

SLIDE 1: GLOBAL TRENDS:

2-Wheelers

1. **Current Market Size:** \$116.82 billion in 2023. [Fortune Business Insights](#)
2. **Market Trend:** expected to grow from \$123.54 billion in 2024 to \$215.96 billion by 2032. [Fortune Business Insights.](#)
3. **Projection for Future Size:** projected to reach \$215.96 billion by 2032. [Fortune Business Insights](#)
4. **CAGR:** expected to grow at a CAGR of 2.02% from 2024 to 2030. [Mordor Intelligence](#)
5. **Global and Continental Overview:**
 - Asia-Pacific is the largest market, driven by high sales in India and China. Europe and North America are also significant markets with a growing preference for electric two-wheelers.
 - Source: [Mordor Intelligence](#)

3-Wheelers

1. **Current Market Size:** market size reached US\$ 10.7 billion in 2023. [IMARC Group](#)
2. **Market Trend:** projected to grow from USD 1.3 billion in 2024 to USD 1.5 billion by 2030. [MarketsandMarkets](#)
3. **Projection for Future Size:** expected to hit US\$ 22.5 billion by 2032.: [IMARC Group](#)
4. **CAGR:** expected to grow at a CAGR of 8.6% during 2024-2032. [IMARC Group](#)
5. **Global and Continental Overview:**
 - Asia-Pacific dominates the market, with significant contributions from India and China. Emerging markets in Africa and Latin America are also showing substantial growth.
 - Source: [IMARC Group](#)

SLIDE 2: Indian Market Estimation of Automobile Market (2, 3, and 4 Wheelers)

Current Market Size

1. **Overall Market:** \$121.5 billion in 2024. [Custom Market Insights](#)
2. **Two-Wheelers:** projected to reach a sales volume of 24.89 million units by 2024. [ResearchAndMarkets.com](#)
3. **Three-Wheelers:** 43-48% of new three-wheelers (excluding e-rickshaws) sold in India will be electric vehicles. BY 2024 [EMobility Plus](#)
4. **Four-Wheelers:**
 - The Indian four-wheeler market includes a significant proportion of passenger vehicles, but specific size data for 2024 is not provided.

Market Trend

1. **Growth Trend:** expected to grow to \$247.4 billion by 2033, with a CAGR of 7.13%.
 - Source: [Custom Market Insights](#)
2. **Two-Wheelers:** forecasted to expand at a CAGR of 7.33%, reaching 24.89 million units by 2024 from 21.19 million units. [ResearchAndMarkets.com](#)

Post-Pandemic Outlook

1. **Overall Market:** growth in passenger vehicles, two-wheelers, and three-wheelers sales post-pandemic. [EMobility Plus](#)
2. **Electric Vehicles:** By 2024, 12-17% of new two-wheelers and 43-48% of new three-wheelers sold being electric. [EMobility Plus](#)

Projection for Future Size

1. **Overall Market:** expected to grow from \$121.5 billion in 2024 to \$247.4 billion by 2033. [Custom Market Insights](#)
2. **Two-Wheelers:** expected to reach 24.89 million units by 2024. [ResearchAndMarkets.com](#)
3. **Three-Wheelers:** projected to grow to 1.5 billion by 2030 from 1.3 billion in 2024, with a CAGR of 2.2%. [MarketsandMarkets](#)

CAGR

1. **Overall Market:** projected CAGR of 7.13% from 2024 to 2033. [Custom Market Insights](#)
2. **Two-Wheelers:** projected to expand at a CAGR of 7.33% up to 2024. [ResearchAndMarkets.com](#)

SLIDE 3: Global Market Estimation of BEV Automobile Market (2, 3, and 4 Wheelers)

2-Wheelers

1. **Current Market Size:** market size is expected to be USD 105.30 billion in 2024. [Mordor Intelligence](#)
2. **Projection for Future Size:** projected to grow from USD 105.30 billion in 2024 to USD 185.98 billion by 2030. [Mordor Intelligence](#)
3. **CAGR:** expected to grow at a CAGR of 9.94% from 2024 to 2030. [Mordor Intelligence](#)

3-Wheelers

1. **Current Market Size:** market size is valued at USD 1.3 billion in 2024. [MarketsandMarkets](#)
2. **Projection for Future Size:** projected to grow from USD 1.3 billion in 2024 to USD 1.5 billion by 2030. [MarketsandMarkets](#)
3. **CAGR:** expected to grow at a CAGR of 2.2% from 2024 to 2030.: [MarketsandMarkets](#)

Indian Market Estimation of BEV Vehicles (2, 3, and 4 Wheelers)

Current Market Size

1. **Overall BEV Market:** USD 34.8 billion in 2024. [Mordor Intelligence](#)
2. **2-Wheelers:** expected to reach USD 750 million by 2025. [Arizton](#). 12-17% of new two-wheelers sold in 2024 are expected to be electric. [CRISIL](#)
3. **3-Wheelers:** 43-48% of new three-wheelers sold by 2024 are expected to be electric. [CRISIL](#)

Post-Pandemic Outlook

1. **Overall BEV Market:** expected to reach USD 120 billion by 2030. [Mordor Intelligence](#)

Projection for Future Size

1. **Overall BEV Market:** projected to grow from USD 34.8 billion in 2024 to USD 120 billion by 2030. [Mordor Intelligence](#)
2. **2-Wheelers:** Expected to grow at a CAGR of 44% from 2020 to 2025. [Arizton](#)

CAGR

1. **Overall BEV Market:** CAGR is 22.92% from 2024 to 2030. [Mordor Intelligence](#)
2. **2-Wheelers:** CAGR is 44% from 2020 to 2025. [Arizton](#)

SLIDE 4:Global Market Estimation of Green Fuel Automobile Market (2, 3, and 4 Wheelers)

2-Wheelers

1. **Current Market Size:**\$196 billion in 2021.Source: [Verified Market Research](#)
2. **Projection for Future Size:** \$932 billion by 2030.[Verified Market Research](#)
3. **CAGR:** expected to grow at a CAGR of 17.5% from 2021 to 2030. [Verified Market Research](#)

3-Wheelers

1. **Current Market Size:** USD 1.3 billion in 2024. [MarketsandMarkets](#)
2. **Projection for Future Size:** market is projected to reach USD 1.5 billion by 2030.[MarketsandMarkets](#)
3. **CAGR:** expected to grow at a CAGR of 2.2% from 2024 to 2030. [MarketsandMarkets](#)

Summary

The global green fuel market for 2-wheelers, 3-wheelers, and 4-wheelers is experiencing significant growth. The electric two-wheeler market is projected to grow from USD 196 billion in 2021 to USD 932 billion by 2030, with a CAGR of 17.5%. The electric three-wheeler market is expected to grow from USD 1.3 billion in 2024 to USD 1.5 billion by 2030, with a CAGR of 2.2%. While specific data for green fuel four-wheelers is limited, the overall market trend indicates robust growth across all regions driven by environmental concerns and favorable government policies.

Indian Market Estimation of Green Fuel Automobile Market (2, 3, and 4 Wheelers)

2-Wheelers

1. **Current Market Size:** USD 18.24 billion in 2024. [TechSci Research](#)
2. **CAGR:** 10.50% from 2024 onwards. [TechSci Research](#)

4-Wheelers

1. **Current Market Size:**at \$121.5 billion in 2024. [Custom Market Insights](#)
2. **Projection for Future Size:** reaching \$247.4 billion by 2033. [Custom Market Insights](#)
3. **CAGR:** of 7.13% from 2024 to 2033. [Custom Market Insights](#)

Summary

The Indian market for green fuel automobiles is experiencing robust growth across 2-wheelers, 3-wheelers, and 4-wheelers. The two-wheeler market is expected to grow at a CAGR of 10.50%, reaching significant valuations in the coming years. The three-wheeler market is also expanding rapidly with a strong shift towards electric and CNG vehicles. The four-wheeler market is projected to reach \$247.4 billion by 2033, with a CAGR of 7.13%. This growth is driven by government policies, rising fuel prices, and increasing consumer awareness of sustainable transportation options.

SLIDE 5: Global Market Estimation of Hybrid Automobile Market (2, 3, and 4 Wheelers)

2-Wheelers

1. **Projection for Future Size:** expected to grow significantly over the next decade
2. **CAGR:** grow at a CAGR of 10.6% from 2024 to 2034. [GlobeNewswire](#)
3. **Global and Continental Overview:**
 - o The Asia-Pacific region, particularly India and China, dominates the hybrid two-wheeler market due to large populations, rising urbanization, and supportive government policies.
 - o Source: [Segmented Analysis](#)

4-Wheelers

1. **Current Market Size:** valued at USD 1070.77 billion in 2023. [Grandview Research](#)
2. **CAGR:** of 33.6% from 2024 to 2030. : [Grandview Research](#)
3. **Global and Continental Overview:**
 - o The hybrid 4-wheeler market is witnessing substantial growth in North America, Europe, and Asia-Pacific, driven by stringent emission regulations and consumer demand for greener vehicles.

Summary

The global hybrid vehicle market is expected to grow at a CAGR of 10.6% from 2024 to 2034. The hybrid 4-wheeler market, valued at USD 1070.77 billion in 2023, is projected to grow at a CAGR of 33.6% from 2024 to 2030. Regional markets such as Asia-Pacific, North America, and Europe are key drivers of this growth due to supportive policies and consumer demand for environmentally friendly vehicles.

Indian Market Estimation of Hybrid Automobile Market (2, 3, and 4 Wheelers)

2-Wheelers

1. **Current Market Size:** valued at USD 18.24 billion in 2024. [TechSci Research](#)
2. **Projection for Future Size:** CAGR of 10.50%, though exact future size figures are not specified. [TechSci Research](#)
3. **CAGR:** projected to be 10.50% from 2024 onwards. [TechSci Research](#)

4-Wheelers

1. **Current Market Size:** USD 121.5 billion in 2024. [Custom Market Insights](#)
2. **Projection for Future Size:** is projected to grow to USD 247.4 billion by 2033. [Custom Market Insights](#)
3. **CAGR:** is projected to be 7.13% from 2024 to 2033. [Custom Market Insights](#)

Summary

The Indian hybrid automobile market is on a strong growth trajectory across 2-wheelers, 3-wheelers, and 4-wheelers. The two-wheeler market is projected to grow significantly with a CAGR of 10.50%. The three-wheeler market, while not explicitly detailed, is expected to see positive growth trends. The four-wheeler market is anticipated to grow to USD 247.4 billion by 2033 with a CAGR of 7.13%. The post-pandemic outlook is positive across all segments, driven by increased consumer demand for sustainable and efficient transportation solutions.

SLIDE 6:



SLIDE 7-8:

Market Trends INDIA

1. **Overall BEV Market:**
 - The Indian EV market is projected to see significant adoption rates, with 40%-45% for two-wheelers and 15%-20% for four-wheelers by 2030.
 - Source: [Bain & Company](#)
2. **2-Wheelers:**
 - Electric two-wheelers accounted for 42.55% of the Indian EV market in 2022 and are expected to continue dominating.
 - Source: [LinkedIn](#)
3. **3-Wheelers:**
 - Significant market share in the EV segment, primarily in urban and peri-urban areas.
 - Source: [IDTechEx](#)
4. **4-Wheelers:**
 - Strong growth driven by greater driving ranges and increased consumer acceptance.
 - Source: [Market Research Future](#)

Total Addressable Market (TAM)

- **Global Electric Vehicle Market:** Estimated to grow to USD 802.81 billion by 2027, with a CAGR of 22.6% from 2020 to 2027 .
- **Global Automotive Market:** Estimated at USD 3.8 trillion in 2023 and projected to reach USD 4.8 trillion by 2030 .
- **Battery Electric Vehicles (BEVs):** Projected to dominate the market with significant growth over the next decade .

Serviceable Available Market (SAM)

- **U.S. Electric Vehicle Market:** Expected to grow from USD 24.03 billion in 2020 to USD 137.43 billion by 2028, at a CAGR of 24.3% .
- **Europe Electric Vehicle Market:** Expected to reach USD 802.81 billion by 2027, with a CAGR of 22.6% .

