



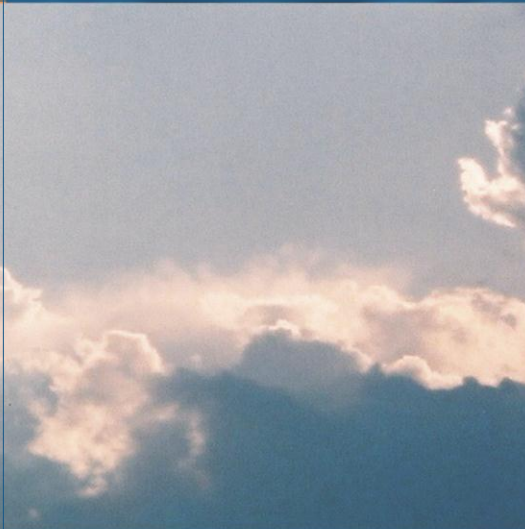
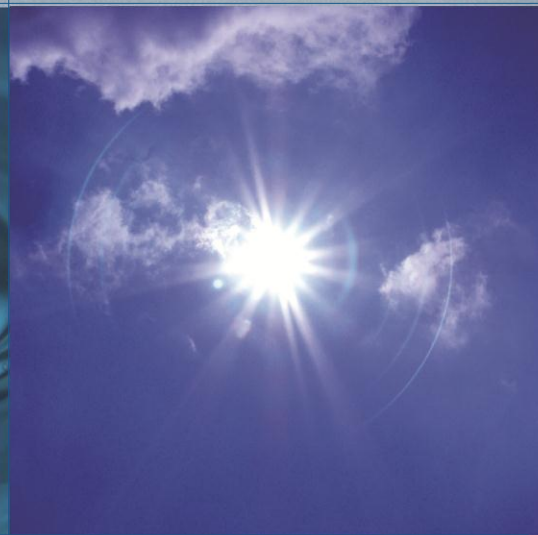
WORLD ENERGY COUNCIL

CONSEIL MONDIAL DE L'ÉNERGIE

For sustainable energy.

World Energy Issues Monitor

World Energy Council 2012



World Energy Issues Monitor

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World Energy Issues Monitor

World Energy Council 2012

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Foreword by Christoph Frei

The World Energy Council (WEC) is the principal impartial energy policy forum promoting an affordable, stable and environmentally sensitive energy system for the greatest benefit of all. Formed in 1923, with headquarters in London, WEC 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. WEC 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 energy leaders' dialogue.

However, we can only advance a meaningful dialogue among global energy leaders if we know what keeps them awake at night. It is their perception of what is important that defines the global energy agenda. In order to assess this global energy agenda and its evolution over time, the World Energy Council conducts an annual issues survey with the Chairs of its Member Committees who are ministers, CEOs and leading experts in over 90 countries.

The survey includes 36 issues covering macroeconomic risks, geopolitics, business environment as well as energy vision in a high-level "helicopter perspective". The Chairs quantify each issue's impact on the energy sector, the degree of uncertainty related to its impact, and the urgency with which they wish to address the specific issue. Their responses

are translated into issues maps with the three assessed dimensions as its axes.

In compiling this report I would like to recognise the exceptional support of our Member Committees and partners in providing the national insights and the constructive dialogue provided by our members at our Executive Assembly meeting who corroborated these findings. I would also like to recognise the contributions from our Regional Vice-Chairs who have kindly provided analysis and perspectives in identifying the underlining regional narratives.

With our content work we then make sure that we can inform the concerns of global energy leaders with facts on technologies and resources, successful practices in policy and strategy, and a mapping of risks and critical uncertainties. We facilitate the on-going energy leaders' dialogue on identified critical uncertainties through our Congress, Energy Leaders' Summits, Regional and National Forums, and by building consensus on required policies and strategies.

With these challenges identified on the one side and the need for global dialogue to find solutions on the other, the founding vision of the World Energy Council is in its fruition.



Christoph Frei
World Energy Council

1. Assessing the Global Energy Agenda

In 2010 it became commonplace to state that over the past decade the world had fundamentally changed. Yet the events of 2011 will be mentioned in our grandchildren's history books and will have profound effects on the global energy industry. The developments in the Middle East and North Africa (MENA) region and the tragedy at the Fukushima nuclear power plant have added to the pressure to adapt and are a set-back in solving the global energy challenges. The expected doubling or even tripling of the global energy demand by 2050, the need to cut global greenhouse gases by 50 per cent during the same period (which requires a cut by 80 per cent in OECD countries), the 1.4 billion people who are still without energy, and the need for improving global governance on the management of global risks from large-scale accidents, require massive transformational efforts on a global scale.

In 2011, the critical uncertainties were dominated by climate framework uncertainty, political instability in the MENA region, and uncertainty regarding the nuclear renaissance post-Fukushima. In contrast with 2009, macroeconomic risks related to the financial and economic crisis have lost their dominance as the key concern for the energy sector; however, as was in 2010 the crisis is still looming, and issues such as energy price volatility, commodity prices and capital market access remain in an alert position. We see that the energy sector has a significant national bias, but with global impact. Issues such as currency uncertainty may come to the fore as

the implications of the economic situation begin to take effect.

