Introduction to financial planning concepts applicable to rational use of energy

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Course contents

- The « financial » perspective
  - Lifetime evaluation => discounting values
  - Basic toolkit: NPV, (D)PB, (M)IRR, PI
  - Risk components
  - Random / probabilistic environment
    - Key variables (salary inflation, energy prices, financial incentives)
    - Monte-Carlo simulation
    - Real Options Valuation/Analysis
  - Case studies from the « Smart City Block » project

- The « accounting » perspective
  - Cutting the future on a yearly base
  - Based on statements : Balance sheet (snapshot) and P&L (movie)
  - Key profitability measurement tools: GM, ROI, ROE, EBIT(DA), Asset Rotation, leverage effect
  - Cost performance monitoring: SG&A %, R&D %, Cogs %
  - Case studies

- Funding sources of an energy efficiency project in the Brussels region

The « financial » perspective

- Lifetime evaluation => discounting values
- Basic toolkit: NPV, (M)IRR, PI, (D)PB
- Risk components
- Random / probabilistic environment
  - Key variables (salary inflation, energy prices, financial incentives)
  - Monte-Carlo simulation
  - Real Options Valuation/Analysis
- Case studies: the « Smart City Block » project
  - Cogeneration and heat network
  - Shared electric vehicule
  - City block swimming pool
  - Common wash house
  - Common external insulation
  - Green wall

The Financial perspective

- Overall principles
  - Based on cash flows (in/out) thus excluding non-cash expenses such as deprecitation
  - Evaluate the profitability of a project taking the « time value of money » into account
  - Total life cycle approach (incl. a.o. EOL dismantling costs and assets residual value)
  - Real versus nominal values: each of the project cost/revenue items has its own inflation rate
- Objectives
  - (Dis)qualify (accept/reject) a project or compare projects with different durations and cash flows
- The Discounted Cash Flow method

$$FV = PV * (1+i) = 1€ * (1{,}05) = 1{,}05\ € \text{ (yearly interest rate of 5\%)}$$

$$PV = \frac{FV}{(1+i)} = \frac{1€}{1{,}05} = 0{,}95\ € \text{ (yearly interest rate de 5\%)}$$

$$DCF = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \cdots + \frac{CF_n}{(1+r)^n}$$

$$NPV = -INV + \sum_{t=1}^{n} \frac{CF^t}{(1+i)^t}$$

Tool 1: Net Present Value (NPV)

$$NPV = -INV + \sum_{t=1}^{n} \frac{CF^t}{(1+i)^t}$$

- Approaches for chosing the right discount rate depending on the perspective
  - A firm planning its future investments/projects

$$WACC = r_e * \frac{SE}{TA} + r_d * (1 - T_c) * \frac{D}{TA}$$

r_e = cost of SE-hareholders equity (dividends & capital gains)
r_d = intesrest rate (cost of debt)
SE = Shareholders Equity
D = Debt
TA = Total Asset = SE + D
Tc = income tax rate

  - A private person envisaging to make an invest in renewable energies
    - Subjective choice of the discount rate
    - Comparison with other types of investment with a similar risk profile (?)
      - Savings passbook (1.5%) (Risk 0 => unstability of financial institutions but State guarantee
      - Bonds / Equities/ Insurance …
      - Lotto (∞)
    - Growing awareness for environmental issues => accept a lower rate than the risk based one ?

Use of the NPV to qualify and select projects

- Case 1: (Dis)qualifying a project
  - Basic rule: Accept project if NPV > 0

$m	Year 0	Year 1	Year 2	Total	NPV (10%)
Project A	-10	5	6	1	€ -0.50
Project B	-20	15	13	8	€ 4.38

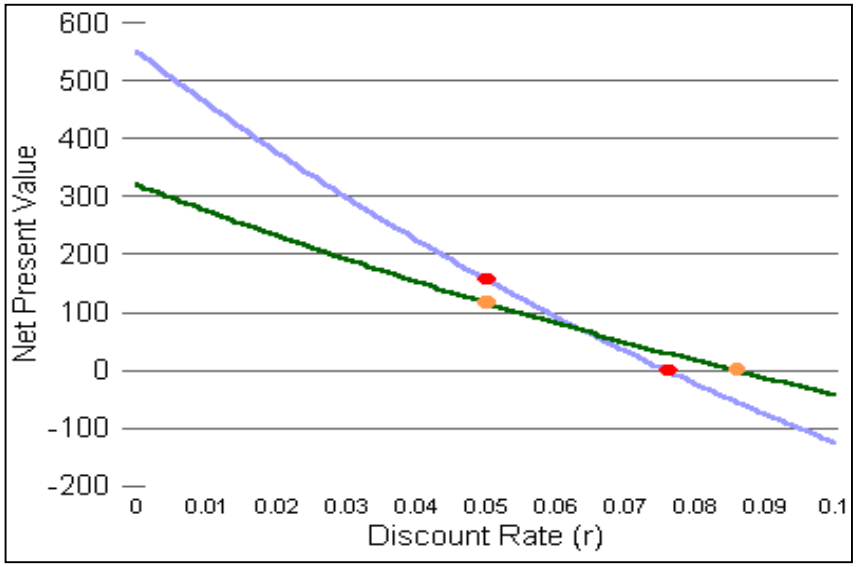
- Case 2 : selecting one project out of two

$m	Year 0	Year 1	Year 2	Total	NPV (10%)
Project A	-20	25	25	30	€ 23.39
Project B	25	0	0	25	€ 25.00

Tool 2: the Internal Rate of Return (IRR)

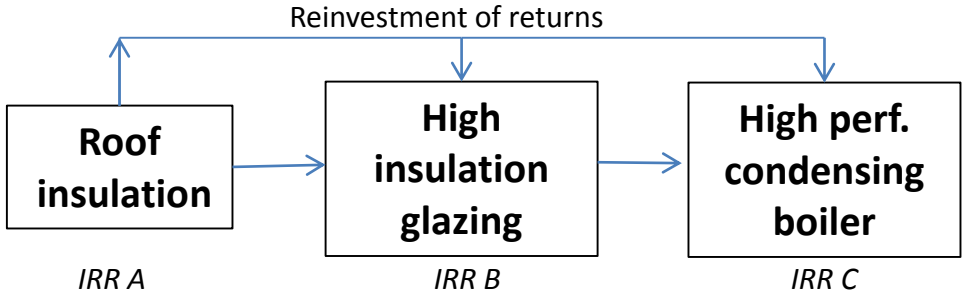
- IRR is the discount rate for which the NPV is zero. A positive NPV means an IRR > WACC (firm) or required rate (private investor)
- IRR is the rate of return of the investment.
- Decision criteria: Accept if IRR ≥ WACC (firm) or required rate (private investor)
- NPV and IRR tools are not interchangeable: case 3 – green and blue projects

Year	0	1	2	3	4	5	6	NPV @ 5%	IRR
Green line investment	-€ 1,000	€ 220	€ 220	€ 220	€ 220	€ 220	€ 220	€ 117	8.6%
Blue line investment	-€ 1,000	€ 0	€ 0	€ 0	€ 0	€ 0	€ 1,550	€ 157	7.6%



Tool 3: the Modified Internal Rate of Return (MIRR)

- IRR assumes that yearly returns are reinvested at the **IRR** of the original project



- If not the case, then use **MIRR** instead of **IRR**

Identical IRRs, but very different annual returns

Internal-rate-of-return (IRR) values are identical for 2 projects . . .

Project							IRR
Year	0	1	2	3	4	5	
Cash flows, $ million	–10	5	5	5	5	5	41%

Project							IRR
Year	0	1	2	3	4	5	
Cash flows, $ million	–10	5	5	5	5	5	41%

. . . however, interim cash flows are reinvested at different rates

Key assumption: reinvestment rate = IRR

Project							CAGR[1]
Year	0	1	2	3	4	5	
Value of cash flows at year 5 if reinvested at 41%		5 →				20	41%
			5 →			14	41%
				5 →		10	41%
					5 →	7	41%
						5	
Year 5 value of $10 million investment =						$56 million	41% CAGR[1]

Key assumption: reinvestment rate = cost of capital

Project							CAGR[1]
Year	0	1	2	3	4	5	
Value of cash flows at year 5 if reinvested at 8%		5 →				7	8%
			5 →			6	8%
				5 →		6	8%
					5 →	5	8%
						5	
Year 5 value of $10 million investment =						$29 million	24% CAGR[1]

True return is nearly 50% less because of lower reinvestment rate

[1]Compound annual growth rate.

Tool 4: the Profitability Index (PI)

- NPV is an absolute value => not suited for comparing projects with different investment sizes
- Resources are scarce and their use should be optimized
- PI = project discounted value per € of investment

$$PI = \frac{\sum_{t=1}^{n} \frac{CF^t}{(1+i)^t}}{INV}$$

- PI is the right measure to compare projects
- Case 4: two projects with same NPV but different investment size

Year	0	1	2	3	4	5	6	NPV @ 5%	PI
Project A	-€ 100	€ 22	€ 22	€ 22	€ 22	€ 22	€ 163	€ 117	2.17
Project B	-€ 1,000	€ 220	€ 220	€ 220	€ 220	€ 220	€ 220	€ 117	1.12

- Non-financial aspects of resource planning are also key to project success (Project Evaluation and Review Technique – PERT and Critical Path Method - CPM)

Taking the project risk level into account

- Relationship between project duration and level of risk
  - Technology risk
  - Human risk
  - Financial risk

- Measuring financial risk due to project duration
  - Total project length
  - Time required to become profitable

- Tool 5 : the Pay Back Period
  - Right measure = Discounted Pay Back (DPB) based on discounted CF's
  - Not enough to choose between projects (+ NPV and (M)IRR because it doesn't take ptoject profitability after the PB date into account

- Case 5: how to compare three projects?

Year	0	1	2	3	4	5	6	NPV @ 5%	PB (years)	DPB (years)
Project A	-€ 100	€ 10	€ 10	€ 10	€ 10	€ 10	€ 163	€ 65	5.31	€ 5.47
Project B	-€ 100	€ 10	€ 150	€ 23	€ 0	€ 0	€ 0	€ 65	1.60	€ 1.67
Project C	-€ 100	€ 10	€ 150	€ 23	€ 0	€ 0	€ 100	€ 140	1.60	€ 1.67

NB: DPB is approximate (DPB Excel add-in function may be bought)

A simple way to include the overall risk in the NPV calculation

- Industry specific project risk assessment questionnaire to evaluate the project risk level
  - Technology
  - Customer
  - Competition
  - Financial
  - Human Resources
- i'= i + risk premium depending on the questionnaire results

Risk level	i' (%)	Disc factor			
		2nd year	3rd year	4th year	5th year
1	15%	0.76	0.66	0.57	0.50
2	20%	0.69	0.58	0.48	0.40
3	25%	0.64	0.51	0.41	0.33
4	30%	0.59	0.46	0.35	0.27
5	35%	0.55	0.41	0.30	0.22

$$NPV = -INV + \sum_{t=1}^{n} \frac{CF^t}{(1+i')^t}$$

Random / probabilistic environment

- The evolution of some key variables is difficult to predict: salaries, technology, energy prices,…

- LT evolution of energy prices = random variable
  - In a changing "geopolitical" world (e.g. shale gas/oil in the US, Australia and Russia)
    - ➢ US will be energy self sufficient by 2020
    - ➢ US price of energy => fraction of the European price (major competitive advantage)
    - ➢ Coal prices will decrease (endangering European coal industry)
  - in Europe
    - ➢ Increasing share of renewable energies and of intermittency
    - ➢ Today only 34% of price is for producers
    - ➢ Cash cow for authorities? (e.g. coal tax, nuclear tax, …);
    - ➢ Ageing generation fleet (fossil and nuclear);

    leading to:

    - ❖ Atypical phenomena such as "prices < 0", "peak price < off peak price"
    - ❖ Increasing volatility in prices due to capacity reduction and absence of new HV transportation lines

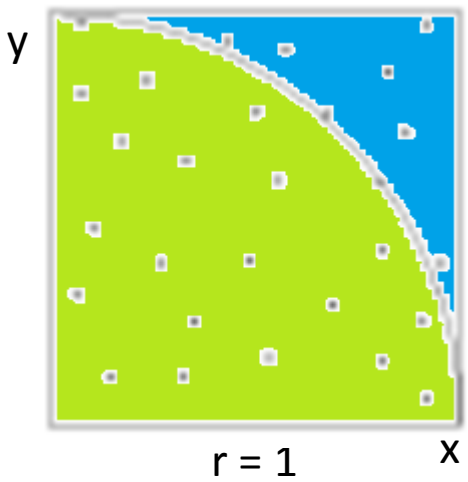
Random / probabilistic environment

- The evolution of some key variables is difficult to predict
  - Energy prices
  - Salaries
  - Technology
- Basic statistical techniques: Case 6

