Triangulum – SCIS recipe book

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Contents

New Buildings SCIS recipe book

Highlighting essential information for the completion of SCIS design and monitoring sheets.

This guide will consist of screenshots of the SCIS platform highlighting essential information / KPIs. Essential information has been highlighted in red. Brief descriptions below each screenshot should help in providing context. If you have extra information and can complete other fields requested in the SCIS template please do so, this improves the effectiveness of the tool.

Aside from the clear boxes added it is important to know that the colour coding and XX.YY in some of the boxes does <u>not</u> relate to importance or function of the box.

When filling out the design form please report the value / demonstration building sections for what realised in the project not what was initially planned; e.g. if you initially planned for 20,000 m^2, but in the end 70,000 m^2 were built by the project, report 70,000 m^2. This principle applies to all sections, please report is what was truly deployed, it enables appropriate comparisons between projects. Complete the reference situation with the national standards for new constructions of the same type as implemented not as planned.

Reference for New Buildings is the national standard practice at the time of the design. The reference value enables the evaluation of the benefits of the design. Reference values are for national standards, or standard practice at the time of design.

Monitoring reporting: SCIS reports on different years of data, therefore it is important to use official conversion factors for the year in which the data is generated. If your data splits across two years, use the year in which most of the data is recorded.

Design sheets

TRIANGULUM Site Manchester: New Buildings (NEW BUILDING S cluster)

Design

1 General data

Number of buildings

Number of monitored buildings in this building group

Completion year of the building/building group

2 Building typology characteristics, dimensions and HTC

Building type   industrial ▼

Number of apartments

Number of inhabitants

Number of occupants

Total gross floor area in m² (external)

Total heated net floor area in m² (internal)

Total cooled net floor area in m² (internal)

Figure 1: Please complete the general data section. For building type select the most appropriate from the drop down list. Total floor area of the implemented building in the gross floor area. Some buildings are either not heated or cooled, this is why there are dashed boxes around these in case of project variance.

Figure 2: Please complete the sections for national requirements relating to the building type constructed. Provide realised HTC of the building once built. Please select appropriate information and communication technologies, and building features, if none match please leave blank.

Figure 3: This may not be applicable to your building, energy sources can be reported separately. If relevant to your building please complete: expected energy production; total investment costs (excluding VAT) for the implemented energy source; total operating costs expected, this includes fuel and maintenance; grants and subsidies, relating directly to the energy source; payback years, number of years to pay for intervention. SCIS calculates a payback period, you can provide your own payback years in the white box.

Energy Carriers - Environmental & Economic Parameters

❶ Technology boiler

Energy carrier Biomass

Building service heating (only)

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-eq/kWh		0	SenterNovem
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	1.1	Ecofys
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.04	Ecofys

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Financial

Parameter	Unit	Value	Reference	SCIS calculation
Total investment costs	€	XXXXXXXX		
Total operating costs	EUR/a			
Grants and subsidies	€	XXXXXXXX		
Total energy costs	€/a	XXXXXXXX		
Dynamic payback period	a			

ⓘ Please, provide a system of reference. This system should be based in BAU and be designed to produce the same comfort levels as the reported technology.

Figure 4: Example of integrated energy carrier. Please provide the national factors, when the building was designed, for the requested environmental parameters. If these are not known the standard values from norm will be used in SCIS calculations. Consumption is the amount of energy required to run the system, provide an estimated consumption based on the implemented design. Financial parameters: provide all requested costs for the intervention and, if available, for the standard system at the time of design, e.g. intervention is air source heat pumps, during design (e.g. 2015) condensing boilers were the national standard, report the cost of the heat pump intervention (value), and the expected cost to implement the condensing boiler (reference). Dynamic payback period can be entered manually if no reference data is available.

5 KPIs

Technical KPIs

Title	Unit	Demonstration building / Group of buildings	Savings compared to reference building	Reference	SCIS calculation
Total Final Energy Demand	kWh/m2a	XXXXXX			
Final Energy Demand for Space Heating	kWh/m2a	XXXXXX			
Final Energy Demand for Cooling	kWh/m2a	XXXXXX			
Final Energy Demand for Domestic Hot Water	kWh/m2a	XXXXXX			
Final Energy Demand Electricity	kWh/m2a	XXXXXX			

Environmental KPIs

Title	Unit	Value (calculated)	Value (optional - overrules calculation)	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a		XXXXXX		
Total Primary Energy Demand	kWh/m2a		XXXXXX		
Total Share of Local Renewable Energy	%		XX		

Economic KPI

Title	Unit	Baseline situation	Demonstration Building/ Building group	SCIS calculation
Total Investments (excl. VAT)	€	XXXXXXXX		
Total additional Energy Related Investments	€	XXXXXXXX		
Total Operating costs	€/a	XXXXXXXX		
Grants	€	XXXXXXXX		
Total Energy cost per year	€/a	XXXXXXXX		
Dynamic Payback Period	a			
Return on Investment	%	XX		

*Figure 5: KPI's are the most critical pieces of information for the SCIS system to operate. For reporting domestic hot water, please report the energy demand for hot water, 'domestic' is a relic of the system and can be ignored. Environmental KPI's are calculated by the SCIS system but can be overridden by your own calculated values; total share of local renewable energy is the amount of energy supplied by renewables for the building. E.g. A building consumes 100 kWh / m² / yr without PV installed. There is a PV system on the building producing 40 kWh / m² / yr (m² is for the building not system). The overall performance is therefore 60 kWh / m² / a. The total share of local renewable energy **is** 40%. For the baseline it is the national standard for share of local renewables required for new builds.*

Figure 6: If you have citizens engaged is includes the number of occupants.

Monitoring sheets

1 General data

Number of buildings

Number of monitored buildings in this building group

Completion year of the building/building group

2 Building typology characteristics, dimensions and HTC

Building type | industrial ▼

Number of apartments

Number of inhabitants

Number of occupants

Total gross floor area in m² (external)

Total heated net floor area in m² (internal)

Total cooled net floor area in m² (internal)

Figure 7: All this data has been completed when filling in the design form, no alterations required.

③ Envelope - Heat Transfer Coefficient (U-Value)

Title	Unit	HTC according to national requirements	HTC realised for the demonstration buildings
Year - National Requirements			
overall average HTC of the building envelope surfaces	W/(m²K)		
average HTC roof	W/(m²K)		
average HTC facade/external walls	W/(m²K)		
average HTC ground floor	W/(m²K)		
average HTC windows (frame and pane)	W/(m²K)		
average energy transmittance of windows (g-value)	%	xx	

Information & Communication Technologies

Select Some Options

Building features Select Some Options

ⓘ Please specify if the following building features were used in this building / group of buildings.

Figure 9: All values in the envelope section will have been completed in the design form, no alterations required.

