Wallonie énergie SPW

ENERGY EFFICIENCY DIRECTIVE 2012/27 / EU - ART. 14

EFFICIENCY POTENTIAL FOR HEATING AND COOLING

Strategy of heating and cooling networks supplied by cogeneration, intermittent power or renewable energy sources

Summary note

issued by the Walloon Government on 11 March 2021

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Introduction

Purpose of the study

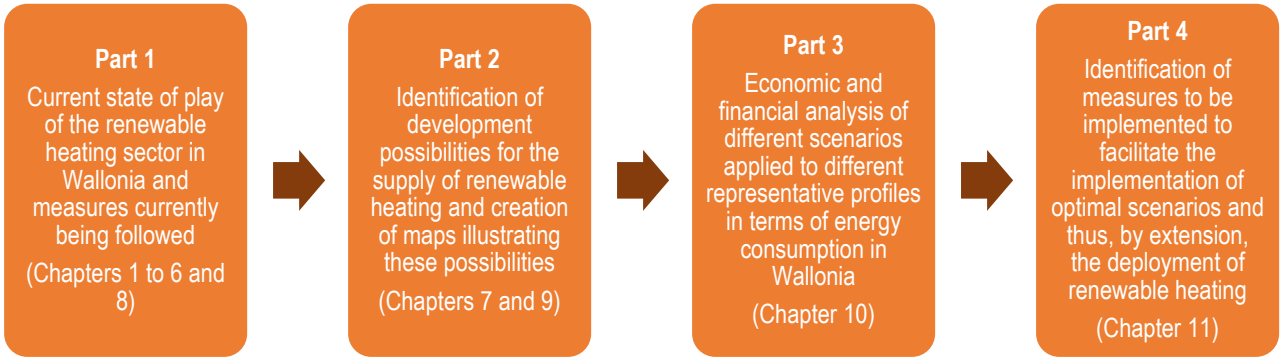
The report *Directive d'efficacité énergétique 2012/27 – Art.14 – Promotion de l'efficacité en matière de chaleur et de froid; Stratégie de réseaux de chaleur et de froid alimentés par des cogénérations et des énergies fatales* is part of the transposition of Article 14 of Directive 2012/27/EU relating to energy efficiency as well as Annexes VIII and IX amended by Delegated Regulation 2019/826 of 4 March 2019.

In particular, Article 14.1 of the Directive stipulates that Member States shall carry out and notify to the Commission a comprehensive assessment of the potential for the application of high efficiency cogeneration and efficient district heating and cooling, containing the information set out in Annex VIII. This assessment must be updated every five years (first version submitted in December 2015). This study therefore aims to meet this requirement of Article 14.

This document summarises this report, the drafting of which was entrusted by the SPW TLPE to the Deplasse & Associés - PwC consortium.

Methodology

The methodology adopted is structured as follows:



Part 1 - Current state of the heating sector based on renewable energy sources

Demand for and supply of heating and cooling

The source of information for establishing heating and cooling needs in Wallonia is the official energy audit for the year 2016 published in 2019 by SPW-Énergie, which corresponds to the **statistics** on energy consumption used for international reporting, to comply with European directives on energy and for regional policies in this area. The analysis is based on the **energy audit for the year 2016** since this is the most recent report since the mission was launched.

Heating

An analysis of heating **needs** and substitutable heating needs (share of the overall heating requirement for the uses of heating provided ensured by a lower temperature (50 °C to 250 °C)), is carried out for each sector of activity of the Walloon energy landscape (residential, tertiary and industrial). Consumption in agriculture and transport is excluded from the analysis. Agriculture represents less than 1% of energy consumption in Wallonia in 2016. Consequently, the fraction of this energy dedicated to heating and cooling appears to be negligible for the analysis. Transport is not affected by heating or cooling needs. Consequently, 37 575 GWh, or nearly 30% of Wallonia's final energy consumption balance, are thus excluded from the analysis. With regard to industry, only energy consumption is covered, i.e. 39 674 GWh out of 44 539 GWh. Non-energy consumption refers to the use of fuel to manufacture products, such as natural gas to produce fertilisers.

The following points should be kept in mind:

In 2016, heating represented 63 217 GWh, or 50% of Wallonia's final energy consumption.

In 2016, the **consumption** of energy related to heating is distributed as follows between the different sectors:

- Residential sector: 42%, or 26 508 GWh
- Tertiary sector: 11%, or 7 022 GWh
- Industrial sector: 47%, or 29 724 GWh

In 2016, the main energy uses of the different technologies **that produce heating** are:

- Residential sector: heating represents 21 931 GWh, or 83% of heating consumption
- Tertiary sector: heating represents 6 262 GWh, or 89% of heating consumption
- Industrial sector: process heating (high temperature represents 18 085 GWh, or 61% of heating consumption

In 2016, the main energy-related **vectors** that account for **all energy consumption** (not just the heating) of each sector, are:

- Residential sector: fuel oil (35%), natural gas (29%) and electricity (22%)
- Tertiary sector: electricity (46%), natural gas (35%) and fuel oil (17%)
- Industrial sector: natural gas (35%) and electricity (25%)

In 2016, on average, the energy **yields** of the various heat-producing technologies are:

- Residential sector: 83.5%
- Tertiary sector: 85.6%
- Industrial sector: 73%

Cooling

In 2016, cooling accounted for 2% of Wallonia's final energy consumption.

In 2016, the **consumption** of energy related to cooling is distributed as follows between the different sectors:

- Residential sector: 36%, or 997 GWh
- Tertiary sector: 33%, or 914 GWh
- Industrial sector: 31%, or 852 GWh

In 2016, the main **uses** of cooling are:

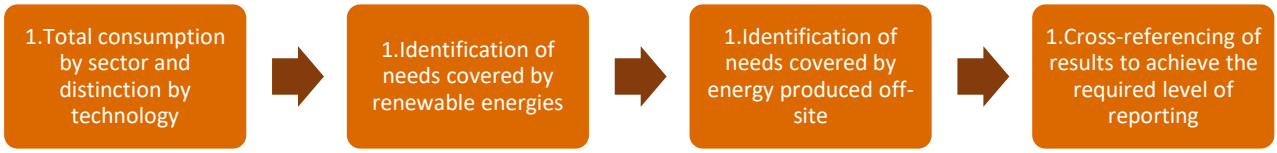
- Residential sector: refrigeration (88%) and air conditioning (12%)
- Tertiary sector: air conditioning (58%) and refrigeration (42%)
- Industrial sector: refrigeration (85%) and air conditioning (15%)

In 2016, on average, the energy **yields** of the various cooling technologies are:

- Residential sector: 236%
- Tertiary sector: 258%
- Industrial sector: 215%

Current supply of heating and cooling

A methodology in **4 steps** was used to estimate the current supply of heating and cooling. These steps are:



The above is done for the residential, tertiary and industrial sectors. The results were as follows:

Sector	On-site heat production		Off-site heat production	
	Fossil (GWh)	RES (GWh)	Fossil (GWh)	RES (GWh)
Residential	22 652	3 789	0	66
Tertiary	6 689	240	17	76
Industrial	23 062	6 579	0	83

Identification of sources of waste heat

The following installations potentially produce waste heat:

- **Thermal energy production installations** which can provide or can be retrofitted to provide waste heat with a total thermal input greater than 50 MW;
- **Cogeneration plants** for heat and electricity using technologies referred to in Part II of Annex I, with a total thermal power exceeding 20 MW;
- Waste **incineration plants**;
- **Renewable energy installations** with a total calorific combustion power greater than 20 MW other than the installations referred to in point 2 (b) (i) and (ii) for producing heating or cooling using energy from renewable sources;
- **Industrial installations** with a total thermal power greater than 20 MW which can provide waste heat.

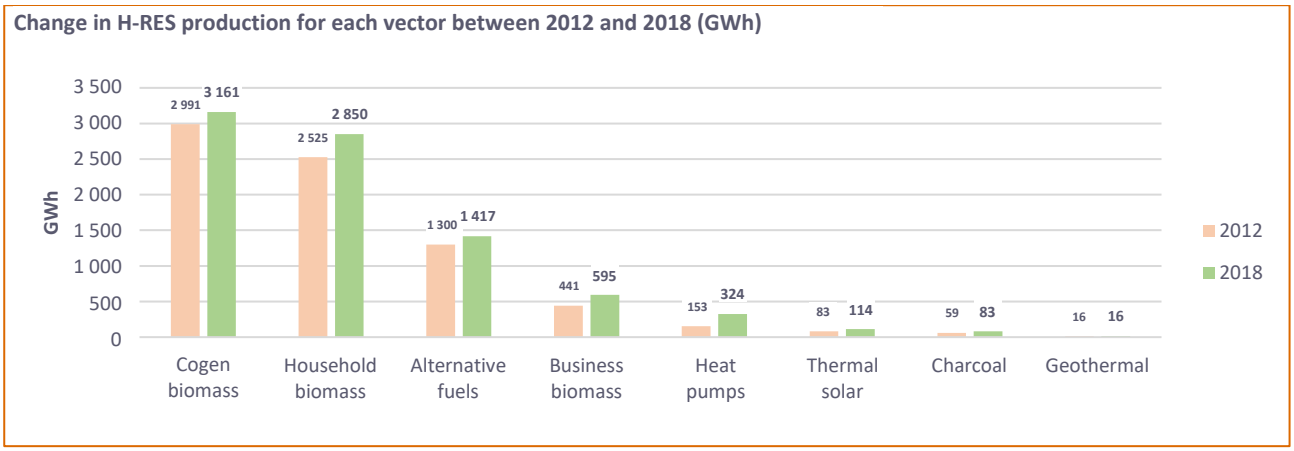
The **waste heat** from each of these types of installations can thus be quantified in GWh:

