17SM

Accelerating the Transition in the Context of Sustainable Development

Supplementary Material

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Table 17.SM.1 | Chapter 6.

		Sustainable Development Goals																	
Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/scale)**
Energy systems	**Wind energy**	+ Wind can provide low-cost electricity to several communities (*high confidence*)	± Land use for wind energy needs to be coordinated based on local circumstances, otherwise can have negative implications on food security (*medium confidence*)	+ Minimal air pollution, also integration with health sector frequently discussed (*high confidence*)			+ Low consumption of water (*high confidence*)	+ Low-cost and low-carbon electricity in several regions (*high confidence*)	+ Large job creation per unit investment (*medium confidence*)	+ Integration with offshore and other infrastructure (*medium confidence*)		+ Could help through net metering (*medium confidence*)	± Cater to sustainable production, however has significant material consumption and disposal needs (*medium confidence*)	+ Low-carbon emissions (*high confidence*)	± Offshore wind could pose risk to marine life if not appropriately managed (*high confidence*)	± Land use for wind energy needs to be coordinated, otherwise can have negative implications on biodiversity (*medium confidence*)			Sections 6.4.2.2 and Section 6.7.7	Need large storage infrastructure associated with their system integration. Will likely require significantly more critical minerals Key context would include availability of land that does not compromise biodiversity
	Solar energy	+ Solar PV can provide low-cost electricity to several communities (*high confidence*)	± Land use for solar energy needs to be coordinated based on local circumstances, otherwise can have negative implications on food security (*medium confidence*)	+ Minimal air pollution, also integration with health sector frequently discussed (*high confidence*)			± Low consumption of water for PV but higher for CSP (Concentrating Solar Power) (*high confidence*)	+ Low-cost and low-carbon electricity in several regions (*high confidence*)	+ Large job creation per unit investment (*medium confidence*)	+ Solar heat may be used in industrial heating (*medium confidence*)		+ Could help through net metering (*medium confidence*)	± Cater to sustainable production, however has significant material consumption and disposal needs (*medium confidence*)	+ Low-carbon emissions (*high confidence*)		± Land use for solar energy needs to be coordinated, otherwise can have negative implications on biodiversity (*medium confidence*)			Sections 6.4.2.1 and Section 6.7.7	Key context would include availability of land that does not compromise biodiversity. Moreover, coordination with materials cycles is needed Need large storage infrastructure associated with their system integration. Will likely require significantly more critical minerals
	Bioenergy	± Bioenergy may be useful to provide rural energy. But large-scale bioenergy projects with CCS may be expensive (*medium confidence*)	± Farm employment and incomes could increase, which is a key component of SDG 2 (2.3 to be specific). The reason for the tradeoff is competition between food and bioenergy crops (*medium confidence*)	± Depending on the scale and infrastructural efficacy, bioenergy may result in good or poor air quality (*medium confidence*)			± Some bioenergy feedstocks may cause competition for water (*high confidence*)	± Significant potential to deliver low-carbon or carbon-negative energy. High dependence of 2.2 billion people on traditional and non-sustainable biomass, with negative impact on health and deforestation (*high confidence*)	+ Potential to provide employment, including to workers who may be transitioning from fossil sectors (*high confidence*)	+ Considerable opportunities for integration with other industries such as wastewater treatment (*high confidence*)		+ Could lead to low-carbon transport fuels (*high confidence*)	+ Use of waste biomass could be useful (*high confidence*)	+ Low-carbon emissions (*high confidence*)	± Treatment of nutrient-rich wastewater (which produces biogas as a co-benefit) is highly relevant for SDG 14.1 – Reduce marine pollution. At the same time, effluents from biofuel production can also cause negative impacts on marine ecosystems when effluent treatment is not meeting high standards (*high confidence*)	± Land use needs to be coordinated, otherwise can have negative implications on biodiversity and food production (*high confidence*)			Sections 6.4.2.6 and 12.5, Box 6.1	The regional context in terms of the types of biomass/land being utilised is critical Has potential for development of low-carbon organic materials, chemicals and plastics that can be produced
	Hydropower		± Could lead to fisheries damage if not properly managed (*medium confidence*)	+ Minimal air pollution (*high confidence*)			+ Coordination with water infrastructure (*medium confidence*)	+ Low-cost and low-carbon electricity in several regions (*high confidence*)						+ Low-carbon emissions (*high confidence*)	± Could lead to fisheries damage if not properly managed (*medium confidence*)	± Land use needs to be coordinated, otherwise can have negative implications on biodiversity (*medium confidence*)			Section 6.4.2	Key context would include availability of land that does not compromise biodiversity
	Geothermal energy	+ Potential to provide energy in several energy-scarce regions (*low confidence*)		± Low air pollution but some water pollution risks (*medium confidence*)			± Water flowback, water pollution and other issues (*medium confidence*)	+ Low-cost and low-carbon electricity and heat in several regions (*high confidence*)		+ Heat may be used in industrial heating (*medium confidence*)		+ Potential for air conditioning and heating (*medium confidence*)		+ Low-carbon emissions (*high confidence*)					Section 6.4.2.8	Would depend on water management infrastructure
	Nuclear power			± Reduced air pollution if displacing fossil. Much Literature on both the health benefits as well as risks arising from such power plants (*high confidence*)			– Significant water consumption (*high confidence*)	± Increased use of nuclear power can provide stable baseload power supply and reduce price volatility but has nuclear waste management needs (*medium confidence*)	+ Local employment and reduced price volatility (*medium confidence*)	± Could provide low-carbon heat. It differs across countries, whether a country already has a nuclear power or whether it is a newcomer country. In the latter case, a wide range of infrastructure issues need to be addressed, including facilities and equipment, as well as human and financial resources, and the legal and regulatory framework (*medium confidence*)			± Cater to sustainable production, low resource consumption, but has significant waste management needs (*medium confidence*)	+ Low-carbon emissions (*high confidence*)	± Low impacts to ecosystems (acidification, eutrophication, ecotoxicity, ozone depletion). Long-term solutions for high-level radioactive waste are under development (*medium confidence*)	± Low impacts to biodiversity but high impact in case of an accident (*medium confidence*)			Section 6.4.2.4, Figure 6.18	Depends on the type of power plants being displaced Nuclear requires significantly less minerals than other low-carbon technologies
	Carbon capture and storage (CCS)			+ CCS infrastructure generally requires reduction of air pollutants for optimal operation (*high confidence*)			– Water use generally increases significantly; significant water treatment needs may also arise for brines (*high confidence*)		+ Potential to spur technological innovation; also could reduce inequity risks for fossil workers (*high confidence*)	+ Could help decarbonise some hard-to-decarbonise sectors (*high confidence*)			± Use of resources and chemicals could increase unless appropriately managed (*medium confidence*)	+ Low-carbon emissions (*high confidence*)					Sections 6.4.2.5 and 6.7.7	Water use could be managed to remain neutral but could also increase based on how produced waters and cooling water is managed It is conventional knowledge that CCS has larger mineral requirements than plants without CCS. However, some of these requirements may be met through low-cost or waste minerals. Moreover, there may be the potential for precipitated $CaCO_3$ production through CO_2 mineralisation (which is largely regarded as CCS and not CCU because of permanent storage). This was highlighted in IPCC SRCCL, p. 332, www.ipcc.ch/srccl/. Thus, it may be synergy or tradeoff

Table 17.SM.2 | Chapter 7.