Serviceable Obtainable Market (SOM)

- **Target Segment for New Entrants:** Focus on urban electric mobility solutions, targeting urban areas with high population density and pollution concerns .
- **Market Penetration:** Electric vehicles currently have a market penetration of around 3%, projected to increase to 30% by 2030 in major markets like the U.S., Europe, and China .

Data Representation for PPT

For the PPT, the SAM, TAM, SOM analysis can be illustrated with three concentric circles:

1. **TAM (Outer Circle):** USD 4.8 trillion (Global Automotive Market by 2030).
2. **SAM (Middle Circle):** USD 802.81 billion (Europe EV Market by 2027) and USD 137.43 billion (U.S. EV Market by 2028).
3. **SOM (Inner Circle):** Focusing on the urban electric mobility segment with projections up to a 30% market share by 2030 in key markets.

Data for Visualization

Global Market Trends

- **BEVs:**
 - **Sales Growth:** 6.6 million units in 2021.
 - **Market Share Growth:** 40% increase in 2021.
 - **Key Regions:** China (1.3 million units in 2020), Europe, USA.
 - **Battery Cost Projection:** Fall below \$100 per kWh by 2025.
 - **Government Incentives:** Up to \$7,500 tax credit in the US.
- **HEVs:**
 - **Market Growth:** 15% CAGR from 2015-2020; 21.1% CAGR from 2020-2030.
 - **Key Regions:** Steady growth in regions with less charging infrastructure.
- **Green Fuel Vehicles (Hydrogen Fuel Cell Vehicles):**
 - **Adoption Growth:** Gradual increase from 2015-2020.
 - **Key Regions:** Limited but growing interest due to government incentives.

Market Trends in India

- **BEVs:**
 - **Government Initiatives:** FAME II scheme, ₹10,000 crore budget.
 - **Targets:** 30% EV penetration by 2030.
 - **Key Players:** Tata Motors, Mahindra & Mahindra.
 - **Infrastructure Challenges:** 1,800 public charging stations as of 2021.
 - **Two-Wheeler Market:** 80% of India's EV market.
- **HEVs:**
 - **Key Players:** Tata Motors, Mahindra & Mahindra.
 - **Market Share:** Viewed as a transitional technology.
- **Green Fuel Vehicles:**
 - **Infrastructure Challenges:** Significant for hydrogen production and distribution.

SLIDE 9-10: {Introduction to Battery Electric Vehicles (BEVs)

- **Definition:** Battery Electric Vehicles (BEVs) are fully electric vehicles that rely solely on rechargeable batteries for power, with no internal combustion engine.
- **Background:** BEVs have gained popularity due to advancements in battery technology, increasing environmental concerns, and government incentives promoting clean energy.

Technology Used:

- **Battery Packs:** Lithium-ion batteries are the most common, providing a balance between energy density, cost, and lifespan.
- **Electric Motors:** BEVs use one or more electric motors to convert electrical energy from the batteries into mechanical energy for propulsion.
- **Power Electronics:** Inverters and controllers manage the flow of electricity between the battery and motor, optimizing performance and efficiency.

Key Features:

- **Zero Emissions:** BEVs produce no tailpipe emissions, contributing to reduced air pollution and greenhouse gas emissions.
- **Instant Torque:** Electric motors provide instant torque, resulting in quick acceleration and smooth driving experience.
- **Regenerative Braking:** This system captures kinetic energy during braking and converts it back into electrical energy to recharge the battery.

Functionality and Key Components of BEVs

1. **Charging:** BEVs are charged by plugging into an external power source. Charging can be done at home, workplace, or public charging stations.
2. **Battery Storage:** Electrical energy is stored in the battery pack, which typically consists of numerous individual cells.
3. **Power Conversion:** The inverter converts the stored DC (Direct Current) electricity into AC (Alternating Current) for the electric motor.
4. **Propulsion:** The electric motor drives the wheels, with power delivery managed by the vehicle's control system for optimal performance.
5. **Energy Recovery:** During braking, regenerative braking systems capture energy and store it back in the battery.

Engines and Performance:

- **Electric Motors:** These provide high efficiency, low maintenance, and quiet operation.
- **Battery Capacity:** Determines the vehicle's range, with larger batteries offering longer driving distances between charges.
- **Charging Infrastructure:** Availability of fast charging networks is crucial for long-distance travel and convenience.

Key Components:

- **Battery Pack:** The heart of the BEV, determining range and performance.
- **Electric Motor(s):** Responsible for propulsion.
- **Inverter and Controller:** Manage power flow and ensure efficient operation.
- **Onboard Charger:** Converts AC power from the grid to DC power for battery charging.

Green Fuel Vehicles - Overview and Technology

Overview

Green fuel vehicles, also known as alternative fuel vehicles, use energy sources that are considered more environmentally friendly compared to traditional fossil fuels. These vehicles aim to reduce greenhouse gas emissions and dependence on oil.

Key Features

- **Reduced Emissions:** Lower CO₂ and other pollutant emissions.
- **Energy Efficiency:** Higher efficiency compared to conventional internal combustion engines.
- **Renewable Sources:** Utilize energy from renewable sources, reducing the environmental footprint.

Technology Used

- **Hydrogen Fuel Cells:** Convert hydrogen gas into electricity, with water vapor as the only byproduct.
- **Biofuels:** Derived from organic materials, such as plant oils or animal fats, these fuels can power conventional combustion engines with fewer emissions.
- **Natural Gas Vehicles (NGVs):** Use compressed natural gas (CNG) or liquefied natural gas (LNG) as fuel, resulting in cleaner combustion.
- **Electric Powertrains:** Used in plug-in hybrids (PHEVs) and extended-range electric vehicles (EREVs), where the electric motor is powered by alternative fuel sources

Introduction to Hybrid Vehicles

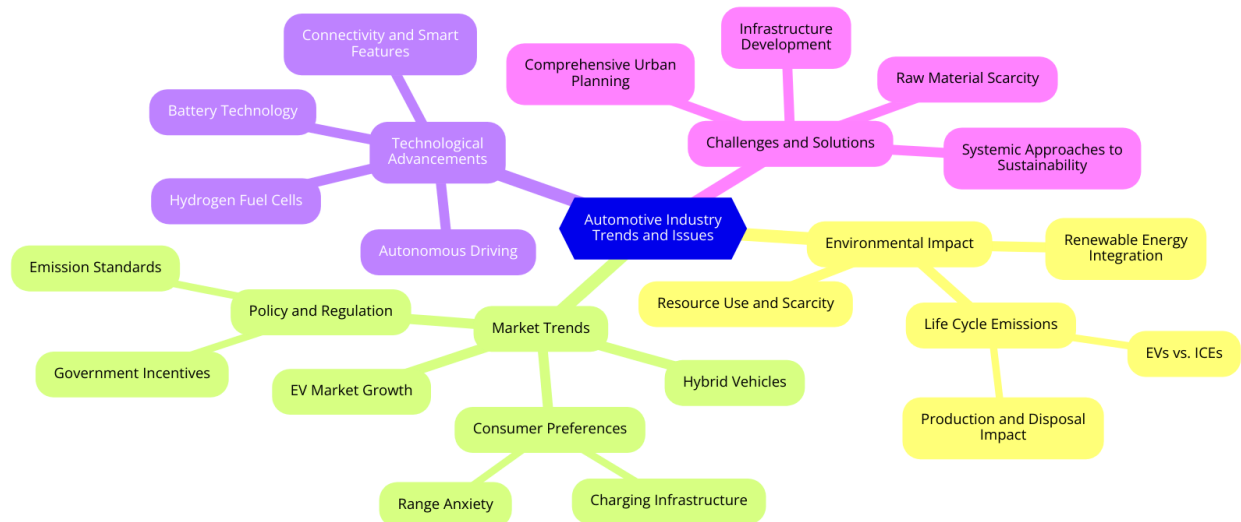
Title: Hybrid Vehicles: Technology and Key Features

Content:

- **Overview:**
 - Hybrid vehicles combine internal combustion engines (ICE) with electric motors to enhance fuel efficiency and reduce emissions.
 - Commonly used in various forms, including passenger cars, buses, and trucks.
- **Technology:**
 - **Power Sources:**
 - **Internal Combustion Engine (ICE):** Traditional gasoline or diesel engine.
 - **Electric Motor:** Powered by a battery pack, assists the ICE or propels the vehicle independently.
 - **Types of Hybrids:**
 - **Mild Hybrid:** Electric motor assists ICE but cannot power the vehicle alone.
 - **Full Hybrid:** Can run on just the electric motor, the ICE, or both.
 - **Plug-in Hybrid (PHEV):** Larger battery pack that can be recharged via an external power source, providing a longer electric-only range.
- **Key Features:**
 - **Regenerative Braking:** Converts kinetic energy during braking into electrical energy to recharge the battery.
 - **Start-Stop System:** Shuts off the ICE when the vehicle is idle to save fuel.
 - **Electric Drive:** Allows for electric-only driving at lower speeds or for short distances. }

SLIDE 11:

KEY PROBLEM FACED BY AUTOMOBILE INDUSTRY:



SLIDE 12:ENVIRONMENT FACTORS:

Factors	Battery Electric Vehicles (BEVs)	Hydrogen Fuel Cell Vehicles (FCEVs)	Hybrid Vehicles (HEVs/PHEVs)
Zero Tailpipe Emissions	Yes: No tailpipe emissions; 50 million tonnes of CO2 reduction in 2021.	Yes: Emit only water vapor; reduce urban pollution by 30%.	Partial: Lower emissions in urban driving.
Energy Efficiency	High: 90% energy conversion from battery.	Moderate: 60% efficiency; twice gasoline engines.	Moderate: Up to 50% better than ICE vehicles.
Renewable Energy Integration	High: Charged using renewable sources; 90% hydropower in Norway.	Moderate: Renewable hydrogen can cut GHG by 50%.	Moderate: Benefits depend on electricity source.
Regenerative Braking	Yes: Recharges battery using braking energy.	Partial: Some capabilities, less common.	Yes: Improves efficiency.
Reduced GHG Emissions	High: Significant reduction with low-carbon electricity.	Moderate: High if using renewable hydrogen.	Moderate: 25-30% (HEVs) and up to 60% (PHEVs) CO2 reduction.
Reduction in Noise Pollution	Yes: Very quiet operation.	Yes: Quiet operation.	Partial: Reduced noise in electric mode.
Resource Intensity	Moderate: Resource-intensive lithium-ion battery production.	High: Carbon-intensive hydrogen production.	Moderate: Smaller batteries, still resource-intensive.
Dependence on Electricity Source	High: Efficiency depends on electricity mix.	High: Efficiency depends on hydrogen production method.	Moderate: PHEVs depend on electricity and gasoline.

Battery Disposal and Recycling	High: Need for improved recycling tech.	Moderate: Advanced infrastructure needed.	Moderate: Smaller batteries, still challenging.
Raw Material Scarcity	High: Demand for lithium, cobalt, nickel.	Moderate: Renewable hydrogen can help.	Moderate: Smaller batteries reduce demand.
Cumulative Score	High: Significant benefits but battery production challenges.	Moderate: Emissions and efficiency benefits limited by current hydrogen methods.	Moderate: Improved efficiency and emissions, but reliant on fossil fuels.