Type of installations	Recoverable waste heat (GWh)
Thermal electricity production installations (>50 MW)	0
Cogeneration plants (>20 MW)	336 (>20MW); 684 (<20MW)
Waste incineration plants	315
Renewable energy installations (excluding cogeneration) (> 20 MW)	0
Industrial waste heat	5 026
Total	**6 361**

More than 6 000 GWh of waste heat are therefore **lost** each year, i.e. around 10% of Wallonia's annual heat needs. At present, this heat is **not recovered.**

Renewable energy

In 2016, H-RES production amounted to 8 907 GWh, **meeting more than 13.5% of overall heat needs** of Wallonia. In comparison, in 2012, H-RES production amounted to 7 568 GWh, meeting 11.3% of heat needs in Wallonia. Between 2012 and 2018, the share of heat produced using renewable energy rose from 11.3% to 13.14% in Wallonia. This growth can be explained by the **overall reduction in heat demand** and by **increased production capacity** of renewable energy sources. The installed capacity is growing by **3% per year** on average over the period 2012-2018, which is increasing the share of heat produced from renewable energy by **0.3 percentage point / year** on average. It is important to keep in mind that the Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources" imposes an increase of **1.1 percentage point / year**. The graph below describes the change in heat production from renewable sources between 2012 and 2018:



In addition, part of this production is conveyed by **heat network**:

	Distributed production	Share of total
District heating network - RES	220 GWh	92.9%
District heating network - Fossil	17 GWh	7.1%
District heating network - Total	237 GWh	100%

The following points should thus be kept in mind:

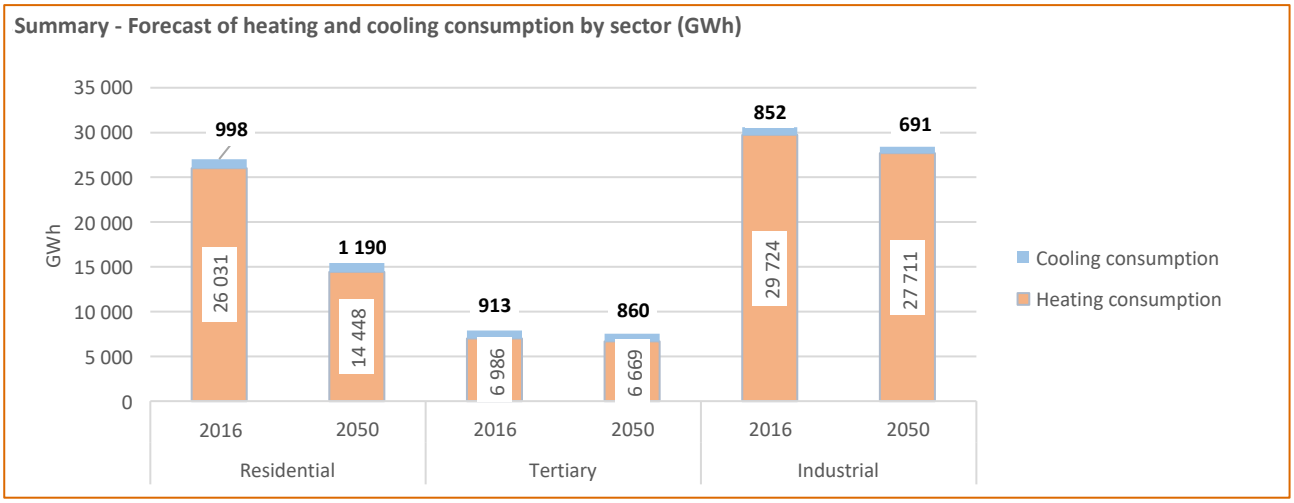
In 2016, the key figures for heat production from renewable energy sources are as follows:

- H-RES production amounts to 8 907 GWh, i.e. **13.5% of heat consumption**.
- The main source of energy is **biomass** which provides 80% of H-RES (via cogeneration biomass (38%), household biomass (35%) and business biomass (6%)).
- The heat distributed by the heating networks established in Wallonia comes mainly from renewable energy sources (nearly 93%).

Change in heating and cooling consumption

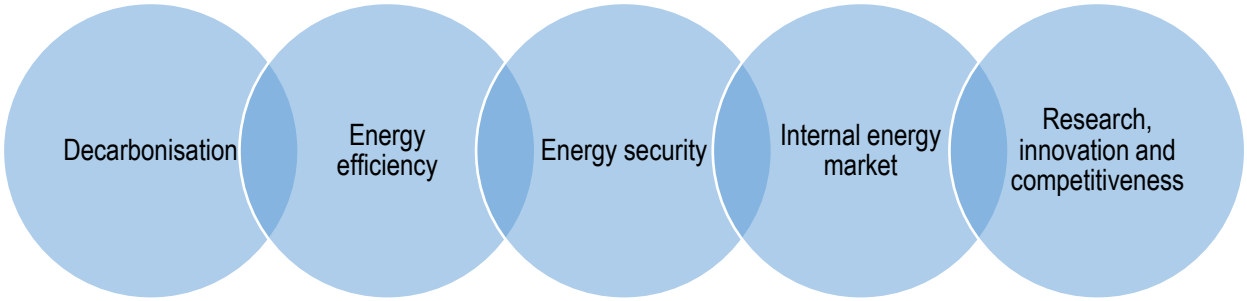
The change in heating and cooling consumption for the residential, tertiary and industrial sectors was analysed. Those **estimates** are based on the evaluation of heat consumption in 2016 and incorporate the prospective change in various key parameters on the basis of existing projections (carried out by the Federal Planning Bureau, for example), the historical evaluation of certain parameters or even strategic targets. It should be noted that the projections presented here do not include the potential impacts of the Covid-19 health crisis (impacts on the economy, the financial capacity of investors, public budgets, the prices of fossil fuels, etc.).

The graph below shows the expected change for 2050, based on the above analyses as well as the heating and cooling consumption for each sector.



Current heating and cooling policies

The policies currently in force in Wallonia in terms of efficient heating and cooling have been structured around **five pillars** of European energy policy:



The following **plans** and **strategies** were taken into account to carry out this compilation:

- The Air Climate Energy Plan 2016-2022, (PACE 2016-2022);
- Wallonia's Contribution to the National Energy Climate Plan 2030, 2019 (PWEC 2030);
- The Walloon strategy for the long-term energy renovation of buildings, 2017 (SWR);
- The Walloon plan for combating poverty, 2018 (PLCP);
- The refocused Employment-Environment Alliance - Multi-year plan 2016-2019, 2016 (AEER);
- The 2nd Sustainable Development Strategy, 2016 (SDD);
- The Marshall Plan 4.0, 2015 (PM4).

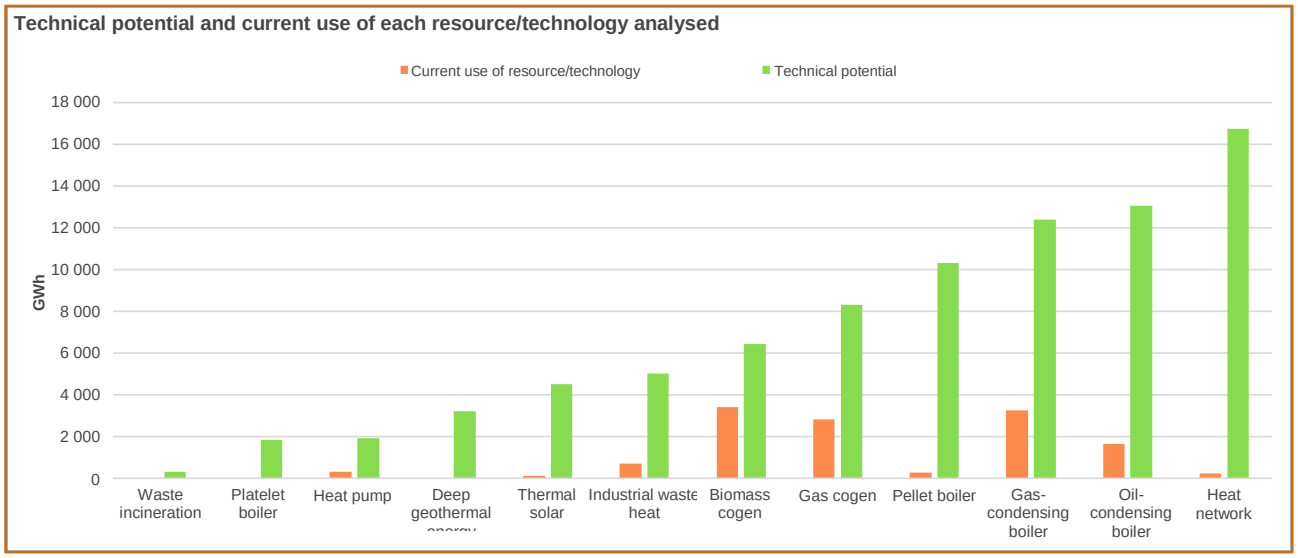
To complement/reinforce this set of measures, economic, legal and informative **recommendations** are provided in Part 4. The analyses summarised in Parts 2 and 3 will make it possible to identify which technologies should be encouraged by examining the information on their technical potential in Walloon territory as well as the results of economic and financial analyses.