		Sustainable Development Goals																		
Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/scale)**
Agriculture, forestry and other land use	**Carbon sequestration in agriculture (soil carbon management in cropland and grasslands, agroforestry, biochar)**	+ May lead to narrowing the yield gap, higher and stable profit due to increased productivity and reduced input use with benefit to soil fertility. Water management for reducing drought and adapting to climate change is important issue (*high confidence*)	+ Better and sustainable soil management will improve food production and availability as well. Water management for reducing drought and adapting to climate change is important issue (*high confidence*)	± Probably no direct impact (soil–human health nexus through nutritional transfer: may contribute to better nutrient security through quality and nutrient-rich products and better living if higher profits and diversified products) (*medium confidence*)			+ Better landscape water balance by influencing the quality and availability of water supply (*high confidence*)		+ Better soil management can lead to improved productivity and thus economic growth (*medium confidence*)				± Low environment footprints, quality and healthy food production and economic and social viability (*high confidence*)	+ Clear climate benefit (*high confidence*)	+ Better sponge function to life in water, and less nutrients into the water (*medium confidence*)	+ Proved beneficial for combating soil degradation and improving soil health and beneficial to biodiversity (*high confidence*)	+ Securing local food production and higher and stable profits may reduce migration and prevent conflict and support peace and justice (*medium confidence*)		Sections 7.3, 7.4 and 7.6	Almost not context or scale dependent. Low-cost option, high level of technology readiness. Difficulty in monitoring. Trade-offs with other uses of the organic matter
	Reduce CH_4 and N_2O emissions in agriculture		± When part of improved agriculture, it may reduce hunger (*low confidence*)	+ Cleaner air and soil-plant-herbivore nexus (*high confidence*)			± Less use of water and less manure into water streams (*low confidence*)			± Requires innovative food production (*low confidence*)			+ Reduction of emissions (which is a part of responsible production) (*medium confidence*)	+ Clear reduction of emissions (*high confidence*)	+ Less impact on water (*high confidence*)	+ Less impact on land (*high confidence*)			Section 7.4	Risks include mitigation persistence, ecological impacts associated with improving feed quality and supply, or potential toxicity and animal welfare issues concerning feed additives
	Reduced conversion of forests and other ecosystems (deforestation, loss and degradation of peatlands and coastal wetlands)	± Protecting huge areas may lead to poverty (*medium confidence*)	– May lead to some competition for land (*medium confidence*)	+ Cleaner air, greener environment generally leads to better health (*high confidence*)			+ Better landscape water balance (*high confidence*)		± May lead to competition for land and less economic benefits (*medium confidence*)			± When surrounding cities, it may lead to cooling (*high confidence*)		+ Clear climate benefit (*high confidence*)	+ Better sponge function to life in water, and less nutrients into the water (*high confidence*)	+ Beneficial to biodiversity (*high confidence*)	± May lead to more competition for resources and thus pressures between actors (*medium confidence*)	± May lead to joint forces (*low confidence*)	Section 7.4	Many benefits in terms of climate and biodiversity. It can compete for land and thus with food provision
	Ecosystem restoration, reforestation, afforestation	+ If it provides income, food and wood products, then neutral to positive (*medium confidence*)	± May lead to competition for land when done at large scales. Reforestation and forest restoration can have co-benefits for food security (*medium confidence*)	+ Cleaner air, greener environment generally leads to better health (*medium confidence*)			± Better landscape water balance. Afforestation (on naturally unforested land) can compound climate-related risks to water security (*medium confidence*)		– May lead to competition for land and less economic benefits (*medium confidence*)		± When done with involvement of locals it can reduce inequality (*low confidence*)	+ When surrounding cities, it may lead to cooling (*high confidence*)		+ Clear climate benefit (*high confidence*)	+ Better sponge function to life in water when done in proper manner (*high confidence*)	+ Beneficial to biodiversity when done in proper manner (*medium confidence*)			Section 7.4	Very much context dependent and on how measures are carried out. If carried out at massive scale, competition for food will arise; when carried out adapted to local circumstances, and for various needs, the trade-offs are small; may have high opportunity costs
	Improved sustainable forest management	+ If it provides income and wood products, then neutral to positive (*high confidence*)	± If it provides income and wood products, then neutral to positive (*low confidence*)	+ Cleaner air, greener environment generally leads to better health (*low confidence*)			+ Better landscape water balance (*medium confidence*)	± Can lead to improved wood chain, including bioenergy from residues (*high confidence*)	+ If it provides income and wood products, then neutral to positive (*medium confidence*)	+ Can lead to improved wood chain, and biobased product innovation (*high confidence*)	± When done with involvement of locals it can reduce inequality (*low confidence*)	± Can lead to cooling of cities and building with biobased products (*medium confidence*)		+ Most likely climate benefit (*medium confidence*)	+ Better sponge function to life in water, and less nutrients into the water (*medium confidence*)	+ Beneficial to biodiversity (*high confidence*)			Section 7.4	This involves small changes in management of existing forests; effects per hectare are small. Can be beneficial for biodiversity, provision of wood, etc.
	Reduce food loss and food waste	+ Reduced food loss will reduce prices, and may lead to less poverty (*high confidence*)	+ Reduced food loss will reduce prices, and may lead to more food available (*high confidence*)	+ Reduced food loss will reduce prices, and may lead to more food available (*high confidence*)			+ Less use of water (*high confidence*)	+ Lead to less energy use (*high confidence*)			+ Balanced food distribution globally may reduce prices for many (*low confidence*)	+ Balanced food distribution globally may provide more sustainable societies (*low confidence*)	+ Balanced food distribution and reduced losses is part of responsible consumption (*high confidence*)	+ Clear reduction of emissions (*high confidence*)	+ Less impact on water (*medium confidence*)	+ Less impact on land (*high confidence*)	+ Leads to less competition for resources and thus less pressures between actors (*medium confidence*)		Section 7.5	Occurs in all societies, there are no trade-offs
	Shift to balanced, sustainable healthy diets	± Depends whether the healthier diet is cheaper, often not (*medium confidence*)	+ Balanced food distribution globally may reduce prices for many (*low confidence*)	+ Healthier diets for affluent populations (*high confidence*)			+ Less use of water (*high confidence*)	+ May lead to less energy use (*high confidence*)		± More innovative food production (*medium confidence*)	+ Balanced food globally may reduce prices for many (*low confidence*)	+ Balanced food globally may provide more sustainable societies (*low confidence*)	+ Clear reduction of emissions – Part of responsible production (*high confidence*)	+ Clear reduction of emissions (*high confidence*)	+ Less impact on water (*medium confidence*)	+ Less impact on land (*high confidence*)			Section 7.4	Only for affluent societies; synergies occur because it may lead to freeing up land
	Renewables supply timber, biomass, agri feedstock)	± Can lead to both positive and negative outcomes for livelihoods and food security; if it provides income, food and wood products, then neutral to positive (*medium confidence*)	± May lead to competition when done at large scale and not taking into account local circumstances or needs (*medium confidence*)	± Can lead to greener landscape, but can also result in large-scale undesirable changes (*medium confidence*)			± Can lead to better landscape-level water balance when done in proper manner (*medium confidence*)	± Can lead to better and more stable products and energy provision if done properly (*medium confidence*)	+ If it provides income and wood products, then neutral to positive (*medium confidence*)	+ Can lead to improved wood chain, and bio-based product innovation (*high confidence*)				± Clear reduction of emissions up to certain scales and volumes and when negative land-use effects are avoided (*high confidence*)	± Depending on type of land use, less impact on water (*medium confidence*)	± Depending on type of land use, less impact on life on land (*medium confidence*)			Section 7.6	Very much context dependent and dependent on how measures are carried out, leads to enhanced production of renewables needed for substitution of fossil based products. If done at massive scale and not adapted to local circumstances, then there are adverse implications for food security and livelihoods, and for biodiversity.