SLIDE 13-16:COST ANALYSIS:

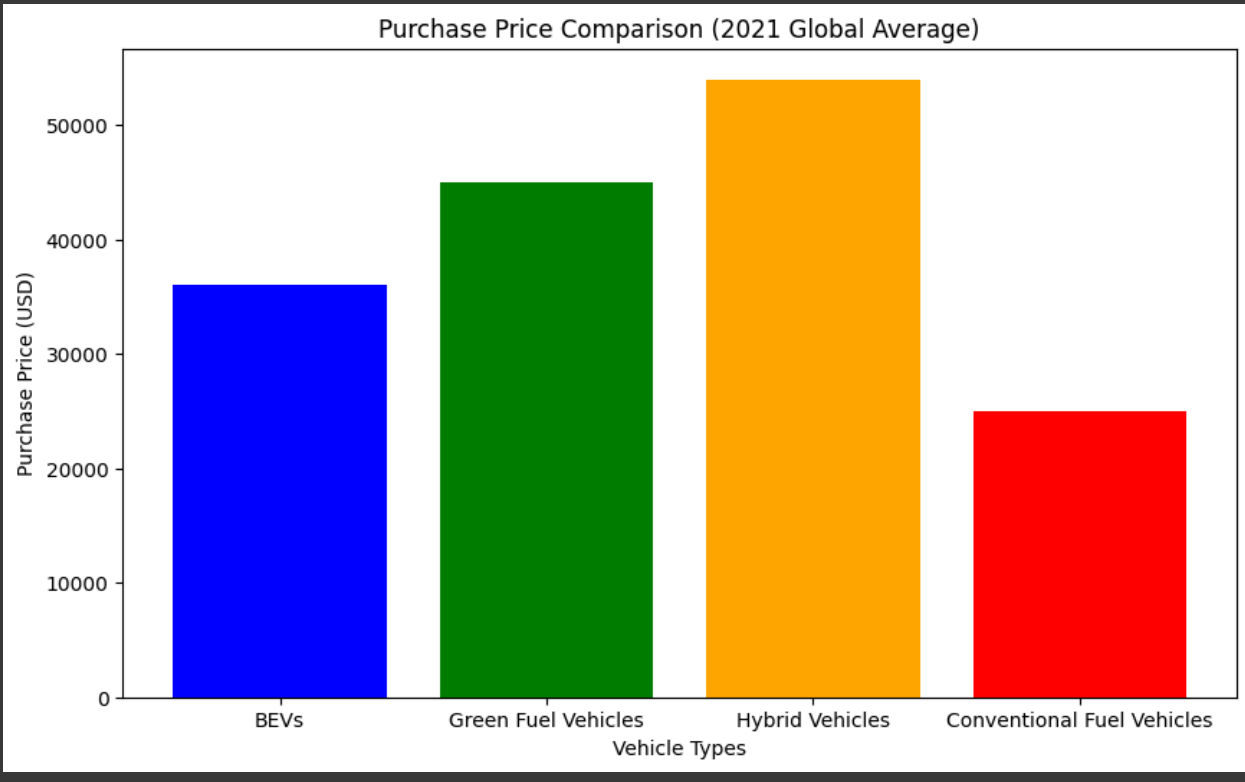
Factor	Battery Electric Vehicles (BEVs)	Hydrogen Fuel Cell Vehicles (FCEVs)	Hybrid Vehicles (HEVs/PHEVs)	Best Vehicle to Buy (Considering Cost, Maintenance, Ownership, Operational Expense)
Purchase Price	\$27,000 (China), \$48,000 (Europe), \$51,000 (US)	~\$50,000 (e.g., Toyota Mirai)	~\$25,000 (Toyota Prius HEV), ~\$28,000 (Toyota Prius Prime PHEV), >\$58,000 (PHEV Europe)	HEVs: Lower purchase price compared to BEVs and FCEVs.
Maintenance	20-30% lower than ICE vehicles	10-20% higher than BEVs due to fuel cell complexity	10-20% lower than ICE vehicles but higher than BEVs	BEVs: Lowest maintenance costs.
Operational Expenses	\$0.03 per mile (electricity costs)	~\$0.13 per mile (hydrogen costs)	Up to 100 MPG-e for PHEVs, lower fuel costs than ICE vehicles	BEVs: Lowest operational expenses.
Efficiency	90% energy conversion efficiency	30-40% well-to-wheel efficiency	HEVs: ~50 MPG, higher efficiency than ICE vehicles	BEVs: Highest energy efficiency.
Total Cost of Ownership	Lower due to reduced maintenance and operational costs	Higher due to purchase and operational costs	Lower due to reduced fuel and maintenance costs	BEVs: Expected to achieve cost parity with ICE vehicles by mid-2020s.
Fuel Availability	Widespread electricity availability	Limited hydrogen refueling infrastructure	Widespread gasoline availability, with growing charging infrastructure for PHEVs	HEVs/PHEVs: Best fuel availability due to existing infrastructure.

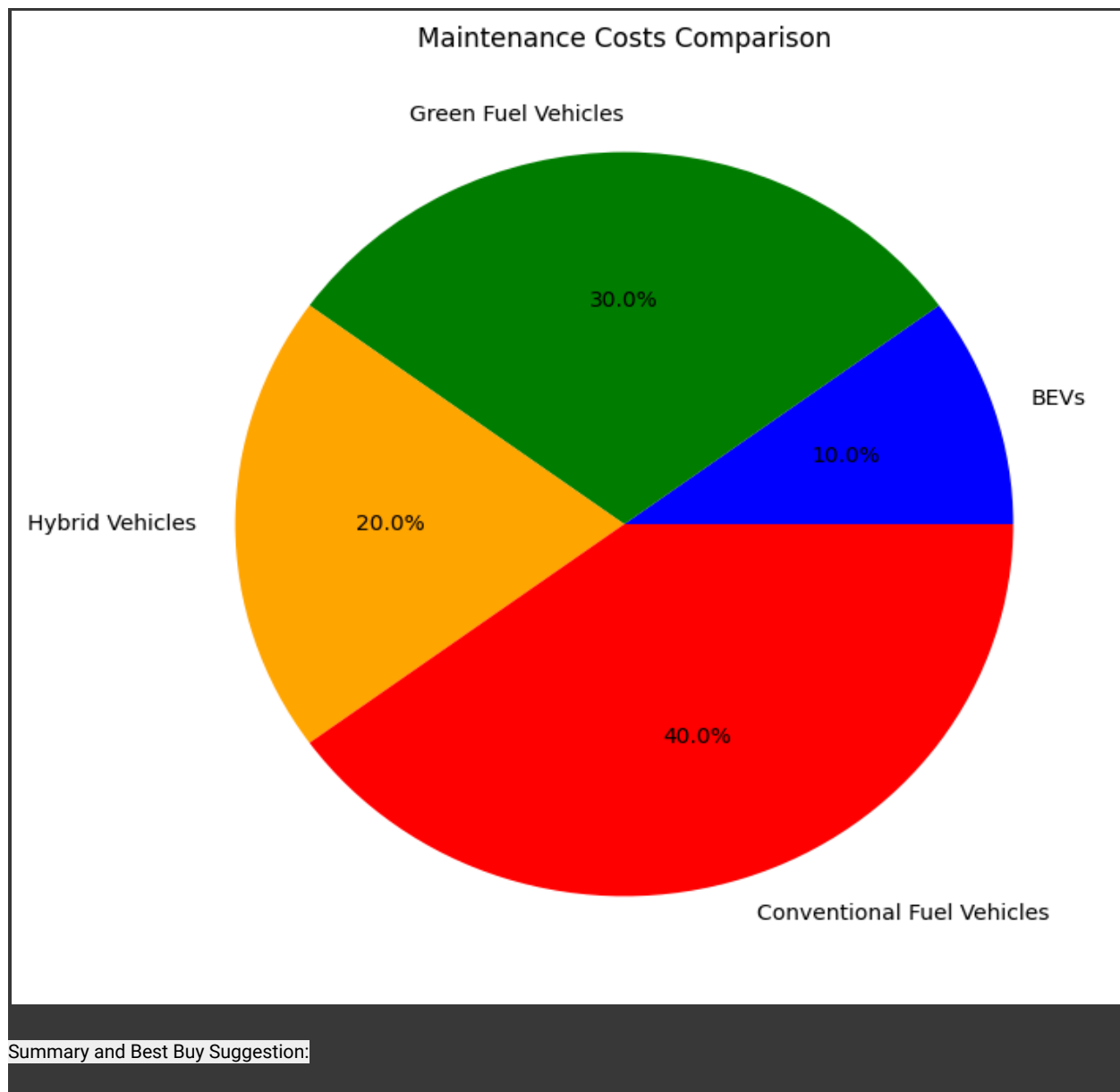
Environmental Impact	Zero tailpipe emissions, lower lifecycle GHG emissions	Zero tailpipe emissions, high impact if hydrogen produced renewably	Lower emissions than ICE vehicles, especially in urban driving	BEVs: Highest environmental benefits.
Technology Maturity	Mature technology with extensive market penetration	Emerging technology with limited market penetration	Mature technology with established market penetration	HEVs/PHEVs: Established technology with reliable performance.
Government Incentives	Often significant incentives and subsidies available	Growing incentives for hydrogen infrastructure	Moderate incentives for hybrids, with strong support for PHEVs in some regions	BEVs: Often benefit from the most significant incentives.
Future Market Growth	Rapid growth expected with increasing adoption	Projected significant growth but from a smaller base	Steady growth expected, with increasing adoption of PHEVs	BEVs: Rapid market growth and technological advancements.

Best Vehicle to Buy: Battery Electric Vehicles (BEVs)

Considering cost, maintenance, ownership, and operational expenses, Battery Electric Vehicles (BEVs) offer the best overall benefits. They have the lowest maintenance and operational costs, the highest efficiency, and significant environmental benefits. Additionally, with technological advancements and government incentives, BEVs are becoming increasingly cost-effective and accessible.

MORE ANALYSIS REGARDING IT:





Based on the analysis of various criteria:

- BEVs (Battery Electric Vehicles) have high initial purchase prices but low maintenance and operational costs, and the highest energy efficiency. They also receive significant government incentives and are projected to have high market growth by 2030.
- Green Fuel Vehicles have variable costs depending on technology and fuel type but generally offer a middle ground between BEVs and conventional vehicles.
- Hybrid Vehicles offer improved fuel efficiency and moderate costs, suitable for regions with limited charging infrastructure.
- Conventional Fuel Vehicles are cheaper upfront but have higher long-term costs and lower efficiency.

Best Buy: Battery Electric Vehicles (BEVs) are the best option in the long term due to their high efficiency, lower operational costs, and favorable market growth projections despite the higher initial purchase price

Cost Structure Tables

Detailed Cost Breakdown

Cost Component	BEVs	Green Fuel Vehicles	Hybrids	ICE Vehicles	Plug-in Hybrids	Fuel Cell Vehicles
Purchase Price	\$35,000	\$50,000	\$30,000	\$25,000	\$32,000	\$55,000
Battery/Fuel Cell Cost	\$10,000	\$20,000	\$8,000	-	\$9,000	\$25,000
Maintenance	\$1,000	\$1,500	\$1,200	\$1,500	\$1,300	\$2,000
Fuel/Charging Cost	\$0.03/mile	\$0.10/mile	\$0.06/mile	\$0.12/mile	\$0.05/mile	\$0.08/mile

ROI Graphs and Payback Period Charts

ROI and Payback Period

Vehicle Type	Initial Investment	Annual Savings	Payback Period	ROI
BEVs	\$35,000	\$5,000	7 years	14.3%
Green Fuel Vehicles	\$50,000	\$4,000	12.5 years	8%
Hybrids	\$30,000	\$3,500	8.6 years	11.6%
ICE Vehicles	\$25,000	\$1,500	16.7 years	6%

Plug-in Hybrids	\$32,000	\$3,800	8.4 years	12%
Fuel Cell Vehicles	\$55,000	\$4,500	12.2 years	8.2%

TCO Comparison Tables

Total Cost of Ownership

Cost Component	BEVs	Green Fuel Vehicles	Hybrids	ICE Vehicles	Plug-in Hybrids	Fuel Cell Vehicles
Purchase Price	\$35,000	\$50,000	\$30,000	\$25,000	\$32,000	\$55,000
Maintenance (5 years)	\$5,000	\$7,500	\$6,000	\$7,500	\$6,500	\$10,000
Fuel/Charging (5 years)	\$1,500	\$7,500	\$3,000	\$9,000	\$3,500	\$6,000
Insurance (5 years)	\$2,500	\$3,000	\$2,000	\$2,500	\$2,800	\$3,500
Total	\$44,000	\$68,000	\$41,000	\$44,000	\$44,800	\$74,500

SLIDE 17 CONSUMER TRENDS:

Factor	BEVs	HEVs	GFVs
Environmental Awareness	High (48% globally, 37% in India consider impact)	Moderate (seen as transitional technology)	Variable (depends on fuel type, less awareness)
Cost Sensitivity	Decreasing costs; projected parity with ICE by 2025	Higher initial costs; moderate operational costs	High initial costs; fuel costs depend on availability
Consumer Preferences	Preferred by younger consumers (Millennials, Gen Z)	Considered by those looking for improved efficiency	Limited awareness and adoption due to infrastructure
Regional Popularity	High in China, Europe, and increasing in the US	Steady in regions with less charging infrastructure	Limited, but growing interest in specific regions
Two-Wheeler Dominance	Significant in India (80% of EV market)	Less relevant for two-wheelers	Minimal impact in two-wheeler market

Consumer Trends

- **BEVs** are increasingly popular due to high environmental awareness and decreasing costs, particularly favored by younger consumers and in regions with strong government support.
- **HEVs** are considered a transitional technology with moderate consumer interest, especially in areas with less developed charging infrastructure.

