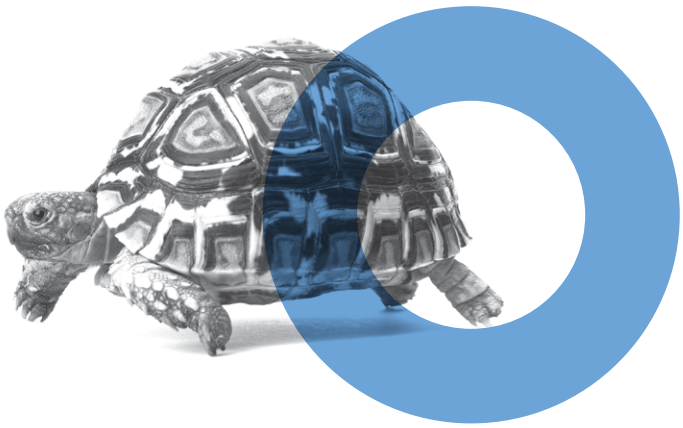
BY OTOKOÇ OTOMOTİV AND YUVAM DÜNYA ASSOCIATION



CLIMATE-SMART MOBILITY GUIDE

Otokoç Otomotiv

yuvam dünya

ROAD COMPANION WHO SAVES THE HOME

We have prepared a guide that can provide guidance to our sector and everyone benefiting from mobility in the battle against the climate crisis, with the support of the participants of "The Road Companion Who Saves The Home" collaboration programme which Otokoç Otomotiv and Yuvam Dünya Association have been running together for three years to raise awareness about the battle against the climate crisis.

If you are ready to embark on the journey for the future, let's get started with this guide, which comprehensively addresses climate-smart mobility.

CHAPTER ONE

CLIMATE CRISIS AND MOBILITY

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CLIMATE CRISIS AND MOBILITY

WHAT IS CLIMATE-SMART MOBILITY?

It refers to the preference for low and zero-emission transportation options.

The greenhouse gases naturally present in our atmosphere trap the solar radiation reflected from the Earth, converting it into heat and causing it to spread more slowly into space. This keeps the Earth's average surface temperature at 15°C, a temperature suitable for human life, instead of -18°C. Human activities, particularly the consumption of fossil fuels, have led to an increase in the amount of greenhouse gases accumulating in the atmosphere, strengthening the greenhouse effect and causing the Earth's average surface temperature to rise.

What are greenhouse gases?

The five main gases that cause the greenhouse effect are: Water Vapor [H_2O], Carbon Dioxide [CO_2], Methane [CH_4], Nitrous Oxide [N_2O], and Ozone [O_3].

AFTER THE HIGHER-THAN-NORMAL TEMPERATURES WE EXPERIENCED IN 2016, 2019, AND 2020, THE YEAR 2023 HAS BROKEN A RECORD WITH THE HIGHEST TEMPERATURES EVER RECORDED TO DATE.

In recent years, while temperature increases have reached record levels, natural disasters are also occurring more frequently and with more devastating impacts. Climate change, heatwaves, and drought are increasing the frequency of forest fires and making their effects more pronounced.

Due to the accumulation of greenhouse gases from fossil fuel use and land use changes, the Earth's surface temperature has risen compared to pre-industrial times. The atmospheric concentrations of carbon dioxide [CO_2], methane [CH_4], and nitrous oxide [N_2O] have reached the highest levels in at least the past 800,000 years. This indicates that the Earth's surface temperature will continue to rise.

It is known that one-fifth of global greenhouse gas emissions come from the transportation sector.

Transportation emissions alone account for 24% of the energy sector's emissions.

Emissions of greenhouse gases such as carbon dioxide and methane are increasing day by day, further accelerated by mobility.