Table 17.SM.3 | Chapter 8.

		Sustainable Development Goals																	
Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/ scale)**
Urban systems	**Urban land use and spatial planning**	(+) Provides employment density and supports productivity (*high confidence*) (+) Can reduce exposure and vulnerability to climate change given policy integration (*high confidence*)	(+) Better spatial planning will reduce pressures on land use change, including croplands (*high confidence*) (–) Growth in urban extent can still reduce cropland if not sufficiently managed (*high confidence*)	(+) Improves access to health infrastructure; improves air quality when coupled to shifting energy use; improves wellbeing with green and blue infrastructure (*high confidence*)	(+) Better spatial planning increases educational opportunities (*medium confidence*)	(+) Can increase equal opportunities and effective participation of women, including urban governance (*medium confidence*)	(+) Can improve water quality, water-use efficiency, water harvesting and wastewater treatment; efficient urbanisation can also reduce GHG emissions from water infrastructure (*high confidence*)	(+) Can reduce energy use and enable access to modern energy infrastructure while urban infrastructure for energy services varies (*high confidence*)	(+) Provides employment density and supports productivity (*high confidence*)	(+) Sustainable urbanisation and settlement planning requires development across all infrastructure sectors (*high confidence*)	(+) Spatial inequalities within cities can be reduced; urban infrastructure gap between cities can be reduced (*high confidence*) (–) Unintended gentrification and spatial inequalities are still possible (*medium confidence*)	(+) Supports capacity for participatory, integrated and sustainable human settlement planning (Target 11.3) and protecting the poor and vulnerable (Target 11.5) (*high confidence*)	(+) Urbanisation with lower material demands will support responsible consumption and production (*high confidence*) (–) Urban population growth contributes to increased demand for resources with differences in scenarios; increase in urban water demand can increase pressures on water scarcity; over-exploitation of groundwater needs to be avoided (*medium confidence*)	(+) Contributes to both climate mitigation and adaptation given integration in urban planning (*high confidence*)	(+) Can reduce growth in urban expansion that can help protect coastal and marine ecosystems (*medium confidence*) (–) Urban development can still impact coastal and marine ecosystems (*medium confidence*)	(+) Can reduce growth in urban expansion that can help protect biodiversity on land and terrestrial and inland freshwaters (*high confidence*) (–) Urban development can still impact biodiversity (*medium confidence*)	(+) Has synergies with responsive, inclusive and participatory decision-making at all levels and transparent institutions (*medium confidence*)		Sections 8.2, 8.4 and 8.6	
	Electrification of the urban energy system	(+) Can address energy poverty that is linked to poverty; eradicating poverty is supported by access to modern energy services for all (*medium confidence*)	(+) Electrification can support welfare; electric stoves can support nutritional food intake (*medium confidence*) (–) Can have trade-offs if food systems are coupled with electricity and bioenergy (*medium confidence*)	(+) Improves air quality when coupled to shifting energy use as included in the option; Avoids air pollution from energy and transport infrastructure; Supports energy services for quality health services in hospitals (*high confidence*)	(+) Electrification and access to electricity supports quality education and educational attainment (*high confidence*)	(+) Supports equal opportunities, also through electricity for internet access if previously lacking (*medium confidence*)	(+) Renewable energy powered water treatment facilities can support clean water and sanitation (*medium confidence*)	(+) Supports renewable energy, energy efficiency and access to affordable, reliable and modern energy; renewable-energy generation technologies can enhance infrastructure resilience (*high confidence*)	(+) Supports technological upgrading, innovation and decent job creation (*high confidence*)	(+) Supports sustainable and resilient infrastructure and can support domestic technology development; renewable-energy generation technologies can enhance infrastructure resilience (*high confidence*)	(+) Supports equal opportunities, e.g. through internet access if previously lacking (*high confidence*)	(+) Supports adequate, safe and affordable housing as well as safe, affordable, accessible and sustainable transport (Targets 11.1 and 11.2) (*high confidence*)	(+) Allows leapfrogging to more resource-efficient urban development (*high confidence*) (–) Material demands of electrification technologies will increase; policies are important (*medium confidence*)	(+) Energy infrastructure can also strengthen climate resilience and adaptive capacity if addressed together (*medium confidence*)	(+) Energy systems can be designed to minimize impacts on water ecosystems (*medium confidence*)	(+) Clean energy will reduce the impacts of climate change on biodiversity and terrestrial ecosystems (*high confidence*) (–) Hydropower development and biofuel cultivation may impact ecosystems while there are multiple alternatives, e.g., use of degraded lands for solar energy farms (*medium confidence*)	(+) Improvement in governance through inclusive decision-making improves ability for energy systems to contribute to sustainable development (*medium confidence*)		Sections 8.2, 8.4 and 8.6	The impacts of the possible synergies and/or trade-offs with the SDGs will change according to the specific urban context. Synergies and/or trade-offs may be more significant in certain contexts than others. Urban mitigation with a view of the SDGs can support shifting pathways of urbanisation towards sustainability. The feasibility of urban mitigation options is also malleable and can increase with more enablers. Strengthened institutional capacity that also supports the scale and coordination of the mitigation options can increase these synergies.
