

Mitigation actions in the energy sector – buildings sector

Mitigation action 11: Public awareness campaigns, EE info centres

Mitigation Action: Public awareness campaigns, EE info centres	
Description: Introduction of awareness raising campaigns and opening of energy efficiency info centres, in order to increase the awareness and to inform the citizens of possibilities to improve EE and of related benefits. The target group will be the residential and commercial buildings sector.	
Sector	Energy – buildings
Gases	CO ₂
Methodology	<ul style="list-style-type: none"> Awareness raising campaigns with videos and printed materials which will make EE information more available to the citizens Info centres will employ energy advisors to give free of charge advice to citizens concerning possibilities of saving energy and related financial benefits.
Assumptions	<ul style="list-style-type: none"> Assumes popular interest in EE measures.
Steps Taken	<ul style="list-style-type: none"> Info Centre for Energy of the City of Skopje established EVN established a Customer Relations Centre Info Centre for Energy of the Republic of Macedonia established Preparation and broadcasting of a documentary film under the GEF Sustainable Energy Project

Mitigation action 12: Introduction of end-use heat metering and consumption-based billing in Skopje's District Heating network

Mitigation Action: Introduction of end-use heat metering and consumption-based billing in Skopje's District Heating network	
Description: Introduction of end-use heat metering at the building and dwelling-level and consumption-based billing in Skopje's District Heating network. Energy bills should be clear and understandable (electricity, heat and natural gas) and individual metering implemented. This will increase consumer awareness of the way in which they themselves consume energy. Invoices should contain a graphical comparison of consumption in period accounts for this year and for the corresponding period last year. Accounts should be based on actual consumption. Accounts should also contain information on where to obtain advice on the efficient consumption of energy, and a toll-free line should be set up.	
Sector	Energy – Residential sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> Number of buildings with meters and consumption-based buildings/ Number of buildings on the network Number of dwellings with meters and consumption-based buildings/ Number of dwellings on the network GWh reduced per year for District Heating kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> XX buildings with meters and consumption-based buildings out of XX buildings XX of dwellings with meters and consumption-based buildings out of 50,000 customers 4.53 GWh reduced per year for District Heating by 2018 XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> Installation of meters at the sub-station and/or building level Installation of heat meters/ calorimeters at the dwelling level Measurement of end-use of heat and efficiencies of heat usage
Assumptions	<ul style="list-style-type: none"> Assumes reduction in actual consumption based on consumption-based billing
Steps Taken	<ul style="list-style-type: none"> 100% of buildings on the DH system have building-level meters
Steps Envisaged	<ul style="list-style-type: none"> Energy Regulatory Commission to amend the Rules for delivery of thermal energy to encourage installation of heat allocators Public promotion to raise awareness and inform users Provide technical assistance and advice to users Ensure proper maintenance services of equipment.

Mitigation action 13: Building codes and enforcement/certification for new buildings and those undergoing major renovation

Mitigation Action: Building codes and enforcement/certification for new buildings and those undergoing major renovation	
Description: Implementation of building code enforcement for new buildings and those undergoing major renovations with area > 1000 m ² – including requirements for level of kWh consumption per m ² . This also involves the implementation of the Rulebook on Energy Performance of Buildings	
Sector	Energy – Residential sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • m² of “A” certification level new buildings built or undergoing major renovation • kWh/m² reduction of energy demand in new buildings/buildings undergoing major renovation • GWh per year reduced per fuel type • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX m² of buildings achieving “A” certification level • XX kWh/m² reduction of energy demand over the baseline of XX kWh/m² • XX GWh per year reduced per fuel type • 833 Kt CO₂-eq reduced per year by 2020 • 2,343 Kt CO₂-eq reduced per year by 2030
Methodology	<ul style="list-style-type: none"> • Advanced solutions for building envelope • Installation of solar hot water systems • Replacement of firewood furnaces and coal furnaces with high efficiency models • Installation of air-sourced heat pumps • Installation of ground-sourced heat pumps
Assumptions	<ul style="list-style-type: none"> • Assumes support for these measures via public awareness and investment mechanisms. • Assumes that citizens, will invest in more advanced technologies/appliances (more efficient ones).
Steps Taken	The Rulebook on Energy Performance of Buildings and Rulebook on Energy Audits (in the buildings sector and in the industry sector) were prepared and adopted
Results Achieved / Progress	<ul style="list-style-type: none"> • 24.65 GWh saved in 2012

Mitigation action 14: Inspections of boilers/air conditioning systems

Mitigation Action: Inspections of boilers/air conditioning systems	
Description: Increased efficiency of boilers with effective rated output bigger than 20 kW and air conditioning systems in buildings with effective rated output bigger than 12 kW.	
Sector	Energy – Residential sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Number of inspections carried out per year • GWh demand reduced per year
Projections	<ul style="list-style-type: none"> • XX inspections carried out per year • XX GWh of electricity demand reduced per year in 2020 • XX GWh of electricity demand reduced per year in 2030
Methodology	<p>The Ministry of Economy and/or EARM would prepare guidelines for the order of control that should realize energy auditor during the inspection of boilers for hot water systems and air conditioners. Before implementing this measure, the following preconditions have to be met:</p> <ul style="list-style-type: none"> • Training and authorization of energy auditors and • Maintain evidence of completed inspections. <p>The measure would be mandatory for new and existing heating systems. The auditing would be coupled with advising.</p>
Assumptions	<ul style="list-style-type: none"> • Assumes support for these measures via public awareness and investment mechanisms. • Assumes that citizens, will invest in more advanced technologies/appliances (more efficient ones).
Steps Taken	Regular inspections is prescribed by the Rulebook on Energy Performance of Buildings
Results Achieved / Progress	<ul style="list-style-type: none"> • 0.70 GWh savings in 2012