④ Parameters - Technologies & Energy Carriers

Renewable Energy Sources - Environmental & Economic Parameters

① **Installed Renewable Energy Source** photovoltaic

Electricity production (in kWh/a)

Financial data for the Renewable energy source

Total Investment costs (in €)

Total Operating costs (in €/a)

Grants and subsidies (in €)

Payback (years): calculated

Payback (years)

Figure 8: This may not be applicable to your building, energy sources can be reported separately. If relevant to your building for the monitoring year please complete: energy production, this is the amount of energy produced in the reporting year; total operating costs, this includes fuel and maintenance. SCIS calculates a payback period, you can provide your own payback years in the white box.

Energy Carriers - Environmental & Economic Parameters

1 **Technology** boiler

Energy carrier   Biomass

Building service   heating (only)

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-eq/kWh		0	SenterNovem
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	1.1	Ecofys
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.04	Ecofys

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Financial

Parameter	Unit	Value	Reference	SCIS calculation
Total investment costs	€	XXXXXXXX		
Total operating costs	EUR/a			
Grants and subsidies	€	XXXXXXXX		
Total energy costs	€/a	XXXXXXXX		
Dynamic payback period	a			

ⓘ Please, provide a system of reference. This system should be based in BAU and be designed to produce the same comfort levels as the reported technology.

Figure 10: Example of integrated energy carrier. Please provide the appropriate years national factors for the requested environmental parameters if available, if these are not known the standard values from norm will be used in SCIS calculations. Consumption is the amount of energy required to run the system, provide the monitored years data. Financial parameters: provide the operating costs and energy costs for the monitored year.

5 KPIs

Technical KPIs

Title	Unit	Demonstration building / Group of buildings	Savings compared to reference building	Reference	SCIS calculation
Total Final Energy Demand	kWh/m2a	XXXXXX			
Final Energy Demand for Space Heating	kWh/m2a	XXXXXX			
Final Energy Demand for Cooling	kWh/m2a	XXXXXX			
Final Energy Demand for Domestic Hot Water	kWh/m2a	XXXXXX			
Final Energy Demand Electricity	kWh/m2a	XXXXXX			

Environmental KPIs

Title	Unit	Value (calculated)	Value (optional - overrules calculation)	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a		XXXXXX		
Total Primary Energy Demand	kWh/m2a		XXXXXX		
Total Share of Local Renewable Energy	%		XX		

Economic KPI

Title	Unit	Baseline situation	Demonstration Building/ Building group	SCIS calculation
Total Investments (excl. VAT)	€	XXXXXXXX		
Total additional Energy Related Investments	€	XXXXXXXX		
Total Operating costs	€/a	XXXXXXXX		
Grants	€	XXXXXXXX		
Total Energy cost per year	€/a	XXXXXXXX		
Dynamic Payback Period	a			
Return on Investment	%	XX		

Figure 11: KPI's are the most critical pieces of information for the SCIS system to operate; please update the technical KPI's, environmental KPI's (if you would like to override SCIS calculation), and economic KPI's for the monitoring year. 'Domestic' can be ignored, report energy for hot water. Report monitored years building energy use total share of local renewable energy. Reference values are what you would expect from a building built to building code or regulation, if unavailable or not mentioned in the building code leave blank e.g. local renewable energy. The building code may refer to the building energy consumption and not include renewables.

Social KPIs

Citizens directly involved	
Number of jobs created	

Figure 12: If you have the number of citizens engaged enter them here, report aggregate figures up to and including the year monitored.

Energy Systems SCIS recipe book

This guide will consist of screenshots of the SCIS platform highlighting essential information / KPIs. Essential information has been highlighted in red, some boxes have dashed boundaries this describes essential but only if relevant to the project. Brief descriptions below each screenshot should help in providing context. If you have extra information and can complete other fields requested in the SCIS template please do so, this improves the effectiveness of the tool.

Aside from the clear boxes added it is important to know that the colour coding and XX.YY in some of the boxes does not relate to importance or function of the box.

When filling out the design form please report the value / demonstration sections for what realised in the project not what was initially planned; e.g. if you initially planned for 20,000 m^2 covered, but in the end 70,000 m^2 were deployed by the project, in design report 70,000 m^2. This principle applies to all sections, please report what was truly deployed, it enables appropriate comparisons between projects. For reference or baseline use standard national technologies for achieving result e.g. heating, where national standard is condensing boilers, use condensing boilers as the baseline.

Monitoring reporting: SCIS reports on different years of data, therefore it is important to use official conversion factors for the year in which the data is generated. If your data splits across two years, use the year in which most of the data is recorded.

Design

Sustainable Energy – Sorption Chiller example

1. General data

Date of commissioning: 2019

2. Interventions

Interventions

Title	Unit	value
maximum thermal cooling output	[kWth]	xxxxxx
set temperature of cooling energy input into the building's cooling circuit	[°C]	xx
energy efficiency ratio (EER)	[%]	

Figure 13: Provide general data, and intervention values expected or planned from the design of the implemented intervention.

3 Parameters - Technologies & Energy Carriers

Energy Carriers - Environmental & Economic Parameters

1 Energy carrier Hydropower

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	24	Covenant of Mayor
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	1.01	IINAS
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.06	Eurostat

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Figure 14: Provide available environmental factors, and the year they are provided for, the year should be the design year. Final energy input is the energy required to run the system once implemented, provide system performance of the implemented design as expected.

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4 KPIs

Technical KPIs

Title	Unit	Value
Total Energy Generation [output] - Cooling	kWh/a	xxxxxx
Energy carrier for peak load supply	kWh/a	xxxxxx
Auxiliary energy used to drive the chiller (electricity)	kWh/a	xxxxxx

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		xxxxxx		

ℹ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	5000000		
Grants	€	xxxxxxxx		
Energy sales revenues for electricity	€/a	xxxxxxxx		
Energy sales revenues for delivered heating energy	€/a	xxxxxxxx		
Energy sales revenues for delivered cooling energy	€/a	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		
Total energy cost Hydropower	€/a	xxxxxxxx		

Figure 15: Provide the expected technical KPIs for the implemented design. Provide environmental and economic KPI's alongside available KPI's for the reference system (standard / national practice) at the time of design, building contractors should be able to supply these, if it is difficult to gather please leave blank.

Social KPIs

Citizens directly involved

Number of jobs created

Gross floor area in m² served by the new system in m2

Figure 16: Provide floor area served once implemented.

Energy storage - electrical specific

1 General data

Date of commissioning [   ]

Figure 17: Provide commissioning date.

Technical KPIs

Title	Unit	Value
Maximum charging/discharging power	kW	
Storage volume	m³	
Electrical storage capacity	kWh	
Roundtrip efficiency	%	xx
Energy density	kWh/kg	
Discharge time (in use)	hr	
Cycles in lifetime	cycles	

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		xxxxxx		

❶ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	xxxxxxxx		
Grants	€	xxxxxxxx		
Energy sales revenues for electricity	€/a	xxxxxxxx		
Energy sales revenues for delivered heating energy	€/a	xxxxxxxx		
Energy sales revenues for delivered cooling energy	€/a	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		

Figure 18: Provide all technical KPI's for design of implemented storage. Volume is the volume of the batteries; energy density is the energy density of the batteries. Provide environmental KPI's for the implemented design, this is the output of CO_2 emissions from operation and the energy demand of the system expected based on design. Provide all relevant economic KPI's expected based on the implemented design, there may not be heating or cooling delivered, energy saved is a form of revenue stream. For the reference value provide the standard / national practice during the year of design for the technology that would deliver an equivalent service, if no such standards exist leave blank.

