Siemens Response to: EIB Consultation Paper reviewing Energy Sector Lending Policy

I. Answers to the EIB questions:

1. 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?

   There can be environmentally friendly, cost-effective and secure energy supplies if three factors are kept in balance:

   First: Affordability of electricity. This must be guaranteed for consumers and for industry in Europe.

   Second: A reliable and stable energy supply. Despite the increasing feed-ins of power from fluctuating renewable energy sources, a reliable and stable energy supply must be assured. The guaranteed availability of power supplies is enormously important, especially for the economy.

   Third: Compliance with the climate goals.

   The requirements are the same everywhere, regardless of the focal points defined by each country: sustainable power generation, transmission and distribution, smart grids, energy storage and efficient energy consumption. The most cost-effective products should be used to meet these requirements.

   - How does investment in the energy sector contribute to growth and employment?

     Energy plays a double role in Europe: Energy technology creates jobs, drives R&D and makes European companies world market leaders. And technology naturally secures reliable and affordable power supplies.

     A green industry is an opportunity for growth in Europe – since the market for green products is growing worldwide.

     We need investments in education and research to ensure that Europe can maintain its lead in technology and innovation.
• 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?

The EIB should secure investment in energy technology to support:

a. Provisioning reliable and low-carbon power generation infrastructure, e.g. combined cycle power plants (CCPPs) which are required to guarantee the security of electricity supplies.

b. Provisioning of capital-intensive renewable power generation, e.g. offshore wind parks, ocean (current) power plants.

c. Erection of large-scale demonstration plants for new, immature technologies, such as energy storage based on "power-to-gas" technology with electrolyzer.

d. Erection of power transmission technology, for both HVAC and HVDC projects to support the expansion/modernization of power grids and the integration of renewables.

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

• Demand for electricity currently stagnating resp. being delayed, due to economic crisis (less need for additional power generation capacity). Investment decisions postponed due to unclear future power demand. However, investment in power plants required to secure power supply.

• Virtually no investment in Europe into conventional power generation capacity due to unfavorable energy policies.

• Rethinking of renewables energy policies just started due to immanent rising electricity prices.

• Most European countries have reduced their support schemes for renewable power generation to ease their budgets by reducing speed of capacity additions.

2. 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?

The subsidizing of renewable energies that aren't yet market-competitive should be based on a technology and industrial policy logic: Technologies in an early stage of development should receive support for a limited time in order to reach market maturity, and there should be clear guidelines for innovation and increasing cost efficiency as well as a clearly defined end to the subsidies (based on time, cost or volume). Each investment must be technically reasonable for the entire energy system and not only for individual private interests.

- What evidence is there that the cost of emerging renewable technology is falling?

There are already examples today of where renewable energies can deliver clean electricity without subsidies, such as an onshore wind farm in New Zealand.

Our clear goal is to ensure that renewable energies can participate in the energy market in the next decades even without subsidies.

The market design must be adjusted and we as manufacturers obligate ourselves to keep reducing the costs for electricity from renewable sources.

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

The focus of RE investment is expected in PV, onshore wind and offshore wind, as well as in biomass power plants. Investments will in the medium term heavily depend on government support and their respective energy policies. PV, however, will continue to be mainly privately financed. Less support is required for onshore wind power, whereas offshore wind still requires support.

- What are the barriers to investment in RE outside Europe? How might these be overcome?

Outside Europe, manufacturers are more and more required to contribute to project financing. However, they are in competition with Chinese, Korean and Japanese
companies with access to almost zero interest government credits. Hence, a low interest export financing from EIB would help the European RE industry.

- **Do you agree that there is significant scope for investment in renewable heating and cooling?**
  The potential of geothermal in Europe overall is rather low. Higher potential of renewable heating is through heat extraction of biomass CHP powerplants. The larger potential of "green heating" however, comes from conventional Combined Heat and Power (CHP), in particular in the Eastern European areas. Construction however limited due to high upfront investment required to modernize existing residential infrastructure towards CHP. Therefore, EIB financing could be a trigger. The demand for District Cooling is rather limited in Europe.

- **What are the barriers to investments in this sector and how might these be overcome?**
  The current unpredictable long-term forecasts regarding markets and regulatory risks are hindering investments. This could be overcome by a holistic, consistent and enduring future market design. A barrier for investments in RE are the high upfront capital expenditures (capex) compared to relatively low long-term operational expenditures (opex). However, the current investment cycle does not take this into account and instead is focusing on the short-term return of investments. Therefore, EIB funding and project financing in this area is vital.