	District heating and cooling networks	(+) Can address energy poverty that is linked to poverty; eradicating poverty is supported by access to modern energy services for all (*medium confidence*)	(–) Can have trade-offs if food systems are coupled with bioenergy and heat (*medium confidence*)	(+) Improves air quality when coupled to shifting energy use as included in the option; supports energy services for quality health services in hospitals (*medium confidence*)				(+) Supports renewable energy, energy efficiency and access to affordable, reliable and modern energy (*medium confidence*)	(+) Supports technological upgrading, innovation and decent job creation (*medium confidence*)	(+) Is being used to support sustainable and resilient infrastructure, including adaptation and mitigation (*medium confidence*)		(+) Supports capacity for participatory, integrated and sustainable human settlement planning (Target 11.3) (*high confidence*)	(+) Allows leapfrogging to more resource-efficient urban development (*medium confidence*)	(+) Energy infrastructure can also strengthen climate resilience and adaptive capacity if addressed together (*medium confidence*)		(+) Clean energy will reduce the impacts of climate change on biodiversity and terrestrial ecosystems (*high confidence*)	(+) Improvement in governance through inclusive decision-making improves ability for energy systems to contribute to sustainable development (*medium confidence*)		Sections 8.2, 8.4 and 8.6	
	Urban green and blue infrastructure	(+) Can increase employment and food security, e.g., urban agriculture (*high confidence*)	(+) Can increase employment and food security, e.g., urban agriculture (*medium confidence*)	(+) Better ecosystem services improve health and well-being, can improve air quality (*high confidence*)	(+) Urban green and blue infrastructure can increase opportunities and sites for environmental education (*medium confidence*)		(+) Also supports water-sensitive urban planning and protection of water-related ecosystems (*high confidence*)	(+) Produces a cooling effect, lowering energy use when in relative proximity (*medium confidence*)	(+) Can stimulate new green economies and green jobs (*medium confidence*)	(+) Supports sustainable and resilient infrastructure (*high confidence*)	(+) Can support equity given policy design (*medium confidence* (–) Can push out low-income residents from main city areas without inclusive policy design (*medium confidence*)	(+) Supports air quality and universal access to safe, inclusive and accessible green and public spaces (Target 11.7) (*high confidence*)	(+) Supports sustainable development and lifestyles also 'in harmony with nature' as emphasised (Target 12.8) (*high confidence*)	(+) Contributes to both climate mitigation and adaptation given integration in urban planning (*high confidence*)	(+) Blue infrastructure can contribute to protecting coastal and marine ecosystems (*high confidence*)	(+) Enhances biodiversity within urban areas and ecosystem services (*high confidence*)	(+) Has synergies with responsive, inclusive and participatory decision-making at all levels and transparent institutions (*medium confidence*)		Sections 8.2, 8.4 and 8.6	
	Waste prevention, minimisation and management	(+) Can reduce informality in the waste sector and support poverty alleviation (*high confidence*)	(+) Can support reducing food waste in municipalities and urban centres (*medium confidence*)	(+) Better waste management improves air quality (*high confidence*) (–) Can depend on air pollution control techniques if waste incineration is involved (*medium confidence*)			(+) Improved water and wastewater infrastructure will reduce water pollution (*high confidence*)		(+) Can stimulate employment for value added products (*medium confidence*) (–) Transforming informality of waste recycling activities into programmes is important (*medium confidence*)	(+) Supports sustainable and resilient infrastructure (*high confidence*)		(+) Directly related to waste management; supports links between urban, peri-urban and rural areas (Target 11.a) (*high confidence*)	(+) Reduces waste generation through prevention, reduction, recycling and reuse (Target 12.5) (*high confidence*) (–) Waste segregation at source and waste processing facilities differ across context (*high confidence*)	(+) Reduces emissions through better management of urban waste in different contexts and is important for resilience, including coastal areas (*medium confidence*)	(+) Better waste management and wastewater treatment will protect coastal and marine ecosystems, reduce marine debris and nutrient pollution (*high confidence*)	(+) Better waste management and wastewater treatment will protect terrestrial and inland freshwaters (*high confidence*)	(+) Has synergies with responsive, inclusive and participatory decision-making at all levels and transparent institutions (*medium confidence*)		Sections 8.2 and 8.4, 8.6	
	Integrating sectors, strategies and innovations	(+) Increases employment density, reduces poverty and exposure and vulnerability to climate change (*high confidence*)	(+) Supports livelihoods, reduces pressures on croplands and consumption-related land-use impacts (*high confidence*)	(+) Improves access to health infrastructure; improves air quality when coupled to shifting energy use; improves wellbeing with green and blue infrastructure (*high confidence*)	(+) Can increase education opportunities, access to electricity and environmental education (*high confidence*)	(+) Can increase equal opportunities and effective participation of women, including urban governance (*medium confidence*)	(+) Can improve water quality, water-use efficiency, water harvesting and wastewater treatment; efficient urbanisation can also reduce GHG emissions from water infrastructure (*high confidence*)	(+) Supports renewable energy, energy efficiency and access to affordable, reliable and modern energy (*high confidence*)	(+) Supports technological upgrading, innovation and decent job creation (*high confidence*)	(+) Supports sustainable and resilient infrastructure (*high confidence*)	(+) Can reduce the urban infrastructure gap; sustainable urbanisation can support reducing inequality within and among cities; inclusivity of inhabitants in the informal sector is important (*high confidence*)	(+) Supports integrated policies and plans for inclusion, resource efficiency, mitigation and adaptation (Target 11.b) (*high confidence*)	(+) Allows leapfrogging to more resource-efficient urban development (*high confidence*)	(+) Contributes to both climate mitigation and adaptation, given integration in urban planning (*high confidence*)	(+) Can reduce growth in urban expansion that can help protect coastal and marine ecosystems (*medium confidence*)	(+) Can reduce growth in urban expansion that can help protect biodiversity on land and terrestrial and inland freshwaters (*high confidence*)	(+) Has synergies with responsive, inclusive and participatory decision-making at all levels and transparent institutions (*medium confidence*)	(+) Partnerships support sustainable infrastructure for urban areas; supports policy coherence for sustainable development (Target 17.14) (*high confidence*)	Sections 8.2 and 8.4, 8.6	

Table 17.SM.4 | Chapter 9.

