Workshop n°1

EPD : Analysis of the Methods, Results, Synthesis

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reviewed by Jean-Philippe Marquié

THERMOVALORISATIONS Project
Leonardo Da Vinci Partnership
Final Seminar, Greta Quercy Rouergue, Lycée Alexis Monteil, Rodez, France
(9 to 13th May 2011)

Workshop n°1

EPD: Analysis of the Methods, Results, Synthesis

Members :

Belgium, Bulgarian
Finnish, and French
representatives
during
the workshop …

Working sessions

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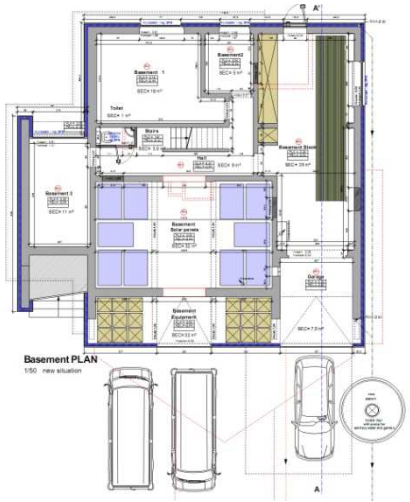
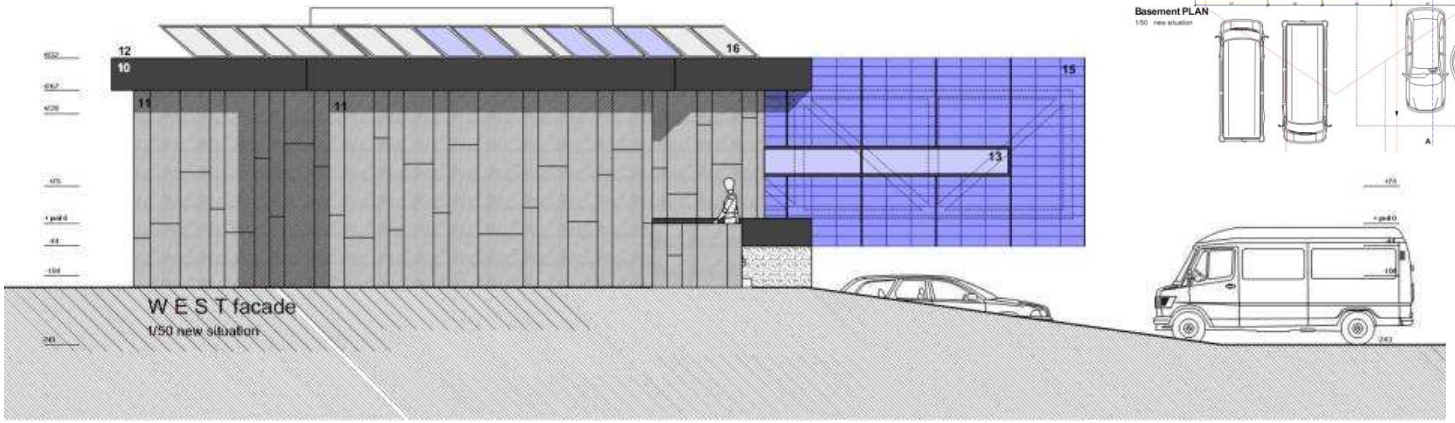
EPD: Analysis of the Methods, Results, Synthesis

Location : Belgium

Technical Support : 2BSAFE





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EPD: Analysis of the Methods, Results, Synthesis

1.Survey: Different EPD calculation methods (simplified approach);

2. Each Country has used a software taking into account the regulation and calculating with some Advantages and Disadvantages,…

3. Input Data -> Objective achieved:
Agreement on hypothesis and data used

4. Output Data -> Comparison of results
Calculation implemented during the Rodez seminar

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1. Calculation of the surface area differs from a country to another one. Standard size can include indoor or outdoor dimensions of the house, stairs, garage, embrasure of the doors, windows…these differences are quite important and can be critical for the analysis of the results

2. Comparison of climate data between countries is not so easy and considering the different softwares used, input data process produces impact on the results that could be substantial.

3. Depending of the country, calculation of the wall coefficients (horizontal or vertical walls) for wall in contact with the ground/floor is considered differently.

