

## INTERACTING WITH ENERGY: A SUMMARY OF USER ENGAGEMENT ACTIVITIES OF THE ENERGY INDUSTRY AT NOAA'S NATIONAL CLIMATIC DATA CENTER

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### 1. Introduction

The Energy Industry is one of the broadest economic industries in the United States. A capital intensive industry by nature, virtually every sector of the Energy Industry is affected by weather, as well as climate variability and change. The National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC) is the world's largest source of weather and climate data, and not surprisingly, energy interests have been one of our largest groups of patrons for many years. In recent years, NCDC has been transitioning from more limited service-based interactions with user industries – including energy – toward a full-scale proactive engagement. The main goal of these renewed efforts at interactions is to not only respond to user needs, but to *anticipate* user needs. This is critical at this moment in time due to (1) industry uncertainty due to climate change and (2) the nation's long-term transition to a "new energy economy." Here, we summarize our recent and ongoing efforts to engage the Energy Industry.

### 2. NCDC's User Engagement Team

While clearly one of the largest industrial sectors NCDC interacts with, the Energy Industry is one of a dozen industries that comprise NCDC's User Engagement initiative. The framework for this initiative largely emanated from an NCDC-sponsored workshop entitled *NOAA Data and Information for a Changing Climate: A Conference for Public and Private Sector Users*. This workshop was held in November 2007 in Asheville, NC, and brought together climate scientists and representatives from the Energy, Insurance, and Transportation industries. A key focus of the workshop was describing how climate change was challenging the 'business as usual' paradigm in certain climate-sensitive business activities. In turn, climate scientists were encouraged to proactively engage user groups to identify emerging needs for climate data and products, especially in light of climate change.

NCDC's User Engagement team was created in response to encouraging feedback during the workshop. The purpose of the team is to engage climate sensitive users in various economic sectors.

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This includes anticipating industrial needs in a changing climate as well as fostering continued dialogue as new needs emerge. The four primary functions of the team are as follows:

- Present at conferences and workshops to introduce users to NCDC data and activities.
- Attend sectoral conferences and workshops to learn industry needs and terminology.
- Host sector relevant conferences and workshops to facilitate discussion between NOAA and users.
- Serve as liaisons between NCDC scientists (the climate experts) and climate sensitive users.

Naturally, each industry has different needs for climate data and products. Here, we focus specifically on NCDC's engagement of the Energy Industry, which we consider to be comprised of businesses involved in the exploration, extraction, production, refining, distribution, and sale of energy. For our purposes, we also include various federal and state government agencies that regulate energy companies, as well as other governmental, non-governmental, and private organizations with clear links to the energy industry.

### 3. Interacting with Energy

#### a. Overview

Currently, we consider the primary sectors within the industry to include petroleum, gas, electric, coal, and nuclear energy, along with renewable energies such as solar, wind, hydropower, and biomass. Climate change and expected changes in the frequency of extreme weather events pose a major challenge to the energy industry. Warming temperatures directly affect heating and cooling requirements and also lead to rising sea level, altered precipitation patterns, reduced snowpack melt, and other climate change impacts that in turn can affect energy supply and demand, the distribution of fuel sources, and the future locations of power plants. This industry is unique in that not only are its business practices affected by climate change, but energy production and use also play a dominant role in human-induced warming of the atmosphere and oceans. Climate can affect environmental trends, with effects on business plans, regulatory requirements, and operations. Having access to relevant and easily understandable weather and climate data is essential for strategic planning purposes, risk management, and for assessing environmental footprints.

#### b. Industry Needs

Climate information is often available only as raw observations or in the form of tables, graphs, or written summaries, which may be difficult for users who are not well-versed in climate science to fully interpret. The energy industry needs climate data to be translated into accessible, useful, and accurate products. The industry can also benefit from NCDC's climate expertise to better understand what the information means and how to most effectively use it.

Climate information can be used in a variety of ways. Some examples include the following:

- Using global surface hourly data for studies of wind energy usage to drive wind turbines for electricity generation.
- Using solar radiation data to estimate solar energy potential in the United States.
- Using temperature information to aid in the assessment of equipment requirements for heavy power line loads during extremely hot weather.
- Using hourly temperature, relative humidity and/or dew point, cloud cover, precipitation, and wind speed and direction data in electric load forecasting models and scenario analyses, for use by utility and power trading companies.
- Using heating/cooling degree day (HDD/CDD) data to help energy regulators determine what rates electric utilities can charge their customers. HDD and CDD are measures of expected energy usage for heating and cooling, based on cumulative daily average temperature observations below or above a specific threshold (typically 65F), respectively.

#### c. NCDC Data and Products

There are many different types of useful climate information available at NCDC. Some examples of particular interest to the Energy Industry include the following:

- *Climate Normals*, which are the average values of meteorological elements, such as temperature, precipitation, frost and freeze data, and snowfall data, over 30 years. The climate normal helps describe the climate and is used as a base to which current conditions can be compared.
- The *Residential Energy Demand Temperature Index* (REDTI), which is based on population-weighted heating and cooling degree days.
- The *Severe Weather Data Inventory* (SWDI), which includes information critical to the detection and evaluation of severe weather derived from radar, such as features related to general storm structure, hail, and tornadoes, preliminary and verified reports of storm

damage, and National Weather Service warnings.

- The *Integrated Surface Data* database, which contains climate data including hourly observations, with parameters such as temperature, dew point, precipitation amount, cloud cover, wind speed and direction, etc. for about 10,000 currently active stations, with some dating as far back as 1901.
- The *National Solar Radiation Database*, which contains hourly solar radiation and meteorological data for more than 1400 stations.

#### d. Current Level of Engagement

Current engagement activities include targeted interactions with respect to the Climate Normals product. In particular, NCDC has gauged the energy industry's use of conventional climate normals, solicited suggestions for improvements, and received feedback on a proposal for a suite of experimental products known collectively as "Alternative Normals." The engagement took the form of teleconferences and webcasts hosted by the AMS Committee on Energy, ad hoc telephone and email communication with energy regulators, and invited talks.

In addition to the AMS Committee on Energy, NCDC scientists also hold memberships on a key climate committee of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). NCDC played a key role in updating ASHRAE's design standards handbook using the most recent climatic data available.

Additional interaction with energy industry representatives has been undertaken with respect to specific climate-energy indices, such as the Residential Energy Demand Temperature Index (REDTI) and an index of natural gas consumption. Recently, we commenced efforts to collaborate with the National Renewable Energy Laboratory on producing climate products relevant to renewable energy interests. We have also facilitated several teleconferences and webcasts between climate scientists and energy industry representatives, including a series of webcasts on the effects of climate change on energy transmission.

It is important to note that the engagement activities described herein are above and beyond NCDC's longstanding history of providing climate services to stakeholders and decisionmakers seeking any of the number of climate data and products we provide. In fact, our user engagement activities are largely building upon well-established relationships between our customer services team and user groups, including many stakeholders from the Energy Industry.

#### **4. Concluding Thoughts**

Collaboration between climate scientists and the energy community is essential in helping to build the necessary bridges that will transform climate data into information that is relevant and credible. Having NCDC membership on selected committees has proven to be an excellent way to improve communication and information use. Ongoing communication is important to ensure that the information NCDC provides is appropriate and applicable to energy sector needs. As climate changes in the years ahead and the effects become more noticeable, new information needs will emerge. NCDC will work closely with those in this community, attending trade meetings and sponsoring future workshops and conferences, in order to better understand, address, and anticipate these needs.