Energy Consumption Dashboarding using Snowflake & Tableau

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Project Link: https://listwr.com/o7dQjj

Tools Used: AWS , Snowflake, SQL, Tableau, Tableau Cloud

Executive Summary

End-to-End Data Analytics Pipeline

Developed an end-to-end **data analytics pipeline** for energy consumption analysis.

Automated Data Ingestion

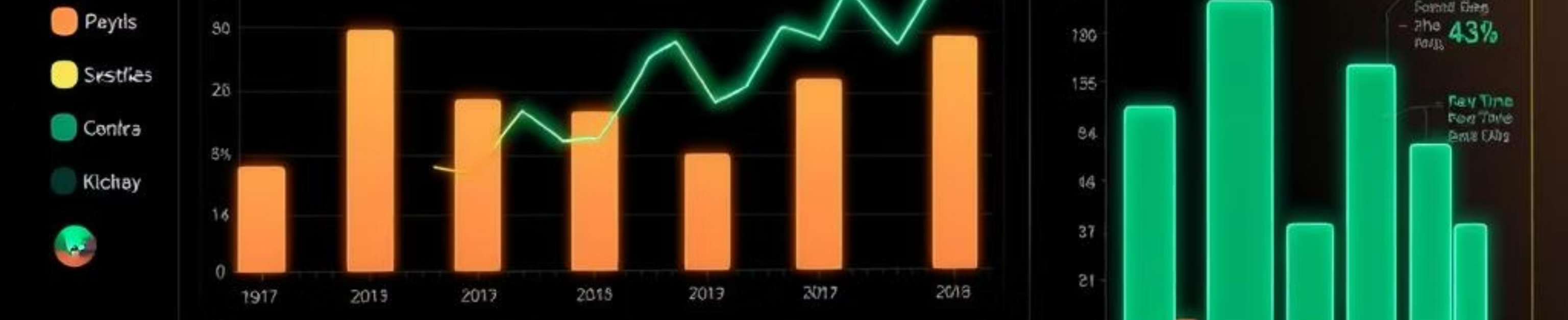Automated **data ingestion from AWS S3 → Snowflake → Tableau**.

Dashboard Creation

Created dashboards to track **monthly usage & cost savings** across regions, countries, and energy sources.

Delivered Key Insights

Delivered **insights on consumption patterns and savings by income level**.

Problem Statement / Objective

Problem Statement

- Rising global energy demand requires **data-driven insights** for efficient resource usage.

- Lack of visibility into **regional, income-based, and source-wise consumption**.
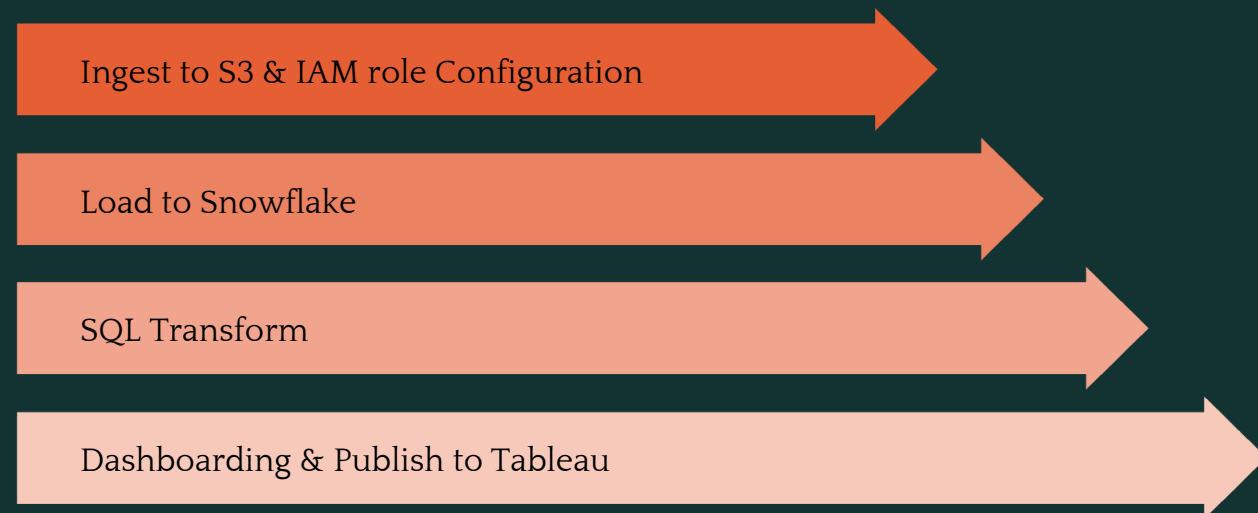
Objective

- Build dashboards to **track, compare, and analyze** energy usage.

- Identify patterns to improve **sustainability and cost-saving strategies**.

Dataset Description

- **Source:** Renewable Energy Usage dataset (CSV) uploaded to AWS S3.

- **Size:** Approx. 1000+ data rows.

- **Key Fields:** Region, Country, Income Level, Energy Source, Monthly Usage, Cost Savings.

- **Data Type:** Time-series + categorical + numerical.

Data Pipeline Workflow

Ingest to S3 & IAM role Configuration

Load to Snowflake

SQL Transform

Dashboarding & Publish to Tableau

1. **Amazon S3 bucket** created for dataset storage.