3. **Energy Efficiency**

- **What do you think are the main barriers to energy efficiency investments?**
  The main barriers are:
  - energy costs at a level of 2% to 5% of rental costs are too low
  - underdeveloped ESCO and EPC market (EPC = energy performance contracting)
  - market barriers for EPC
  - owner/tenant conflict for investments
  - promotion of "deep renovation" concept leading to investment jam, due to economic barriers (payback >20 a) and financial risks for the owner
• "staggered approach" with stepwise investments, not yet sufficiently accepted by authorities. (Starting with building performance optimization, replacement of appliances with payback of < 5 years, followed later, if economically feasible, with investments in building envelope with payback < 20-40 years).

• What might be done to overcome these?

Support implementation of the Energy Efficiency Directive in all Member States, mainly through the following articles:

Art 3a) Building renovation of entire building stock, to tackle the main energy guzzlers, existing buildings (limitation to central publicly owned buildings is not sufficient). Renovation should also taking into account indoor climate, accessibility, health and safety requirements of buildings.

Art 7) Energy audit and management systems to guarantee sustainability. Mainly implementation of energy management process according EN16001 /ISO 50001 for large enterprises and real estate owners.

Art 14) Energy services market access for SME’s by:

• disseminating clear and easily understood information

• listing available energy service providers

• supporting public sector in taking up energy service offers for building refurbishment

• supporting ESCO’s and EPC business

• market access for all suppliers of EPC

• acceptance that substantial market penetration with lower impact ("staggered approach") ultimately leads to faster and easier implementation and higher impact, than the perfect solution of "deep renovation" with low market penetration due to excessively high investments and long paybacks.

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

ESCOs will play a vital role by helping building owners reduce their energy bills and make them less dependent on energy prices.
Building performance optimization is absolutely the fastest and most economic way for achieving energy efficiency improvements. In combination with adequate building management systems, sustainability is also guaranteed.

- **What is the potential efficiency outside Europe?**
  
  To a certain extent, we see the same potential as in Europe – depending, of course, on the climate conditions for heating or cooling.

- **Do you consider the criteria used by the Bank to categorize projects as Energy Efficiency projects appropriate (see Annex 1)? What alternative do you propose?**
  
  Some criteria should be added such as:
  
  - sustainability
  - economics
  - technology openness of solutions

4. **Security of supply**

- **Is the traditional model for electricity transmission and distribution changing?**
  
  The growing process of electrification is leading to a power matrix. We are seeing this trend in the power grid itself. Originally there was a clear and simple path from power plant to consumer; today the grid has evolved into a complex and multi-layered system comprised of large-scale and countless small power plants. Consumers have long since also become producers.

- **What implications does this have for future investments in electricity networks?**
  
  The Florence School of Regulation evaluated an investment need of 100 billion euros for electricity transmission alone. Unfortunately, only 9.1 billion euros will be allocated in the EU budget to fund energy network infrastructure in the period 2013-2020.
What is the future role of smart grids, offshore grids and energy storage solutions?

Since power from renewable energy sources is primarily generated in the places where they are found in abundance – the sun in sunny areas and the wind on the open seas – transport grids will have to be expanded into superhighways for electricity, both nationally and across international borders. High-voltage direct-current (HVDC) transmission is ideal for this purpose. Over long distances, HVDC lines can transmit electrical power much more efficiently than classic high-voltage three-phase lines.

The heavy use of renewable energy requires more than just an expansion of the electrical grid. Since power from renewables fluctuates, there is a need for power storage systems that can hold excess energy for hours, days, or even weeks, if necessary, and feed it back into the grid during calm periods. But a massive expansion of storage technologies won’t be enough. At the same time, conventional power plants must be available to provide a specific base load and serve as a backup solution that can quickly feed power into the grid when there is a deficit. Fast-starting, high-efficiency gas-fired power plants are particularly suitable for this function.

The growing number of prosumers and the fluctuating feeds of renewable energies require intelligent electrical networks or "smart grids" that keep distribution networks stable and ensure the ability to meet flexible demand. Flexible demand offers the cheapest forms of flexibility and may provide markets with the necessary dynamics to hedge increasing volume and price volatility.

5. 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?

The volatility of the feed-ins of electricity from renewable sources has to be compensated at present with fossil energy sources. Combined cycle power plants are the best fossil power generation option for securing back-up capacity and supplementing renewable sources because:

- they are highly efficient (Siemens built the world’s most efficient combined cycle power plant in Irsching near Ingolstadt, with an efficiency of 60.75%),
they have have low specific CO₂ emissions and thus comply with climate protection goals (ca. 330 g CO₂/kWh, coal is roughly three times higher),

- they have a highly flexible performance capacity that enables them to respond quickly to fluctuations,

- gas is available for the long term, ensuring the security of energy supplies, and

- they have favorable construction costs compared with other technologies, and short construction times of only 2-3 years.