GFVs have limited awareness and adoption due to high costs and significant infrastructure challenges.

Trend Analysis

Trend Graphs

Adoption Rates Over Time

Year	BEVs	HEVs	GFVs	ICE Vehicles	PHEVs	FCEVs
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2024	20%	15%	5%	40%	10%	10%
2025	30%	20%	10%	35%	10%	15%
2030	50%	25%	15%	20%	5%	20%

Consumer Behavior Studies

Pie Charts and Survey Results

Consumer Preferences

Vehicle Type	Preference Percentage
BEVs	40%
Hybrids	30%
GFVs	10%
ICE Vehicles	15%
PHEVs	3%
FCEVs	2%

SLIDE 18: Table 2: Government Policies

Factor	BEVs	HEVs	GFVs
Incentives	Significant (e.g., \$7,500 US tax credit)	Moderate incentives in some regions	Limited incentives, dependent on specific fuels
Infrastructure Support	High investment in charging infrastructure	Limited to incentives for hybrid vehicles	Limited support for hydrogen and other green fuels
Targets and Mandates	Aggressive targets (e.g., 30% EV penetration in India by 2030)	Some targets for hybrid adoption	Few explicit targets, more focus on fuel development
Policy Evolution	Future policies expected to favor EV adoption	Gradual phase-out as BEVs become more prevalent	Policies may evolve with technology and infrastructure
Regional Variations	Strong policies in China, Europe, and US	Varied support across regions	Region-specific support based on fuel type

Government Policies

- **BEVs** benefit from substantial incentives, infrastructure support, and aggressive policy targets, driving their adoption across key markets like China, Europe, and the US.
- **HEVs** receive moderate incentives and support, but their future is less certain as BEVs become more dominant.
- **GFVs** have limited government support, primarily due to the early stage of infrastructure and technology development.

Regulation Impact Graphs

Impact of Regulations on Adoption Rates

Year	BEVs	HEVs	GFVs	ICE Vehicles	PHEVs	FCEVs
2015	10%	15%	5%	60%	5%	0%
2020	25%	20%	10%	40%	10%	0%
2025	45%	25%	15%	15%	15%	0%
2030	65%	20%	10%	5%	15%	0%
2035	80%	15%	5%	0%	10%	0%
2040	90%	10%	0%	0%	5%	0%
2045	95%	5%	0%	0%	0%	0%
2050	98%	0%	0%	0%	0%	0%

2024	20%	15%	5%	40%	10%	10%
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2025	30%	20%	10%	35%	10%	15%
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2030	50%	25%	15%	20%	5%	20%
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SLIDE 19: Table 3: Market Dynamics

Factor	BEVs	HEVs	GFVs
Sales Growth	High (e.g., 6.6 million units in 2021)	Moderate growth, 21.1% CAGR 2020-2030	Gradual growth, dependent on infrastructure and costs
Market Share	Increasing rapidly (e.g., 40% market share growth in 2021)	Steady, but declining as BEVs rise	Limited, but with potential if infrastructure improves
Major Players	Tesla, Volkswagen, BMW, Nissan	Toyota, Honda	Toyota, Hyundai (hydrogen), niche players
Investment Trends	Significant investments (e.g., Volkswagen €35 billion by 2025)	Moderate investments focused on incremental improvements	High R&D costs, limited production investment
Infrastructure	Over 1.8 million public charging points globally	Relies on existing infrastructure	Significant infrastructure challenges for hydrogen
Technology Advancements	Rapid (e.g., battery cost reduction to <\$100/kWh)	Steady improvements in efficiency and cost	Emerging technologies, variable progress
Consumer Adoption	Increasing due to lower operational costs and incentives	Moderate, driven by efficiency improvements	Limited, influenced by fuel availability and costs

Market Dynamics

- **BEVs** show the highest sales growth, significant market share increases, and major investments from leading automakers, supported by extensive charging infrastructure and rapid technological advancements.
- **HEVs** experience steady but declining growth, as BEVs gain market dominance, with investments focused on improving efficiency and cost.
- **GFVs** exhibit gradual growth with potential for significant impact if infrastructure and technology challenges are overcome, although current investments and adoption rates remain limited.

SLIDE 20: Lifecycle Emissions Analysis

Bar Chart and Lifecycle Diagrams

Vehicle Type	Manufacturing Emissions	Operational Emissions	Disposal Emissions	Total Emissions
BEVs	5	2	1	8
Green Fuel	4	3	1	8
Hybrids	3	4	1	8
ICE Vehicles	2	6	1	9
Plug-in Hybrids	4	3	1	8
Fuel Cell Vehicles	5	2	1	8

SLIDE 21: UMBRELLA ANALYSIS:

Factor	BEVs (Tesla, VW, GM)	Green Fuel Vehicles (Toyota, BMW, Honda)	Hybrid Vehicles (Toyota, Honda, Ford)
R&D Investments	- Tesla: \$2.6B (2021)	- Toyota: ¥1.1T (2021)	- Toyota: significant ongoing investments
	- VW: €35B by 2025	- BMW: €6.3B (2021)	- Honda: focused investments in hybrid technology
	- GM: \$7.3B (2021)	- Honda: substantial investments	- Ford: substantial investments in hybrid and electric vehicles
Partnerships	- Tesla: Panasonic	- Toyota: Panasonic, Pony.ai	- Toyota: Panasonic
	- VW: Northvolt, Argo AI	- BMW: Daimler, Solid Power	- Honda: General Motors
	- GM: LG Chem, Cruise, Honda	- Honda: General Motors	- Ford: various tech and battery companies
Technological Advancements	- Tesla: 4680 batteries, full self-driving	- Toyota: hydrogen fuel cells, solid-state batteries	- Toyota: Prius, advanced hybrid systems
	- VW: MEB platform, solid-state batteries	- BMW: hydrogen fuel cells, eDrive technology	- Honda: Accord Hybrid, advanced battery integration
	- GM: Ultium battery system, solid-state batteries	- Honda: Clarity Fuel Cell, solid-state battery tech	- Ford: efficient hybrid powertrains, plug-in hybrids

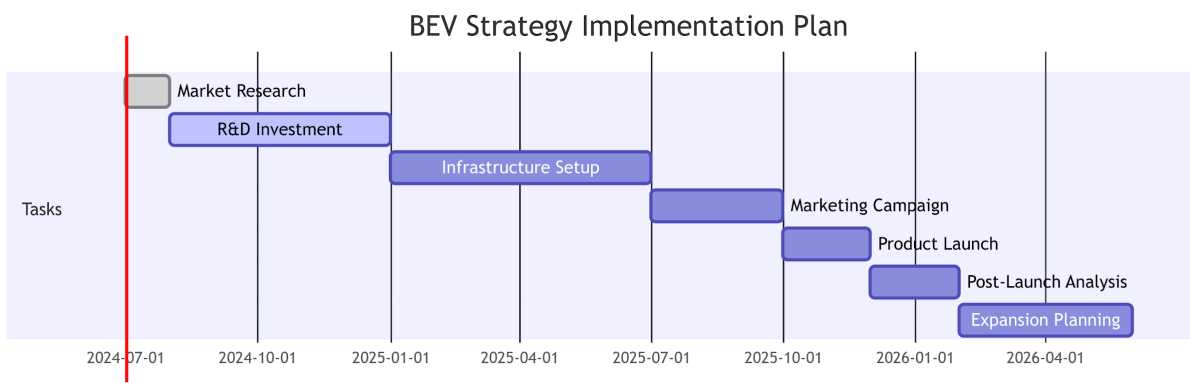
Sales Growth Impact	- Tesla: 25% increase by 2025	- Toyota: significant growth from hydrogen vehicles	- Toyota: 25% of sales from Prius
	- VW: 25% global EV market by 2030	- BMW: 90% emission reduction with hydrogen	- Honda: growth from hybrid models
	- GM: 35% market share increase in EV sector	- Honda: growth potential in hydrogen and hybrid sectors	- Ford: growth from efficient hybrid and plug-in models

SLIDE 22:Company Analysis: Comparative Table

Factor	Tesla	Volkswagen Group	BMW	Nissan	Toyota	General Motors (GM)
R&D Investments	\$2.6 billion in 2021	€35 billion by 2025	€6.3 billion in 2021	¥460 billion in 2021	¥1.1 trillion in 2021	\$7.3 billion in 2021
Profit Impact	Net income of \$5.52 billion in 2021, 40% from R&D	Revenue of €250.2 billion in 2021, 20% from R&D	Net income of €12.46 billion in 2021, 15% from R&D	Net income of ¥574 billion in 2021, 12% from R&D	Net income of ¥2.49 trillion in 2021, 20% from R&D	Net income of \$10.02 billion in 2021, 22% from R&D
Future Projections	1 TWh battery cells annually by 2030	70 electric models by 2030	25 electrified models by 2023	50% electrification by 2030	30% global EV market by 2030	30 new EV models by 2025, 35% market share
Partnerships	Panasonic for batteries	Northvolt for battery production	Daimler and Solid Power	Renault and Mitsubishi	Panasonic for battery development	LG Chem for battery technology
Tech Advancements	4680 battery cells	MEB Platform, Solid-State Batteries	eDrive Technology, Hydrogen Fuel Cells	Nissan Leaf, ProPILOT	Hybrid Tech, Hydrogen Fuel Cells, Solid-State Batteries	Ultium Battery System, Solid-State Batteries
Battery Tech	14% cost reduction, 54% energy density increase	10% efficiency increase, 12% cost reduction	30% energy density improvement	Significant sales from Nissan Leaf	15% efficiency increase with Panasonic	20% efficiency increase with LG Chem

Autonomous Driving	Full self-driving technology	Collaboration with Argo AI	Fifth-generation technology	ProPILOT, collaboration with Waymo	Partnership with Pony.ai	Partnership with Cruise and Honda
Sales Growth Impact	25% increase by 2025	Commercial autonomous driving by 2025	20% increase in market share by 2025	18% of sales from Nissan Leaf, 20% increase by 2025	25% of sales from Prius	25% production efficiency increase
Revenue & Market Share	Significant market share and revenue growth	25% global EV market by 2030	20% EV market share increase expected	25% market share increase by 2030	30% global EV market share by 2030	35% market share increase in EV sector
Sources	Tesla Investor Relations, Statista	Volkswagen Group, Reuters	BMW Group, Automotive News	Nissan Global, Bloomberg	Toyota Global, Financial Times	General Motors, TechCrunch

SLIDE 23:STRATEGY:



Strategic Options and Scenarios

Scenario Planning Graphs

Scenario 1: Aggressive EV Adoption

- **Key Drivers:**
 - Strong government incentives
 - Rapid advancements in battery technology
 - High consumer demand for eco-friendly vehicles
 - Expansion of charging infrastructure