Mitigation action 15: Retrofits in existing residential buildings/ Demand-side measures for energy efficiency for heating/cooling in existing buildings in the residential sector

Mitigation Action: Retrofits in existing residential buildings/ Demand-side measures for energy efficiency for heating/cooling in existing buildings in the residential sector	
Description: This action involves the retrofitting of residential buildings to reduce energy demand for heating and cooling.	
Sector	Energy – Residential sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • m² of buildings/dwellings implementing demand side measures • GWh per year reduced per fuel type • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX m² of buildings/dwellings implementing demand side measures • XX GWh per year reduced per fuel type • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Energy Efficiency in Social Housing • Information centres; Information campaigns on energy efficiency; • Financial support to natural persons for EE investments; • EE measures in existing multi-apartment residential buildings: <ul style="list-style-type: none"> ○ Window and door replacement ○ Attics insulation ○ Façade insulation • Introduction of efficient lighting in residential apartments and common space
Assumptions	<ul style="list-style-type: none"> • Assumes sufficient financial mechanisms developed to encourage demand-side EE in households.
Steps Taken	A number of projects have been undertaken in this area including addressing EE in multi-apartment buildings.
Steps Envisaged	
Results Achieved / Progress	<ul style="list-style-type: none"> • 24.07 GWh savings in 2012

Mitigation action 16: Electrical appliance and equipment labelling, and energy performance standards

Mitigation Action: Electrical appliance and equipment labelling, and energy performance standards	
Description: Introduction of energy performance minimum standards for electrical appliances as well as labelling requirements for energy performance.	
Sector	Energy – Residential and commercial buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Market share (% and total number) of higher class efficient appliances • GWh electricity demand reduced per year in 2020 • GWh electricity demand reduced per year in 2030 • kt CO₂-eq reduced per year in 2020 • kt CO₂-eq reduced per year in 2030
Projections	<ul style="list-style-type: none"> • 50% of higher class efficient appliances replacing inefficient appliances in the residential sector by 2030 • 30% higher class hot water and lighting appliances in the commercial sector by 2030 • 20% higher class heating and cooling appliances in the commercial sector by 2030 • 34 GWh of electricity demand reduced per year in 2020 • 220 GWh of electricity demand reduced per year in 2030 • 21 kt CO₂-eq reduced per year in 2020 • 142 kt CO₂-eq reduced per year in 2030
Methodology	<ul style="list-style-type: none"> • Labelling of electrical appliances • Minimum energy performance standards for electrical appliance
Assumptions	<ul style="list-style-type: none"> • Assumes purchasing power of households is sufficient to purchase appliances.
Steps Taken	The Rulebook on labelling and standard product information of the consumption of energy and other resources by energy-related products was adopted in 2011, and it was amended in 2012. ³ The implementation of this Rulebook gives an opportunity to the consumers to choose more energy efficient appliances

Mitigation action 17: Phasing out of incandescent light bulbs

Mitigation Action: Phasing out of incandescent light bulbs	
Description: This action would involve the ban of production, import and sales of incandescent lights	
Sector	Energy – Residential sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Market share (% and total number) of LED, CFL, and other efficient bulbs • GWh electricity demand reduced per year • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 100% of market share of LED, CFL and other efficient bulbs starting from 2016 • 170 GWh of electricity demand reduced per year in 2020 • 206 GWh of electricity demand reduced per year in 2030 • 66 kt CO₂-eq reduced per year in 2020 • 153 kt CO₂-eq reduced per year in 2030
Methodology	<ul style="list-style-type: none"> • Ban on incandescent lights with a short phasing out period
Assumptions	<ul style="list-style-type: none"> • Assumed that as of 2016 the Republic of Macedonia would introduce a ban on sales of incandescent lights • Assumed that the phasing out period will be 1 to 2 years, and after this period of time only efficient lights will be used (CFL, LED).

Mitigation action 18: Wider application of solar collectors

Mitigation Action: Wider application of solar collectors	
Description: Implementation of solar collectors within the residential sector to reduce fuel consumption for hot water.	
Sector	Energy – Residential sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Number of households installing solar hot water heaters • GWh per year reduced in electricity demand • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 550 kt CO₂-eq cumulative reduction by 2030
Methodology	<ul style="list-style-type: none"> • Installation of solar hot water systems
Assumptions	<ul style="list-style-type: none"> • Assumes support for these measures via public awareness and investment mechanisms.
Steps Taken	Subsidies for home heating from the government cover 30% of the investment (up to EUR 300) for installation of a solar system
Steps Envisaged	
Results Achieved / Progress	<ul style="list-style-type: none"> • 2,415 households subsidized as of 2013 • 16.97 GWh savings in 2012

Mitigation action 19: Phasing out of resistive heating devices

Mitigation Action: Phasing out of resistive heating devices	
Description: This action would involve a ban on selling heating devices with resistive heaters, such as electric heat stove, electric heaters etc. which are used in the households.	
Sector	Energy – Residential sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • GWh electricity demand reduced per year • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 0% of market share of electric heaters starting from 2017 • 165 GWh of electricity demand reduced per year in 2020 • 550 GWh of electricity demand reduced per year in 2030 • 55 kt CO₂-eq reduced per year in 2020 • 401 kt CO₂-eq reduced per year in 2030
Methodology	<ul style="list-style-type: none"> • Ban on resistive heating devices with a short phasing out period
Assumptions	<ul style="list-style-type: none"> • Assumed that as of 2017 the Republic of Macedonia would introduce a ban on sales of electric heaters • Assumed that the phasing out period for these technologies shall be 10 years, taking into consideration the fact that a large number of households still use these type of devices and their life expectancy is longer compared to the incandescent lights.