Part 2 - Possibilities for changing the supply of heat from renewable energy sources

Identification of technologies available to provide low-carbon energy in Walloon territory

The following table presents the conclusions on the technical potential available in Wallonia for each technology or heat resource identified, as well as their current uses and shares of the technical potential exploited.

Technologies/Resources	Current operation (GWh)	Technical potential (GWh)	Share of technical potential currently exploited
Production technologies			
Industrial waste heat	682	5 026	14%
Waste incineration	0	315	0%
Deep geothermal energy	16	3 226	0.5%
Thermal solar	114	4 486	3%
Gas cogeneration	2 799	8 314	34%
Biomass cogeneration	3 421	6 422	53%
Heat pump	323	1 914	17%
Pellet boiler	271	10 289	3%
Platelet boiler	44	1 819	2%
Reference production technologies			
Gas-condensing boiler	3 233	12 393	26%
Oil-condensing boiler	1 634	13 044	13%
Distribution technologies			
Heat network	237	16 712	1.4%



Part 3 - Economic analysis for certain standard consumption profiles

An **economic & financial analysis** was carried out in order to identify the most appropriate technologies for different consumption profiles which are representative of the heat needs in Wallonia. They are, respectively:

Profile 1	An urban / peri-urban municipality
Profile 2	A 'modest and healthy housing' form of collective housing designed on the basis of modernist reflections and theories (e.g. Etrimo/Amelincks)
Profile 3	An industrial profile
Profile 4	A town, houses, housing, industries, etc., ... located near a borehole of a geothermal well
Profile 5	An eco-district

To structure the analysis, each of the consumption profiles that are provided is associated with a base scenario and alternative scenarios. the **base scenario** describes the most **likely** technologies to meet the needs within each of the profiles considered. As mentioned in Directive 2012/27/EU, the baseline scenario will serve as a reference point. The **alternative scenarios** are based on solutions that meet the same needs, but in a **more effective** way. Technologies that are not really technically relevant have not been considered in the construction of the alternative scenarios.

The main conclusions by profile are:

Profile 1- Urban or peri-urban municipality with high energy density				
Scenarios	SB1 - Individual condensing boiler	SA1.1 - Gas cogeneration connected to DH and central gas-fired back-up boiler	SA1.2 - Solid biomass gasification cogeneration connected to DH and central gas-fired back-up boiler	SA1.3 - Waste heat distributed by DH and central gas back-up boiler
Main conclusions	1. All the alternative solutions studied integrating a **heat network** show **more efficient** discounted net costs than a decentralised and fossil solution. However, a **long-term** vision is needed to observe this advantage. However, without **support** for the production of 'green' heat, this vision cannot be reconciled with the short-term profitability requirements of a private project developer; 2. The recovery of **waste heat** is a competitive solution with the greatest positive impact on our carbon footprint; 3. **Cogeneration** gas remains more **efficient** from an economic point of view thanks to the flexibility of the technology in terms of power modulation and its lower cost. However, its impact in terms of CO2 emissions is limited due to the use of fossil fuel; 4. In the long term, gas and biomass cogeneration (gasification) have the same profitability, but the **CO2 impact** of the technology makes **biomass** the preferred technology. 5. From a CO2 balance point of view, the **first resource** to be recovered is the **waste heat**, because this makes it possible to reduce CO2 emissions by more than 5 times compared to the baseline scenario. If this resource is not available, the use of the **biomass** is the best **alternative**. Gas cogeneration remains an alternative that is suitable for the urban environment when the transport of biomass is not possible. In addition, cogeneration makes it possible to reduce CO2 emissions through the production of 'green' electricity. This has a positive impact on the CO2 balance; 6. The increase in carbon-based **fuel prices** improves the competitive positioning of technologies that use biomass or waste heat. This increase is also an indication of the importance of using primary technology as much as possible because it is often more profitable than secondary technology; 7. Self-consumption of the electricity produced, in the form of an **energy community** significantly increases the attractiveness of scenarios that use cogeneration.			

Profile 2- Real-estate park (collective housing)				
Scenarios	SB2 - Gas condensing	SA2.1 - Centralised gas	SA2.2 - Solid biomass	SA2.3 - District heating with

	boiler decentralised for each building	cogeneration with centralised gas back-up and district heating	boiler with centralised gas back-up and district heating	injection of waste heat and gas back-up.
Main conclusions	1. All the **alternative** solutions studied show discounted net costs lower than those of the base scenario in the current context (in the very short term for scenarios integrating cogeneration and waste heat recovery and in the medium term for the scenario integrating a biomass boiler); 2. The recovery of **waste heat** is a competitive solution but it does not offer the greatest impact on our carbon footprint. ; 3. The **cogeneration** gas remains more **efficient** than biomass from an **economic** point of view thanks to its lower operating costs and the sale of electricity. This is mainly because the fuel is not 'standardised' biomass and may thus require more maintenance and monitoring. A better-**organised** biomass sector could partially reduce this problem; 4. The increase in the prices of' 'carbonaceous' fuels improves the competitive positioning of the alternative technologies under consideration. This increase also shows the importance of using primary technology as much as possible because it is often more profitable than secondary technology, especially for technologies operating on biomass or waste heat. ; 5. The **centralisation** of the heating technology makes it possible to reduce the price of fuel and make the solution more attractive than a decentralised solution. ; 6. Self-consumption of the electricity produced, in the form of an **energy community** significantly increases the attractiveness of scenarios that use cogeneration. 7. The 'gas cogeneration' scenario makes it possible to slightly reduce the CO2 produced compared to the base scenario because of the use of fossil energy, which emits CO2. Alternative scenarios 2 and 3 make it possible to significantly reduce CO2 emissions. We note the advantage of using RES fuel or waste heat which does not produce CO2. ; 8. **Support** for green heat would equalise the cogeneration and biomass scenarios.			

Profile 3- Industrial site				
Scenarios	SB3 - Decentralised oil condensing boiler for each building	SA3.1 - Industrial waste heat distributed by DH and central oil-fired back-up boiler	SA3.2 - Solid biomass cogeneration connected to DH and central oil-fired back-up boiler	SA3.3 - Centralised biogas cogeneration (obtained by biomethanisation) with back-up oil-fired backup boiler
Main conclusions	1. The scenario '**waste heat**'(SA3.1) shows discounted net costs that are **lower** than those of the base scenario. Due to a significant CAPEX and OPEX charge for the installation and maintenance of a biomethanisation plant of sufficient critical size, scenario SA3.3 shows discounted net costs higher than the base scenario. Similarly, scenario SA3.2 does not have lower net costs than the base scenario. ; 2. In a situation where electricity costs increase sharply and fuel costs remain stable or increase slightly (maximum 6%), the scenario '**biomass cogeneration**'(SA 3.2) potentially presents discounted net costs **lower** those of the base scenario and those of the alternative 'biomethanisation' scenario (SA 3.3) thanks to cogeneration which makes it possible to produce electricity. ; 3. The scenario '**biomethanisation**' SA3.3 has higher discounted net costs than all the other scenarios. In addition, it benefits from a lot of subsidies but these do not allow it **not** to be **competitive** compared to other technologies, especially in a context of low fossil fuel prices. Only maintaining the support mechanism for the production of renewable electricity (GH) throughout the life of the project can guarantee sufficient profitability. 4. The significant increase in the prices of carbon-based **fuels** improves the **competitive** positioning of technologies that use renewable energy such as waste heat or biomass; 5. The implementation of a 'CO2' cost makes it possible to improve the positioning of technologies that use renewable energies such as waste heat or biomass. However, for the **biomass** (solid & biogas), this is not **enough** to reach a financial break-even point without GH. 6. The biomethanisation solution has the lowest CO2 gain per € invested. However, the analysis does not take into account the 'external' **profits** in terms of circular economy, soil quality and hence reduction in the use of fertilisers, etc.			

Profile 4 - Municipality with high energy density located in an area where deep geothermal energy can be exploited		
Scenarios	SB4 - Decentralised gas/oil energy mix (individual boilers)	SA4.1 - Geothermal installations connected to DH and central gas back-up boiler
Main conclusions	1. Whatever changes in fuel and electricity prices are considered, the alternative scenario (**geothermal**) is still more **advantageous** than the base scenario from a long-term economic point of view. 2. The low place occupied by fuels in the cost structure of the alternative scenario makes it very **inelastic** to the change in fuel prices. Moreover, an increase in the price of fuel makes the alternative scenario more and more profitable compared to the base scenario. ; 3. The implementation of a 'CO2' cost makes it possible **to improve** the competitive positioning of geothermal installations. ; 4. The **alternative** scenario has a **better** carbon footprint with more than 4 times less CO2 emissions. Remark: Despite all of these indicators which mitigate in favour of the deep geothermal scenario, it is useful to remember that deep geothermal energy only becomes more profitable than the base scenario after **16** years. This crucial detail demonstrates the financial **risk** incurred with this project in view of the initial investment required. In view of the results mentioned above, one avenue to consider which would make it possible to remove certain obstacles to geothermal energy could be the establishment of a **form** of **guarantee** on geothermal energy. Given the high investment costs, the risk of not accessing the expected geothermal resource and the lack of an insurance policy covering this 'natural' risk, a guarantee system is considered necessary to create an investment climate that favours the production of renewable heat from deep geothermal energy.	

