Global Certificate Course in Electricity Price Forecasting

Time Series Analysis In Power Markets

AECO: The Alberta Electric System Operator, responsible for the reliable operation of the Alberta electric system, is a key player in the time series analysis of power markets. AECO uses various techniques, including forecasting and modeling, to ensure a balance between electricity supply and demand. Related terms include load forecasting and generation scheduling.

ACF: The autocorrelation function (ACF) is a statistical tool used to analyze the correlation between values in a time series at different points in time. In the context of power markets, ACF is used to identify patterns and trends in electricity demand and prices. Related terms include PACF (partial autocorrelation function) and spectral analysis.

ARIMA: AutoRegressive Integrated Moving Average (ARIMA) models are widely used in time series forecasting to predict future values in a time series based on past patterns and trends. In power markets, ARIMA models are used to forecast electricity demand and prices. Related terms include exponential smoothing and seasonal decomposition.

Availability: The availability of a power plant or generator refers to the percentage of time it is available to produce electricity. In time series analysis, availability is an important factor in predicting electricity supply and demand. Related terms include capacity factor and forced outage rate.

Backcasting: Backcasting is a technique used in time series analysis to estimate past values of a time series based on current and future values. In power markets, backcasting is used to estimate past electricity demand and prices. Related terms include nowcasting and forecasting.

Base Load: The base load refers to the minimum amount of electricity required to meet the constant demand of a power system. In time series analysis, base load is an important factor in predicting electricity demand and prices. Related terms include peak load and load duration curve.

CAC: The California Independent System Operator (CAISO) is a key player in the time series analysis of power markets. CAISO uses various techniques, including forecasting and modeling, to ensure a balance between electricity supply and demand. Related terms include load forecasting and generation scheduling.

Capacity Factor: The capacity factor of a power plant or generator refers to the percentage of its maximum potential output that is actually produced over a given period. In time series analysis, capacity factor is an important factor in predicting electricity supply and demand. Related terms include availability and forced outage rate.

Changepoint Detection: Changepoint detection is a technique used in time series analysis to identify points in time where the underlying distribution of a time series changes. In power markets, changepoint detection is used to identify changes in electricity demand and prices. Related terms include anomaly detection and regime switching.

Co-integration: Co-integration is a statistical technique used to analyze the long-term relationships between two or more time series. In power markets, co-integration is used to analyze the relationships between electricity demand, prices, and other factors. Related terms include vector autoregression and error correction model.

Correlogram: A correlogram is a graphical representation of the autocorrelation function (ACF) and partial autocorrelation function (PACF) of a time series. In power markets, correlograms are used to identify patterns and trends in electricity demand and prices. Related terms include spectral analysis and cross-correlation.

Cross-correlation: Cross-correlation is a statistical technique used to analyze the correlation between two or more time series at different points in time. In power markets, cross-correlation is used to analyze the relationships between electricity demand, prices, and other factors. Related terms include co-integration and vector autoregression.

Day-ahead Market: The day-ahead market is a type of electricity market where generators and load-serving entities submit bids to buy or sell electricity for the next day. In time series analysis, day-ahead market prices are used to predict future electricity prices. Related terms include real-time market and forward market.

Demand Response: Demand response refers to the ability of electricity consumers to adjust their demand in response to changes in electricity prices or other factors. In time series analysis, demand response is an important factor in predicting electricity demand and prices. Related terms include load management and peak shaving.

Dispatch: Dispatch refers to the process of scheduling and controlling the output of power plants and other generators to meet electricity demand. In time series analysis, dispatch is an important factor in predicting electricity supply and demand. Related terms include unit commitment and economic dispatch.

Economic Dispatch: Economic dispatch refers to the process of scheduling and controlling the output of power plants and other generators to minimize costs and maximize efficiency. In time series analysis, economic dispatch is an important factor in predicting electricity supply and demand. Related terms include unit commitment and dispatch.

