#NHforEV

'National Highways for Electric Vehicles'

UPCOMING

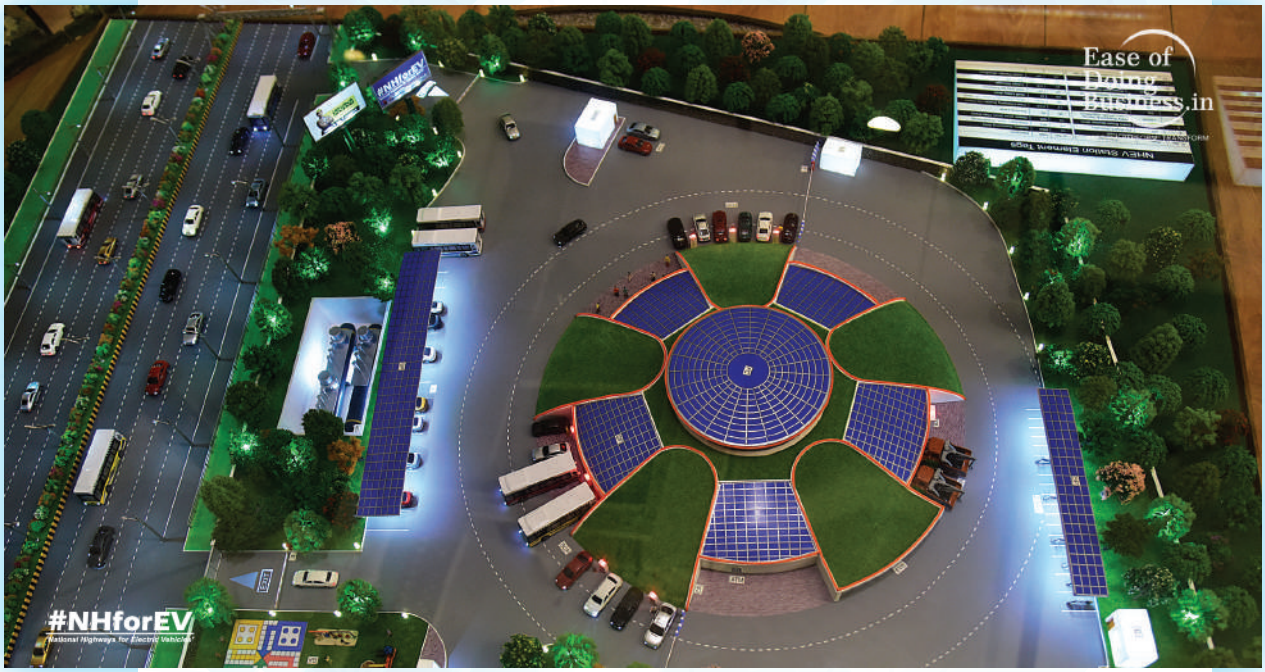
5500 KM eHighway

in India

ABOUT NHEV

NHEV is an E-highway pilot project based on the Public-Private Partnership (PPP) from the Ease of Doing Business. This 1st phase of the pilot is being implemented on the Jaipur-Delhi-Agra highway covering 500km. Going forward the pilot is to be scaled up to 5000 km across India. The pilot includes setting up charging infra, car-bus fleet, roadside assistance for EVs along with theft-proof geofenced highways. The first two prototype stations of NHEV are commissioned in Gurugram with 100 EV chargers as India's Largest Charging station with 75 AC and 25 DC Chargers. Ease of Doing Business proposed easing the charging infra-setup with compliance reduction.

Ministry of Power clarified in 2020 that no license is needed for setting up petrol-pump-like EV charging stations. PM's clarion call of NetZero and this fundamental REFORM brought EoDB in E-Mobility to bring down major bottlenecks and boost the techno-commercial speed of adoption. On 27th September 2022, the miniature concept model for the 3rd generation of EV charging stations with provision for Hydrogen was revealed by Shri Nitin Gadkari, the honourable minister of road transport and highways. NHEV has successfully held Tech-Trial II from Delhi-Jaipur and the first part of the final report was released in March 2023.



THIRD GENERATION CHARGING STATION

The introduction of Third-Generation Charging Stations through the NHEV pilot will prove to be a game-changer. These stations will have no option for traditional fuels like diesel and petrol.

With hydrogen vending capabilities and robust charging infrastructure for EV cars, buses, 2-wheelers and 3-wheelers, these stations are certainly the stations of the future.

