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# GREEN INSIGHTS

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## Green Transport

An  
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*“Given the role that transport plays in causing greenhouse gas emissions, any serious action on climate change will zoom in on the transport sector.”*

Yvo de Boer, Executive Secretary of the UNFCCC, Tokyo, January 2009

An efficient transport sector is important for economic development and for the well-being of people. With the acceleration of the urbanization process, urban traffic congestion is becoming increasingly painstaking. The impact on population, resource and environment are also becoming increasingly critical. The transport sector makes up 30% of the global energy consumption. Its energy use is expected to grow 1% every year till 2030.

Transport activities can produce widespread negative environmental impact. It emits 14% of the global greenhouse gas emissions. It has impact on biodiversity and wildlife and responsible for a large number of deaths and injuries to animals each year. The quality and distribution of urban transport systems have a major bearing on the livability of urban environments. Transport and traffic cause all kinds of detrimental impact on the environment and health. In the main, these are climate change, deterioration of air quality and noise.

Green transportation is a low-carbon initiative, thus very environmentally friendly. The promotion of green transportation is not only good for the use of road resources, the ease of traffic congestion, the decrease of energy consumption and the improvement of air quality, but also, as

a return to health and leisure lifestyles, good for the improvement of human health. Public transport, walking and cycling play key roles in green transport. Developments in technology and fuels can effectively reduce emissions. Emissions from transport and traffic can also be reduced by improvements in community structures.

At the United Nations Framework Convention on Climate Change, India has committed to reducing the emission intensity of its GDP by 33 to 35% by 2030 as compared with its 2005 levels. About 23% of the global CO<sub>2</sub> emissions from fuel combustion is produced by the transport sector, which is both the fastest growing consumer of fossil fuels and the fastest growing source of CO<sub>2</sub> emissions. 60% of the Rs 80,000 crore — i.e. Rs 48,000 crore — is proposed to be provided through a specially set-up National Green Urban Mobility Fund. One major component of the Smart Cities initiative of the government is also creating and developing an efficient urban mobility and public transport system that provides a variety of transport options.

The present issue deals with the impact of transportation on the environment and health. Each of us need help to cut emissions and improve air quality by using public transport, cycling and walking. Carpools, car sharing, combined transport, economical driving and use of low-emission vehicles. The world now aims at combining energy-efficient technologies with clean fuels to enjoy the benefits of vehicles while being sensitive to the environment. Hybrids, electric cars, and biofuels are some examples in this regard. However, there is still a long way to go.

# Green Transport : Conserve energy for the future

**T**ransportation is an integral part of society. It has become faster, easier and sometimes cheaper. But the developments in technology have not always been good for the environment. It is related to global warming, environmental degradation, health implications and emission of greenhouse gases. As per a study by the International Renewable Energy Agency (IRENA) in 2016, the transport sector makes up 30% of the global energy consumption and has the lowest renewable energy share of any sector. Its energy use is expected to grow 1% every year till 2030. The transport sector represents a third of global energy demand and 14% of the global greenhouse gas emissions. The IRENA lays down a renewable route to a more sustainable future in the transportation sector. They have identified three areas that require action in order to realize the REmap: Roadmap for a Renewable Energy Future findings. The REmap is a global renewable energy roadmap that explores the possibility of significantly increasing the share of renewables in the global energy system by 2030.

## The three action areas are:

- Increase electric mobility in combination with renewable electricity generation and apply a system strategies approach that interlinks energy sectors.
- Develop sustainable and affordable advanced biofuel pathways for all transport modes including non-car modes such as freight, aviation and shipping.
- Explore emerging technology solutions and innovation for emerging transport modes such as aviation, shipping and military applications.

They have recommended policies on how to accelerate renewables in transport. IRENA has also identified two key areas where efforts in transportation should be focused. These are electric



<https://www.peoplespostmedia.com>

vehicles and liquid biofuels. The global stock of electric vehicles (EVs) reached 1 million in 2015 and exceeded 2 million by the end of 2016. Yet faster growth is needed for EVs fulfill their role in the global energy transition, both through lowering vehicle emissions and boosting renewable energy use. Increasing reliance on EV batteries and charging stations would support higher shares of solar and wind power, the key variable renewable energy (VRE) sources expected to be prominent in future power grids.