Energy Storage: Energy storage refers to the ability to store excess energy for later use. In time series analysis, energy storage is an important factor in predicting electricity supply and demand. Related terms

include battery storage and pumped hydro storage.

Exponential Smoothing: Exponential smoothing is a statistical technique used to forecast future values in a time series based on past patterns and trends. In power markets, exponential smoothing is used to forecast electricity demand and prices. Related terms include ARIMA and seasonal decomposition.

Forecasting: Forecasting refers to the process of predicting future values in a time series based on past patterns and trends. In power markets, forecasting is used to predict electricity demand and prices. Related terms include nowcasting and backcasting.

Fourier Analysis: Fourier analysis is a statistical technique used to decompose a time series into its component frequencies. In power markets, Fourier analysis is used to identify patterns and trends in electricity demand and prices. Related terms include spectral analysis and cross-correlation.

Frequency Domain: The frequency domain refers to the representation of a time series in terms of its component frequencies. In power markets, the frequency domain is used to analyze patterns and trends in electricity demand and prices. Related terms include time domain and Fourier analysis.

Generation Scheduling: Generation scheduling refers to the process of scheduling and controlling the output of power plants and other generators to meet electricity demand. In time series analysis, generation scheduling is an important factor in predicting electricity supply and demand. Related terms include unit commitment and economic dispatch.

Grid: The grid refers to the network of transmission lines, distribution lines, and other infrastructure used to deliver electricity from power plants to consumers. In time series analysis, the grid is an important factor in predicting electricity supply and demand. Related terms include transmission and distribution.

Hybrid Model: A hybrid model is a type of time series model that combines different techniques, such as ARIMA and machine learning, to forecast future values in a time series. In power markets, hybrid models are used to forecast electricity demand and prices. Related terms include ensemble model and stacking.

Inertia: Inertia refers to the tendency of a time series to resist changes in its pattern or trend. In power markets, inertia is an important factor in predicting electricity demand and prices. Related terms include momentum and trend.

Intermittent Resource: An intermittent resource refers to a type of power plant or generator that produces electricity intermittently, such as solar or wind power. In time series analysis, intermittent resources are an important factor in predicting electricity supply and demand. Related terms include renewable energy and variable generation.

Inverse Demand Function: The inverse demand function refers to the relationship between electricity prices and demand. In time series analysis, the inverse demand function is used to predict electricity demand and

prices. Related terms include demand curve and supply curve.

ISO: An Independent System Operator (ISO) is an organization responsible for managing the flow of electricity on the grid. In time series analysis, ISOs play a critical role in predicting electricity supply and demand. Related terms include transmission system operator and grid operator.

Kalman Filter: The Kalman filter is a statistical technique used to estimate the state of a time series based on noisy measurements. In power markets, the Kalman filter is used to estimate electricity demand and prices. Related terms include state-space model and Bayesian inference.

Load Duration Curve: The load duration curve refers to the relationship between electricity demand and the duration of that demand. In time series analysis, the load duration curve is used to predict electricity demand and prices. Related terms include load profile and peak load.

Load Factor: The load factor refers to the ratio of average electricity demand to peak electricity demand. In time series analysis, the load factor is an important factor in predicting electricity demand and prices. Related terms include peak load and base load.

Load Forecasting: Load forecasting refers to the process of predicting future electricity demand based on past patterns and trends. In power markets, load forecasting is used to predict electricity demand and prices. Related terms include demand forecasting and peak load forecasting.

Load Management: Load management refers to the process of controlling electricity demand to match available supply. In time series analysis, load management is an important factor in predicting electricity demand and prices. Related terms include demand response and peak shaving.

Load Profile: The load profile refers to the pattern of electricity demand over a given period. In time series analysis, the load profile is used to predict electricity demand and prices. Related terms include load duration curve and peak load.

