

The Differences in the Business Strategies of Tesla and Ford

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Abstract. In a context of global energy crisis and environmental pollution, new energy vehicles (NEVs) are leading the transformation of the automotive industry. Traditional fuel vehicles (TFVs) are under severe transformation pressure [1]. This study was conducted on the example of Tesla (representative of NEV) and Ford (manufacturer of TFV Transforming) for a "quantitative environmental evaluation + SWOT + financial analysis" framework to explore the differences and advantages in the business strategies of the two companies. We use 2021-2023 data to compare standard environmental indicators (e.g., emissions per unit of carbon, energy consumption over the life cycle) and financial indicators (e.g., gross profit, asset sales) [2]. The results show that Tesla's unit carbon emissions are 52g CO₂/km, which is only 28% of Ford's (185g CO₂/km) — meaning Ford's carbon emissions per kilometer are nearly 3.6 times that of Tesla. And its total three-year profit margin (22.92%) is twice as high as Ford's (10.73%) [2] [3]. Pearson's analysis confirms a negative correlation between battery energy density and TFV sales ($R = -0.568$). The research provides scientific support to the changing environment of traditional car manufacturers and enriches the study of NEV-TFV industrial interactions. To achieve the goal, we used a hybrid framework (quantitative environmental evaluation, SWOT, financial analysis), analyzed 2021-2023 Tesla/Ford data, and verified NEV-TFV correlations via Pearson analysis.

Keywords: New Energy Vehicles, Traditional Fuel Vehicles, Environmental Performance, Financial Indicators, SWOT - Quantitative Hybrid Model.

1. Introduction

1.1. Background Introduction

Against the global "double carbon" goal, the auto industry, a key energy-consuming and carbon-emitting sector, undergoes profound changes. TFVs account for ~70% of global transportation carbon emissions, and the conflict between fossil energy consumption and environmental protection worsens with rising car ownership [4]. China started NEV technology R&D in the "Eighth Five-Year Plan" period; supported by projects like the "863 Plan", it formed a complete industrial chain. By 2024, China's NEV production/sales hit 12.888/12.866 million units, with 40.9% penetration, leading the world for 10 consecutive years [5].

Tesla, a NEV leader, sold 1.8 million units globally in 2023 (105% growth vs 2021) [2]. In contrast, Ford, a traditional automaker, sold only 120,000 NEVs (5% of total sales) in 2023[2]. The core difference lies in power systems: TFVs rely on high-consumption, high-pollution engine-gearbox systems, while NEVs use low-carbon, efficient "three-electric systems" (battery, motor, electronic control) [6]. NEVs outperform TFVs in environmental protection (Tesla's unit pollutant emissions near zero vs Ford's 45mg/km [3]), energy conservation (12.5% lower life-cycle energy consumption [3]), and long-term economy (projected to fully replace TFVs by 2045).

1.2. Literature Review and Research Progress

Existing research on NEVs vs TFVs focuses on environmental impact, economic benefits, and technological progress. Environmentally, most studies confirm NEVs' low-carbon edge via Life-Cycle Assessment (LCA); e.g., pure NEVs cut 30%-50% carbon emissions vs TFVs [7], but grid structure (thermal power dominance) may narrow this gap [8]. Economically, pure NEVs' annual use cost is 20% of TFVs', yet NEVs are 2-4x pricier post-subsidy due to battery costs [1]. Technologically,

battery energy density rose from 100Wh/kg (2015) to over 300Wh/kg (2024) [5], while TFVs improved engine thermal efficiency (Ford's 40% [2]).

1.3. Research Motivation and Framework

By comparing the operating data of the two companies, this study aims to identify some differences in their business strategies. This research is motivated by the need for industrial innovation and the lack of research. Traditional car manufacturers do not have clear guidelines on innovation and existing studies have not yet linked NEVs to environmental and financial performance.

This study built the framework for a "quantitative environmental assessment + SWOT + financial analysis" using the example of tesla and ford:

Environmental Performance and quantification: GB/T 3262 - five key indicators selected (emissions per unit of carbon/pollutant, energy consumption over the life cycle, dependence on renewable energy, recyclability of batteries) on a 2022 basis [5] and compared by standardization.

Hybrid quantitative and quantitative swot-analysis: the results of the environmental indicators are combined with the SWOT and the financial environmental correlation is verified using Pearson's analysis.

Comparison of financial performance: analysis of four types of indicators (profitability: gross margin; growth capacity: sales growth rate; operating efficiency: revenue; financial strength: asset/liability ratio) [2] [9].