How to read the issues maps:

- “Critical uncertainties” – issues with high uncertainty and high impact (in the upper-right quadrant), and which will most benefit from energy leaders' dialogue and scenario analysis.
- “Need for action” – issues with high impact and low uncertainty (in the lower-right quadrant), where immediate action finds easy consensus.
- “Weak signals” – issues with low impact and low uncertainty (in the lower-left quadrant) which are perceived to be less important, but which may also be issues that are still badly understood.

The urgency of an issue is proportional to the size of its bubble.

The four different categories of issues – macroeconomic risks, geopolitics, business environment and energy vision – are represented in four different colours.

The yellow arrows illustrate the evolution of selected issues and issue clusters over three years.

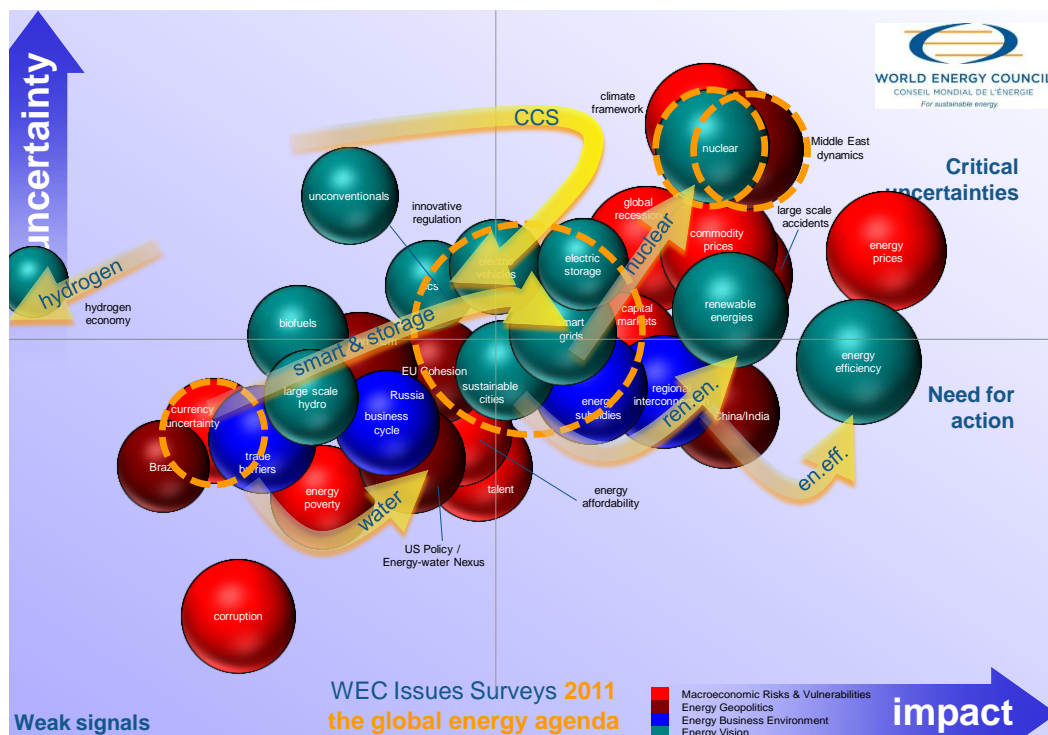


Figure 1. The global energy agenda – the World Energy Council's issues map

The absence of a global climate framework post-2012 and the lack of progress towards a significant agreement between the big countries have kept this issue a dominant critical uncertainty for the sector. The “political spring” in the MENA region with its impact on Libyan oil supply has affected energy markets globally, added volatility and triggered the second IEA stock release in the institution’s 30-year history. The Fukushima event has pushed the nuclear renaissance from consensus to a critical uncertainty. Taken together, the Macondo oil spill and Fukushima have put large-scale accidents on top of energy leaders’ agenda.

Our initial nuclear survey of the short-term policy impacts of Fukushima indicates that the leading nuclear nations (except Japan) do not signal change in their nuclear outlook. Russia, China and Korea, representing two-third of the 61 projects underway, have not changed their nuclear ambitions. Other less reliant countries which have changed their attitude with respect to nuclear include Germany, Switzerland, Italy and Japan. Time will have to show how increased safety costs affect the competitiveness of the technology and whether the ageing nuclear park can be replaced in the given context. Our survey indicates that natural gas is the most likely substitute for yet-to-be

built nuclear plants, followed by coal, then renewables.

On the need-for-action front renewable energies and energy efficiency remain dominant issues, with their perceived impact further increased. However, we note that uncertainty around these issues has slightly increased compared with 2010. For energy efficiency this may be explained by the growing understanding that progress does not simply come with capital investment, but equally depends on investment in education and institutional frameworks to promote adequate behaviour and solutions. The on-going looming economic outlook keeps investors prudent on renewable energies. Last year’s jump of the quartet of smart grid, storage, electric vehicles and sustainable cities is reconfirmed in 2011: these issues have progressed their way to solid presence on the global energy agenda.

