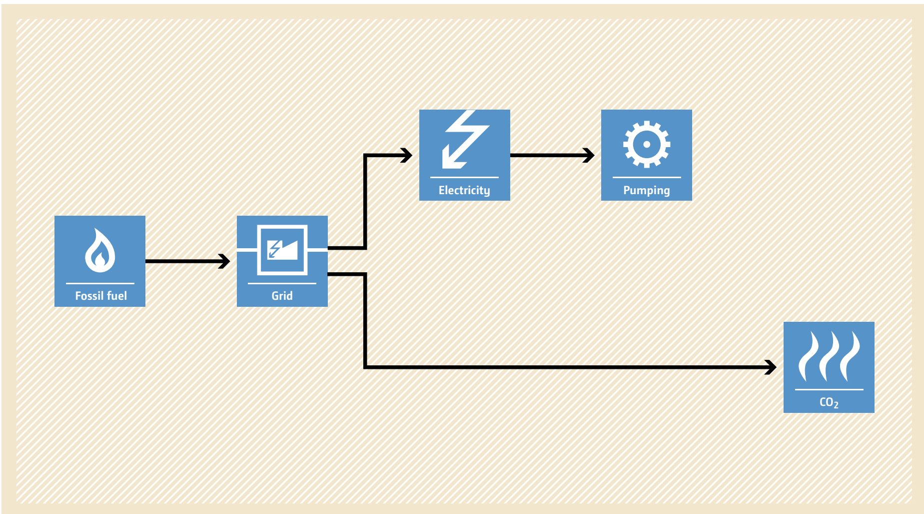
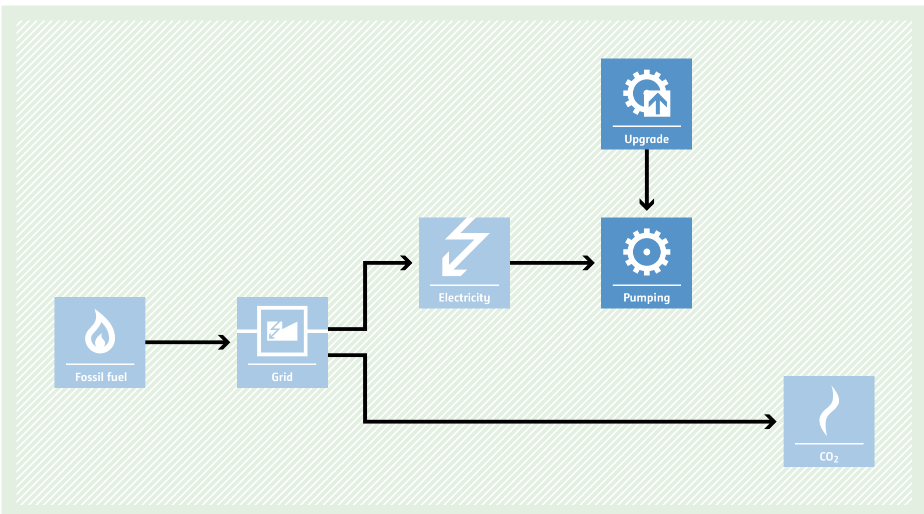
AMS-II.P. Energy efficient pump-set for agriculture use

Typical project(s)	Project activities that adopt energy efficient pump-sets that run on grid electricity at one or more agricultural sites.
Type of GHG emissions mitigation action	• Energy efficiency. Electricity (and fossil fuel) savings through energy efficiency improvement.
Important conditions under which the methodology is applicable	• The project pump-set efficiency shall be higher than the baseline pump-set for the whole range of operating conditions; • The methodology is not applicable for retrofitting pump-sets (e.g. replacement of impellers); • Water output corresponding to the initial head shall be higher or at least equal to that of the baseline pump-set water output at the initial head.
Important parameters	At validation: • Water flow rate and head of replaced pump-sets; • Performance curves of replaced pump-sets.
	Monitored: • Number of pump-sets installed and remain operating; • Performance curves of project pump-sets; • Operating hours of project pump-sets.

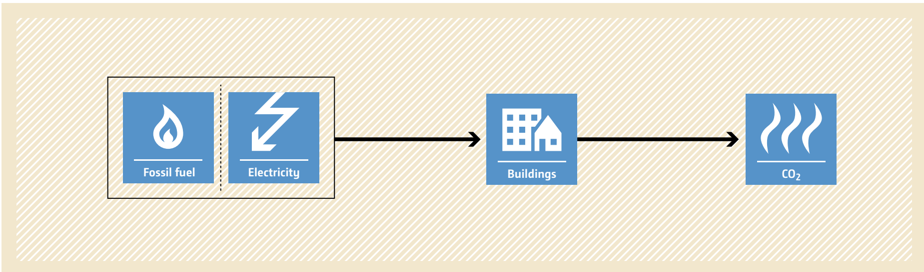
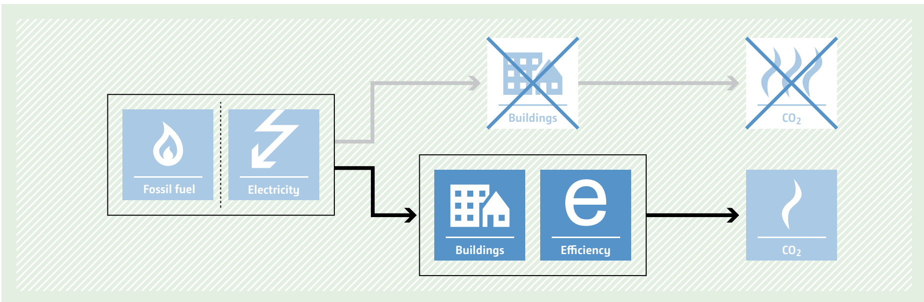
BASELINE SCENARIO
Inefficient pump-sets are used for agricultural irrigation.



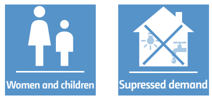
PROJECT SCENARIO
Introduction of efficient pump-set for agricultural irrigation.

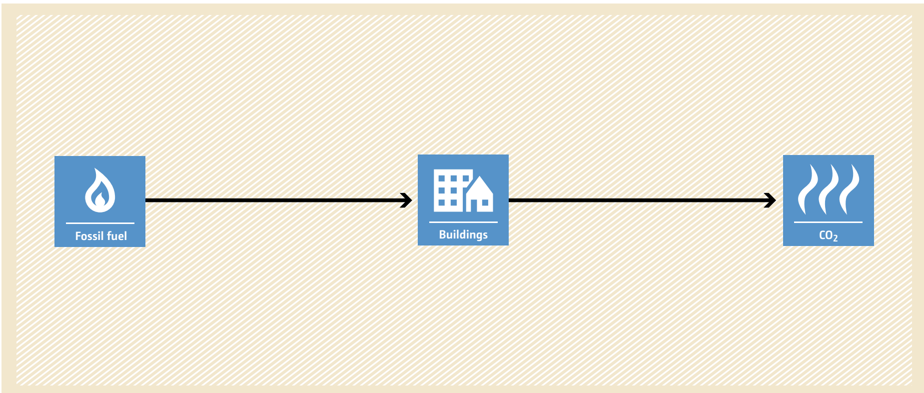
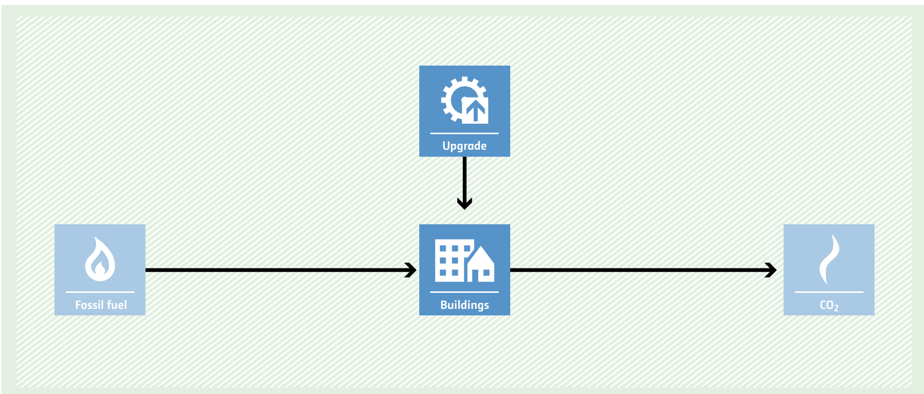


AMS-II.Q. Energy efficiency and/or energy supply projects in commercial buildings

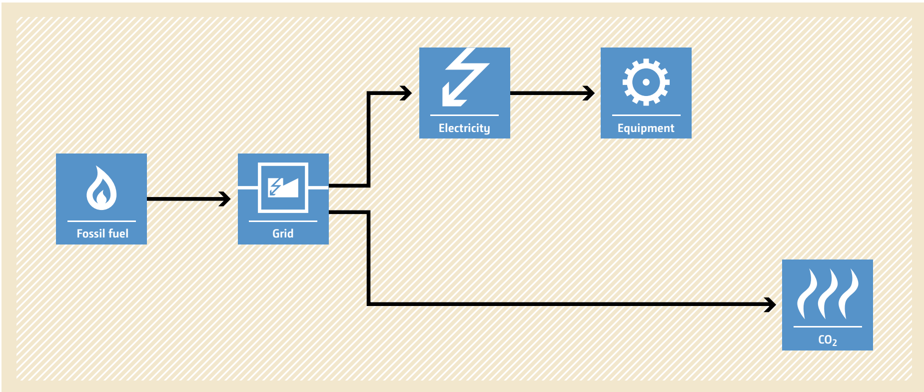
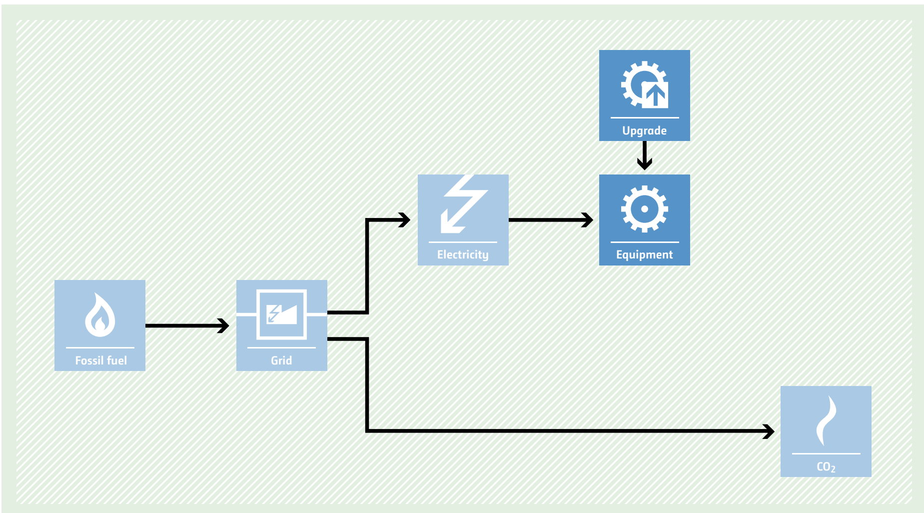
Typical project(s)	On-site building energy supply and whole building energy efficiency projects whose associated emission reductions can be determined with a whole building computerized simulation tool.
Type of GHG emissions mitigation action	• Energy efficiency. Electricity (and fossil fuel) savings through energy efficiency improvement.
Important conditions under which the methodology is applicable	• The methodology is applicable to commercial buildings only (retrofit or new construction); • This methodology is not applicable to project activities that affect off-site district heating and/or cooling plants and distribution networks; • If the energy efficient equipment contains refrigerants, then the refrigerant used in the project case shall have no Ozone Depleting Potential (ODP); • All technologies (e.g. equipment or appliances) used in the project activity shall be new and not transferred from another project activity.
Important parameters	At validation: • Ex ante baseline building data; • Historical energy consumption (in case of retrofits); • Information documenting the calibration process.
	Monitored: • Weather data; • Energy consumption of the project building(s) on at least a monthly basis; • Base building setting changes and occupancy or tenancy-related setting change.
BASELINE SCENARIO Inefficient building construction and operation.	
PROJECT SCENARIO On-site building energy supply and/or whole building energy efficiency measures are reducing consumption of electricity and/or fuel.	

AMS-II.R. Energy efficiency space heating measures for residential buildings

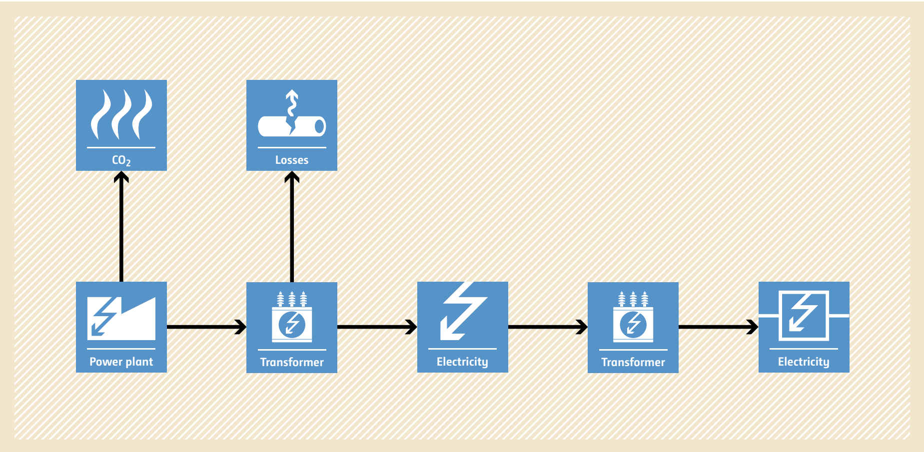
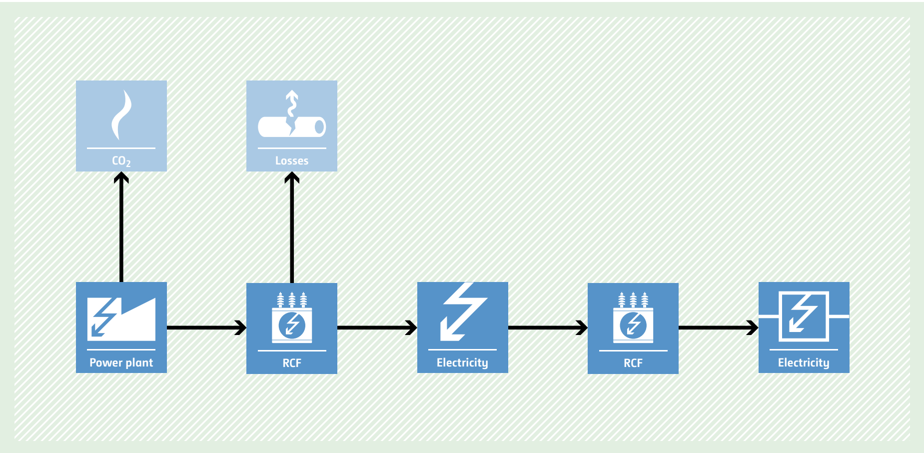


Typical project(s)	Energy efficiency and fuel switching measures implemented within residential buildings to improve the space heating, for example: improving building insulation, enhancing glazing of windows, improving efficiency of heating equipment.
Type of GHG emissions mitigation action	• Energy efficiency; • Fuel switch. Reduction of fossil fuel use and corresponding emissions through energy efficiency improvements.
Important conditions under which the methodology is applicable	• This methodology is applicable to fuel-switching only when it results from the implementation of the energy efficiency measures; • Technology/measures implemented in existing residential buildings; • The impact of the measures implemented by the project activity can be clearly distinguished from changes in energy use due to other variables not influenced by the project activity.
Important parameters	At validation: • Fuel consumption before implementation of project; • Conditions for suppressed demand if applicable.
	Monitored: • Specifications of the equipment replaced or retrofitted; • Energy use in the buildings after the project implementation; • Fuel consumption.
BASELINE SCENARIO Inefficient heating in residential buildings.	
PROJECT SCENARIO Use of more-efficient and/or less-carbon-intensive equipment in buildings.	

AMS-II.S. Energy efficiency in motor systems

Typical project(s)	Introduction of energy efficient motor or motor system (pumps, fans, compressor) through retrofit/replacements.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of more-GHG-intensive service by use of more-efficient technology or system.
Important conditions under which the methodology is applicable	• Emission reductions are accrued only due to the reduction in electricity consumption on account of efficiency improvement; • Emission reductions primarily due to improved maintenance practices, for example, cleaning of filters, repairing valves, correcting system leaks, and using new equipment lubricants are not covered; • Project motor system provides outputs or services (e.g. mechanical energy, compressed air, air or liquid flow, etc.) with comparable quality, properties and application areas as of the baseline.
Important parameters	At validation: • Grid emission factor (can also be monitored ex post); • Electricity consumption, output service level in the baseline; • Technical specification of the motor/motor systems; • Default efficiency gain value.
	Monitored: • Power input, flow rate (for pumps/fans).
BASELINE SCENARIO Less-efficient motors, fans, pumps consume more energy, thus resulting in higher electricity consumption therefore higher GHG emissions.	
PROJECT SCENARIO More-efficient motors, fans, pumps consume less energy, thus resulting in lower GHG emissions.	

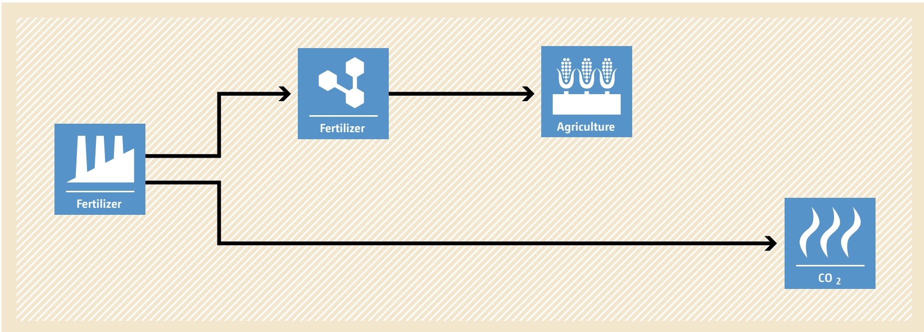
AMS-II.T. Emission reduction through reactive power compensation in power distribution network

Typical project(s)	Installation of a reactive power compensation equipment at transformer substations.
Type of GHG emissions mitigation action	• Energy efficiency. GHG mitigation through energy savings in power distribution lines.
Important conditions under which the methodology is applicable	• The energy losses reduction that can be claimed are only those associated with the distribution lines feeding distribution transformer substations or loads at which RCF are installed and where the reactive power flow is reduced; • The methodology is not applicable in case there is any branching in between the distribution lines included in the project boundary, for which power losses are calculated.
Important parameters	At validation: • Resistance per meter of the lines/feeders of the project activity unit n in the project scenario; • Length of the lines/feeders of the project activity unit n in the project scenario.
	Monitored: • Average active power delivered to the receiving end of the distribution network unit; • Average voltage of the project activity unit; • Combined margin CO_2 emission factor for grid connected project activity; • Power factor of project activity unit in the project scenario; • Power factor of project activity unit in the baseline scenario.
BASELINE SCENARIO The continuation of the current situation prior to the implementation of the project.	
PROJECT SCENARIO A reactive power compensation equipment is installed.	

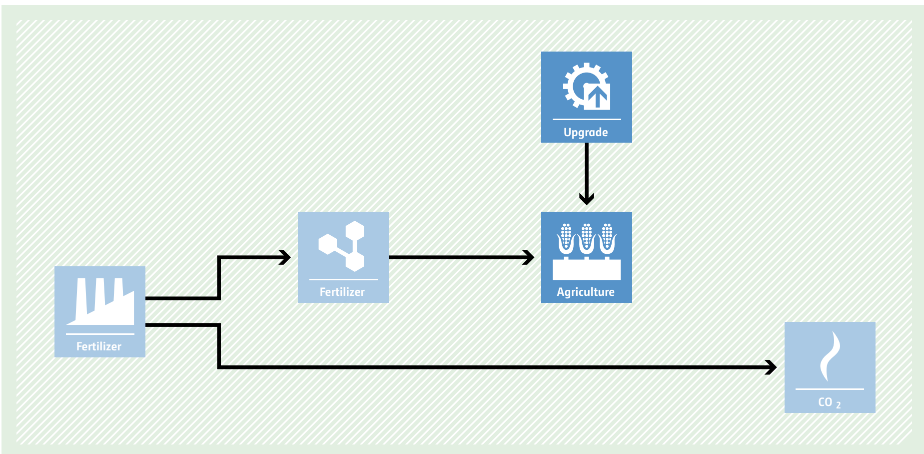
AMS-III.A. Offsetting of synthetic nitrogen fertilizers by inoculant application in legumes-grass rotations on acidic soils on existing cropland

Typical project(s)	Application of inoculant on legumes in a legumes-grass rotation cropping on acidic soils on existing cropland substitutes and reduces the production and use of synthetic nitrogen fertilizer use.
Type of GHG emissions mitigation action	• GHG emission avoidance. Application of inoculant displaces more-GHG-intensive production of synthetic nitrogen fertilizers.
Important conditions under which the methodology is applicable	• The farmers participating have grown legumes and grass in a legumes-grass rotation in the previous three complete rotations without using any inoculant as a fertilizer for legumes, but have used synthetic nitrogen fertilizer for fertilizing legumes; • Only the legume-rhizobia bacteria (inoculant) combinations specied in the methodology are eligible; • For each farmer taking part in the project, reliable and veriable data on the amount of synthetic nitrogen fertilizer used, separately for each crop type, in the previous three complete rotations of legumes and grass cropping, shall be available; • No change in the types of crop cultivated takes place. In both the baseline and project situation legumes and grass are cultivated in rotations. No other changes in farming practices affecting fertilizer application, except the change in application of inoculant and synthetic nitrogen fertilizer, are taking place during the crediting period.
Important parameters	Monitored: • Hectare of crop planted; • Quantity of inoculant (number of rhizobia bacteria), urea and other fertilizers applied (chemical fertilizers as well as organic fertilizers); • Crop yield per crop per hectare; • Independent third party field visits are also required at different stages (e.g. at planting, right before owering etc.).

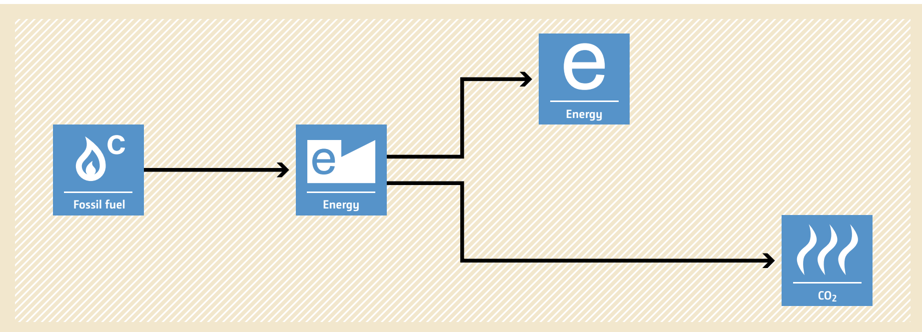
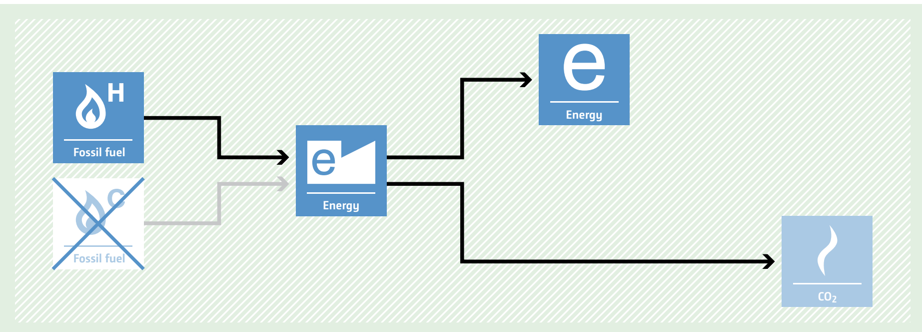
BASELINE SCENARIO
Production and use of synthetic nitrogen fertilizer results in GHG emissions.



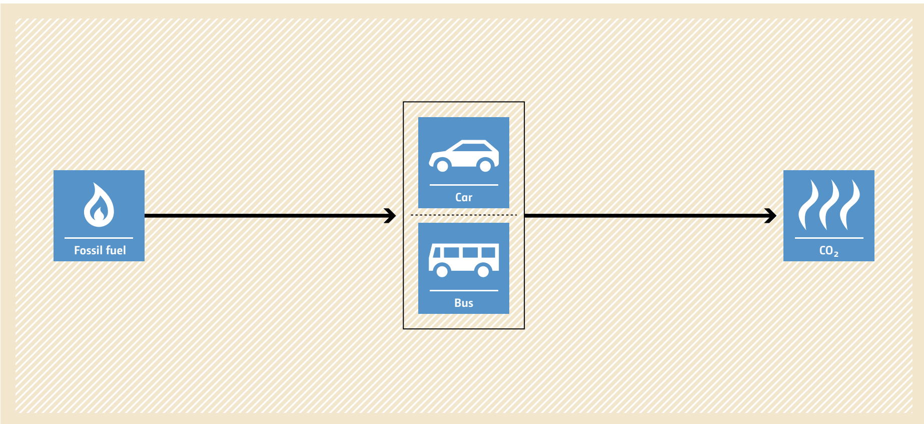
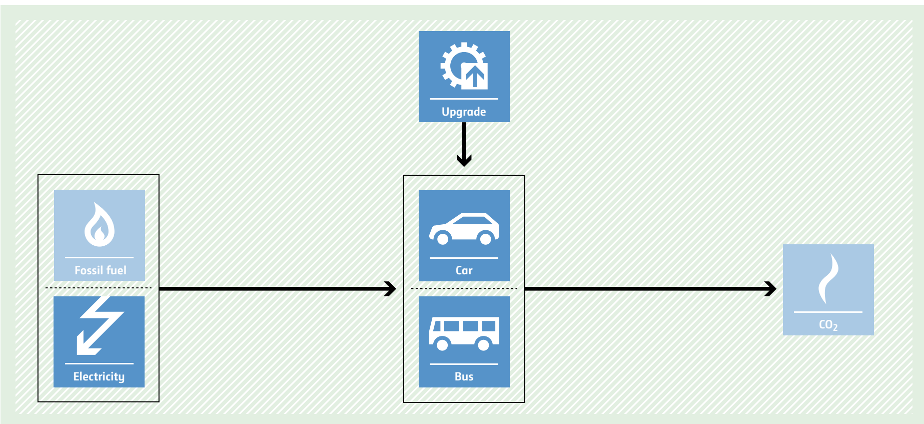
PROJECT SCENARIO
Use of legume-rhizobia bacteria (inoculant) substitutes/reduces the use of synthetic nitrogen fertilizer reducing GHG emissions in the fertilizer production process.



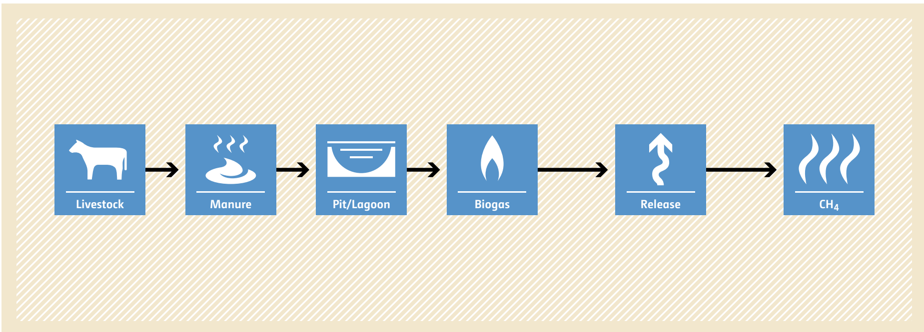
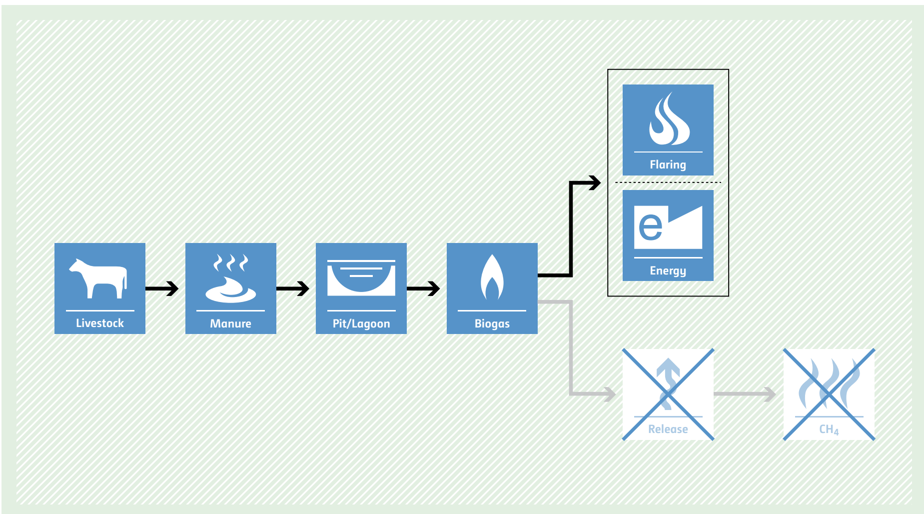
AMS-III.B. Switching fossil fuels

Typical project(s)	The fossil fuel switching in new or existing industrial, residential, commercial, institutional or electricity generation applications.
Type of GHG emissions mitigation action	• Fuel switch. Switch to fuel with a lower GHG intensity (in Greenfield or retrofit or replacement activities).
Important conditions under which the methodology is applicable	• Switch of fossil fuel used in a process with a single output (e.g. electricity, steam or heat); • Project is limited to fuel switching measures which require capital investments; • Projects including biomass or waste gas/energy are not eligible; • Projects including derived gases (from coal and coal products) are not eligible; • Switch of fossil fuel in facilities connected to a grid or an isolated grid(s) system is eligible; • Installed capacity of the project element process supplying electricity to the grid is up to or equal to 15 MW; • Only energy efficiency increase related to the fuel switch is eligible; • Only retrofitting and replacements without integrated process change are eligible; • For project activities where the estimated annual emission reductions of each element process are more than 600 tCO_2e per year the energy use/output should be directly measured, otherwise it is not required.
Important parameters	At validation: • Baseline emission factor; • Historical net energy output; • Efficiencies of element process.
	Monitored: • Quantity of fossil fuel use; • Net energy output where the estimated annual emission reductions of each element process is more than 600 tCO_2e; • Output of element process for electricity/thermal energy exported to other facilities shall be monitored at the recipient end; • Efficiency of each element process or using sampling approach in the case for element process accruing annual emission reductions less than 3000 tCO_2e.
BASELINE SCENARIO Continuation of the current practice or reference plant approach, i.e. use of more-carbon-intensive fossil fuel for energy generation equipment.	
PROJECT SCENARIO Switch of fuel to less-carbon-intensive fossil fuel in energy generation equipment.	

AMS-III.C. Emission reductions by electric and hybrid vehicles

Typical project(s)	Operation and/or charging of electric and hybrid vehicles for providing passenger and/or freight transportation services.
Type of GHG emissions mitigation action	• Fuel switch. Displacement of more-GHG-intensive vehicles.
Important conditions under which the methodology is applicable	• Project and baseline vehicles should belong to the same vehicle category. Vehicles under a category have comparable passenger/load capacity and power rating with variation of no more than 20%; • The prevailing regulations pertaining to battery use and disposal shall be complied with; • Procedure for avoiding double counting of emission reductions should be documented in the PDD.
Important parameters	At validation: • If applicable: grid emission factor (can also be monitored ex post).
	Monitored: • Number of electric/hybrid vehicles operated under the project; • Quantity of fossil fuel used e.g. for hybrid vehicles and electricity consumption for all electric and hybrid vehicles to determine specific electricity/fossil fuel consumption per km; • Annual average distance driven by project vehicles; • Electricity consumed by the project vehicles.
BASELINE SCENARIO Operation of more-GHG-emitting vehicles for providing passenger and/or freight transportation services.	
PROJECT SCENARIO Operation of less-GHG-emitting vehicles with electric/hybrid engines for providing passenger and/or freight transportation services.	

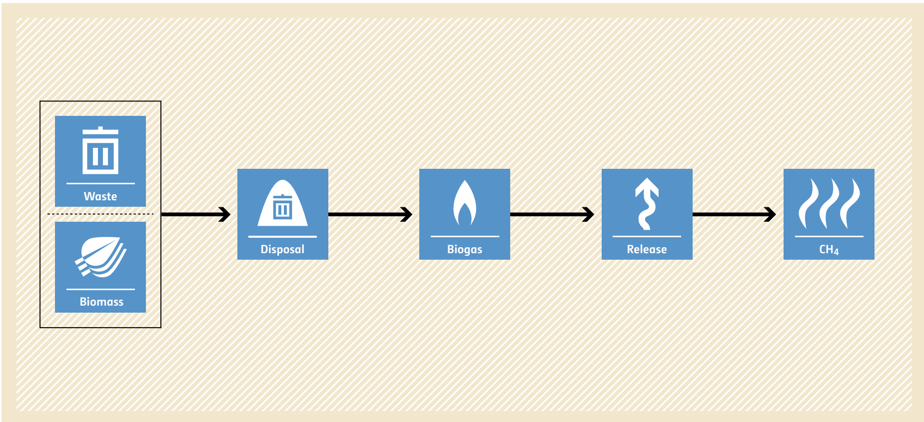
AMS-III.D. Methane recovery in animal manure management systems

Typical project(s)	Replacement or modification of existing anaerobic manure management systems in livestock farms, or treatment of manure collected from several farms in a centralized plant to achieve methane recovery and destruction by flaring/combustion or energetic use of the recovered methane.
Type of GHG emissions mitigation action	• GHG destruction. GHG destruction and displacement of more-GHG-intensive service.
Important conditions under which the methodology is applicable	• Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries); • In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than one month, and in case of anaerobic lagoons in the baseline, their depths are at least 1 m; • Final sludge must be handled aerobically; • The storage time of the manure after removal from the animal barns, including transportation, should not exceed 45 days before being fed into the anaerobic digester, unless it can be demonstrated that the dry matter content of the manure when removed from the animal barns is more than 20%.
Important parameters	Monitored: • Amount of biogas recovered and fuelled, flared or used gainfully; • The annual amount of fossil fuel or electricity used to operate the facility or auxiliary equipment; • Fraction of the manure handled in the manure management system; • Proper soil application (not resulting in methane emissions) of the final sludge must be monitored.
BASELINE SCENARIO Animal manure is left to decay anaerobically and methane is emitted into the atmosphere.	
PROJECT SCENARIO Methane is recovered and destructed or gainfully used due to replacement or modification of existing anaerobic manure management systems.	

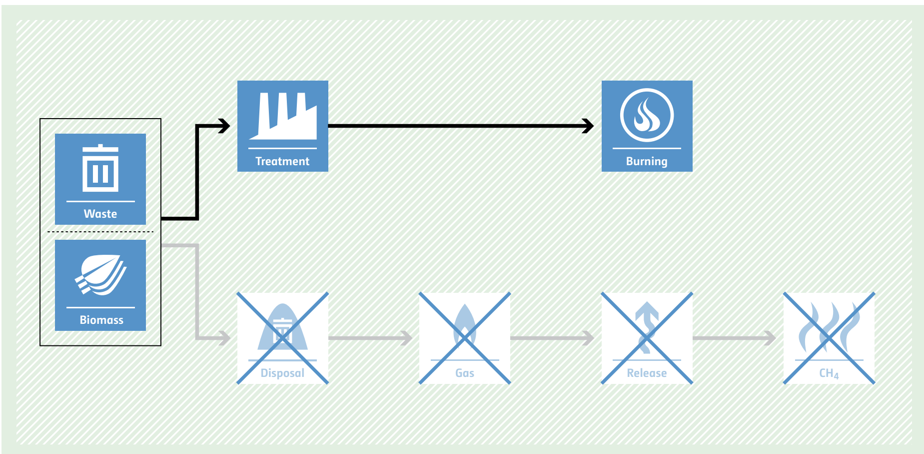
AMS-III.E. Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment

Typical project(s)	Decay of the wastes that would have been left to decay or are already deposited in a waste disposal site is prevented through controlled combustion; or gasification to produce syngas/producer gas; or mechanical/thermal treatment to produce refuse-derived fuel (RDF) or stabilized biomass (SB).
Type of GHG emissions mitigation action	• GHG emission avoidance; Avoidance of methane emissions due to prevention of anaerobic decay of biomass in waste. Use of biomass in waste as energy source.
Important conditions under which the methodology is applicable	• The produced RDF/SB shall be used for combustion either onsite or off-site; • In case of RDF/SB production, no GHG emissions occur other than biogenic CO_2, due to chemical reactions during the thermal treatment process for example limiting the temperature of thermal treatment to prevent the occurrence of pyrolysis and/or the stack gas analysis; • In case of gasification, all syngas produced shall be combusted and not released unburned into the atmosphere; • During the mechanical/thermal treatment to produce RDF/SB no chemical or other additives shall be used.
Important parameters	Monitored: • Amount of waste combusted, gasified or mechanically/thermally treated by the project, as well as its composition through representative sampling; • Quantity of auxiliary fuel used and the non-biomass carbon content of the waste or RDF/SB combusted; • Electricity consumption and/or generation.

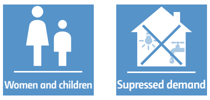
BASELINE SCENARIO
Organic waste is left to decay and methane is emitted into the atmosphere.

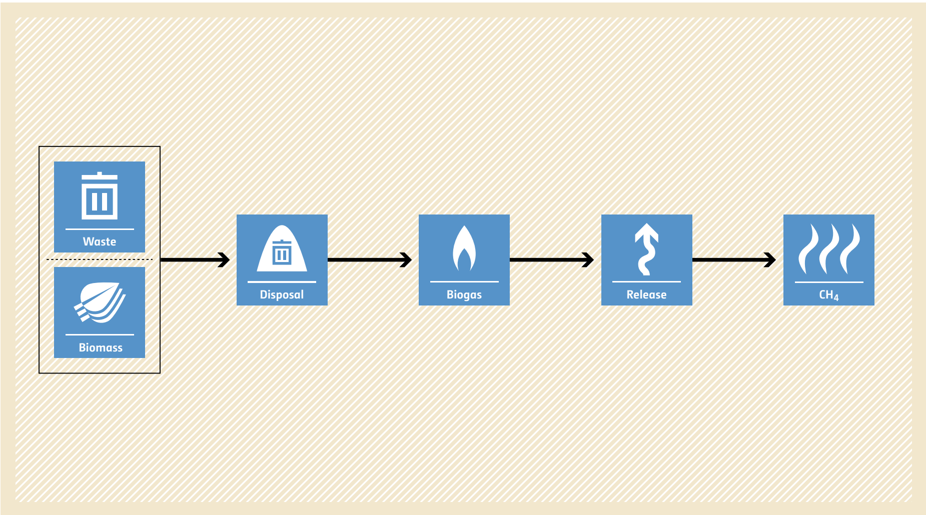
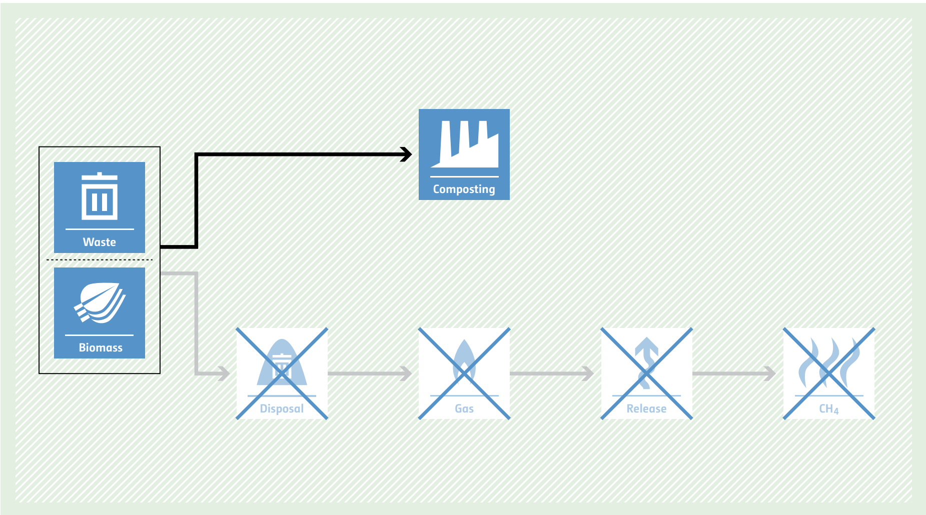


PROJECT SCENARIO
Methane emissions will be avoided through controlled combustion, gasification or mechanical/thermal treatment of the wastes. In case of energetic use of organic waste, displacement of more-GHG-intensive energy generation.



