AI Energy Assistant - Practical Production Implementation Plan

1. Requirements & Scope Finalization

- Define user personas (residential/commercial)

- Confirm data sources: smart meters, CRM, billing systems

- Use cases: Monitoring, Billing Insights, Forecasting, Tariff Optimization, LLM Q&A

2. System Architecture Design

- Frontend: Streamlit / React

- Backend: FastAPI / Flask

- Database: PostgreSQL / Snowflake

- LLM: OpenAI API / Hosted LLaMA

- Data Pipelines: Airflow / Dagster

- Security: OAuth2, Role-based Access, Secret Management

3. Development Phases

Phase 1: Ingestion, visualization, OpenAI tips, basic Streamlit UI

Phase 2: Modular API backend (upload, tips, forecast, recommend)

Phase 3: Interactive frontend, customer filtering

Phase 4: Real-time sync, ETL pipelines, Redis caching

4. Deployment & DevOps

- Cloud: AWS / Azure / GCP

- CI/CD: GitHub Actions

- Containers: Docker, K8s/ECS

- Monitoring: Prometheus, Grafana, CloudWatch

5. Security & Compliance

- GDPR & EU AI Act alignment

- Secure LLM API keys or private LLaMA models

- API Gateway with rate limiting

- LLM output logging

6. Rollout & Enablement

- Pilot with test accounts

- Customer feedback loop

- Admin dashboards for provider visibility

7. Suggested Timeline (16 Weeks)

Weeks 1-2: Requirements & Architecture

Weeks 3-5: Backend + Prompt Modules

Weeks 6-8: UI Dashboards + AI Forecasts

Weeks 9-10: ETL + Real-Time Sync

Weeks 11-12: Security + DevOps

Weeks 13-14: UAT & QA

Weeks 15-16: Go Live & Support

Tech Stack Summary

UI   : Streamlit / React

Backend   : FastAPI / Flask

Database : PostgreSQL / Redis

LLM   : OpenAI / Azure OpenAI / LLaMA

Visuals   : Plotly / Altair

DevOps   : Docker, GitHub Actions, AWS

Security : OAuth2, HTTPS, Vault