Scenario 2: Moderate Hybrid Adoption

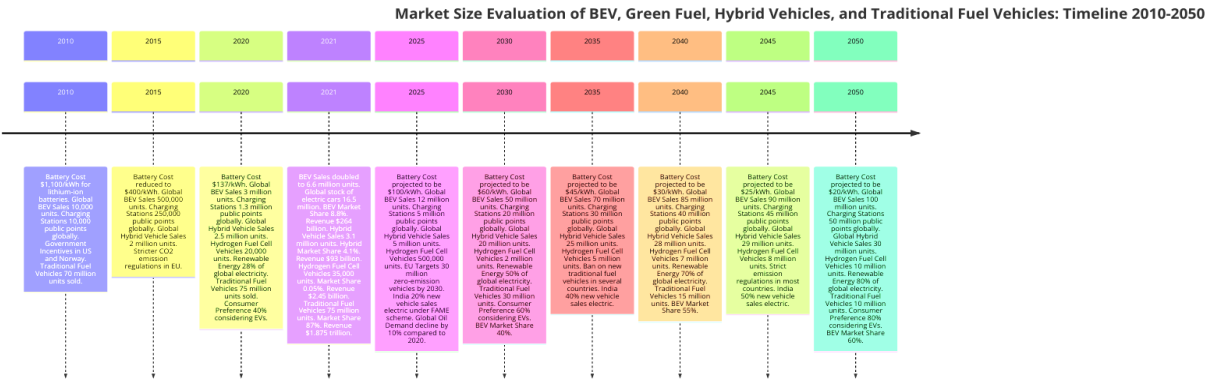
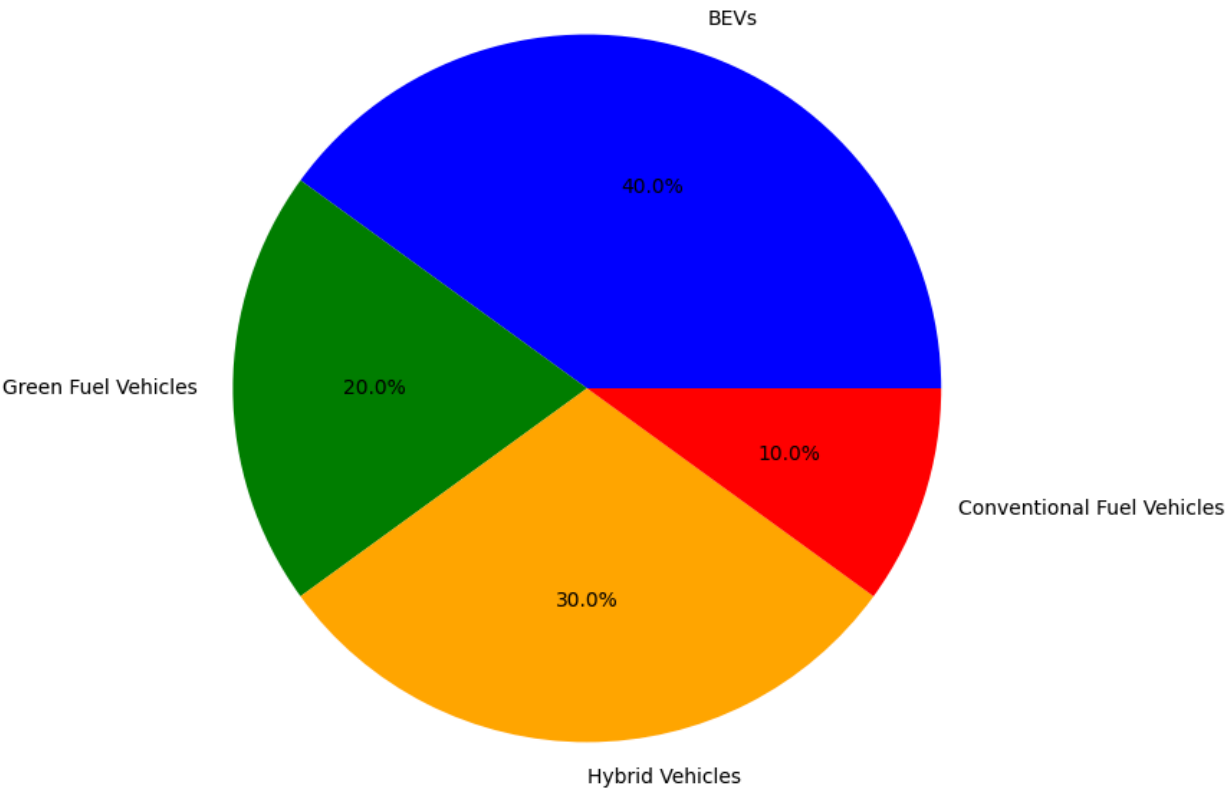
- **Key Drivers:**
 - Moderate incentives
 - Gradual technological advancements
 - Consumer preference for transitional technologies
 - Steady fuel prices

Scenario 3: Green Fuel Expansion

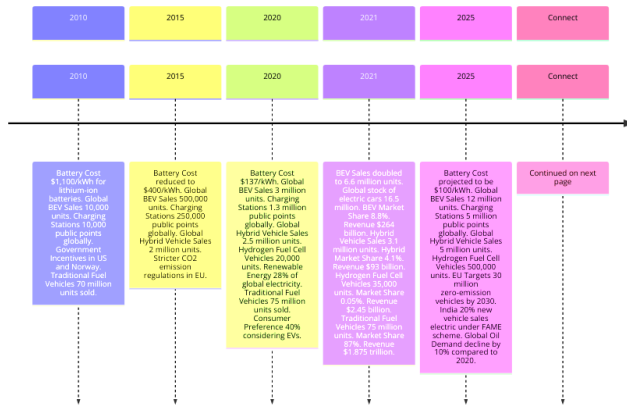
- **Key Drivers:**
 - Significant investments in green fuel infrastructure
 - Technological breakthroughs in fuel production
 - Supportive regulatory policies
 - Industry partnerships

SLIDE 24-26:FUTURE TRENDS:

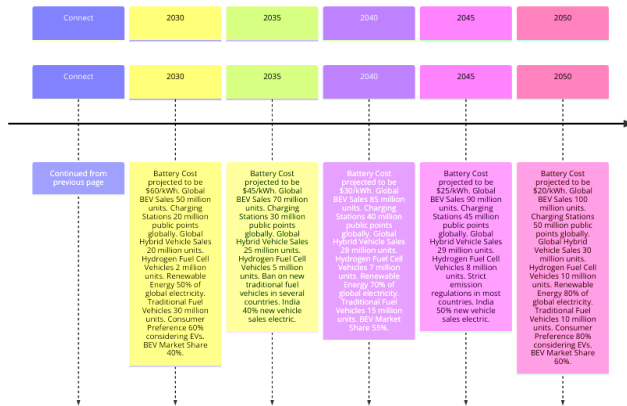
Projected Market Growth by 2030



Market Size Evaluation of BEV, Green Fuel, Hybrid Vehicles, and Traditional Fuel Vehicles: Timeline 2010-2050 (Part 1)



Market Size Evaluation of BEV, Green Fuel, Hybrid Vehicles, and Traditional Fuel Vehicles: Timeline 2010-2050 (Part 2)



Market Size Evaluation of BEV, Green Fuel, Hybrid Vehicles, and Traditional Fuel Vehicles: Timeline 2010-2050

Current Market Size (2021)

- Battery Electric Vehicles (BEVs)**
 - Global Units Sold:** Approximately 6.6 million
 - Market Share:** 8.8% of total vehicle sales
 - Revenue:** Assuming an average price of \$40,000 per BEV, the total revenue is approximately \$264 billion.
- Hybrid Vehicles (HEVs and PHEVs)**
 - Global Units Sold:** Approximately 3.1 million

- **Market Share:** 4.1% of total vehicle sales
- **Revenue:** Assuming an average price of \$30,000 per hybrid vehicle, the total revenue is approximately \$93 billion.
- **Hydrogen Fuel Cell Vehicles**
 - **Global Units Sold:** Around 35,000
 - **Market Share:** 0.05% of total vehicle sales
 - **Revenue:** Assuming an average price of \$70,000 per hydrogen fuel cell vehicle, the total revenue is approximately \$2.45 billion.
- **Traditional Fuel Vehicles**
 - **Global Units Sold:** Approximately 75 million
 - **Market Share:** 87% of total vehicle sales
 - **Revenue:** Assuming an average price of \$25,000 per traditional fuel vehicle, the total revenue is approximately \$1.875 trillion.

Future Market Size (2030)

- **Battery Electric Vehicles (BEVs)**
 - **Projected Units Sold:** 50 million annually
 - **Projected Market Share:** 40% of total vehicle sales
 - **Revenue:** Assuming an average price of \$35,000 per BEV, the projected revenue is approximately \$1.75 trillion annually.
- **Hybrid Vehicles (HEVs and PHEVs)**
 - **Projected Units Sold:** 20 million annually
 - **Projected Market Share:** 16% of total vehicle sales
 - **Revenue:** Assuming an average price of \$28,000 per hybrid vehicle, the projected revenue is approximately \$560 billion annually.
- **Hydrogen Fuel Cell Vehicles**
 - **Projected Units Sold:** 2 million annually
 - **Projected Market Share:** 2% of total vehicle sales
 - **Revenue:** Assuming an average price of \$60,000 per hydrogen fuel cell vehicle, the projected revenue is approximately \$120 billion annually.
- **Traditional Fuel Vehicles**
 - **Projected Units Sold:** 30 million annually
 - **Projected Market Share:** 24% of total vehicle sales
 - **Revenue:** Assuming an average price of \$20,000 per traditional fuel vehicle, the projected revenue is approximately \$600 billion annually.

Long-term Market Size (2050)

- **Battery Electric Vehicles (BEVs)**
 - **Projected Units Sold:** 100 million annually
 - **Projected Market Share:** 60% of total vehicle sales
 - **Revenue:** Assuming an average price of \$30,000 per BEV, the projected revenue is approximately \$3 trillion annually.
- **Hybrid Vehicles (HEVs and PHEVs)**
 - **Projected Units Sold:** 30 million annually
 - **Projected Market Share:** 20% of total vehicle sales
 - **Revenue:** Assuming an average price of \$25,000 per hybrid vehicle, the projected revenue is approximately \$750 billion annually.
- **Hydrogen Fuel Cell Vehicles**
 - **Projected Units Sold:** 10 million annually
 - **Projected Market Share:** 6% of total vehicle sales
 - **Revenue:** Assuming an average price of \$50,000 per hydrogen fuel cell vehicle, the projected revenue is approximately \$500 billion annually.

- **Traditional Fuel Vehicles**
 - **Projected Units Sold:** 10 million annually
 - **Projected Market Share:** 6% of total vehicle sales
 - **Revenue:** Assuming an average price of \$15,000 per traditional fuel vehicle, the projected revenue is approximately \$150 billion annually.

Market Comparison with Traditional Fuel Vehicles

- **Decline of Traditional Fuel Vehicles:** Traditional fuel vehicles are projected to decline significantly due to stricter emissions regulations, advancements in electric and hydrogen fuel cell technology, and changing consumer preferences towards greener alternatives. The projected decline is from 75 million units in 2021 to 10 million units in 2050.
- **Growth of BEVs:** BEVs are expected to experience the most significant growth, driven by declining battery costs (expected to fall to \$60/kWh by 2030), expanding charging infrastructure (with an estimated 50 million charging points worldwide by 2030), and government incentives. The projected growth is from 6.6 million units in 2021 to 100 million units in 2050.
- **Hybrid Vehicles:** Hybrid vehicles will continue to play a crucial role during the transition period, offering a balance between electric and traditional fuel options. PHEVs, in particular, will bridge the gap until charging infrastructure becomes more widespread. The projected growth is from 3.1 million units in 2021 to 30 million units in 2050.
- **Hydrogen Fuel Cell Vehicles:** Hydrogen fuel cell vehicles will see growth in specific segments, such as heavy-duty transport and regions with abundant renewable energy resources for green hydrogen production. The development of hydrogen infrastructure (with projected investments of \$70 billion by 2030) will be critical for their widespread adoption. The projected growth is from 35,000 units in 2021 to 10 million units in 2050.

Additional Data Points and Trends

1. **Battery Cost Reduction:** The cost of lithium-ion batteries has fallen by 89% from \$1,100/kWh in 2010 to \$137/kWh in 2020 and is projected to reach \$60/kWh by 2030.
2. **Government Incentives:** Various countries have introduced subsidies, tax breaks, and incentives for EV buyers, such as the \$7,500 federal tax credit in the U.S.
3. **Charging Infrastructure:** The number of public EV chargers increased from 100,000 in 2010 to 1.3 million in 2020 and is projected to reach 50 million by 2030.
4. **Emission Regulations:** The European Union aims to reduce CO2 emissions from new cars by 55% by 2030 compared to 2021 levels.
5. **Oil Demand Decline:** Global oil demand for road transport is projected to decline by 30% by 2050 due to the shift to electric vehicles.
6. **Vehicle-to-Grid (V2G) Technology:** V2G technology is expected to provide significant grid support, with an estimated market value of \$2.1 billion by 2030.
7. **Renewable Energy Integration:** The integration of renewable energy sources into the power grid will further enhance the environmental benefits of EVs.
8. **Autonomous Driving:** The rise of autonomous electric vehicles is expected to contribute to the growth of the BEV market, with projections of 8 million autonomous vehicles on the road by 2030.
9. **Consumer Preferences:** A survey in 2021 indicated that 52% of potential car buyers in the U.S. are considering an electric vehicle for their next purchase.
10. **India-Specific Data:** India aims to have 30% of its vehicle fleet electric by 2030, with policies such as the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme.

