

Tools and mechanisms fostering EU GCC cooperation on Energy Efficiency

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Abstract: In order to respond to the need for European Union (EU) - Gulf Cooperation Council (GCC) clean energy cooperation and provide a practical instrument fostering such activities, the EC External Relations Directorate General has launched the project “Creation and Operation of an EU-GCC Clean Energy Network”. To the best of our knowledge, there are no practical tools and instruments to guide structured discussion on EU-GCC clean energy cooperation avenues, acting as catalyst and element of coordination.

Aim of this paper is to present the first outcomes of the Discussion Group “Energy Demand Side Management (DSM) and Energy Efficiency (ENEF)” of the Network. Indeed, there exist a significant potential for promoting cooperation EU-GCC on ENEF & DSM and specific areas of cooperation of mutual benefit, which are identified and discussed in this paper. The key message is the importance of taking action over discussion for promoting cooperation on ENEF & DSM, in the sharing of related expertise and knowledge and in raising general public awareness and collaborating in the framework of common project activities.

Keywords: Gulf Cooperation Council, European Union, Clean Energy, Network, Cooperation

1. Introduction

The Gulf Cooperation Council (GCC) is a regional organization created in May 1981, to promote stability and economic cooperation among the Arab States of the Gulf, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates (UAE). The GCC countries are among the world leading oil and gas producing and exporting countries, and constitute prominent members of the Organization of the Petroleum Exporting Countries (OPEC). Indeed, in the GCC countries all power generation is oil and gas based. Especially, the quantities of proved reserves of crude oil and natural gas were estimated to represent about 39.5 per cent and 22.9 per cent of the world’s total reserves respectively in 2008 [1].

These countries are also among the highest energy consumers worldwide; especially domestic energy consumption continues to increase fast. Based on International Energy Agency (IEA) data, the GHG emissions have increased by more than approximately 50 per cent in the last decade [2]. Furthermore, electricity demand is increasing particularly fast, at average growth rates of 7 per cent, which implies a doubling of the needed power generation capacity every 10 years. The electricity load curve in the GCC countries shows very high summer loads - in general and in particular during peak hours. At the same time approximately 45 per cent of domestic electricity consumption is linked to these appliances [3]. This strong electricity demand growth is also driven by artificially low prices.

Despite the high exploitable potential, till now, only pilot, research and some small scale activities related to the renewable energy and energy efficiency were conducted in the Arab States of the Gulf and as a result, some small and medium capacity projects were installed and tested [4]. However, the current situation has been changing as the government, the financial organizations, the academics, the general public and the private sector start realizing the inevitability of putting climate change issues on the top of the priorities’ list in the process of sustainable development [5]. Furthermore, the price fluctuations, the rapid population growth

and the increasing energy demand contribute to the increased necessity of sustainable energy solutions, as the region cannot depend on conventional fuels forever. As also depicted in recent studies, the GCC countries have recently adopted a more pro-active approach toward ecological modernization. This reorientation has not yet resulted in the development of consistent strategies and policies. However, pioneering projects such as Masdar City, the Energy City Qatar and innovative regulation like the green building code in Dubai will spread within the GCC [6-8].

The European Union (EU) has a well founded interest to cooperate with the GCC countries and support them in addressing and successfully tackling clean energy issues. This is particularly true taking into consideration that on one hand EU is the leading world proponent of climate change prevention and on the other hand is one of the world's major importers of hydrocarbons. Indeed, the global warning poses certain constraints to energy usage with direct impacts to the international economic activity and the producer-consumer dialogue is currently focused on the identification of prospects and opportunities for the development of a sustainable energy economy in order to pass from the current carbon constrained economy to new and prosperous sustainable development paths.

To the best of our knowledge, there are no practical tools and instruments to guide structured discussion on EU-GCC clean energy cooperation avenues, acting as catalyst and element of coordination. Aim of this paper is to present the first outcomes of the Discussion Group "Energy Demand Side Management (DSM) and Energy Efficiency (ENEf)" of the Network. Indeed, there exist a significant potential for promoting cooperation EU-GCC on ENEf & DSM and specific areas of cooperation of mutual benefit, which are identified and discussed in this paper.