Profile 5 - Eco-neighbourhood				
Scenarios	SB5 - Individual gas condensing boiler and installation of a gas distribution network	SA5.1 - Gas cogeneration connected to DH and central gas-fired back-up boiler	SA5.2 - Solid biomass boiler connected to DH and central gas back-up boiler	SA5.3 - Individual heat pumps and decentralised condensing gas boiler
Main conclusions	1. In the short term, and from an economic point of view only, alternative scenario 3 (HPs) makes more sense than all the other scenarios. After ten years, all the scenarios show discounted net costs lower than this scenario and the gap widens after 15 years because of the **replacement** of all HPs. ; 2. The most **relevant** scenario, economically and environmentally, is that of the boiler room **biomass** and the heating network. 3. The alternative scenarios SA5.1 (gas cogeneration) and SA5.2 (biomass boiler) show discounted net costs that are lower than those of the base scenario, taking into account the current **support mechanisms**. 4. The HP scenario consumes a lot of electricity and this makes it very sensitive to changes in the price of electricity, with a significant risk of **undermining** end consumers. 5. Scenario SA5.2, which consumes biomass, is not very sensitive to changes in the price of fossil fuel. Its sensitivity to variations in the price of electricity is identical to the basic and alternative scenarios 2. 6. **Collective self-consumption** of electricity strengthens the competitive positioning of the SA1 scenario, integrating gas cogeneration; 7. The 'centralised boiler room **biomass** centralised' scenario (SA5.2) has the strongest **impact** in terms of CO2 saved per euro invested. 8. The **HP** investment (SA5.3) does not compete in the long run with the different scenarios in terms of net costs.			

Part 4 - Measures to be implemented to promote heat from renewable energy sources

On the basis of previous analyses, 29 measures were identified for promoting renewable heat. Those **measures** concern the technologies identified in part 3 and have varying degrees of priority.

No.	Name of measure	Concerning
In progress		
1	Issue implementing decrees relating to the organisation of the thermal market and thermal energy networks	Global RES
2	Allow the establishment of renewable energy communities (heat and electricity)	Global RES
3	Taking heat networks into account in the calculation of the EPB	Heat network
4	Basement decree	Geothermal
Priority measures		
5	Stop all subsidisation of fossil fuels	Global RES
6	Support the recovery of RES and waste heat	RES heat
Measures with significant impacts		
7	Set up an online platform, by sector of activity (residential, tertiary, industry), to facilitate procedures that lead to the realisation of a project	Global RES
8	Develop AMURE and UREBA aid	Global RES
9	Maintain and adapt investment aid (UDE)	Global RES
10	Encourage maintenance of the performance of RES production facilities	Global RES
11	Provide a financing mechanism adapted to a long lifespan of the heating/cogeneration network equipment	Heat network
12	Review the amortisation period of DHNs from an accounting point of view	Heat network
13	Incorporate local or neighbourhood study requirements for DHNs and renewable energy in the context of major construction projects	Heat network
14	Creation of a guarantee fund for the decontamination of excavated soil	Heat network
15	Development of a cartographic system (GIS) identifying heating needs, heating networks and technical installations	Heat network
16	Extension of the duties of the industry facilitator by including a component on the recovery of waste heat	Waste heat
17	Creation of a guarantee fund against industrial risk in waste heat recovery projects	Waste heat
18	Promotion of the development of installations supplying district heating networks (deep geothermal energy, mining geothermal energy and shallow open system geothermal energy)	Geothermal
19	Modification of the permit system for open systems in shallow geothermal energy and biomass gasification	Geothermal, biomass

No.	Name of measure	Concerning
20	Measures to reduce the geological risk of deep geothermal projects	Deep geothermal installations
Measures with moderate impacts		
21	Professionalisation of the 'Cogeneration', 'District heating network', 'Geothermal' and 'Biomass' sectors	Global RES
22	Integration of a facilitator/expertise system directly into the administration - with field agents	Global RES
23	Establishment of an effective system for the follow-up of applicants	Heat network
24	Organisation of a collection and treatment / recovery process for the ashes	Solid biomass
25	Promotion quality biomass with low emissions of fine particles (possibly of Walloon origin)	Solid biomass
Measures requiring further analysis		
26	To plan the phase-out of oil and natural gas	Global RES
27	Analyse the benefits of the development of solar thermal installations that supply district heating networks	Heat network
28	Set up a recovery policy for Solid Recovered Fuels (SRF)	Global RES

The proposed measures are without prejudice to the plans already approved by the Government. Where the implementation of these still makes it possible to take the measures proposed below into account, they will be integrated (for example, via circular, for projects that have not yet been finalised, etc.).

Measures In progress	
Measure sheet # 1	**Issue implementing decrees relating to the organisation of the thermal market and thermal energy networks**
Type of measure	Legal (short-term)
Objective	In general, to transpose European obligations relating to metering and information on billing and pricing. More specifically, deal with thermal energy networks subject to certain obligations when there is a sale of energy to one or more consumers.
Potential players	SPW TLPE - GW
Technology(ies) concerned	Heat network
Findings Chap. 10	The profitability of a district heating network is subject to many risks, in particular with regard to the resale of thermal energy. There is a need for a clear legal framework.
Proposed actions	• Establish a legal framework for district heating networks • Transpose the provisions of the directives of the 'clean energy for all Europeans' package to comply with standards in terms of metering, customer information, the right to disconnect and the guaranteeing this right, in regard to thermal energy networks with sale
Strategy link	PWEC 2030 (district heating networks are a relevant option for recovering renewable heat) PACE 2016-2022 (support measure for green heating, in particular through district heating networks)

Measures In progress	
Measure sheet # 2	**Allow the establishment of renewable energy communities (heat and electricity)**
Type of measure	Legal (medium-term)
Objective	To encourage collective self-consumption of electricity and heat
Potential players	SPW TLPE - CWAPE
Technology(ies) concerned	Cogeneration, district heating networks
Findings **Chap. 10**	The development of a 'heating' energy community has real potential for a local and societal economy project, for example by integrating fuel production as well. The sensitivity analyses have demonstrated the value of recovering RES electricity at a fair price for the development of cogeneration systems linked to a district heating network. The calculation of the rate at which green certificates takes a significant portion of self-consumed electricity, which is valued at a higher price than that of resale on the market, into account. A high self-consumption rate is only rarely achieved in the context of a district heating network because the production of heat is shared between consumers, but the current electricity framework does not allow it. This brake will be partially lifted with the establishment of energy communities. Many district heating networks do not have cogeneration because this investment is not economically viable due to the low cost of buying back the electricity injected into the network. The other possibilities for upgrading electricity or heat (supply license or resale to an aggregator) are too complex to implement for medium-sized projects. The forthcoming implementation of 'electricity' energy communities will resolve this issue under certain specific conditions (fossil cogeneration excluded, cogeneration must be owned by the EC, only new installations). Other means of recovering this electricity must thus be considered.
Proposed actions	• Public contract in progress relating to technical and legal support to promote the development of different forms of energy sharing in Wallonia • Implement regulatory provisions governing the sale of thermal energy to one or more consumers • Transpose Article 22 of the RED II Directive providing that Member States must ensure that end customers, in particular households, can participate in a renewable energy community while retaining their rights or obligations as end customers and without being subject to unjustified or discriminatory conditions or procedures (…). • Incorporate the specific case of renewable heat networks into current discussions on the implementation of energy communities and on the implementation of the 'peer-to-peer' mechanism (REDII Article 2.18).
Strategy link	Link with the PWEC 2030 ('Supervision of the deployment of decentralised sources aiming at maximising collective well-being via in particular collective self-consumption schemes') and the PACE 2016-2022 ('Creation of favourable conditions for the development of renewable energy communities')

Current measures	
Measure sheet # 3	**Taking heat networks into account in the calculation of the EPB**
Type of measure	Communication (short term)
Objective	To make district heating networks attractive to property developers
Potential players	SPW TLPE
Technology(ies) concerned	District heating network, cogeneration
Findings Chap. 10	In the context of new subdivisions of single-family houses, many new dwellings are equipped by default with a heat pump. However, the analysis has shown that this type of equipment is not the most profitable, economically and environmentally, in the long term. Historically, for the calculation of their EPB (energy performance), buildings connected to a district heating network were negatively impacted by an energy factor by default. The implementation of a district heating network for new homes, which must comply with the EPB requirement, was almost impossible. A new tool allows a more objective consideration of the performance of the district heating network.
Proposed actions	• Communicate on the existence of the EPB tool for district heating networks • Establish a link between the heat network EPB declarations and the reporting to the Administration provided for in the 'Decree/WGD on Thermal Energy' currently being validated
Strategy link	Link with measure 14 of Chapter 8 ('Continue to strengthen (EU) energy standards in compliance with European directives') and measure 17 ('Implement the building passport') based on PACE 2016-2022, the PWEC 2030, AEER and SWR