Detailing 01

The Setup, detailing, and even micro-detailing of a petrol pump is clearly defined in the public domain but standard norms and other relevant details for setting up a charging station were yet unknown and confusing.

Financing 02

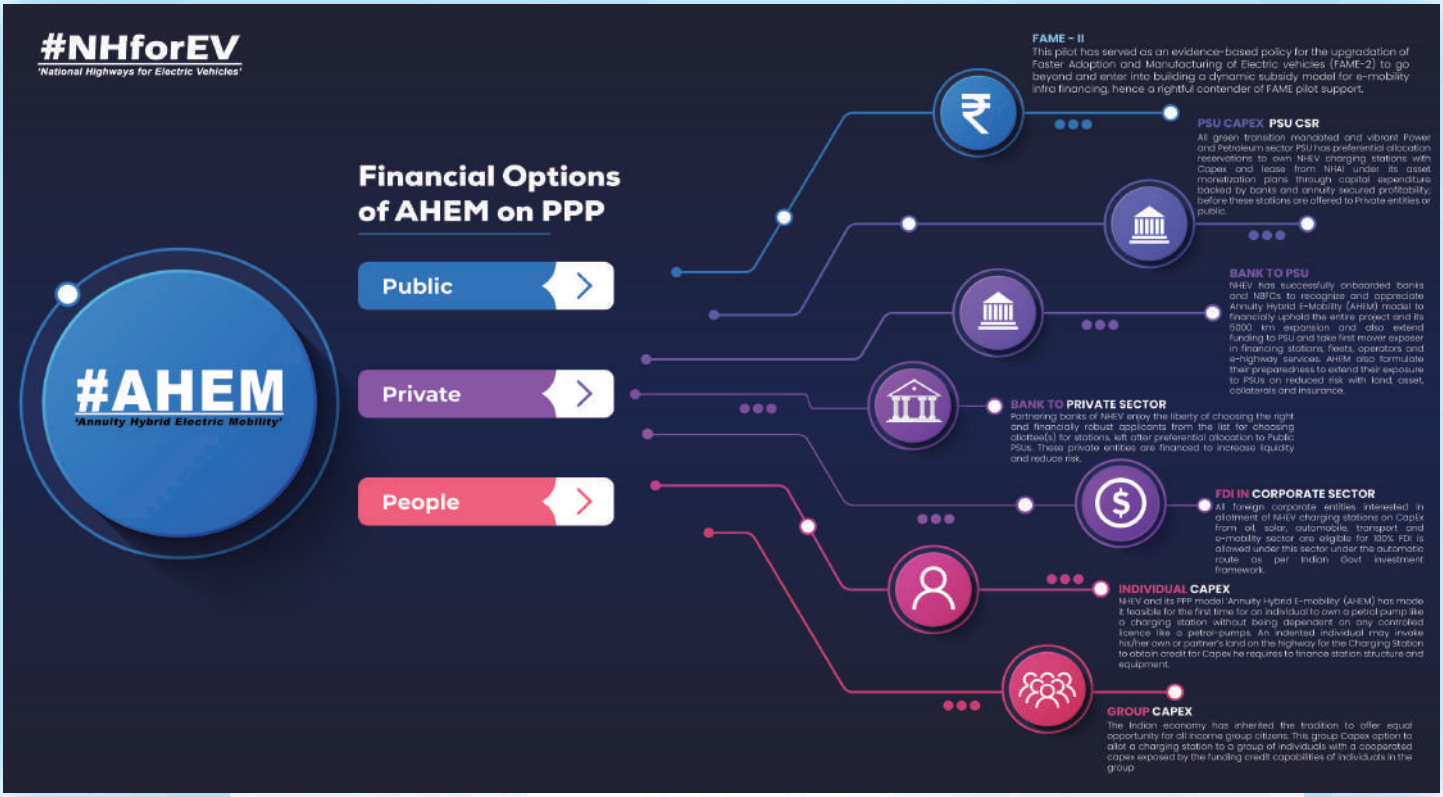
There was ample financial support for the notion and dialogues but at an individual level, financing was a struggle.

Earning 03

Everyone knew infrastructural investment is a high CapEx business and the CapEx recovery periods of projects like Petrol pumps or metro were defined and calculated, but the breakeven for setting up of charging stations was unknown leaving the investors confused.