AMS-III.F. Avoidance of methane emissions through composting

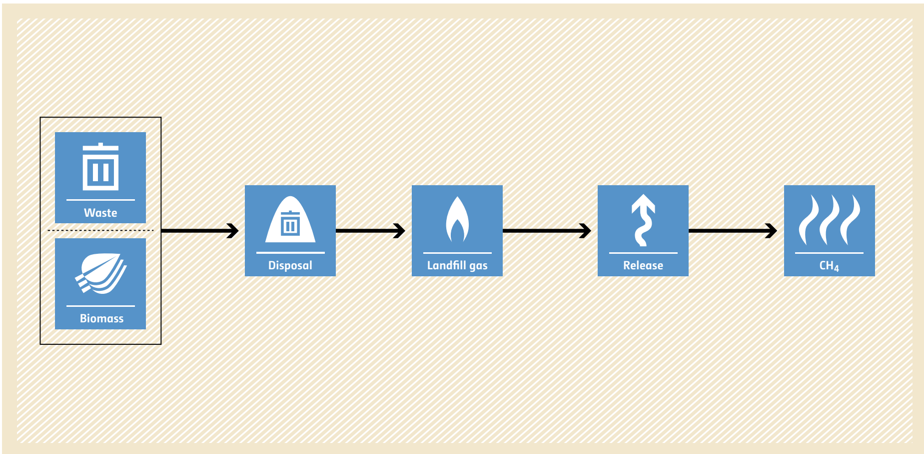


Typical project(s)	Controlled biological treatment of biomass or other organic matter is introduced through aerobic treatment by composting and proper soil application of the compost.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of GHG emissions by alternative treatment process.
Important conditions under which the methodology is applicable	• Recovery and combustion of landfill gas is not eligible; • Identified landfill(s) should be able to accommodate the waste to be used for the project for the duration of the crediting period; or it is common practice in the region to dispose of the waste in solid waste disposal sites (landfills).
Important parameters	Monitored: • Quantity of waste biologically treated and its composition through representative sampling; • When project includes co-treating of wastewater, the volume of co-treated wastewater and its COD content through representative sampling; • Annual amount of fossil fuel or electricity used to operate the facilities or auxiliary equipment.
BASELINE SCENARIO Biomass and other organic matter (including manure where applicable) are left to decay and methane is emitted into the atmosphere.	
PROJECT SCENARIO Methane emissions are avoided through composting.	

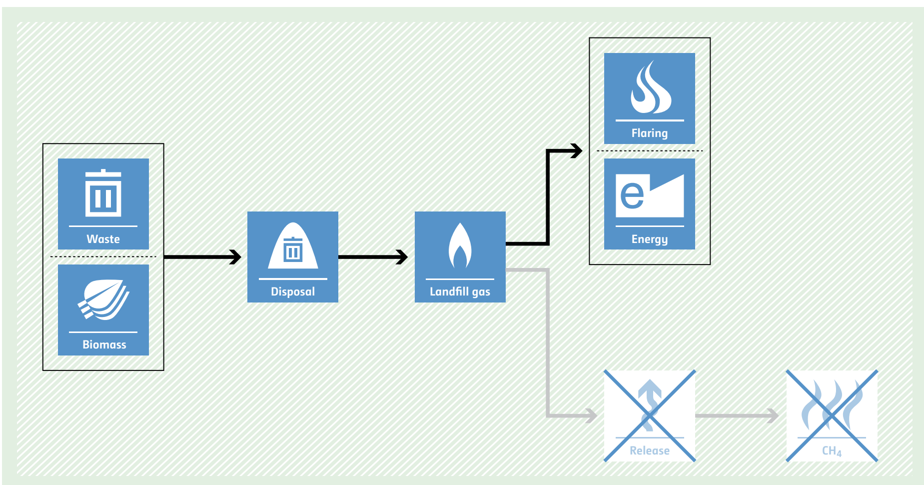
AMS-III.G. Landfill methane recovery

Typical project(s)	Capture and combustion of methane from landfills used for disposal of residues from human activities including municipal, industrial and other solid wastes containing biodegradable organic matter.
Type of GHG emissions mitigation action	• GHG destruction. Destruction of methane and displacement of more-GHG-intensive energy generation.
Important conditions under which the methodology is applicable	• The project activity does not reduce the amount of organic waste that would have been recycled in its absence; • The management of the solid waste disposal site in the project activity shall not be changed deliberately to increase methane generation compared to the situation prior to the implementation of the project activity; • Baseline emissions shall exclude methane emissions that would have to be removed to comply with national or local safety requirement or legal regulations; • The effect of methane oxidation that is present in the baseline and absent in the project activity shall be taken into account.
Important parameters	Monitored: • The amount of methane recovered and gainfully used, fuelled or flared shall be monitored ex post, using continuous flow meters; • Fraction of methane in the landfill gas; • Flare efficiency; • Electricity generation (only for project activities utilizing the recovered methane for power generation).

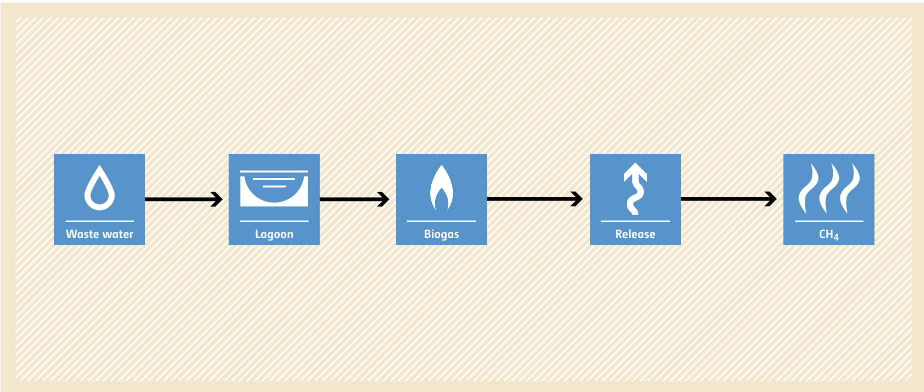
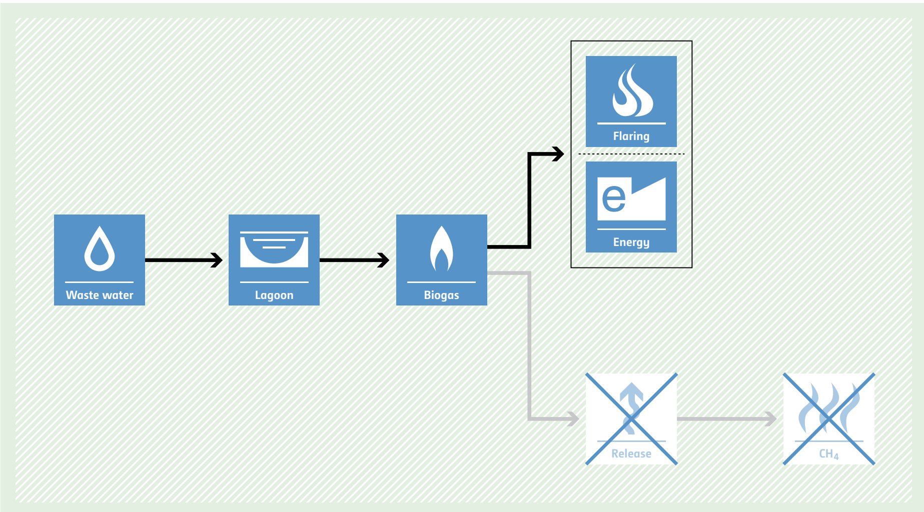
BASELINE SCENARIO
Biomass and other organic matter in waste are left to decay and methane is emitted into the atmosphere.



PROJECT SCENARIO
Methane in the landfill gas is captured and destroyed or used. In case of energetic use of landfill gas, displacement of more-GHG-intensive energy generation.



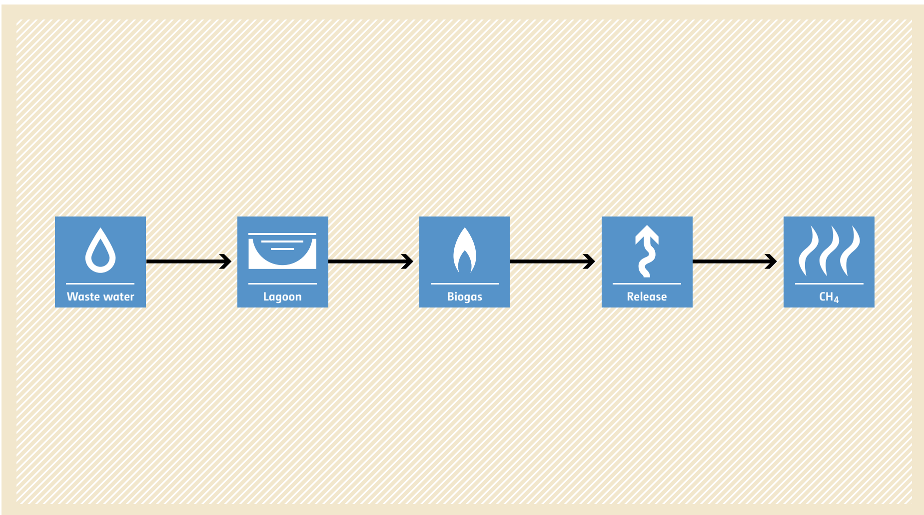
AMS-III.H. Methane recovery in wastewater treatment

Typical project(s)	Recovery of biogas resulting from anaerobic decay of organic matter in wastewaters through introduction of anaerobic treatment system for wastewater and/or sludge treatment.
Type of GHG emissions mitigation action	• GHG destruction. Destruction of methane emissions and displacement of more-GHG-intensive service.
Important conditions under which the methodology is applicable	• Anaerobic lagoons should be deeper than 2 metres, without aeration, ambient temperature above 15°C, at least during part of the year, on a monthly average basis. The minimum interval between two consecutive sludge removal events shall be 30 days; • In determining baseline emissions, historical records of at least one year prior to the project implementation shall be available. Otherwise, a representative measurement campaign is required.
Important parameters	At validation: • COD removal efficiency of the baseline system.
	Monitored: • Flow of wastewater; • Chemical oxygen demand of the wastewater before and after the treatment system; • Amount of sludge as dry matter in each sludge treatment system; • Amount of biogas recovered, fuelled, flared or utilized (e.g. injected into a natural gas distribution grid or distributed via a dedicated piped network).
BASELINE SCENARIO Methane from the decay of organic matter in wastewater or sludge is being emitted into the atmosphere.	
PROJECT SCENARIO Methane is recovered and destroyed due to the introduction of new or modification of existing wastewater or sludge treatment system. In case of energetic use of biogas, displacement of more-GHG-intensive energy generation.	

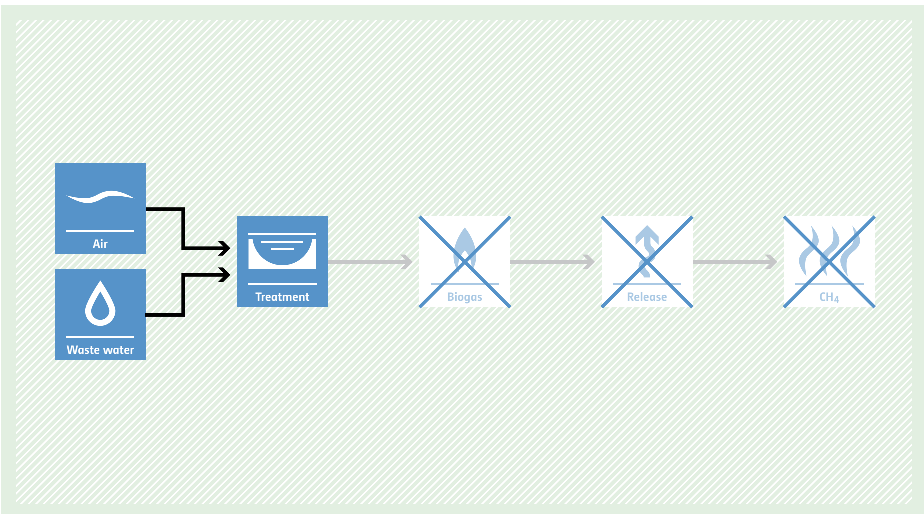
AMS-III.I. Avoidance of methane production in wastewater treatment through replacement of anaerobic systems by aerobic systems

Typical project(s)	Avoidance of production of methane from organic matter in wastewater being treated in anaerobic systems. Due to the project, the anaerobic systems (without methane recovery) are substituted by aerobic biological systems.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of methane emissions from anaerobic decay of organic matter in wastewater.
Important conditions under which the methodology is applicable	• In order to determine baseline emissions, at least one year of historical data is required. Otherwise, a 10-day measurement campaign should be carried out.
Important parameters	At validation: • COD removal efficiency of the baseline system.
	Monitored: • Amount of COD treated in the wastewater treatment plant(s), amount of wastewater entering and/or exiting the project; • Amount of sludge produced and sludge generation ratio; • Amount of fossil fuel and electricity used by the project facilities; • Use of the final sludge will be monitored during the crediting period.

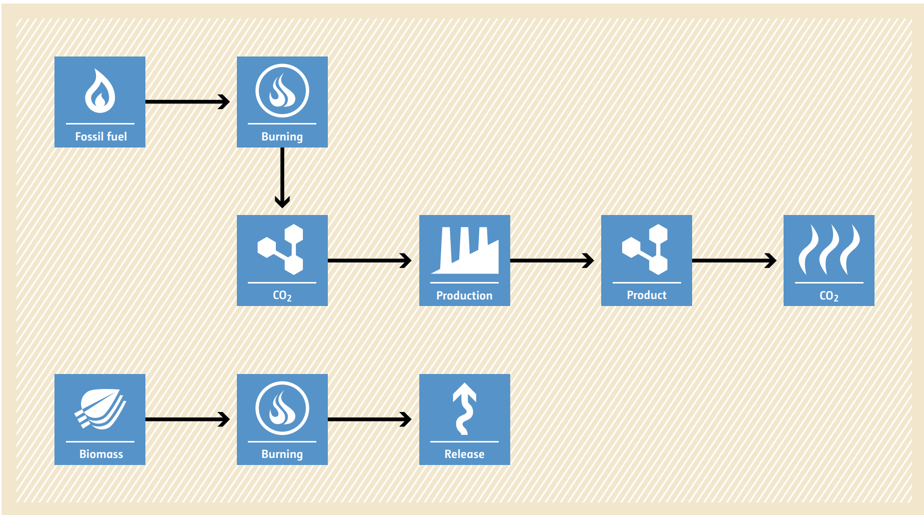
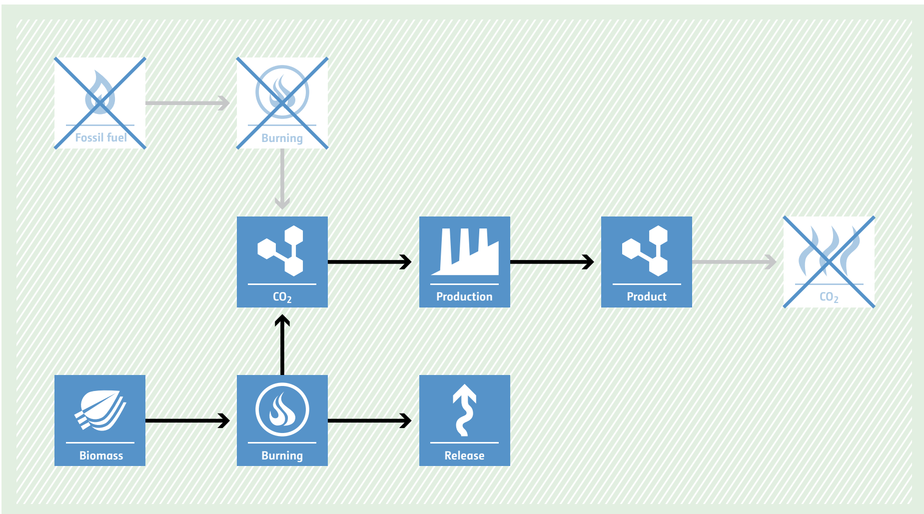
BASELINE SCENARIO
Organic matter in wastewaters is being treated in anaerobic systems and produced methane is being released into the atmosphere.



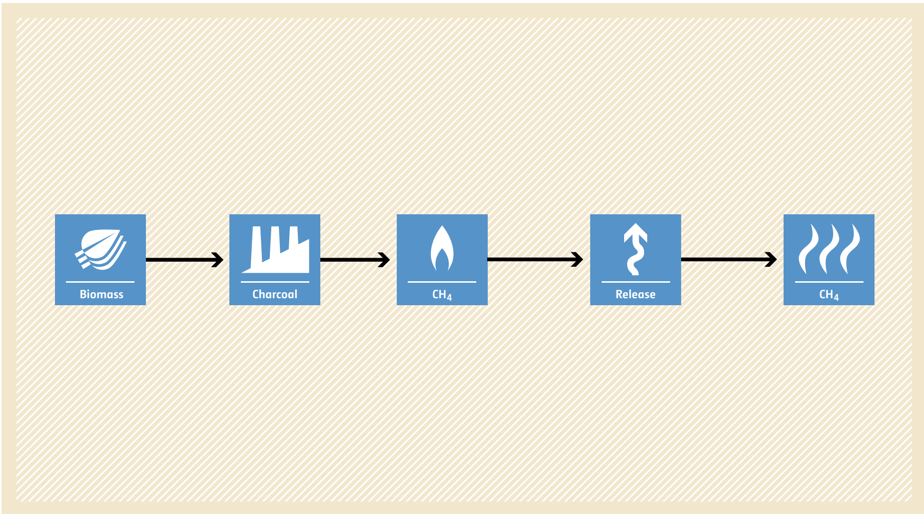
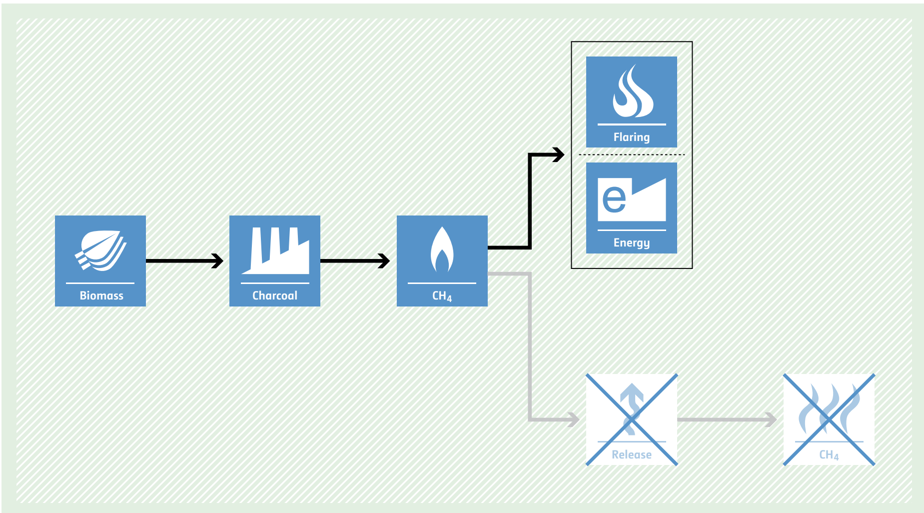
PROJECT SCENARIO
Anaerobic wastewater treatment systems, without methane recovery, are substituted by aerobic treatment systems.



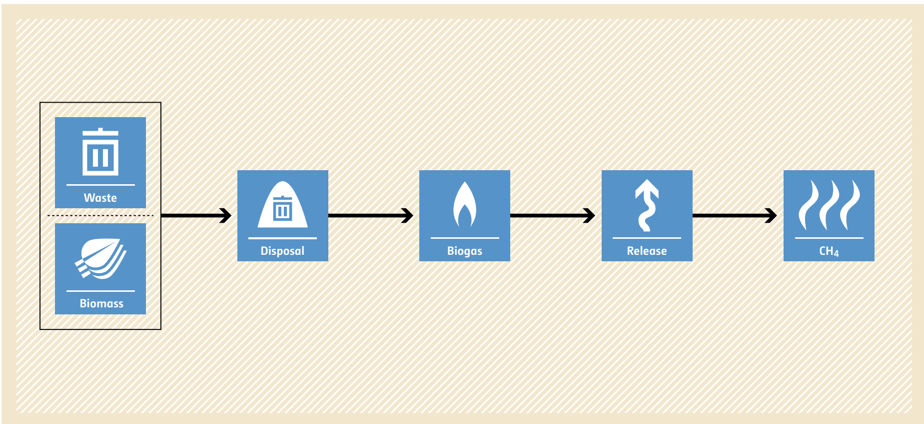
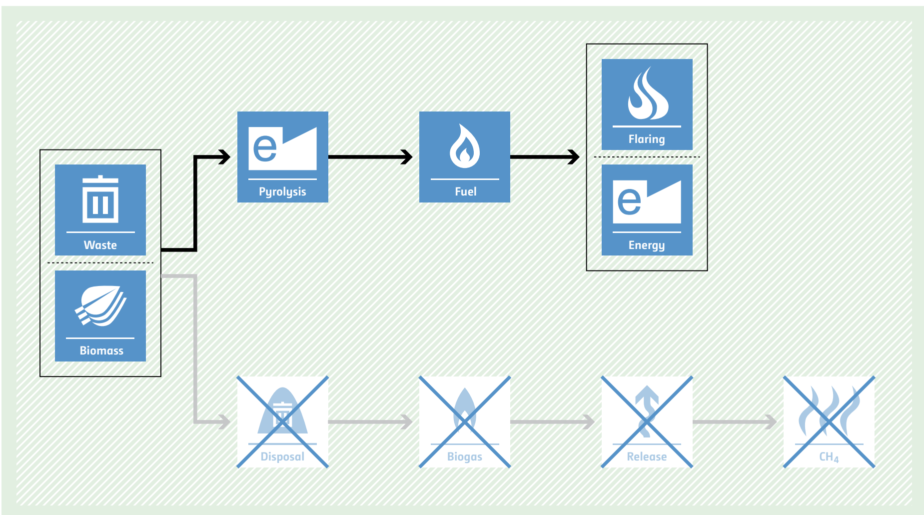
AMS-III.J. Avoidance of fossil fuel combustion for carbon dioxide production to be used as raw material for industrial processes

Typical project(s)	Switch from CO_2 of fossil origin to a source of CO_2 from renewable origin.
Type of GHG emissions mitigation action	• Feedstock switch. Avoidance of fossil fuel combustion to provide CO_2 by the use of CO_2 that is generated from renewable sources.
Important conditions under which the methodology is applicable	• CO_2 from combustion of renewable biomass would have been emitted into the atmosphere and not otherwise used; • The generation of CO_2 from fossil or mineral sources in the baseline is only for the purpose of CO_2 production to be used for the production of inorganic compounds; • CO_2 from fossil or mineral sources that is used for the production of inorganic compounds prior to the project will not be emitted into the atmosphere when the project is in place.
Important parameters	At validation: • Historical specific fuel consumption per tonne of output.
	Monitored: • Amount of the final product produced on a monthly basis.
BASELINE SCENARIO Fossil fuels are used to produce CO_2 which is used as raw material; CO_2 from a renewable source is vented into the atmosphere.	
PROJECT SCENARIO Fossil fuels are no longer used to produce CO_2. The CO_2 stream from renewable sources is used as raw material for a production process.	

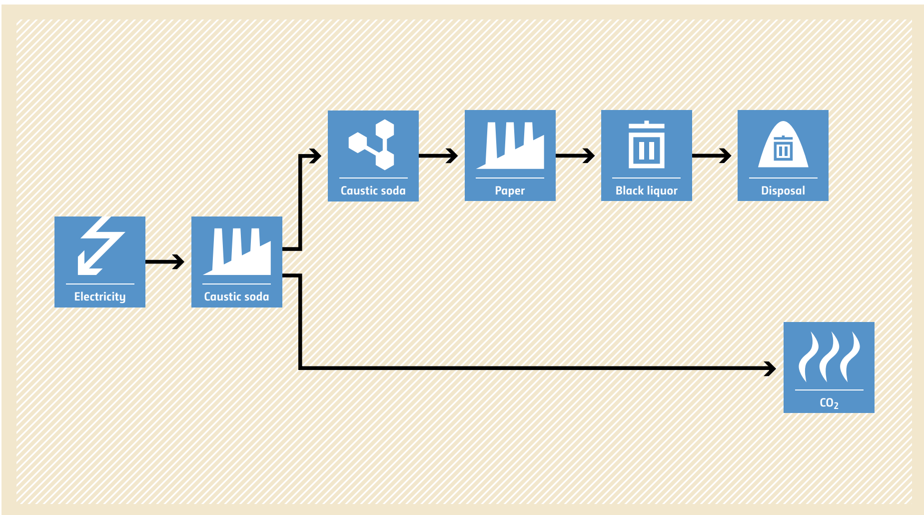
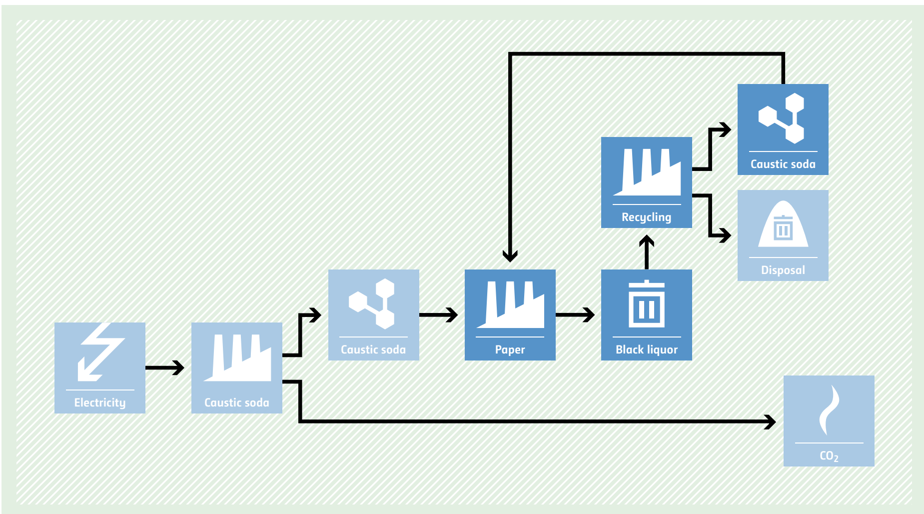
AMS-III.K. Avoidance of methane release from charcoal production

Typical project(s)	Construction of a new charcoal production facility with recovery and flaring/combustion of methane or retrofitting of existing production facilities.
Type of GHG emissions mitigation action	• GHG destruction. Use of a technology that destructs or recovers methane generated during the production of charcoal.
Important conditions under which the methodology is applicable	• Laws restricting methane emissions from charcoal production either do not exist or are not enforced; • No relevant changes in greenhouse gas emissions other than methane occur as a consequence of the project and/or need to be accounted for; • No changes in the type and source of biomass used for charcoal production.
Important parameters	At validation: • Methane emission factor in the baseline.
	Monitored: • Quantity of raw material used and its moisture content; • Quantity of charcoal produced and its moisture content; • Amount of methane generated, fuelled or flared; • Power and auxiliary fuel consumption of the facility.
BASELINE SCENARIO Biomass is transformed into charcoal. Methane is emitted in the process.	
PROJECT SCENARIO Biomass is transformed into charcoal. Methane is recovered and combusted. In case of energetic use of methane, displacement of more-GHG-intensive energy generation.	

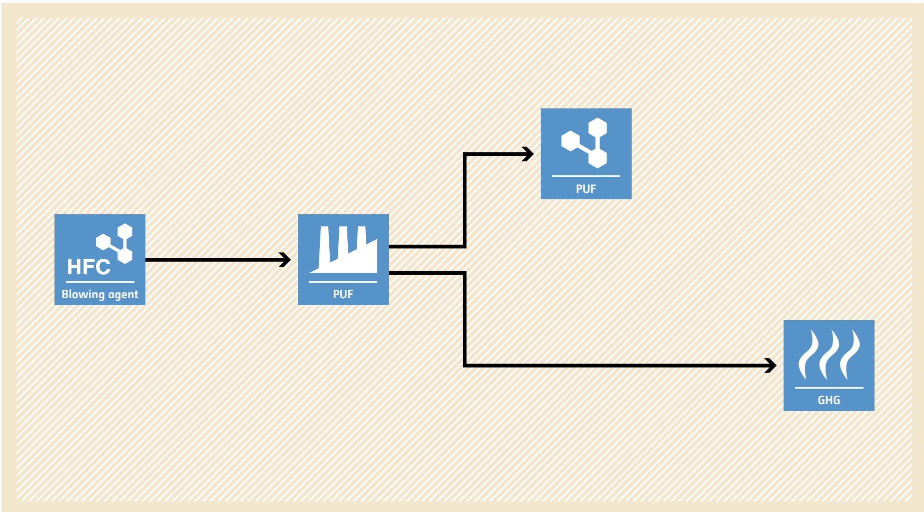
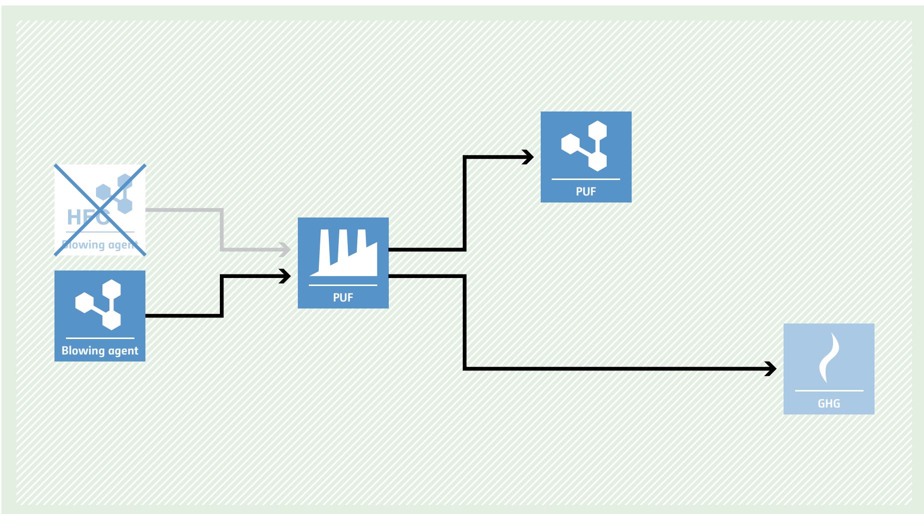
AMS-III.L. Avoidance of methane production from biomass decay through controlled pyrolysis

Typical project(s)	Avoidance of the production of methane from organic matter that would have otherwise been left to decay under anaerobic conditions in a solid waste disposal site without methane recovery. Due to the project, decay is prevented through controlled pyrolysis.
Type of GHG emissions mitigation action	• GHG emission avoidance. GHG emission avoidance and replacement of more-GHG-intensive service by pyrolysis of organic matter.
Important conditions under which the methodology is applicable	• The pyrolysed residues are no longer prone to anaerobic decomposition; • Measures shall include recovery and combustion of non-CO greenhouse gases produced during pyrolysis; • The location and characteristics of the disposal site in the baseline condition shall be known, in such a way as to allow the estimation of its methane emissions.
Important parameters	Monitored: • Percentage composition of volatile carbon, fixed carbon, ashes and moisture in the waste processed by pyrolysis (by a representative number of samples); • Amount and composition (weight fraction of each waste type) of waste processed by pyrolysis; • Quantity of non-biogenic waste processed by pyrolysis; • Quantity of auxiliary fuel used and power consumption of the project facilities and/or power generation by the project.
BASELINE SCENARIO Organic matter will decay under clearly anaerobic conditions in a solid waste disposal site and the produced methane is being released into the atmosphere.	
PROJECT SCENARIO Methane production due to anaerobic decay of organic matter will be avoided through controlled pyrolysis. In case of energetic use of products (e.g. pyrolysis gas or oil), displacement of more-GHG-intensive energy generation.	

AMS-III.M. Reduction in consumption of electricity by recovering soda from paper manufacturing process

Typical project(s)	Recovery of caustic soda from waste black liquor generated in paper manufacturing.
Type of GHG emissions mitigation action	• GHG emission avoidance. Reduction of production of caustic soda and thereby reduction of electricity consumption by recovery of caustic soda from black liquor.
Important conditions under which the methodology is applicable	• The project technology/measures consists of recovering caustic soda from waste black liquor generated in paper manufacturing.
Important parameters	At validation: • Historical electricity intensity of soda production (including imports); • Grid emission factor (can also be monitored ex post).
	Monitored: • Quantity of caustic soda recovered per year; • Electricity consumption, consumption of fossil fuel and auxiliary fuel in the caustic soda recovery plant; • Quantity of residues produced, portion of residue used for the production of lime and portion of residue that is disposed in a solid waste disposal site.
BASELINE SCENARIO Black liquor from paper production is wasted. Much electricity is needed to produce caustic soda that is consumed in the paper mill.	
PROJECT SCENARIO Caustic soda is recovered from black liquor to displace equivalent quantity of purchased caustic soda. Less electricity is required for recovery.	

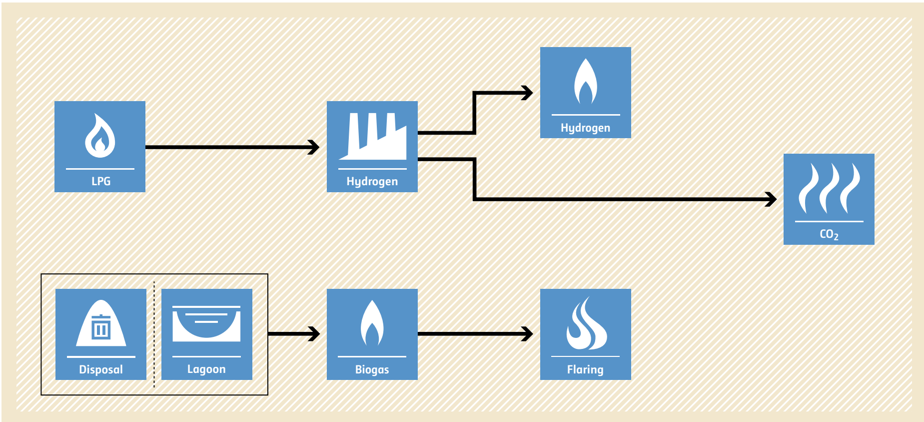
AMS-III.N. Avoidance of HFC emissions in poly urethane foam (PUF) manufacturing

Typical project(s)	Use of a non-GHG blowing agent (e.g. pentane) to replace HFC gases used as a blowing agent (e.g. HFC-134a, HFC-152a, HFC-365mfc and HFC-245fa) during the production of PUF in an existing or a new manufacturing facility.
Type of GHG emissions mitigation action	• Feedstock switch. Avoidance of fugitive emissions of HFC gases through the use of a non-GHG blowing agent.
Important conditions under which the methodology is applicable	• In case a project is implemented at an existing facility, only HFC blowing agent was used in PUF production for at least three years prior to the project implementation; • There are no local regulations that constrain the use of HFC and hydrocarbon (e.g. pentane) as blowing agents; • PUF produced with a non-GHG blowing agent will have equivalent or superior insulating properties than the PUF produced using a HFC blowing agent; • Emission reductions can be claimed only for domestically sold PUF and excludes export of the manufactured PUF.
Important parameters	At validation: • The first year and annual losses of HFC blowing agent. Monitored: • Total quantity of PUF production (in m) on daily basis.
BASELINE SCENARIO Production of PUF using HFC blowing agents.	
PROJECT SCENARIO Production of PUF using pentane blowing agents.	

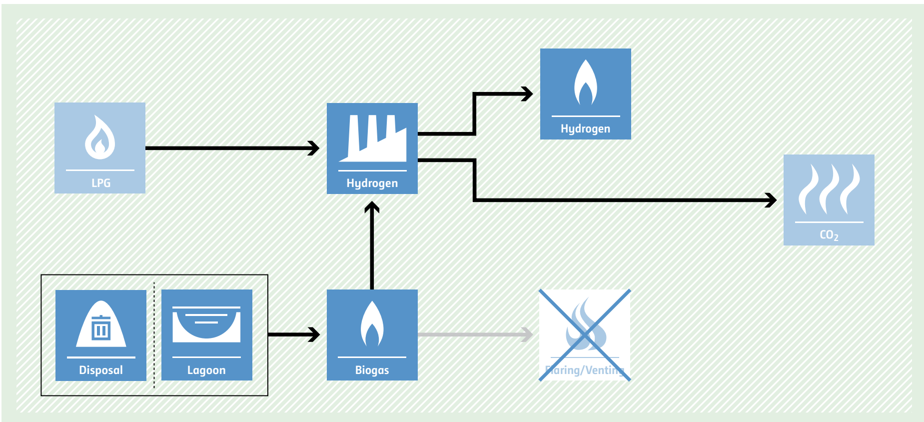
AMS-III.O. Hydrogen production using methane extracted from biogas

Typical project(s)	Installation of biogas purification system to isolate methane from biogas for the production of hydrogen displacing LPG as both feedstock and fuel in a hydrogen production unit. Examples are the project activities that install: (i) a biogas purification system to isolate methane from biogas which is being flared in the baseline situation or (ii) a biogas purification system in combination with installation of new measures that recover methane from organic matter from waste water treatment plants or landfills, using technologies/measures covered in AMS-III.H. or AMS-III.G.
Type of GHG emissions mitigation action	• Fuel and feedstock switch. Fuel and feed stock switch to reduce consumption of fossil fuel.
Important conditions under which the methodology is applicable	• This methodology is not applicable to technologies displacing the production of hydrogen from electrolysis; • The methodology is applicable if it can be ensured that there is no diversion of biogas that is already being used for thermal or electrical energy generation or utilized in any other (chemical) process in the baseline.
Important parameters	Monitored: • Continuous metering of produced hydrogen on volumetric basis; • Continuous metering of LPG used as feedstock to hydrogen production unit; • Continuous monitoring of specific fuel consumption of LPG when biogas is not available in sufficient quantity; • Continuous measurement of electricity and fuel used by the biogas purification system; • Continuous measurement of biogas produced by the waste water treatment system, landfill gas capture system or other processes producing biogas.