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Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/scale)**
Buildings	**Demand-side management**	+ Reduce poverty due to less energy expenditures and other financial savings (*high confidence*)	+ Result in avoiding the 'heat or eat' dillemma (*low confidence*)	+ Improve health through better indoor air quality, fuel poverty alleviation, better ambient air quality, and reduction of the heat island effect. Furthermore, smart controllers and wireless communications that are used for controlling lighting, windows, HVAC equipment, water heaters, and other building equipment provide many other non-energy benefits such as improved security, access control, fire and other emergency detection and management, and on-time identification of maintenance issues (*high confidence*)			+ Lower energy demand can lead to reduced water demand for thermal cooling at energy production facilities (*medium confidence*)	+ Result in fuel poverty alleviation and improving the security of energy supply (*high confidence*)	± Result in direct and indirect macroeconomic effects (GDP, employment, public budgets) associated with lower energy prices due to the reduced energy demand, energy efficiency investments, and fostering innovation. + Also result in improving labour productivity (*high confidence*)	+ Adoption of digitalisation, smart meters, etc., help in infrastructure improvement and expansion – Reduced energy demand can lead to early retirement of fossil energy infrastructure (*high confidence*)	+ Reduce income inequalities (*low confidence*)	+ Eliminate major sources (both direct and indirect) of poor air quality (indoor and outdoor) (*high confidence*)	+ Result in reduced consumption of natural resources (*medium confidence*)	+ Reduce emissions and increase resilience (*high confidence*)					Section 9.8 and Table 9.5	Economic impacts (synergies and trade-offs) are associated with reduced energy demand, resulting in lower energy prices, energy efficiency investments, fostering innovation, and improvements in labour productivity
	Highly energy-efficient building envelope	+ Reduce poverty due to less energy expenditures and other financial savings – The distributional costs of some mitigation policies supporting energy efficiency may reduce the disposable income of the poor (*medium confidence*)	+ Result in avoiding the 'heat or eat' dillema (*low confidence*)	+ Improve health through better indoor air quality, fuel poverty alleviation, better ambient air quality, and reduction of the heat island effect. – Inadequate ventilation may lead to the sick building syndrome symptoms (*high confidence*)	+ Reduce school absenteeism due to better indoor conditions, while fuel poverty alleviation increases the availble space at home for reading (*medium confidence*)		+ Lower energy demand can lead to reduced water demand for thermal cooling at energy production facilities (*medium confidence*)	+ Result in fuel poverty alleviation and improving the security of energy supply (*high confidence*)	± Result in direct and indirect macroeconomic effects (GDP, employment, public budgets) associated with lower energy prices due to the reduced energy demand, energy efficiency investments, and fostering innovation + Also result in improving labour productivity (*high confidence*)	+ The development of 'green buildings' can foster innovation – Reduced energy demand can lead to early retirement of fossil energy infrastructure (*medium confidence*)	± Can reduce or increase income inequalities (*medium confidence*)	+ Eliminate major sources (both direct and indirect) of poor air quality (indoor and outdoor). Also, buildings with high energy efficiency and/or green features are sold/rented at higher prices than conventional, low-energy-efficient houses (*high confidence*)	+ Result in reduced consumption of natural resources (*medium confidence*)	+ Reduce emissions and increase resilience (*high confidence*)			+ Building retrofits are associated with lower crime; institutions that are effective, accountable and transparent are needed at all levels of government for boosting zero-energy buildings. (*medium confidence*)	+ The development of zero-energy buildings requires, among other things, capacity building and citizen participation, as well as monitoring of the achievements (*medium confidence*)	Section 9.8 and Table 9.5	Trade-offs related to public health may be minimised with adequate ventilation. Economic impacts (synergies and trade-offs) are associated with reduced energy demand, resulting in lower energy prices, energy efficiency investments, fostering innovation, and improvements in labour productivity
	Efficient heating, ventilation and air conditioning (HVAC)	+ Reduce poverty due to less energy expenditures and other financial savings – The distributional costs of some mitigation policies supporting energy efficiency may reduce the disposable income of the poor (*medium confidence*)	+ Result in avoiding the 'heat or eat' dillemma (*low confidence*)	+ Improve health through better indoor air quality, fuel poverty alleviation, better ambient air quality, and reduction of the heat island effect (*high confidence*)			+ Lower energy demand can lead to reduced water demand for thermal cooling at energy production facilities (*medium confidence*)	+ Result in fuel poverty alleviation and improving the security of energy supply (*high confidence*)	± Result in direct and indirect macroeconomic effects (GDP, employment, public budgets) associated with lower energy prices due to the reduced energy demand, energy efficiency investments, and fostering innovation + Also result in improving labour productivity (*high confidence*)	+ The development of 'green buildings' can foster innovation – Reduced energy demand can lead to early retirement of fossil energy infrastructure (*medium confidence*)	± Can reduce or increase income inequalities (*medium confidence*)	+ Eliminate major sources (both direct and indirect) of poor air quality (indoor and outdoor) (*high confidence*)	+ Result in reduced consumption of natural resources (*medium confidence*)	+ Reduce emissions and increase resilience (*high confidence*)					Section 9.8 and Table 9.5	The distributional costs of some mitigation policies may hinder the implementation of these measures. In this case, appropriate access policies should be designed to efficiently shield poor households from the burden of carbon taxation Economic impacts (synergies and trade-offs) are associated with reduced energy demand, resulting in lower energy prices, energy efficiency investments, fostering innovation, and improvements in labour productivity
	Efficient appliances	+ Reduce poverty due to less energy expenditures and other financial savings – The distributional costs of some mitigation policies supporting energy efficiency may reduce the disposable income of the poor (*medium confidence*)	+ Result in avoiding the 'heat or eat' dillemma. Also, improved cookstoves provide better food security (*medium confidence*)	+ Improve health through better indoor air quality, fuel poverty alleviation, better ambient air quality, and reduction of the heat island effect (*high confidence*)	+ Reduce school absenteeism due to better indoor conditions, while fuel poverty alleviation increases the availble space at home for reading (*medium confidence*)	+ Efficient cookstoves result in substantial time savings for women, thus increasing the time for rest, communication, education and productive activities (*medium confidence*)	+ Lower energy demand can lead to reduced water demand for thermal cooling at energy production facilities (*medium confidence*)	+ Result in energy/ fuel poverty alleviation and improving the security of energy supply (*high confidence*)	± Result in direct and indirect macroeconomic effects (GDP, employment, public budgets) associated with lower energy prices due to the reduced energy demand, energy efficiency investments, and fostering innovation + Also result in improving labour productivity (*high confidence*)	– Reduced energy demand can lead to early retirement of fossil energy infrastructure (*medium confidence*)	± Can reduce or increase income inequalities + Efficient cookstoves result in substantial time savings for women and children, thus enhancing education and the development of productive activities (*medium confidence*)	+ Eliminate major sources (both direct and indirect) of poor air quality (indoor and outdoor) (*high confidence*)	+ Result in reduced consumption of natural resources – Possible risks due to the penetration of new, efficient appliances and early retirement of existing equipment (*medium confidence*)	+ Reduce emissions and increase resilience (*high confidence*)		+ Result in halting deforestation through efficient cookstoves (*medium confidence*)			Section 9.8 and Table 9.5	Under real-world conditions improved cookstoves have shown smaller, and in many cases limited, long-run health and environmental impacts than expected, as the households use these stoves irregularly and inappropriately, fail to maintain them, and their usage declines over time. It is of paramount importance for the various cookstove programmes to consider the mid- and long-term needs of maintenance, repair, or replacement to support their sustained use. In addition, the distributional costs of some mitigation policies may hinder the implementation of these measures. In this case, appropriate access policies should be designed to efficiently shield poor households from the burden of carbon taxation. Economic impacts (synergies and trade-offs) are associated with reduced energy demand, resulting in lower energy prices, energy efficiency investments, fostering innovation, and improvements in labour productivity and energy access

Table 17.SM.4 | Chapter 9 (continued).