Initial investment	1,000					
Cash flow year 1 C_1	300					
Grow rate *g*	5%	StDev	10%			
Discount rate *r*	10%					
Year	0	1	2	3	4	5
g			19.75%	9.67%	-8.16%	16.21%
Cash flow	-1000.00	300.00	359.26	394.00	361.86	420.51
Discount factor	1.000	0.909	0.826	0.751	0.683	0.621
NPV	373.91					
Simulation	*NPV*					
	373.91		Mean		265.94	
1	308.92		StDev		92.29	
2	257.72		Min		70.26	
3	288.32		Max		414.36	
4	182.81		5% Percentile		120.91	
5	414.36					
6	279.95					
7	301.98					
8	70.26					
9	226.34					
10	328.76					

- Use of Monte-Carlo simulation to assess key project indicators

Monte-Carlo Simulations



$$n_1 = number\ of\ random\ plotter\ impacts\ where\ \ (x^2 + y^2) \leq 1$$

$$n_2 = number\ of\ random\ plotter\ impacts\ where\ \ (x^2 + y^2) > 1$$

$$When\ (n_{1+}\, n_2)\ \ => \infty \qquad \frac{n_1}{n_1 + n_2} => \frac{\pi}{4}$$

Example: MC simulation based on a Single random variable (grow rate) With a Normal distribution

Grow rate *g*	5%	StDev	10%			
Discount rate *r*	10%					
Year	0	1	2	3	4	5
g			-1.03%	9.84%	17.34%	-6.14%
Cash flow	-1000.00	300.00	296.91	326.13	382.67	359.17
Discount factor	1.000	0.909	0.826	0.751	0.683	0.621
NPV	247.52					
Simulation	*NPV*					
	247.52		Mean		249.42	
1	333.68		StDev		129.34	
2	238.68		Min		-115.86	
3	195.83		Max		767.20	
4	183.23		5% Percentile		49.99	
5	401.32					
6	182.11					
7	401.45					
8	288.77					
9	341.09					
10	110.77					
11	135.56					
12	33.39					
13	101.75					

Result of the Monte-Carlo simulation

	10 simulations									
	1	2	3	4	5	6	7	8	9	10
Mean	262.09	232.23	255.38	311.99	212.35	270.00	302.18	232.77	146.25	221.65
StDev	69.90	106.26	115.11	128.96	134.95	149.18	156.15	110.05	73.06	116.83
Min	156.60	121.84	1.57	28.44	51.96	56.46	92.17	107.55	34.59	105.86
Max	364.42	455.91	378.24	505.32	432.45	538.49	520.09	410.86	252.81	456.12
5% Percentile	174.17	122.52	55.38	122.12	62.78	88.38	105.21	108.66	34.86	109.84
	1000 simulations									
Mean	248.31	246.05	249.35	241.97	248.66	249.44	245.33	242.55	245.19	244.05
StDev	129.21	125.67	126.07	126.43	131.55	131.91	127.01	121.56	124.63	123.46
Min	-115.55	-126.12	-54.63	-102.64	-100.98	-110.44	-117.65	-130.20	-165.91	-105.42
Max	774.74	703.35	746.15	802.47	655.18	825.97	664.18	704.07	672.25	782.78
5% Percentile	46.59	41.47	51.69	44.39	47.96	48.90	48.32	47.01	40.70	51.04

Functions available in Microsoft Excel 2010

NPV(rate,value1,[value2],...) The NPV function syntax has the following arguments (argument: A value that provides information to an action, an event, a method, a property, a function, or a procedure.):
Rate Required. The rate of discount over the length of one period.
Value1, value2, ... Value1 is required, subsequent values are optional. 1 to 254 arguments representing the payments and income.

IRR(values, [guess]) The IRR function syntax has the following arguments: Values Required. An array or a reference to cells that contain numbers for which you want to calculate the internal rate of return.
Values must contain at least one positive value and one negative value to calculate the internal rate of return.
IRR uses the order of values to interpret the order of cash flows. Be sure to enter your payment and income values in the sequence you want.
If an array or reference argument contains text, logical values, or empty cells, those values are ignored.
Guess Optional. A number that you guess is close to the result of IRR.

MIRR(values, finance_rate, reinvest_rate)The MIRR function syntax has the following arguments (argument: A value that provides information to an action, an event, a method, a property, a function, or a procedure.):
Values Required. An array or a reference to cells that contain numbers. These numbers represent a series of payments (negative values) and income (positive values) occurring at regular periods.
Finance_rate Required. The interest rate you pay on the money used in the cash flows.
Reinvest_rate Required. The interest rate you receive on the cash flows as you reinvest them.

$$\left(\frac{-\mathrm{NPV}(rrate, values[positive]) * (1+rrate)^{n}}{\mathrm{NPV}(frate, values[negative]) * (1+frate)}\right)^{\frac{1}{n-1}} - 1$$

DPB Discounted Pay Back period is not available as a standard function of Excel. Add-ins do exist (free or not free)

Microsoft Excel technical aspects

- Time unit : from years to months (example)

NPV	200.00 €	200.00 €			
YEAR 1	110	8.40	jan		
YEAR 2	121	8.47	feb		
		8.53	mar	YEARLY RATE	10%
		8.60	apr	MONTHLY RATE	0.80%
		8.67	may		
		8.74	jun		
		8.81	jul		
		8.88	aug		
		8.95	sep		
		9.02	oct		
		9.09	nov		
		9.17	dec		
		9.24	jan		
		9.31	feb		
		9.39	mar		
		9.46	apr		
		9.54	may		
		9.61	jun		
		9.69	jul		
		9.77	aug		
		9.85	sep		
		9.92	oct		
		10.00	nov		
		10.08	dec		

- **(M)IRR function** : there may be sometimes no solution (if NPV<0) or multiple ones (if all future flows are not ≥ 0

Real Options Valuation/Analysis

- NPV/MIRR analysis based on a static approach: once the investment is done, nothing can be changed, many choices are irreversible even if they turn to be negative in the future
- Not appropriate for many environmental projects which are complex, unpredictable and unstable
- The flexibility needed in the course of such projects generically, will relate to project size, project timing, and the operation of the project once established
- Real options analysis (ROA), as a discipline, extends from its application in corporate finance, to decision making under uncertainty in general, adapting the techniques developed for financial options to "real-life" decisions
- A Call/Put option is a contract giving its owner the right to buy/sell a security asset or a commodity at a given price (« strike price ») and a given date (European style option) or during a given period of time (american style)
- A Real Option is the same applied to an investment decision

> The real options approach allows one to properly take into account options such as:
>
> - deciding when the investment project should be undertaken (option to delay),
> - investing in new or additional capacity (option to expand),
> - closing or abandoning an existing project (option to abandon),
> - undertaking sequential investments (multi-stage options),
> - undertaking horizontal or geographical diversification for multinational companies (option to grow),

- In such cases, any (non-recoverable) upfront expenditure related to this flexibility is the option premium (the price to gain flexibility) to be compared to flexibility gains
- ROA can be based on multiple mathematical techniques which will not be part of this introductory course (Black Scholes, Binomial, Specific Monte-Carlo techniques)

Real Options Valuation/Analysis: postponing investment decision

- Consider an individual that has the option to invest in a new solar panels installation. He may invest this year or next year. The question is: when should he invest? If he invests this year, it has an income stream earlier. But, if he invests next year, he may obtain further information about the state of the public subsidies, which can prevent it from investing with losses.

- He knows its discounted cash flows if he invests this year: 5k€. If he invests next year, the discounted cash flows are 6k€ with a 66.7% probability, and 3K€ with a 33.3% probability. Assuming a risk neutral rate of 10%, future discounted cash flows are, in present terms, 5.45K and 2.73K, respectively. The investment cost is 4K. If he invests next year, the present value of the investment cost is 3.63K€.

- Following the net present value rule for investment, he should invest this year because the discounted cash flows (5K) are greater than the investment costs (4K) by 1K. Yet, if he waits for next year, he will only invest if discounted cash flows do not decrease. If discounted cash flows decrease to 3K€, then investment is no longer profitable. If, they grow to 6K, then he invests. This implies that he invests next year with a 66.7% probability and earns 5.45K - 3.63K= 1.82K€ if he does invest. Given that the value to invest next year exceeds the value to invest this year, the firm should wait for further information to prevent losses.

- This simple example shows how the net present value may lead the firm to take unnecessary risk, which could be prevented by real options valuation. In this case, waiting 1 year to decide brings more money and avoids a risk to make a loss.

Inspired from Wikipedia

Real Options Valuation/Analysis: staged investment

- Staged investments are quite often in the pharmaceutical, mineral, and oil industries but may apply to any other industry like for example environmental consulting firms

- To illustrate the concept, lets take the case of a small firm called « smart city block » (SCB) dedicated to the renovation of cities envisaging to transpose what they did in Brussels to other large cities in Europe.

- In this example, we analyze a staged investment abroad in which the SCB firm decides whether to start new SCB projects in cities of a foreign country.

- The SCB firm does not know how well its city renovation concept will be accepted in a foreign country. If it has high demand, the discounted cash flows per city is 10M. If it has low demand, the discounted cash flows per city is 5M. Assuming that the probability of both events is 50%, the expected discounted cash flows per city is 7.5M. <u>It is assumed that the performance will be identical for all renovated cities</u>. The risk neutral rate is 10%. The investment cost per city is 8M.

- Should the SCB firm invest in one city, two cities, or not invest? The net present value suggests the SCB firm should not invest: the net present value is -0.5M per city. But is it the best alternative? Following real options valuation, it is not: the SCB firm has the real option to attack one city this year, wait a year to know its demand, and invest in the new city next year if demand is high.

- By renovating one city, the SCB firm knows that the probability of high demand is 50%. The potential value gain to expand next year is thus 50%*(10M-8M)/1.1 = 0.91M. The value to start one city this year is 7.5M - 8M = -0.5 (=the option premium). Thus the value of the real option to invest in one city, wait a year, and invest next year is 0.41M. Given this, the SCB firm should opt by starting one city .

- This simple example shows that a negative net present value does not imply that the SCB firm should not invest.

Inspired from Wikipedia

Case Studies Agenda

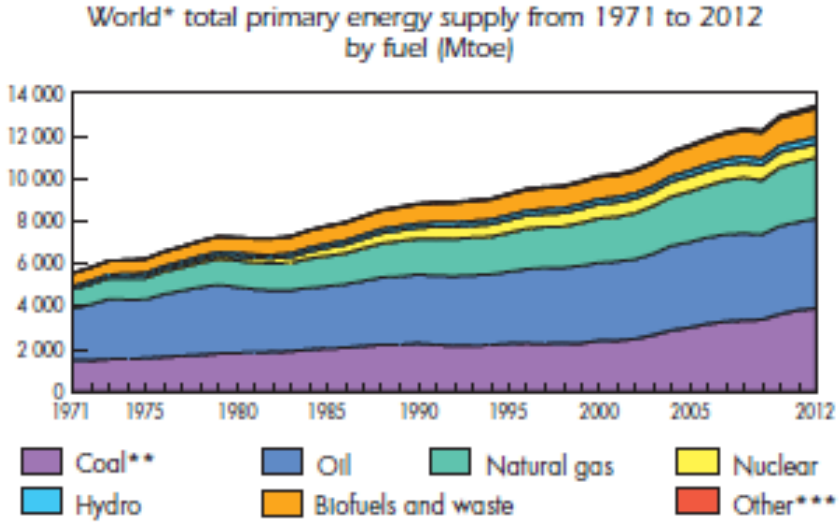
- Introduction to the « Smart City Block » project
  - Cogeneration and heat network
  - Shared electric vehicule
  - City block swimming pool
  - Common wash house
  - Common external insulation
  - Green wall

