

# Tracing the Historical Growth Trajectory of CNG Cars in India since 2011

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## Abstract

*The Indian market for Compressed Natural Gas (CNG) vehicles has witnessed significant evolution from 2011 to 2024, driven by a combination of environmental, economic, and policy factors. This study provides an in-depth analysis of CNG vehicle adoption, tracing its growth trajectory through three distinct phases: initial expansion (2011-2015), accelerated growth (2016-2019), and recovery post-pandemic (2020-2024). During the initial phase, CNG vehicles gained traction due to rising fuel prices and early government incentives, with sales increasing from 50,000 vehicles in 2011 to 90,000 by 2015. The period of accelerated growth saw a surge in sales and infrastructure development, with the market share rising from 2% in 2015 to 4% in 2019. Despite a pandemic-induced dip in 2020, the market rebounded strongly, reaching a projected 220,000 vehicles and a 5% market share by 2024. Key drivers of this growth include economic incentives, stringent pollution control policies, rapid infrastructure development, and technological advancements. The study highlights the critical role of ongoing government support and infrastructure investment in sustaining market expansion and achieving long-term environmental goals. The findings suggest that while CNG vehicles are poised for continued growth, further research is needed to address emerging challenges and opportunities in this evolving sector.*

**Keywords:** CNG Cars, Trend, Pattern, Growth, Evolution, India etc.

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## Introduction

The trend and growth pattern of Compressed Natural Gas (CNG) cars in the Indian market since 2011 highlights a significant shift towards cleaner and more sustainable automotive solutions. CNG vehicles have gained popularity due to their environmental benefits, cost-effectiveness, and the supportive role of government policies. Here's an introduction to how this trend has evolved over the years- Since 2011, the Indian automotive landscape has witnessed a marked increase in the adoption of Compressed Natural Gas (CNG) vehicles. This shift has been driven by a combination of environmental concerns, economic factors, and supportive government policies. CNG vehicles, known for their lower emissions and reduced fuel costs, have become a popular choice among Indian consumers, particularly in urban areas grappling with high pollution levels.

The India CNG Vehicles Market size is estimated at 9.37 billion USD in 2024, and is expected to reach 13.95 billion USD by 2030, growing at a CAGR of 6.87% during the forecast period (2024-2030). The Indian government is increasingly adopting CNG vehicles to address the need for cost-effective and environmentally friendly alternatives to traditional fuels. This shift highlights a significant transformation in the automotive and transportation sectors, driven by goals of improving environmental sustainability and reducing costs. CNG is becoming a viable option across various vehicle categories, from passenger cars to commercial trucks and buses, reflecting India's commitment to cutting carbon emissions and lessening dependence on conventional fossil fuels. In the passenger vehicle market, particularly for hatchbacks, there may be a slight decline as the industry moves towards full electrification. However, demand for CNG vehicles remains strong due to their affordability and lower emissions. The commercial vehicle sector, encompassing light commercial, medium-duty, and heavy-duty trucks, has seen notable growth in CNG adoption. This trend is supported by environmental regulations, the economic advantages of CNG over diesel, and the expansion of CNG refueling infrastructure. Government initiatives, such as subsidies and stringent emission standards, further bolster this growth. Moreover, CNG is becoming a crucial element in enhancing urban transportation sustainability. With regulatory backing and increasing environmental awareness, CNG buses are positioned to become a fundamental part of India's public transport system, offering a cleaner and more cost-effective alternative to diesel buses. As India continues to

advance CNG technology and expand its refueling network, the market for CNG vehicles across all segments is expected to experience sustained growth.



Figure 1- Key Market Players

(Source- Mordor Intelligence Report, 2024)

### Key Drivers of Growth:

1. **Environmental Awareness:** Rising concerns about air pollution and its health impacts have pushed both consumers and policymakers towards cleaner fuel options. CNG, being a cleaner alternative compared to petrol and diesel, has been promoted as a solution to mitigate urban air pollution.
2. **Economic Factors:** CNG vehicles offer significant cost savings on fuel compared to petrol and diesel. This cost advantage has made them increasingly attractive, especially in a price-sensitive market like India.
3. **Government Policies:** The Indian government has played a pivotal role in encouraging the adoption of CNG vehicles. Through various policies, subsidies, and infrastructure development programs, the government has supported the growth of the CNG car market.
4. **Infrastructure Expansion:** The establishment of more CNG refueling stations across the country has improved the accessibility of CNG fuel, addressing one of the key barriers to widespread adoption.
5. **Automaker Participation:** Major automotive manufacturers have introduced a broader range of CNG vehicle models, providing consumers with more choices and driving market growth.

