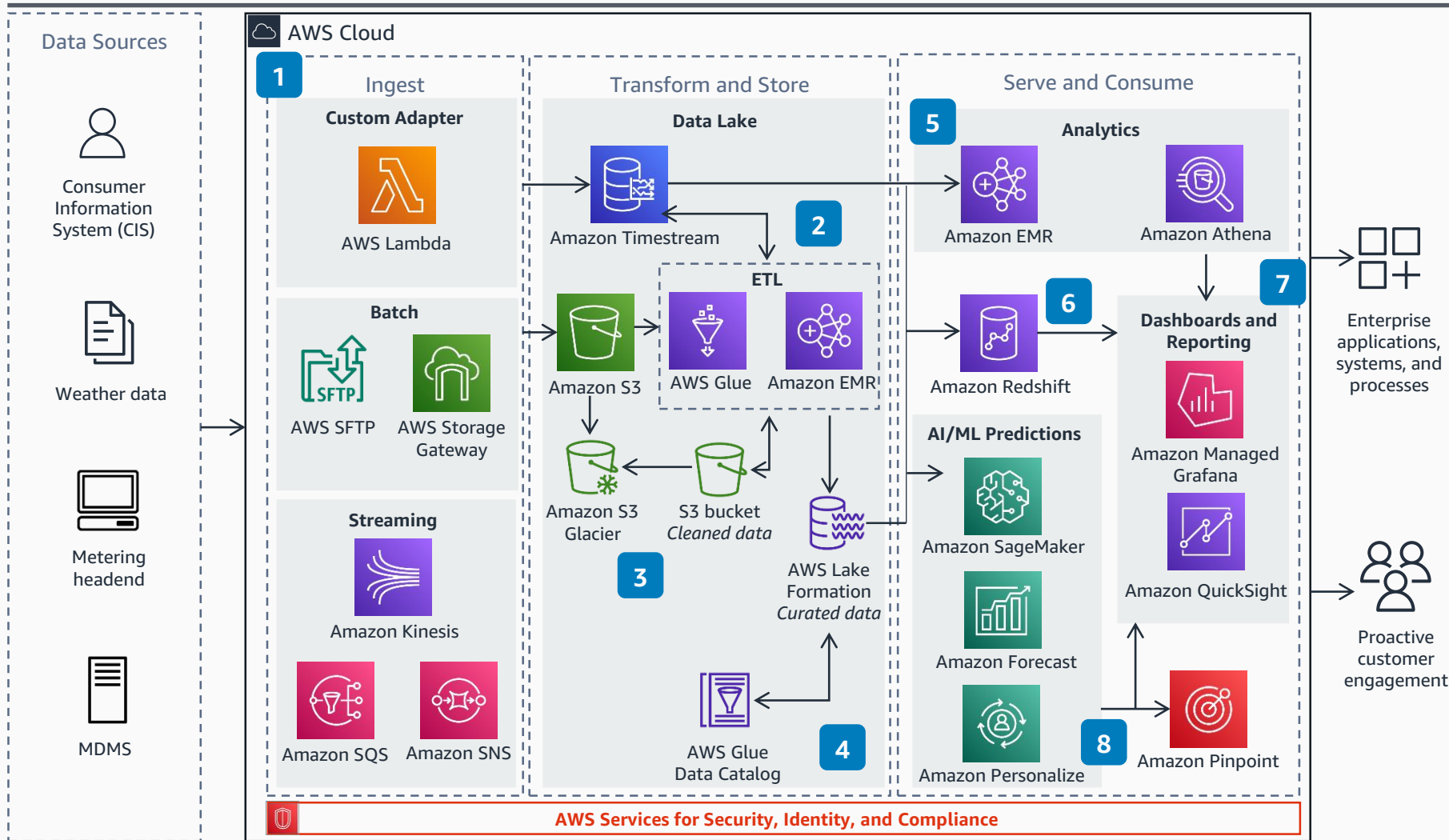# Guidance for Meter Data Analytics on AWS

This Architecture Diagram is an enhanced version which automatically deploys the following new features: data lake, data ingestion/ML pipelines, visualization components, HCS simulator, and enhanced load testing.

1 Choose from multiple AWS tools to ingest customer and meter data, such as **AWS Lambda** for custom adapters, **AWS SFTP** and **AWS Storage Gateway** for batch processing, and **Amazon Kinesis, Amazon Simple Notification Service (Amazon SNS)** and **Amazon Simple Queue Service (Amazon SQS)** for streaming data.

2 Use **Amazon Timestream** to store time-series data, **AWS Glue** and **Amazon EMR** to process data, and **Amazon Simple Storage Service (Amazon S3)** for raw data and archival storage. The time-series data can be sent directly to analytic services like **Amazon EMR** and **Amazon Athena** for further processing.

3 Get raw data from the **S3** bucket and send it to **AWS Glue** and **Amazon EMR** to automate extract, transform, and load (ETL) processes or for value-add processing. Use **Amazon S3 Glacier** for archival copies and retention compliance.

4 Your final clean and curated data sets are stored in an **S3** bucket within a data lake. Create a metadata catalog with **AWS Glue Data Catalog** to make all data visible and searchable. Keep data secure with **AWS Security, Identity, and Compliance** services.

5 Perform complex analytics with **Amazon EMR**. Perform one-time data discovery and query against your data lake and warehouse with **Athena**.

6 Query petabytes of structured, time-series, and semi-structured data using standard SQL with **Amazon Redshift**.

7 Create and publish interactive dashboards that include AI/ML insights with **Amazon QuickSight** or **Amazon Managed Grafana**.

8 Use **Amazon SageMaker**, **Amazon Forecast**, and **Amazon Personalize** to detect grid anomalies, forecast energy usage, and predict equipment failures. **Amazon Pinpoint** lets you communicate with customers and measure customer engagement. Combine analytics and ML outputs with **Amazon Pinpoint** to create personalized customer target segments and campaigns.

AWS Reference Architecture