The paper, apart from this first introductory section, is structured along the following sections. Section 2 is focused on a short description of the EU-GCC Clean Energy Network initiative. Section 3 provides, in a concise way, the activities and methodological procedures followed within the D/G of the Network. Section 4, which is the main part of the study, focuses on the first outputs within the Energy Demand Side Management and Energy Efficiency D/G, providing areas for EU-GCC cooperation under this D/G. Section 5 presents the main conclusions drawn from work carried out so far under the Energy Demand Side Management and Energy Efficiency D/G.

2. The EU GCC Clean Energy Network

The EU-GCC partnership started officially in 1988, when the EU and the GCC signed a Cooperation Agreement, which put into place a regular high level framework of dialogue. The Cooperation Agreement established two important bodies:

- On the strategic level, an annual Joint Council and Ministerial Meeting between the EU and the GCC foreign ministers and between senior officials at a Joint Cooperation Committee.
- On the operational level, an Energy Experts Group that started its work at the beginning of 1990's.

The EU – GCC on the 17th GCC-EC Joint Co-operation Committee (March 2006) outlined the need for policy support towards the promotion of renewable and energy efficiency options in the Arab States of the Gulf. In the EU – GCC expert meeting on climate change on the 22nd of January 2007 in Brussels, all participants underlined the importance of Clean Development Mechanism (CDM) projects for GCC countries and especially in the areas of Carbon Capture

and Storage (CCS) technology, energy production, energy efficiency and conservation, petroleum refining and petrochemical industries. Respectively, the EU – GCC meeting on climate change on the 11th of February 2008 in Brussels focused on the need for better technology cooperation frameworks and technology transfer progress. The Workshop “Enhancing the EU-GCC Relations within the New Climate Regime: Prospects and Opportunities for Cooperation”, on the 26th of February 2009 underlined the importance of EU-GCC co-operation issues related to energy and the environment [9].

In this context, the European Commission (EC), External Relations Directorate General has commissioned the project “Creation and Operation of an EU-GCC Clean Energy Network”. The specific objective of this project, aimed to create and facilitate the operation of an EU-GCC Clean Energy Network. This network aims to act as a catalyst and element of coordination for development of cooperation on clean energy, including the related policy and technology aspects, among various stakeholders in the EU and GCC countries. The 20th EU-GCC Joint Council and Ministerial Meeting, Luxembourg, 14 June 2010, welcomed the EC-GCC Clean Energy Network.

In light of the above facts, an integrated procedure for the identification of appropriate renewable and energy efficiency solutions could stimulate the interest of donors (GCC funds, EU funds, International donors’ funds, National Funds) and foster joint activities and deployment of technologies in the area of clean energy. It is also noted that the Network will support the identified project ideas, by the:

- Identification and mobilisation of available sources of financing for joint EU-GCC projects and activities;
- Identification, preparation & submission of applications and implementation of research projects under FP7 funding and other R&D financing programmes;
- Assistance in development of project fiches and submission to international donors and other financing institutions.

This Network’s scope and operation aims to identify the huge potential for EU-GCC cooperation, as well as to strengthen the cooperation ties between these two regions.

3. Discussion Groups’ Structure and Methodological Procedures

To achieve these results, the network (EU-GCC Clean Energy Network) is designed in a way that allows robust operation, efficiency and flexibility, so as to provide the wide variety of services necessary to achieve the expected results. Essential features of the project are the Discussion Groups (D/G) that focus on areas of common interest.

The thematic Discussion Groups (D/Gs) contribute to the Network’s strategic objectives for enhancing EU-GCC clean energy cooperation. The five key thematic areas on which the D/Gs’ work is focused are:

- D/G 1: Renewable Energy Sources
- D/G 2: Energy Demand Side Management and Energy Efficiency
- D/G 3: Clean Natural Gas and Related Clean Technologies
- D/G 4: Electricity Interconnections and Market Integration
- D/G 5: Carbon Capture and Storage (CCS).

The Discussion Groups (D/G) are structured in a simple way, so as to allow ease of operation and flexibility. The proposed organisational structure of a D/G is presented in the following Figure 1.

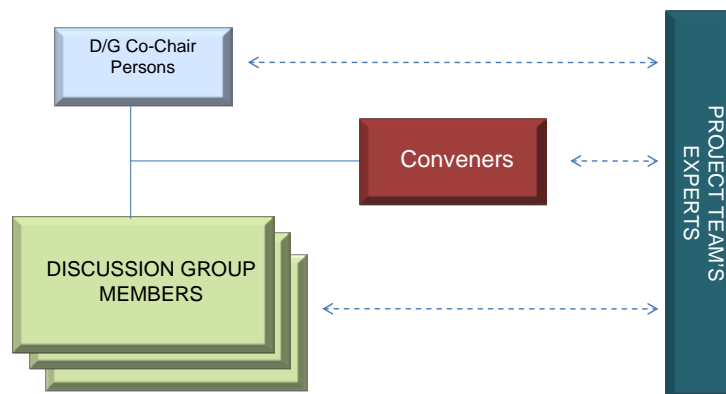


Fig. 1. Structure of a Discussion Group.