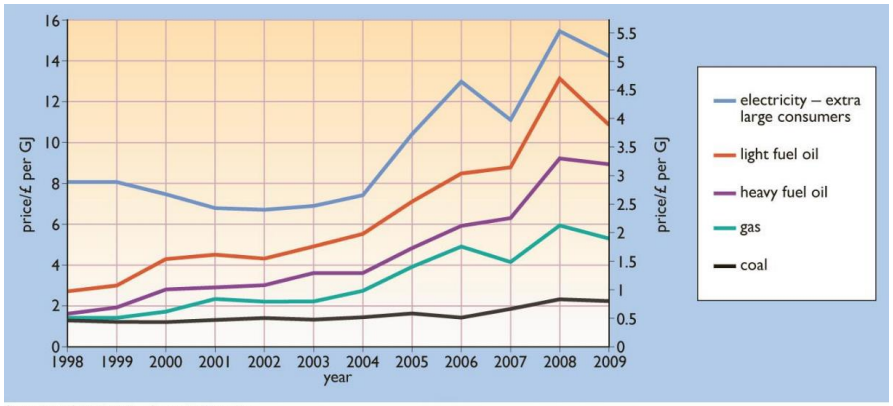
- Q&A

The Smart City Block project

Sponsored by

The energy-climate context





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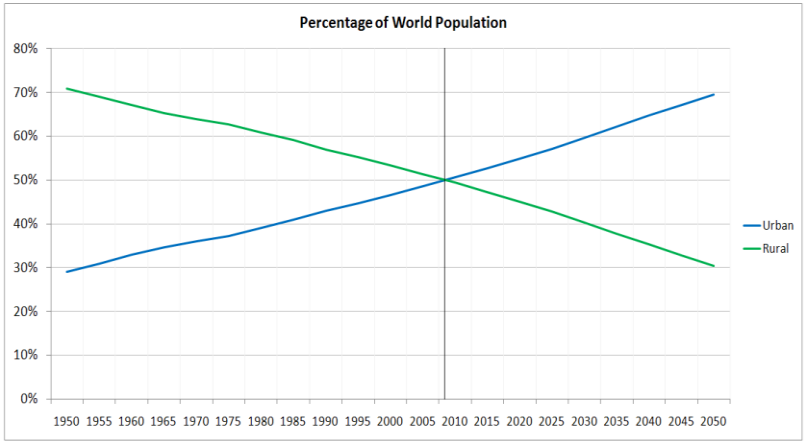
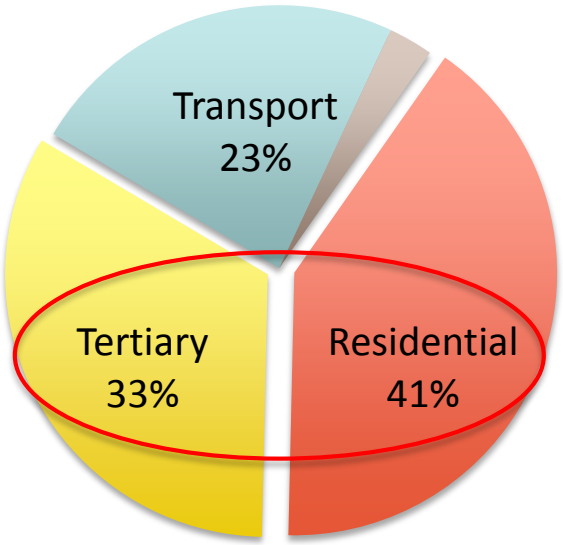
Source: IEA Key World Energy Statistics, 2014

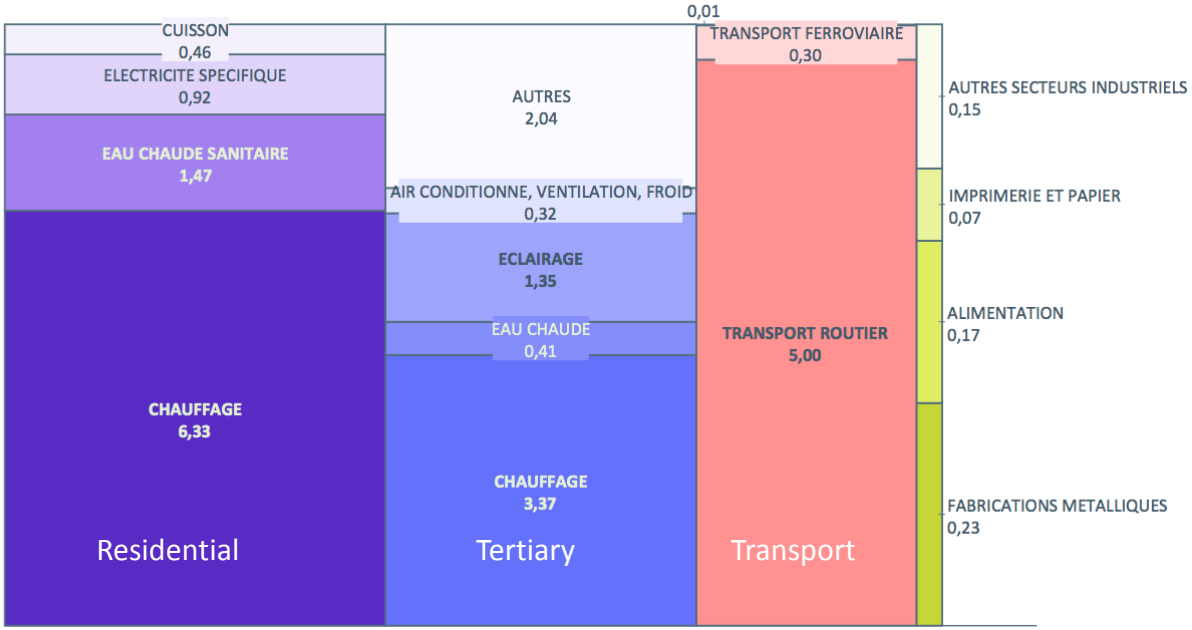


Data Source: United Nations, http://esa.un.org/unup/p2k0data.asp

Brussels, capital of Europe …



Primary Energy Consumption in Brussels Region (TWh)



Source: IBGE 2009

Cities emissions:

- ➡ ***Building performance → 150 kWh/m2.Y → 15 kWh/m2.Y***
- ➡ ***Building materials → 50 % CO2 in grey energy (50kWh/m2.Y, 50Y)***
- ➡ ***Behavioral practices → the way people approach consumption***

Regulatory Context

- **Post-Kyoto**
- **Conference Of the Parties (COP21 in Paris)**
- **Multi / Bilateral negotiations**

- **RES 20/20/20 Directive**
- **EPDB (Building Efficiency)**
- **EED (Energy Efficiency)**

➔ 20% Energy Efficiency
➔ 20% Renewable Energy
➔ 20 % CO_2 reduction

➔ NZEB 2020

➔ 80-95% CO_2 reduction by 2050

- **BATEX (incitative)**
- **Passive standard 2015 (regulatory)**

Introduction to the « Smart City Block » project (SCB)

The objective is to propose a mix of technical and behavioural changes at city block level that can lead to both energy savings and increased quality of life.

Objectives

- Tackle the renovation, not only new buildings
- Energy and financial savings in households/SME
- Increase quality of life and social ties

Methodological approach

- Renovation at block-level
- Between individual level and city planning level
- Trans-disciplinary (Technology and Human sciences)
- Take into account population and housing diversity
- Currently concentrated on Brussels

What is a City Block?

City
↓
Municipality
↓
District
↓
Statistical Sector
↓
City block
↓
Street
↓
Street section
↓
Address

- Climate change
- Scarcity of energy resources
- Cost of energy

↓

- Renewable energy
- Energy efficiency
  - Technologies
  - Behaviour changes

- Brussels region (1.8 m inhabitants)
- Local authority (19)
- District
- Statistical sector (700)
- **City Block (5000=>3600)**
- Street
- Part of a street
- Address

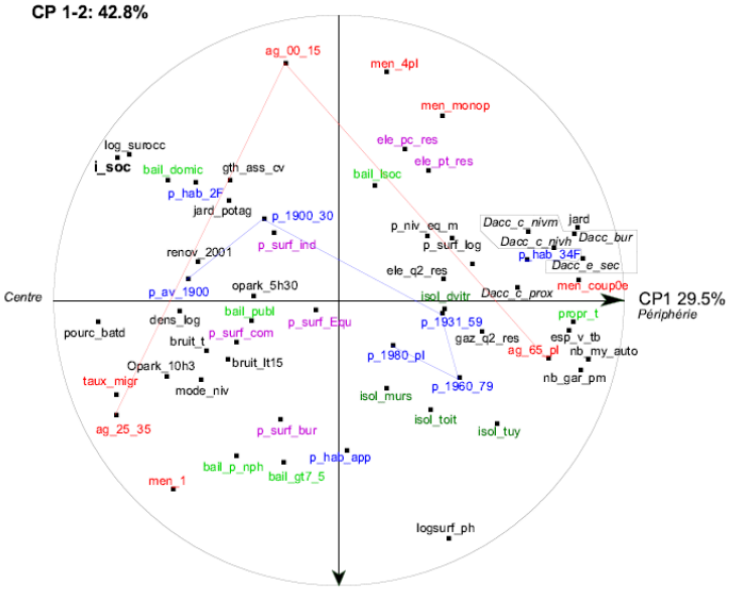
The Smart City Block team

- Promoter: Pr. J.C. Maun
- Coordination
  - Frédéric Klopfert
  - Olivier Mortehan
- Collaboration with
  - ULB: multiple faculties (EPB, SBS, FSP, Law, Archi,…)
  - VUB: F. Descamps, Sophie Chamart
- Students 2012-2016
  - 3 PhD
  - 42 Master Thesis
  - 12 Enterprise seminar
  - 13 Solvay Consulting Group

City-block segmentation of Brussels

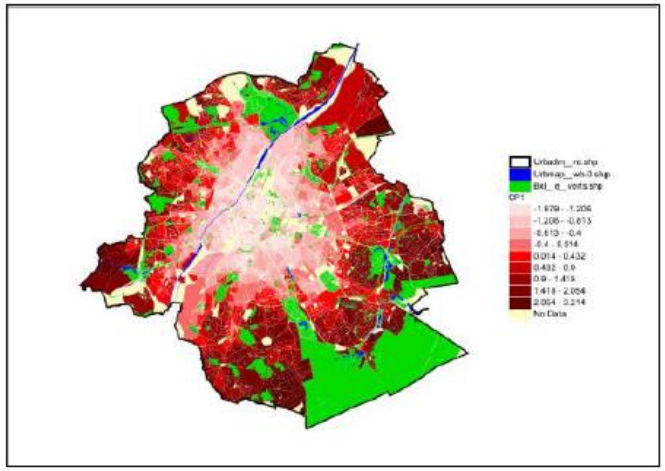
- Heterogeneity of
  - The infrastructure environment and its consequences on the type of renovation best suitable to the local environment considered
  - The population and its interests, understanding and acceptance of an SCB project
- Building a database (98 => 37 variables) for 3600 city blocks
  - Energy (electricity and gas)
  - Urbanism
  - Mobility
  - Environmental impact
  - Social impact
  - Financial

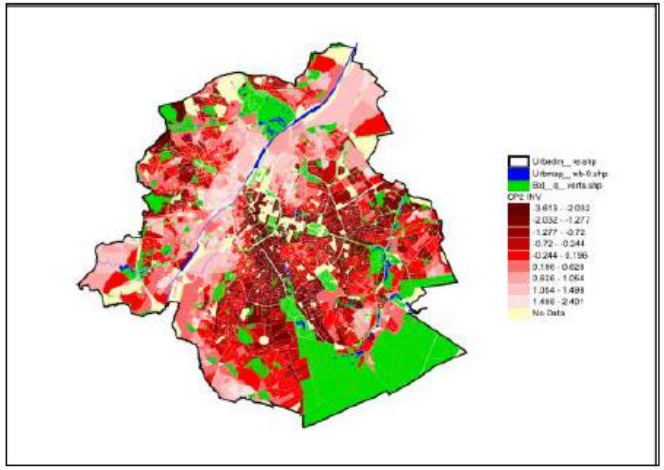
Principal Component Analysis



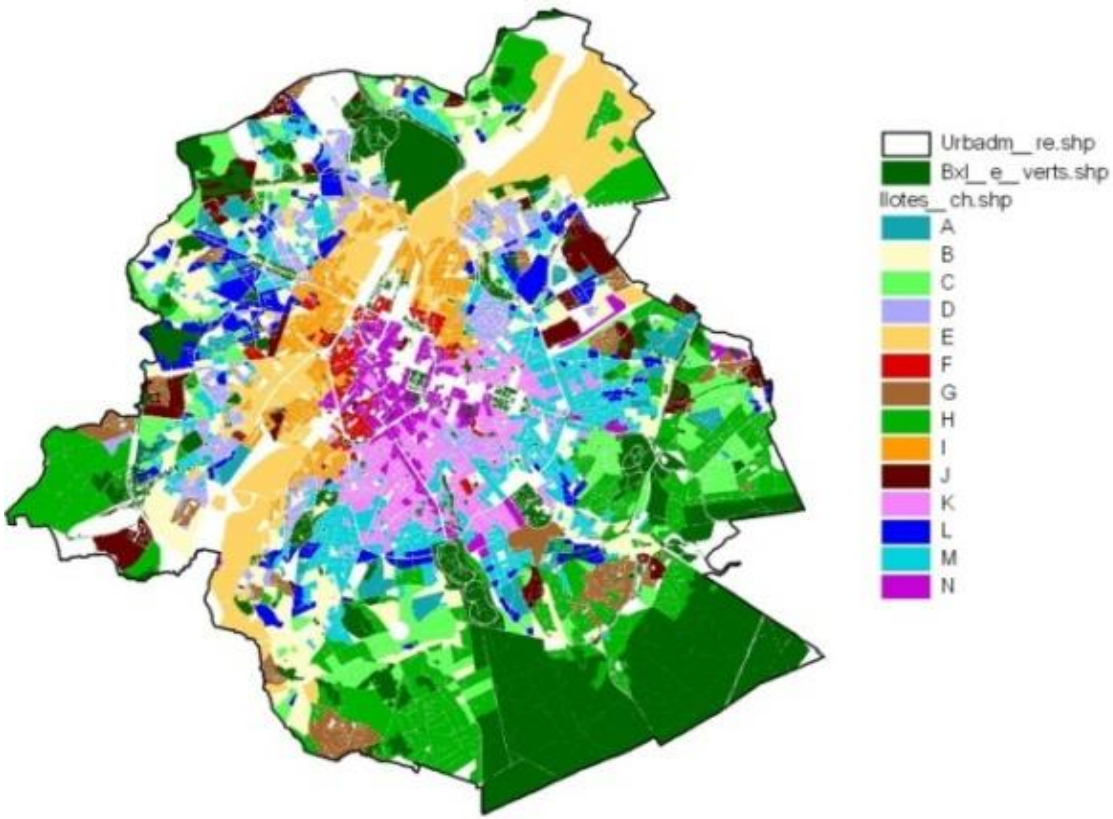
Eastern part of the city made of apartments and offices, above average socio-economic level

