Two-Hour Presentation Flow

1. Welcome & Context Setting (10 minutes)

Welcome and Introduction (2 minutes):  
Briefly introduce yourself and share the agenda.

Why Energy Matters (8 minutes):

Discuss the enormous global investments and real-world impact of energy systems.

Introduce the Energy Trilemma (sustainability, reliability, affordability) using everyday analogies (e.g., comparing energy grids to road networks).

2. Foundations of Energy Systems (25 minutes)

What Are Energy Systems? (10 minutes):

Define energy systems in layman’s terms.

Explain the flow of energy—from generation to consumption—using simple diagrams.

Variable Renewable Energy & Associated Challenges (5 minutes):

Discuss the intermittency of renewables and the impact on grid reliability.

Use visuals to illustrate how variability can create challenges.

Demand-Side Management (5 minutes):

Explain the concept and its importance in balancing supply and demand.

Understanding Power Flow (5 minutes):

Introduce basic power flow concepts using clear analogies (like water flowing through pipes).

3. Fundamentals of Energy System Modelling (25 minutes)

Why Model Energy Systems? (5 minutes):

Explain the need for simulation and optimization in planning energy networks.

Networks & Graph Theory (10 minutes):

Introduce key concepts of network modeling.

Use simple network diagrams to illustrate nodes and connections.

Optimization Fundamentals (10 minutes):

Cover the basics of optimization theory with real-world examples (e.g., planning an efficient road trip).

Relate these concepts to how energy models optimize grid performance.

4. Introduction to PyPSA (20 minutes)

Overview of PyPSA (5 minutes):

Explain what PyPSA is and its role in energy system modelling.

Deep Dive into Components (10 minutes):

Break down PyPSA’s key components (e.g., network creation, simulation, and optimization modules).

Use visual aids to illustrate how these components work together.

Contextualizing PyPSA in Real-World Problems (5 minutes):

Link back to earlier sections by showing how PyPSA addresses challenges in renewable integration, grid stability, and demand-side management.

5. Live Demonstration (30 minutes)

Demo Setup Overview (5 minutes):

Introduce the demo environment (Jupyter Notebook, GitHub repo, etc.) and the goals of the demonstration.

Step-by-Step Walkthrough (20 minutes):

Build a basic PyPSA model live:

Show network setup.

Demonstrate parameter adjustments (e.g., renewable energy inputs).

Highlight optimization outcomes.

Interactive Elements (5 minutes):

Engage the audience with live polls or questions (e.g., “What do you expect will happen if we tweak this parameter?”) to foster real-time participation.

6. Wrap-Up & Extended Q&A (10 minutes)

Recap & Key Takeaways (5 minutes):

Summarize the energy trilemma, the fundamentals of energy systems, modelling techniques, and PyPSA’s role.

Open Q&A Session (5 minutes):

Address audience questions, clarifying any complex concepts, and invite further discussion.

Call to Action:

Direct participants to your GitHub repo for additional materials, code samples, and further reading.