Upcoming 5500 KM eHighway in India

#AHEM™
'Annuity Hybrid Electric Mobility'



MULTI-LAYERED INVESTMENT SAFETY INDEX

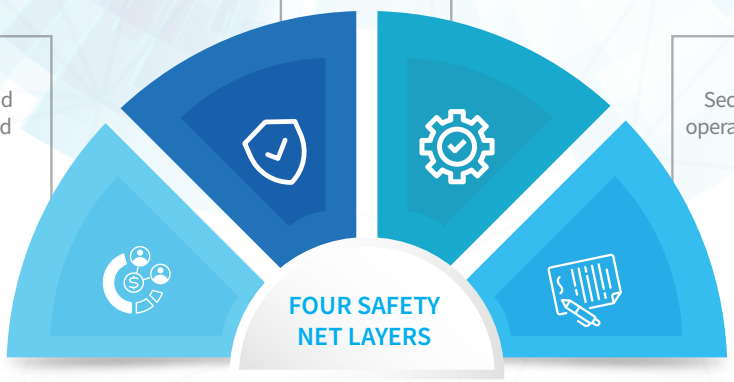
Investment funds on NHEV Highway upgradation are utilized under Annuity Hybrid E-Mobility (AHEM) model. They are protected with 4 layers of safety nets and 3 optional financing processes to ensure the allocation of each utility, asset and station.

01 Strong demand and Market Share based business models

02 Advance Annuity Contracts of Minimum Guarantee (MG)

03 Conservative Utilization Matrix for schedule Breakeven

04 Securities & Warrantiesfor operational accountabilities



01 Public
Land is made available to the Power & Petroleum Public Sector Undertakings (PSUs) by the NHAI

02 Private
In this scenario, a private entity buys the land for the station construction.

03 People
In this case, common people offer their suitable land as collateral to the bank to get a credit line in order to erect the station.

Upcoming 5500 KM eHighway in India

225 KM DELHI AGRA

25th Nov to 25th Dec 2022

Taking the initiative forward from 25th Nov 2020, NHEV starts its Tech-Trial Run from Delhi to Agra via Yamuna Expressway, where components of all 4 major Ease of Doing Business deliveries shall be showcased to bring EVs on highways.

30-Min Backup for EVs on E-highways

30% Lesser Priced EVs in NHEV

30 % CapEx Utilization of Charging Infra

3-year Breakeven of Entire Ecosystem

272 KM DELHI JAIPUR

09th Sep to 09th Dec 2022

Tech-Trial Run II from Delhi-Jaipur, held from September to December 2022, highlighted the major points of Technical Investigation of E-Mobility.These major takeaways make EV adoption easier and user confidence higher on National Highways and Expressways.

01 Seat Fare

₹1000 v/s ₹1500

₹4000 v/s ₹12000

01 Day EV Fare

01 KM Upgradation Cost

₹80 Lakhs v/s ₹1 Crore

4500 MT

01 EV CO_2 Emissions Cut

Upcoming 5500 KM eHighway in India

PROTOTYPE STATIONS INAUGURATION

Gurgaon Sector-52

NHEV (National Highway for Electric Vehicles) inaugurated its first and India's largest Prototype Electric Vehicle (EV) charging station Model situated in Sector 52, Gurgaon, Haryana on 28th January 2022.

This charging station has been installed and operated by Alektrify. This EV charging station gets 100 charging points for four-wheelers, of which 72 units are AC slow chargers while 24 units are DC fast chargers.

72 AC Chargers

100 Charging Points

24 DC Chargers

Gurgaon Sector-86

NHEV (National Highway for Electric Vehicles) inaugurated its second Prototype Electric Vehicle (EV) charging station Model situated in Sector 86, Gurgaon, Haryana on 3rd March 2022.

This charging station has been installed and operated by Alektrify. This EV charging station gets 100 charging points for four-wheelers, of which 75 units are AC slow chargers while 25 units are DC fast chargers.

