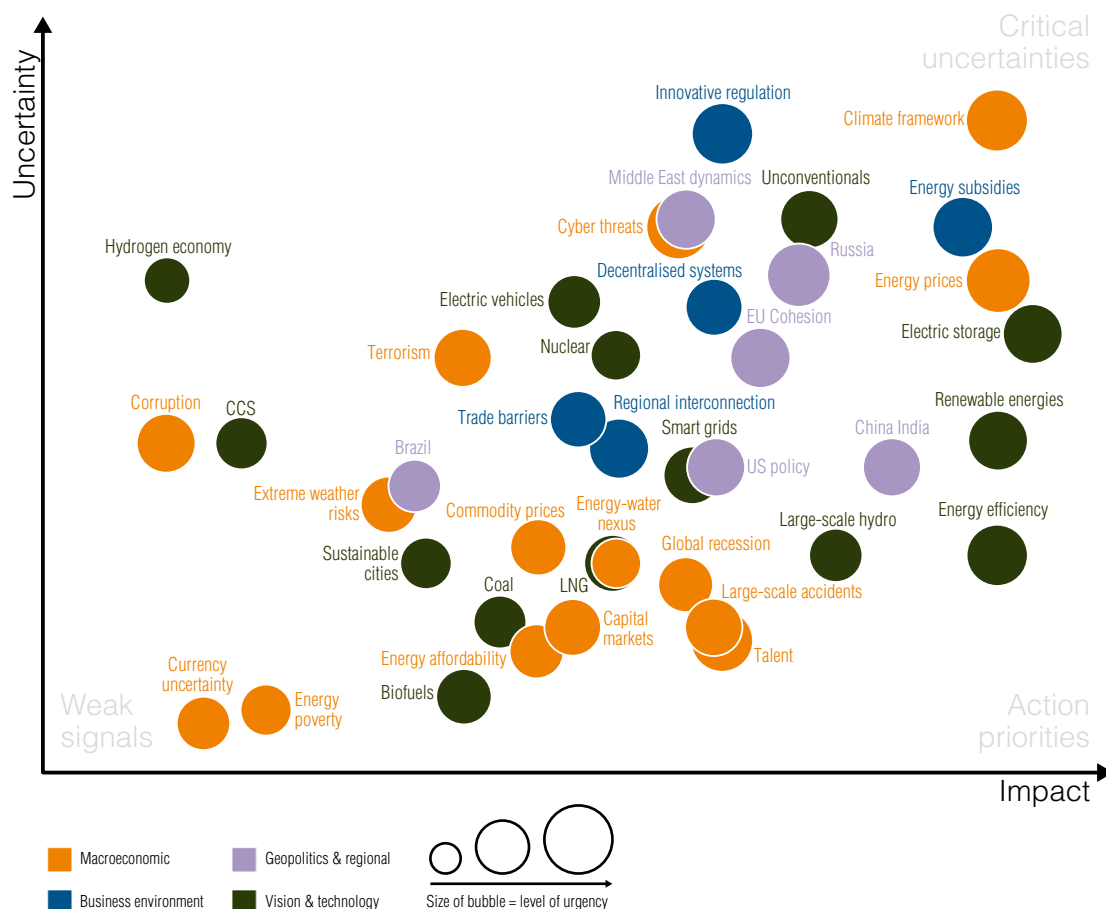
On the other side, those issues that have decreased in terms of perceived levels of uncertainty and impact over the last period have been **unconventionals, global recession** and **currency uncertainty**. Although the economic recession suffered in the country for the last years is still a top priority on the government's agenda, the evidences of economic recovery have reduced the level of uncertainty about this issue on the national map. Furthermore, regarding the new position of unconventionals, the slowness of the regulatory process both at a European and local level might have diminished the level of national awareness about this matter.

The comparison between the Spanish and European map shows multiple similarities at the high uncertainty-high impact area. **Russia, climate framework, renewable energies, regional interconnection** and **energy prices** are issues that demonstrate the common priorities that keep both regional and national leaders awake at night. Nevertheless, certain issues such as **nuclear** and **energy subsidies** exhibit a major degree of concern in the European case without a corresponding importance for the national agenda.