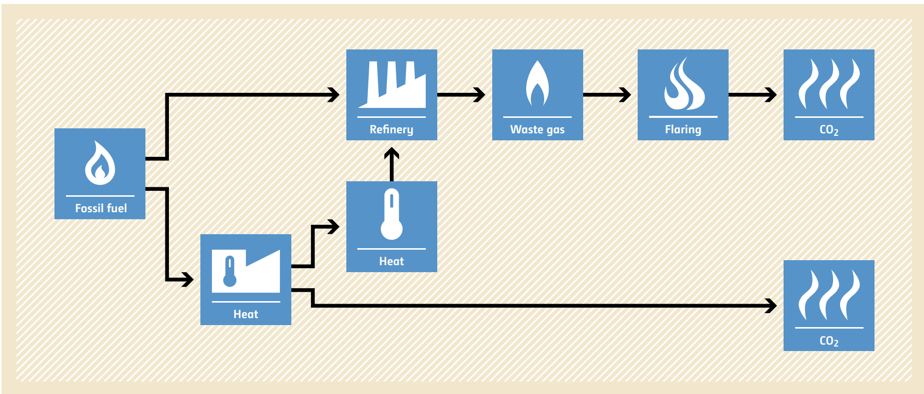
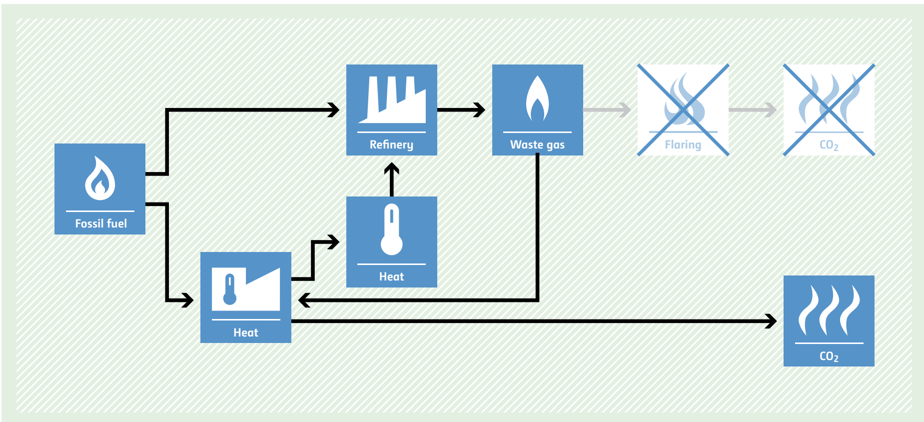
BASELINE SCENARIO
LPG is used as feedstock and fuel for hydrogen production.



PROJECT SCENARIO
LPG is displaced by methane extracted from biogas for hydrogen production.



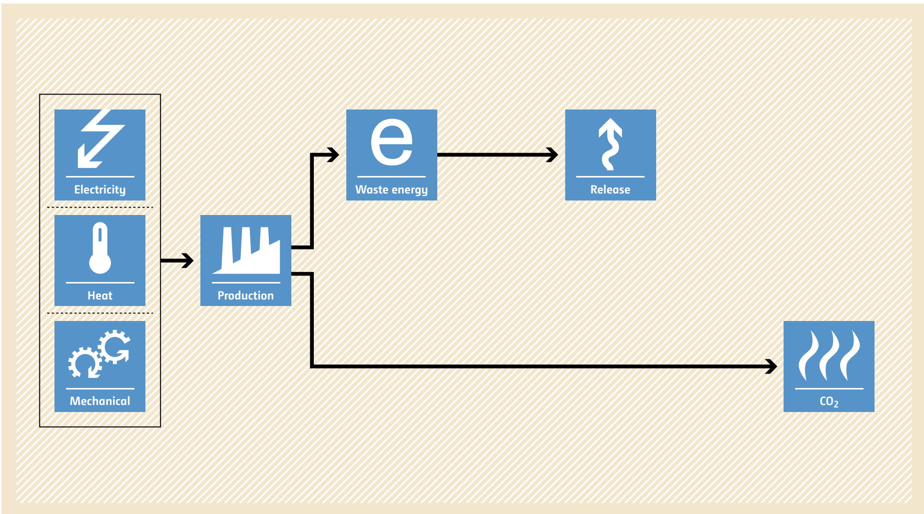
AMS-III.P. Recovery and utilization of waste gas in refinery facilities

Typical project(s)	Implementation of waste gas recovery in an existing refinery, where waste gas is currently being flared, to generate process heat in element process(es).
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of more-GHG-intensive heat production.
Important conditions under which the methodology is applicable	• Proof that the recovered waste gas in the absence of the project was flared (evidence for the last three years). Baseline emissions are capped either at the historical three-year average or its estimation; • Waste gas is not combined with additional fuel gas or refinery gas between recovery and its mixing with a fuel-gas system or its direct use; • The project does not lead to an increase in production capacity of the refinery facility; • The recovery of waste gas may be a new initiative or an incremental gain in an existing practice. If the project is an incremental gain, the difference in the technology before and after implementation of the project should be clearly shown.
Important parameters	At validation: • Historical annual average amount of waste gas sent to flares; • Efficiencies of the process heating device using the recovered waste gas compared to that using fossil fuel.
	Monitored: • Data needed to calculate the emission factors of electrical energy consumed by the project, either from the captive power plant or imported from grid as well as the amount and composition of recovered waste gas (e.g. density, LHV) and data needed to calculate the emission factors from fossil fuels used for process heating and steam generation within the refinery.
BASELINE SCENARIO Element process(es) will continue to supply process heat, using fossil fuel. The waste gases from the refinery are flared.	
PROJECT SCENARIO Element process(es) will be fuelled with waste gas, replacing fossil fuel usage.	

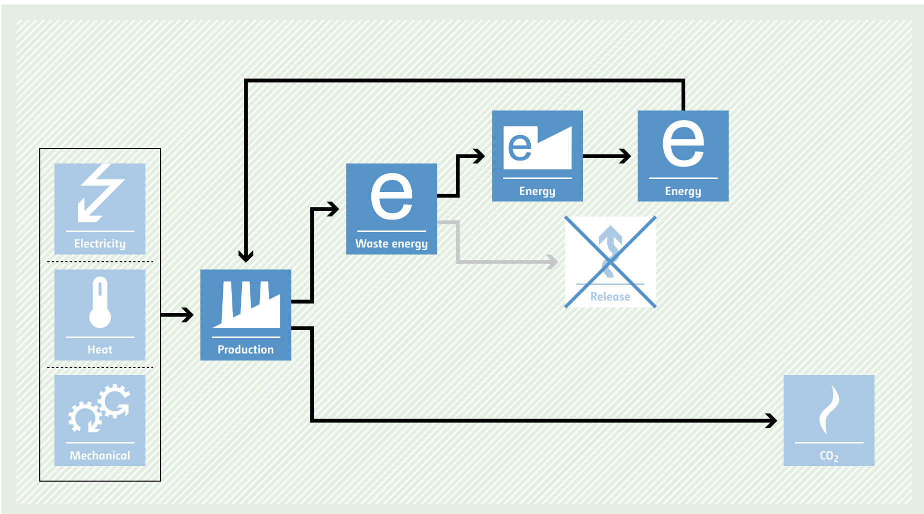
AMS-III.Q. Waste energy recovery

Typical project(s)	Utilization of waste gas and/or waste heat at existing or Greenfield waste generation facilities and convert the waste energy into useful energy, which may be for cogeneration, generation of electricity, direct use as process heat, generation of heat in an element process or generation of mechanical energy.
Type of GHG emissions mitigation action	• Energy efficiency. Reduction of GHG emissions by energy recovery.
Important conditions under which the methodology is applicable	• If the project activity is implemented at an existing or greenfield waste generation facility, demonstration of the use of waste energy in the absence of the project activity shall be based on historic information; • It shall be demonstrated that the waste energy utilized in the project activity would have been flared or released into the atmosphere in the absence of the project activity.
Important parameters	Monitored: • Thermal/electrical/mechanical energy produced; • Amount of waste gas or the amount of energy contained in the waste heat or waste pressure.

BASELINE SCENARIO
Energy is obtained from GHG-intensive energy sources (e.g. electricity is obtained from a specific existing power plant or from the grid, mechanical energy is obtained by electric motors and heat from a fossil-fuel-based element process) and some energy is wasted in the production process and released.



PROJECT SCENARIO
Waste energy is utilized to produce electrical/thermal/mechanical energy to displace GHG-intensive energy sources.

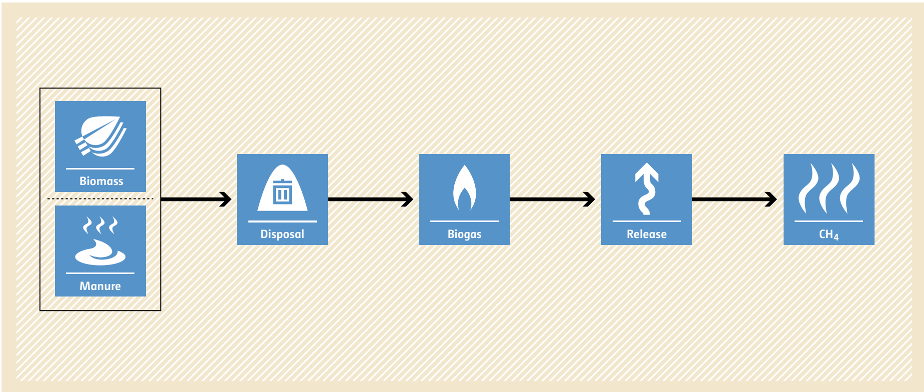


AMS-III.R. Methane recovery in agricultural activities at household/small farm level

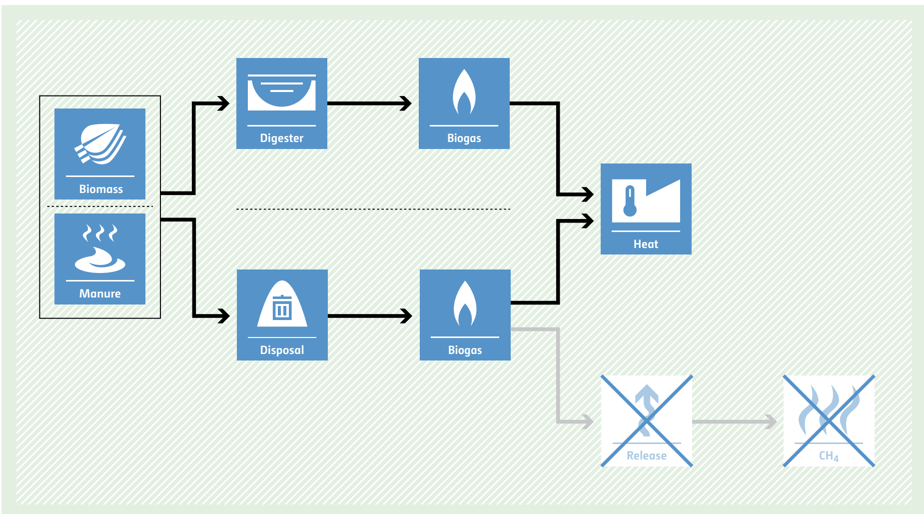
Women and children

Typical project(s)	Recovery and destruction of methane from manure and wastes from agricultural activities through: Installation of a methane recovery and combustion system to an existing source of methane emissions; or, change of the management practice of an organic waste or raw material in order to achieve controlled anaerobic digestion that is equipped with methane recovery and combustion system.
Type of GHG emissions mitigation action	• GHG destruction; • Fuel switch. Destruction of methane and displacement of more-GHG-intensive energy generation.
Important conditions under which the methodology is applicable	• Limited to measures at individual households or small farms, (e.g. installation of a domestic biogas digester); • The sludge shall be handled aerobically; • All the methane collected by the recovery system shall be destroyed; • Applicable only in combination with AMS-I.C., and/or AMS-I.I. and/or AMS-I.E.; • Applicable only to the portion of the manure, which would decay anaerobically in the absence of the project activity.
Important parameters	Monitored: • Number of thermal applications commissioned; • Proportion of thermal applications that remain operating; • Annual average animal population; • Amount of waste/animal manure generated on the farm and the amount of waste/animal manure fed into the system, e.g. biogas digester; • Proper soil application (not resulting in methane emissions) of the final sludge verified on a sampling basis.

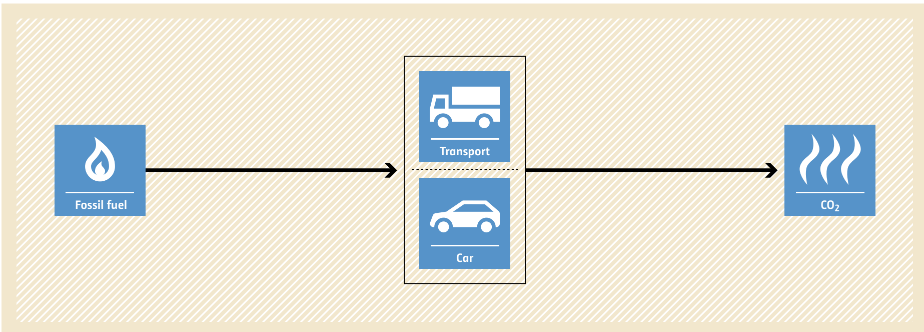
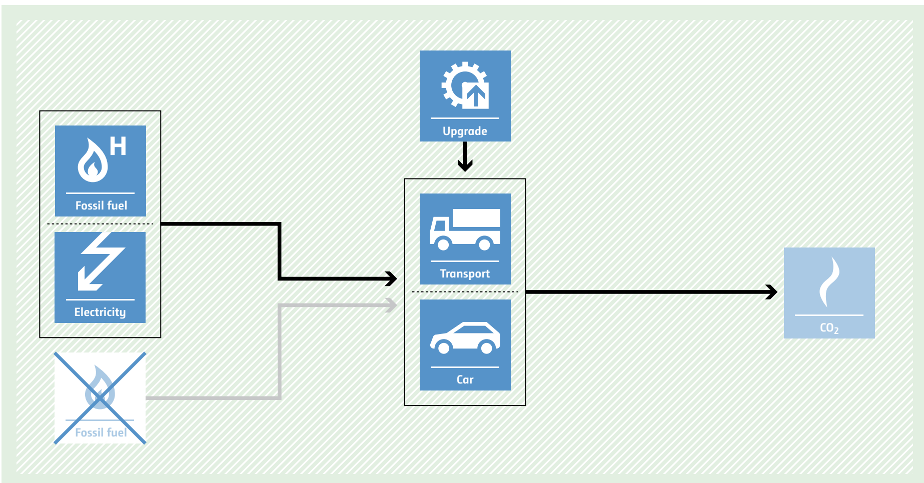
BASELINE SCENARIO
Biomass and other organic matter are left to decay anaerobically, and methane is emitted into the atmosphere.



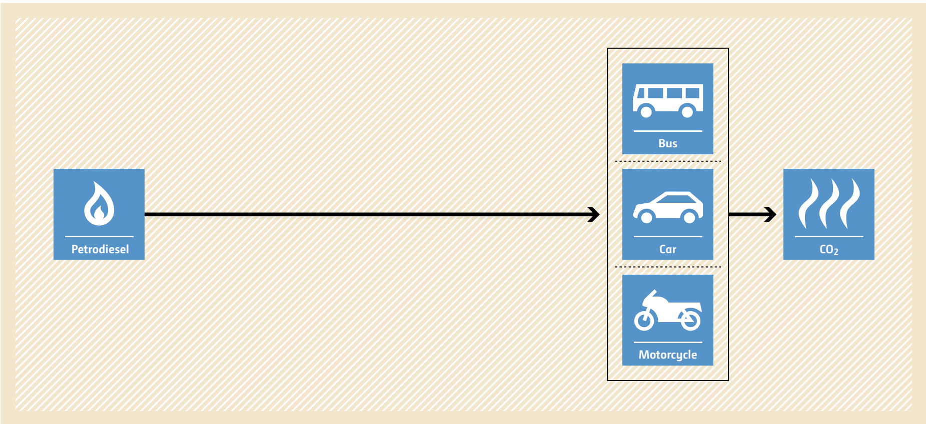
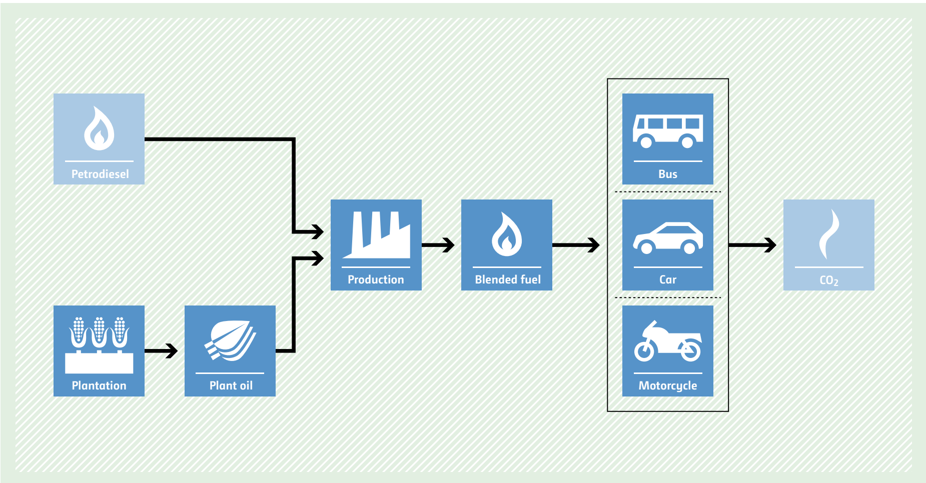
PROJECT SCENARIO
Methane is recovered and destroyed or used. In case of energetic use of biogas, displacement of more-GHG-intensive energy generation.



AMS-III.S. Introduction of low-emission vehicles/technologies to commercial vehicle fleets

Typical project(s)	Introduction and operation of new less-greenhouse-gas-emitting vehicles (e.g. CNG, LPG, electric or hybrid) for commercial passengers and freight transport, operating on routes with comparable conditions. Retrofitting of existing vehicles is also applicable.
Type of GHG emissions mitigation action	• Fuel switch. Displacement of more-GHG-intensive vehicles.
Important conditions under which the methodology is applicable	• The overall level of service provided on comparable routes before project implementation shall remain the same and a modal shift in transport is not eligible; • There is no significant change in tariff discernible from their natural trend, which could lead to change in patterns of vehicle use; • The frequency of operation of the vehicles is not decreased; • The characteristics of the travel route – distance, start and end points and the route itself and/or the capacity introduced by the project is sufficient to service the level of passenger/freight transportation previously provided.
Important parameters	At validation: • Efficiency of baseline vehicles (can also be monitored ex post). Monitored: • Total annual distance travelled and passengers or goods transported by project and baseline vehicles on route; • Annual average distance of transportation per person or tonne of freight per baseline and project vehicle; • Service level in terms of total passengers or volume of goods transported on route before and after project implementation.
BASELINE SCENARIO Passengers and freight are transported using more-GHG-intensive transportation modes.	
PROJECT SCENARIO Passengers and freight are transported using new less-greenhouse-gas-emitting vehicles or retrofitted existing vehicles on routes.	

AMS-III.T. Plant oil production and use for transport applications

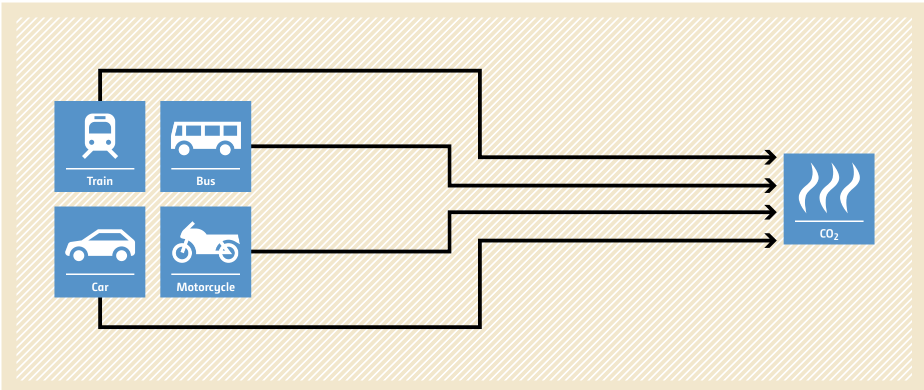
Typical project(s)	Plant oil production that is used for transportation applications, where the plant oil is produced from pressed and filtered oilseeds from plants that are cultivated on dedicated plantations.
Type of GHG emissions mitigation action	• Fuel switch. Displacement of more-GHG-intensive petrodiesel for transport.
Important conditions under which the methodology is applicable	• If the biomass feedstock is sourced from dedicated plantation, the pre-project activities such as grazing and collection of biomass must be accommodated for within the project activity; • The plant oil is used in blends with pure petrodiesel of up to 10% by volume only or use of pure plant oil in converted vehicles; • Baseline vehicles use petrodiesel only; • No export of produced plant oil to Annex I countries allowed.
Important parameters	Monitored: • Crop harvest and oil content of the oilseeds as well as net calorific value and amount of plant oil produced by the project per crop source; • Energy use (electricity and fossil fuel) for the production of plant oil; • Parameters to estimate project emissions from the cultivation of oil; • In case of use of pure plant oil it shall be monitored and verified by random sampling that the vehicles have carried out engine conversions.
BASELINE SCENARIO Petrodiesel would be used in the transportation applications.	
PROJECT SCENARIO Oil crops are cultivated, plant oil is produced and used in the transportation applications displacing petrodiesel.	

AMS-III.U. Cable Cars for Mass Rapid Transit System (MRTS)

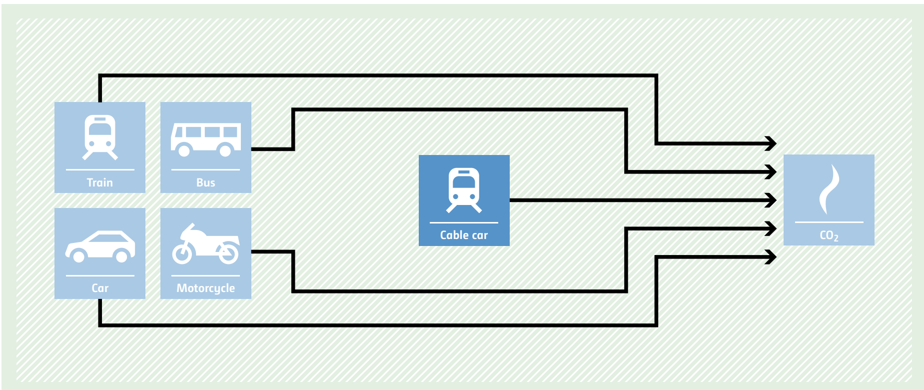
Women and children

Typical project(s)	Construction and operation of cable cars for urban transport of passengers substituting traditional road-based transport trips. Extensions of existing cable cars are not allowed.
Type of GHG emissions mitigation action	• Energy efficiency; • Fuel switch. Displacement of more-GHG-intensive vehicles.
Important conditions under which the methodology is applicable	• The origin and final destination of the cable cars are accessible by road; • Fuels used in the baseline and/or the project are electricity, gaseous or liquid fossil fuels. If biofuels are used, the baseline and the project emissions should be adjusted accordingly; • The analysis of possible baseline scenario alternatives shall demonstrate that a continuation of the current public transport system is the most plausible baseline scenario.
Important parameters	At validation: • Occupancy rate of vehicles category; • If applicable: grid emission factor (can also be monitored ex post).
	Monitored: • Total passengers transported by the project; • By survey: trip distance of passengers using the baseline mode and the trip distance of passengers using the project mode from their trip origin to the project entry station and from project exit station to their final destination; • By survey: share of the passengers that would have used the baseline mode; • Share of the passengers using the project mode from trip origin to the project entry station and from project exit station to their final destination; • Quantity of electricity consumed by the cable car for traction.

BASELINE SCENARIO
Passengers are transported under mixed traffic conditions using a diverse transport system involving buses, trains, cars, non-motorized transport modes, etc.



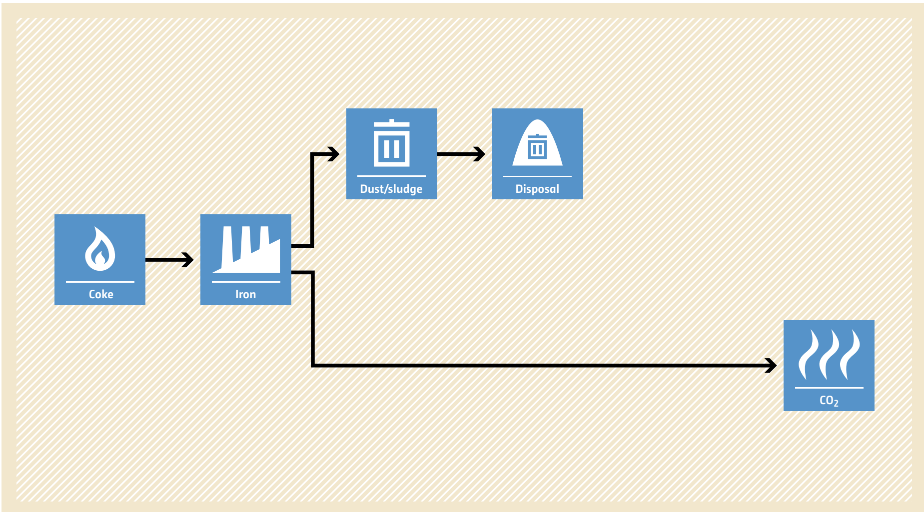
PROJECT SCENARIO
Passengers are transported using cable cars, thus reducing fossil fuel consumption and GHG emissions.



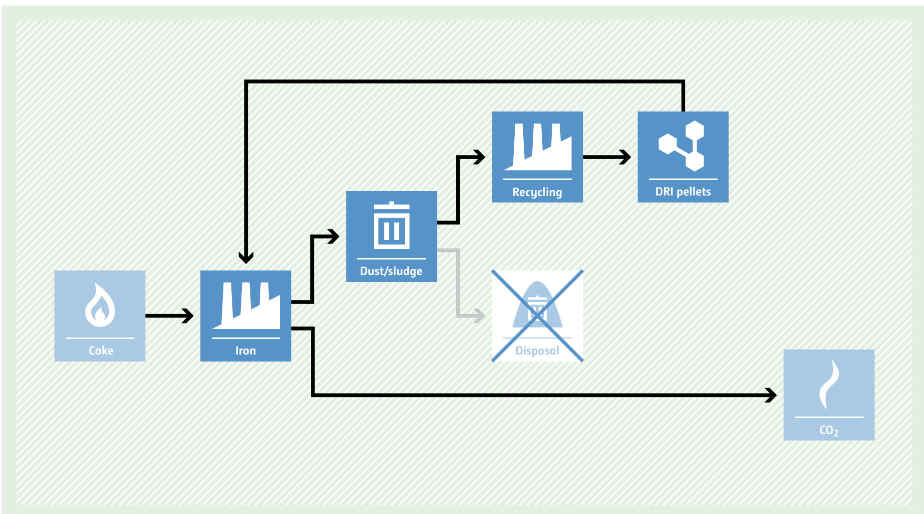
AMS-III.V. Decrease of coke consumption in blast furnace by installing dust/sludge recycling system in steel works

Typical project(s)	Introduction of dust/sludge-recycling system such as Rotary Hearth Furnace (RHF), Waelz, and Primus to produce DRI pellet, which is fed into the blast furnace of steel works in order to reduce coke consumption.
Type of GHG emissions mitigation action	• Energy efficiency. Decreased use of coke as reducing agent by recycling dust/sludge in the form of DRI pellets.
Important conditions under which the methodology is applicable	• The dust/sludge is not currently utilized inside the works but sold outside and/or land filled; • "Alternative material" that can be used by the "outside user" instead of the dust/sludge is abundant in the country/region; • Only steel works commissioned before September 26, 2008 are eligible.
Important parameters	At validation: • Historical average of pig iron production and coke consumption.
	Monitored: • Annual quantity of pig iron production, coke consumption; • Quantity and iron content of DRI pellet fed into the blast furnace; • Fuel and electricity use; • Fraction of carbon in coke fed into the blast furnace (tonnes of C per tonne of coke).

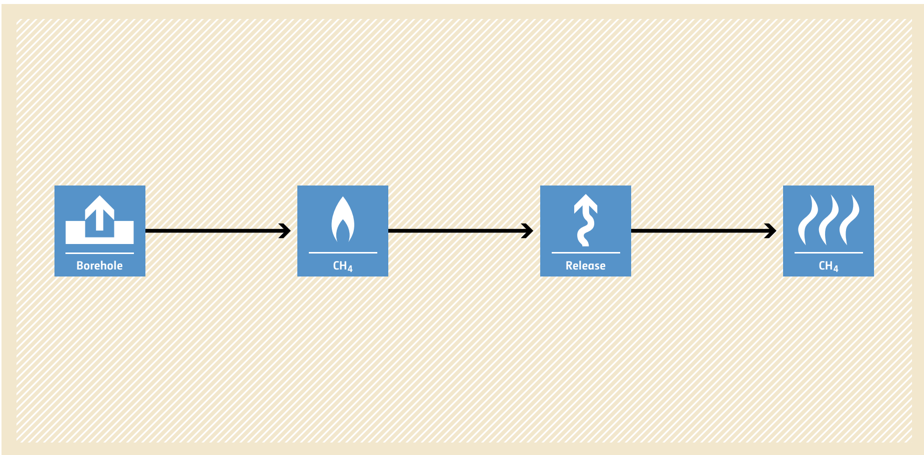
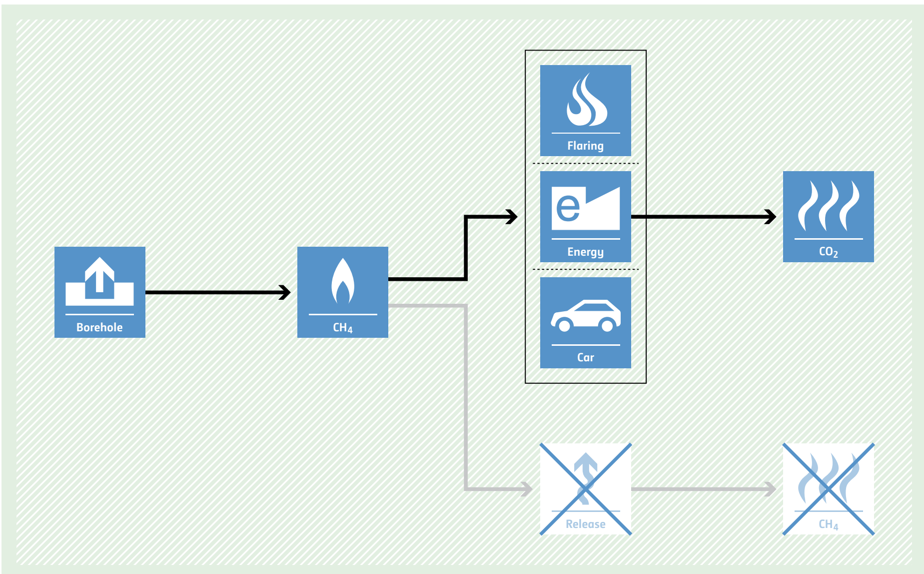
BASELINE SCENARIO
High amounts of coke are used to produce pig iron, thus leading to high CO_2 emissions. Dust/sludge from steel works is sold to outside user and/or land-filled.



PROJECT SCENARIO
Less coke is used to produce pig iron. This leads to lower CO_2 emissions. Dust/sludge is transformed into DRI pellets which are reused as input in this pigiron production.



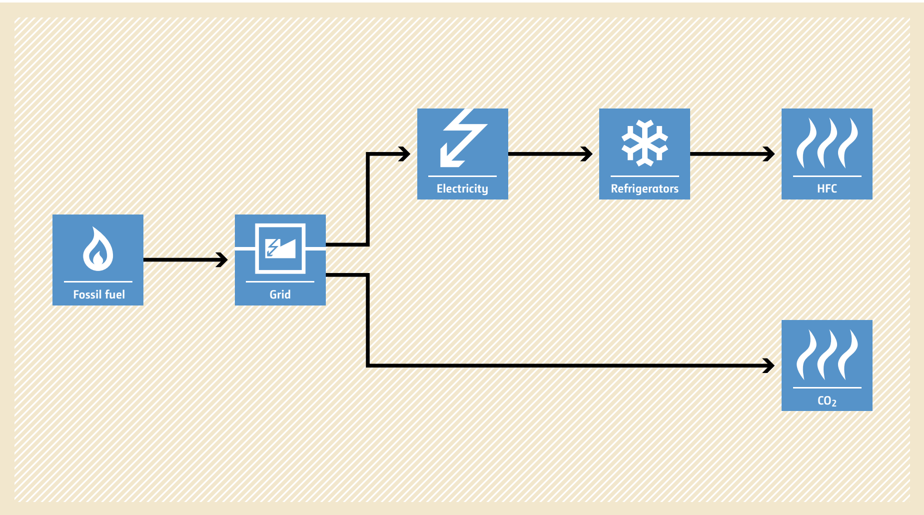
AMS-III.W. Methane capture and destruction in non-hydrocarbon mining activities

Typical project(s)	This methodology comprises activities that capture delete methane released from holes drilled into geological formations specifically for mineral exploration and prospecting.
Type of GHG emissions mitigation action	• GHG destruction. Capture and combustion/utilization of methane released from boreholes.
Important conditions under which the methodology is applicable	• Abandoned or decommissioned mines, as well as open cast mines are excluded. Coal extraction mines or oil shale, as well as boreholes or wells opened for gas/oil exploration or extraction do not qualify under this methodology; • This methodology is applicable for structures installed, or boreholes drilled before end of 2001, or for structures installed, or boreholes drilled after 2001, where it can be demonstrated that the structures or the boreholes were part of an exploration plan; • Maximum outside diameter of the boreholes should not exceed 134 mm; • This methodology excludes measures that would increase the amount of methane emissions from the boreholes beyond the natural release as would occur in the baseline.
Important parameters	Monitored: • Vehicle fuel provided by the project activity; • Amount of methane actually flared; • Electricity and/or heat produced by the project activity; • Consumption of grid electricity and/or fossil fuel by the project.
BASELINE SCENARIO Methane is emitted from boreholes into the atmosphere.	
PROJECT SCENARIO Capture and destruction of methane from boreholes.	

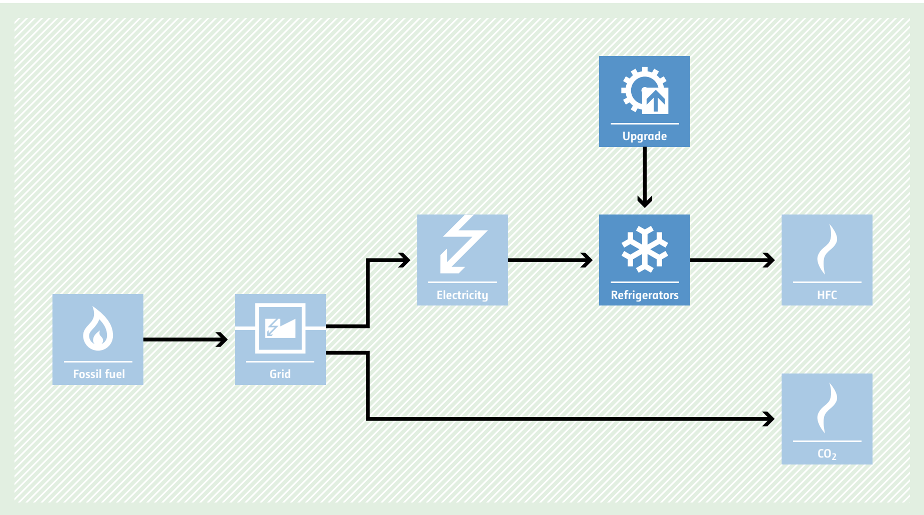
AMS-III.X. Energy efficiency and HFC-134a recovery in residential refrigerators

Typical project(s)	Replacement of existing, functional domestic refrigerators by more-efficient units and recovery/destruction of HFCs from the refrigerant and the foam.
Type of GHG emissions mitigation action	• Energy efficiency; • GHG emission avoidance; • GHG destruction. GHG emission avoidance by re-use of refrigerant or GHG destruction combined with an increase in energy efficiency.
Important conditions under which the methodology is applicable	• Project refrigerants and foam-blowing agents have no ozone depleting potential ozone depleting potential and a global warming potential lower than 15; • All refrigerator replacements take place within just one year of project start; • Project and baseline refrigerators are electrically driven; • Project refrigerators have an average volume capacity of at least 80% of the baseline refrigerators.
Important parameters	Monitored: • Number of refrigerators distributed and their electricity consumption; • Quantity of HFC reclaimed; • Specific electricity consumption from replaced refrigerators.

BASELINE SCENARIO
Use of large amounts of electricity by refrigerators and HFC emissions from the refrigerators.



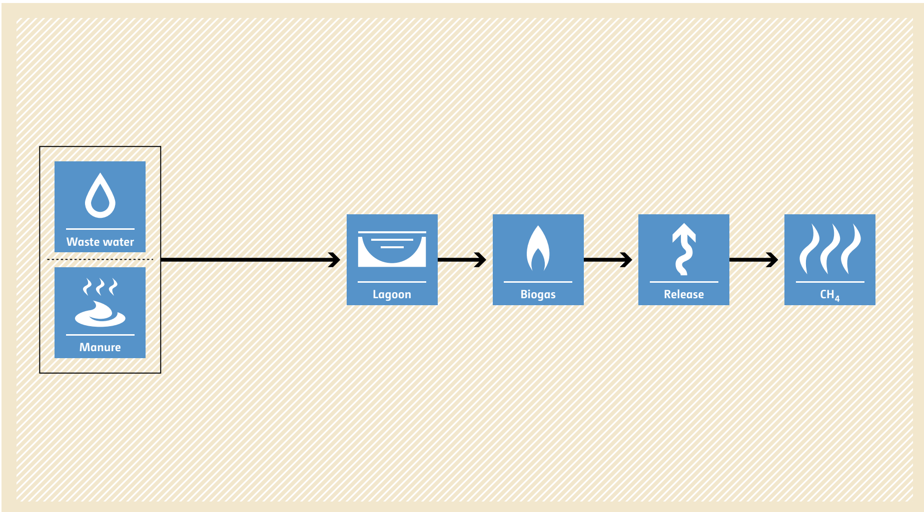
PROJECT SCENARIO
Use of lower amounts of electricity by refrigerators and reduced HFC emissions from refrigerators.



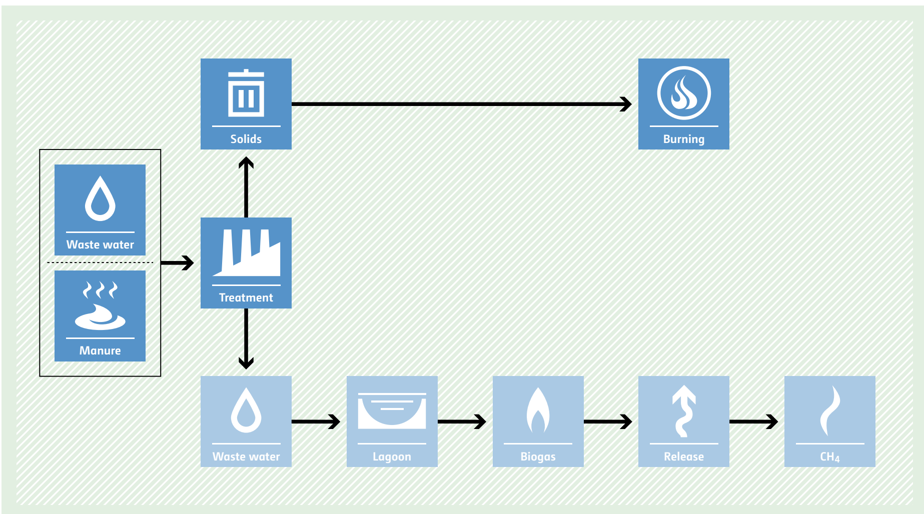
AMS-III.Y. Methane avoidance through separation of solids from wastewater or manure treatment systems

Typical project(s)	Avoidance or reduction of methane production from anaerobic wastewater treatments systems and anaerobic manure management systems where the volatile solids are removed and the separated solids are further treated/used/disposed to result in lower methane emissions.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of methane emissions.
Important conditions under which the methodology is applicable	• The project does not recover or combust biogas; • Technology for solid separation shall be one or a combination of mechanical solid/liquid separation technologies and thermal treatment technologies, and not by gravity; • Dry matter content of the separated solids shall remain higher than 20% and separation shall be achieved in less than 24 hours; • The liquid fraction from the project solid separation system shall be treated either in a baseline facility or in a treatment system with lower methane conversion factor than the baseline system.
Important parameters	Monitored: • For manure management systems, number of animals, their type and their individual volatile solids excretion; • For wastewater systems, the flow of wastewater entering the system and the COD load of the wastewater.