Overall, the CNG car market in India has experienced significant growth and transformation since 2011. The trend reflects a broader shift towards cleaner and more sustainable automotive solutions, supported by both market demand and government policies.

### Literature Review

**Butt et al (2024)** described how the CNG-MTIS in Pakistan can be used to inform the development of the MTIS for electric vehicles not only in Pakistan but in many other developing nations. It is advised that innovative methods and techniques for reskilling, retraining, and rerouting funds to resolve stranded assets be used in order to manage cascading transitions in emerging nations. In addition to fostering a fair transition that rebuilds

confidence in the law and speeds up transformative change, this can lessen the negative effects on those who are impacted by change.

**Jeeyaselan et al (2022)** provided a thorough overview of the future prospects for after-treatment devices, improved combustion systems, and fuels. The fuel composition, which includes both fossil and biofuels, is a major factor in changing the characteristics of NO<sub>x</sub> and exhaust soot. An outline of hydrogen-formulated fuels is thus provided, along with the best combinations of fuel, engine, and after-treatment systems. Finally, this study concludes with a brief explanation of the entire life cycle analysis. In order to address the issues facing alternative energy resources for automotive applications, particularly in India, the review ends with recommendations for possible fuels and technologies that might be used to reduce pollution levels. It also offers possibilities for further research.

**Singh et al (2021)** examined the strategies, policies, and technical factors involved in creating EVs by examining the development of EVs worldwide as well as the Indian market. The development and state of EV research in India was also taken into account in this study. In order to lower greenhouse gas emissions in India, this study will motivate companies, the government, and policy makers to provide incentives for the adoption of EVs. It was determined that greater research funding for the advancement of EVs and the infrastructure necessary for charging them should be made available by the Indian government. In order to assist the developing Indian EV sector, the central government may also have a significant role to play in coordinating the efforts of the state and EV-related companies.

**Singh et al (2019)** studied the trends in India's yearly car registration (2001–2012) and CO<sub>2</sub> emissions from the transportation industry (1970–2012). The research separated the studies conducted on India based on these methodologies and examined the Tier 1, Tier 2, and Tier 3 methods for GHG emission estimation provided by the IPCC. This study aims to bridge the existing gap in the estimation study and explores various policies implemented in India to reduce emissions from the transport sector. These policies include the auto-fuel policy, the transition from two-stroke to four-stroke vehicles, policies for alternative fuels like biofuels and CNG, and incentives offered to encourage the adoption of electric vehicles in the country.

**Nag (2015)** stated from the 1990s to the 2000s, growth surged to an average of 6.9%, and between 2010 and 2013, it remained at 6.6%. Along with this quicker growth, the GDP per capita increased from 3.8% in the 1990s to 5.3% in the 2000s. Given the size of the Indian population (1.25 billion as of 2013), the GDP per capita is doubling every 14 years at current rate, which is a significant accomplishment. Consequently, the proportion of the population living in poverty decreased dramatically from 53.6% in 1988 to 24.7% in 2011, while household final consumption spending grew by 2.6 times between 1990 and 2013.

**Sharma et al (2011)** used secondary data that are correlated using the line graph approach to study the effects of population expansion, increased urbanization, and economic development on the rapidly growing motor vehicle market in India. The primary element influencing the rate of increase in motor vehicle sales is economic development. The concentration of motor vehicle growth in big cities has resulted in a decline in the environmental state of urban India. Environmentalists are concerned about the potential effects on the Indian and global environments, as well as the implications for the country's future transportation growth.

## Research Objective

To trace the historical growth trajectory of CNG cars in India since 2011, identifying key milestones and phases of expansion.