75 AC Chargers

100 Charging Points

25 DC Chargers

RECORD **72%** **UTILIZATION**

Commissioned Protoype
RECORDED HIGHEST
NATIONAL AVERAGE
With 100 Chargers & 576 EVs

MAXIMUM **36** **MONTHS**

Commissioned Protoype
REACHING ITS BREAKEVEN
NATIONAL AVERAGE RECORDS
With 75 AC & 25DC FAST CHARGERS

Upcoming 5500 KM eHighway in India

MINIATURE EV CHARGING STATION CONCEPT MODEL REVEALED

Shri Nitin Gadkari, Hon'ble Minister of Road Transport & Highways revealed the miniature of NHEV Third Generation Charging Station

NHEV initially aimed for Agra-Delhi-Jaipur routes to be open as India's first 500 km E-Highway under this commercial pilot. On 27th September 2022, Shri Nitin Gadkari, Hon'ble Minister of Road Transport & Highways, inaugurated the miniature model of the NHEV third-generation Green Fuel Charging Stations. His appreciation towards the pilot fueled the scale-up of the pilot tenfold up to 5000 kms. By the end of 2023, NHEV committed itself to equally increase procurement and capabilities up to tenfold as it entered the expansion phase.

01	Sensor Gate	09	Road Side Assistance	17	Fast Charging Points (10 Cars)
02	AD Board (Annuity)	10	Bank & ATM	18	Slow Charging Points (19 Cars)
03	Entry Boom Barrier (EV)	11	Conference Room	19	Staff Utility Area
04	Utility Support & Server Room (AI-ML Algorithm)	12	EV Showroom 2W & 3W	20	Tyre and Air Pressure
05	Compact Substation	13	Battery Swapping Area	21	Cargo Storage
06	Car Swapping (Relay)	14	Hydrogen Tank (Dispensing)	22	2W & 3W Parking
07	Food Court & Lounge	15	Green Area (Kids Play Area)	23	Solar Panels (Rooftop)
08	Battery Swapping Unit	16	Parking Lane	24	Smart Parking Management

Upcoming 5500 KM eHighway in India

NHEV E-HIGHWAY PROTOTYPE REPORT RELEASE

JANUARY 2023

NHEV E-highway Prototype Report draft tabled on 10th January 2023 at the 5th NHEV Working Group Meeting at New Delhi

FEBRUARY 2023

This was followed by a high-level interaction with the NITI Aayog for pricing revisions, citing low EV fares in the NHEV ecosystem.

MARCH 2023

NHEV E-highway Prototype Report Released on 24th March 2023 at the Festival of Manufacturing by ET Edge at New Delhi.

MOU SIGNING CEREMONY

HDFC BANK

Ease of Doing Business.in

REFORM PERFORM TRANSFORM

For

#NHforEV

'National Highways for Electric Vehicles'

On 31st August 2023, HDFC Bank and Ease of Doing Business have come together for National Highways for EV to structure a credit outlay of ₹3,672 Crores for the upgradation of 5500 KM of national highways and expressways into E-highways nationwide and revolutionise the Indian E-mobility ecosystem.

COMMERCIAL TAKEAWAYS

Station Allocation on PPP Model

PUBLIC	PRIVATE	PEOPLE
1. FAME – II	1. Bank to PSU	1. Individual CapEx
2. PSU CapEx PSU CSR	2. Bank to Private Sector	2. Group CapEx
	3. FDI in Corporate Sector	

Annuity Hybrid E-Mobility (AHEM) Financial Model

Annuity Hybrid E-Mobility (AHEM) is the financial model inspired by the Hybrid Annuity Model (HAM) having the capability to upgrade any highway or expressway into an E-highway within 90 days. AHEM means procurement from on-boarded partners and suppliers for CapEx to earn OpEx for breakeven in 36 months.

NHEV: A GEM for E-Mobility

To be onboarded with the NHEV marketplace is like being onboarded by Amazon. AHEM promotes higher-quality products and services and avoids curtailing a better-quality emerging technology due to cost constraints.

Beta Version E-Highway

NHEV has prototyped a beta version of global E-Highways in India on Relay Model Resilience where the responsibility of providing Mobility as a Service (MaaS) as the ticket/trip booked by the user is shared by the Fleet operator or the Highway operator and not burdened on the shoulders of the User or Driver

Merit, Productivity and Performance based Procurement

NHEV has a robust takeaway for its first-mover participants and stakeholders to list themselves on the e-marketplace and participate in the speedy qualification of repeated procurements on the basis of merit, and productivity in performance.

Mobility as a Service (MaaS)

MaaS is an evidence-based policy takeaway from NHEV that embarked on changing trends in people's behaviour and approach towards their transportation needs. NHEV fits electric mobility in users' needs and pockets as well by making EVs available without drivers for intercity usage for multiple cities for flexible trips and customised usages.