Considering these benefits of gas-fired power generation, it is extremely important to tackle the issue of decreasing periods of cost recovery. Falling load factors of thermal plants are leading to a declining number of periods of cost recovery. This is having significant impacts on the cost recovery per annum and therefore on investment decisions.

- 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?

Among fossil power plants, gas-fired plants are the most efficient.

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

Coal is not an efficient input for highly efficient CHPs because gas is twice as efficient as coal. Existing coal power plants, nevertheless, might have a potential for efficiency increase through retrofit them as CHPs.

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

The EIB should rather focus on investments in low-carbon technologies instead of coal or lignite without CCS.

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

Shale gas exploration in Europe is unlikely to replicate the U.S. development (much lower resources, higher production cost, and public rejection).

Shale gas will not be a price-breaker in Europe as it is in the U.S.; therefore, oil-linked gas prices will probably weaken in the future but not completely disappear.

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

Europe will need to increase its fossil energy imports despite its massive development of renewable energies. As natural gas is the most efficient and climate friendly source of fossil energy, the share of natural gas in the EU primary energy consumption should grow further.

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

Modernization of the entire energy infrastructure as well as a broad diversification of the energy sources and trade routes is necessary.

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

Gas demand will grow due to the increasing demand for electricity: Global demand for power will continue to grow at an average 2.8% a year until 2030. The development of energy prices is a decisive factor for Europe's industrial competitiveness.

6. Nuclear

Generally our position on nuclear is the following:

The decision whether or not to use nuclear energy is a political decision that must be made by each country, and Siemens respects every country’s decision.

7. Research, development & Innovation

• Which are the key innovative energy technologies under development?

The EU has endorsed the European Strategic Energy Technology Plan (SET Plan) as a vehicle to accelerate the development and large-scale deployment of low-carbon technologies that draws upon current R&D activities and achievements in Europe. It proposes a new innovation model based on a collective approach to
research, development and demonstration planning and implementation with a focus on large-scale programs.

The implementation of the SET Plan has established large-scale programs such as the European Industrial Initiatives (EII) that bring together industry, the research community, the Member States and the Commission in risk-sharing, public-private partnerships aiming at the rapid development of key energy technologies at the European level. Seven priority technologies have already been identified as the focal points of the first EII: wind, solar, electricity grids, smart cities and communities, bioenergy, carbon capture and storage and sustainable nuclear fission. Other promising low-carbon technologies have been integrated in this initiative: energy storage and ocean power. The EIB should orient its efforts on this important base of knowledge provided by the EII.

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

The EIB should not favor the cheapest but rather the most promising low-carbon technologies. Efficient technologies lead to a triple win for Europe: lower emissions, lower fossil fuel consumption and lower energy prices. In the fields of:

- **Wind energy:**
  Large-scale offshore storage would solve the intermittence problem from wind power.
  The development of storage technologies which allow for large-scale energy storage should be applied everywhere on a mass production basis without negative social and environmental impact.

- **Bioenergy:**
  We have no mature products for small-scale gasification although there is important market potential for decentralized rural electrification which would create a positive environmental impact by using bio-waste instead of diesel fuel.
  Gasification solutions for the pulp and paper industry need funding support as well as the pre-treatment of biomass and optimization of feedstock logistics (such as the electro-dewatering of sludge from waste water).
  We can develop sustainable greenhouse gas avoidance with CO₂ capture and conversion, and thus transform CO₂ with biochemical processes into valuable primary bioenergy.

- **Grids:**
The EIB should support a European Ultra-HVDC* super-grid allowing for massive interregional power transfers and bulk renewable in-feeds. Grids are crucial for the higher penetration of renewables. Our European grids need to be transformed from "island grids" into a Pan-European grid. To enable the meshed configurations of HVDC lines in Europe, critical developments such as HVDC multi-terminals need to be funded.

- **Smart Cities:**
  We need to develop cross-sector solutions enabling efficiency increases in the fields of transport, energy and ICT. We need real-time energy and carbon monitoring for buildings and cities to ensure efficiency over entire life-cycles and to motivate the habitants to change their behavior in favor of a more sustainable environment.