		Sustainable Development Goals																		
Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/scale)**
Buildings	**Building design and performance**	+ Reduce poverty due to less energy expenditures and other financial savings (*medium confidence*)	+ Result in avoiding the 'heat or eat' dillema. Also, green surfaces and urban farming (vertical, basement or unused buildings) contribute to local and resilient food production (*medium confidence*)	+ Improve health through better indoor air quality, fuel poverty alleviation, better ambient air quality, and reduction of the heat island effect (*high confidence*)			+ Lower energy demand can lead to reduced water demand for thermal cooling at energy production facilities. Also, these measures result in water savings due to improved indoor conditions and lower space of dwellings (*medium confidence*)	+ Result in fuel poverty alleviation and improving the security of energy supply (*high confidence*)	± Result in direct and indirect macro-economic effects (GDP, employment, public budgets) associated with lower energy prices due to the reduced energy demand (*high confidence*)	– Reduced energy demand can lead to early retirement of fossil energy infrastructure (*medium confidence*)	+ Reduce income inequalities (*low confidence*)	+ Eliminate major sources (both direct and indirect) of poor air quality (indoor and outdoor) (*high confidence*)	+ Result in reduced consumption of natural resources (*medium confidence*)	+ Reduce emissions and increase resilience (*high confidence*)		+ Green roofs and walls strengthen urban biodiversity (*medium confidence*)	+ Institutions that are effective, accountable and transparent are needed at all levels of government for boosting sufficiency measures (*medium confidence*)		Section 9.8 and Table 9.5	Economic impacts (synergies and trade-offs) are mainly associated with reduced energy demand and the resulting in lower energy prices
	On-site and nearby production and use of renewables	+ Increase the productive time of women and children – The distributional costs of some mitigation policies supporting RES (renewables) may reduce the disposable income of the poor (*medium confidence*)	+ Improving energy access enhances agricultural productivity and improves food security – Increased bioenergy production may restrict the available land for food production (*medium confidence*)	+ Improve health through better indoor air quality, energy/fuel poverty alleviation, better ambient air quality, and reduction of the heat island effect (*high confidence*)	+ Reduce school absenteeism due to better indoor conditions and enable people living in poor developing countries to read (*medium confidence*)	+ Improved access to electricity and clean fuels in developing countries will result in substantial time savings for women, thus increasing the time for rest, communication, education and productive activities (*medium confidence*)	+ Substituting fossil-fuelled electricity can lead to reduced water demand for thermal cooling at energy production facilities. Also, improved access to electricity is necessary to treat water in homes – Switch to bioenergy may increase water use compared to existing conditions (*medium confidence*)	+ Result in energy poverty alleviation and improving the security of energy supply – Risks of reduced energy access, in cases where the distributional costs of mitigation increase the energy costs (*medium confidence*)	± Result in direct and indirect macro-economic effects (GDP, employment, public budgets) associated with lower energy prices due to the reduced energy demand, RES investments, improved energy access and fostering innovation (*high confidence*)	+ Adoption of RES and smart grids helps in infrastructure improvement and expansion – Increased RES penetration can lead to early retirement of fossil energy infrastructure (*high confidence*)	± Can reduce or increase income inequalities + Improved access to electricity and clean fuels in developing countries will result in substantial time savings for women and children, enhancing education and the development of productive activities (*medium confidence*)	+ Eliminate major sources (both direct and indirect) of poor air quality (indoor and outdoor) (*high confidence*)	+ Result in reduced consumption of natural resources (*medium confidence*)	+ Reduce emissions and increase resilience (*high confidence*)		+ Result in halting deforestation through improved access to electricity and clean fuels (*medium confidence*)	+ Improved access to electric lighting can improve safety (particularly for women and children) + Institutions that are effective, accountable and transparent are needed at all levels of government for providing energy access and promoting modern renewables (*medium confidence*)	+ The development of zero energy buildings requires, among other things, capacity building and citizen participation, as well as monitoring of the achievements (*medium confidence*)	Section 9.8 and Table 9.5	The distributional costs of some mitigation policies supporting RES may reduce the disposable income of the poor and hinder their utilisation. In this case, appropriate access policies should be designed to efficiently shield poor households from the burden of carbon taxation. Some of the trade-offs are mainly related to the switch to bioenergy, which may restrict the available land for food production and increase water consumption Economic impacts (synergies and trade-offs) are associated with reduced demand for fossil fuels, resulting in lower energy prices, RES investments, fostering innovation, and improvements in energy access
	Change in construction methods and circular economy			+ Improve health through better labour conditions (*medium confidence*)			± The change in construction methods and the devlopment of circular business models can lead to reduced or increased water demand, as a trade-off (*medium confidence*)	+ Result in energy/fuel poverty alleviation and improving the security of energy supply (*high confidence*)	± Result in direct and indirect macro-economic effects (GDP, employment, public budgets) associated with development of smarter construction methods and circular business models + Also result in improving labour productivity (*high confidence*)	+ The development of smarter construction methods and circular business models can foster innovation (*high confidence*)		+ Result in reduced consumption of natural and scarce resources, waste generation and enviromental impacts (*high confidence*)	+ Result in reduced consumption of natural and scarce resources (*high confidence*)	+ Reduce emissions and increase resilience (*high confidence*)				+ The change in construction methods and the development of circular business models requires a better integration and partnership between stakeholders (*high confidence*)	Sections 9.4 and 9.5	Economic impacts (synergies and trade-offs) are associated with development of smarter construction methods, circular business models, and improvements in labour productivity
	Change in construction materials			+ Bio-based and natural materials, e.g., raw earth, can improve indoor air quality and brings the concept of biophilia – Bio-based and natural materials can be more susceptible to the appearance of biological organisms that can cause health problems (*medium confidence*)			± The change in construction materials can lead to reduced or increased water demand, as a trade-off (*medium confidence*)	+ Result in energy/fuel poverty alleviation and improving the security of energy supply (*high confidence*)	± Result in direct and indirect macro-economic effects (GDP, employment, public budgets) associated with the use and development of green construction materials (*medium confidence*)	+ The use and development of green construction materials can foster innovation (*high confidence*)		+ Result in reduced consumption of natural and scarce resources, waste generation and enviromental impacts (*high confidence*)	+ Result in reduced consumption of natural and scarce resources (*high confidence*)	+ Reduce emissions, removal and storage of CO_2 (bio-based materials) and increase resilience (*high confidence*)		– Bio-based materials can increase the pressure and competition for land use (*medium confidence*)		+ The change in construction materials requires a better integration and partnership between stakeholders (*high confidence*)	Section 9.4	Economic impacts (synergies and trade-offs) are associated with the use and development of green construction materials

Table 17.SM.5 | Chapter 10.