2. Methodology

2.1. Selection Basis of Research Methods

The comparison of environmental advantages between Tesla and Ford should take into account both the objectivity of quantitative indicators and the comprehensiveness of strategic situations. Based on this, this paper constructs a hybrid research framework of "quantitative environmental indicator evaluation + SWOT qualitative analysis":

Quantitative aspect: Select core environmental indicators, eliminate dimensional differences through data standardization, and quantitatively compare the environmental performance of Tesla (representative of new energy vehicles) and Ford (representative of traditional fuel vehicles);

Qualitative aspect: Introduce the SWOT analysis method (Strengths, Weaknesses, Opportunities, Threats), and interpret the strategic situation of NEVs in the environmental field in combination with quantitative results to avoid judgment deviations on the "sustainability of environmental advantages" caused by single quantitative analysis [10] [11].

2.2. Construction of Environmental Evaluation Index System

Based on the principles of "full life cycle environmental impact" and "data availability", and in combination with the environmental evaluation standards of the automotive industry (such as GB/T 32692-2022 "Guidelines for Carbon Emission Accounting of the Automotive Life Cycle"), five core environmental indicators were selected and classified into environmental advantage indicators (the lower the value, the better the environmental performance) and environmental contribution indicators (the higher the value, the better the environmental value) according to their "indicator nature". The specific indicators are as follows:

1) Environmental Advantage Indicators (Negative):

Carbon emissions per unit of mileage (g CO₂/km): including direct and indirect emissions corresponding to energy consumption during vehicle use (combustion emissions for fuel vehicles and grid power supply emissions for electric vehicles);

Pollutant emissions per unit of mileage (mg/km): mainly nitrogen oxides (NO_x) and particulate matter (PM_{2.5}), the core emissions of traditional fuel vehicles;

Total energy consumption of the vehicle life cycle (MJ/km): covering the total energy consumption during production, use, and recycling stages (electric vehicles need to include battery production energy consumption);

2) Environmental Contribution Indicators (Positive):

Renewable energy dependence (%): the proportion of wind power, photovoltaic power, and other renewable energy sources in the charging of electric vehicles.

Battery recyclability rate (%): the proportion of recyclable materials (such as lithium and cobalt) in retired power batteries, reflecting the end-of-life environmental performance

2.3. Data Standardization Combined with SWOT Method

2.3.1. Standardization of environmental protection indicators

Due to the dimensional differences of environmental protection indicators (such as carbon emissions in "g/km" and energy consumption in "MJ/km"), standardization is necessary for horizontal comparison.

Let the number of samples be n (in this paper, $n = 2$, namely Tesla Model 3 and Ford F-150, both being the main models of their respective brands), and the number of indicators be m (in this paper, $m = 5$).

The original data is x'_{ij} (the j th indicator of the i th sample), and the standardized data is x'_{ij}

1) Standardization formula for environmental protection advantage indicators

a. negative direction:

$$x'_{ij} = \frac{\max(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} \quad (1)$$

The lower the unit carbon emission is, the closer the x'_{ij} is to 1, the more significant the environmental protection advantage will be.

b. positive direction:

$$x'_{ij} = \frac{\max(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} \quad (2)$$

The higher the recycling rate of batteries, the closer the x'_{ij} gets to 1, and the stronger the end-of-life environmental protection effect will be.

2) Z-score standardization method

$$Z_{ij} = \frac{X_{ij} - \mu_j}{\sigma_j} \text{ and the } \mu_j = \frac{1}{n} \sum_{i=1}^n X_{ij}, \sigma_j = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (X_{ij} - \mu_j)^2} \quad (3)$$

This method can eliminate the influence of data distribution and ensure the highest level of experimental accuracy.

2.3.2. The logical combination of SWOT and quantitative indicators

Strength (S) and Weakness (W): Based on the standardized environmental protection indicator scores, indicators with scores ≥ 0.8 are classified as "core strengths", and indicators with scores ≤ 0.3 are classified as "key weaknesses". This directly reflects the environmental shortcomings and advantages of NEVs compared to traditional fuel vehicles.

Opportunity (O) and Threat (T): By combining industry policies, technological trends, and correlation analysis of quantitative data - for example, "tightening environmental regulations" (opportunity) is directly related to "unit carbon emission indicators", and "pollution from raw material extraction for batteries" (threat) has a coupling relationship with "full life cycle energy consumption indicators" [11] [12].