4. Conversion factor used for calculating « Final energy in Primary energy » has a significant influence.

Climatic zones : Bulgaria Workshop n°1

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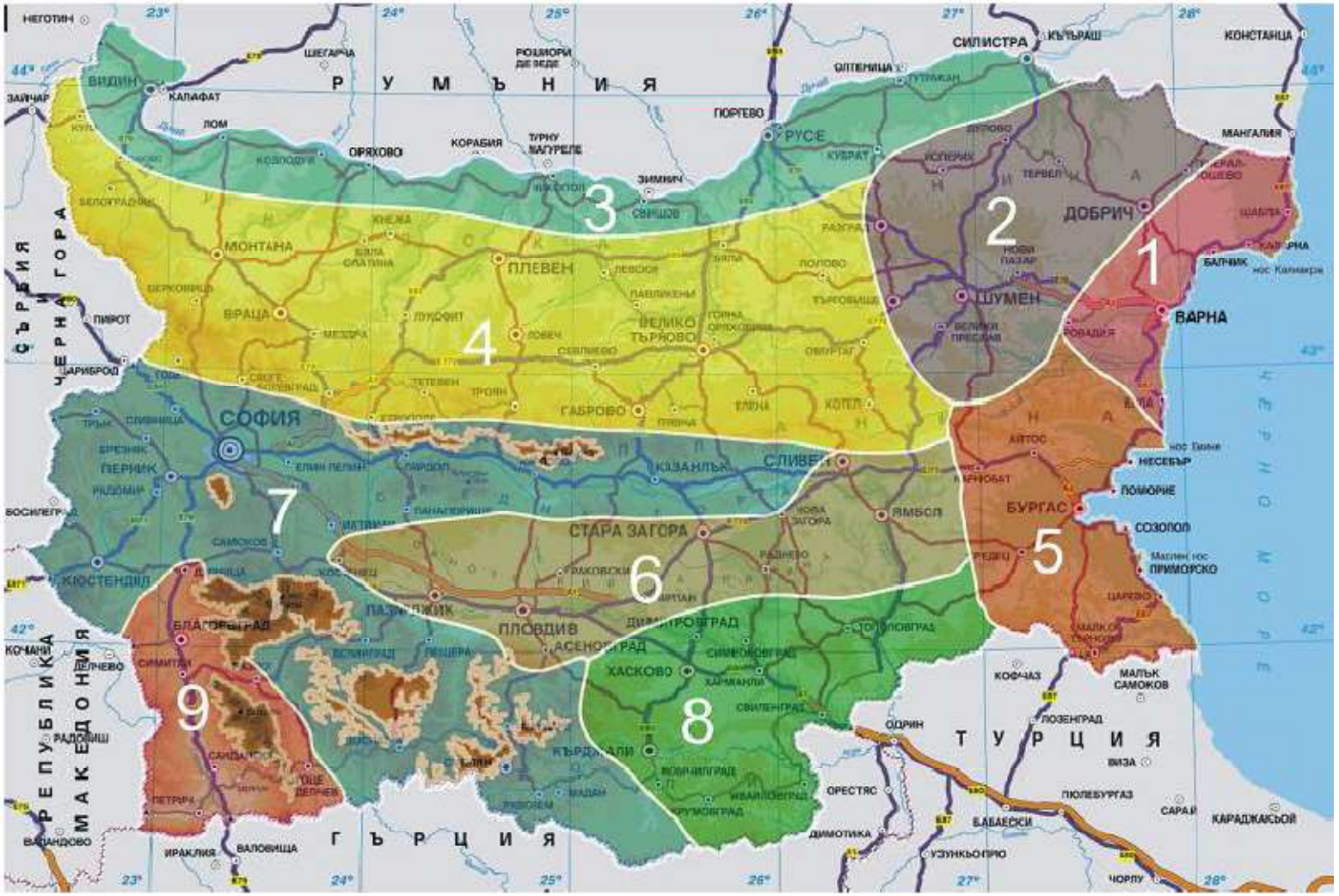

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Climatic zones : Finland

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- Location between 60°-70°N latitude
- Average temperature 6,5°C in west coast
- Köppen climate rating Df that stands for cold winter, snow and forest climate with rains throught the year
- Golf stream of the Atlantic
- More continental climate than other Norden
- Open Barents sea in North that warm up winters
- Eight (8) zones of vegetation