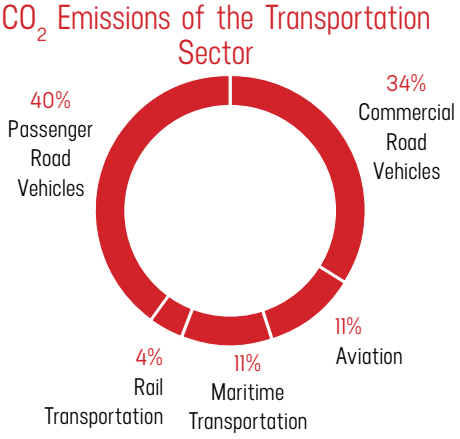
According to the Turkish National Greenhouse Gas Inventory, the increase in the number of vehicles, particularly those consuming diesel and gasoline, is one of the primary factors contributing to the rise in greenhouse gas emissions in road transportation.

According to TURKSTAT's 2020 greenhouse gas emission measurement data, CO_2 emissions originating from transportation...

94.9%	1.6%	0.4%	0.4%
Road Transportation	Aviation	Rail Transportation	Other

As a result, the necessity for people to change their resource-consuming lifestyle has become evident. If we are living in an age of mobility, it should be a climate-smart mobility era.

But how?



CHAPTER ONE
CLIMATE CRISIS AND MOBILITY

HOW CAN WE EXTEND THE LIFESPAN OF OUR PLANET WITH OUR DAILY CHOICES?

- In transportation, public transit can be preferred as much as possible.

- For short distances that can be covered on foot, walking or cycling can be chosen.

- Your driving style has a significant impact on the amount of emissions released into the atmosphere. There is a considerable difference between driving at normal RPM levels and driving at high RPMs. By avoiding high RPMs, adhering to speed limits, and steering clear of sudden braking, your vehicle will consume less energy, and carbon dioxide emissions will significantly decrease.

- You should avoid excessive speed. Fuel consumption increases at speeds over 100 km/h. If your vehicle has a cruise control feature, using it—or, if not, driving at or below the speed limits set by traffic regulations—will reduce your fuel consumption. Additionally, one of the main causes of traffic accidents is high speed.

- Air conditioners draw power from the vehicle's engine, which increases fuel consumption and emits more emissions. Therefore, avoid using the air conditioning unless necessary. Especially in summer, when the vehicle is first started, the hot air inside should be released by opening the windows, and then the air conditioning can be turned on at a low setting. Once the system cools down, the windows should be closed. To reduce air conditioning use, window tinting can be applied within legal limits, or vehicles with factory-tinted windows can be preferred.

- Regular maintenance is crucial to ensure your vehicle's safety, efficient performance, fuel savings, and extended lifespan. While the frequency of periodic maintenance depends on the vehicle and its usage, it is generally recommended to service gasoline and diesel vehicles after every 10,000 to 15,000 km.

- If there is unnecessary weight in your vehicle, you can reduce it. This will help decrease the amount of fuel your vehicle consumes. Make sure to reduce extra weight in your vehicle, except for essential items like the spare tire and first aid kit.

- Make sure your tires are properly inflated and regularly maintained. When tires are underinflated, your engine will use more power to move the vehicle forward. It is important to check the tire pressure according to the load of your vehicle (e.g., extra weight or passengers during long trips). Maintaining the proper tire pressure will help you save money. Correct tire pressure not only improves fuel efficiency but also extends the lifespan of your tires.

- Summer and winter tires are designed to provide optimal traction based on seasonal weather conditions. Using winter tires in the summer not only increases braking distance but also shortens the lifespan of the tire. When the air temperature drops below 7°C, it is recommended to switch to winter tires.

- If your vehicle has a start-stop feature, activating it in areas with heavy traffic and traffic lights can help reduce fuel consumption.

- Regularly check your emission systems. Your vehicle's emission system ensures the efficient and smooth operation of the engine under all conditions. By performing regular emission tests and maintenance, you help protect the environment and can also save money. Keeping your emission systems in check is important.