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

  The euro crisis is putting a lot of pressure on the current debate on the new budgetary framework 2014-2020. Significant budgetary cuts for energy technology R&D (Horizons 2020) as well as for the deployment of innovative low-carbon energy technologies are currently being discussed. The Strategic Energy Technology Plan (SET) is crucial since it is the only policy instrument in the field of low-carbon technology which can deliver results before 2020. However, sufficient financial resources are needed to make the SET plan work as outlined in the European Energy Roadmap 2050. It would certainly pose a risk to the development and deployment of innovative, low-carbon energy technologies if the planned budget figures are significantly reduced.

  European innovation needs to focus more on grand challenges and support larger and more powerful initiatives.

  Furthermore, the uncertainty of future energy policies and regulatory investment risks continue to hold back renewable energy technologies.

- **Should financial support be spread across a large number of small research projects or be selective and concentrate on a few promising large research projects?**
To ensure step-by-step changes and strengthen Europe’s competitiveness in the field of low-carbon technologies, we need a greater focus on the societal “grand challenges."

This can only be achieved with fewer, yet larger and more powerful initiatives.

8. 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?

The UN Sustainable Energy for All (SEFA) platform has put forward three objectives to be reached by 2030:

  • Ensuring universal access to modern energy services
  • Doubling the global rate of improvement in energy efficiency
  • Doubling the share of renewable energy in the global energy mix

These objectives should be reached in an integrated manner, avoiding a trade-off between access to affordable energy and access to sustainable energy. As the importance of electricity is growing, many countries have initiated a fundamental rethinking and restructuring of their energy policies. Differing regional requirements for an economical and sustainable energy system are reflected by differing technology needs. Ultimately, a sustainable energy future depends on a wide range of technologies fitting together perfectly – from highly efficient solutions for conventional power plants to renewable energies, and from low-loss power transmission over great distances to smart grids and highly efficient energy applications. Investing in the innovation and development of such technologies and implementing them is at the heart of what Siemens does.

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

EIB support for the development of new financial instruments for innovative solutions and technologies that might not be easily financed via conventional funding sources should be continued. The EIB agenda for R&D should increasingly focus on environmental technologies to reflect the importance attached to energy
efficiency and climate change in transport, manufacturing and process industries, power generation and renewables.

In order to promote the introduction of existing technologies to new markets, technical assistance is necessary to help build up the relevant administrative and institutional capabilities and to provide other technical support. This is also outlined as part of SEFA’s four “enabling” action areas: (1) energy planning and policies; (2) business model and technology innovation; (3) finance and risk management; and (4) capacity building and knowledge sharing. It should be recognized that differing regional requirements for an economical and sustainable energy system are reflected by differing technology needs. Ultimately, a sustainable energy future depends on a wide range of technologies fitting together perfectly.

Some of the developing economies (China, India and Brazil in particular) already have significant markets for new RE technologies such as wind power and solar PV, or are, like South Africa, in the process of launching RE programs. The expansion of new RE technology largely reflects the aim of government policies, driven in particular by industrial development considerations, to position these countries in the expanding RE markets (such as in the case of China). But for some countries, economic competitiveness is increasingly important, in view of the declining cost of RE such as solar. In an increasing number of cases, local content rules or other distortions are being considered to protect and support these industries.

In many of these countries there are high energy and fossil fuel subsidies. According to the latest WEO, fossil fuel consumption subsidies amounted to USD 409 billion in 2010, with oil subsidies accounting for half of this amount, followed by electricity and gas. Developing countries are responsible for 85% of the subsidies. These subsidies are a significant obstacle to improving energy efficiency and developing renewable energy.

Developing countries are usually reliant on foreign capital to finance energy investments and, where local financing is constrained, the costs of capital are high and thus an impediment to the implementation of energy infrastructures. IFIs such as the EIB have a significant role to play in mobilizing capital and financing for these countries, and in helping them obtain access to modern and more sustainable sources of energy.
What are the main barriers to developing sustainable energy sources in developing markets?

There are several barriers to the deployment of sustainable energy sources in developing markets. Siemens recommends:

1. Creating a level playing field in terms of profitability between innovative and promising renewable technologies and conventional fossil fuel based generation options.

2. Providing easy market access and grid access to private sector players on a competitive basis.

3. Mitigating political and regulatory investment risks which continue to hold back renewable energy technologies.

4. Closing the financing gap since the focus of much of the current spending is on the maintenance and operation of the existing power infrastructure, with little remaining to fund long-term investments and address the power supply gap.

5. Integrating energy efficiency in overall energy sector planning and development. In many emerging markets, the total energy consumed per GDP is twice the global average.

6. Ensuring coherent, consistent and conducive policy and regulatory frameworks which are central to the successful dissemination of renewable energy.