In the case of the assessment of the Spanish map versus the global one, some issues have a lower level of priority on the world's agenda in comparison to the Spanish one. This is certainly the case with regards to **Russia, Middle East dynamics** and **EU cohesion**, meanwhile issues of **capital markets, coal** or **energy affordability** are perceived to be more critically relevant in the global map.

SWITZERLAND

Figure 44
WEC's 2015 World Energy Issues Monitor: Switzerland



In May 2011 only two months after Fukushima – the Swiss Government drafted its 'Energy Strategy 2050'. After consultation with all stakeholders, a final draft was presented to Parliament, which contains some changes in the sectors of transportation (European emission standards) and heating and cooling, but is still aimed at a rapid change in electricity production. In December 2014 the proposal has been discussed by the first Chamber (National Council). After consideration by the second Chamber (Council of the Cantons), the final proposal will probably be subject to a referendum in the coming years; when Swiss citizens will accept or reject the strategy and its legal consequences. In the meantime, Switzerland has also introduced stronger levies on CO₂ emissions for heating, but not for the transport sector. By an early decision of Parliament in June 2013, the energy intensive companies can be relieved from feed-in tariff remuneration at cost.

Over the three years that Switzerland has been participating in the World Energy Issues Monitor national deep dive, it has become evident that Switzerland's critical agenda is stable and has become ever more clear.

Generally speaking, the petroleum and gas industries are concerned by the general trends towards a zero-emission society, which explains that the questions of unconventional energies and of a **climate framework** are important for them. Both topics are and have been subjects of high uncertainty and great impact.

The possibly upcoming climate framework is also of utmost importance for the electricity industry. This significance is reflected in this year's valuation as the most important uncertainty in Switzerland. The main reason for the critical uncertainty, which is connected to this issue, is the influence of feed-in tariff remuneration at cost in Germany on energy prices. State subsidy measures created an increasing distortion of final energy prices, with adverse impacts on neighbouring countries. As a consequence of heavy **subsidies**, the electricity market is a distorted one; a strong and functioning climate framework could be a means to partly reintroduce an undistorted market. This hope covers the equally important critical uncertainties with high impact as energy subsidies, energy prices and renewable energies. For the latter, it is remarkable that they are reaching more and more the need for action quadrant.

Electric storage is a top priority and key uncertainty in Switzerland. The water stored in its reservoir lakes has played an important part in generating hydropower, but these are no longer profitable under the current circumstances. Even though **hydropower** is the most accessible renewable energy source in Switzerland, there is a risk that the potential is not harnessed, as it will be difficult for this energy source to compete against other highly subsidised energy sources. At the same time Switzerland has to decide whether there is the public acceptance to enlarge the storage capacity of the existing reservoir lakes.

In this context it is interesting to note that while electric storage is a critical uncertainty in Europe and in Switzerland, large scale hydro only reaches the weak signals area in Europe, whereas it is a clear need for action topic for Switzerland. This discrepancy may be explained by the need to harness the potential for the large hydropower potential in Switzerland, whereas electric storage in Europe in general is viewed as a tool to develop the grid resiliency to intermittent power sources.

Nuclear has lost weight concerning critical uncertainty and impact over the years and seems to be of less importance for Switzerland than for Europe. The Swiss energy strategy does not propose closure of existing nuclear power plants, but has abandoned the construction of new ones based on today's technology (generation III). However, a first nuclear power plant (Mühleberg) will be shut down in 2019, based on a decision by its owners.