CHAPTER TWO

WAYS TO REDUCE CARBON FOOTPRINT IN DIFFERENT TRANSPORTATION MODELS

- Opting for micromobility options instead of vehicles can significantly reduce the carbon footprint. Micromobility options include walking, cycling, electric bikes, and shared scooters. For short distances (trips of up to 10 km), light vehicles such as bicycles, electric bikes, and e-scooters, which operate at speeds below 25 km/h, can be used.

MICROMOBILITY
FOR SHORT DISTANCES (UP TO 10 KM)
LIGHT VEHICLES OPERATING BELOW 25 KM/H
(BICYCLES, ELECTRIC BIKES, E-SCOOTERS)

- In Türkiye, the average annual carbon footprint of a passenger vehicle is approximately 2,600 kg of CO_2 (assuming it drives 15,000 km per year and consumes an average of 7 liters of fuel per 100 km). However, the carbon footprint of cycling is at least 95% lower. This means that by using a bicycle instead of a car, you can save an average of 2,475 kg of CO_2 per year. By choosing micromobility options for your short-distance trips, you can reduce your carbon footprint.

The average annual carbon footprint of a passenger vehicle in Türkiye is,

2,600 kg of CO_2

The savings achieved by using a bicycle is,

2,470 kg of CO_2 (95%)

CHAPTER TWO
WAYS TO REDUCE CARBON FOOTPRINT IN DIFFERENT TRANSPORTATION MODELS

URBAN PUBLIC TRANSPORTATION

- For urban transportation, you can prefer public transportation (such as buses, metrobuses, subways, trams, ferries, etc.) instead of using your personal vehicle, both in terms of time and cost. Opting for public transportation whenever possible is always a choice that reduces carbon emissions compared to using a personal car. Additionally, choosing public transport alternatives will help reduce traffic congestion.
- Public transportation vehicles with dedicated routes, such as metro and metrobuses, provide approximately 40% time savings compared to using your personal vehicle.
- Private vehicle transportation leads to significantly higher carbon emissions compared to public transportation (according to IETT data, approximately 7-7.5 times more).
- Vehicles used for sea transport run on fossil fuels, which contribute to the carbon footprint. However, since they operate as public transport, they cause less environmental damage compared to personal vehicle use. For example, for a person living in Istanbul, choosing the ferry instead of a car for the Üsküdar - Beşiktaş route is an option that reduces carbon footprint and saves time.
- To prevent traffic congestion, you can reduce the use of personal vehicles. A vehicle stuck in traffic contributes 2.5 times more carbon emissions compared to normal traffic conditions.

URBAN BICYCLES / ELECTRIC BICYCLES

- In areas where cycling is feasible, you can use a bicycle or electric bicycle for short-distance trips instead of fossil fuel-powered vehicles.
- You can encourage more people around you to use bicycles or electric bicycles.
- The carbon reduction capacity of electric bicycles is the maximum cumulative carbon dioxide emission reduction potential that can be achieved if people replace short car trips with electric bicycles as much as possible.

INTERCITY TRANSPORTATION

Bus

- For intercity travel, choosing a bus instead of your personal vehicle will reduce your carbon footprint. Considering the distance between two cities and the number of passengers on the bus, the per-person carbon footprint will be lower.

Train / High-Speed Train

- Although railways account for 8.5% of transportation activities, they contribute only 0.6% of greenhouse gas emissions. If emissions from electricity generation are taken into account, this rate rises to 1.5%. Therefore, if possible, you can prefer train travel for transportation.

Airplane

- Air travel accounts for 11.6% of all transportation emissions, with 81% of this coming from passenger flights. Therefore, whenever possible, you can choose transportation options with a lower carbon footprint as an alternative to air travel.
- According to the International Air Transport Association (IATA), aviation contributes approximately 2% of global carbon emissions. Therefore, for essential air travel, you can opt for airlines that prioritize environmentally friendly practices.

CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS

CHAPTER THREE
CONTRIBUTION TO THE SUSTAINABLE DEVELOPMENT GOALS

HOW CAN CLIMATE-SMART MOBILITY GUIDE CONTRIBUTE TO THE UN SUSTAINABLE DEVELOPMENT GOALS?