Liquid biofuels offer an alternative fuel for all types of internal combustion engines running on gasoline, diesel or kerosene, including for use in passenger vehicles, trucks, ships and airplanes. REmap shows that liquid biofuels, including both conventional and advanced forms of ethanol and biodiesel, could account for 10% of the transport sector energy use by 2030, more than triple the share in 2017. Liquid biofuels will be key if shipping and aviation are to be made more sustainable. These modes of transport make up 20% of the total energy demand for transportation, and are the fastest growing segments of the transport sector.

Green transportation is an important means for easing traffic congestion and solving urban pollution and environmental problems of the major cities. Promotion of green traveling and public transport

and shift from being vehicle-oriented to being human-oriented is required for the environment and health.

### Electric Vehicles

The production of electric vehicles began as far back as 1838 – 52 years before combustion engine vehicles. However, after 1913 the mass commercialisation of the combustion engine led to a rapid decline in electric vehicles. Attempts to reintroduce electric vehicles in past decades have for the most part been unsuccessful and they still represent a very small, niche market. Great progress has been made in battery technology and electric vehicles are expected to re-enter the market on a large scale within the next couple of years. Based on a moderate growth scenario, by 2050, electric vehicles could represent more than 60% of new sales and constitute up to 25% of the global car fleet.

As per a study by the Center of Automotive Research, University of Duisburg-Essen, Germany in 2012, there is a worldwide trend for light-vehicle production's gradual shift towards hybrid and electric vehicles. By 2030, 56% vehicles produced would use combustion engines, 35% hybrid technologies and 9% electric power. It means a whopping 44% of small vehicles would not use a combustion engine produce energy to run the vehicle. This would reduce Green House Gas (GHG) emissions to a significant level.

The electric car offers significant environmental benefits, specially in urban areas. Several European countries as well as the US, Japan, China and others, have already introduced the electric vehicles. The Indian market for electric vehicles is still nascent. It has been projected that electric vehicles could account for close to 5% of the Indian car market, or 1,75,000 cars, by 2017, while the global market for the vehicles could reach about 20 million cars by 2020.

### Hybrid Vehicles

A hybrid car uses both an electric motor and an internal combustion engine to power the vehicle. A



hybrid vehicle has a traditional internal-combustion engine and a fuel tank, as well as one or more electric motors and a battery pack. These are sometimes mistakenly confused with electric vehicles. Hybrids are most often petrol-burning machines that utilize their electric bits to collect and reuse energy that normally goes to waste in standard cars. Greenhouse emissions in hybrid cars are very low; emissions can range from 26% to 90% lower compared to conventional cars. These are a greener option and more fuel efficient, resulting in cheaper running costs and less damage to the environment.

### Hydrogen Vehicles

Hydrogen is used as a primary source of power instead of petrol. They are not a huge success at the moment and only a few hydrogen cars have been produced so far. There are two ways in which hydrogen can be used to power a vehicle. Combustion conversion-hydrogen is burned in engines in much the same way as conventional cars. Fuel-cell conversion-fuel cells turn the hydrogen into electricity to power internal electric motors. Hydrogen can be produced from renewable energy sources, so there would be no increase in carbon dioxide emissions.

### Solar Vehicles

The solar energy is used to power the vehicle. It obtains solar energy by using solar panels on the surface of the vehicle and converts it into electrical energy. There are significant benefits of solar cars to the environment. No exhaust fumes and no release of greenhouse gases. There is no fuel cost as they run on sunlight.



### Alternative Transportation

It includes carpooling, vanpooling, using public transportation (e.g., a bus), bicycling, walking, and running. Although using alternative transportation often requires extra effort, its impact on the environment is less. The cleaner and greener transportation options for commuting within the city is a good option. It reduces traffic, air pollution, and other negative side effects of solo automobile travel. It reduces fuel costs and can lead to community building and social networking.

With growing freight and passenger transport, the risk of pollution and congestion risk is increasing. The

global need to cut carbon emissions and air pollution, at the same time as improving human development, has created the demand for sustainable and accessible transport systems.

**Source:** [http://www.indiaenvironmentportal.org.in/files/file/IRENA\\_REmap\\_Transport.pdf](http://www.indiaenvironmentportal.org.in/files/file/IRENA_REmap_Transport.pdf)  
<http://www.conserve-energy-future.com/modes-and-benefits-of-green-transportation.php>  
<https://www.petrolprices.com/green-guide.html>  
<http://www.grantthornton.in/globalassets/1.-member-firms/india/assets/pdfs/smart-transportation-report.pdf>

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## Environmental impact of transport



Transportation conveys substantial socioeconomic benefits, but at the same time transportation is impacting environmental systems. Transportation contributes to a significant and rising share of global energy use and GHG emissions. Our travel has changed a lot over the last few centuries in many ways. Transport has become faster, easier and sometimes cheaper. But the developments in technology have not always been good for the environment.