3. Quantitative Comparative Analysis of Environmental Protection Indicators between New Energy Vehicles and Traditional Cars

3.1. Original Data and Standardized Results of Core Environmental Protection Indicators

Based on the indicator system in Section 2.2, the environmental protection data for Tesla Model 3 (pure electric) and Ford F-150 (fuel-powered version) in 2023 were collected. Combined with the formula in Section 2.3.1, the standardized scores were calculated, and the results are shown in Table 1:

Table 1. Comparative Analysis of Environmental Protection Indicators of Main Models of Tesla and Ford (2023)

Environmental Protection indicators	Unit	Tesla Model 3 (new energy)	Ford F-150 (conventional fuel)	Nature Of The indicators	Tesla's standardization score	Ford's standardization score
Carbon emissions per unit of travel distance	g CO ₂ /km	52	185	Negative	0.92	0.00
Pollutant emissions per unit mileage traveled	mg/km	0	45	Negative	1.00	0.00
Vehicle life cycle energy consumption	MJ/km	280	320	Negative	0.67	0.33
Dependency on renewable energy	%	42	0	Positive	1.00	0.00
Battery recovery rate	%	95	-	Positive	1.00	0.00
Average score of electrical standardization	-	-	-	-	0.92	0.07

3.2. Core Conclusions of Quantitative Results

1) NEVs have significant advantages in core environmental protection indicators: The average standardized score of Tesla (0.92) is much higher than that of Ford (0.07). Among the three indicators of "unit pollutant emissions", "reliance on renewable energy", and "battery recyclability utilization rate", it achieves "full score advantages" - this directly confirms the core environmental protection value of "zero exhaust emissions" of new energy vehicles, especially playing a prominent role in improving urban air quality [3];

2) TFVs have obvious environmental protection shortcomings: Ford's scores in "unit carbon emissions" and "pollutant emissions" are 0, reflecting the environmental disadvantage caused by the essence of fuel combustion from fossil fuels, which is consistent with the conclusion in the "Global Climate Governance White Paper" that "70% of carbon emissions in the transportation sector come from fuel vehicles" [13];

3) There is still room for optimization in the environmental performance of NEVs throughout their life cycle: Tesla's "full life cycle energy consumption" score (0.67) is lower than other indicators. Due to the large amount of electricity consumed in the production of battery power (such as lithium extraction energy consumption), it indicates that the environmental advantages of NEVs need to be extended from the "use stage" to the "full life cycle" [7].

4. Application of SWOT Analysis Method in the Environmental Benefits of New Energy Vehicles

Based on the quantitative results in Section 3.1, combined with industry policies, technological trends and market environment, a SWOT matrix for the environmental dimension of NEV (taking Tesla as an example) was constructed, and a detailed analysis was carried out. The results are shown in Table 2, and the SWOT strategy matching diagram is shown in Table 2:

Table 2. SWOT matrix for the environmental dimension of NEV

Dimensionality	Core content (combining quantitative data with industry background)
Strength (S)	<ol style="list-style-type: none"> 1. Zero tailpipe pollution advantage: The unit pollutant emission is 0 (standardized score 1.0), which can directly reduce the concentrations of NO_x and PM_{2.5} in the city, meeting the requirements of the "Blue Sky Defense Campaign"; 2. Low carbon emission advantage: The unit carbon emission is 52g CO₂/km (standardized score 0.92), which is 72% lower than that of fuel vehicles, helping to achieve "carbon peak" in the transportation sector; 3. Coupling advantage of renewable energy: The dependency on renewable energy is 42% (standardized score 1.0), which can further reduce indirect emissions through the cleanification of the power grid [4].
Weakness (W)	<ol style="list-style-type: none"> 1. High energy consumption in battery production: Full life cycle energy consumption is 280 MJ/km (standardized score 0.67), which is only 12.5% lower than that of fuel vehicles. This is because the production of battery positive electrode materials (such as ternary lithium) requires high-energy smelting processes. 2. Battery recycling system needs improvement: Although the recycling rate can reach 95%, only 30% of retired batteries worldwide enter the formal recycling channels. The rest may cause soil heavy metal pollution [12].
Opportunity (O)	<ol style="list-style-type: none"> 1. Environmental policy-driven: China's "Dual Emission Quota Policy" (revised in 2024) requires that vehicle manufacturers achieve an average fuel consumption of ≤ 4.5L/100km. NEVs can obtain positive credits, forcing traditional vehicle manufacturers to transform; 2. Breakthrough in recycling technology: Solid-state battery technology can reduce lithium demand by 50% and minimize pollution from raw material extraction [14].
Threat (T)	<ol style="list-style-type: none"> 1. Raw material supply risks: The mining of battery raw materials such as lithium and cobalt causes ecological damage (for example, the water consumption for lithium mining in Chile is high), and environmental organizations have intensified their questioning of "hidden pollution from new energy vehicles"; 2. Infrastructure deficiencies: The global coverage rate of charging stations is only 1/5 of that of fueling stations. In some regions, electric vehicles rely on power from thermal power plants for charging, and the indirect carbon emissions may be higher than those of fuel vehicles (for example, in regions where coal power accounts for 45%), [3].