Mitigation action 20: Street lighting efficiency upgrades

Mitigation Action: Street lighting efficiency upgrades	
Description: Improvement of energy management and auditing in buildings in the health sector, education sector, and other public building sector	
Sector	Energy – commercial and public sector
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • km of street-lighting upgraded • Reduction in kWh/km demand - electricity • GWh of electricity per year reduced • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX km of street-lighting upgraded • Reduction of XX kWh/km demand - electricity • 15.0 GWh of electricity per year reduced in 2018 • XX Kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Replacements as a part of general upgrades to the system • Energy Performance Contracting for investments
Assumptions	Assumes that investments continue to occur.
Steps Taken	A number of projects have been implemented and results are based on actual measured savings
Steps Envisaged	Continued investments in this area are envisaged
Results Achieved / Progress	<ul style="list-style-type: none"> • 7.68 GWh of savings in 2012

Mitigation action 21: Application of renewable energy in public sector buildings

Mitigation Action: Application of renewable energy in public sector buildings	
Description: This action encourages the wider application of solar thermal systems for hot water preparation, the use of heat pumps in heating systems, the use of biomass systems in public buildings	
Sector	Energy – commercial and public buildings sector
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • # of buildings implementing renewable energy sources • GWh per year reduced per fossil fuel type • Kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX buildings implementing renewable energy sources • XX GWh per year reduced per fuel type • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Installation of heating sources based on renewable resources (solar hot water, efficient biomass stoves/boilers and heat pumps)
Assumptions	Assumes the continued investment in these measures.
Steps Taken	<ul style="list-style-type: none"> • Currently mandatory for public buildings to implement solar water heaters where economically efficient
Results Achieved / Progress	<ul style="list-style-type: none"> • 2.09 GWh savings in 2012

Mitigation action 22: Application of renewable energy in commercial sector buildings

Mitigation Action: Application of renewable energy in commercial sector buildings	
Description: The aim of the measure is to achieve mass use of solar thermal systems for hot water and heat pump installation in hotels, private hospitals and similar buildings in the service sector which operate with huge quantities of hot water.	
Sector	Energy – commercial and public sector buildings
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • # of buildings implementing renewable energy sources • GWh per year reduced per fossil fuel type • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX buildings implementing renewable energy sources • XX GWh per year reduced per fuel type • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Installation of heating sources based on renewable resources (solar hot water, efficient biomass stoves/boilers and heat pumps)
Assumptions	
Steps Taken	<ul style="list-style-type: none"> • The Rulebook for energy performance demands that for new buildings and when a building is subject to major reconstruction, highly efficient systems must to be installed, if their use is technically, environmentally and economically justified.
Steps Envisaged	<ul style="list-style-type: none"> • Control over the work of the energy auditors – proper realization of the legislation • Government financial incentives • NGO, private sector awareness, information, promotion • Development of domestic technologies and transfer of know-how by the academic institutions and through the private sector
Results Achieved / Progress	<ul style="list-style-type: none"> • 3.26 GWh in fuel savings in 2012

Mitigation actions in the energy sector – transport sector

Mitigation action 23: Introduction of biofuels as 10% of fuel mix

Mitigation Action: Introduction of biofuels as 10% of fuel mix	
Description: This action would involve the introduction of biofuels into the fuel mix	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> Quantity (GWh equivalent) of biofuels used as a fuel kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> 686 GWh equivalent of biofuels used as a fuel (10%) by 2020 1,022 GWh equivalent of biofuels used as a fuel (10%) by 2030 175 kt CO₂-eq reduced per year by 2020 265 kt CO₂-eq reduced per year by 2030
Methodology	<ul style="list-style-type: none"> Adoption a Rulebook on the manner of securing a relevant share of biofuels in the total energy consumption in transport Measures to promote the use of blends with biofuels without significant increase of fuel prices (e.g. reducing the excise tax on biofuels and by introducing increased excise tax for oil derivatives not used in transport). Stimulate the production of domestic raw materials for biofuels by supporting producers of biofuels to invest in agricultural production of raw materials, guaranteed purchase, favourable crediting lines, etc.
Assumptions	<ul style="list-style-type: none"> Demand of 6,897 GWh demand for fuels projected in 2020. Assumed that the percentage of biofuels by 2020 would change starting in 2015 with 0.5%, 1.25% in 2016, reaching 10% in 2020, and after 2020 it is assumed that the participation of biofuels shall remain at 10%.

Mitigation action 24: Awareness raising campaigns to improve driver behaviour

Mitigation Action: Awareness raising campaigns to improve driver behaviour	
Description: This action involves improving the driver behaviour to improve fuel economy.	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> Total fuel reduction (GWh equivalent) kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> 63 GWh equivalent of total fuel reduction by 2020 16.7 kt CO₂-eq reduced per year by 2020
Methodology	<ul style="list-style-type: none"> Awareness campaign on the benefits of better fuel efficient driving Ex ante and ex post public surveys to measure impact
Assumptions	<ul style="list-style-type: none"> Assumes no significant rebound effect in driving behaviour due to reductions in fuel consumption per km.