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Climatic zones : Finland

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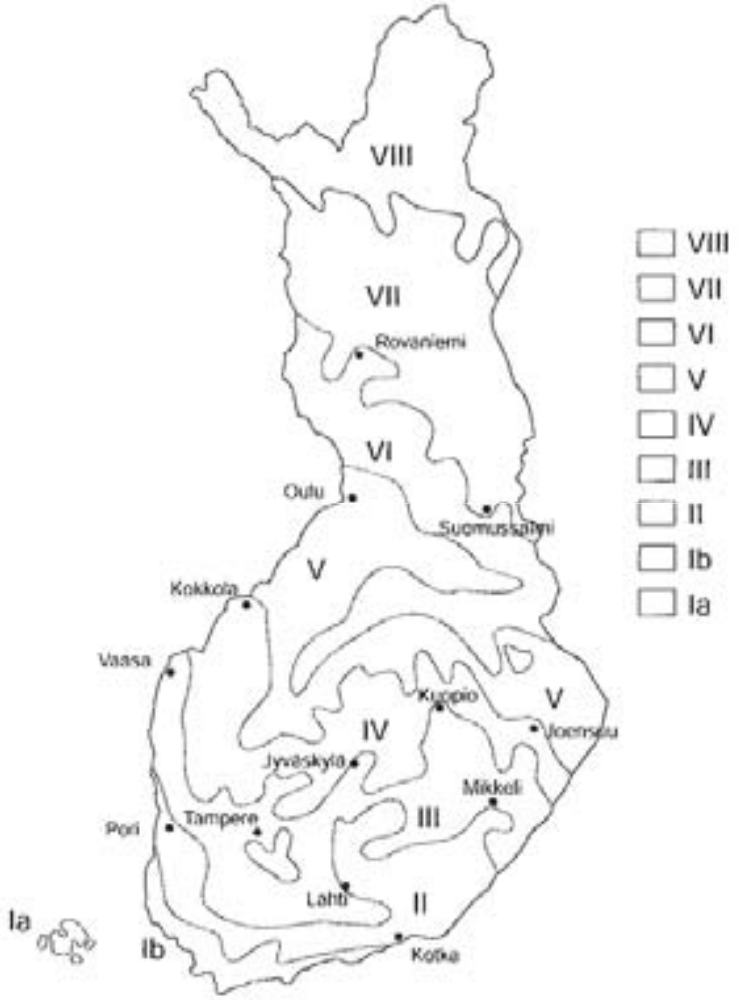

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Climatic zones : Belgium

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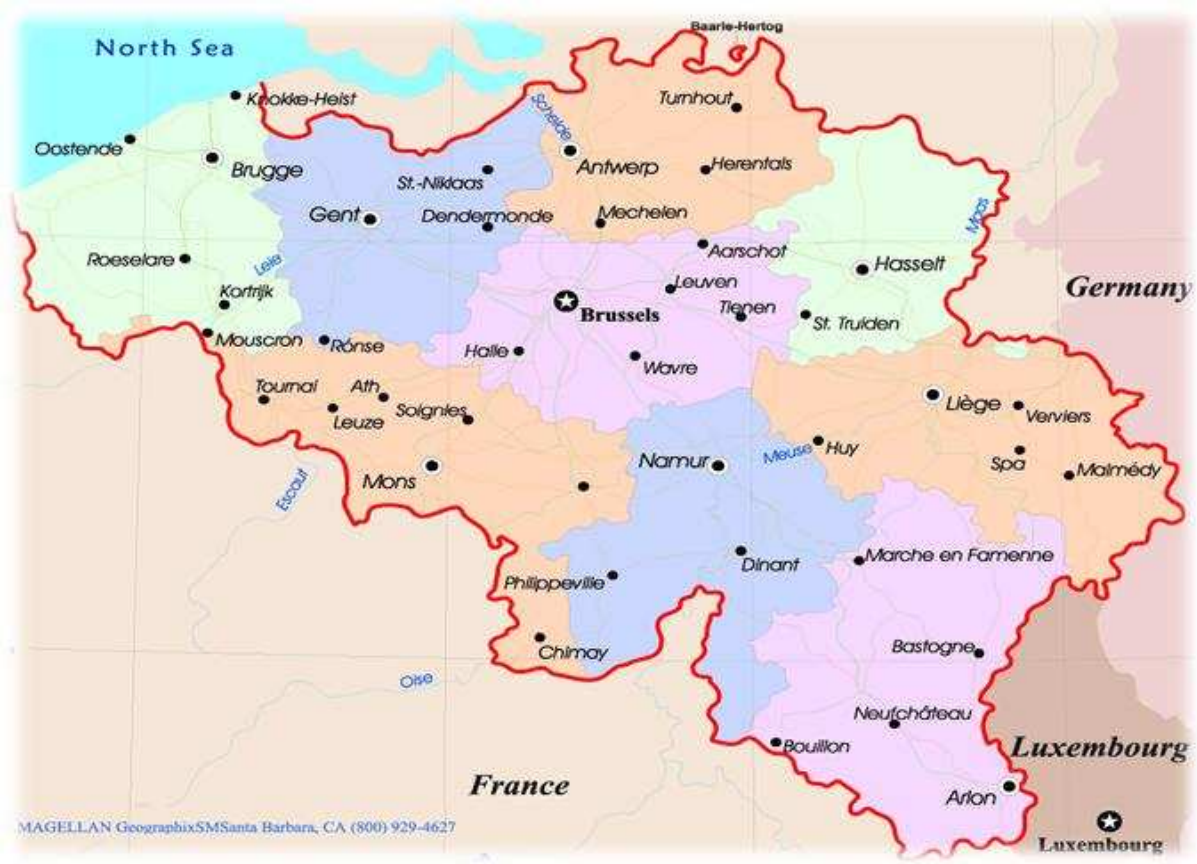
EPD: Analysis of the Methods, Results, Synthesis