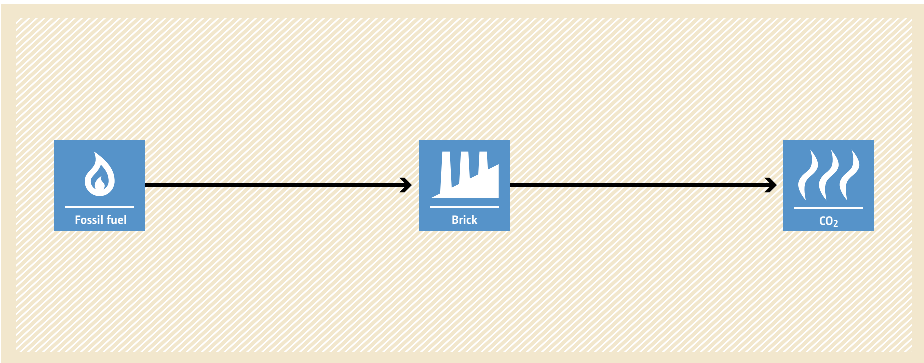
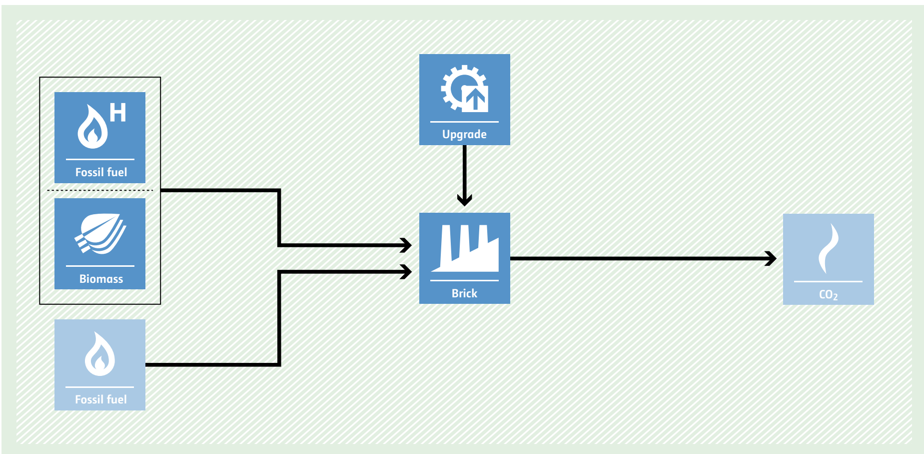
BASELINE SCENARIO
Solids in manure or wastewater would be treated in a manure management system or wastewater treatment facility without methane recover, and methane is emitted into the atmosphere.



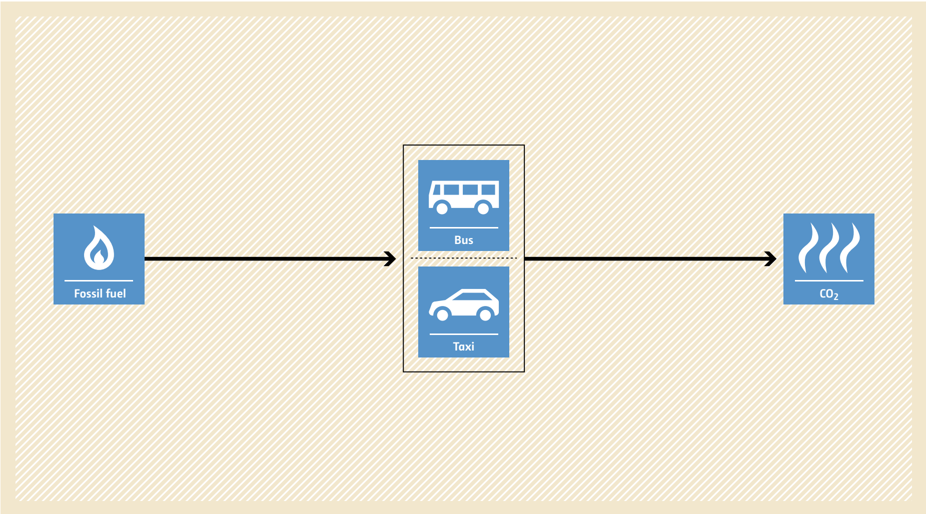
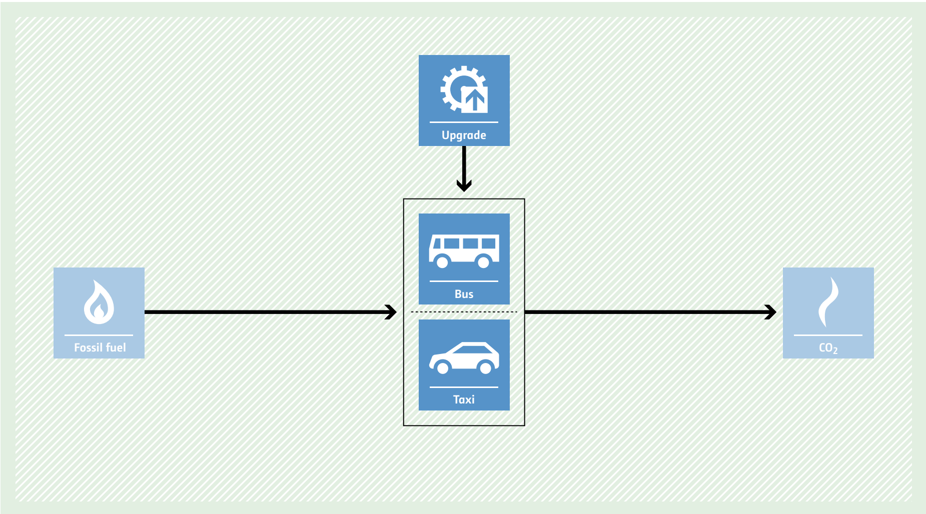
PROJECT SCENARIO
Less methane is emitted due to separation and treatment of solids.



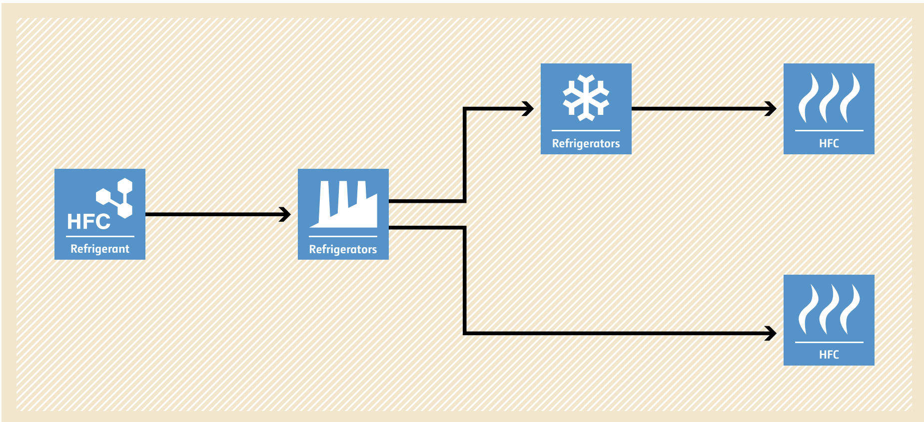
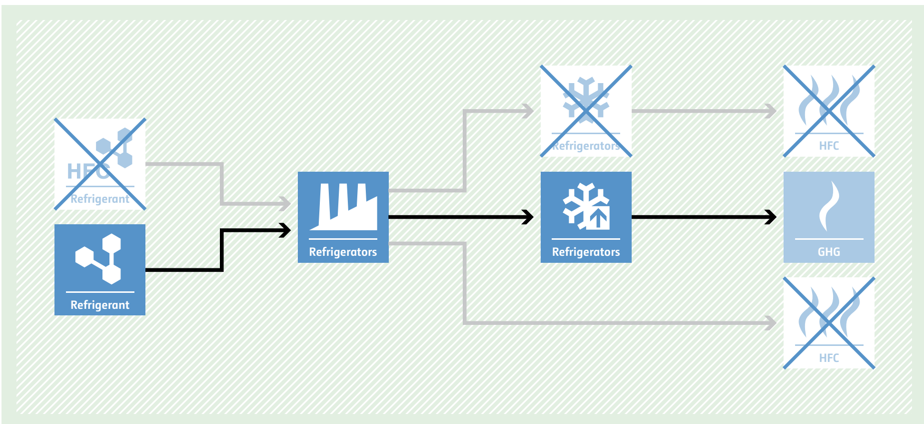
AMS-III.Z. Fuel switch, process improvement and energy efficiency in brick manufacture

Typical project(s)	Switch to a more-energy-efficient brick production process and/or switch from fossil fuel to renewable biomass or less-carbon-intensive fossil fuel or non-renewable biomass.
Type of GHG emissions mitigation action	• Energy efficiency; • Renewable energy; • Fuel or feedstock switch. Reduction of emissions from decreased energy consumption per brick produced and from the use of fuels with lower carbon intensity, either at an existing brick kiln or at a new facility.
Important conditions under which the methodology is applicable	• Quality of the project bricks should be comparable to or better than the baseline bricks; • No renewable biomass has been used in the existing project facility during the last three years immediately prior to the start of the project activity; • For project activities involving changes in raw materials, the raw materials to be utilized shall be abundant in the country/region; • For project activities using crops from renewable biomass origin as fuel, the crops shall be cultivated at dedicated plantations; • Exemption of demonstration of debundling is allowed under certain conditions.
Important parameters	At validation: • Historical brick output and fuel consumption.
	Monitored: • Production output; • Quantity and type of fuels used; • Quantity of raw and additive materials; • Quality of the project bricks.
BASELINE SCENARIO Brick production using more-carbon-intensive fuel and energy-intensive technology.	
PROJECT SCENARIO Brick production using less-carbon-intensive fuel or biomass in a more-efficient facility.	

AMS-III.AA. Transportation energy efficiency activities using retrofit technologies

Typical project(s)	Retrofit of the engine of existing/used vehicles for commercial passengers transport (e.g. buses, motorized rickshaws, taxis) which results in increased fuel efficiency of the vehicles.
Type of GHG emissions mitigation action	• Energy efficiency. Energy efficiency measures in transportation reduce GHG emissions due to decreased fuel consumption.
Important conditions under which the methodology is applicable	• The vehicles for passenger transportation are of the same type, use the same fuel and single type of retrofit technology; • The methodology is not applicable to brand new vehicles/technologies (e.g. CNG, LPG, electric or hybrid vehicles); • The vehicles shall operate during the baseline and project on comparable routes with similar traffic situations.
Important parameters	At validation: • Determination of the remaining technical lifetime of the retrofitted vehicles.
	Monitored: • Fuel efficiency of the baseline and project vehicle; • Annual average distance travelled by project vehicles; • Number of theoretically operating project vehicles; • Share of project vehicles in operation.
BASELINE SCENARIO Passengers are transported using less-fuel-efficient vehicles.	
PROJECT SCENARIO Passengers are transported using retrofitted more-fuel-efficient vehicles.	

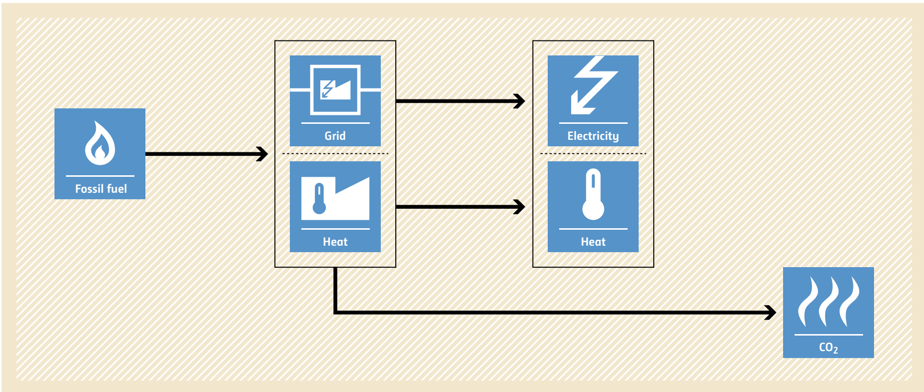
AMS-III.AB. Avoidance of HFC emissions in standalone commercial refrigeration cabinets

Typical project(s)	Introduction of new commercial standalone refrigeration cabinets using refrigerants with low global warming potential (GWP).
Type of GHG emissions mitigation action	• GHG emission avoidance; • Feedstock switch. Avoidance of fugitive emissions of refrigerants with high GWP (e.g. HFC-134a) through the use of refrigerants with low GWP.
Important conditions under which the methodology is applicable	• Cabinets in the project case utilize one type of refrigerants and foam blowing agents having no ozone depleting potential (ODP) and low GWP; • The cabinets introduced by the project are equally or more energy efficient than the cabinets that would have been used in the absence of project; • The project proponent has been producing or managing commercial refrigeration cabinets charged with refrigerants with high GWP for at least three years and has not been using refrigerants with a low GWP in significant quantities prior to the start of the project.
Important parameters	At validation: • Nameplate initial refrigerant charge for each refrigeration cabinet model; • Fugitive emissions of refrigerants during manufacturing, servicing/maintenance, and disposal of refrigeration cabinets.
	Monitored: • Number of refrigeration cabinets that are manufactured, put into use, under servicing/maintenance, and decommissioned and disposed.
BASELINE SCENARIO Fugitive HFC emissions with high GWP during manufacturing, usage and servicing, and disposal of refrigeration cabinets.	
PROJECT SCENARIO Fugitive emissions of refrigerants with low GWP during manufacturing, usage and servicing, and disposal of refrigeration cabinets.	

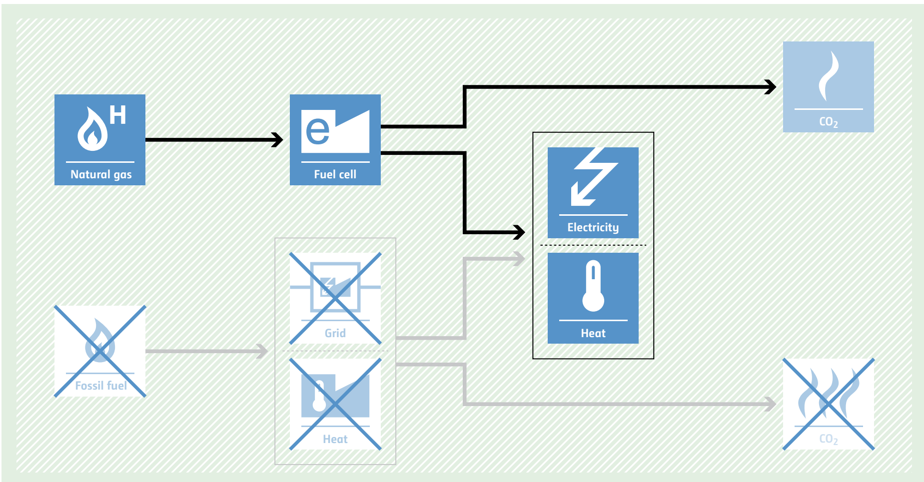
AMS-III.AC. Electricity and/or heat generation using fuel cell

Typical project(s)	Generation of electricity and/or heat using fuel cell technology using natural gas as feedstock to supply electricity to existing or new users or to a grid.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of more-GHG-intensive electricity or electricity and heat generation.
Important conditions under which the methodology is applicable	• Not applicable where energy produced by fuel cell is used for transportation application; • Electricity and/or steam/heat delivered to several facilities require a contract specifying that only the facility generating the energy can claim CERs; • Natural gas is sufficiently available in the region or country; • If the project includes the replacement of the cell or any part of it (the molten carbonate, the electrodes, etc.) during the crediting period, there shall be no significant changes in the efficiency or capacity of the fuel cell technology used in the project due to the replacement. The lifetime of the fuel cell shall be assessed in accordance with the procedures described in General Guideline to SSC methodologies.
Important parameters	At validation: • If applicable: grid emission factor (can also be monitored ex post).
	Monitored: • Monitoring of energy (heat/power) generation and consumption of the project; • Consumption and composition of feedstock (e.g. natural gas) used for hydrogen production.

BASELINE SCENARIO
Other technologies that would have been used in absence of the project and/or grid imports are supplying electricity and/or heat to new users or to a grid.



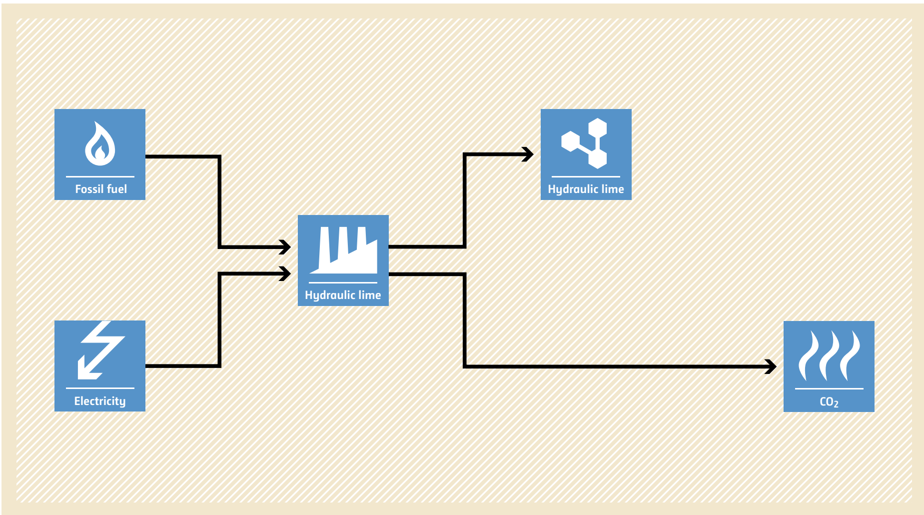
PROJECT SCENARIO
Natural gas as feedstock is used for hydrogen production which is then used in a fuel cell technology to produce heat/electricity displacing alternative technologies and therefore reducing baseline emissions.



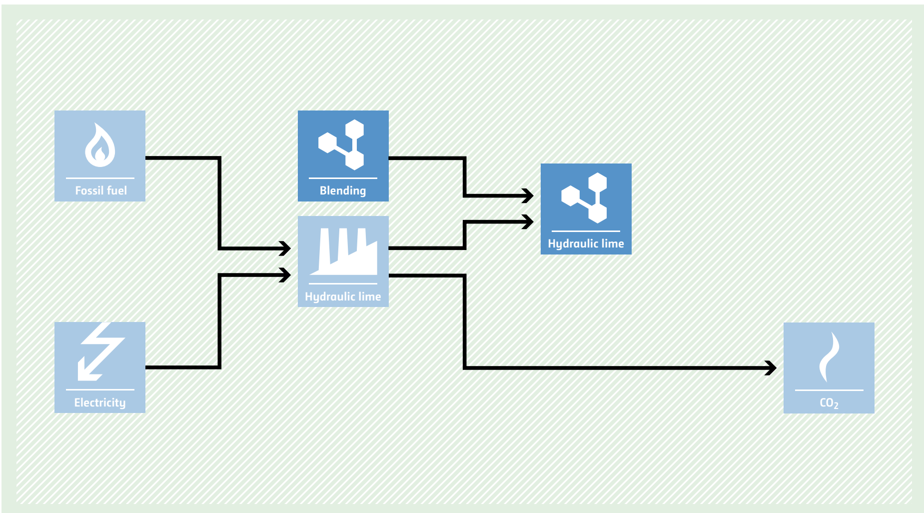
AMS-III.AD. Emission reductions in hydraulic lime production

Typical project(s)	Production of alternative hydraulic lime for construction purposes by blending a certain amount of conventional hydraulic lime with alternative material and additives.
Type of GHG emissions mitigation action	• Feedstock switch. Reduction of production of hydraulic lime and thereby reduction of fossil fuel use and electricity consumption during the production process.
Important conditions under which the methodology is applicable	• Quality of alternative hydraulic lime is the same or better than the hydraulic lime; • There is no other allocation or use for the amount of alternative material used by the project and there is sufficient availability; • The project is in an existing plant; • This methodology is limited to domestically sold output of the project plant and excludes export of alternative hydraulic lime.
Important parameters	• Alternative hydraulic lime meets or exceeds the quality standards of the baseline hydraulic lime; • Total production of alternative lime and hydraulic lime (intermediate product) consumption of alternative lime and additives; • Fuel and electricity consumption.

BASELINE SCENARIO
Production of hydraulic lime using conventional process consuming high amount of energy.

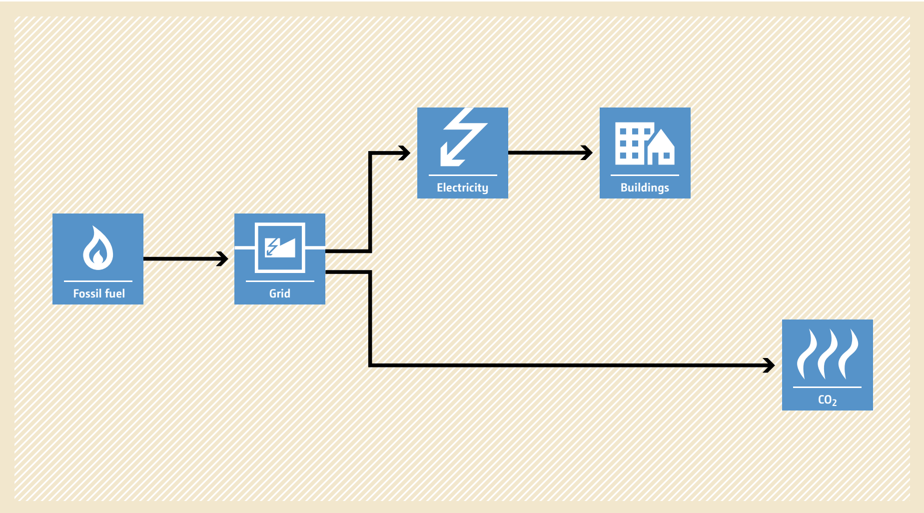
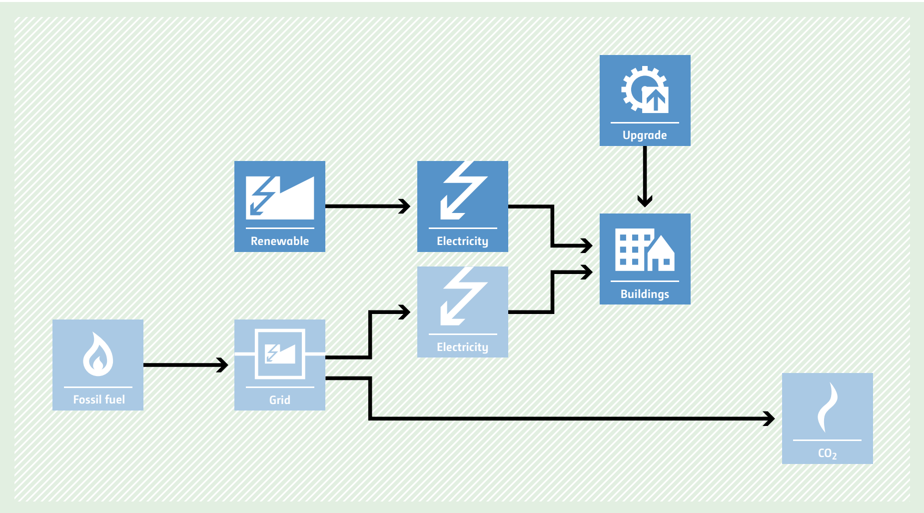


PROJECT SCENARIO
Reduced fossil fuel input in hydraulic lime production due to blending with additives.

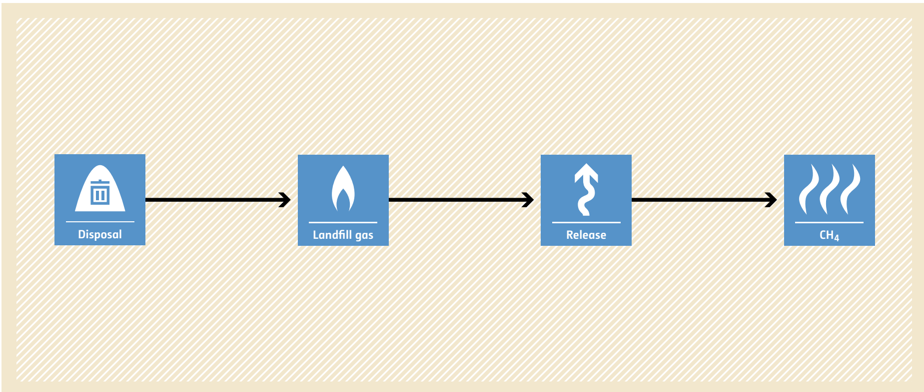
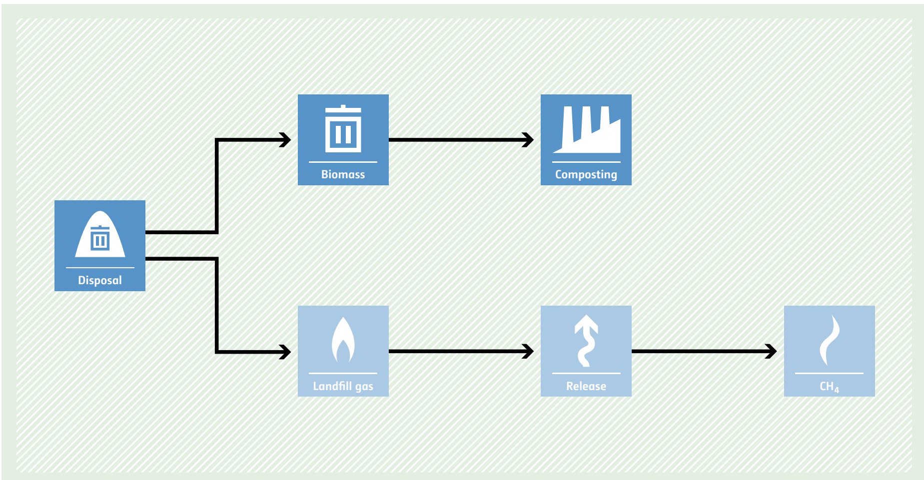


AMS-III.AE. Energy efficiency and renewable energy measures in new residential buildings

Women and children

Typical project(s)	Installation of energy efficiency and optional renewable power generation measures in new, grid-connected residential buildings.
Type of GHG emissions mitigation action	• Energy efficiency; • Renewable energy. Electricity savings through energy efficiency improvement and optional use of renewable power.
Important conditions under which the methodology is applicable	• Emission reductions shall only be claimed for grid electricity savings; • Emission reductions through biomass energy supply cannot be claimed; • Project buildings must be newly constructed residential buildings, and shall not use fossil or biomass fuels for space heating or cooling; • Refrigerant used in energy-efficient equipment under the project, if any, shall be CFC-free.
Important parameters	At validation: • Monthly electricity consumption of baseline and project residences; • Grid emission factor (can also be monitored ex post); • Monthly HDD and CDD for baseline and project residences; • Baseline and project residence characteristics.
	Monitored: • Update of the parameters provided for validation; • Annual records of project residence occupancy.
BASELINE SCENARIO Less-efficient use of electricity in buildings.	
PROJECT SCENARIO More-efficient use of electricity and optional use of renewable power in buildings.	

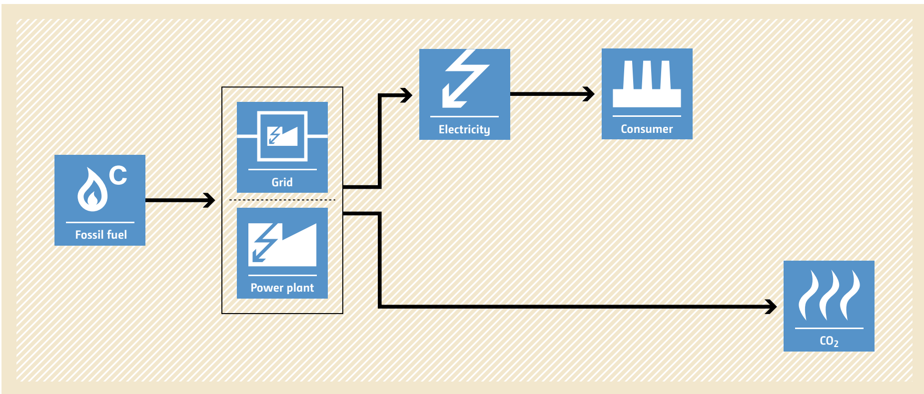
AMS-III.AF. Avoidance of methane emissions through excavating and composting of partially decayed municipal solid waste (MSW)

Typical project(s)	Avoidance of methane emissions from MSW that is already deposited in a closed solid waste disposal site (SWDS) without methane recovery. Due to the project, non-inert material will be composed through pre-aeration, excavation and separation of the MSW in the closed SWDS, so that methane emissions will be avoided.
Type of GHG emissions mitigation action	• GHG emission avoidance. Methane emissions from anaerobic decay of organic matter in municipal solid waste is avoided by alternative waste treatment (i.e. composting).
Important conditions under which the methodology is applicable	• This methodology is applicable if the aerobic pre-treatment is realized either through high pressure air injection enriched with oxygen (20-40% vol.) or low pressure aeration using ambient air; • The existing regulations do not require the capture and flaring of landfill gas of closed SWDS; • The composting process is realized at enclosed chambers or roofed sites, outdoor composting is not applicable.
Important parameters	Monitored: • Quantity of raw waste removed and quantity of compost produced; • Parameters related to transport, e.g. truck capacity; • Parameters related to methane generation potential of the non-inert fraction of the partially decayed, separated MSW; • Amount of non-inert waste excavated and aerobically composted; • Annual amount of fossil fuel or electricity used to operate the facilities or power auxiliary equipment.
BASELINE SCENARIO MSW is left to decay within the SWDS and methane is emitted into the atmosphere.	
PROJECT SCENARIO Methane emissions will be avoided by applying pre-aeration and excavation of existing SWDS, followed by separation and composting of non-inert materials.	

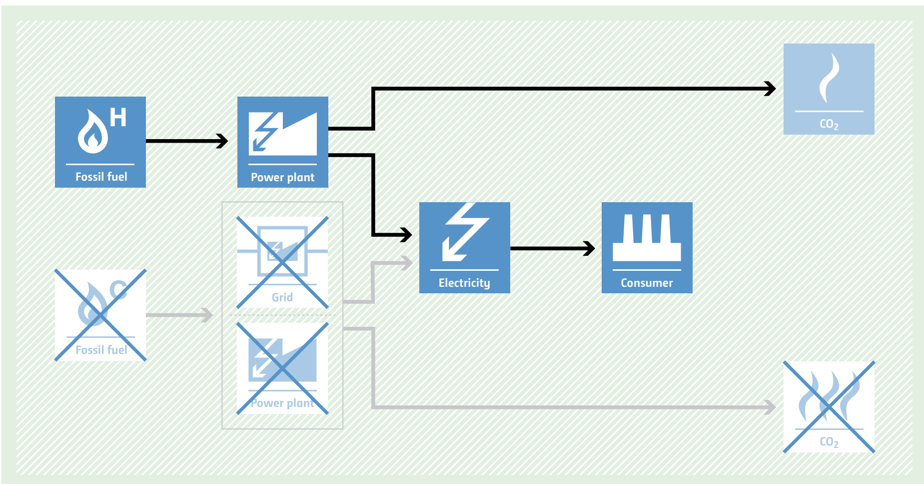
AMS-III.AG. Switching from high carbon intensive grid electricity to low carbon intensive fossil fuel

Typical project(s)	Switch from high carbon grid electricity to electricity generation using less-carbon-intensive fossil fuel such as captive natural-gas-based power generation.
Type of GHG emissions mitigation action	• Fuel switch. Switch to a less-carbon-intensive fuel for power generation.
Important conditions under which the methodology is applicable	• The project is primarily the switch from fossil-fuel-based electricity generation, supplied partly or entirely by the grid, to a single or multiple, less-carbon-intensive fuel at Greenfield or existing facilities; • The sole energy source or one of the energy sources in the baseline shall be high-carbon-intensive grid electricity; • Cogeneration (e.g. gas turbine with heat recovery) is allowed provided that the emission reductions are claimed only for the electricity output; • Multiple fossil fuels switching is allowed if one of the energy sources in the baseline is high-carbon-intensive grid electricity; • Export of electricity to a grid is not part of the project boundary; • Project does not result in integrated process change.
Important parameters	At validation: • Historical power generation for existing baseline plants; • Quantity of fossil fuels for existing baseline plants; • Grid emission factor can also be monitored ex post.
	Monitored: • Quantity of fossil fuel use; • The output of element process for electricity exported to other facilities shall be monitored in the recipient end.

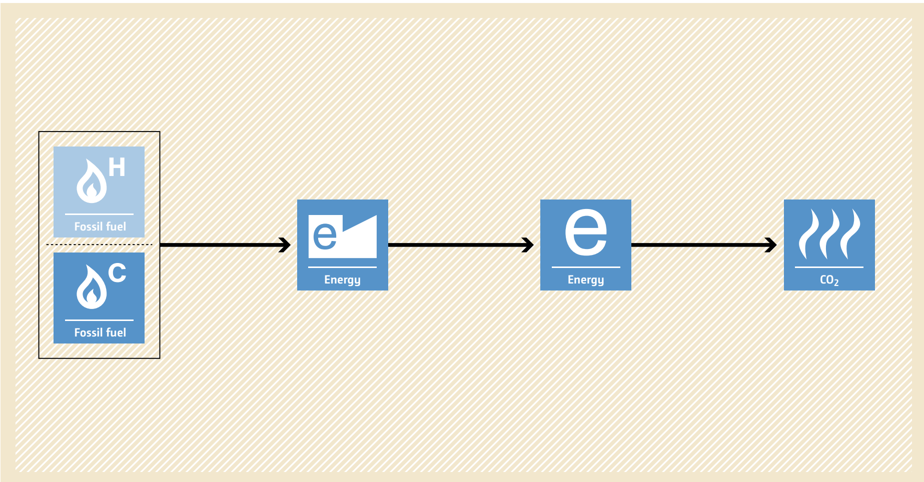
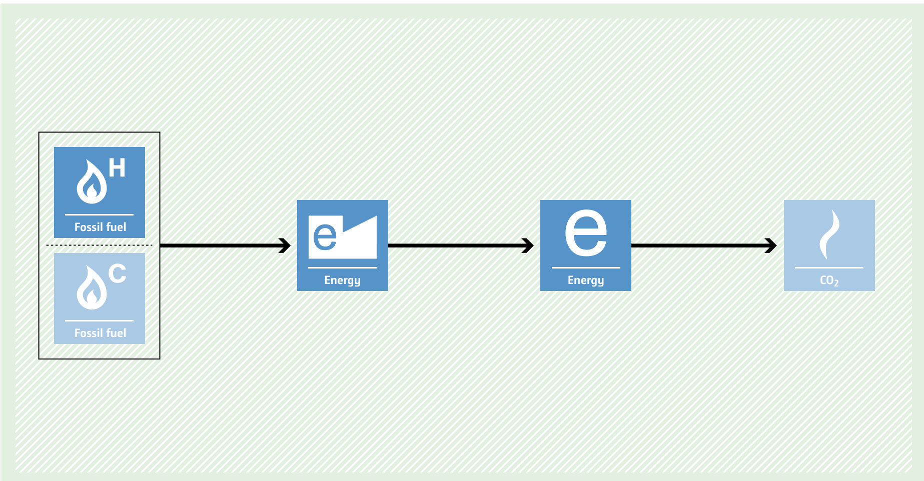
BASELINE SCENARIO
Use of carbon-intensive fuel to generate electricity.



PROJECT SCENARIO
Use of a less-carbon-intensive fuel to generate electricity, which leads to a decrease in GHG emissions.



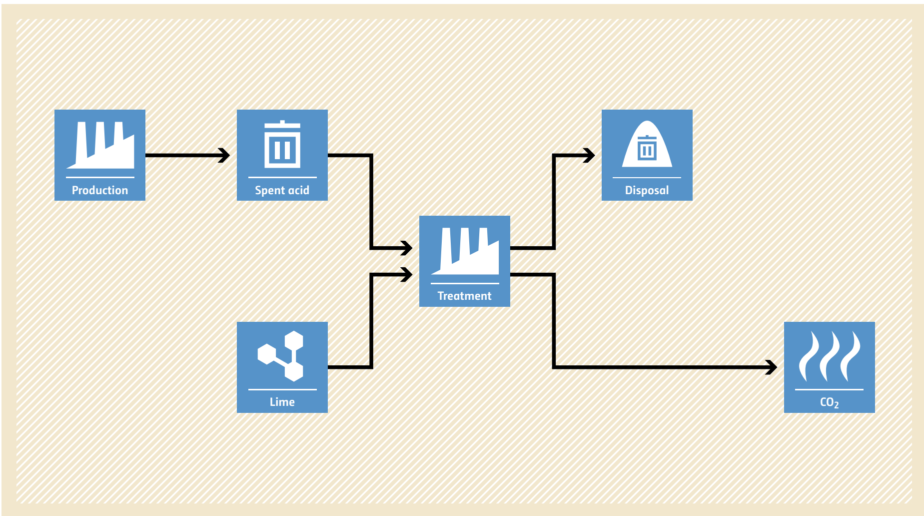
AMS-III.AH. Shift from high carbon intensive fuel mix ratio to low carbon intensive fuel mix ratio

Typical project(s)	Replacement or retrofit in order to increase the share of less-carbon-intensive fossil fuels in an element process of industrial, residential or commercial applications.
Type of GHG emissions mitigation action	• Fuel switch. Switch to less-carbon-intensive fuel in energy conversion processes.
Important conditions under which the methodology is applicable	• Retrofit or replacement at existing installations to increase the share of less-carbon-intensive fuel other than biomass or waste gas/energy; • Energy efficiency improvements related to the fuel switch are eligible; • Retrofit and replacements without capacity expansion and/or integrated process change are eligible; • Project activity may be physically connected to a grid but emission reduction cannot be claimed for the electricity export to the grid.
Important parameters	At validation: • Quantity of fossil fuel use; • The output and efficiency of element process (e.g. heat or electricity); • Where output cannot be measured, the amount of fossil fuel consumed during the project is used as proxy; • Availability of all baseline fossil fuels.
	Monitored: • Fossil fuel and energy input to the element process; • Output of the element process and exported to the recipient end.
BASELINE SCENARIO Production of energy using more-carbon-intensive fossil fuel mix.	
PROJECT SCENARIO Production of energy using less-carbon-intensive fossil fuel mix.	