Mitigation action 25: Increased use of bicycles, walking and introduction of parking policy

Mitigation Action: Increased use of bicycles, walking and introduction of parking policy	
Description: This measure includes various actions aimed at promotion of more sustainable modes of transport and travel behaviour. This specifically means using public transport instead of one's own car and bicycle and walking instead of driving.	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Change in person-km per year travelled by car • Change in person-km per year travelled by public transport • Change in person-km per year travelled by bicycle • GWh equivalent of fuel saved • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX reduction in person-km per year travelled by car • XX increase in person-km per year travelled by public transport • XX increase in person-km per year travelled by bicycle • 5.5 GWh equivalent of fuel saved in 2020 • 17.8 GWh equivalent of fuel saved in 2030 • 1.7 kt CO₂-eq reduced per year by 2020 • 5.4 kt CO₂-eq reduced per year by 2030
Methodology	Specific activities to undertake this Action include: <ul style="list-style-type: none"> • Renewal of public transport bus fleet; • Promotion of greater use of bicycles – including investments in the bicycle network infrastructure, as well as a public campaign for greater use of bicycles; • Introduction of paid parking schemes to encourage public transport use; • Car-free day promotions through the media (TV, radio, posters, etc.);
Assumptions	<ul style="list-style-type: none"> • From the person-kms involving individual cars for short distances, it is assumed that 0.1% annually would start using a bicycle and 0.01% would start walking.
Steps Taken	<ul style="list-style-type: none"> • Renewal of the public bus transport fleet in Skopje has been accomplished
Steps Envisaged	<ul style="list-style-type: none"> • Training for eco-driving • Invest in bicycle infrastructure/ rent-a-bicycle system, public campaigns • Revise parking policy
Results Achieved / Progress	<ul style="list-style-type: none"> • 43.7 GWh savings in 2012

Mitigation action 26: Increased use of railways

Mitigation Action: Increased use of railways	
Description: This measure includes various actions aimed at promotion the use of railways for inter-city transport of people and of goods	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Change in person-km per year travelled by train • Change in tonne-km per year travelled by train • GWh equivalent of fuel saved for transport of people • GWh equivalent of fuel saved for transport of goods • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • Change of 145 million person-km (2011) to 270 million person-km (2030) per year travelled by train • Change of 423 million tonne-km (2012) to 1000 million tonne-km (2030) per year travelled by train • 7.68 GWh equivalent of fuel saved in 2018 • 26 kt CO₂-eq reduced per year in 2020 • 56 kt CO₂-eq reduced per year in 2030
Methodology	<p>Specific activities to undertake this Action include:</p> <ul style="list-style-type: none"> • Improvement of freight cars • Improvement of passenger trains
Assumptions	<ul style="list-style-type: none"> • Assumes that there will be remarkable financial sources for the realization of the activities. • Assumes that people will switch modes of transport • Assumes that price differentials will encourage shifting the mode of transport
Steps Taken	<ul style="list-style-type: none"> • The Government has ordered 150 new freight cars • The Government has ordered 6 new train compositions for passengers (locomotive + passenger wagons)
Steps Envisaged	<ul style="list-style-type: none"> • JSC Macedonian Railways Transport Skopje have to improve their service offer: <ul style="list-style-type: none"> ○ New wagons acquisition; ○ Publishing the rail timetables on internet and teletext; ○ Better service suited to the passenger needs as are information, modern ticket selling, Improvement of interior (restrooms, gates, restaurants etc.) and ○ Preparation a media campaign for the advantages of railway transport. • Campaign promoting advantages of railway transport • Improve annual statistic data.
Results Achieved / Progress	<ul style="list-style-type: none"> • 2.9 GWh savings in 2012

Mitigation action 27: Extension of railway to Bulgaria

Mitigation Action: Extension of railway to Bulgaria	
Description: This measure involves a capital investment to establish railway links to Bulgaria resulting in a decrease of freight traffic via trucks	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Change in tonne-km per year travelled by truck • Change in tonne-km per year travelled by train • GWh equivalent of fuel saved for transport of goods • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • Change of 423 million tonne-km (2012) to 1900 million tonne-km (2030) per year travelled by train • 850 GWh equivalent of fuel saved by 2030 • 227 kt CO₂-eq reduced per year by 2030
Methodology	<p>Specific activities to undertake this Action include:</p> <ul style="list-style-type: none"> • Investment into the railway routes to Bulgaria
Assumptions	Assumes that the railway will be finished in 2022

