CIM Joint Issues - CIM Issues #7040

Add attributes to time-series to record forecast uncertainty

10/29/2024 12:43 PM - Tom Berry

Status:	New		
Priority:	Normal		
Target version:			
Author/Contact Info:		**Standard(s):**	IEC 61970-301
Base Release:		**Version:**	
Solution to be Applied To:		**Clause:**	
Solution Version:		**Sub-Clause:**	
Solution Applied By:		**Paragraph:**	
Completion Date:		**Table:**	
CIM Keywords:		**Originally Closed in Version:**	
Breaking Change:	No	**Origination Date:**	10/29/2024
Breaking Change Description:		**Origination ID:**	
CIM Impacted Groups:	WG13, WG14, WG16, WG21	**Originally Assigned To:**	
Requestor:	Tom Berry		

Description

A known omission in the CIM models is a standard way of describing the confidence levels of a forecast.
Commercial services provide APIs with various methods.

A simple extension to the CIM could follow this example:

https://docs.meteoblue.com/en/weather-apis/forecast-api/forecast-data

Predictability
A single weather forecasts model cannot be optimized for all weather conditions and areas. meteoblue operates a large number of weather models and collects data from multiple national weather services. Some models are more suitable for complex alpine terrain, while other models calculate fog conditions more precise. By combining multiple forecast models with statistics and machine learning algorithms, meteoblue calculates a learning multi-model forecasts (mLM). A byproduct of this approach is the ability to estimate the accuracy of the current forecast for each location.
If the majority of forecast models predicts the same weather conditions for a given location and achieve consensus, a high predictability is indicated. The predictability is given in percent, as well as a predictability_class which is just a simpler representation for the percentage value.

Predictability   0-100   %
Predictability class   0 - 5   1 = very low, 5 = very high

Existing CIM models
Core::BasicIntervalSchedule   used for load forecasts, generation forecasts
Environmental::Forecast

History

#1 - 11/18/2024 05:06 PM - Becky Iverson

11/18/2024: Discussed possible additions to the Forecast class in the Enviromental package. Considering additions for new attributes confidence (percentage) and/or confidenceRange (enum of high, medium and low). Plans to continue discussion in the next Environmental Data Team meeting on 11/25/2024.

#2 - 11/19/2024 04:30 AM - Tom Berry

PLUS
If there are multiple forecasts for the same location & time intervals, then attributes are needed to distinguish which series is which.

Draft IEC 63402 for home/buildings EMS defines a forecast as an array of PowerForecastValue, where PowerForecastValue has multiple values per time slot.

Mandatory
value_expected The expected power value

Optional (1)
value_upper_limit The upper boundary of the range with 100 % certainty the power value is in it
value_lower_limit The lower boundary of the range with 100 % certainty the power value is in it

Optional (2)
value_upper_95PPR The upper boundary of the range with 95 % certainty the power value is in it
value_upper_68PPR The upper boundary of the range with 68 % certainty the power value is in it
value_lower_68PPR The lower boundary of the range with 68 % certainty the power value is in it
value_lower_95PPR The lower boundary of the range with 95 % certainty the power value is in it

If the values were represented in CIM as seven different time series then they could be distinguished by enumerated and/or numeric attributes:
100 = upper limit
95 = upper two sigma boundary
68 = upper one sigma boundary
50 = expected
32 = lower one sigma boundary
5   = lower two sigma boundary
0   = lower limit

#3 - 02/27/2025 05:52 PM - Becky Iverson

2/27: UCATF16 briefly discussed and noted a number of other types of modeling references to confidence, uncertainty.
Operations::ERTConfidenceKind (high, low)
EnvDomain::UncertaintyKind (estimated, interpolated, standard, unknown)
ExtSchedule::TimeSeriesInterpolationKind (linear, next, none, previous, zero)

#4 - 03/11/2025 05:38 AM - Jan Owe

- File EnergyPrognosis - uncertainty in timeseries.pdf added

In the attached presentation we can see how "UncertaintyPercentage" is used in the ESMP EnergyPrognosis_MarketDocument. But there are, and will be, other ways of specifying this kind of information.

Files

EnergyPrognosis - uncertainty in timeseries.pdf	472 KB	03/11/2025		Jan Owe