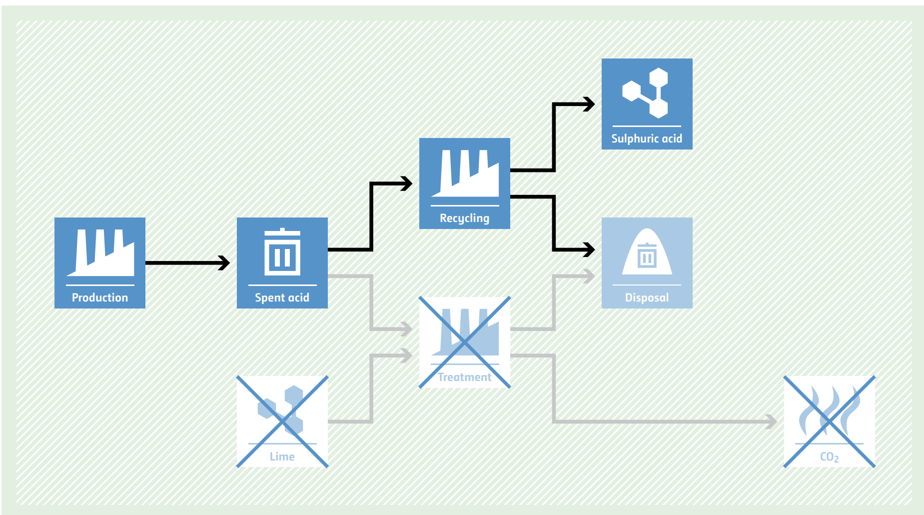
AMS-III.AI. Emission reductions through recovery of spent sulphuric acid

Typical project(s)	Recovery of sulphuric acid from 'spent sulphuric acid' where the neutralization of spent acid with hydrated lime or lime stone and the associated CO_2 emissions in the existing facility are avoided.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of neutralization of spent acid and of related GHG emissions.
Important conditions under which the methodology is applicable	• The project is a new sulphuric acid recovery facility; • The concentration of the spent sulphuric acid ranges from 18% w/w to 80% w/w (weight percentage); • Specific spent sulphuric acid recovery procedures are applied.
Important parameters	At validation: • Historical data on the quantity of spent sulphuric acid neutralized.
	Monitored: • Quantity and acidity of sulphuric acid recovered; • Historic energy (electricity/steam) self-generated by a neighbouring facility that will be replaced by supply of an equivalent energy by the project; • Energy displaced by the project by supply of energy to a neighbouring facility that displaces an equivalent amount of energy usage in the baseline or supplied to the grid.

BASELINE SCENARIO
The spent sulphuric acid is neutralized using hydrated lime, leading to CO_2 emissions.



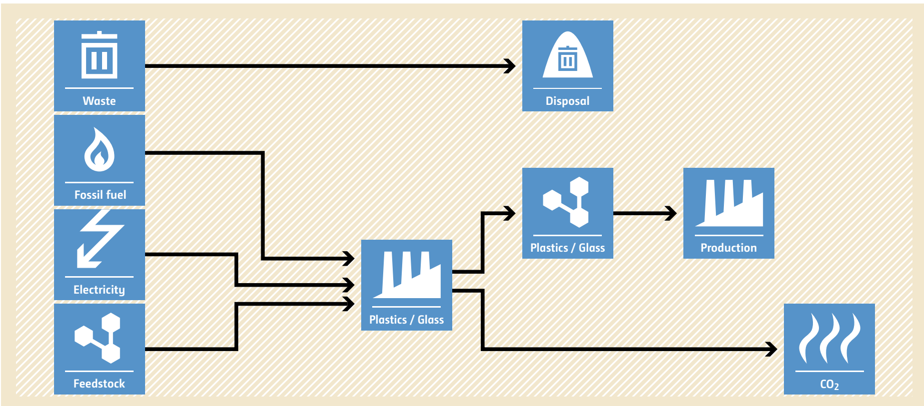
PROJECT SCENARIO
No hydrated lime is used to neutralize the spent sulphuric acid. The associated CO_2 emissions are avoided.



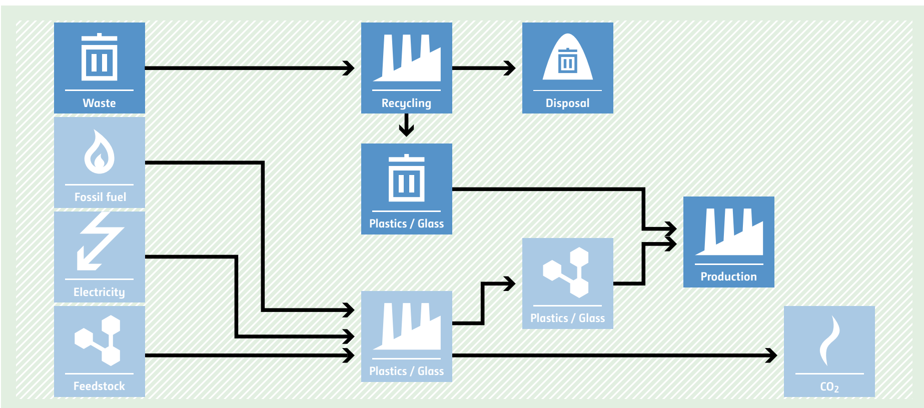
AMS-III.AJ. Recovery and recycling of materials from solid wastes

Typical project(s)	Projects that involve the recycling of plastic materials (HDPE, LDPE, PET and PP), container glass and metals (aluminium and steel) collected from municipal solid wastes (MSW) that are processed into intermediate or finished products (e.g. plastic bags, container glass and steel/aluminium products).
Type of GHG emissions mitigation action	• Energy efficiency. Reduction of production of HDPE, LDPE, PET/PP, container glass and metals (aluminium and steel) from virgin materials, thus reducing related energy consumption.
Important conditions under which the methodology is applicable	• Recycling process may be accomplished manually and/or using mechanical equipment and includes washing, drying, compaction, shredding and pelletizing; • Emission reductions can only be claimed for the difference in energy use for the production of materials from virgin inputs versus production from recycled material. For container glass, emission reductions can only be claimed for the difference in energy use for the production of virgin container glass corresponding to the preparation and mixing of raw materials before the melting stage versus production of container glass from recycled material; • Contractual agreement between recycling facility and manufacturing facility guarantees that only one of them claims CERs; • Three years historical data show that displaced virgin material is not imported from an Annex I country or a default global baseline correction factor could be used; • For recycling of PET/PP, the chemical equivalence of the recycled PET/PP to that of PET/PP made from virgin input shall be proved; • For recycling of aluminium and steel, the methodology covers only post consumer obsolete wastes.
Important parameters	Monitored: • Quantity of each type of recycled materials sold to a manufacturing facility; • Electricity and fossil fuel consumption of the recycling facility; • Percentage of plastics produced in the host party out of total plastic consumed; • Percentage of plastics imported by the host party out of total plastic consumed; • Intrinsic viscosity of PET/PP.

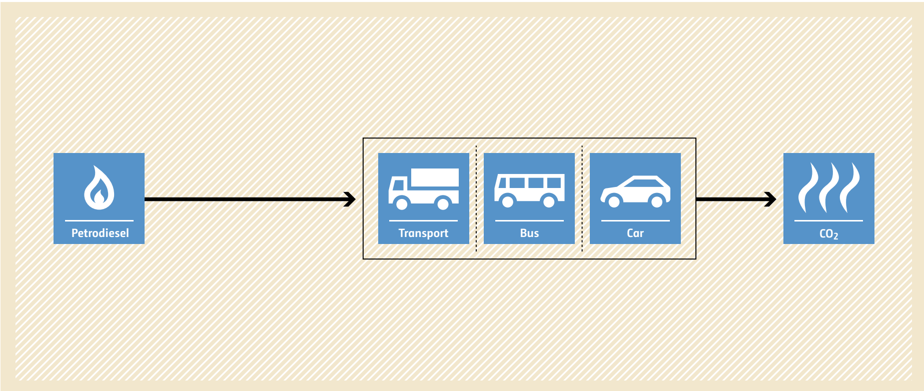
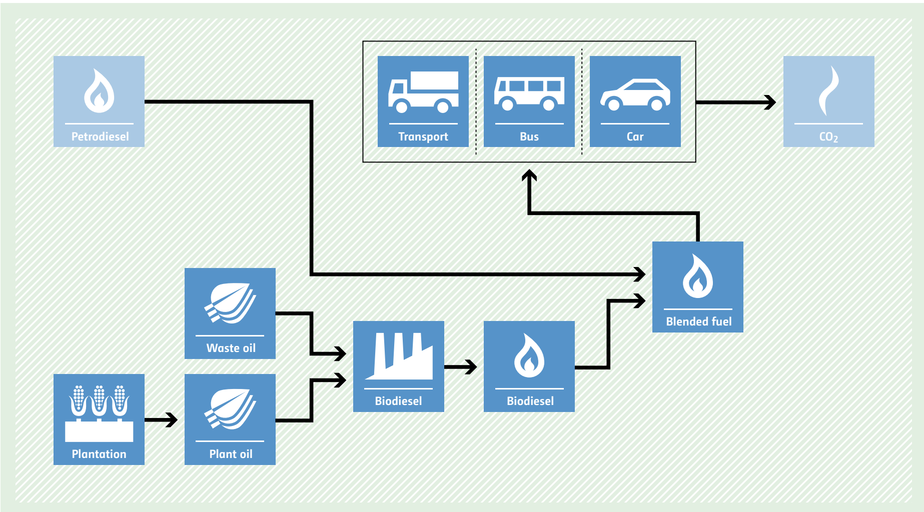
BASELINE SCENARIO
HDPE, LDPE, PET/PP, container glass, aluminium and steel are produced from virgin raw material resulting in high energy consumption.



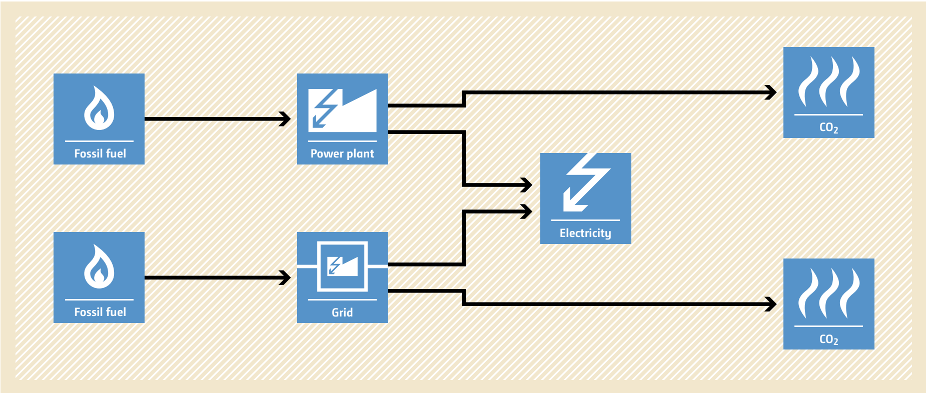
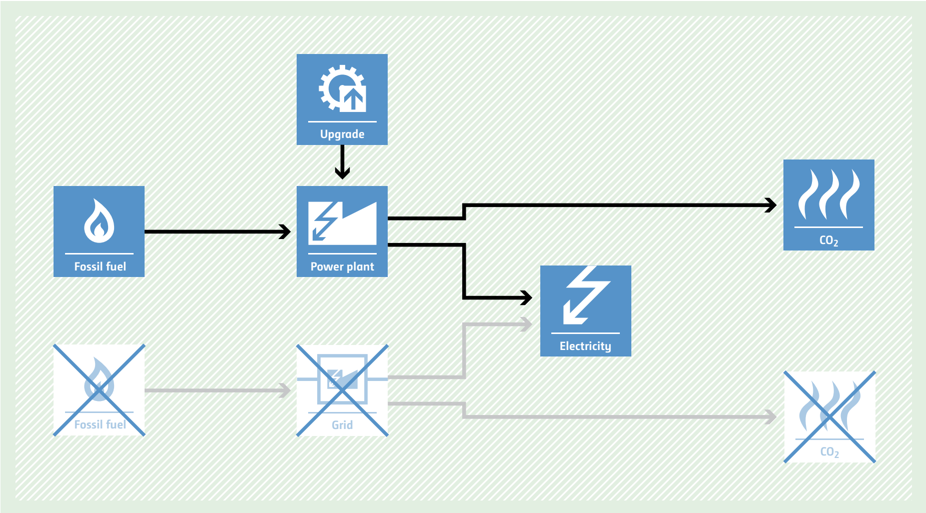
PROJECT SCENARIO
Production of HDPE, LDPE, PET/PP, container glass, aluminium and steel based on virgin raw material is reduced. Use of recycled material results in less energy consumption.



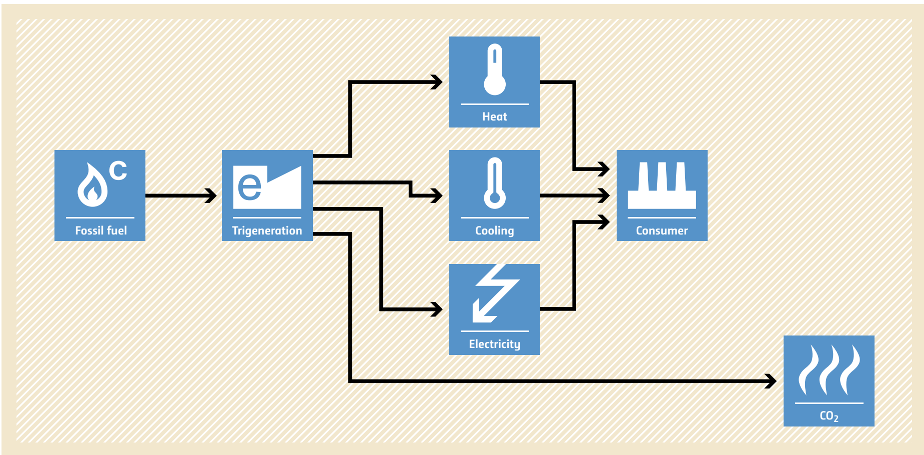
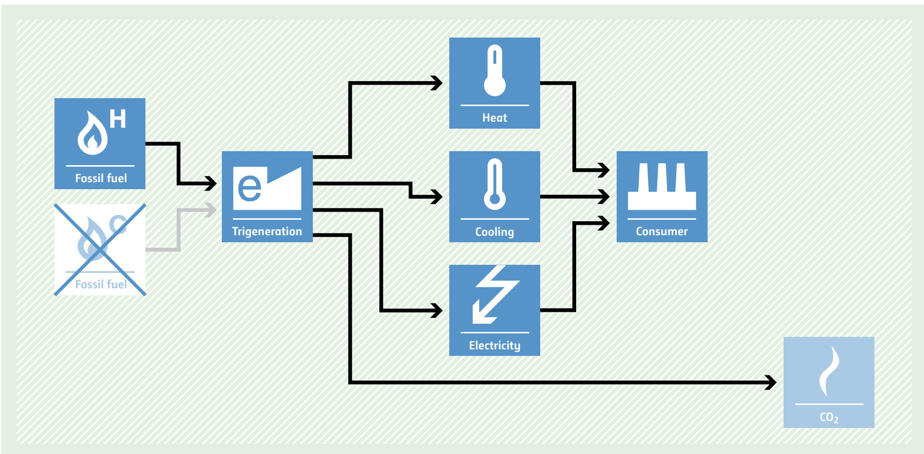
AMS-III.AK. Biodiesel production and use for transport applications

Typical project(s)	Biofuel production and utilization in transportation applications, where the biofuel is produced from biomass residues, biomass cultivated on dedicated plantations and from waste oil/fat.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of more-carbon-intensive fossil fuel for combustion in vehicles/ transportation applications by use of renewable biomass.
Important conditions under which the methodology is applicable	• If the biomass feedstock is sourced from a dedicated plantation, associated project and leakage emissions shall be considered; • The export of produced biodiesel is not eligible; • The blending proportion of the biofuel shall ensure that its performance does not differ significantly from that of fossil fuels; • The consumer group of the biofuel and the distribution system shall be identified; • Any alcohol used for esterification is methanol of fossil fuel origin or alcohols produced with biomass from dedicated plantations.
Important parameters	Monitored: • Quantity of biofuel produced in the project plant and consumption of biodiesel and its blends by the captive users; • Quantity of any fossil fuel and/or electricity for the operation of the project activity; • Parameters to estimate project emissions from the cultivation of biomass.
BASELINE SCENARIO Fossil fuels would be used in the transportation applications.	
PROJECT SCENARIO Biomass is cultivated, blended biofuel is produced and used in the transportation applications.	

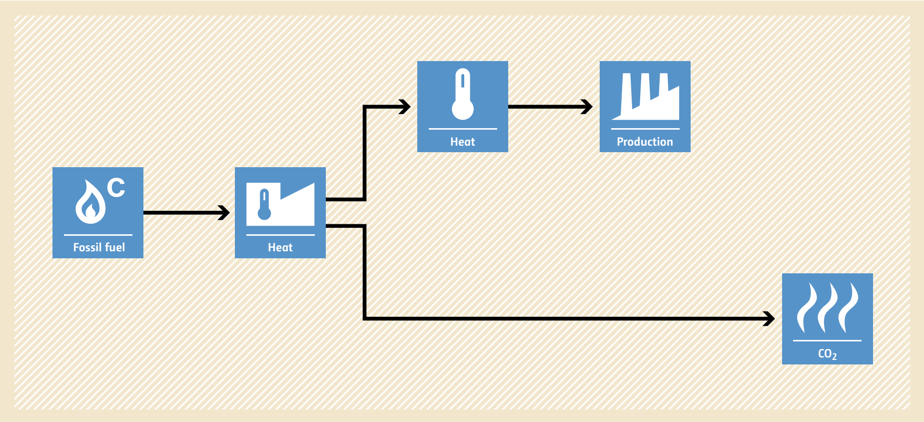
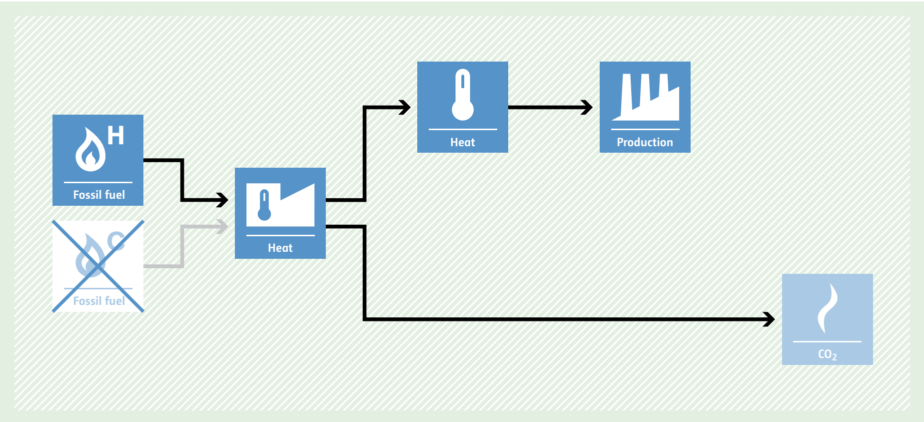
AMS-III.AL. Conversion from single cycle to combined cycle power generation

Typical project(s)	Conversion of an existing single-cycle gas turbine(s) or internal combustion engine(s) with or without cogeneration system to a combined-cycle system with or without cogeneration to produce additional electricity for captive use and/or supply to a grid.
Type of GHG emissions mitigation action	• Energy efficiency. Fuel savings through energy efficiency improvement.
Important conditions under which the methodology is applicable	• The project utilizes excess heat (e.g. gas turbine/engine exhaust heat) that was previously unused for at least three years before the start of the project; • Useful thermal energy produced in the baseline and project is for captive use only; • The project does not involve any major overhauls to the existing single-cycle gas turbine/engine system (no increase of the lifetime or capacity of the system).
Important parameters	At validation: • Grid emission factor (can also be monitored ex post); • Average net annual electricity generation of the existing system in the three years immediately prior to the project start; • Average annual fuel consumption of the existing system in the three years immediately prior to the project start.
	Monitored: • Net electricity generated by the project; • Fuel and electricity consumed by the project; • Net thermal energy consumed by the project.
BASELINE SCENARIO Electricity is generated by a single-cycle gas turbine(s)/ engine(s) with or without simultaneous generation of thermal energy (steam or hot water).	
PROJECT SCENARIO The existing single-cycle gas turbine(s) is converted to a combined-cycle gas turbine(s)/ engine(s) for more efficient electricity generation with or without simultaneous generation of thermal energy (steam or hot water).	

AMS-III.AM. Fossil fuel switch in a cogeneration/trigeneration system

Typical project(s)	Fossil fuel switching from a carbon-intensive fossil fuel to a low-carbon-intensive fossil fuel in a new or existing cogeneration/trigeneration system(e.g. switching from coal to natural gas in a cogeneration/trigeneration unit).
Type of GHG emissions mitigation action	• Fuel switch. Displacement of a more-GHG-intensive service.
Important conditions under which the methodology is applicable	• Fuel input efficiency (thermal and electricity output/fuel input) is better (or at least equal) to the baseline one; • Specific auxiliary energy consumption does not change more than ±10%; • For existing cogeneration/trigeneration systems at least three years of historical data prior to the start of the project (one year if less than three years operational history); • If installations of cooling equipment use refrigerants, such refrigerants must have no or negligible global warming potential (GWP) and no or negligible ozone depleting potential (ODP); • The project does not impact any production processes or other level of service provided.
Important parameters	• Amount of net electricity produced; • Quantity of fossil fuel consumed; • Thermal energy (mass flow, temperature, pressure for heat/cooling) delivered by the project.
BASELINE SCENARIO Use of carbon-intensive fossil fuel in cogeneration/trigeneration system for production of power/heat/cooling.	
PROJECT SCENARIO Switch from from carbon-intensive fossil fuel to a low-carbon-intensive fossil fuel in cogeneration/trigeneration system for production of power/heat and cooling.	

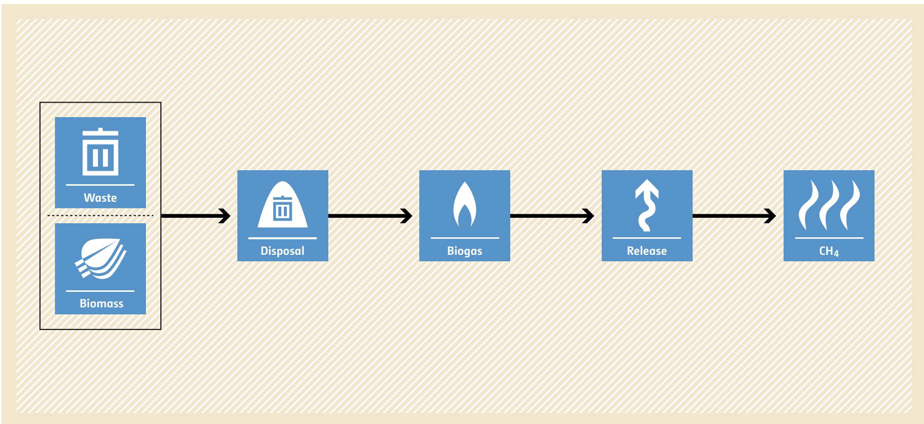
AMS-III.AN. Fossil fuel switch in existing manufacturing industries

Typical project(s)	Switching from a carbon-intensive fossil fuel to either a less-carbon-intensive fossil fuel or electricity with lower carbon intensity.
Type of GHG emissions mitigation action	• Fuel switch. Switch to a fuel/energy source with a lower GHG intensity.
Important conditions under which the methodology is applicable	• The fuel switch occurs at a manufacturing facility with three years of historical data; • The type of inputs and products are equivalent (outputs with same or better service level as compared to the baseline); • The fuel switch at each element manufacturing process is from a single fossil fuel to less-carbon-intensive single fossil fuel or grid electricity; • The fuel switch does not lead to a decrease in energy efficiency; • Elemental process or other down stream/upstream processes do not change as a result of the fossil fuel switch.
Important parameters	At validation: • Quantity of fossil fuel use or amount of the grid electricity consumed; • Baseline raw material consumption and product output.
	Monitored: • Quantity of fossil fuel use or amount of the grid electricity consumed; • The annual net project production of the element process or in cases where product output cannot be measured (e.g. hot/fused metal) annual net project raw material consumption should be monitored.
BASELINE SCENARIO Continued use of a carbon-intensive fossil fuel for the heat generation in a manufacturing process.	
PROJECT SCENARIO Switch of fuel to a less-carbon-intensive fuel or low-carbon grid electricity for the heat generation in a manufacturing process.	

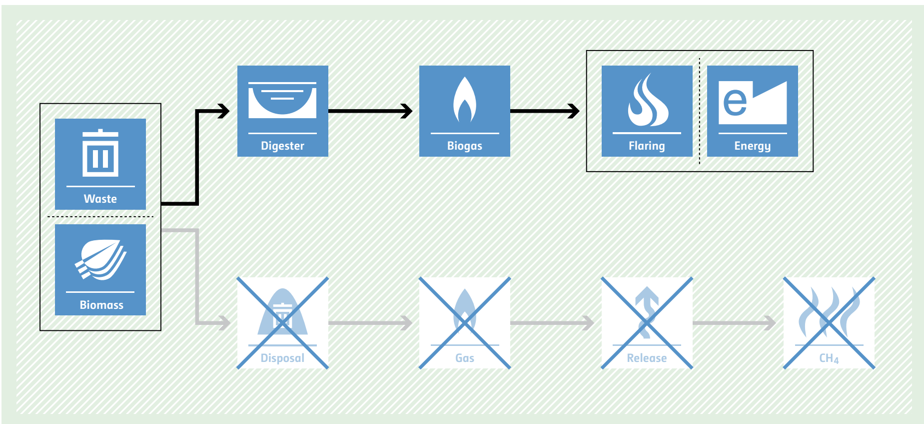
AMS-III.AO. Methane recovery through controlled anaerobic digestion

Typical project(s)	The project activity is the controlled biological treatment of biomass or other organic matters through anaerobic digestion in closed reactors equipped with biogas recovery and a combustion/flaring system.
Type of GHG emissions mitigation action	• GHG formation avoidance. Methane formation avoidance.
Important conditions under which the methodology is applicable	• If for one or more sources of substrates, it can not be demonstrated that the organic matter would otherwise been left to decay anaerobically, baseline emissions related to such organic matter shall be accounted for as zero; • Project activities treating animal manure as single source substrate shall apply AMS-III.D., similarly projects only treating wastewater and/or sludge generated in the wastewater treatment works shall apply AMS-III.H.; • The project activity does not recover or combust landfill gas from the disposal site (unlike AMS-III.G.), and does not undertake controlled combustion of the waste that is not treated biologically in a first step (unlike AMS-III.E.).
Important parameters	At validation: • The location and characteristics of the disposal site of the biomass used for digestion, in the baseline condition.
	Monitored: • Quantity of solid waste (excluding manure); • Parameters for calculating methane emissions from physical leakage of methane; • Parameters related to emissions from electricity and/or fuel consumption.

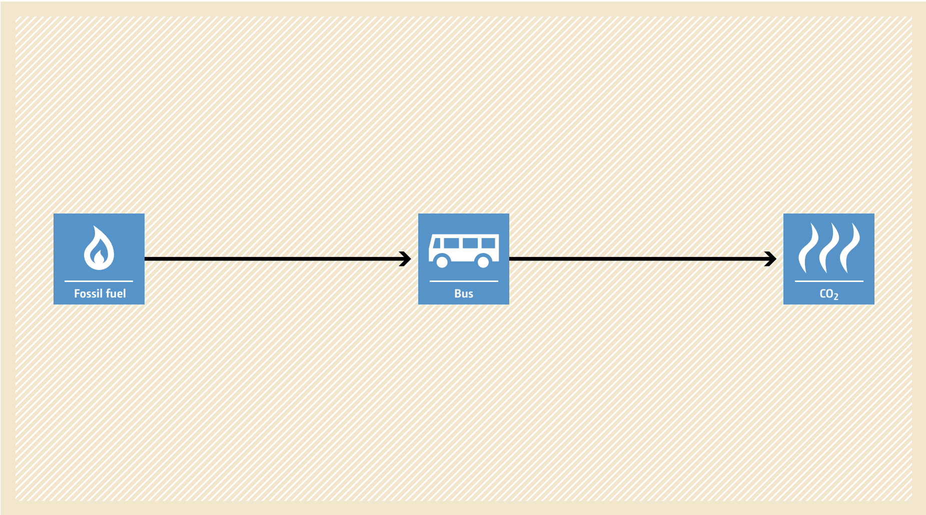
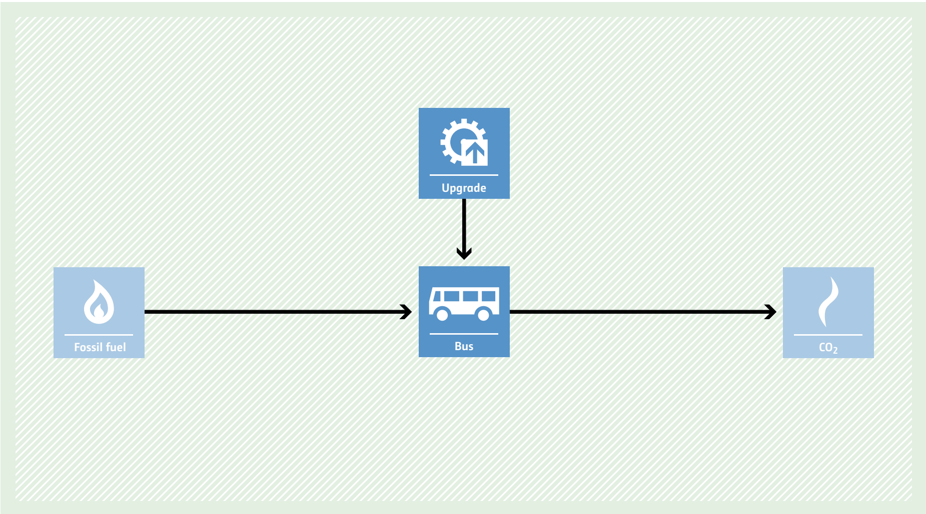
BASELINE SCENARIO
Biomass or other organic matter would have otherwise been left to decay anaerobically.



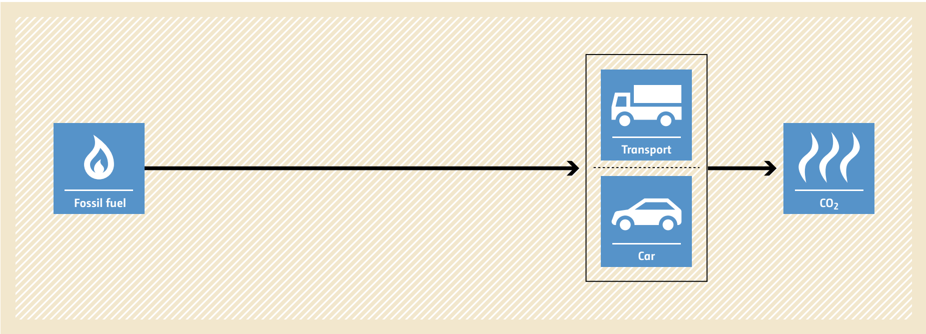
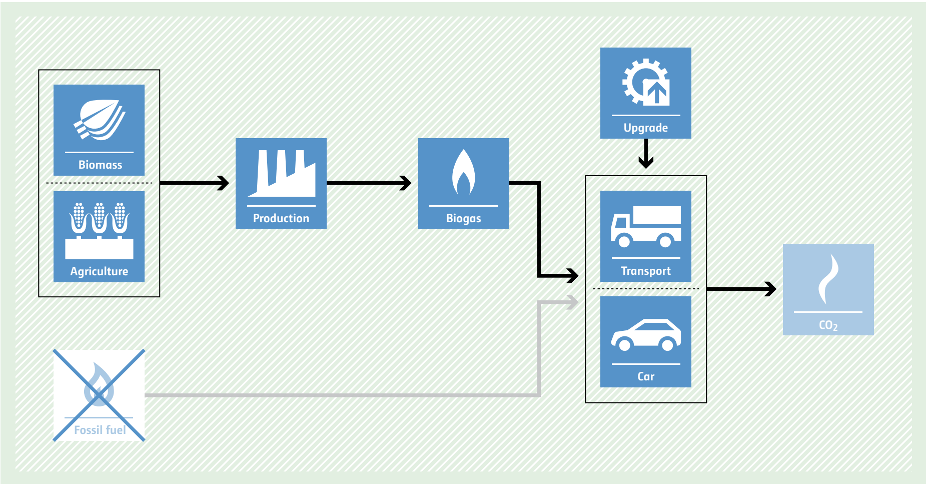
PROJECT SCENARIO
Biological treatment of biomass or other organic matters through anaerobic digestion in closed reactors equipped with biogas recovery and a combustion/flaring system.



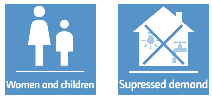
AMS-III.AP. Transport energy efficiency activities using post – fit Idling Stop device

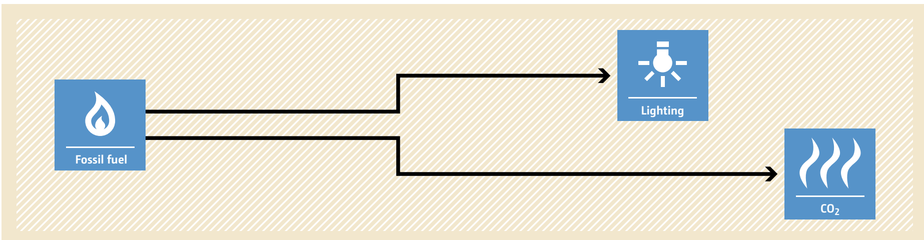
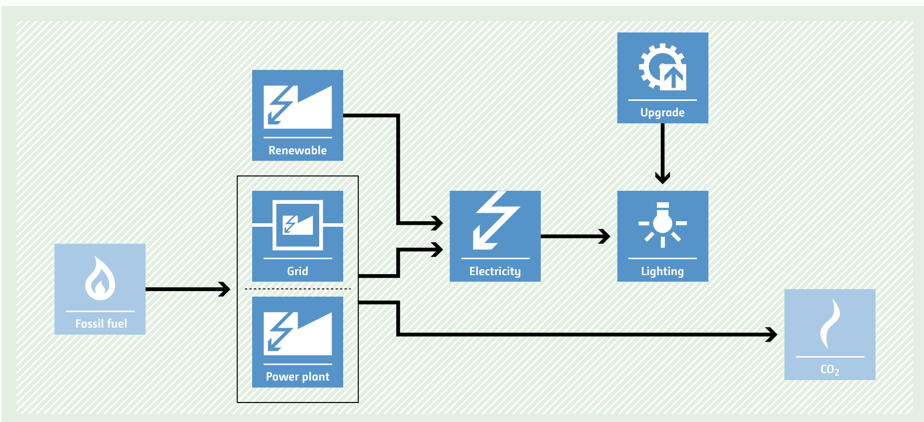
Typical project(s)	Demand side activities associated with the installation of post-fit type Idling Stop devices in passenger vehicles used for public transport (e.g. buses).
Type of GHG emissions mitigation action	• Energy Efficiency. Reduction of fossil fuel use and corresponding emissions through energy efficiency improvements.
Important conditions under which the methodology is applicable	• Vehicles used for public transportation; • Vehicles using gasoline or petrodiesel as fuel; • Vehicles in which it is possible to install post-fit Idling Stop device.
Important parameters	Monitored: • Cumulative Idling Period of all vehicles of type i in year y; • Total number of times of Idling Stop of vehicle i in the year y.
BASELINE SCENARIO Vehicles used for public transportation continue idling.	
PROJECT SCENARIO Vehicles used for public transportation using a post-fit type Idling Stop device that will turn off the vehicle engine and prevent idling.	

AMS-III.AQ. Introduction of Bio-CNG in transportation applications

Typical project(s)	Production of Biogenic Compressed Natural Gas (Bio-CNG) from renewable biomass and use in transportation applications. The Bio-CNG is derived from various sources such as biomass from dedicated plantations; waste water treatment; manure management; biomass residues.
Type of GHG emissions mitigation action	• Renewable Energy. Displacement of more-GHG-intensive fossil fuel for combustion in vehicles.
Important conditions under which the methodology is applicable	• Bio-CNG is used in Compressed Natural Gas (CNG) vehicles, modified gasoline and/or diesel vehicles; • Methane content of the Bio-CNG meets relevant national regulations or a minimum of 96 per cent (by volume); • Conditions apply if the feedstock for production of the Bio-CNG is derived from dedicated plantation; • Export of Bio-CNG is not allowed; • Only the producer of the Bio-CNG can claim emission reductions.
Important parameters	At validation: • Determine fraction of gasoline (on mass basis) in the blend where national regulations require mandatory blending of the fuels with biofuels; • Amount of gasoline consumption in the baseline vehicles ex ante.
	Monitored: • Amount of Bio-CNG produced/distributed/sold/consumed directly to retailers, filling stations; • Parameters for calculating methane emissions from physical leakage of methane; • Parameters for determining project emissions from renewable biomass cultivation.
BASELINE SCENARIO Gasoline or CNG are used in the baseline vehicles.	
PROJECT SCENARIO Only Bio-CNG are used in the project vehicles.	

AMS-III.AR. Substituting fossil fuel based lighting with LED/CFL lighting systems

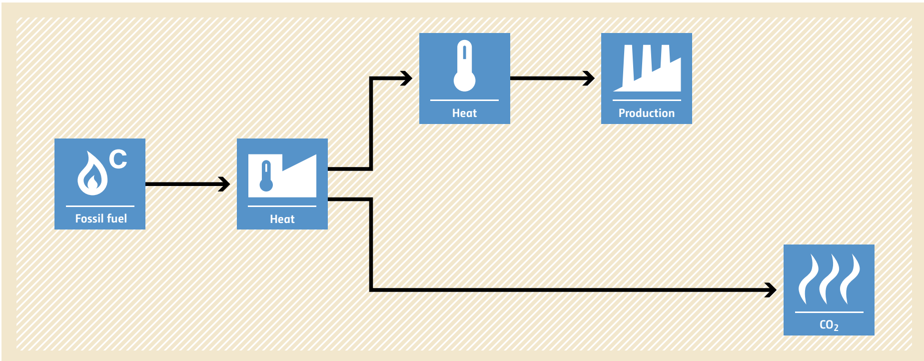


Typical project(s)	Activities that replace portable fossil fuel based lamps (e.g. wick-based kerosene lanterns) with battery-charged LED or CFL based lighting systems in residential and/or non-residential applications (e.g. ambient lights, task lights, portable lights).
Type of GHG emissions mitigation action	• Renewable energy; • Energy efficiency. Displacement of more-GHG-intensive service (lighting).
Important conditions under which the methodology is applicable	• Project lamps whose batteries are through: – A renewable energy system (e.g. a photovoltaic system or mechanical system such as a hand crank charger); – A standalone distributed generation system (e.g. a diesel generator set) or a mini-grid; – A grid that is connected to regional/national grid; – A combination of the above options; • When the LED/CFL lighting system has more than one LED/ CFL lamp connected to a single rechargeable battery system, each LED/CFL lamp may be considered as one project lamp; • At a minimum, project lamps shall be certified by their manufacturer to have a rated average operational life of at least: – 5,000 hours where project lamps are assumed to operate for two years after distribution to end-users (i.e. emission reductions are not credited beyond two years). Under this option, ex post monitoring surveys to determine the percentage of project lamps in service in year *y* are not required; – 10,000 hours where project lamps are assumed to operate for up to seven years after distribution to end-users (i.e. emission reductions are not credited beyond seven years). Under this option, more stringent requirements (e.g. test on light output, ex post monitoring surveys) are specified; • Project lamps shall have a minimum of one year warranty; • The replaced baseline lamps are those that directly consume fossil fuel.
Important parameters	Monitored: • Recording of project lamp distribution data; • In some cases, ex post monitoring surveys to determine percentage of project lamps distributed to end users that are operating and in service in year y.
BASELINE SCENARIO Use of fossil fuel based lamps.	
PROJECT SCENARIO Use of LED/CFL based lighting systems.	