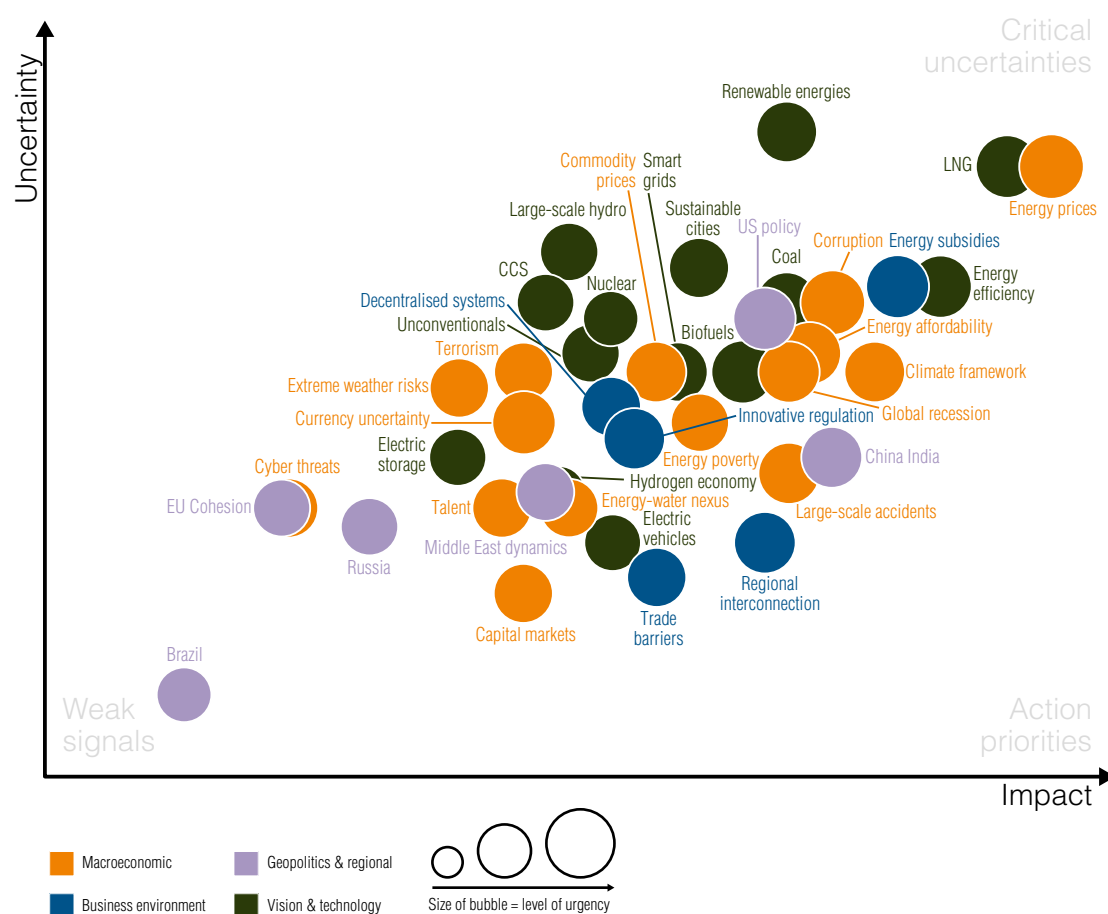
Smart grids have developed a trend of reduced uncertainty towards becoming a need for action topic, whereas **decentralised systems** are still perceived as a critical uncertainty with a high impact. With an even higher degree of perceived impact compared to the European perspective, Switzerland's energy leaders are positioning **energy efficiency** in the 'need for action' space, as the energy system is supposed to change from a producer-centred to a consumer-centred one.

THAILAND

The Thailand National Committee identifies that **energy efficiency** and **energy subsidies** remain consistently relevant and **renewable energies** are becoming increasingly important to the Thai energy leaders. On the other end of the spectrum, issues such as **Brazil** and **EU cohesion** are weak signals and are perceived to be less important to Thailand as the country is less affected by the direct regional impacts resulting from these issues.

The Thai map shares similarities with the regional Asia map and the world map with regards to **energy prices** (Figure 45), where the issue consistently is viewed as one of the top critical uncertainties. The country is vulnerable to energy price volatilities as it heavily relies on energy imports to sustain its demand.

Figure 45
WEC's 2015 World Energy Issues Monitor: Thailand



In order to address **energy price** problems, the government tends to employ national measures. These include on the one hand measures to liberalise the energy market and on the other hand energy subsidies. The government thereby aims to promote the country's competitiveness while also promoting the supply of and access to **affordable energy**.

In 2012 **energy subsidies** amounted to \$6.8 billion, which poses a burden on the government budget. Energy subsidies have however been found to bring benefits across various consumer classes and play an essential part in ensuring that 99% of the population has access to electricity. Reducing subsidies to ensure a more efficient energy market

therefore proves difficult which explains the uncertainty associated with the issue. In the context of high energy price volatility and uncertainties related to the future of subsidies it becomes clear that **energy affordability** is an important factor with a high perceived impact and need for action. Energy affordability is similarly positioned on the regional map and world map. It indicates that this issue is perceived to be a challenge with a need for action for energy leaders around the world. With increasing energy demand this issue is becoming increasingly important.