Overall it appears that the issues which in previous years were seen as a substantial part of the solution (energy efficiency, renewables, nuclear) are all taxed with higher uncertainties. The risks associated with these issues, ranging from physical accidents to regulatory to financial risks, have increased and have become a growing concern. This indicates that

managing relevant risks will be an important part of the agenda going forward.

Carbon capture and sequestration (CCS) was among the highest uncertainties in the last two years: in the absence of a climate framework there will be no effective financing mechanisms and incentives to develop this technology beyond the pilot stage. In 2011 we see both the perceived impact and uncertainty decrease. A plausible interpretation is that energy leaders do not trust CCS to be at scale in a desired time horizon – an observation that we may not want to leave unchallenged, given the rapid growth in global coal consumption.

Other notable issues include the energy–water nexus as a rapidly growing concern. The position of unconventional remains unchanged, still with significant uncertainty. Hydrogen is still not believed to play a big future role as a clean energy vector.

2. Assessing the Regional Energy Agenda

2.1 Africa

2.1.1 Top critical agenda for Africa

- Energy prices
- Energy poverty and affordability
- MENA dynamics
- Renewable energy
- Energy efficiency

2.1.2 Africa's critical agenda in common with the global critical agenda

- Energy prices
- MENA dynamics
- Renewable energy
- Energy efficiency

2.1.3 Major differences with the global map

- Energy poverty: This is more prominent in Africa than in any other region due to the high level of social poverty and the low access to modern energy. About 70% of Sub-Saharan Africa's (SSA) population (and 58% of Africa's population) lack access to electricity, while some 80% of SSA's population without access to electricity live in rural areas.
- Climate framework: This is the only region where climate framework

uncertainty is not among the dominant critical uncertainties.

- Nuclear: For Africa, nuclear power has been playing a minor role so far and is not considered a critical issue. Just two reactors in South Africa provide only 2% of Africa's electricity supply; and nuclear power does not count as a substantial part of the continent's electricity generation plans.

2.1.4 Observations

- Energy–water nexus: Among all the regions Africa shows the highest interest in this subject. Higher impact and urgency have been observed compared with last year. There is an expressed concern that if dry cooling were not implemented at power plants, then there would not be enough water to sustain the current population plus cooling for the power plant.