		Sustainable Development Goals																	
Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/ scale)**
Transport	**Fuel efficiency-light duty vehicle**	+ Improved efficiency reduces costs and makes transport more affordable (*high confidence*)	± Land use for wind energy needs to be coordinated based on local circumstances, otherwise can have negative implications on food security (*medium confidence*)	+ Reduce air pollution/ improve air quality (*high confidence*)				+ Can support the global rate of improvement in overall energy efficiency (*high confidence*)	+ Creation of new jobs due to new investment in fuel efficiency (*medium confidence*)			+ Can reduce air pollution in cities (*high confidence*)		+ Reduction of GHG emissions (*high confidence*)		+ Reduce demand for land needed to produce transportation fuels (*medium confidence*)			Sections 10.3, 10.4 and 10.8	Increased demand for electricity for EVs and production of hydrogen and derivatives requires careful integration with the power sector. For example, increased demand for renewable electricity could pose additional land-use constraints. Simultaneoulsy, smart charging of EVs can support the grid integration of renewables. Similarly, hydrogen production could be scheduled to manage the variability of wind and solar. Competition for hydrogen with other sectors should also be considered. Synergies and/or trade-offs may be more significant in certain contexts than others. Strengthened institutional capacity that also supports the scale and coordination of the mitigation options can increase these synergies
	Electric light-duty vehicles (LDVs)		± Land use for solar energy needs to be coordinated based on local circumstances, otherwise can have negative implications on food security (*medium confidence*)	± Battery electric vehicles (BEVs) have no tailpipe emissions, which further offsets the increased PM emissions from road and tyre wear. BEVs are generally heavier than their ICEV counterparts, which may potentially cause higher stress on the road surfaces and tyres, with consequently higher PM emissions per kilometre driven (*high confidence*)				+ EVs consume considerably less energy than conventional fuels, which increases affordability (*high confidence*) ± EVs can positively or negatively impact electric grid functioning depending on charging behaviour and grid integration strategy (*high confidence*)	+ Could create jobs associated with the EV supply chain + Could create jobs to build and operate the associated infrastructure (*low confidence*)	+ Larger penetration of electric vehicles requires innovative business models; n Digitalisation and automatic vehicle will help on the socio-economic structures that impede adoption of EVs and the urban structures that enable reduced car dependence; there is a need for investments in the infrastructure that can support alternative fuels for LDVs. Large-scale electrification of LDVs requires expansion of low-carbon power systems, while charging or battery swapping infrastructure is needed for some segments (*high confidence*)	± Significant equity issues with EVs in the transition period can be overcome with programmes, for example, by expanding public charging infrastructure (*medium confidence*)	+ Can reduce air and noise pollution in cities (*high confidence*)	± Could increase demand for critical minerals but increased recycling can mitigate this risk (*medium confidence*)	+ Reduction of GHG emissions (*high confidence*)					Sections 10.3, 10.4 and 10.8	
	Shift to public transport	+ Affordable transport access for all + Improve access to health, education, and other social services lowering the cost of services needed by the low-income/ poor (*high confidence*)	± Farm employment and incomes could increase, which is a key component of SDG 2 (2.3 to be specific). The reason for the trade-off is competition between food and bioenergy crops (*medium confidence*)	+ Access to healthcare; reduce air pollution/ inrease air quality (*high confidence*)	+ Affordable public transport can increase access to educational resources (*high confidence*)	+ Affordable transport access for all (*high confidence*)		+ Improves energy efficiency of transport and makes it more affordable (*high confidence*)	+ Role of transport for economic and human development (*high confidence*)	± Needs adequate infrastructure; in developing countries weather conditions and unreliable connectivity affect the lack of incentives to improve existing public transportation (*high confidence*)	+ Improved investments in public transit increase equity in transport access (*high confidence*)	+ Sustainable transport systems for cities; facilitates universal access to public transport (*high confidence*) + Could support positive economic links between urban and peri-urban areas (*high confidence*) + Can reduce air pollution in cities (*high confidence*)	+ Reduced material consumption during production of vehicles and their operations (*high confidence*)	+ Reduction of GHG emissions (*high confidence*)					Sections 10.2 and 10.8, Table 10.3	
	Shift to bikes, ebikes and non motorised transport	+ Affordable transport access for all + Improve access to health, education, and other social services, lowering the cost of services needed by the low-income/ poor (*high confidence*)	± Could lead to fisheries damage if not properly managed (*medium confidence*)	± Reduce air pollution; increases physical activity leading to reduced health mortality – Traffic crashes discourage the use of bikes + Scaling up active modes (through careful local urban design and transport planning) can reduce gender inequities in access to basic services, healthcare and education (*medium confidence*)	+ Scaling up active modes (through careful local urban design and transport planning) can reduce gender inequities in access to basic services, healthcare and education (*medium confidence*)	+ Scaling up active modes (through careful local urban design and transport planning) can reduce gender inequities in access to basic services (*medium confidence*)		+ Saves energy (*high confidence*)	+ Increases employment opportunities, demand for bike repair shops, bike parking (*medium confidence*)	+ Needs adequate infrastructure + Opportunities including digitalisation, the Internet of Things and also 'big data' (*high confidence*)	+ Access to bicycle lanes or cycle tracks increases the odds of female commuters using bicycles (*medium confidence*)	+ Compact, polycentric cities where active transport is most viable can enhance inclusive and sustainable urbanisation (*high confidence*) + Can reduce air pollution in cities (*high confidence*)	+ Reduced material consumption during production of vehicles and their operations (*high confidence*)	+ Reduction of GHG emissions (*high confidence*)		+ Preserve land that would have been otherwise used to construct and maintain parking garages and surface parking lots (*medium confidence*)			Sections 10.2 and 10.8, Table 10.3	
	Fuel efficiency-heavy duty vehicle	+ Improved efficiency reduces costs and makes transport more affordable (*high confidence*)		+ Reduce air pollution/ improve air quality (*high confidence*)	+ Improved efficiency reduces costs and makes transport more affordable (*high confidence*)			+ Can support the global rate of improvement in overall energy efficiency (*high confidence*)	+ Creation of new jobs due to new investment in fuel efficiency (*medium confidence*)					+ Reduction of GHG emissions (*high confidence*)		+ Reduce demand for land needed to produce transportation fuels (*medium confidence*)			Sections 10.3, 10.4 and 10.8	

Table 17.SM.5 | Chapter 10 (continued).