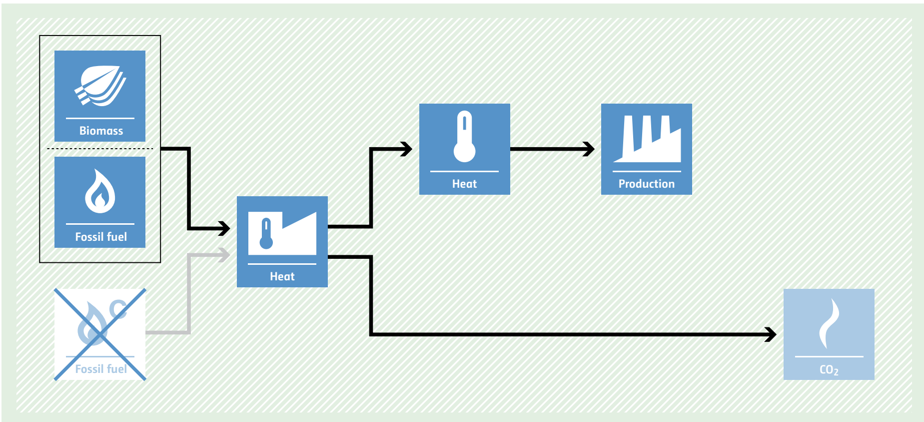
AMS-III.AS. Switch from fossil fuel to biomass in existing manufacturing facilities for non-energy applications

Typical project(s)	Activities for fuel switching (complete or partial) from the use of carbon intensive energy source (or a mix of energy sources) of fossil origin to renewable biomass or a mix of renewable biomass and fossil fuel in existing manufacturing facilities (e.g. steel, ceramics, aluminium, lime, clinker production).
Type of GHG emissions mitigation action	• Fuel Switch. Complete or partial switch from fossil fuel to biomass in non-energy applications.
Important conditions under which the methodology is applicable	• The switch occurs at a manufacturing facility with three years of historical data; • The type of inputs and products are equivalent (outputs with same or better service level as compared to the baseline); • If the biomass feedstock is sourced from dedicated plantation, the pre-project activities such as grazing and collection of biomass must be accommodated for within the project activity; • Syngas derived from renewable energy source is eligible; • Renewable biomass utilized by the project activity shall not be chemically processed.
Important parameters	At validation: • Quantity of fossil fuel use; • Baseline raw material consumption and product output.
	Monitored: • The annual production output of the process or in cases where product output cannot be measured annual net project raw materials consumption; • Net quantity of biomass; • Quantity of fossil fuel or amount of electricity consumed; • Net calorific value/ Moisture content of biomass; • Parameters to estimate project emissions from the cultivation of biomass.

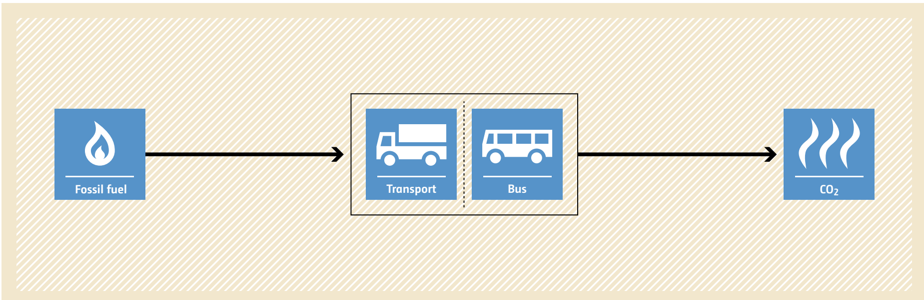
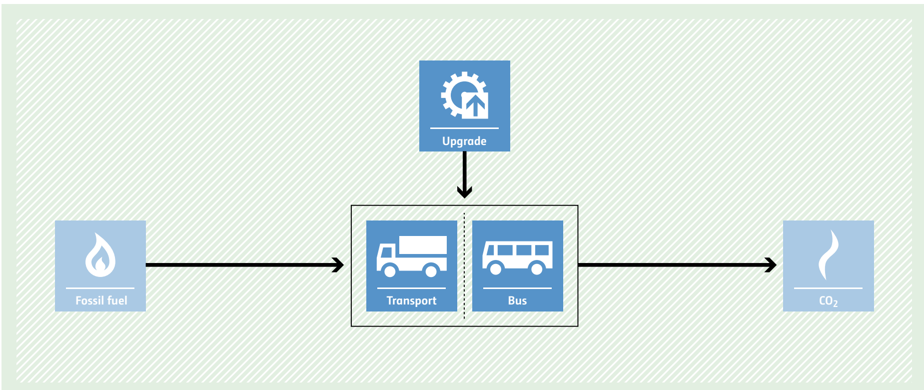
BASELINE SCENARIO
Use of fossil in manufacturing production process.



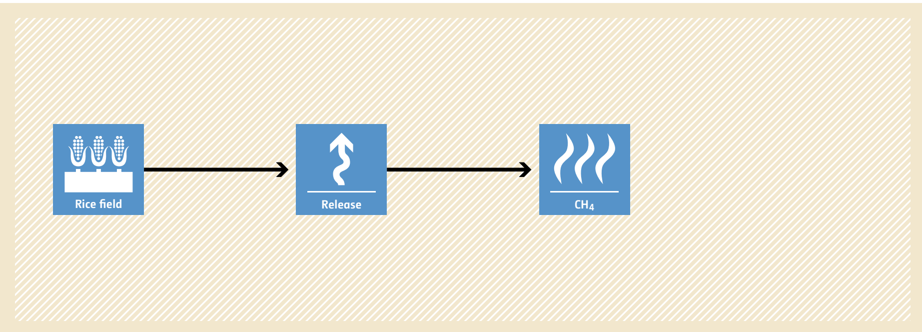
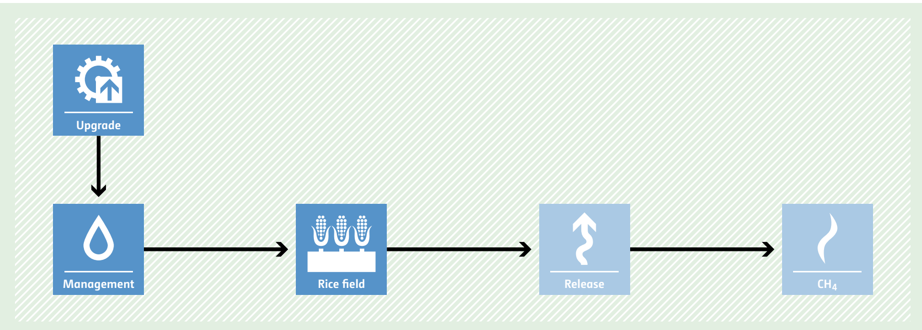
PROJECT SCENARIO
Use of renewable biomass or mix of biomass/fossil fuel in manufacturing production process.



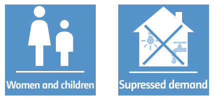
AMS-III.AT. Transportation energy efficiency activities installing digital tachograph systems or similar devices to transport fleets

Typical project(s)	Project activities that install digital tachograph systems or another device that monitors vehicle and driver performance and provides real-time feedback to drivers in freight vehicles and/or commercial passenger vehicles.
Type of GHG emissions mitigation action	• Energy Efficiency. Reduction of fossil fuel use and corresponding emissions through energy efficiency improvements.
Important conditions under which the methodology is applicable	• This methodology applies to freight vehicle fleets and/or passenger vehicle fleets that are centrally controlled and managed by a single entity; • The project activity is unlikely to change the level of service of the vehicle fleet provided before the project activity; • The project activity does not involve a fuel switch in existing vehicles; • This methodology is not applicable to project activities in locations where the installation of the device is mandatory by law; • For freight vehicle fleets, project participants shall identify the traceable routes along which the vehicles operate, the characteristics of those routes, the level of service on each route, the vehicles that are in use on each traceable route before and after project implementation.
Important parameters	Monitored: • Total distance travelled by each vehicle; • The vehicles are identified based on the age, characteristics and load capacity and availability of historical data; • Annual average distance of transportation per tonne of freight by each project vehicle; • Consumption of fuel by vehicle; • Total annual goods transported by each project vehicle; • Annual monitoring to check if devices have become a mandatory practice, or that highly-enforced anti-idling policies or legislation have been put into place; • Monitoring to ensure that all device and feedback systems including fuel flow sensors (meters) are operating correctly and have not been disabled.
BASELINE SCENARIO Fossil fuel consumption due to inefficient driving.	
PROJECT SCENARIO A digital tachograph system or similar device reduces fossil fuel consumption in vehicles by providing to the driver feedback against inefficient driving, and thus encouraging efficient driver behaviour which results in improved vehicle fuel efficiency.	

AMS-III.AU. Methane emission reduction by adjusted water management practice in rice cultivation

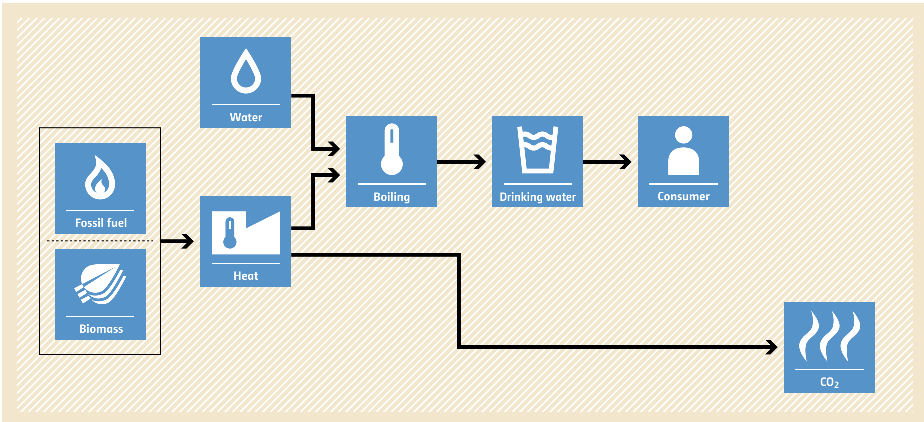
Typical project(s)	Rice farms that change the water regime during the cultivation period from continuously to intermittent flooded conditions and/or a shortened period of flooded conditions; alternate wetting and drying method and aerobic rice cultivation methods; and rice farms that change their rice cultivation practice from transplanted to direct seeded rice.
Type of GHG emissions mitigation action	• GHG emission avoidance. Reduced anaerobic decomposition of organic matter in rice cropping soils.
Important conditions under which the methodology is applicable	• Rice cultivation in the project area is predominantly characterized by irrigated, flooded fields for an extended period of time during the growing season; • The project rice fields are equipped with controlled irrigation and drainage facilities; • The project activity does not lead to a decrease in rice yield. Likewise, it does not require the farm to switch to a cultivar that has not been grown before; • Training and technical support during the cropping season is part of the project activity; • The introduced cultivation practice, including the specific cultivation elements, technologies and use of crop protection products, is not subject to any local regulatory restrictions; • If not using the default value approach, project participants shall have access to infrastructure to measure CH_4 emissions from reference fields using closed chamber method and laboratory analysis.
Important parameters	Monitored: • Three options are provided: – Option 1: Field measurements to determine of baseline emission factor and project emission factor ($kgCH_4$/ha per season or day); – Option 2: Default values adjusted by region specific field measurements to determine baseline emission factor and project emission factor ($kgCH_4$/ha per season or day); – Option 3: Default values for baseline emission factor and project emission factor ($kgCH_4$/ha per season or day); • Aggregated project area; • Monitoring of farmers' compliance with project cultivation practice.
BASELINE SCENARIO Generation of methane due to anaerobic decomposition of organic matter in rice cropping soils.	
PROJECT SCENARIO Methane emission avoidance, for example, by changing the water regime during the cultivation period from continuously to intermittent flooded conditions and/or a shortened period of flooded conditions.	

AMS-III.AV. Low greenhouse gas emitting safe drinking water production systems

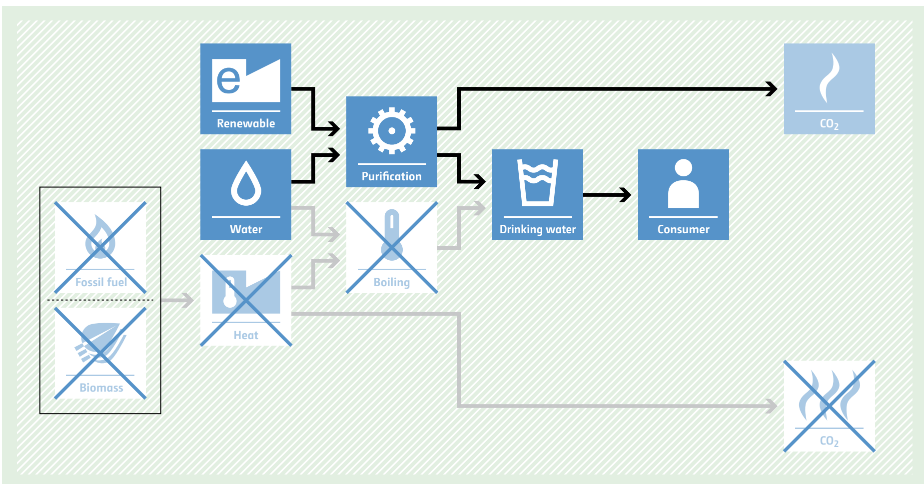


Typical project(s)	Project activities that introduce low GHG emitting water purification systems to provide safe drinking water and displace water boiling using non-renewable biomass or fossil fuels. Water kiosks that treat water using one or more of the following technologies: chlorination, combined flocculant/disinfection powders and solar disinfection are also eligible.
Type of GHG emissions mitigation action	Displacement of a more-GHG-intensive output.
Important conditions under which the methodology is applicable	• Prior to the implementation of the project activity, a public distribution network supplying safe drinking water to the project boundary does not exist; • The application of the project technology/equipment shall achieve compliance either with: (i) the comprehensive protection performance target as per "Evaluating household water treatment options: Health based targets and microbiological performance specifications" (WHO, 2011); or (ii) an applicable national standard or guideline; • In cases where the life span of the water treatment technologies is shorter than the crediting period of the project activity, there shall be documented measures in place to ensure that end users have access to replacement purification systems of comparable quality.
Important parameters	Monitored: • Checking of appliances to ensure that they are still operating or are replaced by an equivalent; • Quantity of purified water; • Annual check if a safe drinking water public distribution network is installed; • Safe drinking water quality; • Total electricity and fossil fuel consumption by the project activity.

BASELINE SCENARIO
Fossil fuel/non-renewable biomass consumption for water boiling as a mean for water purification.



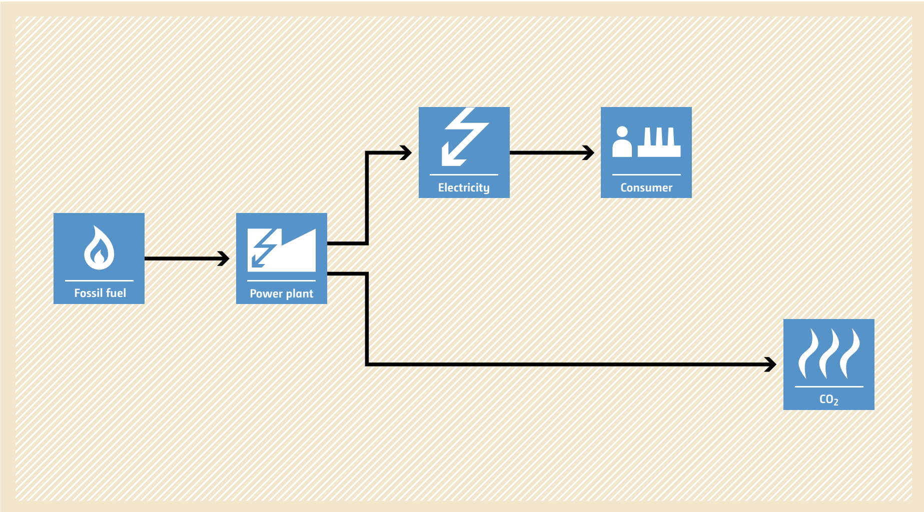
PROJECT SCENARIO
Low greenhouse gas emitting water purification system ensures safe drinking water supply.



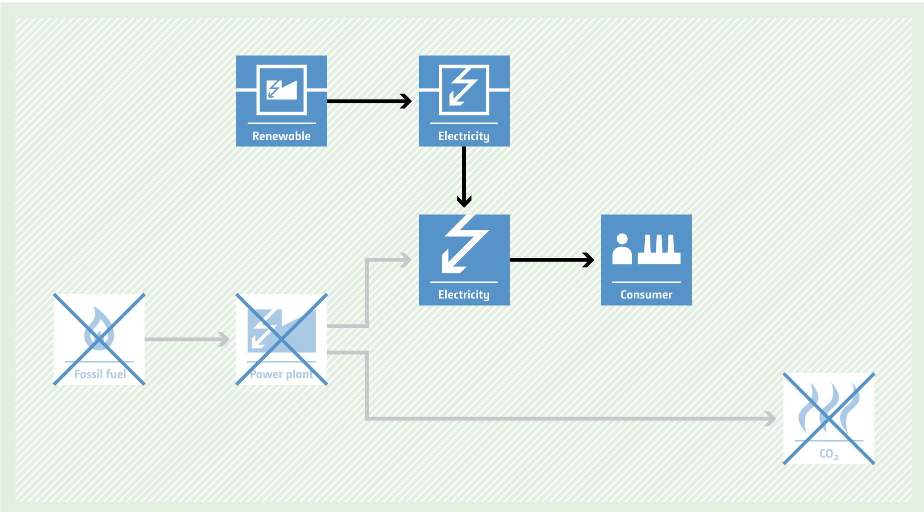
AMS-III.AW. Electrification of rural communities by grid extension

Typical project(s)	Rural communities which were not connected to a grid prior to project implementation are supplied with electricity by connection to a national or regional grid.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of electricity that would be provided by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• End-users are not connected to a grid prior to the project; • Existing renewable mini-grid electricity is not displaced by the project; • Emission reductions can only be claimed, if the renewable electricity generation in the grid is greater than or equal to 99% of the total electricity generation.
Important parameters	At validation: • In case of a diesel-based mini-grid, fuel consumption and electricity generation of mini-grid connected plants (the most recent data from the last three years).
	Monitored: • Net amount of renewable electricity delivered to the project area.

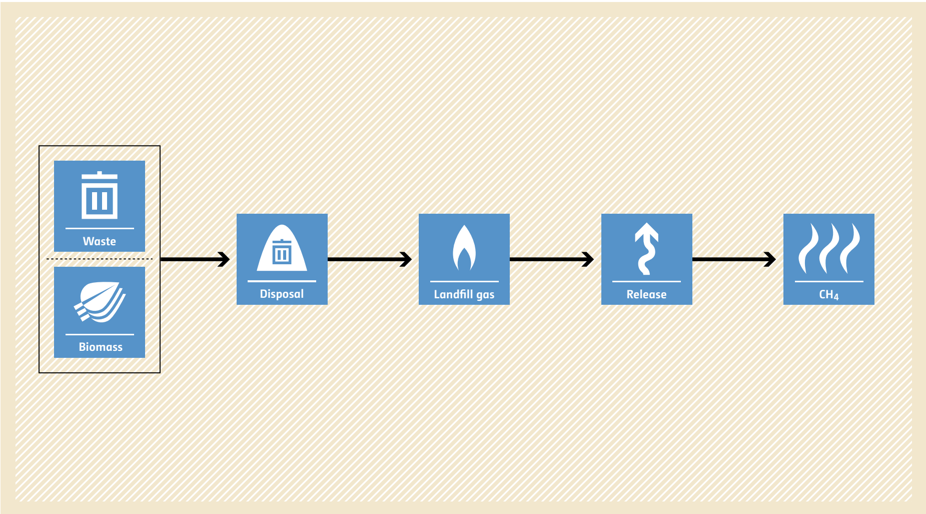
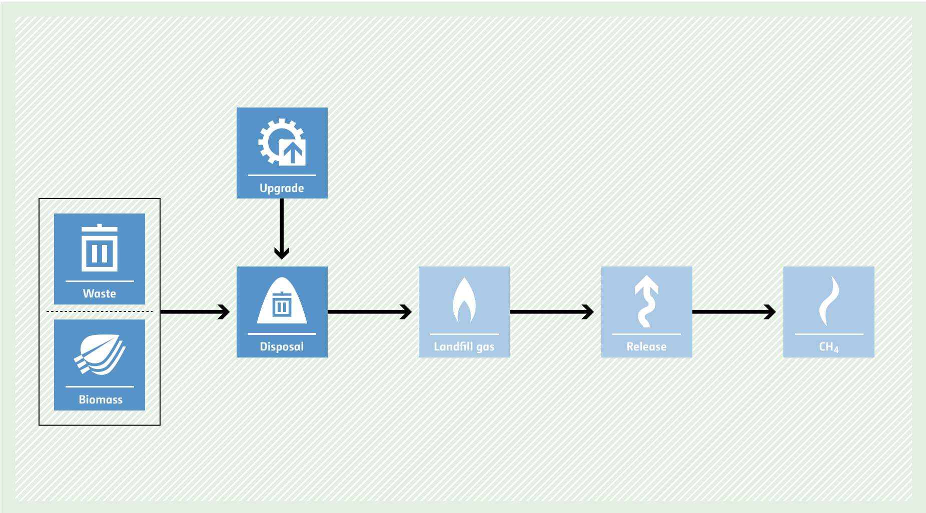
BASELINE SCENARIO
In the absence of the project activity, the end users would have used diesel generator to generate electricity.



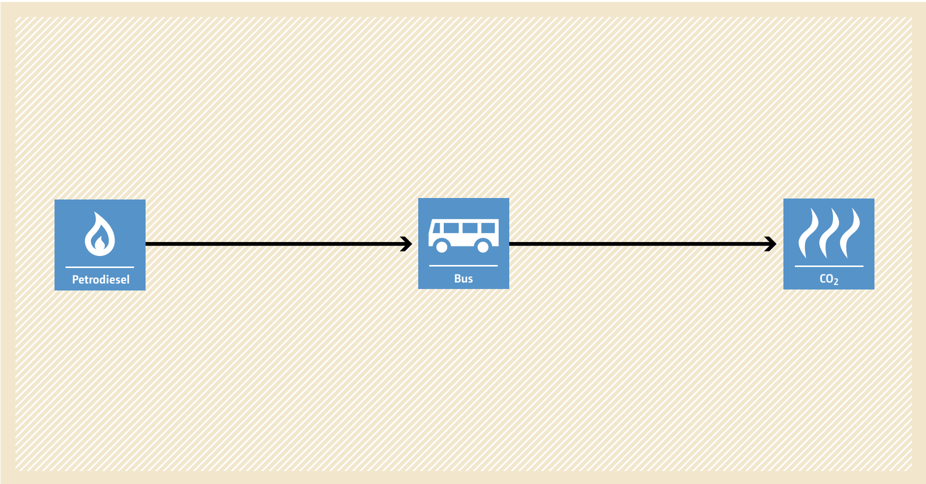
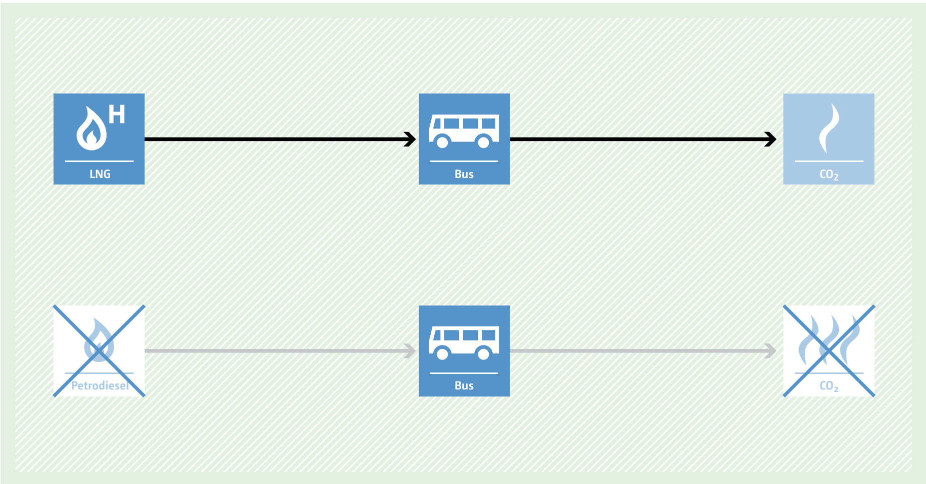
PROJECT SCENARIO
End users are supplied electricity with a grid with high shares of renewable generation (i.e. 99%).



AMS-III.AX. Methane oxidation layer (MOL) for solid waste disposal sites

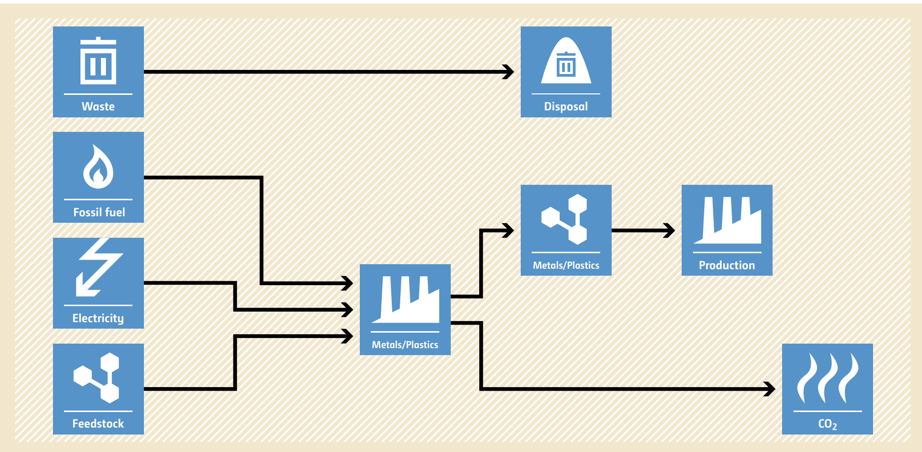
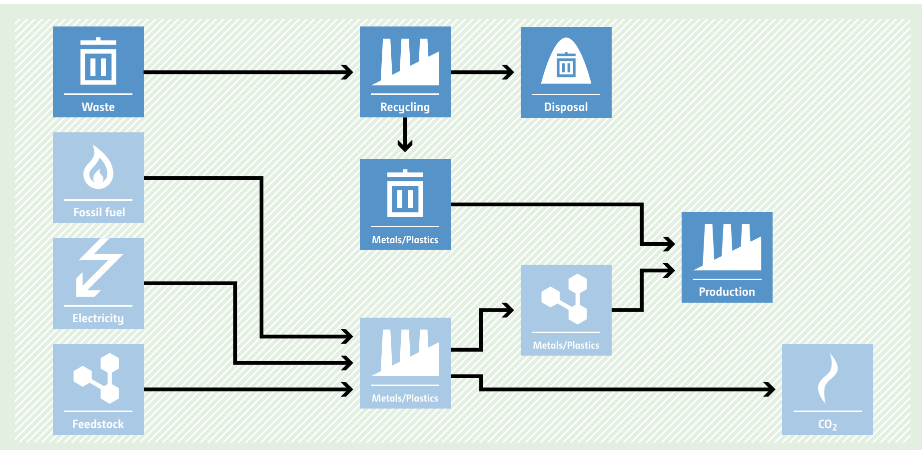
Typical project(s)	Project activities involving the construction of a methane oxidation layer (MOL) on top of a municipal solid waste disposal site (SWDS) to avoid the release of methane through biological oxidation in the MOL.
Type of GHG emissions mitigation action	• GHG destruction. Avoidance of methane emissions from solid waste disposal sites.
Important conditions under which the methodology is applicable	• It is applicable where landfill gas collection and treatment is not applicable due to low concentration of landfill gas (less than 4 L $CH_4 \cdot m^{-2} \cdot h^{-1}$) or other reasons; • It is not applicable at SWDS with an active gas extraction system, or that are still receiving wastes for disposal or where a MOL is required by legal regulation.
Important parameters	Monitored: • Parameters related to methane oxidising material quality such as TOC, ammonium and nitrite have to be analyzed; • Parameters related to MOL construction properties, e.g. thickness of MOL and gas distribution layer/balancing layer during application; • Parameters related to methane oxidation performance, e.g. measured volume fraction of methane in the middle of the distribution layer.
BASELINE SCENARIO Biomass and other organic matter in waste are left to decay and methane is emitted into the atmosphere.	
PROJECT SCENARIO Methane that would have been released is oxidized in the MOL.	

AMS-III.AY. Introduction of LNG buses to existing and new bus routes

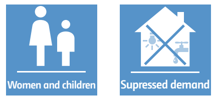
Typical project(s)	Introduction and operation of new LNG buses for passengers transportation to existing and new routes.
Type of GHG emissions mitigation action	• Fuel switch. Displacement of more-GHG-intensive vehicles.
Important conditions under which the methodology is applicable	• The existing and new routes are fixed; • On each route only one type of bus and fuel are used; • For the new routes it should be demonstrated that these new routes have been planed prior to the start date of the project activity and serviced by fossil fuel busses; • The project and baseline frequency of operation of the buses should be the same; • The project and baseline buses should be with comparable passengers capacity and power rating.
Important parameters	At validation: • Baseline fuel data (NCV and emission factor). Monitored: • Specific fuel consumption of baseline buses; • Total annual distance travelled by baseline buses; • Fuel consumption of the project buses.
BASELINE SCENARIO Buses use diesel or comparable fossil fuel.	
PROJECT SCENARIO Buses use LNG only.	

AMS-III.BA. Recovery and recycling of materials from E-waste

Women and children

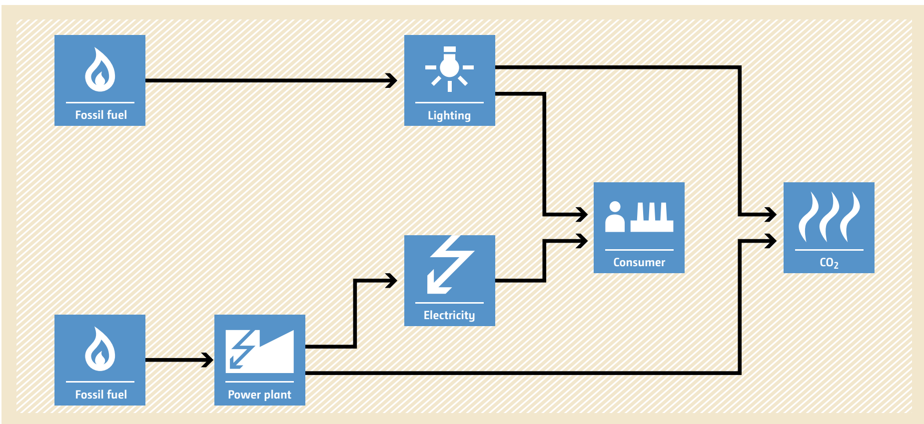
Typical project(s)	Collection and recycling activities of E-waste, comprising of end-of-life, discarded, surplus, obsolete, or damaged electrical and electronic equipment, performed in dedicated facilities with the aim of recovering materials such as ferrous metals, non-ferrous metals, plastics.
Type of GHG emissions mitigation action	• Energy efficiency. Reduction of production of metals and plastics from virgin materials, thus reducing related energy consumption.
Important conditions under which the methodology is applicable	• This methodology applies to the recycling of the following materials: aluminium, steel, copper, gold, silver, palladium, tin, lead; Acrylonitrile Butadiene Styrene (ABS), High Impact Polystyrene (HIPS); • Materials recycled under the project activity are recovered only from end-of-life E-wastes; • The properties of the metals and plastics produced from E-waste recycling are the same as those of the metals and plastics from virgin materials; • The ex ante baseline recycling rate of E-waste is equal to or smaller than 20% of the total amount of E-waste. Where the baseline recycling rates exceed 20%, the project activity has to lead to significantly higher rates of recycling in the region/country.
Important parameters	Monitored: • Quantity of material recycled and sent to a processing or manufacturing facility; • Percentage of plastics produced in the host party out of total plastic consumed; • Percentage of plastics imported by the host party out of total plastic consumed; • Electricity and fossil fuel consumption at the recycling facility; • Evidence that the materials recycled under the project activity are recovered only from end-of-life E-wastes.
BASELINE SCENARIO Metals and plastics are produced from virgin raw materials resulting in high energy consumption.	
PROJECT SCENARIO Production of metals and plastics based on virgin raw material is reduced. Use of recycled material results in less energy consumption.	

AMS-III.BB. Electrification of communities through grid extension or construction of new mini-grids

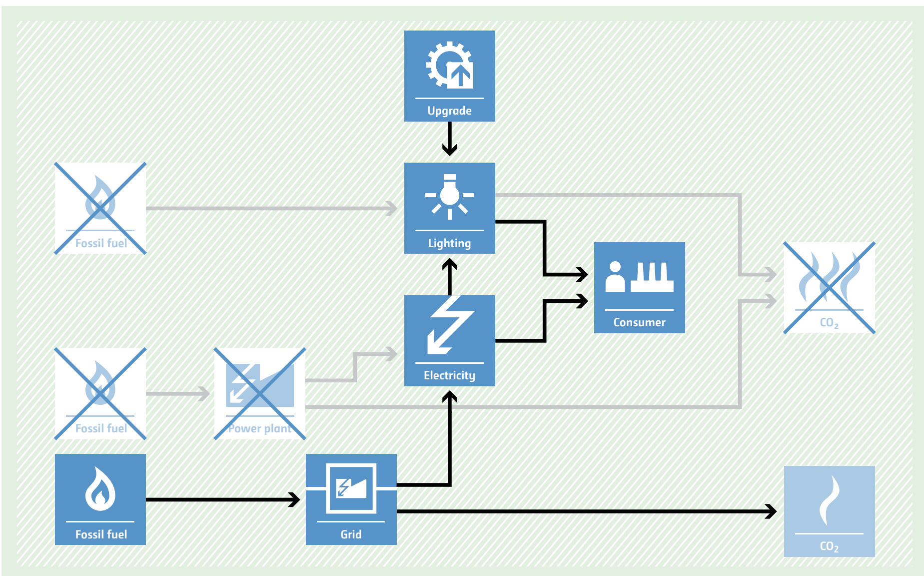


Typical project(s)	The project activity supplies electricity to consumers who, prior to project implementation, were not connected to a national/regional grid and were supplied by a high-carbon-intensive mini-grid or stand-alone power generators. Also fuel-based lighting systems might have been used before the project implementation.
Type of GHG emissions mitigation action	• Displacement of more-GHG-intensive output. Low-carbon-intensive grid/mini-grid electricity displaces high-carbon-intensive electricity or lighting services.
Important conditions under which the methodology is applicable	• Limited to communities with no access to a national or regional grid; • At least 75% of the end users (by number) shall be households.
Important parameters	At validation: • The physical location of each consumer and the anticipated connected load and usage hours of each consumer.
	Monitored: • Metering of total electricity delivered to consumers (e.g. at a substation). Prepaid devices for purchase of electricity can also be used for the purpose of metering; • Metering of electricity consumption of all non-household end users (e.g. commercial consumers, SMMEs, public institutions, street lighting, irrigation pumps) and household end-users expected to consume more than 1000 kWh/year.

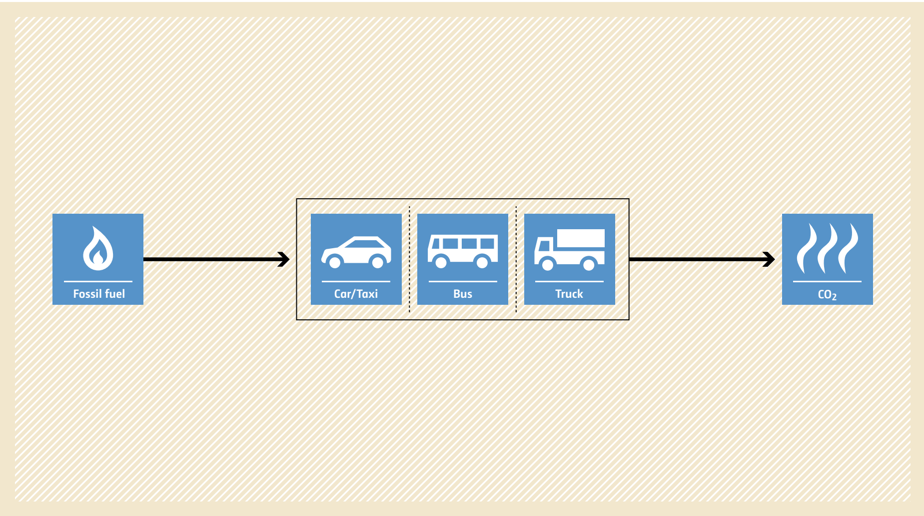
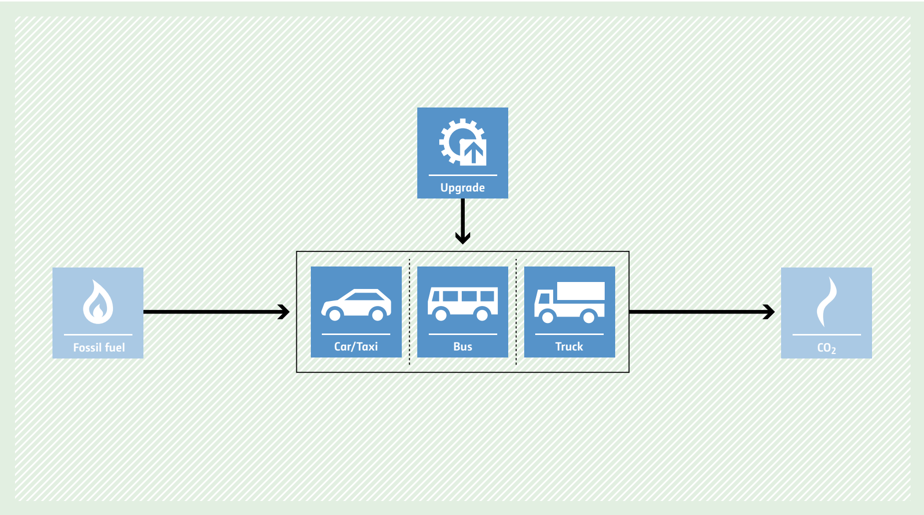
BASELINE SCENARIO
In the absence of the project activity, the end users would have used fossil fuel based lighting, stand-alone diesel electricity generators for appliances other than lighting (e.g. TV) or would have been supplied by fossil-fuel-based mini-grid.



PROJECT SCENARIO
Consumers are supplied with electricity by connection to a national or regional or mini grid or by a new mini-grid.



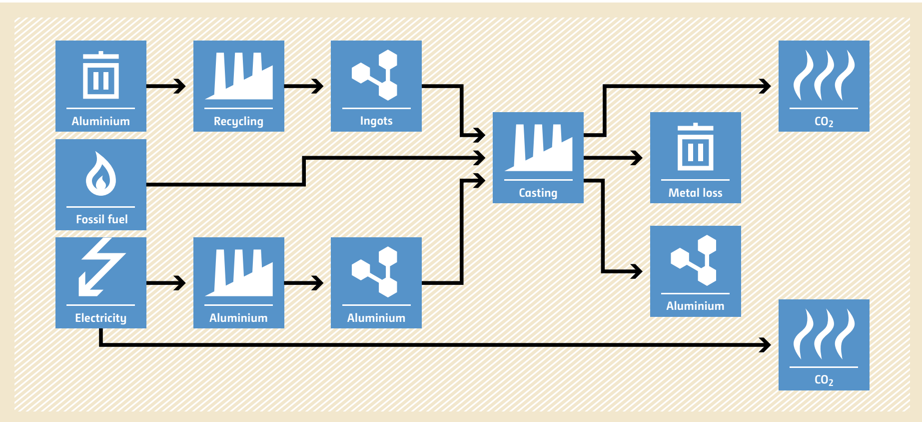
AMS-III.BC. Emission reductions through improved efficiency of vehicle fleets

Typical project(s)	Improvement of the operational efficiency of vehicle fleets (e.g. fleets of trucks, buses, cars, taxis or motorized tricycles).
Type of GHG emissions mitigation action	• Energy efficiency. Fossil fuels savings through various equipment and/or activity improvement.
Important conditions under which the methodology is applicable	• Implementation of idling stop device, eco-drive systems, tire-rolling resistance improvements, air-conditioning system improvements, use of low viscosity oils, aerodynamic drag reduction measures and/or transmission improvements, retrofits that improve engine efficiency; • Vehicle fleets shall be centrally owned and managed by a single entity and driven by contractors or employees of the central entity; • Technologies employed to improve combustion efficiency without improvements in engine efficiency are not applicable.
Important parameters	Monitored: • Specific baseline and project fuel consumption of the vehicle categories; • Average gross weight per vehicle of the vehicle categories; • Activity levels (travelled distance) of the project vehicle categories.
BASELINE SCENARIO Fossil fuel consumption due to inefficient operation of vehicle fleets.	
PROJECT SCENARIO Reduced fossil fuel consumption due to improved operational efficiency of vehicle fleets.	