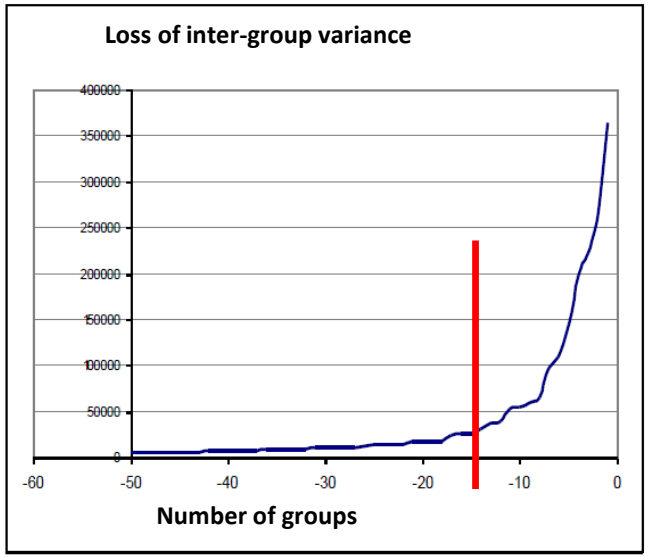
Total Variance Explained			
Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	17.43	29.54	29.54
2	7.80	13.21	42.75
3	4.57	7.75	50.50
4	3.13	5.30	55.81
5	2.41	4.09	59.89
6	2.20	3.72	63.61





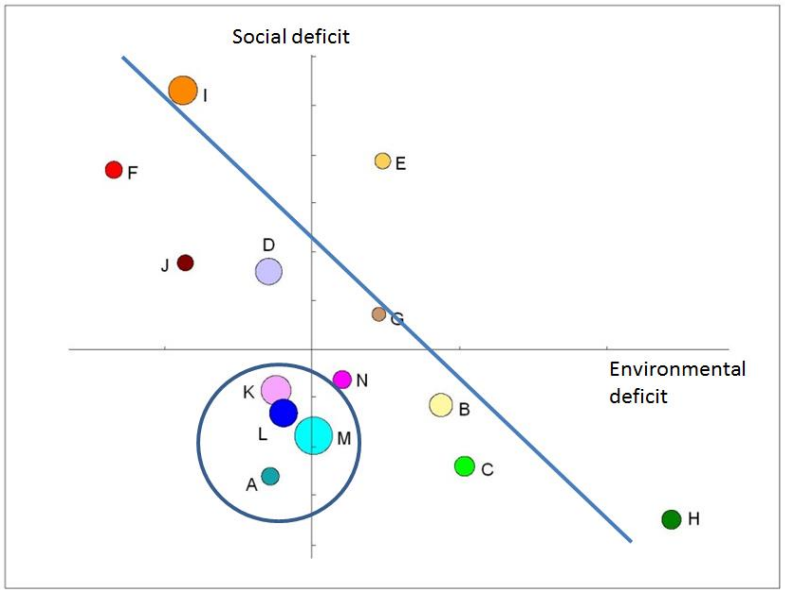
Building a 14 group topology of Brussels





- Each of the 14 groups is geographically homogeneous.
- There is a strong centric component of the city structure (linked to socio economic variables)
- There is a visible link between the main valley crossing the city from the North to the South and the topology structure (groups E and J corresponding to old and poor districts mixing housing and industry).

Prioritizing the City blocks to be surveyed



- Building 2 deficit indicators
  - Social
  - Environmental
- Priority criteria
  - The maximization of both deficits
  - The number of city blocks involved in each group

Selection of 3 target groups to be surveyed

Group H : Older easy periphery (High-Net-Worth individuals), with very strong presence of luxury houses with 3-4 frontages and large gardens
Group I : Old dense central districts, low socio-economic level, with a domination of old joint buildings, and remains of industrial function, lack of green space
Group M : Apartments in joint buildings, above average social status, part of the first dense crown, mid-20th

Group	# Quest. distributed	# answered quest. Paper	# answered quest. Online	Coverage	Total # of blocks
H	92	3	4	8%	176
I	220	1	1	1%	396
M (1)	151	3	24	18%	677
M (2)	400	43	0	11%	677

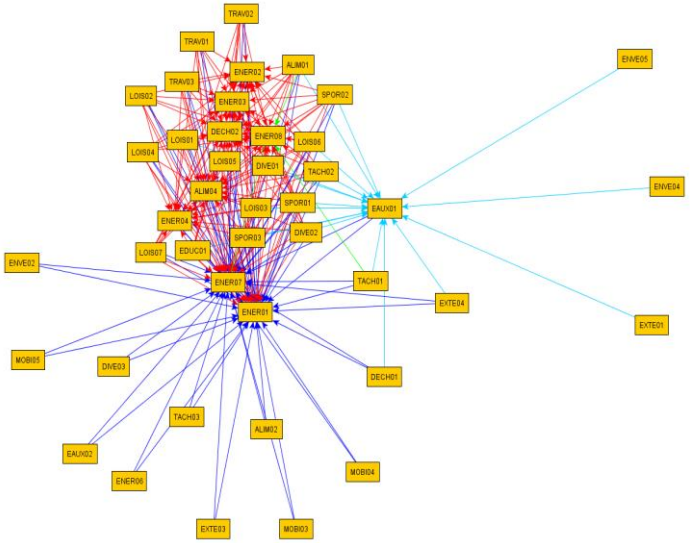
Elements and scenarios

« Element »

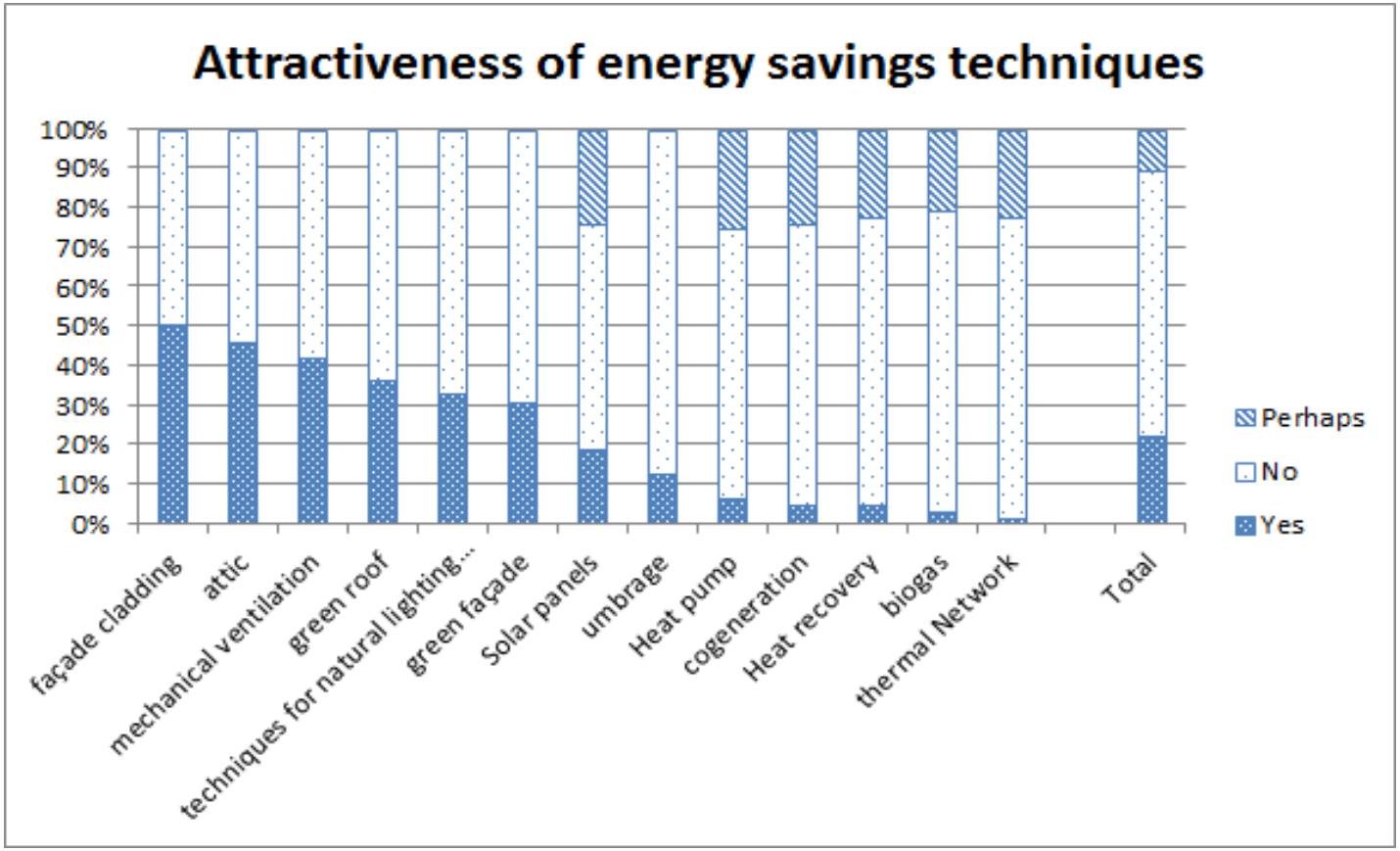
Physical element (construction, interior or exterior space, infrastructure, equipment, resource, etc.) which can be proposed during renovation for bringing energy savings, economic savings, increasing social interactions or reducing environmental impacts.

Technology	CODE	
Energy		
Solar photovoltaic pannels	ENER01	ATM
Solar thermal pannels	ENER02	ATM
Geothermy	ENER03	ATM
Heat pump (air/air)	ENER04	ATM
Heat skimmer	ENER05	ATM
Thermal network	ENER06	ATM
Cogeneration	ENER07	ATM
Biogaz	ENER08	ATM
Enveloppe		
Isolation	ENVE01	BATir
Mechanical ventilation	ENVE02	BATir
Umbrage	ENVE03	BATir
Green roof	ENVE04	BATir
Green facade	ENVE05	BATir
Attic	ENVE06	BATir
Facade cladding	ENVE07	BATir
openings	ENVE08	BATir
Environnemental		
Mobility		
Bicycle parking	MOBI01	BATir
Car parking	MOBI02	BATir
Shared bicycle	MOBI03	
Shared car	MOBI04	
Mobility network	MOBI05	BATir
Waste		
Space for sorting waste	DECH01	
Compost	DECH02	
Water		
Recuperation and handling of grey water	EAUX01	BATir
Recuperation and handling of rainwater	EAUX02	BATir
External areas		
Kitchen garden	EXTE01	
Sport area	EXTE03	
Garden	EXTE04	

Common services/ equipment	CODE
Sports/hobbies	
Slow sport room	SPOR01
Fitness room	SPOR02
Swimming pool/thalasso/sauna/hammam	SPOR03
Work/intellectual	
Shared office	TRAV01
Meeting room	TRAV02
Library	TRAV03
Domestic tasks	
Wash-out office	TACH01
Workshop	TACH02
Parts storage	TACH03
Food	
Kitchen	ALIM01
Deep freezer	ALIM02
Cellar	ALIM03
Wine cellar	ALIM04
Hobbies	
Guest room	LOIS01
music/concert room	LOIS02
Recreational room	LOIS03
Museum	LOIS04
Movie/theatre/conference room	LOIS05
Meeting room	LOIS06
TV/Hifi studio	LOIS07
Education	
Day nursery	
Divers	
Bathroom	DIVE01
Relighting	DIVE03



Attractiveness of energy-savings techniques: the knowledge gap



Attractiveness of new shared activities aiming at reducing energy consumption

	YES	NO		YES	NO		YES	NO
Kitchen garden	41%	13%	Movie theater	17%	35%	Working space	12%	35%
Compost	30%	15%	museum	17%	22%	Recreational space	10%	38%
Swimming pool thalasso	29%	22%	Music room	15%	28%	Guestroom	8%	38%
Waste sorting space	28%	17%	Parts storage	15%	42%	Storeroom	7%	50%
Workshop	25%	27%	Study room/ Library	15%	35%	Deep freezer	7%	58%
Slow sport room	22%	31%	Crib	13%	17%	Kitchen	5%	60%
Playground	20%	15%	Garden	13%	37%	Wash-out office	3%	62%
Fitness	20%	31%	Shared bicycle	13%	35%	Wine cellar	3%	57%
Shared car	18%	28%	Meeting room	12%	27%	TV Hifi room	2%	63%

