Please find below GDF SUEZ response in the form of replies to the questions posed in section 4 of the EIB October 2012 Consultation Paper.

General Energy and economic context

Particularly in the current economic climate, is there a trade-off between promoting a competitive and secure energy supply and one which is environmentally sustainable? Where should the balance lie and what implications does this have for energy sector investments?

Given the current the investment climate, the energy sector faces lots of uncertainties:
- Economic uncertainty with low growth perspective in most European countries;
- Financial uncertainty with already negative outlook by some rating agencies for European utilities;
- Regulatory uncertainty with many new, and sometimes overlapping, regulations and fear of possible retroactive decisions.

Therefore, the European Energy Policy should provide some elements of answer to restore confidence in the European market. Long term visibility is also an important element that should be provided to investors. Investors in the energy sector need long-term predictability and stability of the regulatory framework.

To keep investments rational, attention should be paid in any case to the fact that final prices must remain competitive.

Yes, there is undoubtedly a trade-off but it is less between competitiveness and environment than between present and future generations. Investments in the energy sector must aim at creating immediate value (for customers, shareholders, employees...) while integrating long term constraints on climate, society and economy.

This balance in investments connects with the balanced and sustainable energy mix that we promote, at the crossroads of three major criteria: competitiveness, security of supply, environment protection. As a consequence, guidelines should be: favoring diversity of energy sources and supporting energies that reconcile the three criteria above - gas being the best combination. Therefore, GDF SUEZ advocates for a single GHG reduction target post 2020 as a technology-neutral approach that provides the flexibility to
make use of all current and future low-carbon technologies in the most cost-effective way. In addition, the current economic crisis makes this balance even more important.

**How does investment in the energy sector contribute to growth and employment? Are investments in all energy sub-sectors equally valuable? And how does investment in the energy sector rank relative to other investments in the economy which support growth and employment?**

- Access to energy at an affordable price is a key element for the competitiveness of the European industry and so far an essential contribution to growth and employment.

- Although there is no objective study on the actual contribution of the energy sector to growth and employment, we can see that *energy prices have a direct impact on both growth and employment*. For instance, Natixis has observed that today, a 10% increase in oil prices would lower the French GDP by 0.19 (by 0.32 in Spain, by 0.08 in Germany). Nevertheless, as an example of possible positive impacts of the energy sector on growth, the recovery plan, launched by the European Commission in 2010 has already shown great results: according, the mid-term evaluation of the European energy program for recovery around 1,700 jobs (both direct and indirect) have been created across the different projects in electricity infrastructure, and that around 3,600 jobs (both direct and indirect) have been created across the different gas projects to date (end 2010, 2012).

- Moreover, for 20 years, energy price has risen continuously and European states have bought energy on credit to sustain their growth. Today, if Europe wants to foster growth and thus employment, its debts (and debt prospects) must be alleviated by importing less energy. It implies for instance:
  - **Increasing the share of renewables in the European energy mix** to lower their cost and develop their competitiveness. So far, subsidies have supported the sector and impacted all energy prices.
  - **Developing Europe’s existing natural resources**, such as shale oil and gas.

**What impact do you consider the current economic crisis will have on the energy sector (demand, policies, supply)?**

- The economic crisis has revealed a two-speed international context, with a recession in the EU in 2012 while growth rises in the rest of the world. As a consequence, the *energy market faces a large decrease in demand*.

- There is a sharp decrease in demand, energy prices and spread. According to the Eurogas statistical report, in 2011, primary energy consumption in the EU decreased by 4% compared with 2010, to 1 704 Mtoe. Consumption of natural gas decreased by 10%, oil by 4%, nuclear by 2% and hydropower by 13%, whereas consumption of other renewable energy sources increased by 5%. The consumption of solid
fossil fuels (i.e. coal and peat) increased by 3% reflecting the price competitiveness of coal throughout 2011. The rebound option in Europe is expected for 2015.