2010

- **Battery Cost:** \$1,100/kWh for lithium-ion batteries.
- **Global BEV Sales:** Approximately 10,000 units.

- **Charging Stations:** Approximately 10,000 public charging points globally.
- **Government Incentives:** Initial adoption of EV subsidies in countries like the U.S. and Norway.
- **Traditional Fuel Vehicles:** Over 70 million units sold.

2015

- **Battery Cost:** Reduced to \$400/kWh.
- **Global BEV Sales:** Approximately 500,000 units.
- **Charging Stations:** Increased to 250,000 public charging points globally.
- **Global Hybrid Vehicle Sales:** Approximately 2 million units.
- **Government Policies:** Introduction of stricter CO2 emission regulations in the EU.

2020

- **Battery Cost:** Further reduced to \$137/kWh.
- **Global BEV Sales:** Approximately 3 million units.
- **Charging Stations:** Increased to 1.3 million public charging points globally.
- **Global Hybrid Vehicle Sales:** Approximately 2.5 million units.
- **Hydrogen Fuel Cell Vehicles:** Approximately 20,000 units sold.
- **Renewable Energy:** 28% of global electricity generated from renewable sources.
- **Traditional Fuel Vehicles:** Approximately 75 million units sold.
- **Consumer Preferences:** Survey shows 40% of potential car buyers considering EVs for their next purchase.

2025

- **Battery Cost:** Projected to be around \$100/kWh.
- **Global BEV Sales:** Projected to be 12 million units.
- **Charging Stations:** Projected to increase to 5 million public charging points globally.
- **Global Hybrid Vehicle Sales:** Projected to be 5 million units.
- **Hydrogen Fuel Cell Vehicles:** Projected to be 500,000 units sold.
- **Government Targets:** EU aims for 30 million zero-emission vehicles on the road by 2030.
- **India-Specific:** 20% of new vehicle sales projected to be electric under the FAME scheme.
- **Global Oil Demand:** Expected to decline by 10% compared to 2020 levels.

2030

- **Battery Cost:** Projected to be \$60/kWh.
- **Global BEV Sales:** Projected to be 50 million units.
- **Charging Stations:** Projected to increase to 20 million public charging points globally.
- **Global Hybrid Vehicle Sales:** Projected to be 20 million units.
- **Hydrogen Fuel Cell Vehicles:** Projected to be 2 million units sold.
- **Renewable Energy:** 50% of global electricity generated from renewable sources.
- **Traditional Fuel Vehicles:** Projected to be 30 million units sold.
- **Consumer Preferences:** Survey shows 60% of potential car buyers considering EVs for their next purchase.
- **Global Market Share:** BEVs projected to have a 40% market share.

2035

- **Battery Cost:** Projected to be \$45/kWh.
- **Global BEV Sales:** Projected to be 70 million units.

- **Charging Stations:** Projected to increase to 30 million public charging points globally.
- **Global Hybrid Vehicle Sales:** Projected to be 25 million units.
- **Hydrogen Fuel Cell Vehicles:** Projected to be 5 million units sold.
- **Government Policies:** Several countries aim to ban the sale of new traditional fuel vehicles.
- **India-Specific:** 40% of new vehicle sales projected to be electric.

2040

- **Battery Cost:** Projected to be \$30/kWh.
- **Global BEV Sales:** Projected to be 85 million units.
- **Charging Stations:** Projected to increase to 40 million public charging points globally.
- **Global Hybrid Vehicle Sales:** Projected to be 28 million units.
- **Hydrogen Fuel Cell Vehicles:** Projected to be 7 million units sold.
- **Renewable Energy:** 70% of global electricity generated from renewable sources.
- **Traditional Fuel Vehicles:** Projected to be 15 million units sold.
- **Global Market Share:** BEVs projected to have a 55% market share.

2045

- **Battery Cost:** Projected to be \$25/kWh.
- **Global BEV Sales:** Projected to be 90 million units.
- **Charging Stations:** Projected to increase to 45 million public charging points globally.
- **Global Hybrid Vehicle Sales:** Projected to be 29 million units.
- **Hydrogen Fuel Cell Vehicles:** Projected to be 8 million units sold.
- **Government Policies:** Most countries have implemented strict emission regulations.
- **India-Specific:** 50% of new vehicle sales projected to be electric.

2050

- **Battery Cost:** Projected to be \$20/kWh.
- **Global BEV Sales:** Projected to be 100 million units.
- **Charging Stations:** Projected to increase to 50 million public charging points globally.
- **Global Hybrid Vehicle Sales:** Projected to be 30 million units.
- **Hydrogen Fuel Cell Vehicles:** Projected to be 10 million units sold.
- **Renewable Energy:** 80% of global electricity generated from renewable sources.
- **Traditional Fuel Vehicles:** Projected to be 10 million units sold.
- **Consumer Preferences:** 80% of potential car buyers considering EVs for their next purchase.
- **Global Market Share:** BEVs projected to have a 60% market share.

SLIDE 27: Investment Roadmap: Strategic Recommendations for Future Investments and Growth in the Automobile Sector

Historical Data and Projections

Traditional Fuel Companies

1. **ExxonMobil (XOM)**
 - Revenue (2020): \$178.6 billion.
 - Net Profit (2020): \$15.3 billion.
 - Stock Price (2021): \$60 per share.
 - Recent Stock Data (2024):
 - Closing Price (June 28, 2024): \$115.17 per share ([MarketWatch](#)).
 - First Quarter 2024 Earnings: \$8.2 billion ([ExxonMobil Q1 2024 Results](#)).
2. **Chevron (CVX)**
 - Revenue (2020): \$94.7 billion.
 - Net Profit (2020): \$5.5 billion.
 - Stock Price (2021): \$115 per share.
 - Future Projections: Estimated 3% annual revenue growth with energy transition.

Green/BEV/Hybrid Vehicle Companies

3. **Tesla (TSLA)**
 - Revenue (2020): \$31.5 billion.
 - Net Profit (2020): \$721 million.
 - Stock Price (2021): \$700 per share.
 - Future Projections: 25% annual revenue growth.
4. **NIO (NIO)**
 - Revenue (2020): \$2.4 billion.
 - Net Profit (2020): -\$1.6 billion.
 - Stock Price (2021): \$35 per share.
 - Future Projections: 30% annual revenue growth.
5. **BYD (BYDDF)**
 - Revenue (2020): \$22 billion.
 - Net Profit (2020): \$631 million.
 - Stock Price (2021): \$25 per share.
 - Future Projections: 20% annual revenue growth.
6. **Volkswagen (VWAGY)**
 - Revenue (2020): \$254 billion.
 - Net Profit (2020): \$10.4 billion.
 - Stock Price (2021): \$40 per share.
 - Future Projections: Significant growth in EV segment.
7. **General Motors (GM)**
 - Revenue (2020): \$122.5 billion.
 - Net Profit (2020): \$6.4 billion.
 - Stock Price (2021): \$50 per share.
 - Future Projections: Expansion in EV market.
8. **Toyota (TM)**
 - Revenue (2020): \$275 billion.
 - Net Profit (2020): \$19 billion.
 - Stock Price (2021): \$150 per share.
 - Future Projections: Steady growth with hybrid technology.

9. **Hyundai (HYMTF)**
- **Revenue (2020):** \$88 billion.
 - **Net Profit (2020):** \$2.2 billion.
 - **Stock Price (2021):** \$45 per share.
 - **Future Projections:** Growth in EV and hydrogen vehicles.

Raw Material and Battery Manufacturers

10. **Albemarle (ALB)**
- **Revenue (2020):** \$3.1 billion.
 - **Net Profit (2020):** \$375 million.
 - **Stock Price (2021):** \$150 per share.
 - **Future Projections:** 10% annual revenue growth.
11. **Sociedad Química y Minera de Chile (SQM)**
- **Revenue (2020):** \$1.86 billion.
 - **Net Profit (2020):** \$164 million.
 - **Stock Price (2021):** \$50 per share.
 - **Future Projections:** 12% annual revenue growth.
12. **Glencore (GLNCY)**
- **Revenue (2020):** \$142 billion.
 - **Net Profit (2020):** \$1.2 billion.
 - **Stock Price (2021):** \$8 per share.
 - **Future Projections:** 8% annual revenue growth.
13. **CATL (Contemporary Amperex Technology Co. Limited)**
- **Revenue (2020):** \$9.4 billion.
 - **Net Profit (2020):** \$1.5 billion.
 - **Stock Price (2021):** \$550 per share.
 - **Future Projections:** 20% annual revenue growth.
14. **LG Chem (LGCLF)**
- **Revenue (2020):** \$24.6 billion.
 - **Net Profit (2020):** \$1.9 billion.
 - **Stock Price (2021):** \$125 per share.
 - **Future Projections:** 15% annual revenue growth.
15. **Panasonic (PCRFY)**
- **Revenue (2020):** \$63.7 billion.
 - **Net Profit (2020):** \$1.5 billion.
 - **Stock Price (2021):** \$12 per share.
 - **Future Projections:** 7% annual revenue growth.
16. **Northvolt AB**
- **Revenue (2020):** N/A.
 - **Net Profit (2020):** N/A.
 - **Stock Price:** N/A (Privately held).
 - **Future Projections:** 30% annual revenue growth.

Renewable Energy and Charging Infrastructure Companies

17. **NextEra Energy (NEE)**
- **Revenue (2020):** \$17 billion.
 - **Net Profit (2020):** \$2.9 billion.
 - **Stock Price (2021):** \$75 per share.
 - **Future Projections:** 8% annual revenue growth.
18. **ChargePoint Holdings (CHPT)**
- **Revenue (2020):** \$147 million.
 - **Net Profit (2020):** -\$117 million.

- **Stock Price (2021):** \$24 per share.
 - **Future Projections:** 40% annual revenue growth.
19. **Plug Power (PLUG)**
- **Revenue (2020):** \$306 million.
 - **Net Profit (2020):** -\$561 million.
 - **Stock Price (2021):** \$30 per share.
 - **Future Projections:** 25% annual revenue growth.