Only ONE climatic zone



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Climatic zones : France

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Data Capture for Energy Performance Diagnosis

method for Individual House

Questions	Answers Belgium	Answers Bulgaria	Answers Finland	Answers France
1) Administrative information	-	-	-	-
· Reference	Leonardo Project	Leonardo Project	Leonardo Project	Leonardo Project
· Address, Name of the accommodation	Oplinter, Belgium	Oplinter, Belgium	Oplinter, Belgium	Oplinter, Belgium
· Company	PISO, Tienen	PISO, Tienen	PISO, Tienen	PISO, Tienen
· Date of the visit	2011, january, 19th	2011, january, 19th	2011, january, 19th	2011, january, 19th
· Client	Belgian team	Belgian team	Belgian team	Belgian team
	-	-	-	-
2) General information				
· Climatic Region	niet aanpasbaar	Tienen is like in Zone 4 (Middle part of Bulgaria)	software consider an average between the 3 zones	H1a
· Meteorological Station	Ukkel	Veliko Tarnovo	Jyvaskyla	Lille
· Altitude	56 m	# 200 m	# 100m	zone 0-200 m
Lowest Temperature	-18,7	-17°C	-12.2	-9
· Outside temperature	3,3 °C	4,7 °C	2,8 °C	10 °C
· Inside temperature	21 °C	19,5 °C	21 °C	19 °C
· Day degrees	No Information to be seized	2700 °C.j	No Information	2737 °C.j
· Average solar energy	3000Wh/(m².day)	3024 Wh/(m².day)	4100 Wh/(m².day)	3000Wh/(m².day)
· Nature of the EPD (for rent, for sale or new)	for rent	for rent	for rent	for rent
· Year of construction	1983 + Renovation 2010	1985 + Renovation 2010	1985 + Renovation 2010	1986 + Renovation 2010
· Calculation method	EPC	ENSI (Energy Saving International)	DOF energy	3CL

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3) Diagnosis				
3.1 Detailed description.				
· Living space: Surface area of the ground floor +surface of all storey's	179 m²	179 m²	179 m²	179 m²
· Configuration	compact	compact	compact	compact
· Average ceiling height	2,88 m	2,88 m	2,88 m	2,88 m
· Number of heated levels	1	1	1	1
· Type of construction	detached	detached	detached	detached
· Type of walls	bricks	bricks	bricks	bricks
· Type of roof	below terrace	below terrace	below terrace	under terrace
· Type of lower floor	above basement	above basement	above basement	above basement
· Amount of south glazing (solar content)	no	no	no	no
· Heavy thermal inertia for the upper floor	yes	yes	yes	yes
· House thermal inertia	heavy	heavy	heavy	heavy
3.2 Description of walls (outside or unheated premises)				
1st type of wall: Thick Blue Line				
· Surface walls for each level	163.56 m²	163.56 m²	163.56 m²	163.56 m²
Orientation of the walls				
U known : value	0,280 W/m².K	0,280 W/m².K	0,280 W/m².K	0,280 W/m².K
U unknown : type of wall :				
Thickness of the wall	\	\	\	\
or: R insulating (materials) known	\	\	\	\
or: Thickness of the insulating materials or years works	\	\	\	\
2nd type of wall: Kalwall				
· Surface walls for each level	57,73	57,73	57,73	57,73
U known : value	0,780 W/m².K	0,780 W/m².K	0,780 W/m².K	0,780 W/m².K
U unknown : type of wall :				
Thickness of the wall	\	\	\	\
or: R insulating (materials) known	\	\	\	\
or: Thickness of the insulating materials or years works	\	\	\	\