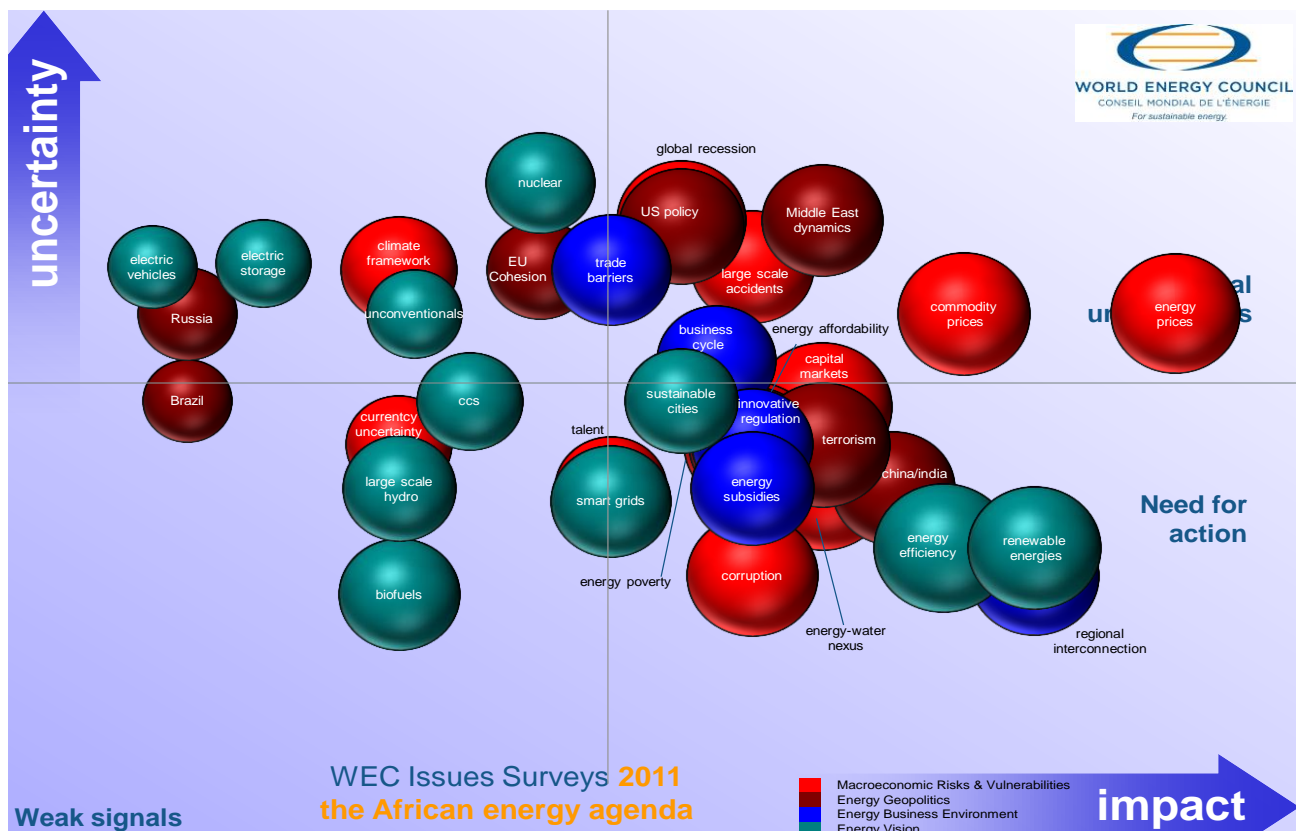


Figure 2.1. Africa – energy issues map 2011

- Large-scale hydro: Is an important asset for Africa and holds great potential for development, but its further development and exploitation requires huge amount of investment, suitable social and environmental framework, political stability and bold economic reforms. It could take time to address all these challenges and to make development happen in a sustainable way. Those may be the reasons that this issue is positioned in the lower-uncertainty, less-impact quadrant.
- Renewable energies: Is in the “need for action” quadrant, yet biofuels and large hydro exhibit weak signals. It could possibly mean that people find solar and wind a lot easier to develop in the short term than hydropower and biofuels.
- Regional interconnection: This will play a more important role undoubtedly, and the existing power pools constitute important instruments of support. However, how to finance those projects needs to be addressed first.
- Talent: To fulfill the potential growth of energy systems and economy, the issues of talent (i.e. technology transfer, capacity building and policy making), terrorism and corruption should not be neglected.
- Electric vehicles: Shows higher impact, uncertainty and urgency compared with 2010. However, this growth may reflect the interest of a particular country, such as South Africa, but not that of all African countries.
- Innovation cluster: Electric vehicles and electric storage show weak signals, while smart grids and sustainable cities are of comparative higher interest.
- 15 WEC member committees from Africa responded to this issues survey but we should not underestimate the interest or concerns of other African countries, in particular regarding large-scale hydro power or biofuels.

2.2 Asia

2.2.1 Top critical agenda for Asia

- Energy security
(as closely connected with Middle East dynamics, or other geopolitical agenda)
Asian countries, especially emerging economies, have experienced increasing demand for electricity as a result of rapid economic growth. To meet the incremental demand, Asian economies are heavily relying upon coal and nuclear as their energy source.
- Energy poverty
1.4 billion people live without access to electricity with 67% of them living in Asia. Energy poverty retards the economic growth of developing countries and creates social unrest. The recent public outcry and turmoil in some countries has demonstrated the high socio-political impact of energy inequity and the need for urgency in addressing this critical issue. Yet, energy poverty is still low in the issues map. Their voices and needs may have been offset by some developed countries in Asia.
- Economic growth (global recession/ commodity prices/ energy prices)
- China/India growth (as affecting both commodity prices and energy prices)
China and India demand large amounts of energy due to their rapid economic

growth, which could push up the price of resources, with negative impact on the world economy.

- Climate framework
While almost every country will agree that this is the global common agenda and needs immediate actions to substantiate a legitimate framework, we must not forget that climate framework can be a divisive and polarising issue for those countries because emerging economies tend to put energy security and economic growth before environmental concerns.