- On the supply side: **due to weaker demand, electricity prices are getting lower** (CO₂ price collapsed due to CO₂ quota oversupply, coal price are low -due to weaker Asian demand- in comparison to the relatively high natural gas price, which remains more linked to the crude price). In addition the economic crisis had a strong impact on exchange rates (€/$) which contributed to drive oil prices upwards. Therefore, between 2011 and 2012, the CCGTs generation significantly decreased in association with a strong decrease of their market revenues. **Investments in electric capacity are delayed, power plants are even shut down, even when they contribute to the reduction of CO₂ emissions, to the flexibility and security of the electric system.**

- **A coordinated policy effort is then required**: as energy prices are no longer sufficient to drive investments, an adequate capacity mechanism needs to be developed.

**Renewable Energy**

The Bank’s economic justification for supporting emerging renewable energy technologies, whose cost is significantly above that of conventional and mature renewable energy technologies, is that continued investments in these technologies will eventually lead to cost reductions and will ultimately be the least-cost approach to meeting the EU’s renewable energy targets. Do you agree with this approach? Is there an alternative approach to the economic justification of these technologies which you consider more appropriate?

- **Yes, GDF SUEZ agrees** that continuous investment in renewable energy technologies will reduce their overall cost eventually. This has been observed in most cases through learning rates, which are a yard stick on cost reduction per doubling of the installed capacity. The cost reduction potential varies from technology to technology.

- **However, GDF SUEZ does not agree that a strategy based solely on RES will allow to reach the EU’s RES targets at the lowest cost.** Shifting from coal to gas and a less speedy development of RES technologies would have allowed the EU to reach even lower emissions today at a lower cost. It has to be born in mind that most learning has been financed by rather ill conceived (far too generous) support schemes, giving, in some cases, high returns to actors in the technology’s value chain. This has particularly been the case for solar photovoltaic technologies.

What evidence is there that the cost of emerging renewable technology is falling?
- The cost of photovoltaic modules has been lowered substantially, primarily through massive industrialization in China. New modules are being tested in labs which have a higher efficiency than those currently being rolled-out.

- For wind energy too, costs have been going steadily down through simplifying the technology and using lighter materials, which have allowed an increase in running hours. The whole logistic chain has also been drastically improved. Economies of scale have been observed in wind technologies, through the increase in turbine capacities. For wind (both onshore and offshore) we expect new turbine manufactures moving in from Japan, Korea and at a later stage China.

What level of investment in RE do you expect in the short and medium term?

- Many factors indicate that RES roll-out, due to the economic crisis, is going to slow down in a number of countries: the constant reduction of support for RES in debt-stricken countries, RES owners have to provide for their own balancing in Italy, the pressure of governments not to see the energy prices rise for their electorate.

- In addition GDF SUEZ believes that the Transport Grid developments, necessary to bring the RES power to the consumption areas will not be developed as experts expect. In Germany for instance massive high voltage lines have to be built in areas facing important local resistance. The transport grid will be a bottle neck in the short and medium term for further RES rolls out in some European regions.

What are the barriers to investment in renewable energy outside Europe? How might these be overcome?

- The main barrier remains public choices and governments’ commitment to develop renewable energies. Investors need long term visibility and a stable regulatory framework without any retroactive decisions or new charges/rules negatively affecting the confidence of the investors. GDF SUEZ advocates for close cooperation between operators and authorities when deciding on a middle / long term vision that is necessary to reinforce confidence for operators to take investments decisions.

- As a long-term investor in RES, the Group considers that excessive support schemes costs engender concerns amongst policymakers as well as the general public opinion levels and could undermine, in general terms, European RES policy. Therefore, to avoid overcapacity and excessive costs for consumers - no matter which model is in place (green certificate, feed-in tariff, feed-in premium, tender) - the authority could fix a maximum capacity or budget available for supporting renewable energy production.
GDF SUEZ believes that RES should progressively bear the same responsibilities as conventional generators (including balancing). The full cost of RES (including connection costs, grid access, balancing, back-up …) should be transparently communicated to the customers. System balancing and back-up needs generated by high RES development create high additional system costs which should be taken into account in the assessment of the cost of RES support policy. In order to reduce associated costs for consumers, RES operators should progressively become responsible for the imbalance of their portfolio.

GDF SUEZ truly believes in the advantages of a pan-European approach with harmonized market rules across Europe and therefore supports a fully integrated energy market. Therefore, in the medium term GDF SUEZ advocates for a progressive convergence of national RES support schemes. By having a more global and harmonized approach, investors will gain more confidence for investing in new RES projects, primarily in areas where it is most cost-effective.

