SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)
COIMBATORE-35
Accredited by NBA-AICTE and Accredited by NAAC – UGC with A++ Grade
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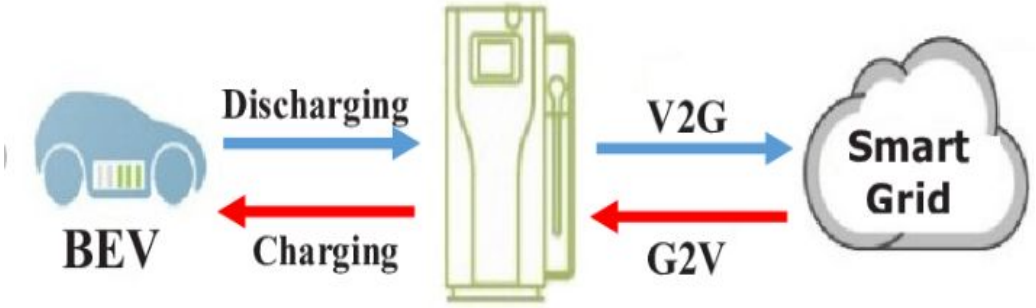
UNIT V: BUSINESS

TOPIC: **V2G, G2V**

Introduction

- **What are V2G and G2V?**
  - **G2V (Grid-to-Vehicle)**: Energy transfer from the grid to charge EV batteries.
  - **V2G (Vehicle-to-Grid)**: EVs supply stored energy back to the grid when needed.
- **Importance**:
  - Balancing grid load.
  - Optimizing renewable energy integration.
  - Reducing energy costs for EV owners.



Energy flow during G2V and V2G operating modes

How V2G and G2V Work

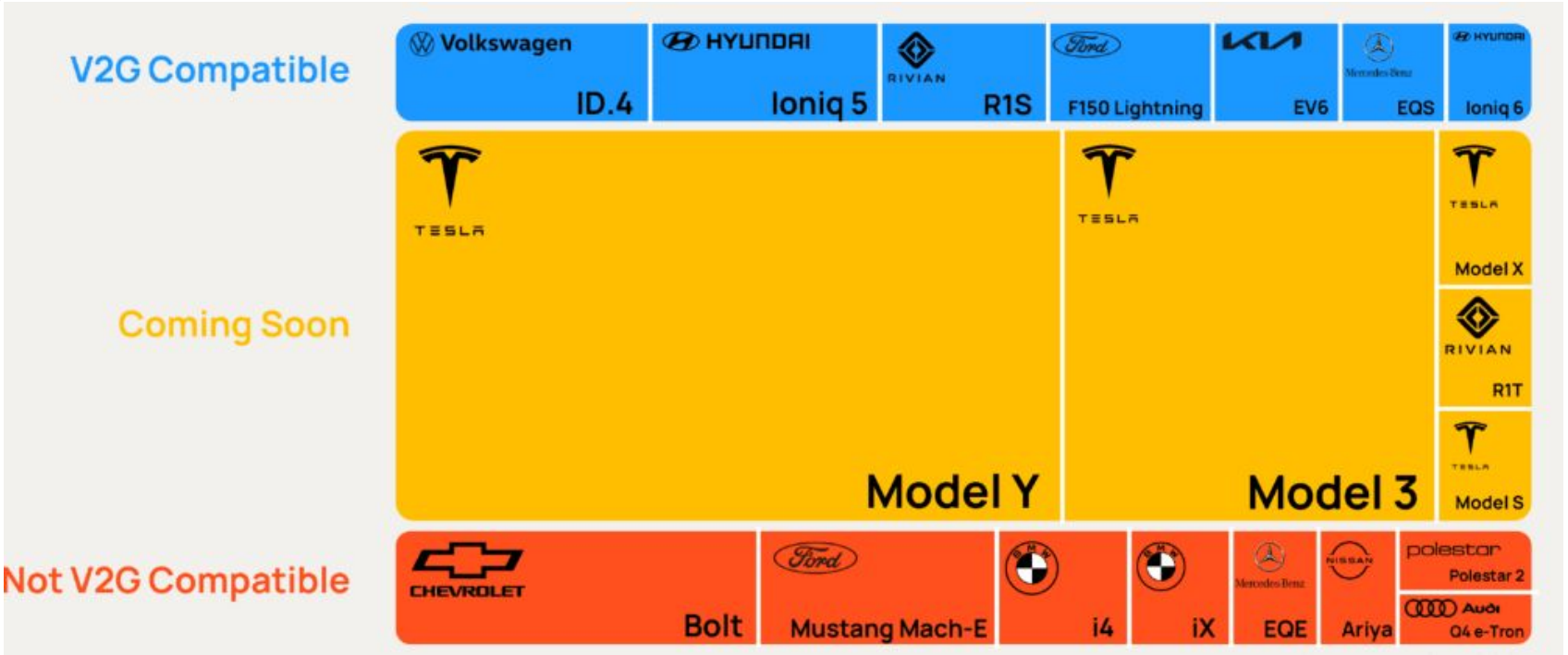
- **Components Involved**:
  - Smart chargers and bidirectional inverters.
  - Connected grid infrastructure.
  - Advanced software for energy management.
- **Energy Flow Cycle**:
  - Charging (G2V) → Energy storage → Discharge to grid (V2G).

Benefits of V2G and G2V

- **For the Grid**:
  - Demand response management.
  - Stabilization during peak loads.
  - Backup power supply during outages.
- **For EV Owners**:
  - Potential to earn income by supplying energy to the grid.
  - Reduced electricity bills.
- **For the Environment**:
  - Efficient use of renewable energy sources.
  - Reduction in reliance on fossil fuel power plants.

