CLEAN DEVELOPMENT MECHANISM

CDM METHODOLOGY BOOKLET

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FOREWORD

The international community achieved a resounding success with the new, universal climate change agreement adopted at COP21 in Paris in December 2015. The Paris Agreement marks a historic turning point in our common journey towards a secure and sustainable world. The Paris Agreement will shape international climate policy for the next decades. It holds great challenges, but also exciting, transformational opportunities driven by ambitious national action and increased international cooperation.

The Paris Agreement is a catalyst for policies and action for low-carbon development, climate finance, technology transfer, capacity building and mar et-driven approaches. For market-based approaches, different types of contributions and units are available for transfer. Compatibility, comparability and fungibility among these units ensures there is no double counting and safeguards environmental integrity. Internationally recognized standards to quantify emission reductions is key for environmental integrity.

Environmental integrity is crucial for the Clean Development Mechanism, or CDM, and methodologies form the foundation for integrity. Methodologies help establish a project's emissions baseline, or anticipated emissions if the project does not move forward. They also help monitor, quantify and accurately estimate emissions once a project is built. Eligible certified emission reduction units a e determined by the difference between the baseline and actual emissions. Methodologies are essential to quantify real and accurate emission reductions. Standardized baselines allow methodologies also to cover sector-wide emissions.

While the necessity of methodologies is easy to understand, how they are constructed is quite complex. To make standards applicable to projects from diverse sectors, techno-economic situations and geographical regions, they must be diverse in composition and application. This publication is designed to guide users through the complex world of CDM methodologies.

This booklet clearly summarizes mitigation methodologies available under the CDM. This can help market actors choose the right method to estimate their emission reductions. It is my firm belief and that of the team that deve oped this work, that this will contribute to more CDM projects where there is larger impact on sustainable development. This holds great potential to improve the livelihoods of people, reduce poverty, promote better health, directly benefit women and chil ren and enhance the regional distribution of projects, which is a key desire of Parties to the Kyoto Protocol, the CDM Executive Board and this secretariat.

CDM has played a critical role in promoting climate action on the ground in more than one hundred developing countries and remains one of the most successful running international market mechanisms. It is clear from the Paris Agreement that the CDM will continue to be an important tool in meeting the climate change challenge, and this report helps accomplish that vision.

James Grabert, *Director*
Mitigation Division
United Nations Framework Convention on Climate Change

Chapter I

INTRODUCTION

11 METHODOLOGIES AND THE BOOKLET

BASELINE AND MONITORING METHODOLOGIES

The Clean Development Mechanism (CDM) requires the application of a baseline and monitoring methodology in order to determine the amount of Certified Emission Reductions (CERs) generated by a mitigation CDM project activity in a host country. Methodologies are classified into five categories

- Methodologies for large-scale CDM project activities;
- Methodologies for small-scale CDM project activities;
- Methodologies for large-scale afforestation and reforestation (A/R) CDM project activities;
- Methodologies for small-scale A/R CDM project activities;
- Methodologies for carbon capture and storage (CCS) project activities.[1]

Methodologies often refer to methodological tools, which address specific aspects of the project activity, e.g. to calculate Greenhouse Gas (GHG) emissions from specific sources.

PURPOSE OF THE BOOKLET

This booklet provides concise summaries of CDM methodologies and description of methodological tools, approved by the CDM Executive Board (Board). It is arranged to assist CDM project developers in identifying methodologies that are suitable for their CDM project activities.[2] The general purpose of the booklet is to help in achieving the objective of the Board to raise awareness of CDM methodologies.

USE OF THE BOOKLET

The booklet is intended for use by varied audiences interested in the CDM and in particular potential CDM project developers who already have an idea of the mitigation project activities they intend to implement. It facilitates the initial selection of potentially applicable methodologies. However, it cannot provide detailed guidance on specific elements of each methodology nor replace the approved methodologies. Therefore, the project developers should refer to the original methodologies available on UNFCCC CDM methodologies website.

This edition of the Booklet reflects the effective status of methodologies and methodological tools as of December 2022 (up to EB 116). However, as methodologies and methodological tools 36may change, users of the booklet are encouraged to consult EB meeting reports subsequent to EB 116 to find out whether any changes have occurred.

CONTENT OF THE BOOKLET

Each methodology is presented through a one-page summary sheet, which provides the following information:

- Typical project(s) to which the methodology is applicable;
- Type(s) of GHG emission mitigation action;
- Important conditions for application of the methodology;
- Key parameters that need to be determined or monitored;
- Visual description of baseline and project scenarios.

A short textual description of each methodological tool is also contained in the booklet.

HOW TO FIND A SUITABLE METHODOLOGY

1 CATEGORIZATION BY MITIGATION ACTIVITY TYPE

This way of looking up methodologies is according to the relevant sectoral scopes and type of mitigation activities such as renewable energy, low carbon electricity generation, energy efficiency measures, fuel and feedstock switch, GH destruction, GHG emission avoidance, displacement of a more-GHG-intensive output and GHG removal by sinks. Project developers knowing the type of mitigation activity to be implemented in their project activities can thus easily identify potentially suitable methodologies.

2. CATEGORIZATION BY APPLIED TECHNOLOGY TYPE/MEASURE

This second way of looking up methodologies focuses on the technology applied in the project activity. The categorization by technology type enables project developers to identify a set of comparable methodologies applicable to the technology that is going to be implemented in their project activities.

[1] There are no approved methodologies for CCS project activities.

[2] For the purpose of this booklet, CDM project activities also refer to CDM programme of activities.

AFTER FINDING POTENTIALLY SUITABLE METHODOLOGIES

After identifying potentially applicable methodologies through the summary sheet, users should access the full text of the methodologies available on the UNFCCC CDM methodologies website. It is also advisable to look at information about existing CDM project activities that have already applied the methodologies, which is also available through this website.

If there is no approved methodology applicable, then one can propose a new methodology or request a revision of an approved methodology or methodological tool. In general, the new methodology option should be pursued if a project activity requires methodological approaches substantially different from an approved methodology. The revision option is suitable if an approved methodology is not applicable to a project activity, but the project activity is broadly similar to the one to which the approved methodology is applicable. For cases where an approved methodology is applicable to a project activity but minor changes in the methodology application are required due to the project-specific circumstances, requesting a deviation of an approved methodology could be considered.

If an approved methodology is unclear or ambiguous in its methodological procedures, a request for clarification may be submitted.

CDM PROJECT CYCLE

Once project participants have selected an applicable approved methodology, they apply it to their project activity and prepare a Project Design Document (PDD); this is the first step in the CDM project cycle. The methodology provides provisions for the core elements of a PDD:

- the demonstration of additionality;
- the establishment of the baseline scenario and the estimation of emission reductions or net removals; and
- the monitoring plan.

The main steps of the CDM project cycle and their actors are the following:

- Project design (Project Participants);
- National approval (Designated National Authority);
- Validation (Designated Operational Entity);
- Registration (CDM Executive Board);
- Monitoring (Project Participant);
- Verification (Designated Operational Entity)
- Issuance (CDM Executive Board).

USEFUL LINKS

UNFCCC CDM website
<https://cdm.unfccc.int/>

CDM methodologies, submission of proposed new methodologies and requests for clarification and revisio
<https://cdm.unfccc.int/methodologies/index.html>

CDM project cycle
<http://cdm.unfccc.int/Projects/diagram.html>

CDM project activities
<https://cdm.unfccc.int/Projects/index.html>

CDM programmes of activities (PoA)
<https://cdm.unfccc.int/ProgrammeOfActivities/index.html>

CDM sectoral scopes
<https://cdm.unfccc.int/DOE/scopes.html>

CDM standardized Baselines
<http://cdm.unfccc.int/methodologies/standard_base/index.html>

UNEP Risø CDM pipeline analysis and database
<http://cdmpipeline.org/>

Finding applicable methodologies — two categorization approaches

There are two ways the booklet categorizes methodologies. The first approach – the methodology categorization table – is based on the sectoral scopes defined by the UNFCCC (see <https://cdm.unfccc.int/DOE/scopes.html>). This table allocates the methodology to generic mitigation activity types. This approach is useful for project developers who have not yet made a technology choice or CDM stakeholders who are interested in a type of mitigation activity.

It structures methodologies according to technology and the history of methodology development that has led to several "families" of methodologies all relating to a specific technology. It is appropriate for project developers who have already decided on a particular technology for their project.

12. CATEGORIZATION BY MITIGAION ACTIVITY TYPE (METHODOLOGY CATEGORIZATION TABLE)

In addition to the methodology sectoral scopes[3], methodologies in this table are also categorized by the type of mitigation activity, these being renewable energy, low carbon electricity generation, energy efficiency measures, fuel switch, GHG destruction GHG emission avoidance and GHG removal by sinks.

Sectoral scopes 1 to 3 (energy sectors – generation, supply and consumption) are first distinguished according to

- Electricity generation and supply;
- Energy for industries;
- Energy (fuel) for transport;
- Energy for households and buildings.

And then categorized in terms of type of mitigation activity:

- Displacement of a more-GHG-intensive output:
  - i. Renewable energy;
  - ii. Low carbon electricity.
- Energy efficiency
- Fuel and feedstock switch.

Sectoral scopes 4 to 15 (other sectors) are categorized according to these mitigation activities:

- Displacement of a more-GHG-intensive output;
- Renewable energy;
- Energy efficiency
- GHG destruction;
- GHG emission avoidance;
- Fuel switch;
- GHG removal by sinks.

DESCRIPTION OF TYPES OF MITIGATION ACTIVITIES

DISPLACEMENT OF A MORE-GHG-INTENSIVE OUTPUT

This category refers to project activities where the consumption of a more-GHG-intensive output is displaced with the output of the project. The category is separately defined because of the importance of not jus implementing the project activity, but also ensuring that the more-GHG-intensive output is displaced by the output of the project activity.

All renewable energy generation and low carbon energy generation project activities are part of this category. Many other methodologies are also allocated to this category depending upon how the emission reductions are calculated in the corresponding methodologies.

Examples:

- Power generation from waste energy recovery and supply to a recipient who was receiving more-GHG-intensive power;
- Power generation using renewable or low carbon energy sources and export of power to a grid with combined margin emission factor of more than zero and/or to a recipient using fossil fuel based power in the absence of project activity.

[3] The Methodology categorization table allocates the methodology to the sectoral scope(s) that have been formally defined for it, which are primarily used as he basis of DOE accreditation. However, if there are additional sectoral scopes that are also applicable to the methodology, then the methodology is also shown in these sectors in the table. This is to make it potentially easier to look up the methodology.

RENEWABLE ENERGY

This category includes the use of various renewable energy sources.

Examples:

- Hydro power plant;
- Wind power plant;
- Solar cooker;
- Biomass-fired boiler

LOW CARBON ELECTRICITY

This encompasses mainly Greenfield electricity generation based on less carbon intensive fuel such as natural gas. As no power plant exists at the project location before implementation of the project, the mitigation activity is not fuel switch. At the same time the applied technology might not be best available technology, differentiating it from energy efficiency measures. A typical low carbon electricity project is the construction of a greenfield natural-gas-fired power plant. Also projects that reduce emissions due to grid extension or connection are included under this category where applicable.

ENERGY EFFICIENCY

The category energy efficiency includes all measures aiming to enhance the energy efficiency of a certain system. Due to the project activity, a specific output or service requires less energy consumption. Waste energy recovery is also included in this category.

Examples:

- Conversion of a single cycle to a combined cycle gas-fired power plant
- Installation of a more efficient steam turbine
- Use of highly efficient refrigerators or compact fluorescent lamps
- Recovery of waste heat from flue gases
- Recovery and use of waste gas in a production process.

FUEL OR FEEDSTOCK SWITCH

In general, fuel switch measures in this category will replace carbon-intensive fossil fuel with a less-carbon-intensive fossil fuel, whereas a switch from fossil fuel to renewable biomass is categorized as “renewable energy”. In case of a feedstock switch, no differentiation between fossil and renewable sources is applied.

Examples:

- Switch from coal to natural gas;
- Feedstock switch from fossil sources of CO_2 to renewable sources of CO_2;
- Use of different raw material to avoid GHG emissions;
- Use of a different refrigerant to avoid GHG emissions;
- Blending of cement in order to reduce demand for energy intensive clinker production.

GHG DESTRUCTION

The category GHG destruction covers activities that aim at the destruction of GHG. In many cases, the project includes capture or recovery of the GHG. The destruction is achieved by combustion or catalytic conversion of GHGs.

Examples:

- Combustion of methane (e.g. biogas or landfill gas)
- Catalytic N_2O destruction.

GHG EMISSION AVOIDANCE

This category includes various activities where the release of GHG emissions to the atmosphere is reduced or avoided.

Examples:

- Avoidance of anaerobic decay of biomass;
- Reduction of fertiliser use.

GHG REMOVAL BY SINKS

All A/R activities are allocated to this category. Through photosynthesis in plants, CO_2 from the atmosphere is removed and stored in form of biomass.

- Methodologies for large-scale CDM project activities
- Methodologies for small-scale CDM project activities
- Methodologies for small and large-scale a orestation and reforestation (A/R) CDM project activities
- AM0000 Methodologies that have a particular potential to directly improve the lives of women and children

Table VI-1. **Methodology Categorization in the Energy Sector**

Sectoral scope	Type	Electricity generation and supply	Energy for industries	Energy (fuel) for transport	Energy for households and buildings
1 Energy industries (renewable-/ non renewable sources)	Renewable energy	AM0007	AM0007	AM0089	AM0053
		AM0019	AM0036	ACM0017	AM0069
		AM0026	AM0053		AM0072
		AM0052	AM0069		AM0075
		AM0100	AM0075		AM0094
		AM0103	AM0089		ACM0022
		ACM0002	ACM0006		ACM0024
		ACM0006	ACM0020		AMS-I.A.
		ACM0018	ACM0022		AMS-I.B.
		ACM0020	ACM0024		AMS-I.C.
		ACM0022	AMS-I.C.		AMS-I.E.
Displacement of a more-GHG-intensive output		AMS-I.A.	AMS-I.F.		AMS-I.F.
		AMS-I.C.	AMS-I.G.		AMS-I.G.
		AMS-I.D.	AMS-I.H.		AMS-I.H.
		AMS-I.F.			AMS-I.I.
		AMS-I.G.			AMS-I.J.
		AMS-I.H.			AMS-I.K.
		AMS-I.M.			AMS-I.L.
	Low carbon electricity	AM0045	AM0099		
		AM0074	ACM0025		
		AM0099	ACM0026		
		AM0104			
		AM0108			
		ACM0025			
		ACM0026			
	Energy efficiency	AM0048	AM0048		AM0048
		AM0049	AM0049		AM0058
		AM0061	AM0055		AM0084
		AM0062	AM0056		AM0107
		AM0076	AM0076		
		AM0084	AM0084		
		AM0107	AM0095		
		ACM0006	AM0098		
		ACM0007	AM0107		
		ACM0012	ACM0006		
		ACM0013	ACM0012		
		ACM0018	ACM0018		
		AMS-II.B.	ACM0023		
		AMS-II.H.			
		AMS-III.AL.			

Table VI-1. **Methodology Categorization in the Energy Sector** (continued)

Sectoral scope	Type	Electricity generation and supply	Energy for industries	Energy (fuel) for transport	Energy for households and buildings
1 Energy industries (renewable-/ non renewable sources) (continued)	Fuel/feedstock switch	AM0049 ACM0006 ACM0011 ACM0018 AMS-I.M. AMS-III.AG. AMS-III.AH. AMS-III.AM.	AM0049 AM0056 AM0069 AM0081 ACM0006 ACM0009 ACM0018 AMS-III.AM.		AM0081
2 Energy distribution	Renewable energy	AMS-III.AW. AMS-III.BB. AMS-III.BL.	AM0069 AM0075		AMS-III.AW.
	Energy efficiency	AM0067 AM0097 AM0118 AMS-II.A. AMS-II.T. AMS-III.BB. AMS-III.BL.			
	Fuel/feedstock switch	AMS-III.BB. AMS-III.BL.	AM0077		
3 Energy demand	Renewable energy				AMS-III.AE. AMS-III.AR.
	Energy efficiency	AMS-III.AL.	AM0017 AM0018 AM0020 AM0044 AM0060 AM0068 AM0088 AM0105 AMS-I.I. AMS-II.C. AMS-II.F. AMS-II.G. AMS-II.L. AMS-II.N. AMS-II.P. AMS-II.S.		AM0020 AM0044 AM0046 AM0060 AM0086 AM0091 AM0113 AM0117 AM0120 AMS-II.C. AMS-II.E. AMS-II.F. AMS-II.G. AMS-II.J. AMS-II.K. AMS-II.L. AMS-II.M. AMS-II.N. AMS-II.O. AMS-II.Q. AMS-II.R. AMS-III.AE. AMS-III.AR. AMS-III.AV. AMS-III.X.
	Fuel/feedstock switch	AMS-III.B.	AM0121 ACM0003 ACM0005 AMS-II.F. AMS-III.B.		AMS-II.F. AMS-III.B.

Table VI-2. **Methodology Categorization other Sectors**

Sectoral scope	Renewable energy	Energy Efficiency	GHG destruction	GHG emission avoidance	Fuel/Feedstock Switch	GHG removal by sinks	Displacement of a more-GHG-intensive output
4 Manufacturing industries	AM0007 AM0036 ACM0003 AMS-III.Z. AMS-III.AS. AMS-III.BG.	AM0049 AM0055 AM0070 AM0106 AM0109 AM0114 AM0115 ACM0012 AMS-II.D. AMS-II.H. AMS-II.I. AMS-III.P. AMS-III.Q. AMS-III.V. AMS-III.Z. AMS-III.AS. AMS-III.BD. AMS-III.BG.	AM0078 AM0096 AM0111 AMS-III.K.	AM0057 AM0065 AM0092 AM0121 ACM0005 ACM0021 AMS-III.L.	AM0049 AM0092 AM0121 ACM0003 ACM0005 ACM0009 ACM0015 AMS-III.N. AMS-III.Z. AMS-III.AD. AMS-III.AM. AMS-III.AN. AMS-III.AS.		AM0070 AM0095 AM0114 AM0115 ACM0012
5 Chemical industries	ACM0017 AM0053 AM0075 AM0089	AM0055 AM0114 AMS-III.AC. AMS-III.AJ.	ACM0019 AM0021 AM0028 AM0098	AM0053 AMS-III.M. AMS-III.AI.	AM0027 AM0037 AM0050 AM0063 AM0069 AMS-III.J. AMS-III.O.		AM0053 AM0055 AM0069 AM0081 AM0098 AM0114 AM0115
6 Construction					AMS-III.BH.		AMS-III.BH.
7 Transport	AMS-I.M. AMS-III.T. AMS-III.AK. AMS-III.AQ.	AM0031 AM0090 AM0101 AM0110 AM0116 ACM0016 AMS-III.C. AMS-III.S. AMS-III.U. AMS-III.AA. AMS-III.AP. AMS-III.AT. AMS-III.BC. AMS-III.BM. AMS-III.BN. AMS-III.BO.			AMS-III.S. AMS-III.AY.		AMS-III.BP.
8 Mining/mineral production	ACM0003		ACM0008 AM0064 AMS-III.W.		AM0121 ACM0005 ACM0015		

Table VI-2. **Methodology Categorization other Sectors** (continued)

Sectoral scope	Renewable energy	Energy Efficiency	GHG destruction	GHG emission avoidance	Fuel/Feedstock Switch	GHG removal by sinks	Displacement of a more-GHG-intensive output
9 Metal production	AM0082	AM0038 AM0059 AM0066 AM0068 AM0109 AMS-III.V.		AM0030 AM0059 AM0065	AM0082		
10 Fugitive emissions from fuel (solid, oil and gas)			AM0064 AM0122 ACM0008 AMS-III.W.	AM0023 AM0043 AMS-III.BI.	AM0009 AM0037 AM0077	AM0074	AM0009 AM0077
11 Fugitive emissions from production and consumption of halocarbons and SF_6			AM0001 AM0078 AM0096 AM0111 AMS-III.X.	AM0035 AM0065 AM0079 AM0092 AM0119 AMS-III.X.	AM0071 AM0092 AMS-III.AB.		
12 Solvent use							
13 Waste handling and disposal	ACM0022 AM0112 AMS-III.BJ.	AMS-III.AJ. AMS-III.BA.	AM0073 ACM0001 ACM0010 ACM0014 AMS-III.G. AMS-III.H. AMS-III.AX.	AM0057 AM0080 AM0083 AM0093 AM0112 ACM0022 AMS-III.E. AMS-III.F. AMS-III.I. AMS-III.Y. AMS-III.AF. AMS-III.AO. AMS-III.BE.			
14 Afforestation and reforestation						AR-AM0014 AR-ACM0003 AR-AMS0003 AR-AMS0007	
15 Agriculture			AM0073 ACM0010 AMS-III.D. AMS-III.R.	AMS-III.A. AMS-III.AU. AMS-III.BE. AMS-III.BF. AMS-III.BK.	AMS-III.R.		

13. CATEGORIZATION BY APPLIED TECHNOLOGY TYPE/MEASURE (METHODOLOGY FAMILY TREES)

There have been distinct development phases of methodologies over time, leading to “families” when one methodology catalyzed the development of other methodologies.[4] The figures below show the families of methodologies in form of family trees. They are designed as follows: Each methodology is denoted by a box showing its unique identification number. Methodologies that can be found in the same family tree deal with comparable technologies or measures.

(dark yellow)	Methodologies for large-scale CDM project activities
(light yellow)	Methodologies for small-scale CDM project activities
(dark green)	Methodologies for small and large-scale a orestation and reforestation (A/R) CDM project activities
AM0000	Methodologies that have a particular potential to directly improve the lives of women and children

Figure VII-1. **Methodologies for renewable electricity**

Biomass electricity	AM0007, ACM0006, ACM0018, ACM0020
Grid electricity	AM0019, AM0026, AM0100, ACM0002, AMS-I.D.
Offgrid electricity/ isolated grids	AM0103, AMS-I.A., AMS-I.L., AMS-III.BL., AMS-I.M.
Enhanced generation	AM0052
Captive power	AMS-I.F.

[4] The concept of methodology families and family trees was initially adopted in the following guidebook: Understanding CDM Methodologies: A guidebook to CDM Rules and Procedures, written by Axel Michaelowa, Frédéric Gagnon-Lebrun, Daisuke Hayashi, Luis Salgado Flores, Phlippe Crête and Mathias Krey, commissioned by the UK Department for Environment Food and Rural Affairs (© Crown Copyright 2007).

Figure VII-2. **Methodologies for renewable energy (thermal or mechanical energy)**

Renewable thermal energy	AM0036, AM0072, AM0075, AM0082, AM0094, ACM0003, AMS-I.C., AMS-I.E., AMS-I.I., AMS-I.J., AMS-I.K., AMS-III.BG.
Renewable mechanical energy	AMS-I.B.

Figure VII-3. **Methodologies for efficient or less-carbon-intensive fossil-fuel-fired power plants**

Co- or trigeneration	AM0048, AM0049, AM0076, AM0084, AM0107, ACM0026, AMS-II.H., AMS-II.K., AMS-III.AM.
Gas – newly built	AM0049, AM0099, AM0107, ACM0013, ACM0025, ACM0026
Fuel cell – newly built	AMS-III.AC.
Coal – newly built	ACM0013
Low carbon electricity	AM0074
Energy efficiency	AM0061, AM0062, ACM0007, AMS-II.B., AMS-III.AL.

Figure VII-4. **Methodologies for fuel switch**

Coal/oil to gas	ACM0009	ACM0011	AMS-II.F.	AMS-III.B.
	AMS-III.AG.	AMS-III.AH.	AMS-III.AM.	AMS-III.AN.
Other low-carbon fuels	AM0081	ACM0003	AMS-III.Z.	AMS-III.AM.
	AMS-III.AN.	AMS-III.AS.		

Figure VII-5. **Methodologies for biofuel**

Plant oil	AMS-I.G.	AMS-III.T.		
Biodiesel	AM0089	ACM0017	AMS-I.H.	AMS-III.AK.
Bio-CNG	AMS-III.AQ.			

Figure VII-6. **Methodologies for industrial energy efficiency**

Steam systems	AM0017, AM0018
Water pumping	AM0020, AMS-II.C., AMS-II.P., AMS-II.S.
Waste gas/energy recovery	AM0055, AM0058, AM0066, AM0095, AM0098, AM0115, ACM0012, AMS-II.I., AMS-III.P., AMS-III.Q., AMS-III.BI.
Metal	AM0038, AM0059, AM0066, AM0068, AM0109, AMS-III.V., AMS-III.BD.
Boilers	AM0044, AM0056, ACM0023, AMS-II.D.
Chillers	AM0060
Kilns	AM0066, AM0068, AM0106, AMS-III.Z.
District heating	AM0058
Lighting	AMS-II.L.
Agriculture	AMS-II.F., AMS-II.P., AMS-II.S., AMS-III.A., AMS-III.BE.
Efficient motor or motor appliances (pump, fans, compressor)	AMS-II.S.
Other/various technologies	AM0088, AM0105, AM0114, AM0115, AM0118, AMS-II.C., AMS-II.D., AMS-II.T.

Figure VII-7. **Methodologies for household & building energy efficiency**

Cookstove	AMS-II.C.	AMS-II.G.		
Water pumping	AMS-II.C.	AMS-II.S.		
Water purifier	AM0086	AMS-II.C.	AMS-III.AV.	
Water saving	AMS-II.M.			
Refrigerators/chillers	AM0060	AM0070	AM0120	AMS-II.C.
	AMS-II.O.	AMS-III.X.		
Lighting	AM0046	AM0113	AMS-II.N.	AMS-II.J.
	AMS-II.L.	AMS-II.N.	AMS-III.AR.	
Whole building	AM0091	AMS-II.E.	AMS-II.Q.	AMS-II.R.
	AMS-III.AE.			
Others/various technologies	AMS-II.C.	AM0117		

Figure VII-8. **Methodologies for gas flaring and gas leak reduction**

Oil production	AM0009	AM0037	AM0077	AM0122
Compressors and distribution systems	AM0023			
Pipe replacement	AM0043			

Figure VII-9. **Methodologies for feedstock switch**

Cement	AM0121	ACM0015	
Cement blending	AM0121	ACM0005	
Inorganic	AM0027	AM0050	
Paper	AM0057	AMS-III.M.	
Metal	AMS-III.BA.		
Plastic	AMS-III.AJ.	AMS-III.BA.	
Other industries	AM0063	AMS-III.J.	AMS-III.AD.
Avoidance/decrease of usage	AMS-III.AI.		

Figure VII-10. **Methodologies for industrial gases**

HFC-23	AM0001			
Other HFCs	AM0071	AMS-III.N.	AMS-III.X.	AMS-III.AB.
N_2O, adipic acid	AM0021			
N_2O, nitric acid	AM0028	ACM0019		
PFC	AM0030	AM0059	AM0092	AM0096
	AM0111			
SF_6	AM0035	AM0065	AM0078	AM0079
	AM0119			

Figure VII-11. **Methodologies for waste management and wastewater**

Alternative treatment – composting	ACM0022	AMS-III.F.	AMS-III.AF.	
Alternative treatment – other technologies	AM0112	ACM0022	AMS-III.E.	AMS-III.L.
	AMS-III.R.	AMS-III.Y.	AMS-III.BJ.	
Alternative treatment – aerobic	AM0083	AM0093	AMS-III.AX.	
Landfill gas	ACM0001	AMS-III.G.		
Lagoons and biodigester – biogas	ACM0014	AMS-III.H.	AMS-III.AO.	
Manure and comparable animal waste	AM0073	ACM0010	AMS-III.D.	
Aerobic wastewater treatment	AM0080	AMS-III.I.		
Biogenic methane	AM0053	AM0069	AM0075	ACM0024
	AMS-III.O.	AMS-III.R.		

Figure VII-12. **Methodologies for transport**

Bus systems	AM0031	AMS-III.BN.		
Mass rapid transit systems	ACM0016	AMS-III.U.		
High speed rail systems	AM0101			
Energy efficiency	AMS-III.C.	AMS-III.AA.	AMS-III.AP.	AMS-III.BC.
Fuel switch	AMS-III.S.	AMS-III.AK.	AMS-III.AQ.	AMS-III.AY.
Transportation of cargo	AM0090	AMS-III.BO.		
Transportation of liquid fuels	AM0110			
Technology for improved driving	AMS-III.AT.	AMS-III.BC.		
Electric taxiing systems for airplanes	AM0116			
Solar power for domestic aircraft at-gate operations	AMS-I.M.			
Bicycles, e-bikes and Tricycles	AMS-III.BM.			
Shore-side electricity supply for ships	AMS-III.BP.			

Figure VII-13. **Other methodologies**

Methane from mining activities	AM0064, ACM0008, AMS-III.W.
Charcoal production	ACM0021, AMS-III.K., AMS-III.BG.
Electricity grid connection	AM0045, AM0104, AM0108, AMS-III.AW., AMS-III.BB., AMS-III.BL.
Efficient transmission and distribution	AM0067, AM0097, AMS-II.A.
Afforestation and reforestation	AR-AM0014, AR-ACM0003, AR-AMS0003, AR-AMS0007
Agriculture	AMS-III.AU., AMS-III.BF., AMS-III.BK.
Construction	AMS-III.BH.

14. PROGRAMMES OF ACTIVITIES

THE CONCEPT

In the CDM, a Programme of Activities (PoA) is defined as a voluntary coordinated action by a private or public entity that coordinates and implements any policy/measure or stated goal, which leads to emission reductions or net removals that are additional to any that would occur in the absence of the PoA, via an unlimited number of Component Project Activities (CPAs).

A CPA is a single measure, or a set of interrelated measures under a PoA, to reduce emissions or result in net removals, applied within a designated area.

A PoA is therefore like an “umbrella program”, which is registered by the Board. Individual CPAs that comply with the eligibility criteria specified in the PoA Design Document (PoA-DD) of the registered PoA can be included under this “umbrella” and actually generate emission reductions or net removals to benefit from carbon revenues.

BENEFITS

Compared to regular CDM project activities, PoAs have many benefits, particularly for less developed countries or regions. The process for the inclusion of individual CPAs under a registered PoA is considerably simplified and results in lower costs as compared to registration of regular project activities.

The main benefits of PoAs are

- Transaction costs, investment risks and uncertainties for individual CPA participants are reduced;
- PoAs are managed by a designated Coordinating and Managing Entity (CME). The CME is responsible for most of the CDM process. Therefore, direct engagement of individual project developers in the CDM process is not required;
- Access to the CDM is extended to smaller project activities which would not be viable as regular project activities;
- Emission reductions can be continuously scaled up after PoA registration, since an unlimited number of CPAs can be added at a later stage;
- Many technologies with high co-benefits, e.g. household technologies, are supported by PoAs;
- Specific regional policy goals can be effectively supported by accessing carbon finance through PoAs
- Monitoring/Verification of parameter values may be undertaken on a collective basis by utilizing a sampling approach;
- No registration fee is due for each CPA included after registration. Registration fees are based on the expected average emission reductions or net removals of the “actual case” CPAs submitted at the PoA registration.

PoA IN THE CDM PIPELINE

At the time of preparation of this edition of the Booklet, there were some sectors that have a higher proportion of PoAs in the CDM pipeline than regular project activities: energy efficiency demand side (sectoral scope 3), waste (sectoral scope 13) and solar energy (sectoral scope 1). Furthermore, out of the registered PoAs, it was observed that some methodologies were commonly used, such as:

- ACM0002 Grid-connected electricity generation from renewable sources
- AMS-I.C. Thermal energy production with or without electricity
- AMS-I.D. Grid connected renewable electricity generation
- AMS-II.G. Energy efficiency measures in thermal applications of non-renewable biomass
- AMS-II.J. Demand-side activities for efficient lighting technologies
- AMS-III.R. Methane recovery in agricultural activities at household/small farm

15. STANDARDIZED BASELINES

A standardized baseline can be a positive list containing names of emission reduction activities that, if implemented in a given country or region, would be considered automatically additional under certain conditions. It can also be a baseline emission factor to be used for the purpose of estimation of baseline emissions (e.g. grid emission factor).

THE CONCEPT

A standardized baseline is a baseline established for a Party or a group of Parties to facilitate the calculation of emission reduction and removals and/or the determination of additionality for CDM project activities.

The following elements may be standardized by an approved standardized baseline:
(a) Additionality; and/or
(b) Baseline (baseline scenario and/or baseline emissions).

BENEFITS

The objective of standardized baselines is to scale up the abatement of GHG emissions while ensuring environmental integrity by potentially:

- Reducing transaction costs;
- Enhancing transparency, objectivity and predictability;
- Facilitating access to the CDM, particularly with regard to underrepresented project types and regions;
- Simplifying measuring, reporting and verification

APPROVED STANDARDIZED BASELINES

Reference	Sector	Applicable countries/Region	Full View and History
ASB0005-2021	Power	Belize	Grid emission factor for the Belize national power grid (version 01.0)
ASB0008-2020	Rice cultivation	The Republic of the Philippines	Methane Emissions from Rice Cultivation in the Republic of the Philippines (version 01.0)
ASB0011-2021	Waste	The Dominican Republic	Landfill gas capture and flaring in the Dominican Republic (version 01.0)
ASB0034-2021	Power	West African Power Pool (WAPP) comprising of the following countries: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal, Republic of Togo	Grid emission factor for West African Power Pool (version 01.0)
ASB0038-2021	Power	Republic of Armenia	Grid emission factor for the electricity system of the Republic of Armenia (version 01.0)
ASB0045-2019	Power	Guyana	Grid emission factor of Guyana (version 01.0)
ASB0046-2019	Power	Mauritius	Mauritius Grid Emission Factor (version 01.0)
ASB0048-2020	Building	Republic of Korea	Specific CO_2 emissions in Residential Buildings in Republic of Korea (version 01.0)
ASB0049-2020	Cookstoves	Republic of the Union of Myanmar	Fraction of non-renewable biomass in Myanmar (version 01.0)
ASB0050-2020	Power	Republic of Kenya	Grid Emission Factor for the Republic of Kenya (version 01.0)
ASB0051-2021	Power	Antigua and Barbuda	Grid Emission Factor for Antigua and Barbuda (version 01.0)
ASB0052-2021	Power	Cape Verde	Grid emission factor for Cape Verde (version 01.0)
ASB0053-2021	Power	Saint Kitts and Nevis	Grid Emission Factors for Saint Kitts and Nevis (version 01.0)
ASB0054-2022	Power	Uganda	Grid emission for the national power grid of Uganda (version 01.0)

16. METHODOLOGIES ADDRESSING SUPPRESSED DEMAND

THE CONCEPT

Under the CDM, suppressed demand is defined as a "Scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances of the host Party".

The concept of suppressed demand is included in some CDM methodologies to consider situations where key services such as lighting and heating, water supply, waste disposal and transportation are only available in quantities that are insufficient to meet basic human needs before the implementation of a CDM project activity. This can be due to low income and lack of technologies/infrastructures or resources for its implementation. The minimum service level required to fulfil generally accepted basic human needs is expected to be reached in the future as host countries develop their economies, hence incomes increase, resources improve and technologies/infrastructures are implemented.

For example, before the start of a CDM project activity, households may be devoid of access to an electricity grid and have only a few kerosene lamps in place that are operated for short time periods, or just use candles. Or they may not have access to clean drinking water and therefore boil a small quantity of water manually.

The concept of suppressed demand is included in CDM methodologies for the baseline calculation specifying a minimum service level. For example, the daily amount of drinking water availability recommended by the World Health Organization is used as baseline water provision volume for the methodology AM0086 for water purification. In other methodologies such as AMS-I.A. and AMS-I.L., suppressed demand is taken into account by applying default emission factors for high emission technologies (e.g. kerosene lamps) assumed to be used due to the suppressed demand situation. In the methodology ACM0022, a default emission factor for a shallow landfill can be used in the absence of an organized waste collection and disposal system. If suppressed demand were not included, baseline emissions would be so small that project activities would become unattractive under the CDM due to the small number of CERs generated.

Methodologies addressing the issue of suppressed demand are labelled with a specific icon "Suppressed demand", put on the top right of the summary sheet.

BENEFIT

The consideration of suppressed demand allows host countries to improve life conditions by implementing CDM project activities.

Another benefit is the reduction of transaction costs for CDM project developers. Detailed data gathering to establish parameter values for baseline emission calculations may not be necessary as CDM methodologies that address the issue of suppressed demand usually include default values that are representative for the specific service level, such as the amount of kerosene used for lighting.

METHODOLOGIES ADDRESSING SUPPRESSED DEMAND

AM0086	Installation of zero energy water purifier for safe drinking water application
AM0091	Energy efficiency technologies and fuel switching in new and existing buildings
ACM0022	Alternative waste treatment processes
AMS-I.A.	Electricity generation by the user
AMS-I.B.	Mechanical energy for the user with or without electrical energy
AMS-I.L.	Electrification of rural communities using renewable energy
AMS-II.R.	Energy efficiency space heating measures for residential buildings
AMS-III.F.	Avoidance of methane emissions through composting
AMS-III.AR.	Substituting fossil fuel based lighting with LED/CFL lighting systems
AMS-III.AV.	Low greenhouse gas emitting safe drinking water production systems
AMS-III.BB.	Electrification of communities through grid extension or construction of new mini-grids
AMS-III.BL.	Integrated methodology for electrification of communities

17. METHODOLOGIES HAVING BENEFITS FOR WOMEN AND CHILDREN

The dual goals of the CDM are to promote sustainable development and reduce GHG emissions or enhance GHG removals. The outcomes of a CDM project activity should therefore directly or indirectly improve the living conditions of all people.

What has been highlighted in the booklet is that some methodologies have a particular potential to directly improve the lives of women and children effected by the project activity. These methodologies are labelled with a specific icon “Women and children”, put on the top right of the summary sheet.

The criteria used to label these methodologies as having particular benefits for women and children are the potential to:

- increase access to affordable household fittings and appliances (e.g. light globes, refrigerators);
- optimize tasks typically undertaken by women or children (e.g. fuel wood gathering, cooking, water collection);
- improve the living environment of women and children (e.g. better air quality, heating, lighting); or
- utilize community-based participatory approaches, that give women and children an opportunity to learn about the projects and contribute to decision making processes.

In the case of A/R CDM project activities, this icon is also indicated for project activities that generate new local employment opportunities because these positions are often filled by women

It is important to note that a methodology that has not been labelled with this icon will not impact adversely on women and children.

The following publication, “CDM and Women”, accessible on the CDM website, further highlights some women-friendly methodologies and aims to encourage project developers to consider the CDM when planning projects to help empower and improve women’s lives.

18. METHODOLOGIES FOR URBAN SECTORS

18.1 CDM METHODOLOGIES APPLICABLE TO CITY-BASED MITIGATION PROGRAMMES

1. In urban centres, there are many opportunities for reducing greenhouse gas (GHG) emissions. City-based mitigation programmes may target various sectors, including buildings, transport, energy supply and demand, water supply and treatment, and waste management, and may contain a range of measures in each sector aimed at reducing GHG emissions.
2. Many of these interventions could result in GHG emission reductions that are additional and eligible under the CDM. However, these measures may be dispersed and the resulting emission reduction from each individual measure relatively low. On the other hand, if these measures are implemented together at a community or city level, they could potentially generate significant emission reductions when the individual reductions are summed together.
3. Mitigation initiatives may also be implemented in a phased manner, in which case they may be better suited to be the structure of a PoA because that would allow a stage-wise implementation of the projects and an expansion of the mitigation measures during the PoA period (i.e. 28 years).
4. The CDM framework offers a wide range of methodologies and tools to estimate the emission reduction effect of these projects. A city-wide mitigation programme developed under the CDM may apply these methodologies and take into account any cross effects that may occur as a result of their application.
5. The tables below provide a non-exhaustive list of the methodologies applicable to each sector: Urban Transport (table 1); Household & Building Energy Generation and Energy Efficiency (table 2); and Waste Management and Wastewater (table 3).

TABLE 1. LIST OF CDM METHODOLOGIES RELEVANT TO URBAN TRANSPORT

Measure	CDM methodology	
Bicycles, tricycles, e-bikes or e-tricycles	AMS-III.BM.	Lightweight two and three wheeled personal transportation
Bus systems	AM0031	Bus rapid transit projects
Mass rapid transit systems	ACM0016	Mass Rapid Transit Projects
	AMS-III.U.	Cable Cars for Mass Rapid Transit System (MRTS)
Energy efficiency	AMS-III.C.	Emission reductions by electric and hybrid vehicles
	AMS-III.AA.	Transportation Energy Efficiency Activities using Retrofit Technologies
	AMS-III.AP.	Transport energy efficiency activities using post - fit Idling Stop device
	AMS-III.BC.	Emission reductions through improved efficiency of vehicle fleets
Fuel switch	AMS-III.S.	Introduction of low-emission vehicles/technologies to commercial vehicle fleets
	AMS-III.T.	Plant oil production and use for transport applications
	AMS-III.AK.	Biodiesel production and use for transport applications
	AMS-III.AQ.	Introduction of Bio-CNG in transportation applications
	AMS-III.AY.	Introduction of LNG buses to existing and new bus routes
Transportation of cargo	AM0090	Modal shift in transportation of cargo from road transportation to water or rail transportation
Transportation of liquid fuels	AM0110	Modal shift in transportation of liquid fuels
Technology for improved driving	AMS-III.AT.	Transportation energy efficiency activities installing digital tachograph systems to commercial freight transport fleets
	AMS-III.BC.	Emission reductions through improved efficiency of vehicle fleets

TABLE 2. LIST OF CDM METHODOLOGIES RELEVANT TO URBAN HOUSEHOLD & BUILDING ENERGY GENERATION AND ENERGY EFFICIENCY

Measure	CDM methodology	
Renewable electricity (captive power)	AMS-I.F.	Renewable electricity generation for captive use and mini-grid
Thermal energy for cooking	AMS-I.E.	Switch from non-renewable biomass for thermal applications by the user
	AMS-I.I.	Biogas/biomass thermal applications for households/small users
	AMS-I.K.	Solar cookers for households
	AMS-II.G.	Energy efficiency measures in thermal applications of non-renewable biomass
Solar water heating	AMS-I.J.	Solar water heating systems (SWH)
Energy efficiency in water delivery	AM0020	Baseline methodology for water pumping efficiency improvements
	AMS-II.C.	Demand-side energy efficiency activities for specific technologies
	AMS-II.S.	Energy efficiency in motor systems
Water purifier	AM0086	Distribution of zero energy water purification systems for safe drinking water
	AMS-III.AV.	Low greenhouse gas emitting safe drinking water production systems
Water saving	AMS-II.M.	Demand-side energy efficiency activities for installation of low-flow hot water savings devices

TABLE 2. (CONT.)

Refrigerators/chillers	AM0060 AMS-II.C. AMS-II.O. AMS-III.X. AM0120	Power saving through replacement by energy efficient chillers Demand-side energy efficiency activities for specific technologies Dissemination of energy efficient household appliances Energy Efficiency and HFC-134a Recovery in Residential Refrigerators Energy-efficient refrigerators and air-conditioners
Lighting	AM0046 AM0113 AMS-II.C. AMS-II.J. AMS-II.N. AMS-III.AR.	Distribution of efficient light bulbs to households Distribution of compact fluorescent lamps (CFL) and light-emitting diode (LED) lamps to households Demand-side energy efficiency activities for specific technologies Demand-side activities for efficient lighting technologies Demand-side energy efficiency activities for installation of energy efficient lighting and/or controls in buildings Substituting fossil fuel-based lighting with LED/CFL lighting systems
Street lighting	AMS-II.L.	Demand-side activities for efficient outdoor and street lighting technologies
Whole building	AM0091 AMS-II.E. AMS-II.K. AMS-II.Q. AMS-II.R. AMS-III.AE.	Energy efficiency technologies and fuel switching in new and existing buildings Energy efficiency and fuel switching measures for buildings Installation of co-generation or tri-generation systems supplying energy to commercial building Energy efficiency and/or energy supply projects in commercial buildings Energy efficiency space heating measures for residential buildings Energy efficiency and renewable energy measures in new residential buildings
District heating/cooling	AM0044 AM0058 AM0072 AM0117 AMS-II.B.	Energy efficiency improvement projects - boiler rehabilitation or replacement in industrial and district heating sectors Introduction of a district heating system Fossil Fuel Displacement by Geothermal Resources for Space Heating Introduction of a new district cooling system Supply side energy efficiency improvements – generation
Others/various technologies	AMS-II.C.	Demand-side energy efficiency activities for specific technologies

TABLE 3. LIST OF METHODOLOGIES RELEVANT TO URBAN WASTE MANAGEMENT AND WASTEWATER

Measure	CDM methodology	
Alternative waste –composting	ACM0022 AMS-III.F. AMS-III.AF.	Alternative waste treatment processes Avoidance of methane emissions through composting Avoidance of methane emissions through excavating and composting of partially decayed municipal solid waste (MSW)
Alternative waste treatment – other technologies	ACM0022 AM0112 AMS-III.E. AMS-III.L. AMS-III.Y. AMS-III.BJ.	Alternative waste treatment processes Less carbon intensive power generation through continuous reductive distillation of waste Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment Avoidance of methane production from biomass decay through controlled pyrolysis Methane avoidance through separation of solids from wastewater or manure treatment systems Destruction of hazardous waste using plasma technology including energy recovery
Alternative waste treatment – aerobic	AM0083 AM0093 AMS-III.AX.	Avoidance of landfill gas emissions by in-situ aeration of landfills Avoidance of landfill gas emissions by passive aeration of landfills Methane oxidation layer (MOL) for solid waste disposal sites
Landfill gas recovery	ACM0001 AMS-III.G.	Flaring or use of landfill gas Landfill methane recovery
Lagoons and biodigester – biogas	ACM0014 AMS-III.H. AMS-III.AO.	Treatment of wastewater Methane recovery in wastewater treatment Methane recovery through controlled anaerobic digestion
Manure treatment	AM0073 ACM0010 AMS-III.D. AMS-III.R.	GHG emission reductions through multi-site manure collection and treatment in a central plant GHG emission reductions from manure management systems Methane recovery in animal manure management systems Methane recovery in agricultural activities at household/small farm level
Aerobic wastewater treatment	AM0080 AMS-III.I.	Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants Avoidance of methane production in wastewater treatment through replacement of anaerobic systems by aerobic systems
Utilization of biogenic methane	ACM0024 AM0053 AM0069 AM0075 AMS-III.O.	Natural gas substitution by biogenic methane produced from the anaerobic digestion of organic waste Biogenic methane injection to a natural gas distribution grid Biogenic methane use as feedstock and fuel for town gas production Methodology for collection, processing and supply of biogas to end-users for production of heat Hydrogen production using methane extracted from biogas
Recycling	AMS-III-AJ. AMS-III-BA.	Recovery and recycling of materials from solid wastes Recovery and recycling of materials from E-waste

18.2. STANDARDIZATION OF PARAMETERS

6. In order to determine the parameter values required to estimate baseline, project and leakage emissions, the application of the methodologies identified in Section 1.8.1. may require data collection and surveys to be undertaken, which can be complex and time consuming. In order to simplify this process, a standardized baseline process has been set up, whereby a host country Designated National Authority (DNA) may submit proposals for standardized baselines. A wide range of parameters in these methodologies could be standardized by taking a region/country-specific approach for a sector. This could facilitate the cost-effectiveness and scalability of CDM PoAs in the urban sector.

7. The table below includes examples of parameters that could potentially be standardized, in accordance with the "Procedure for the development, revision, clarification and update of standardized baselines"

TABLE 4. EXAMPLES OF PARAMETERS THAT MAY BE STANDARDIZED

Sector/Measure	CDM methodology / tool		Parameters	Possible data sources for standardization of parameters
Electricity generation	TOOL07	Tool to calculate the emission factor for an electricity system	CO_2 emission factor of the electricity system	Official report/statistics
Energy-efficient refrigerators and air-conditioners	TOOL29	Determination of standardized baselines for energy-efficient refrigerators and air-conditioners	Baseline energy consumption	See requirements in TOOL29
Energy efficiency measures in buildings	TOOL31	Determination of standardized baselines for energy efficiency measures in residential, commercial and institutional buildings	CO_2 emissions per m^2 for different building categories	Surveys
Energy-efficient Lighting	AMS-II.C. AMS-II.J.	Demand-side energy efficiency activities for specific technologies Demand-side activities for efficient lighting technologies	Utilization hours	Surveys, peer-reviewed literature, official reports/statistics, etc.
Solid Waste	AMS-III.G. ACM0001 TOOL04	Landfill methane recovery Flaring or use of landfill gas Emissions from solid waste disposal sites	Waste composition	Test results, peer-reviewed literature, official reports/statistics, etc.
			Legal requirements to destroy methane as part of regular operation of landfills	Local regulations/legislation
Cooking	AMS-I.E. AMS-II.G.	Switch from non-renewable biomass for thermal applications by the user Energy efficiency measures in thermal applications of non-renewable biomass	Baseline woody biomass consumption	Surveys, peer-reviewed literature, official reports/statistics, etc.
Non-renewable biomass	TOOL30	Calculation of the fraction of non-renewable biomass	Fraction of non-renewable biomass	See requirements in TOOL30
Transport	ACM0016 AM0031 TOOL18	Mass Rapid Transit Projects Bus rapid transit projects Baseline emissions for modal shift measures in urban passenger transport	Specific CO_2 emissions per passenger-kilometer transported in the baseline	Surveys, official reports/statistics, etc.
	AMS-III.AY.	Introduction of LNG buses to existing and new bus routes	Specific fuel consumption of baseline buses	Official report/statistics
	AMS-III.BM.	Lightweight two and three wheeled personal transportation	CO_2 emission factor per passenger-kilometer corresponding to public transportation-mix in the city	Peer-reviewed literature, official reports/statistics

19. INTRODUCTION TO METHODOLOGY SUMMARY SHEETS

The methodology summary sheets are distinguished as being for large-scale and small-scale CDM project activities, as well as large-scale and small-scale A/R CDM project activities. Each methodology summary sheet has the sections as follows:

TYPICAL PROJECT(S) APPLICABLE TO THE METHODOLOGY

Project activities for which the methodology is applicable are described. Practical examples are mentioned for better understanding of the purpose of the specific methodology

TYPE(S) OF GHG EMISSION MITIGATION ACTION

This refers to the type of mitigation activity presented in the methodology categorization table (section 1.2. above). The type of mitigation action, such as fuel switch or energy efficiency, is briefly describe

IMPORTANT CONDITIONS UNDER WHICH THE METHODOLOGY IS APPLICABLE

Methodologies are only applicable under particular conditions and the most relevant conditions are listed in this section. However, not all conditions can be listed and it is important to consult the full text of each methodology.

IMPORTANT PARAMETERS THAT NEED TO BE DETERMINED OR MONITORED

In order to calculate emission reductions or net removals of a project activity, certain parameters have to be determined at the beginning when the project activity is validated and various parameters have to be monitored during the operation of the project activity. Therefore this section is divided into parameters “at validation” and parameters “monitored”. In addition, some methodologies require checking of specific conditions or parameters to prove that applicability conditions are met.

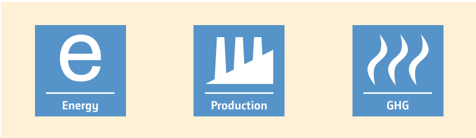
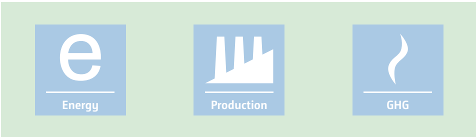
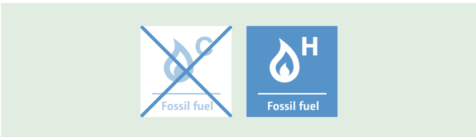
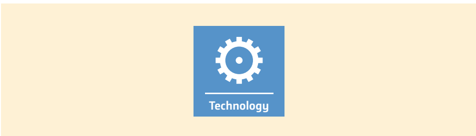
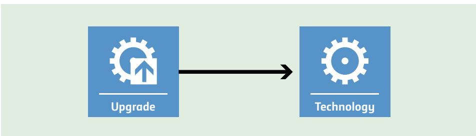
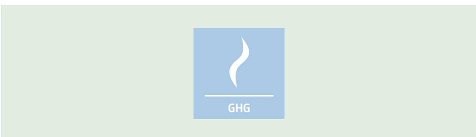
VISUAL DESCRIPTION OF BASELINE AND PROJECT SCENARIOS

An important feature of the booklet is the use of diagrams made of icons to illustrate the baseline and project scenarios. These diagrams enable readers to quickly grasp the scope of the methodology.

The baseline scenario represents the situation that would occur in the absence of the project activity. The project scenario refers to the situation that is achieved by the implementation of the project activity. Complex scenarios cannot be displayed by a simplified diagram. Therefore, the simplified diagrams focus on the main activity that results in emission reductions or net removals. The diagrams do not replace the necessity to consult the full methodology text.

A list of icons used in the booklet is given in chapter II. Some exemplifications of diagrams are presented below

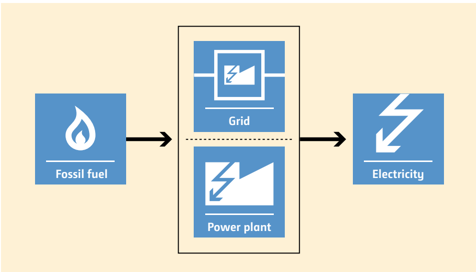
EXEMPLIFICATION OF DIAGRAMS

	Full intensity in the baseline scenario is depicted with bold colour.
	Reduced, decreased intensity in the project activity is depicted with pale colour.
	Avoidance and replacement is depicted with crossed icons.
	A carbon-intensive fossil fuel is used in the baseline scenario.
	Instead of the carbon-intensive fossil fuel, a less-carbon-intensive fossil fuel is used due to the project activity.
	A less-efficient technology is used in the baseline scenario.
	A more-efficient technology is used due to the project activity.
	Activities in the baseline scenario result in GHG emissions.
	Less GHG emissions are occurring due to the project activity.

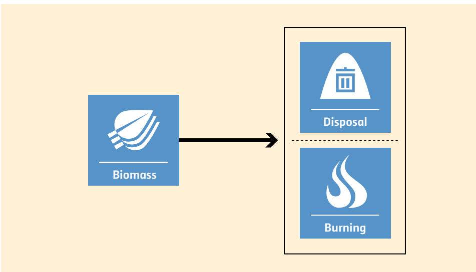
EXEMPLIFICATION OF DIAGRAMS

Activities in the baseline scenario result in GHG emissions.

These GHG emissions are avoided due to the project activity.



Electricity is either produced by power plants connected to the grid or a captive power plant using fossil fuel.



Biomass is either left to decay or burned in an uncontrolled manner.

Baseline situation

Project situation

The project boundary encompasses all emissions of GHG under the control of the project participants that are significant and reasonably attributable to the CDM project activity. Due to the simplification of the diagrams, please consult each methodology for the detailed delineation of the project boundary.

Chapter II

ICONS, ABBREVIATIONS AND GLOSSARY

2.1 ICONS USED IN THIS BOOKLET

Afforestation/reforestation areas
Small afforestation/reforestation areas.

Agricultural activity
Production of crops or livestock.

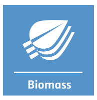
Agricultural land
Land with crops on solid ground. Also plantations not meeting definition of forest.

Air

Airplane
Any kind of airplane-based transport.

Animal grazing
Grazing livestock in pasture land or any other land.

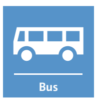
Bicycle
Bicycles, e-bikes and Tricycles



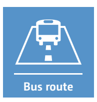
Biomass
Unless stated otherwise, renewable biomass is implied. Types of biomass include residues, plant oil, wood.