LNG is an important energy source for Thailand with 70% of power generation being fuelled through natural gas. Over the next 10 years the existing gas supply contracts with Myanmar, who currently supply 25% of Thailand's natural gas, will expire. LNG imports are thereby expected to help offset the losses from Myanmar's supply, making LNG a key uncertainty and priority in Thailand. In order to meet the demand of natural gas in future, the Electricity Authority of Thailand (EGAT) is considering building a receiving LNG terminal, which further explains the uncertainty and high impact perceived with this issue.

Thailand's energy leaders also expect to see a new, wide-ranging **climate framework**, which will impact to the long-term direction of the national energy plans such as the Alternative Energy Development Plan and Energy Efficiency Development Plan. In this context there is a high uncertainty associated with **renewable energies**, for which the share is expected to increase from a modest 2% share of total energy demand. At the same time there is a high need for action with regards to energy efficiency which could help to achieve climate targets and secure the supply of energy in the long run.

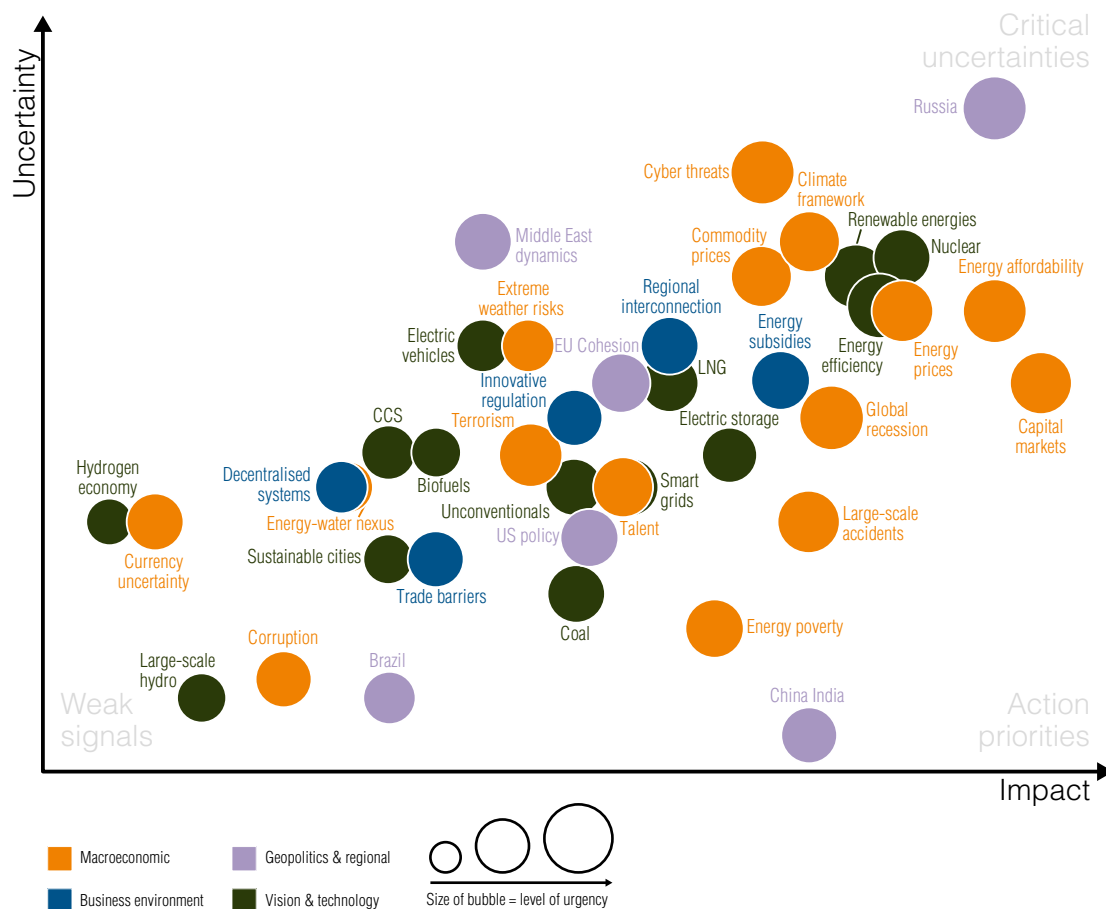
A surprising observation is related to the corruption issue. Thailand's Issue Monitor indicates that corruption is an important concern among the energy leaders which may have an impact on energy policy, creating uncertainty around energy investment. It creates a perception that investments are not necessarily based on sound analysis and transparent processes. However, Thailand has improved the management process for policy making and is making the implementation of energy matters more accountable.