The transportation activities support increasing mobility of passengers and freight. But on the other side transport activities are linked to having increased levels of environmental externalities. The growth of personal and freight mobility has expanded the role of transportation as a source of emission of pollutants and their multiple impacts on the environment. The transport sector uses over a quarter of the world's energy and is responsible for a comparable share of global CO<sub>2</sub> emissions from fossil fuel combustion.

Dr Jean-Paul Rodrigue of Hofstra University, New York has classified these impacts in three categories in his book "The Geography of Transport Systems."

**Direct impact:** The immediate consequence of transport activities on the environment where the cause and effect relationship is generally clear and well understood. For instance, noise and carbon

monoxide emissions are known to have direct harmful effects.

**Indirect impact:** The secondary (or tertiary) effects of transport activities on environmental systems. They are more often of higher consequence than direct impacts, but the relationships involved are often misunderstood and more difficult to establish. For instance, particulates are mostly the outcome of incomplete combustion in an internal combustion engine are indirectly linked to respiratory and cardiovascular problems since they contribute among other factors to such conditions.

**Cumulative impact:** The additive, multiplicative or synergistic consequences of transport activities. They take into account of the varied effects of direct and indirect impacts on an ecosystem, which are often unpredicted. Climate change, with a complex causes and consequences, is the cumulative impact of several natural and anthropogenic factors, in which transportation plays a role. 15% of global CO<sub>2</sub> emissions are attributed to the transport sector.

The transportation sector is linked to environmental problems. The most important impacts include as follows:

### **Climate**

The change in climate has become a global environmental problem. The emissions of greenhouse gas bring a long term change in the entire climate system. Carbon dioxide is the most significant anthropogenic gas affecting the climate. Other important greenhouse gases include methane, nitrous oxide, certain stable chlorine and fluorine compounds, primarily HFC, FC and silicon tetrafluoride (Sf6) along with ozone. Transport makes a considerable contribution to the greenhouse effect and represents around 27% of 2015 greenhouse gas emissions. The report "Addressing Climate Change in Transport" by Asian Development Bank says "Asia's motorized transport emissions have become a significant contributor to the global problem of



greenhouse gas (GHG) emissions that lead to climate change. In 2009, transport was responsible for 23% of global GHG emissions compared with 41% for energy. But by 2035 transport is expected to become the single largest GHG emitter accounting for 46% of global emissions, and by 2050 it is set to reach 80%. Emissions from transport are the fastest-growing source of carbon dioxide (CO<sub>2</sub>) emissions, with the vast majority of projected increases expected to come from developing Asia. In 2006, Asia accounted for 19% of the total worldwide transport sector-related CO<sub>2</sub> emissions. By 2030, the share of Asia in total worldwide transport sector-related CO<sub>2</sub> emissions will increase to 31%."

### **Air Quality**

Transport activity has a range of impacts including congestion, air pollution, emissions of nitrogen oxide (NOX), carbon monoxide (CO) and black smoke. Growth in transport is also damaging to the efficient functioning of the economy (through road congestion). Human exposure to this air pollution whilst commuting, cycling or simply staying at home gives rise to adverse health impacts.

### **Noise**

According to the World Health Organisation (WHO), noise is second only to air pollution in the impact it has on health. Transport noise can cause sleep disturbance, cardiovascular disease, elevated hormone levels, psychological problems and even premature death. The studies on children have

identified cognitive impairment, worsened behaviour and diminished quality of life.