Main stakeholders of a SCB project

- Private sector
  - Financial institutions
  - Architects
  - Consulting firms (engineering, construction, design, social economy, urban planning, environment)
  - Real-estate promoters
  - Energy producers/suppliers
  - Local inhabitants comittees
- Public sector
  - European Union
  - Federal, regional governments
  - Local authorities (19)
  - Education (filling in the knowledge gap)
- Initiatives
  - Contrats de quartiers durables
  - Quartiers durables citoyens
  - Partenariats Public Privé

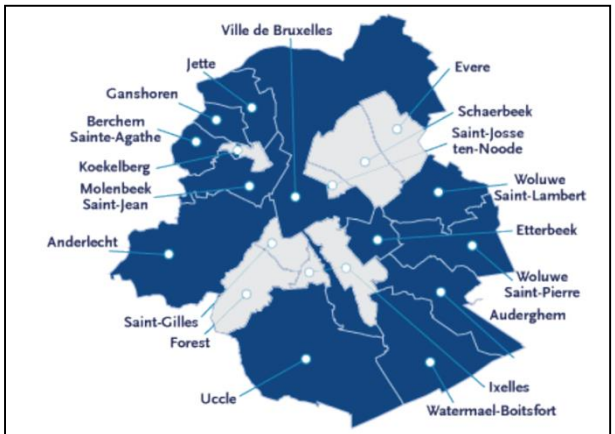
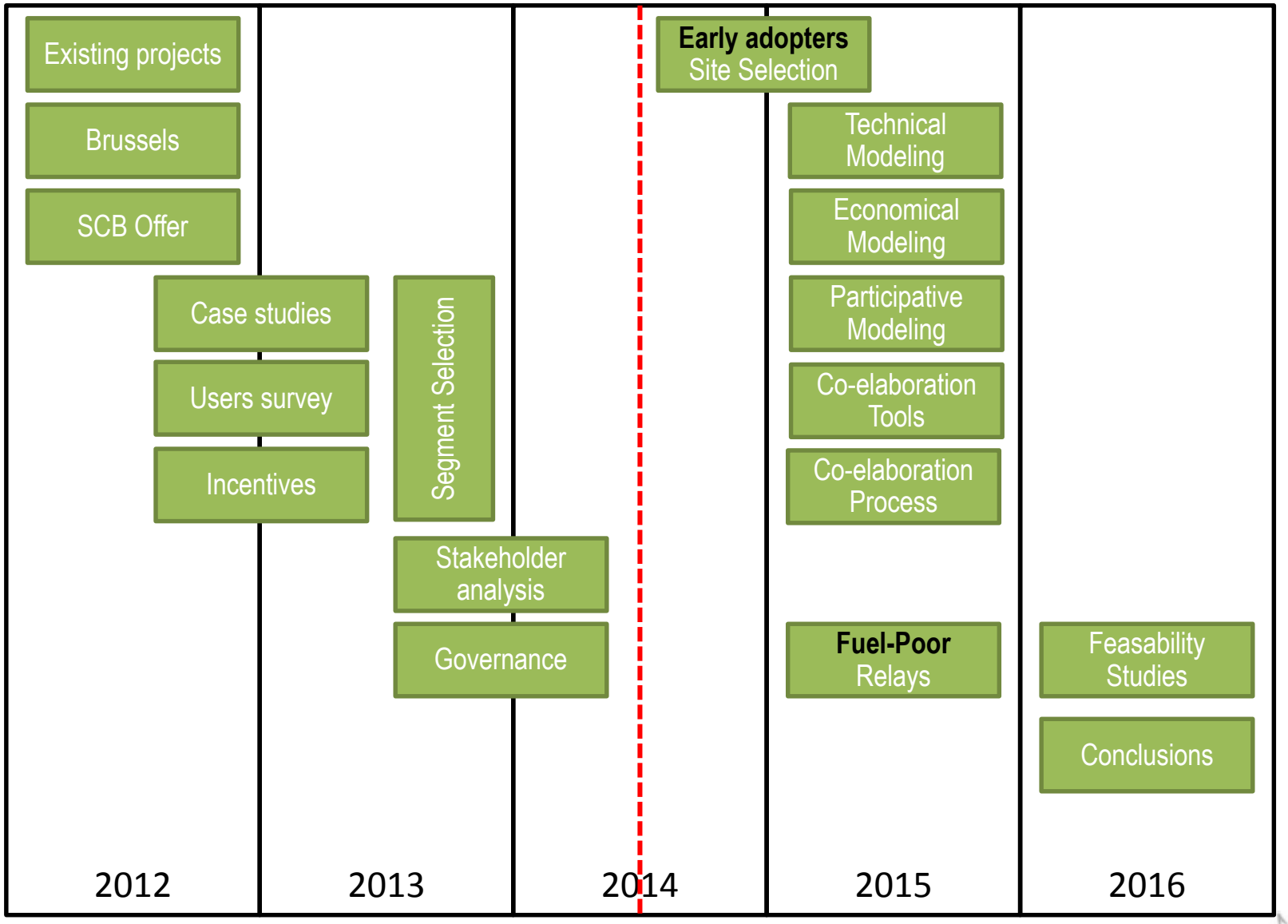


Figure 2 - Communes interrogées représentées par les zones en bleu foncé

	Commune	Localisation	Type
1.	Molenbeek-St-Jean	Rive Gauche-Minoterie (SDRB)	Rénov.
		Rive Gauche-Cap Bon (SDRB)	Rénov.
		Rive Gauche-Chien Vert (SDRB)	Rénov.
		Terrasse de l'écluse (SDRB)	Rénov.
2.	Berchem-Ste-Agathe	Rue de l'Eglise	Rénov.
3.	Uccle	Quartier du Chat	Révov.
4.	Watermael-Boitsfort	Quartier du Coin du Balais	Rénov.
		Cités Jardin Logis et Floréal	Rénov.
5.	Bruxelles-Ville	Quartier des Square	Rénov.
		Av.Théodore Roosevelt	Rénov.
6.	Ganshoren	Quartier des Villas	Rénov.
7.	Woluwe-St-Lambert	Site de ULC Woluwe	Rénov.
8.	Woluwe-St-Pierre	Rue François Gay	Nouv.
		Champs des Dames Blanches	Nouv.
9.	Etterbeek	Les Jardins de la Chasse	Nouv.

2015-2016: from Idea to Feasibility Study



Request for Proposals
Site Selection

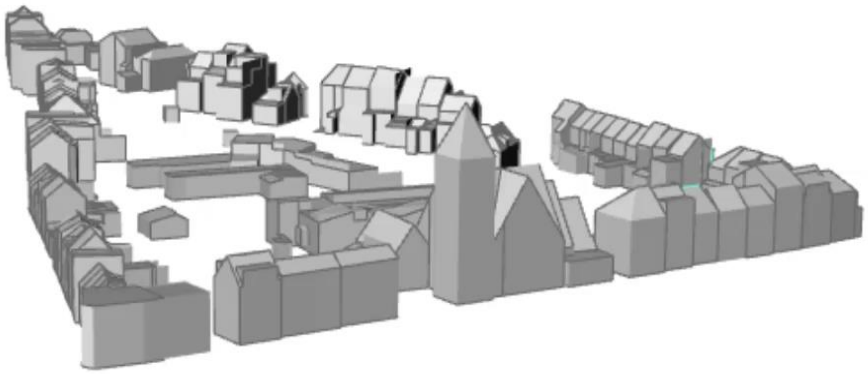
- Preselection of relays, interview
  - Top-down: public authorities, promoters
  - Bottom-up: local associations, inhabitants
- Communication
  - Internet site www.smartcityblock.be
  - Twitter, facebook
  - Flyers
  - Mailing
  - Information meetings on request
- Selection method
  - Request for proposals
  - List of criteria
  - Collaboration agreement

Selecting 2 city blocks out of 11 candidates

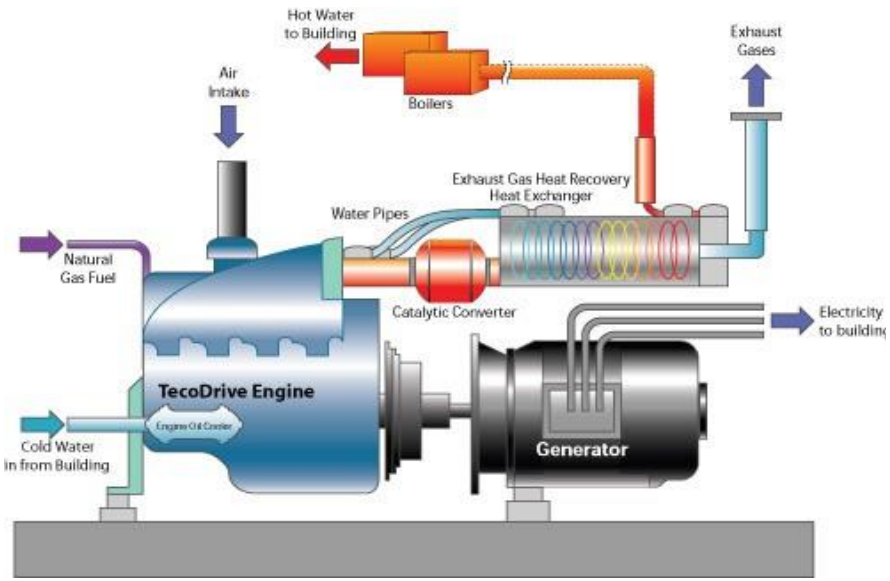
- **Saint-Josse**
  - Top down
  - Fuel poor
  - Social housing
  - Mixity

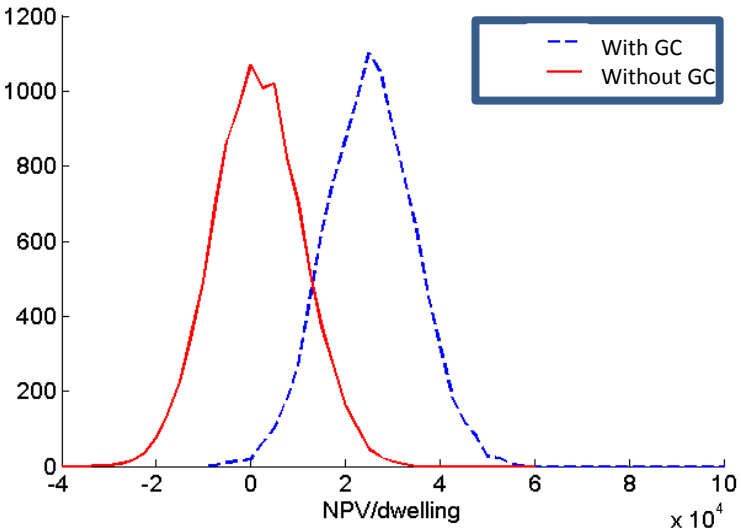
- **Uccle**
  - Bottom up
  - Early adopters
  - 100 dwellings
  - 1 school & church

3-D wood model of the Uccle city block



Case study 1: cogeneration and heat network in Uccle





Where is the value generation for a cogeneration?

