

Energy Exemplar to the User Interface Platform (UIP) of the Global Framework for Climate Services

Executive Summary

The Need

Energy systems are the engine of economic and social development. Their investments represent a sizeable portion of a country's GDP. Indeed, energy is essential to practically all aspects of human welfare, including access to water, agricultural productivity, health care, education, job creation and environmental sustainability (*UNDP, 2005*). Furthermore, energy sector emissions such as CO₂ account for the largest share of global anthropogenic greenhouse gas (GHG) emissions. Emissions reduction targets under the UN Framework Convention on Climate Change are expected to significantly increase demand for energy from renewable sources, which are highly sensitive to climate, as well as lead to requirements for energy efficiency measures. Energy planning and operations in general are markedly affected by meteorological events. For instance, 4.3% (equivalent to many hundreds of M€) of the total Electricité De France (EDF)'s 2013 income was attributed to effective management of weather and climate conditions in France. With an ever-growing global energy demand – currently about 13 billion tonnes of oil equivalent, an increase of nearly 30% in ten years – expanding energy systems are increasingly exposed to the vagaries of weather and climate. Although this is certainly the case for renewable sources such as wind, solar and hydropower, and for electrical distribution and transmission systems, the more traditional energy sources can also be severely affected by extreme weather and climate events. Thus, by properly taking into account weather and climate information, energy systems can considerably improve their resilience to weather extremes, climate variability and change. Climate services can also support increased development and use of renewable energy sources.

Better climate services can help meet these challenges by giving decision-makers enhanced tools and systems to analyse and manage risk, under current hydro-meteorological conditions, as well as in the face of climatic variability and change. This Exemplar explains how improved climate services can benefit the energy sector. It illustrates a vision as to how the development and application of targeted climate products and services through the Global Framework for Climate Services (GFCS) can help improve efficiency and reduce risk associated with hydro-meteorological hazards affecting energy systems. The main focus of this Energy Exemplar is to address climate services needed to support:

1. Greater climate resilience and adaptation across the sector, due to its fundamental importance for development;
2. The important role of efficiency and reduction of energy consumption with consequent emissions reduction in support of mitigation targets;
3. The growing renewable sub-sector, given the apparent climate sensitivity of renewables on the one hand and the policy priority accorded to them due to their GHG emissions reduction benefits on the other.

Mission

By developing user-tailored weather-water-climate services in close cooperation with the Energy industry, the GFCS will enable it to better manage the risks and opportunities arising from extreme events, climate variability and change. The GFCS will ensure that the resulting science-based climate information leads to improved planning, policy and operational activities.

Principles

The GFCS Energy Exemplar will be implemented according to three (sequential) principles:

1. *Take stock* – The GFCS will take stock of relevant current activities in the area of meteorology/climate & energy so as to have a detailed overview of the state-of-the art.
2. *Harmonise activities* – The GFCS will assist in the coordination of available activities whenever there is a perceived benefit for doing so by a range of stakeholders. The GFCS is not meant to replace current activities but to provide a harmonization platform, with the aim of allowing stakeholders to increase their awareness of available data, tools and energy policies.
3. *Multi Benefits* – The GFCS will provide a platform for collaboration amongst energy sector stakeholders with a need for improved climate services. The GFCS will facilitate the implementation of new complementary projects.

It should be emphasised that in order for these principles to be effectively applied, and hence for the Energy Exemplar to be implemented in a successful manner, strong leadership is required. Such leadership should be shared via a partnership between WMO and counterpart organisations representing the energy industry.

The GFCS and its Pillars

The World Climate Conference-3 (Geneva, 2009) unanimously decided to establish a GFCS, a United Nations-led initiative spearheaded by WMO to guide the development and application of science-based climate information and services in support of decision-making (<http://www.gfcs-climate.org>). The GFCS had four initial priorities: agriculture and food security, water, health and disaster risk reduction. Given that climate and energy are intrinsically entwined, subsequently energy was considered as a candidate to become the fifth priority sector. Energy itself plays a significant role for the other pillars, as a driver for improving them.

The GFCS is supported by a network of technical experts; national, regional and global specialized centers and services; and international partners. Its implementation plan spans five areas of activity (or pillars):

1. *User Interface Platforms (UIP)* – forums for forging the stakeholder relationships needed to define needs and respond to requirements for climate information and services in particular sectors and contexts
2. *Climate Services Information System (CSIS)* – for producing and distributing climate data and information tailored for policy- and decision-support
3. *Observations and Monitoring (Obs/Mon)* – for generating the necessary data for the development of climate services
4. *Research, Modelling and Prediction (RMP)* – to advance the science needed for improved climate services and climate-related outcomes
5. *Capacity Development and Support* – to support the systematic development of the institutions, infrastructure and human resources needed for effective climate services.