China and India are also high impact issues which demand an urgent need for action. The emerging countries are heavily reliant on coal, accounting for about two-thirds of global coal consumption.

UNITED KINGDOM

The security of energy supply remains a key issue for the United Kingdom. UK industry leaders, like their European counterparts, have identified **Russia** as a critical uncertainty most likely reflecting ongoing geopolitical tensions within the region and the potential impact on European gas supplies (Figure 46). At a national level, concerns remain around **access to capital** for energy infrastructure, to a greater extent than the overall world view. This may reflect the need for significant investment in UK infrastructure over the coming years as well as wider investment uncertainties.

Figure 46
WEC's 2015 World Energy Issues Monitor: United Kingdom



As in 2014 **energy prices** remain a critical uncertainty and are a subject of increasing political concern. **Energy affordability** has moved to become a greater critical uncertainty than prices. The link between energy affordability and energy prices is particularly close for the UK relative to other countries, possibly reflecting close political and media scrutiny of these issues, as the UK moves closer to a general election in May 2015.

Industry leaders have highlighted a need for action in several important areas. **Large-scale accidents** are seen to have a higher impact compared to the European and world perspectives. This may be reflective of specific incidents in the UK at both nuclear and gas plants in recent months, and the tighter capacity margins that were announced by National Grid in the winter 2014/2015. Global factors may also be influencing this issue, with incidents in the Gulf of Mexico and Fukushima continuing to impact on the UK perspective. Indeed, **nuclear** is a critical uncertainty for the UK this year.

Macroeconomic issues remain an area for action, despite good UK economic growth. Similar to previous years, **Chinese and Indian growth** will continue to have an impact on the UK. Key areas of impact in this regard will be global coal and gas prices as well as future levels of investment in the UK, which could in turn be influenced through competition for scarce global resources as well as fluctuations in demand in the Chinese and/or Indian economy.

Innovative regulation in the UK, driven by the introduction of the RIIO model for networks, has reduced in impact and uncertainty since last year. The Government's Electricity Market Reform (EMR) implementation continues, following State Aid approval in July. The first round of the Capacity Market auctions was completed in December 2014, for capacity to be in place by winter 2018. The first round of allocations for Contracts for Difference took place in October 2014. Ofgem's decision to refer the energy market to the Competition and Markets Authority means that there is a clear timeline for an announcement, with a provisional decision due in December 2015. Even so, investor confidence continues to be affected by these events, potential changes in the subsidy levels for specific technology types and the wide scope of potential outcomes from the market investigation.

The rollout of Smart Meters is expected to ramp up after the election and there is an increasing focus on the move towards **Smart Grids**, with the December 2014 price control providing a significant boost to electricity distribution companies' smart grid ambitions. The full benefits of smart technologies may not be realised without real time pricing. The introduction of **cyber threats** as a new category, and its UK position as a critical uncertainty, may be indicative of the increase in technological innovation over the coming years. Other innovative technologies such as **carbon capture and storage, biofuels** and **unconventional fossil fuels** are not at the top of the agenda and **energy efficiency** remains a critical uncertainty.

The upcoming general election, with energy being a major issue for all parties, is crucial politically. The new EU Commission is also expected to have a renewed focus on security of supply and a 4th Directive is being openly discussed. This could have a particular impact on the UK-EU debate.

In summary, the UK focus is increasingly shifting towards energy security as a principal issue. Whilst the UK remains legally and politically committed to environmental sustainability, global factors combined with policy uncertainty continues to impact investor confidence. energy prices are likely to remain a high priority for the foreseeable future.