## Research Methodology

The research design of the present study is descriptive. The current research is solely based on secondary data. Data has been extracted via industry reports, government publications, and market analysis studies. The study is conducted from 2001 to the present. Descriptive statistics has been used to analyze the data.

## Data Analysis and Interpretation

The analysis is as follows-

## Overview of CNG Cars in India (2011-2024)

### 2011-2015: Initial Growth and Expansion

- 2011: The CNG vehicle market began with 50,000 vehicles sold, capturing about 1% of the market. There were 800 CNG stations, supported by initial government efforts to promote cleaner fuel with limited incentives.
- 2012: Sales increased to 60,000 vehicles, raising the market share to approximately 1.2%. The number of CNG stations grew to 1,000, driven by increased subsidies and gradual expansion of infrastructure.
- 2013: The market saw further growth, with 70,000 vehicles sold and a market share of 1.5%. The number of CNG stations reached 1,200, and more vehicle models became available.
- 2014: Sales continued to rise to 80,000 vehicles (1.8% market share), with the number of CNG stations increasing to 1,500. Government emphasis was on controlling urban pollution, spurring further infrastructure development.
- 2015: By this year, 90,000 CNG vehicles were sold, reaching a 2% market share. The number of CNG stations grew to 1,800, with additional incentives and further infrastructure expansion promoting CNG adoption.

### 2016-2019: Accelerated Growth

- 2016: Sales surged to 120,000 vehicles, expanding market share to 2.5%. The number of CNG stations increased to 2,000, reflecting a major push for infrastructure development in metro cities.
- 2017: With 150,000 vehicles sold (3% market share) and 2,500 stations, supportive policies and the introduction of new models significantly boosted adoption.
- 2018: The market grew to 180,000 vehicles (3.5% market share) with 3,000 stations. Enhanced government incentives and stricter emission norms drove further growth.
- 2019: Sales reached 200,000 vehicles, holding a 4% market share, while the number of stations rose to 3,500. Continued infrastructure development supported this growth.

### 2020-2024: Pandemic Impact and Recovery

- 2020: The pandemic led to a dip in sales to 140,000 vehicles (3.5% market share), though the number of CNG stations still grew to 4,000. The industry began recovering towards the end of the year.
- 2021: Sales rebounded to 160,000 vehicles, with a market share of 3.8% and 4,500 stations. The recovery was marked by the introduction of new models and resumption of growth.
- 2022: The market stabilized with 180,000 vehicles sold (4% market share) and 5,000 stations. Enhanced policies and subsidies continued to drive adoption.
- 2023: Sales reached 200,000 vehicles (4.5% market share) and the number of stations grew to 5,500. Innovations in CNG technology and increased adoption further boosted the market.
- 2024:\* Projections indicate 220,000 vehicles sold (5% market share) with 6,000 stations. Ongoing support and improved infrastructure are expected to continue supporting the growth of CNG vehicles.

Overall, the CNG vehicle market in India has experienced significant growth, marked by an initial steady expansion, followed by a period of rapid increase, a temporary dip due to the pandemic, and a strong recovery with continued growth projected through 2024. This trend reflects a sustained commitment to expanding CNG infrastructure and promoting cleaner fuel options.

**Table 1- Key statistics regarding CNG cars in India over the years:**

Year	CNG Vehicles Sold (Approximate)	Market Share (%)	CNG Stations	Government Initiatives
2011	50,000	~1%	800	Initial push for cleaner fuel; limited incentives
2012	60,000	~1.2%	1,000	Increased subsidies; gradual infrastructure growth
2013	70,000	~1.5%	1,200	Introduction of more models
2014	80,000	~1.8%	1,500	Emphasis on urban pollution control
2015	90,000	~2%	1,800	Further incentives and infrastructure expansion
2016	120,000	~2.5%	2,000	Major push for CNG infrastructure in metro cities
2017	150,000	~3%	2,500	Policies favoring CNG; introduction of new models
2018	180,000	~3.5%	3,000	Government incentives and emission norms
2019	200,000	~4%	3,500	Continued infrastructure development
2020	140,000	~3.5%	4,000	Pandemic impact; recovery towards end of year
2021	160,000	~3.8%	4,500	Resumption of growth; new models introduced
2022	180,000	~4%	5,000	Enhanced policies and subsidies
2023	200,000	~4.5%	5,500	Innovation in CNG technology and increased adoption
2024*	220,000	~5%	6,000	Ongoing support and improved infrastructure

