



GAS WEATHER OUTLOOK

OVERVIEW

The *Gas Weather Outlook* (GWO), produced jointly by PIRA and MDA EarthSat, combines the weather forecasting expertise of MDA EarthSat with PIRA's renowned energy fundamentals analysis. GWO is distributed each business day to provide timely updates of PIRA's forecasts for EIA storage data together with projections of heating and cooling degree days two weeks into the future and a related discussion of issues behind changing weather patterns. In addition, GWO issues a comprehensive weekly forecast of supply/demand balances along with a regional breakdown of anticipated storage changes in future EIA storage reports. GWO gives subscribers insightful analysis of the interactions between cooling/heating demand and changes in working gas storage, which are crucial in any assessment of short-term gas markets.

DATA SOURCES, APPROACH & METHODOLOGY

GWO's foundation is the unique and powerful combination of two companies that are each a leader in their respective fields.

MDA EarthSat's Contribution

Data Gathering and Processing: The strong correlation between temperature and energy demand requires that accurate and timely instrument data be fed into the GWO process. MDA EarthSat focuses on the 200 primary, first-order weather stations in the continental United States. Data are collected hourly from these stations via a NOAAPORT satellite receiver, as well as through direct feeds from the National Weather Service. Data for nearly 1,000 other stations are stored and utilized to offset missing or erroneous data in the primary 200 locations. (MDA EarthSat's quality-control data cleaning processes have earned it its position as the primary scorekeeper in the weather derivatives industry.) Temperature data are then converted to a national demand number by using a combination of population and natural gas consumption weighting. All in all, a significant quantity of weather data are received, analyzed, and stored for the GWO. Gas consumption-weighted temperature data are converted to degree days for translation by PIRA into a weekly storage forecast.

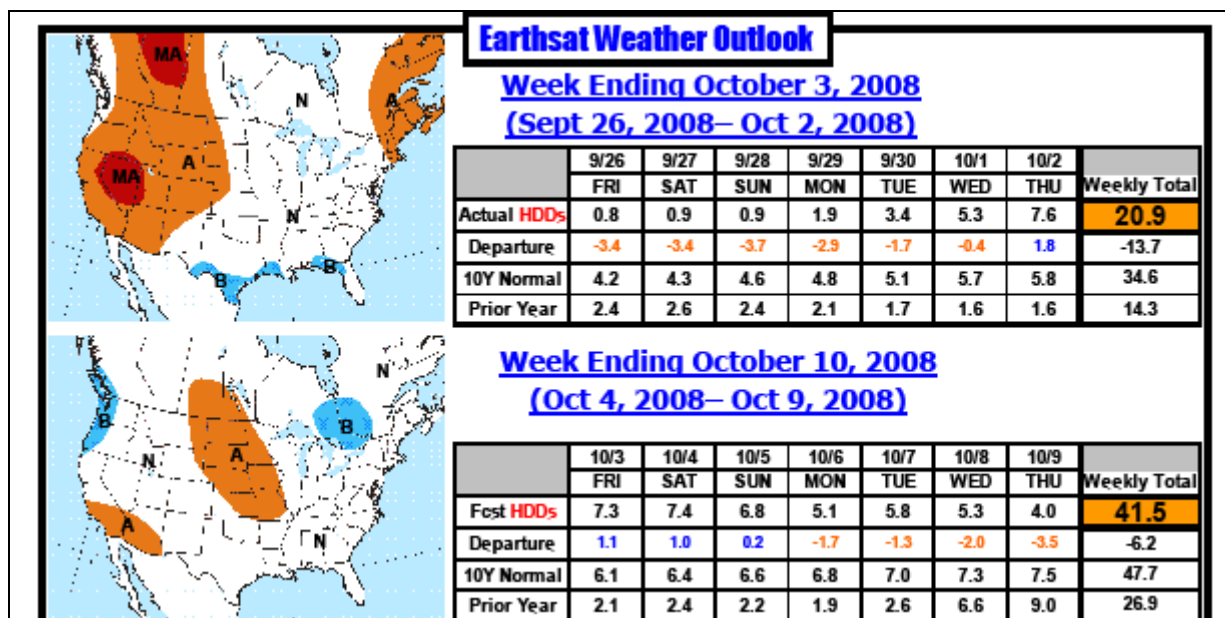
Forecasting: To understand the future price implications of weekly gas storage reports, a gas market analyst must understand the *weather-adjusted* dynamics behind historical weekly storage changes. The next step involves forecasting future weekly storage changes. MDA EarthSat's team of experienced energy-weather meteorologists analyzes several weather models to create top-line temperature and degree-day forecasts. Models from the European weather service offices, the NWS, Environment Canada, the U.S. Navy, and other international sources are used to create the latest one- and two-week forward forecasts. The latest weather forecast is constantly piped to PIRA for daily updates on the future storage implications of changes in weather expectations.

PIRA's Contribution

Forecasting: Using MDA EarthSat's degree-day forecasts, PIRA generates forward projections of weekly storage changes reported by the EIA. PIRA uses extensive market intelligence, proprietary pipeline scrapes, and data collection to forecast gas supply/demand components required to determine those weekly storage changes divided among the Consuming East, the Producing Area, and the Consuming West (in line with the EIA's regional definitions).