People Ownership of Station in PPP mode

NHEV and its PPP model (AHEM) have made it feasible for the first time for an individual to own a petrol pump like a charging station without being dependent on any controlled licence like a petrol pump. An indented individual may invoke his/her own or partner's land on the highway for the Charging Station to obtain credit for Capex he requires to finance station structure and equipment.

TECHNICAL TAKEAWAYS

Anti-theft Ecosystem

NHEV will be able to create an Anti-Theft system for EVs through the synchronization of three key players:

The EV | The Battery | The Charger

Battery as a Subscription (BaaS)

Battery-as-a-subscription(BaaS) model is the first of its kind that is tested under the NHEV Pilot. The battery and the vehicle are sold separately which reduces the CapEx for fleet operators and owners by 30%-40%.

forEV
for Electric Vehicles'

Relay Model Resilience

The Relay Model is piloted by taking inspiration from the operations of Metro trains. Whenever a fleet car arrives at any of the stations, it is swapped with a fully charged car. The customer now gets a fully charged car to continue the journey whereas the swapped car is put in for charging to continue the same relay process.

Battery Recycling Lifecycle

Overall competence developed by NHEV through technical prototyping of such model allows a battery to be tracked, sold, used, monitored, leased, insured and financed from day 1 of its manufacturing till repair, refurbished, reused and recycled back without getting lost or buried in our environment unknowingly.

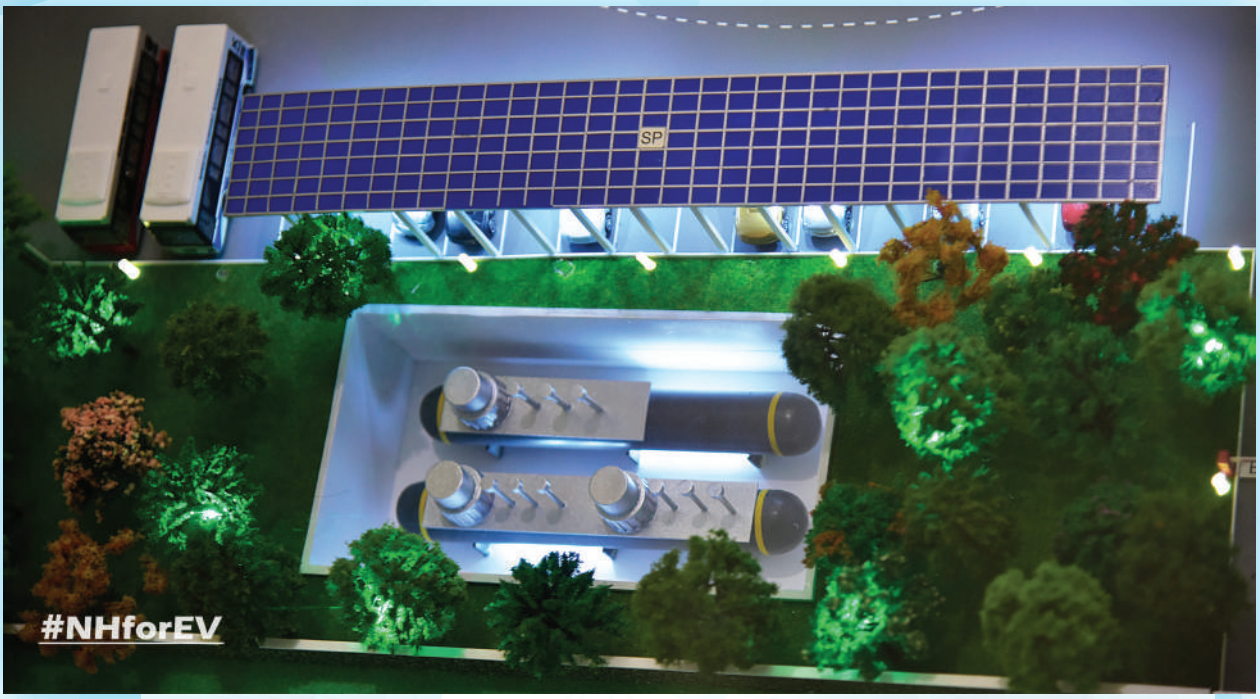
Vehicle-to-Grid (V2G)

Vehicle-to-Grid (V2G) is a technology enabling energy stored in a vehicle to flow back to the grid. This helps stabilise the electricity grid thereby making solar and wind scalable.

