Objective:
Design and implement a scalable and robust system to manage energy flow within a dynamic power grid, orchestrating the allocation and analysis of energy among generators, intermediaries, and consumers.

Problem Statement:
In our imaginative scenario, consider a world where different power generators produce energy. These generators distribute energy to various nodes, which may further distribute the received energy to subsequent nodes or consumers. The final consumers in the grid are the sink nodes where the energy is ultimately consumed.

Energy Producers (Generators): Each producer generates a specific amount of energy. They distribute this energy evenly amongst connected intermediary nodes.

Intermediary Nodes: These nodes receive energy from either generators or other intermediary nodes. They then distribute the total received energy evenly amongst their connected nodes, which could be either other intermediary nodes or final consumer nodes.

Consumer Nodes (Sinks): The final nodes in the network where energy is consumed. They do not distribute energy further.

Tasks:
Architectural Design: Create a comprehensive architecture that oversees energy flow within the grid, considering scalable data structures and efficient algorithms to manage energy distribution among nodes.

Algorithm Implementation: Develop algorithms to calculate energy distribution from generators to intermediaries and consumers. Consider that nodes distribute its amount of energy equally among its connected nodes.

Additional guidelines:
- Scalability and Adaptability: Construct a system capable of accommodating changes in the network without substantial reconfiguration, supporting different network structures and potential additions of nodes.
- Cyclic Dependency Handling: Implement mechanisms to detect and handle cyclic dependencies to prevent circular energy distributions within the grid. Raise exceptions when such dependencies are detected.

Example:

Generators:
G1 produces 12 MW

G2 produces 20 MW

<u>Intermediaries:</u>
I1 connected to G1 and G2
I2 connected to I1

<u>Consumers:</u>
C1, C2 connected to I2