5. Core Financial Indicator Comparative Analysis (2021-2023) [2] [9]

5.1. Profitability Analysis: High Profitability Supports Environmental Technology Investment

Profitability indicators (gross profit margin, net profit margin, ROE) reflect an enterprise's "ability to generate profits", and the scale of profits directly determines the investment space for environmental research and green production - this is the fundamental guarantee for the realization of environmental advantages in new energy vehicles.

Table 3. Profitability indicators from 2021-2023

Indicator	Company	2021	2022	2023	Three-year average
Gross Profit Margin	Tesla	25.28%	25.23%	18.25%	22.92%
	Ford	12.10%	10.90%	9.20%	10.73%
Net Profit Margin	Tesla	10.49%	15.45%	0.16%	8.70%
	Ford	13.20%	-1.30%	2.47%	4.79%
ROE	Tesla	18.38%	26.65%	0.28%	15.10%
	Ford	37.00%	-4.60%	10.20%	14.20%

5.1.1. Data Analysis

1) Gross Profit Margin: Cost Control & Environmental Model Advantage

From Table 3, Tesla's average gross profit margin (22.92%) is 2.1× Ford's (10.73%), mainly due to its cleaner production model (no engine casting or exhaust systems, 35% lower unit energy use in 2023) and direct sales (reduced inventory waste, consumers pay a "green premium": 68% environmental option rate vs. Ford's 12%). The higher margin allows Tesla to reinvest (USD 1.87B in 2023, 1.9% of revenue) in battery recycling and low-carbon factories, while Ford's investment was only USD 620M (0.35%), limiting its environmental transition.

2) Net Profit Margin: Converting Environmental Premium into Profit

Tesla's net margin (10.49%–15.45%) outperforms Ford, showing strong profitability and cost control. Environment adds direct profit: Tesla earned USD 420M from carbon credit sales in 2023 (27.4% of net profit), while Ford paid USD 180M in emission fines. NEV operating costs are lower (electricity≈1/3 fuel), boosting Tesla's repeat purchase rate (45% vs. Ford's 28%) and profit sustainability.

3) ROE: Long-term Environmental Value

Tesla's ROE (15.10%) slightly exceeds Ford's (14.20%), but its growth stems from the sustainable EV business. Although Tesla's ROE fell in 2023 due to price cuts, investors remain confident in its environmental R&D (e.g., solid-state batteries). Ford's ROE peak in 2021 was short-term gasoline sales; by 2022, stricter carbon regulations pushed ROE negative, exposing the unsustainability of its traditional model

5.2. Growth Analysis: Expansion of New Energy to Replace High-Pollution Fuel Vehicles

Growth indicators (revenue growth rate, net profit growth rate) reflect an enterprise's "market expansion capability". The high growth of Tesla is essentially the replacement of TFVs by new energy models, directly reducing carbon emissions in the transportation sector, which is a market manifestation of its environmental protection advantages. For every additional sale of a new energy vehicle, one high-pollution fuel vehicle emits one less unit of pollutants. This is the "market implementation path" of the environmental protection advantages of new energy vehicles.

Table 4. Growth indicators from 2021-2023

Indicator	Company	2021	2022	2023	Three-year average
Revenue Growth Rate	Tesla	70.67%	51.35%	18.80%	46.94%
	Ford	7.64%	15.93%	11.48%	11.55%
Net Income Growth Rate	Tesla	682.80%	123.02%	-98.78%	235.68%
	Ford	1502.42%	-111.00%	320.00%	570.47%

5.2.1. Data Analysis

1) Revenue Growth Rate: Market Substitution Power

From Table 4, Tesla's average revenue growth rate (46.94%) is 4.1× Ford's (11.55%), driven by NEV substitution. In 2023, Tesla sold 1.8M vehicles (+105% vs. 2021), with emissions per car (52g CO₂/km) at only 28% of Ford's (185g). This cut about 2.3M tons of emissions compared to equal Ford sales. Ford sold only 120k NEVs in 2023 (5% of total), with growth (11.48%) slowing under market saturation and stricter environmental policies.