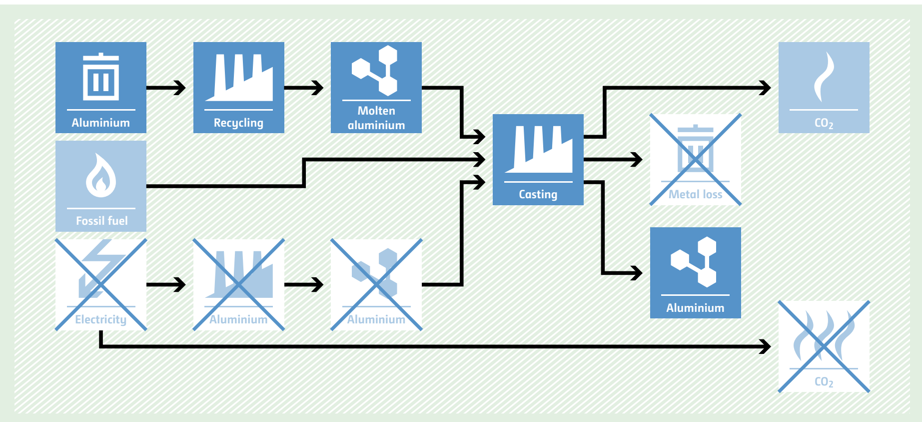
AMS-III.BD. GHG emission reductions due to supply of molten metal instead of ingots for aluminium castings

Typical project(s)	Construction and operation of scrap aluminium recycling units to directly supply molten aluminium instead of ingots to casting units, thereby reducing GHG emissions on the account of avoided use of energy tore-melt aluminium ingots and produce equivalent quantity of primary aluminium due to metal loss during re-melting of aluminium ingots.
Type of GHG emissions mitigation action	• Feedstock switch; • Energy efficiency. Displacement of a more-GHG-intensive output. Savings of energy due to direct supply of molten aluminium to casting units.
Important conditions under which the methodology is applicable	• For project implemented in existing facilities, both recycling and casting units have a history of operation for at least three years prior to the start of the project activity; • Mandatory investment analysis for baseline determination if the project size is greater than 600 t CO_2 per year per casting unit; • Hot metal transport between the recycling facility and casting unit is undertaken in closed ladle; • Contractual agreement between the recycling facility and casting unit to avoid double counting of emission reductions; • Production outputs in baseline and project scenarios remain homogenous and within a range of ±10% with no change in installed capacity.
Important parameters	At validation: • Percentage loss of aluminium due to oxidation during the process of re-melting of ingots; • Efficiency of the furnace at the casting unit to which the molten metal is being supplied. Monitored: • Quantity of molten aluminium supplied; • Energy consumption associated to the transportation of molten metal.

BASELINE SCENARIO
Supply of aluminium ingots to the casting units from the aluminium metal recycling facilities. The casting units melt the ingots using fossil fuel and/or electricity before being moulded. During the melting of ingots, some aluminium metal is lost because of oxidation.



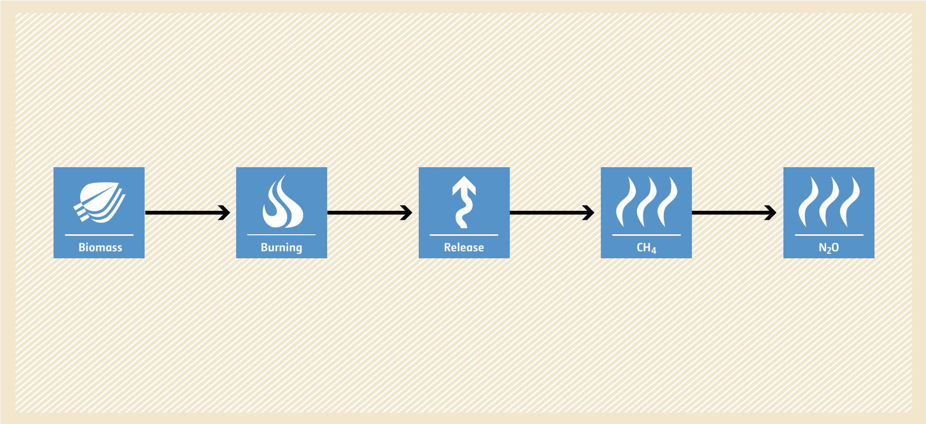
PROJECT SCENARIO
Direct supply of molten aluminium from aluminium recycling units avoids the remelting of ingots in the casting units and thus reduces the energy use for the production of aluminium.



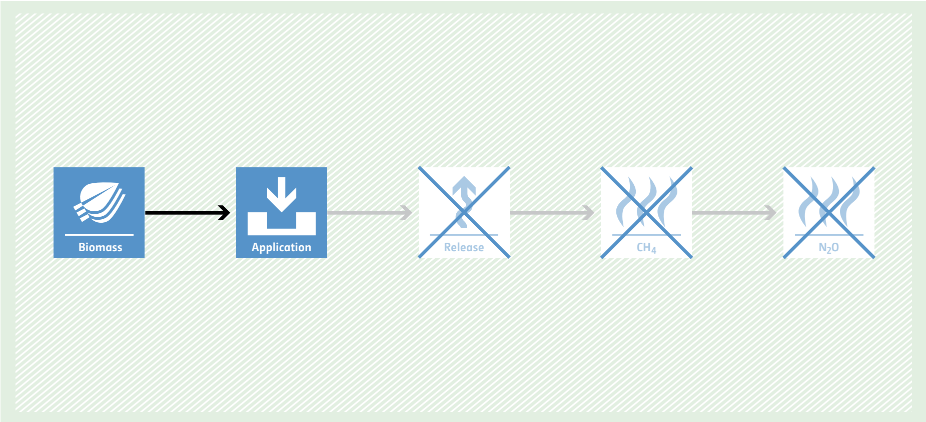
AMS-III.BE. Avoidance of methane and nitrous oxide emissions from sugarcane pre-harvest open burning through mulching

Typical project(s)	Aerobic treatment of biomass from sugarcane harvesting by mulching.
Type of GHG emissions mitigation action	• GHG emission avoidance. Methane and nitrous oxide emissions avoidance by replacing pre-harvest open burning of sugarcane biomass with mulching of sugarcane biomass.
Important conditions under which the methodology is applicable	• It shall be established ex ante at the beginning of the project activity that open burning is not legally prohibited in the project region and it is the common practice; • It can be demonstrated that the participating farms have been cultivating only sugarcane or, have been cultivating sugarcane as well as other crops on the same land in the immediate three years prior to the starting date of the project activity; • If sugarcane biomass is stored before the mulching process, the storage time shall be less than 7 days.
Important parameters	At validation: • Cultivation of sugarcane in the farms; • Open burning status before the implementation of project activity.
	Monitored: • Mulching process of sugarcane biomass residues; • Status of open burning after the project activity; • Sugarcane yield and raw sugar production.

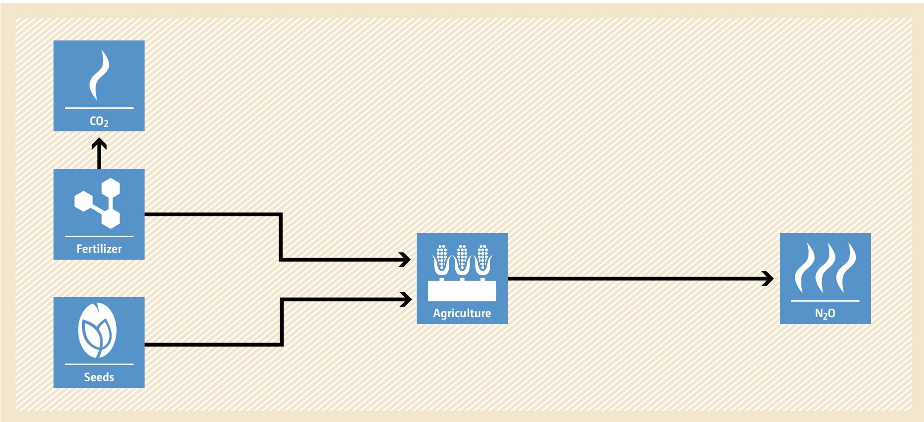
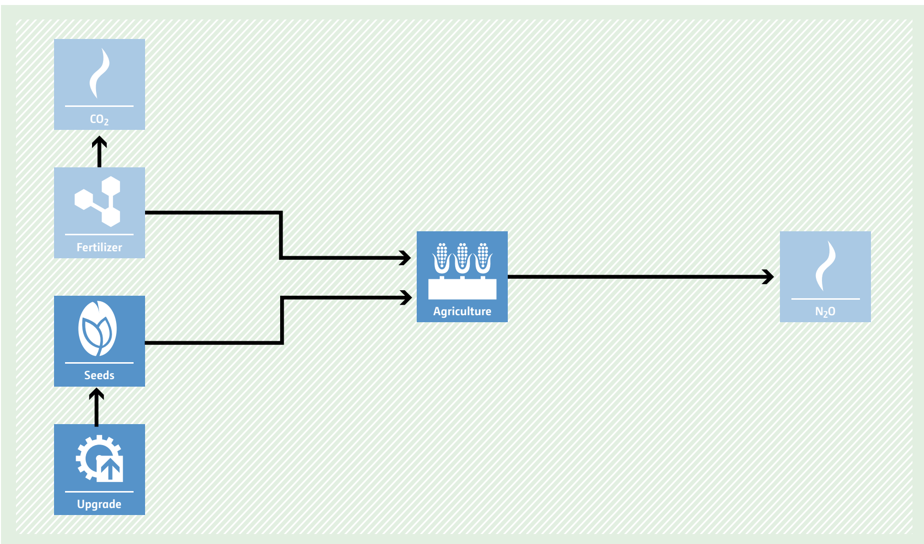
BASELINE SCENARIO
Sugarcane biomass residues are burnt in open fire.



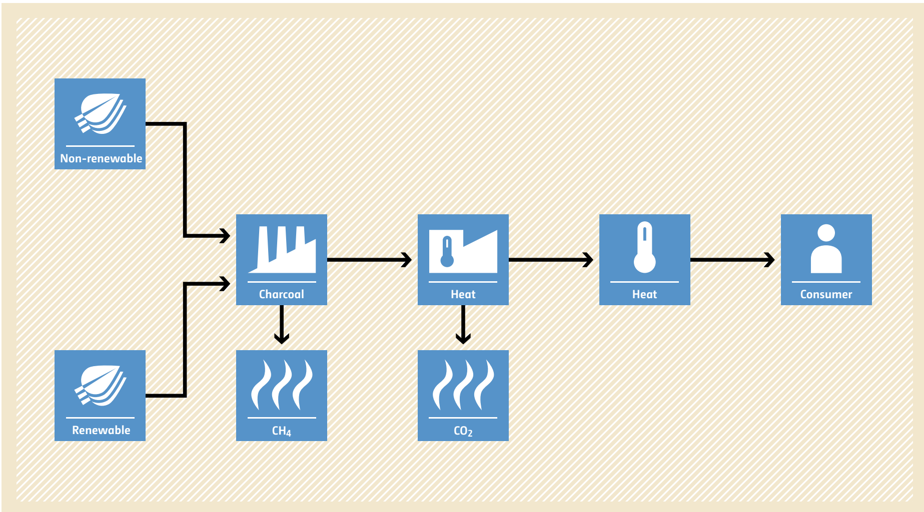
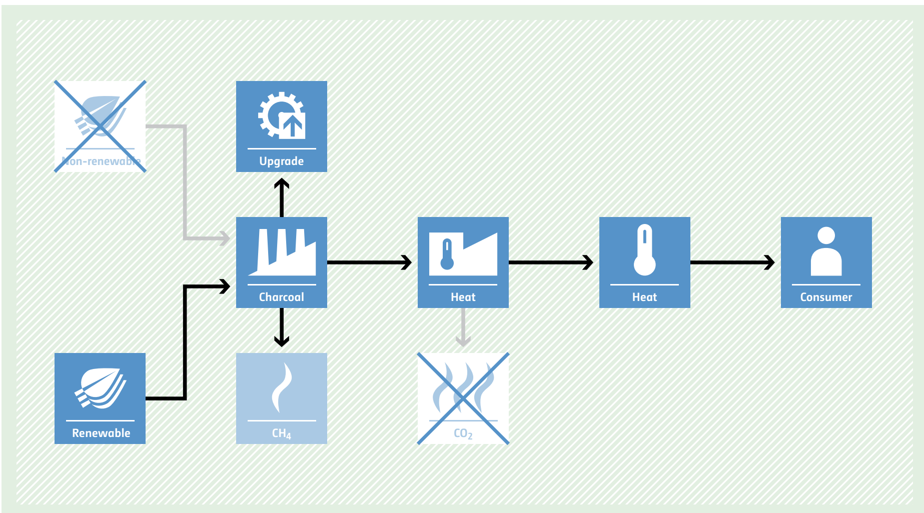
PROJECT SCENARIO
Sugarcane biomass residues are collected and applied in the field by mulching.



AMS-III.BF. Reduction of N_2O emissions from use of Nitrogen Use Efficient (NUE) seeds that require less fertilizer application

Typical project(s)	Use of a genetically distinct type of seed for crops that will utilize nitrogen more efficiently.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of N_2O emissions from agricultural activity by reducing the amount of fertilizer used by the crop.
Important conditions under which the methodology is applicable	• The seeds have been genetically engineered to modify genes in nitrogen assimilation and metabolic pathways in ways that significantly increase the quantity of crop output per unit of nitrogen available for plant use; • The containers of NUE seed must be clearly marked as such and always remain segregated from other seed; • Technologies/measures where the savings in synthetic nitrogen fertilizer applications are attributable in total or in part to enhanced biological fixation (e.g. by rhizobia activity) are not applicable.
Important parameters	At validation: • Historic data for synthetic nitrogen fertilizer, crop yield, and management practices.
	Monitored: • Amount of crop produced by the project activity; • Cultivated area; • Total quantity of nitrogen fertilizers utilized by the farms/fields utilizing the baseline and project technology; • Area cultivation efficiency (productivity) in the project scenario.
BASELINE SCENARIO Use of traditional seeds and nitrogen fertilizer rates, in order to achieve the same crop output as in the project scenario.	
PROJECT SCENARIO Use of NUE seeds and reduced nitrogen fertilizer rates, in order to achieve the same crop output as in the baseline scenario.	

AMS-III.BG. Emission reduction through sustainable charcoal production and consumption

Typical project(s)	Project activities that displace the use of non-renewable biomass in the production of charcoal supplied to identified consumers.
Type of GHG emissions mitigation action	• Fuel or feedstock switch; • Energy efficiency. Displacement of more GHG intensive, non-renewable biomass fuelled applications by introducing more efficient technologies.
Important conditions under which the methodology is applicable	• End users of charcoal shall be: (i) households; or (ii) small and medium enterprises (SME); or (iii) a group of households served by a charcoal market; • The project activity shall introduce efficient charcoal production technologies, including micro gasifier stoves.
Important parameters	At validation: • Kiln used in the baseline scenario; • Feedstock used in the baseline kiln.
	Monitored: • Produced quantity of charcoal; • Energy consumption; • End-user of charcoal produced in project activities.
BASELINE SCENARIO Production of charcoal by using non-renewable and renewable biomass.	
PROJECT SCENARIO Production of charcoal by using renewable biomass in a more efficient way.	

AMS-III.BH. Displacement of production of brick and cement by manufacture and installation of gypsum concrete wall panels

Typical project(s)

Replacement of brickwork with less GHG intensive gypsum concrete wall panels in construction of walls.

Type of GHG emissions mitigation action

- GHG emission avoidance.

Displacement of a more GHG intensive construction material.

Important conditions under which the methodology is applicable

- Domestically produced gypsum concrete wall panel shall be used for applications such as non load-bearing walls, load-bearing walls and fencing (compound/security walls) in Greenfield building projects or expansion of existing buildings;
- The proportion of imported cement is less than 10% of the cement produced within the host country where the projects are hosted;
- A declaration from the panel buyers and or final users stating that they would not claim CERs for the panels used by them is required to avoid double counting.

Important parameters

At validation:

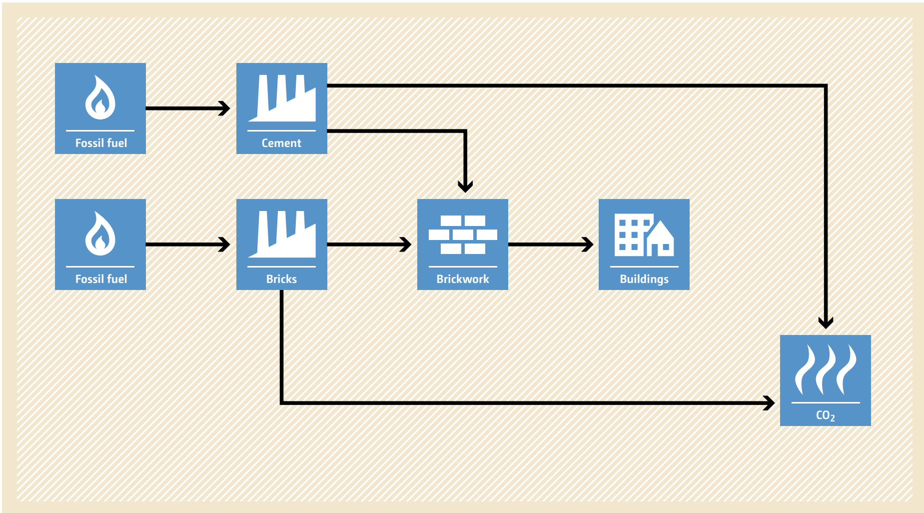
- Type of applications of gypsum concrete wall panels;
- Gypsum concrete composition;
- Number of bricks and quantity of cement used per square meter of wall in the baseline scenario.

Monitored:

- Area of wall panel sold and used by final consumers;
- Quantity of raw material consumed in the production of gypsum concrete wall panel;
- End-user of charcoal produced in project activities.

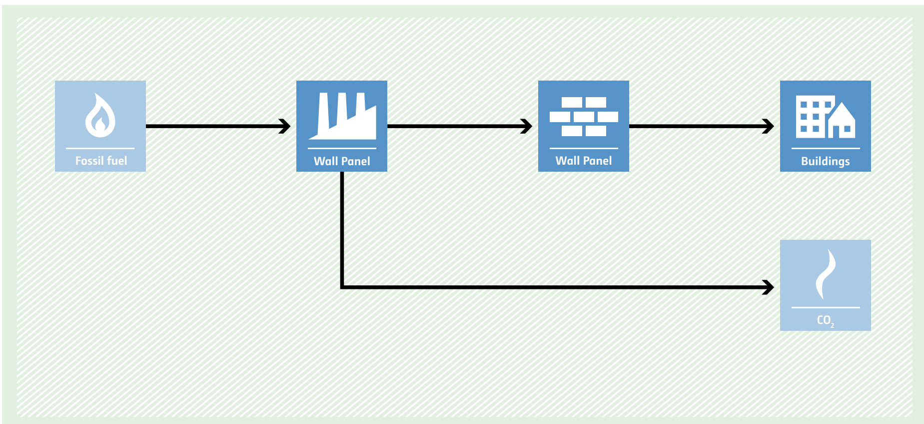
BASELINE SCENARIO

Use of traditional construction material such as brick and cement in brickwork for construction of walls.

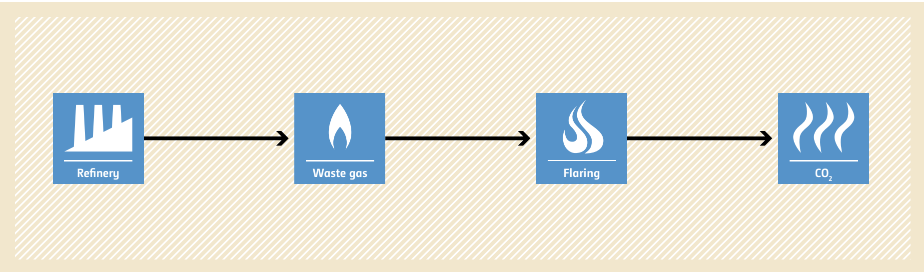
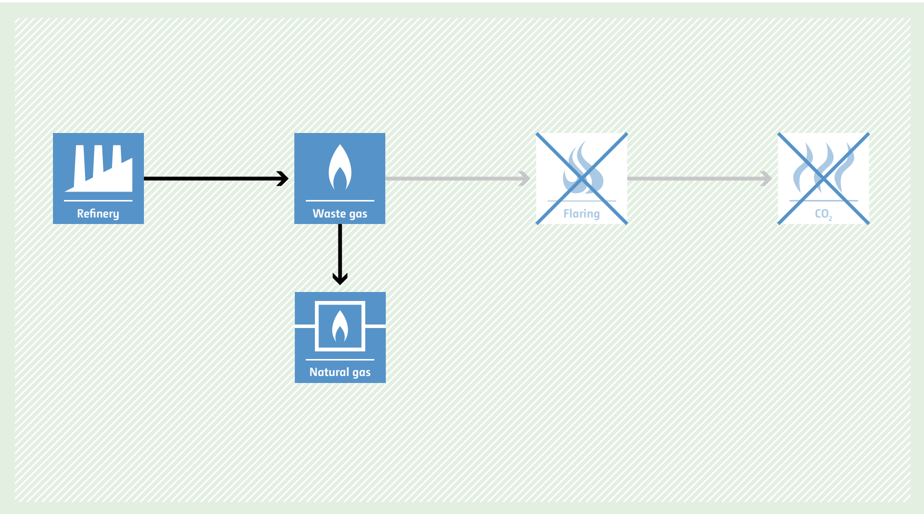


PROJECT SCENARIO

Use of gypsum concrete wall panel for construction of walls which will provide same or better service and performance level when compared with base scenario.



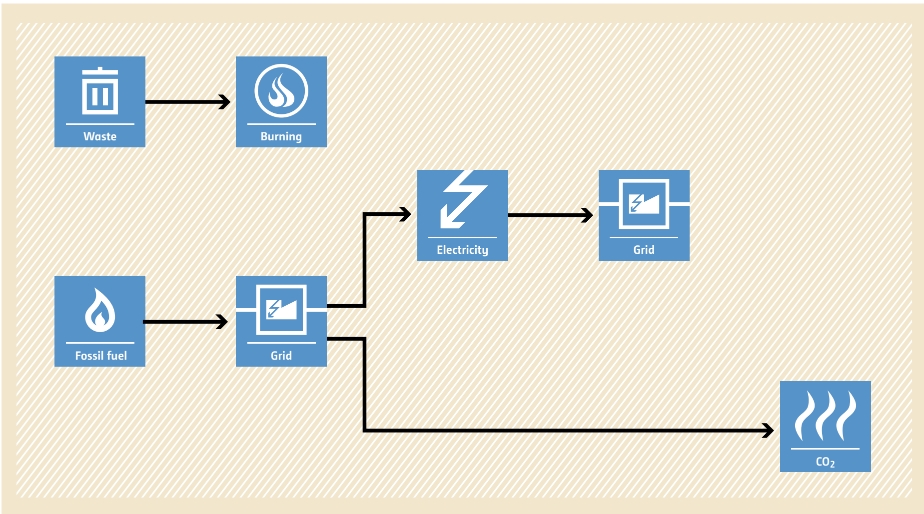
AMS-III.BI. Flare gas recovery in gas treating facilities

Typical project(s)	Off-spec gas is captured and injected into a gas sales line for transportation to the market after cleaning/processing and compressing in dedicated project facilities.
Type of GHG emissions mitigation action	• Energy efficiency. Recovering the waste off-spec gas and utilizing for useful applications.
Important conditions under which the methodology is applicable	• Off-spec gas from gas processing facilities (GPF), used by the project activity, totally or partially was flared (not vented) for at least three years, prior to the start date of the project; • Recovered off-spec gas in the project activity should be captured, compressed, and cleaned/processed in the GPF before being injected into a gas sales line for transportation to the market; • Off-spec gas volume, energy content and composition are measurable; • There shall not be any addition of fuel gas or dry gas into the off-spec gas pipeline between the point of recovery and the point where it is fed into the GPF.
Important parameters	At validation: • Quantity and composition of off-spec gases.
	Monitored: • Quantity and composition of off-spec gases utilised; • Electricity and fuel used.
BASELINE SCENARIO The off-spec gas is flared.	
PROJECT SCENARIO Off-spec gas is captured and injected into a gas sales line for transportation to the market after cleaning/processing and compressing in dedicated project facilities.	

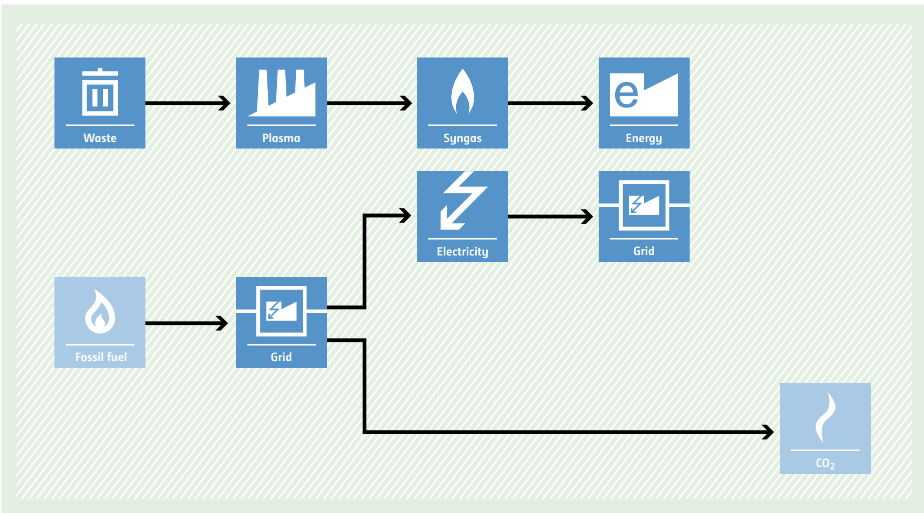
AMS-III.BJ. Destruction of hazardous waste using plasma technology including energy recovery

Typical project(s)	Gasification of hazardous waste, using plasma technology, to produce syngas. Electricity and heat are generated by the syngas produced.
Type of GHG emissions mitigation action	• Renewable energy. The syngas produced by the project activity is used as a renewable energy source.
Important conditions under which the methodology is applicable	• The project incinerates only hazardous waste; • The regulation requires incineration of hazardous waste; • No existing hazardous waste incinerators produce heat or electricity.
Important parameters	At validation: • Historical waste incineration; • Fuel and electricity consumption for historical waste incineration. Monitored: • Project waste incineration; • Project fuel and electricity consumption; • Compliance rate with incineration regulations; • Heat and/or electricity generated.

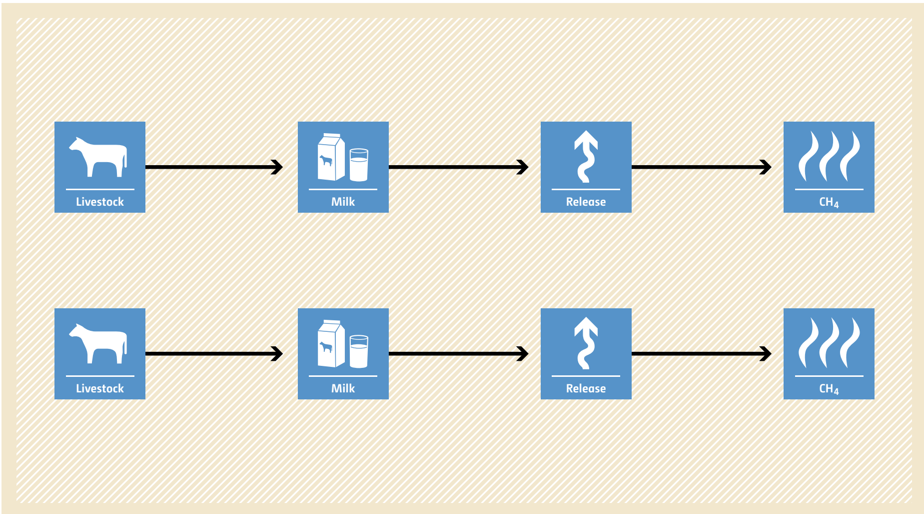
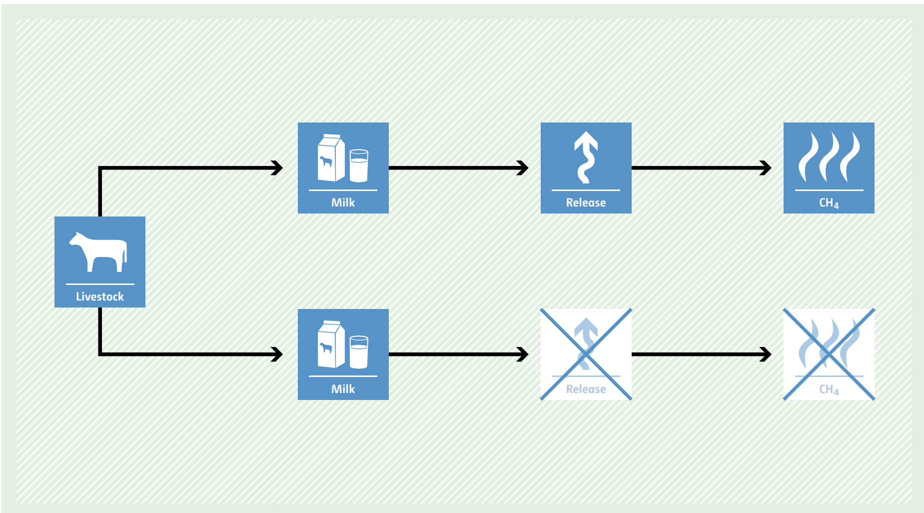
BASELINE SCENARIO
Hazardous waste is incinerated without energy generation.



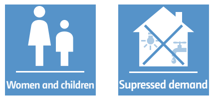
PROJECT SCENARIO
Hazardous waste is gasified using plasma technology with energy generation.



AMS-III.BK. Strategic feed supplementation in smallholder dairy sector to increase productivity

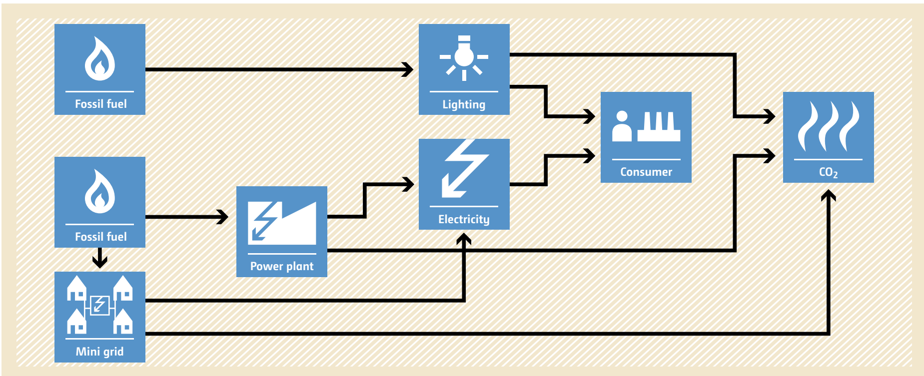
Typical project(s)	Provision of strategic supplementation to large ruminants (e.g. cows), which reduces the level of methane emissions per unit of milk produced.
Type of GHG emissions mitigation action	• Methane avoidance and displacement of a more-GHG-intensive output. Methane emission avoidance from large ruminants due to improved productivity by using strategic supplementation to improve digestibility.
Important conditions under which the methodology is applicable	• The population of lactating animals maintained in the participating smallholders shall be equal or less than 100; • The gross energy (GE) content of the supplement consumed does not exceed 10% of the total GE of the basal ration.
Important parameters	At validation: • Number of lactating animals in the farm and their milk production. Monitored: • Number of lactating animals in the farm and their milk production; • Dry matter intake of feedstuff.
BASELINE SCENARIO High specific methane emission per unit of milk production due to the poor nutritional conditions of lactating animals in the baseline.	
PROJECT SCENARIO Reduced specific methane emission per unit of milk production due to improved nutritional conditions of lactating animals in the project.	

AMS-III.BL. Integrated methodology for electrification of communities

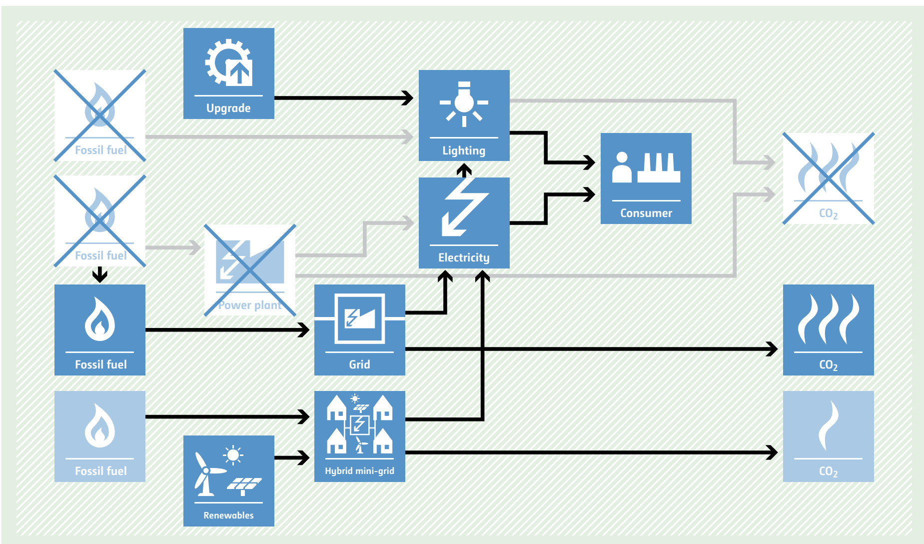


Typical project(s)	Rural communities that are supplied with electricity either from renewable energy or hybrid energy systems (e.g. wind-diesel) or through grid extension which displace fossil fuel use, such as fossil fuel-based lighting systems, stand-alone diesel generators and diesel-based mini-grids.
Type of GHG emissions mitigation action	• Displacement of fossil fuel use. Low-carbon-intensive grid/mini-grid electricity displaces high-carbon-intensive electricity or lighting services.
Important conditions under which the methodology is applicable	• Limited to communities with no access to a national or regional grid; • At least 75% of the end users (by number) shall be households.
Important parameters	At validation: • The physical location and consumption level of each consumer using survey, and the classification of consumer type by their electricity consumption and project technology/measure implemented; • Default emission factors as provided in the methodology.
	Monitored: • Electricity consumption need to be monitored using one of the following options (i) Metering (standard electric meter or pre-payment meter), (ii) Sample survey (e.g. stratified random sampling), (iii) Distribution metering and consumer numbers and (iv) Deemed consumption; • In case of consumers (e.g. commercial consumers, small, medium and micro enterprises, public institutions, street lighting, irrigation pumps) having electricity consumption more than 1000 kWh/year, consumption is necessarily monitored through metering.

BASELINE SCENARIO
In the absence of the project activity, the end users would have used fossil fuel based lighting, stand-alone diesel electricity generators for appliances other than lighting (e.g. TV) or would have been supplied by carbon-intensive mini-grid.



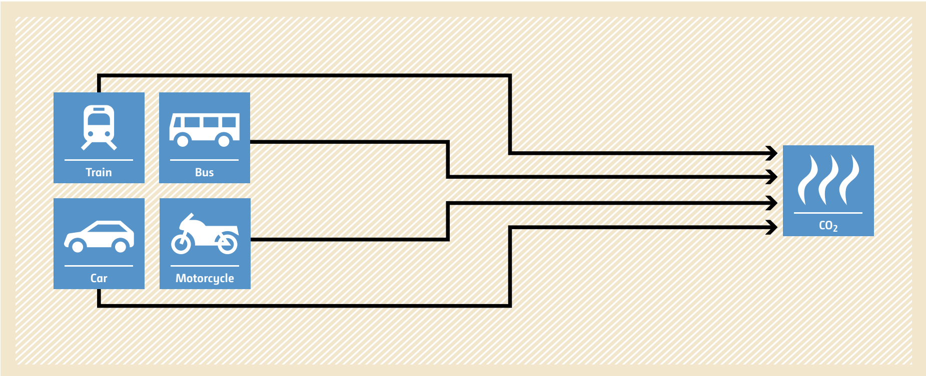
PROJECT SCENARIO
Consumers are supplied with electricity by new construction of renewable energy system or hybrid energy system or rehabilitation/refurbishment of renewable energy system or connection to a national or regional or mini-grid.



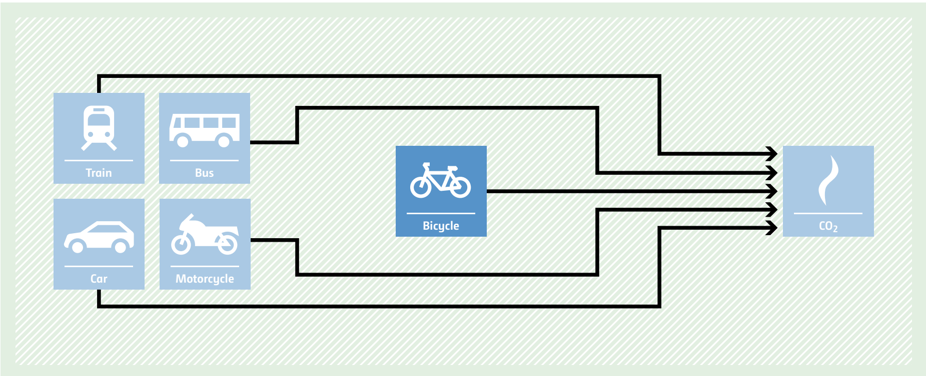
AMS-III.BM. Lightweight two and three wheeled personal transportation

Typical project(s)	Project activities that shift the mode of transport of urban passengers to mechanical bicycles, tricycles, e-bikes or e-tricycles.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of a more-GHG-intensive output.
Important conditions under which the methodology is applicable	Project activities involve one or more of the of the measures below: • Bicycle lanes: construction of new or extension of existing lanes; • Bicycle parking areas: construction of new or expansion of existing areas; • Bicycle sharing programs (dockless or with docking stations): implementation of new or expansion of existing programs; • Promoting the introduction of e-bikes; • Promoting the transportation service based on tricycles and by introducing e-bikes or e-tricycles.
Important parameters	At validation: • CO_2 emission factor per passenger-kilometer, based on the public transportation-mix in the city; • CO_2 emission factor per passenger-kilometer, based on survey; • Number of bicycle trips.
	Monitored: • Distance travelled per trip by users of bicycle or e-bikes; • Number of bicycle trips; • Electricity consumed to recharge the batteries.