The D/Gs work in a continuous “collaboration mode”, by communicating mainly through the Network’s Communication- Collaboration- Dissemination Platform (NCCDP). There is a specific “area” within the NCCDP for each D/G, where D/G members have full access. The D/Gs works under an agreed yearly Work-Plan with clearly identified working directions regarding analysis and advice on:

- Best practice technologies.
- EU and GCC Policies.
- Cooperation opportunities- projects among EU and GCC entities.
- Exchange of ideas/know-how for the specific D/G clean energy topics.

Communication and collaboration within the D/G members is supported by the NCCDP “D/G area” that provides tools for: discussion on topics, exchange of documents and information, collaborative work on documents, web-meetings (convened by the D/GC or D/G Co-Chair Persons), Training Webinars, etc. The D/GC assisted by the D/G co-chair persons mobilize, coordinate and facilitate communication and collaboration. Discussion Group members are registered in the D/G Mailing List to receive important D/G notifications from the D/GC, the D/G Co-Chair Persons and the Network Administration.

4. First Outputs within the Energy Demand Side Management and Energy Efficiency D/G

In the following parts, the main points drawn up from the background report elaborated within the D/G are presented. It is noted that this background report is a collaborative work/contribution among D/G experts, which is aimed to be further enhanced so as to constitute a “Thematic EU-GCC Co-operation Roadmap” on DSM and ENEF.

4.1. EU & GCC State of Play

4.1.1. EU State of Play

The EU region is a frontrunner in tackling climate change and energy efficiency issues. The 20-20-20 target set for 2020 has placed very ambitious goals for the reduction by 20% of GHG emissions and primary energy consumption.

According to a WEC report [10], EU has one of the lowest primary energy intensities in purchasing power parities in the world, and significantly lower than the world average. Figure 2 below depicts this favorable EU standing in the world as far as the primary energy intensity levels in 2008 are concerned.

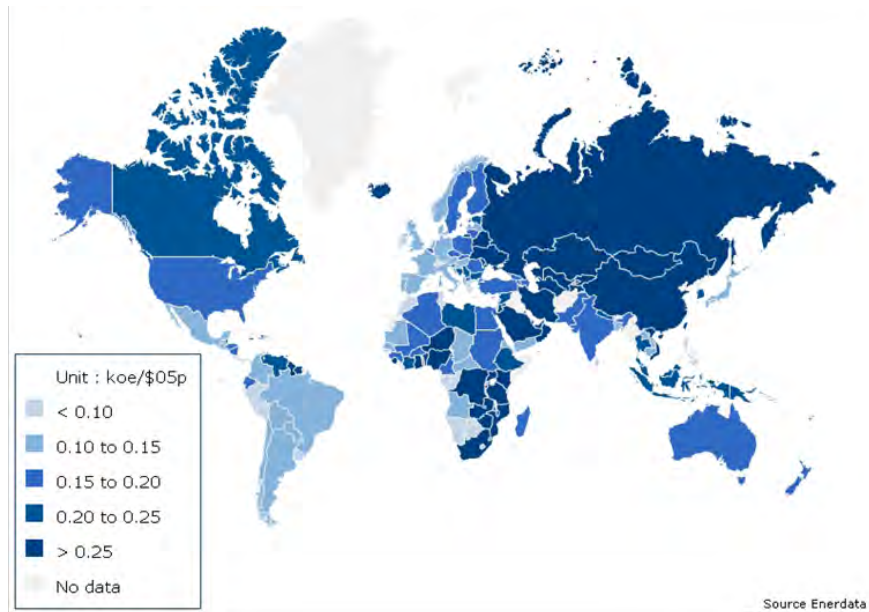


Fig. 2. Primary energy intensity levels by country (2008).

Source: WEC 2010

EU has taken significant legislative action so as to further enhance energy efficiency in the region. Although tackling energy consumption through demand side management activities in the national level remains a very challenging task, EU central policy developed is a key driver towards the achievement of the 20-20-20 target.