### Water Quality

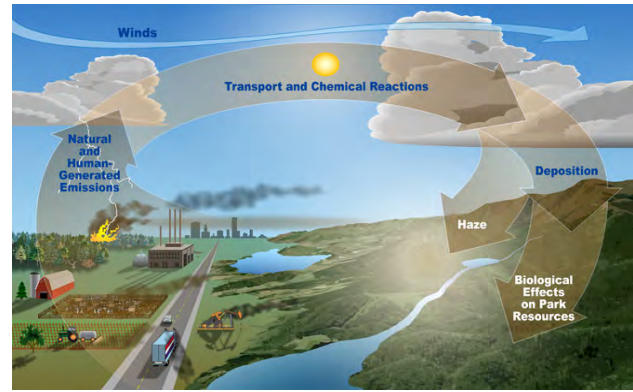
Water pollution is of crucial importance in the transportation and environment nexus. Fuel, particles and runoff from roads and highways result in damage to water supplies, ponds, lakes and streams, roadside soil, vegetation and trees and infrastructure. According to the US Environment Protection Agency, transportation affects water quality directly in four ways: 1) road construction and maintenance, including the creation of impervious surfaces can adversely affect water quality due to faster rates of runoff, lower groundwater recharge rates, and increased erosion; 2) pollutants such as vehicle exhaust, oil, and dirt, and deicing chemicals, are deposited to roadways and other impervious surfaces; 3) leaking underground storage tanks release petroleum to groundwater; and 4) oil spills, especially in the marine sector affect the water quality of inland waterways and coastal areas. NO<sub>2</sub> of the vehicle emissions, promotes the algal growth in water bodies starve the fish of oxygen.

### Soil Quality

Soil erosion and sediments are the major impacts of transportation. Soil erosion removes valuable topsoil, which is the most productive part of the soil profile for agricultural purposes. The loss of this topsoil results in lower yields and higher production costs. Sediment degrades water quality and often carries soil-absorbed polluting chemicals.

### Biodiversity

Transport is a large and expanding development sector. It has been recognized as a primary cause of habitat loss and a subsequent decline in biodiversity locally and regionally. Road Networks create fragmentation and degradation of habitat. It impacts directly on the killing of animals, felling of roadside trees, spills and contaminated runoff. Access to remote areas leads to resource exploitation and land-use and population change.



### Urban Landscape

Transport networks have become a commonplace feature of the country's landscape. They connect people, boost economic activity and provide access to key services, but they also introduce barriers between natural areas, while their use emits pollutants and introduces non-local species to ecosystems.

Everyone gets to benefit from good transport, which makes the economy stronger and lives better. But there are negative consequences of transport on human health and the environment. There is a need to integrate health, environment and other social concerns into transport policies requires a high-level political commitment to intersectoral cooperation, and to a change in current strategies towards full consideration of the implications of transport policy for development, the environment and health.

**Source:** Adaptation of transport to climate change in Europe - Challenges and options across transport modes and stakeholders, European Environment Agency, 2014. 62 pages,

<https://people.hofstra.edu/geotrans/eng/ch8en/conc8en/ch8c1en.html>

<https://www.naturvardsverket.se/Documents/publikationer/620-5183-0.pdf?pid=2861>

<https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>

<https://www.adb.org/sectors/transport/key-priorities/climate-change>,

<https://www.sjf.tuke.sk/transferinovacii/pages/archiv/transfer/24-2012/pdf/070-077.pdf>

# Green Transport: India's Policy

The Urban population of India is currently around 30% of its total population. Experience across the world has been that as economies grow, rapid urbanization takes place before it begins to stabilize. It is projected that India's urban population would grow to about 473 million in 2021 and 820 million by 2051, as against only 285 million in 2001. So, cities need good infrastructure to meet the mobility demands of both passengers and as well as freight. Transport is integral to today's society and the environmental impact of transport is significant. It is a major user of energy and burns most of the world's petroleum. It creates air pollution and is a significant contributor to global warming through emissions of carbon dioxide. By sub-sector, road transport is the largest contributor to global warming.

Good transport infrastructure is essential for the socio-economic development of a country. A more sustainable development approach is essential to promote overall 'green growth' of the transport sector and a green economy in the long run.

To develop a future roadmap for green growth of the transport sector in India, Ministry of Urban Development and Ministry of Road Transport & Highways have launched many policies to make transport Green.

## **Green Urban Transport Scheme (GUTS)**

The Ministry of Urban Development has launched a new scheme with Central assistance of Rs.25,000 crore to improve green urban transport. It is named as Green Urban Transport Scheme (GUTS). The scheme aims to develop and improve climate-friendly transport system in urban areas across the country. The new policy will encourage private investments in climate-friendly and sustainable public transport systems like Metro rail, Non-motorised Transport and other low carbon emitting systems in urban areas.