Buildings
Any kind of building.

Burning
Uncontrolled burning of biomass, flaring or venting of waste gas.

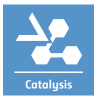


Bus
Any kind of bus-based transport.

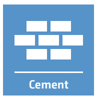


Bus route
Any route where buses drive, from the origin to the final stop.

Car
Any kind of car-based transport.

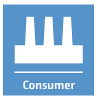


Catalysis
Catalysis of substances (i.e. GHGs) in order to convert them into substances with less or no GWP.



Cement
Products such as clinker, cement, lime or bricks.

Charcoal production
Charcoal production activity.

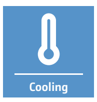


Commercial Consumer
Commercial consumer, e.g. industrial or institutional consumer.

Consumer
Residential or commercial consumer.

Contaminated land
May indicate chemically polluted land (e.g. mine spoils) or naturally hostile land (e.g. naturally occurring salinity or alkalinity). The specific type is shown in the icon caption.

Controlled burning
Any kind of combustion or decomposition in a controlled manner to dispose combustible substances. Also combustion to produce feedstock such as CO_2 or heat.

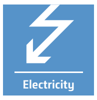


Cooling

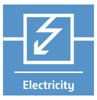
Data centre

Disposal
Any kind of disposal. E.g. landfilling.

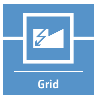
Drinking water



Electricity

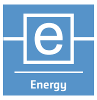


Electricity distribution grid
This icon is used to depict an electricity distribution system and is used when generated electricity is/ has to be supplied to the electricity grid or if the project activity occurs directly within the electricity distribution system.



Electricity grid
This icon is used to depict all (fossil-fuel-fired) power plants connected and providing electricity to the grid (e.g. national or regional grid).

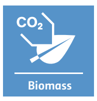
Energy
Any kind of energy. This icon is used, if different types of energy are depicted. E.g. electricity, heat, steam or mechanical energy.



Energy distribution system
Any kind of energy distribution system. E.g. electricity grid or heat distribution system.

Energy generation
Any kind of plant, facility or equipment used to generate energy. This icon represents any co- or tri-generation system as well as systems to provide mechanical energy. The icon is also used, if either electricity or heat are produced.

Exploitation
Any kind of exploitation activity such as mining activities, oil and gas production.

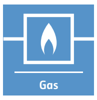


Fixation of CO_2 in Biomass
Fixation of atmospheric CO_2 from the atmosphere in biomass through the process of photosynthesis

Fossil fuel
Any kind of fossil fuel used for combustion. Can be gaseous, liquid or solid. E.g. natural gas, fuel oil, coal.

Fuelwood collection
Collecting fuelwood without full-tree harvest.

Gas
Any kind of combustible gas. E.g. natural gas, methane, biogas, landfill gas.

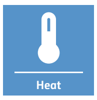


Gas distribution system
Any kind of gas distribution system. E.g. natural gas pipeline system.

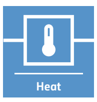
Grassland
Grass on ground without cracks.

Greenhouse gas emissions
Emissions of greenhouse gases, i.e.:
Carbon dioxide (CO_2)
Hydrofluorocarbons (HFCs)
Methane (CH_4)
Methane-rich vapours (CH_4 & HCs)
Nitrous oxide (N_2O)
Perfluorocarbons (PFCs)
Sulphur hexafluoride (SF_6).
Where applicable, the specific GHG is presented in the icon caption.

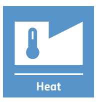
Harvesting
Harvesting activity.



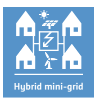
Heat
Any kind of thermal energy. E.g. steam, hot air, hot water.



Heat distribution system
Any kind of heat distribution system.
E.g. steam system, district heating system.



Heat generation
Any kind of plant, facility or equipment used to generate heat. This includes fossil-fuel-fired boilers to generate steam, incinerators, but also small applications such as radiators, cookers and ovens.



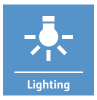
Hybrid mini-grid

Input or output material
Any kind of material. Can be gaseous, liquid or solid. E.g. raw materials, substances used for production, products such as plastics. This icon is also used if a GHG such as CO_2 is used as feedstock.

Input or output material storage tank
Storage of any kind of material.

Land application
The material (e.g. sludge) is applied to land.

Less-carbon-intensive fossil fuel
Any kind of less-carbon-intensive fossil fuel used for combustion. E.g. natural gas.

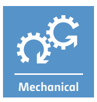


Lighting
Any kind of lighting equipment such as incandescent light bulbs, compact florescent lamps.

Livestock
Any kind of livestock.

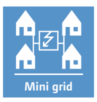
Losses
Any kind of losses from leaks in pipe systems and other distribution systems.

Manure
Manure from livestock.

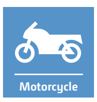


Mechanical energy

Milk production



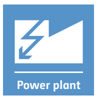
Mini grid



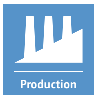
Motorcycle
Any kind of motorcycle-based transport.

Oil
Oil of fossil origin. E.g. crude oil.

Planting or seeding
Afforestation/reforestation activity by planting, seeding or other measures.



Power plant
Any kind of plant, facility or equipment used to produce electricity. This includes fossil-fuel-fired power plants, renewable power plants such as hydro power plants, but also (small) photovoltaic systems.

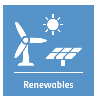


Production
The output of the production can be specified in the icon caption. E.g. aluminium, iron, cement, refrigerators.

Refrigerant
Refrigerant that contains HFC.

Refrigerators and chillers
Any kind of refrigerator or chiller.

Release
Any kind of release of substances or energy without using the substance or the energy content of the substances.



Renewables

Residential Consumer
Residential consumer, e.g. households.

Sand dunes or barren land
Sand dunes or barren land without vegetation.

Seeds
Any type of seeds.

Settlement land
Land within settlements (parks, lawns, etc.) or along infrastructure (roads, powerlines, railways, waterways, etc.).

Ship
Any kind of transport based on ships or barges.

Shrub and/or single tree vegetation
Non-forest woody vegetation: shrubs and single trees on “solid” ground (without cracks).

Suppressed demand
Methodologies that address the issue of suppressed demand.

Technology
Any kind of technology, equipment, appliance.

Train
Any kind of train-based transport.

Transformer

Transmission line

Treatment
Any kind of treatment of waste or materials, e.g. production of RDF from municipal waste.

Treatment
Any kind of treatment of wastewater or manure, e.g. lagoons, pits, aerobic treatment systems.

Truck
Any kind of truck-based transport.

Upgrade
Any type of upgrade. Can be retrofitting of existing equipment or installation of more-advanced technology to displace existing less-advanced equipment. E.g. replacement of incandescent light bulbs by compact fluorescent lamps. Also applicable to upgrade agricultural activity processes.

Waste
Any kind of waste. Can be gaseous, liquid or solid. The specific substance can be specified in the icon caption.

Water
Any kind of water. E.g. drinking water, waste water.

Wetland
Lands with wet to moist soil, e.g. swamp or peatland.

Women and children
Project activities using these methodologies have a particular potential to directly improve the lives of women and children.

2.2. ABBREVIATIONS USED IN THIS BOOKLET

%	Per cent
°C	Degree Celsius
A/R	Afforestation/ Reforestation
ABS	Acrylonitrile Butadiene Styrene
ACM	Approved Consolidated Methodology
AL	Aluminium
AM	Approved Methodology
AMC	Alternative Raw Materials That Do Not Contain Carbonates
AMS	Approved Methodology for Small-scale CDM project activities
AOG	Ammonia-Plant Off Gas
AOR	Ammonia Oxidation Reactor
APU	Auxiliary Power Unit
BC	Blended Cement
BEMS	Building Energy Management Systems
Board	CDM Executive Board (also referred to as EB)
BRT	Bus Rapid Transit
BSG	Baseline Sample Group
C_2F_6	Hexafluoroethane
C_3F_8	Octafluoropropane
$c\text{-}C_4F_8$	Octafluorocyclobutane
$CACO_3$	Calcium Carbonate
CCHP	Trigeneration (Combined Cooling, Heating and Power generation)
CDD	Cooling Degree Days
CDM	Clean Development Mechanism
CDR	Carbon Dioxide Recovery
CDRI	Cold Direct Reduced Iron
CER	Certified Emission Reduction
$(CF_3CF_2C(0)$ $CF(CF_3)_2$	Perfluoro-2-methyl-3-pentanone
CF_4	Tetrafluoromethane
CFC	Chlorofluorocarbons
CFL	Compact Fluorescent Lamps
CH_2F_2	Difluoromethane
CH_3F	Fluoromethane
CH_4	Methane
CHF_3	Fluoroform
CHP	Cogeneration (Combined Heat and Power generation)
Cl_2	Chlorine Gas
CM	Combined Margin
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
COG	Coke Oven Gas
COP	Coefficient of Performance
CPA	CDM Project Activity
CRD	Continuous Reductive Distillation
CSP	Concentrating Solar Power
CVD	Chemical Vapour Deposition
CWPB	Centre Worked Pre-Baked
DC	Direct Current
DME	Dimethyl ether
DMI	Dry Matter Intake
DOE	Designated Operational Entity
DOM	Dead Organic Matter
DPM	Dynamic Power Management
DRI	Direct Reduced Iron
DSS	Decision Support System
DWW	Dewatered Wastewater
EAF	Electric Arc Furnace
ELT	End of Life Tyres
FF	Frost Free
fNRB	Fraction of Non-Renewable Biomass
GE	Gross Energy
GHG	Greenhouse Gas
GIEE	Gas Insulated Electrical Equipment
GIS	Geographic Information System
GPF	Gas Processing Facilities
GWh	Gigawatthours
GWP	Global Warming Potential
H_2	Hydrogen
HCl	Hydrogen Chloride
HCs	Hydrocarbons
HDD	Heating Degree Days
HDPE	High Density Polyethylene
HDRI	Hot Direct Reduced Iron
HDS	Hydrodesulphurization Process
HFC	Hydrofluorocarbon
HIPS	High Impact Polystyrene
HPO (process)	Hydroylamin-Phosphat-Oxim (process)
HRSG	Heat Recovery Steam Generator
HSR	High Speed Rail
HSS	Horizontal Stud Soederberg
HSTs	Hydrocarbon storage tanks
HVAC	Heating, Ventilation and Air Conditioning
HVDC	High Voltage Direct Current
IAI	International Aluminium Institute
ICL	Incandescent Lamps
IEC	International Electronic Commission
IG	Intermediate Gas
IPCC	Intergovernmental Panel on Climate Change
ISCC	Integrated Solar Combined Cycle
ISO	International Organization for Standardization
ITS	Intelligent Transportation Systems
kg	Kilogramme
km	Kilometre
kV	Kilovolt
kWh	Kilowatt Hour
kt	Kiloton
LCD	Liquid Crystal Display
LDPE	Low Density Polyethylene

LED	Light-Emitting Diode
LFG	Landfill gas
LNG	Liquefied Natural Gas
LHV	Lower Heating Value
LPG	Liquefied Petroleum Gas
LSC	Large-scale
m	Metre
m^2	Square metre
m^3	Cubic metre
$MgCO_3$	Magnesium Carbonate
mm	Millimetre
MOL	Methane Oxidation Layer
MRG	Methane Rich Gas
MRTS	Mass Rapid Transit System
MSW	Municipal Solid Waste
MW	Megawatt
N_2O	Nitrous Oxide
NCV	Net Calorific Value
NMHCs	Non-methane hydrocarbons
NUE	Nitrogen Use Efficient
ODP	Ozone Depleting Potential
PD	Project Devices
PDD	Project Design Document
PET	Polyethylene Terephthalate
PFC	Perfluorocarbon
PFPB	Point Feeder Pre-Baked
pkm	Passenger-Kilometer
PoA	Programme of Activities
PoA-DD	Programme of Activities Design Document
PP	Polypropylene
PSG	Project Sample Group
P-U	Power-Voltage (characteristic curve)
PUF	Polyurethane Foam
PV	Photovoltaic
RDF	Refuse-Derived Fuel
RHF	Rotary Hearth Furnace
SB	Stabilized Biomass
SDW	Safe Drinking Water
SF_6	Sulphur Hexafluoride
SiMn	Silicomanganese
SME	Small and Medium Enterprises
SMMEs	Small, Medium and Micro Enterprises
SO_2	Sulphur Dioxide
SOC	Soil Organic Carbon
SSC	Small-scale
STG	Steam Turbine Generator
SWDS	Solid Waste Disposal Site
SWH	Solar Water Heating
SWPB	Side Worked Pre-Baked
TG	Tailgas
TOC	Total Organic Carbon
TPA	Total Project Area
VAM	Ventilation Air Methane
VRUs	Vapour Recovery Units
VSS	Vertical Stud Soederberg
W	Watt

2.3. GLOSSARY

Explanations on general terminologies used in this booklet are listed below. More definitions are given in the Glossary of CDM terms. For terminologies specific to a certain methodology, please refer to the definition section of the respective methodology available at <https://cdm.unfccc.int/methodologies/index.html>.

Above-ground biomass[5]	All living biomass above the soil including stem, stump, branches, bark, seeds, and foliage as well as herbaceous vegetation.
Additional/Additionality	**For a CDM project activity** (non-A/R) or **CPA** (non-A/R), the effect of the CDM project activity or CPA to reduce anthropogenic GHG emissions below the level that would have occurred in the absence of the CDM project activity or CPA; or **For an A/R or SSC A/R CDM project activity** or **CPA** (A/R), the effect of the A/R or SSC A/R CDM project activity or CPA (A/R) to increase actual net GHG removals by sinks above the sum of the changes in carbon stocks in the carbon pools within the project boundary that would have occurred in the absence of the A/R or SSC A/R CDM project activity or CPA (A/R). Whether or not a CDM project activity or CPA is additional is determined in accordance with the CDM rules and requirements.
Afforestation	The direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or the human-induced promotion of natural seed sources.
Agroforestry	Growing of both trees and agricultural / horticultural crops on the same piece of land.
Allometric biomass equations	Regression equations calculating biomass based on measured parameters of a tree (or shrub), for example, quantifying the relationship between above-ground tree biomass and the diameter at breast height and tree height of a specific tree species.
Baseline scenario	**For a CDM project activity** (non-A/R) or **CPA** (non-A/R), the scenario for a CDM project activity or CPA that reasonably represents the anthropogenic emissions by sources of GHG that would occur in the absence of the proposed CDM project activity or CPA. **For an A/R** or **SSC A/R CDM project activity** or **CPA** (A/R), the scenario for an A/R or SSC A/R CDM project activity or CPA (A/R) that reasonably represents the sum of the changes in carbon stocks in the carbon pools within the project boundary that would occur in the absence of the A/R or SSC A/R CDM project activity or CPA (A/R).
Below-ground biomass[5]	All living biomass of roots. Fine roots of less than (suggested) 2 mm diameter are oft en excluded because these oft en cannot be distinguished empirically from soil organic matter or litter.
Biomass expansion factor	Ratio of total stand biomass to stand (merchantable) volume (e.g. as derived from forest yield tables).
Biomass	Non-fossilized and biodegradable organic material originating from plants, animals and micro-organisms, including: (a) Biomass residue; (b) The non-fossilized and biodegradable organic fractions of industrial and municipal wastes; and (c) The gases and liquids recovered from the decomposition of non-fossilized and biodegradable organic material.
Biomass, non-renewable	Biomass not fulfilling the conditions of renewable biomass is considered as non-renewable.

Biomass,[6] renewable	Biomass which meets one of the following conditions: (a) The biomass originates from land areas that are forests where: (i) The land area remains a forest; (ii) Sustainable management practices are undertaken on these land areas to ensure, in particular, that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and (iii) Any national or regional forestry and nature conservation regulations are complied with; (b) The biomass is woody biomass and originates from croplands and/or grasslands where: (i) The land area remains cropland and/or grasslands or is reverted to forest; and (ii) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbonstocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and (iii) Any national or regional forestry, agriculture and nature conservation regulations are complied with; (c) The biomass is non-woody biomass and originates from croplands and/or grasslands where: (i) The land area remains cropland and/or grasslands or is reverted to forest; and (ii) Sustainable management practices are undertaken on these land areas to ensure in particular that the level of carbon stocks on these land areas does not systematically decrease over time (carbon stocks may temporarily decrease due to harvesting); and (iii) Any national or regional forestry, agriculture and nature conservation regulations are complied with; (d) The biomass is a biomass residue and the use of that biomass residue in the CDM project activity does not involve a decrease of carbon pools, in particular dead wood, litter or soil organic carbon, on the land areas from which the biomass residues originate; (e) The biomass is the non-fossil fraction of an industrial or municipal waste.
Biomass, residues	Non-fossilized and biodegradable organic material originating from plants, animals and micro-organisms which is a by-product, residue or waste stream from agriculture, forestry and related industries.
Captive generation	Electricity generation in a power plant that supplies electricity only to consumer(s) and not to the electricity grid. The consumer(s) are either located directly at the site of the power plant or are connected through dedicated electricity distribution line(s) with the power plant but not via the electricity grid.
Carbon sequestration	Carbon sequestration is defined as a biological, chemical or physical process of removing carbon from the atmosphere and depositing it in a reservoir.
Cogeneration	Simultaneous production of electricity and useful thermal energy in one process.
Deadwood[5]	All non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. Dead wood includes wood lying on the surface, dead roots, and stumps larger than or equal to 10 cm in diameter or any other diameter used by the country.
Emission factor	Measure of the average amount of GHG emitted to the atmosphere by a specific process, fuel, equipment, or source.
Energy efficiency	Energy efficiency is defined as the improvement in the service provided per unit power, for example, project activities which increase unit output of traction, work, electricity, heat, light (or fuel) per MW input are energy efficiency project activities.
Feedstock	Gaseous, liquid or solid raw material used in manufacturing.
Forest	A minimum area of land of 0.05 –1.0 hectare with tree crown cover (or equivalent stocking level) of more than 10 – 30 per cent with trees with the potential to reach a minimum height of 2 – 5 metres at maturity in situ and may include: (a) Either closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest; (b) Young natural stands and all plantations which have yet to reach a crown density of 10–30 per cent or tree height of 2–5 metres; (c) Areas normally forming part of the forest area which are temporarily unstocked as a result of human intervention such as harvesting or natural causes but which are expected to revert to forest. The definition of forest becomes applicable to a Party when: (a) For an Annex I Party, the Party selects a single minimum tree crown cover value between 10 and 30 per cent, a single minimum land area value between 0.05 and 1 hectare and a single minimum tree height value between 2 and 5 metres, as provided under paragraph 16 of the Annex to decision 16/CMP.1; (b) For a non-Annex I Party, the Party selects a single minimum tree crown cover value between 10 and 30 per cent, a single minimum land area value between 0.05 and 1 hectare and a single minimum tree height value between 2 and 5 metres, as provided under paragraph 8 of the Annex to decision 5/CMP.1.

Fossil fuel	Fuels formed by natural resources such as anaerobic decomposition of buried dead organisms (e.g. coal, oil, and natural gas).
Greenfield facility	The construction of a new facility at a location where previously no facility exists, for example, construction of new power plant at a site where previously no power generation activity exists.
Greenhouse gas (GHG)	A greenhouse gas listed in Annex A to the Kyoto Protocol, unless otherwise specified in a particular methodology.
Grid	The spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity (e.g. the renewable power plant location or the consumers where electricity is being saved) and that can be dispatched without significant transmission constraints.
Harvesting	Cutting and removal of trees from forests for timber or other uses. In sustainable forestry, harvesting is followed by planting or natural regeneration of the forest.
Industrial gases	Greenhouse gases originating from chemical production processes that are not naturally occurring. In addition, N_2O from chemical production processes is included in this group of greenhouse gases.
Land use, land-use change and forestry	A GHG inventory sector that covers emissions and removals of GHG resulting from direct human-induced land use, land-use change and forestry activities.
Leakage	**For a CDM project activity** (non-A/R) or **PoA** (non-A/R), the net change of anthropogenic emissions by sources of GHG which occurs outside the project boundary, and which is measurable and attributable to the CDM project activity or PoA, as applicable. **For an A/R** or **SSC A/R CDM project activity** or **PoA** (A/R), the increase in GHG emissions by sources or decrease in carbon stock in carbon pools which occurs outside the boundary of an A/R or SSC A/R CDM project activity or PoA (A/R), as applicable, which is measurable and attributable to the A/R or SSC A/R CDM project activity or PoA (A/R), as applicable.
Litter[5]	Includes all non-living biomass with a diameter less than a minimum diameter chosen by the country (for example 10 cm), lying dead, in various states of decomposition above the mineral or organic soil. This includes the litter, fumic, and humic layers. Live fine roots (of less than the suggested diameter limit for below-ground biomass) are included in litter where they cannot be distinguished from it empirically.
Low-carbon electricity	Electricity that is generated using a less-GHG-intensive fuel than in the baseline (for example, electricity generated using natural gas in the project is low carbon electricity, when coal is used in the baseline for electricity generation).
Merit order	A way of ranking existing power plants in ascending order of their short-run marginal costs of electricity generation, so that those with the lowest marginal costs are the first ones to be brought on line to meet demand and the plants with the highest marginal costs are the last to be brought on line.
Project boundary	**For a CDM project activity** (non-A/R) or **CPA** (non-A/R), the significant anthropogenic GHG emissions by sources under the control of the project participant that are reasonably attributable to the CDM project activity or CPA, as determined in accordance with the CDM rules and requirements. **For an A/R** or **SSC A/R CDM project activity** or **CPA** (A/R), geographically delineates the A/R or SSC A/R CDM project activity or CPA (A/R) under the control of the project participant as determined in accordance with the CDM rules and requirements.
Reforestation	The direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but has been converted to non-forested land.
Renewable energy	Energy that comes from solar, wind, rain, tides, geothermal heat and biological sources which are renewable (naturally replenished) in nature.
Sectoral scope	The category of GHG source sectors or groups of activities that apply to CDM project activities or PoAs. It is based on the sectors and source categories set out in Annex A to the Kyoto Protocol. A CDM project activity or PoA may fall within more than one sectoral scope.
Soil organic carbon[5]	Organic carbon in mineral and organic soils (including peat) to a specified depth chosen by the country and applied consistently through the time series. Live fine roots (of less than the suggested diameter limit for below-ground biomass) are included with soil organic matter where they cannot be distinguished from it empirically.

Standardized baseline	A baseline developed for a Party or a group of Parties, on a sub-national, national or group-of-countries basis rather than on a project basis, to facilitate the calculation of GHG emission reductions and removals by sinks and/or the determination of additionality for CDM project activities or PoAs, while providing assistance for assuring environmental integrity.
Suppressed demand	A scenario where future anthropogenic emissions by sources are projected to rise above current levels, due to the specific circumstances of the host Party.
Trigeneration	Simultaneous generation of electrical energy and thermal energy in the form of cooling and heating in one process.
Waste energy	Energy contained in a residual stream from industrial processes in the form of heat, chemical energy or pressure, for which it can be demonstrated that it would have been wasted in the absence of the project activity. Examples of waste energy include the energy contained in gases flared or released into the atmosphere, the heat or pressure from a residual stream not recovered (i.e. wasted).
Wetland	Area of land whose soil is saturated with moisture either permanently or seasonally.

[5] According to Intergovernmental Panel on Climate Change Good Practice Guidance for Land Use, Land-Use Change and Forestry, table 3.2.1 on page 3.15

[6] In accordance with the A/R modalities and procedures.

Chapter III

METHODOLOGIES FOR CDM PROJECT ACTIVITIES

3.1 INTRODUCTION TO METHODOLOGIES FOR CDM PROJECT ACTIVITIES

Methodologies provide the information that is required in order to determine the amount of Certified Emission Reductions (CERs) generated by a mitigation project activity. The following main sections can be found in a methodology:

- Definitions that are required to apply the methodology;
- Description of the applicability of the methodology;
- Description of the project boundary;
- Procedure to establish the baseline scenario;
- Procedure to demonstrate and assess additionality;
- Procedure to calculate emission reductions;
- Description of the monitoring procedure.

Further guidance to project developers is available in other CDM regulatory documents, such as standards (including methodological tools), procedures and guidelines (available through the CDM website).

Methodologies for large-scale project activities can be used for project activities of any size, whereas small-scale methodologies can only be applied if the project activity is within certain limits. Small-scale methodologies are grouped into three different types:

- *Type I:* Renewable energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent);
- *Type II:* Energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, with a maximum output (i.e. maximum savings) of 60 GWh per year (or an appropriate equivalent);
- *Type III:* Other project activities that result in emission reductions of less than or equal to 60 kt CO_2 equivalent per year.

More detailed information on specific limits can be found in each small-scale methodology.

3.2. METHODOLOGICAL TOOLS FOR CDM PROJECT ACTIVITIES

Methodological tools are generic modules that can be referenced in large-scale and small-scale methodologies in order to determine a specific condition (e.g. additionality of a CDM project activity) or to calculate particular emissions (e.g. emissions from electricity consumption). It is stated in the methodology if a methodology requires application of a certain methodological tool. A list and a short description of current methodological tools can be found below. These tools can be accessed from the CDM website.

Tools that apply to A/R methodologies are described in section 4.2.

TOOL01: TOOL FOR THE DEMONSTRATION AND ASSESSMENT OF ADDITIONALITY

The tool provides a step-wise approach to demonstrate and assess the additionality of a CDM project activity. These steps are:

Step 1 Identification of alternatives to the project activity;
Step 2 Investment analysis;
Step 3 Barriers analysis; and
Step 4 Common practice analysis.

The tool is required by many methodologies.

TOOL02: COMBINED TOOL TO IDENTIFY THE BASELINE SCENARIO AND DEMONSTRATE ADDITIONALITY

This tool provides a step-wise approach to identify the baseline scenario and simultaneously demonstrate additionality of a CDM project activity using the following steps:

Step 0 Demonstration whether the proposed project activity is the first-of-its-kind
Step 1 Identification of alternative scenarios
Step 2 Barrier analysis;
Step 3 Investment analysis;
Step 4 Common practice analysis.

Step 3 is optional if the project activity demonstrates additionality using barrier analysis or is first-ok-its-kind. Step 4 is not required if the project activity is first-of-its-kind. The tool is referred to in many methodologies wherein the potential alternative scenarios to the proposed project activity available to project participants are mutually exclusive to the proposed project activity.

TOOL03: TOOL TO CALCULATE PROJECT OR LEAKAGE CO_2 EMISSIONS FROM FOSSIL FUEL COMBUSTION

This tool provides procedures to calculate project and/or leakage CO_2 emissions from the combustion of fossil fuels. It can be used in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. This tool is required by methodologies whenever fossil fuel combustion is relevant in the project scenario or leakage.

TOOL04: EMISSIONS FROM SOLID WASTE DISPOSAL SITES

This tool calculates emissions of methane from waste disposed of in a solid waste disposal sites (SWDS). Emission reductions are calculated with a first order decay model. The tool is applicable to calculating baseline, project and leakage emissions and to both situations that the solid waste disposal site can or cannot be clearly identified. The tool is required by landfill methodologies (e.g. ACM0001 or AMS-III.G.), alternative waste treatment methodologies (e.g. ACM0022 or AMS-III.F.) and biomass methodologies (e.g. ACM0006 or AMS-III.E.).

TOOL05: BASELINE, PROJECT AND/OR LEAKAGE EMISSIONS FROM ELECTRICITY CONSUMPTION AND MONITORING OF ELECTRICITY GENERATION

This tool provides procedures to estimate the baseline, project and/or leakage emissions associated with the consumption of electricity and provisions for monitoring of electricity generation and consumption. The tool may, for example, be required by methodologies where auxiliary electricity is consumed in the project and/or the baseline scenario.

TOOL06: PROJECT EMISSIONS FROM FLARING

This tool provides procedures to calculate project emissions from flaring of a residual gas where methane is the component with the highest concentration in the flammable residual gas. Due to incomplete flaring of methane or even non-operation of the flare, methane emissions may occur in the project scenario. By determination of a flaring efficiency, such effects are taken into account

TOOL07: TOOL TO CALCULATE THE EMISSION FACTOR FOR AN ELECTRICITY SYSTEM

This methodological tool determines the CO_2 emission factor of electricity generated by power plants in an electricity system, by calculating the "combined margin" emission factor of the electricity system (grid). The combined margin is the result of a weighted average of two emission factors of the electricity system: the "operating margin" and the "build margin". The operating margin represents the emission factor of the existing power plants serving the grid. The build margin represents the emission factor of a group of the most recently built power plants. This tool is required whenever electricity consumption or generation is relevant in the baseline and/or project scenario or in terms of leakage. It is particularly relevant to methodologies that involve either grid-connected electricity generation or energy efficiency project activities PoAs that would displace or avoid electricity generation in a grid.

TOOL08: TOOL TO DETERMINE THE MASS FLOW OF A GREENHOUSE GAS IN A GASEOUS STREAM

This tool provides procedures to determine the mass flow of a greenhouse gas in a gaseous stream, based on measurements of (a) the total volume or mass flow of the gas stream and (b) the volumetric fraction of the gas in the gas stream. The volume flow, mass flow and volumetri fraction may be measured on a dry basis or wet basis. It also provides procedures to address issues such as missing data during the monitoring period in case of biogas.

TOOL09: DETERMINING THE BASELINE EFFICIENCY OF THERMAL OR ELECTRIC ENERGY GENERATION SYSTEMS

The tool describes various procedures to determine the baseline efficiency of an energy generation system such as a power plant, including a co-generation system or an industrial boiler, for the purpose of estimating baseline emissions. The tool is used in case of project activities that improve the energy efficiency of an existing system through retrofits or replacement of the existing system by a new system. This tool provides different procedures to determine the baseline efficiency of the system: either a) a load-efficiency function is determined which establishes the efficiency as a function of the operating load of the system or b) the efficiency is determined conservatively as a constant value.

TOOL10: TOOL TO DETERMINE THE REMAINING LIFETIME OF EQUIPMENT

The tool provides guidance to determine the remaining lifetime of baseline or project equipment. An application of the tool would be for project activities which involve the replacement of existing equipment with new equipment or which retrofit existing equipment as part of energy efficiency improvement activities. Under this tool, impacts on the lifetime of the equipment due to policies and regulations (e.g. environmental regulations) or changes in the services needed (e.g. increased energy demand) are not considered.

TOOL11: ASSESSMENT OF THE VALIDITY OF THE ORIGINAL/CURRENT BASELINE AND UPDATE OF THE BASELINE AT THE RENEWAL OF THE CREDITING PERIOD

This tool provides a procedure to assess the continued validity of the baseline and to update it at the renewal of a crediting period. The tool consists of two steps. The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.

This tool is applicable in a situation where the crediting period needs to be renewed.

TOOL12 PROJECT AND LEAKAGE EMISSIONS FROM TRANSPORTATION OF FREIGHT

This tool provides procedures to estimate project and/or leakage CO_2 emissions from road transportation of freight by vehicles. Two options are provided to determine these emissions:

- Option A: Monitoring fuel consumption; or
- Option B: Using conservative default values.

The tool also provides default conservative emission factors to estimate project and/or leakage CO_2 emissions from freight transportation by rail.

The tool is applicable to project activities which involve transportation of freight and where transportation is not the main project activity.

TOOL13: PROJECT AND LEAKAGE EMISSIONS FROM COMPOSTING

This tool calculates project and leakage emissions from composting and co-composting. It accounts for methane and nitrous oxide emissions from the composting process, energy requirements to operate the composting plant, treatment of run-off wastewater and leakage emissions associated with the end-use of the compost product. Options are given in the tool to calculate emissions based on monitored parameters or conservative default values.

TOOL14: PROJECT AND LEAKAGE EMISSIONS FROM ANAEROBIC DIGESTERS

This methodological tool provides procedures to calculate project and leakage emissions associated with anaerobic digestion in an anaerobic digester. The tool is not applicable to other systems where waste may be decomposed anaerobically, for instances stockpiles, SWDS or un-aerated lagoons. It is particularly relevant for waste management methodologies such as ACM0022.

TOOL15: UPSTREAM LEAKAGE EMISSIONS ASSOCIATED WITH FOSSIL FUEL USE

This methodological tool provides methodological guidance to determine upstream leakage emissions associated with the use of fossil fuels in either or both the baseline scenario and project activity. Upstream emissions associated with fossil fuel use are emissions from fugitive emissions of CH_4 and CO_2, CO_2 emissions from combustion of fossil fuel and CO_2 emissions due to consumption of electricity.

The fossil fuels applicable to this tool are those that can be categorized to be either based on natural gas, oil or coal. The tool provides two options to determine emissions: Option (A) provides simple default emission factors for different types of fossil fuels and Option (B) calculation of emission factors based on emissions for each upstream emissions stage.

TOOL16: PROJECT AND LEAKAGE EMISSIONS FROM BIOMASS

This tool provides a procedure to calculate project and leakage emissions from cultivation of biomass. It can be used for estimation of (i) project and leakage emissions resulting from cultivation of biomass in a dedicated plantation of a CDM project activity that uses biomass as a source of energy, excluding plantations on wetlands and organic soils; (ii) project and leakage emissions resulting from utilization of biomass residues; (iii) leakage emissions due to shift of pre-project activities; and (iv) leakage emissions due to diversion of biomass residues from other applications.

TOOL17: BASELINE EMISSIONS FOR MODAL SHIFT MEASURES IN INTER-URBAN CARGO TRANSPORT

The tool provides step-wise methodological guidance to estimate baseline emissions for transport projects implementing modal shift measures in inter-urban cargo transport:

Step 1 Determine relevant cargo types;
Step 2 Determine the mode share for each relevant cargo type;
Step 3 Determine the average specific emission factor per TKM for cargo type;
3.1 Rail; 3.2 Domestic water;
3.3 Pipeline; 3.4 Road;
Step 4 Determine baseline emission factor;
Step 5 Determine baseline emissions.

The tool is applicable for estimating baseline emissions for individual CDM project activities in inter-urban cargo transport that implement a measure or a group of measures aimed at modal shift from road to water-borne (using barges or domestic ships) or rail transportation. This tool can be used by designated national authorities (DNAs) for establishing standardized baselines for these measures.

TOOL18: BASELINE EMISSIONS FOR MODAL SHIFT MEASURES IN URBAN PASSENGER TRANSPORT

The tool provides step-wise methodological guidance to estimate baseline emissions for transport projects implementing modal shift measures in urban passenger transport:

Step 1 Determine relevant vehicle categories;
Step 2 Determine the emission factor per kilometre for each relevant vehicle category;
Step 3 Determine the emission factor per passenger-kilometre;
Step 4 Determine baseline emissions.

The tool is applicable for estimating baseline emissions for individual CDM project activities in urban passenger transport that implement a measure or a group of measures aimed at modal shift to urban public transit such as metro, bus rapid transit, light rail and trams. This tool can be used by DNAs for establishing standardized baselines for these measures.

TOOL19: DEMONSTRATION OF ADDITIONALITY OF MICROSCALE PROJECT ACTIVITIES

This tool provides simplified approach to demonstrat additionality for a CDM project activity or a component project activity (CPA) of PoA which meets one of the following criteria:

a. Project activities involving renewable energy technologies up to 5 MW that employ renewable energy as their primary technology;
b. Energy efficiency project activities that aim to achiev energy savings at a scale of no more than 20 GWh per year; or
c. Other project activities (e.g. methane avoidance) that aim to achieve GHG emissions reductions at a scale of no more than 20 ktCO_2e per year.

The CDM project activity or a CPA is considered to be additional if one of the criteria below is met:

a. If located in LDCs/SIDs/SUZ;
b. Composed of off-grid renewable energy technologies;
c. Grid-connected renewable energy technologies that are recommended by the DNAs and approved by the Board; or
d. Specific technologies as listed in the Tool for households communities/small and medium enterprises.

TOOL20: ASSESSMENT OF DEBUNDLING FOR SMALL-SCALE PROJECT ACTIVITIES

This methodological tool is applicable to proposed small-scale project activities and small-scale component project activities (CPA) to check whether they are debundled components of large-scale project activities or programme of activities (PoAs) and provides a step-wise approach for the determination of the occurrence of debundling.

TOOL21: DEMONSTRATION OF ADDITIONALITY OF SMALL-SCALE PROJECT ACTIVITIES

This tool provides:
This tool provides a general simplified framework for a small-scale project activity to demonstrate additionality using one of the following barriers:

a. Investment barrier;
b. Technological barrier;
c. Barrier due to prevailing practice;
d. Other barriers (e.g. institutional barrier).

TOOL22: LEAKAGE IN BIOMASS SMALL-SCALE PROJECT ACTIVITIES

This tool can be used for estimation of leakage and project emissions for small-scale project activities using renewable biomass as a source of energy. It can be used for estimation of project emissions resulting from cultivation of biomass, shifts of pre-project activities and competing uses for the biomass.

TOOL23: ADDITIONALITY OF FIRST-OF-ITS-KIND PROJECT ACTIVITIES

This methodological tool provides a general approach for the demonstration of additionality of first-of-its-kind projec activities, as referred to in the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", or the baseline and monitoring methodologies that consider first-of-its-kin project activities as additional.

TOOL24: COMMON PRACTICE

This methodological tool provides a step-wise approach for the conduction of the common practice analysis as referred to in the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", or the baseline and monitoring methodologies that use the common practice test for the demonstration of additionality.

TOOL25: APPORTIONING EMISSIONS FROM PRODUCTION PROCESSES BETWEEN MAIN PRODUCT AND CO- AND BY-PRODUCT

This methodological tool provides criteria for apportioning emissions from a production process between the main product, the co-products, the by-products and the residues (waste) where the main product is produced and/or consumed/used under a CDM project activity. This tool shall be applied in conjunction with AM0089 and ACM0017.

TOOL26: ACCOUNTING ELIGIBLE HFC-23

The methodological tool provides criteria for the determination of the quantity of HFC-23 eligible for crediting and shall be applicable for registered project activities using version 1 to version 5 of AM0001.

TOOL27: INVESTMENT ANALYSIS

This methodological tool provides guidance and requirements on how to conduct investment analysis as referred to in the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", the guidelines "Non-binding best practice examples to demonstrate additionality for SSC project activities", or the baseline and monitoring methodologies that use the investment analysis for the identification of the baseline scenario and/o demonstration of additionality.

TOOL28: CALCULATION OF BASELINE, PROJECT AND LEAKAGE EMISSIONS FROM THE USE OF REFRIGERANTS

The methodological tool provides procedures to estimate the baseline, project and leakage emissions associated with the use of refrigerant gases in refrigeration and air-conditioning systems. It also clarifies the types of refrigerants eligible for accounting emission reductions under the CDM.

TOOL29: DETERMINATION OF STANDARDIZED BASELINES FOR ENERGY-EFFICIENT REFRIGERATORS AND AIR-CONDITIONERS

This methodological tool provides guidance for the development and assessment of standardized baselines including additionality demonstration, identification of baseline scenario and determining baseline emissions for energy-efficient refrigerators and air conditioners (RAC) for residential application. The tool covers the determination of baseline factors (for greenfield/replacement of RAC appliances) associated with energy and refrigerant used for the RAC sector (market) or one or more segments of the RAC sector, in a town/city or a region of a country or a country or a group of countries. It includes methods to standardize baseline parameters to accommodate diverse data formats and sources encountered in host countries such as appliance standards, labeling database, commercial marketing data and manufacturers (industry) data. This tool should be applied in conjunction with the applied methodology AM0120 "Energy-efficient refrigerators and air-conditioners".

TOOL30: CALCULATION OF THE FRACTION OF NON-RENEWABLE BIOMASS

This tool provides guidance and a step-wise procedure/method to calculate values of fraction of non-renewable biomass (f_{NRB}). The tool may be applied when calculating baseline emissions in applicable methodologies (e.g. AMS-I.E., AMS-II.G., AMS-III.Z., AMS-III.AV., AMS-III.BG.) for a project activity or a PoA that displaces the use of non-renewable biomass.

This tool may be used by:

a. DNAs to submit region- or country-specific default $_{NRB}$ values, following the procedures for development, revision, clarification and update of standardize baselines (SB procedures); or
b. Project participants to calculate project- or PoA-specifi f_{NRB} values.

TOOL31: DETERMINATION OF STANDARDIZED BASELINES FOR ENERGY EFFICIENCY MEASURES IN RESIDENTIAL, COMMERCIAL AND INSTITUTIONAL BUILDINGS

This methodological tool provides guidance for the development and assessment of standardized baselines to determine the specific C_2 emissions due to the consumption of electricity, fuel and hot/chilled water of different building types (residential, commercial and institutional) in terms of tCO_2/m2 of floor area of building, taking into account th geographical scope and availability of historical data. This tool should be applied in conjunction with the approved methodologies AM0091, AMS-II.E. and AMS-III.AE.

TOOL32: POSITIVE LISTS OF TECHNOLOGIES

This methodological tool provides list of technologies that confer automatic additionality to CDM project activities and CDM programmes of activities (PoAs) that apply them.

The application of this methodological tool is not mandatory for the project participants of a CDM project activity or CDM PoA for demonstrating their additionality. However, if applied, this methodological tool shall be applied in conjunction with a small-scale or large-scale methodology which refers to this tool.

Currently following technologies under the following area are included in this tool:

a. Landfill gas recovery and its gainful use
b. Methane recovery in wastewater treatment;
c. Renewable energy technologies for large-scale grid-connected power generation;
d. Renewable energy technologies for large-scale isolated grid power generation;
e. Renewable energy technologies for small-scale grid-connected power generation;
f. Renewable energy technologies for small-scale off-grid power generation;
g. Rural electrification projects; and
h. The technology/measure used by household, communities and SMEs.

The Board may include additional technologies to the positive list in this tool. However, the stakeholders may also propose addition of technologies to the positive list in this tool following the “Procedure: Development, revision and clarification of baseline and monitoring methodologies an methodological tools”.

TOOL33: DEFAULT VALUES FOR COMMON PARAMETERS

This tool serves as a repository of default values of common parameters which are applied in methodologies that refer to this tool.

This tool provides default values for the following parameters:

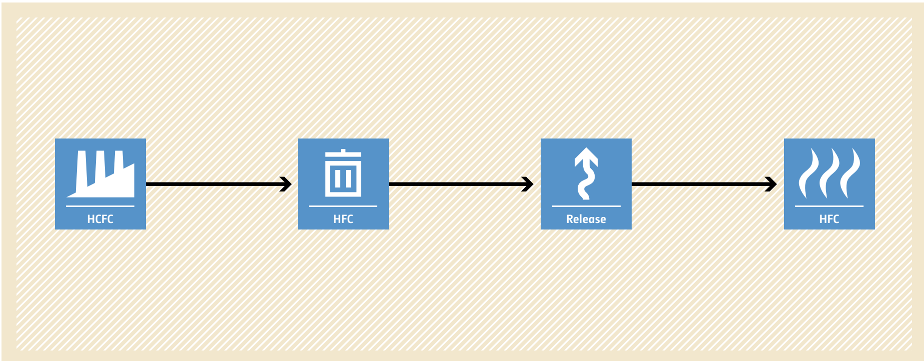
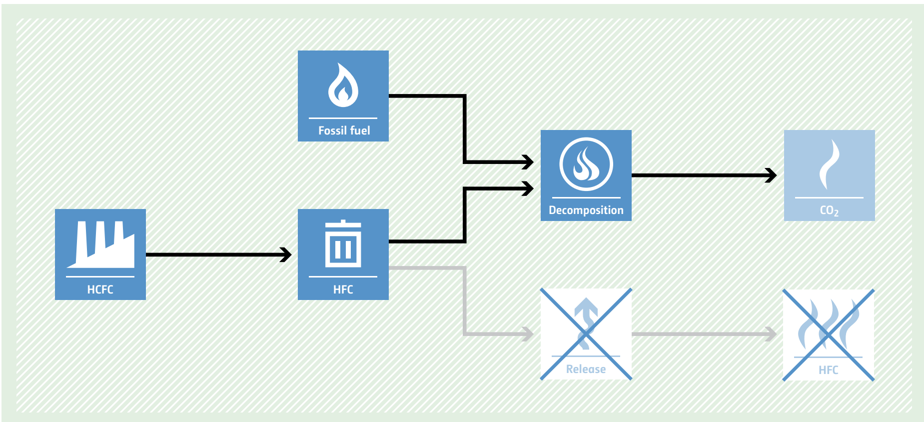
a. CO2 emission factor for diesel generating system used for off-grid power generation purposes;
b. CO2 emission factor for kerosene used for lighting applications;
c. Wood-to-charcoal conversion factor;
d. Average annual consumption of woody biomass per person for cooking;
e. Fraction of non-renewable biomass; and
f. Efficiency of pre-project cooking device

The Board may include additional default values in this tool. However, the stakeholders may also propose addition of default values in this tool following the “Procedure: Development, revision and clarification of baseline an monitoring methodologies and methodological tools”.

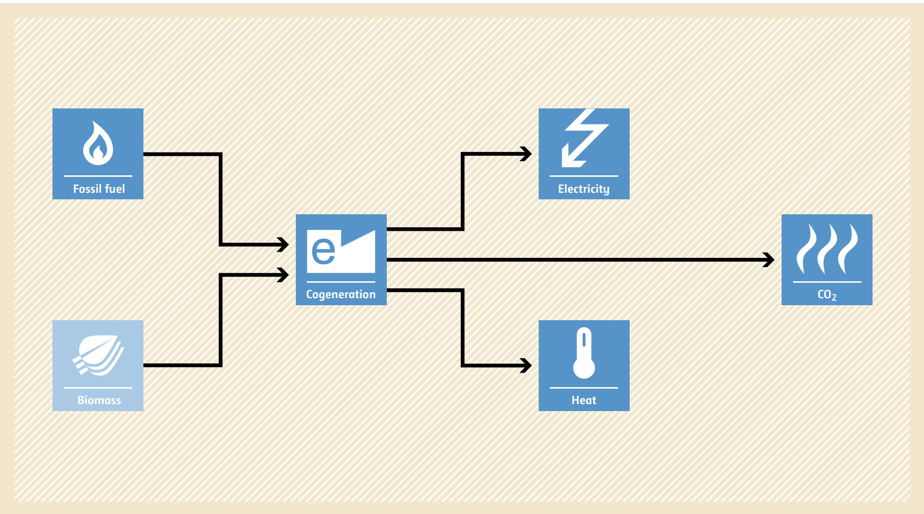
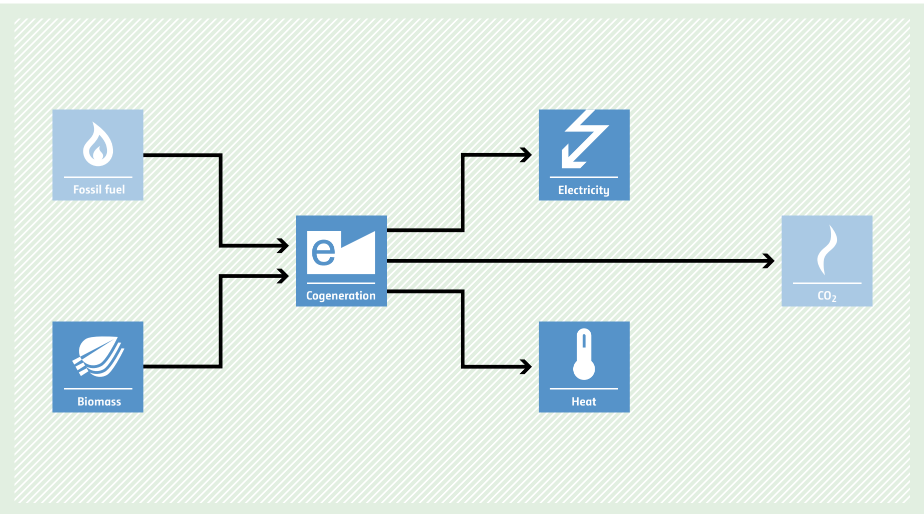
Chapter III

3.3. METHODOLOGIES FOR LARGE-SCALE CDM PROJECT ACTIVITIES

AM0001 Decomposition of fluoroform (HFC-23) waste streams

Typical project(s)	Project activities which capture and decompose HFC-23 formed in the production of HCFC-22.
Type of GHG emissions mitigation action	• GHG destruction. Destruction of HFC-23 emissions.
Important conditions under which the methodology is applicable	• At least one HCFC-22 reaction unit at the project activity site has an operating history of at least three years between 1 January 2000 and 31 December 2004 and has been in operation from 2005 until the start of the project activity; • The HFC-23 decomposition and, if applicable, any temporary storage of HFC-23, occurs only at the project activity site (i.e. no off-site transport occurs); • No regulation requires the decomposition of the total amount of HFC-23 generated; • No HFC-23 decomposition facility was installed prior to implementation of the project activity.
Important parameters	At validation: • Average annual HCFC-22 equivalent production level in specific HCFC-22 production line in the historical three year period from 2002 to 2004; • Quantities of carbon and fluorine contained in hydrogen fluoride fed into HCFC-22 reactor units and in the HCFC-22 produced by specific production line, required for fluorine and carbon mass balance to determine the HFC-23 waste generation rate for years prior to the implementation of the project activity.
	Monitored: • Quantity of HFC-23 generated as a by-product in specific HCFC-22 production line in specific monitoring period; • Quantity of HFC-23 that is generated as a by-product in HCFC-22 production lines that are eligible for crediting and that is supplied to the inlet of the HFC-23 decomposition facility(ies) d in specific monitoring period.
BASELINE SCENARIO HFC-23 is released to the atmosphere from the production of HCFC-22.	
PROJECT SCENARIO HFC-23 emitted from the production of HCFC-22 is decomposed using fossil fuel in a decomposition facility, resulting into CO_2 emissions.	

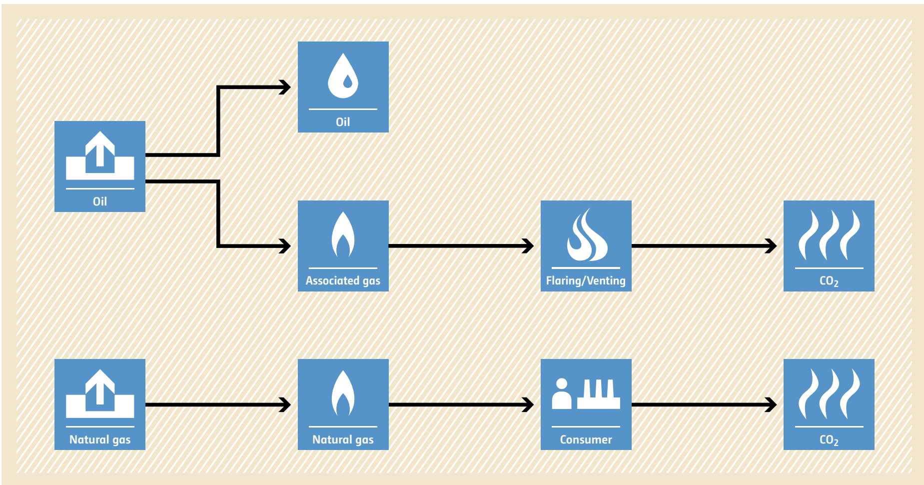
AM0007 Analysis of the least-cost fuel option for seasonally-operating biomass cogeneration plants

Typical project(s)	Refurbishment and fuel switch of renewable biomass cogeneration projects connected to the grid which operate in seasonal mode and use other fuel during the off-season, when biomass – for instance bagasse in case of a sugar mill – is not being produced.
Type of GHG emissions mitigation action	• Renewable Energy. Displacement of more-GHG-intensive power generation using fossil fuel.
Important conditions under which the methodology is applicable	• The proposed project has access to biomass that is not currently used for energy purposes.
Important parameters	At validation: • Leakage emissions due to biomass transport and crowding out of biomass for other plants; • Baseline emission factor of the cogeneration plant based on the use of the least-cost fuel available (usually fossil fuel).
	Monitored: • Power generated by the project; • Quantity of biomass used in the project; • Electricity and fossil fuel consumption of the project.
BASELINE SCENARIO Power would be produced with the least cost fuel (usually fossil fuels) in the absence of the project.	
PROJECT SCENARIO Use of renewable biomass for power generation avoids the use of fossil fuel.	

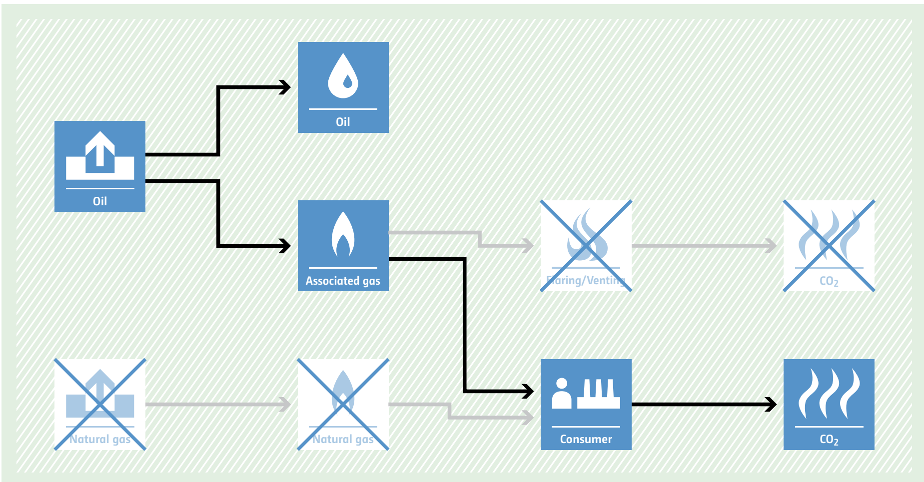
AM0009 Recovery and utilization of gas from oil fields that would otherwise be flared or vented

Typical project(s)	Associated gas from oil fields (including gas-lift gas) that was previously flared or vented is recovered and utilized.
Type of GHG emissions mitigation action	• Fuel switch. Displacement of use of other fossil fuel sources such as natural gas, dry gas, LPG, condensate etc. coming from non-associated gas by utilizing associated gas and/or gas-lift gas from oil fields.
Important conditions under which the methodology is applicable	• The recovered gas comes from oil wells that are in operation and are producing oil at the time of the recovery; • The recovered gas is transported to a gas pipeline with or without prior processing. Prior processing may include transportation to a processing plant where the recovered gas is processed into hydrocarbon products (e.g. dry gas, liquefied petroleum gas (LPG)). The dry natural gas is either: (i) transported to a gas pipeline directly; or (ii) compressed to CNG first, then transported by trailers/trucks/carriers and then decompressed again.
Important parameters	Monitored: • Quantity and net calorific value of the total recovered gas measured after pre-treatment and after the point where the recovered gas is directed for on-site use.

BASELINE SCENARIO
Associated gas from oil wells is flared or vented and non-associated gas is extracted from other gas wells.



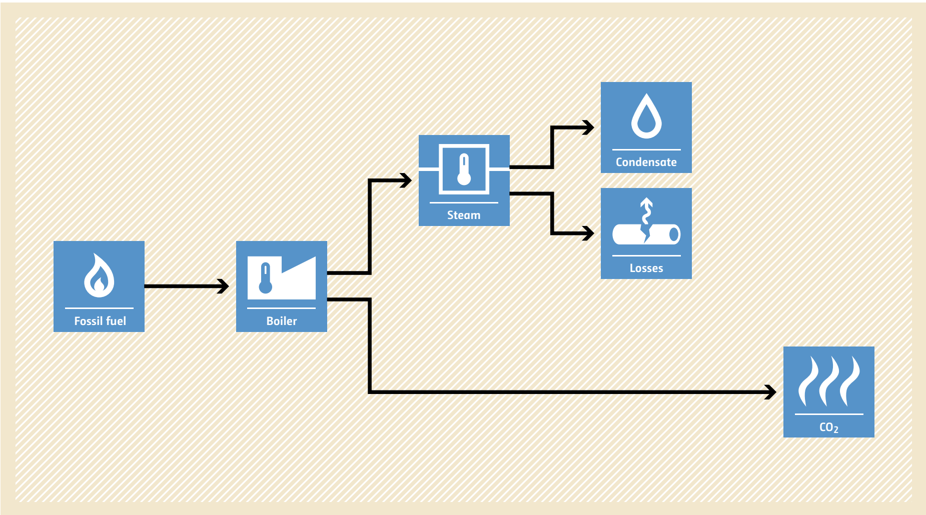
PROJECT SCENARIO
Associated gas from oil wells is recovered and utilized and non-associated gas is not extracted from other gas wells.