4.1.2. GCC State of Play

While no harmonized policy on DSM exists in the GCC states, recent developments show some changes in individual GCC countries. In the following paragraphs, an outline of the prevailing situation in these countries is presented.

- **UAE:**

- Urban master Plan Abu Dhabi 2030 addresses sustainability as a core principle. Estidama, which is the Arabic word for sustainability, is an initiative developed and promoted by the Abu Dhabi Urban Planning Council (UPC), while the early aspirations of Estidama are incorporated into Plan 2030 and other UPC policies.
- The Pearl Rating System for Estidama is one of the key tools for driving and determining the core principles of sustainable development. It is a framework for sustainable design, construction and operation of communities, buildings and villas, specifically tailored to the hot climate and arid environment of Abu Dhabi.
- The Economic Affairs Unit of Abu Dhabi is currently working with other government and non-government entities to develop a comprehensive Demand Side Management strategy for electricity and water consumption within the Emirate.
- As regards Dubai, the government adopted a sustainable development policy ("Dubai Strategic Plan 2015"), covering all aspects of society. In the energy branch, green building standards, and water and energy conservation and management are

- relevant aspects. The Green Building Regulation came into effect in April 2010 and aimed at reducing energy demands of new buildings by up to 40%.
- Moreover, the Emirates Authority for Standardisation and Metrology (ESMA) has launched a new energy efficiency label and standard scheme in a bid to reduce country's environmental impact. The new certification will be placed on electronic goods - in particular air-conditioning units - and will be based on an international standards template while being specifically designed for the UAE market.
 - **Kuwait:** The Ministry of Electricity and Water has developed a code of practice for energy conservation in buildings, placing emphasis on HVAC, since 1983. A revised version of the code was issued in 2010.
 - **Saudi Arabia:**
 - Ministry of Water and Electricity systematically promotes DSM, by founding the Energy Conservation and Awareness Department, imposing limits to the maximum power that can be delivered to electricity consumers, establishing DSM actions, and rationalizing the use of electricity.
 - Saudi Arabian Standards Organization adopted several standards aiming to limit the penetration of in-efficient electrical appliances, without however having the effective power to enforce these standards.
 - **Qatar:**
 - Qatar Green Building Council (QGBC) with mission to educate and increase awareness and develop a set of green building best practice guidelines.
 - Qatar Sustainable Energy and Water Utilisation Initiative is a project to improve desalination technologies, and promote public awareness of sustainable use of energy.
 - National Vision 2030 on sustainable development is supported by Dohaland, introducing edge urban living concepts, aimed at delivering a sustainable development that is energy-efficient, high in performance and low in wastage.
 - **Oman:** Electricity companies trying to implement certain DSM programmes are facing difficulties, such as large subsidies offered for tertiary sectors' tariffs.
 - **Bahrain:** A number of activities promoting energy conservation and DSM measures have been realized. These programmes are targeted towards thermal insulation, energy audit, power factor, CFLs, labels and energy standards, load control and awareness raising.

4.2. EU & GCC main technology and policy fields of interest

Main technological focus till now from the GCC side has been placed upon Combined Heat and Power Generation, as well as the development of cross-cutting technologies in the industrial sector (compressed air pumps, electric motors, ventilation and air conditioning, steam generation, cooling etc.). Nevertheless, the significant progress being made on the implementation of RUE technologies in the tertiary sector cannot be neglected.

Some potential technology and policy fields of interest for EU/GCC cooperation include:

- Application of efficient labels and standards for energy household appliances;
- Redesign of subsidies offered for tertiary sector tariffs;
- Use of bioclimatic architecture;
- Promotion of energy efficiency awareness campaigns;
- Promotion of energy audits in all sectors (industries, tertiary sector buildings, households);
- Realization of RUE technologies in public buildings, as demonstration projects;
- Common efforts of government/electricity companies to promote DSM measures;

- Introduction of smart meters not only for the large consumers, but for the household sector as well.

4.3. Promoting co-operation on Energy Efficiency & Demand Side Management

Particular emphasis was laid on the discussion for the identification of a few concrete examples of areas on which the EU and the GCC could cooperate. These areas are the following:

- Air Conditioning (AC) maintenance and AC technicians' certification,
- Replacement of incandescent lamps, further introduction of solar water heaters, reverse osmosis.
- To support legislation and infrastructures e.g. through information platforms and the development of standards

In addition, fruitful discussions were elaborated on financing measures that could foster related cooperation activities, such as:

- Lower than market cost tariffs hamper the significant promotion of energy efficiency. However, raising prices to more cost reflecting tariffs is already happening.
- District cooling is a promising option for GCC. However, currently the district cooling pricing is double than the cost of using AC units.