2. Configured **IAM role & trust policy** for Snowflake integration.

3. Loaded dataset into **Snowflake SQL worksheet**.

4. Performed **transformations in Snowflake**.

5. Connected data to **Tableau dashboards** & published to **Tableau Cloud**.

Data Transformations

Adjusted Monthly Usage by Income Level

- +10% (Low Income)
- +20% (Middle Income)
- +30% (High Income)

Adjusted Cost Savings by Income Level

- −10% (Low Income)
- −20% (Middle Income)
- −30% (High Income)

Data Cleaning

Cleaned missing values & standardized fields.

Dashboards & Insights

Dashboard 1: Monthly Usage Analysis

- By Region, Country, Energy Source

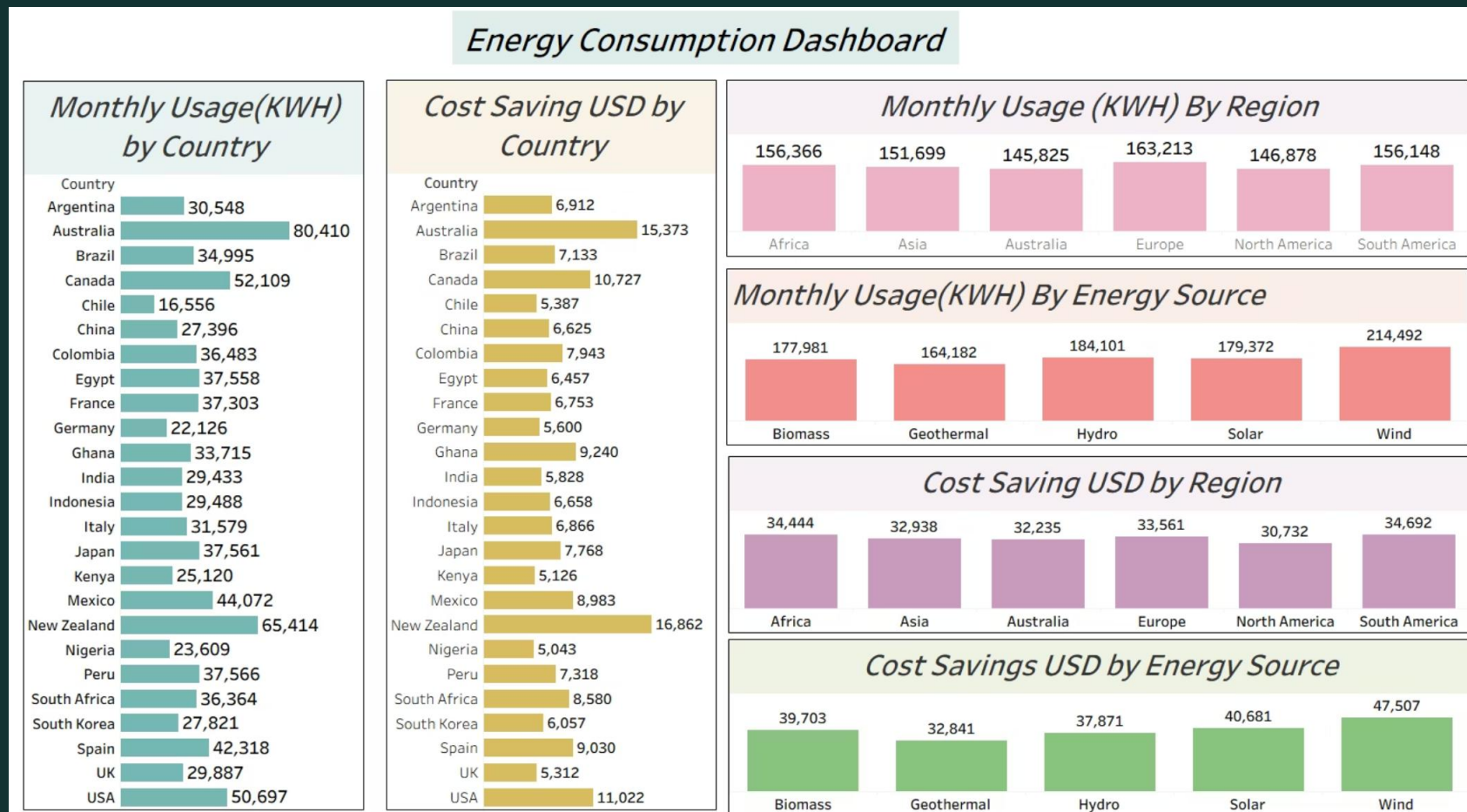### Dashboard 2: Cost Savings Analysis

- By Region, Country, Energy Source

Key Insights:

- High-income regions show **higher consumption growth rates**.
- Low-income groups achieve **better cost efficiency** per unit of energy.
- Renewable adoption varies strongly by **region & source** (e.g., solar/wind dominance).

Results :

Scalable Cloud-Based Pipeline

Built a **scalable cloud-based pipeline** (S3 → Snowflake → Tableau Cloud).

Interactive Dashboards

Delivered **interactive dashboards** for energy stakeholders.

Income-Based Demand Patterns

Insights highlight **income-based demand patterns** & **optimization opportunities**.

Possible Impact & Business Value

Improved Visibility

Improved **visibility into renewable energy adoption**.

Data-Driven Decisions

Supports **data-driven decisions** for governments & energy companies.

Scalable Solution

Scalable solution for **future datasets & advanced analytics (e.g., ML forecasting)**.

Challenges & Learnings

Challenges:

- Cloud integration setup
- Trust policy configuration

Learnings:

- Hands-on with **end-to-end cloud data pipelines**.
- Stronger **SQL + Tableau Cloud** skills.

Conclusion

- Successfully developed a **cloud-to-dashboard solution** for energy analytics.

- Showed that **integrating cloud platforms with BI tools delivers scalable, actionable insights.**