Current measures	
Measure sheet # 4	**Basement decree**
Type of measure	Legal (short-term)
Objective	Global regulations for the exploration and exploitation of the Walloon subsoil resource
Potential players	SPW TLPE - SPW ARNE - GW - PW
Technology(ies) concerned	Geothermal
Actions	• The purpose of the project is to establish a clear and precise framework of activities and installations aimed at exploring and exploiting the resources of the Walloon subsoil. • The objective of this project is to determine a clear legal framework for geothermal energy in order to attract investors, who are reluctant to enter the market because of the current legal vacuum. The SPW TLPE has therefore positioned itself in favour of integration into the draft subsoil decree to avoid any redundancy and ensure complementarity and legal certainty. • It was also logical to consider the provisions relating to geothermal energy in the environmental law, insofar as the exploitation cannot be carried out without the required environmental permit and in view of the possible effects of this activity, particularly at the time of drilling, on the groundwater bodies. In addition, the interaction of the exploitation of geothermal energy with the other possible uses of the subsoil had to be understood in a coherent framework. • The options proposed by the subsoil resource codification mission ensured that a common core could be established for 'strategic' resources, allowing the exclusivity needed to secure investments to be granted to the candidate explorer and/or operator, thereby promoting private sector initiatives, which are essential in this area. This is all the more important as it will improve the public authorities' knowledge of the Walloon subsoil and its potential, including with respect to energy.
Strategy link	PWEC 2030, PNEC 2030 and PACE 2016-2022 (the geothermal component is addressed in these strategies by removing the obstacles to its development through a clear legal framework)

Priority measures	
Measure sheet # 5	**Stop all subsidisation of fossil fuels in connection with the objectives of the RW**
Type of measure	Economic
Objective	To eliminate aid that promotes the competitiveness of fossil fuels
Potential players	SPW TLPE - CWaPE - SPW economy - GW - PW - Federal level (non-regionalised powers, e.g. taxation)
Technology(ies) concerned	All RES technology
Findings Chap. 10	• Fossil energy 'heating' projects generally benefit from a more advantageous payback time in the short term. They do not need any financial support. • Support for the production of electricity from fossil fuels (natural gas) via Green Certificates is marginal on the VAACN. • The Walloon Region has set itself the objective of having public housing with an energy performance of decarbonised A label by 2040; the other residential buildings should achieve this same objective in 2050, while for the tertiary sector, the ambition is to strive for buildings with zero annual energy and carbon balance for heating, domestic hot water, cooling and lighting by 2040.
Proposed actions	• Creation of a registry to identify all fossil fuel subsidies • In connection with the reflection and phasing on the end of the use of fossil fuels, modify the WGDs concerned by eliminating this aid to fossil fuels by 2025 at the latest, provided that there are sustainable alternatives or by transforming it into aid for renewable energies • Eliminate the aid already identified where there are alternatives • Given the long lifespan of some of the subsidised projects and GW's desire to achieve 100% renewable energy by 2050, encourage all projects that have not yet been finalised to opt for a carbon-free energy source.
Strategy link	PACE 2016-2022 PWEC 2030 (Link with measure 4 of Chapter 8: 'Encourage the population to switch to less polluting fuel')

Priority measures	
Measure sheet # 6	**Support recovery of RES and waste heat**
Type of measure	Economic
Objective	To increase the share of heat recovered from renewable and/or waste sources
Potential players	SPW TLPE - CWaPE - Walloon Union of Enterprises - GW
Technology(ies) concerned	All RES heat production technologies
Findings Chap. 10	The presence of support for the production of electricity without specific support for heating distorts the short-term competitiveness of RES technologies and in particular of the recovery of waste energy. However, industries do not invest in technologies with a payback period of more than 3 years and are thus not encouraged to use their waste heat beyond their own needs.
Proposed actions	• Evaluate the advisability of extending the reflection on the Branch Agreements after 2023 to the issue of heating, including for the tertiary sector. • Continue and extend the establishment of a registry of renewable heat production in Wallonia • Set up a registry of waste heat in Wallonia: technical potential, connection with the needs for heating and cooling that can be substituted nearby • Develop a certification system for the renewable or sustainable nature of heat production installations (Via Guarantees of Origin - Decree and WGD 'Heating' in the process of being approved) • Develop support mechanisms for the recovery of RES or waste heat: aid for setting up installations, financial support for heat energy recovered and reused (via LGOs). • Develop subsidy mechanisms adapted to the payback time of the technology investment and reduce the risk for private investors • Develop communication around renewable heat towards industries, project leaders, and the general public, possibly with the designation of a SPOC at the administration level • Ensure the sustainability of funding for RES support by setting up independent funding for electricity consumption. No longer allow installations to be designed without considering heat recovery. • Condition the allocation of subsidies on technical, ecological and performance factors that are maintained for the long term.
Strategy link	PACE 2016-2022 PWEC 2030 (Support for green heat, in particular through district heating networks)

Measures with significant impacts	
Measure sheet # 7	**Set up an online platform, by sector of activity (residential, tertiary, industry), to facilitate procedures that lead to the realisation of a project**
Type of measure	Administrative simplification
Objective	Centralisation of information and procedures
Potential players	SPW TLPE - EWBS - Renowatt
Technology(ies) concerned	All RES technologies
Findings Chap. 10	• RES projects are subject to a series of administrative obligations during project implementation and during their lifetime, unlike 'fossil' projects. • These obligations are managed by different departments and entities, which creates additional complexity • Supervision is necessary for RES sectors but the impact must be limited as much as possible on the development of projects (cost, complexity and duration of the procedures)
Proposed actions	After having reflected on the procedures, set up an online platform containing: • A single, consolidated source of information on procedures for project leaders • A single tool for monitoring the administrative procedures of the various services (SPW TLPE, Cross-functional Biomass Committee (CTB), Permits and Authorisation Department (SPW-ARNE, SPW economy, etc.) • A single tool to process study-type and investment-type grant applications based on a 'virtuous' workflow: Audit -> Study -> Investment -> operating support. (Functional tools are already available on the market and would allow rapid deployment) • A single tool for collecting information on the operation of RES equipment (encoding Green Certificates, monitoring of emissions, energy consumption and performance (assessment, Heat Decree, etc.), monitoring of sustainability (REDII Directive), etc.) Strengthen synergies between existing tools and services within the SPW (Sowalfin, SRIW, Renowatt, etc.). Work on communication and mutual recognition of the services offered.
Strategy link	PWEC 2030 and PACE 2016-2022 (Remove administrative and regulatory barriers to promote renewable energy)

Measures with significant impacts	
Measure sheet # 8	**Develop AMURE and UREBA aid**
Type of measure	Economic
Objective	To support the development of RES in Wallonia, in particular improving the quality of projects studied by AMURE and UREBA aid to better target projects to be subsidised for investment.
Potential players	SPW TLPE - SPW EER (Department of Investment Programs (DPI)) - GW
Technology(ies) concerned	District heating network, cogeneration
Findings Chap. 10	Problem highlighted by the analysis
Proposed actions	• With some exceptions (for example according to certain types or size of investments), require that a (pre-)feasibility study be carried out by an auditor approved by Wallonia for any investment aid relating to thermal energy production systems. This study should highlight the relevance of the project in achieving Wallonia's environmental objectives. • Impose the unified audit methodology proposed by the Walloon Region on its website for carrying out studies and audits (currently proposed but not imposed) in order to make the analyses comparable. • Extend the possibility of subsidising feasibility studies beyond companies with branch agreements, in particular so that SMEs can benefit from them • Support the realisation of specifications and site monitoring by independent design offices on certain particularly complex RES projects (Cogeneration, Biomass, Geothermal, District heating network) • Stop subsidising studies for sectors relating to fossil fuels (e.g. replacement of boilers, gas cogeneration). • Impose and subsidise the implementation of annual performance audits for RES production equipment with reporting to the Administration (for example reporting within the framework of the 'Thermal energy' Decree). For projects with operating subsidies, link this subsidy to carrying out the audit and maintaining performance (tolerance ranges to be agreed). • Stop all fossil fuel subsidies, by 2025 at the latest, provided that there are sustainable alternatives or by transforming them into support for renewable energies • Analyse the subsidisation rules for investments between UDE Energie and UREBA aid, and ensure the consistency of the mechanisms. • Strengthen synergies between existing tools and services within the Walloon Region (AMURE, UDE, UREBA, Infrasport, Sowalfin, SRIW, Renowatt, etc.). Work on communication and mutual recognition of the services offered.
Strategy link	PACE 2016-2022 AEER SWR (Link with measures 27, 28 and 29 of Chapter 8: 'Optimising the system of aid for energy studies for SMEs/VSEs, local authorities and the non-profit sector'; 'Launch a new program for the renovation of exceptional UREBA public buildings' and 'Create a financing mechanism to promote the energy efficiency of buildings in the public sector and the non-profit sector (loan at zero rate)'