<https://www.ohmyrajasthan.com>

The main objective is to reduce the carbon footprint and bring in the sustainable transport system. The scheme will help provide a sustainable framework for funding urban mobility projects with minimum recourse to budgetary support by encouraging innovative financing of projects. The government will focus on creating non-motorized transport infrastructure. Under this Scheme, provision of non-motorised transport infrastructure, increasing access to public transport, use of clean technologies, adoption of Intelligent Transport Systems (ITS) and private sector participation in urban transport projects will be increased. The scheme is considered for implementation for the cities and urban areas where population 5 Lakh and above and all capital cities. The initial investment by the central government will encourage private investment in allocating resources for GUTS for the next 5 years.

## **Green Highways: An Initiative Towards Sustainable Development**

The Ministry of Road Transport and Highways (MoRTH), Government of India has promulgated Green Highways (Plantations, Transplantations, Beautification and Maintenance) Policy – 2015 in September 2015 to develop green corridors along National Highways for a sustainable environment and inclusive growth. The policy envisions “development of eco-friendly National Highways with the



<http://porttoport.in>



participation of the communities, farmers, NGOs, the private sector, institutions, government agencies and the Forest Departments for economic growth and development in a sustainable manner.”

India has a total 46.99 lakh km of road length and out of which over 96214 km are National Highways, accounting 2% of the total road length. The Highways carry about 40% of the traffic load. The Ministry has decided to develop all of existing National Highways and 40,000 km of additional roads in the next few years as Green Highways.

The objective is to reduce the impacts of air pollution and dust as trees and shrubs along the Highways act as natural sinks for air pollutants and arrest soil erosion at the embankment slopes. Plants along highway median strips and along the edges reduce the glare of oncoming vehicles which sometimes become the cause of accidents. The community involvement in tree plantation directly benefits local people by generating employment. Panchayats, NGOs and other Self Help Groups (SHGs) will be involved in the process of planting and maintenance. The plant species selected will be region specific depending on local conditions such as rainfall, climate type of soil, etc. For example, at some places, soil conditions may suit for the plantation of Jamun or mango trees while at other places plants and grasses can be grown to derive biomass. Wherever possible, transplantation of existing trees will be given preference while widening the roads.

### Non motorised Transport (NMT) Policy

Non motorised Transport includes mainly walking, cycling and cycle rickshaw. These are green modes of transport. The carbon footprint is low, minimum energy consumption and local emissions are zero. They are not dependent on fossil fuels and inexpensive compared with motorised transport.



<http://www.rtautoarts.co.uk>

There are several large-scale developments taking place on the national level to focus on NMT as a key mode in Indian cities. A number of national and sub-national policies are included NMT either as a critical component or key focus.

Some of other policies/programmes are:

**The National Urban Transport Policy:** The policy lists out the role of NMT as a last mile connector for the urban transport systems and as an independent mode for short distances. It should be implemented in cities by local levels of government.

**The National Mission for Sustainable Habitat:** Prime Minister's National Action Plan on Climate Change, has constituted a sub-committee focusing on urban transport. It listed out eight principles of sustainable urban transportation, of which the first two are 'walk' and 'cycle.'

**The Ministry of Urban Development** has developed Service Level Benchmarks (SLBs) for urban transport to be undertaken by all Indian cities. These specifically integrated the mission of NMT system.



**Atal Mission for Rejuvenation and Urban Transformation (AMRUT):** One of the objectives of the scheme is to reduce pollution by switching to public transport or constructing facilities for non-motorised transport.

**Smart Cities:** One of the features is creating walkable localities to reduce congestion, air pollution and resource depletion, boost the local economy, promote interactions and ensure security. The road network is created or refurbished not only for vehicles and public transport, but also for pedestrians and cyclists, and necessary administrative services are offered within walking or cycling distance.

**Green Urban Mobility Scheme:** The government is formulating a scheme to make the cities greener and more eco-friendly. The government is working on this Scheme for transportation in 103 cities have more than 5 lakh population that would promote the use of hybrid/electric vehicles and non-fossil fuels among others for public transport. The scheme proposes the construction of pedestrian pathways, cycling tracks, public bike sharing, bus rapid transit (BRT) systems, intelligent transport system, urban freight management and innovating financing to transport systems and progressively shift to the usages of hybrid/electric and non-fossil fuels for

public transport. Government is planning for Rs 70,000 crore budget.

