

Weather Normalization Update

13 August, 2015

- **Update** on Subcommittee activities
- Methodology 8, **Adjustment 3**: Statistical Model Approach to Calculating Weather and/or Economic Adjustments to Compliance Year GPCD
- **Discussion/Comments**

Section 10608.24 states:

(1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

*(A) Differences in **evapotranspiration and rainfall** in the baseline period compared to the compliance reporting period.*

*(B) **Substantial changes to commercial or industrial water use resulting from increased business output and economic development** that have occurred during the reporting period.*

*(C) Substantial changes to institutional water use resulting from fire suppression services or other **extraordinary events**, or from new or expanded operations, that have occurred during the reporting period.*

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Weather
Normalization
Subcommittee
(ongoing)

Draft
Methodology
8 language
developed /
USC
commented in
Fall 2013

A. DWR Modeling Criteria

- ✓ **Model Specification Criteria**
- ✓ **Regression Output Criteria**

B. Modeling Documentation

A. DWR Modeling Criteria

✓ Model Specification Criteria

1. water demand should be modeled at the monthly level, or finer.
2. normal variation due to climate should be captured.
3. include a trend term, and possibly other variables and features, to capture effects influencing water demand during the model calibration period.
4. include measures of weather to capture deviations.
5. account for the seasonal differences
6. economic measures should include the unemployment rate or the labor force participation rate for the geographic jurisdiction that best overlaps with a water supplier's service area.
7. the dependent variable (monthly GPCD) should first be logarithmically transformed.

A. DWR Modeling Criteria

✓ Regression Output Criteria

1. Model coefficients should be statistically significant at the 5% level at a minimum (p-value ≤ 0.05).
2. Normality assumption for linear regression should not be unacceptably violated. The test should demonstrate at a significance level of 10% that model residuals are distributed normally. .
3. Coefficients for the weather and economic variables should have the expected sign.
4. The percentage correction to account for abnormal weather should not exceed half of the abnormality in weather itself.
5. The model's annual GPCD prediction error band should be within $\pm 10\%$ (i.e., the percentage difference between actual and predicted annual GPCD across all the years included in the model calibration time period is within $\pm 10\%$).

B. Modeling Documentation

Water suppliers must submit:

1. Source of and type of weather data.
2. Source of and type of economic data.
3. Model description, including dependent and independent variables used in the model.
4. Statistical software used.
5. Model input data.
6. Regression output, including R-square and estimated regression coefficients with the significance (p-values) of each of these coefficients.
7. Indicators of the credibility of the regression significance metrics.
 - Probability plot of model residuals.
 - Results from a test of residual normality.
 - Results from a test for serial correlation.
8. Percent difference between actual GPCD and model predicted GPCD for each year during the baseline period (error band for the model calibration years).
9. Compliance year weather adjustment calculations and, if used, economic adjustment calculations.

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