On each Tuesday, ahead of EIA's Thursday storage data release, PIRA discusses key factors behind expected shifts in working gas storage and details the individual supply/demand component of those balances. To do so, PIRA takes into account the impacts on daily gas balances of: 1) closely monitored LNG, Mexican, and Canadian gas imports/exports; 2) gas demand for electricity generation (EG) and from the industrial sector, adjusted for anomalies such as major holidays; and 3) domestic gas production, incorporating PIRA's industry-leading models and daily nomination data from our pipeline scrapes, adjusted for anomalies such as hurricane-related shut-ins.

Below is an illustration of the GWO's weekly update report that provides daily breakdowns of gas balances consistent with the EIA's survey of gas changes between Friday and the following Thursday. Projections of temperature-sensitive residential/commercial and EG gas demand are updated in sync with MDA EarthSat's latest degree-day forecasts.



The focus of weather data varies seasonally from a gas demand standpoint. From October into May, PIRA links MDA EarthSat forecasts of heating degree days (HDDs) with PIRA's latest heating load coefficients to project gas heating demand. These projections are updated each business day to reflect the impact of fast-changing HDD conditions on demand.



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PIRA Energy Group and MDA EarthSat

From May through September, PIRA links its proprietary EG grid model simulations with MDA EarthSat forecasts of cooling degree days (CDDs) to project U.S. electricity supply and demand. PIRA's model then determines the changing primary energy mix for EG between natural gas, fuel oil, and other primary energy sources for each major power grid — the Eastern Grid, the Western Grid, and ERCOT. The end result is a gas storage forecast that is firmly guided by the season's overriding weather fundamentals.

WHAT DO GWO CLIENTS RECEIVE?

Every business day: The weather portion includes heating/cooling degree-day forecasts for the current and coming weeks, a prior-year weather comparison, a 10-year-normal weather comparison, and a daily discussion of short- and medium-term weather outlooks along with weather maps. The storage outlook portion shows weekly storage levels and changes from the previous day's number and a comparison with the previous year's storage changes and levels.

Every Tuesday: A supplemental overview includes daily HDD/CDDs of the prior week and a daily forecast for the week in progress, along with a brief discussion of PIRA's storage outlook and a detailed breakdown of recent and forecast storage changes and overall storage levels by region. The U.S. is broken down into the EIA regions of Consuming East, Consuming West, and Producing Area. In addition, the report includes an extensive breakdown of PIRA's estimates for daily supply, R/C heating demand (during the heating season), EG gas burn demand, and industrial demand for the past week and forecasts of gas balances for the week in progress. In sum, *Gas Weather Outlook* provides subscribers invaluable insights into the dynamics of the various supply and demand components of the gas market, as well as their interaction with the changes in heating and cooling load.

FEES

PIRA Retainer Clients may subscribe to GWO under discounted terms, which are determined by the scope of their license. For prices, please contact your PIRA Account Executive.

ABOUT PIRA ENERGY GROUP

PIRA Energy Group is an international consulting firm retained by more than 550 companies spread across some 60 countries. PIRA's Retainer Client Services are renowned for their comprehensive research and market analysis of global crude oil, refined products, natural gas/LNG, natural gas liquids, coal, electric power, biofuels, and related environmental analysis. They are comprised of periodic reports, access to *PIRA Online* (the statistical database and market analysis archive accessible via www.pira.com); monthly market forecasts; weekly analyses; market updates; private strategic briefings; seminars; and ongoing direct access to PIRA's staff for timely information and assessments of energy market developments.

ABOUT MDA FEDERAL



MDA Federal Inc. is an international professional services firm that specializes in the development and application of remote sensing and geographic information technologies (GIS). Its projects focus on the exploration, sustainable development and management of the earth's resources and the monitoring of the environment. MDA Federal is a world leader in the utilization of remote

sensing data from aircraft and satellites and is the largest commercial provider of enhanced satellite imagery — tools used by natural resource scientists to better understand, use and manage the earth's resources. There is a single compelling reason to employ remote sensing and GIS technologies: they are extraordinarily cost-effective tools. MDA Federal (formerly Earth Satellite Corp.), which was founded in 1969, is preeminent in the development and use of these powerful and advanced technologies.

For over 35 years, MDA Federal has conducted resource programs around the world for private and public clients. Its technical staff, which includes foresters, agronomists, ecologists, wildlife biologists, geologists, geographers, meteorologists, computer scientists, physicists and photographic specialists, has made substantial contributions to the advancement of image processing, information technology and GIS. It has performed over 350 studies in the fields of forestry, land use, environmental analysis, change detection, GIS, military applications, mineral exploration and agriculture.

MDA EarthSat (division of MDA Federal Inc.) is also the premier source for industry-sensitive energy weather information. MDA EarthSat Energy Weather was launched in 1990, at the dawn of natural gas deregulation. The product was designed with assistance from early industry players and meteorologists. Today its clients include major energy conglomerates, large and small utilities, trading houses, investment firms, oil and gas producers/suppliers, and anyone else who trades natural gas, electricity, and heating oil. Close to 300 energy companies across the U.S., Canada and Europe subscribe to various MDA EarthSat Energy Weather products.

Versus the competition, MDA EarthSat Energy Weather performs ongoing verification, emphasizes extremes, sends out rapid e-mails and alerts highlighting weather changes/forecast alterations to clients, and utilizes unique forecast technologies. Its staff of meteorologists has the experience in forecasting weather for the energy industry. Unlimited (24/7) phone consultation for weather-related questions is utilized by all EarthSat Energy Weather clients. This is especially useful during weekends and holidays, when weather can change drastically.

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