At the core of sustainable development lies a multi-layered development approach that encompasses environmental, social, and economic elements. Approximately 60% to 80% of energy consumption and 75% of carbon emissions occur in cities.

Therefore, it is essential to enhance public transportation systems to ensure that everyone has access to safe, affordable, accessible, and sustainable transportation solutions.

International collaborations should be strengthened through investment incentives to facilitate access to renewable energy, energy efficiency, clean energy research, and alternative fuel technologies.

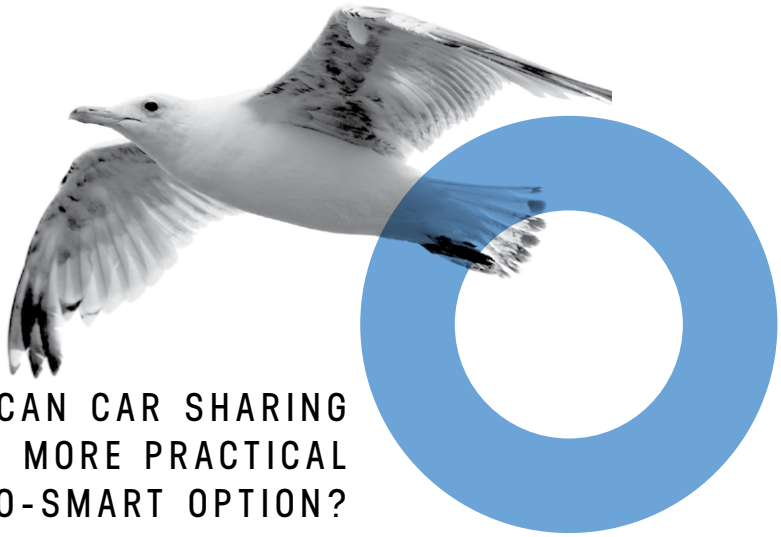
Sustainable transportation systems based on renewable energy sources should be developed instead of fossil fuel-based transportation.

In the transition to a low-carbon economy, setting net-zero carbon emission targets, gradually phasing out fossil fuels, and shifting towards green energy and sustainable transportation methods have become essential for the continuity of future generations.

Among the goals that all countries worldwide should focus on, Climate Action, Goal 13, stands out, particularly in addressing environmental issues and combating climate change.

What we can do to achieve these goals:

- Through corporate carbon footprint calculations, organizations can measure their greenhouse gas emissions and set reduction targets.
- By calculating their individual carbon footprints, people can adopt habits that reduce their carbon impact.
- Implementing energy efficiency measures in buildings or using energy-efficient equipment can reduce consumption and greenhouse gas emissions.
- Projects aimed at promoting the use of renewable energy can be planned and implemented.
- By adhering to the zero-waste principle, separating waste at its source can increase recycling rates.



HOW CAN CAR SHARING BECOME A MORE PRACTICAL AND ECO-SMART OPTION?

With the sharing economy, the need for vehicle ownership can be reduced, resulting in fewer cars on the road.

By sharing the same vehicle, multiple passengers traveling in the same direction can reduce traffic congestion and carbon emissions by 20% to 30%.

Car sharing can also help reduce and divide individual parking costs.

Car sharing not only prevents individuals from spending a large portion of their budget on purchasing a vehicle, but also helps reduce parking and traffic congestion, contributing to lower air pollution.

HOW CAN CAR RENTAL BECOME A MORE PRACTICAL AND ECO-SMART OPTION?

While renting a car, you can choose an environmentally friendly electric vehicle or a car with low carbon emissions.

Electric vehicles are among the cars that produce zero carbon emissions. They do not have components such as fuel tanks and exhaust pipes.

If electric vehicles are not available at the car rental location, you can also opt for hybrid vehicles.
Compared to traditional cars, hybrid vehicles emit less carbon, making them an environmentally friendly option as well.

If you encounter poorly maintained cars with a damaged exhaust system while renting, you can request a replacement vehicle, as these cars can harm the environment.