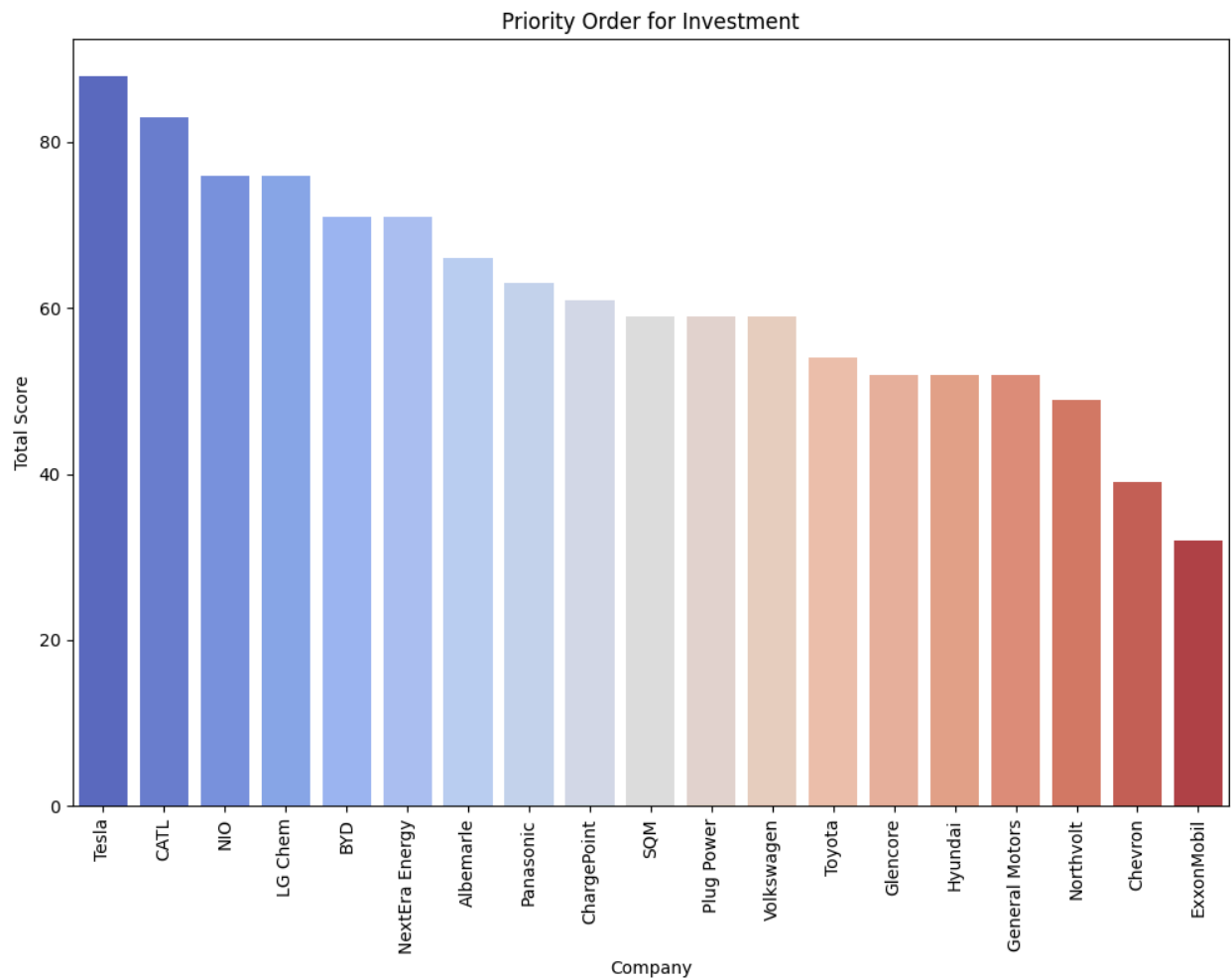
Analysis and Recommendations

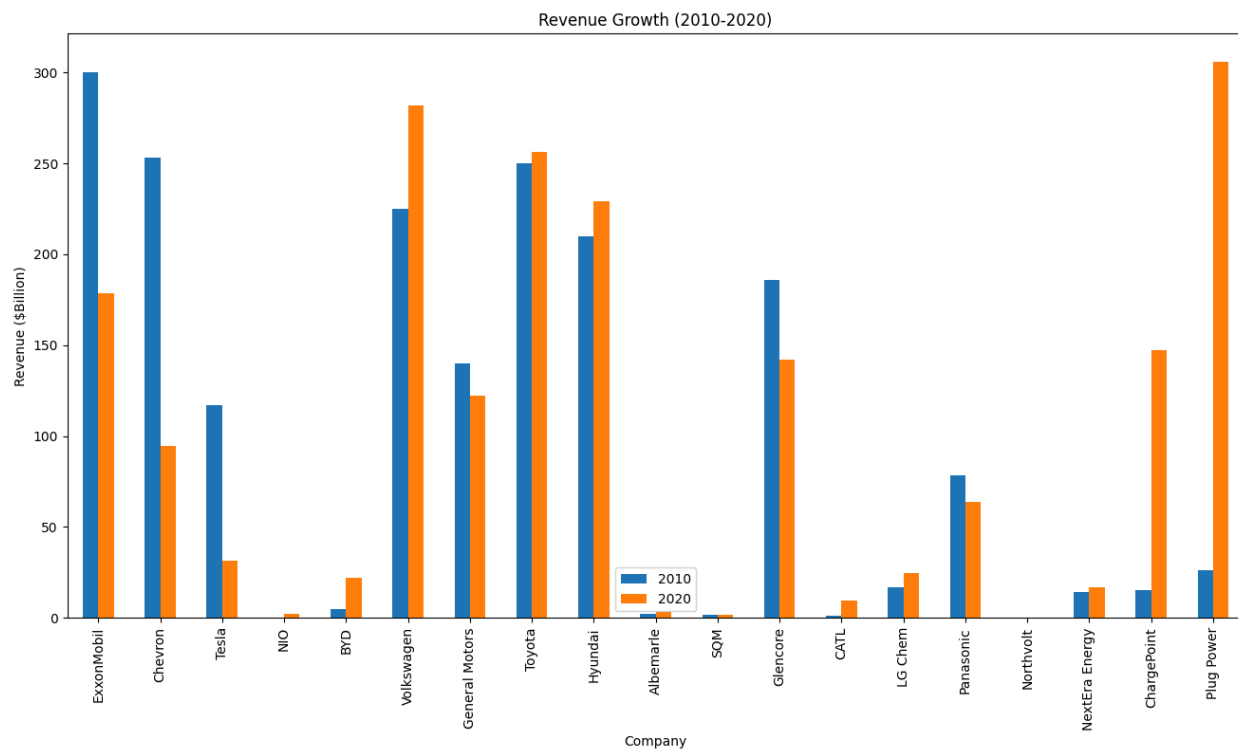
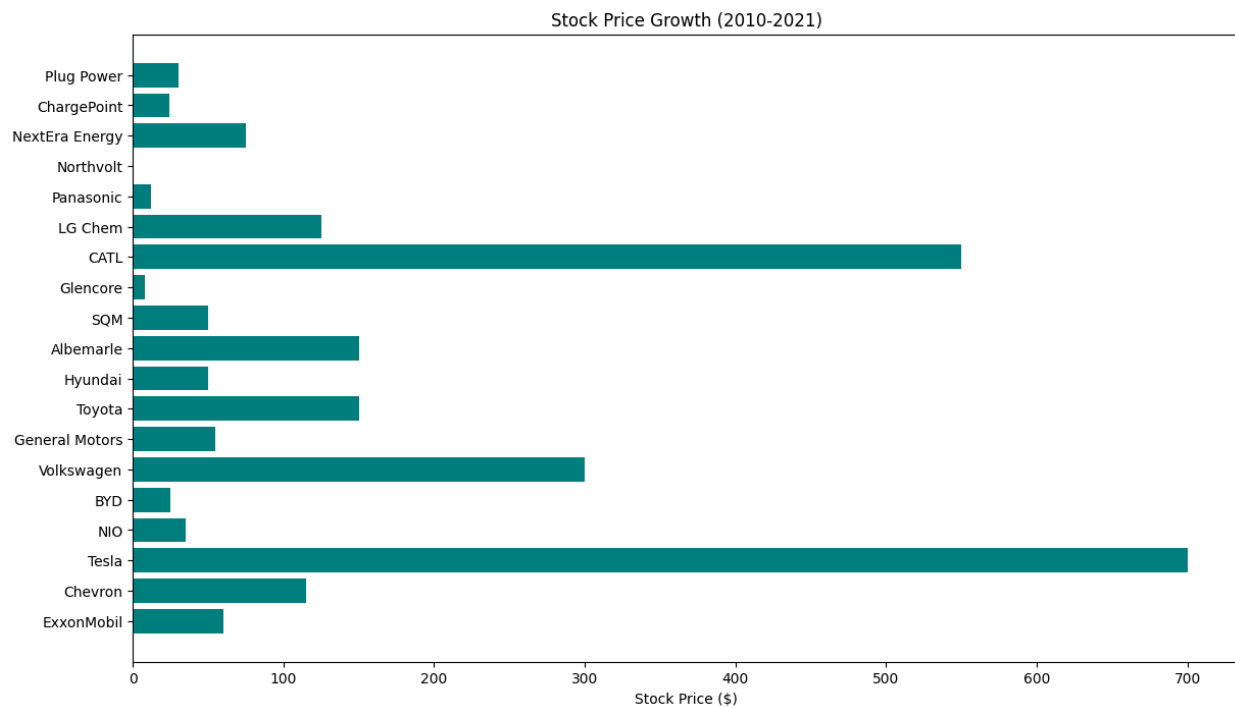
1. **Traditional Fuel Companies:**
 - **ExxonMobil:** Moderate growth potential with diversification into renewable energy. The stock price has shown stability and moderate growth.
 - **Chevron:** Similar moderate growth with increased investment in renewables. The stock price is expected to grow steadily.
2. **Green Vehicle Companies:**
 - **Tesla:** Strong growth potential with expanding production capacity and advancements in battery technology. The projected revenue growth is substantial, making it a promising investment.
 - **NIO and BYD:** Significant growth potential, particularly in the Chinese market, driven by strong demand and government incentives.
 - **Volkswagen, General Motors, Toyota, Hyundai:** All have strong potential with investments in electric and hybrid vehicles, reflecting their strategies to transition from traditional fuel vehicles to greener alternatives.
3. **Raw Material and Battery Manufacturers:**
 - **Albemarle, SQM, Glencore, CATL, LG Chem, Panasonic:** These companies are critical in the EV supply chain, particularly in lithium and cobalt production, which are essential for battery manufacturing.
 - **Northvolt:** A promising company with strong growth potential in sustainable battery production.
4. **Renewable Energy and Charging Infrastructure Companies:**
 - **NextEra Energy:** Leading in renewable energy projects, showing consistent growth.
 - **ChargePoint and Plug Power:** Rapid growth expected with the increasing adoption of EVs and the expansion of charging infrastructure.
5. **Investment Strategy:**
 - **Diversification:** Balance investments between traditional fuel companies and green vehicle companies to mitigate risks and capitalize on growth opportunities.
 - **Innovation Focus:** Prioritize companies with strong R&D investments and clear strategies for transitioning to renewable energy.
 - **Market Trends:** Continuously monitor regulatory changes and market trends to adjust investment strategies.