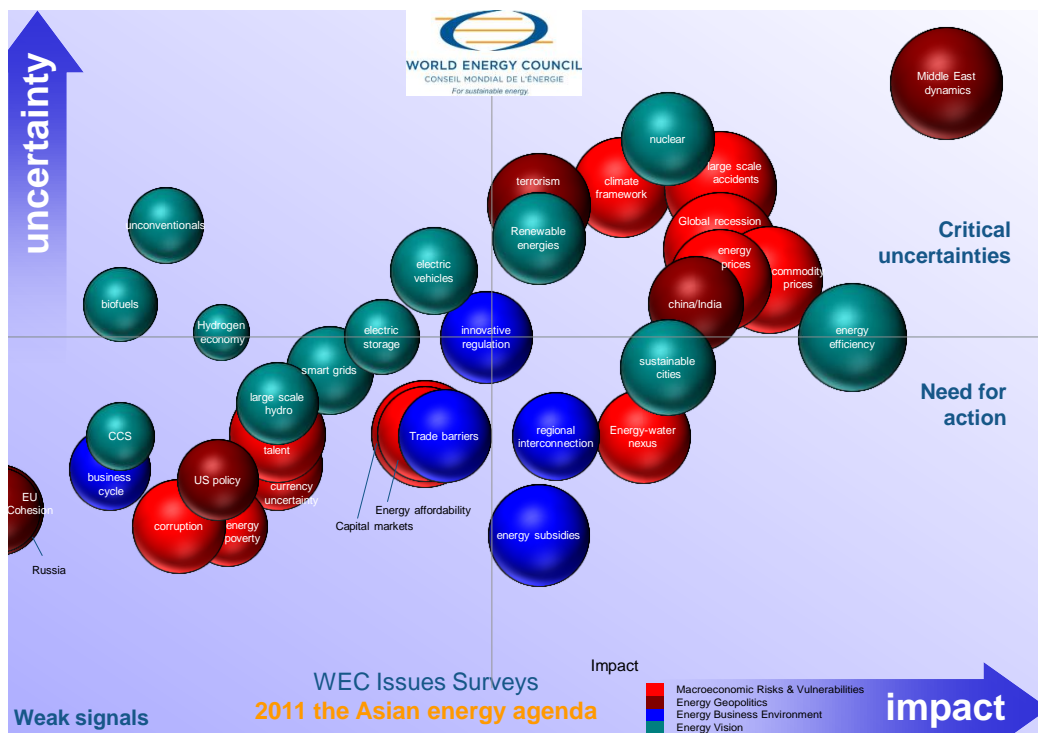


Figure 2.2. Asia – energy issues map 2011

2.2.2 Asia's critical agenda in common with the global critical agenda

- Nuclear: After Fukushima, with many players in Asia, such as China, India, Indonesia, Japan, Malaysia, Pakistan, South Korea, and Thailand (and Bangladesh, North Korea, Vietnam), WEC Member Committees would see the technology as most critically influenced by global safety governance and standards. Its business viability has now been more challenged by the associated increased cost to assure the plant safety and improved design.
- Energy efficiency: It would be important to focus on improving the thermal efficiency of existing power plants including coal power plants, since some of the new technologies such as CCS may take more time to develop or commercially become feasible.
- Climate framework
- Large-scale accidents

2.2.3 Differences with the global map

- Middle East dynamics is the most critical uncertainty which is far more

prominent than the global average or other regions.

- The energy–water nexus is growing with more impact, uncertainty and urgency for Asia, one of the regions with the highest interest in this issue. This is because with climate change, desertification, economic and population growth in the region, this issue will have posed a lot more uncertainties and impacts. In addition, many Asian countries have been sharing Mekong River as the resource for their economic growth and hydropower development. Large-scale hydro, however, is relatively low in getting attention.

2.2.4 Observations

- Regional interconnection is considered as the most important means to promote regional integration, with mutual development of the regional constituent countries. However, this economic integration has many facets, which may result in both social and geopolitical implications (even complications). This may be further

discussed as cross-border trade issues and in combination with trade barrier issues. It may also be connected with the agenda of the energy–water nexus, large-scale hydro, or energy prices.

- Innovation cluster: sustainable cities are of clearly higher interest than EVs, e-storage, or smart grids.
- CCS is almost off the map, and biofuels and unconventional are also low in the rank. It may have reflected the fact that CCS has been considered as still premature and unfeasible on a commercial basis. However, even though CCS is positioned very low in the Asian issues map, it is not because Asia is not interested in this technology. People have in fact taken it seriously and there will be a lot more to be seen with this technology in future.

2.2.5 WEC Asian Member Committees' action plans

- As an after-effect of the Fukushima accident, general awareness of energy has been changing against coal and nuclear energy. However, fossil fuel supply is limited, and renewable energy (green energy) is insufficient to solve energy shortage for the time being. The present diversity of energy is being kept in status quo for a sustainable energy supply.
- Against this backdrop the WEC's Asian members have adopted two new issues: "Efficient and Clean Use of Coal (ECUC) in Asia Region", and

"Expansion of Nuclear Power and Human Development in Asia" in the Asia Action Plan, in addition to the existing GEEP Project and Energy Poverty Alleviation.

2.3 Europe

2.3.1 Top critical agenda for Europe

Climate framework: Since the last COPs in Copenhagen, Cancun and Durban, it has become clear that Europe is globally in a rather isolated position and it will be very difficult to convince other regions to follow a similar climate agenda. Another reason is the economic development in many European countries. Weaker economic activity has led to dramatically lower greenhouse gas emissions in the emissions-trading sector as expected. Consequently CO₂ prices decreased, since this makes it much easier to fulfil the emission goals within Europe. Some politicians are however disappointed because this also reduces investment in carbon-friendly technology.