Largest H_2 Vending Network

Hydrogen Dispensers at the 3rd Generation Charging Station facilitate multiple features:
High flow in short filling times | Low noise refueling | Pressure stages between 35 MPa to 25 MPa | Special Data interface for communication between vehicles and fuelling dispensers | Coding for pressure stage and gas type | User's convenience and safety through integrated swivel joints and nozzles with suitable breakaway couplings

HYDROGEN DISPENSING INFRASTRUCTURE BY NHEV



The Third Generation Green Fuel Charging Stations of NHEV, planned to be installed on 23 E-Highways in a range of each 50 km on a 5500 km stretch spread across 28 Cities in 12 states, focused on EV Charging Facilities, are also equipped with Hydrogen Dispensing Capabilities for the times when Indian transportation service will be catering Hydrogen- driven vehicles.

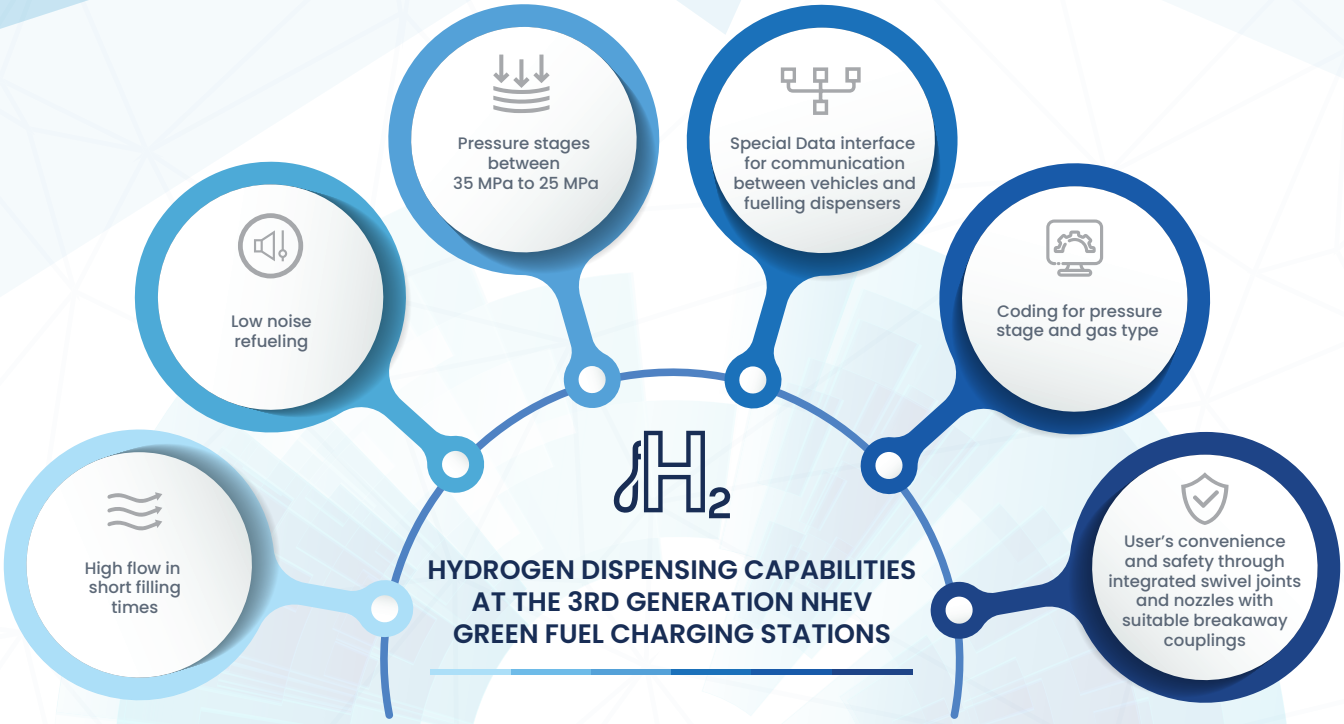
Inducting hydrogen dispensing capabilities at the planning stage of stations was a game-changer input from our visionary Chair of NHEV Knowledge Group Dr. V K Saraswat, Member of NITI AAYOG. It allowed us time to gather information on global tech trends and make Indian refueling stations, creating a balanced load on one commodity as well as creating efficient transportation for all.

