



## Forecast Methodology...

Speedwell provides fully downscaled forecasts based upon global numerical weather prediction models. These are based on the ECMWF (European Center for Medium Range Weather Forecasting) and the GFS (Global Forecast System produced by NOAA) outputs and processed with physical and statistical methods to produce a station - level forecast.

### 15-day Downscaled 24hr & 12hr Forecast

- Source:** ECMWF & GFS models
- Release:** ECMWF 2x per day / GFS 4x per day
- Format:** Available as multi member (ECMWF 51; GFS 21) or as ensemble-average
- Variables:** 24hr TMax/TMin & precipitation, 12hr TMin (1800 to 0600) and 12hr TMax (0600 to 1800)
- Application:** Numerical models, any application where understanding forecast confidence is important
- Delivery:** Web site or data feed

*\*\* Also available as a raw-model spread*

### 15-day Raw Model Output Forecasts

- Source:** ECMWF & GFS models
- Release:** ECMWF 2x per day / GFS 4x per day
- Format:** Available as multi member (ECMWF 51; GFS 21) or as ensemble-average
- Variables:** Daily max/min & precipitation
- Application:** Raw material interpolated from grid for clients wishing to run their own downscaling
- Delivery:** Data feed

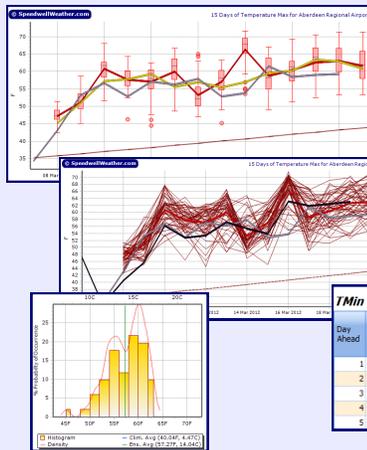
### Monthly Downscaled Forecasts

- Source:** ECMWF model
- Release:** Twice per week
- Format:** 30-day multi-member ensemble forecast
- Variables:** Daily max/min & precipitation
- Delivery:** Web site or feed

### Forecast Change Analysis

A quick guide of the day to day change in modeled CME futures prices as a result of change in the forecast and the impact of daily accrual

CME Close	IndexMean (Actuals + 15-day Forecast + 10 yr Historical)	IndexMean Change (Actuals + 15 day Forecast + 10 Yr Historical)
101	96.4	-3.1
274	297.8	-2.4
325	332.5	-2.7
331	337.5	-13.2
288	291.9	-5.5
	430.3	8.7



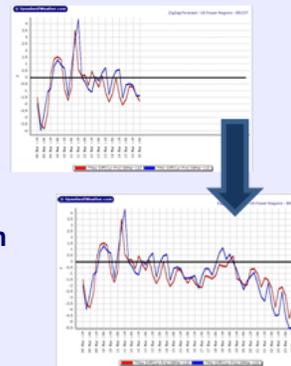
### Web site forecast viewer

- forecast overlay
- viewing of all members
- overlay of climatology
- overlay of actual
- probability distribution for each day
- verification

Day Ahead	Num of Days	Error Avg	Clim. Error Avg	Error SDev	Error Min	Error Max	In Min-Max Range %	In Q1-Q3 Range %	Abs. Error Avg	Abs. Clim. Error Avg	Abs. Error Avg - Abs. Clim. Error Avg
1	349	-0.01	-1.76	4.21	-19.04	8.81	81	29	3.27	7.42	-4.15
2	348	-0.01	-1.81	4.29	-18.16	9.02	87	34	3.21	7.40	-4.09
3	347	-0.11	-1.89	4.61	-19.00	11.43	89	41	3.46	7.34	-3.88
4	346	-0.21	-1.93	5.00	-25.71	13.16	88	41	3.77	7.33	-3.56
5	345	-0.34	-1.98	5.71	-21.42	18.65	86	39	4.38	7.31	-2.93

### ZigZag Forecasts

- **FAST...**Real time graphical and numeric representation of frame-by-frame change in the forecast from the previous model
- Presented on a station-by-station basis or group
- Ultra fast delivery - fastest in the market (auto update)
- Showing forecast change for single model or for multiple models overlaid



Station Name	Country	Units	Forecast	Observed	Diff	10/11	12/12	13/13	14/14	15/15	16/16	17/17	18/18	19/19	20/20	21/21	22/22
Aberdeen Regional Airport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62
Abilene International Airport	United States	Fahrenheit	68	72	-4	68	72	68	72	68	72	68	72	68	72	68	72
Albuquerque International Sunport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62
Albany International Airport	United States	Fahrenheit	48	52	-4	48	52	48	52	48	52	48	52	48	52	48	52
Albuquerque International Sunport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62
Albuquerque International Sunport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62
Albuquerque International Sunport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62
Albuquerque International Sunport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62
Albuquerque International Sunport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62
Albuquerque International Sunport	United States	Fahrenheit	58	62	-4	58	62	58	62	58	62	58	62	58	62	58	62

### U.S. Weighted Degree Day Report

Combining CWG forecasts and SWD data, this product provides the best possible information to anticipate the US EIA natural gas storage and withdrawal reports.

- Correlate with energy usage
- Estimate the EIA natural gas storage and withdrawal forecasts (high weather correlation)
- Examine historical events in the context of recent, current, or upcoming extreme weather events

### Speedwell Cleaned Data & CWG Forecasts

- 344 Climate Divisions
- 48 State Divisions
- 9 Region Divisions
- Producing / Consuming