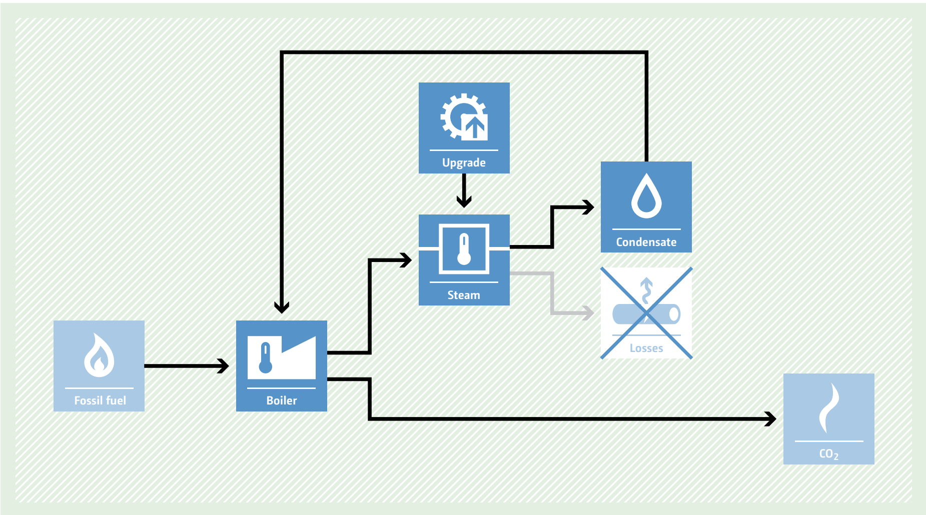
AM0017 Steam system efficiency improvements by replacing steam traps and returning condensate

Typical project(s)	Optimization of steam distribution, end-use and condensate return to increase the energy efficiency of a steam system.
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	• Steam is generated in a boiler fired with fossil fuel; • The regular maintenance of steam traps or the return of condensate is not common practice or required under regulations in the respective country; • Data on the condition of steam traps and the return of condensate is accessible in at least five other similar plants.
Important parameters	At validation: • Steam trap failure rate and condensate return at plant and other similar plants.
	Monitored: • Steam and condensate flow, temperature and pressure; • Boiler efficiency; • Electricity consumption of the project.

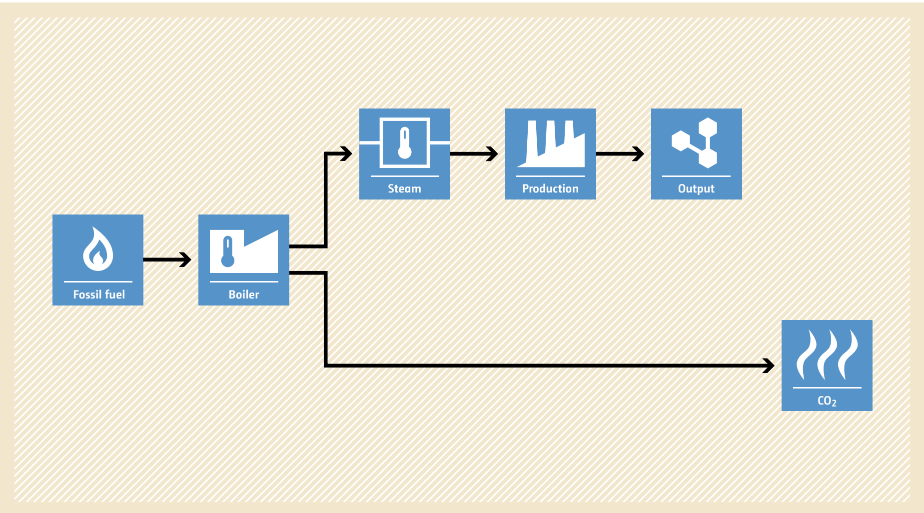
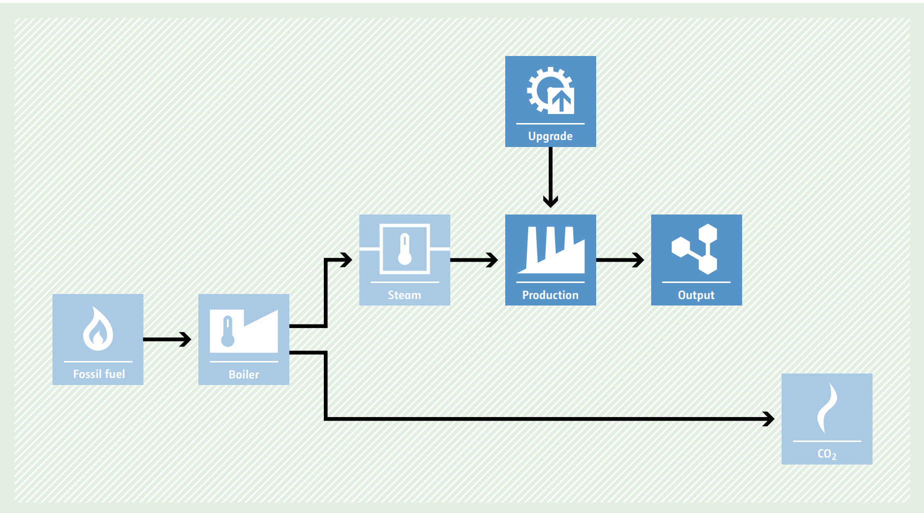
BASELINE SCENARIO
Use of fossil fuel in a boiler to supply steam to a steam system with a low efficiency.



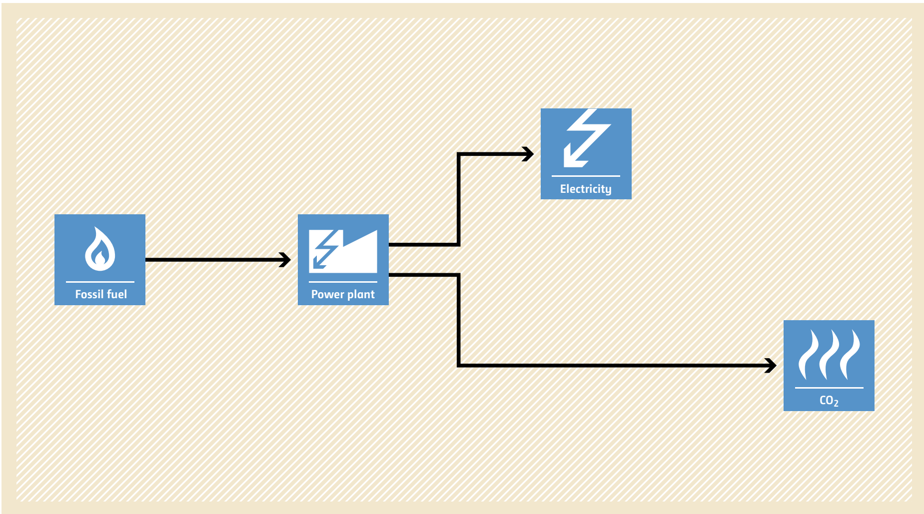
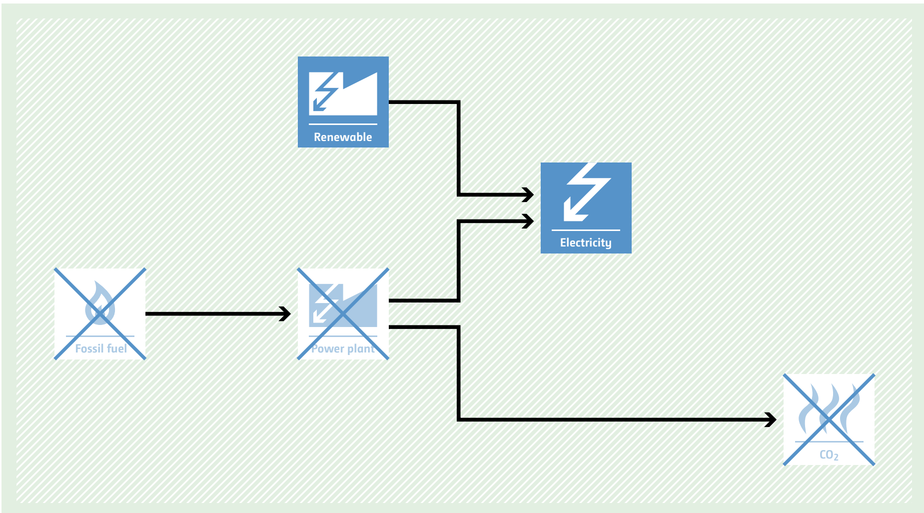
PROJECT SCENARIO
Use of less fossil fuel in a boiler as less steam is required for the steam system with improved efficiency.



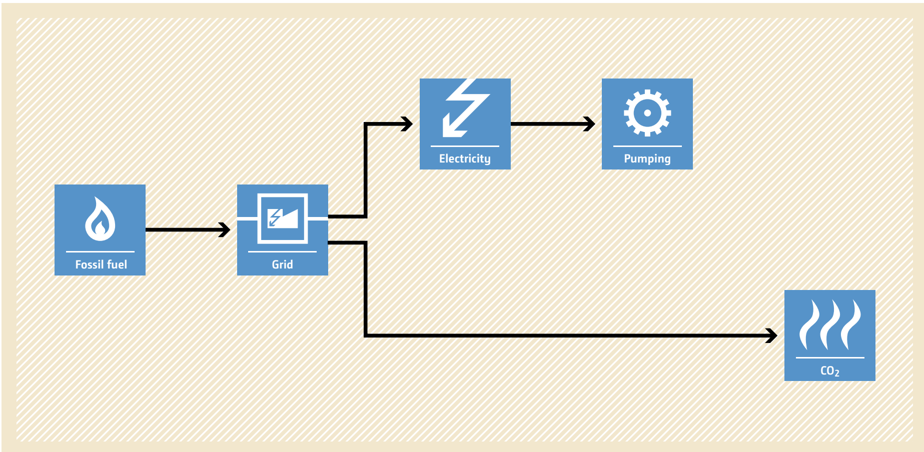
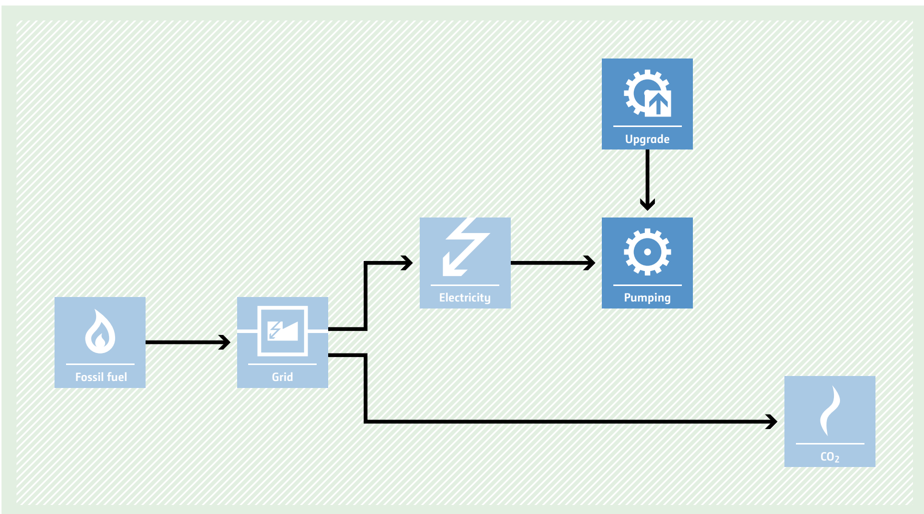
AM0018 Baseline methodology for steam optimization systems

Typical project(s)	More-efficient use of steam in a production process reduces steam consumption and thereby steam generation.
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	• The process supplied by the heat system produces a homogeneous output and its production volume is reasonably constant under steady state conditions; • For cogeneration systems, steam generation at boiler decreases by the amount of steam saved; • If the steam saved is further used, it shall be demonstrated it does not increase GHG emissions.
Important parameters	Monitored: • Output of the main process involved in the project; • Steam, feed water, blow down water flow, temperature and pressure; • Boiler efficiency.
BASELINE SCENARIO Use of fossil fuel in a boiler to supply steam to a process with high steam consumption.	
PROJECT SCENARIO Use of less fossil fuel in a boiler as less steam is required for the process with a higher efficiency.	

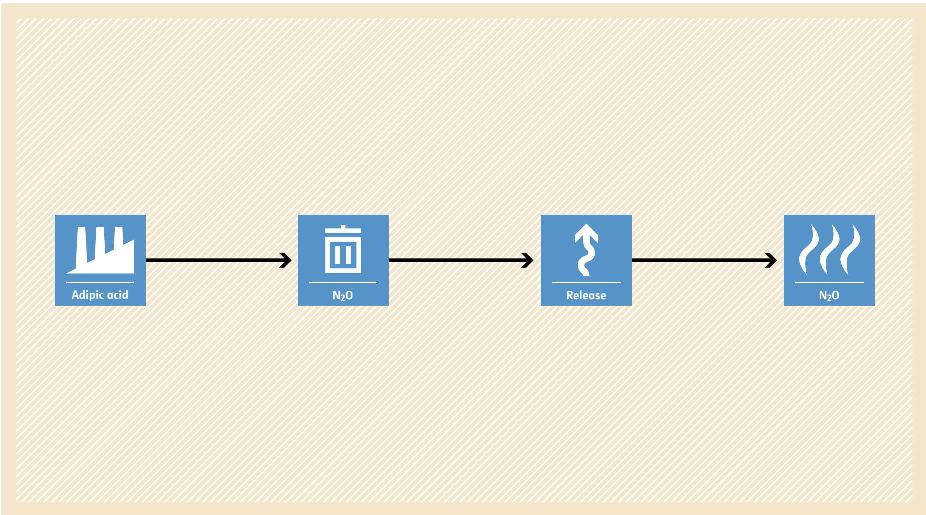
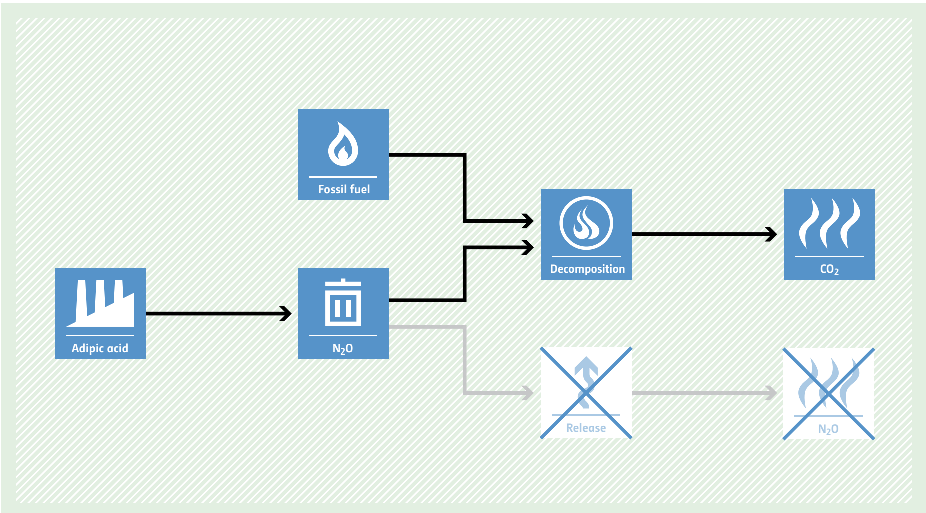
AM0019 Renewable energy projects replacing part of the electricity production of one single fossil fuel fired power plant that stands alone or supplies to a grid, excluding biomass projects

Typical project(s)	Generation of electricity from the zero-emission renewable energy sources such as wind, geothermal, solar, hydro, wave and/or tidal projects that displaces electricity produced from a specific fossil fuel plant.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of more-GHG-intensive generation of electricity by the use of renewable energy sources.
Important conditions under which the methodology is applicable	• Biomass projects are not eligible; • The identified baseline plant is able to meet any possible increase of energy demand that occurs during the crediting period; • Three years of historical data is required for the calculation of emissions reductions; • Hydro power plants with reservoir require power densities greater than 4W/m^2.
Important parameters	At validation: • Carbon emission factor of the baseline power plant.
	Monitored: • Quantity of electricity supplied to the grid by the project; • If the project involves geothermal energy: fugitive CO_2 and CH_4 emissions due to release of non-condensable gases from the produced steam.
BASELINE SCENARIO A specific fossil fuel plant generates electricity that is supplied to the grid.	
PROJECT SCENARIO A renewable energy plant partially or completely displaces the electricity that is generated by the specific fossil fuel power plant.	

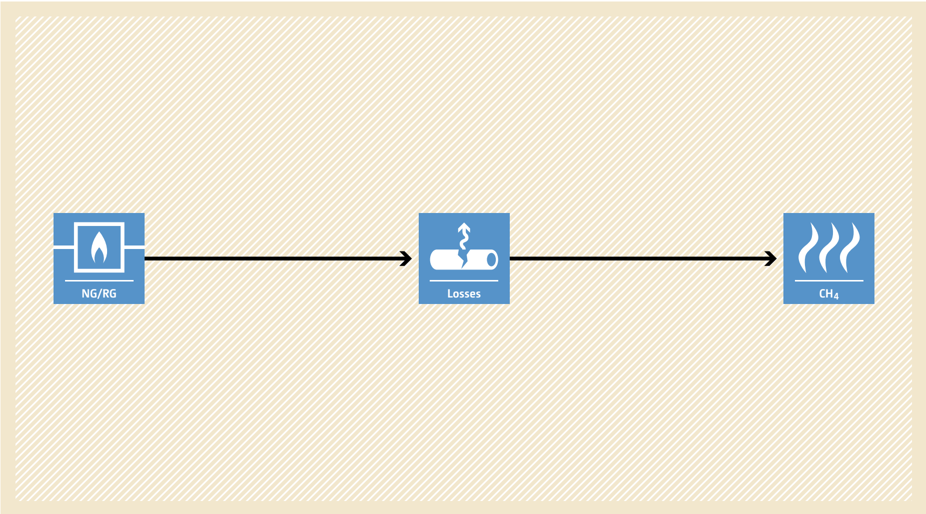
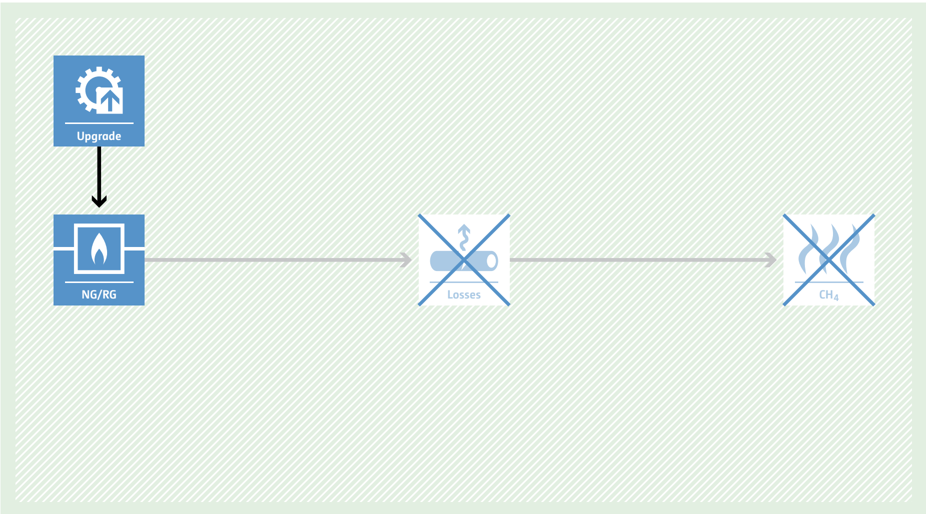
AM0020 Baseline methodology for water pumping efficiency improvements

Typical project(s)	Energy efficiency improvement in municipal water utilities (e.g. increasing the energy efficiency of a water pumping system, reducing technical losses and leaks) thereby reducing the amount of energy required to deliver a unit of water to end-users.
Type of GHG emissions mitigation action	• Energy efficiency. Switch to more energy-efficient technology/measure.
Important conditions under which the methodology is applicable	• The project pumping system is powered by grid electricity; • No performance related contract or policies are already in place that would trigger improvements anyway; • New system/s developed to completely replace the old pumping system/s that will no longer be used, however the methodology applies to new system/s only up to the measured delivery capacity of the old system/s; • This methodology is not applicable to projects where entirely new system/s is/are implemented to augment the existing capacity.
Important parameters	At validation: • Water supplied and power consumption in the baseline situation.
	Monitored: • Grid emission factor; • Water volume supplied by the project; • Electrical energy required to deliver water within the boundaries of the system.
BASELINE SCENARIO Delivery of water from an inefficient pumping system.	
PROJECT SCENARIO Delivery of water from a pumping system that has a lower energy demand due to reducing losses or leaks in the pumping system and/or by implementing measures to increase energy efficiency.	

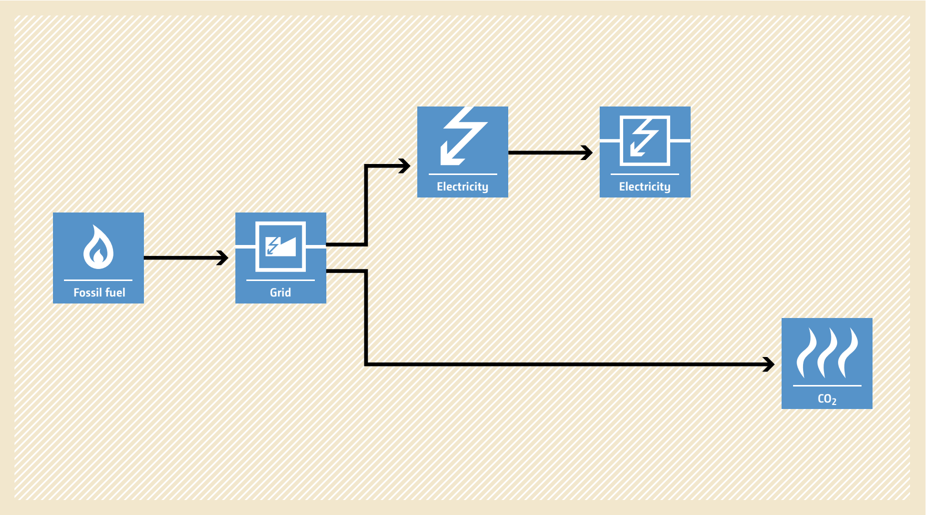
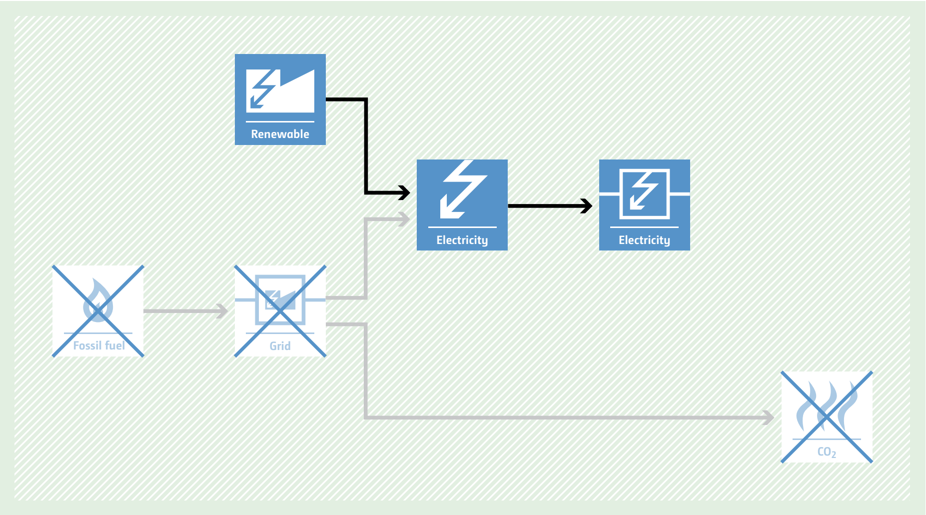
AM0021 Baseline methodology for decomposition of N_2O from existing adipic acid production plants

Typical project(s)	Installation of a catalytic or thermal N_2O destruction facility at an existing adipic acid production plant.
Type of GHG emissions mitigation action	• GHG destruction. Catalytic or thermal destruction of N_2O emissions.
Important conditions under which the methodology is applicable	• The adipic acid plant started the commercial production no later than 31 December 2004; • European Norm 14181 must be followed for real-time measurement of N_2O concentration and gas volume flow rate.
Important parameters	At validation: • Maximum amount of adipic acid production in the most recent three years.
	Monitored: • Production of adipic acid; • Consumption of nitric acid; • N_2O concentration at the inlet and outlet of the destruction facility; • Volume of gas flow at the inlet and outlet of the destruction facility.
BASELINE SCENARIO N_2O is emitted into the atmosphere during the production of adipic acid.	
PROJECT SCENARIO N_2O is destroyed in a catalytic or thermal destruction unit.	

AM0023 Leak detection and repair in gas production, processing, transmission, storage and distribution systems and in refinery facilities

Typical project(s)	Identification and repair of natural gas (NG) and refinery gas (RG) leaks in above-ground process equipment in natural gas production, processing, transmission, storage, distribution systems and in refinery facilities.
Type of GHG emissions mitigation action	• GHG formation avoidance. Avoidance of CH_4 emissions.
Important conditions under which the methodology is applicable	• No systems are in place to systematically identify and repair leaks in the transmission and distribution system; • Leaks can be identified and accurately measured; • A monitoring system ensures the permanence of the repairs.
Important parameters	Monitored: • Leak flow; • Methane concentration in the flow.
BASELINE SCENARIO CH_4 leaks from a natural gas transmission distribution system.	
PROJECT SCENARIO CH_4 leaks from the natural gas transmission systems have been repaired.	

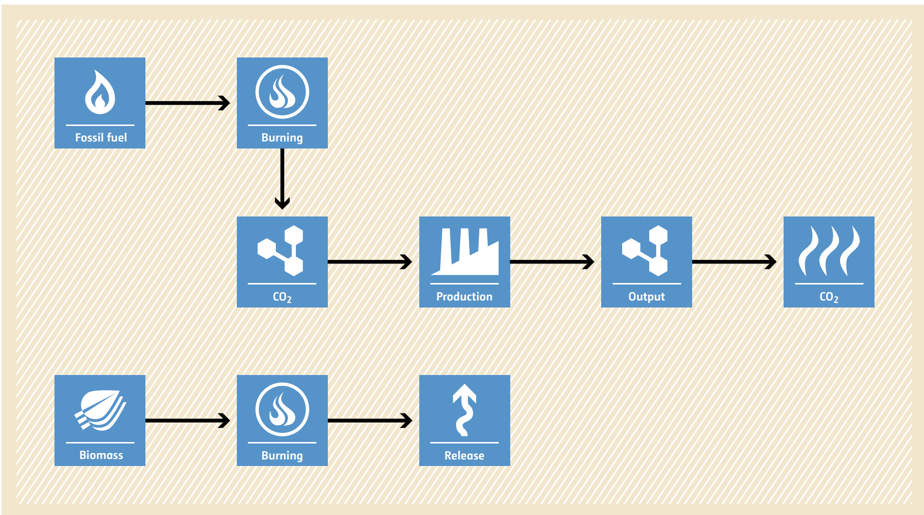
AM0026 Methodology for zero-emissions grid-connected electricity generation from renewable sources in Chile or in countries with merit order based dispatch grid

Typical project(s)	Electricity capacity additions (either through the installation of new, or the modification of existing, power plants) that supply electricity to the grid and use renewable energy sources such as hydro, wind, solar, geothermal, wave or tidal power. The capacity additions have to be connected to the Chilean interconnected grid or others countries' grids providing a similar merit order based framework.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of electricity that would be provided to the grid by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• The project power plant must either be connected to the grid of Chile and fulfil the legal obligations under the Chilean Electricity Regulation, or be implemented in other countries if the country has a regulatory framework for electricity generation and dispatch that meets the conditions described in the methodology; • New hydroelectric power projects with reservoirs require power densities greater than 4 W/m^2.
Important parameters	Monitored: • Electricity supplied to the grid by the project; • Hourly data for merit order based on marginal costs; • Operational data of the power plants connected to the same grid as the project.
BASELINE SCENARIO Power is provided to the grid using more-GHG-intensive power sources.	
PROJECT SCENARIO Installation of a new, or modification of an existing, renewable power plant that results in an increase of renewable power and displacement of electricity that would be provided to the grid by more-GHG-intensive means.	

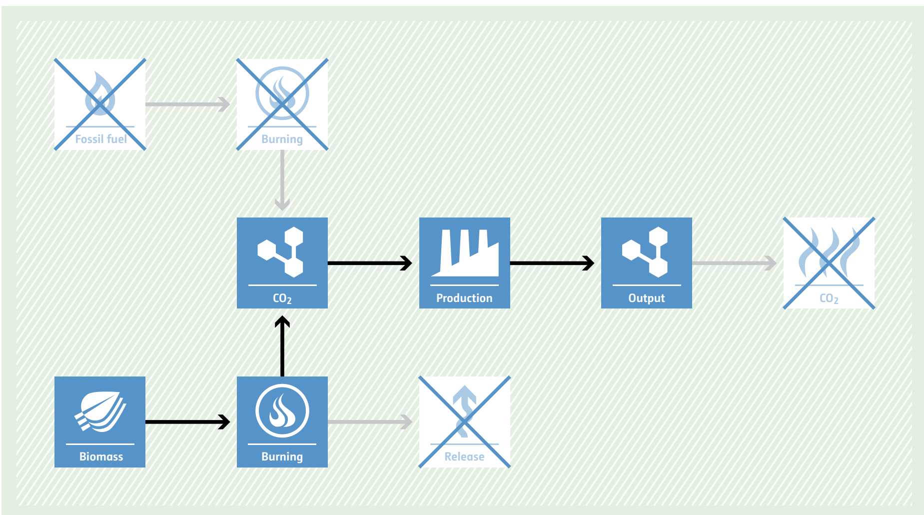
AM0027 Substitution of CO_2 from fossil or mineral origin by CO_2 from renewable sources in the production of inorganic compounds

Typical project(s)	Industrial processes where biogenic residual CO_2 is used as input in the production of inorganic compounds substituting CO_2 from fossil or mineral sources.
Type of GHG emissions mitigation action	• Feedstock switch. Use of a biogenic residual source of CO_2 displacing fossil/mineral sources for the production of inorganic compounds.
Important conditions under which the methodology is applicable	• Prior to the implementation of the project activity, the biogenic residual CO_2 was produced, but not used for any purpose; • The CO_2 used prior to the implementation of the project activity was sourced from a process which does not involve energy production and will not continue under the project scenario; • The production process of inorganic compounds does not undergo changes in product, energy requirement or capacity as a result of the implementation of the project activity.
Important parameters	Monitored: • Amount of inorganic compound produced; • Carbon content and molecular weight of the inorganic compound; • Amount of CO_2 used per tonne of inorganic compound.

BASELINE SCENARIO
CO_2 is obtained from fossil or mineral sources to be used as input for the production of inorganic compounds.



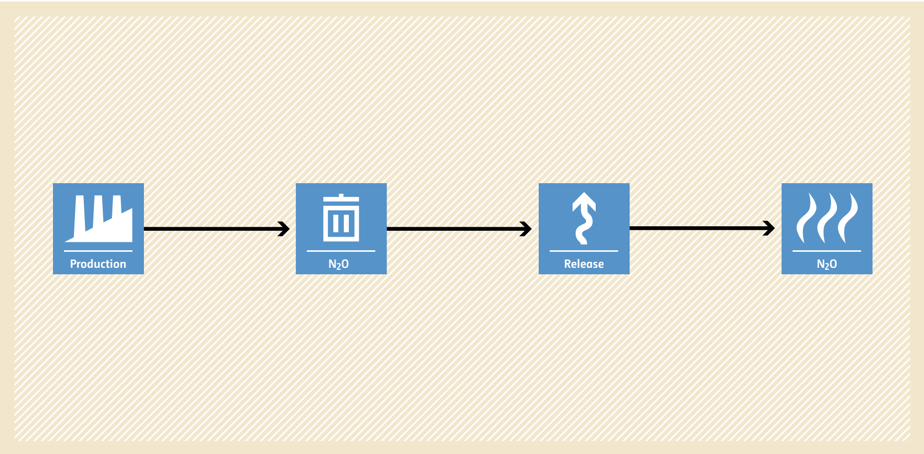
PROJECT SCENARIO
Biogenic residual sources of CO_2 are used for the production of inorganic compounds.



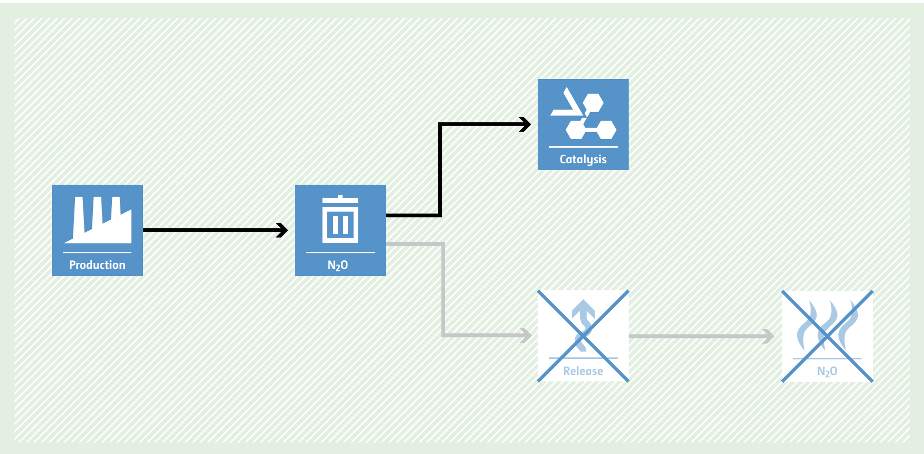
AM0028 N_2O destruction in the tail gas of caprolactam production plants

Typical project(s)	Installation of a catalytic reduction unit to destroy N_2O emissions in the tail gas of caprolactam production plants.
Type of GHG emissions mitigation action	• GHG destruction. Catalytic destruction of N_2O emissions.
Important conditions under which the methodology is applicable	• The caprolactam plant started the commercial production no later than 31 December 2005; • Caprolactam plants are limited to those employing the Raschig or HPO® processes; • European Norm 14181 or an equivalent standard must be followed for real-time measurement of N_2O concentration and gas volume flow rate; • The methodology allows thermal and catalytic destruction of N_2O.
Important parameters	At validation: • Normal operating conditions of the plant (oxidation temperature and pressure, ammonia gas flow rate to AOR, and composition of ammonia oxidation catalyst). Monitored: • Production of caprolactam; • Volume of gas flow at the inlet and outlet of the destruction facility; • N_2O concentration at the inlet and outlet of the destruction facility; • Update of the parameters for determining the normal operating conditions of the plant.

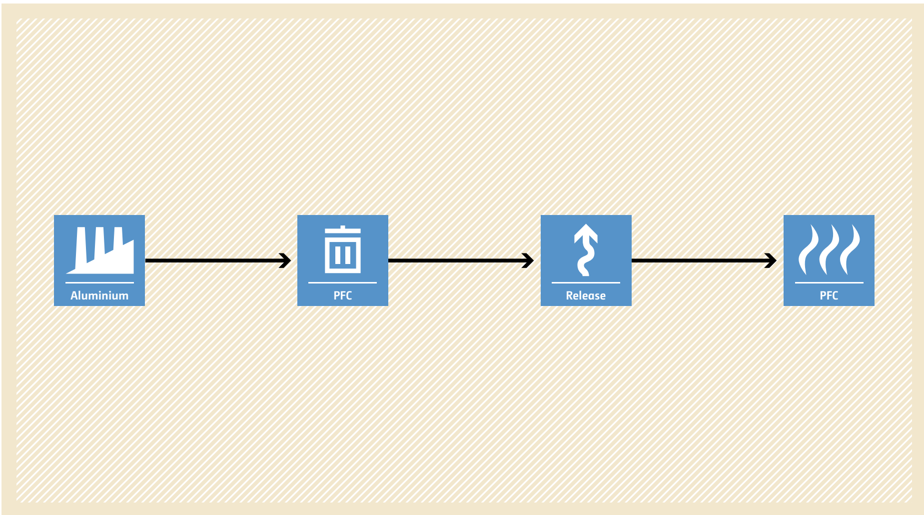
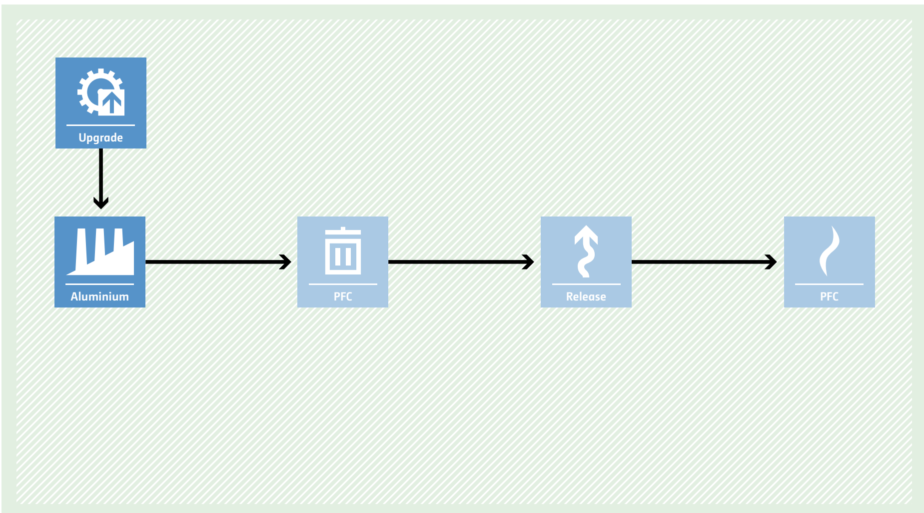
BASELINE SCENARIO
N_2O is emitted into the atmosphere during the production of caprolactam.



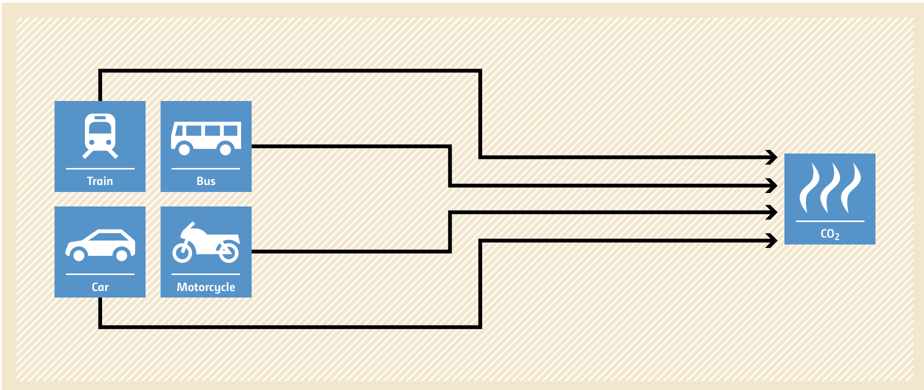
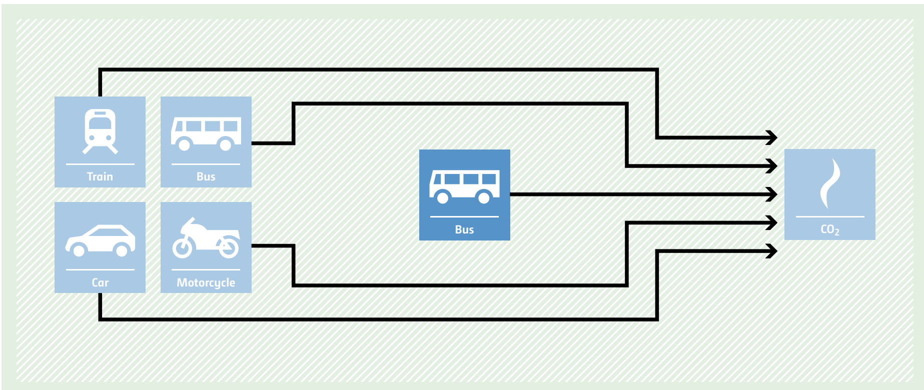
PROJECT SCENARIO
N_2O is destroyed in a catalytic destruction unit installed at the tail gas stream.



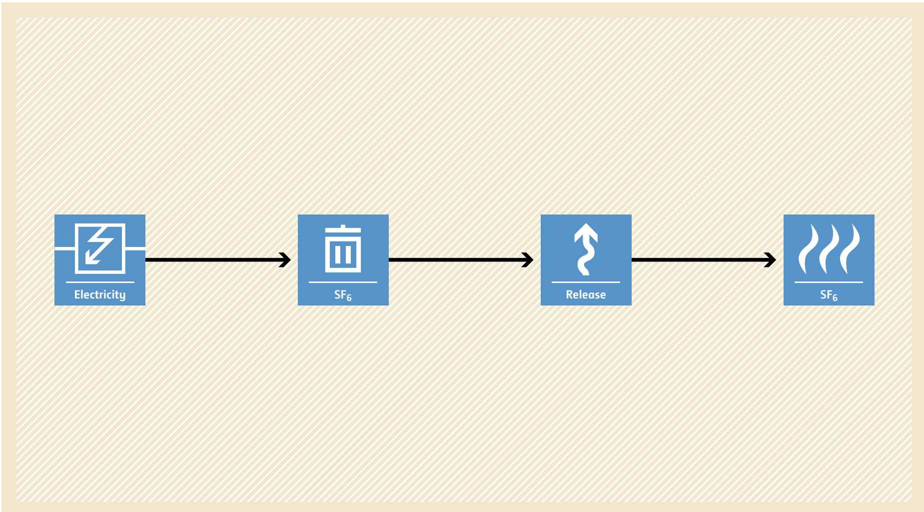
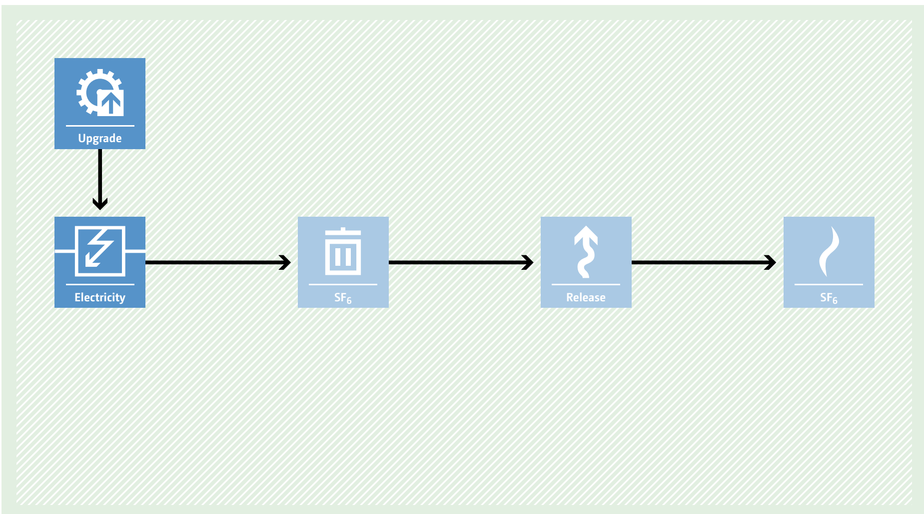
AM0030 PFC emission reductions from anode effect mitigation at primary aluminium smelting facilities

Typical project(s)	Implementation of anode effect mitigation measures at a primary aluminium smelter (e.g. improving the algorithm of the automatic control system for smelting pots).
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of PFC emissions by anode effect mitigation.
Important conditions under which the methodology is applicable	• The aluminium smelting facility started the commercial operation before 1 January 2009; • Minimum of three years of historical data is available on current efficiency, anode effect and aluminium production; • The aluminium smelting facility uses centre work pre-bake cell technology with bar brake (CWPB) or point feeder systems (PFPB); • The aluminium smelting facility has achieved an “operational stability associated to a PFC emissions level” that allows increasing the aluminium production by simply increasing the electric current in the pots.
Important parameters	Monitored: • Quantity of aluminium produced by the aluminium smelting facility; • Anode effect minutes per cell-day.
BASELINE SCENARIO No mitigation of PFC emissions from anode effects at primary aluminium smelting facilities.	
PROJECT SCENARIO Implementation of anode effect mitigation measures to reduce PFC emissions from aluminium smelting.	

AM0031 Bus rapid transit projects

Typical project(s)	Construction and operation of a new bus rapid transit system (BRT) for urban transport of passengers. Replacement, extensions or expansions of existing bus rapid transit systems (adding new routes and lines) are also allowed.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of more-GHG-intensive transportation modes by less-GHG-intensive ones.
Important conditions under which the methodology is applicable	• The methodology is applicable for urban or suburban trips on BRT system with feeder and trunk routes where passengers can realize their entire trip on the project system; • If the analysis of possible baseline scenario alternatives leads to the result that a continuation of the use of the current modes of transport is the baseline scenario; • If biofuels are used, project buses must use the same biofuel blend (same percentage of biofuel) as commonly used by conventional comparable urban buses in the country.
Important parameters	At validation: • Baseline distance and transport mode, which are obtained through a comprehensive survey involving the users of the project transport system; • Occupancy rates and travelled distances of different transport modes (including the project); • Policies affecting the baseline (i.e. modal split of passengers, fuel usage of vehicles, maximum vehicle age); • If expected emissions per passenger kilometer for BRT system is less than or equal to 50 gCO_2/pkm, the project is considered automatically additional.
	Monitored: • Number of passengers transported in the project; • Total consumption of fuel/electricity in the project.
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 the newly developed bus rapid transit system that partially displaces the existing transport system operating under mixed traffic conditions.	

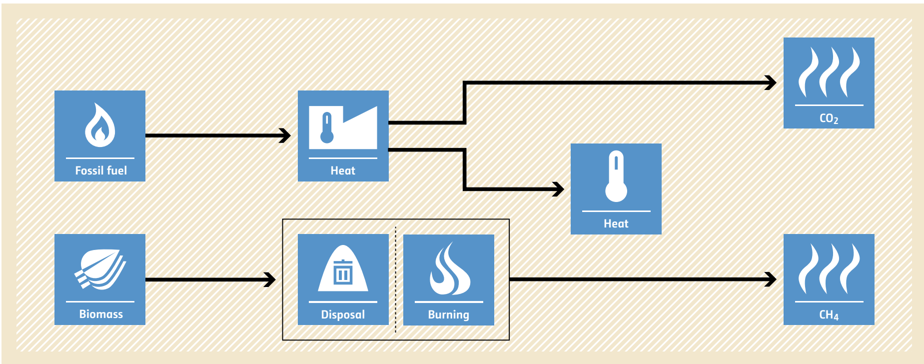
AM0035 SF_6 emission reductions in electrical grids

Typical project(s)	Recycling and/or leak reduction of SF_6 in a electricity grid.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of SF_6 emissions by recycling and/or leak reduction.
Important conditions under which the methodology is applicable	• The project is implemented either in the entire grid or a verifiable distinct geographic portion of a grid; • Minimum of three years of historical data is available on the total SF_6 emissions from the grid.
Important parameters	At validation: • Net reduction in an SF_6 inventory for the grid; • Nameplate capacity (in kg SF_6) of equipment retired from and added to the grid. Monitored: • Update of the above parameters necessary for validation.
BASELINE SCENARIO SF_6 emitted from leaks and/or non-recycling of SF_6 during repair and maintenance of electricity transmission and distribution systems.	
PROJECT SCENARIO Recycling and/or leak-reduction of SF_6 during repair and maintenance of electricity transmission and distribution systems.	

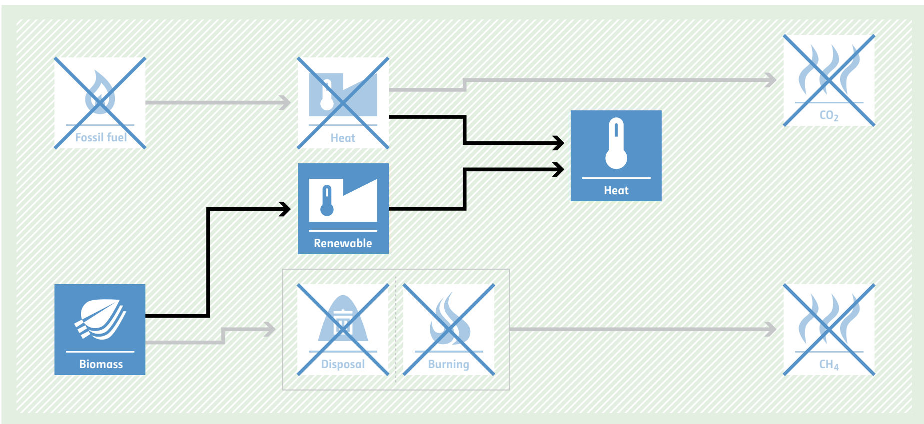
AM0036 Use of biomass in heat generation equipment

Typical project(s)	Fuel switch from fossil fuels to biomass in the generation of heat. Applicable activities are retrofit or replacement of existing heat generation equipment and installation of new heat generation equipment.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of more-GHG-intensive heat generation using fossil fuel and avoidance of CH_4 emissions from anaerobic decay of biomass residues.
Important conditions under which the methodology is applicable	• Heat generated in the project can only be used for power generation if power generation equipment was previously installed and is maintained throughout the crediting period; • Biomass types used by the project activity are limited to biomass residues, biogas, Refuse Derived Fuel (RDF) and/or biomass from dedicated plantations; • In case of existing facilities, three years of historical data is required for the calculation of emissions reductions.
Important parameters	At validation: • Historical annual heat generation and biomass consumption at the project site.
	Monitored: • Heat generated by the project activity; • Quantities of biomass used in the project plant; • Electricity and fossil fuel consumption by the project activity; • Parameters related to project and leakage emissions from biomass.

BASELINE SCENARIO
Heat would be produced by the use of fossil fuels. Biomass residues could partially decay under anaerobic conditions, generating CH_4 emissions.



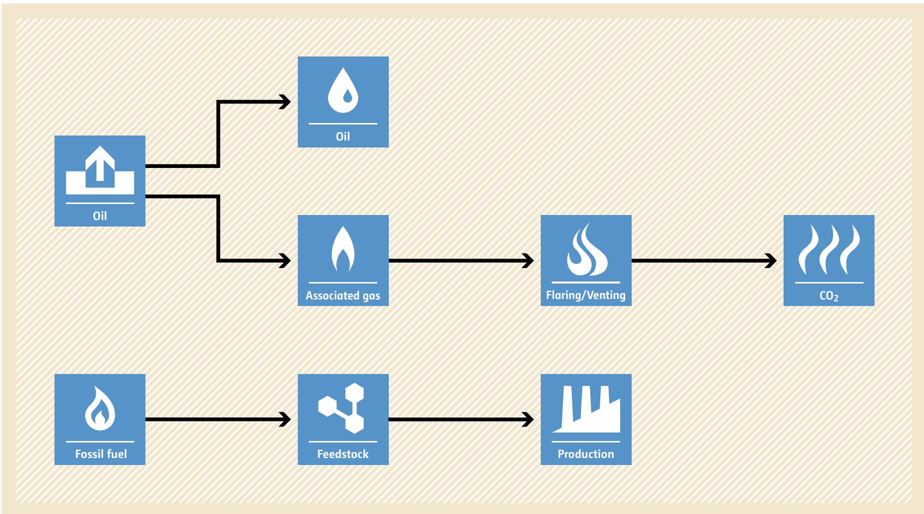
PROJECT SCENARIO
Use of biomass for heat generation avoids fossil fuel use and its associated GHG emissions.



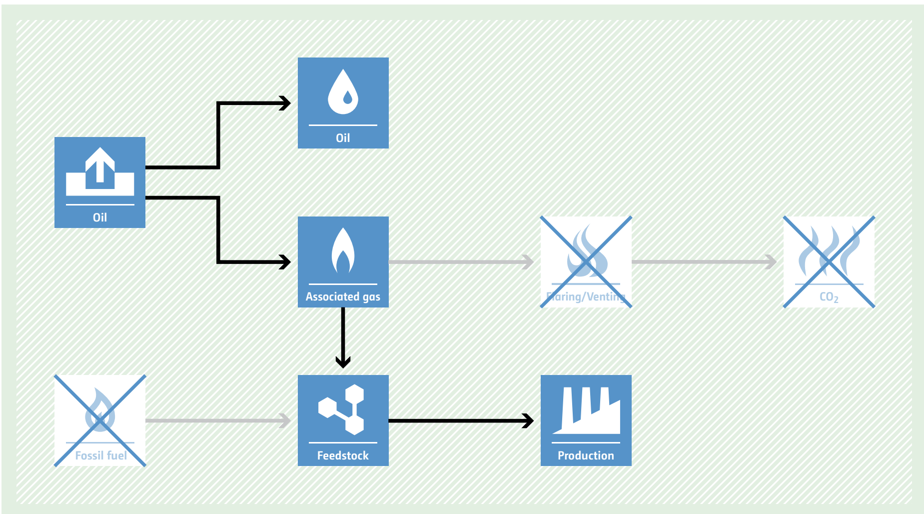
AM0037 Flare (or vent) reduction and utilization of gas from oil wells as a feedstock

Typical project(s)	Associated gas from oil wells that was previously flared or vented is recovered and utilized as a feedstock to produce a chemical product.
Type of GHG emissions mitigation action	• Feedstock switch. Avoidance of GHG emissions that would have occurred by flaring/venting the associated gas.
Important conditions under which the methodology is applicable	• The associated gas from the oil well, which is used in the project, was flared or vented for the last three years prior to the start of the project; • Under the project, the previously flared (or vented) associated gas is used as feedstock and, where applicable, partly as energy source in a chemical process to produce a useful product (e.g. methanol, ethylene or ammonia).
Important parameters	Monitored: • Mass fraction of methane in the associated gas; • Quantity of product(s) produced in the end-use facility in the project; • Quantity and carbon content of associated gas utilized in the project, i.e. the quantity of associated gas entering the pipeline for transport to the end-use facility.