Measures with significant impacts	
Measure sheet # 9	**Maintain and adapt investment aid (UDE)**
Type of measure	Economic
Objective	To promote energy investments
Potential players	SPW TLPE - SPW Economy - Investment Programs Department (DPI) - GW
Technology(ies) concerned	All
Findings Chap. 10	As long as fossil fuel prices are low, RES energies remain heavily dependent on investment support. District heating networks are eligible for UDE investment aid, but only an SME-type project leader is eligible. A large company that has waste heat therefore does not benefit from any support for recovering this heat. There is no support for connection to a district heating network for residential buildings, yet it is the diversity of consumption profiles that makes this type of project profitable. The intervention rates are fixed and no longer correspond to the reality of the market.
Proposed actions	• Review the lump sum amounts of eligible additional costs and incorporate a specific category for RES heat networks. • Provide a mechanism for rapidly revising packages to correspond to market developments. • Condition the subsidy on the profitability of the project (rule out unprofitable projects even over the life of the machine) • Provide the necessary resources for on-site monitoring of subsidised projects, 2 or 3 years after their start-up. Make use of performance audits, carried out via AMURE or UREBA auditors, for example, to guarantee the sustainability of the funds invested by Wallonia • Establish high ceilings for subsidisation by technology to avoid over-financing non-mature technologies, which may benefit from other research aid. • Provide a subsidy for connection to any efficient heating network (possibly conditional on the energy vector being RES and deemed relevant for the municipality in question). This allowance was in existence (http://forms6.wallonie.be/DGO4_Energie_v17.07.01/formulaire31.pdf) The allowance is requested by the district heating network manager responsible for connecting the new consumer. • Study the possibility of opening the UDE allowance system to real estate companies for H-RES projects with a district heating network and to large companies for waste heat recovery.
Strategy link	PWEC 2030 PACE 2016-2022 (Link with measure 1 of Chapter 8: 'Maintain investment allowances for installations that use renewable energies')

Measures with significant impacts	
Measure sheet # 10	**Encourage maintenance of the performance of RES production facilities**
Type of measure	Economic
Objective	To provide financial support for the development of efficient installations
Potential players	SPW TLPE - CwaPE - GW
Technology(ies) concerned	District heating network, cogeneration
Findings Chap. 10	RES installations are economically and environmentally more efficient when the entire service life of the installations is taken into account. Achieving savings objectives thus depends on maintaining high performance production tools. There is currently no supervision, no aggregation, or support for quality maintenance of RES installations subsidised by Wallonia.
Proposed actions	• Support/mandate the implementation of a performance audit of COGEN, RES and DHN installations to ensure long-term performance and the organisation of reporting to Wallonia. Conducting this audit would make it possible to define the amount of aid (for investment and/or operation) or even to spread it out and reduce the risk of a financial bubble. • Organise financial support based on the performance of the supported facilities: need to set up precise criteria that can be verified by field staff. This field staff can be the energy auditors already recognised by Wallonia in the AMURE and UREBA systems.
Strategy link	PWEC 2030 PACE 2016-2022 (These strategies focus on improving the energy performance of installations)
Indicators	Average yield observed by certification bodies during installation performance audits

Measures with significant impacts	
Measure sheet # 11	**Provide a financing mechanism adapted to a long lifespan of the heating/cogeneration network equipment**
Type of measure	Economic
Objective	To facilitate the financing of DHNs and Cogen RESs
Potential players	SRIW - BEI - SPW TLPE - GW
Technology(ies) concerned	District heating network, cogeneration
Findings Chap. 10	RES heating networks are always more attractive in the long term, financially and environmentally, but in the short term their competitiveness is weak due to the high CAPEX to be incurred and the risks associated with the supply of heat. A mechanism is thus essential to smooth out CAPEX investments over the long life of the equipment and to reduce the risks associated with the disappearance of one of the players in the heating networks.
Proposed actions	• Facilitate the third-party investor system within the framework of RES heating/cogeneration network projects • Set up financing systems over periods adapted to the lifespan of the heating networks • Establish conditions for access to financing set by Wallonia involving control of the development of the Walloon infrastructure network dedicated to heating • Consider setting up a network social support system: Inter-heating network solidarity factor (the most profitable finance the least profitable) • Consider the financing of heating networks (transport infrastructure) by local authorities, as for gas and electricity.
Strategy link	PWEC 2030 PACE 2016-2022 (To allow district heating networks to be economically competitive with respect to traditional technologies, a financing mechanism must be set up)

Measures with significant impacts	
Measure sheet # 12	**Review the amortisation period of DHNs from an accounting point of view**
Type of measure	Legal
Objective	To match the financial profitability of DHNs from an accounting point of view with reality
Potential players	SPW TLPE - Federal (SPF finances) - institute of auditors - GW
Technology(ies) concerned	Heat network
Findings Chap. 10	Given that the heating network has a lifespan of 50 years, carrying out a project study over 30 years is not conducive to the financial burden of the heating networks.
Proposed actions	• Organise a consultation with the federal level and the institute of auditors to make them aware of the amortisation period of DHNs to be considered (50 years) • Take into account the IAS 16 standard indicating that accounting depreciation depends on the effective life of the asset (it should be 50 years like gas networks). • Indicate the lifespan of the DHNs to be taken into account for depreciation in the decree or 'Thermal energy' WGD (in the same way as the gas & electricity methodologies include the lifespan of the various fixed assets)
Strategy link	PWEC 2030 PACE 2016-2022 (With a view to supporting green heating, district heating networks must be able to become competitive with respect to traditional technologies)

Measures with significant impacts	
Measure sheet # 13	**Integrate study obligations on DHNs and renewable energies within the framework of major projects at the municipal level**
Type of measure	Legal
Objective	To take advantage of major projects to pool the costs linked to the opening of roads. To do this, it is necessary to have previously studied the potential of district heating networks at the municipal or district level
Potential players	SPW TLPE & Municipalities (POLLEC) - GW
Technology(ies) concerned	Heat network
Findings Chap. 10	The territory has numerous areas that are suitable for the installation of a heating network, but are not exploited.
Proposed actions	• Incorporate a study carried out independently on heating networks and renewable energy sources during the construction or renovation of thermal energy production systems in public buildings, thermal energy production systems in buildings with a high and constant consumption or during the construction of new subdivisions; • Incorporate a study carried out independently on heating networks and renewable energy sources during road works or extension of the gas network, including when passing in front of tertiary buildings or industries; • Incorporate a study carried out independently on heating networks and renewable energy sources as part of the 2025-2030 public housing renovation plans, in the future drawing rights for the creation of public housing and in renovation projects by districts. • As far as possible, on the basis of the renovation plans submitted by the SLSPs, also consider the creation of heating networks in the renovations of public housing that are underway within the framework of the 2020-2024 plan; • Consider an expansion of co-financing for carrying out (pre-)feasibility studies at SLSPs. Depending on the situation, these studies listed above will be supported by the backer of the renovation or construction project. • During the design of the various plans relating to energy and decarbonation, drawn up by the municipalities, evaluate the relevance of an efficient district heating network in their territory by directly involving the municipal urban planning services.
Strategy link	PWEC 2030 PACE 2016-2022 (With a view to supporting green heat, this technological solution must be studied when possible)

Measures with significant impacts	
Measure sheet # 14	**Creation of a guarantee fund for the decontamination of excavated soil**
Type of measure	Communication and funding
Objective	To avoid passing the cost of any soil pollution on to the backer of the heating network project.
Potential players	SPW TLPE - SPW ARNE - GW
Technology(ies) concerned	Heat network
Findings Chapter 10	The soil decree (03/01/2018) currently provides for a soil analysis in all district heating network projects that require soil excavation. In the event of pollution from an unknown source, it is up to the project leader to assume the costs of pollution control. A significant fixed additional cost was therefore charged to all the scenarios comprising a heating network. Note that in some regions, this additional cost can represent up to 30% of the cost of the heating network.
Proposed actions	• Identify the Walloon Region's tools for analysing the level of soil pollution at the scale of a heating network and draw up practical information sheets on the use of this tool and communicate on them. • Study the possibility of setting up a guarantee fund for the decontamination of excavated soil via the Interregional Soil Remediation Commission • Analyse the interest on the part of stakeholders in this type of fund and possible public-private partnerships for its establishment • Carry out an economic study identifying the costs incurred due to the risk of soil pollution on the projects, including the costs related to the management and traceability of the excavated soil: type of treatment according to the type of pollution, consequences on the economic situation of projects in order to ensure a certain proportionality
Strategy link	n.d.