Your need: 350kWh of electricity
530kWh of heat

Classic	Cogeneration
1225 kWh of natural gas	1000 kWh of natural gas
η_e=55% η_Q=90%	η_e=35% η_Q=53%

1000kWh of natural gas	60.09 €
Less energy	13.50€
Less CO2	12.40€
No electricity transmission/taxes	44.36 €

Selection of an area in Brussels (Smart City Block project)

108 dwellings

Mean per dwelling:
Electricity: 5,468 kWh/yr
Gas: 26,607 kWh/yr

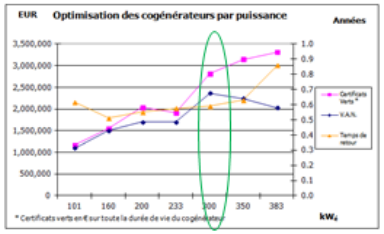
Mean Brussels:
Electricity: 3,500 kWh/yr
Gas: 23,000 kWh/yr

Total block:
Electricity: 590,579 kWh/yr
Gas: 2,873,564 kWh/yr

Selection of the desired cogenerator

VME-Mercedes
FMB-355-BSM
Biogas
300 kWelectric
η elec (100%) = 36%
η elec (50%) = 32%
η heat = 52%

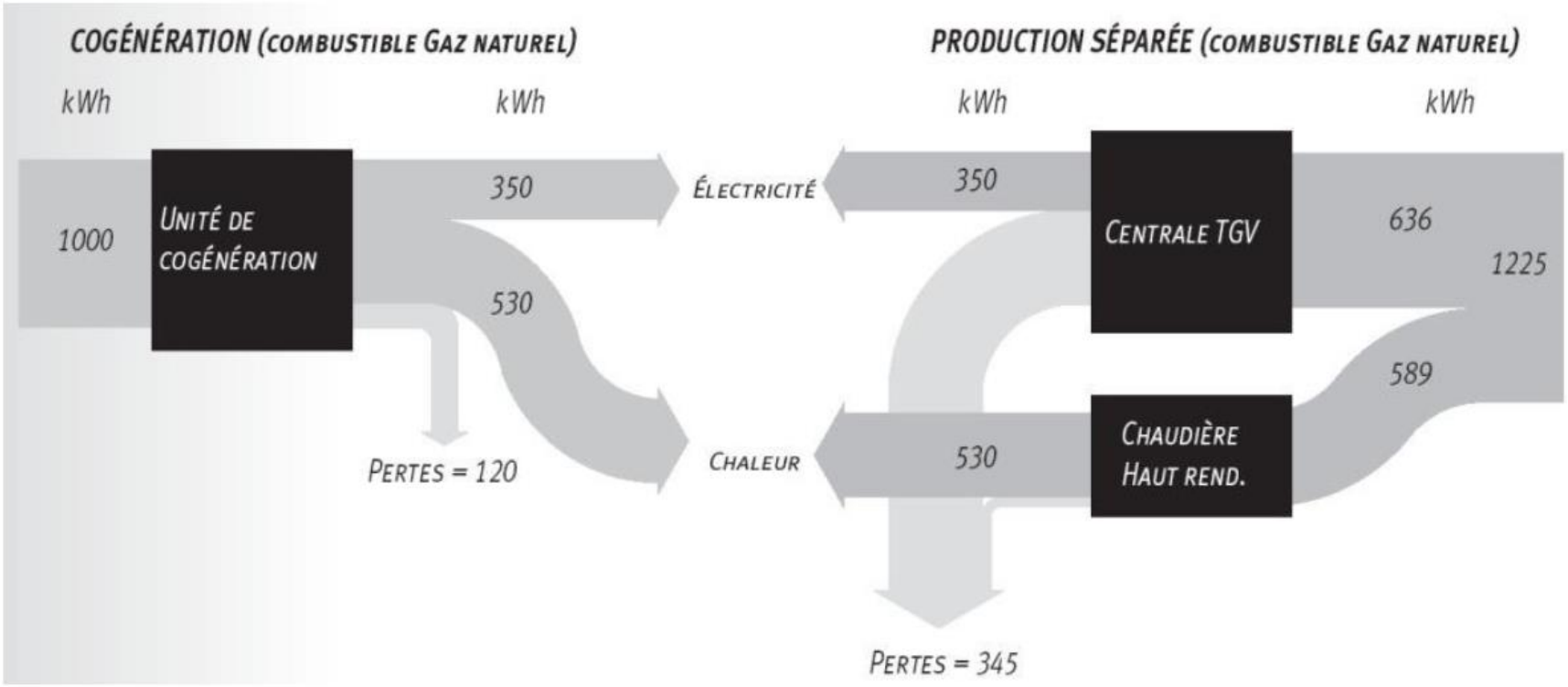
Cost = 205,402.02 €
Maintenance = 3.76 €/h



Using cogensim.xls database

Matthieu Loos, 2013 ULB SBS master thesis

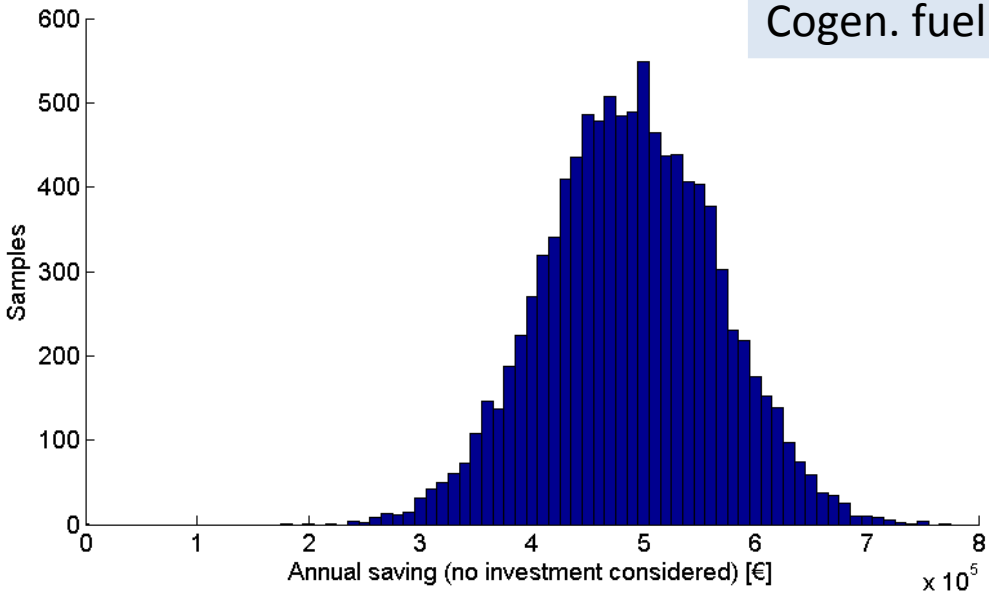
Comparison of a cogen with separete production of heat and electricity



It sounds a great tech! Should I invest in this project?

Well… look at the risk

Parameters	Price (€/MWh)	Volatility
Natural gas price	60.09	33%
Electricity price	176.75	11%
Cogen. e- out	40	12.5%
Cogen. fuel price	20	50%



Volatility: 16%
Savings always >0

If the assumptions are true (non-correlated cov=0)

Selection of an area in Brussels (Smart City Block project)

108 dwellings

<u>Mean per dwelling:</u>
Electricity: 5,468 kWh/yr
Gas: 26,607 kWh/yr

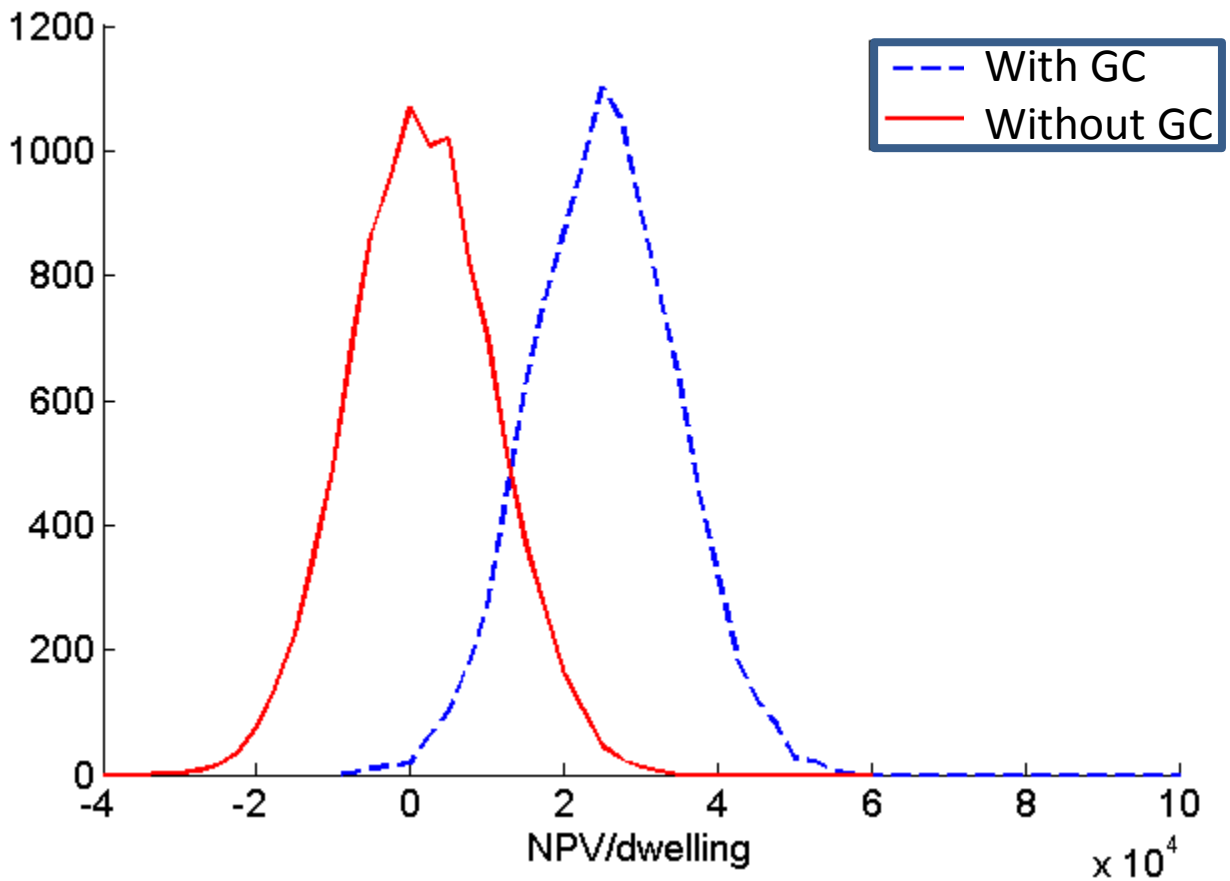
<u>Mean Brussels:</u>
Electricity: 3,500 kWh/yr
Gas: 23,000 kWh/yr

<u>Total block:</u>
Electricity: 590,579 kWh/yr
Gas: 2,873,564 kWh/yr

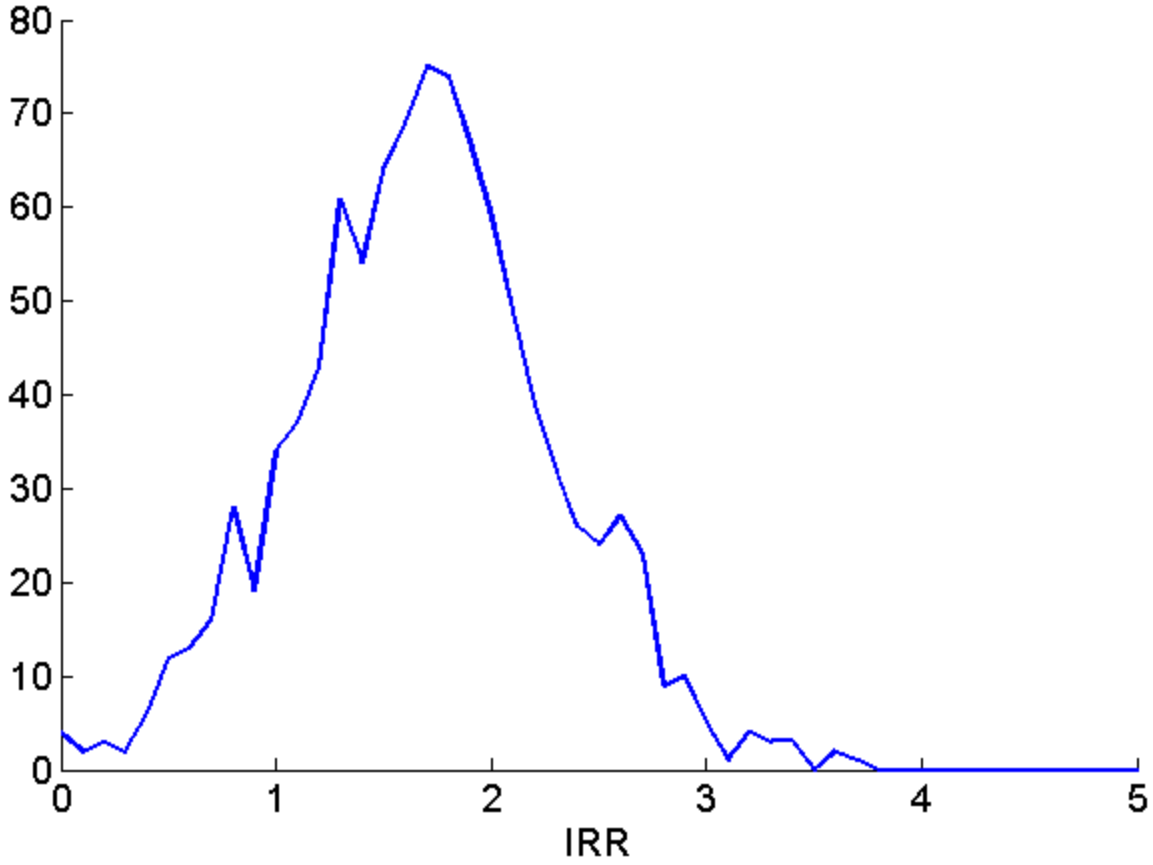
Compute the yearly cashflow for 10 years

Year	0	1	2	3	4
e- savings	99,480.27 €	102,465 €	105,539 €	108,705 €	111,966 €
Green certificate	313,275.72 €	313,276 €	313,276 €	313,276 €	313,276 €
Combustible	-45,375.12 €	-46,736 €	-48,138 €	-49,583 €	-51,070 €
Maintenance	-20,321.86 €	-20,728 €	-21,143 €	-21,566 €	-21,997 €
Investment	-205,402.02 €				
Cash-Flow	**141,660 €**	**348,277 €**	**349,534 €**	**350,832 €**	**352,175 €**