5. Conclusions

The main points drawn from the discussion group on “Energy Demand Side Management and Energy Efficiency”, as also discussed within the 1st Meeting of the Network's Discussion Groups, 30th November - 1st December 2010, Dubai, UAE, include the following:

- The GCC region is facing increasing energy demand and high environmental concerns. Especially as concerns the electricity consumption, the increasing rates in the GCC region have more than doubled within a ten years period, while the load curve shows very high summer loads in general and in particular during peak hours.
- Implementation of Demand Side Management (DSM) schemes is gaining ground in the region. More specifically, Abu Dhabi has incorporated their utilization in the energy policy 2030, while efforts are being made for their implementation also in Bahrain, Oman and Saudi Arabia. In addition, KSA and UAE have already started pilot projects on smart energy meters, while activities such as the Abu Dhabi Masdar City, the Qatar Energy City, the Bahrain World Trade Center and the KAUST Sustainable Campus, show the GCC interest in these fields.
- The EU has placed significant emphasis on promoting energy efficiency through the adoption of the 20-20-20 target. In addition to the EU common policy measures, the EU member states possess significant experience in the promotion of energy efficiency measures and technologies.
- GCC countries can benefit, through the exchange of experiences and know how in the field of policies and measures, based on the EU related efforts and activities. The FP7 Programme could also provide opportunities for related collaborations of EU/GCC entities.

Indeed, the Discussion Group outcomes in terms of exploration of possibilities for joint projects (both technological research and pilot industrial scale projects) are of significant importance for enhancing EU-GCC Clean Energy Cooperation in fields of mutual interest.

The future direction is to make this Network a forum of action and not just discussion. The discussion and networking opportunities this platform provides the potential users/

beneficiaries with should be a means to deliver projects which could push forward the GCC region on the global scene in the field of clean energy. These potential users/ beneficiaries, including donors (GCC funds, EU funds, International donors' funds, National Funds), other financing institutions and energy actors, should work together for preparation & submission of applications as well as implementation of research projects under FP7 funding and other R&D financing programmes.

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References

- [1] BP - Beyond Petroleum, BP Statistical Review of World Energy, BP, London, June 2009.
- [2] International Energy Agency (IEA), Key world energy statistics 2010, IEA, Paris, 2010.
- [3] M. Al-Sulami, Poor-quality electrical appliances banned, Arab News, 2010, April 26. Retrieved from: <http://arabnews.com/saudi-arabia/article47257.ece>.
- [4] H. Doukas, K.D. Patlitzianas, A.G. Kagiannas, J. Psarras, Renewable Energy Sources and Rationale Use of Energy Development in the GCC Region: Myth or Reality?, *Renewable Energy*, 31(6), 2006, pp. 755-770.
- [5] United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol Status of Ratification, UNFCCC, Bonn, Germany, 2009. Retrieved from: http://unfccc.int/files/kyoto_protocol/status_of_ratification/application/pdf/kp_ratification_20090826corr.pdf.
- [6] D. Reiche, Energy Policies of Gulf Cooperation Council (GCC) countries – possibilities and limitations of ecological modernization in rentier states, *Energy Policy*, 38(5), 2010, pp.2395-2403.
- [7] D. Reiche, Renewable Energy Policies in the Gulf countries: A case study of the carbon-neutral "Masdar City" in Abu Dhabi, *Energy Policy*, 38(1), 2010, pp.378-382.
- [8] H.M. Taleb, A.C Pitts, The potential to exploit use of building-integrated photovoltaics in countries of the Gulf Cooperation Council, *Renewable Energy*, 34(4), 2009, pp.1092-1099.
- [9] J. Psarras, A. Flamos, K. Patlitzianas, Background Paper of the Workshop "Enhancing the EU-GCC Relations within the New Climate Regime: Prospects and Opportunities for Cooperation", Brussels, Belgium, 26th of February 2009, Al Jisr project on "Public Diplomacy and Outreach Devoted to the European Union and EU-GCC Relations", February 2009.
- [10] World Energy Council, Energy Efficiency: A recipe for success, 2010.