Measures with significant impacts	
Measure sheet # 15	**Development of a geographic information system (GIS) identifying heating needs, heating networks and technical installations**
Type of measure	Communication
Objective	To improve the referencing, particularly in space, of technical installations related to heating and its transport
Potential players	SPW TLPE - SPW ARNE - SPW SG (geomatics department)

Technology(ies) concerned	All
Findings Chap. 10	The promotion of RES technology via incentives requires good visibility of the market, its liabilities and its development. The collection of information for this report was a very complex process.
Proposed actions	Establishment of a database with geographic referencing fed by • energy audits • Sector statistics from the SPW TLPE (Gas & Electricity Markets Department) • Environmental permit data for installations related to heating and its distribution • Existing registries • Studies carried out by or for the public service • Subsidised studies carried out by approved auditors in Wallonia
Strategy link	PWEC 2030 PACE 2016-2022 (To allow the establishment of heating networks and therefore to maximise the use of green heating, it seems logical to develop a mapping that is related to it)

Measures with significant impacts	
Measure sheet # 16	**Extension of the duties of the industry facilitator by including a component on the recovery of waste heat**
Type of measure	Technical
Objective	To improve communication and the development of waste heat recovery. Field support from the industry facilitator would make it possible to respond to or raise the specific issues of companies in their diversity and thus facilitate this intra and inter-company optimisation.
Potential players	SPW TLPE - Industry / Business Facilitators - GW
Technology(ies) concerned	Heat network
Findings Chap. 10	The potential for recoverable waste heat is significant and profitable. But it has not been exploited to date, in particular because this profitability is greater than 3 years.
Proposed actions	• Develop technical publications for the recovery and use of waste heat • Identify exploitable incentives to promote waste heat • Establish a competent resource person to answer questions from industrial players, in particular on the subject of waste heat recovery • Provide technical avenues for estimating the recoverable waste heat and recovering it
Strategy link	PWEC 2030 PACE 2016-2022 (The objective is to be able to set up support mechanisms for the use of waste heat)

Measures with significant impacts	
Measure sheet # 17	**Creation of a guarantee fund against industrial risk in waste heat recovery projects**
Type of measure	Financial incentive
Objective	To reduce the risk relating to waste heat recovery projects
Potential players	SPW TLPE
Technology(ies) concerned	Installations that recover waste heat
Findings Chap. 10	Waste heat recovery projects have great potential because they allow industrial energy to be harnessed at a cost much lower than fossil fuels. The use of this resource, in suitable areas, makes it possible to cover almost all of the area's heating needs. However, the amortisation period of such a valuation project is incompatible with the financial and time constraints of an industry. This incompatibility gives rise to an industrial risk that blocks the development of this type of project.
Proposed actions	• Study the establishment of a guarantee fund or any other mechanism to reduce the industrial risk linked to the recovery of waste heat. • Analyse the interest on the part of stakeholders in this type of fund and possible public-private partnerships for its establishment • Define measures to cover the risks of the disappearance of an economic stakeholder necessary for a district heating network (producer, consumer).
Strategy link	PWEC 2030 PACE 2016-2022 PM4 (In connection with measure 42 'Support self-production of energy' through its objective 'Analyse and adapt regulations relating to self-production of energy and the expansion of Renewable Energy (RE) for the industrial sector (including finalising the reforms already underway). ')

Measures with significant impacts	
Measure sheet # 18	**Promotion of the development of installations supplying district heating networks (deep geothermal energy, mining geothermal energy and shallow open system geothermal energy)**
Type of measure	Financial
Objective	To develop heating networks supplied by geothermal resources
Potential players	SPW TLPE - SRIW - BEI - SPW ARNE (Geological Survey of Wallonia) - GW
Technology(ies) concerned	Open system deep geothermal, mining geothermal and shallow geothermal facilities
Findings Chap. 10	Geothermal projects (deep, mining and shallow) have great local and permanent potential to exploit energy contained in the subsoil at a cost much lower than fossil fuels. The use of this resource, in suitable areas, makes it possible to cover almost all of the area's heating needs.
Proposed actions	• Develop knowledge of geothermal resources (heat from geothermal fluid) in the Walloon subsoil, which are still very poorly understood, and define areas for the exploitation of geothermal resources • Set up pilot projects in Wallonia (mainly mining geothermal energy in the three basins Mons, Charleroi and Liège) and shallow geothermal energy with open systems. • Develop subsidy mechanisms adapted to the payback time of the technology investment and reduce the risk for private investors
Strategy link	PWEC 2030 (district heating networks are a relevant option for recovering renewable heat) PACE 2016-2022 (support measure for green heating, in particular through district heating networks)

Measures with significant impacts	
Measure sheet # 19	**Modification of the permit system for open systems in shallow geothermal energy and biomass gasification**
Type of measure	Legal
Objective	To facilitate the development of: - Shallow geothermal energy, for open systems; - The biomass gasification sector.
Potential players	SPW TLPE - SPW ARNE - AWAC - DPA
Technology(ies) concerned	Shallow geothermal installations of open systems Biomass gasification cogeneration plants
Findings Chap. 10	The potential of shallow geothermal energy and biomass gasification is barely exploited in Wallonia. Geothermal energy: the constraint lies in the granting of class 1 permits for carrying out injection tests (section 41.00.04), which requires an impact study. The procedure is too long, too expensive and complicated to carry out as part of a project and above all undermines the profitability of the projects. Biomass gasification: the constraint comes from the default application of section 40.20.01.02 as part of the environmental permit for any gas producer, fossil or renewable, with or without storage. This section imposes a class 1 for an equivalent of 50 kWe, which destroys the profitability of the project due to the high cost of the environmental study and the additional procedures required for this type of permit.
Proposed actions	Overall, set up a technical committee between the SPW TLPE, AWAC and DPA administrations to assess the various changes to be made to the texts in force. As part of the general exercise of revising environmental permit sections, pay particular attention to the obligations that apply to shallow geothermal projects with open systems and biomass gasification, in order to limit these to what is appropriate for such projects. Regarding biomass gasification in particular, create specific permit headings, as for biomethanisation, so that gasification does not fall by default into an unsuitable heading in terms of technological risk. Regarding shallow geothermal energy for open systems, • Identify favourable areas for the development of shallow geothermal energy with an open system, in order to specify the real potential of these projects to the DPA; • It would be advisable to have a single licensing process that would make the issuance of an operating licence conditional on the production of a comprehensive and high quality hydrogeological study to determine the impacts of the system and its long-term sustainability.
Strategy link	n.d.

Measures with significant impacts	
Measure sheet # 20	**Measures to reduce the geological risk of deep geothermal projects**
Type of measure	Financial - Guarantee fund to mitigate geological risk (determination of the underground geothermal resource)
Objective	The geological risk with regard to the determination of the geothermal resource is a significant risk that is difficult for project promoters to control. Given the high investment costs at the start of the project, the risk of not accessing the expected geothermal resource and the lack of an insurance policy covering this 'natural' risk, one of the options being studied is to set up a guarantee fund system, or join an already existing guarantee system, in order to create an investment climate that favours the production of renewable heat from deep geothermal energy.
Potential players	SPW TLPE - GW - PW
Technology(ies) concerned	Deep geothermal installations
Findings Chap. 10	The CAPEX necessary to implement a deep geothermal installation depends to a large extent on the risk taken by the project developer on the first drilling. In fact, the expected geothermal resource depends on the flow rate and the temperature of the borehole. The risk is therefore linked to these two parameters and their impact on the operating project. The risk is certainly high during the first phases of development of a project, but it gradually fades after the completion of the first exploratory drilling. It is this first drilling that will only confirm, or invalidate, the existence of a geothermal resource at the targeted location, and hence the success of a deep geothermal project.
Proposed actions	• Work on a better knowledge of the thermal resources (heat of the geothermal fluid) of the Walloon subsoil via geophysical campaigns, feasibility studies and exploratory prospecting • Study different options to guarantee the financial risk of a first drilling, among others the implementation of a Walloon guarantee. • Analyse the interest on the part of stakeholders in this type of fund and possible public-private partnerships for its establishment
Strategy link	PWEC 2030 PACE 2016-2022 (A regional guarantee fund will be set up for technologies with a high risk but attractive return (e.g. geothermal energy)

Measures with moderate impacts	
Measure # 21	**Professionalisation of the 'Cogeneration', 'District heating network', 'Geothermal' and 'Biomass' sectors**
Type of measure	Technical
Objective	To energise the market by improving and recognising the technical skills of players in the sector
Potential players	SPW TLPE - GW - Walloon training centres
Technology(ies) concerned	All
Findings Chap. 10	The profitability of RES technologies is very sensitive to the correct design of the installations. Massive deployment of these technologies requires a large number of well-trained players on the market, which is not the case today.
Actions	• Recognise or organise training/information sessions for project leaders • Through AMURE and UREBA approvals, recognise the competence of experts who have been trained on cogen/DRC/geothermal/biomass topics • In collaboration with training operators, in particular skills centres, work to set up cross-border partnerships for the organisation or recognition of specialised training • Write Vademecum or course materials for installers (more sustainable than training) • Raise awareness of the importance of maintenance, follow-up and monitoring • Orient these tools from a technical and financial perspective, with formalisation of the profitability calculation methodology to allow a comparison of projects and avoid 'commercial' studies. • Set up a certification/labelling system for RES operators
Strategy link	AEER SWR PACE 2016-2022 (Link with measures 18 'Promote the Vademecum on sustainable buildings' and 41 'Raise awareness, train and certify professionals')

Measures with moderate impacts	
Measure sheet # 22	**Integration of a facilitator/expertise system directly into the administration - with field agents**
Type of measure	Technical
Objective	Centralisation of know-how
Potential players	SPW TLPE - Wallonia energy portals- Renowatt
Technology(ies) concerned	All
Findings Chap. 10	The projects related to heat recovery, RES heat production and the installation of a district heating network are complex from a technical and financial point of view. A lot of money is required to deploy these technologies and there are not infinite funds available. Wallonia thus needs to equip itself with a neutral and competent arbitration tool to best advise project leaders and prioritise the possible injection of public funds.
Proposed actions	• Set up a facilitator system within the administration with centralisation of requests and distribution to the experts concerned (who may be external); • Set up different response lines depending on the complexity of the request; These two players would have the task of answering the questions asked and providing information, as well as offering the possibility of sending professionals to carry out field visits.
Strategy link	PWEC 2030 PACE 2016-2022 SWR (Provision of facilitator services)