If a vehicle you purchase is not used frequently, it will begin to age while parked. Older vehicles always contribute more to environmental pollution. Therefore, if you don't use a vehicle regularly, renting a car instead of purchasing one can help reduce your carbon footprint.

Directing car renters to options that suit their usage habits contributes to making car rental a more climate-smart process. To achieve this, you can review your habits and consider alternatives like hourly rentals or car sharing instead of short-term rentals.

WHAT SHOULD I CONSIDER TO MINIMIZE ENVIRONMENTAL IMPACT WHEN PURCHASING A CAR?

When purchasing a car, we can consider its carbon footprint. To do so, we can opt for hybrid or electric vehicles instead of gasoline or diesel cars.

When purchasing from an authorized dealership, you can check the vehicle's fuel efficiency and exhaust CO_2 emission rates on environmental labels.

Various complex structures can be used as formulas for calculating greenhouse gas emissions. The most general and straightforward formula is as follows:

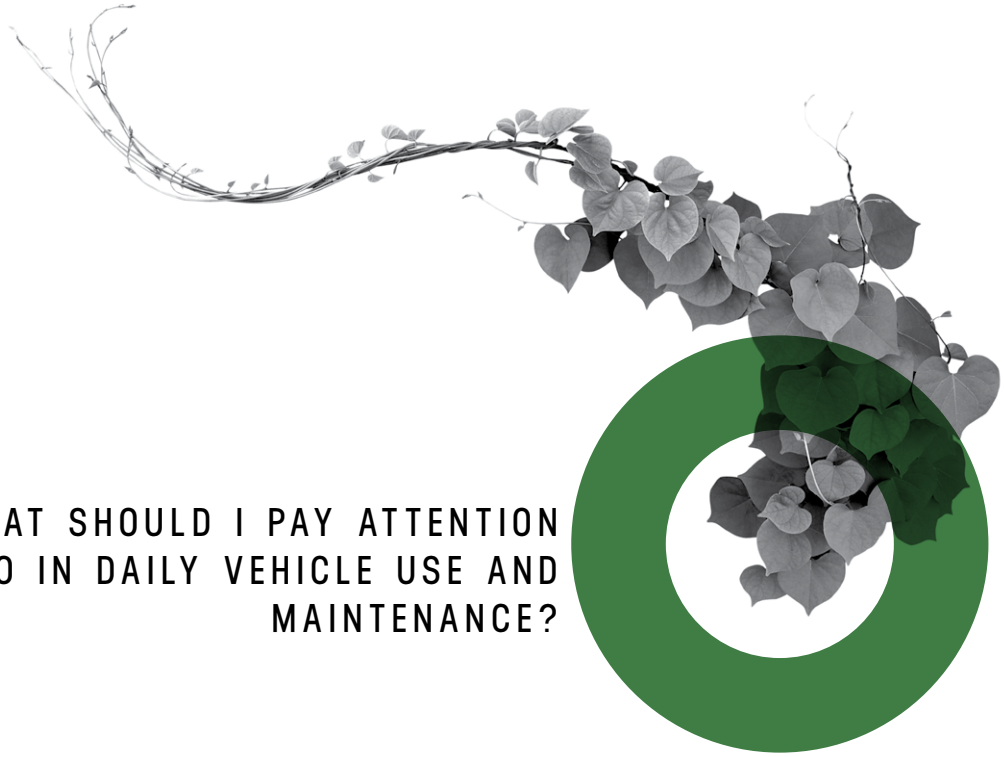
Greenhouse Gas Emissions = Fuel Consumption x Emission Factor

Therefore, we should thoroughly examine the engine and fuel technology of the vehicle we intend to purchase.

A passenger vehicle emits approximately 2.6 tons of CO_2 annually (assuming it is driven 15,000 km per year with an average fuel consumption of 7 liters per 100 km). For vehicles with an average lifespan of 20 years, the total CO_2 emissions amount is approximately 52 tons*.