Mitigation action 28: Improvement/renewal of vehicle fleet

Mitigation Action: Improvement of vehicle fleet	
Description: This action involves replacement of the old vehicle fleet is renewed based on the lowest price, so the old vehicles are replaced with vehicles having internal combustion engines.	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Number of cars classified as clean/energy efficient versus overall fleet • GWh equivalent of fuel saved using clean/energy efficient cars • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX clean cars/XX total fleet • 78 GWh equivalent of fuel saved using clean/energy efficient cars in 2020 • 537 GWh equivalent of fuel saved using clean/energy efficient cars in 2030 • 20 kt CO₂-eq reduced per year in 2020 • 140 kt CO₂-eq reduced per year in 2030
Methodology	<ul style="list-style-type: none"> • Reduction of taxes for purchase of new clean and energy efficient car and keeping the same/increasing existing costs for the other cars; • Provision of bank credits with lower interest rates, if a new clean and energy efficient car is purchased. • Lower costs for vehicle registration for clean and energy efficient cars; • Lower costs for parking in the centre of the city for the clean and energy efficient cars; • Lower ecological tax and tax on property (if there is any) for clean and energy efficient cars.
Assumptions	Assumes the market for newer more efficient cars continues to grow.
Steps Taken	<p>Amendment of legislation:</p> <ul style="list-style-type: none"> • Rulebook for identification and/ or identification and appreciation of vehicles technical condition (Official Gazette No. 131/2009 and 16/2010), • Rulebook for individual authorization of vehicles (Official Gazette No. 16/2010, 62/2010 and 185/2011) • Law for registration and technical inspection - part of Law for vehicles (Official Gazette 140/2008);
Steps Envisaged	<ul style="list-style-type: none"> • Implementation of EURO standards (EU new standard is EURO 5, while in Macedonia it is EURO 2) for import of new EE vehicles up to 2020 • Lower costs for EE vehicle registration • Registration period for EE vehicles (e.g., each 3 years for vehicle up to 8 years old) • Increase of registrations cost for old vehicles with EURO 2, with incompatible eco-test
Results Achieved / Progress	<ul style="list-style-type: none"> • 43.4 GWh savings in 2012

Mitigation action 29: Improving vehicle efficiency, tax exemption for hybrid and electric vehicles

Mitigation Action: Improving vehicle efficiency, tax exemption for hybrid and electric vehicles	
Description: This action would involve using fiscal measures to encourage the purchase of hybrid and electric vehicles.	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Number of cars classified as hybrid/electric versus overall fleet • GWh equivalent of fuel saved using clean/energy efficient cars • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX hybrid/electric cars/XX total fleet (10% by 2035) • 90 GWh equivalent of fuel saved using clean/energy efficient cars in 2020 • 610 GWh equivalent of fuel saved using clean/energy efficient cars in 2030 • 24 kt CO₂-eq reduced per year in 2020 • 158 kt CO₂-eq reduced per year in 2030
Methodology	<ul style="list-style-type: none"> • Exempt owners of hybrids/electric cars from paying annual registration tax to an amount not higher than 100€
Results Achieved / Progress	<ul style="list-style-type: none"> • 43.4 GWh savings in 2012

Mitigation action 30: Advancement of vehicle equipment

Mitigation Action: Advancement of vehicle equipment	
Description: This strategy is aimed at promoting the utilization of advanced equipment (i.e. low resistance tires and low viscosity lubricant) which can considerably contribute to fuel economy improvement. Furthermore, it is possible to reduce the fuel consumption by another few per cent via optimal vehicle maintenance. Regular awareness rising campaigns and driver training are crucial factors of success.	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Number of cars utilizing advanced equipment and optimal maintenance versus overall fleet • GWh equivalent of fuel saved • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 600,000 cars utilizing advanced equipment and optimal maintenance/XX total fleet • 122 GWh equivalent of fuel saved in 2020 • 30 kt CO₂-eq reduced per year in 2020
Methodology	<ul style="list-style-type: none"> • Improvement of tire, low viscosity lubricant, vehicle maintenance • Public awareness campaign to encourage better maintenance

Mitigation action 31: Car free days

Mitigation Action: Car free days	
Description: A promotion of car free days can help to reduce the number of vehicles in use during this action. This measure should be applied on a national level and should be supported by nationwide promotion and marketing. The importance of establishment of the “car free days” is to make people to leave their cars and to get them acquainted to other modes of travel, he/she may find out to be unexpectedly good (value added).	
Sector	Energy – transport
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • Reduction in person-km by car during car free day and as a direct result • GWh equivalent of fuel saved • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX person-km by car reduced during car free day and as a direct result • XX GWh equivalent of fuel saved • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Implementation of Car Free Days • National campaign and local-level campaigns • Monitoring of impacts via daily vehicle fleet reports
Assumptions	
Steps Taken	<ul style="list-style-type: none"> • European Car Free Day, 22 September established as an annual event
Steps Envisaged	<ul style="list-style-type: none"> • Car free days of national level, 3 days in the year • Preparation of campaign on a national and local level • Preparation of daily vehicle fleet reports (3 days in the year) • Information, nationwide promotion and marketing.

Mitigation actions in the energy sector – industry sector

Mitigation action 32: Improvement of process performances

Mitigation Action: Improvement of process performances	
Description: This action entails a number of different measures to improve EE in the processes for manufacturing. This could include improvements to processes such as compressed air, condensate distribution, steam traps, etc.	
Sector	Energy – industry
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • # of industries improving process performances • GWh equivalent of fuel saved • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX # of industries improving process performances • 46.6 GWh equivalent of fuel saved by 2018 • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Improvement of process performances (Cleaner production, integrated pollution prevention and control – IPPC – permitting); • Energy Auditing; • Compressed air supply; • Good house-keeping
Steps Envisaged	<ul style="list-style-type: none"> • Provision of benchmarking information for industries (kWh/tonne of production) • Mandatory reporting of EE indicators by industry
Results Achieved / Progress	<ul style="list-style-type: none"> • 36.05 GWh savings in 2012