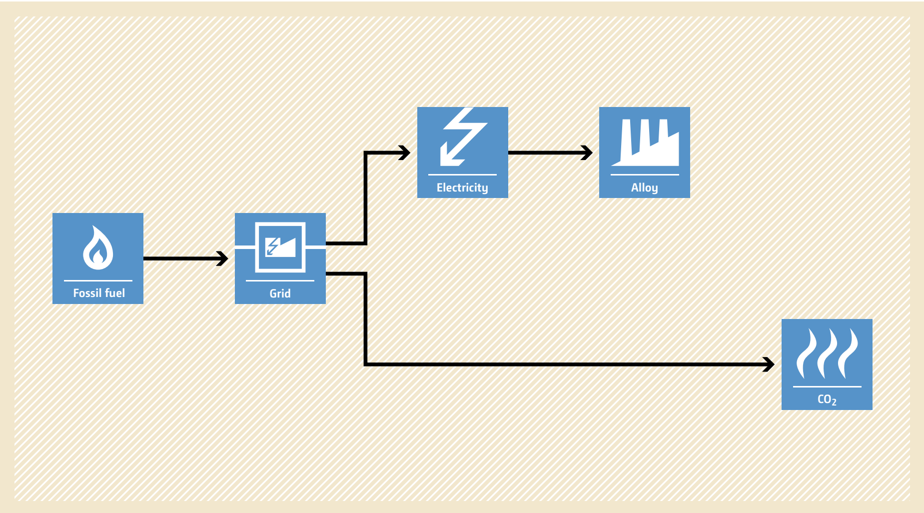
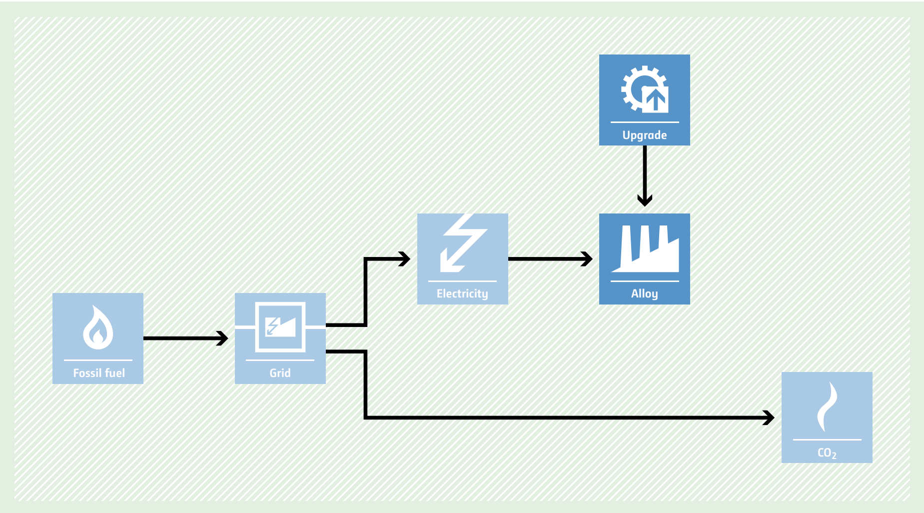
BASELINE SCENARIO
Associated gas from oil wells is flared or vented and other feedstock is used to produce a chemical product.



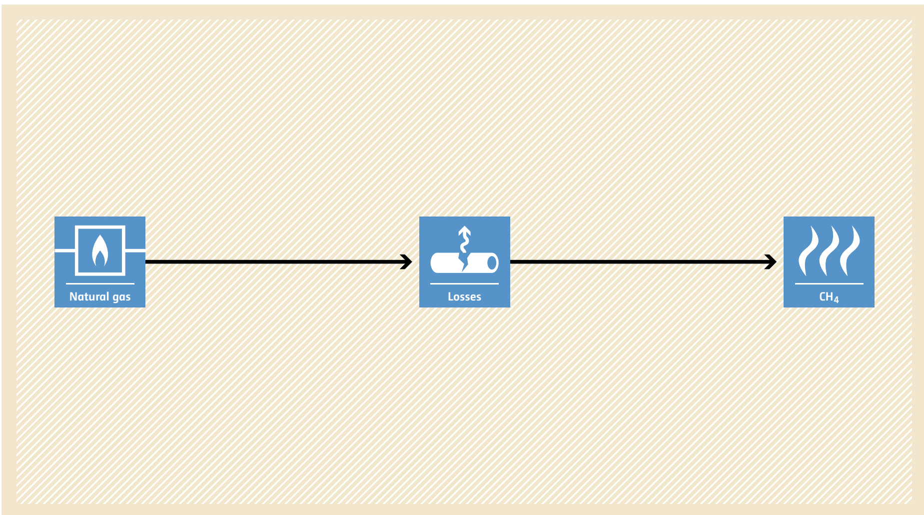
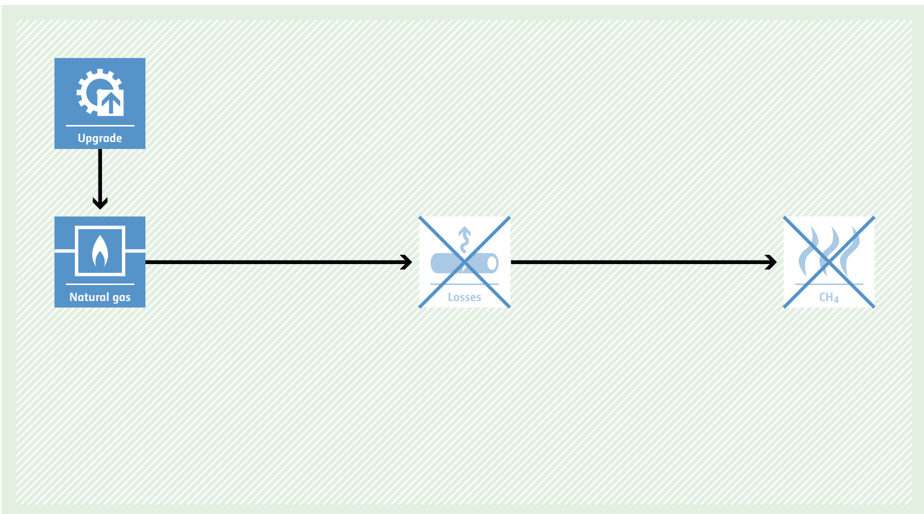
PROJECT SCENARIO
Associated gas from oil wells is recovered and utilized as feedstock to produce a chemical product.



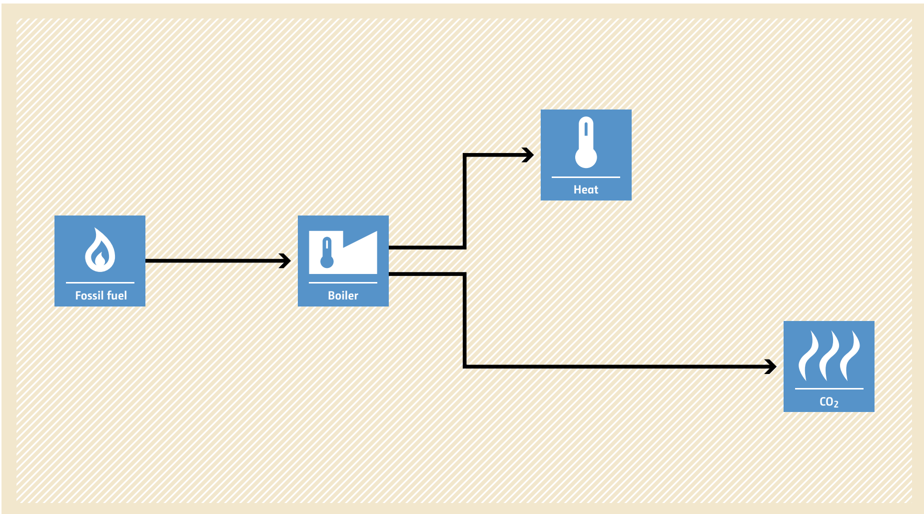
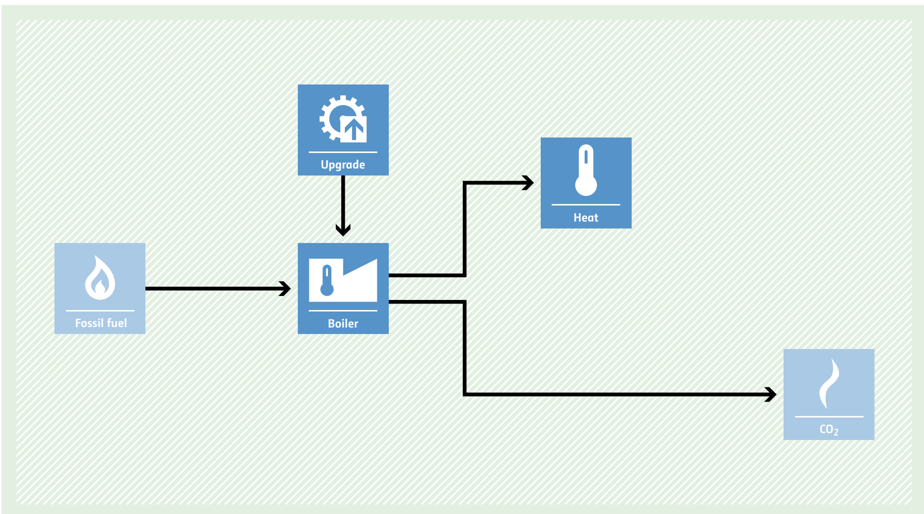
AM0038 Methodology for improved electrical energy efficiency of an existing submerged electric arc furnace used for the production of silicon and ferry alloys

Typical project(s)	Retrofitting of existing furnaces for the production of silicon and ferry alloys including control and peripheral systems with a more efficient system.
Type of GHG emissions mitigation action	• Energy efficiency. Switch to more energy-efficient technology.
Important conditions under which the methodology is applicable	• The electricity consumed is supplied by the grid; • The quality of the raw material and products remains unchanged; • Data for at least three years preceding the implementing the project is available to estimate the baseline emission.
Important parameters	At validation: • Grid emission factor (can also be monitored ex post). Monitored: • Alloys production and consumption of electricity, reductants and electrode paste; • Project-specific quality and emission factors for reductants and electrode paste.
BASELINE SCENARIO Consumption of grid electricity in the submerged arc furnaces results in CO_2 emissions from the combustion of fossil fuel used to produce electricity.	
PROJECT SCENARIO The more-efficient submerged arc furnaces consume less electricity, and thereby, emissions from the combustion of fossil fuel used to produce electricity are reduced.	

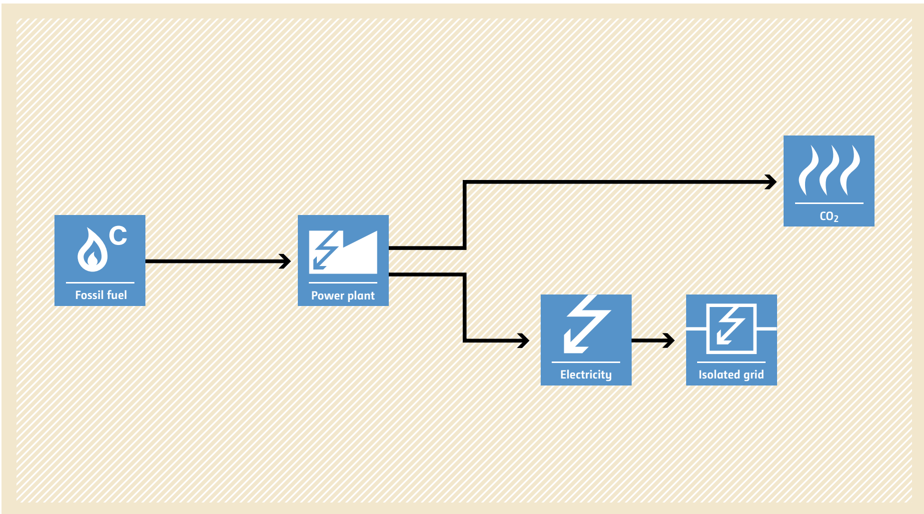
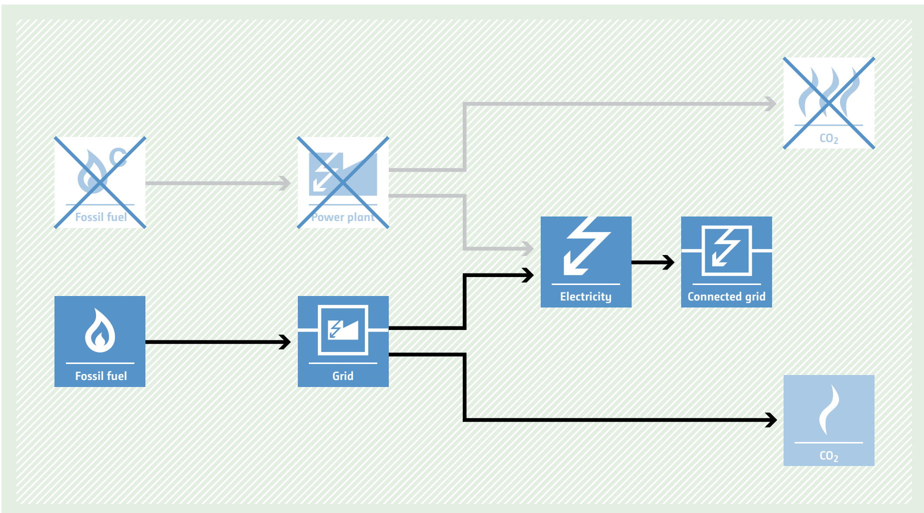
AM0043 Leak reduction from a natural gas distribution grid by replacing old cast iron pipes or steel pipes without cathodic protection with polyethylene pipes

Typical project(s)	Installation of polyethylene pipes for the early replacement of leaking cast iron pipes or steel pipes without cathodic protection in a natural gas distribution network.
Type of GHG emissions mitigation action	• GHG emissions avoidance. Avoidance of CH_4 emissions from leaks in natural gas transportation.
Important conditions under which the methodology is applicable	• The project replaces either cast iron pipes or steel pipes without cathodic protection that have been in use for 30 years with polyethylene pipes without altering the pattern and supply capacity of the system; • The replacement is not part of normal repair and maintenance, planned replacement, or due to interruptions or shortages or a switch from servicing other gases; • The distribution system does not include gas transmission pipelines or storage facilities.
Important parameters	At validation: • Length of pipes and number of leaks (alternative: leakage rate of the section).
	Monitored: • Length of new pipeline due to both project and procedural replacement; • Fraction of methane in the natural gas; • Pressure of natural gas in the network.
BASELINE SCENARIO Methane leaks from a natural gas network.	
PROJECT SCENARIO No leaks or fewer leaks in the natural gas network.	

AM0044 Energy efficiency improvement projects - boiler rehabilitation or replacement in industrial and district heating sectors

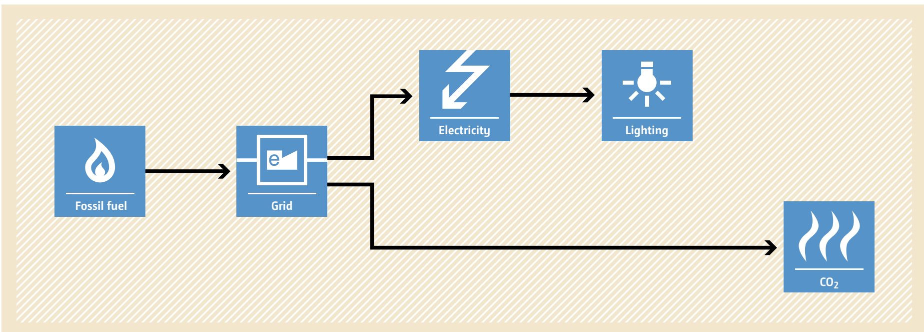
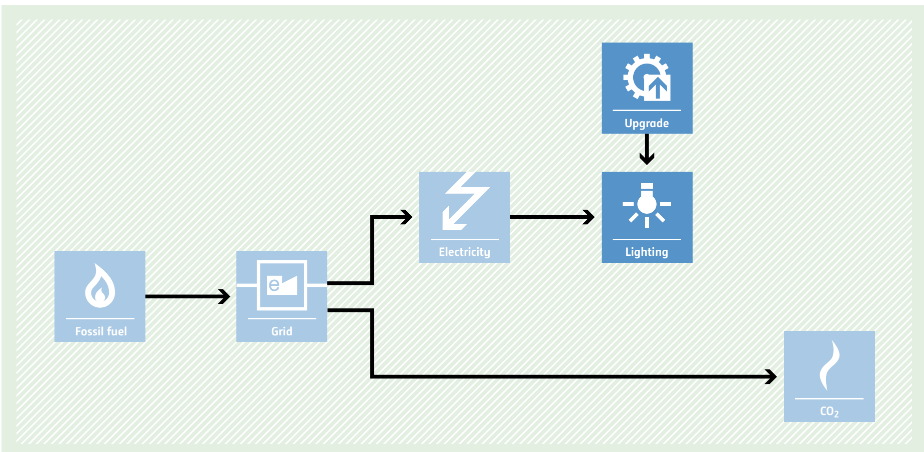
Typical project(s)	Projects that results in thermal energy efficiency improvement of fossil-fuel-fired boilers, at multiple locations, through rehabilitation or replacement of the boilers implemented by the project participant, who may be the owner of boilers or owner of all the sites or part of the sites where the boilers are to be installed or a third party that owns all the project boilers during the project period.
Type of GHG emissions mitigation action	• Energy efficiency. Switch to more energy-efficient technology.
Important conditions under which the methodology is applicable	• The boilers that are rehabilitated or replaced under the project should have some remaining lifetime; • Only one type of fuel is used by each of the boilers included in the project boundary and no fuel switching is undertaken within the project boundary, as a part of project; • The installed capacity of each boiler shall be determined using a performance test in accordance with well-recognized international standards.
Important parameters	Monitored • Amount of fossil fuel consumed, net calorific value of fossil fuel, emission factor of fossil fuel, oxidation factor of fossil fuel in each boiler in the project; • Total thermal output of each boiler in the project.
BASELINE SCENARIO Boiler(s) with lower efficiency will continue to operate at multiple locations, thereby consuming high amounts of fossil fuel.	
PROJECT SCENARIO The efficiency of boiler(s) is improved through their rehabilitation or replacement, resulting in a reduction of fossil fuel consumption and related CO_2 emissions.	

AM0045 Grid connection of isolated electricity systems

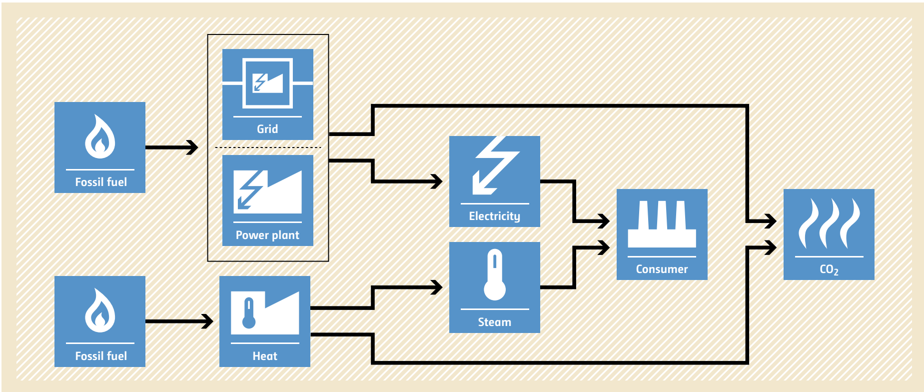
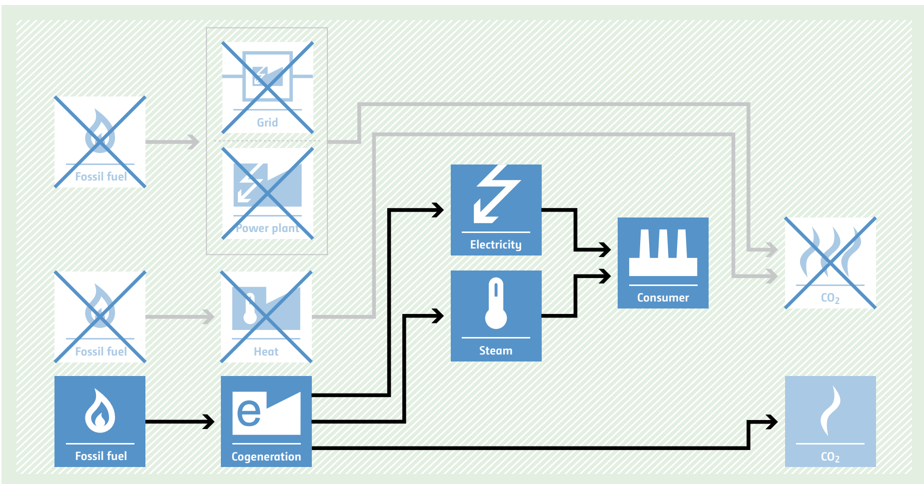
Typical project(s)	Expansion of an interconnected grid to supply electricity generated by more-efficient, less-carbon-intensive means to an isolated electric power system.
Type of GHG emissions mitigation action	• Displacement of a more-GHG-intensive output. Displacement of electricity that would be provided by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• Renewable energy-based electricity generation in the isolated systems is not displaced and its operation is not significantly affected; • All fossil-fuel-fired power plants in the isolated system are 100% displaced.
Important parameters	At validation: • Grid emission factor of isolated system before start of the project; • Electricity supplied to isolated system before start of the project (three years of historic data required).
	Monitored: • Quantity of electricity supplied to the previously isolated system by the interconnected grid; • Grid emission factor of the interconnected grid.
BASELINE SCENARIO Power generation based on fossil fuel applying less-efficient technologies in isolated electricity systems.	
PROJECT SCENARIO Displacement of fossil-fuel-fired power plants in the isolated grid by expansion of an interconnected grid to the isolated electricity system.	

AM0046 Distribution of efficient light bulbs to households

Women and children

Typical project(s)	Compact fluorescent lamps (CFLs) are sold at a reduced price, or donated to households to replace incandescent lamps (ICL).
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of less-efficient lighting by more-efficient technology.
Important conditions under which the methodology is applicable	• The households are within a distinct geographical area and are connected to the electricity grid and no other CDM project that may affect the energy efficiency of lighting in households located within the total project area has been registered; • A maximum of four CFLs can be distributed or sold to each household and these CFLs have to be more efficient and have the same or a lower lumen output as the previously used ICL; • The displaced light bulbs have a maximum rated power of 100 W and are returned to the project coordinator, who ensures destruction of the light bulbs; • Electricity consumption from lighting has to be monitored in a baseline sample group (BSG) and a project sample group (PSG). The project coordinator implements a social lottery system as an incentive among all households included in the BSG and the PSG.
Important parameters	At validation: • The average grid voltage in the low-voltage part of the grid, the power rating and the P-U characteristic curve of the distributed light are determined before the start of the project; • Grid emission factor (alternatively monitored).
	Monitored: • Electricity consumed to provide lighting (or utilization hours and power rating of lighting appliance) for household within the BSG and PSG; • Number of project ICL and scrapped light bulbs; • Technical distribution losses in the grid.
BASELINE SCENARIO Less-energy-efficient light bulbs are used in households resulting in higher electricity demand.	
PROJECT SCENARIO More-energy-efficient CFLs are used in households saving electricity and thus reducing GHG emissions.	

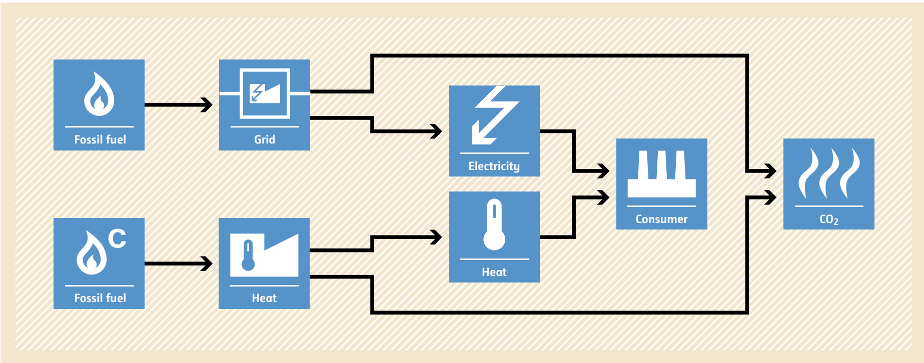
AM0048 New cogeneration project activities supplying electricity and heat to multiple customers

Typical project(s)	Fossil-fuel-fired cogeneration project supplying heat and electricity to multiple project customers.
Type of GHG emissions mitigation action	• Energy efficiency. Switch to cogeneration of steam and electricity.
Important conditions under which the methodology is applicable	• Installation of a new fossil fuel fired cogeneration facility(ies) that supply heat and electricity to: (i) existing or new recipients; (ii) supply electricity to grid; and/or (iii) supply heat to heat networks; • The baseline scenario for the project activity is a construction of a new fossil fuel based electricity generation facility and a construction of a new fossil-fuel based heat generation facility.
Important parameters	Monitored: • Quantity of electricity generated by the project and supplied to recipient facility(ies) and/or the power grid; • Quantity of steam or hot water generation by the project and supplied to recipient facility(ies) and/or heat networks.
BASELINE SCENARIO Separate heat and electricity production.	
PROJECT SCENARIO Cogeneration of electricity and heat.	

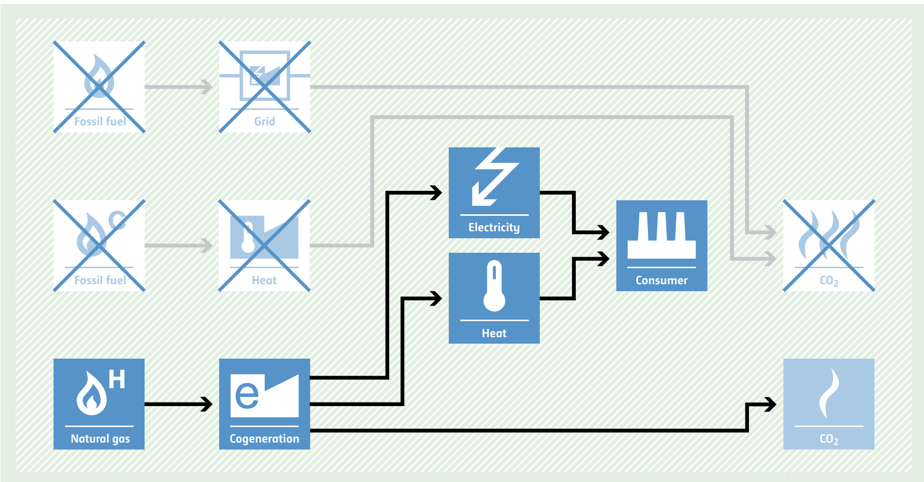
AM0049 Methodology for gas based energy generation in an industrial facility

Typical project(s)	Installation of gas-based energy generation systems, either separate or cogeneration, at an existing industrial facility to meet its own electricity and/or steam/heat demand.
Type of GHG emissions mitigation action	• Fuel switch; • Energy efficiency. Displacement of more-carbon-intensive fuel with less-carbon-intensive fuel.
Important conditions under which the methodology is applicable	• Prior to the project implementation, the existing industrial facility produces its own thermal energy and maybe electricity, but the electricity supply is not enough to meet its own demand; • Coal or oil is replaced by natural gas or methane-rich gas, which shall be sufficiently available in the region or country; • There are no regulatory requirements for fuel switch or technology upgrade; • The project does not change the quality requirement of steam/heat; • Electricity export to the power grid, if any, is on ad-hoc basis and consists of less than 10% of the total electricity produced by the project power plant.
Important parameters	At validation: • Grid emission factor.
	Monitored: • Electricity generation and export of the project power plant; • Efficiency of the baseline and project fuel combustion systems; • Flow rate, pressure and temperature of heat carrier at inlet and outlet of waste heat generation sources; • Fuel consumption by the project plant.

BASELINE SCENARIO
On-site generation of heat using coal or oil and import of electricity from the grid.



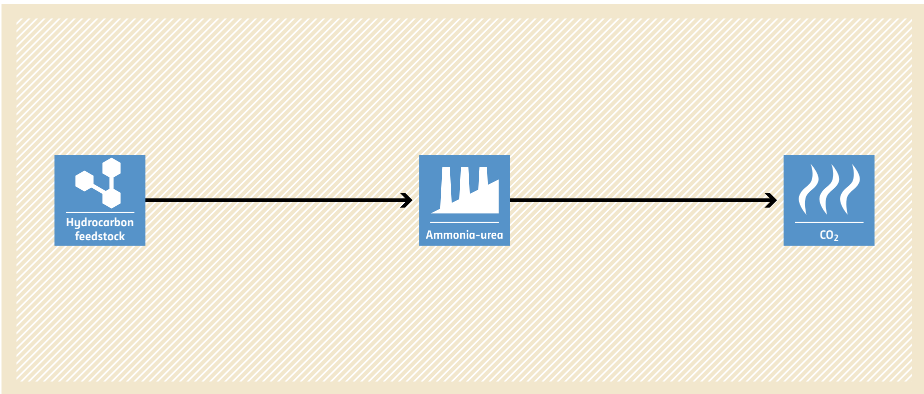
PROJECT SCENARIO
Installation of energy generation systems, either separate or cogeneration, to supply electricity and/or steam/heat using natural gas or methane-rich gas.



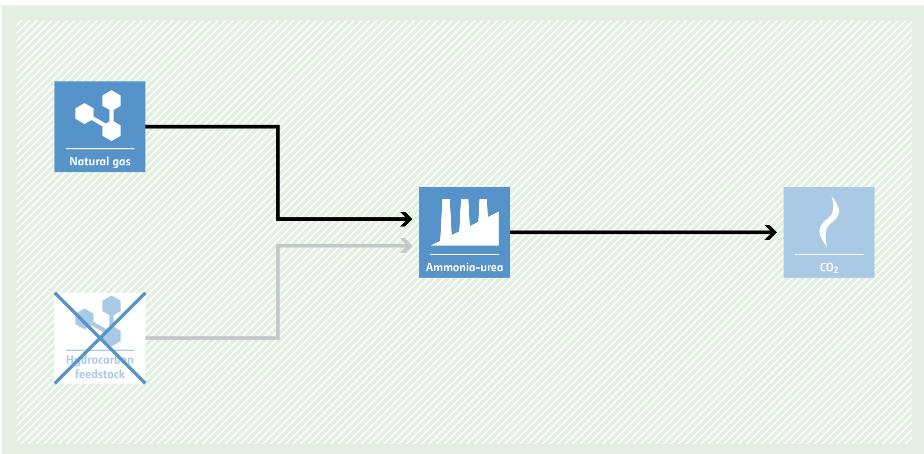
AM0050 Feed switch in integrated ammonia-urea manufacturing industry

Typical project(s)	Feed switch from existing hydrocarbon feedstock (i.e. naphtha, heavy oils, coal, lignite and coke) to natural gas, either completely or partially, in an existing integrated ammonia-urea manufacturing facility, with optional implementation of a CO_2 recovery plant within the manufacturing facility.
Type of GHG emissions mitigation action	• Feedstock switch. Displacement of more-GHG-intensive feedstock (naphtha, heavy oils, coal, lignite and coke) with less-GHG-intensive feedstock (natural gas).
Important conditions under which the methodology is applicable	• The project activity should not result in the increase of the production capacity beyond 10% of the existing capacity, and change in production process; • Natural gas is sufficiently available in the region or country; • The integrated ammonia-urea manufacturing facility is an existing plant with a historical operation of at least three years prior to the implementation of the project; • Prior to the implementation of the project, no natural gas has been used in the integrated ammonia-urea manufacturing facility.
Important parameters	At validation: • Urea production in the most recent three years; • Quantity of each existing feedstock used as feed in the most recent three years; • Quantity of fuel consumed in furnaces in the most recent three years.
	Monitored: • Urea production in the project; • Quantity of natural gas used as feed in the project; • Quantity of fuel consumed in furnaces in the project; • Quantity and CO_2 emission factor of electricity consumed by the CO_2 recovery plant.

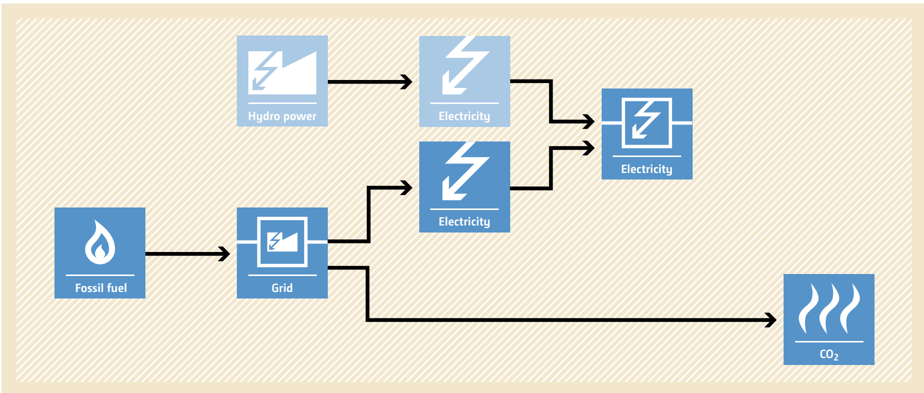
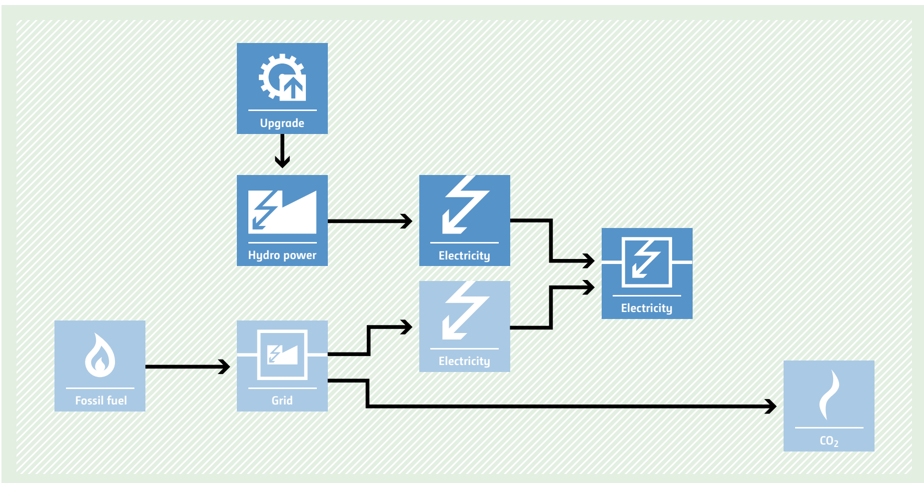
BASELINE SCENARIO
The integrated ammonia-urea manufacturing facility continues to use existing hydrocarbon feedstock as the feed emitting excess CO_2, not used by the urea plant, into atmosphere.



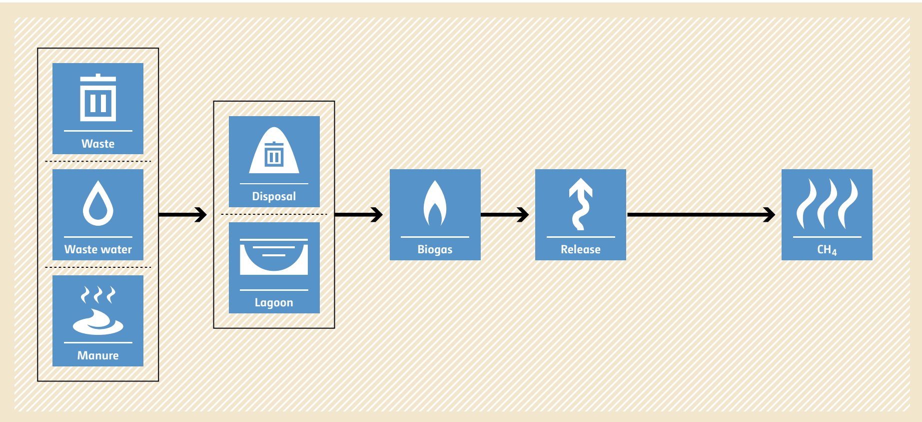
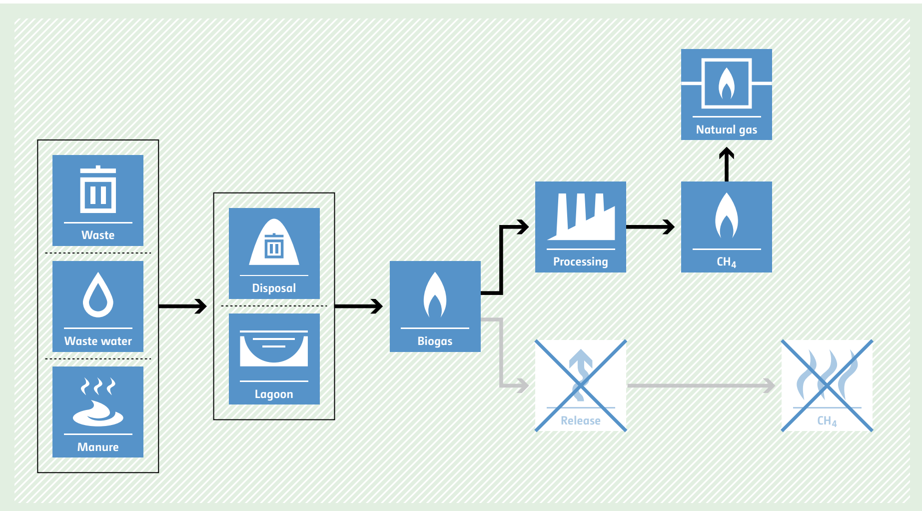
PROJECT SCENARIO
The feed to the integrated ammonia-urea manufacturing facility is switched from existing hydrocarbon feedstock to natural gas, if required in combination with the implementation of a CO_2 recovery, to reduce the emission of excess CO_2.



AM0052 Increased electricity generation from existing hydropower stations through decision support system optimization

Typical project(s)	Increased annual generation of electricity through the introduction of a Decision Support System (DSS) that optimizes the operation of the existing hydropower facility/ies, both run-of-the-river and reservoir-based type, connected to a grid.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of electricity that would have been provided by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• Recorded data is available for a minimum of three years to establish the baseline relationship between water flow and power generation; • Hydropower units, covered under the project, have not undergone and will not undergo significant upgrades beyond basic maintenance (e.g. replacement of runners) that affect the generation capacity and/or expected operational efficiency levels during the crediting period; • No major changes in the reservoir size (e.g. increase of dam height) or to other key physical system elements (e.g. canals, spillways) that would affect water flows within the project boundary, have been implemented during the baseline data period or will be implemented during the crediting period.
Important parameters	At validation: • Grid emission factor (can also be monitored ex post); • Measurement data of headwater level, vertical opening of spillway, power output etc. from previous year before project implementation as well as power polynomial coefficients (hill diagram).
	Monitored: • Quantity of electricity generated by each hydropower unit in the project.
BASELINE SCENARIO Additional electricity would be produced by more-GHG-intensive power plants connected to the grid.	
PROJECT SCENARIO Introduction of a Decision Support System (DSS) increases the supply of electricity generated by existing hydropower units to the grid, thereby reducing the amount of more-GHG-intensive electricity in the grid.	

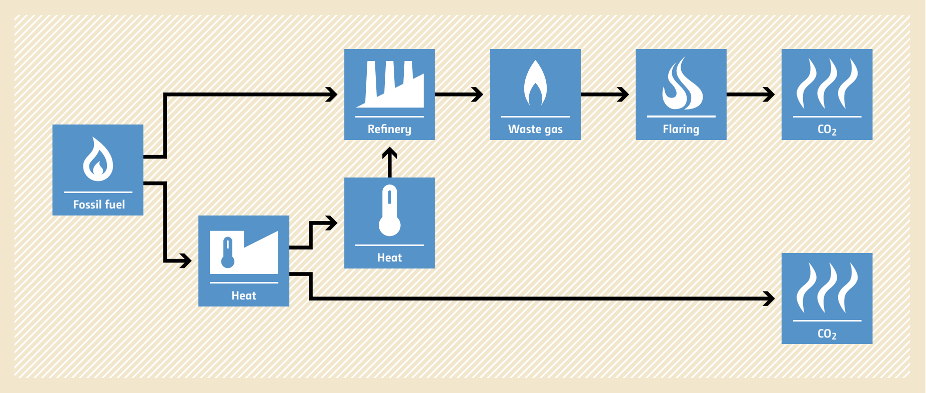
AM0053 Biogenic methane injection to a natural gas distribution grid

Typical project(s)	Recovering of biogas generated by anaerobic decomposition of organic matter in wastewater treatment systems, animal waste management systems, etc., processing and upgrading the biogas to the quality of natural gas and distributing it as energy source via a natural gas distribution grid.
Type of GHG emissions mitigation action	• Renewable energy; • GHG emission avoidance. Avoidance of CH_4 emissions and displacement of use of natural gas in a natural gas distribution grid.
Important conditions under which the methodology is applicable	• The biogas was either vented or flared prior to implementation of the project activity and would continue to be either vented or flared in the absence of the project activity; • The geographical extent of the natural gas distribution grid is within the host country; • One or several of the following technologies are used to upgrade biogas to natural gas quality: pressure swing adsorption; absorption with/without water circulation; absorption with water, with or without water recirculation; membrane CO_2 removal technology.
Important parameters	Monitored: • Quantity and net calorific value of upgraded biogas injected to the natural gas distribution grid; • Quantity of biogas captured at the source of biogas generation; • Concentration of methane in biogas at the source of biogas generation.
BASELINE SCENARIO Biogas is vented or flared and natural gas distribution grid is supplied by natural gas extracted from gas wells.	
PROJECT SCENARIO Biogas is recovered, processed, upgraded and supplied to the natural gas distribution grid and replaces additional natural gas from gas wells.	

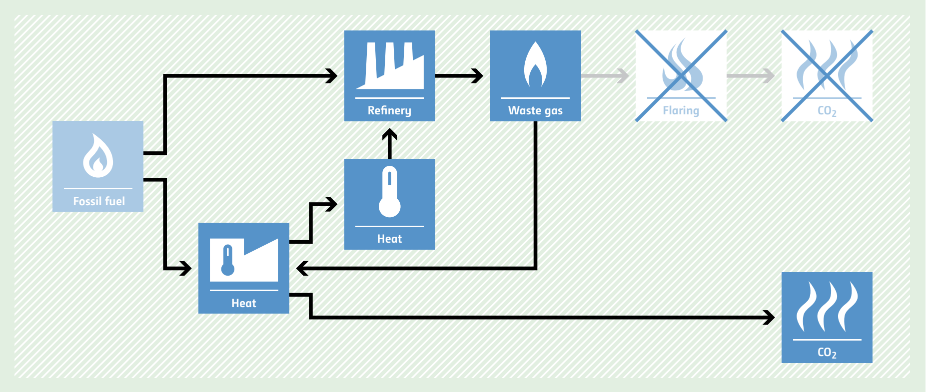
AM0055 Recovery and utilization of waste gas in refinery or gas plant

Typical project(s)	The project activity is implemented in existing refinery facilities or gas plants to recover waste gas, which is characterized by its low pressure or a low heating value and that is currently being flared to generate process heat in element process(es) (e.g. for the purpose of steam generation by a boiler or hot air generation by a furnace). Recovered waste gas is a by-product generated in several processing units of the refinery or gas plant.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of fossil fuel used for heat production by recovered waste gas.
Important conditions under which the methodology is applicable	• Waste gases from the refinery or gas plant, used under the project activity, were flared (not vented) for the last three years prior to the implementation of the project activity; • The waste gas recovery device is placed just before the flare header (with no possibility of diversions of the recovered gas flow) and after all the waste gas generation devices; • The recovered waste gas replaces fossil fuel that is used for generating heat for processes within the same refinery or gas plant; • The composition, density and flow of waste gas are measurable.
Important parameters	At validation: • Historical annual average amount of waste gas sent to flares before the project implementation.
	Monitored: • Parameters to calculate the emission factor for consumed electricity; • Amount and composition of recovered waste gas (e.g. density, LHV) and data needed to calculate the emission factor of fossil fuel used for process heating and steam generation within the refinery or gas plant.

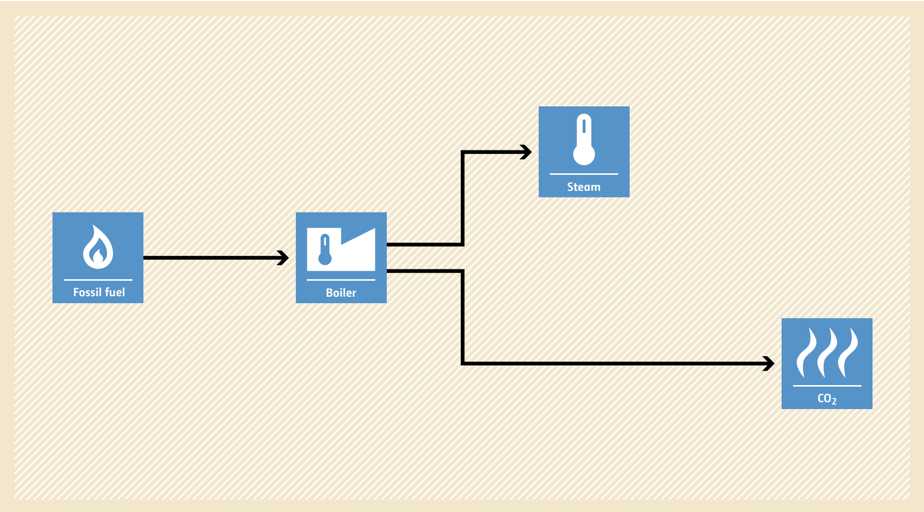
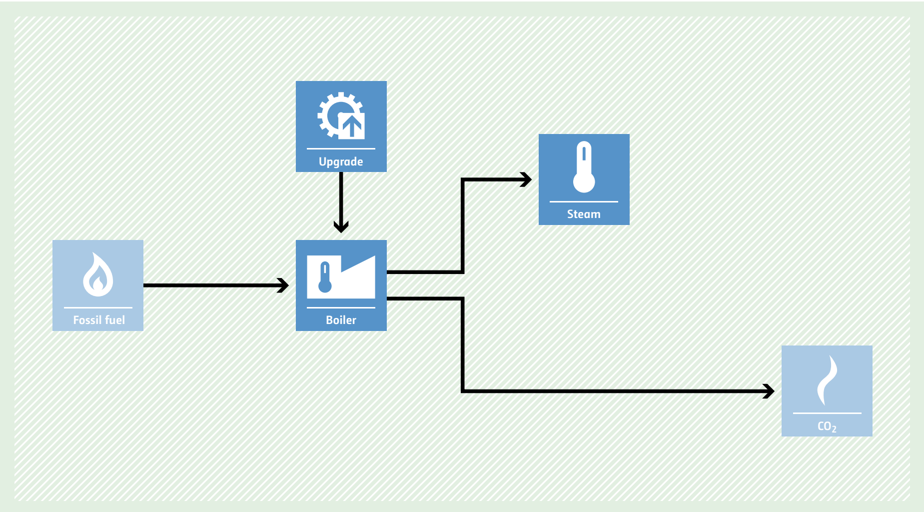
BASELINE SCENARIO
Use of fossil fuel to generate process heat. Waste gas is flared.



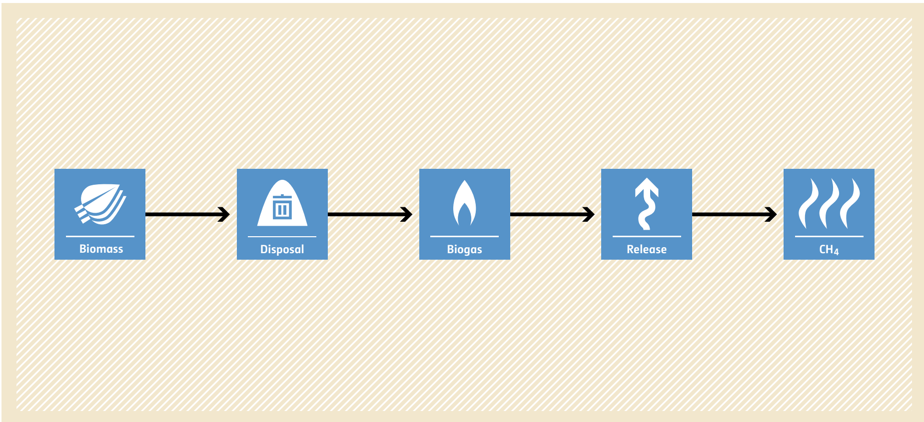
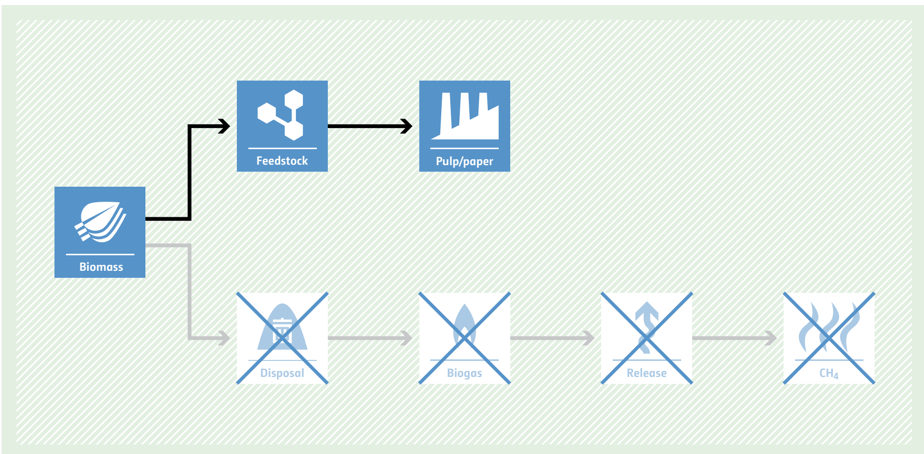
PROJECT SCENARIO
Use of recovered waste gas to generate process heat. Thereby, fossil fuel usage is reduced and waste gas is not flared anymore.



AM0056 Efficiency improvement by boiler replacement or rehabilitation and optional fuel switch in fossil fuel-fired steam boiler systems

Typical project(s)	Complete replacement of existing boilers by new boilers with a higher efficiency in an existing facility with steam demands or retrofitting of existing boilers in order to increase their efficiency; or a combination with one or both activities described above and a switch in the type of fossil fuel used to fuel boilers.
Type of GHG emissions mitigation action	• Energy efficiency. Technology switch resulting in an increase in energy efficiency.
Important conditions under which the methodology is applicable	• The project boilers utilize fossil fuels to produce steam; • The compliance with national/local regulations are not the cause of the development of the project; • Steam quality (i.e. steam pressure and temperature) is the same prior and after the implementation of the project; • Only one type of fossil fuel is used in all boilers included in the project boundary.
Important parameters	Monitored: • Quantity of fuel used in the boilers; • Quantity of steam produced; • Temperature and pressure of the steam produced.
BASELINE SCENARIO Continuation of the current situation, i.e. use of the existing boilers without fossil fuel switch, replacement of retrofit of the boilers.	
PROJECT SCENARIO Complete replacement of boilers, and/or retrofitting of an existing steam generating system results in higher efficiency and less consumption of fossil fuel (fuel switch may also be an element of the project scenario).	

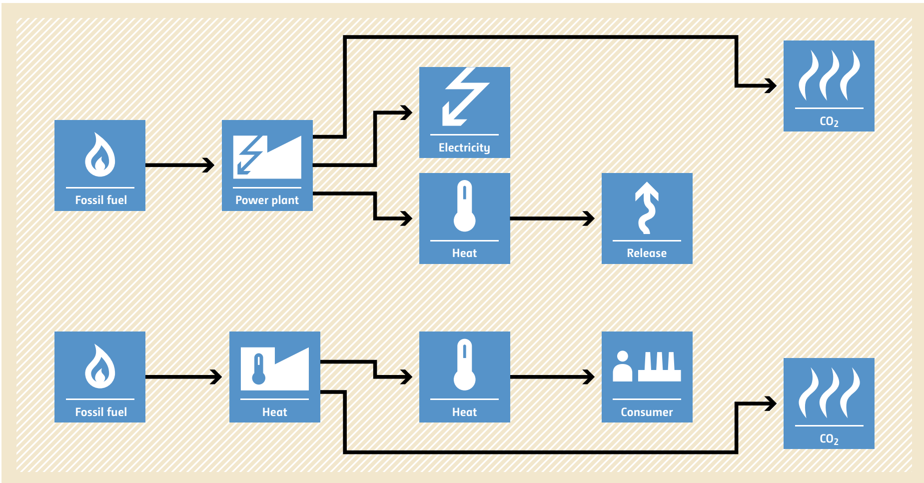
AM0057 Avoided emissions from biomass wastes through use as feed stock in pulp and paper, cardboard, fibreboard or bio-oil production

Typical project(s)	Agricultural wastes are used as feed stock for pulp, paper, cardboard, fibreboard or bio-oil production in a new facility, where the end product is similar in characteristics and quality to existing high quality products in the market and does not require special use or disposal methods.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of CH_4 emissions.
Important conditions under which the methodology is applicable	• A new production facility is being constructed; • Waste is not stored in conditions that would generate methane; • Production does not involve processes that emit significant additional greenhouse gas emissions except from those arising directly from pyrolysis (bio-oil only) processes that were also used in the baseline or associated with electricity or fossil fuel consumption; • If biomass is combusted for the purpose of providing heat or electricity to the plant, then the biomass fuel is derived from biomass residues; • In the case of bio-oil, the pyrolyzed residues (char) will be further combusted and the energy derived thereof used in the project.
Important parameters	Monitored: • Quantity of waste used as feedstock; • Fossil fuel and electricity consumption; • Transportation parameter – distance, fuel type and load details; • Agricultural waste residues – produced in the region, used in and outside the project and surplus.
BASELINE SCENARIO Agricultural residues are left to decay anaerobically.	
PROJECT SCENARIO Agricultural residues are used as feedstock in a new facility for producing paper, pulp, cardboard, fibreboard or bio-oil.	

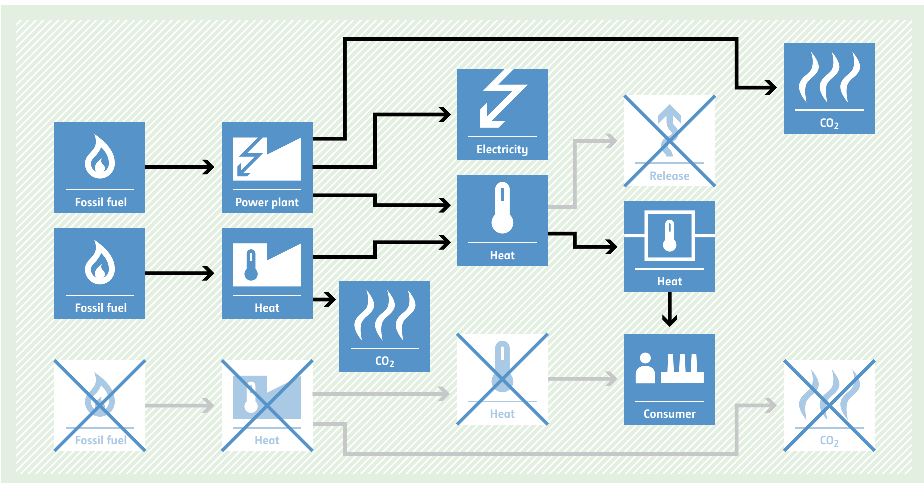
AM0058 Introduction of a new primary district heating system

Typical project(s)	Introduction of a district heating system supplying heat from a fossil fuel-fired power plant and/or by new centralised boilers. It replaces decentralised fossil fuel fired heat only boilers.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of fossil-fuel-based heat generation by utilization of heat extracted from a power plant and/or by a more efficient centralized fossil fuel fired boiler.
Important conditions under which the methodology is applicable	The heat supplied by the project is either from: • Existing grid connected thermal power plant with no steam extraction for heating purposes, other than that required for the operation of the power plant auxiliary systems, prior to the project activity; or • A new centralised heat only boiler(s); or • A combination of both (a) and (b).
Important parameters	At validation: • Efficiency of the heat supply and fuel types in the baseline; • Minimum and maximum power generation during the last three years.
	Monitored: • Quantity of heat from the cogeneration plant and from all heat only/peak load boilers in the project; • Quantity of heat supplied from each sub-station to the buildings.