**National Electric Mobility Mission Plan 2020:** The government has developed a National Electric Mobility Mission Plan 2020 which proposes to incentivise the adoption of green vehicles and facilitate domestic manufacturing capability in the automobile sector. As part of the Foreign Trade Policy, Government is providing subsidy in the form of the exemption of duties on parts of green vehicles.

**Source:** <https://govinfo.me/green-urban-transport-scheme/>, <http://pib.nic.in/newsite/PrintRelease.aspx?relid=153393>

<http://pib.nic.in/newsite/mbErel.aspx?relid=126427>[http://www.sutp.org/files/contents/documents/resources/E\\_Fact-Sheets-and-Policy-Briefs/GIZ\\_SUTP\\_FS\\_Non-Motorised-Transport-Policy-in-India\\_EN.pdf](http://www.sutp.org/files/contents/documents/resources/E_Fact-Sheets-and-Policy-Briefs/GIZ_SUTP_FS_Non-Motorised-Transport-Policy-in-India_EN.pdf)

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<http://www.newindianexpress.com/nation/2017/mar/16/government-plans-rs-70000-crore-green-urban-mobility-scheme-in-103-cities-1582127.html>

<http://www.grantthornton.in/globalassets/1.-member-firms/india/assets/pdfs/smart-transportation-report.pdf>

# Daily Guide for Green Transportation



[https://waytogo.org/sites/default/files/carpool\\_image.jpg](https://waytogo.org/sites/default/files/carpool_image.jpg)

Sustainable transport can save money, improve health and reduce environmental footprint. It is worth taking the time to evaluate transportation habits and consider how it can improve efficiency. Look for ways to create a personal and positive impact.

- Avoid quick acceleration and heavy braking. It can reduce fuel economy by 33% on the highway
  - Car-pooling is a great way to share costs of fuel and parking. It breaks the monotony of the daily commute.
  - Do not idle. Unnecessary idling pollutes the air, wastes fuel, and causes excess engine wear.
  - Drive instead of flying if the trip is less than 400 Km.
  - Drive smoothly. Stop/start driving is much less efficient and more polluting than driving at a constant speed.
  - Drive within the speed limit. Driving at 90 km per hour uses 25% less fuel than driving at 110 km per hour. Fit the car with cruise control, using it during highway driving will help to maintain a steadier speed, which will save fuel.
  - Go by Bicycle. Don't have to bike everywhere, but simply incorporate into a lifestyle. It will not only reduce petrol consumption, but keep in great shape as well. Start using bicycles for errands.
  - Go for Eco-friendly car washes. These protect environment, communities and water supply.
- These washes save water and recycle the water that is used for cleaning water and reusing it.
- Keep windows open when driving at under 70 km per hour. Air conditioning can increase fuel consumption by 10%.
  - Prefer public transportation. It is an affordable and environmentally friendly choice.
  - Regularly check tyre pressure. Under-inflated tyres can increase fuel consumption by 3% and take 10,000 km off the tyre's life.
  - Service your car regularly. A well-tuned car can use 15% less fuel.
  - Screw on fuel cap firmly to avoid evaporation and leaks when turning corners.
  - Travel light. Do not use the car as a mobile storeroom. Extra Luggage consumes more fuel. An extra 50 kg of weight increases fuel consumption by 2%.
  - Use a clean diesel vehicle for group trips. According to the US Environment Protection Agency, clean diesel vehicles produce 90% fewer emissions than regular diesel engines
  - Work from home periodically if your job allows it.
  - Walk for short distances. Explore the joy of walking a little bit every day — it is healthy and energizing.
  - When going for a new car, look for fuel-efficient vehicles, with low greenhouse gas emissions.

**Source:** <http://environment.gov.au/settlements/transport/fuelguide/tips.html>



*Source: <https://bikergogal.wordpress.com/tag/bicycle-riding-benefits/>*

The Environmental Information System acronymed as ENVIS was implemented by the Ministry of Environment & Forests by end of 6th Five Year Plan as a Plan Scheme for environmental information collection, collation, storage, retrieval and dissemination to policy planners, decision makers, scientists and environmentalists, researchers, academicians and other stakeholders.

The Ministry of Environment and Forests has identified Consumer Education and Research Centre (CERC), Ahmedabad, as one of the centers to collect and disseminate information on "Environment Literacy - Eco-labelling and Eco-friendly Products". The main objective of this ENVIS Centre is to disseminate information on Eco products, International, and National Eco labeling programmes.

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