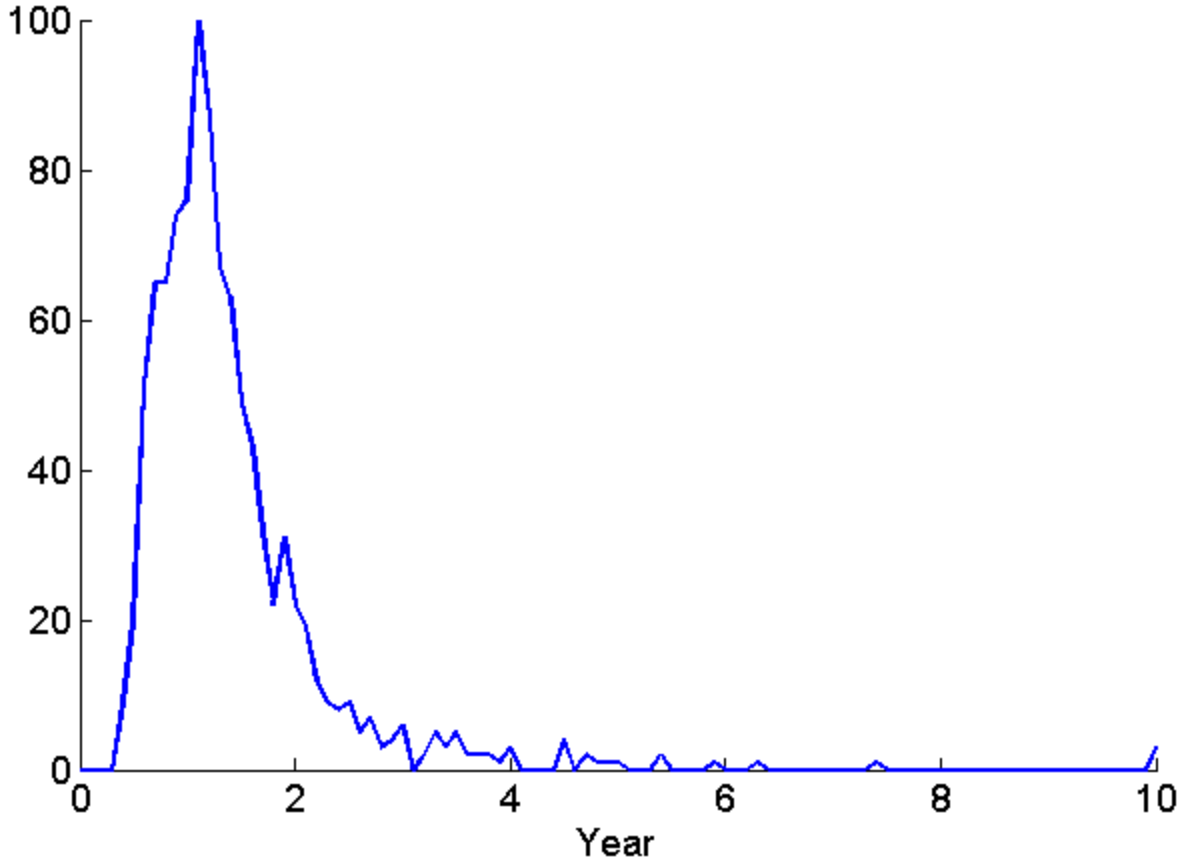
Result Net Present Value



Result Internal Rate of Return with GC



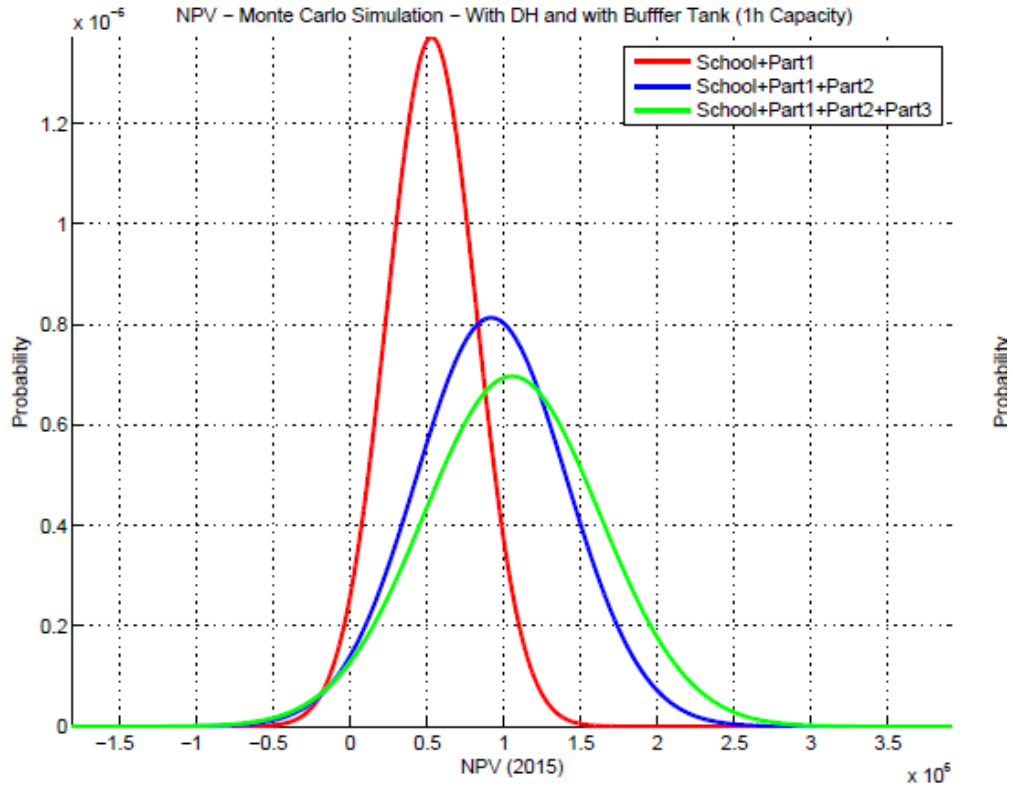
Result Discount Payback with GC

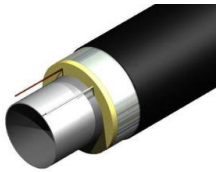


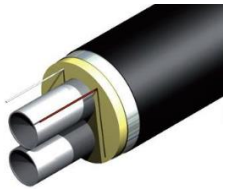
The limits

There is no Heat Network and such a heat network is very costly
Future of GC?
Assumptions?

District heating modelling







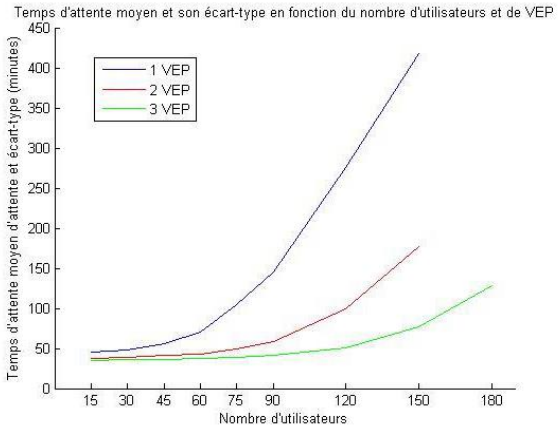
Hahati Bilal, ULB EPB 2015 master thesis

Other case Studies

- Shared electric vehicule
- City block swimming pool
- Common wash house
- Common external insulation
- Green wall

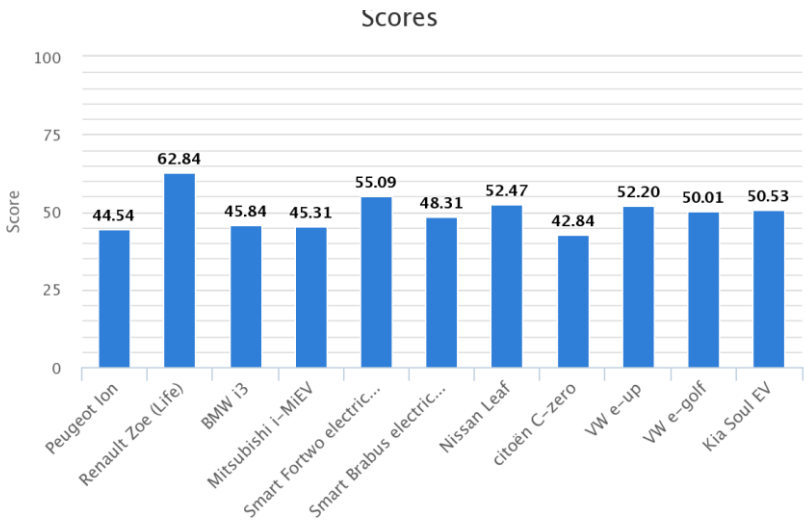
Shared Electrical Vehicules (SEV)

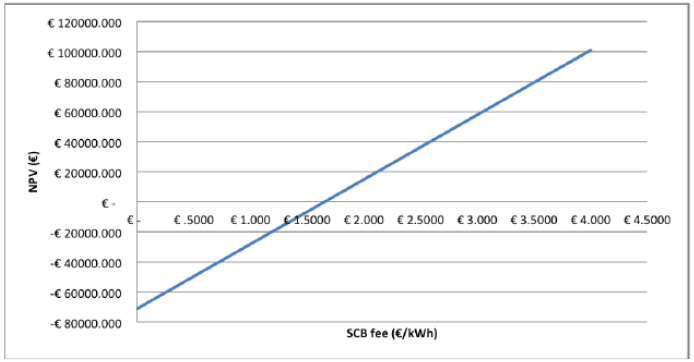
Figure 3.2: Possible locations for the EV station



	Costs		
Electric Vehicle	EV initial price	Price_EV	-€22,749.00
	EV registration charges	reg_EV	-€400.00
	EV discount	disc_EV	€5,000.00
	Total EV Initial investment	**Init_EV**	**-€18,149.00**
	EV Insurance	Insur_EV	-€3,282.00
	EV annual maintenance cost	maint_EV	-€454.98
	EV battery renting	battery_EV	-€1,032.00
	Additional costs	addit_EV	-€227.49
	Total EV Operational cost	**Op_EV**	**-€4,996.47**
Zen Car	Zen car subscription fee for 40 users	fee_Zen	-€5,760.00
	Zen car hourly rate for 4h a day	rate_Zen	-€16,424.00
	Total Zen car Operational cost	**Op_Zen**	**-€22,184.00**
Chargin Station	Charging station price	price_CS	-€3,490.00
	Charging station installation cost	inst_CS	-€400.00
	Charging station cable wiring cost	wiring_CS	-€4,000.00
	Charging Station discount	disc_CS	€1,500.00
	Total Charging station Inital investment	**Init_CS**	**-€6,390.00**
	Charging station annual maintenance	maint_CS	-€300.00
	Charging station management cost	manag_CS	-€300.00
	Parking space fee	park_CS	-€100.00
	Total Charging station Operational cost	**Op_CS**	**-€700.00**
Photovoltaic	PV price and installation	price_PV	-€7,517.89
	Premium D2	D2	€817.52
	Total PV initial investment	**Init_PV**	**-€6,700.37**
	PV maintenance costs	maint_PV	€75.18
	Green Certificat	GC	€645.75
	Total PV operational cost	**Op_PV**	**€720.93**

Table 5.3: Investment and operational costs related to the SEV project

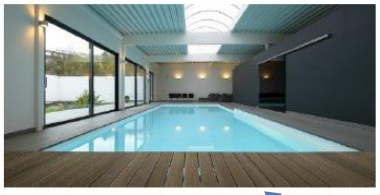




Source: ULB EPB master thesis C. Motreu (2013) and F. Shall 52015)