LMP: The Locational Marginal Price (LMP) refers to the price of electricity at a specific location on the grid. In time series analysis, LMPs are used to predict electricity prices. Related terms include nodal price and zonal price.

Machine Learning: Machine learning refers to a type of artificial intelligence used to forecast future values in a time series based on past patterns and trends. In power markets, machine learning is used to forecast electricity demand and prices. Related terms include deep learning and neural network.

Mean Absolute Error: The mean absolute error (MAE) refers to the average difference between forecasted and actual values in a time series. In power markets, MAE is used to evaluate the accuracy of electricity demand and price forecasts. Related terms include mean squared error and root mean squared error.

Mean Reversion: Mean reversion refers to the tendency of a time series to revert to its historical mean over time. In power markets, mean reversion is an important factor in predicting electricity demand and prices. Related terms include trend and stationarity.

Microgrid: A microgrid refers to a small-scale grid that operates independently of the main grid. In time series analysis, microgrids are an important factor in predicting electricity supply and demand. Related terms include distributed generation and energy storage.

Monte Carlo Simulation: The Monte Carlo simulation is a statistical technique used to estimate the uncertainty of a time series based on random sampling. In power markets, Monte Carlo simulations are used to estimate the uncertainty of electricity demand and prices. Related terms include uncertainty analysis and risk analysis.

Nodal Price: The nodal price refers to the price of electricity at a specific node on the grid. In time series analysis, nodal prices are used to predict electricity prices. Related terms include locational marginal price and zonal price.

Non-stationarity: Non-stationarity refers to the property of a time series where its statistical properties change over time. In power markets, non-stationarity is an important factor in predicting electricity demand and prices. Related terms include stationarity and trend.

Nowcasting: Nowcasting refers to the process of predicting the current or very near future values of a time series based on current and past patterns and trends. In power markets, nowcasting is used to predict current electricity demand and prices. Related terms include forecasting and backcasting.

Operational Risk: Operational risk refers to the risk of loss or damage to a power system or grid due to operational failures or errors. In time series analysis, operational risk is an important factor in predicting electricity supply and demand. Related terms include market risk and credit risk.

Peak Load: The peak load refers to the maximum amount of electricity required to meet demand at a given time. In time series analysis, peak load is an important factor in predicting electricity demand and prices. Related terms include base load and load duration curve.

Peak Shaving: Peak shaving refers to the process of reducing peak electricity demand to match available supply. In time series analysis, peak shaving is an important factor in predicting electricity demand and prices. Related terms include load management and demand response.

PJM: The Pennsylvania-New Jersey-Maryland (PJM) Interconnection is a regional transmission organization that coordinates the flow of electricity in the northeastern United States. In time series analysis, PJM plays a critical role in predicting electricity supply and demand. Related terms include independent system operator and grid operator.

Power Flow: Power flow refers to the flow of electricity through the grid from power plants to consumers. In time series analysis, power flow is an important factor in predicting electricity supply and demand. Related terms include transmission and distribution.

Price Forecasting: Price forecasting refers to the process of predicting future electricity prices based on past patterns and trends. In power markets, price forecasting is used to predict electricity prices. Related terms include load forecasting and demand forecasting.

Real-time Market: The real-time market is a type of electricity market where generators and load-serving entities submit bids to buy or sell electricity in real-time. In time series analysis, real-time market prices are used to predict future electricity prices. Related terms include day-ahead market and forward market.

Regime Switching: Regime switching refers to the process of identifying changes in the underlying distribution of a time series over time. In power markets, regime switching is used to identify changes in electricity demand and prices. Related terms include changepoint detection and anomaly detection.

Renewable Energy: Renewable energy refers to energy generated from natural resources that can be replenished over time, such as solar or wind power. In time series analysis, renewable energy is an important factor in predicting electricity supply and demand. Related terms include intermittent resource and variable generation.

Reserve Margin: The reserve margin refers to the amount of excess electricity generating capacity available to meet peak demand. In time series analysis, the reserve margin is an important factor in predicting electricity supply and demand. Related terms include peak load and base load.