Measures with moderate impacts	
Measure sheet # 23	**Establishment of an effective system for the follow-up of applicants**
Type of measure	Technical and communication
Objective	To allow the provision of plans by applicants for all the stakeholders concerned within a reasonable time frame
Potential players	SPW TLPE - asbl Powalco –asbl KLIM-CICC - GW
Technology(ies) concerned	District heating networks
Findings	For the installation of a district heating network, road works are necessary and a precise plan of the position of the applicants would thus facilitate its installation and reduce the CAPEX. • **The PoWalCo platform is not up to date (for the oldest applicants)** However it seems, according to the decree, that the players mentioned in article 8 have the obligation to register on the platform (road and pipe managers, cables). In addition, they have the obligation to respond within 15 days to a request, but only in the event of possible coordination. • **Geographic horizon of files too small.** It should be possible to obtain data covering more than an area only. For example over an entire city. However, the area is supposed to be selectable and so it should be possible to obtain data for a complete city. • **Lack of** knowledge of project leaders of the existence of this tool and therefore reduction in the number of applicants likely to use it
Actions	• Organise feedback from the project leaders and the PoWalco platform • Introduction of DHN infrastructures in the Powalco platform • Check if the mapped areas are large enough to select all the relevant applicants over the extent of a heating network (1 - 10 km) • Define reasonable deadlines to be met for declarations of addition of applicants
Strategy link	PWEC 2030 PACE 2016-2022 (Link with support for green heat conveyed by a district heating network; the readiness of the applicants must be known before this type of solution can be envisaged)

Measures with moderate impacts	
Measure sheet # 24	**Organisation of a collection and treatment / recovery process for the ashes**
Type of measure	Economic
Objective	To increase the economic and environmental attractiveness of recycling ashes as bio-based material To allow ashes to be returned to the forest
Potential players	SPW TLPE - SPW ARNE - Valbiom - Febhel - DNF - FRW - CRAW - GW
Technology(ies) concerned	Technologies using biomass as an energy vector
Findings Chap. 10	The ash from the combustion of biomass, whether the latter is polluted or not, is currently considered as waste intended exclusively for technical landfill. This can represent a significant cost in the OPEX projects, with the risk of a 'wild' deposit that is not controlled in agricultural or forest areas.

Proposed actions	• Study the possibility of setting up a recovery system based on that of sewage plant sludge (exogenous materials) in line with the fertiliser regulation and with the legislation on by-products that are no longer considered as waste. To do this:
	  ○ Estimate the potential of the ash recovery deposit (gross, net, plausible) in Wallonia (production, content, quality), geolocate it and establish a register of installations that generate ash;
	  ○ Clarify the classification of ash produced from the different categories of wood waste (WGD of February 28, 2019 implementing article 4bis of the decree of June 27, 1996 relating to waste concerning the recognition of by-products (= no longer considered as waste);
	  ○ Study the potential uses and applications for this deposit and highlight the opportunities to be exploited and the obstacles (economic, environmental, legal) to be eliminated;
	  ○ Estimate the energy-related and environmental repercussions in Wallonia.
	• Adopt the implementing decree of the forestry code to allow the return of unpolluted ashes to the forest
	• Facilitate access to qualitative analyses of ashes in the laboratory with a view to their recovery
	• Facilitate the procedures for returning clean ashes to the ground, create synergies between the actors (exchange platform, link with the existing cartography of the trophic state of the soils (http://geoportail.wallonie.be/ - https://www.fichierecologique.be/#!/, etc.)
	• Communicate the environmental benefits of returning unpolluted ash to agriculture, horticulture or forests

Strategy link	Implementation of a biomass strategy (BTC)

Measures with moderate impacts	
Measure sheet # 25	**Promotion quality biomass with low emissions of fine particles (possibly of Walloon origin)**
Type of measure	Economic
Objective	To facilitate the development of local biomass production while guaranteeing its quality
Potential players	SPW TLPE - Office Economique Wallon du bois - Febhel - EDORA - TWEED - FRW - AWAC - ISSeP _ GW
Technology(ies) concerned	Biomass installations
Findings Chap. 10	The combustion of biomass is often criticised due to its flue gas emissions. This is a barrier to the deployment of the technology that is not always properly understood, especially in tertiary and industrial installations. However, the use of quality biomass makes it possible to better control the parameters of combustion gases, including fine particles. Standard (ISO - 17225) and certification tools exist (DIN +, ENplus, Goodchips, etc.). The chip sector is subject to strong pressure from market prices to the detriment of quality, mainly through ignorance of consumers, many of them public authorities. Good quality fuel is available on the market but it is not highlighted enough.

Proposed actions	• Provide project leaders (public and private) with tools and training to understand, assess and monitor the quality of the biomass purchased
	• Work on the exemplary nature of Public Authorities by supervising public supply contracts:
	  ○ Price cannot be the only award criterion
	  ○ Impose deliveries in energy unit (kWh) instead of volume unit (MAP)
	  ○ Carry out local qualitative monitoring of projects
	• Work in collaboration with the SPF Santé on the evolution of the RDs 'Pellets' (RD of 5/04/2011 - C-2011/24112) and 'heating' (RD of 24/11/2010 - C-2010/24412)
	• Set up an incentive mechanism for the certification of producers
	• Set up an incentive mechanism for the use of certified biomass by consumers

Strategy link	PWEC 2030 PACE 2016-2022 (Link with measure 8 of Chapter 8 'Better characterise and reduce particulate emissions from heaters supplied with solid fuels and improve their energy efficiency')

Measures requiring further analysis	
Measure sheet # 26	**To plan the phase-out of oil and natural gas**
Type of measure	Legal
Objective	To plan the phase-out of oil and natural gas
Potential players	SPW TLPE - CWAPE - Distribution network managers - GW
Technology(ies) concerned	All
Proposed actions	• Benchmarking the methodologies used in other countries/regions (including Flanders) • Determine the preferred method (end of sale of installations, end of connection, end of sale of the energy vector) • Differentiate by sector • Determine a phasing out agenda • Objectively analyse from an energy point of view, for areas not currently served by gas, the benefits of creating a district heating network • Identify the potential reuse of the existing gas network for renewable gases (biomethane, hydrogen, etc.)
Strategy link	PWEC 2030 PACE 2016-2022 (Link with measure 4 of Chapter 8 'Encourage the population to switch to less polluting fuel')

Measures requiring further analysis	
Measure Sheet # 27	**Analyse the benefits of the development of solar thermal installations that supply district heating networks**
Type of measure	Subsidisation - Mechanism
Objective	To develop heating networks and their supply by solar thermal resources
Potential players	SPW TLPE - SRIW - BEI - GW
Technology(ies) concerned	Solar thermal installations
Findings Chap. 10	Given the low consumption in summer on the heating networks, supplying them with 'fuel' resources entails consideration of a high loss rate. The use of a resource such as solar energy allows this loss to be eliminated and thus substantially improves the efficiency of district heating networks.

Proposed actions	• Study the different possible subsidy mechanisms:
	  • Define potential beneficiaries
	  • Determine how this grant will be funded
	• Condition the allocation of subsidies on technical, ecological and performance factors
	• Analyse the advisability of implementing an obligation for district heating networks to have a share of their heat supply from renewable sources

Strategy link	PWEC 2030 PACE 2016-2022 (Solar thermal is a potential source of renewable heat that can be exploited in a district heating network. The benefits of this type of installation thus need to be assessed)

Measures requiring further analysis	
Measure sheet # 28	**Set up a recovery policy for Solid Recovered Fuels (SRF)**
Type of measure	Economic
Objective	To develop the SRF sources present in Wallonia with a view to reducing dependence on fossil fuels
Potential players	SPW TLPE - AWAC - SPW-ARNE - DSD - GW
Technology(ies) concerned	District heating network, cogeneration
Findings Chap. 10	The recovery of solid recovered fuels (SRF) is only possible today in large installations because the permits require very specific combustion parameters and hence significant investments. Due to these high CAPEX, profitability is only guaranteed in large power plants. The recovery of heat is often problematic due to the lack of sufficient consumers nearby. Other types of waste, currently exported on a large scale, can be recovered via smaller capacity installations and are thus more compatible with district heating networks. SRF (solid recovery fuel) is one waste to be analysed among others. SRFs are currently subject to an obligation to landfill or incinerate under conditions not technically feasible in units geared to energy recovery.
Actions	• Identify the potential of SRFs: consultation of existing statistics to identify the potential of recoverable SRF for energy recovery, and the impact of this on waste landfills. • Consultation with local stakeholders to identify the obstacles and opportunities relating to the development of the sector (environmental, legal, etc.) • Identify the measures and mechanisms to be put in place for the development of the SRf sector (waste sorting, packaging, transport, etc.) • Implementation of measures allowing the recovery of SRFs as an energy vector and their use for the supply of energy to companies (financial aid, subsidies, tax aid, etc.)
Strategy link	PACE 2016-2022 (Measures to regulate and recover green waste) PWEC 2030 (Recovery of certain types of waste for biomethanisation).