3th type of wall: Kalwall + 12cm rockwool				
· Surface walls for each level	9,78	9,78	9,78	9,78
U known : value	0,280 W/m².℃	0,280 W/m².℃	0,280 W/m².℃	0,280 W/m².° C
U unknown : type of wall :				
Thickness of the wall	\	\	\	\
or: R insulating (materials) known	\	\	\	\
or: Thickness of the insulating materials or years works	\	\	\	\
4th type of wall: Inside wall border cave				
· Surface walls for each level	Not heated area => Not taken into account in the calculation	Not heated area => Not taken into account in the calculation	Not heated area => Not taken into account in the calculation	Not heated area => Not taken into account in the calculation
U known : value	0,520 W/m².℃	0,520 W/m².℃	0,520 W/m².℃	0,520 W/m².° C
U unknown : type of wall :				
Thickness of the wall	\	\	\	\
or: R insulating (materials) known	\	\	\	\
or: Thickness of the insulating materials or years works	\	\	\	\
3.3 Description of windows or French windows.				
1st type of windows or French windows				
· Surface of the windows or French windows	24,17 m²	24,17 m²	24,17 m²	24,17 m²
U known: value	1,36 W/m².℃	1,36 W/m².℃	1,36 W/m².℃	1,36 W/m².℃
U unknown: type of windows or French windows	\	\	\	\
thickness of air gap + glazing				
filled with argon ?				
type of woodwork				
presence of shutters				
2nd type windows or French windows				
· Surface of the windows or French windows	\	\	\	\
U known: value	\	\	\	\
U unknown: type of windows or French windows	\	\	\	\
thickness of air gap + glazing	\	\	\	\
filled with argon ?	\	\	\	\
type of woodwork	\	\	\	\
presence of shutters	\	\	\	\

3.4 Description of the doors				
1st type of doors				
· Surface of the doors	4,82 m²	4,82 m²	4,82 m²	4,82 m²
U known: value	1,47 W/m².℃	1,47 W/m².℃	1,47 W/m².℃	1,47 W/m².℃
U unknown: type of doors	\	\	\	\
2nd type of doors				
· Surface of the doors	\	\	\	\
U known: value	\	\	\	\
U unknown: type of doors	\	\	\	\
3.5 Description of the Upper floor				
1st type of upper floor: Flat roof Type 1				
· Surface area of the high floor	143,68 m²	143,68 m²	143,68 m²	143,68 m²
U known: value	0,180 W/m².℃	0,180 W/m².℃	0,180 W/m².℃	0,180 W/m².° C
U unknown: type of high ceiling				
or: R known insulating materials	\	\	\	\
or: thickness of the insulating material or year installation	\	\	\	\
2nd type of upper floor				
· Surface area of the high floor	35,06	35,06	35,06	35,06
U known: value	0,07	0,07	0,07	0,07
U unknown: type of high ceiling				
or: R known insulating materials	\	\	\	\
or: thickness of the insulating material or year installation	\	\	\	\
3.6 Description of Lower floor.				
1st type of lower floor: Floor above cave				
· Surface area of the 1st low floor	Not heated area => Not taken into account in the calculation	Not heated area => Not taken into account in the calculation	Not heated area => Not taken into account in the calculation	Not heated area => Not taken into account in the calculation
U known: value	0,430 W/m².℃	0,430 W/m².℃	0,430 W/m².℃	0,430 W/m².° C
U unknown: type of lower floor				
· Type of floor: health space under floor or other unheated premises	\	\	\	\
· R unknown insulating material thickness of the insulating material or year of installation	\	\	\	\

2nd type of lower floor: Floor above outside air (car parking)				
· Surface area of the 2nd low floor	35,06	35,06	35,06	35,06
U known: value	0,120 W/m².℃	0,120 W/m².℃	0,120 W/m².℃	0,120 W/m².° C
U unknown: type of lower floor				
· Type of floor: health space under floor or other unheated premises	\	\	\	\
· R unknown insulating material thickness of the insulating material or year of installation	\	\	\	\
3.7 System of heating and Domestic Hot Water.				
· Type of boiler	Geothermal system	Geothermal system	Geothermal system	Geothermal system
· Type of transmitters	heated floor	heated floor	heated floor	heated floor
· Equipment of transmitters	thermostat	thermostat	thermostat	thermostat
· Numbers of transmitters				
· Closur plate or wood stove	no	no	no	no
· Timer / thermostat	no	no	no	no
· Other systems of heating	no	no	no	no
· D.H.W system	Geothermal system	Geothermal system	Geothermal system	Geothermal system
· Other type of D.H.W system	no	no	no	no
· Complementary solar D.H.W	no	no	no	no
3.8 Additional.				
· Solar installation	yes	yes	yes	yes
· Ventilation system	no	no	no	no
· Percentage of air conditioned surface	no	no	no	no
· System of air conditioning	no	no	no	no
· Electricity rates	0,1235 and 0,0784€/kWh	0,1235 and 0,0784€/kWh	0,1235 and 0,0784€/kWh	0,1235 and 0,0784€/kWh
· Gas utilizations: rates, Individual gas meter , gas used for: heating + D.H.W + cooking ?	no	no	no	no