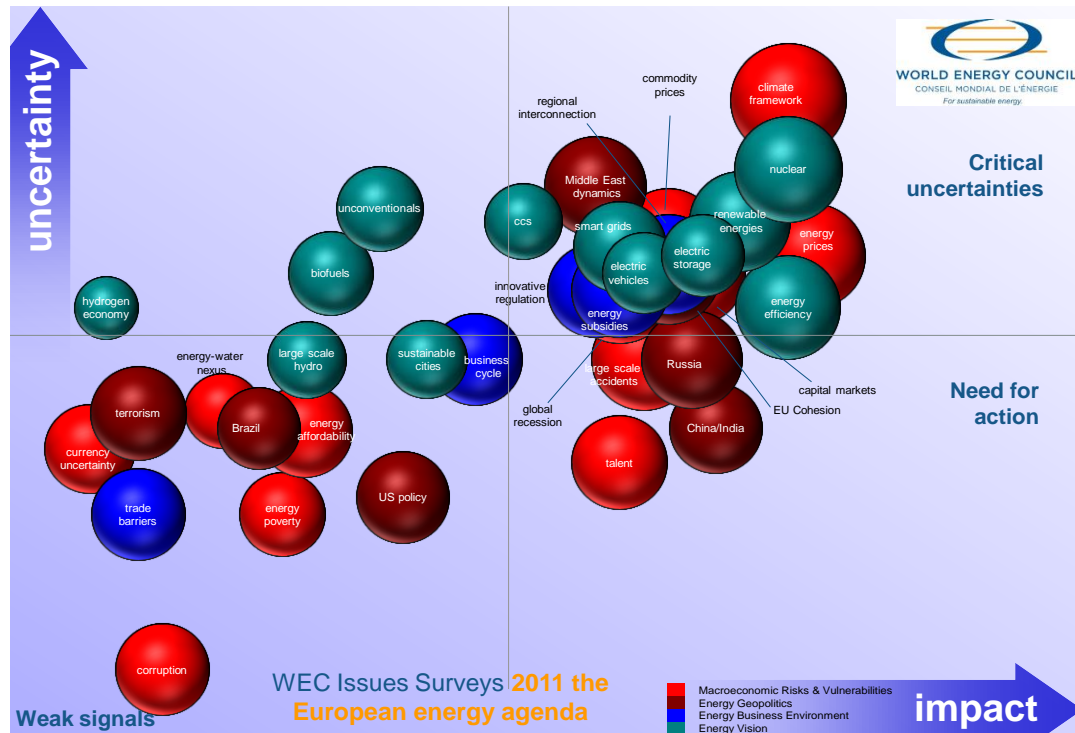


Figure 2.3. Europe – energy issues map 2011

In order to trigger these investments, there are several discussion on how carbon can be made more expensive, e.g. by cutting allocation amounts or stronger targets than first planned. The threat of political intervention on an established market is hence raising the uncertainty.

- Nuclear
- Energy prices
- Commodity prices (impact of the demand growth of China/India/Brazil/Russia)
- Renewables: For renewable energies the uncertainty also increased, partly due to retroactive cuts in the subsidy schemes of some European countries. With a tough economic outlook, the affordability of electricity has become a more pressing issue. Some governments are therefore looking for ways to reduce customer bills. And sometimes this leads to corrections in the promotion schemes. Hence the

advantageous situation of the past for renewable energies has changed: they are now also entering an environment with more competition

- Those critical agenda are divided into two groups: (1) macroeconomic risks (energy prices, commodity prices, global recession, geopolitics); and (2) all future technologies including renewable energy, nuclear and CCS.

2.3.2 Europe's critical agenda in common with global critical agenda

- Climate framework
- Nuclear
Nuclear is more prominent not because of its renaissance but because it is now viewed as an urgent, high-impact uncertainty. With not only Germany's phase-out, but also others like Switzerland and Belgium, people start to wonder if this is the end of the story

or how they should develop nuclear.

- Energy prices
 - Commodity prices
 - Renewables
 - Energy efficiency
- It has showed higher impact and higher uncertainty than the global agenda because the EU has already been addressing the new regulations on efficiency. There is also a close relationship between the European climate agenda and energy efficiency: the ambitious goals for energy efficiency of the EU will already lead to a high abatement of greenhouse gas emissions. Hence the increasing uncertainty of the carbon agenda creates some questions for energy efficiency goals and vice versa. This clearly shows that in future there is a need for a more streamlined and coherent approach in energy policy.
- Renewables, energy efficiency, and climate framework (EU priority issues to achieve its 20x20x20 goal) are becoming more uncertain. In addition to the current unstable economic conditions and without any effective carbon market, or with carbon market price being too low,

it becomes very difficult to see their certain growth.

- Renewables are almost at the same place as nuclear – in the quadrant of critical uncertainties.
- It is quite obvious that most of the uncertainties about nuclear, renewables and energy efficiency come from government rather than from the markets. They are the issues all highly influenced by government framework conditions.

2.3.3 Differences with the global map

- Middle East dynamics are taken with less enthusiasm compared with other regions, despite the new developments. It may be because Europeans are more looking to Russia rather than Middle East for oil/gas.

2.3.4 Observations

- Energy infrastructure, including regional interconnection, is an important agenda for Europe. However, progress in areas such as large-scale high-voltage transmission projects have been delayed by a lack of innovative regulations. Transmission bottleneck issues could become more serious in future.