**This amount varies depending on the vehicle's fuel type, fuel efficiency, and annual mileage.*

CHAPTER SEVEN



WHAT SHOULD I PAY ATTENTION TO IN DAILY VEHICLE USE AND MAINTENANCE?

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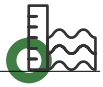
- If you drive aggressively during daily use, you can consume 12% to 40% more fuel and produce 20% to 50% higher emissions.

- By taking fuel-efficient driving courses, you can achieve a reduction in fuel consumption of 5% to 25%.

- Whether you live in a small or large city, make sure your tires are properly inflated and regularly maintained. Properly inflated tires improve your vehicle's mileage and efficiency. Underinflated tires force your engine to work harder, consuming more fuel. Maintaining proper tire pressure can save you money, so always check your tire pressure.

- Be mindful of your water footprint when having your vehicle washed. Modern car wash facilities that implement wastewater treatment systems can reduce large amounts of chemical and harmful waste that pose environmental risks, while also minimizing water consumption. By avoiding facilities that lack these systems, you can contribute to driving positive change in the industry.

- Automatic car wash systems are computer-controlled systems that not only reduce water consumption but also ensure vehicle cleaning. You can opt for these facilities for a more eco-smart car wash.



- A vehicle that is washed every month consumes approximately 300 liters of water annually. If your car isn't very dirty, you may consider skipping a wash to conserve water.

- To ensure that the exhaust emissions of the vehicle we use daily do not exceed the permitted levels, we should regularly check and change the oil.

- We can save fuel by avoiding the use of air conditioning unless necessary.

CHAPTER EIGHT

FREQUENTLY ASKED QUESTIONS

CAN I REDUCE MY CARBON FOOTPRINT THROUGH MY VEHICLE OR FUEL CHOICES?

When comparing fuel types, we can rank them from the highest to the lowest emissions as shown on the side.

- Diesel / Gasoline
- Full Hybrid
- Plug-in Hybrid
- Fully Electric (Even lower when powered by renewable sources)

source: https://www.transportenvironment.org/discover/how-clean-are-electric-cars/)

Fuel consumption and maintenance costs by vehicle type are presented in the table below.

	Vehicle Type		
	Electric Engine	Hybrid Engine	Gasoline Engine
Fuel Consumption (L/100 km) Hybrid	-	5.2	6.5
Electricity Consumption (kWh/100 km) Hybrid	15.9	-	-
Consumption (liters) for 20,000 km	-	1.040	1.300
Consumption (kWh) for 20,000 km	3.180	-	-
Fuel Price per Liter (TL)	-	44.97	44.97
Consumption kWh Price (TL)	6.2		
Cost for 20,000 km (TL)	19.716	46.769	58.461

* The 1 kWh price was obtained from the WAT Mobilite app on July 30, 2024.
* The fuel price per liter for Istanbul was obtained from Opet's website: https://www.opet.com.tr/akaryakit-fiyatlari/istanbul-anadolu on July 30, 2024.
* The energy consumption data (kWh/100 km) for the fully electric Jeep® Avenger: 15.9-15.4, was obtained from Jeep https://www.jeep.com.tr/jeep-avenger/avenger.
* The hybrid and gasoline vehicle data refers to the Fiat Egea, obtained from https://kampanya.fiat.com.tr/kataloglar/pdf/Egea-Cross-katalog.pdf on July 30, 2024.

CHAPTER EIGHT
FREQUENTLY ASKED QUESTIONS

CAN I REDUCE MY CARBON FOOTPRINT THROUGH MY VEHICLE OR FUEL CHOICES?

What Are the Advantages of LPG?

Although it is less preferred compared to other fuels, LPG offers numerous advantages. When the necessary equipment is installed in gasoline and diesel vehicles, they can easily be converted to LPG. The carbon emission values are lower compared to gasoline. As a result, it can be considered a more environmentally friendly fuel option. Additionally, it has a lower fuel cost.

Are More Practical and Environmentally Friendly Options Possible?