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Thermal Balance

Flat located in Belgium (Tienen)

Thermal coefficients of different countries: U values (W/m².K)

	Type of partition	Belgium	Bulgaria	Finland	France
1	External Wall type 1 (thick blue-line)	0,280	0,280	0,280	0,280
2	External Wall type 2 (Kalwall)	0,780	0,780	0,780	0,780
3	External Wall type 2 (Kalwall + 12 cm Rockwool)	0,280	0,280	0,280	0,280
4	Inside wall border cave (non heated area)	0,520	0,520	0,520	0,520
5	Flat roof type 1	0,180	0,180	0,180	0,180
6	Flat roof type 2	0,070	0,070	0,070	0,070
7	Floor above cave (non heated area)	0,430	0,430	0,430	0,430
8	Floor above outside air	0,120	0,120	0,120	0,120

	Living area (m²)	179,00	179,00	179,00	179,00
FINAL ENERGY	Heating (kWh)	5928	5448	31262	5011
FINAL ENERGY	D.H.W (kWh)	2229	1188	8937	1937
FINAL ENERGY	Cooling (kWh)	/	/	/	/
FINAL ENERGY	FINAL ENERGY (kWh/year)	8157	6636	40199	6948
FINAL ENERGY	FINAL ENERGY and LABEL (kWh/m².year)	46	37	225	39
		B	B	D	C
	PRIMARY ENERGY (kWh_{EP}/year)	15564	19908		17926
	PRIMARY ENERGY and LABEL (kWh_{EP}/m².year)	87	111		100
	GAS EMISSION and LABEL (kgCO2/year)	778	13597		895
	GAS EMISSION and LABEL (kgCO2/m².year)	4	76		5

Gas	37350	
Geotherm	17829	2,1

+ Delta T
+ U val

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With our French Software (From PERRENOUD, EPD module), on the basis of the Finnish results (heating = 31262 kWh), if we take into account the heating system (heat pump with performance coefficient of five or six, in this case), we get to a similar value of Heating (kWh)! So we can consider that we have a common agreement on the results.

We can't obtain harmonization with our labels. Mr Elian Coment proposed a special European label.

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EPD: Analysis of the Methods, Results, Synthesis

For France 5011 kWh :
This result was found with the French software PERRENOUD module DPEWIN version 3.01 of 6th December 2010 (calculation method 3CL), with the choice of a geothermal heat pump.
If we replace this chosen heating system with a class III wood stove, for example, we get 40555 kWh for heating needs. This result is close to the Finnish value of 31262 kWh, a value obtained without any particular choice of heating system.

energieprestatiecertificaat

bestaand gebouw met woonfunctie

certificaatnummer 20110511-0000832969-00000003-1
straat Muizenbemptstraat
nummer 1 bus b
postnummer 3300 gemeente Tienen

bestemming eengezinswoning
type open bebouwing

softwareversie 1.3.3

berekend energieverbruik (kWh/m²):

87

PROEFCERTIFICAAT

Het berekende energieverbruik is een inschatting van de energiezuinigheid van de woning. Op de schaal wordt het energieverbruik van de woning vergeleken met het energieverbruik van alle bestaande gebouwen met woonfunctie.

87

kWh/m²

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700

zeer energiezuinig
lage energiekosten

niet energiezuinig
hoge energiekosten

energiedeskundige

rechtsvorm BVBA firma 2B-SAFE KBO-nr. 0477508432
voornaam Ivo achternaam Verjans erkenningscode EP05194
straat Esperantolaan nummer 13 bus 9
postnummer 3300 gemeente Tienen
land België

Ik verklaar dat alle gegevens op dit certificaat overeenstemmen met de werkelijkheid.

datum: 11-05-2011
handtekening:

Dit certificaat is geldig tot en met 11 mei 2021

Flemish Belgium

Class limits of energy consumption in buildings

Limits (from-to)	Class of energy consumption	Values (from – to), kWh/m²
$EP < 0,5\,EP_{max,r}$	A	EP < 114,8
$0,5\,EP_{max,r} < EP \leq EP_{max,r}$	B	114,8 < EP ≤ 229,5
$EP_{max,r} < EP \leq 0,5\,(EP_{max,r} + EP_{max,s})$	C	Not defined for new building
$0,5\,(EP_{max,r} + EP_{max,r}) < EP \leq EP_{max,s}$	D	Not defined for new building
$EP_{max,s} < EP \leq 1,25\,EP_{max,s}$	E	Not defined for new building
$1,25\,EP_{max,s} < EP \leq 1,5\,EP_{max,s}$	F	Not defined for new building
$1,5\,EP_{max,s} < EP$	G	Not defined for new building

Energy performance of the building EP = 222,9 kWh/m², thus falling into energy consumption class **B**.