Figure 19: Provide the floor area served once implemented.

Energy generation – boiler cluster

1 General data

Date of commissioning [   ]

2 Interventions

Interventions

Title	Unit	value
Maximum thermal output of plant excluding peak load boiler	kWth	[ ]
set temperature of heating energy output into district heating network	°C	[ ]

3 Parameters - Technologies & Energy Carriers

Energy Carriers - Environmental & Economic Parameters

1 Energy carrier Biowaste

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	98	as for biogas (lack o
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	2.71	as for biogas (lack o
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.05	as for biogas (lack o

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Figure 20: Provide general data, intervention data expected from implemented design (calculated) for the technology once deployed, and national environmental KPIs. If no environmental KPI's provided SCIS will use its own data. Final energy input is the energy required to run the system once implemented, provide system performance expected of the implemented design.

4 KPIs

Technical KPIs

Title	Unit	Value
Total Energy Generation [output] - Heat	kWh/a	xxxxxx
Energy carrier for peak load supply	kWh/a	xxxxxx

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		xxxxxx		

❸ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	xxxxxxxx		
Grants	€	xxxxxxxx		
Energy sales revenues for electricity	€/a	xxxxxxxx		
Energy sales revenues for delivered heating energy	€/a	xxxxxxxx		
Energy sales revenues for delivered cooling energy	€/a	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		
Total energy cost Biowaste	€/a	xxxxxxxx		

Figure 21: KPI's are the most important section for SCIS, provide all available KPI's for the intervention. Reference values are the standard / national practice alternative at the time of the design of the intervention. Reference for cost of biowaste would be the equivalent cost of fuel for the standard technology to deliver the same heating as the implemented system.

Social KPIs

Citizens directly involved

Number of jobs created

Gross floor area in m² served by the new system in m2

Figure 22: Provide floor area served.

Waste heat cluster

1 General data

Source of waste heat *(required)*	Other ▾
Other source of waste heat	Sewage and Agri waste
Industrial sector *(required)*	Other industry ▾
Other industry	Agriculture
Date of commissioning	

2 Interventions

Interventions

Title	Unit	value
maximum thermal network connection power	kWth	
set temperature of heating energy output into district heating network	°C	
set input heat temperature	°C	

Figure 23: Complete the general info, other is highlighted as necessary if you cannot categorise your system or fuel source from the available selection leave blank. Interventions: provide the expected (from design calculations) figures for the final implamented intervention.

③ Parameters - Technologies & Energy Carriers

Energy Carriers - Environmental & Economic Parameters

① Energy carrier   Waste heat

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	0	SCIS estimation for
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	1	SCIS estimation for
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.03	Ecofys

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Figure 24: Provide available environmental factors, and the year they are provided for, the year should be the design year. Final energy input is the energy required to run the system, provide system performance, both these should be the vales expected based on the design.

④ KPIs

Technical KPIs

Title	Unit	Value
The yearly amount of thermal energy produced/provided by the new system	kWh/a	XXXXXX

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		XXXXXX		

❶ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Figure 25: Provide expected yearly thermal energy provided/produced based on the implemented deployed system. Provide the environmental KPI's for your system and a reference system (standard/national practice) at the time of system design e.g. condensing boiler.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	XXXXXXXX		
Grants	€	XXXXXXXX		
Energy sales revenues for electricity	€/a	XXXXXXXX		
Energy sales revenues for delivered heating energy	€/a	XXXXXXXX		
Energy sales revenues for delivered cooling energy	€/a	XXXXXXXX		
Total Operating costs	€/a	XXXXXXXX		
Dynamic Payback Period	a			
Return on Investment	%	XX		
Total energy cost Waste heat	€/a	XXXXXXXX		

Social KPIs

Citizens directly involved

Number of jobs created

Gross floor area in m² served by the new system in m2

Figure 26: Provide economic KPI's expected for the implemented system, and available KPI's for the reference system (standard / national practice) at the time of design. Provide the floor area served once implemented.

Monitoring

Sustainable energy – sorption chiller example

1 General data

Date of commissioning	2019

2 Interventions

Interventions

Title	Unit	value
maximum thermal cooling output	[kWth]	xxxxxx
set temperature of cooling energy input into the building's cooling circuit	[°C]	xx
energy efficiency ratio (EER)	[%]	

Figure 27: General data does not change, interventions are the data for the monitored year.

③ Parameters - Technologies & Energy Carriers

Energy Carriers - Environmental & Economic Parameters

① Energy carrier   Hydropower

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	24	Covenant of Mayor
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	1.01	IINAS
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.06	Eurostat

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Figure 28: Provide monitored years environmental factors. Provide the final energy input is the energy required to run the system, and system performance for the monitored year.

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4 KPIs

Technical KPIs

Title	Unit	Value
Total Energy Generation [output] - Cooling	kWh/a	XXXXXX
Energy carrier for peak load supply	kWh/a	XXXXXX
Auxiliary energy used to drive the chiller (electricity)	kWh/a	XXXXXX

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		XXXXXX		

ℹ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	5000000		
Grants	€	XXXXXXXX		
Energy sales revenues for electricity	€/a	XXXXXXXX		
Energy sales revenues for delivered heating energy	€/a	XXXXXXXX		
Energy sales revenues for delivered cooling energy	€/a	XXXXXXXX		
Total Operating costs	€/a	XXXXXXXX		
Dynamic Payback Period	a			
Return on Investment	%	XX		
Total energy cost Hydropower	€/a	XXXXXXXX		

Figure 29: Provide the monitored years technical, environmental, and economic KPI's. The reference system is not updated from design.

Social KPIs

Citizens directly involved

Number of jobs created

Gross floor area in m² served by the new system in m2

Figure 30: Provide aggregate citizens engaged, and jobs created up to and including the monitored year, if applicable or measurable.

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Electrical energy storage specific

Figure 31: Commissioning data completed in design sheet

Technical KPIs

Title	Unit	Value
Maximum charging/discharging power	kW	
Storage volume	m³	
Electrical storage capacity	kWh	
Roundtrip efficiency	%	xx
Energy density	kWh/kg	
Discharge time (in use)	hr	
Cycles in lifetime	cycles	

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		xxxxxx		

ⓘ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	xxxxxxxx		
Grants	€	xxxxxxxx		
Energy sales revenues for electricity	€/a	xxxxxxxx		
Energy sales revenues for delivered heating energy	€/a	xxxxxxxx		
Energy sales revenues for delivered cooling energy	€/a	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		

Figure 32: Provide the monitored years technical KPI's, they may be the same as in design however if they have changed, due to e.g. battery degradation, please update for the monitoring year. Provide environmental KPI's for the monitored year. Provide monitored years costs and revenues, there may not be heating or cooling delivered, energy saved is a form of revenue stream. Reference values stay the same.