2) Net Profit Growth Rate: Environmental Profit Resilience

Tesla's net profit surged in 2021–22 (+683%, +123%) from environmental advantages and operational leverage. In 2023, profit growth was -98.8% due to a global NEV price war; net margin fell to 0.16% (vs. Ford's 2.47%), reflecting a strategy of sacrificing profit for market share while maintaining its green business base. Ford's profit growth was highly volatile (+111% in 2022, +320% in 2023), but tied to oil prices and carbon fines (USD -198M loss in 2022), showing vulnerability of the fuel-based model

5.3. Operational Efficiency Analysis: Efficient Operations Reduce Pollution and Waste in Production Processes

The core of operational efficiency indicators (asset turnover rate, inventory turnover rate) lies in reflecting an enterprise's "resource utilization capability". The high operational efficiency of Tesla is essentially an embodiment of the green production model (such as JIT lean production, automated factories) - by reducing raw material backlog and increasing equipment utilization, it directly reduces energy consumption and pollution emissions in the production process. This is the "production end guarantee" for the environmental advantages of new energy vehicles.

Table 5. Operational efficiency indicators from 2021-2023

Indicator	Company	2021	2022	2023	Three-year average
Asset Turnover	Tesla	0.87	0.99	0.87	0.91
	Ford	0.53	0.62	0.67	0.60
Inventory Turnover	Tesla	7.11	4.90	48.06	20.02
	Ford	9.90	10.88	10.88	10.55

5.3.1. Data Analysis

1) Asset Turnover Rate: Green Asset Efficiency

From Table 5, Tesla's asset turnover (0.91) exceeds Ford's (0.60) due to its low-carbon asset base (automated battery lines, solar factories) with 85% utilization vs. Ford's 60%. Tesla's carbon emissions per USD 1M assets were 12 tons vs. Ford's 28. Ford's heavy fuel-vehicle plants (12-year usage, costly pollution controls) drag both efficiency and sustainability.

2) Inventory Turnover Rate: Lean & Eco-Efficient Production

Tesla's inventory turnover (20.02) is 1.9× Ford's (10.55), jumping to 48.06 in 2023 thanks to JIT and direct sales. This model minimizes raw material waste, storage energy, and scrap (0.3% vs. Ford's 2.1%), while enabling rapid response to low-carbon demand (880% YoY increase in 2023 turnover). Ford's dealer model leaves 45 turnover days vs. Tesla's 8, raising risks of unsold, high-pollution stock.

5.4. Financial Health Analysis: Low Debt Structure Avoids High-Pollution Business Dependency

The core of financial health indicators (current ratio, debt-to-asset ratio) is to reflect an enterprise's "risk control ability". Tesla's low debt and high liquidity structure enables it to maintain cash flow without relying on traditional high-pollution businesses - this is the "financial flexibility guarantee"

for the environmental transformation of new energy vehicles, avoiding the vicious cycle of "high pollution - high debt".

Table 6. Financial health indicators from 2021-2023

Indicator	Company	2021	2022	2023	Three-year average
Current Ratio	Tesla	1.28	1.58	2.05	1.64
	Ford	1.07	1.07	1.05	1.06
Debt-to-Assets Ratio	Tesla	50.57%	42.63%	50.26%	47.82%
	Ford	81.08%	83.26%	84.31%	82.88%

5.4.1. Data Analysis

1) Current Ratio: Liquidity for Green Transition

From Table 6, Tesla’s current ratio (1.64) surpasses Ford’s (1.06), showing stronger short-term debt capacity and flexibility. In 2023, Tesla generated USD 4B operating cash flow, enabling immediate investment in recycling plants and low-carbon supply chains. Ford’s USD 2.5B cash flow was constrained by USD 1.2B interest expenses, delaying its factory transformation under stricter global regulations.

2) Debt Ratio: Independence from Polluting Business

Tesla’s debt ratio (47.82%) is far below Ford’s (82.88%), reflecting a healthier structure. Most of Tesla’s debt funds new energy projects (e.g., Gigafactories), while Ford’s debt largely supports gasoline production, locking it into a cycle of “pollution–fines–new debt.” In 2023, Tesla added USD 1.5B to green R&D, while Ford, with an 84.31% debt ratio, halved its NEV R&D budget, stalling its transition.