Bulgaria

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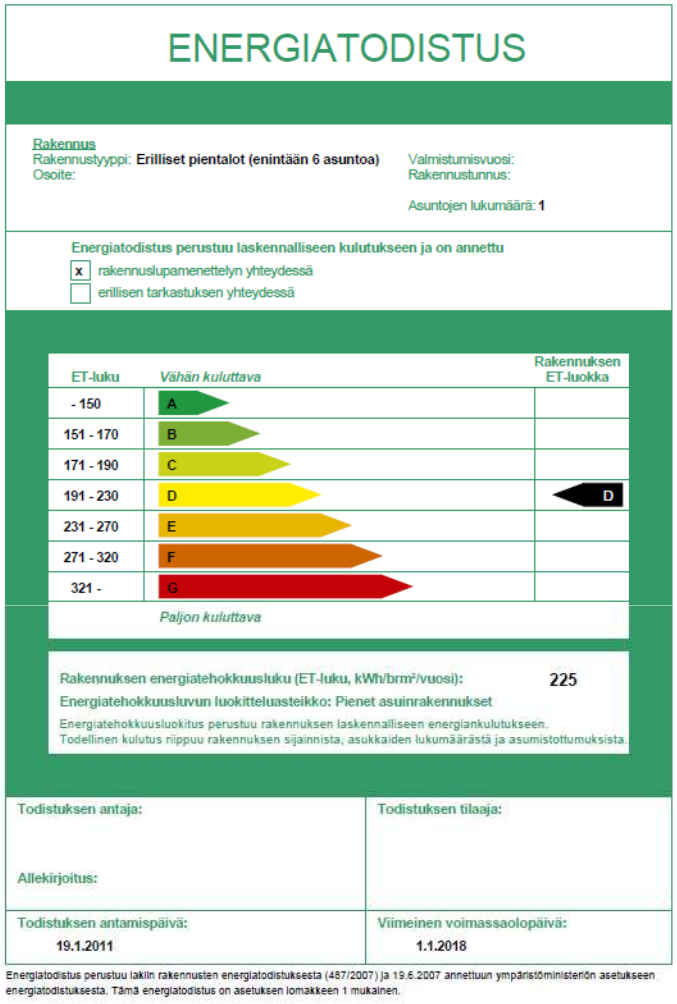
Note about BULGARIA : Our total primary energy (regarding our ordinance) include :
primary energy for heating (91,2) + primary energy for ventilation (0) + primary energy for DHW (19,8) + primary energy for lighting (24,9) + primary energy for various equipment (others) (87,00) = 222,9 (kWhEP/m².year).
Primary energy for heating (91,2) + primary energy for DHW (19,8) = 111 (kWhEP/m².year)



ENERGIATODISTUS

Rakennus
Rakennustyyppi: **Erilliset pientalot (enintään 6 asuntoa)**
Osoite:

Valmistumisvuosi:
Rakennustunnus:

Asuntojen lukumäärä: **1**

Energiatodistus perustuu laskennalliseen kulutukseen ja on annettu
[x] rakennuslupamenettelyn yhteydessä
[ ] erillisen tarkastuksen yhteydessä

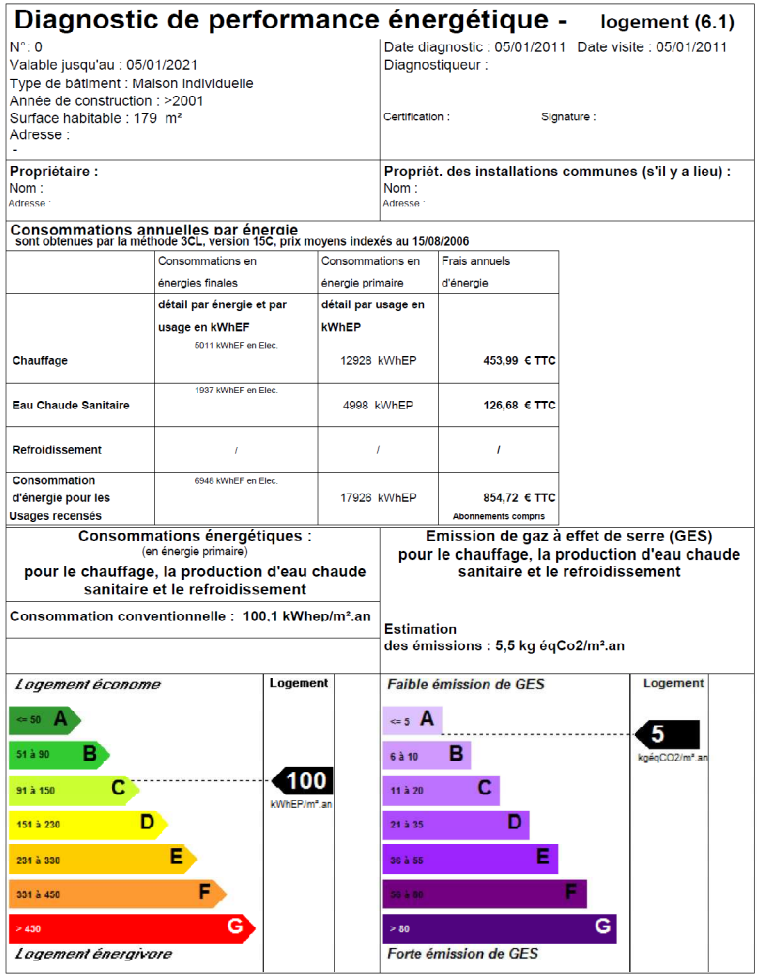
ET-luku	*Vähän kuluttava*	Rakennuksen ET-luokka
- 150	A	
151 - 170	B	
171 - 190	C	
191 - 230	D	D
231 - 270	E	
271 - 320	F	
321 -	G	
	Paljon kuluttava	