Social KPIs

Citizens directly involved

Number of jobs created

Gross floor area in m² served by the new system in m2

Figure 33: Provide the aggregate citizens engaged, and jobs created by the intervention up to and including the monitoring year.

Energy generation – boiler cluster

1 General data

Date of commissioning	

2 Interventions

Interventions

Title	Unit	value
Maximum thermal output of plant excluding peak load boiler	kWth	
set temperature of heating energy output into district heating network	°C	

3 Parameters - Technologies & Energy Carriers

Energy Carriers - Environmental & Economic Parameters

1 Energy carrier Biowaste

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	98	as for biogas (lack o
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	2.71	as for biogas (lack o
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.05	as for biogas (lack o

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Figure 34: General data do not change. Provide intervention data for the monitored year. Provide monitored years national environmental KPIs. If no environmental KPI's provided SCIS will use design data. Provide the monitored years final energy input. (energy to run the system), and the years system performance.

KPIs

Technical KPIs

Title	Unit	Value
Total Energy Generation [output] - Heat	kWh/a	xxxxxx
Energy carrier for peak load supply	kWh/a	xxxxxx

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		xxxxxx		

ⓘ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	xxxxxxxx		
Grants	€	xxxxxxxx		
Energy sales revenues for electricity	€/a	xxxxxxxx		
Energy sales revenues for delivered heating energy	€/a	xxxxxxxx		
Energy sales revenues for delivered cooling energy	€/a	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		
Total energy cost Biowaste	€/a	xxxxxxxx		

Figure 35: Provide the monitored years data for all highlighted KPI's. Reference values do not change, some energy sales may not be applicable to your project, if not applicable leave blank.

Social KPIs

Citizens directly involved

Number of jobs created

Gross floor area in m² served by the new system in m2

Figure 36: Provide aggregate citizens engaged, and jobs created from the project up to and including the monitored year.

32

Waste heat cluster

1 General data

Source of waste heat *(required)*	Other ▼
Other source of waste heat	Sewage and Agri waste
Industrial sector *(required)*	Other industry ▼
Other industry	Agriculture
Date of commissioning	

2 Interventions

Interventions

Title	Unit	value
maximum thermal network connection power	kWth	
set temperature of heating energy output into district heating network	°C	
set input heat temperature	°C	

Figure 37: General info is already complete. Interventions: provide the measured figures for the monitored year.

③ Parameters - Technologies & Energy Carriers

Energy Carriers - Environmental & Economic Parameters

① Energy carrier Waste heat

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	0	SCIS estimation for
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	1	SCIS estimation for
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.03	Ecofys

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Figure 38: Provide the monitored years national available environmental factors. Final energy input is the energy required to run the system during the monitored year, provide monitored years system performance.

④ KPIs

Technical KPIs

Title	Unit	Value
The yearly amount of thermal energy produced/provided by the new system	kWh/a	XXXXXX

Environmental KPIs

Title	Unit	Demonstration power plant (calculated)	Demonstration power plant	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a				
Total Primary Energy Demand	kWh/a		XXXXXX		

❶ Please, provide the savings of your system compared with a system of reference. This system should be based in BAU (e.g. gas boiler for heating) and be designed to produce the same output as the reported technology (e.g. the input should be different due to different performance ratios). If no savings are entered, SCIS provides calculation of savings from BAU baseline.

Figure 39: Provide the monitored year's thermal energy produced by the deployed system. Provide the monitored years environmental KPI's.

Economic KPI for the Energy System Integration Unit

Title	Unit	Value	Reference value	SCIS calculation
Total Investments (excl. VAT)	€	xxxxxxxx		
Grants	€	xxxxxxxx		
Energy sales revenues for electricity	€/a	xxxxxxxx		
Energy sales revenues for delivered heating energy	€/a	xxxxxxxx		
Energy sales revenues for delivered cooling energy	€/a	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		
Total energy cost Waste heat	€/a	xxxxxxxx		

Social KPIs

Citizens directly involved

Number of jobs created

Gross floor area in m² served by the new system in m2

Figure 40: Provide the monitored year's economic KPI's, reference data do not change. Provide aggregate citizens engaged up to and including monitored year citizens engaged is the number of people using or interacting with the intervention e.g. EV drivers trained, occupants of a building. Jobs created is the aggregate number of permanent jobs created as a result of the project from design up to and including the monitoring year.

ICT SCIS recipe book

Highlighting essential information for the completion of SCIS design and monitoring sheets.

This guide will consist of screenshots of the SCIS platform highlighting essential information / KPIs. Essential information has been highlighted in red. Brief descriptions below each screenshot should help in providing context. If you have extra information and can complete other fields requested in the SCIS template please do so, this improves the effectiveness of the tool.

Aside from the clear boxes added it is important to know that the colour coding and XX.YY in some of the boxes does not relate to importance or function of the box.

When filling out the design form please complete the baseline situation and the after intervention. The after intervention needs to be what was finally implemented in the project. E.g. if you initially planned for 3 smart lampposts, but in the end 5 smart lampposts were deployed by the project, report 5 in the 'After Intervention' box for that section; this applies to all sections after intervention is what was truly deployed.

Monitoring reporting: SCIS reports on different years of data, therefore it is important to use official conversion factors for the year in which the data is generated. If your data splits across two years, use the year in which most of the data is recorded.

Design sheets

1 **General Data**

Description of the intervention	The data visualization platform is a collection of tools to visualize data from a range of sources in different ways (€
Thematic field of ICT Intervention	City level ▼
Type of ICT Intervention (City level)	Urban data platform ▼
Date of commissioning	2017

2 **KPIs**

Demand Side Management

Title	Unit	Baseline situation	After intervention	Improvement (%)
Reliability in terms of power interruptions	number/a			
Power Quality and Quality of Supply (DSO+TSO): Time needed for awareness of grid faults	minutes			

Infrastructure

Title	Unit	Baseline situation	After intervention	Improvement (%)
Amount of smart lampposts	number			

Figure 41: Complete the general data section, this is where you should provide a brief description of the project. Many of the KPI's may not be relevant to your project.

Focus on Energy Savings

Title	Unit	Baseline situation	After intervention	Improvement (%)
Flexibility from energy players by increase of load capacity participating in demand side management	MW			
Energy price (averaged over a year)	€/kWh	XX.ZZ		
Peak load level	MW			
RES and DER hosting capacity	MW			
Hosting capacity for electric vehicles and other new loads	MW			

Consumers engagement

Title	Unit	Baseline situation	After intervention	Improvement (%)
Number of end users involved	#			
Number of people with increased ability to manage their energy consumption	#			

Environmental KPI

Title	Unit	Baseline situation	After intervention	Savings (%)
Total CO2 Emissions	kgCO2eq/a			
Total Primary Energy Demand (due to the ICT measure implemented)	kWh/a	XXXXXX		

Figure 42: Energy price will be for the institution/city/region. Total CO₂ emissions are the expected savings gained from the implemented design, if no savings leave blank. Consumers engaged is the expected number. Total energy demand is the energy expected to be used by the intervention based on the design, if this data is not available leave blank.