Growth in RES-E will depend on a well-functioning and integrated energy market. Obstacles for investments in renewable and grid infrastructure should be removed as grid infrastructure (both the transport and distribution grids) will require huge investments. In particular, GDF SUEZ estimates that current necessity both for back-up generation and investments in the grid infrastructure should not be underestimated.

Do you agree that there is significant scope for investment in renewable heating and cooling? What are the barriers to investments in this sector and how might these be overcome?

Yes, GDF Suez is very much in line with this assertion. Several technologies are available from heat pump (both electric and gas driven) to solar boilers, biogas and biomass solutions. Heating and cooling solutions will be developed together with energy efficiency solutions for buildings.

Today the objectives set by the EU on energy efficiency are not met, due to implementation difficulties (e.g. high investment costs for existing building stock upgrade). Solutions would then come mainly from the dedication of local stakeholders (local authorities, inhabitants, property developers…) to reach jointly higher standards. Public Private Partnerships in these sectors would facilitate the required investments.

Energy Efficiency

What do you think are the main barriers to energy efficiency investments? What might be done to overcome these?
Barriers to energy efficiency are multiple: energy price signal, split incentives, short term financial return constraints, behavior and sociological aspects, organization of the beneficiary, organization of the energy efficiency providers, laws, regulations. In addition, implementing energy efficiency targets may be slowed by the multiplicity of parties involved, and thus able to block a decision: local authorities, national decision makers, users, owners, local NGOs, etc.

In more details, the main barriers to energy efficiency investments are:

- lack of information of the contracting owner on the energetic and economic performance of the energy efficiency solutions;
- due to lack of long term vision on energy prices, on green value of buildings energy performance or on health and comfort standards for occupants, contracting owners are unable to take quickly investment decision;
- an energy efficiency roadmap for buildings is needed to increase stakeholder long term visibility and consequently investments for the next ten year period;
- European financial tools should be concentrated, among others, on research, innovation and development in the field of buildings;
- last but not least the main issue of energetic renovation is a weak profitability, in comparison with bank rate and a too long turn of return. Investments should be completed by other tools to increase project profitability. For example a green value could be given to the energy performance of a building through taxes or bonus/malus system.

Nevertheless, energy efficiency financing is key and barriers can be overcome by:

- Implement a specific and coordinated energy performance policy in the building sector which is major energy-consuming area. In particular, substantial efforts need to be made to rehabilitate old buildings by launching renovation programs and helping the most humble citizens to do the required works.

- In this regard, traditional financing patterns must be adapted in two ways: increase the length of the loan to the lifetime of the action in order to ensure financial return (insulation last 25 years for example), and link the loan to the installation so that it is sold with its ownership. For instance, these principles have been applied in designing the green deal in the UK for residential buildings.

What role can Energy Service Companies (ESCOs) play in developing energy efficiency investments?

- Energy Service Companies ESCO play a key role in energy efficiency, as they insure that energy efficiency is delivered over time. Energy efficiency services include: measures in order to reduce energy consumption, replacement, modification or addition of equipment, continuous optimization of technical installations, improved maintenance, and deployment of behavioral change programs and implementation of an energy management system.
ESCOs can play several roles, separately or jointly, to warranty that energy efficiency improvements are delivered over time: investing party, project manager, and installer. In any case a good energy efficiency project should include energy efficiency services for the time of operation of the installation.

Therefore, GDF SUEZ encourages the development of energy efficiency as it can reduce both generation and grid build-out and bring immediate emission cuts. GDF SUEZ is indeed very active in this area. Its subsidiary Cofely, is active in more than 25 countries, number 1 in Europe to propose solution of energy efficiency services.

Energy efficiency represents an attractive mean to decarbonize by decoupling economic growth and energy consumption. Finally, demand side management and demand side participation in the price formation process, will play a role in ensuring grid security and generation adequacy, and could support the reduction of energy consumption. This may be supported by the roll-out of smart metering for gas and electricity, smart electricity grids, and local heating.

What is the potential for energy efficiency outside Europe?

According to the IEA, two third of the efforts to improve energy efficiency remain untapped by 2035. Yet if taken into consideration as much as it could be, energy efficiency could help the world delay the lock-in of CO₂ emissions permitted under the 2°C trajectory and “buy” us five extra years.