Rakennuksen energiatehokkuusluku (ET-luku, kWh/brm²/vuosi): **225**
Energiatehokkuusluvun luokitteluasteikko: **Pienet asuinrakennukset**
Energiatehokkuusluokitus perustuu rakennuksen laskennalliseen energiankulutukseen.
Todellinen kulutus riippuu rakennuksen sijainnista, asukkaiden lukumäärästä ja asumistottumuksista.

Todistuksen antaja:	Todistuksen tilaaja:
Allekirjoitus:	
Todistuksen antamispäivä: 19.1.2011	Viimeinen voimassaolopäivä: 1.1.2018

Energiatodistus perustuu lakiin rakennusten energiatodistuksesta (487/2007) ja 19.6.2007 annettuun ympäristöministeriön asetukseen energiatodistuksesta. Tämä energiatodistus on asetuksen lomakkeen 1 mukainen.

Finland



Diagnostic de performance énergétique - logement (6.1)

N°. 0
Valable jusqu'au : 05/01/2021
Type de bâtiment : Maison individuelle
Année de construction : >2001
Surface habitable : 179 m²
Adresse :
-

Date diagnostic : 05/01/2011 Date visite : 05/01/2011
Diagnostiqueur :
Certification : Signature :

Propriétaire :
Nom :
Adresse :

Propriét. des installations communes (s'il y a lieu) :
Nom :
Adresse :

Consommations annuelles par énergie
sont obtenues par la méthode 3CL, version 15C, prix moyens indexés au 15/08/2006

	Consommations en énergies finales	Consommations en énergie primaire	Frais annuels d'énergie
	détail par énergie et par usage en kWhEF	**détail par usage en kWhEP**	
Chauffage	5011 kWhEF en Elec.	12928 kWhEP	453,99 € TTC
Eau Chaude Sanitaire	1937 kWhEF en Elec.	4998 kWhEP	126,68 € TTC
Refroidissement	/	/	/
Consommation d'énergie pour les Usages recensés	6948 kWhEF en Elec.	17926 kWhEP	854,72 € TTC Abonnements compris

Consommations énergétiques :
(en énergie primaire)
pour le chauffage, la production d'eau chaude sanitaire et le refroidissement

Consommation conventionnelle : **100.1 kWhep/m².an**

Emission de gaz à effet de serre (GES)
pour le chauffage, la production d'eau chaude sanitaire et le refroidissement

Estimation
des émissions : **5,5 kg éqCo2/m².an**

Logement économe — Logement
<= 50 A
51 à 90 B
91 à 150 C — 100 kWhEP/m².an
151 à 230 D
231 à 330 E
331 à 450 F
> 450 G
Logement énergivore

Faible émission de GES — Logement
<= 5 A — 5 kgéqCO2/m².an
6 à 10 B
11 à 20 C
21 à 35 D
36 à 55 E
56 à 80 F
> 80 G
Forte émission de GES

France

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For Flemish Belgium : Energy Label in kWhEP/m2.year
For Bulgaria : Energy Label in kWhEP/m2.year
For Finland : Energy Label in kWh /m2.year
For France : Energy Label in kWhEP/m2.year

So we haven't any harmonization.
It's difficult to compare!
Only France country propose a Climate Label.

EP = Primary Energy

Workshop n°1

Thank you for your attention
&
Congratulations to the Organizers !

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