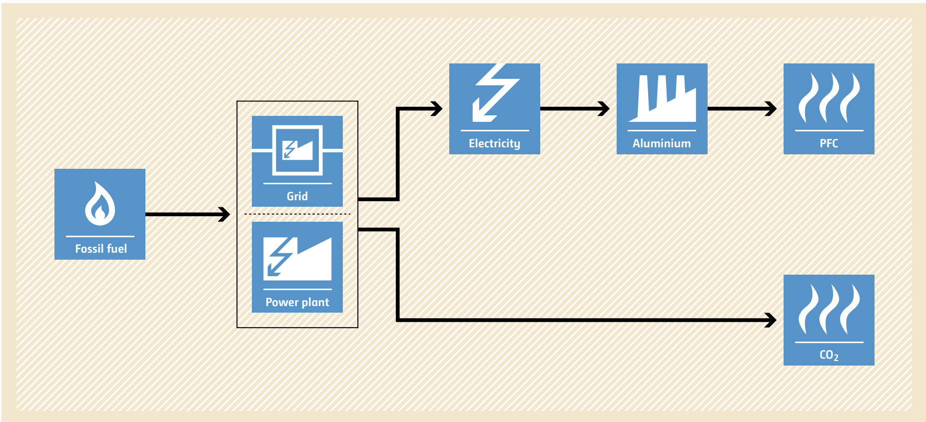
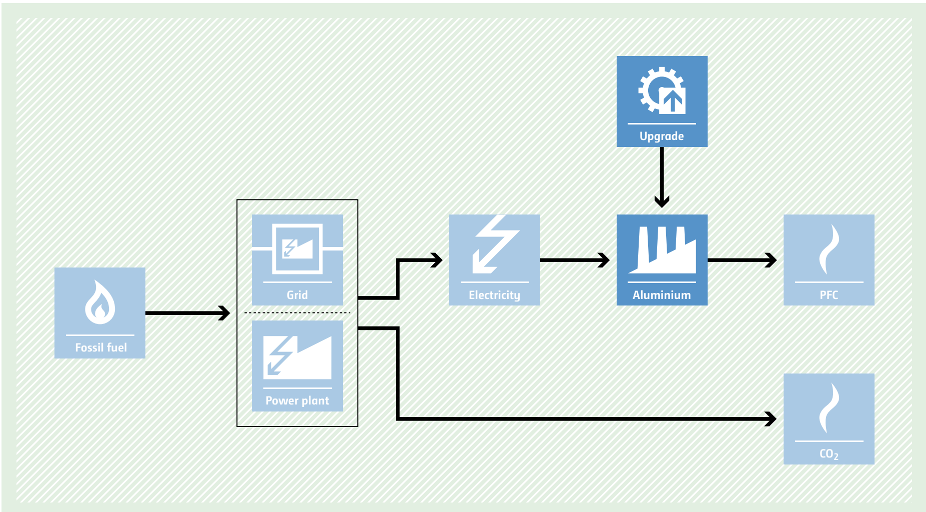
BASELINE SCENARIO
Fossil fuel is used in a power plant that only supplies grid electricity; fossil fuel is used in individual boilers that supply heat to users.



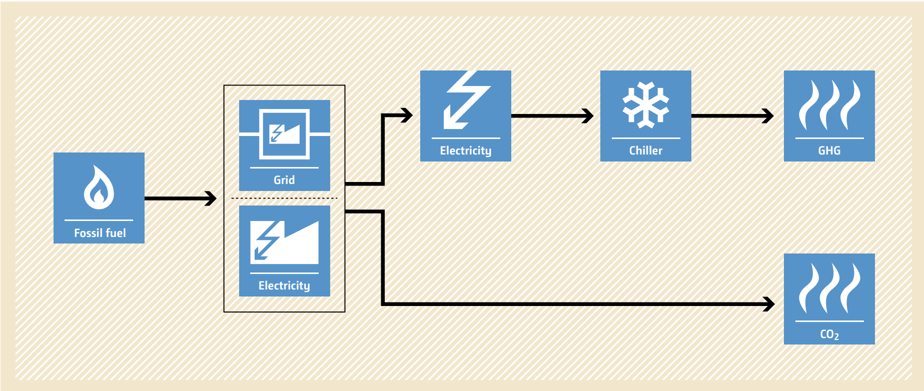
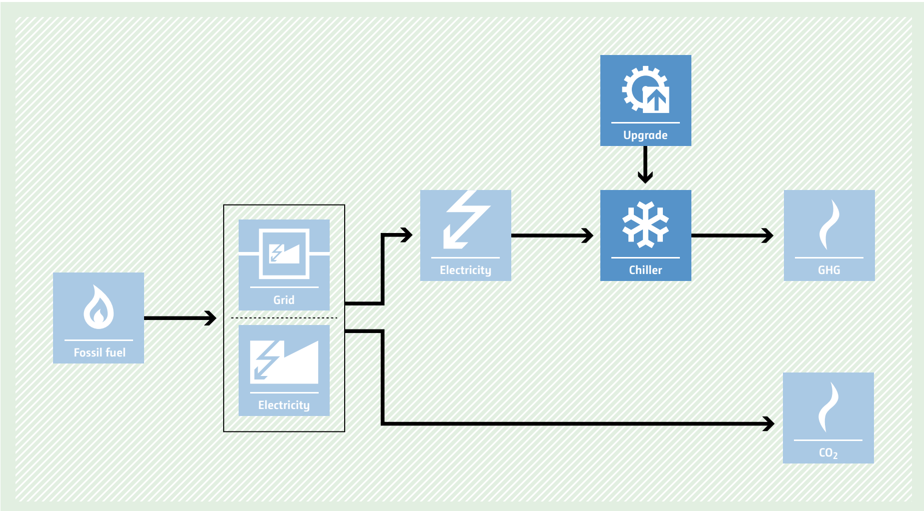
PROJECT SCENARIO
A new district heating network is supplied by heat provided by a power plant and/or centralized boilers.



AM0059 Reduction in GHGs emission from primary aluminium smelters

Typical project(s)	Technology improvement at a primary aluminium smelter (PFPB, CWPB, SWPB, VSS or HSS) using computerized controls or improved operating practices, to reduce PFC emissions and/or to improve electrical energy efficiency.
Type of GHG emissions mitigation action	• Energy efficiency; • GHG emission avoidance. Avoidance of PFC emissions and electricity savings leading to less GHG emissions.
Important conditions under which the methodology is applicable	• The project is limited to changes of the smelting technology; • At least three years of historical data for estimating baseline emissions are available.
Important parameters	At validation: • If less than 95% of the anode effects are manually terminated, number and duration of anode effect or anode effect over-voltage, and current efficiency; • PFC emissions; • If applicable: grid emission factor (can also be monitored ex post).
	Monitored: • Quantity of aluminium produced in the project; • Quantity of electricity imported from captive plants and the grid; • PFC emissions; • If applicable: electricity factor for captive generated electricity.
BASELINE SCENARIO Electricity is consumed to produce aluminium and the production process leads to PFC emissions.	
PROJECT SCENARIO Less electricity is consumed to produce aluminium and the production process leads to less PFC emissions.	

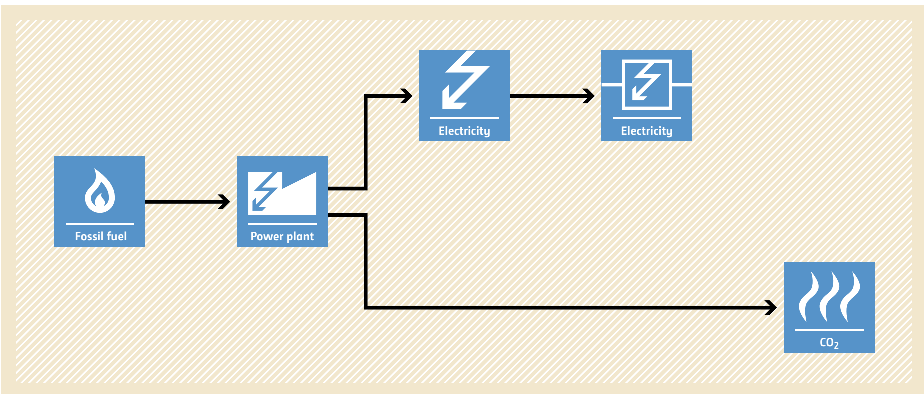
AM0060 Power saving through replacement by energy efficient chillers

Typical project(s)	The one-to-one replacement of existing electricity-driven chillers by more-energy-efficient new chillers with similar rated output capacity to the existing ones.
Type of GHG emissions mitigation action	• Energy efficiency. Electricity savings through energy efficiency improvement.
Important conditions under which the methodology is applicable	• For each chiller replacement, the rated output capacity of the new chiller is not significantly larger or smaller (maximum ±5%) than the existing chiller; • The chiller is used to generate chilled water or a water/antifreeze mixture (e.g. water with addition of glycol) for process cooling or air conditioning; • The existing and new chillers are driven by electrical energy; • The existing chillers are functioning and fully operational and can continue to operate for several years if regular maintenance is undertaken; • The existing chillers are destroyed, and the refrigerant contained in the existing chiller will be recovered and destroyed, or stored in suitable containers.
Important parameters	At validation: • Power consumption function of the existing chillers; • Grid emission factor (can also be monitored ex post). Monitored: • Average chiller output of the new chillers; • Average inlet temperature of condensing water of the new chillers; • Average inlet and outlet temperature of chilled water supplied by the new chillers.
BASELINE SCENARIO Continued operation of the existing, less-energy-efficient chillers.	
PROJECT SCENARIO Operation of energy-efficient chillers, resulting in lower CO_2 emissions.	

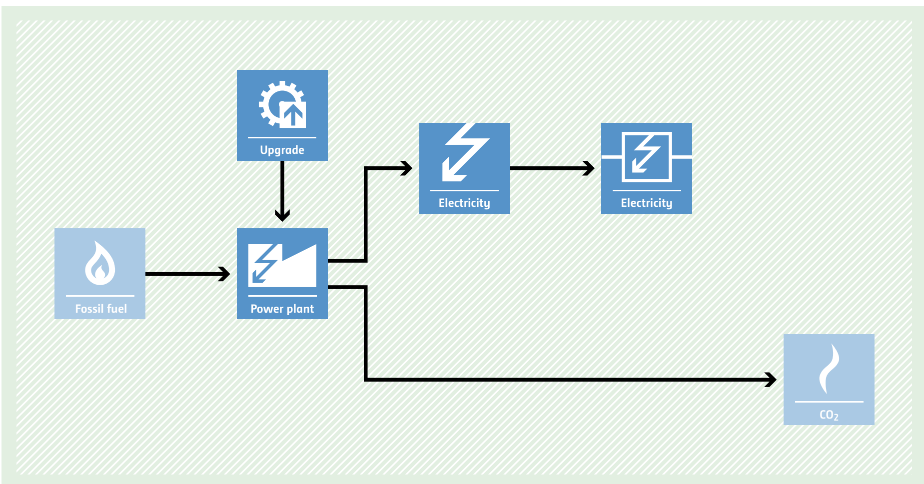
AM0061 Methodology for rehabilitation and/or energy efficiency improvement in existing power plants

Typical project(s)	Implementation of measures to increase the energy efficiency of existing power plants that supply electricity to the grid. Examples of these measures are: the replacement of worn blades of a turbine by new ones; the implementation of new control systems; replacement of deficient heat exchangers in a boiler by new ones, or the installation of additional heat recovery units in an existing boiler.
Type of GHG emissions mitigation action	• Energy efficiency. Technology switch resulting in an increase in energy efficiency in an existing power plant.
Important conditions under which the methodology is applicable	• The project does not involve the installation and commissioning of new electricity generation units; • The designed power generation capacity of each unit may increase as a result of the project but this increase is limited to 15% of the former design power generation capacity of the whole plant; • The existing power plant has an operation history of at least 10 years and data on fuel consumption and electricity generation for the most recent five years prior to the implementation of the project are available; • Only measures that require capital investment can be included. Consequently, regular maintenance and housekeeping measures cannot be included in the project.
Important parameters	Monitored: • Energy efficiency of the project power plant; • Quantity of fuel used in the project power plant; • Calorific value and emission factor of the fuel used in the project power plant; • Electricity supplied to the grid by the project power plant.

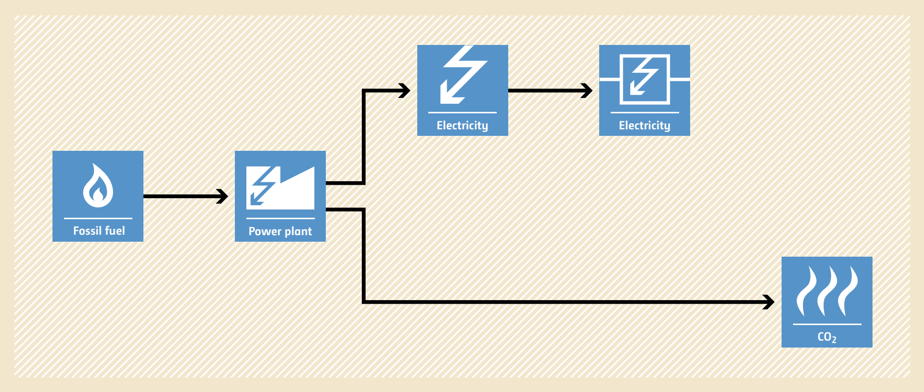
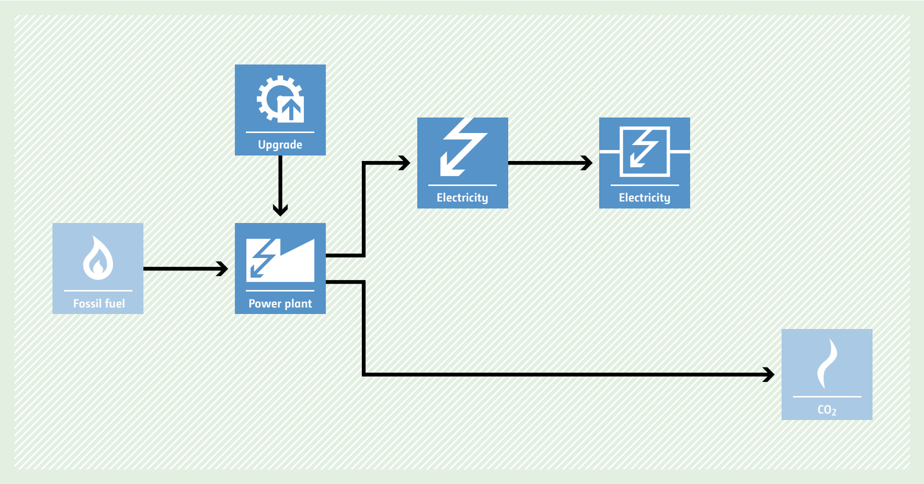
BASELINE SCENARIO
Continuation of the operation of the power plant, using all power generation equipment already used prior to the implementation of the project, and undertaking business as usual maintenance.



PROJECT SCENARIO
Implementation of energy efficiency improvement measures or the rehabilitation of an existing fossil-fuel-fired power plant. As a result, less fossil fuel is consumed to generate electricity.



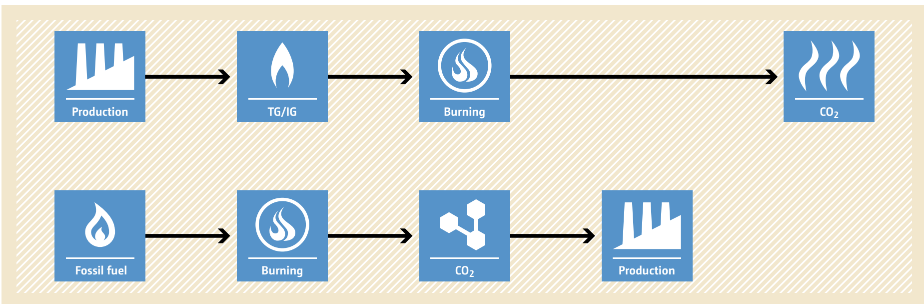
AM0062 Energy efficiency improvements of a power plant through retrofitting turbines

Typical project(s)	Implementation of measures to increase the energy efficiency of steam or gas turbines in existing power plants that supply electricity to the grid. Examples of these measures are: replacement of worn blades of a turbine by new ones; implementation of refined sealing to reduce leakage; replacement of complete inner blocks (steam path, rotor, inner casing, inlet nozzles).
Type of GHG emissions mitigation action	• Energy efficiency. Technology switch resulting in an increase in energy efficiency at an existing power plant.
Important conditions under which the methodology is applicable	• The project power plant utilizes fossil fuel to operate; • Measures related to recommended regular or preventive maintenance activities (including replacements and overhauling) as provided by the manufacturer of turbine, or superior practices of preventive maintenance (e.g. sophisticated cleaning systems resulting in improved efficiency) are not applicable; • The operational parameters that affect the energy efficiency of the turbine (e.g. steam pressure and temperature, quality of steam in the case of a saturated steam turbine; condenser vacuum, and combustion temperature for gas turbine) remain the same, subject to a variation of ±5%, in the baseline and the project scenario; • The methodology is applicable up to the end of the lifetime of the existing turbine, if shorter than the crediting period.
Important parameters	Monitored: • Quantity, calorific value and emission factor of fuel used in the project power plant; • Electricity supplied to the grid by the project power plant; • Enthalpy of the steam supplied to the turbine, in case of steam turbines.
BASELINE SCENARIO Continuation of the current practice, i.e. the turbine continues to be operated without retrofitting.	
PROJECT SCENARIO Retrofitting of steam turbines and gas turbines with components of improved design to increase the energy efficiency in an existing fossil fuel power plant. Thus, fossil fuel consumption is reduced.	

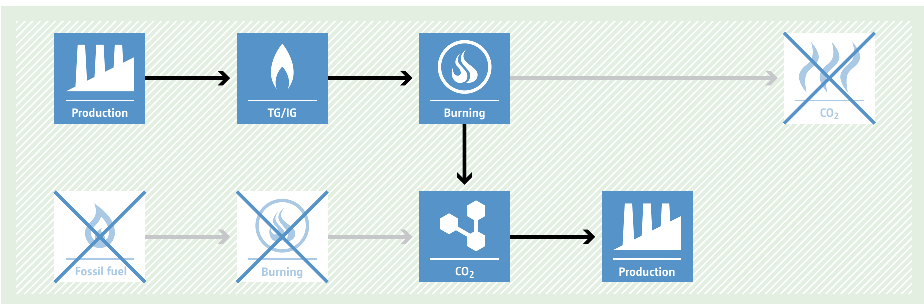
AM0063 Recovery of CO_2 from tail gas in industrial facilities to substitute the use of fossil fuels for production of CO_2

Typical project(s)	Recovery of CO_2 from the tail gas (TG) generated by an existing industrial facility to substitute the combustion of fossil fuels at an existing conventional CO_2 production facility or a new CO_2 production plant; and use of intermediate gas (IG) of a new production facility, for recovery of CO_2 in a new CO_2 production plant, established as part of the project activity.
Type of GHG emissions mitigation action	• Feedstock switch. Displacement of more-GHG-intensive feedstock with CO_2 recovered from the tail gas or intermediate gas.
Important conditions under which the methodology is applicable	• The tail gas from the existing industrial facility has been produced for as long as the industrial facility has been in operation; • There exist at least three years of historical records related to the operation of the industrial facility from which the tail gas is extracted; • Prior to the project implementation, the tail gas has either been used as fuel in the industrial facility without extraction of the CO_2 or has been flared; • The total amount of CO_2 produced at the project facility shall not be consumed at the project facility (e.g. for manufacturing of chemicals) and has to be sold within the host country; • The industrial facility does not utilize CO_2 in the intermediate gas for any other purpose in the production process.
Important parameters	At validation: • Quantity of CO_2 produced at the existing CO_2 production facility; • Electricity and fuel consumption at the existing CO_2 production facility.
	Monitored: • Average carbon content and volume of the tail gas and/or intermediate gas delivered to the project CO_2 production facility; • Quantity of CO_2 produced at the project CO_2 production facility; • Average carbon content and volume of the off gas combusted at the industrial facility; • Amount and end use of CO_2 purchased by customers and date of delivery; • Quantity or volume of main product actually produced in year; • Quantity or volume of main product actually sold and delivered to customers.

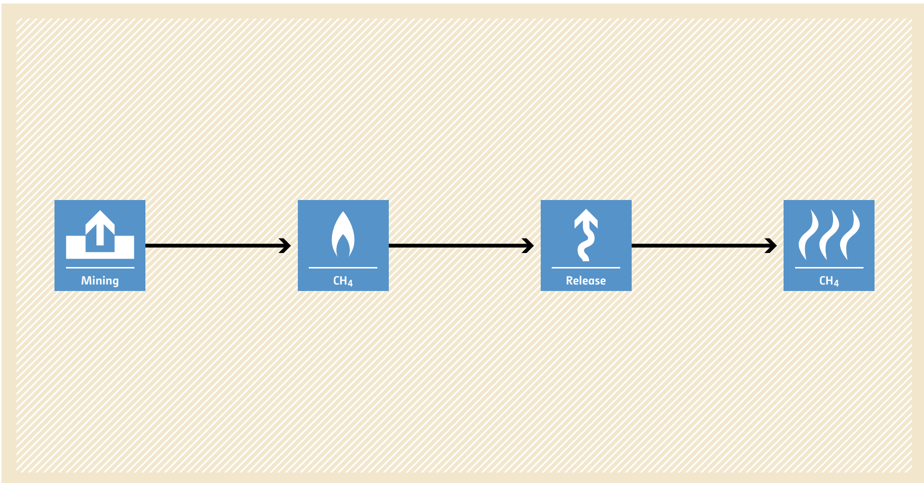
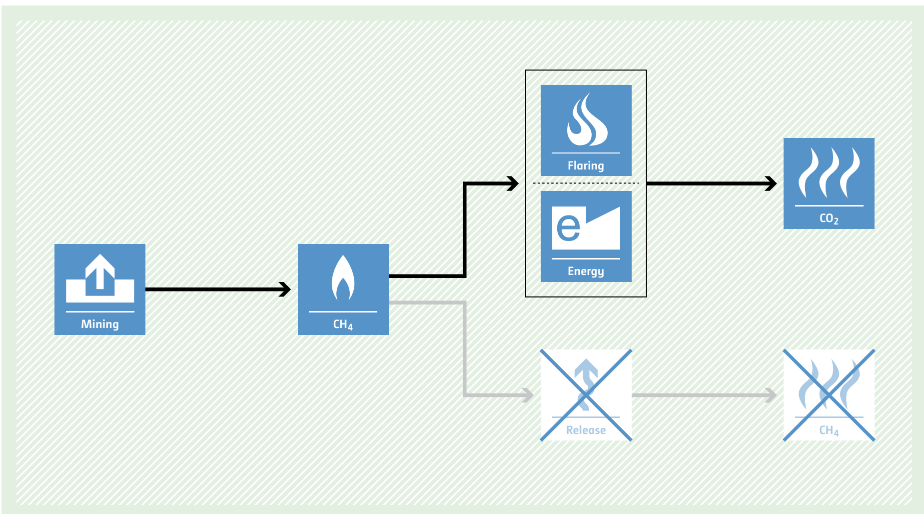
BASELINE SCENARIO
Combustion of fossil fuel at a conventional CO_2 production facility.



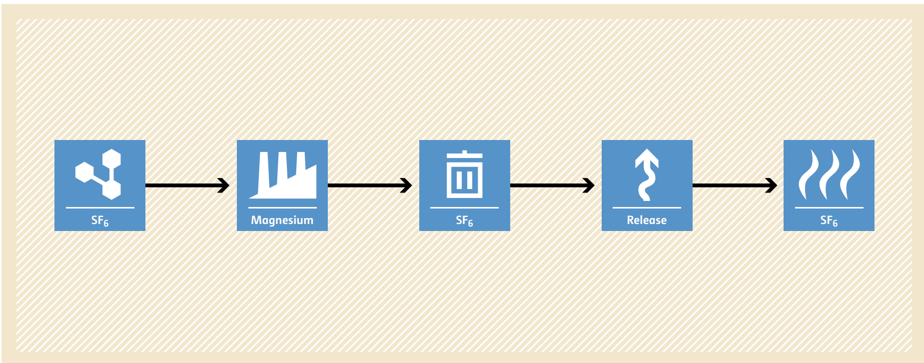
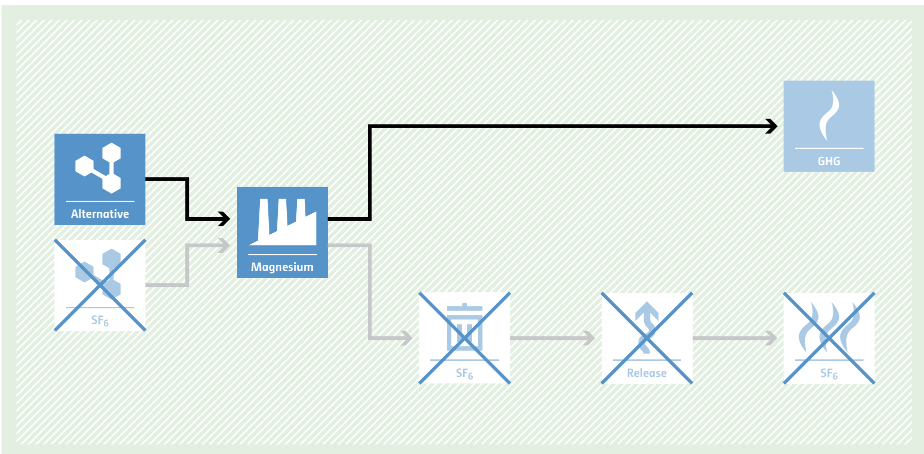
PROJECT SCENARIO
Recovery of CO_2 from the tail gas/intermediate gas generated by an existing industrial facility for use at the project CO_2 production facility.



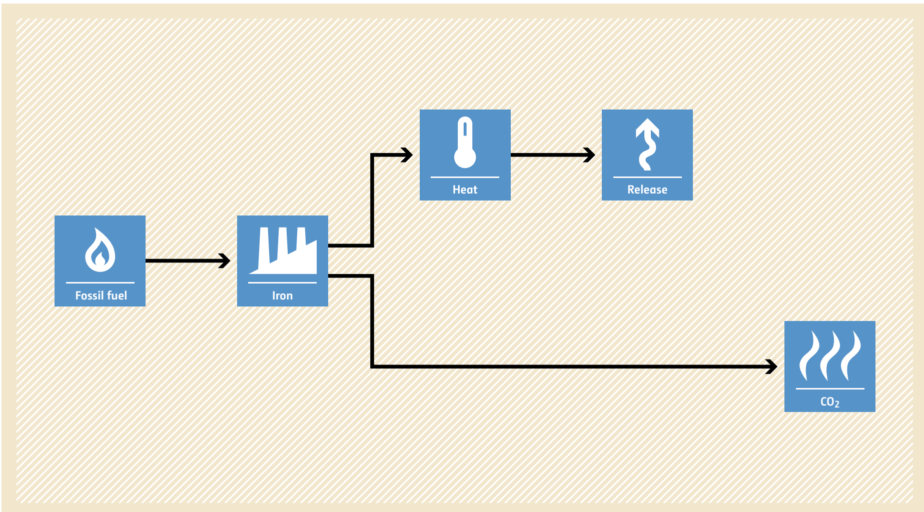
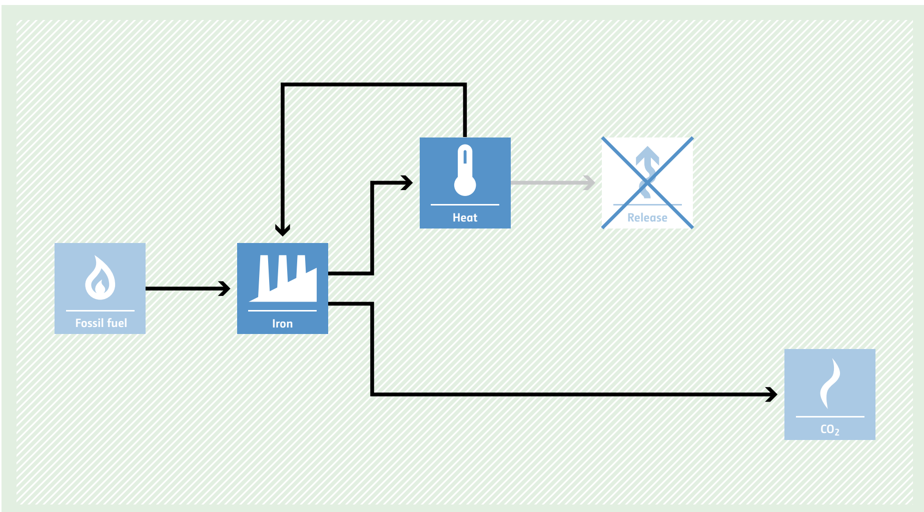
AM0064 Capture and utilisation or destruction of mine methane (excluding coal mines) or non mine methane

Typical project(s)	Capture and utilization or destruction of methane from an operating mine, excluding mines where coal is extracted; capture and utilization or destruction of methane released from geological structures, e.g. methane released directly from holes drilled in geological formations specifically for mineral exploration and prospecting activities.
Type of GHG emissions mitigation action	• GHG destruction. Avoidance of GHG emissions from underground, hard rock, precious and base metal mines.
Important conditions under which the methodology is applicable	• In case the project is capture and utilization or destruction of methane from an operating mine, the captured methane is utilized to produce electricity, motive power and/or thermal energy and/or destroyed through flaring. Prior to the start of the project all methane was released into the atmosphere or partially used for heat generation; • In case the project is capture and utilization or destruction of methane released from geological structures, 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; • Maximum outside diameter of the boreholes should not exceed 134 mm.
Important parameters	Monitored: • Concentration of methane in extracted gas; • Quantity of methane sent to power plant, boiler and gas grid for end users; • Quantity of electricity and heat generated by the project.
BASELINE SCENARIO Methane is emitted from operating mines and geological structures into the atmosphere.	
PROJECT SCENARIO Methane is captured and destroyed or utilized for energy generation.	

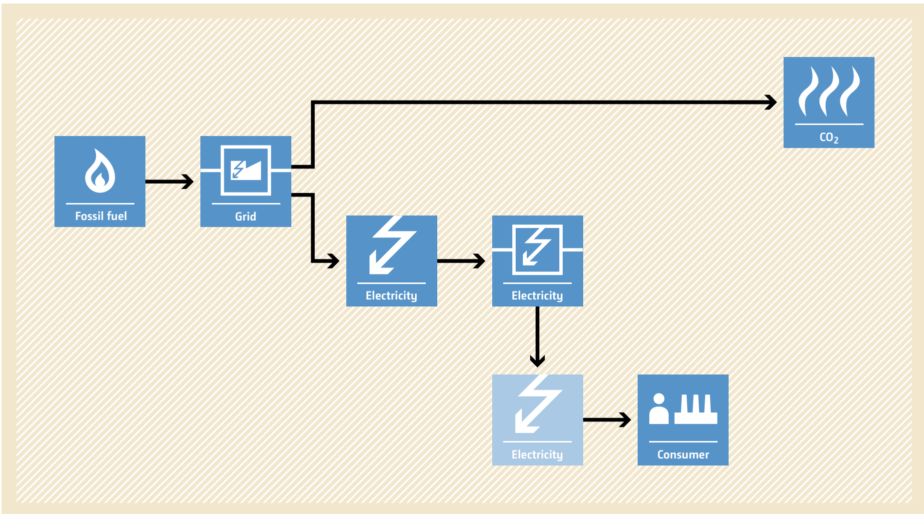
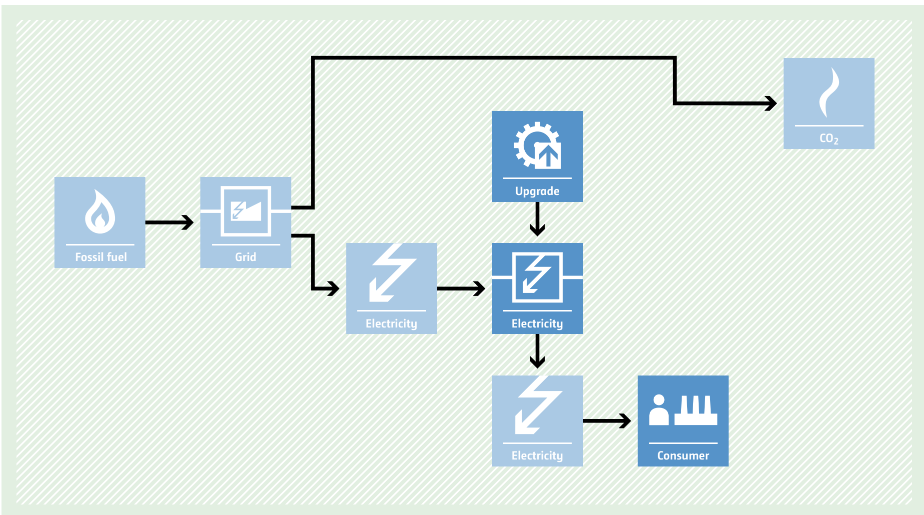
AM0065 Replacement of SF_6 with alternate cover gas in the magnesium industry

Typical project(s)	Full or partial replacement of the use of cover gas SF_6, an inert gas used to avoid oxidation of molten magnesium in casting and alloying processes, by alternate cover gas (HFC134a, Perfluoro-2-methyl-3-pentanone ($CF_3CF_2C(O)CF(CF_3)_2$) or SO_2 using lean SO_2 technology), in existing facilities of magnesium metal cast industry.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of SF_6 emissions by the use of alternate cover gas.
Important conditions under which the methodology is applicable	• Project of SF_6 replacement can be implemented in all segments of the magnesium metal cast industry, as defined in the methodology; • The magnesium metal cast facility has an operating history of at least three years prior to the project implementation; • If SO_2 is used as cover gas in the project, only “dilute SO_2” technology is used that meets the specifications provided in methodology; • Local regulations in the host country regarding SO_2 emissions in the exhausting system should be complied with. If such regulations are not in place, the values of SO_2 emissions given in the methodology should be complied with.
Important parameters	At validation: • Amount of magnesium manufactured in the most recent three years; • SF_6 consumption in the magnesium cast facility in the most recent three years prior to the project implementation.
	Monitored: • Amount of magnesium manufactured in the project; • Consumption of alternate cover gas in the project; • Consumption of SF_6 or CO_2 in the project, if any.
BASELINE SCENARIO SF_6 continues to be used as cover gas in magnesium metal cast industry, leading to its emission from the processes.	
PROJECT SCENARIO SF_6 is replaced with alternate cover gas, resulting in avoidance of SF_6 emissions.	

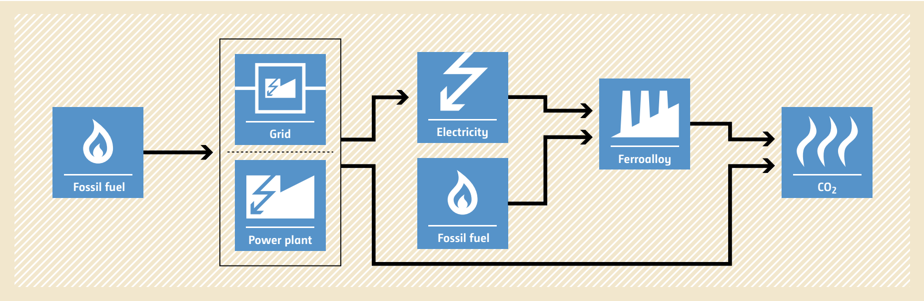
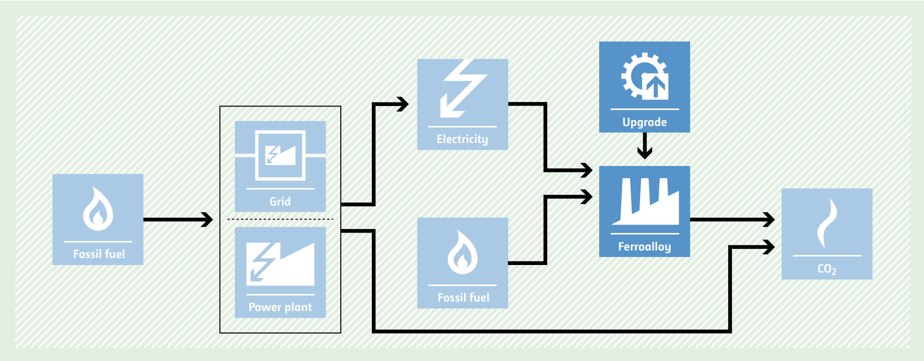
AM0066 GHG emission reductions through waste heat utilisation for pre-heating of raw materials in sponge iron manufacturing process

Typical project(s)	Waste heat released from furnace(s)/kiln(s) is utilized to preheat raw material(s) in an existing or Greenfield sponge iron manufacturing facility.
Type of GHG emissions mitigation action	• Energy efficiency. Energy efficiency improvement leading to reduced specific heat consumption.
Important conditions under which the methodology is applicable	• The project is implemented either for an individual furnace/kiln or a group of furnaces/kilns producing the same type of output; • Waste heat to be utilized is generated in the project furnace(s)/kiln(s); • Only solid matter without scrap/product rejects is used as raw material; • In the project, the raw material is fed directly from the preheater to the furnace/kiln. However, the possibility to bypass the preheater equipment remains.
Important parameters	At validation: • Historical production and fossil fuel consumption.
	Monitored: • Quantity, chemical composition and physical state (including the percentage of the metallization) of raw materials and final product; • Type and quantities of fossil fuel; • Quantity of thermal and electrical (from the grid and from the captive power plant, respectively) energy consumed.
BASELINE SCENARIO Fossil fuel is fired for the process. The resulting heat from furnace(s)/kiln(s) is not utilized and instead vented.	
PROJECT SCENARIO Less fossil fuel is fired in the process. The heat from furnace(s)/kiln(s) is used to preheat raw material(s) before feeding it into the furnace(s)/kiln(s).	

AM0067 Methodology for installation of energy efficient transformers in a power distribution grid

Typical project(s)	Replacement of existing less-efficient transformers with more-efficient transformers in an existing distribution grid or the installation of new high-efficient transformers in new areas that are currently not connected to a distribution grid.
Type of GHG emissions mitigation action	• Energy efficiency. Implementation of high-efficient transformers reduces losses in the grid and thereby GHG emissions.
Important conditions under which the methodology is applicable	• Emission reductions due to reduction in no-load losses alone are claimed; • Load losses, at rated load, of the transformers implemented under the project are demonstrated to be equal or lower than the load losses in transformers that would have been installed in absence of the project; • Project proponent implements a scrapping system to ensure that the replaced transformers are not used in other parts of the distribution grid or in another distribution grid.
Important parameters	At validation: • Average of no-load loss rate provided by the manufacturers of all type of transformers; • Grid emission factor (can also be monitored ex post).
	Monitored: • Cumulative number of transformers installed by the project as well as related load-loss rates and the black out rate.
BASELINE SCENARIO Less-efficient transformers are installed in existing distribution grids or will be installed in new distribution grids.	
PROJECT SCENARIO High-efficient transformers are installed in existing distribution grids or will be installed in new distribution grids resulting in lower electricity generation requirements and thereby a reduction of GHG emissions.	

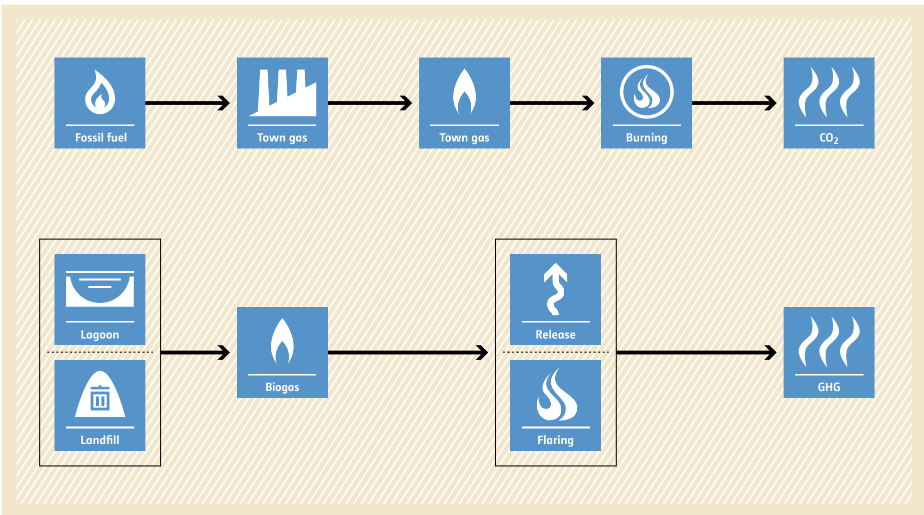
AM0068 Methodology for improved energy efficiency by modifying ferroalloy production facility

Typical project(s)	The project is implemented to improve energy efficiency of an existing ferroalloy production facility. Improvement includes modification of existing submerged electric arc smelting furnace(s) into open slag bath smelting furnace(s) or modification of existing co-current rotary kilns into counter-current rotary kilns. The existing facility is limited to the submerged electric arc smelting furnace(s) and rotary kilns producing only one type of ferroalloy, as defined by the composition of its ingredients.
Type of GHG emissions mitigation action	• Energy efficiency. Switch to more-efficient technology.
Important conditions under which the methodology is applicable	• The project includes at least the modification of "submerged bath electric furnaces" to "open slag bath melting furnaces" and can also include a modification of "co-current rotary kilns" to "counter-current rotary kilns"; • Only one type of ferroalloy is produced at the facility and its type and quality is not affected by the project and remains unchanged throughout the crediting period; • Data for at least the three years preceding the implementation of the project is available to estimate the baseline emissions.
Important parameters	At validation: • Quantity and quality of ferroalloys produced; • Consumption of electricity and fossil fuels in rotary kilns and smelting furnaces; • Grid emission factor (can also be monitored ex post).
	Monitored: • Quantity and quality of ferroalloy produced; • Consumption of electricity and fossil fuels in rotary kilns and smelting furnaces; • Non energy-related carbon streams (quantities and carbon content of reducing agents and its volatiles, ore, slag forming material, non product stream, etc.).
BASELINE SCENARIO Energy (fossil fuel and electricity) is used in a ferroalloy production facility, leading to CO_2 emissions.	
PROJECT SCENARIO Less energy (fossil fuel and electricity) is used in a ferroalloy production process, leading to lower CO_2 emissions.	

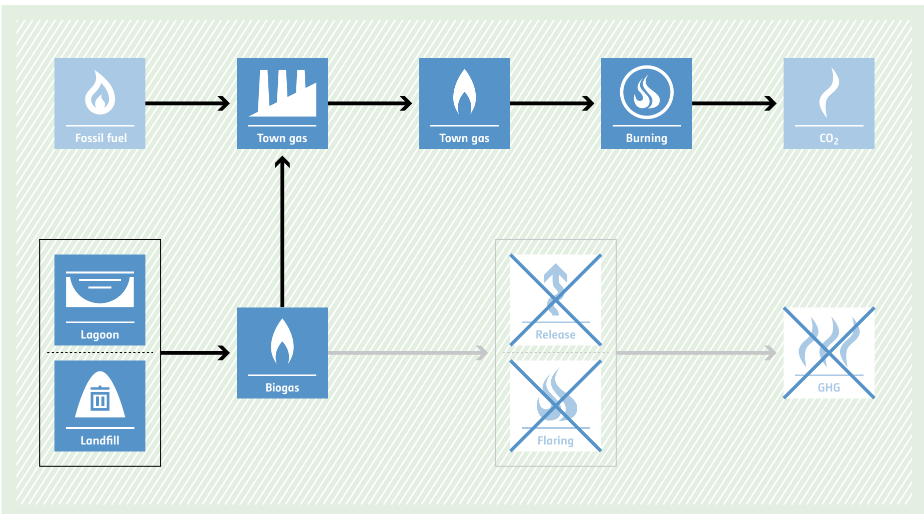
AM0069 Biogenic methane use as feedstock and fuel for town gas production

Typical project(s)	Capture of biogas at a wastewater treatment facility or a landfill and use of the biogas to fully or partially substitute natural gas or other fossil fuels as feedstock and fuel for the production of town gas.
Type of GHG emissions mitigation action	• GHG destruction; • Renewable energy; • Feedstock switch. CH_4 emissions are avoided and fossil fuel is replaced.
Important conditions under which the methodology is applicable	• There is no change in the quality of the produced town gas; • Town gas consumer and/ or distribution grid are within the host country boundaries; • Biogas is captured at an existing landfill site or wastewater treatment facility that has at least a three-year record of venting or flaring of biogas. Biogas would continue to be vented or flared in the absence of the project; • Project is implemented in an existing town gas factory that used only fossil fuels, no biogas, for at least three years prior to the start of the project.
Important parameters	Monitored: • Quantity and calorific value of town gas produced; • Quantity and calorific value of the biogas and fossil fuel used as feedstock.

BASELINE SCENARIO
Venting or flaring of biogas at the site where it is captured and use of fossil fuel as feedstock for town gas production.

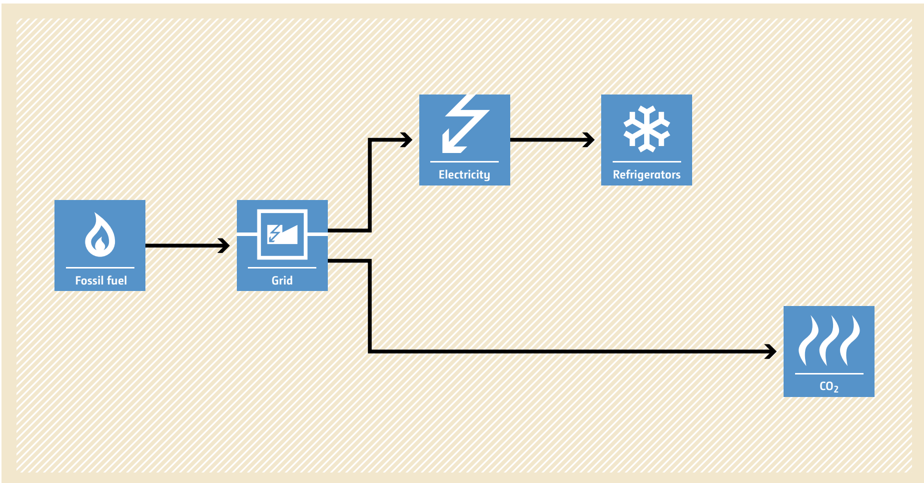
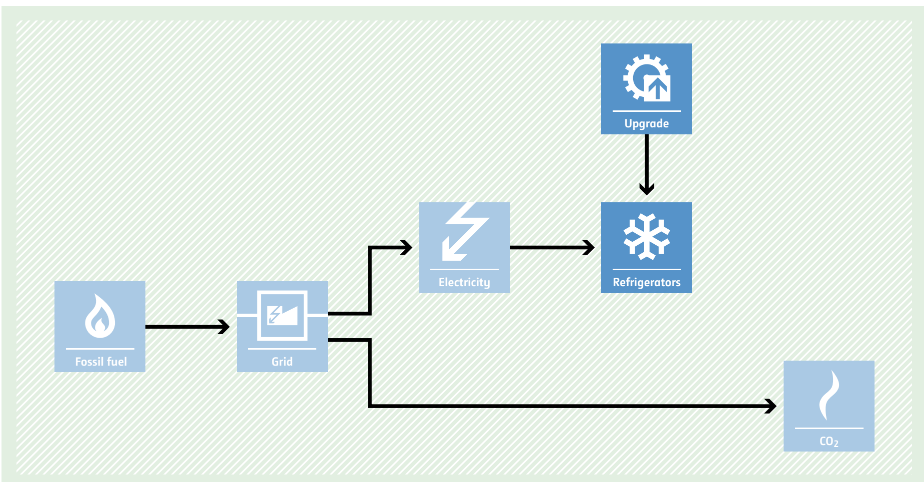


PROJECT SCENARIO
Capture of biogas from landfills and/or waste treatment plants and use of it to replace fossil fuel.



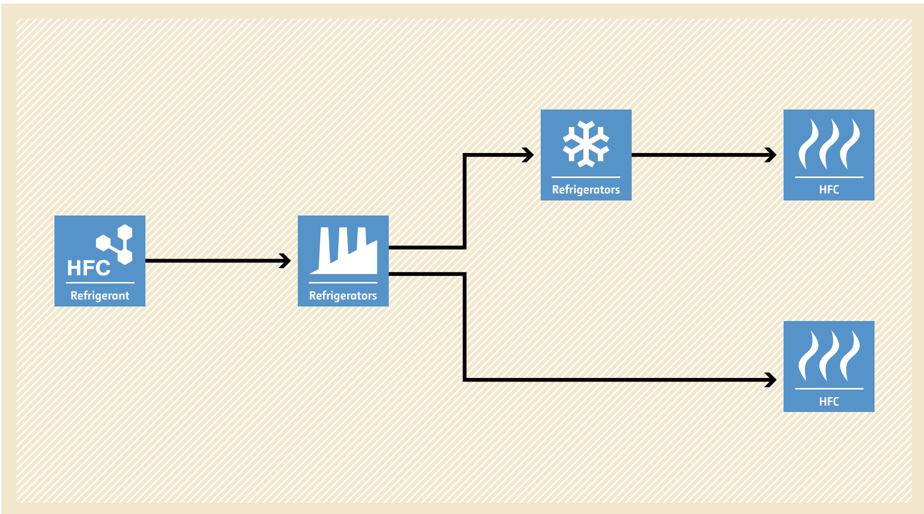
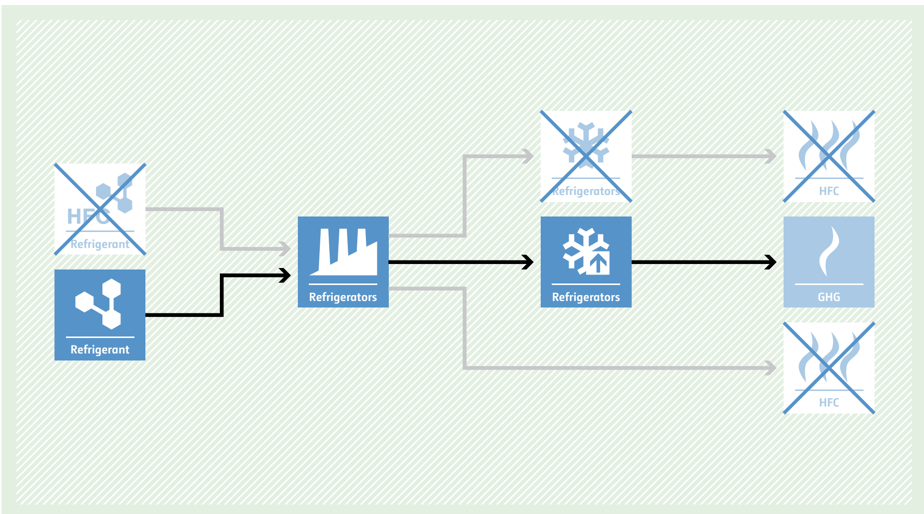
AM0070 Manufacturing of energy efficient domestic refrigerators

Women and children

Typical project(s)	Increase in the energy efficiency of manufactured refrigerators.
Type of GHG emissions mitigation action	• Energy efficiency. Increase in energy efficiency to reduce electricity consumed per unit of service provided.
Important conditions under which the methodology is applicable	• Refrigerators are used by households on a continuous basis; • No increase in the GWP of refrigerants and foam blowing agents used; • No change in the general type of refrigerators; • If a labelling scheme is used to determine the rated electricity consumption of refrigerators, then it must cover 30% of the market share and include the most efficient refrigerators in the host country.
Important parameters	At validation: • Autonomous improvement ratio; • Information on historical sales (quantity, storage volumes, rated electricity consumption); • Grid emission factor (can also be monitored ex post). Monitored: • Quantity of refrigerators sold; • Specifications (model, design type and volume class) of refrigerators sold; • Electricity consumption of refrigerators in the monitoring sample group.
BASELINE SCENARIO High electricity consumption by inefficient domestic refrigerators results in high CO_2 emissions from generation of electricity.	
PROJECT SCENARIO Lower electricity consumption by more-efficient domestic refrigerators results in less CO_2 emissions from generation of electricity.	

AM0071 Manufacturing and servicing of domestic and/or small commercial refrigeration appliances using a low GWP refrigerant

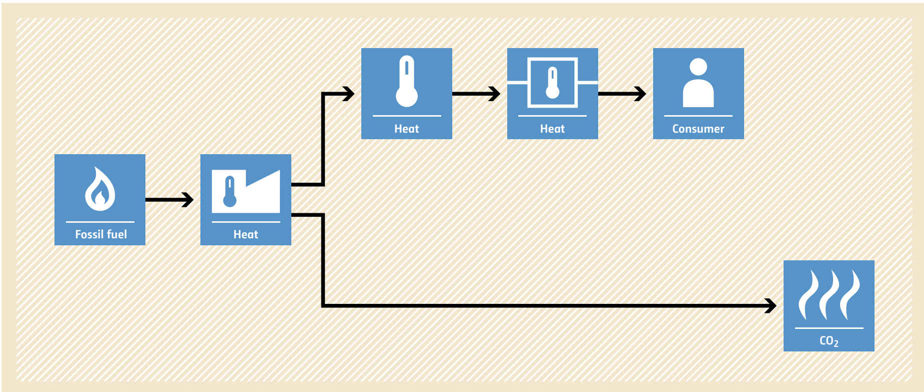
Women and children

Typical project(s)	Switching from a high GWP to low GWP refrigerant while manufacturing and refilling domestic and/or small commercial refrigeration appliances.
Type of GHG emissions mitigation action	• Feedstock switch. Avoidance of GHG emission by switching from high-GWP refrigerant to low-GWP refrigerant.
Important conditions under which the methodology is applicable	• The manufacturer has been producing refrigeration appliances using HFC-134a for at least three years and has not been using low-GWP refrigerants prior to the start of the project; • Only one low-GWP refrigerant is used in manufacturing and refilling of refrigeration appliances; • The project does not lead to a decrease in energy efficiency; • Imported refrigeration appliances shall not be included in the project; • Less than 50% of the domestic refrigerant production use low GWP refrigerants.
Important parameters	At validation: • Historical production of refrigerators sold in host country with initial charge. Monitored: • Initial refrigerant charge in the project and its distribution losses; • Quantities and models of appliances manufactured and exported; • Number of reject units of refrigeration appliance model; • Failure rate involving refrigerant recharge.
BASELINE SCENARIO Production of refrigeration appliances with high-GWP refrigerant.	
PROJECT SCENARIO Production of refrigeration appliances with low-GWP refrigerant.	