Do you consider the criteria used by the Bank to categorise projects as Energy Efficiency projects appropriate (see Annex 1)? What alternative would you propose?

- Targeting a 20% reduction in energy consumption to evaluate a project seems an accurate assessment criterion, when ESCO insures the achievement of the targeted energy performance. In this case, design characteristics and a verification plan for the operation contract should suffice.
- In other cases, like for residential buildings, additional criteria could apply, such as a predefined set of measures for a specific type of buildings, in a given energy class, the right evaluation of the initial energy performance, the customer’s complete information...

*Security of Supply*

**Is the traditional model for electricity transmission and distribution changing? What implications does this have for future investments in electricity networks?**

- Overall transmission and distribution system operators (TSO and DSO) can cope with the current capacities of renewable energy technologies.

- Yet, with additional intermittent RES being pumped into the system, adjustments of both TSO and DSO will be needed. Large renewable projects (onshore/offshore wind) will require adjustments to the TSO grid in order to transport the produced energy to the consumption areas. For instance, with the large offshore plans in the North Sea we will see further developments of transport lines with Norwegian hydro, with the possibility to create a whole new integrated market environment between Northern Europe, the Central Western Copperplate and the British Isles.

- At the distribution level, the development of distributed generation (primarily PV) has already created bottlenecks in Italy - where local storage is being contemplated. Depending on further cost reductions of PV technology and its subsequent development, DSO adjustments are to be expected. The market model of DSOs might also shift from volumetric billing to maximum capacity billing if local system usage would drop.

*What is the future role of smart grids, offshore grids and energy storage solutions?*

- Grids and storage solutions *come with the transformations in the electricity trade model*, by allowing energy producers like GDF Suez to take into account consumers expectations at best. Smart energy solutions represent what the electricity market is becoming:
  - A more and more decentralized market, with a specific local demand
  - An urban market, where energy performance has become a key driver for cities development.

*Fossil Fuel*

**Gas is an important bridging fuel source in the transition to a low carbon economy: to what extent and under what conditions should gas-fired generation be supported?**
- In considering the balance of competitiveness, sustainability, and security of supply a supportive EU policy stance should be taken with regard to a growing role for natural gas in a high-efficiency, low-carbon energy sector.

- Indeed, gas is the ideal partner for variable renewable energy sources as it is quickly available and can be stored effectively in large quantities. In addition, gas brings immediate reductions in carbon emissions by comparison to higher carbon fuels. In this respect, CO₂ prices should increase significantly to compensate the spread between coal and gas prices.

As a result, we do not consider that natural gas will be only a bridge fuel to a low carbon economy but a full player in the energy mix.

**What role will coal and lignite fired generation have in the EU power system in the medium term, with or without CCS, and how is this consistent with the EU’s Climate Action goals and its security of supply objectives?**

- **Coal fired generation leads to higher carbon emission, which is not in adequacy with EU’s Climate Action goals.** However, due to the economic crisis since 2008, emission target of -20% in 2020 should be reached without major changes in the power generation mix. CO₂ prices should rise significantly (set aside required) to give back the right signal for low carbon investments. As regards for CCS development, it directly depends on carbon price. As long as CO₂ will remain low, there won’t be any incentive for investments in this technology.

- **Given the current price of CO₂ within the ETS system, urgent adjustments have to be made** to send the right signal and encourage low-carbon energy like gas. For instance: withdraw a share of quotas from the market and give the appropriate visibility to the ETS System beyond 2020.

**What will be the role of local coal supplies as input for highly efficient CHPs?**

- Indigenous coal is part of the national fuel mix particularly in Eastern Europe (Poland) and Germany, and as such developing highly efficient generation based on this fuel is attractive for these countries.

- However **the trend in Europe is very much against further coal generation** of any kind, mostly as it is the most polluting fuels in terms of CO₂. Even with indigenous resources, new German CHPs being developed are gas-fired – both for environmental reasons, and because gas plant are generally more flexible.

- The **CO₂ price will likely keep increasing.** If you are going to develop local coal plant in Europe, you will need some sort of CO₂ emissions mitigation, such as CCS or Biomass co-firing capability. CHP is a way to
increase overall energy efficiency and reduce emissions intensity (tCO2/GJ), only if there is a demand for steam. If there is no demand for steam, CHP offers no advantage.