- The lack of an effective carbon market and a stagnating economy may have raised the uncertainty regarding the future of technologies, such as electric vehicles, electricity storage, smart grids, CCS and nuclear. In order to reach higher shares of green electricity, there is now greater awareness that proper integration of renewables in the electricity system is only possible if there is also electricity storage and if the consumer can react to the intermittent energy production via smart grids. So this strong need for new infrastructure is up against an economic situation that is currently avert to investments. Furthermore, some European states are trying to find out how to implement these facilities and there is also a strong discussion on whether those new technologies should be part of the liberalised or the regulated market. Some researchers made the interesting observation that in cases where there are so many different technological answers available (further to the technologies mentioned above, there exist also alternatives like grid expansion, improved renewable technologies and conventional power plants), the best thing is to let competition decide, which technology and to what extent will be used by the market participants.
- Europe is now learning that moving towards a world with more renewable generation not only may solve problems but also may create new ones.
- 34 European WEC member committees (MCs) have been well represented in the global survey map, as they account for 45% of the 75 MCs who responded.

2.4 Latin America and the Caribbean (LAC)

2.4.1 Top critical energy agenda for LAC

- Transforming energy wealth into social development and reducing energy poverty. Energy subsidies for demand side in particular are important for developing countries as it is seen to help guarantee access of energy for low-income people. They strongly impact on affordability and education, healthcare, and their budget for transportation. Good policy for subsidies is critical so it does not distort energy prices.
- Ensuring the security of energy supply because resources are distributed unequally in the countries. Energy prices also highlight the importance of regional interconnection.
- The need to improve the design and implementation of regulations to promote sustainable energy systems.
- As for climate change the challenge is to adapt to enable the region to prepare their production

systems and infrastructure to meet the enormous impacts of global warming.

In rural areas the substitution of biomass with commercial energy (such as natural gas, liquefied petroleum gas or renewable energy, which is cleaner) as alternative energy resources is being promoted.

2.4.2 LAC's critical agenda in common with the global critical agenda

- Energy price concerns grow bigger as they could slow down economic development, since we expect energy demand to increase on one hand while we see the influence of MENA dynamics on the other.
- Climate framework
- Global governance to mitigate risks with large-scale accidents

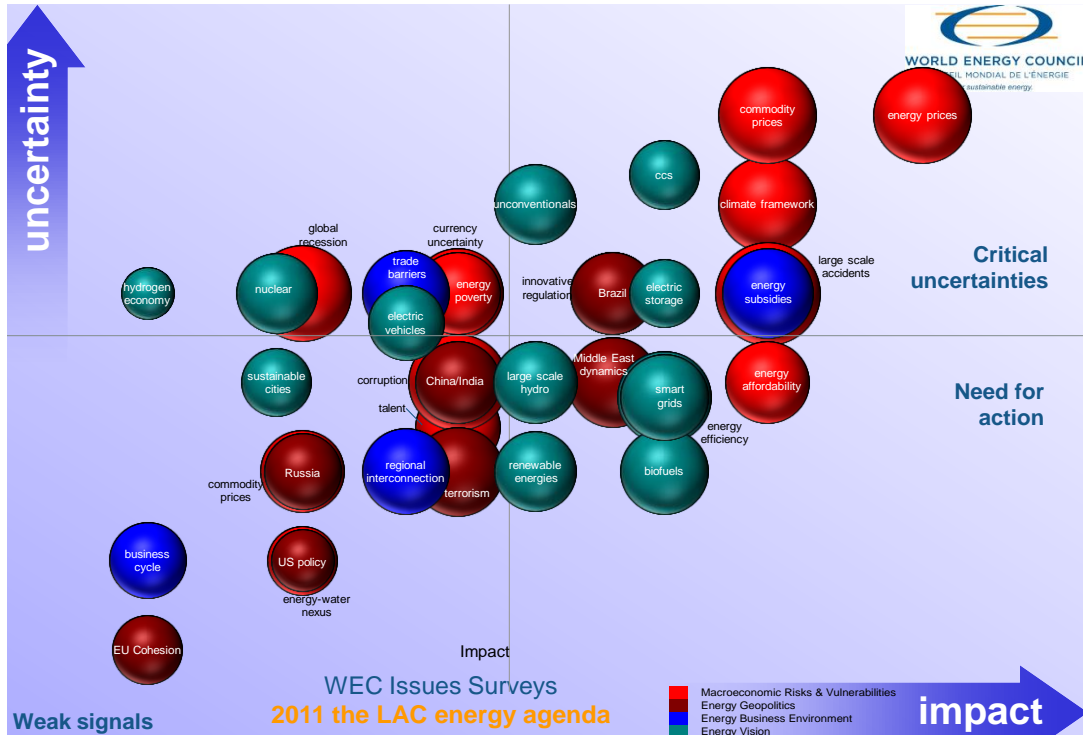


Figure 2.4. Latin America and the Caribbean – energy issues map

2.4.3 Observations

- Biofuels: less uncertain and higher impact than in other regions. This region is the only region that has little doubt about the future of biofuels.
- The energy–water nexus is very low on the map.
- Regional interconnection/integration: Though it is under-represented in the LAC issue map, it should still remain as one of the key critical agenda of the region. With only four interconnection power transmission lines to be added across the region, it is estimated that the region could save \$1 billion per year for operational expenses. However, proper framework, rule, design and implementation should be put in place to promote such investment.