Economic KPI

Title	Unit	Intervention
Total Investments (excl. VAT)	€	xxxxxxxx
Grants	€	xxxxxxxx
Annual value of improvements	€/a	xxxxxxxx
Total Operating costs	€/a	xxxxxxxx
Dynamic Payback Period	a	
Return on Investment	%	xx

Social KPIs

Citizens directly involved	
Number of jobs created	

Figure 43: All Economic KPI's should be available please report the expected values based on the implemented design. Savings from the intervention are included in the annual value of improvements, if factors affecting are complex to report, report what is available or leave blank. The dynamic payback period is calculated by SCIS but can be over-written. ROI is also calculated by SCIS but can be manually overridden. Often there are no savings or payback periods available. For social KPI's this would be number of inhabitants in homes with the intervention (for citizens engaged this is the same value as the number of end users), number of employees working on maintaining the intervention. There is limited scope in SCIS to report soft impacts or stories, these should be reported separately either through the M60 report or via alternative avenues.

Monitoring Sheets

1 General Data

Description of the intervention	The data visualization platform is a collection of tools to visualize data from a range of sources in different ways (e
Thematic field of ICT Intervention	City level ▼
Type of ICT Intervention (City level)	Urban data platform ▼
Date of commissioning	2017

2 KPIs

Demand Side Management

Title	Unit	Baseline situation	After intervention	Improvement (%)
Reliability in terms of power interruptions	number/a			
Power Quality and Quality of Supply (DSO+TSO): Time needed for awareness of grid faults	minutes			

Infrastructure

Title	Unit	Baseline situation	After intervention	Improvement (%)
Amount of smart lampposts	number			

Figure 44: The General Data section is complete already in the monitoring forms (copy of design). Many of the KPI's may not be relevant to your project, they are not highlighted as essential, as essentials should apply to all projects. Please update any KPI's you are measuring in the after intervention section, do not change the baseline.

Focus on Energy Savings

Title	Unit	Baseline situation	After intervention	Improvement (%)
Flexibility from energy players by increase of load capacity participating in demand side management	MW			
Energy price (averaged over a year)	€/kWh	xx.zz		
Peak load level	MW			
RES and DER hosting capacity	MW			
Hosting capacity for electric vehicles and other new loads	MW			

Consumers engagement

Title	Unit	Baseline situation	After intervention	Improvement (%)
Number of end users involved	#			
Number of people with increased ability to manage their energy consumption	#			

Environmental KPI

Title	Unit	Baseline situation	After intervention	Savings (%)
Total CO2 Emissions	kgCO2eq/a			
Total Primary Energy Demand (due to the ICT measure implemented)	kWh/a	xxxxxx		

Figure 45: Energy price will be for the institution/city/region. Total CO$_2$ emissions are the savings gained from the intervention, if no savings leave blank. Total energy demand is the energy used by the intervention, if this data is not available leave blank. Provide data for the monitored year.

Economic KPI

Title	Unit	Intervention
Total Investments (excl. VAT)	€	XXXXXXXX
Grants	€	XXXXXXXX
Annual value of improvements	€/a	XXXXXXXX
Total Operating costs	€/a	XXXXXXXX
Dynamic Payback Period	a	
Return on Investment	%	XX

Social KPIs

Citizens directly involved

Number of jobs created

Figure 46: All Economic KPI's should be available. Savings from the intervention are included in the annual value of improvements, if factors affecting are complex to report, report what is available or leave blank. Complete the total operating costs for the year stated in the monitoring sheet. For Social KPI's report the aggregate number of citizens engaged with over the project up to and including the year on the monitoring forms.

Infrastructure recipe book

This guide will consist of screenshots of the SCIS platform highlighting essential information / KPIs. Essential information has been highlighted in red, some boxes have dashed boundaries this describes essential but only if relevant to the project. Brief descriptions below each screenshot should help in providing context. If you have extra information and can complete other fields requested in the SCIS template please do so, this improves the effectiveness of the tool.

Aside from the clear boxes added it is important to know that the colour coding and XX.YY in some of the boxes does not relate to importance or function of the box.

When filling out the design form please report the value / demonstration sections for what realised in the project not what was initially planned; for reference or baseline provide the fleet or infrastructure unchanged outside the implementation over the course of the project. For example in the first year of the project there were 5 charging stations, over the course of the project 1 was removed so in the end there were 6 charging stations, state 5 charging stations as the baseline. For design report the baseline plus the number added as a direct result of the project. If two were added by the project the after intervention would be reported as 7 (5 as baseline + 2 from project). Please report what was deployed, it enables appropriate comparisons between projects.

Monitoring reporting: SCIS reports on different years of data, therefore it is important to use official conversion factors for the year in which the data is generated. If your data splits across two years, use the year in which most of the data is recorded.

Design

Infrastructure cluster

① General data

Technology used	Charging infrastructure ▾
Description of the intervention	6 Type-2 AC chargers (2 access points) in Strijp-S with two charging points. One located in a parking garage and tv
Date of commissioning	2017

② KPIs

Energy consumption data aggregated by sector fuel (GJ)

Mode	Public transport BEFORE	Private vehicles BEFORE	Public transport AFTER	Private vehicles AFTER
LPG				
Motor Spirit				
Kerosene - Jet Fuels				
Diesel Oil				
Heavy Fuel Oil				
Natural gas				
Biodiesel				
Electricity - grid				
Electricity - RES				

Figure 47: Provide all general data. For energy consumption, provide data for appropriate and available transport fuel data if the intervention is focused on changing the energy source of transport. After intervention is an estimation of yearly consumption based on design. If you do not have data or the data request is not relevant to your intervention, leave blank.

Transport system

Improvement	Unit	Baseline situation	After intervention	Improvement (%)
New e-hub/charging/fueling stations	outlets			
Deployment of bicycle lanes and pedestrian roads	km			
Deployment of public transport system	km/100000 inhabitar			
New car sharing/car pooling locations	spaces			

Kilometers

Mode	Public transport BEFORE	Private vehicles BEFORE	Public transport AFTER	Private vehicles AFTER
passenger-kilometer				

Environmental KPI

Title	Unit	Baseline situation	After intervention	Savings (%)
Total CO2 Emissions	kgCO2eq/a			
Total Primary Energy Demand	kWh/a	xxxxxx		

Figure 48: For transport system provide the relevant data for your intervention, baseline is before the project, after intervention is the expected based on the design. Environmental KPI provide baseline data for CO_2 emissions and energy consumption (convert GJ to kWh). Environmental KPI after intervention is expected based on the design.