- **At the end of the day, highly efficient local coal-fire CHP will have to compete with other thermal generation options** – typically gas-fired CCGT. If the local conditions are right (cheap local coal supply, future CCS capability or good value biomass availability, local low flex steam demand, no political objections) there may very well be a case for local coal-fired CHP generation, but that would have to be analyzed on a project by project basis.

- We don’t see it as a major new entrant in the near future, and even less so in the long run as CO2 prices keep rising.

**What evaluation criteria should the Bank use to assess the economic, environmental and financial viability of coal and lignite fired generation?**

- The **carbon-compensated spark spread** is an estimate of the gross margin of a power plant from selling one unit of electricity (MWh), having bought the coal required to produce this unit of electricity and the allowances to cover the CO2 emissions:

\[
\text{Carbon-compensated Spread} = \text{Electricity Price} - \text{Fuel Commodity Cost} - \text{CO}_2 \text{ Emission Cost}
\]

- All other costs must be covered from the carbon-compensated spread. A precise definition of a spread has to be given by the source publishing such indicators. Definitions should specify energy (electricity, coal, CO2) prices considered and the plant efficiency and CO2 emission factor used for the calculation.

- The **base load carbon-compensated dark spread** can be computed as follows:

\[
\text{CCDS} = \text{Base load Electricity Price} - (\text{Coal Price} \times 3.6 / \text{Net efficiency}) - (\text{CO}_2 \text{ Price} \times \text{CO}_2 \text{ emission factor} \times 3.6 / \text{Net efficiency})
\]

**What is the scope for the development of shale gas resources in the EU?**

- According to the World Energy Outlook 2012 (from AIE), the world resources of natural gas are large enough to accommodate demand for several decades.
- For GDF Suez, unconventional gas is an **interesting resource to be further explored but prospects are uncertain** for several reasons: public concerns expressed about the environmental and social impacts, fiscal and regulatory framework, shortages of expertise could hold back production. And it remains very uncertain how costly it will be to produce unconventional gas given that our understanding of the resource base is still relatively limited.

- According to the OECD, in Europe, the remaining technically recoverable conventional natural gas resources are 24 tcm. For unconventional gas, it’s estimated at 22 tcm (4 tcm of tight gas, 16 tcm of shale gas, 2 tcm of coal bed methane).

**Do you expect the share of natural gas in EU primary energy consumption to grow further?**

- **Yes, the share of natural gas is expected to grow** in the European consumption, like in the rest of the world. According to WEO 2012 (new policy scenario), the share of gas in the European Union in total primary energy demand should grow increase by 15% between 2010 and 2035. This should mainly be driven by a growth of the consumption of gas for power generation.

**What would be the best approach to increase security of gas supply and reduce import dependency?**

- Security of supply is of utmost importance for gas. In this area, we wish to remind the essential role of gas infrastructure (transmission, distribution, storage, LNG).

- Regarding supply, even though Europe’s indigenous production is declining, European gas supply is still very secure due to:
  - the enforcement of the gas security of supply regulation (definition of standards, preventive and emergency national plans, reverse flows …) and the implementation of the Early Warning Mechanism (in relation with EU-Russia energy dialogue)
  - the development of LNG (providing now 25% of Europe’s gas supplies)
  - the development of gas storages and new pipelines (Nordstream for example)

**Given the large uncertainty on future gas demand, what is the risk that investment in natural gas infrastructure may be stranded?**

- First, the **need for investment** is huge: according to the European Commission, €70bn must be invested in gas infrastructures by 2020. **Risk exists and stability here very much depends on the public will** to establish the appropriate market structure and to give the regulatory visibility producers and investors need.
Avoiding the risk of stranded investment costs in gas infrastructures implies dealing with at least two issues. First, gas infrastructures operators have to rationalize their investment programs, on the basis of demand previsions and forecasted return on investments. Their investment plans design may also include a real options approach for their investment decision making, as well as interruptible capacity offer for their clients. Second, there is a high risk that natural gas infrastructure becomes stranded in the long term if the role of natural is not significant enough, given the significant pay-back period for gas infrastructures (40-50 years). That’s why it is so important that policy makers acknowledge the essential role of natural gas, not only in the short term but also beyond 2030. Otherwise, investments will not be made.