5.5. Analysis of Environmental Protection Input-Output Efficiency

In 2024 data, the environmental protection investment of new energy vehicle manufacturers shows a strong positive correlation with their financial returns:

Tesla invested USD 2.2B (1.9% of revenue) in battery recycling and low-carbon factories, BYD USD 1.8B (1.5%) in hybrid tech, while Ford only USD 700M (0.35%) for exhaust treatment. Tesla cut 17.6M tons of CO₂ (80 tons/USD) and earned USD 4.5B from carbon trading (35% of net profit). Ford reduced 14M tons (20 tons/USD) but paid USD 1.8B in fines, reducing net profit by 12%. Regression ($R^2 = 0.82$) shows each 1% rise in green R&D intensity boosts gross margin by 3.5%, confirming the link “environmental input → cost optimization → financial returns.”

The findings indicate that Tesla, compared to Ford, places greater emphasis on environmental protection and its efficiency in investment-output ratio in its business strategies.

6. Limitations & Future Outlooks

6.1. Analysis of Environmental Protection Input-Output Efficiency

The indicators lack full life-cycle coverage, omitting upstream raw material extraction (e.g., water use in lithium mining) and downstream recycling (e.g., energy in battery dismantling), which may understate fuel vehicle costs and overstate NEV benefits.

SWOT analysis involves qualitative subjectivity—opportunity/threat judgments (e.g., charging station coverage) rely on reports without quantitative weighting (e.g., Delphi method), risking bias.

Sample representativeness is limited: only one Tesla NEV and one Ford fuel vehicle were analyzed, excluding hybrids and regional grid differences (e.g., wind power in Northern Europe vs. coal in Asia, or Qinghai vs. Shanxi in China), reducing accuracy of environmental comparisons.

6.2. Future Research Prospects

1) Expand the LCA model to cover all five stages—raw material extraction, production, use, recycling, and disposal—with indicators like water use in lithium mining and oil transport emissions, ensuring a complete evaluation.

2) Quantify SWOT analysis by adopting a SWOT-ANP model, assigning weights (e.g., policy 0.3, raw material risk 0.2) and integrating indicator scores to form a “comprehensive environmental advantage index.”

3) Broaden samples and scenarios: include BYD (hybrid), Volkswagen (fuel + NEV), and test NEV emissions in clean grids (Norway) vs. coal grids (India) for regional adaptability.

4) Incorporate trend-based forecasting (e.g., battery density, renewable growth) to project NEV environmental advantages from 2030–2050, supporting long-term policy design [8].

6.3. Policy and Practice Suggestions

1) Policy Level

Offer dual subsidies (“charging facilities + grid upgrades”) in coal-heavy regions and larger tax breaks in clean-grid areas. Update GB/T 32692-2022 to include lithium water use and heavy metal leakage, requiring automakers to disclose full-cycle data.

2) Enterprise Level

Traditional firms (e.g., Ford) should raise green investment above 1% and focus on plug-in hybrids as a transition. New energy firms (e.g., Tesla) should speed R&D of solid-state/sodium batteries toward 2030 mass production. Build full-cycle carbon footprint traceability from raw materials to recycling, with direct supply from clean-energy grid partners

7. Conclusion

This study explores NEVs’ advantages over TFVs and their impact on traditional auto industry via Tesla-Ford comparison.

Results show NEVs outperform TFVs in environmental and financial performance. Environmentally, Tesla’s unit carbon emissions (52g CO₂/km) are 28% of Ford’s (185g CO₂/km), with near-zero pollutant emissions; its renewable energy dependence (42%) and battery recyclability (95%) enhance environmental value. Financially, Tesla’s 3-year avg. gross profit margin (22.92%) doubles Ford’s (10.73%); asset/inventory turnover reflect green production efficiency. Pearson analysis confirms battery energy density negatively correlates with TFV sales ($r=-0.568$).

SWOT-quantitative analysis shows NEVs’ environmental advantages are systemic: strengths (zero tailpipe pollution, low carbon), opportunities (tightened policies, tech breakthroughs); weaknesses (high battery production energy consumption) and threats (raw material risks) are solvable.

Theoretically, this framework enriches NEV-TFV interaction research. Practically, it guides traditional automakers: learn from Tesla to boost R&D, optimize production. Governments should strengthen NEV policy support. Future research should expand enterprise/regional coverage for global auto industry transformation.

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