2.5 North America

2.5.1 Top critical agenda for North America

- Nuclear: With 104 reactors operating in the United States, accounting for 20% of America's electricity, it is a vital part of the US and global electricity portfolio. However, the falling price of gas, reducing the production cost of other North American thermal generation stations and lowering electricity prices, would slow down the development of new nuclear plants (and also renewable energy projects). Public approval of nuclear has been also fluctuating, reflecting people's uncertainty, and is now on its way to recovery.
- Unconventionals: They are critical on the agenda in terms of their abundance and impact on energy prices. Shale gas, oil sands, fracking and tight oil have transformed America's energy outlook. Shale gas played an important role in the global energy market as its global production will increase to 30% by 2030, and 70% of this will come from the US and

Canada. As for oil sands, its environmental acceptability including pipeline construction, will be the key element for its timely development and even the creation of a new market.

- Climate framework: In line with the global issues map

2.5.2 North America's critical agenda in common with the global critical agenda

- Nuclear
- Middle East dynamics
- Energy efficiency
- Global recession
- Electric vehicles

2.5.3 Issues showing clear differences with those in 2010

- Unconventionals: This issue has jumped up distinctly.
- Global recession: Impact and urgency to act have been more strongly felt throughout the region.

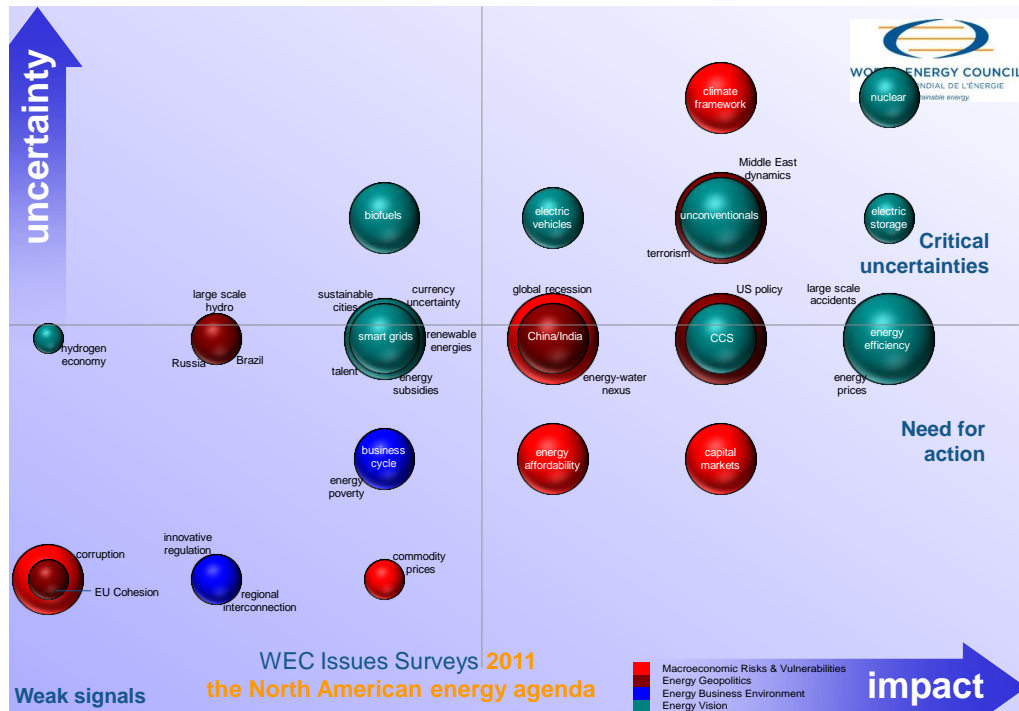


Figure 2.5. North America – energy issues map

- Energy prices: It is unclear why this issue shows the highest growth compared with last year (while commodity prices have gone in the opposite direction.) A possibility is that energy prices may have been quite affected by Middle East dynamics, which also indicates a big rise from the last year.
- Middle East dynamics
- Renewable energies: This issue seems to show less impact and less uncertainty.
- Commodity prices, currency uncertainty, and sustainable cities: these are becoming “less fervent” issues in North America.
- photovoltaic and wind energy into the grid and the advent of smart grid, the impact of this issue may grow even bigger. And yet, it shows no immediate urgency.
- Large-scale accidents: Impact and urgency are considered high, and much higher than in other regions. This may have been influenced by both Fukushima and the Macondo oil disaster in the Gulf of Mexico.
- CCS: It is in the need-for-action quadrant unlike any other region.
- Terrorism: It is in the critical uncertainties quadrant, with high uncertainty and high impact.

2.5.4 Observations

- In contrast with the global issues map, renewable energies, commodity prices, and regional interconnection are now far less important issues.
- Electric storage: It is in the critical uncertainties quadrant higher than in other regions. With an anticipated penetration of

Member committees of the World Energy Council

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Belgium	Ireland	Qatar
Bolivia	Israel	Romania
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