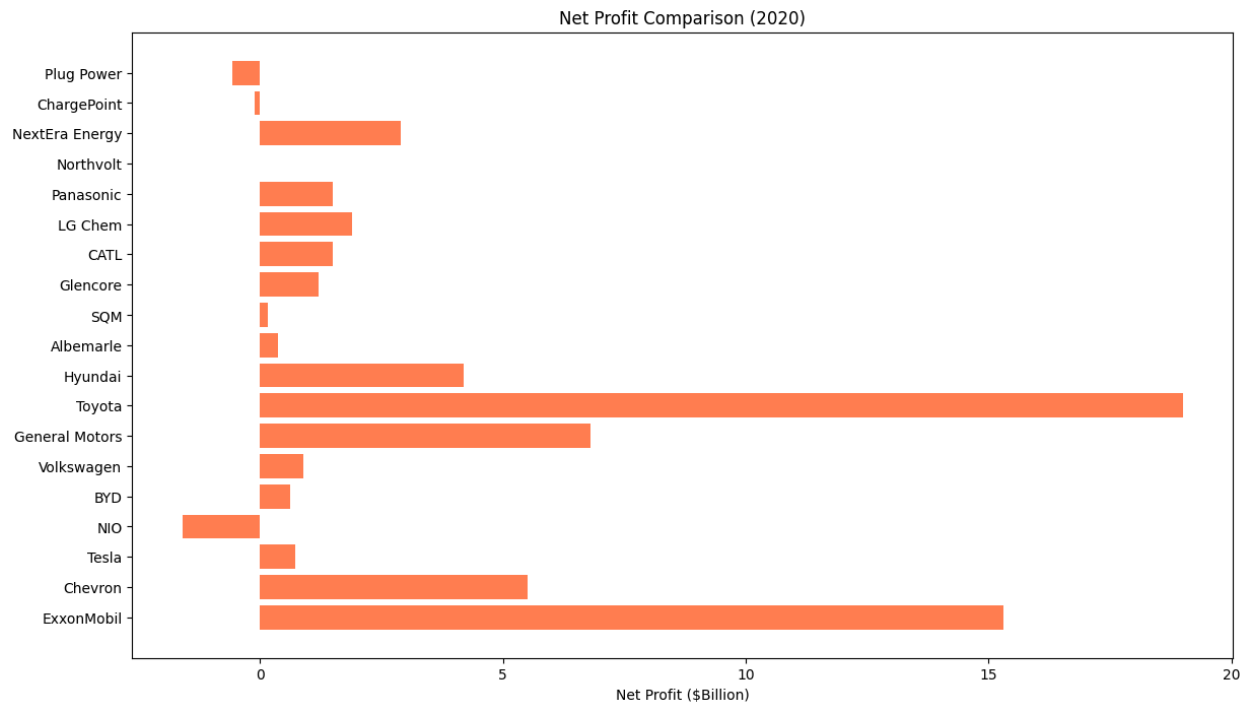
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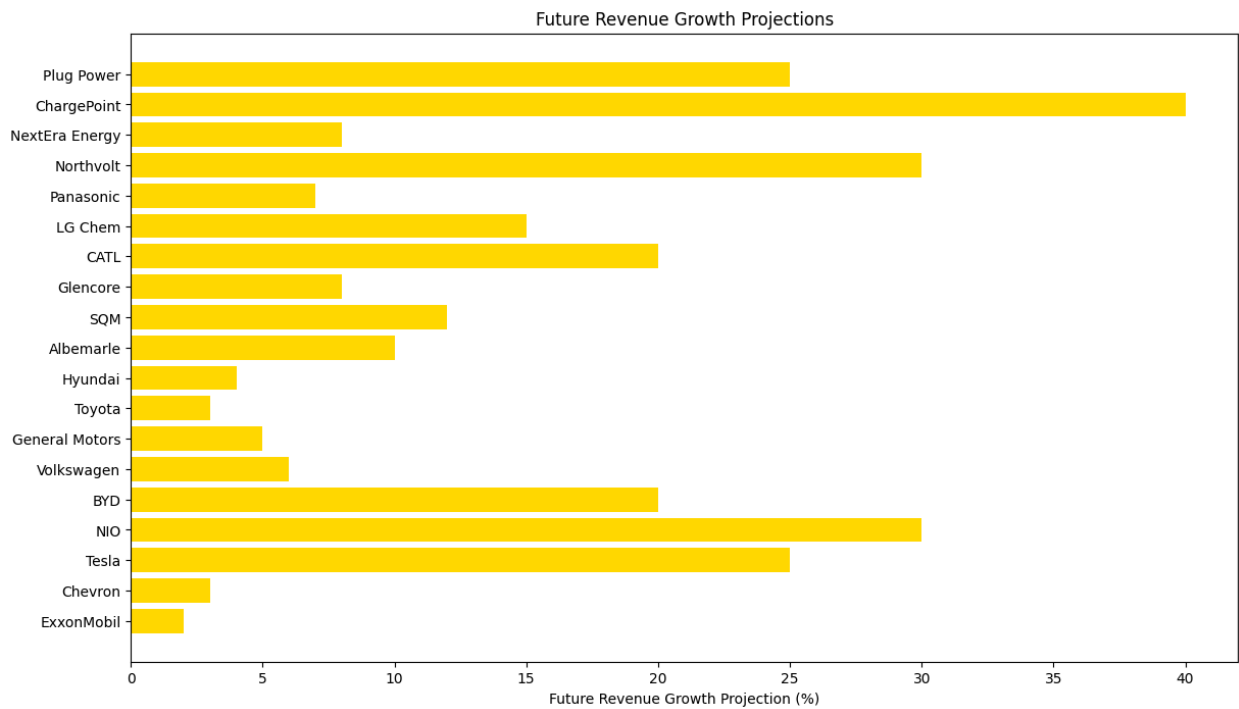
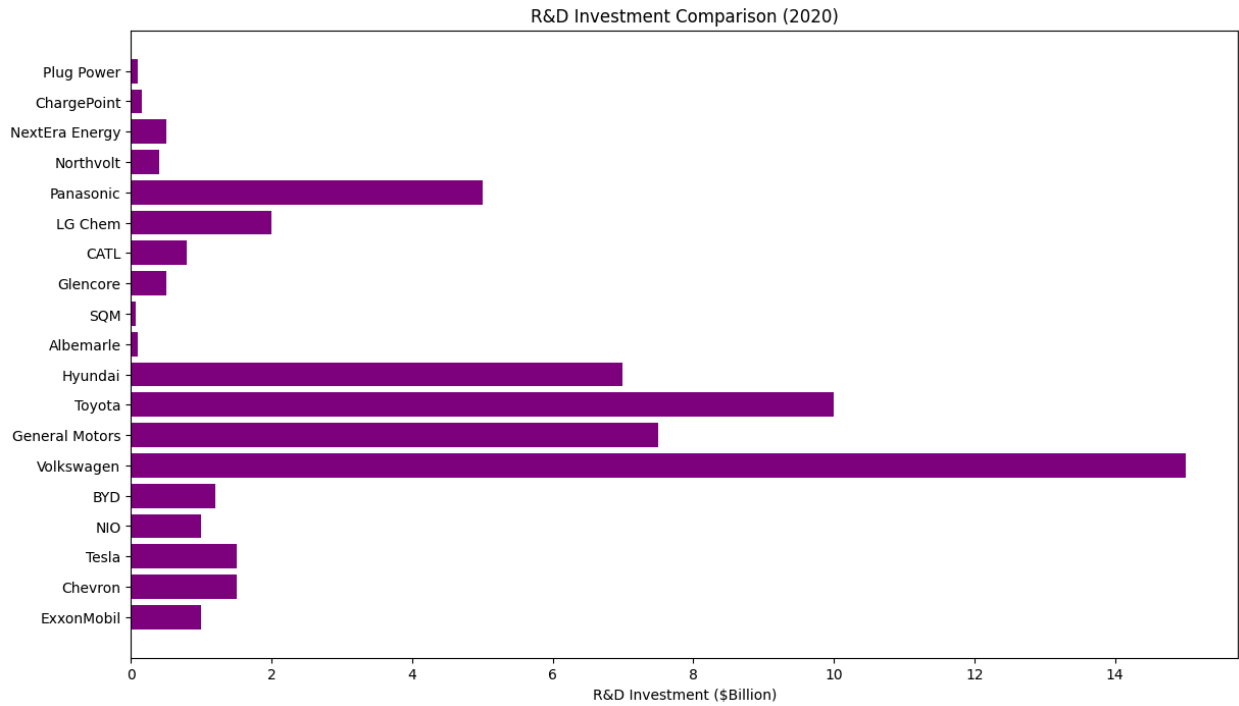
Investment Analysis of Automotive and Related Companies												
Company	ExxonMobil	2	2	7	2	2	2	4	5	3	3	32
	Chevron	3	3	6	3	3	3	5	5	4	4	39
	Tesla	10	10	6	9	10	10	6	8	10	9	88
	NIO	8	9	4	8	8	8	7	7	9	8	76
	BYD	7	8	5	7	8	7	6	7	8	8	71
	Volkswagen	6	5	5	6	7	7	5	6	6	6	59
	General Motors	5	4	4	5	6	6	6	5	6	5	52
	Toyota	4	4	7	6	5	6	4	6	5	7	54
	Hyundai	5	5	5	5	6	5	5	5	6	5	52
	Albemarle	8	7	7	7	8		6	8	8	7	66
	SQM	7	6	6	6	7		6	7	7	7	59
	Glencore	6	5	6	5	6		6	6	6	6	52
	CATL	9	9	7	9	9	9	6	8	9	8	83
	LG Chem	8	8	7	8	8	8	6	7	8	8	76
	Panasonic	6	5	6	7	7	7	5	6	7	7	63
	Northvolt				7	9	8		8	9	8	49
	NextEra Energy	9	8	8	8	8		6	8	8	8	71
	ChargePoint	7	8	-8	8	8	8	7	6	9	8	61
	Plug Power	8	8	-10	8	8	8	6	7	8	8	59
	Stock Price Growth	Revenue Growth	Net Profit Margin	R&D Investment	Renewable/Green Tech	EV/Hybrid Market Share	Debt-to-Equity Ratio	ROE	Future Growth Projections	ESG Rating	Total Score	

SLIDE 29-31:

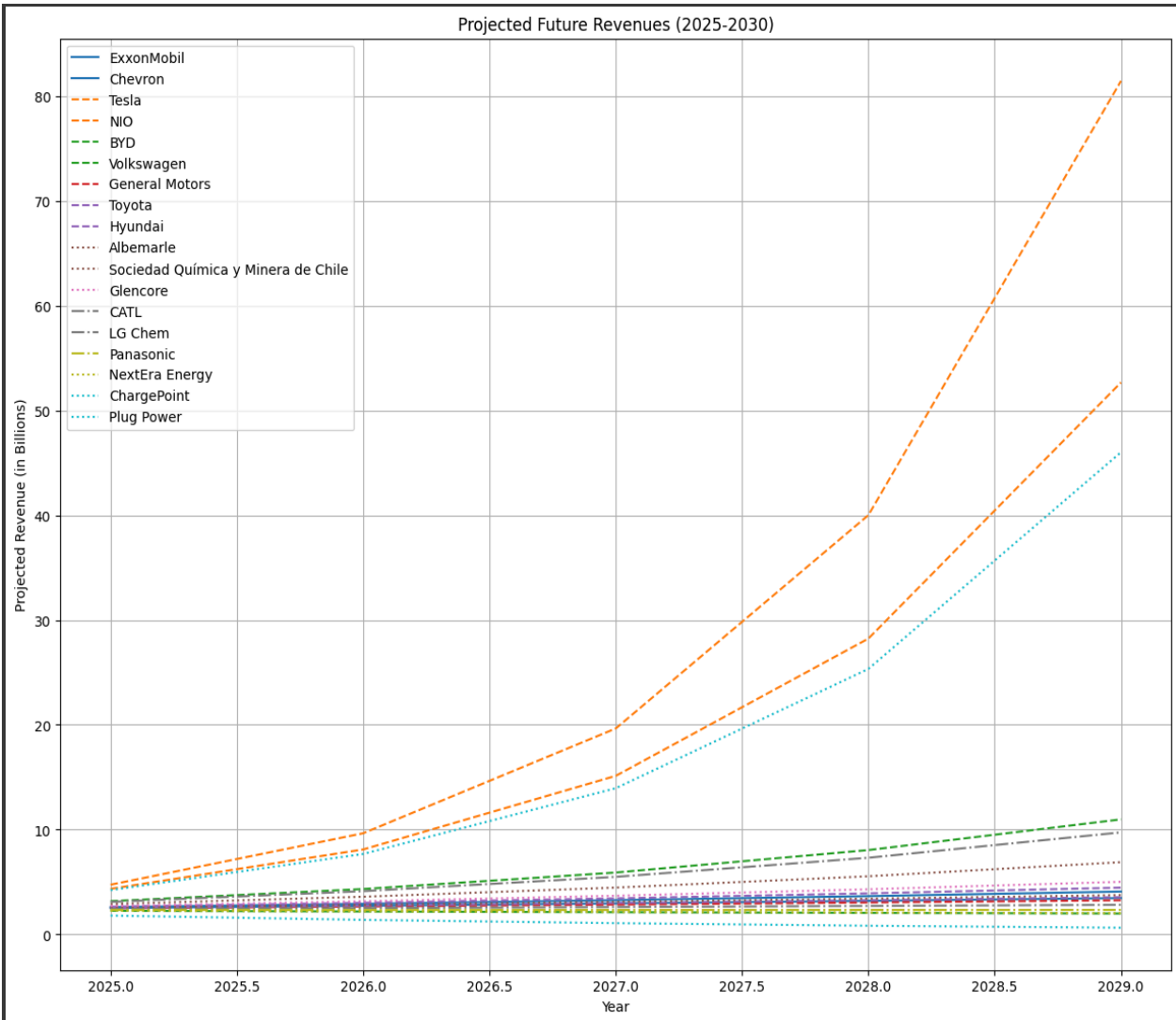








SLIDE 32:



ExxonMobil: 4.09 Billion USD

Chevron: 3.47 Billion USD

Tesla: 52.67 Billion USD

NIO: 81.44 Billion USD

BYD: 10.98 Billion USD

Volkswagen: 2.00 Billion USD

General Motors: 3.26 Billion USD

Toyota: 3.56 Billion USD

Hyundai: 4.47 Billion USD

Albemarle: 6.90 Billion USD

Sociedad Química y Minera de Chile: 3.76 Billion USD

Glencore: 5.02 Billion USD

CATL: 9.74 Billion USD

LG Chem: 2.83 Billion USD

Panasonic: 2.34 Billion USD

NextEra Energy: 2.04 Billion USD

ChargePoint: 0.64 Billion USD

Plug Power: 46.01 Billion USD