Electric BUS and EV SUVs have already conducted their 500 km tech-trial run successfully between Jaipur- Delhi– Agra in 2 phases and the ambitious pilot, National Highways for EV (NHEV), now awaits the manufacturing of hydrogen-driven heavy cargo trucks and vehicles to test its Hydrogen storage and dispensing model.

As the need of Indian Transition and requirements for heavy vehicles, which contributes a large part in automobile and transportation sector, Green Hydrogen is the most relatable alternative specifically for commercial vehicles and their needs.

The only major downside of Green Hydrogen in India is the distribution and availability, as well the compatibility of Generation of First and Second Generation Stations which are incapable of technology adaptability and refueling of Hydrogen- Driven vehicles.

HYDROGEN DISPENSING CAPABILITIES AT 3rd GENEGRATION CHARGING STATIONS



The miniature model of the NHEV station with H_2 provision as envisaged by Dr V. K. Saraswat, Member NITI Aayog and NHEV Knowledge Group Member, in the planning and designing phase itself was revealed in September 2022 by Shri Nitin Gadkari.

The introduction of Third-Generation Green Fuel Charging Stations through the NHEV pilot will prove to be a game-changer. These stations will have no option for traditional fuels like diesel and petrol. With hydrogen vending capabilities and robust charging infrastructure for EV cars, buses, 2-wheelers and 3-wheelers, these stations are certainly the stations of the future.

> "Utmost safety and outstanding functionality to achieve commercialization are our key focus areas in these technical trials and pilot projects; day by day we are achieving capabilities of fast filling of hydrogen in buses and trucks at upcoming NHEV green fuel stations."
>
> -Abhijeet Sinha Project Director, NHEV

5500 KM
Expansion Overview

The total cost of the overall project for the Upgradation Of National Highways and Expressways into 23 E- Highways nationwide will be approximately ₹3,672 Crores

500 KM SUCCESSFUL PILOTS

Currently operating Electric Cars, SUV & Buses

DELHI – AGRA

225 KM

DELHI – JAIPUR

272 KM

5000 KM EXPANSION PHASE

01	Agra – Lucknow
02	Lucknow – Prayagraj
03	Prayagraj – Varanasi
04	Varanasi – Bodhgaya
05	Bodhgaya – Dhanbad
06	Dhanbad – Kolkata
07	Kolkata – Balasore
08	Balasore - Bhubaneswar
09	Jaipur – Udaipur
10	Udaipur–Ahmedabad
11	Ahmedabad – Vadodara
12	Vadodara – Surat
13	Surat – Mumbai
14	Mumbai – Pune
15	Pune – Goa
16	Goa – Bengaluru
17	Chennai - Trichy
18	Trichy – Madurai
19	Coimbatore - Ulundurpett
20	Krishnagiri – Madurai
21	Madurai – Kanyakumari

5500KM HIGHWAY MARATHON KICKSTART

NHEV Marathon Meet covers the Project overview and is giving away Letter of Award (LoA) for the official supplier status to eligible partners as the project enters its construction and allocation phase. The Marathon marks the upgradation of 5500 kms of National Highways and Expressways into E-Highways through 121 NHEV 3rd Generation Charging Stations. Digital announcement of Letter of Awards was done on 31st July 2023.

This paved the way for NHEV Marathon Meet which will be full of Deliberation, Discussions and Documentation around NHEV. The key takeaways of this meet will be finalisation and clarity in the scope, AHEM submissions and disbursement of the Letter of Awards (LoA) to the partners along with networking opportunities with the masters of the E-mobility sector, scheduled to be held 26 September 2023 onwards at ITC Maurya, New Delhi.

03 Roundtables

30 LoA

80 Partners

30 Speakers

100+ Visitors

10 Institutions

9 Sessions

30 Hours

Register Now

nhev.in/marathon

EHIGHWAY

GERMANY INDIA

TRIAL 1

10 **KM** Length, Location: A5 Federal Autobahn, Speed:56 mph,
Frankfurt Airport to Reinfeld junction / Lübeck interchange
Funding: **132 Cr** for motorway installation, Trial Run Cost: 138 Cr

225 **KM** Length, Speed: 100kmph, Yamuna Expressway
India Gate via Greater Noida Yamuna Exp to Agra
Funding: Rs. **2 Cr** from NHEV Partners, Trial Run: 1 Cr