Work in each of these areas will be undertaken to support the specific needs of the energy sector. Due to their high sensitivity to climatic factors, renewables such as wind, bioenergy, solar and hydropower and their connecting infrastructure will receive particular attention.

Areas of Focus

Work to be undertaken during the implementation of the Exemplar reflects the project stages of a generic energy system, namely from planning to construction, to operation & maintenance, including also the balancing of supply and demand:

1. *Identification & Resource Assessment*
2. *Impact assessments (incl. infrastructure and environment)*
3. *Site Selection & Financing*
4. *Operations & Maintenance*
5. *Energy Integration*

Benefits to the Energy Sector Stakeholders

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The GFCS will provide a coordinating mechanism to allow energy sector stakeholders to acquire wider access to relevant climate expertise, information, tools and energy policies beyond what may be currently accessible. While some energy stakeholders are well versed in the use of climate information, a considerable share of the stakeholders cannot afford to have climate specialists in their ranks. Similarly, engagement with energy-sector stakeholders will enable hydro-meteorological specialists to better understand and respond to the sector's needs. In either case, information gathering and sharing is a worthwhile investment in this burgeoning area at the relationship between energy and meteorology. The GFCS will allow stakeholders to contribute their services and tools into the system; it will also offer the opportunity to suggest improved ways to exchange information and/or request specific services or training.

Timeline and Funding Opportunities

The GFCS is already underway. The activities of the first four priority areas – Agriculture and Food Security, Disaster Risk Reduction, Health, and Water – are progressing according to the following three phases: Initial – Phase I (2015–2017), Implementation – Phase II (2017–2019), Consolidation – Phase III (2019–2023). Given that the governance structure of the GFCS has been established in the initial phase, activities of the Energy Exemplar will be integrated in the Operational Plan for the GFCS for the period 2015 – 2018.

WMO has set up a GFCS Trust Fund that has attracted contributions from a number of countries. It helps fund some initial projects and administrative costs. Moreover, the GFCS provides an organizing structure for framing initiatives and contributing to improved energy-related outcomes. This may generate incentives for self-funding as well as opportunities for funding from third parties.

Building on Existing Expertise and Structures

The GFCS seeks to promote support for its vision and activities at national, regional and global levels, building on existing partnerships and avoiding duplication. This principle can be implemented through active engagement in the working mechanisms, programmes and activities of the energy sector. While energy companies generally have a good appreciation of weather and climate information, technology and science advancements mean that weather and climate information is becoming broader and more sophisticated. The challenge for GFCS is enabling effective communication between a science-led provider community and a business-driven sector. Decision-making will take place whether or not adequate climate information is available. However, improved climate services, such as maybe developed on the basis of this Exemplar, will aid decision-making by reducing risks or costs.

Therefore, in order for the this Exemplar to be truly effective, strong partnerships are required with key international organizations, which recognize the benefit of developing climate services and which can assist in communicating and engaging with private-sector companies active in the energy industry.

Evaluating and Monitoring Progress

A principal challenge faced by the GFCS in its initial stages will be to demonstrate its ability to add value. In this sense, the risks associated with implementing GFCS priority activities include organizational complexity, leadership and management, resourcing, and support for coordination between international agencies and individual companies active in the energy sector. To manage these risks, the Exemplar proposes establishing monitoring and evaluation practices, both to assess the success of activities in its priority categories, and to measure overall improvement in climate knowledge and communication between technical experts, energy practitioners, and decision-makers at all levels. These will be incorporated in the GFCS operational plan and monitoring and evaluation framework.

Conclusions

The energy industry is a complex sector that is undergoing a major transformation, involving an increasingly diversified supply base (e.g. with the widespread rooftop solar systems) and less predictable demand patterns. A major consequence of this is that weather and climate are becoming increasingly critical to the balancing of energy supply and demand at any one time, and at a range of timescales. By leveraging the power of improved, more user-friendly climate services, the GFCS has a clear opportunity to beneficially contribute to this energy system transformation. Sustained, effective leadership and coordination are however crucial if climate services are to be embraced and adopted by the energy industry.