Nuclear

What role do you expect nuclear power to play in the European energy market?

- The electricity demand is forecasted to grow at medium term which could create an opportunity to develop nuclear energy. Indeed, for GDF Suez, nuclear energy remains a competitive power source for the countries that made the choice to support it, and obviously to the condition that safety standards are fulfilled.

- Post-Fukushima developments have brought a new deal. A much contrasted view is to be expected between countries that have decided to reduce their nuclear dependency and countries embracing the technology afresh (UK, Poland).

- The deployment of new generation nuclear power will very much depend on the cost evolution of third generation plant (cf. the EPR issues on cost in France and Finland). Technologies coming from Korea, Japan or even China are not to be excluded.

As nuclear power stations are ageing, should their life be extended (where possible) or should they be replaced with other generation sources?

- Life extension makes sense provided that the security of the plant can be guaranteed and that the power source remains profitable. Revamped nuclear power plants allow to damper the expected electricity price increases expected by new RES deployment. It is our view that existing plant embrace all the new standards issued after the stress tests carried out subsequent to the Fukushima nuclear accident. Nuclear power plants will also allow providing certain stability in the power system.

- New constructions, utilizing the proven as well as the best available technologies bring the industry forward, maintain technological progress, utilize evenly the resources of nuclear suppliers and
consequently keep the construction costs at check. At the same time the newest safety requirements can be implemented more efficiently. Therefore new nuclear generation sources and lifetime extensions of present nuclear capacity can be seen as complementary.

- Considering GDF SUEZ, we rely on a recognized operational excellence track record for our existing nuclear generation fleet. The Group intends to maintain and valorize the different competences and skills present in nuclear generation, engineering and services by operating the existing fleet as long as the economical, regulatory and legal framework will allow. In that sense, Long Term Operation justification cases will be submitted in due time for the most recent units.

What will be the impact on electricity generation and climate action of the reconsideration of nuclear policies within EU member states, in particular after the Fukushima accident?

- The Fukushima accident in 2011 (but also the financial crisis) has altered the political and public climate for nuclear and has reduced hopes for nuclear revival in some countries. Other countries remain committed to maintain or extend nuclear (e.g. UK, Poland).

- Nuclear will face critics of the public in several countries and will have to claim for a legitimate seat in the low carbon energy portfolio for Europe.

- Those member states which have decided to phase out their nuclear power plants will have to replace this production capacity with other sources, notably by RES and fossil fuels, including large back-up units, which will be, to a very large extend, gas powered (existing and possibly new ones for super peak demand in case of massive RES penetration). They could also rely more on imports of electricity from neighbouring countries leading to possible security of supply issues. As noted in Germany, after the closure of eight nuclear power plants, the total emissions of CO2 have increased. This is mostly due to the current profitability of the coal power plant (over gas power plant) in a context where coal imports are very cheap - mostly because of the very low CO2 prices and, subsequently, the ETS system failing to promote CO2 light generation units.

- In those countries which will continue their nuclear programmes, the energy system will be secured and agreed climate targets can be met and the price levels for consumers will stay affordable, provided a high level of safety be maintained and sustainable nuclear wastes management be implemented.

Research, Development & Innovation (RDI)

Which are the key innovative energy technologies under development?
R&D is the preparation of tomorrow competitiveness of the European energy sector. Given the major European political ambition of moving towards a low carbon society, an unprecedented innovation effort will be required.

Increasing energy efficiency and reducing carbon footprint should be supported at all scales:
- new and retrofitted buildings, cities and territories;
- electricity production (including energy from waste and other RES: offshore wind technologies where the development efforts should target costs reduction, we would value a financial support to organic photovoltaic and micro-algae as future energy technologies. CSP is also interesting but its deployment in Europe will be rather limited.);
- development of alternative gaseous fuels either hydrogen or bio-gases;
- safe and environmental friendly unconventional gases production technologies;
- new grid technologies to manage RES balancing across the European grid;
- energy storage (bulk energy storage including the use of gas infrastructure to store and transport the surplus of renewable electricity that could also open a new routes for CO2 re-use).
- CCS

The development of which key innovative low-carbon energy technologies should receive most financial support?