Hybrid vehicles, also known as "mild hybrids," feature a working method that combines the advantages of both electric and conventional motors. During most of the drive, the electric motor's power is utilized, while the gasoline engine is activated when needed to maximize efficiency. This approach minimizes the environmental impact of fossil fuels while eliminating the disadvantages related to the range and charging times of electric vehicles.

In hybrid vehicles, only the electric motor is used during acceleration and at low speeds. This working principle minimizes carbon emissions, especially in stop-and-go traffic where fuel consumption tends to be higher.

In addition to their environmental benefits, hybrid vehicles operate with technology that meets the additional needs of drivers. For instance, the power generated by the gasoline engine allows the electric motor to recharge itself, offering mobility freedom and fuel savings without facing range limitations. Additionally, the regenerative braking system stores the energy released when braking into the battery.

Electric Vehicles

Electric vehicles do not have an internal combustion engine and use electricity as fuel, which results in lower fuel and maintenance costs compared to other vehicles.

When the electricity used to power electric vehicles is sourced from renewable energy, carbon emissions can be eliminated. Electricity generated from fossil fuels contributes to carbon emissions during the production phase.

To reduce greenhouse gas emissions, it is crucial to use low-emission sources for electricity generation instead of fossil fuels.

What are some other innovative methods to reduce my carbon footprint?

There are some innovative methods emerging in the field of mobility. For example:

The benefit of autonomous vehicles is achieved by reducing fuel consumption and preventing traffic congestion based on driver behavior. Autonomous vehicles can communicate with other vehicles to optimize traffic flow and reduce congestion. Factors such as driving speed, acceleration, and braking of autonomous vehicles can help optimize fuel consumption.

In addition, carbon emissions can be reduced by 5% to 15% through the use of navigation. With navigation, drivers can choose less congested routes, thus reducing the time spent in traffic.

On the other hand, applications such as **smart traffic and parking management** can reduce traffic congestion and minimize parking time, leading to a reduction in carbon footprint by up to 30%.

In short, the environmental benefits of **connected next-generation vehicles,** which are equipped with internet connectivity and enable communication between vehicles through a central system, are achieved through increased fuel efficiency and reduced emissions. Since connected vehicles can monitor driver behavior, they can detect and prevent fuel-consuming actions such as excessive acceleration and sudden braking. Reducing behaviors that increase fuel consumption can lead to a reduction in emissions by approximately 10-15%.

WHAT ELSE CAN I DO TO FIGHT CLIMATE CHANGE?

- Installing heat insulation in our homes will be beneficial both economically and environmentally in the long run.

- In winter, you can heat your home a little less. Even reducing the radiator setting by just 1°C can reduce energy consumption by approximately 5-10%.

- You can opt for a fan instead of an air conditioner.

- You can reduce your consumption of red meat.

- Prefer products produced in Türkiye, especially food.

- Try to reduce the amount of waste you generate.

- When you're outdoors, you should dispose of your trash in trash bins or, if recyclable, in packaging waste collection bins.

- Electric appliances should not be left on standby; they should be completely turned off when not in use.

- Avoid using hot water unless necessary.

- If possible, you should subscribe to a green energy company that generates electricity from renewable sources.

- To save energy and water, run the washing machine and dishwasher as fully loaded as possible.

- Only boil as much water as you need in appliances like electric kettles.

- Opt for energy-efficient LED bulbs.

- Give up consumption habits that you realize are unnecessary.

WITH OUR INFINITE THANKS...

To Yuvam Dünya Association which contributed to the creation of this guide and Rıfat Ünal Sayman, one of the consultants of the "The Otokoç Otomotiv Road Companion Who Saves The Home" project by Otokoç Otomotiv,

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Ufuk Durmaz
Yiğit Çorlu
Yiğit Alp Koçer

We express our heartfelt thanks with love and respect for our world...

EMBRACE A NEW GENERATION OF TRAVEL WITH CLIMATE-SMART MOBILITY.

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