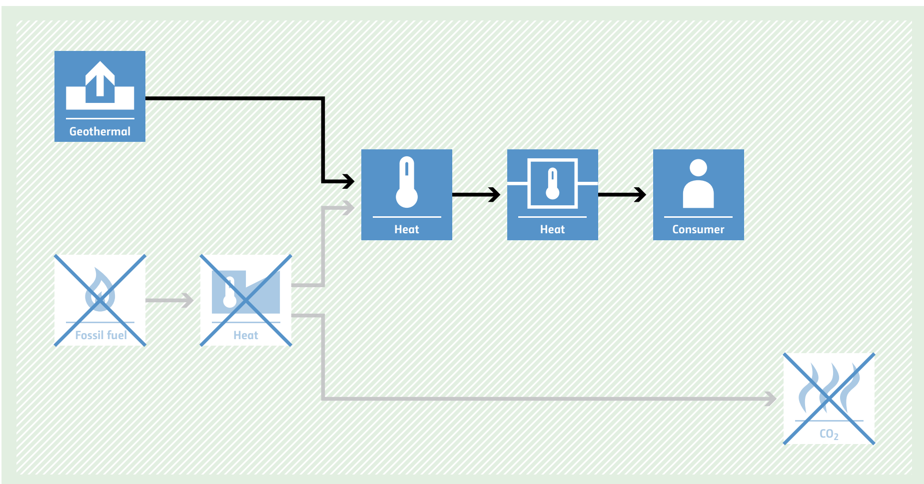
AM0072 Fossil fuel displacement by geothermal resources for space heating

Typical project(s)	Introduction of a centralized geothermal heat supply system for space heating in buildings. The geothermal heat supply system can be a new system in new buildings, the replacement of existing fossil fuel systems or the addition of extra geothermal wells to an existing system.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of more-GHG-intensive thermal energy generation.
Important conditions under which the methodology is applicable	• Use geothermal resources for centralized space-heating system in residential, commercial and/or industrial areas; • Use of GHG-emitting refrigerants is not permitted; • The heat drawn from the geothermal water replaces, partially or completely, the use of fossil fuel in the baseline situation whereas a maximum increase of the previous capacity of 10% is eligible (otherwise a new baseline scenario has to be developed).
Important parameters	At validation: • If applicable: three years of historical data for fossil fuel system, e.g. average thermal energy output or fuel consumption.
	Monitored: • Temperature difference between inlet and outlet temperatures as well as flow rate at the downstream of the geothermal heat exchanger and the net heating area of the buildings included in the project boundary; • Geothermal non-condensable gas (CO_2 and CH_4) produced after the implementation of the project.

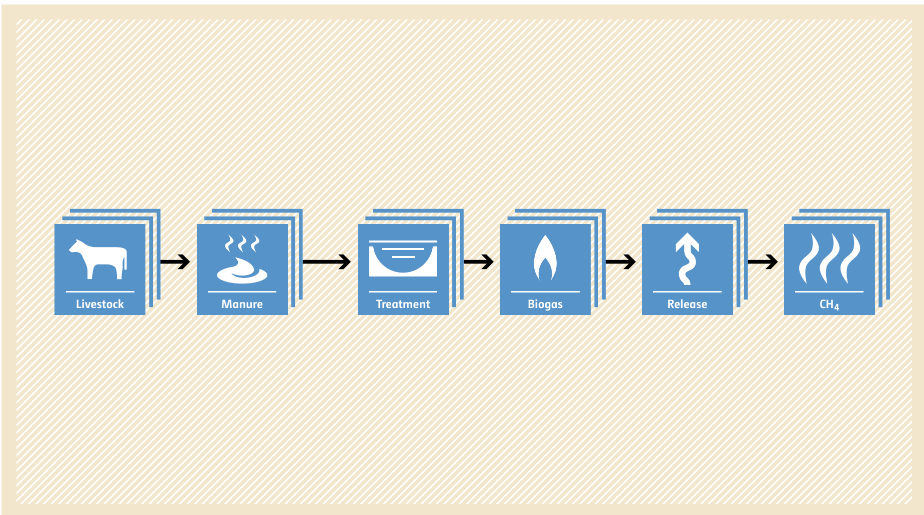
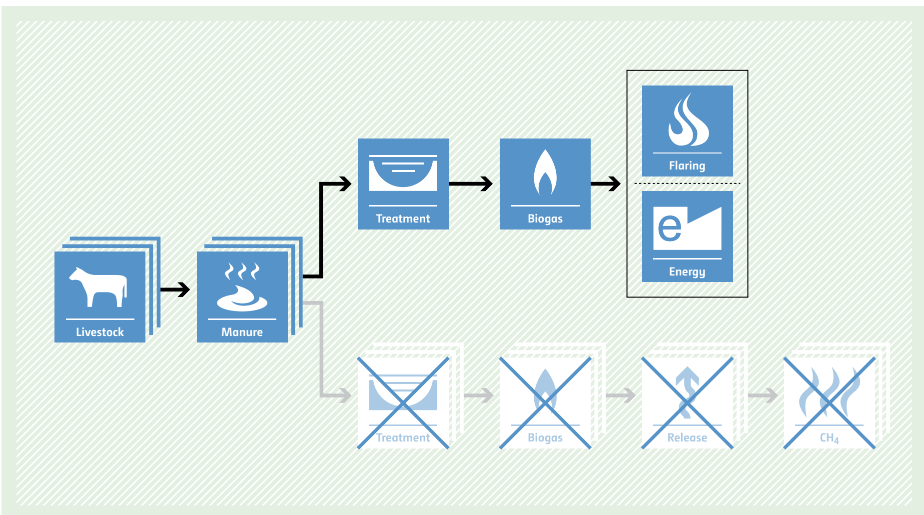
BASELINE SCENARIO
Fossil fuel is used as energy source for space heating



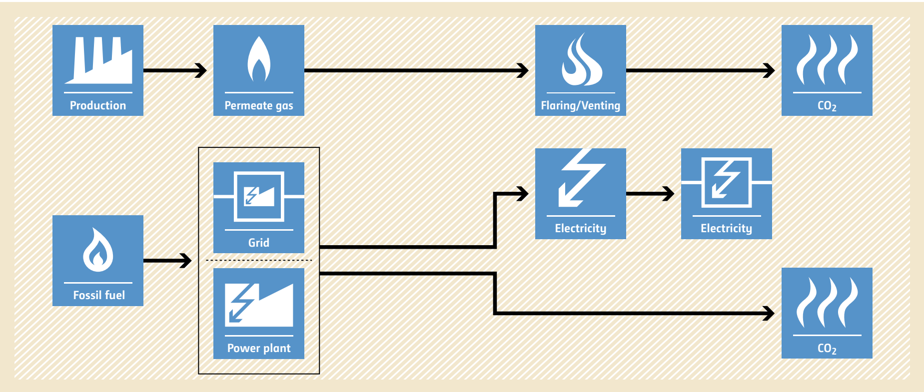
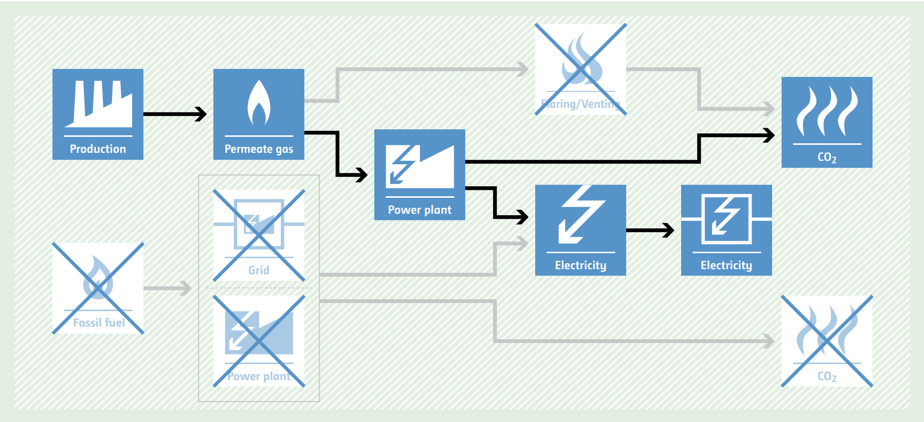
PROJECT SCENARIO
Installation of a new geothermal system in new building(s), replacement of existing fossil fuel heating systems or expansion of capacity of an existing geothermal system instead of using fossil fuel.



AM0073 GHG emission reductions through multi-site manure collection and treatment in a central plant

Typical project(s)	Manure is collected by tank trucks, canalized and/or pumped from multiple livestock farms and then treated in a single central treatment plant.
Type of GHG emissions mitigation action	• GHG destruction. Release of CH_4 emissions is avoided by combustion of methane.
Important conditions under which the methodology is applicable	• Livestock farm populations are managed under confined conditions; • Manure is not discharged into natural water resources (e.g. rivers or estuaries); • Animal residues are treated under anaerobic conditions in the baseline situation (conditions for this treatment process are specified); • If treated residue is used as fertilizer in the baseline, then this end use continues under the project; • Sludge produced during the project is stabilized through thermal drying or composting, prior to its final disposition/application.
Important parameters	Monitored: • Volume, volatile solids and total nitrogen of the effluent and residues being treated or produced at the central treatment plant; • Auxiliary energy used to run project treatment steps; • Electricity or heat generated by the use of biogas.
BASELINE SCENARIO Anaerobic manure treatment systems without methane recovery result in CH_4 emissions.	
PROJECT SCENARIO Manure from farms is collected and processes in a central treatment plant. Methane is captured and flared or used. In case of energetic use of biogas, displacement of more-GHG-intensive energy generation.	

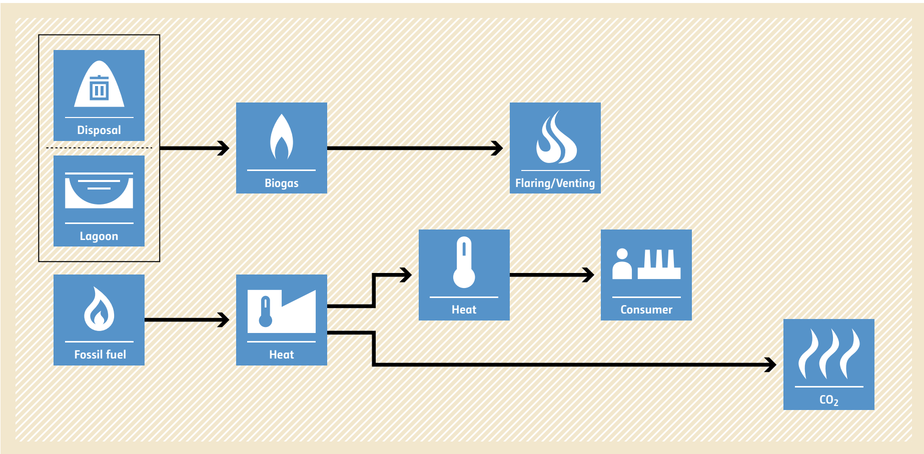
AM0074 New grid connected power plants using permeate gas previously flared and/or vented

Typical project(s)	Construction and operation of a power plant that supplies electricity to the grid and uses permeate gas, low heating value off-gas resultant from the processing of natural gas, as fuel to operate the power plant.
Type of GHG emissions mitigation action	• Low carbon electricity. Displacement of electricity that would be provided by more-carbon-intensive means.
Important conditions under which the methodology is applicable	• The total amount of permeate gas from the gas processing facility was flared and/or vented for at least three years prior to the start of the project; • The transportation of the permeate gas from the natural gas processing facility to the new power plant occurs through a dedicated pipeline that is established as part of the project and not used for the transportation of any other gases; • All power produced by the project power plant is exported to the grid.
Important parameters	At validation: • Fugitive CH_4 emission factor of all relevant equipment types used to transport the permeate gas; • Low heating value of permeate gas; • Annual average quantity of permeate gas flared and/or vented in three years prior to the start of the project activity.
	Monitored: • Electricity supplied to the grid by the project power plant; • Average mass fraction of methane in the permeate gas; • Operation time of equipment used to transport the permeate gas; • Baseline emission factor for project electricity system; • Quantity of permeate gas used for electricity generation.
BASELINE SCENARIO Permeate gas is flared and/or vented. Electricity is generated using processed natural gas or other energy sources than permeate gas, or electricity is provided by the grid.	
PROJECT SCENARIO Permeate gas, previously flared and/or vented at the existing natural gas processing facility, is used as fuel in a new grid-connected power plant.	

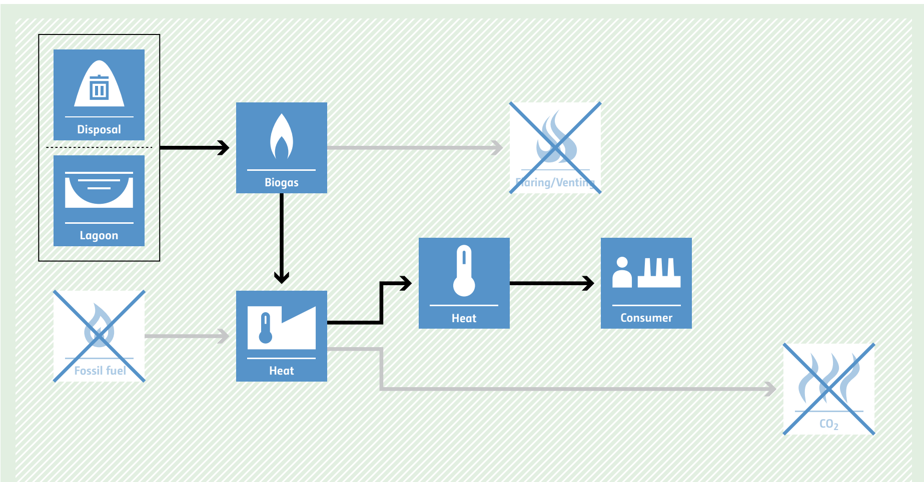
AM0075 Methodology for collection, processing and supply of biogas to end-users for production of heat

Typical project(s)	Processing and upgrading the biogas collected from biogas producing site(s) in a new biogas processing facility and supplying it to existing end-user(s) to produce heat in heat generation equipments for on-site use.
Type of GHG emissions mitigation action	• GHG destruction; • Renewable energy. Switching from more-carbon-intensive fuel to biogas that was previously flared or vented.
Important conditions under which the methodology is applicable	• The biogas is obtained from one or several existing biogas producing site(s) that have to be identified ex ante; • The biogas was either vented or flared prior to implementation of the project; • All heat generation equipments included in the project have to be identified ex ante, and it has to be demonstrated that these were using only fossil fuel prior to implementation of the project; • Any transportation of biogas or processed biogas occurs only through dedicated pipelines or by road vehicles.
Important parameters	Monitored: • Amount and net calorific value of processed biogas supplied to the boiler or heat generation equipment(s); • Amount of the steam or heat produced in the boiler or heat generation equipment(s); • Amount and net calorific value of fossil fuel used in the boiler or heat generation equipment.

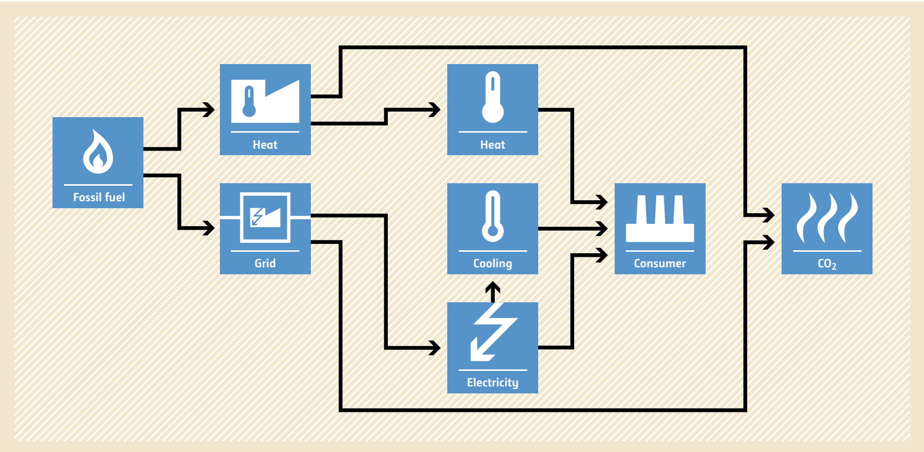
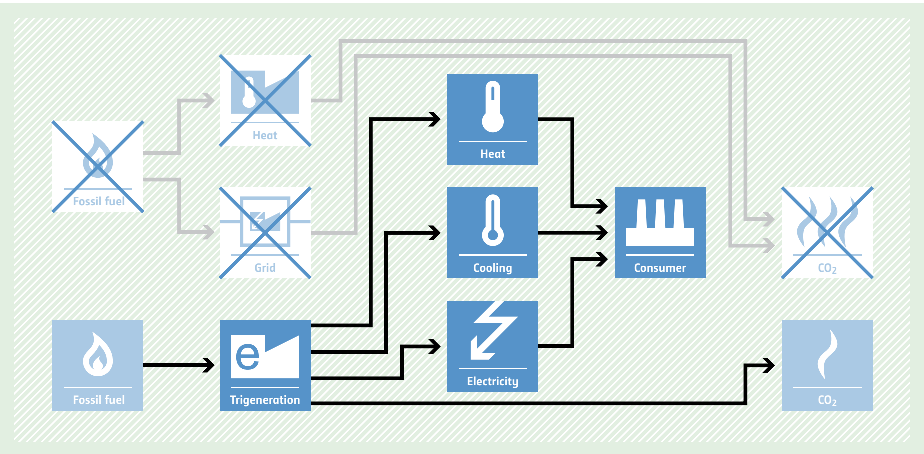
BASELINE SCENARIO
Use of fossil fuel in heat generation equipments and biogas is flared or vented.



PROJECT SCENARIO
Upgraded biogas burned in the heat generation equipments avoiding the use of fossil fuel.



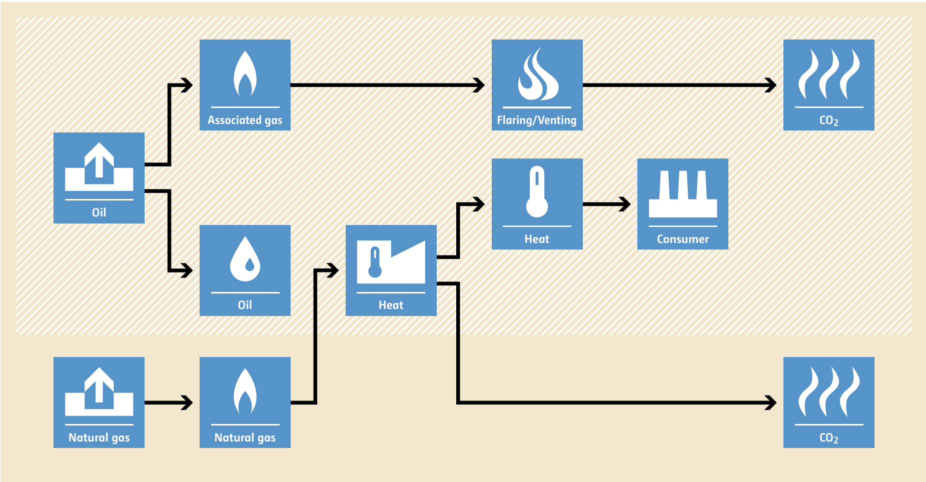
AM0076 Implementation of fossil fuel trigeneration systems in existing industrial facilities

Typical project(s)	Installation of an on-site fossil-fuel-based trigeneration plant to supply electricity, steam and chilled water to an industrial facility.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of electricity, heat and cooling that would be provided by more-carbon-intensive means.
Important conditions under which the methodology is applicable	• The baseline is the separate supply of electricity from the grid, heat supplied by an on-site fossil fuel fired boiler and chilled water from on-site electrical compression chillers; • There have been no cogeneration (CHP) or trigeneration (CCHP) systems operating in the industrial facility prior to the project; • No steam or chilled water is exported in the project; • Chillers in the project are heat driven (absorption chillers).
Important parameters	At validation: • Output efficiency of the baseline boiler; • Power consumption function of the baseline chiller.
	Monitored: • Electricity produced/purchased/sold by the trigeneration plant; • Quantity of fuels used in the trigeneration plant; • Quantity, temperature and pressure of steam produced by the trigeneration plant; • Quantity and temperature of chilled water produced by the trigeneration plant.
BASELINE SCENARIO Separate supply of electricity from the grid, chilled water using grid electricity and steam by a fossil-fuel-fired boiler.	
PROJECT SCENARIO A fossil fuel-fired trigeneration plant generates directly at the industrial facility electricity, steam and chilled water resulting in overall lower CO_2 emissions.	

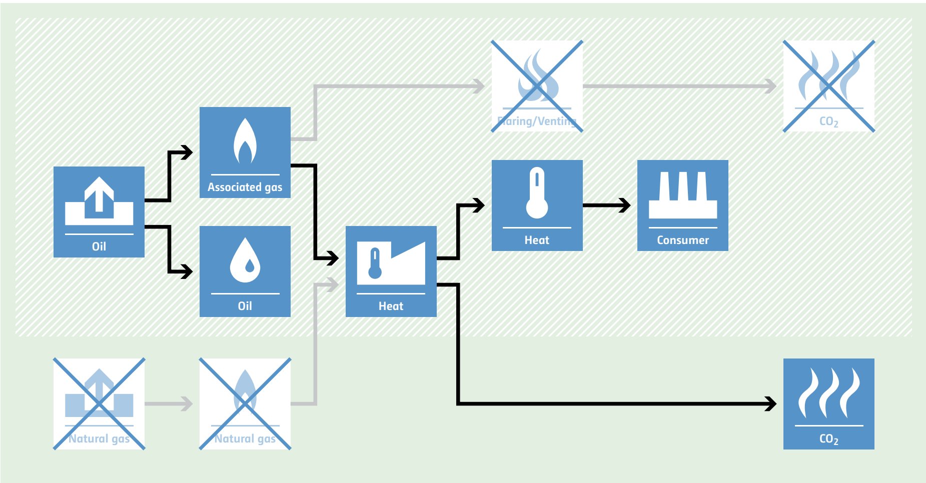
AM0077 Recovery of gas from oil wells that would otherwise be vented or flared and its delivery to specific end-users

Typical project(s)	Associated gas from oil wells that was previously flared or vented, is recovered and processed in a new gas processing plant along with, optionally, non-associated gas. The processed gas is delivered to clearly identifiable specific end-user(s) by means of CNG mobile units and/or delivered into an existing natural gas pipeline.
Type of GHG emissions mitigation action	• Fuel switch. Recovery of associated gas from oil wells that would otherwise be flared or vented for displacement of non-associated gas in a new gas processing plant.
Important conditions under which the methodology is applicable	• The recovered gas comes from oil wells that are in operation and producing oil at the time. Records of flaring or venting of the associated gas are available for at least three years; • The processed gas is consumed in the host country(ies) only; • If the project oil wells include gas-lift systems, the gas-lift gas has to be associated gas from the oil wells within the project boundary; • The natural gas can be used only in heat generating equipment.
Important parameters	Monitored: • Quantity and carbon content of gas measured at various points, i.e. recovered associated gas, non-associated gas from natural gas wells, gas or other fossil fuel consumed on site, gas delivered to end-user(s), gas delivered to natural gas pipeline; • If applicable: quantity and net calorific value of fuel consumed in vehicles for transportation of CNG.

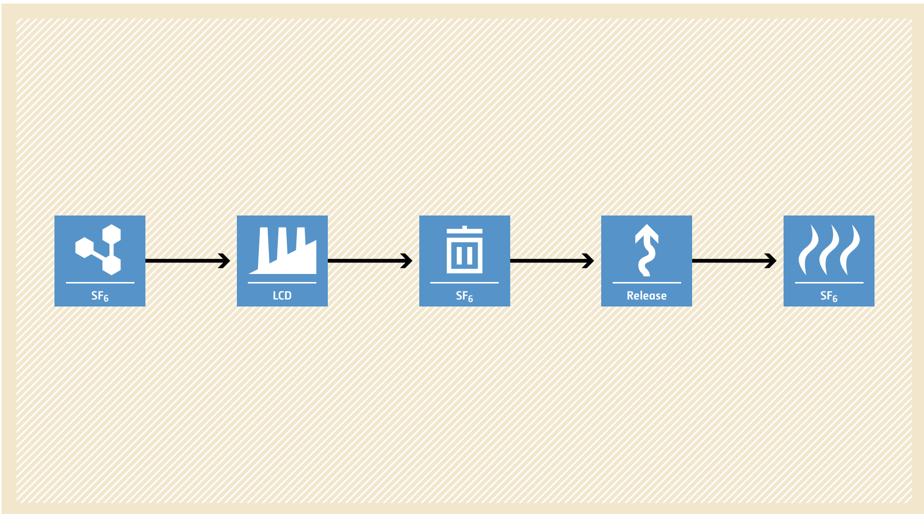
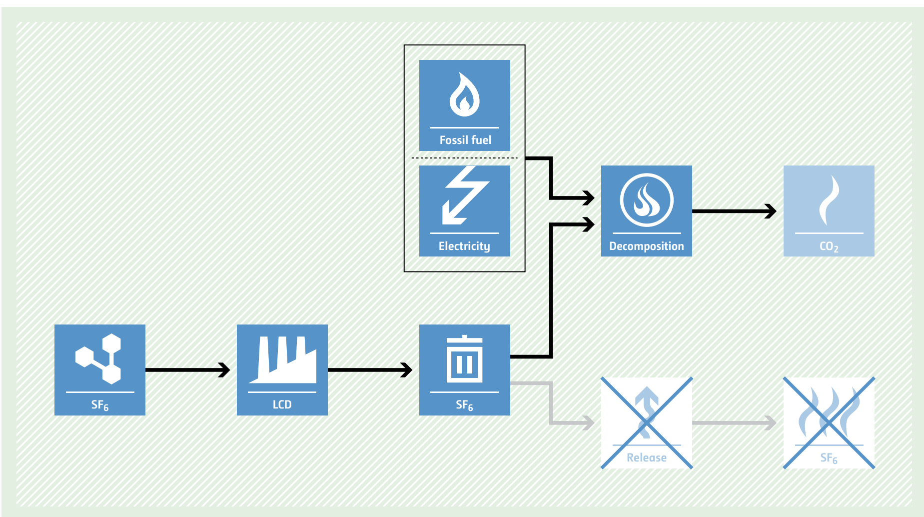
BASELINE SCENARIO
Associated gas from oil wells is flared or vented and end users meet their energy demand using other fossil fuel.



PROJECT SCENARIO
Associated gas from oil wells is recovered instead of flared or vented and displaces the use of other fossil fuel by the end-users.



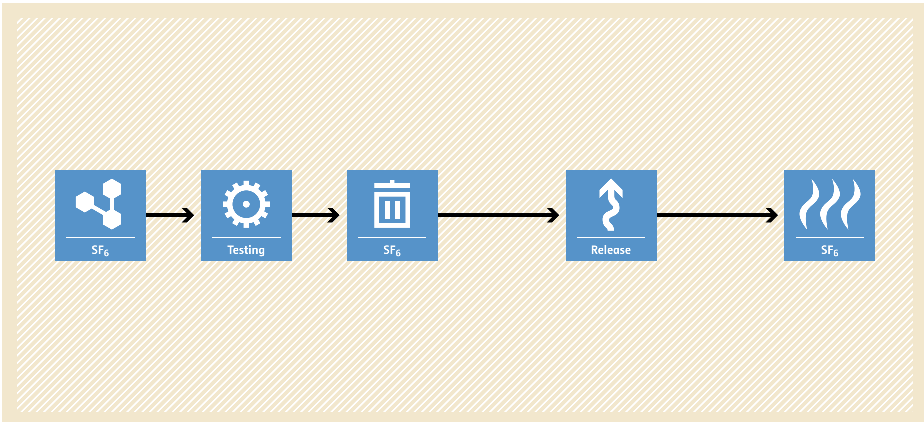
AM0078 Point of use abatement device to reduce SF_6 emissions in LCD manufacturing operations

Typical project(s)	Installation of a combustion or thermal abatement device to destroy SF_6 emissions from an LCD etching plant.
Type of GHG emissions mitigation action	• GHG destruction. Combustion or thermal destruction of SF_6 emissions.
Important conditions under which the methodology is applicable	• Production lines with at least three years of information about SF_6 purchase and consumption and production of LCD substrate by 31. january, 2009; • There is no local law or regulation that mandates decomposition, destruction, recycling or substitution of SF_6 or any component of exhaust gases containing SF_6; • The SF_6 destruction should occur at the same industrial site where SF_6 is used, and the SF_6 destroyed is not imported from other facilities.
Important parameters	At validation: • SF_6 consumption in the most recent three years; • Production of LCD substrate in the most recent three years.
	Monitored: • Mass of SF_6 gas entering and existing the abatement device; • SF_6 consumption in the project; • Production of LCD substrate; • Electricity and/or fuel consumption for the operation of the abatement device.
BASELINE SCENARIO SF_6 is released to the atmosphere after being used in the etching of LCD units.	
PROJECT SCENARIO SF_6 is recovered and destroyed in an abatement unit located after the etching unit.	

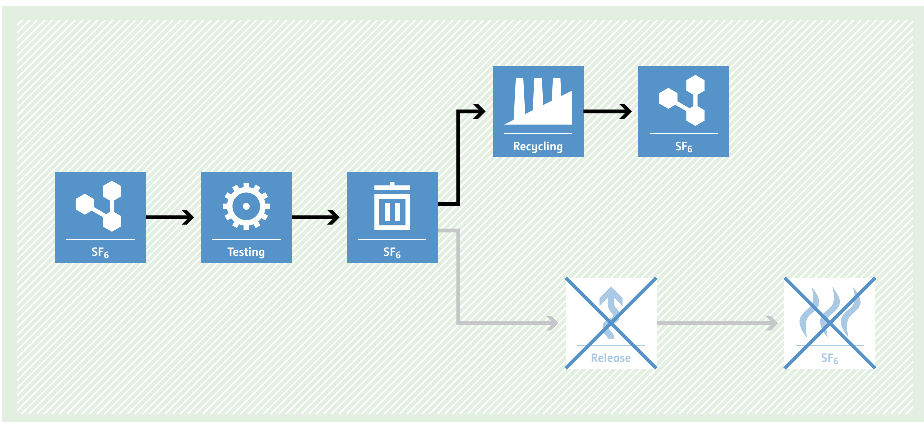
AM0079 Recovery of SF_6 from gas insulated electrical equipment in testing facilities

Typical project(s)	Installation of a recovery system for used SF_6 gas that would be vented after the testing of gas-insulated electrical equipment at a testing facility, and then reclamation of the recovered SF_6 gas at an SF_6 production facility.
Type of GHG emissions mitigation action	• GHG formation avoidance. Avoidance of SF_6 emissions by recovery and reclamation of the SF_6 emissions.
Important conditions under which the methodology is applicable	• The SF_6 recovery site uses SF_6 in the testing of gas-insulated electrical equipment, which are performed as part of a rating process, or during development or production of new electrical equipment; • The recovered gas is reclaimed by using it as a feedstock in the production of new SF_6 on the premises of an existing SF_6 production facility; • The testing considered for the project is electrical tests of medium and high voltage rated equipment (>1 kV); • Before the project implementation, SF_6 gas used in the equipment for the tests is vented after testing.
Important parameters	At validation: • Mass of SF_6 that is vented during testing for at least one year of historical data; • Concentration of SF_6 in a recovery cylinder for at least one year of historical data.
	Monitored: • Mass of SF_6 that is filled into each gas-insulated electrical equipment; • Mass of SF_6 recovered at the recovery site and used as feedstock at the reclamation site; • Concentration of SF_6 in a recovery cylinder.

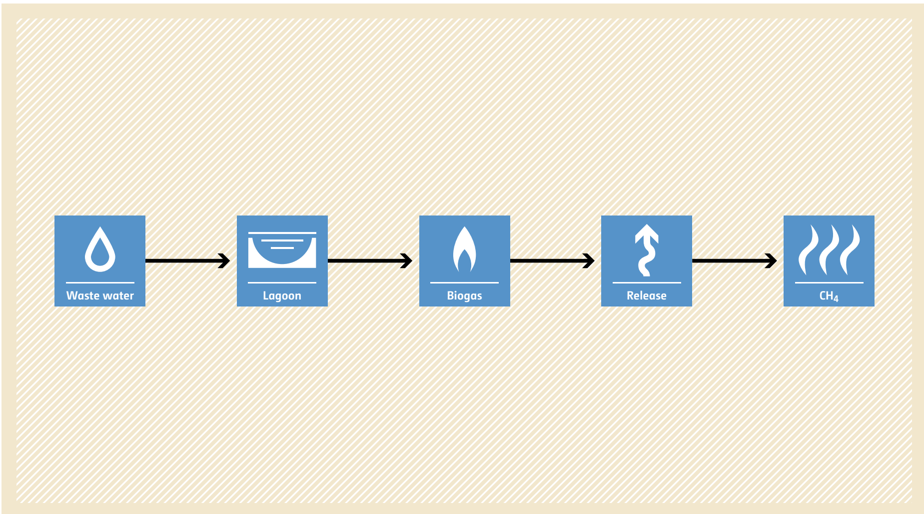
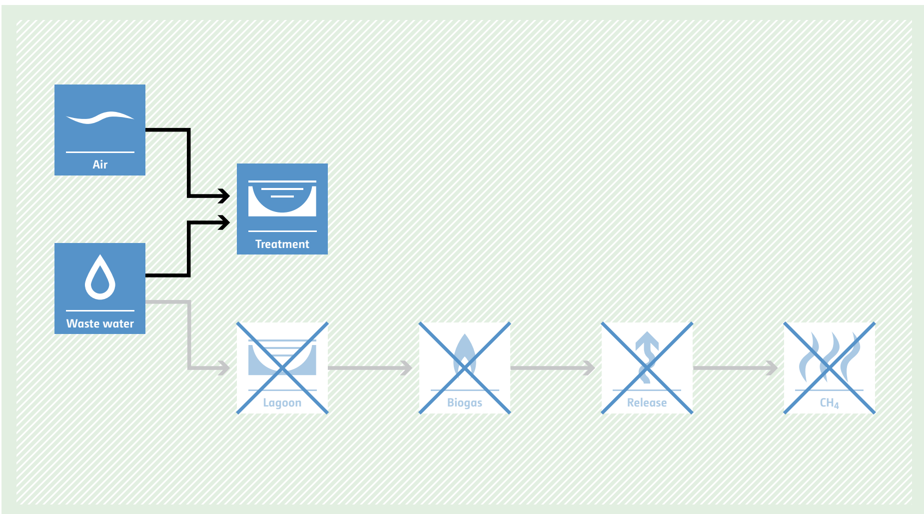
BASELINE SCENARIO
SF_6 is released to the atmosphere after the completion of the test of a gas-insulated electrical equipment.



PROJECT SCENARIO
SF_6 used during the test is recovered and transported to a reclamation facility where the recovered gas will be re-injected in the stream to produce new SF_6.



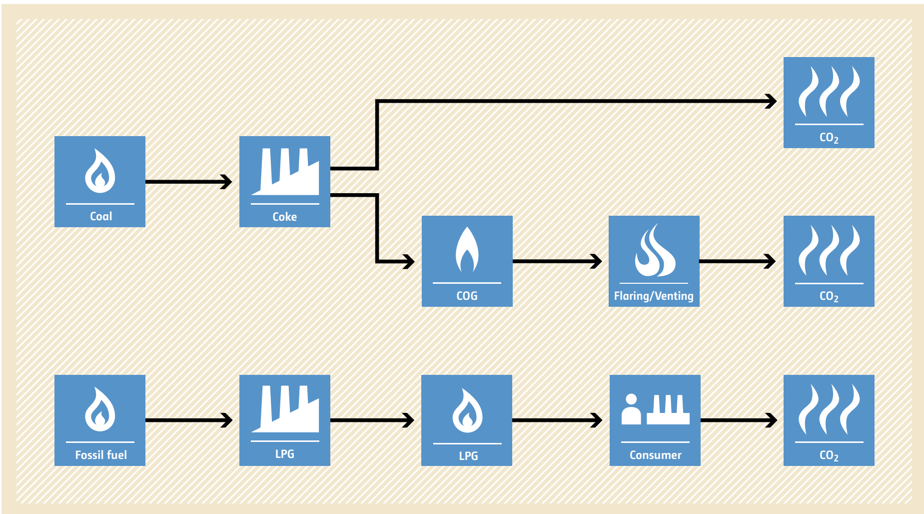
AM0080 Mitigation of greenhouse gases emissions with treatment of wastewater in aerobic wastewater treatment plants

Typical project(s)	Implementing a new aerobic wastewater treatment plant for the treatment of domestic and/or industrial wastewater, with sludge treated either in the same manner as the baseline, or in a new anaerobic digester with biogas capture. The biogas is either flared and/or used to generate electricity and/or heat.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of CH_4 emissions from wastewater treatment.
Important conditions under which the methodology is applicable	• The project either replaces an existing anaerobic open lagoon system, with or without conversion of the sludge treatment system, or is an alternative to a new to be built anaerobic open lagoon system; • Loading in the wastewater streams has to be high enough to ensure that algal oxygen production can be ruled out in the baseline; • The average depth of the existing or new to be built anaerobic open lagoons system is at least one metre and residence time of the organic matter is at least 30 days.
Important parameters	Monitored: • Quantity and average chemical oxygen demand of the wastewater that is treated; • Electricity and heat generated with biogas from the new anaerobic digester, if applicable; • Quantity of produced sludge; • Fossil fuel, electricity and transportation needed to operate the project.
BASELINE SCENARIO Wastewater would have been treated in an anaerobic open lagoon system without methane recovery and flaring. Sludge would have been dumped or left to decay, or dried under controlled and aerobic conditions and then disposed to a landfill with methane recovery or used in soil application.	
PROJECT SCENARIO Installation of a new aerobic wastewater treatment plant. Sludge is treated either the same way as the baseline or in a new anaerobic digester with the biogas capture.	

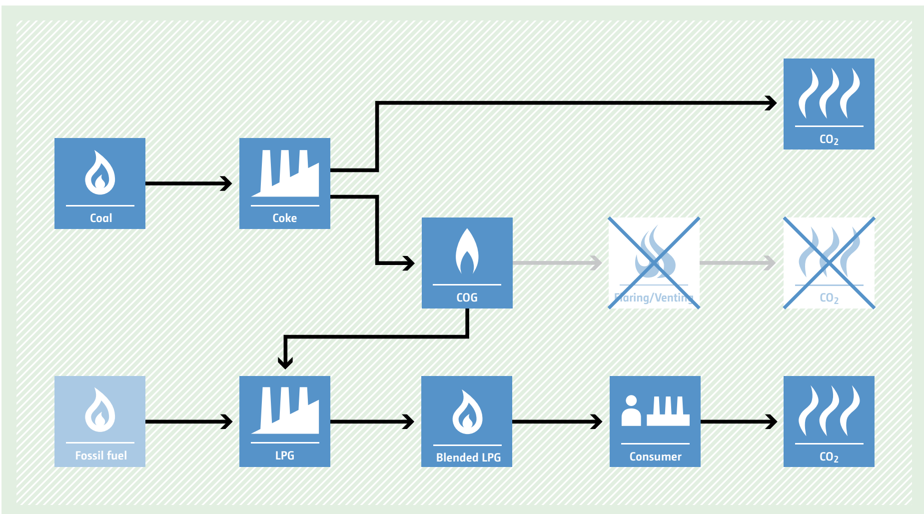
AM0081 Flare or vent reduction at coke plants through the conversion of their waste gas into dimethyl ether for use as a fuel

Typical project(s)	Construction of a new dimethyl ether (DME) facility to utilize a previously vented or flared stream of Coke Oven Gas (COG).
Type of GHG emissions mitigation action	• Fuel switch. Use of a previously vented source of carbon for the production of DME and use of DME for LPG blending.
Important conditions under which the methodology is applicable	• The project is a newly built DME plant which will supply DME to LPG processing facilities for blending purposes; • The history of the coke plant is the venting or flaring of COG for at least three years; • Bituminous coal remains the sole coking coal for the coke plant; • COG is the only carbon source used for DME production.
Important parameters	At validation: • Historical coal consumption and coke production in coke plants.
	Monitored: • The type and amount of coal consumed in each coke plant (for process and fuel); • The quantity of fossil fuels combusted as a result of the project (i.e. in the operation of the DME production facility or power plant); • Electricity consumption in DMR plant.

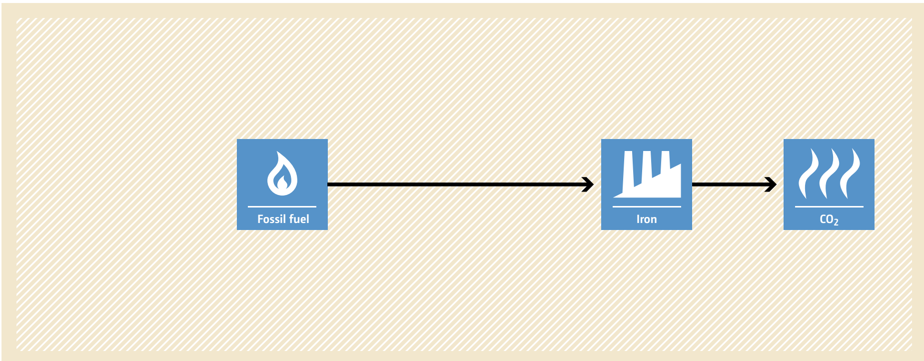
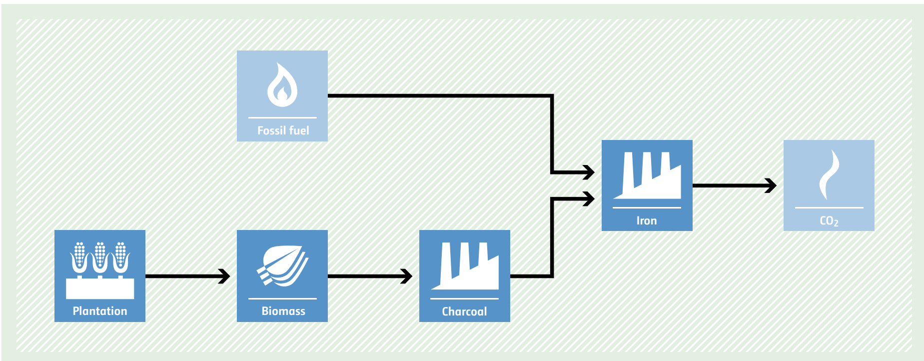
BASELINE SCENARIO
Venting or flaring of COG. Use of unblended LPG fuel resulting in high CO_2 emissions.



PROJECT SCENARIO
Use of all or part of the wasted COG to produce DME. This DME is supplied to LPG processing facilities for blending purpose. Thus, use of LPG is reduced.



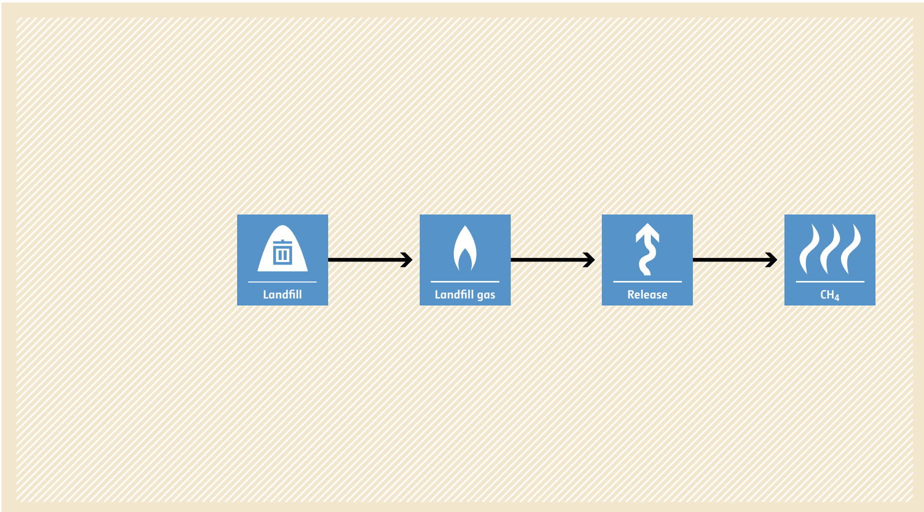
AM0082 Use of charcoal from planted renewable biomass in the iron ore reduction process through the establishment of a new iron ore reduction system

Typical project(s)	Use of charcoal from planted biomass instead of fossil fuel based reducing agents, in the iron ore reduction process using blast furnace technology.
Type of GHG emissions mitigation action	• Renewable energy. Switch to a renewable source of carbon for the reduction of iron in blast furnaces.
Important conditions under which the methodology is applicable	• The renewable biomass that is used for charcoal production originates from a dedicated plantation, located within the boundaries of the project activity; • The dedicated plantations are under the control of project participants either directly owned or through a long term contract; • The project does not rely on imported mineral coke.
Important parameters	At validation: • Amount of reducing agent (i.e. coal coke) required to produce one tonne of hot metal.
	Monitored: • Production of hot metal by the project activity; • Parameters related to emissions from reducing agents production (carbonization and coal distillation); • Parameters related to iron ore reduction facility such as fuel/reducing agent consumption, their emission factors, hot metal produced and its carbon content etc.
BASELINE SCENARIO The hot metal in iron and steel plant is produced using reducing agents of fossil fuel origin, resulting into high amount of CO_2 emissions.	
PROJECT SCENARIO The new iron ore reduction system partially or fully replaces fossil-fuel-based reducing agent with charcoal of renewable origin, resulting into reduction of CO_2 emissions.	

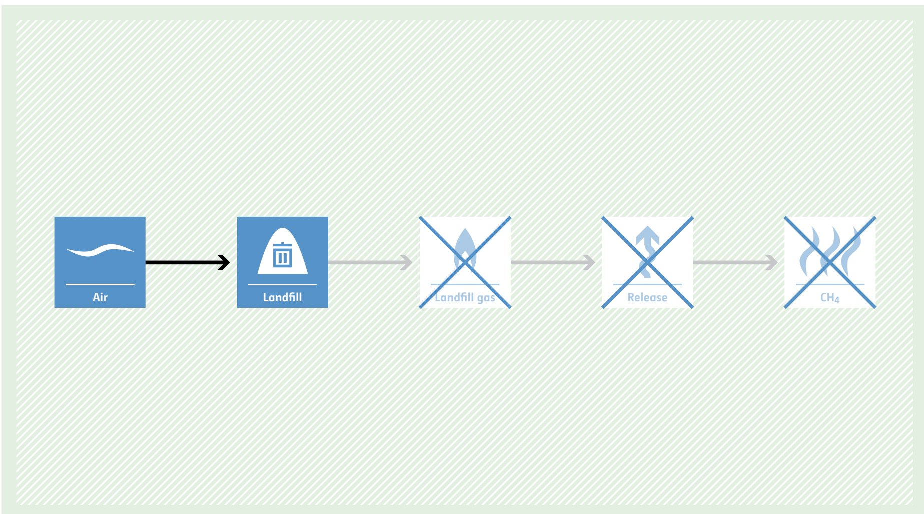
AM0083 Avoidance of landfill gas emissions by in-situ aeration of landfills

Typical project(s)	Landfilled waste is treated aerobically on-site by means of air venting (overdrawing) or low pressure aeration with the objective of avoiding anaerobic degradation processes.
Type of GHG emissions mitigation action	• GHG emission avoidance. The project avoids CH_4 emissions from landfills.
Important conditions under which the methodology is applicable	• Aeration techniques used are either air venting (overdrawing) or low pressure aeration; • Treatment of landfilled waste is in closed landfills or closed landfill cells; • If mandatory environmental regulations require the collection and flaring of landfill gas, the corresponding compliance rate is below 50% in the host country; • Closed cells of operating or closed landfills might be eligible as long as they are physically distinct from the remaining parts of the landfill.
Important parameters	Monitored: • Amount of degradable waste disposed in the landfill; • Potential methane generation capacity; • Vented and surface emissions: volume and methane and nitrous oxide content.

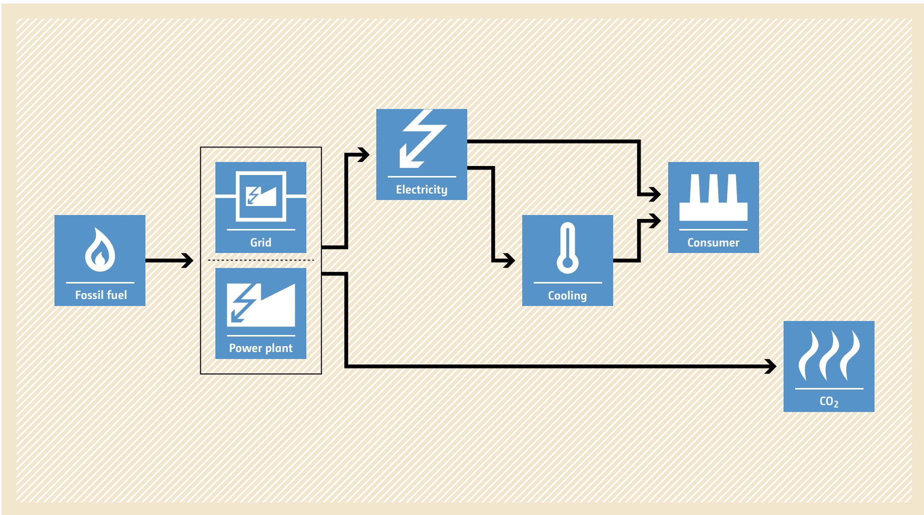
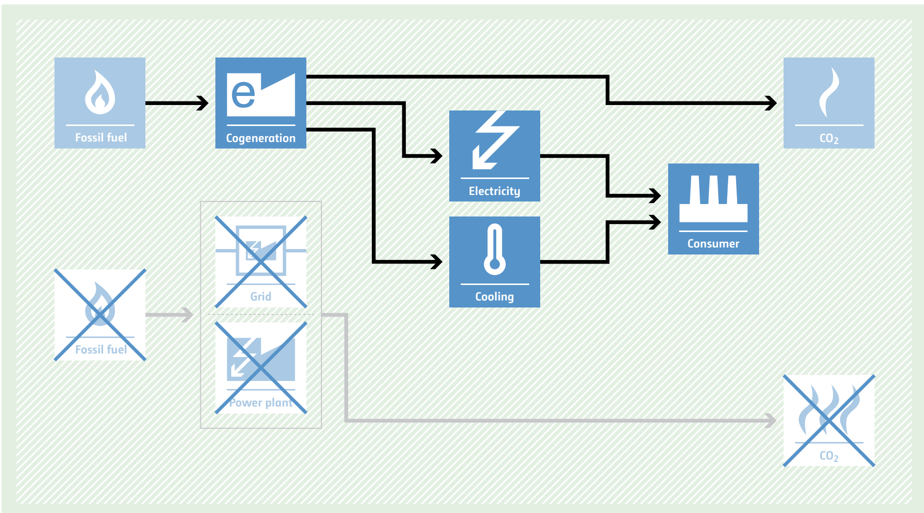
BASELINE SCENARIO
Partial or total release of landfill gas from the closed landfill or the closed landfill cell.



PROJECT SCENARIO
In-situ aeration of the closed landfill or the closed landfill cell reduces GHG emissions.



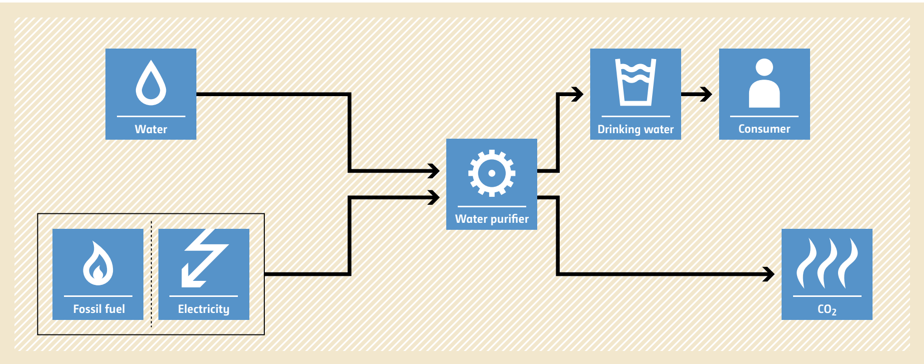
AM0084 Installation of cogeneration system supplying electricity and chilled water to new and existing consumers

Typical project(s)	Installation of a new cogeneration plant producing chilled water and electricity.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of electricity and cooling that would be provided by more-carbon-intensive means.
Important conditions under which the methodology is applicable	• The chilled water is supplied by vapour compression chillers in the baseline and in the case of existing baseline facilities only used on-site by customers; • After the implementation of the project, the cogeneration facility cannot supply services to facilities that are outside the project boundary; • The demand of electricity and water at a consumer cannot exceed 110% of its historical level for a cumulative period longer than three months.
Important parameters	At validation: • Power consumption of the baseline vapour compression chiller(s). Monitored: • Electricity generated and consumed by the project; • Chilled water generated by the project.
BASELINE SCENARIO Consumers use electricity provided by an on-site power plant or by the grid. Consumption of electricity for the production of chilled water by the use of electrical chillers (vapour compression chillers).	
PROJECT SCENARIO Consumers use electricity provided by a fossil-fuel-fired cogeneration system. The cogeneration system provides electricity and chilled water.	

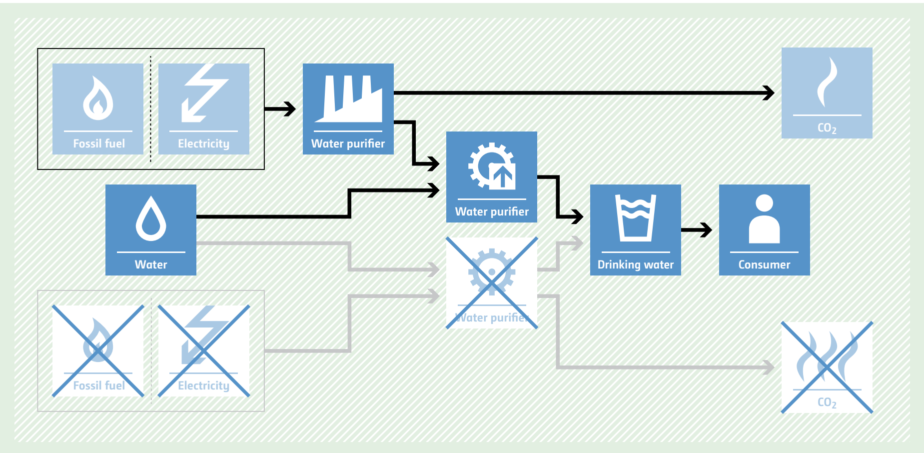
AM0086 Distribution of low GHG emitting water purification systems for safe drinking water

Typical project(s)	Low GHG emitting water purification systems are distributed to consumers to provide safe drinking water (SDW).
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of more GHG intensive technologies to provide SDW.
Important conditions under which the methodology is applicable	• No public distribution network supplying SDW exists within the project boundary; • Project technology/equipment provides SDW based on laboratory testing or official notifications; • End users must have access to replacement purification systems; • Only for water purifiers sold or distributed within the first crediting period are eligible for claiming emissions reductions.
Important parameters	At validation: • Fraction of population served by low GHG emitting water purification technologies; • Volume of drinking water per person; • Fraction of population which would use electricity or fuel type i to boil water.
	Monitored: • Quantity of purified water consumed; • Failure rate of the project water purification systems; • Number of project water purification systems; • Population that consumes the purified water serviced by the project activity; • Safe drinking water quality.