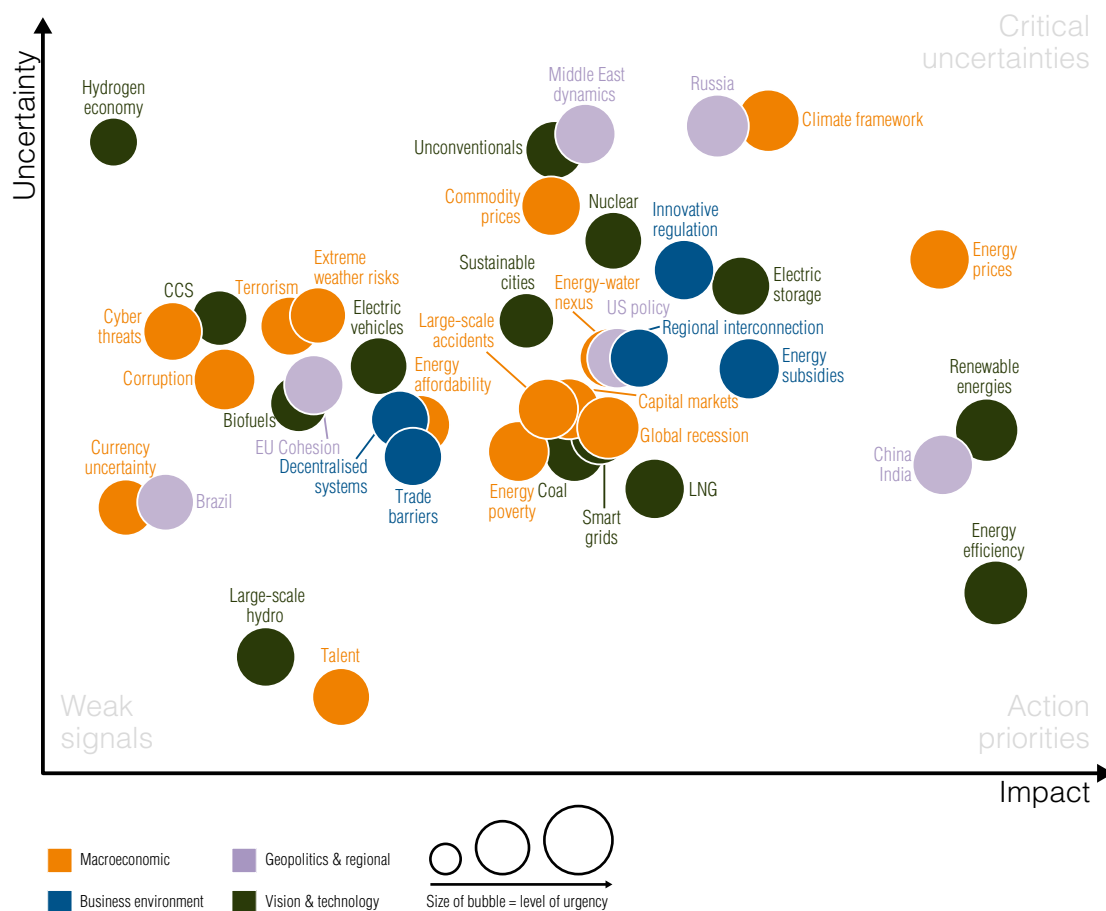
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The Future Energy Leaders' perspective

The Future Energy Leaders' perspective

WEC's Future Energy Leaders (FELs) are a global community of young professionals who share a commitment to shaping the global energy future. Made up of 100 carefully selected young professionals from diverse sectors, in over 40 different countries, WEC's FELs represent the future of energy leadership. WEC FELs participate in network activities through a designated programme that enables them to further their experience, knowledge and skills in an energy-focused environment, contributing to WEC's global dialogue and helping to shape energy solutions for tomorrow. WEC looks at its community of next generation leaders to inform the energy debate through their fresh thinking, innovative ideas and new approaches to business.

Figure 47
WEC's 2015 World Energy Issues Monitor: Future Energy Leaders



In line with rising geopolitical instability, WEC Future Energy Leaders (FEL) emphasised the recent tension between **Russia** and Ukraine as well as the **Middle East Dynamics** as critical uncertainties which could disrupt energy supply (Figure 47). These issues strike a contrast with the FEL analysis conducted in previous periods, as well as from the current world community view. On the demand side, the constant rise of **India and China** continue to be a major concern for both the FEL and greater world community. FELs put significant emphasis on a stable geopolitical environment, which they view as crucial to tackle energy-specific challenges.