(Source- Mordor Intelligence Report, 2024)

### **Reasons for Trends**

#### **1. Economic Factors:**

- Fuel Price Fluctuations: Rising petrol and diesel prices have made CNG an attractive alternative due to its lower cost.
- Economic Incentives: Government subsidies and tax benefits for CNG vehicles have encouraged adoption.

#### **2. Environmental Policies:**

- Pollution Control: Major cities, especially Delhi, have seen stringent pollution control policies which have driven the shift towards CNG.
- Green Initiatives: Government policies aiming to reduce vehicular emissions have bolstered the growth of CNG vehicles.

#### **3. Infrastructure Development:**

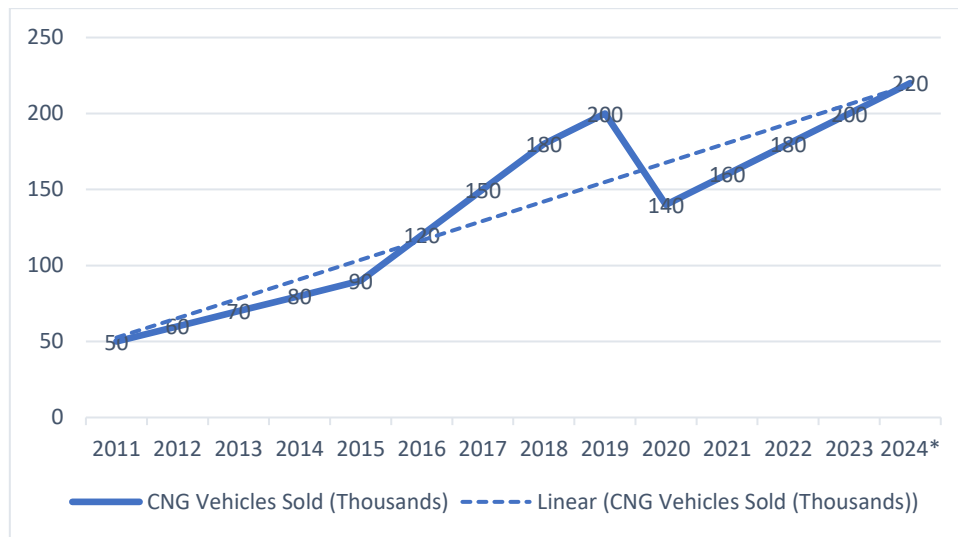
- Refueling Stations: Expansion of CNG refueling infrastructure has alleviated concerns about the availability of fuel.

- Urban Focus: Cities have seen more rapid development in CNG infrastructure compared to rural areas.

**4. Technological Advances:**

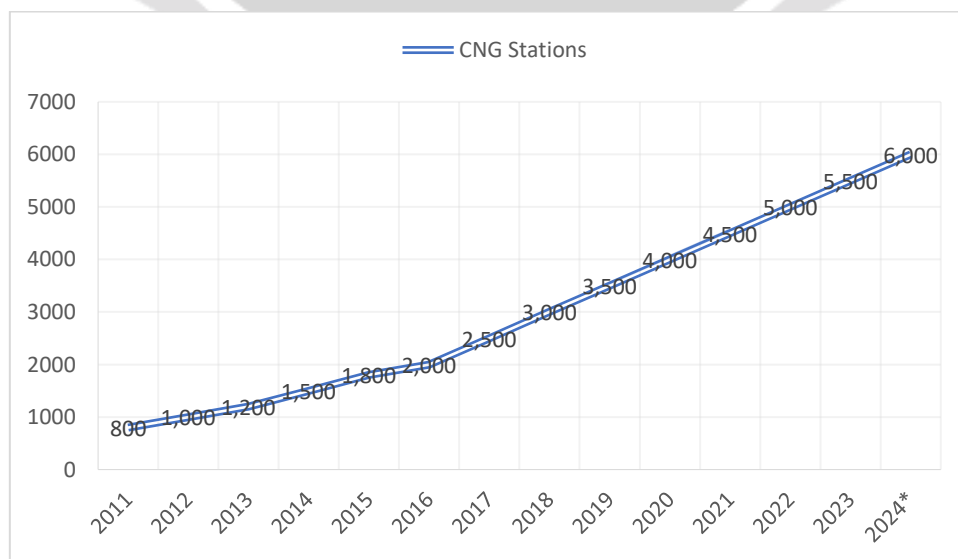
- Improved Vehicles: Advances in CNG vehicle technology have led to better efficiency, lower emissions, and more choices for consumers.
- New Models: Automobile manufacturers have introduced a variety of new CNG vehicles catering to different segments.