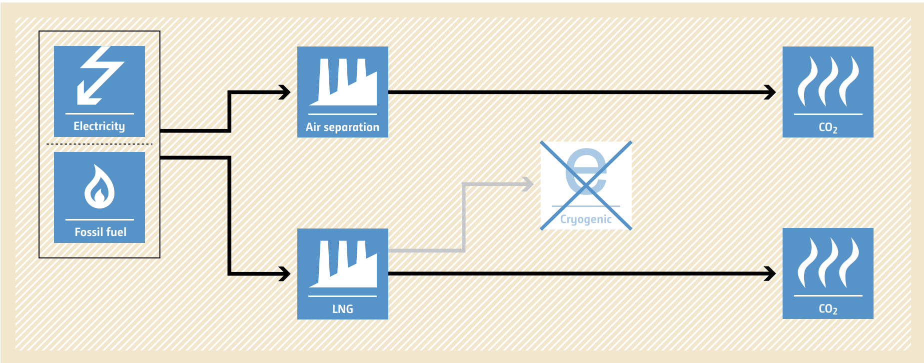
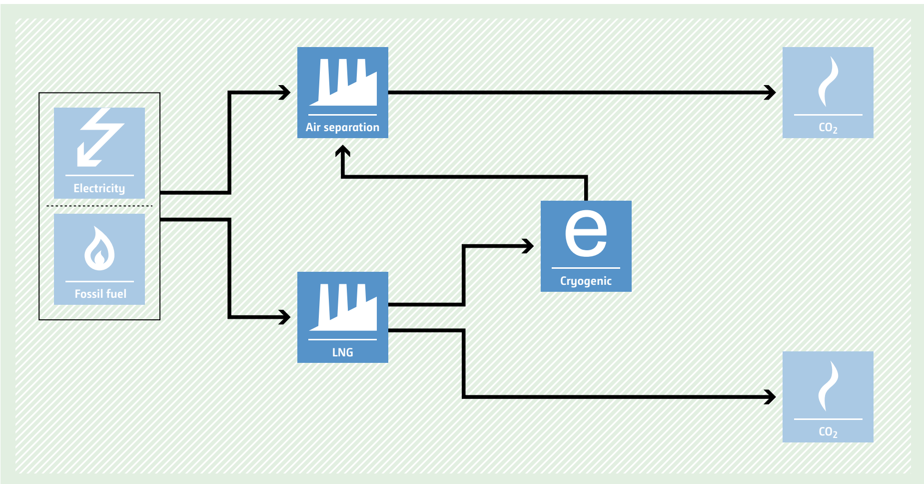
BASELINE SCENARIO
Energy consuming applications to produce safe drinking water will continue to be used in the households of a specific geographical area.



PROJECT SCENARIO
The low GHG emitting purifier displaces the current technologies/techniques for generation of safe drinking water in the households of a specific geographical area.



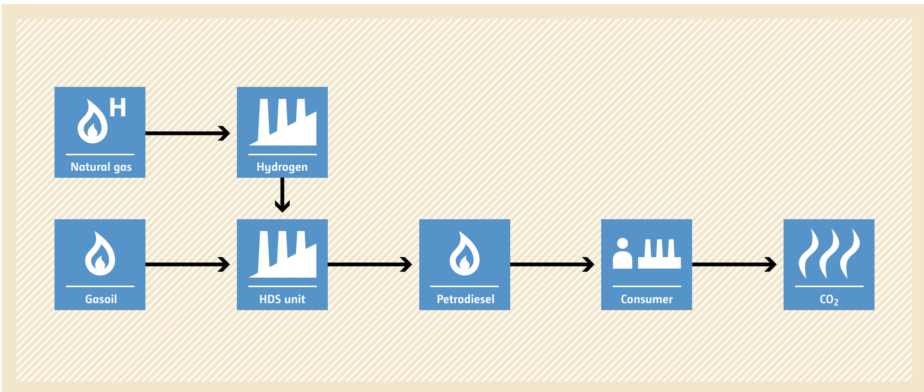
AM0088 Air separation using cryogenic energy recovered from the vaporization of LNG

Typical project(s)	The construction and operation of a new air separation plant that utilizes the cryogenic energy recovered from a new or existing LNG vaporization plant for the air separation process.
Type of GHG emissions mitigation action	• Energy efficiency. Reduction in heat consumption for LNG vaporization and fuels/electricity use in air separation plants.
Important conditions under which the methodology is applicable	• The purity of the oxygen and nitrogen produced by the new air separation plant is equal to or higher than 99.5%; • The new air separation plant is located at the same site as the LNG vaporization plant; • The cryogenic energy from existing LNG vaporization plant was not utilized for useful purposes and was being wasted prior to the implementation of the project.
Important parameters	At validation: • Electricity emission factor (can also be monitored ex post); • Quantity of fossil fuels and electricity consumed by the air separation and the LNG Vaporization facilities; • Amount and physical properties of LNG vaporized.
	Monitored: • Quantity of fossil fuels and electricity consumed by the Air Separation and the LNG Vaporization facilities; • Amount and physical properties of LNG vaporized and gas produced at the separation plant.
BASELINE SCENARIO The air separation process would use fossil fuels or electricity for cooling.	
PROJECT SCENARIO The air separation process use cryogenic energy recovered from a LNG vaporization plant for cooling.	

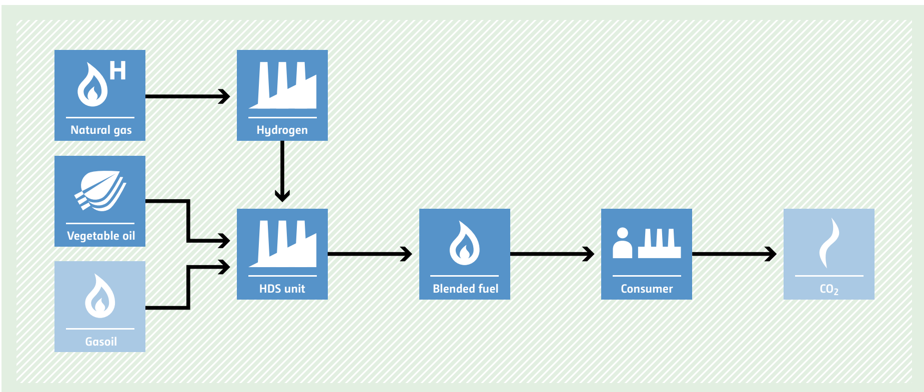
AM0089 Production of diesel using a mixed feedstock of gasoil and vegetable oil

Typical project(s)	Production of petro/renewable diesel by switching the feedstock of hydrodesulphurization process (HDS) unit from 100% gasoil to a mixture of gasoil and vegetable oil in an existing refinery, where the vegetable oil comes from oilseeds from plants that are cultivated on dedicated plantations established on lands that are degraded or degrading at the start of the project.
Type of GHG emissions mitigation action	• Renewable energy; • Feedstock switch. Displacement of more-GHG-intensive feedstock for the production of diesel.
Important conditions under which the methodology is applicable	• Three years of historical data are required for the HDS unit; • Energy consumption in the HDS unit under the project is lower or equal to the baseline scenario and any combustible gases and off-gases formed during the hydrogenation of vegetable oil have to be flared or used in the refinery as fuel; • The petro/renewable diesel is not exported to an Annex I country.
Important parameters	At validation: • Ratio between the amount of renewable diesel produced and vegetable oil fed into HDS unit, density of renewable diesel.
	Monitored: • Amount of vegetable oil fed to HDS unit, volume of H_2 consumed in the HDS unit and amount of petro/renewable diesel produced by the project; • Project emissions from transport of oilseeds and/or vegetable oil if distances more than 50 km are covered; fossil fuel and electricity consumption of the vegetable oil production plant; • Leakage emissions related to the upstream emissions of excess natural gas and positive leakage associated with the avoided production of petrodiesel; • Destination of exported petro/renewable diesel produced by the project.

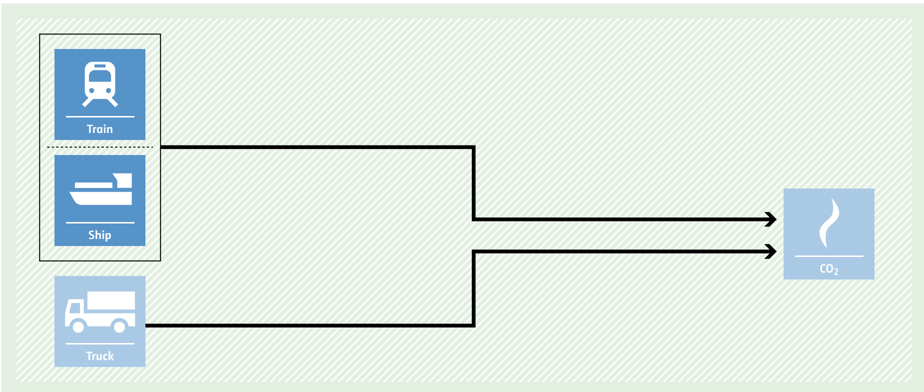
BASELINE SCENARIO
Diesel is produced from gasoil.



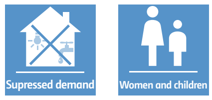
PROJECT SCENARIO
Diesel is produced from mixture of gasoil and vegetable oil.



AM0090 Modal shift in transportation of cargo from road transportation to water or rail transportation

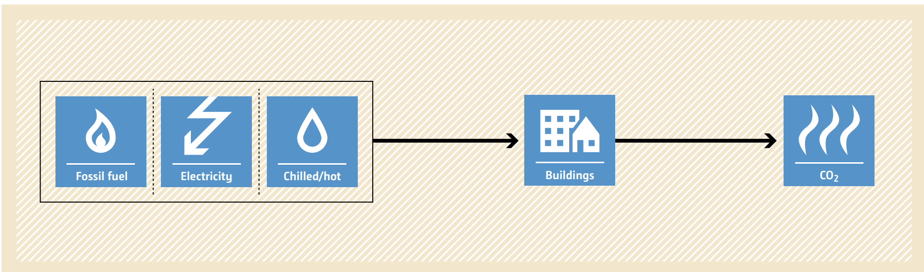
Typical project(s)	Transportation of cargo using barges, ships or trains.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of a more-carbon-intensive transportation mode.
Important conditions under which the methodology is applicable	• The owner of the cargo is one of the project participants. If the entity investing in the project is not the owner of the cargo, it should also be a project participant; • The project should have made at least one of the following new investments: direct investment in new infrastructure for water transportation or for rail transportation, or refurbishment/replacement of existing water and rail transportation infrastructure or equipments, with transport capacity expansion; • The cargo type, transportation mode, and transportation routes of the project are defined at the validation of the project and no change is allowed thereafter; • Both in the baseline and project, only one type of cargo is transported and no mix of cargo is permitted.
Important parameters	At validation: • Distance of the baseline trip route (both forward and return trips). Monitored: • Fuel and/or electricity consumption by the project transportation mode; • Amount of cargo transported by the project transportation mode (both forward and return trips).
BASELINE SCENARIO The cargo is transported using trucks.	
PROJECT SCENARIO The cargo is transported using barges, ships or trains.	

AM0091 Energy efficiency technologies and fuel switching in new and existing buildings

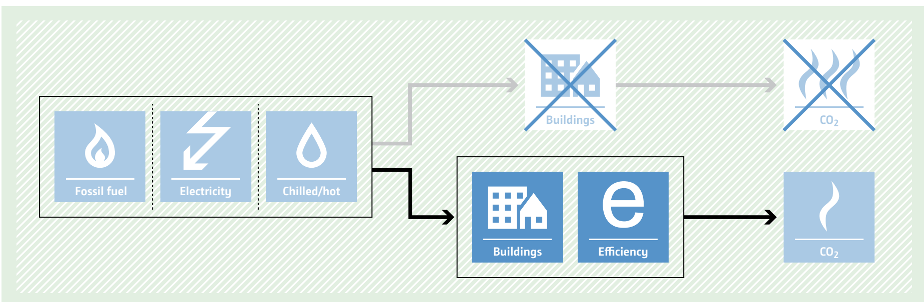


Typical project(s)	Project activities implementing energy efficiency measures and/or fuel switching in new and existing building units (residential, commercial, and/or institutional building units). Examples of the measures include efficient appliances, efficient thermal envelope, efficient lighting systems, efficient heating, ventilation and air conditioning (HVAC) systems, passive solar design, optimal shading, building energy management systems (BEMS), and intelligent energy metering.
Type of GHG emissions mitigation action	• Energy Efficiency. Electricity and/or fuel savings through energy efficiency improvement. Use of less-carbon-intensive fuel.
Important conditions under which the methodology is applicable	• Building units should belong to residential, commercial and institutional categories as defined in methodology; • Eligible sources of emissions include consumption of electricity, fossil fuel, and chilled water as well as leakage of refrigerant used in the building units; • Biogas, biomass or cogeneration systems should not be the source of thermal or electrical energy for project building units and chilled/hot water systems used for project building units; • All the project building units must comply with all applicable national energy standards (e.g. building codes) if they exist and are enforced.
Important parameters	At validation: • Emission factors of fuel used in baseline buildings; • Historical average retail price of the fuel most commonly used in the baseline building units. Monitored: • Total number of efficient appliances of type n that are used in registered CDM project(s) in the host country; • Gross floor area of project buildings; • Fuel consumption, quantity and energy content of hot/chilled water consumed and electricity consumption in project buildings; • Emission factors and calorific values of fuels.

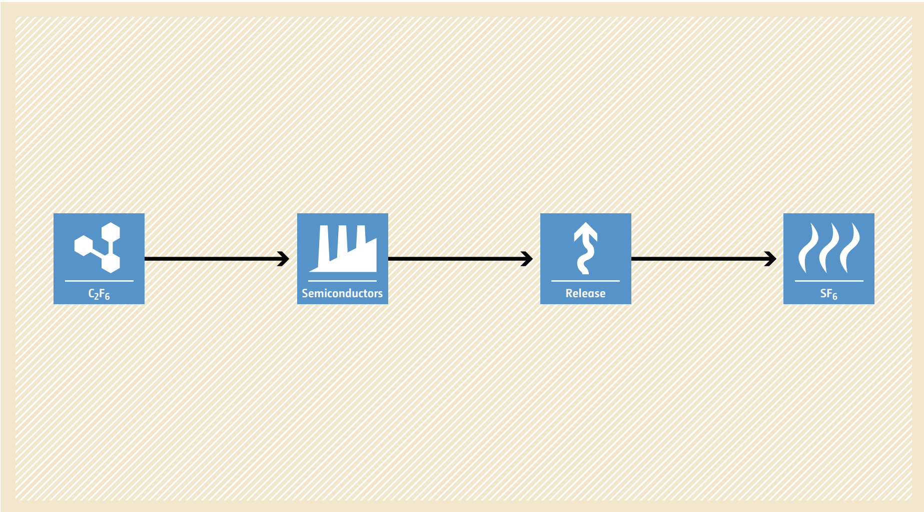
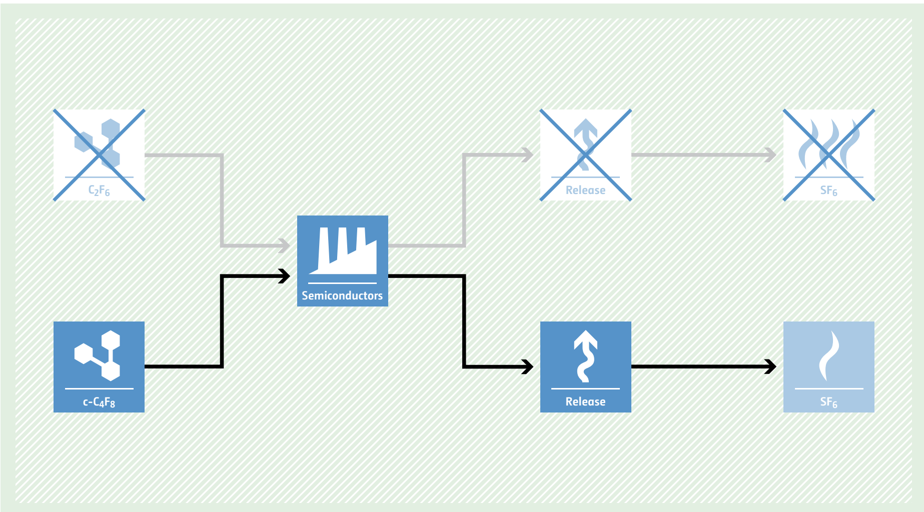
BASELINE SCENARIO
Residential, commercial and institutional building units (similar to those constructed and then occupied in the project activity) will result in higher emissions due to fuel, electricity and chilled/hot water consumption.



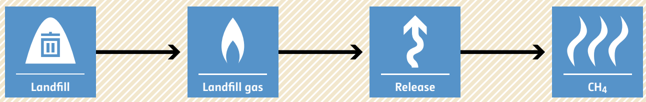
PROJECT SCENARIO
Energy efficient residential, commercial and institutional project building units will result in lower emissions due to lower consumption of fuel, electricity and chilled/hot water.



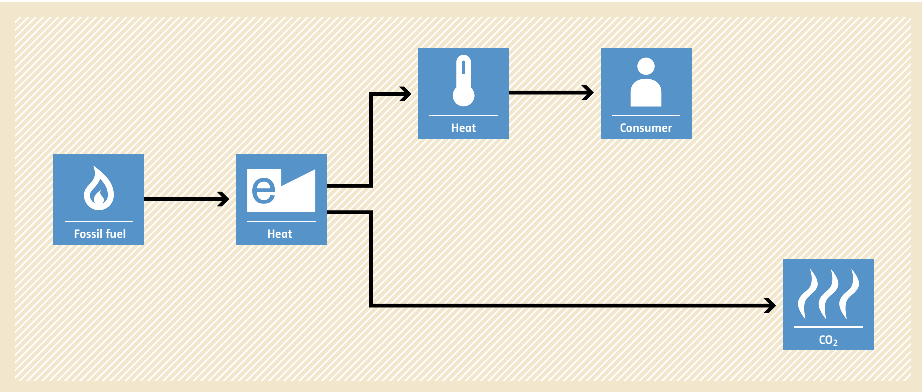
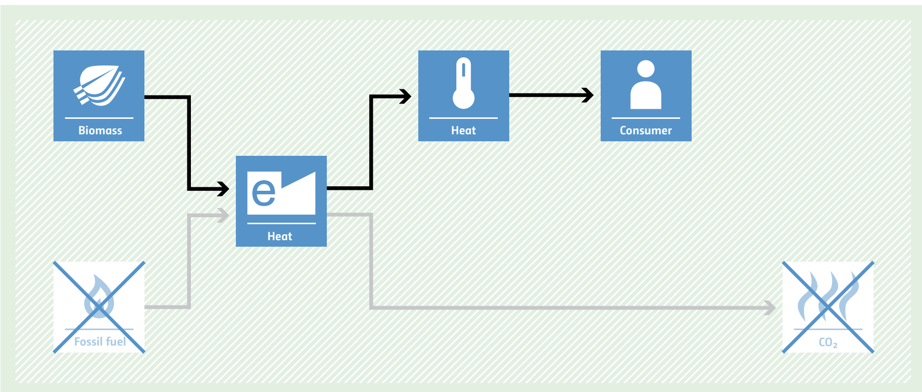
AM0092 Substitution of PFC gases for cleaning Chemical Vapour Deposition (CVD) reactors in the semiconductor industry

Typical project(s)	Projects activities that reduce PFC emissions through replacement of C_2F_6 with c-C_4F_8 (octa-fluoro-cyclo-butane) as a gas for in-situ cleaning of CVD reactors in the semiconductor industry.
Type of GHG emissions mitigation action	• Fuel or feedstock switch. Displacement of C_2F_6 with c-C_4F_8.
Important conditions under which the methodology is applicable	• Production lines included in the project boundary started commercial operation before 1 January 2010 and have an operational history of at least three years prior to the implementation of the project activity, during which the original PFC gas was C_2F_6; • The substitute PFC gas is not temporarily stored for subsequent destruction.
Important parameters	At validation: • Consumption of C_2F_6 in the baseline; • Production of substrate in the baseline.
	Monitored: • Consumption of c-C_4F_8; • Production of substrate.
BASELINE SCENARIO The baseline scenario is the continuation of the current situation, i.e. the continuation of the same baseline feedstock (i.e. CVD reactors cleaned with C_2F_6).	
PROJECT SCENARIO The project scenario is CVD reactors cleaned with c-C_4F_8.	

AM0093 Avoidance of landfill gas emissions by passive aeration of landfills

Typical project(s)	Landfilled waste is treated aerobically on-site by means of passive aeration with the objective of avoiding anaerobic degradation processes.
Type of GHG emissions mitigation action	• GHG emission avoidance. The project avoids CH_4 emissions from landfills.
Important conditions under which the methodology is applicable	• Treatment of landfilled waste is in closed landfills or closed landfill cells; • If mandatory environmental regulations require the collection and flaring of landfill gas, the corresponding compliance rate is below 50% in the host country; • Closed cells of operating landfills might be eligible as long as they are physically distinct from the remaining parts of the landfill; • Distance between vertical venting wells should not be more than 40m.
Important parameters	At validation: • Amount of biodegradable waste disposed in the landfill.
	Monitored: • Potential methane generation capacity; • Vented and surface emissions: volume and methane and nitrous oxide content.
BASELINE SCENARIO Partial or total release of landfill gas from the closed landfill or the closed landfill cell.	
PROJECT SCENARIO In-situ passive aeration of the closed landfill or the closed landfill cell reduces GHG emissions.	

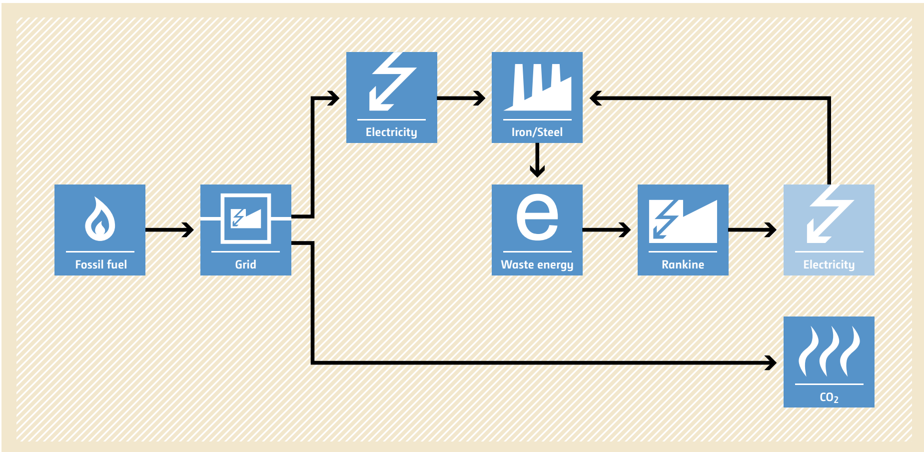
AM0094 Distribution of biomass based stove and/or heater for household or institutional use

Typical project(s)	Distribution of biomass based stoves and/or heaters and the supply of biomass briquettes for household or institutional use.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of more-GHG-intensive thermal energy production by introducing renewable energy technologies.
Important conditions under which the methodology is applicable	• The total project area (TPA) is defined prior to the start of the project activity and will not be changed later; • Biomass penetration rate in the TPA is ≤10%; • The biomass based stove or heater shall have a rated capacity of not more than 150 kW thermal; • A contractual agreement between the project consumers and the project participants shall ensure that the project consumers do not claim any CERs from the use of stove and/or heater and biomass briquettes.
Important parameters	At validation: • Percentage of biomass used as a fuel for cooking purposes or heating purposes, on energy basis, in project area(s); • Proportion of fuel(s) used in the stoves or heaters in project area(s) in the baseline; • Proportion of stove or heater type(s) used in project area(s) in the baseline.
	Monitored: • Dry weight of biomass briquettes consumed by project consumer(s) in project area(s); • NCV of biomass briquettes; • Proportion of project stove or heater type(s) in use in project area(s).
BASELINE SCENARIO Continuation of the use of existing stove or heater technologies and fossil fuels for thermal application.	
PROJECT SCENARIO Use of biomass based stoves and/or heaters and the supply of biomass briquettes for thermal application.	

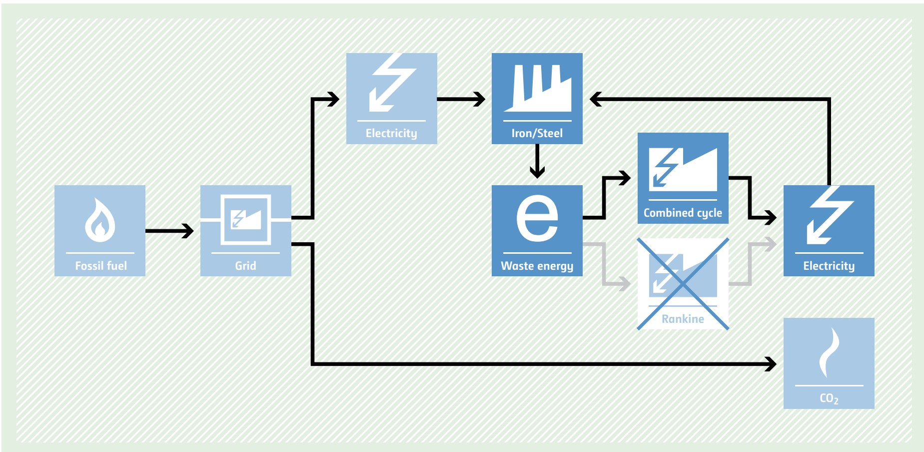
AM0095 Waste gas based combined cycle power plant in a Greenfield iron and steel plant

Typical project(s)	Project activities that construct and operate a captive or grid-connected combined cycle electricity generation power plant in a Greenfield iron and steel plant, using waste gas such as blast furnace gas, coke oven gas, and converter gas sourced from the same facility.
Type of GHG emissions mitigation action	• Energy efficiency. Waste energy recovery in order to displace more-carbon-intensive source of energy.
Important conditions under which the methodology is applicable	• Specifications of coke oven and iron and steel plant has been determined before the project activity is considered; • The project participants have to demonstrate that the level of use of waste gas for power production in the iron and steel plant is the same in absence of and after the implementation of the CDM project activity.
Important parameters	At validation: • Data on waste gas based electricity generation in top 20% Rankine cycle based power plant in other iron and steel plants; • Energy Efficiency of waste gas based Rankine cycle based power plants in iron & steel plant using manufacturer's data.
	Monitored: • Data required to calculate grid emission factor; • Net Calorific Value of waste gas, and supplementary and auxiliary fuels; • Quantity of supplementary and auxiliary fuel fired and quantity of waste gas consumed by project power plant; • Net electricity generated by project power plant.

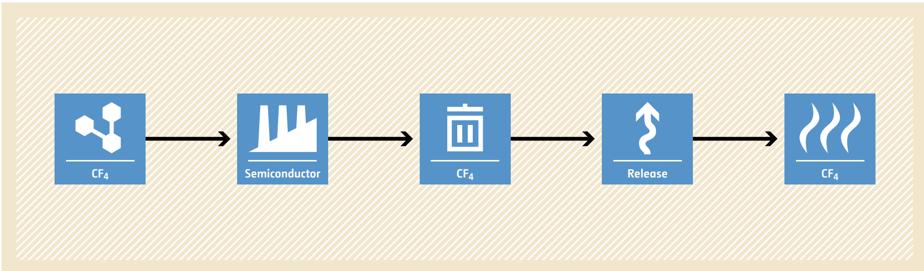
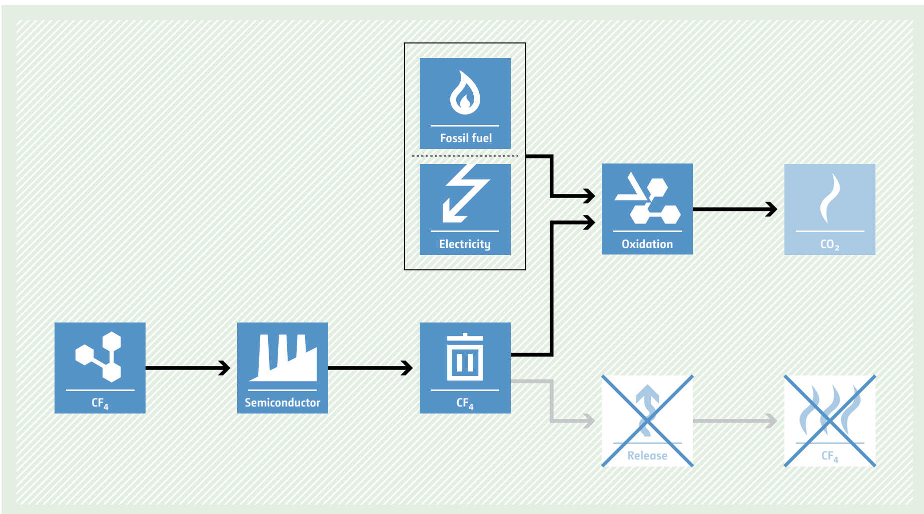
BASELINE SCENARIO
Construction of Rankine cycle based power plant using the same waste gas type and quantity as used in the project power plant.



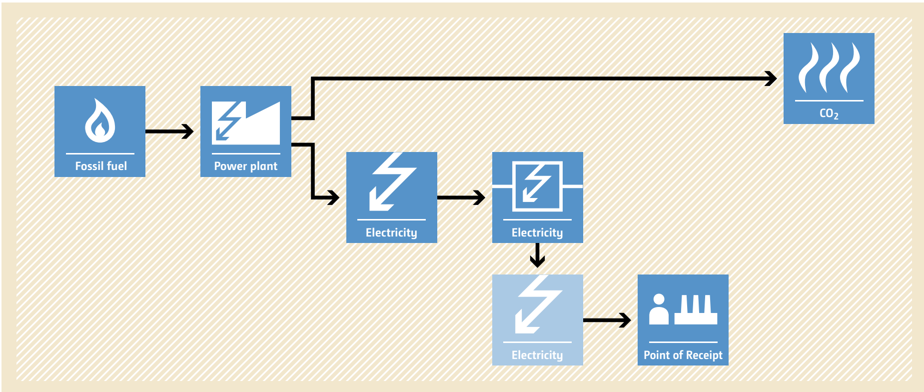
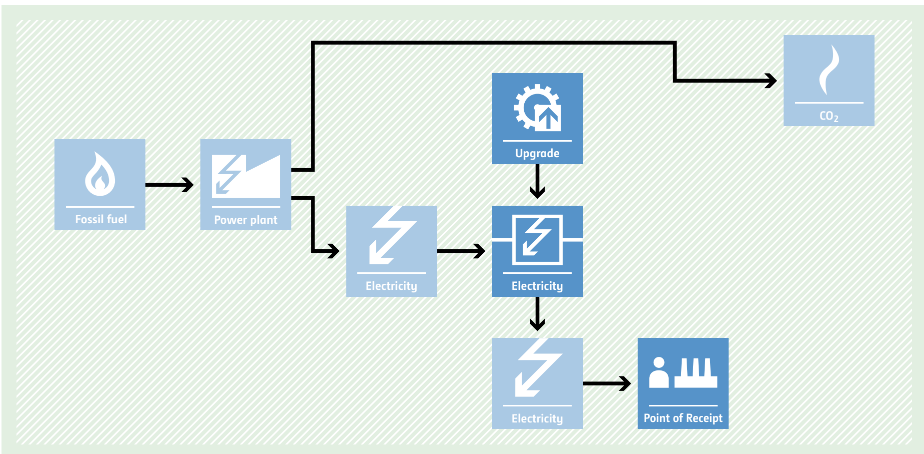
PROJECT SCENARIO
Energy efficient combined cycle based power plant recovering energy from waste gas in a greenfield iron and steel plant.



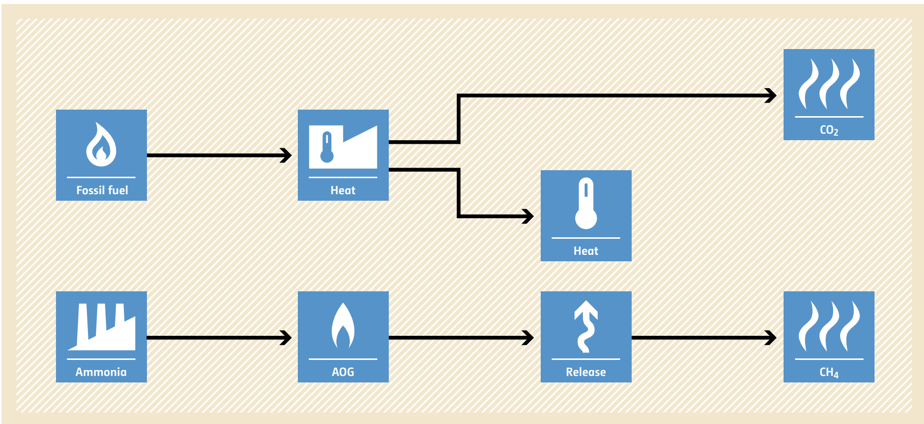
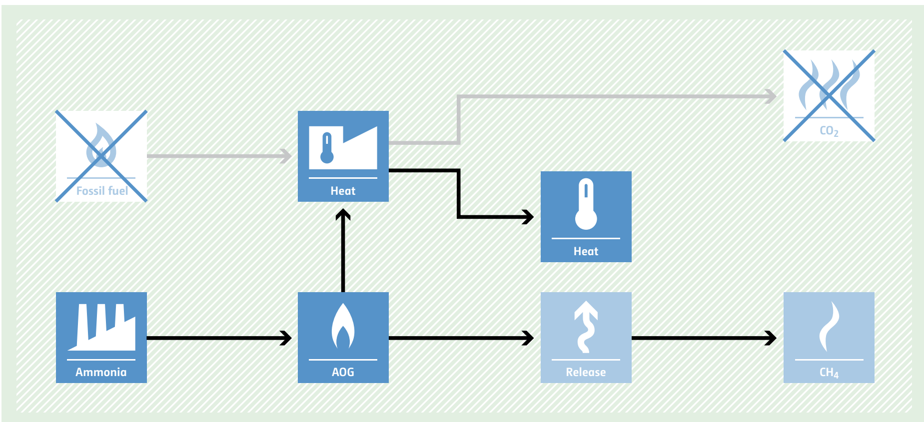
AM0096 CF_4 emission reduction from installation of an abatement system in a semiconductor manufacturing facility

Typical project(s)	Installation of an abatement system in an existing semiconductor manufacturing facility for the abatement of CF_4 from the semiconductor etching process.
Type of GHG emissions mitigation action	• GHG destruction. Destruction of CF_4 emissions.
Important conditions under which the methodology is applicable	• Applicable to existing production lines without CF_4 abatement device installed and where CF_4 was being vented in the last three years; • CF_4 is not temporarily stored or consumed for subsequent abatement; • CF_4 abatement at the same industrial site where the CF_4 is used; and CF_4 to be abated is not imported from other facilities; • Not applicable to project activities which reduce emissions of PFCs from Chemical Vapour Deposition (CVD) processes.
Important parameters	At validation: • Amount of CF_4 consumed in years prior to the implementation of the project activity; • Amount of semiconductor substrate produced in years prior to the implementation of the project activity. Monitored: • Amount of CF_4 consumed; • Amount of semiconductor substrate produced; • Calibrated flow rate of Helium (He) gas added to duct before entering to the abatement system during a monitoring interval; • He concentration entering the abatement system and out of the abatement system; • Concentration of CF_4 in the gas entering the abatement system and in the gas leaving the abatement system; • Temperature at mass flow controller.
BASELINE SCENARIO CF_4 is vented to the atmosphere after being used in the semiconductor etching process.	
PROJECT SCENARIO CF_4 is recovered and destroyed in a catalytic oxidation unit (abatement system) located after the etching unit.	

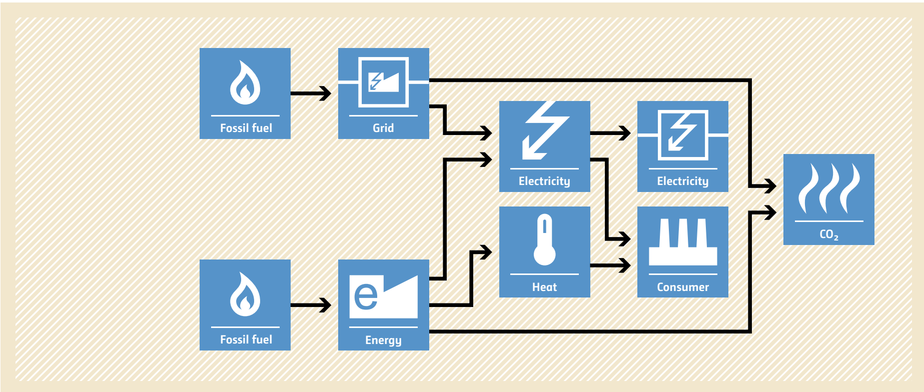
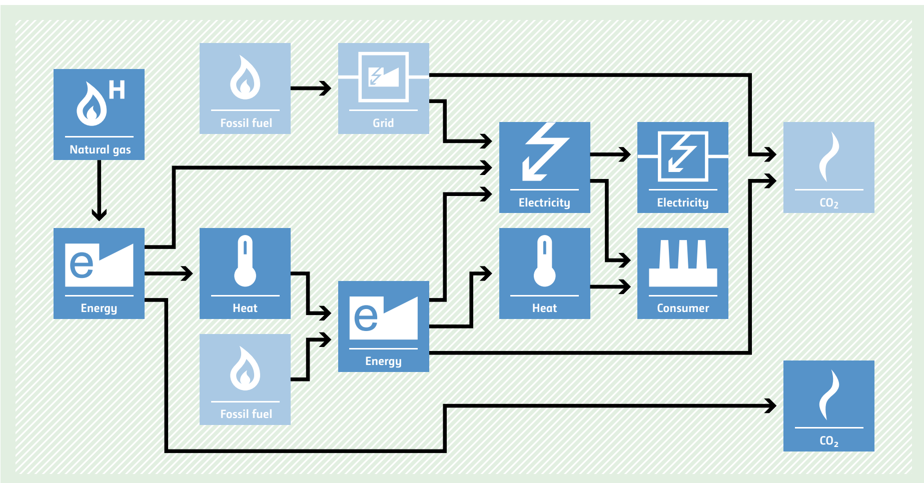
AM0097 Installation of high voltage direct current power transmission line

Typical project(s)	Installation of Greenfield High Voltage Direct Current (HVDC) power transmission line/s for transmission of power from point of origin/supply to the point of receipt; or replacement of existing alternating current power transmission line by a new HVDC power transmission line.
Type of GHG emissions mitigation action	• Energy efficiency. Energy efficient electricity transmission line instead of inefficient electricity transmission line.
Important conditions under which the methodology is applicable	• Project participants shall invest in setting up a HVDC power transmission line and utilize it; • Project participant shall demonstrate through verifiable data that the right-of-way requirement for the project activity is less than for the baseline scenario; • This methodology is not applicable to project activities that seek to expand or retrofit existing grids by the construction of a new piece of HVDC transmission line.
Important parameters	At validation: • Data required for simulation software to calculate technical losses of baseline transmission line. This includes voltage, length, inductance, capacitance, and sub-station spacing of baseline transmission line.
	Monitored: • Gross electricity evacuated from the point of supply in project year using project transmission line; • Net electricity received at the point of receipt; • Right-of-way requirement for the transmission line under the project as well as under baseline.
BASELINE SCENARIO Implementation or continuation of inefficient power transmission line.	
PROJECT SCENARIO Energy efficient HVDC transmission line.	

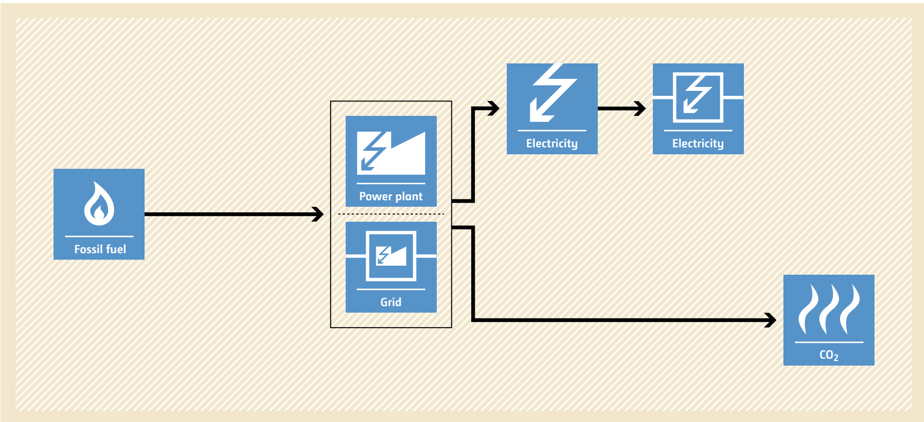
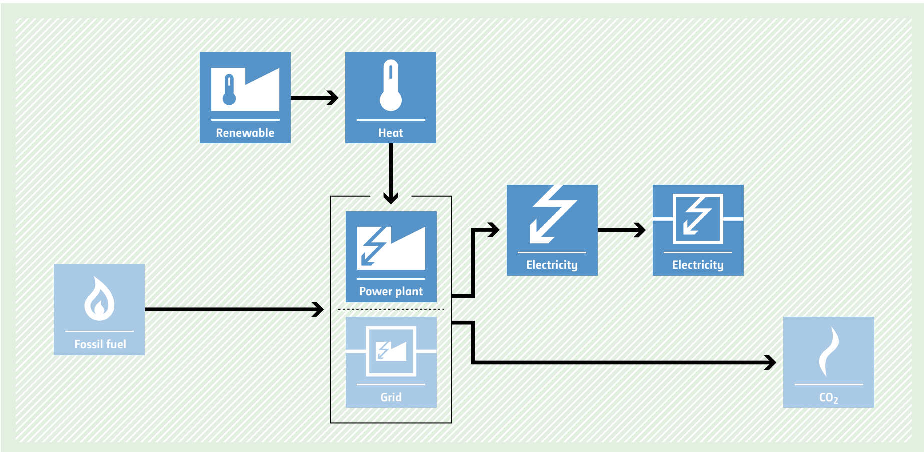
AM0098 Utilization of ammonia-plant off gas for steam generation

Typical project(s)	Utilization of ammonia-plant off gas (AOG), which was being vented, for heat generation at an existing ammonia production plant.
Type of GHG emissions mitigation action	• GHG destruction. Destruction of methane emissions and displacement of a more-GHG-intensive service.
Important conditions under which the methodology is applicable	• AOG is only used to generate steam to meet heat demands in the existing ammonia production plant and/or in nearby facilities in the same project site; • Amount of AOG vented from the start of operations at the existing ammonia production plant until the implementation of the project activity shall be demonstrated; • Regulations of the host country do not prohibit the venting of gases with the physical and chemical characteristics of the AOG.
Important parameters	At validation: • Volume of AOG vented by the existing ammonia production facility in historical years; • Total production of ammonia in historical years; • Average volume fraction of methane in the AOG in historical years.
	Monitored: • Volume of AOG recovered and used for steam generation by the project activity; • Total production of ammonia; • Average volume fraction of methane in the AOG recovered in the project activity; • Carbon density of AOG; • Net quantity of heat generated from AOG combustion; • Volume fraction of methane in the exhaust out of ammonia recovery section; • Volume of gaseous stream vented to the atmosphere out of the ammonia recovery section of AOG.
BASELINE SCENARIO AOG is vented to the atmosphere.	
PROJECT SCENARIO AOG is collected and utilized to generate heat.	

AM0099 Installation of a new natural gas fired gas turbine to an existing CHP plant

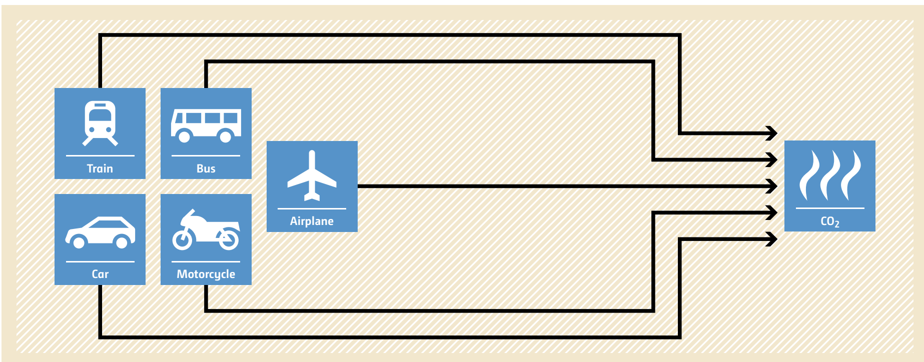
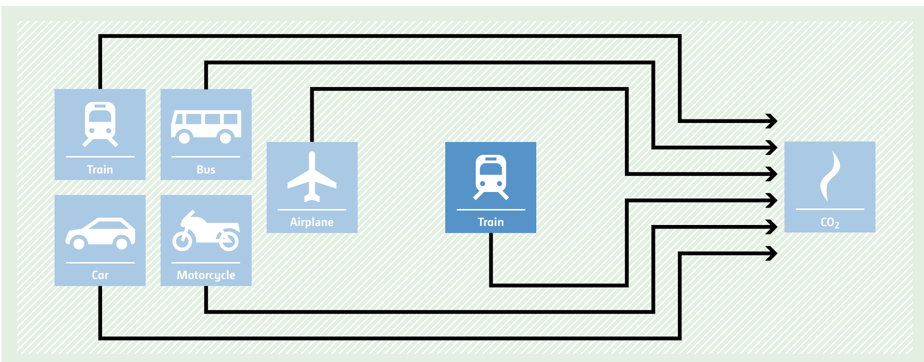
Typical project(s)	Installation a new natural-gas-fired gas turbine at a site where there is an existing combined heat and power (CHP) plant and supply of the electricity to the grid or an existing electricity consuming facility and waste heat to the existing CHP plant.
Type of GHG emissions mitigation action	• Low carbon electricity; • Energy efficiency. Displacement of more-GHG-intensive electricity generation in a grid or captive power plant and supply of heat.
Important conditions under which the methodology is applicable	• The steam from the heat recovery steam generator (HRSG) is not directly supplied to final users/consumers; • The existing CHP plant produced electricity and steam for at least three years prior to the implementation of the project activity.
Important parameters	At validation: • Amount of historical steam generation of the existing CHP; • Amount, emission factor and net calorific value (NCV) of fuel historically used to generate steam at the existing CHP plant.
	Monitored: • Electricity generated by the gas turbine that is fed into the grid and/or supplied to the electricity consuming facility; • Total electricity supplied to the grid by the existing steam turbine generator (STG) at the project site; • Steam generated by the project facility from heat recovery steam generator (HRSG); • Steam generated by the existing steam boilers.
BASELINE SCENARIO Electricity is generated in the grid or captive power plant using more-carbon-intensive fuel and steam/heat is generated in existing steam boilers.	
PROJECT SCENARIO Electricity is generated using natural gas and heat/steam is generated from waste heat from the gas turbine.	

AM0100 Integrated Solar Combined Cycle (ISCC) projects

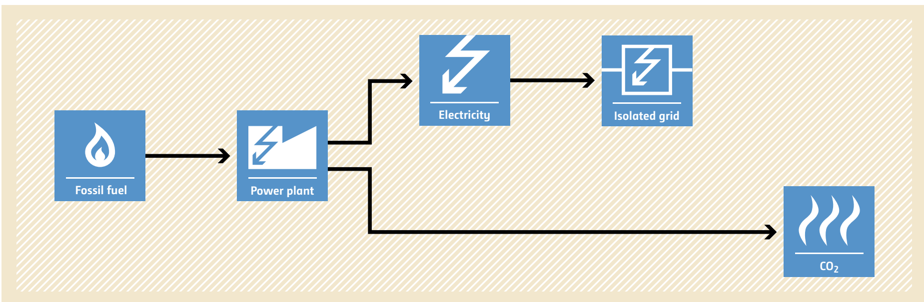
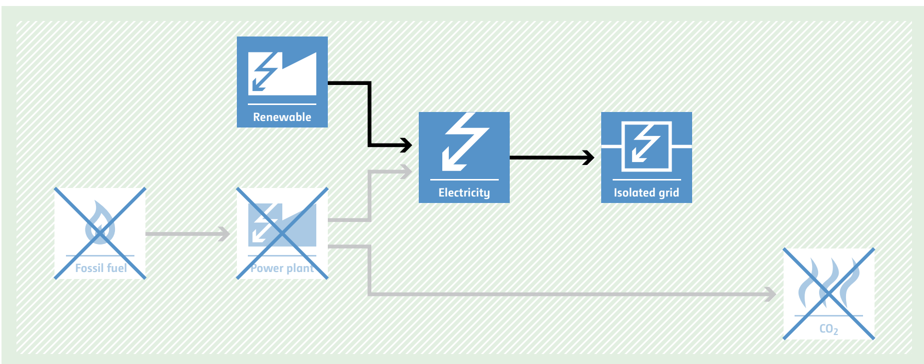
Typical project(s)	Implementation of Integrated Solar Combined Cycle (ISCC) projects.
Type of GHG emissions mitigation action	• Renewable Energy. Displacement of electricity that would be provided to the grid by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• Applicable to: – Conversion of an existing Combined Cycle Power Plant into an ISCC; or – Conversion of an existing single cycle gas turbine power plant into an ISCC, where the project activity comprises exclusively the Solar Field and Supplementary Firing; or – Construction of a new ISCC, where the project activity comprises exclusively the Solar Field and Supplementary Firing; • Electric Solar Capacity does not account for more than 15% of the Electric Steam Turbine Capacity of the ISCC.
Important parameters	Monitored: • Average temperature, pressure and mass flow of steam leaving the solar steam generator; • Average temperature, pressure and mass flow of high pressure and low pressure steam entering the steam turbine and at the condenser outlet; • Gross electricity generation from gas turbine; • Net electricity generation from the ISCC; • Mass or volume, net calorific value (NCV), and emission factor of supplementary fuel; • Grid emission factor and/or emission factor of supplementary firing.
BASELINE SCENARIO Electricity is generated in the grid using more-carbon-intensive fuel.	
PROJECT SCENARIO Electricity is generated using steam generated from solar collectors and reducing the use of fossil fuel.	

AM0101 High speed passenger rail system

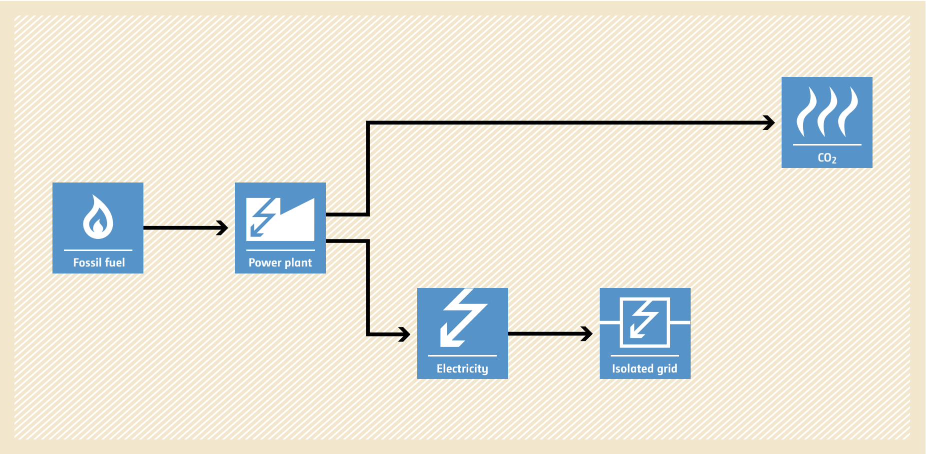
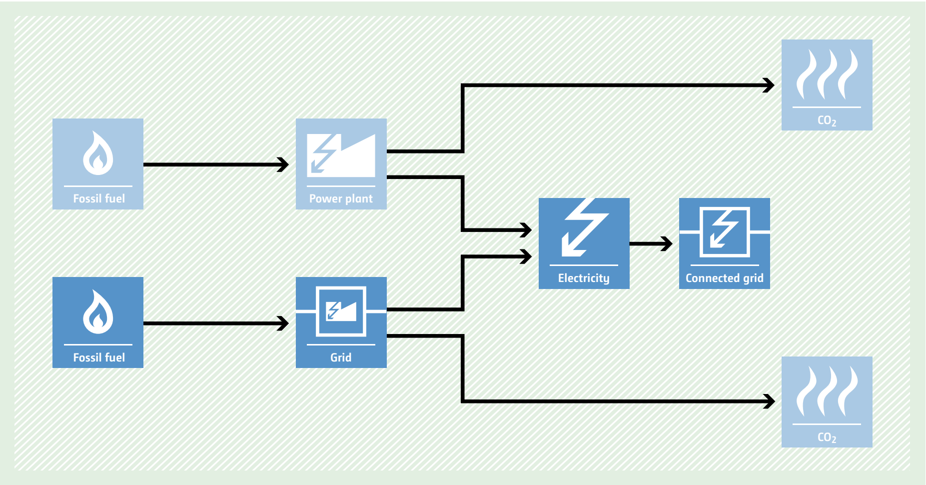
Women and children

Typical project(s)	Establishment and operation of a new high speed rail system. Extension of an existing high speed rail system. Replacement or upgrading of a conventional rail system to the high speed rail system.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of more GHG-intensive transport modes (airplanes, buses, conventional rail, motorcycles and personal cars) by less-GHG intensive one (high speed rail).
Important conditions under which the methodology is applicable	• The project establishes a new rail-based infrastructure for high speed rail. The new rail infrastructure can be the extension of an existing high speed rail system. It can also be the replacement or upgrading of an existing conventional rail system to high speed rail system; • The average design speed between the origin and the destination point of the new HSR shall be at least 200 km/h; • The project activity shall be an inter-urban passenger transport only; • The entire high speed rail system must be located in the same host country; • The average distance between all stations served by the project high speed rail system is at least 20 km.
Important parameters	At validation: • Baseline distance and transport mode, which are obtained through a comprehensive survey involving the users of the project transport system; • Specific fuel consumption, occupancy rates and travelled distances of different transport modes; • If expected emissions per passenger kilometer for HSR system is less than or equal to 0.08 kWh/pkm, the project is considered automatically additional.
	Monitored: • Total number of passengers travelled by the project high speed rail system; • Share of the project passengers or the number of passengers who would have travelled by the relevant modes of transport in absence of the project activity; • Passenger trip distances.
BASELINE SCENARIO Passengers transported between cities using a conventional transport system including buses, trains, cars, motorcycles and airplanes.	
PROJECT SCENARIO Passengers are transported between cities by the high-speed passenger rail-based system that partially displaces the existing modes of inter-urban transport.	