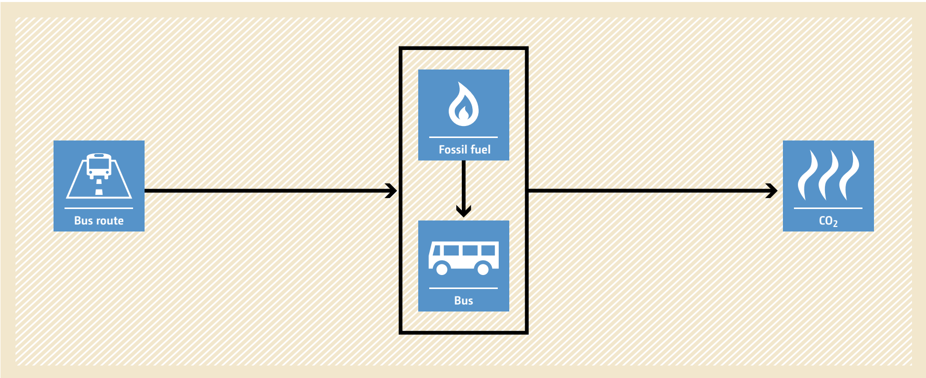
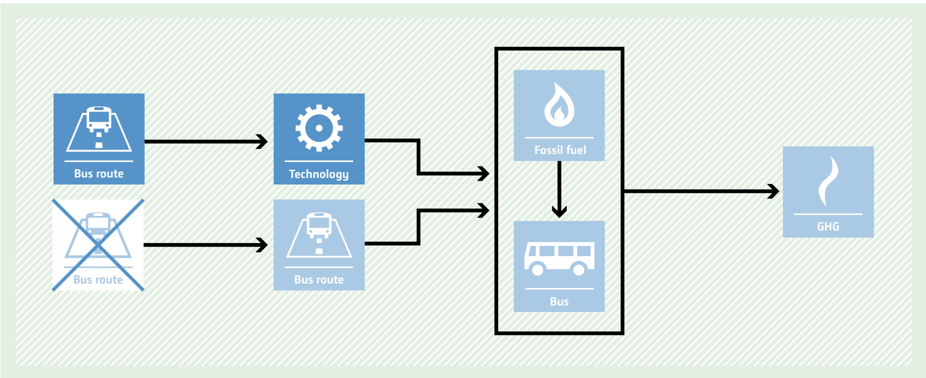
BASELINE SCENARIO
Passengers are transported using a diverse transport system involving buses, trains, cars, non-motorized transport modes, etc. operating under mixed traffic conditions.



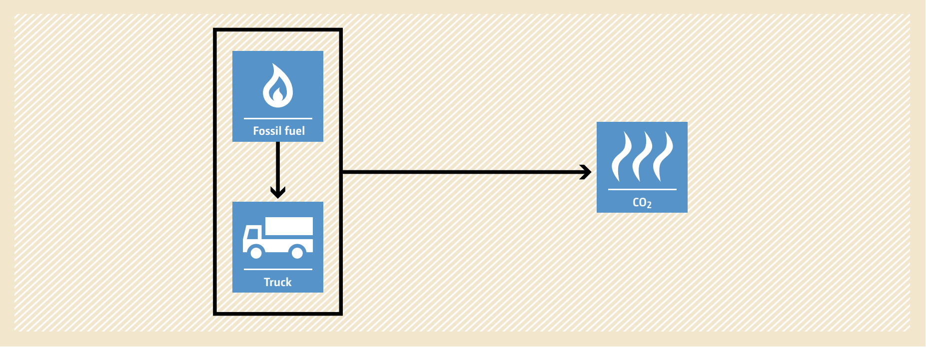
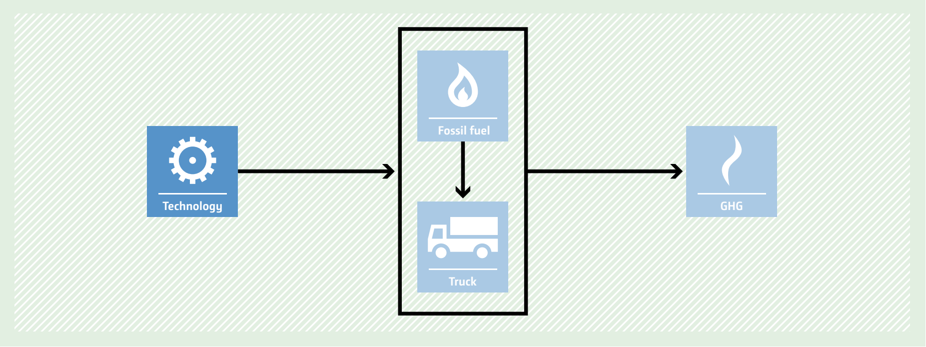
PROJECT SCENARIO
Passengers are transported using bicycles, e-bikes or e-tricycles that partially displaces the existing transport system operating under mixed traffic conditions.



AMS-III.BN. Efficient operation of public transportation

Typical project(s)	Implementation of measures such as ITS (Intelligent Transportation Systems) and changes/ improvements in bus routes to improve the operation of buses used for public transportation, without reducing the level of service.
Type of GHG emissions mitigation action	• Energy efficiency. Reduction in the consumption of fossil fuels per passenger transported.
Important conditions under which the methodology is applicable	• The methodology involves the implementation of the following measures to improve the operation of buses: ITS measures, re-design of bus routes, constructions to eliminate traffic lights or roundabouts (such as viaducts/tunnels), priority bus lanes, express bus service during peak hours and bus queue jump lane; • The project activity shall not reduce the number of passengers travelling on the affected bus route(s), as compared to the baseline; • The methodology is not applicable to project activities implementing a new BRT or expanding an existing BRT by creating new lanes.
Important parameters	At validation: • Fuel consumed by the buses driving in the baseline route; • Electricity consumed by the buses driving in the baseline route; • Passenger-kilometres transported in the baseline route; • Specific energy consumed per passenger-kilometre from the baseline route.
	Monitored: • Fuel consumed by the buses driving in the project route; • Electricity consumed by the buses driving in the project route; • Passengers transported in the project route; • Average distance travelled by passengers in the project route; • CO_2 emission factor of the electric grid supplying electricity to the electric buses.
BASELINE SCENARIO CO_2 emitted by the buses travelling in the baseline route(s) without the project measures.	
PROJECT SCENARIO Implementation of ITS measures in the baseline route or changes to the baseline route's infra-structure resulting in buses consuming less fuel/electricity to transport the same number of passengers.	

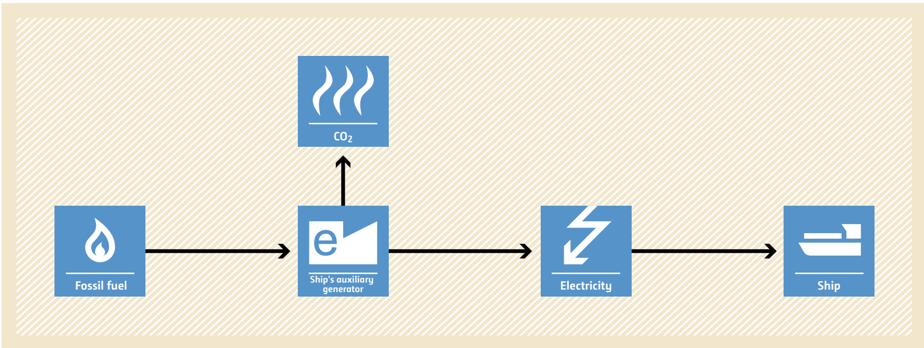
AMS-III.BO. Trip avoidance through equipment improvement of freight transport

Typical project(s)	Use of new freight transportation equipment (trailers, rigid trucks, cargo tricycles and vans) built with less or lighter materials or applying a new design to improve the freight loading and storage.
Type of GHG emissions mitigation action	• Energy efficiency. Reduction in the consumption of fossil fuels to transport the same amount of freight.
Important conditions under which the methodology is applicable	• Measures applied may include: (i) use of lighter materials; (ii) use of less material in the equipment structure; (iii) new design for improved freight loading, e.g. side doors of the trailer that would allow more compact freight loading, avoiding empty spaces; (iv) new design for storage configuration of freight; • One or more types of freights can be transported provided that the types of freight and the average ratio of the different freight types to the total freight shall be the same between baseline and the project scenarios; • The methodology is not applicable to modal shift; • The vehicle fleet shall be centrally owned or contracted by a single entity; • The freight shall be transported to one single destination, different delivery points of fractions of the full freight are not allowed; • The origin and destination of the freight shall remain the same throughout the crediting periods.
Important parameters	At validation: • Length of the route in the baseline; • Amount of different freight types transported in the baseline; • Total distance travelled in the baseline to transport the total freight. Monitored: • Length of the route in the project; • Amount of different freight types transported in the project; • Total distance travelled in the project to transport the total freight; • Fuel consumed by the project vehicle fleets; • Electricity consumed by the project vehicle fleets.
BASELINE SCENARIO Passengers are transported using a diverse transport system involving buses, trains, cars, non-motorized transport modes, etc. operating under mixed traffic conditions.	
PROJECT SCENARIO Passengers are transported using bicycles, e-bikes or e-tricycles that partially displaces the existing transport system operating under mixed traffic conditions.	

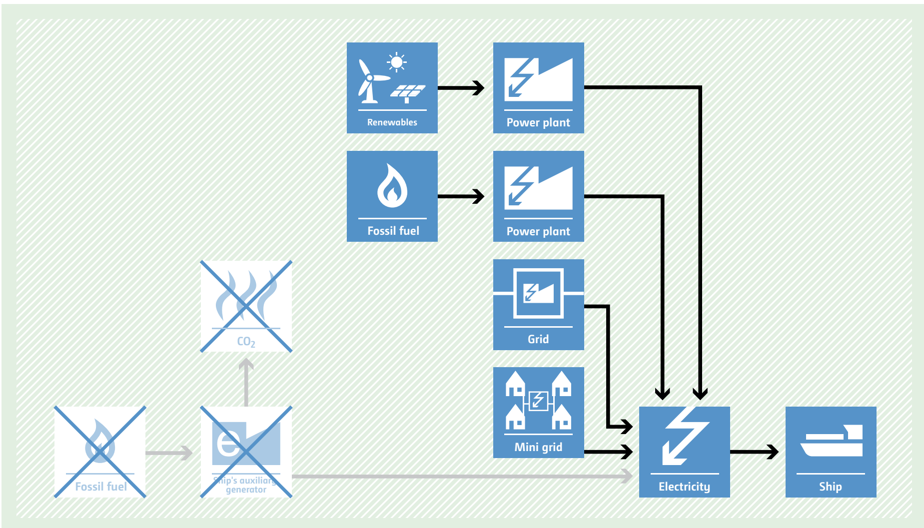
AMS-III.BP. Emission reduction by shore-side electricity supply system

Typical project(s)	Introduction of shore-side electricity supply to ships docked at berths, displacing electricity produced from ships' fossil-fuel auxiliary power generator(s).
Type of GHG emissions mitigation action	• Displacement of a more-GHG-intensive output: Electricity supplied to ships docked at berths generated form (i) a connected grid, (ii) a mini-grid, (iii) a captive power plant (fossil or renewable), or (iv) a combination of the options.
Important conditions under which the methodology is applicable	• Ships operating in domestic routes (i.e. the departure and arrival locations of the route of the ship are in the same country); • In the absence of the project, electricity would have been supplied by the ship's fossil fuel auxiliary power generation; • Switching from fossil fuel to electricity for heat production is not allowed.
Important parameters	At validation: • Consumption rate of fossil fuel of auxiliary power generator in the baseline scenario (mass or volume units/MWh);
	Monitored: • Electricity consumed by the ship docked at the berth; • CO_2 emission factor of the source supplying electricity to the ship.

BASELINE SCENARIO
Ships docked at berths consuming electricity from the ships' fossil fuel auxiliary power generator system.

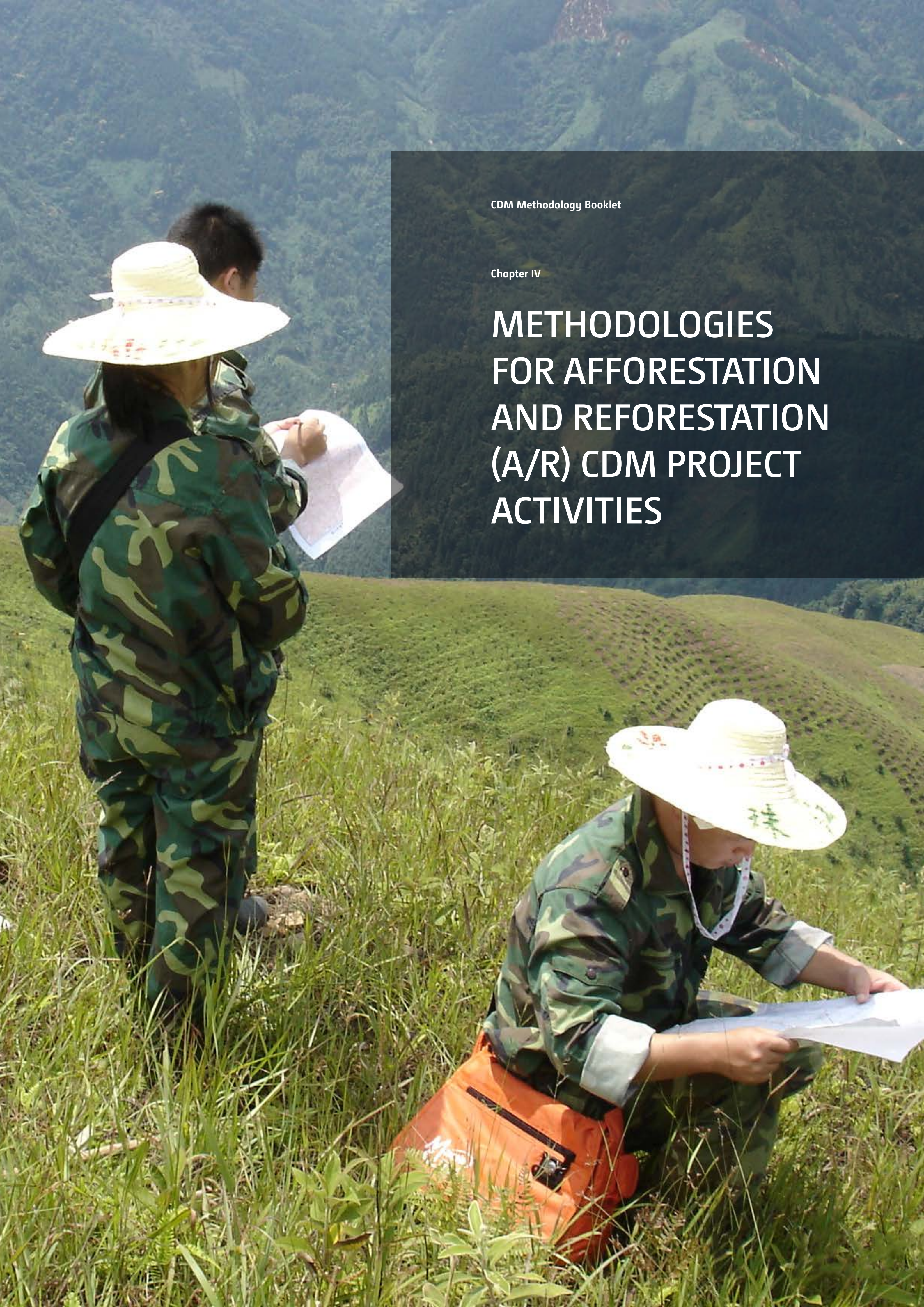


PROJECT SCENARIO
Electricity supplied to the ship by a connected electric grid, a mini-grid, a captive power plant (fossil or renewable) or a by combination.



Chapter IV

METHODOLOGIES FOR AFFORESTATION AND REFORESTATION (A/R) CDM PROJECT ACTIVITIES



4.1 INTRODUCTION TO METHODOLOGIES FOR A/R CDM PROJECT ACTIVITIES

The following conditions and information are relevant for all A/R methodologies and are applicable in addition to the conditions listed in the methodology summaries:

- Vegetation cover on the land eligible for project activities must have been below the forest threshold[7] on 31 December 1989. This needs to be proven (e.g. using satellite image or participatory rural appraisal (PRA));
- No tree vegetation is expected to emerge without human intervention to form a forest on the project land;
- Project start date must be January 1, 2000 or later.
- In absence of the project activity, carbon stocks of the carbon pools not considered in the project activity are expected to decrease or increase less relative to the project scenario.

A/R CDM project activities result in t-CERs and l-CERs.

A/R methodologies can be distinguished as large-scale and small-scale. Small-scale A/R methodologies provide simplified approaches for project design and monitoring. Small-scale A/R project activities must fulfil the following conditions:

(1) Net anthropogenic GHG removals by sinks must be less than 16,000 tons of CO_2 per year; and
(2) The project activities must be developed or implemented by low-income communities and individuals as determined by the host Party.

If an A/R CDM project activity does not meet these criteria an A/R large-scale methodology has to be applied.

[7] The host country determines the forest definition which lies wi hin the following thresholds: A single minimum tree crown cover value between 10 and 30%; and a single minimum land area value between 0.05 and 1 hectare; and a single minimum tree height value between 2 and 5 metres

4.2. METHODOLOGICAL TOOLS FOR A/R CDM PROJECT ACTIVITIES

A short description of methodological tools relevant to A/R methodologies can be found below.

AR-TOOL02: COMBINED TOOL TO IDENTIFY THE BASELINE SCENARIO AND DEMONSTRATE ADDITIONALITY IN A/R CDM PROJECT ACTIVITIES

This tool provides a step-wise approach to identify the baseline scenario and simultaneously demonstrate additionality. These steps include:

Step 0 Preliminary screening based on the starting date of the A/R project activity;
Step 1 Identification of alternative land use scenarios
Step 2 Barrier analysis;
Step 3 Investment analysis (if needed);
Step 4 Identification of the baseline scenario
Step 5 Common practice analysis.

AR-TOOL03: CALCULATION OF THE NUMBER OF SAMPLE PLOTS FOR MEASUREMENTS WITHIN A/R CDM PROJECT ACTIVITIES

This tool can be used for calculation of number of sample plots required for estimation of biomass stocks from sampling based measurements in the baseline and project scenarios of an A/R CDM project activity.

The tool calculates the number of required sample plots on the basis of the specified targeted precision for biomass stocks to be estimated.

The tool applies the following assumptions:

(a) Approximate value of the area of each stratum within the project boundary is known;
(b) Approximate value of the variance of biomass stocks in each stratum is known from a preliminary sample, existing data related to the project area, or existing data related to a similar area;
(c) The project area is stratified into one or more strata

AR-TOOL08: ESTIMATION OF NON-CO_2 GHG EMISSIONS RESULTING FROM BURNING OF BIOMASS ATTRIBUTABLE TO AN A/R CDM PROJECT ACTIVITY

This tool can be used for estimation of non-CO_2 GHG emissions resulting from all occurrence of fire within the project boundary, i.e. burning of biomass when fire is used for site preparation and/or to clear the land of harvest residue prior to replanting of the land, or when a forest fire occurs within the boundary of an A/R CDM project activity.

For burned areas exceeding a minimum area described in the tool, it provides separate step-by-step calculations and parameter estimation for non-CO_2 GHG emissions from site preparation and from forest fires

AR-TOOL12 ESTIMATION OF CARBON STOCKS AND CHANGE IN CARBON STOCKS IN DEAD WOOD AND LITTER IN A/R CDM PROJECT ACTIVITIES

This tool can be used for ex post estimation of carbon stocks and change in carbon stocks in dead wood and/or litter in the baseline and project scenarios of an A/R CDM project activity. This tool has no internal applicability conditions.

AR-TOOL14: ESTIMATION OF CARBON STOCKS AND CHANGE IN CARBON STOCKS OF TREES AND SHRUBS IN A/R CDM PROJECT ACTIVITIES

This tool can be used for estimation of carbon stocks and change in carbon stocks of trees and shrubs in the baseline and project scenarios of an A/R CDM project activity. This tool has no specific internal applicability conditions.

AR-TOOL15: ESTIMATION OF THE INCREASE IN GHG EMISSIONS ATTRIBUTABLE TO DISPLACEMENT OF PRE-PROJECT AGRICULTURAL ACTIVITIES IN A/R CDM PROJECT ACTIVITY

This tool provides a step-by-step method for estimating increase in GHG emissions resulting from displacement of pre-project agricultural activities from the project boundary of an A/R project activity under the CDM. The tool estimates the increase in emissions on the basis of changes in carbon stocks in the affected carbon pools in the land receiving the displaced activities.

AR-TOOL16: TOOL FOR ESTIMATION OF CHANGE IN SOIL ORGANIC CARBON STOCKS DUE TO THE IMPLEMENTATION OF A/R CDM PROJECT ACTIVITIES

This tool estimates the change, occurring in a given year, in soil organic carbon (SOC) stocks of land within the boundary of an A/R CDM project activity. The tool is only applicable if litter remains on site during the A/R CDM project activity and soil disturbance for site preparation and project activity is limited. It is not applicable on land containing organic soils or wetlands, and if specific land management practices with inputs are applied. Specific management practices limitations are listed in the tool for each temperature/moisture regime.

AR-TOOL17: DEMONSTRATING APPROPRIATENESS OF ALLOMETRIC EQUATIONS FOR ESTIMATION OF ABOVEGROUND TREE BIOMASS IN A/R CDM PROJECT ACTIVITIES

This tool allows demonstration whether an allometric equation is appropriate for estimation of aboveground tree biomass in an A/R CDM project activity. It provides criteria for direct applicability of an equation for ex ante and ex post calculations, and – if these criteria are not met – describes the process required for verification of an allometric equation. This tool has no internal applicability conditions.

AR-TOOL18: DEMONSTRATING APPROPRIATENESS OF VOLUME EQUATIONS FOR ESTIMATION OF ABOVEGROUND TREE BIOMASS IN A/R CDM PROJECT ACTIVITIES

This tool allows demonstration whether a volume table or volume equation, in combination with selected biomass expansion factors (BEFs) and basic wood density, is appropriate for estimation of aboveground tree biomass in an A/R CDM project activity. It provides criteria for direct applicability of an equation for ex post calculations, and – if these criteria are not met – describes the process required for verification of a volume equation. This tool has no internal applicability conditions.

AR-TOOL19: DEMONSTRATION OF ELIGIBILITY OF LANDS FOR A/R CDM PROJECT ACTIVITIES

This tool provides a step-by-step method for demonstrating eligibility of land for an A/R CDM project activity. The tool also specifies the types of information and data that are required to be furnished for demonstration of eligibility of land. Aerial photographs or satellite imagery complemented by ground reference data, land-use or land-cover information from maps or digital spatial datasets, and data from ground-based surveys or existing records (e.g. permits or plans, cadaster or owner registers) are allowed to be used for demonstrating land eligibility. The tool also allows use of a written testimony resulting from participatory rural appraisal (PRA) where other form of data is either not available or is inadequate.

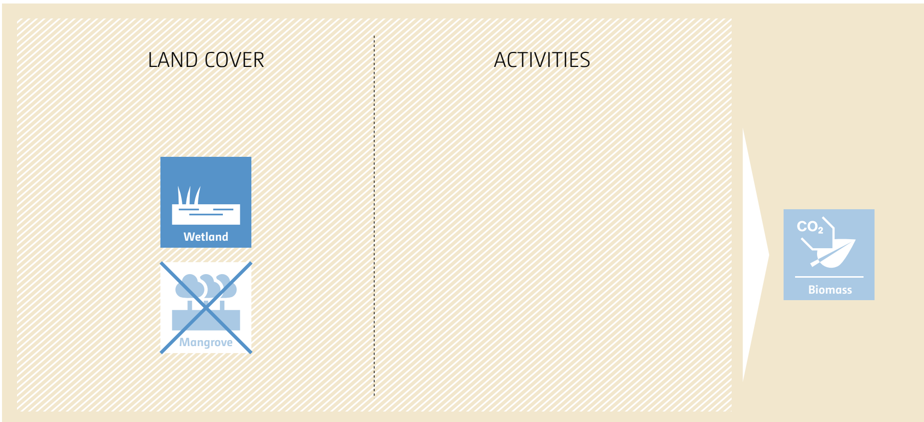
Chapter IV

4.3. METHODOLOGIES FOR LARGE-SCALE A/R CDM PROJECT ACTIVITIES

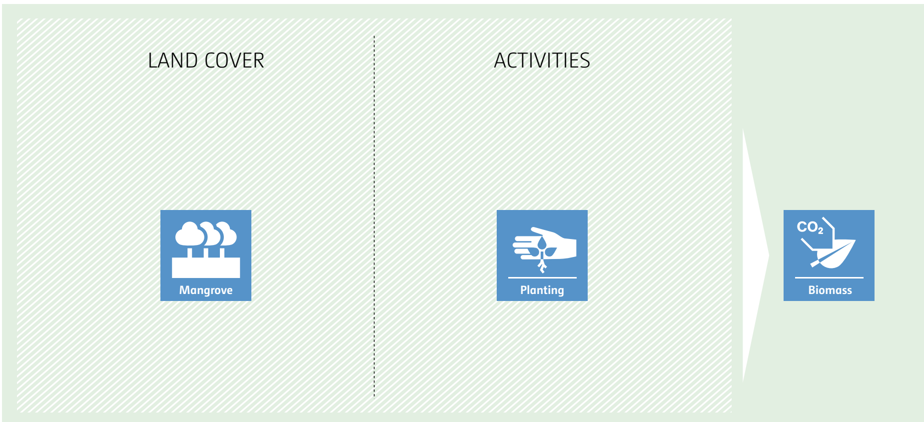
AR-AM0014 Afforestation and reforestation of degraded mangrove habitats

Typical project(s)	Afforestation/reforestation of degraded mangrove habitats.
Type of GHG emissions mitigation action	• GHG removal by sinks. GHG removal by increasing carbon stocks in the following pools: above-ground biomass, below-ground biomass, and optionally: deadwood and soil organic carbon.
Important conditions under which the methodology is applicable	• The land subject to the project activity is degraded mangrove habitat; • More than 90 % of the project area is planted with mangrove species. If more than 10 % of the project area is planted with non-mangrove species then the project activity does not lead to alteration of hydrology of the project area and hydrology of connected up-gradient and down-gradient wetland area; • Soil disturbance attributable to the A/R CDM project activity does not cover more than 10 % of area.
Important parameters	At validation: • Tree diameter increments, allometric equations or biomass expansion factors, root-shoot ratios and basic wood densities; • Pre-project crown cover of trees and shrubs.
	Monitored: • Area forested, stratum-wise areas, area of sample plots; • Diameter, and possibly height, of trees in sample plots; • Optionally: Diameters of pieces of dead wood, shrub crown cover by strata; area under agricultural activities displaced by the project activity, area subjected to burning of biomass for site preparation and clearing of harvest residue; area affected by forest fires.

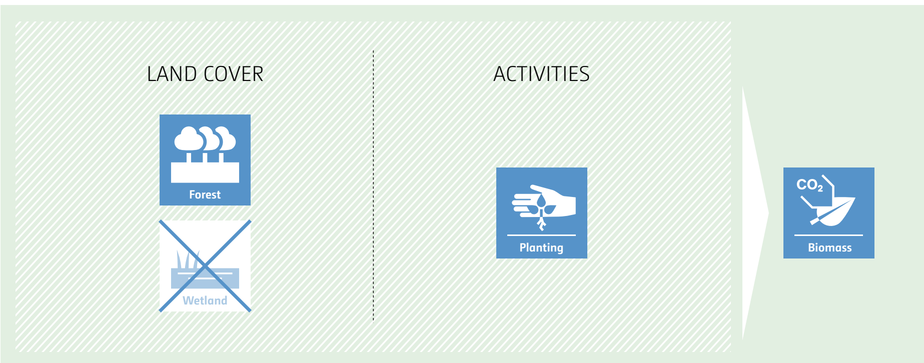
BASELINE SCENARIO
Mangrove habitat (wetland) is degraded but may contain a few mangrove trees of very poor quality, some signs of human activities are visible, e.g. fuel wood collection.

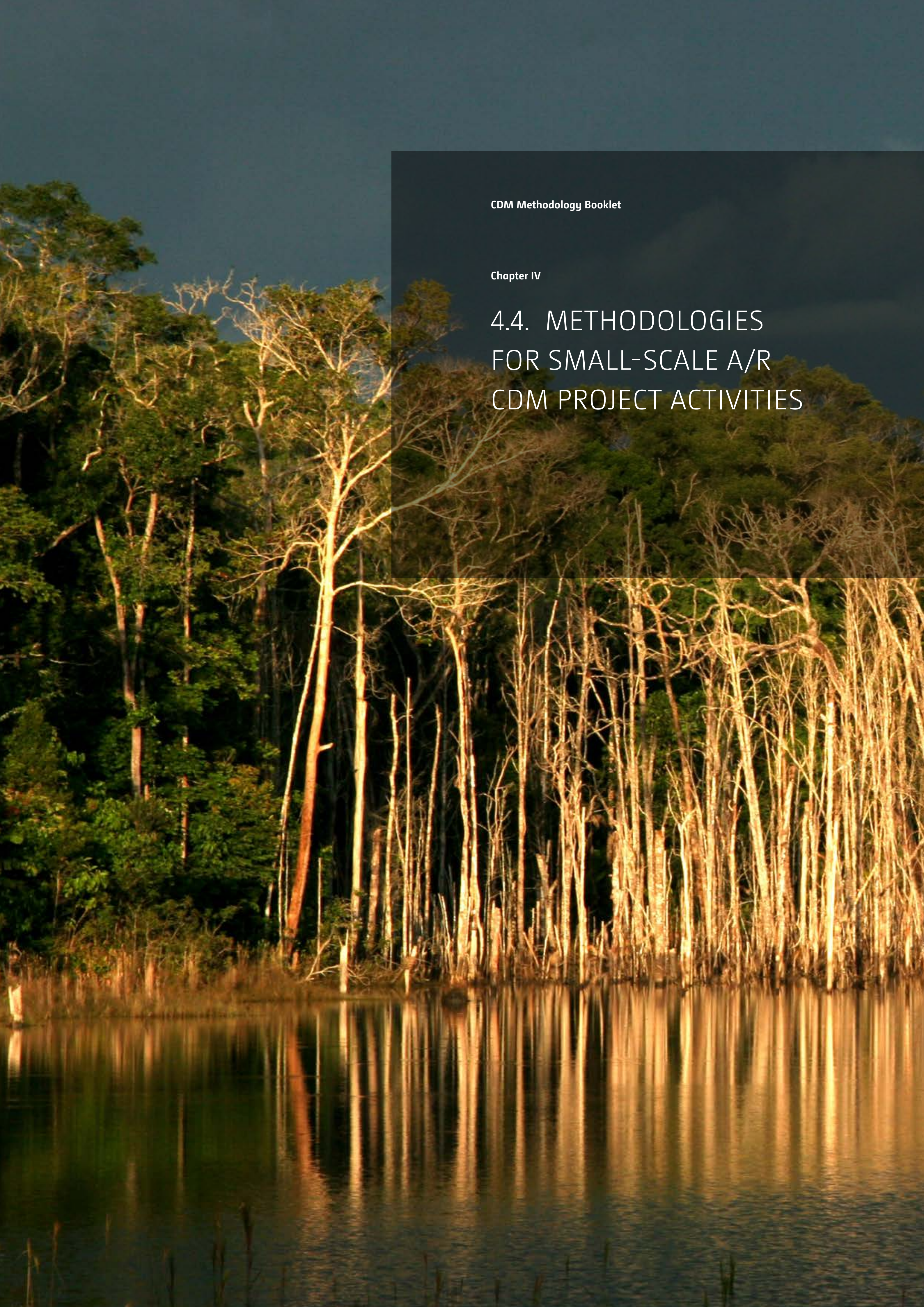


PROJECT SCENARIO
Mangrove forests are standing on lands.



AR-ACM0003 Afforestation and reforestation of lands except wetlands

Typical project(s)	Afforestation/reforestation of lands other than wetlands.
Type of GHG emissions mitigation action	• GHG removal by sinks. GHG removal by increasing carbon stocks in the following pools: above-ground biomass, below-ground biomass, and optionally: deadwood, litter, and soil organic carbon.
Important conditions under which the methodology is applicable	• The land subject to the project activity does not fall in wetland category; • Soil disturbance attributable to the project activity does not cover more than 10% of area in each of the following types of land, when these lands are included within the project boundary: (i) Land containing organic soils; (ii) Land which, in the baseline, is subjected to land-use and management practices and receives inputs listed in the appendix of the methodology.
Important parameters	At validation: • Tree diameter increments, allometric equations or biomass expansion factors, root-shoot ratios and basic wood densities; • Pre-project crown cover of trees and shrubs.
	Monitored: • Area forested, stratum-wise areas, area of sample plots; • Diameters, and possibly heights, of trees in sample plots; • Optionally: Diameters of pieces of dead wood, shrub crown cover by strata, weights of litter bags; area under agricultural activities displaced by the project activity, area subjected to burning of biomass for site preparation and clearing of harvest residue; area affected by forest fires.
BASELINE SCENARIO Any lands other than wetlands and no forest stands on the lands.	
PROJECT SCENARIO Forests are planted on lands.	

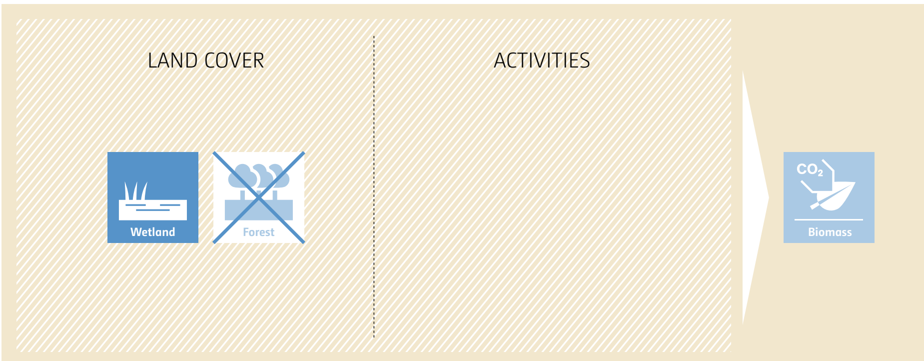


Chapter IV

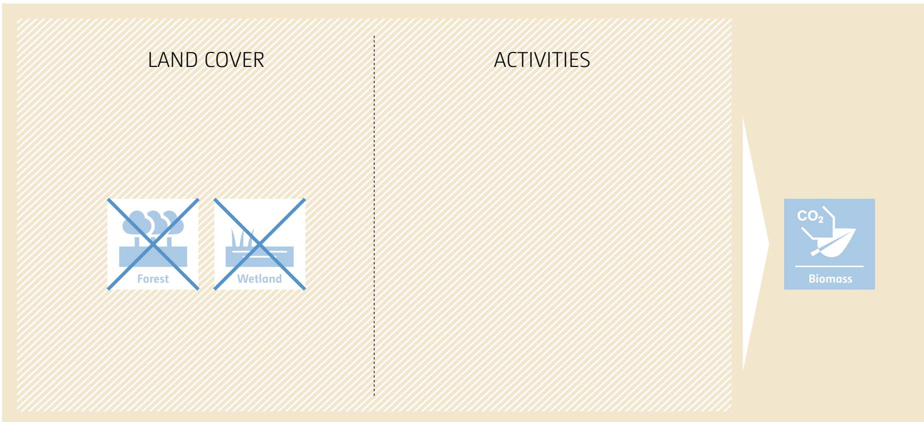
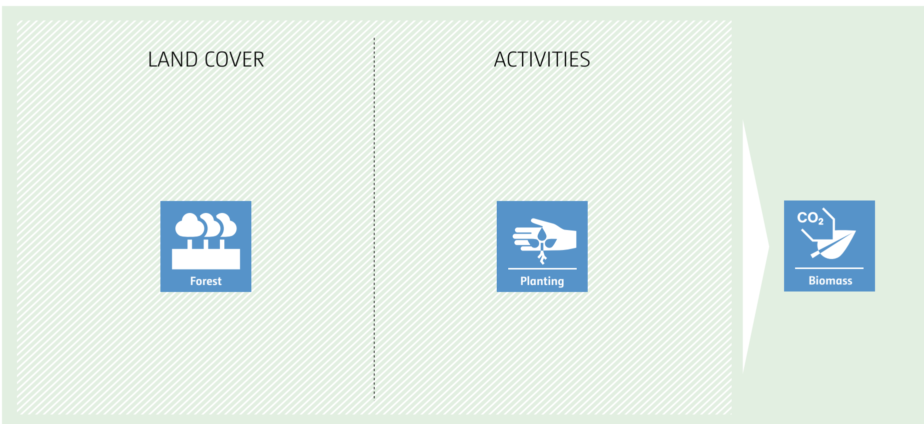
4.4. METHODOLOGIES FOR SMALL-SCALE A/R CDM PROJECT ACTIVITIES

AR-AMS0003 Afforestation and reforestation project activities implemented on wetlands

Women and children

Typical project(s)	Afforestation/reforestation of wetlands.
Type of GHG emissions mitigation action	• GHG removal by sinks. CO_2 removal by increasing carbon stocks in the following pools: above-ground biomass, below-ground biomass, dead wood and soil organic carbon.
Important conditions under which the methodology is applicable	• The land subject to the project activity falls under one of the following wetland categories: (i) Intertidal wetlands (e.g. mangrove habitats) with a tree crown cover that is less than 20% of the minimum tree crown cover adopted by the host Party for the purpose of definition of forest under the CDM; (ii) Flood plain areas on inorganic soils; (iii) Seasonally flooded areas on margin of water bodies/reservoirs; • The project activity does not lead to alteration of the water regime of the project area or areas hydrologically connected to the project area; • Soil disturbance attributable to the project activity does not exceed 10% of the project area; • The land subject to the project activity does not contain peat soils (histosols).
Important parameters	At validation: • Tree diameter increments, allometric equations or biomass expansion factors, root-shoot ratios and basic wood densities; • Pre-project crown cover of trees and shrubs.
	Monitored: • Area forested, stratum-wise areas, area of sample plots; • Diameter, and possibly height, of trees in sample plots; • Optionally: Diameters of pieces of dead wood, shrub crown cover by strata; area under agricultural activities displaced by the project activity, area subjected to burning of biomass for site preparation and clearing of harvest residue; area affected by forest fires.
BASELINE SCENARIO Lands are degraded wetlands.	
PROJECT SCENARIO Forests are planted on the wetlands.	

AR-AMS0007 Afforestation and reforestation project activities implemented on lands other than wetlands

Typical project(s)	Afforestation/reforestation of lands other than wetlands.
Type of GHG emissions mitigation action	• GHG removal by sinks. CO_2 removal by increasing carbon stocks in the following pools: above-ground biomass, below-ground biomass, optionally deadwood, litter and soil organic carbon.
Important conditions under which the methodology is applicable	• The land subject to the project activity does not fall into wetland category; • Soil disturbance attributable to the A/R CDM project activity does not cover more than 10% of area in each of the following types of land, when these lands are included within the project boundary: (i) Land containing organic soils; (ii) Land which, in the baseline, is subjected to land-use and management practices and receives inputs as listed in appendix 2 and appendix 3 of the methodology.
Important parameters	At validation: • Tree diameter increments, allometric equations or biomass expansion factors, root-shoot ratios and basic wood densities; • Pre-project crown cover of trees and shrubs.
	Monitored: • Area forested, stratum-wise areas, area of sample plots; • Diameters, and possibly heights, of trees in sample plots; • Optionally: Diameters of pieces of dead wood, shrub crown cover by strata, weights of litter bags; area under agricultural activities displaced by the project activity, area subjected to burning of biomass for site preparation and clearing of harvest residue; area affected by forest fires.
BASELINE SCENARIO Any lands other than wetlands and no forest stands on the lands.	
PROJECT SCENARIO Forests are planted on lands.	

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This booklet will also be updated regularly in order to reflect changes in approved methodologies and methodological tools. The latest version of the booklet is available on the UNFCCC website.

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