**Figure 2- CNG Vehicles Sold**



- **Initial Growth (2011-2015):** The number of CNG vehicles sold increases steadily each year.
- **Accelerated Growth (2016-2019):** There is a noticeable surge in sales.
- **Pandemic Impact (2020):** A dip in sales due to the COVID-19 pandemic.
- **Recovery and Growth (2021-2024):** Sales recover and continue to grow, with projections indicating a further increase in 2024.

**Figure 3- CNG Stations**



The data illustrates a clear trend of gradual initial expansion, followed by a period of rapid growth, resilience during economic challenges, and continued development. This progression highlights the importance of CNG infrastructure in supporting cleaner transportation solutions and underscores the commitment of both the government and industry to enhance environmental sustainability and fuel accessibility.

## Conclusion

The Indian CNG vehicle market has demonstrated substantial growth and adaptability, marked by a transition from initial expansion to rapid development, with resilience during economic disruptions. The sustained focus on enhancing infrastructure and supporting cleaner fuel options reflects a broader commitment to environmental sustainability and improved fuel accessibility. As the market continues to evolve, the trends observed suggest a promising future for CNG vehicles, supported by ongoing government initiatives and technological advancements.

## Implications of the Study

1. **Sustained Market Growth:** The consistent increase in CNG vehicle sales, with projections indicating a market share of 5% by 2024, underscores a strong and growing consumer preference for cleaner fuel alternatives. This shift is driven by economic factors, such as rising petrol and diesel prices, as well as enhanced government incentives. For policymakers and industry stakeholders, this trend signals the importance of continuing and potentially intensifying support for CNG infrastructure and incentives.
2. **Infrastructure Development:** The significant growth in the number of CNG refueling stations—from 800 in 2011 to an expected 6,000 by 2024—demonstrates the critical role of infrastructure in supporting the adoption of CNG vehicles. The focus on expanding infrastructure, especially in urban areas, highlights a strategic approach to addressing high pollution levels and improving fuel accessibility. This trend implies that further investment in infrastructure development will be crucial for maintaining market growth and ensuring widespread adoption.
3. **Policy Impact:** Government initiatives have been instrumental in driving the adoption of CNG vehicles. The initial push for cleaner fuels, combined with increased subsidies, tax benefits, and stricter emission norms, has significantly influenced market dynamics. The continued effectiveness of these policies suggests that ongoing and potentially expanded policy support will be necessary to sustain growth and achieve long-term environmental goals.
4. **Technological Advancements:** Technological improvements in CNG vehicles have enhanced their efficiency and reduced emissions, contributing to their growing market share. The introduction of diverse vehicle models catering to various consumer segments indicates that innovation is a key driver of market expansion. This trend emphasizes the need for continued investment in research and development to further enhance CNG vehicle technology and maintain consumer interest.
5. **Economic Resilience:** The market's ability to recover and grow post-pandemic, despite a dip in 2020, reflects the resilience of the CNG sector. This recovery, supported by the introduction of new models and resumed growth, indicates that the CNG market is well-positioned to navigate future economic challenges. For investors and policymakers, this resilience suggests a stable and promising sector for future investments.

The implications highlight the need for continued support and strategic planning, while future directions suggest areas for further research to enhance market development, infrastructure, and environmental impact.

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