Risk Analysis: Risk analysis refers to the process of identifying and evaluating potential risks or uncertainties in a time series. In power markets, risk analysis is used to evaluate the uncertainty of electricity demand and prices. Related terms include uncertainty analysis and Monte Carlo simulation.

Seasonal Decomposition: Seasonal decomposition refers to the process of decomposing a time series into its component seasonal patterns. In power markets, seasonal decomposition is used to identify seasonal patterns in electricity demand and prices. Related terms include trend and stationarity.

Seasonality: Seasonality refers to the property of a time series where its values exhibit regular fluctuations over a fixed period. In power markets, seasonality is an important factor in predicting electricity demand and prices. Related terms include trend and stationarity.

Smart Grid: A smart grid refers to a modernized grid that uses advanced technologies, such as sensors and communication systems, to manage the flow of electricity. In time series analysis, smart grids are an important factor in predicting electricity supply and demand. Related terms include grid modernization and energy storage.

Spectral Analysis: Spectral analysis refers to the process of decomposing a time series into its component frequencies. In power markets, spectral analysis is used to identify patterns and trends in electricity demand and prices. Related terms include Fourier analysis and cross-correlation.

Stochastic Process: A stochastic process refers to a mathematical model that describes the behavior of a time series in terms of probability distributions. In power markets, stochastic processes are used to model electricity demand and prices. Related terms include Markov chain and Brownian motion.

Stationarity: Stationarity refers to the property of a time series where its statistical properties remain constant over time. In power markets, stationarity is an important factor in predicting electricity demand and prices. Related terms include non-stationarity and trend.

Supply Curve: The supply curve refers to the relationship between electricity prices and supply. In time series analysis, the supply curve is used to predict electricity supply and demand. Related terms include demand curve and inverse demand function.

Time Domain: The time domain refers to the representation of a time series in terms of its values over time. In power markets, the time domain is used to analyze patterns and trends in electricity demand and prices. Related terms include frequency domain and Fourier analysis.

Time Series: A time series refers to a sequence of values measured at regular time intervals. In power markets, time series are used to analyze and forecast electricity demand and prices. Related terms include forecasting and nowcasting.

Time Series Analysis: Time series analysis refers to the process of analyzing and forecasting time series data. In power markets, time series analysis is used to predict electricity demand and prices. Related terms include forecasting and nowcasting.

Trend: A trend refers to the long-term pattern or direction of a time series. In power markets, trends are an important factor in predicting electricity demand and prices. Related terms include seasonality and stationarity.

Unit Commitment: Unit commitment refers to the process of scheduling and controlling the output of power plants and other generators to meet electricity demand. In time series analysis, unit commitment is an important factor in predicting electricity supply and demand. Related terms include generation scheduling and economic dispatch.

Variable Generation: Variable generation refers to the output of power plants or generators that produce electricity intermittently, such as solar or wind power. In time series analysis, variable generation is an important factor in predicting electricity supply and demand. Related terms include intermittent resource and renewable energy.

Vector Autoregression: Vector autoregression (VAR) is a statistical technique used to analyze the relationships between multiple time series. In power markets, VAR is used to analyze the relationships between electricity demand, prices, and other factors. Related terms include co-integration and error correction model.

Volatility: Volatility refers to the degree of uncertainty or randomness in a time series. In power markets, volatility is an important factor in predicting electricity demand and prices. Related terms include risk analysis and uncertainty analysis.

Weather Forecasting: Weather forecasting refers to the process of predicting future weather conditions. In power markets, weather forecasting is used to predict electricity demand and prices. Related terms include load forecasting and price forecasting.

Zonal Price: The zonal price refers to the price of electricity in a specific zone or region on the grid. In time series analysis, zonal prices are used to predict electricity prices. Related terms include locational marginal price and nodal price.