2020 **Electric Vehicle participated**
Compatiblity: 5 Pantograph Scania Trucks
Trucks from Schanz, Meyer Logistics, Contargo & Merck

2021 **Electric Vehicle participated**
Compatible : NueGo Electric Bus (Greencell)
Cars - Sedan Fleet Vehicle from Blusmart Mobility

TRIAL 2

12 **KM** Length, Speed: 56 mph, Location: A5 federal Autobahn
From Zeppelinheim/Cargo City, Frankfurt to Darmstadt
Trial Run Cost: 90 Cr INR (EUR 2 Million per Kilometer)

272 **KM** Length,Speed: 100kmph, Location: Delhi- Jaipur(NH 48)
From India Gate to Albert Hall Museum, Jaipur, Rajasthan
Funding: Rs. 4 Cr INR from EoDB, Trial Run Cost: 7 Cr INR

2020 **Electric Vehicle participated**
Compatiblity : 5 Scania R 450 hybrid trucks
OEM: Schanz, Meyer Logistics, Contargo, Merck & Knauf

2022 **Electric Vehicle participated**
Compatible : NueGo Electric Bus (Greencell)
Cars - SUV from Blusmart Mobility

TRIAL 3

3.4 **KM** Length, Location: B 462 Federal Highway,
Funding: 253 Cr INR, Trial Cost: 75 Cr INR, **June 2021**
5 Fully Electric, Hybrid and Hydrogen-Fueled Trucks participated

3 **rd** Generation Charging Station Miniature Model
Revealed in **Sept 2022** by Nitin Gadkari,
Union Minister Road Transport & Highway, Govt. of India

4000 km into EHighways by 2030 ..... **UPGRADATION** ..... **5,500 km** into EHighways by 2030

22 Cr INR / Km ..... **COST** ..... **1 Cr INR / Km**

Federal Government of Germany
Environment Ministry, Germany
Olaf Scholz, Federal Chancellor of Germany
Steffi Lemke, Environment Ministry, Germany
Robert Habeck,Economic Affairs & Climate Action
Federal Ministry for Transport and Digital Infrastructure
National Platform for the Future of Mobility (NPM), Germany

..... **SUPPORTED BY** .....

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V.K. Saraswat, Niti Aayog, Govt. of India
Suresh Prabhu,Minister of Commerce & Industry, Govt. of India
K.J Alphons, Minister of State for Tourism, Govt. of India

Environment Ministry, Government of Germany ..... **FINANCED BY** ..... **On Annuity Hybrid E-Mobility (AHEM) PPP Model**

- **Overhead lines** may be adversely affected by **strong winds** causing wires to swing resulting in short circuit
- **Storms** can knock the power out with **lightning strikes** on the wires, stopping trucks following a **power surge**
- During **cold or frosty weather**, ice may coat overhead lines, resulting in **electrical arcing** and power surges

..... **CHALLENGES** .....

- Commercial Prototyping on **23 proposed E- Highway** Routes
- **E-Vehicle Manufacturing** & Deployment on **BAAS Model**
- Uninterrupted Power supply & speedy connection from Grid
- Federal cooperation on **Annuity Hybrid E-Mobility** (AHEM)
- State and Central Government collaboration to upgrade their **National Highways into E-Highways** on AHEM Model

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REFORM | PERFORM | TRANSFORM

REFORM PERFORM TRANSFORM

CONTACT US

MR. ABHIJEET SINHA
National Program Director-Ease Of Doing Business
Project Director-NHEV | DIISHA | Drone Pilot
President-Charge Point Operators Society Of India
+91 9910 760 999 director@easeofdoingbusiness.in

MR. ABHISHEK GUPTA
Techno-Commercial Lead
National Highways for Electric Vehicles (NHEV)
+91 99102 26499 tech-team@nhev.in

CORPORATE OFFICE
Advance Services for Social and Administrative Reforms
2nd Floor, Innov8, Khadi Gram Udyog Bhavan,
69 Regal Connaught Place, New Delhi-110001
T: 01 4300 9699 | @: office@assar.in | W: www.nhev.in

PROGRAMME OFFICE
Ease of Doing Business Services - Board Office 505,
5th Floor, Antariksh Bhawan, LM American Centre, 22
Kasturba Gandhi Marg, New Delhi - 110001
T: 011 4105 9899 | www.easeofdoing business.in