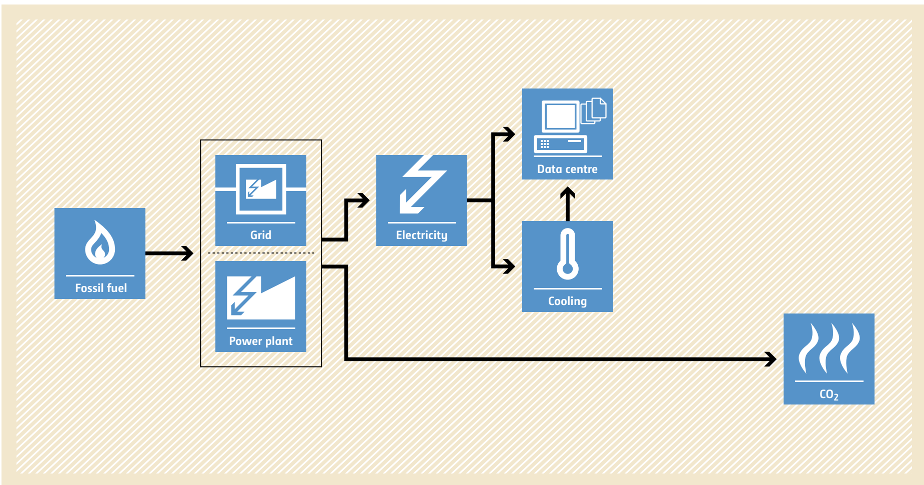
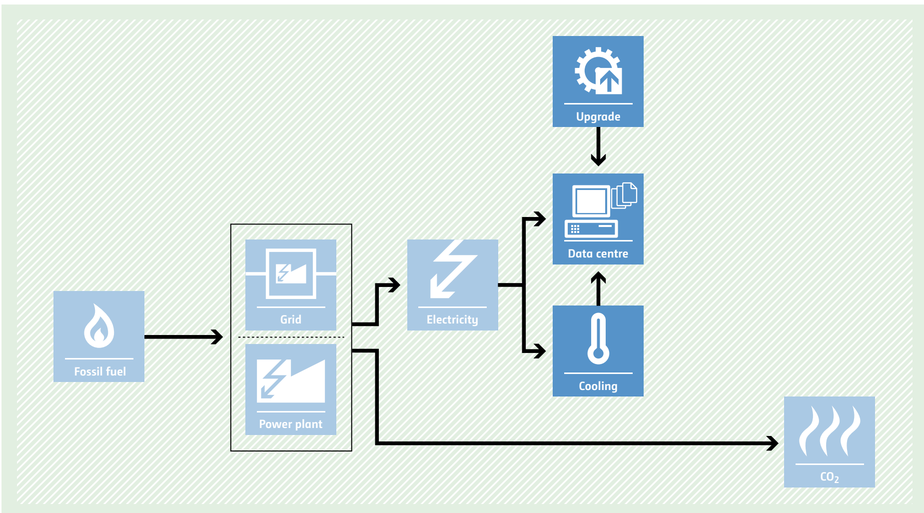
AM0103 Renewable energy power generation in isolated grids

Typical project(s)	Power generation using renewable energy sources connected to a new or an existing isolated grid.
Type of GHG emissions mitigation action	• Renewable energy. Displacement of electricity that would be provided to the isolated grid by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• The project power plant is using one of the following sources: hydro, wind, geothermal, solar, wave or tidal power. Biomass-fired power plants are not applicable; • In case of hydro power: – The project shall be implemented in an existing reservoir, with no change in the volume of reservoir; – The project shall be implemented in an existing reservoir, where the volume of reservoir is increased and the power density is greater than 4 W/m2; – The project results in new reservoirs and the power density is greater than 4 W/m2; or – The project activity is an integrated hydro power project involving multiple reservoirs; • The following technologies are deemed automatically additional if their penetration rate of the specific technology is below 2 per cent of the total installed isolated grid connected power generation capacity in the host country or the total installed isolated grid power generation capacity of the specific technology in the host country is less than or equal to 50 MW: – Solar photovoltaic technologies; – Solar thermal electricity generation including concentrating Solar Power (CSP); – Off-shore wind technologies; – Marine wave technologies; – Marine tidal technologies; – Ocean thermal technology.
Important parameters	At validation: • Emission factor of the isolated grid. Monitored: • Electricity supplied to the isolated grid by the project.
BASELINE SCENARIO Generation of electricity with fossil-fuel-fired generators (e.g. diesel generators).	
PROJECT SCENARIO A renewable energy power plant displaces the energy that was generated by fossil fuel sources.	

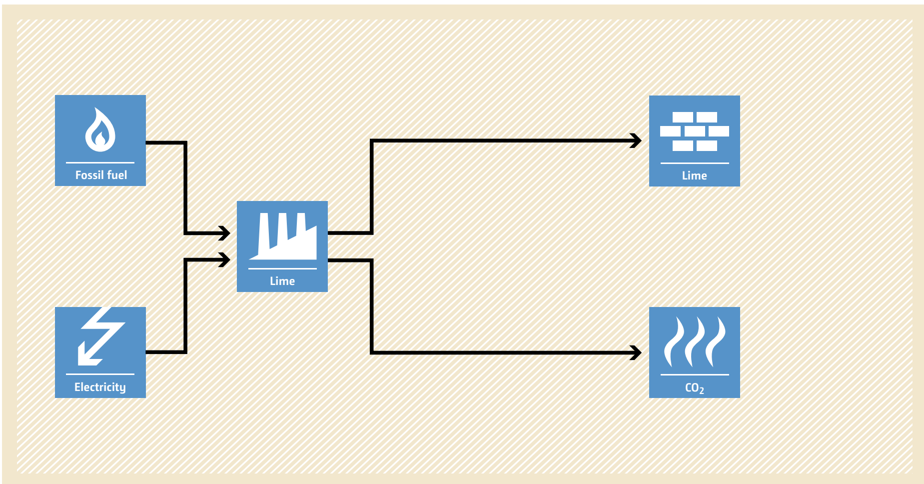
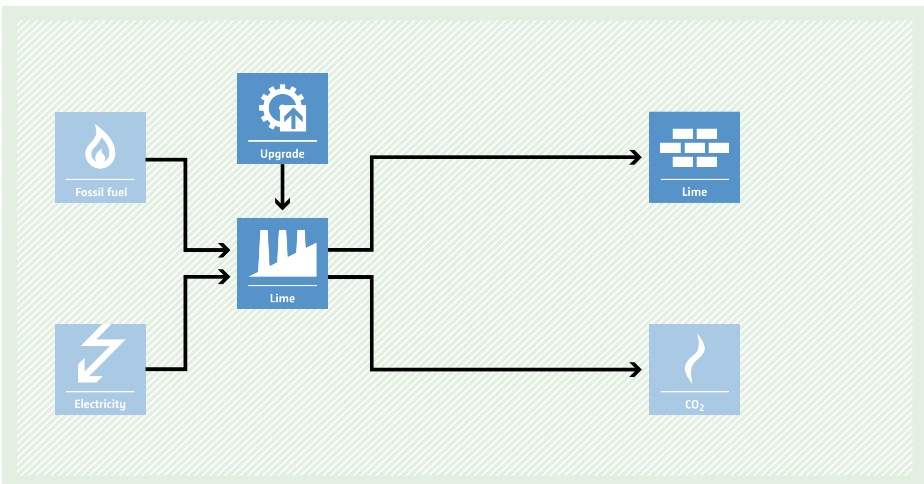
AM0104 Interconnection of electricity grids in countries with economic merit order dispatch

Typical project(s)	Construction of one or multiple new interconnection lines to connect two grids (i.e. connection of a main grid and a previously isolated grid).
Type of GHG emissions mitigation action	• Displacement of a more-GHG-intensive output. Displacement of electricity that would be provided by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• The total installed power capacity in the previously isolated grid is less than 10% of the total installed power capacity in the main grid in the year prior to the implementation of the project activity; • Previously isolated grid is a grid that has no interconnection with any grid prior to the implementation of the project activity; • After the implementation of the project activity, there will be only one dispatch centre responsible for the operation of the resulting grid (previously isolated and main grid).
Important parameters	At validation: • Grid emission factor of the previously isolated grid.
	Monitored: • Quantity of electricity delivered to the previously isolated grid; • The average quantity of SF_6 emitted from equipment installed under the project activity; • Amount of electricity transferred from the previously isolated grid to the grid(s) other than the main grid.
BASELINE SCENARIO No interconnection is constructed, and electricity demand of the isolated grid is met by power units connected to the isolated grid.	
PROJECT SCENARIO Interconnection is constructed and electricity demand of the isolated grid is partially met by power units from the main grid.	

AM0105 Energy efficiency in data centres through dynamic power management

Typical project(s)	Introduction of dynamic power management (DPM) in an existing data centre.
Type of GHG emissions mitigation action	• Energy efficiency. The data centre will consume less electricity for the operation and cooling of its servers.
Important conditions under which the methodology is applicable	• The project activity must be implemented in data centres that, prior to the implementation of the project activity, have no DPM system, no systematic method to adjust the data centre's total server capacity to actual demand, and no manual adjustment of server's operation mode to reduce electricity consumption.
Important parameters	At validation: • Three years of historical load and operation hours information; • Power consumption of the existing servers in idle mode and off mode; • Transaction capacity of the existing servers; • Grid emission factor (can also be monitored ex post). Monitored: • Turn off time of the servers; • Load of the servers; • Market share of the technology.
BASELINE SCENARIO Servers of the data centre operate at "Always On" mode independent of demand.	
PROJECT SCENARIO Servers of the data centre are switched to "Off Mode" when not required to process transaction load.	

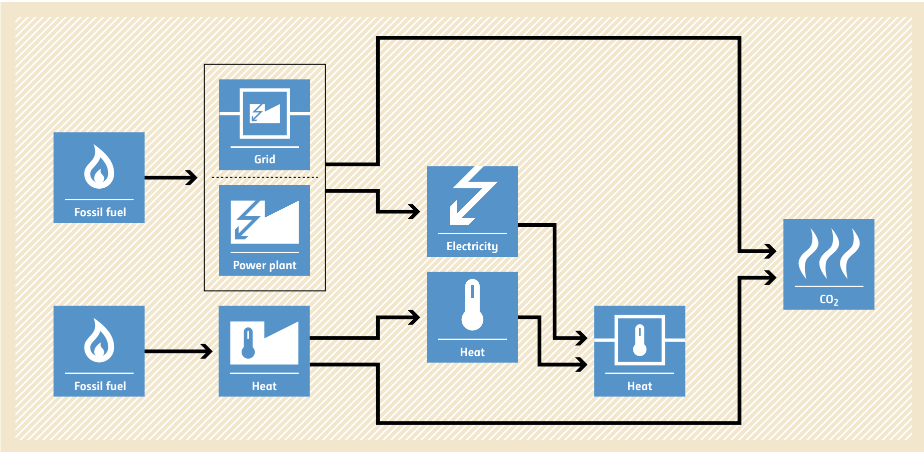
AM0106 Energy efficiency improvements of a lime production facility through installation of new kilns

Typical project(s)	Replacement of existing kilns by new and more energy-efficient kilns in an existing lime production facility.
Type of GHG emissions mitigation action	• Energy efficiency. Production of lime using more energy-efficient technology.
Important conditions under which the methodology is applicable	• The lime production facility is an existing facility and has operational history of at least three years prior to the start of the project activity; • The existing kilns and the new kilns use same fossil fuel; • The new kilns shall improve energy efficiency and not combustion efficiency; • The replaced kilns shall be decommissioned and not be used in another facility.
Important parameters	At validation: • Amount and net calorific value of the fuel consumed prior to the start of the project activity; • Amount of electricity consumed prior to the start of the project activity; • Amount of lime produced prior to the start of the project activity.
	Monitored: • Quantity of used limestone; • Amount of produced lime; • Amount and CO_2 emission factor of fuel and electricity.
BASELINE SCENARIO Lime production using inefficient kilns.	
PROJECT SCENARIO Lime production using more energy-efficient kilns.	

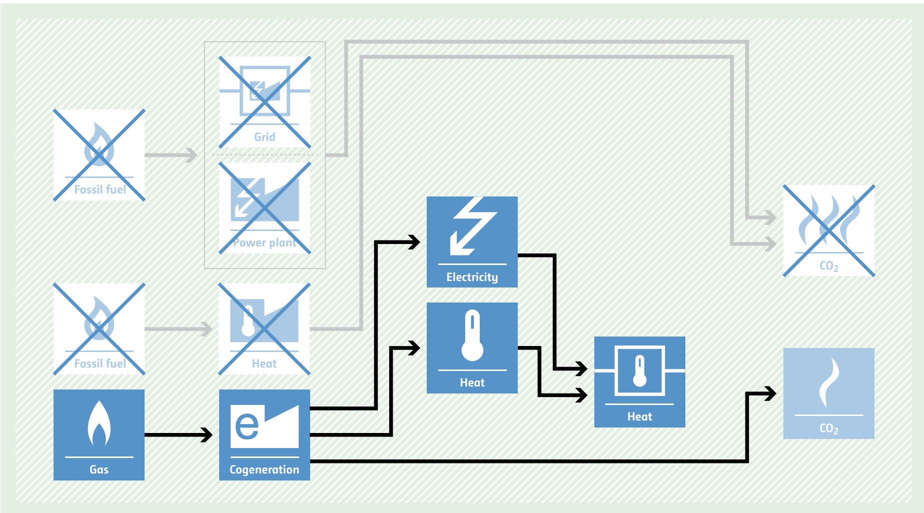
AM0107 New natural gas based cogeneration plant

Typical project(s)	Natural gas based cogeneration project supplying heat and electricity to multiple project customers.
Type of GHG emissions mitigation action	• Fuel switch/technology switch/energy efficiency. Switch to cogeneration of steam and electricity.
Important conditions under which the methodology is applicable	• The heat-to-power ratio of the project cogeneration facility shall be higher than 0.3 during the crediting period.
Important parameters	At validation: • Assumed efficiency of heat/electricity generation in the baseline cogeneration plant; • CO_2 emission factor of the fuel that would have been used in the baseline cogeneration plant.
	Monitored: • Quantity of electricity generated in the project cogeneration plant; • Quantity of heat supplied by the project activity; • Heat supplied by the heat generation facilities within the heat network; • Heat-to-power ratio of the cogeneration plant.

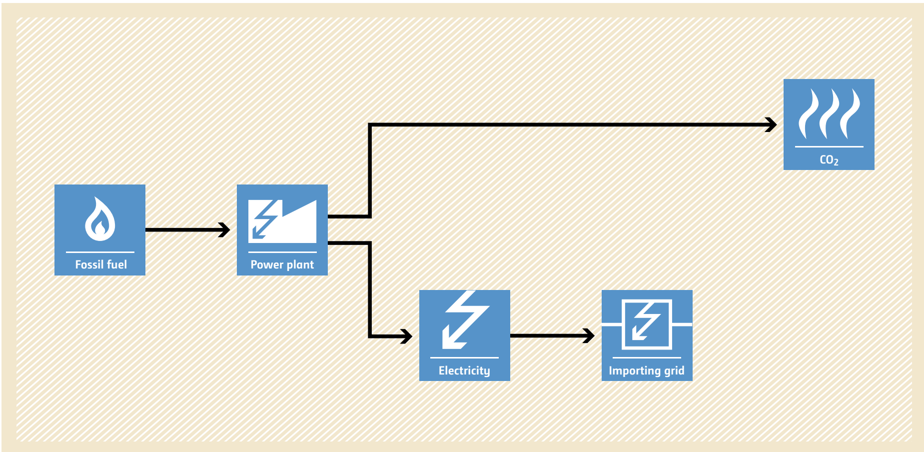
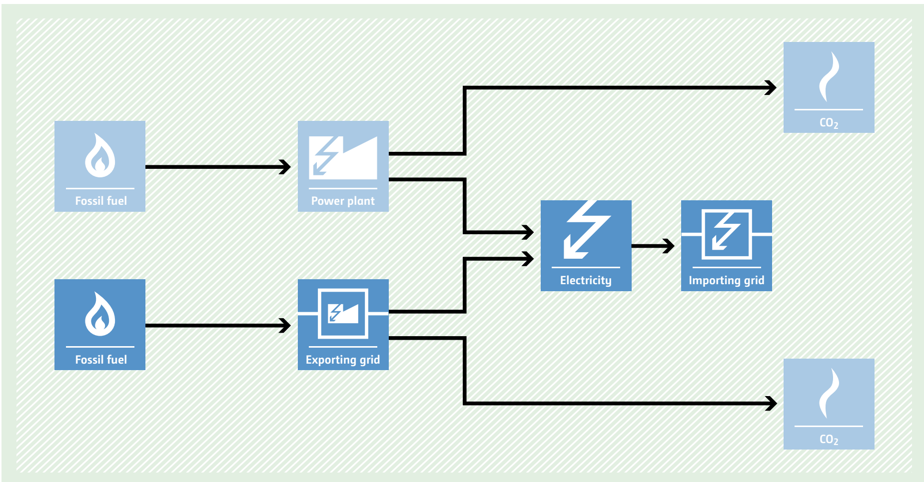
BASELINE SCENARIO
Electricity and heat would be produced by more-carbon-intensive cogeneration plant.



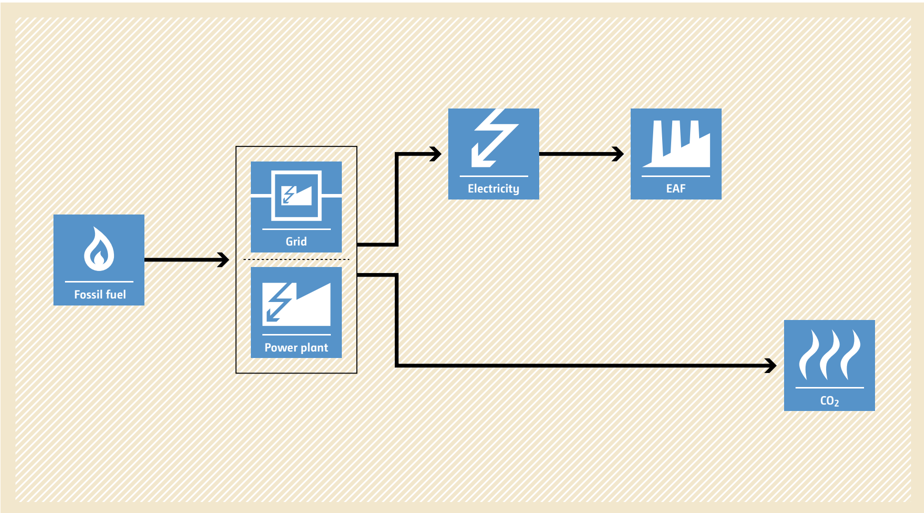
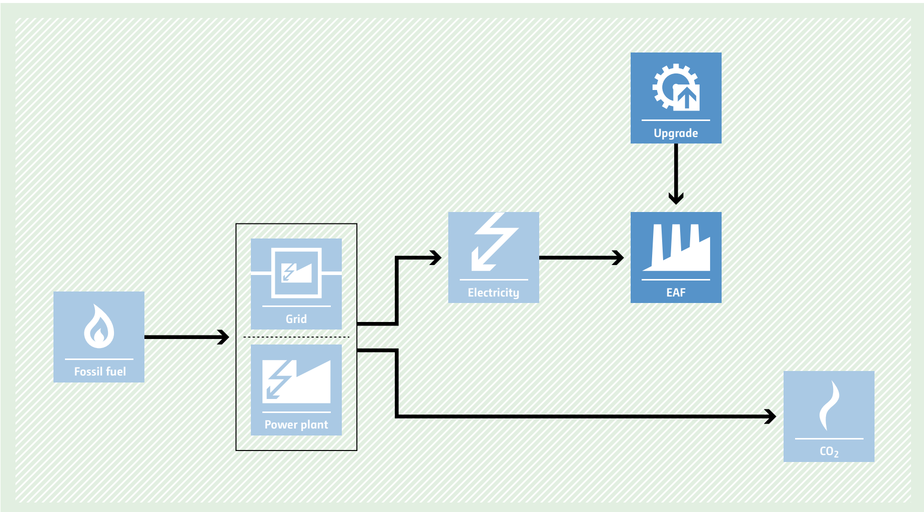
PROJECT SCENARIO
Electricity and heat are produced by natural gas based cogeneration plant.



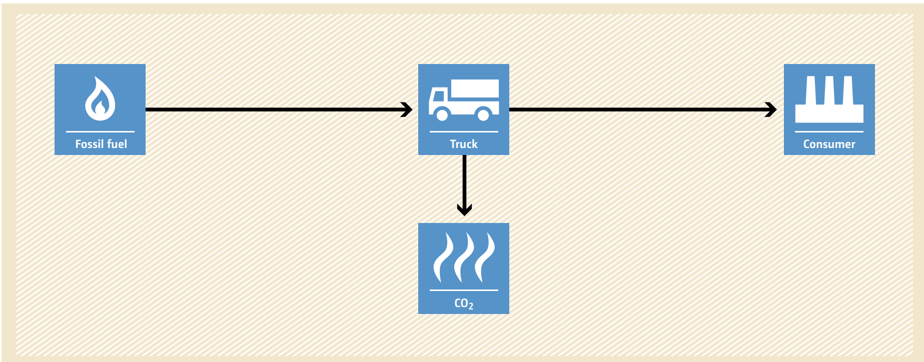
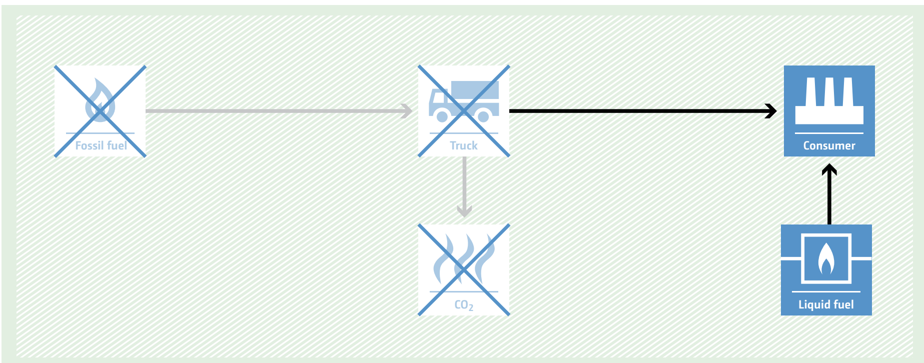
AM0108 Interconnection between electricity systems for energy exchange

Typical project(s)	Construction of one or multiple new interconnection lines to connect two systems (grids), i.e. connection of an exporting system and an importing system.
Type of GHG emissions mitigation action	• Displacement of a more-GHG-intensive output. Displacement of electricity that would be provided by more-GHG-intensive means.
Important conditions under which the methodology is applicable	• The interconnection is through the construction of new transmission lines; • The relation between annual electricity flow from the exporting system to the importing system and vice versa shall not fall below 80/20; • The exporting system has more than 15 % of reserve capacity during the most recent year prior to the start of the crediting period.
Important parameters	At validation: • Historical electricity transfers between exporting, importing and third party systems (if any).
	Monitored: • Emission factor of the exporting and importing grids; • Amount of electricity transferred between exporting and importing systems; • Amount of electricity imported from the third party system to the exporting system; • Amount of electricity exported from the importing system to the third party system; • The average quantity of SF_6 emitted from equipment installed under the project activity.
BASELINE SCENARIO No interconnection is constructed, and electricity demand of the importing system is met by power units in the importing system.	
PROJECT SCENARIO Interconnection is constructed and electricity demand of the importing system is partially met by power units from the exporting system.	

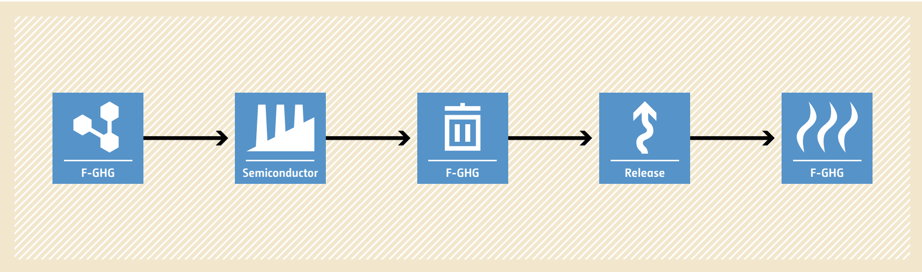
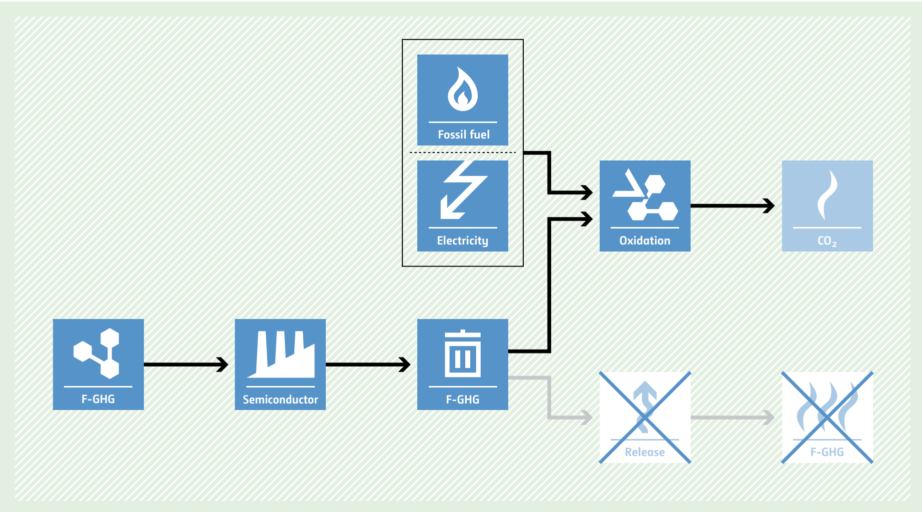
AM0109 Introduction of hot supply of direct reduced iron in electric arc furnaces

Typical project(s)	Utilizing hot direct reduced iron (HDRI) instead of cold direct reduced iron (CDRI) as raw material in existing or new electric arc furnace/s (EAFs).
Type of GHG emissions mitigation action	• Energy efficiency. Switch to more energy-efficient technology.
Important conditions under which the methodology is applicable	• The baseline is retrievable for the project activity; • The quality of output from EAF in hot DRI charging can vary by ±5% from the quality of output from EAF in cold DRI charging; • The project EAF unit(s) uses DRI from an on-site direct reduced plant (DRP) as source of iron during the crediting period.
Important parameters	At validation: • Metal production capacity of EAF.
	Monitored: • Electricity consumption in EAF and emission factors; • Electricity and fuel consumption in EAF charging system.
BASELINE SCENARIO Due to cold DRI charging, high consumption of electricity in the electric arc furnaces results in high CO_2 emissions from the combustion of fossil fuel used to produce electricity.	
PROJECT SCENARIO Due to hot DRI charging, electric arc furnaces consume less electricity, and thereby, CO_2 emissions from the combustion of fossil fuel used to produce electricity are reduced.	

AM0110 Modal shift in transportation of liquid fuels

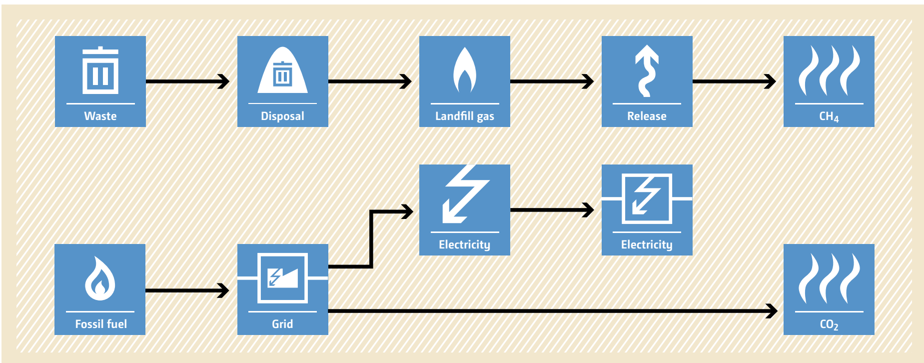
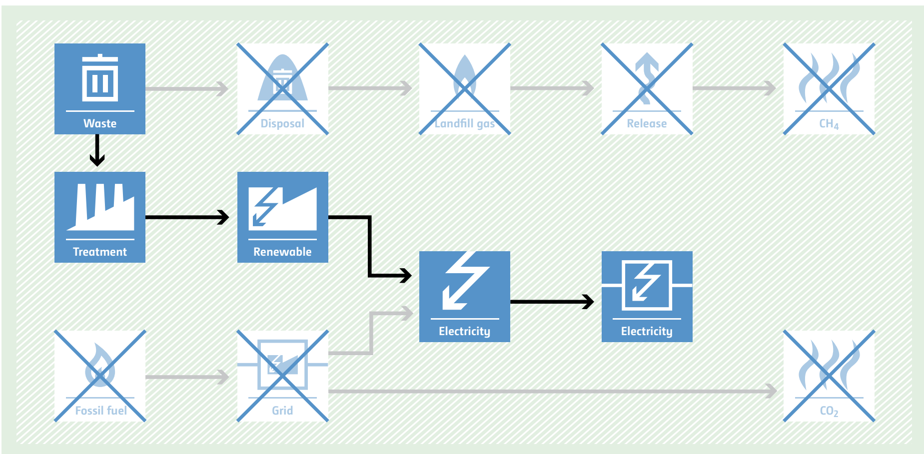
Typical project(s)	Transportation of liquid fuels using newly constructed pipeline.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of a more-carbon-intensive transportation mode.
Important conditions under which the methodology is applicable	• The pipeline network operator is the project participant; • The liquid fuel is transported using two or multiple pre-identified nodes of pipeline network; • The type of liquid fuel to be transported under the project activity is defined in the CDM-PDD at the validation of the project activity and no change of type of liquid fuel is allowed thereafter; • Operational improvements of an existing pipeline that is in operation are not applicable; • The geographic conditions of the project site permit the use of different transportation means (e.g. pipeline, trucks, etc.); • There is sufficient road transportation capacity to transport the liquid fuel by trucks at the time of implementing the CDM project activity and for the duration of the crediting period.
Important parameters	At validation: • Amount of fuel consumed by the trucks for transportation of liquid fuel in route; • Distance of the baseline route; • Amount of liquid fuel transported in trucks.
	Monitored: • Amount of liquid fuel transported by the pipeline.
BASELINE SCENARIO Liquid fuels are transported by trucks.	
PROJECT SCENARIO Liquid fuels are transported using a newly constructed pipeline.	

AM0111 Abatement of fluorinated greenhouse gases in semiconductor manufacturing

Typical project(s)	Installation of an abatement system in an existing semiconductor manufacturing facility for the abatement of fluorinated GHGs (F-GHGs) from the semiconductor etching process.
Type of GHG emissions mitigation action	• GHG destruction. Destruction of various fluorinated GHGs (CF_4, C_2F_6, CHF_3, CH_3F, CH_2F_2, C_3F8, c-C_4F_8, and SF_6).
Important conditions under which the methodology is applicable	• Existing production lines are those that do not have F-GHG-specific abatement devices before January 2012; • At least three years of historical information; • F-GHGs have been vented in the three years prior to the project activity; • No regulations mandate abatement, recycling or substitution of the project gases.
Important parameters	At validation: • Operation conditions prior to implementation of the project activity; • Historical semiconductor production.
	Monitored: • Concentration of F-GHG at the inlet and outlet of the abatement system; • Flow of the gas stream at the inlet and outlet of the abatement system; • Operation conditions; • Semiconductor production; • Market share of baseline technology; • Mass of F-GHG at the inlet and outlet of the abatement system.
BASELINE SCENARIO F-GHG is vented to the atmosphere after being used in the semiconductor etching process.	
PROJECT SCENARIO F-GHG is recovered and destroyed in a catalytic oxidation unit (abatement system) located after the etching unit.	

AM0112 Less carbon intensive power generation through continuous reductive distillation of waste

Women and children

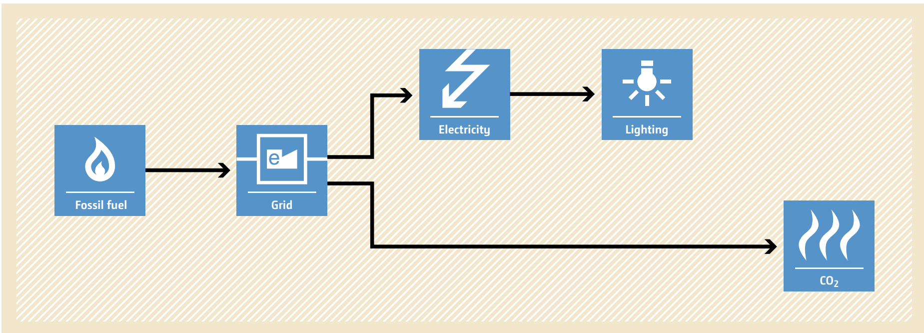
Typical project(s)	Project activities where waste is treated by applying continuous reductive distillation (CRD) technology and resultant output gases is used for power generation. The wastes covered under this methodology are municipal solid waste (MSW), biomass residues and tyres.
Type of GHG emissions mitigation action	• GHG emission avoidance; • Renewable energy. CH_4 emissions due to anaerobic decay of MSW and biomass residues are avoided by alternative waste treatment process. Tyres, biomass residues and MSW account for renewable energy.
Important conditions under which the methodology is applicable	• The project activity involves the construction of a new plant to implement CRD technology for waste treatment; • The co-products (e.g. syn gas, carbon char, emulsion fuel, fuel oil grade 2-4 etc.) of the CRD technology should be used within the project boundary; • When tyres are used as waste, only End of Life Tyres (ELT) should be used; • Neither waste nor products and by-products from the waste treatment plant established under the project activity are stored on-site under anaerobic conditions; • The project does not reduce the amount of waste that would be recycled in the absence of the project activity.
Important parameters	At validation: • Source of end of life tyres; • Source of MSW.
	Monitored: • Weight fraction of the different waste types in a sample and total amount of organic waste prevented from disposal; • Stack gas analysis; • Electricity and fossil fuel consumption in the project site; • Electricity generated by the project activity.
BASELINE SCENARIO Disposal of the waste in a landfill site without capturing landfill gas, electricity is generated by the grid.	
PROJECT SCENARIO Continuous reductive distillation technology is used to treat the waste. Electricity is generated as final product.	

AM0113 Distribution of compact fluorescent lamps (CFL) and light-emitting diode (LED) lamps to households

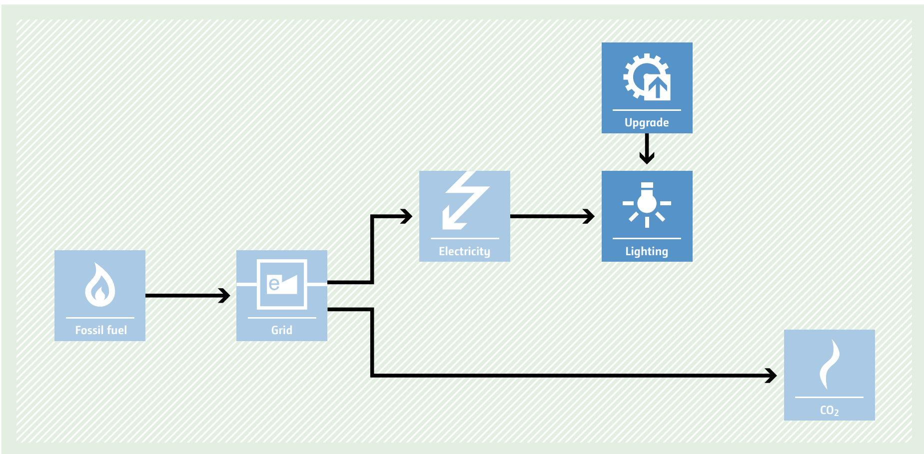
Women and children

Typical project(s)	Self-ballasted compact fluorescent lamps (CFLs) and light-emitting diode (LED) lamps are sold or distributed to households to replace less efficient lamps (e.g. incandescent lamps) in households.
Type of GHG emissions mitigation action	• Energy efficiency. Displacement of less-efficient lighting by a more-efficient technology.
Important conditions under which the methodology is applicable	• Baseline lamps replaced by the project meet the national/local lighting performance standards; • Lumen output of a project lamp shall be equal to or more than that of the baseline lamp being replaced; • Project lamps shall be marked.
Important parameters	At validation: • Rated average life of each type of project lamp.
	Monitored: • Failure rate of each type of lamp; • Scrapping/destruction of replaced baseline lamps.

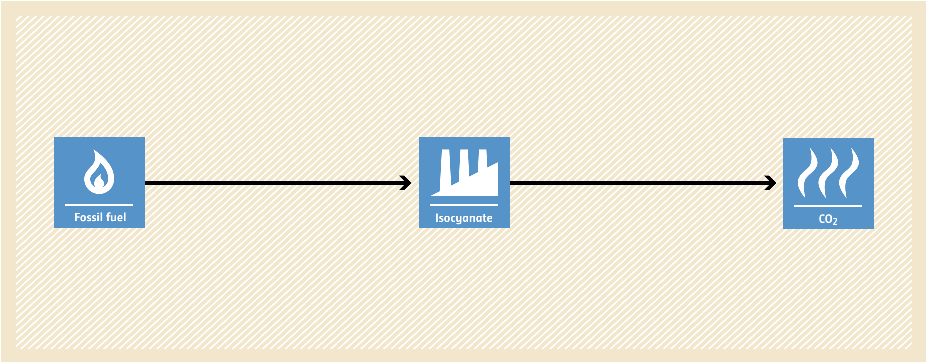
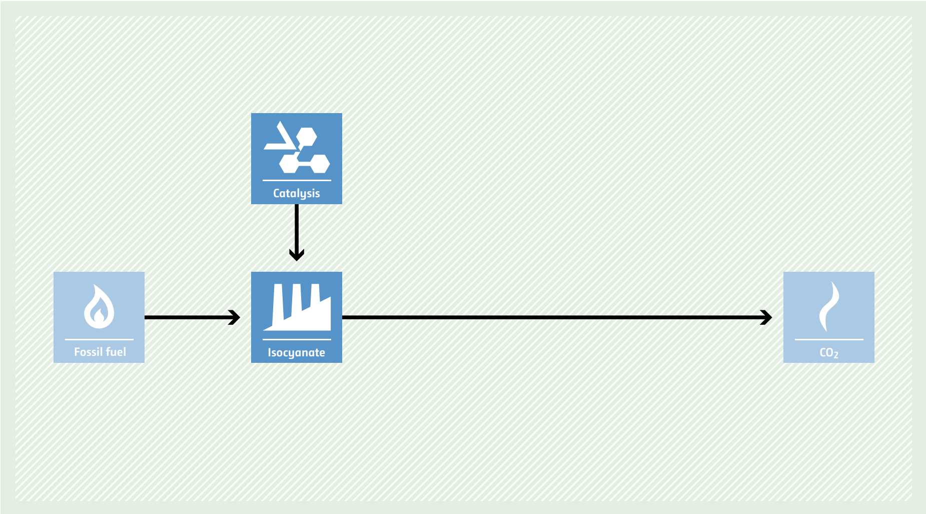
BASELINE SCENARIO
Less-energy-efficient light bulbs are used in households resulting in higher electricity demand.



PROJECT SCENARIO
More-energy-efficient lamps are used in households saving electricity and thus reducing GHG emissions.



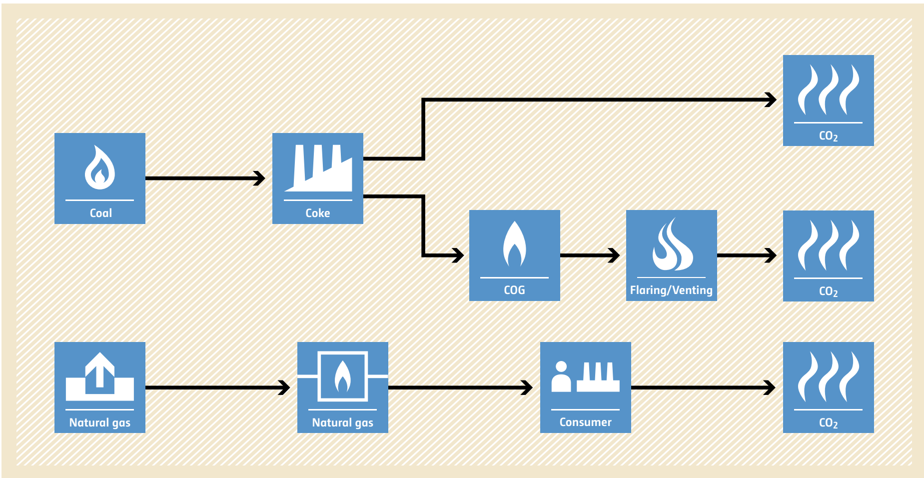
AM0114 Shift from electrolytic to catalytic process for recycling of chlorine from hydrogen chloride gas in isocyanate plants

Typical project(s)	Project activities where electrolytic process is replaced by catalytic process for the recycling of chlorine (Cl_2) from hydrogen chloride (HCl) gas in isocyanate plant.
Type of GHG emissions mitigation action	• Energy efficiency. Reduction in electricity consumption and displacement of production of electricity by fossil fuel.
Important conditions under which the methodology is applicable	• Not applicable to project activities taking place in Greenfield isocyanate plants; • The isocyanate plant, the Cl_2 plant and the electrolytic recycling facilities have operational history of at least three years prior to the starting date of the CDM project activity; • Project activities where the production ratio of HCl to isocyanate in the crediting period shall not change by more than ±10 per cent compared to the maximum ratio of the three years of the baseline.
Important parameters	At validation: • Amount and quality of HCl and isocyanate used in the baseline; • Amount of electricity consumed for the production of recycled Cl_2 in baseline.
	Monitored: • Amount and quality of HCl, Cl_2 and isocyanate in the project scenario.
BASELINE SCENARIO Continuation of current practices, i.e. continued use of electrolytic process to recycle Cl_2 from the HCl gas in isocyanate plant.	
PROJECT SCENARIO Catalytic process for the recycling of Cl_2 from HCl gas in isocyanate plant.	

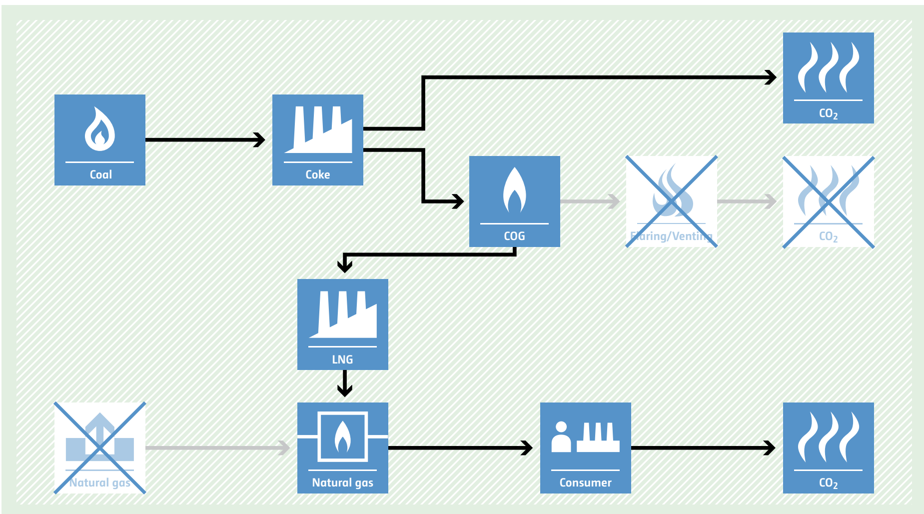
AM0115 Recovery and utilization of coke oven gas from coke plants for LNG production

Typical project(s)	Installation of a new LNG production plant producing LNG from recovered COG in existing coke plant; and project activities where some other carbon containing waste stream (i.e. exhaust from other chemical plants) is used with COG for LNG production.
Type of GHG emissions mitigation action	• Fuel switch. Reduction of GHG emissions by switching from carbon-intensive to a less-carbon-intensive fuel from waste energy.
Important conditions under which the methodology is applicable	• The COG is sourced from existing coke plant(s); • The COG generated would have been flared or vented to atmosphere in the absence of the project activity.
Important parameters	At validation: • The historical annual amount of COG generated in the existing coke production plants and vented/flared before the proposed project.
	Monitored: • Actual quantity of LNG produced in the project activity; • The mass fraction of methane in LNG produced by the project activity.

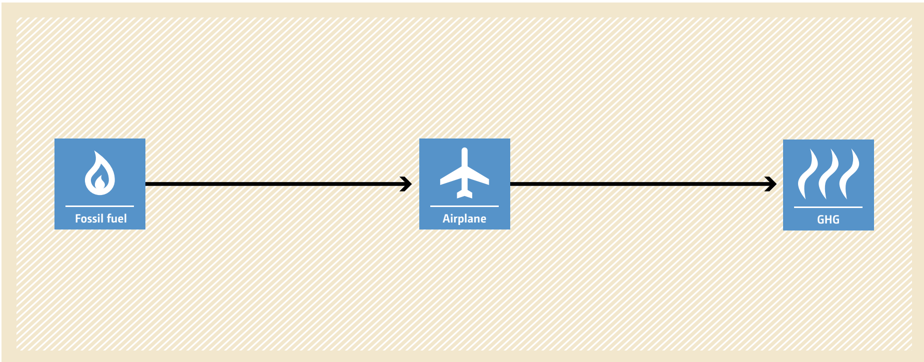
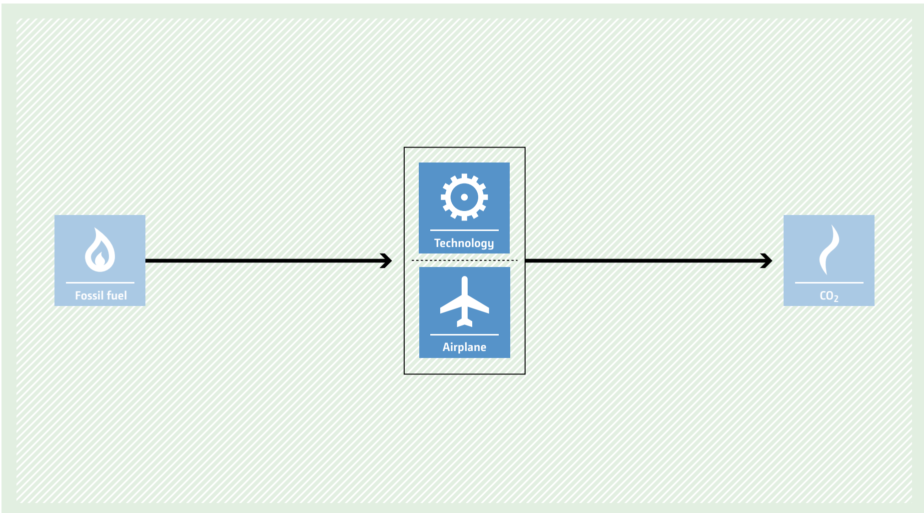
BASELINE SCENARIO
COG is flared or vented to the atmosphere.



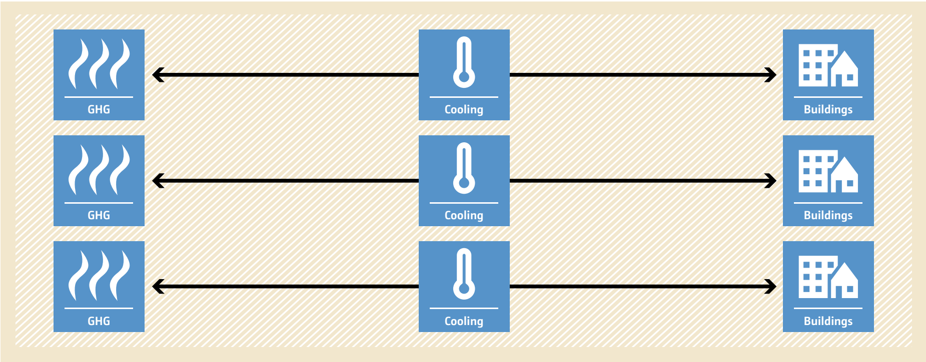
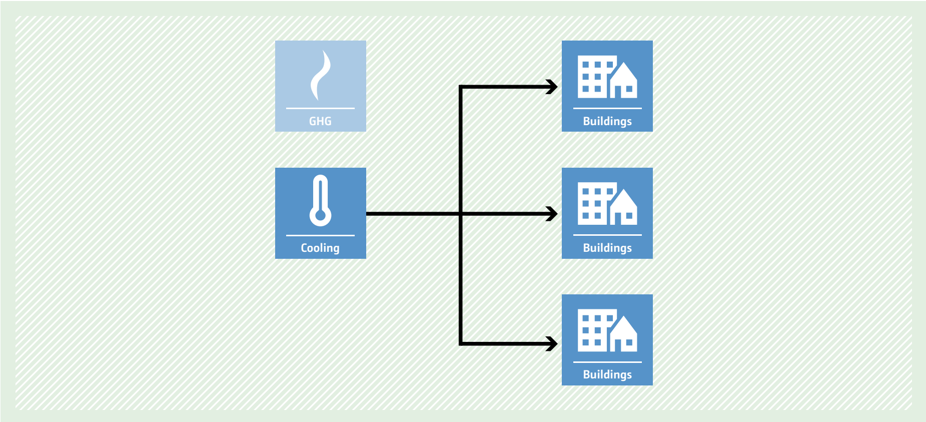
PROJECT SCENARIO
COG is recovered for the production of LNG.



AM0116 Electric taxiing systems for airplanes

Typical project(s)	Implementation and operation of e-taxi systems in airplanes.
Type of GHG emissions mitigation action	• Energy efficiency. Switch to energy-efficient technology.
Important conditions under which the methodology is applicable	• The percentage share of commercial airplanes operating an e-taxi system is equal to or less than 20 per cent in the total number of commercial airplanes registered in the host country.
Important parameters	At validation: • Specific fuel consumption by engine or APU without e-taxi during operational cycle.
	Monitored: • Specific fuel consumption by APU with e-taxi during operational cycle; • Taxiing time during operational cycle.
BASELINE SCENARIO Use of fossil fuel as an airplane implements multi-engine taxi, single-engine with auxiliary power unit (APU) running taxi, and sometimes a mix of above. In addition, tractors are always required if the airplane needs to push backwards away from its gate.	
PROJECT SCENARIO Use of less fossil fuel as an airplane implements taxiing operations with e-taxi system power by APU, while main engines are switched off.	

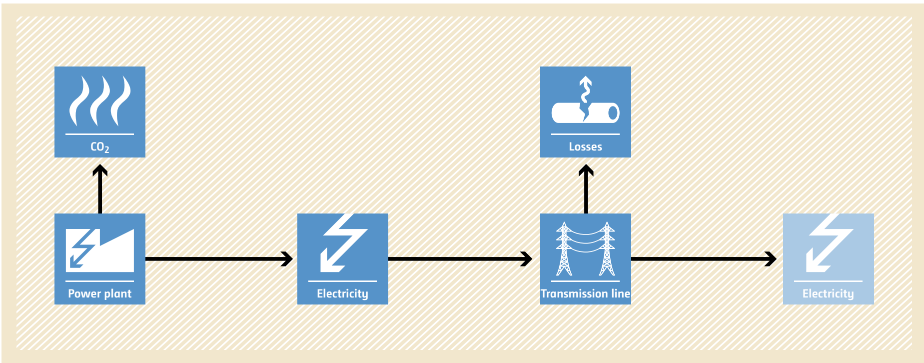
AM0117 Introduction of a new district cooling system

Typical project(s)	Introduction of a district cooling system supplying coolant from a new cooling plant(s). It replaces baseline cooling technologies.
Type of GHG emissions mitigation action	• Energy efficiency. Reduction of energy consumption by utilization of more efficient centralized cooling technologies.
Important conditions under which the methodology is applicable	• A new district cooling system(s) supplies cooling to residential and commercial consumers through a new or existing dedicated distribution network; • A new district cooling plant(s) are added to a dedicated distribution network; • Emission reductions that are gained due to the switch of the energy sources shall not be claimed by applying this methodology alone.
Important parameters	At validation: • Categories grouped by type of buildings (new/existing). For each category, all connected buildings should be clearly identified; • Baseline cooling technologies; • Emission factor associated with the production of freshwater; • Maximum designed quantity of freshwater to be used in the project system.
	Monitored: Cooling output of new district cooling plant; • Average flow rate (integrated over the year) of new district cooling plant; • Number of the operating hours of the new district cooling plant.
BASELINE SCENARIO Baseline scenario is the continuation of the cooling energy production by the baseline cooling technologies.	
PROJECT SCENARIO A district cooling system supplying coolant to buildings. Less-efficient technologies are no longer in use.	

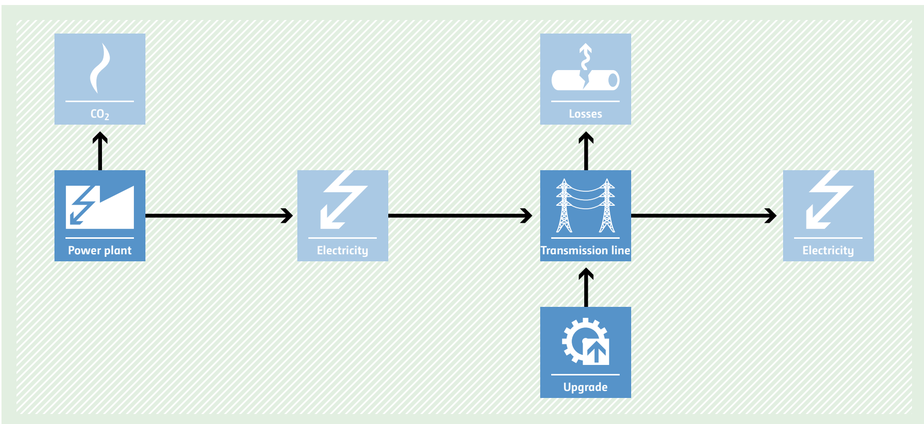
AM0118 Introduction of low resistivity power transmission line

Typical project(s)	Introduction of efficient high voltage alternating current transmission line.
Type of GHG emissions mitigation action	• Energy efficiency. GHG mitigation through energy savings in power transmission lines.
Important conditions under which the methodology is applicable	• There should not be any branching in between the proposed project transmission line; • The project transmission line possesses the same or equivalent mechanical characteristics, such as outer diameter, nominal weight and minimum tensile strength, with a variation of no more than ± 20 per cent as compared to baseline power transmission line; • (The project transmission line should have the same transmission parameters, such as voltage level, transmission capacity, distance, power transmission technology (e.g. alternating current) as compared to the baseline system.
Important parameters	At validation: • Length of the power line in the baseline scenario; • Direct current resistance of the baseline power line; • Direct current (DC) resistance of the project power line.
	Monitored: • Length of the power line in the project scenario; • Emission factor of electricity system that supplies electricity to the transmission line; • Gross electricity evacuated from the point of origin/supply of the power transmission line; • Gross electricity received at the point of receipt of the power transmission line.

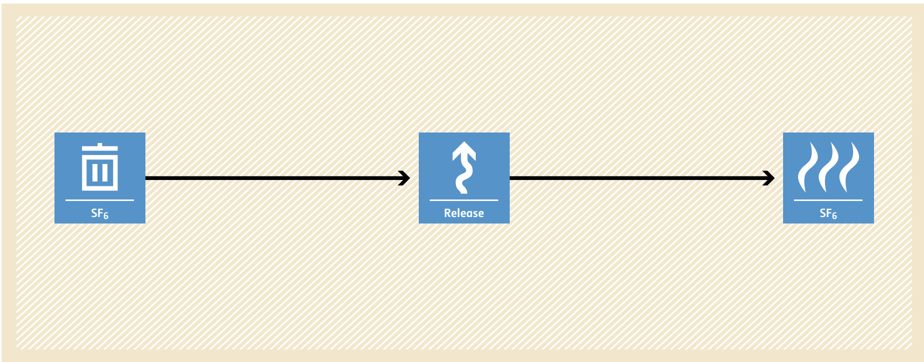
BASELINE SCENARIO
Implementation of power line based on the current trends/ practices in the region or country or continuation of power transmission using existing alternating current transmission line.



PROJECT SCENARIO
Implementation of power line using low resistivity cable.



AM0119 SF_6 emission reductions in gas insulated metal enclosed switchgear

Typical project(s)	Introduction of new, or replacement of existing gas insulated switchgear(s) (GIS) with those filled with lower content of SF_6 or SF_6 free.
Type of GHG emissions mitigation action	• GHG emission avoidance. Avoidance of SF_6 fugitive emissions in switchgears.
Important conditions under which the methodology is applicable	• The project equipment shall provide the same or better functional results as the baseline equipment; • Refilling of SF_6 is required to the baseline equipment for its proper operation during its lifetime; • Residual SF_6 of both, the baseline and the project equipment, would have the same fate at the end of its lifetime (e.g. atmosphere venting); • The type of baseline GIS shall be high voltage (> 52kV), closed pressure system for gas; • Emission reductions are claimed only by the project proponent.
Important parameters	At validation: • SF_6 content of baseline equipment; • Annual SF_6 loss rate of the equipment; • Amount of SF_6 recharged to baseline equipment.
	Monitored: • Amount of SF_6 recharged to project equipment.
BASELINE SCENARIO SF_6 that would have been recharged to the baseline equipment and emitted.	
PROJECT SCENARIO SF_6 is reduced or avoided in SF_6 free equipment or lower volume SF_6 installations