Mitigation action 33: Energy management in industry

Mitigation Action: Energy management in industry	
Description: This action provides support for the assessment of potential energy savings in industrial plants through an implementation of energy audit. The audit scheme for industry should include:	
<ul style="list-style-type: none"> • Mandatory energy audits for companies with an annual energy consumption of more than prescribed within the law; • Voluntary scheme for other companies, especially for SMEs and • Introduction and implementation of ISO 50001 scheme for Energy Management in Industry. 	
Sector	Energy – industry
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • # of industries adopting energy management standards • GWh equivalent of fuel saved • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX # of industries improving energy management standards • 33.26 GWh equivalent of fuel saved in 2018 • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Energy Auditing; • Introduction and implementation of ISO 50001 • Good house-keeping
Assumptions	Assumes industry interest in these measures.
Steps Taken	<ul style="list-style-type: none"> • Training of a certain number of companies by a USAID-funded project has begun
Results Achieved / Progress	<ul style="list-style-type: none"> • 17.2 GWh savings in 2012

Mitigation action 34: Introduction of efficient electrical motors

Mitigation Action: Introduction of efficient electrical motors	
Description: This action entails the introduction of efficient electrical motors in industry which reduces electricity consumption	
Sector	Energy – industry
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • # of industries introducing efficient electrical motors • GWh saved per year • Kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX # of industries introducing efficient electrical motors • 28.8 GWh electricity saved • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Installing of new high-efficiency electric motors • Installing of devices for frequency/ number of revolution control of existing electric motors.
Assumptions	Assumes industry interest in these measures.
Steps Envisaged	<ul style="list-style-type: none"> • Prepare manual for achieving fast control of rational energy consumption of existing electrical power engines. • Determination of economic viability of investing in the improvement of energy efficiency of the equipment • Providing access to soft loans for the purchase of EE equipment of this type.
Results Achieved / Progress	<ul style="list-style-type: none"> • 6.04 GWh savings in 2012

Mitigation action 35: Waste heat utilisation in industry

Mitigation Action: Waste heat utilisation in industry	
Description: This action entails the rearranging of industrial processes in order to utilise waste heat. For example, this would mean water recirculation in tanner facilities, usage of hot air in installations for baking bricks, the sensible heat in the gaseous combustion products from the chamber furnaces for heat treatment of refractory products emitted in large amount and at relatively high temperature, etc.	
Sector	Energy – industry
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • # of industries utilising waste heat • GWh equivalent of fuel saved • Kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX # of industries utilising waste heat • 251.8 GWh equivalent of fuel saved in 2018 • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Waste heat utilization in industry
Assumptions	
Steps Taken	<ul style="list-style-type: none"> • CDM case studies for utilization of waste heat identified
Steps Envisaged	<ul style="list-style-type: none"> • Launch a programme for waste heat utilization for small scale projects (not qualifying for CDM) and create a mechanism for control of project implementation • Support by provision of financial incentives/ fiscal measures/ soft loans for efficient use of waste heat • Realization of case studies in the National Strategy for CDM
Results Achieved / Progress	<ul style="list-style-type: none"> • 31.8 GWh savings in 2012
Emissions Reduction	
International Market Mechanisms:	Expected to be linked to the Clean Development Mechanism

Mitigation action 36: Cogeneration in industry

Mitigation Action: Cogeneration in industry	
Description: This action entails providing the necessary preconditions for distributed production of heat and electricity for small and micro energy consumers in the industrial sector, but also in public buildings if appropriate (such as hospitals, hotels etc.).	
Sector	Energy – industry
Gases	CO ₂
Indicators	<ul style="list-style-type: none"> • # of industries implementing cogeneration facilities • # of industries switching fuels • GWh equivalent of fuel saved • Kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX # of industries implementing cogeneration facilities • XX # of industries switching fuels • XX GWh equivalent of fuel saved • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Co-generation; • Fuel switching; • Waste heat utilization;
Steps Envisaged	<ul style="list-style-type: none"> • Promotion of application of micro and small-scale CHP in the industry and other sectors • Ensure faster transfer of know-how, good practice between industrial organizations, as well as to support inter-collaboration • Provide the companies with information and to prepare preconditions to obtain soft loans
Results Achieved / Progress	<ul style="list-style-type: none"> • 151 GWh savings in 2012

Mitigation actions in the waste sector

Mitigation action 37: Closing and covering the existing non-compliant landfills followed by gas extraction and flaring

Mitigation Action: Closing and covering the existing non-compliant landfills followed by gas extraction and flaring	
Description: This Action involves the closure, covering and flaring of methane gas within 4 large landfills in Macedonia	
Sector	Waste
Gases	CH ₄
Indicators	<ul style="list-style-type: none"> • Tonnes of CH₄ flared per year • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX Tonnes of CH₄ flared per year • 11,450 kt CO₂-eq reduced by 2020
Methodology	<ul style="list-style-type: none"> • There are four municipal landfills which need urgent closure and rehabilitation: Kicevo, Ohrid, Kriva Palanka, and Gevgelija. • The action involves covering the whole disposal area and introducing gas extraction and flaring, converting methane emissions to CO₂. • Production of electricity as an option is not chosen because there is uncertainty in landfill gas quantities.
International Market Mechanisms:	IPA funds can be used along with municipal budgets and other donors

Mitigation action 38: Mechanical and biological treatment (MBT) in new landfills with composting

Mitigation Action: Mechanical and biological treatment (MBT) in new landfills with composting	
Description: This Action involves the sorting of waste for removal of metals, plastics and glass. It is a necessary step for any other treatment (composting, anaerobic treatment, or RDF development).	
Sector	Waste
Gases	CH ₄
Indicators	<ul style="list-style-type: none"> • Tonnes of CH₄ reduced per year • Kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX tonnes of CH₄ reduced per year • 7,678 kt CO₂-eq reduced by 2030
Methodology	<ul style="list-style-type: none"> • This measure involves the sorting of waste for removal of metals, plastics and glass. It is a necessary step for any other treatment (composting, anaerobic treatment, or RDF development).
International Market Mechanisms:	IPA funds can be used along with Public Private Partnerships, and other donors