Economic KPI

Title	Unit	Intervention
Total Investments (excl. VAT)	€	xxxxxxxx
Grants	€	xxxxxxxx
Net energy savings/value of improvements	€/a	xxxxxxxx
Total Operating costs	€/a	xxxxxxxx
Dynamic Payback Period	a	
Return on Investment	%	xx

Social KPIs

Citizens directly involved

Number of jobs created

Figure 49: Provide all economic KPI's, the payback period can be overridden by typing you your own calculated payback time.

Monitoring

Infrastructure cluster

1 General data

Technology used	Charging infrastructure ▼
Description of the intervention	6 Type-2 AC chargers (2 access points) in Strijp-S with two charging points. One located in a parking garage and tv
Date of commissioning	2017

2 KPIs

Energy consumption data aggregated by sector fuel (GJ)

Mode	Public transport BEFORE	Private vehicles BEFORE	Public transport AFTER	Private vehicles AFTER
LPG				
Motor Spirit				
Kerosene - Jet Fuels				
Diesel Oil				
Heavy Fuel Oil				
Natural gas				
Biodiesel				
Electricity - grid				
Electricity - RES				

Figure 50: General data does not change from design. Energy consumption before does not change, consumption after is the data gathered for the monitored year. Only report vehicle changes funded through the project.

Transport system

Improvement	Unit	Baseline situation	After intervention	Improvement (%)
New e-hub/charging/fueling stations	outlets			
Deployment of bicycle lanes and pedestrian roads	km			
Deployment of public transport system	km/100000 inhabitar			
New car sharing/car pooling locations	spaces			

Kilometers

Mode	Public transport BEFORE	Private vehicles BEFORE	Public transport AFTER	Private vehicles AFTER
passenger-kilometer				

Environmental KPI

Title	Unit	Baseline situation	After intervention	Savings (%)
Total CO2 Emissions	kgCO2eq/a			
Total Primary Energy Demand	kWh/a	xxxxxx		

Figure 51: The baselines have already been completed in the design form. Provide the relevant after intervention KPI's for the monitored year. For the environmental KPI provide ensure that conversion factors from the monitored year are used to calculate the appropriate CO_2 emissions.

Economic KPI

Title	Unit	Intervention
Total Investments (excl. VAT)	€	XXXXXXXX
Grants	€	XXXXXXXX
Net energy savings/value of improvements	€/a	XXXXXXXX
Total Operating costs	€/a	XXXXXXXX
Dynamic Payback Period	a	
Return on Investment	%	XX

Social KPIs

Citizens directly involved

Number of jobs created

Figure 52: Provide monitored years costs and savings, provide the aggregate number of citizens involved, and the number of jobs created from the deployment of the project up to and including the monitored year.

Mobility SCIS recipe book

Highlighting essential information for the completion of SCIS design and monitoring sheets.

This guide will consist of screenshots of the SCIS platform highlighting essential information / KPIs. Essential information has been highlighted in red. Brief descriptions below each screenshot should help in providing context. If you have extra information and can complete other fields requested in the SCIS template please do so, this improves the effectiveness of the tool.

Aside from the red boxes added it is important to know that the colour coding and XX.YY in some of the boxes does not relate to importance or function of the box.

When filling out the design form please complete the baseline situation and the after intervention. The after intervention needs to be what was finally implemented in the project. E.g. if you initially planned for 3 EV cars, but in the end 5 EV cars were deployed by the project, report 5 in the 'After Intervention' box for that section; this applies to all sections after intervention is what was truly deployed.

Monitoring reporting: SCIS reports on different years of data, therefore it is important to use official conversion factors for the year in which the data is generated. If your data splits across two years, use the year in which most of the data is recorded.

Design sheets

1 **General data**

Technology used: Electrical vehicles ▼

Description of the intervention: 7 Nissan Tekna ENV 200: 7 diesel vans from the university estate management team were replaced with new elect

Date of commissioning: 2016

Figure 53: Complete the General Data section, this is where you should provide a brief description of the project. Many of the KPI's may not be relevant to your project, they are not highlighted as essential, as essentials should apply to all projects.

2 **KPIs**

Number of biofuel/electric/hydrogen vehicles deployed in the area

Title	Unit	Baseline situation	After intervention	Improvement (%)
Number of cars	number			
Number of buses	number			
Bikes	number			
Others	number			

Clean mobility utilization

Title	Unit	Baseline situation	After intervention	Improvement (%)
Number of kms	km/a			
Number of trips	trips/a			

*Figure 54: The red dashed section indicates that this must be completed with the number of each vehicle intervention, for example no cars are deployed you can leave this blank, if busses deployed fill the bus section. The number of km/a for the baseline will be 0 as this is recording vehicles related to the project, there were none to begin with. For the after intervention please complete this with the number of km/a in the **final?** **Provide the number planned to have during the project (for monitoring the actual number in the monitored year)** year of data. The km/a recorded should report only the intervention used e.g. number of kms travelled by EV busses funded by the project.*

Modal split

Title	Unit	Baseline situation	After intervention	Improvement (%)
Public and collective transport	%	xx		
Private vehicles	%	xx		
Biking and walking	%	xx		
Average occupancy	%	xx		

Energy consumption

Title	Unit	Baseline situation	After intervention	Savings (%)
Final Energy Consumption	kWh/a	xxxxxx		

Environmental KPI

Title	Unit	Baseline situation	After intervention	Savings (%)
Total CO2 Emissions	kgCO2eq/a			
Total Primary Energy Demand	kWh/a	xxxxxx		

Figure 55: Modal split is not required, unless this is the focus of the intervention. Final energy consumption and total primary energy demand are different; primary energy is the energy used to create the final energy, depending on the fuel source and the final energy used the two values for energy can vary substantially. There will be national conversion factors you can apply for the fuels used. CO₂ emissions must be reported, these are not just tail pipe emissions, these are emissions based on the generation of energy for the mode of transport, official carbon factors for each fuel type should be available. After intervention is the amount consumed or produced in the final? year of the project.

Economic KPI for the mobility action

Title	Unit	Intervention
Total Investments (excl. VAT)	€	xxxxxxxx
Grants	€	xxxxxxxx
Net energy savings/value of improvements	€/a	xxxxxxxx
Total Operating costs	€/a	xxxxxxxx
Dynamic Payback Period	a	
Return on Investment	%	xx

Social KPIs

Citizens directly involved	
Number of jobs created	

Figure 56: All Economic KPI's should be available. The dynamic payback period is calculated by SCIS but can be overridden by typing in the box. ROI is also calculated by SCIS but can be manually overridden. Often there are no savings or payback periods available. There is limited scope in SCIS to report soft impacts or stories, these should be reported separately either through the M60 report or via alternative avenues.

Monitoring Sheets

Monitoring sheets are a copy of the design forms, they differ by requesting the realised or measured values in the monitoring year. Boxes highlighted in red in this section is where to enter the data gathered by monitoring.