Applications of V2G

- **Renewable Energy Integration**:
  - Storing solar/wind energy during off-peak hours.
  - Supporting intermittent energy generation.
- **Fleet Electrification**:
  - Managing large-scale energy for EV fleets.
- **Disaster Recovery**:
  - Powering critical infrastructure during grid failures.


V2G Compatible
Volkswagen ID.4
HYUNDAI Ioniq 5
RIVIAN R1S
Ford F150 Lightning
KIA EV6
Mercedes-Benz EQS
HYUNDAI Ioniq 6
Coming Soon
TESLA Model Y
TESLA Model 3
TESLA Model X
RIVIAN R1T
TESLA Model S
Not V2G Compatible
CHEVROLET Bolt
Ford Mustang Mach-E
BMW i4
BMW iX
Mercedes-Benz EQE
NISSAN Ariya
polestar Polestar 2
Audi Q4 e-Tron

Challenges in Implementation

- **Technical Barriers**:
  - Need for bidirectional charging technology.
  - Battery wear due to frequent charging/discharging.
- **Economic Factors**:
  - High initial cost of infrastructure.
  - Uncertain financial incentives for EV owners.
- **Regulatory Hurdles**:
  - Need for clear policies and standards.

Global Examples of V2G Initiatives

- **Japan**:
  - Nissan's V2G-enabled LEAF for energy balancing.
- **Denmark**:
  - Large-scale V2G projects with renewable energy integration.
- **USA**:
  - Pilot projects in California supporting grid stability.

Future Outlook

- **Projections**:
  - Growing adoption of bidirectional charging systems.
  - Integration with smart cities and IoT-enabled grids.
- **Role of AI and Blockchain**:
  - Optimizing energy transactions.
  - Enhancing grid security.
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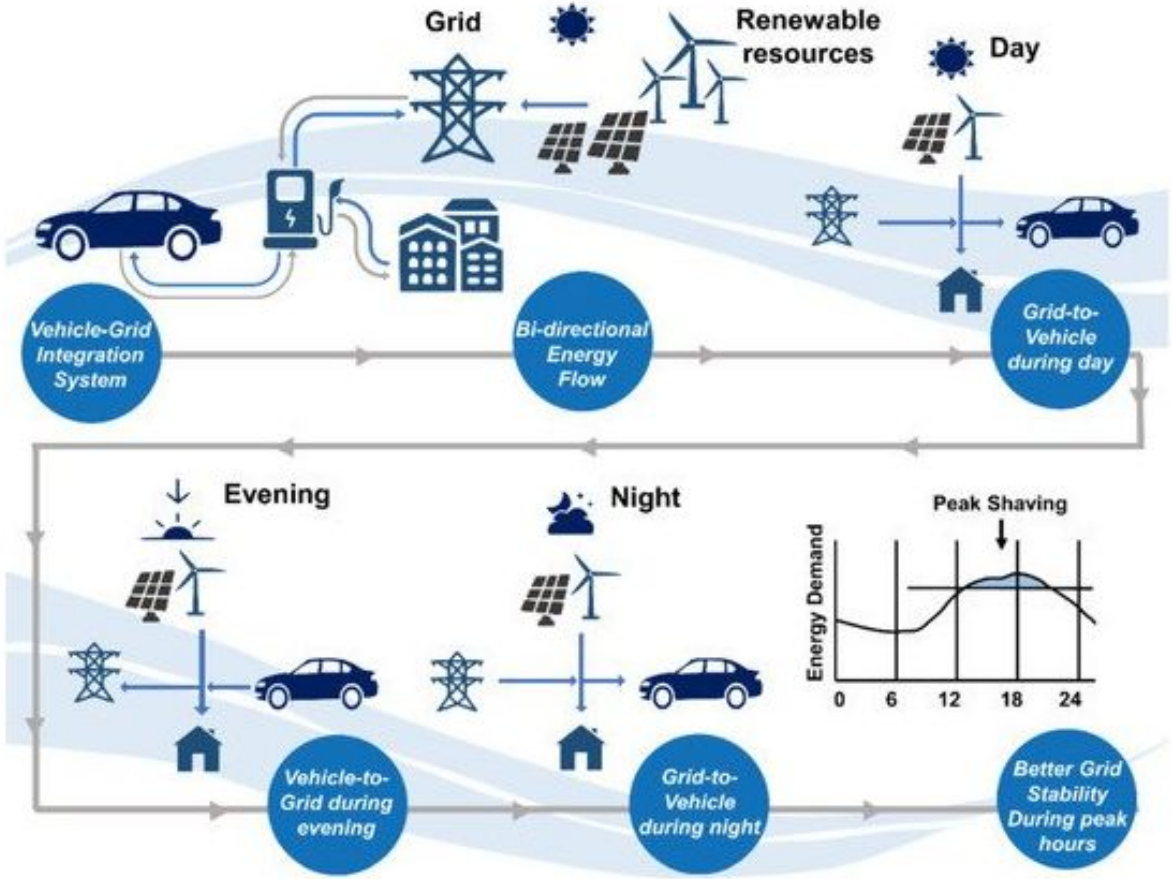
Conclusion

- **Key Takeaways**:
  - V2G and G2V are essential for a sustainable energy ecosystem.
  - Collaboration among governments, utilities, and manufacturers is vital.
  - Early adoption challenges are outweighed by long-term benefits.
- **Call to Action**:
  - “Be part of the revolution—drive smarter, power smarter.”


Grid
Renewable resources
Day
Vehicle-Grid Integration System
Bi-directional Energy Flow
Grid-to-Vehicle during day
Evening
Night
Peak Shaving
Energy Demand
0
6
12
18
24
Vehicle-to-Grid during evening
Grid-to-Vehicle during night
Better Grid Stability During peak hours

…THANK YOU