Mitigation action 39: Mechanical and biological treatment (MBT) in one new landfill with composting plus production of Refuse-Derived Fuel (RDF) intended for cement industry

Mitigation Action: Production of Refuse-Derived Fuel (RDF) intended for cement industry	
Description: This Action involves the production of RDF from waste streams and then use in the cement industry as a source of energy instead of using fossil fuels.	
Sector	Waste
Gases	CH ₄ , CO ₂
Indicators	<ul style="list-style-type: none"> • Tonnes of CH₄ reduced per year • GWh produced using RDF displacing other energy sources • kt of CO₂ reduced from displacement of other energy sources • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • XX tonnes of CH₄ reduced per year • XX GWh produced using RDF displacing other energy sources • XX kt of CO₂ reduced from displacement of other energy sources • 5,890 kt CO₂-eq reduced cumulatively by 2030
Methodology	<ul style="list-style-type: none"> • The production of RDF involves converting combustible waste materials to an engineered fuel. • The RDF system provides additional GHG reduction because all the carbon contained in the waste is incinerated instead of put into landfills – which can reduce methane emissions and displace fuel sources with higher-GHG content such as coal.

Mitigation actions in the agriculture sector

Mitigation action 40: Increase in organic farming

Mitigation Action: Increase in organic farming	
Description: Organic agriculture directly contributes to reduction of GHG emissions as it emits less N ₂ O from nitrogen application (lower nitrogen input), biomass waste burning is avoided (less N ₂ O and CH ₄ emissions) and there is almost no usage of chemical fertilizers. The increased soil quality is also a value added that makes the agriculture sector more resilient to droughts or extreme weather events.	
Sector	Agriculture
Gases	N ₂ O, N ₂ O and CH ₄
Indicators	<ul style="list-style-type: none"> • Ha of agriculture under organic agriculture • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • Increase from 4,663 ha in 2012 to 30,400 ha in 2030 • 63.76 kt CO₂-eq reduced per year in 2030
Methodology	<ul style="list-style-type: none"> • Financial support for organic production area • Re-imburement of inspection and certification costs. • Financial support for organic farmers for production of approved organic seed material. • Co-financing of storage, packaging and processing
Assumptions	<ul style="list-style-type: none"> • For all type of crops, it is required that the Government gives adequate subsidies for the farmers and the benefit of the organic products is recognized by customers.

Mitigation action 41: Livestock management for less GHG-intensive enteric fermentation

Mitigation Action: Livestock management for less GHG-intensive enteric fermentation	
Description: Enteric fermentation is a natural part of the digestive process for many ruminant animals where anaerobic microbes, called methanogens, decompose and ferment food present in the digestive tract producing compounds that are then absorbed by the host animal. Measures to mitigate enteric fermentation would not only reduce emissions, they may also raise animal productivity by increasing digestive efficiency..	
Sector	Agriculture
Gases	CH ₄
Indicators	<ul style="list-style-type: none"> • % of the population of the dairy cows and cattle taking propionate precursors or probiotics • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 50% of the population of the dairy cows and cattle taking propionate precursors or probiotics by 2030 • 1,498 kt CO₂-eq reduced cumulatively by 2030
Methodology	<ul style="list-style-type: none"> • Improvement of the cattle food intake using propionate precursors and probiotics
Assumptions	<ul style="list-style-type: none"> • Mitigation measures related to enteric fermentation are expensive and are considered feasible only if the Government gives adequate subsidies in the upcoming period for replacement of feed intake of animals.

Mitigation action 42: Improved crop residues management

Mitigation Action: Improved crop residues management	
Description: The burning of crop residues is very common and causes various concerns: GHG emissions, pollution linked to respiratory and health issues, possible soil erosion, adverse effects on soil fertility, organic matter depletion and soil structure damage, reduced numbers of macro and micro-organisms, and fires that get out of control. Emissions could be reduced from this cumulative total if better crop residue management was used – especially by using the residues as a fuel source. With recent policy changes, open-fire burning of the agricultural residues in the country is strictly prohibited.	
Sector	Agriculture
Gases	CO ₂ , CH ₄ , and N ₂ O
Indicators	<ul style="list-style-type: none"> • The annual amount of briquettes produced (kt/year) • The annual amount of the re-used crop residues (kt/year) • The substitution of the usage of the ordinary biomass with agricultural residues briquettes (kt/year) • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 3.12 kt/year of briquettes produced • XX kt/year of crop residues reused • XX kt/year of briquettes replacing ordinary biomass • 3,792 kt CO₂-eq reduced per year by 2030
Methodology	<ul style="list-style-type: none"> • The most effective and common practice for managing crop residues is using mechanical equipment for residue removal and packaging into briquettes for fuel use. • This measure provides high environmental and economic benefits, and investment in even the most expensive production plant (an investment of ~EUR 430,000) has a pay-back period of 4.3 years.
Steps Taken	<ul style="list-style-type: none"> • The burning of crop residues has been banned by law.