1 General data

Technology used	Electrical vehicles ▾
Description of the intervention	7 Nissan Tekna ENV 200: 7 diesel vans from the university estate management team were replaced with new elect
Date of commissioning	2016

Figure 57: General data, nothing is changed in this section.

2 KPIs

Number of biofuel/electric/hydrogen vehicles deployed in the area

Title	Unit	Baseline situation	After intervention	Improvement (%)
Number of cars	number			
Number of buses	number			
Bikes	number			
Others	number			

Clean mobility utilization

Title	Unit	Baseline situation	After intervention	Improvement (%)
Number of kms	km/a			
Number of trips	trips/a			

Figure 58: Update the relevant 'After Interaction' sections with the data gathered for the monitoring year reported. As with the monitoring forms complete the dashed boxes with the number of each vehicle intervention, for example no cars are deployed you can leave this blank, if busses deployed fill the bus section. Complete the section for number of km travelled within the year of reported data.

Modal split

Title	Unit	Baseline situation	After intervention	Improvement (%)
Public and collective transport	%	XX		
Private vehicles	%	XX		
Biking and walking	%	XX		
Average occupancy	%	XX		

Energy consumption

Title	Unit	Baseline situation	After intervention	Savings (%)
Final Energy Consumption	kWh/a	XXXXXX		

Environmental KPI

Title	Unit	Baseline situation	After intervention	Savings (%)
Total CO2 Emissions	kgCO2eq/a			
Total Primary Energy Demand	kWh/a	XXXXXX		

Figure 59: Modal split is not required, enter if available or relevant. Final energy consumption and total primary energy demand are different; primary energy is the energy used to create the final energy, depending on the fuel source and the final energy used the two values for energy can vary substantially. There will be national factors available for the year of monitored data which you should apply for the fuels used. CO₂ emissions must be reported, these are not just tail pipe emissions, these are emissions based on the total generation of final energy for the mode of transport, official carbon factors for each fuel type should be available. These numbers are the values for the year stated in the monitoring form.

Economic KPI for the mobility action

Title	Unit	Intervention
Total Investments (excl. VAT)	€	XXXXXXXX
Grants	€	XXXXXXXX
Net energy savings/value of improvements	€/a	XXXXXXXX
Total Operating costs	€/a	XXXXXXXX
Dynamic Payback Period	a	
Return on Investment	%	XX

Social KPIs

Citizens directly involved

Number of jobs created

Figure 60: All Economic KPI's should be available. All grants and investments in the intervention should be reported in the design sheet. Report the net energy savings/value of improvements, and total operating costs for the year stated for the monitoring form.

Refurbished Buildings SCIS recipe book

Highlighting essential information for the completion of SCIS design and monitoring sheets.

This guide will consist of screenshots of the SCIS platform highlighting essential information / KPIs. Essential information has been highlighted in red. Brief descriptions below each screenshot should help in providing context. If you have extra information and can complete other fields requested in the SCIS template please do so, this improves the effectiveness of the tool.

Aside from the clear boxes added it is important to know that the colour coding and XX.YY in some of the boxes does not relate to importance or function of the box.

When filling out the design form please report the value / demonstration building sections for what realised in the project not what was initially planned; E.g. if you initially planned for 20,000 m², but in the end 70,000 m² were built by the project, report 70,000 m²; this principle applies to all sections, please report is what was truly deployed, it enables appropriate comparisons between projects. Complete the reference situation with national standards if available, if not please use the existing building as a reference. Please provide the reference and existing building values where requested.

Reference for Refurbished Buildings is the building before refurb. The reference value enables the evaluation of the benefits of the design.

Monitoring reporting: SCIS reports on different years of data, therefore it is important to use official conversion factors for the year in which the data is generated. If your data splits across two years, use the year in which most of the data is recorded.

Design sheets

1 General data

Number of buildings

Number of monitored buildings in this building group

Completion year of the building/building group

Figure 61: Please complete the general data section.

2 Building typology characteristics, dimensions and HTC

Building type: industrial ▼

Number of apartments

Number of inhabitants

Number of occupants

3 Envelope - Heat Transfer Coefficient (U-Value)

Title	Unit	HTC according to national requirements	HTC realised for the demonstration buildings	Existing Building
Year - National Requirements				
overall average HTC of the building envelope surfaces	W/(m²K)			
average HTC roof	W/(m²K)			
average HTC facade/external walls	W/(m²K)			
average HTC ground floor	W/(m²K)			
average HTC windows (frame and pane)	W/(m²K)			
average energy transmittance of windows (g-value)	%	xx		

Information & Communication Technologies

Select Some Options

Building features | Select Some Options

ⓘ Please specify if the following building features were used in this building / group of buildings.

Figure 62: If available complete refurbishment HTC national requirements for the year the refurbishment was designed, if available complete realised after the refurbishment and the existing building. If there are no national requirements leave blank, if there is no data for the existing, savings can be entered manually in the KPI's. Please select all appropriate information and communication technologies, and building features, if you deployed a technology unavailable in the list do not include it, report this in the main project report.

Energy Carriers - Environmental & Economic Parameters: before refurbishment

1 Technology   boiler

Energy carrier   Domestic gas - grid-bound

Building service   heating (only)

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	xxx.zz	305	Eurostat
Primary Energy Factor	kWhPE/kWhFE	xxx.zz	1.36	EN Standard - 156
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	xx.zz	0.0664	Eurostat

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	xxxxxx
Overall System Performance (output divided by input)	%	xx

Figure 64: Example of integrated energy carrier, before refurbishment. Please provide the national factors, regarding the energy carrier building in before refurbishment. If these are unknown, the standard values from norm will be used in SCIS calculations. Consumption: final energy input is the amount of energy expected from design to run the system, overall system performance is the expected system performance.

5 KPIs

Technical KPIs

Title	Unit	Demonstration building / Group of buildings	Savings compared to reference building	Reference	SCIS calculation	Existing Building
Total Final Energy Demand	kWh/m2a	xxxxxx				
Final Energy Demand for Space Heating	kWh/m2a	xxxxxx				
Final Energy Demand for Cooling	kWh/m2a	xxxxxx				
Final Energy Demand for Domestic Hot Water	kWh/m2a	xxxxxx				
Final Energy Demand Electricity	kWh/m2a	xxxxxx				

Environmental KPIs

Title	Unit	Existing Building	Value (calculated)	Value (optional - overrules calculation)	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a					
Total Primary Energy Demand	kWh/m2a	xxxxxx				
Total Share of Local Renewable Energy	%	xx				

Figure 65: KPI's are the most critical pieces of information for the SCIS system to operate. For reporting domestic hot water, please report the energy demand for hot water, 'domestic' is a relic of the system and can be ignored. The demonstration building is the after refurbishment, report the expected yearly data. Provide reference values, reference is national refurb standards, if not available provide figures for existing building, provide existing building data in existing data column. Environmental KPI's are calculated by the SCIS system but can be overridden by your own calculation values; total share of local renewable energy is the amount of energy supplied by renewables for the building. E.g. A building consumes 100 kWh / m² / yr without PV installed. There is a PV system on the building producing 40 kWh / m² / yr (m² is for the building not system). The overall performance is therefore 60 kWh / m² / a. The total share of local renewable energy is 40%. For the reference / existing building: If there is no local renewables implemented then it is 0, provide the baseline share if there is any.