- For decoupling economic growth from energy consumption and GHG emissions it is crucial to intensify R&D in low-carbon technologies:
  - electricity and energy storage;
  - energy efficient appliances (also in other market segments);
  - energy from waste or waste water (e.g. biogas, heat, biofuels,…);
  - contribution of biotechnologies to foster the development of new energy sources (i.e. biomethane);
  - nuclear issues (like safety, waste management and Generation IV reactors);
  - CCS.

Which barrier(s) are hindering the deployment of innovative, low-carbon energy technologies most significantly?

- The most important factor which limits innovative low-carbon energy technology roll-out is the availability of capital.
  - For technologies having a leveled cost of electricity, close to grey electricity, the remuneration system is ill-adapted. Today most RES technologies benefit from some sort of subsidy scheme in order to guarantee an acceptable return of the investor. We have seen many non utilities entering the market because the market risk of RES is currently very low. Once the technologies will have to
compete in the market, those investors will not continue investing in market risk exposed technologies.

- All utilities have seen their ratings downgraded and many are on negative watch. The investments needed to convert the European electricity sector are estimated at well over 1.000 G€. The current balance sheet structure of utilities does not allow financing such large investments. To make matters worse, the current economic downturn, the low spark spreads and the hold-ups by Governments on utilities’ cash-flow have reduced the profitability of utilities and worse are to come. Current outlooks for European utilities predict that their ROCE will be close or below their WACC for the very near future. In these circumstances one can fear that CAPEX amounts will dwindle in the coming years.

- The uncertainty of remuneration, especially in debt stricken countries will also have a negative impact on the amounts that will be invested in the future.

- Public acceptance, especially for onshore wind is an issue.

- Lastly, some issues remain on the feasibility of high voltage grid roll-out, especially in Germany. If wind parks struggle to connect to the network and can’t transport the produced energy to the consumption markets, further wind developments will stall.

Should financial support be spread across a large number of small research projects or be selective and concentrated on a few promising large research projects?

Depending on the maturity of the technology, funds should be made available for demonstration projects in order to evaluate how technologies operate in an industrial environment. Such projects are capital intensive and will probably reduce the funds available for fundamental research, which is equally important for the longer term. Therefore, a smaller share of financial support should always be kept for smaller projects.

**EIB external and Cotonou mandates**

In a developing market context, where should the balance lie between meeting local energy needs at least cost and reducing global greenhouse gas emissions – the trade-off between affordable energy for all and sustainable energy for all?

We can differentiate here between the least developed countries and emerging countries:
- For the former, the priority is economic and social development. In this respect, a large access to energy and to electricity, regardless of the energy source. Therefore, the most affordable – likely the coal – will be preferred.

- For the latter, where economic growth (and thus demand for energy) increases rapidly, it is important to favor the adoption and the respect of international standards on greenhouse gas emissions.

**What should be the role of the EIB in promoting new technology and helping to transfer existing technologies to new markets?**

The first condition for developing new technologies on a new market an existing national government decision and clear national targets to develop new energies. In this case, The EIB could help in implementing risk mitigation solutions, such as guarantees and hedging instruments, in order to offer “safety nets” to the private sectors and favor investments.

**Where can sources of low-cost finance be more effectively used by the private sector to develop energy projects?**

Private investors could use low-cost finance to invest on capital-consuming projects that are in the energy sector, such as infrastructures and R&D. Also, if the objective is to develop at the same time energy access at a lower price and low-carbon energies, a good investment strategy would be to support the development of natural gas.

**What are the main barriers to developing sustainable energy sources in developing markets?**

We can see many economic and political hurdles to the development of sustainable energy in developing countries:

- **Economic factors**: the capital-intensity of renewable energy technologies, the continued provision of subsidies to fossil fuels that make renewable energy generation in the short term, more costly or more difficult to implement than conventional fossil fuel-based technologies, particularly for large-scale generation. Also, local electricity markets often need to be liberalized in order to allow renewable energy development.

- **Political factors**: the lack of a government vision based on effective targets for renewable energy, along with the necessary financial tools (feed-in tariffs). There is a need for public incentive mechanisms that create for the private sector a financial ‘level playing field’ between renewable and conventional energy technologies.