Mitigation action 43: Improved sprinkler and drip irrigation

Mitigation Action: Improved sprinkler and drip irrigation	
Description: Irrigation is very carbon intensive because a lot of energy is spent for pumping water. Emissions are estimated at 1,448 kg CO ₂ -eq/ha for furrow irrigation, 446 kg CO ₂ -eq/ha for sprinkler irrigation and 792 kg CO ₂ -eq /ha for drip irrigation. Furthermore, inefficient irrigation that leaves the soil overly wet leads to higher emissions of N ₂ O. For a variety of crops, this action would involve the abandonment of flood and furrow irrigation to favour sprinkler irrigation and drip irrigation, since they are proven to be more effective techniques. Additionally, it would involve higher frequency of irrigations with lower amounts of water per irrigation.	
Sector	Agriculture
Gases	N ₂ O, CO ₂
Indicators	<ul style="list-style-type: none"> • Increase of yield production (t yield/year). • ha of crops under improved sprinkler and drip irrigation • kt CO₂-eq reduced per year segregated by product type
Projections	<ul style="list-style-type: none"> • Increase of yield production of XX t /year. • XX ha of crops under improved sprinkler and drip irrigation • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Abandonment of flood and furrow irrigation to favour sprinkler irrigation and drip irrigation. • Higher frequency of irrigations with lower amounts of water per irrigation.
Steps Taken	<ul style="list-style-type: none"> • Economic and financial analysis has been conducted on this measure to find the best combination as part of preparation of the Third National Communication.

Mitigation action 44: Altering tillage techniques

Mitigation Action: Altering tillage techniques	
Description: Conventional tillage practices may adversely affect long-term soil productivity due to erosion and loss of organic matter in soils. Sustainable soil management can be practiced through conservation tillage (including no-tillage), high crop residue return, and crop rotation. Conservation tillage is defined as a tillage system in which at least 30% of crop residues are left in the field and is an important conservation practice to reduce soil erosion. The advantages of conservation tillage practices over conventional tillage include: reducing cultivation cost; allowing crop residues to act as an insulator and reducing soil temperature fluctuation; building up soil organic matter; conserving soil moisture.	
Sector	Agriculture
Gases	N ₂ O, CO ₂
Indicators	<ul style="list-style-type: none"> • ha of arable soil utilising conservation tillage techniques • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 227,000 ha of arable soil utilising conservation tillage techniques • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Sustainable soil management through conservation tillage (including no-tillage), high crop residue return, and crop rotation. • Leaving at least 30% of crop residues in the field
Assumptions	<ul style="list-style-type: none"> • Assumes a rejection of conventional techniques of farmers because of the increased labour costs

Mitigation action 45: Improved management of fertilizers

Mitigation Action: Improved management of fertilizers	
Description: This action involves a fertilisation strategy in wet conditions in which fertilisers containing only NH ₄₊ are applied instead of the commonly used NO ₃₋ fertiliser, to mitigate N ₂ O emission from intensively managed arable land or grasslands. It also involves the reduction of the application of synthetic fertiliser in arable and grassland systems by an efficient use of manure that is otherwise disposed of as waste products.	
Sector	Agriculture
Gases	N ₂ O
Indicators	<ul style="list-style-type: none"> • The amount of the mineral fertilizers substituted with the organic fertilizers (t/year) • The area of application of the organic fertilizers (ha/year) • kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> • 7,500 t/year of mineral fertilizers substituted with the organic fertilizers • 90,986 ha/year of application of the organic fertilizers • XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> • Utilizing NH₄₊ fertilisers instead of NO₃₋ fertilisers for wet conditions • Use of manures instead of synthetic fertilisers in arable and grassland systems

Mitigation action 46: Improved manure management

Mitigation Action: Improved manure management	
Description: This practice is based on the drying of cattle waste, since dry cattle manure produces ~14% of the methane than the equivalent in wet weight – which can be used for the production of organic fertilizers.	
Sector	Agriculture
Gases	N ₂ O, CH ₄
Indicators	<ul style="list-style-type: none"> t/year of organic fertilizers produced # of composting plants implemented kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> XX t/year of organic fertilizers produced 6 composting plants implemented 37.5 kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> Ensure aerobic decomposition and avoid methane evolution, by daily spreading of manures and composting Convert evolved methane to carbon dioxide, including anaerobic digestion and covered lagoon systems
Assumptions	<ul style="list-style-type: none"> Assumes the ability to market organic fertilisers. Assumes compliance with the law
Steps Taken	<ul style="list-style-type: none"> This action measures fall under Integrated Pollution Prevention and Control (IPPC) environmental legislation (A-Integrated permits). Legislation has been passed to require their completion as an amendment of the Law on Environment (Official gazette of R.M, no.53/05) and IPPC Decree (Official gazette of R.M, no.89/05)

Mitigation action 47: Production of biogas from farming

Mitigation Action: Production of biogas from farming	
Description: This practice is based on the processing of animal waste in combination with other organic waste products such that they will create biogas which can be injected into the grid or burned for electricity/heat production. The leftover material can then be used for the production of organic fertilizers.	
Sector	Agriculture
Gases	CH ₄ , CO ₂
Indicators	<ul style="list-style-type: none"> t/year production of high quality compost (t/year) MWh equivalent of biogas/electricity/heat produced kt CO₂-eq reduced per year
Projections	<ul style="list-style-type: none"> XX t/year production of high quality compost (t/year) XX MWh equivalent of biogas/electricity/heat produced XX kt CO₂-eq reduced per year
Methodology	<ul style="list-style-type: none"> This would involve the introduction of system for biogas production on the major swine farms in the country (5 big farming associations)
Assumptions	<ul style="list-style-type: none"> Assumes the proper incentives put into place for the use of biogas for electricity production.