Energy Carriers - Environmental & Economic Parameters

① Technology   heat pump: reversible

Energy carrier   Electricity

Building service   heating and cooling

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	617	EN Standard - 1560
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	3.31	EN Standard - 1560
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.2078	Eurostat

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Financial

Parameter	Unit	Value	Reference	SCIS calculation
Total investment costs	€	XXXXXXXX		
Total operating costs	EUR/a			
Grants and subsidies	€	XXXXXXXX		
Total energy costs	€/a	XXXXXXXX		
Dynamic payback period	a			

❶ Please, provide a system of reference. This system should be based in BAU and be designed to produce the same comfort levels as the reported technology.

Figure 66: Example of integrated energy carrier. As with before refurbishment: provide the national environmental factors for when the refurb was designed. If these are unknown the standard values from norm will be used in SCIS calculations. Provide consumption: final energy input is the amount of energy expected from design to run the system, overall system performance is the expected system performance Provide expected financial KPI's for the new system, the operating costs are yearly maintenance costs, and energy costs is the cost of the energy to run the system. Provide available figures for the reference, what was there before. Provide the reference data for the year before refurbishment began.

Economic KPI

Title	Unit	Baseline situation	Demonstration Building/ Building group	SCIS calculation
Total Investments (excl. VAT)	€	xxxxxxxx		
Total additional Energy Related Investments	€	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Grants	€	xxxxxxxx		
Total Energy cost per year	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		

Social KPIs

Citizens directly involved	
Number of jobs created	

Figure 67: Economic KPI's for the demonstration building are the costs, and investments expected based on the implemented design of the building. Provide operating costs and energy costs for the un-refurbished building as the baseline. Payback time is based on most of the economic KPI's, you can over write this with your own calculated value. Ignore the payback for the baseline. **Figure to be checked by Rudy.**

Monitoring Sheets

1 General data

Number of buildings

Number of monitored buildings in this building group

Completion year of the building/building group

2 Building typology characteristics, dimensions and HTC

Building type | industrial ▼

Number of apartments

Number of inhabitants

Number of occupants

Total gross floor area in m² (external)

Total heated net floor area in m² (internal): before refurbishment

Total heated net floor area in m² (internal)

Total cooled net floor area in m² (internal): before refurbishment

Total cooled net floor area in m² (internal)

Figure 68: All data in general data and building topology will have already been completed in the design form and do not need updating.

❸ Envelope - Heat Transfer Coefficient (U-Value)

Title	Unit	HTC according to national requirements	HTC realised for the demonstration buildings	Existing Building
Year - National Requirements				
overall average HTC of the building envelope surfaces	W/(m²K)			
average HTC roof	W/(m²K)			
average HTC facade/external walls	W/(m²K)			
average HTC ground floor	W/(m²K)			
average HTC windows (frame and pane)	W/(m²K)			
average energy transmittance of windows (g-value)	%	XX		

Information & Communication Technologies

Select Some Options

Building features   Select Some Options

❶ Please specify if the following building features were used in this building / group of buildings.

Energy Carriers - Environmental & Economic Parameters: before refurbishment

❶ **Technology**   boiler

Energy carrier   Domestic gas - grid-bound

Building service   heating (only)

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	305	Eurostat
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	1.36	EN Standard - 156
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.0664	Eurostat

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Figure 69: All data in this section has been complete in the design forms, there should not be any changes to before refurbishment data. If there were changes from HTC design and implementation, provide the HTC of the actually installed intervention.

Energy Carriers - Environmental & Economic Parameters

1 **Technology** heat pump: reversible

Energy carrier Electricity

Building service heating and cooling

Environmental

Parameter	Unit	Factors (national/local)	Standard values from Norm	Source
Greenhouse Gas Emissions (CO2-equivalent) factor	gCO2-equ/kWh	XXX.ZZ	617	EN Standard - 1560
Primary Energy Factor	kWhPE/kWhFE	XXX.ZZ	3.31	EN Standard - 1560
Year of collection of energy price	Year	YYYY		
Energy price (Energy carrier), excluding VAT, grants	€/kWh	XX.ZZ	0.2078	Eurostat

Consumption

Parameter	Unit	Value
FINAL ENERGY INPUT	kWh/a	XXXXXX
Overall System Performance (output divided by input)	%	XX

Financial

Parameter	Unit	Value	Reference	SCIS calculation
Total investment costs	€	XXXXXXXX		
Total operating costs	EUR/a			
Grants and subsidies	€	XXXXXXXX		
Total energy costs	€/a	XXXXXXXX		
Dynamic payback period	a			

ℹ Please, provide a system of reference. This system should be based in BAU and be designed to produce the same comfort levels as the reported technology.

Figure 70: Most of the data in this form will not need to be changed, please update the values with the data gathered or reported for the appropriate monitoring year.

KPIs

Technical KPIs

Title	Unit	Demonstration building / Group of buildings	Savings compared to reference building	Reference	SCIS calculation	Existing Building
Total Final Energy Demand	kWh/m2a	xxxxxx				
Final Energy Demand for Space Heating	kWh/m2a	xxxxxx				
Final Energy Demand for Cooling	kWh/m2a	xxxxxx				
Final Energy Demand for Domestic Hot Water	kWh/m2a	xxxxxx				
Final Energy Demand Electricity	kWh/m2a	xxxxxx				

Environmental KPIs

Title	Unit	Existing Building	Value (calculated)	Value (optional - overrules calculation)	Savings (SCIS calculation)	Reference value
Total CO2 Emissions	kgCO2eq/a					
Total Primary Energy Demand	kWh/m2a	xxxxxx				
Total Share of Local Renewable Energy	%	xx				

Figure 71: Update the demonstration building values with the data gathered or reported for the appropriate monitoring year. You can override calculated emissions by providing the in the value (optional) section.

Economic KPI

Title	Unit	Baseline situation	Demonstration Building/ Building group	SCIS calculation
Total Investments (excl. VAT)	€	xxxxxxxx		
Total additional Energy Related Investments	€	xxxxxxxx		
Total Operating costs	€/a	xxxxxxxx		
Grants	€	xxxxxxxx		
Total Energy cost per year	€/a	xxxxxxxx		
Dynamic Payback Period	a			
Return on Investment	%	xx		

Social KPIs

Citizens directly involved

Number of jobs created

Figure 72: Please complete the economic KPIs with the data gathered for the appropriate monitoring year. Provide the aggregate citizens directly involved and jobs created from the specific project intervention up to and including the year of reported data.