Year after year, the FELs Issues Monitor emphasises a higher degree of importance on sustainability and climate change than the world community. Not surprisingly, the **climate framework**, a proxy that consolidates multiple global efforts to reduce pollutants, remains

one of the primary uncertainties. The perceived lack of collective commitment and international cooperation and the difficulty of establishing comparability and equivalence in heterogeneous policy frameworks contribute to this uncertainty. The FEL survey also puts greater emphasis than its global counterpart on related sustainability issues such as the **energy-water-food nexus**. It thus comes as a surprise that **extreme weather events**, generally believed to be partly a consequence of climate change, is seen as having a much lower impact by the FELs.

In terms of consistent priorities, FELs pay much attention to advancements in **electric storage** that may have an outsized impact on the transition to a renewable and decentralised energy system. As storage technologies mature, variable electricity production can be smoothed and **electric vehicles** will become increasingly competitive. However, the development of such technologies will likely be accelerated only with the adoption of specific **innovative energy regulation** – an inter-connected issue that FELs see as critical.

Energy prices remain a high-uncertainty issue for both the FELs and world community. They dictate access and affordability, but furthermore strongly influence the development and implementation of renewables and energy efficient systems, two other high impact issues. Surprisingly, FELs put less emphasis than the broader pool of global leaders on the challenges of volatile **commodity prices** and the effects of the **global recession** that may contribute to issues of **energy poverty** and inadequate energy access.

In what is probably a testament to the passion of youth, the FELs Issues Monitor is consistently more polarised than that of the broader community, with issues being cast more readily to the edges of the chart. In conclusion, FELs call on young and senior energy leaders alike to address these critical issues on the road to a sustainable, inclusive, affordable and resilient energy system in the 21st century.

PROJECT PARTICIPATION

Thanks go to all the WEC national member committees for their active participation in the development of the 2015 World Energy Issues Monitor. Further thanks go to the WEC regional Vice Chairs for their support in the regional assessments and to each of the energy leaders, experts and policymakers who kindly provided their insights on an anonymous basis.

Principal Contributors/World Energy Council

Christoph Frei (Secretary General), Latsoucabé Fall (Regional Manager, Africa), J.K. Mehta (Regional Manager, South Asia), Einari Kisel (Regional Manager, Europe), Paul Mollet (Regional Manager, Middle East, Gulf States and North Africa), Cristina Morales (Regional Manager, Latin America and the Caribbean), John Bourne (Senior Manager), Yoshiyuki Tsuji (Director), Stuart Neil (Senior Director), Andrea Buser (Coordinator)

Contributing Member Committees for the National Monitoring and Assessment

Austria, Belgium, Canada, Colombia, Estonia, France, Germany, Hungary, India, Indonesia, Italy, Japan, Latvia, Lebanon, Lithuania, Mexico, New Zealand, Namibia, Nigeria, Poland, Portugal, Romania, South Africa, Spain, Switzerland, Thailand, United Kingdom

FEL Advisory Board Contributors

Nathan Bittle (New Zealand), Bruno Benedetti (Canada), Anna Illarionova (Russia), David Livingston (United States)

Project Management

John Bourne (Senior Manager, World Energy Council)

Member Committees of the World Energy Council

Algeria	Hungary	Philippines
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Formed in 1923, the World Energy Council is the UN-accredited global energy body, representing the entire energy spectrum, with more than 3000 member organisations located in over 90 countries and drawn from governments, private and state corporations, academia, NGOs and energy related stakeholders.

The Council informs global, regional and national energy strategies by hosting high-level events, publishing authoritative studies, and working through its extensive member network to facilitate the world's energy policy dialogue.

Further details at www.worldenergy.org and [@WECouncil](https://twitter.com/WECouncil)

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World Energy Council

62–64 Cornhill
London EC3V 3NH United Kingdom
T (+44) 20 7734 5996
F (+44) 20 7734 5926
E info@worldenergy.org
www.worldenergy.org

For sustainable energy.
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