		Sustainable Development Goals																		
Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/ scale)**
Transport	**Fuel shift (including electricity)-heavy duty vehicles (HDVs)**			+ Reduce air pollution/improve air quality (*medium confidence*)				+ Some alternative fuels can help increase the share of renewable energy in the global energy mix (*medium confidence*)	+ Could create jobs associated with the supply chain of new fuels + Could create jobs to build and operate the associated infrastructure (*low confidence*)	+ R&D is critical for new fuels and to test the full life cycle costs of various heavy vehicle options; need to invest in supporting infrastructure (*high confidence*)			± Electric vehicles (EVs) and fuel cell vehicles (FCVs) for HDVs could increase demand for critical minerals but increased recycling can mitigate this risk (*medium confidence*)	+ Reduction of GHG emissions (*high confidence*)					Sections 10.3, 10.4 and 10.8	Increased demand for electricity for EVs and production of hydrogen and derivatives requires careful integration with the power sector. For example, increased demand for renewable electricity could pose additional land-use constraints. Simultaneoulsy, smart charging of EVs can support the grid integration of renewables. Similarly, hydrogen production could be scheduled to manage the variability of wind and solar. Competition for hydrogen with other sectors should also be considered. Synergies and/or trade-offs may be more significant in certain contexts than others. Strengthened institutional capacity that also supports the scale and coordination of the mitigation options can increase these synergies
	Shipping efficiency, logistics optimisation, new fuels							+ Some alternative fuels can help increase the share of renewable energy in the global energy mix (*medium confidence*) + Can support the global rate of improvement in overall energy efficiency (*medium confidence*)	+ Could create jobs associated with the supply chain of new fuels + Could create jobs to build and operate the associated infrastructure (*low confidence*)	+ R&D is critical for new fuels and to test the full life cycle costs of various heavy vehicle options; need to invest in supporting infrastructure (*high confidence*)				+ Reduction of GHG emissions (*high confidence*)					Sections 10.6 and 10.8	
	Aviation-energy efficiency, new fuels							+ Some alternative fuels can help increase the share of renewable energy in the global energy mix (*medium confidence*) + Can support the global rate of improvement in overall energy efficiency (*medium confidence*)	+ Could create jobs associated with the supply chain of new fuels + Could create jobs to build and operate the associated infrastructure (*low confidence*)	+ R&D is critical for new fuels and to test the full life cycle costs of various heavy vehicle options; need to invest in supporting infrastructure (*high confidence*)				+ Reduction of GHG emissions (*high confidence*)					Sections 10.5 and 10.8	
	Biofuels		– Using land to produce biofuels could put stress on global food systems + Could increase incomes for farmers and support investments in rural infrastructure (*medium confidence*)	± Biofuels may improve air quality due to reductions in tailpipe emissions of some pollutants. The biofuels supply chain may negatively impact air quality (e.g., due to increased fertiliser use) (*medium confidence*)				+ Can help increase the share of renewable energy in the global energy mix (*high confidence*)	+ Could create jobs associated with the supply chain of biofuels + Could create jobs to build and operate the associated infrastructure (*low confidence*)	+ R&D is critical for new fuels and to test the full life cycle costs of various heavy vehicle options; need to invest in supporting infrastructure (*high confidence*)		+ Could reduce air pollution in cities (*medium confidence*)		+ Reduction of GHG emissions (*high confidence*)	± Could increase eutrophication in water bodies (*high confidence*)	± Additional land use for biofuels may increase pressue on biodiversity (*high confidence*)			Sections 10.3, 10.4, 10.5, 10.6 and 10.8	

Table 17.SM.6 | Chapter 11.

		Sustainable Development Goals																	
Sector	**Sectoral mitigation options**	**SDG 1 End poverty**	**SDG 2 Zero hunger**	**SDG 3 Good health and wellbeing**	**SDG 4 Quality education**	**SDG 5 Gender equality**	**SDG 6 Clean water and sanitation**	**SDG 7 Affordable and clean energy**	**SDG 8 Decent work and economic growth**	**SDG 9 Industry, innovation and infrastructure**	**SDG 10 Reduced inequalities**	**SDG 11 Sustainable cities and communities**	**SDG 12 Responsible consumption and production**	**SDG 13 Climate action**	**SDG 14 Life below water**	**SDG 15 Life on land**	**SDG 16 Peace, justice and strong institutions**	**SDG 17 Partnership**	**Line of sight (section numbers, tables, figures, box)**	**Remarks (context specificity/scale)**
Industry	**Energy efficiency**			+ Reduce air pollution (*medium confidence*)				+ Enhances security in clean energy (*high confidence*)	+ Employment opportunities in a green economy (*high confidence*)	+ Industrial innovation through new technologies (*high confidence*)				+ Contributes to climate action through efficient use of energy (*high confidence*)					Section 11.5.3	Heavily dependent on technology and so the scale of the continous co-benefits across regions would depend on the extent and ease of technological transfer
	Material efficiency and demand reduction						+ Reduce the pressures on water bodies (*low confidence*)		+ New Business Models generate employment opportunities (*medium confidence*) – Reduction in national sales tax revenue in medium term (*low confidence*)	+ Infrastructural development to support mitigation option (*medium confidence*)			+ Environmental stewardship (*medium confidence*)	+ Contributes to climate action through reduced consumption (*high confidence*)					Section 11.5.3	The scale of the co-benefits achieved through material efficiency would depend on the extent to which the transition from traditional to requisite new business models can be achieved
	Circular material flows			+ Reduce air pollution (*medium confidence*)			+ Increase use of waste as resource (*high confidence*)	+ Improved energy efficiency as key CE practice (*medium confidence*)	+ Job opportunities through new business models (*medium confidence*)			+ Public environmental awareness (*medium confidence*)	+Enhances environmental benefits + Increase use of waste as resource (*high confidence*)		+ Studies reported direct relationship between CE and SDG 14 (*high confidence*)	+ Enhances biodiversity protection on land (*low confidence*)		+ Improved social relations between industrial sectors and local societies (*medium confidence*)	Section 11.5.3	Successful implementation of transformational new business models is required to scale up and derive extended co-benefits through the CE strategy
	Electrification	+ Supports poverty alleviation strategies (*high confidence*)	+ Improved food security – Fuel switching to options such as biomass and bioenergy can have negative impact on food prices (*medium confidence*)	+ Supports delivery of health services + Improves indoor air quality compared to biomass use (*high confidence*)		+ Reduces energy-related hurdles domestically affecting women (*high confidence*)		+ Decarbonisation of grid when fuel is switched to cleaner sources (*high confidence*)	+ Increased economic activity and employment (*high confidence*)					+ Contributes to climate action through switching to renewables (*high confidence*)		– Negative impact on SDG 15 [fuel switching to options such as biomass and bioenergy] (*high confidence*)			Sections 11.5.3 and 6.7.7	The extent of the co-benefits experience on social system would be relative as it would be dependent on their current access to energy
	CCS and carbon capture and utilisation (CCU)			+ Control of non-CO_2 pollutants (such as sulphur dioxide) – increase of non-CO_2 pollutants (such as particulate matter, nitrogen oxide and ammonia) (*high confidence*)			– Deployment of CCS and CCU would require increased water consumption (*high confidence*)	+ Decarbonisation of energy production through utilisation of CO_2 (*high confidence*) – Deployment of CCS and CCU would require high energy demand (*high confidence*)	+ Diversified employment prospects (*low confidence*)	+ Direct foreign investment and know-how (*medium confidence*)		+ Deployment of CCS and CCU would contribute to enhancing the sustainability of cities (*high confidence*)		+ Contributes to climate action through carbon capture (*high confidence*)		– Deployment of CCS and CCU would require additional land use (*high confidence*)			Section 11.5.3	15–25% additional energy is required by CCS technologies compared with conventional plants. As such, this has potential implications for air pollutants. If no additional measures to reduce emissions are installed, particulate matter, nitrogen oxide and ammonia would increase accordingly