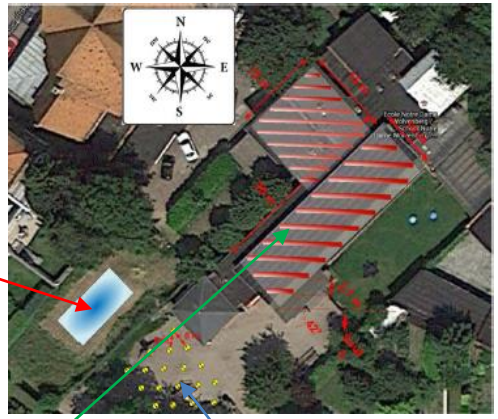
Sharing a swimming pool in the block

Indoor



Outdoor

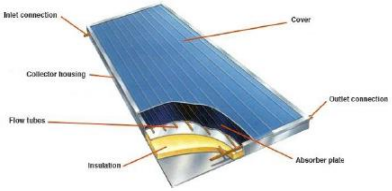
Natural



- Photovoltaic

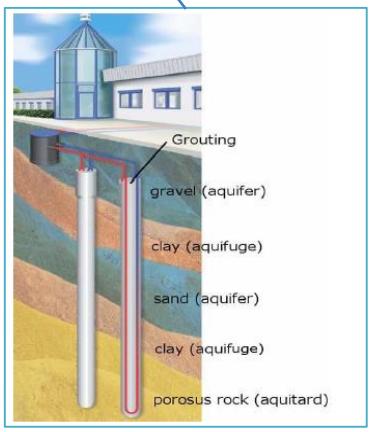
$$E_{kWp} = \frac{E_{kWh}}{R}$$

- Solar Thermal – FPC



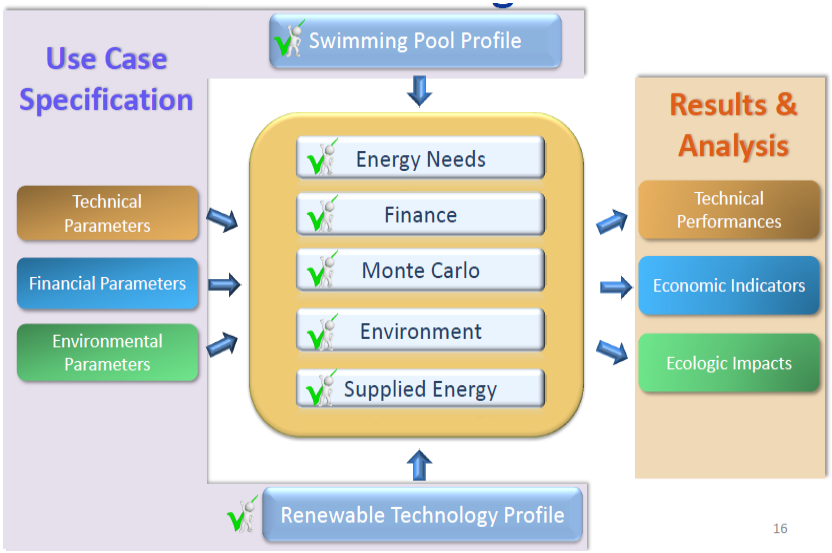
$$E_{square\ panel}\ [kWh] = \frac{G_{effective}}{1000} * \eta_{panel}$$

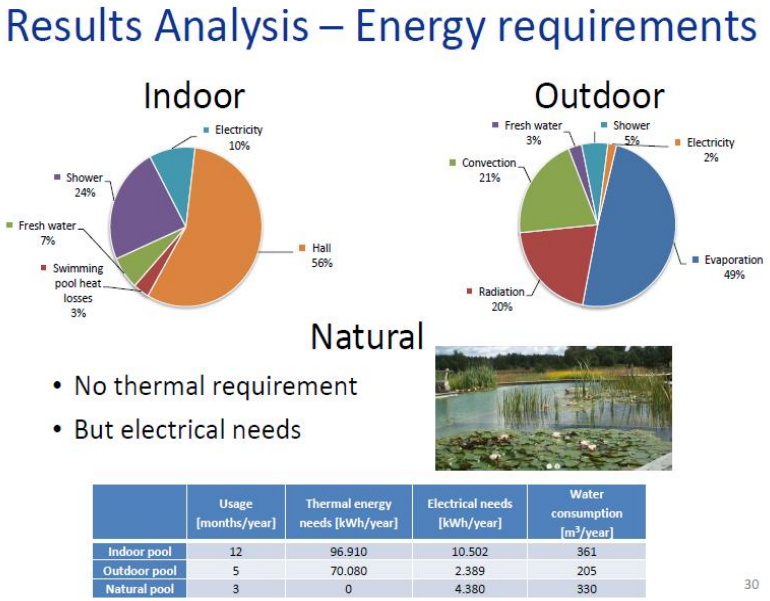
Total global radiation in Uccle : 1.049 kWh/m²



Laurent Gabriel, ULB EPB 2015 master thesis

Sharing a swimming pool in the block (2)





	Usage [months/year]	Thermal energy needs [kWh/year]	Electrical needs [kWh/year]	Water consumption [m³/year]
Indoor pool	12	96.910	10.502	361
Outdoor pool	5	70.080	2.389	205
Natural pool	3	0	4.380	330

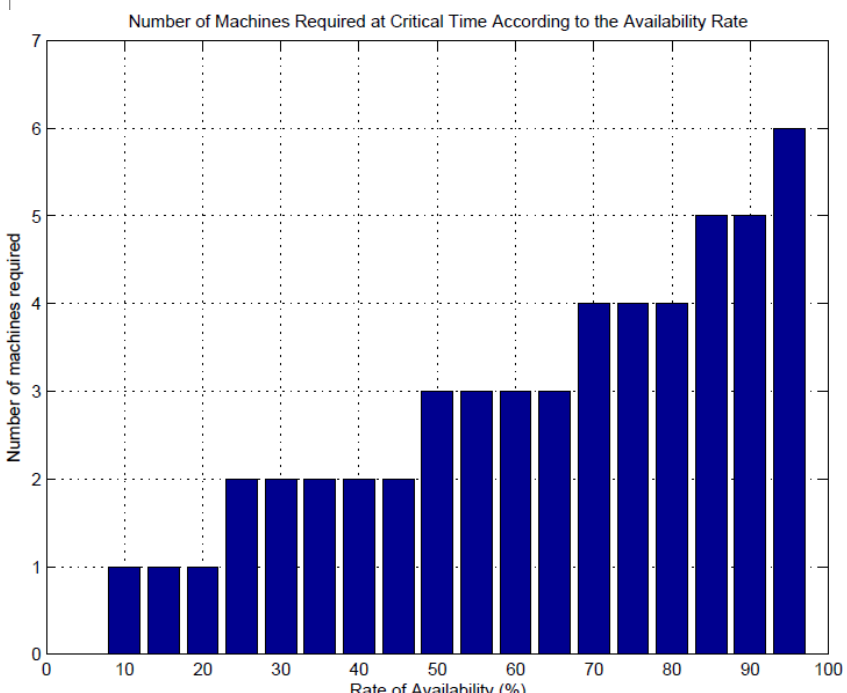
- *Initial investment :*
  - *Concrete basin : 30.000 €*
  - *Pool house : 20.000 €*
  - *Pump : 500 €* *-> total : **54.750 €***
  - *Construction permit : ~ 2.600 €*
  - *Insuance fee : ~ 1.650 €*
  - *Solar panels (150) : **120000 €***
  - *Ex. Indoor Solar : 54.750 + 120.000 ~ 175.000 € if the gound is already property of the inhabitants*
  - *If 100 families -> **1750 € / family***

Indicators	Values for a 150m² system	Values for 7x89 = 623m boreholes
Lifetime	25 Years	50 Years
Energy produced [kWh/year]	56.018	78.244
Coverage rate of the needs [%]	58	80
CO_2 saved [ton_{CO2}/year]	20,167	21,15
LCOE [€2015/kWh]	0,09	0,14
MIRR [%]	4,5	7,2
Mean NPV [$€_{2015}$]	56.550	338.670
Std NPV [$€_{2015}$]	34.710	187.290
Mean PI [/]	1.5	8,4
Std PI [/]	0.3	4,1

Laurent Gabriel, ULB EPB 2015 master thesis

Implementing a common Wash-house supplied by thermal and photovoltaic solar panels

Parameter	Value	Unit
Washing machine a week	140	cycles/week
Dryers a week	70	cycles/week
Annual maintenance costs (alarm + machines)	388	$€_{2014}$
Marginal price of electricity	0.197	$€_{2014}$/kWh
Electricity price evolution	4	%
Life time	25	years
rent	800	$€_{2014}$/month
Local maintenance	1500	$€_{2014}$/5years



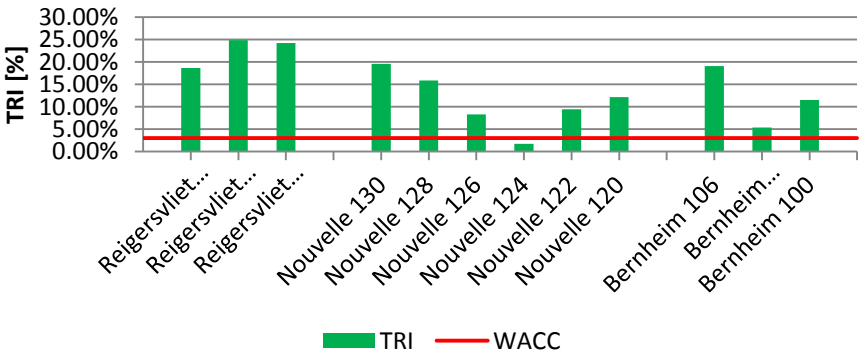
Availability rate	Discount rate (%)	Washing machine and dryer price (€/cycle)	Annual gain for a household (€/y)
High availability rate, i.e. 4 washing machines and 3 dryers	3	0.69	29
	3.5	0.72	18
	4	0.76	4
	4.5	0.80	-11
Medium availability rate, i.e. 3 washing machines and 2 dryers	3	0.62	54
	3.5	0.65	43
	4	0.68	33
	4.5	0.72	18

- Less CO2 generated thanks to RE sources
- Saving place in apartments or houses
- Less noise in the houses
- Less machines to be fabricated
- Lower water consumption
- Developing human relationships

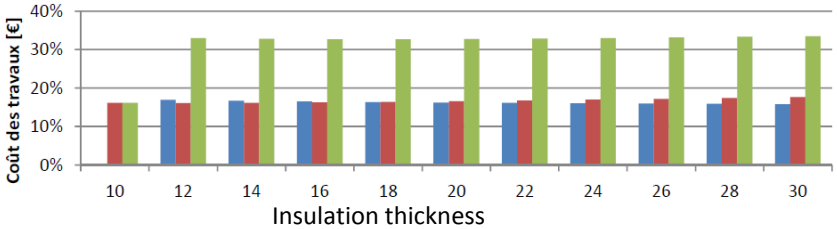
External Thermal Insulation Complex System (ETHICS)

External insulation of a city block in Etterbeek

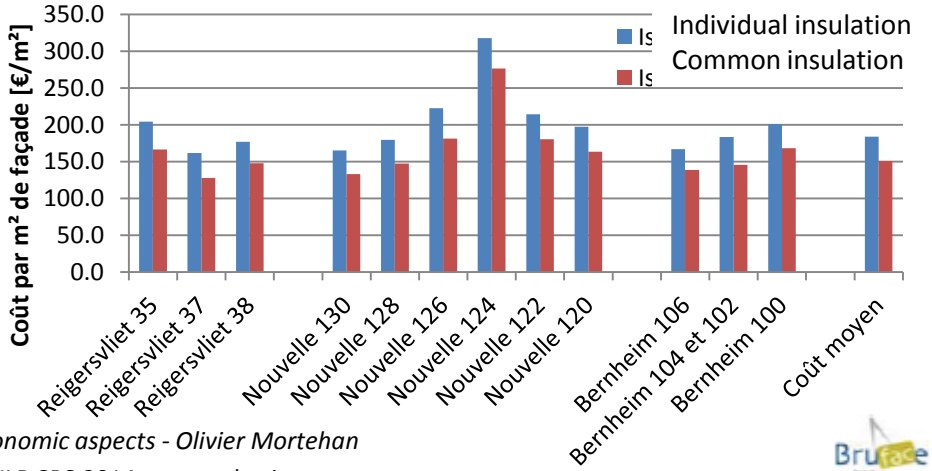
IRR for a 18 cm insulation per building



Gains due to premiums (red) and collective performance of work (blue)



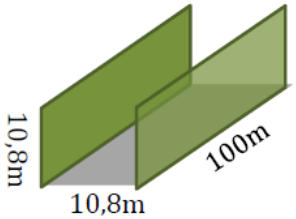
Cost heterogeneity per building



Environmental and financial impact of Green Wall

Hypothèses:

- 40 maisons
- 2,3 habitants par maison
- ±350.000€ par maison
- ±2000m² de surface côté rue
- ±1000m² de surface végétalisable (sans les portes et fenêtres)
- Utilisation de plantes grimpantes
- Après 50 ans les plantes sont retirées



Avantages quantifiés:

- Bienfait esthétique
- Réduction du bruit
- Captage des particules fines
- Isolation thermique
- Puits de carbone

Principaux impacts sur:

- Le prix immobilier:
  Exprimé en augmentation de la valeur locative
- La santé:
  Bénéfice $= \left(1 - \frac{L_0}{L_0 + \Delta L}\right) * V_{QALY}$
  avec L_0= 81,2 ans et V_{QALY}=48.000

Positive impact of a Green Wall project at street level

	Parthénocisse simple	Parthénocisse avec foliostop	Plantes avec supports
VAN	€ -8.544,37	€ 8.259,88	€ -4.490,26
TRI	-	6,24%	4,53%
ANCO	€ -468,03	€ 452,45	€ -245,96
IP	-53,74	2,27	2,39
TRS	-	15	20

Financial analysis of a Green Wall project in a Virtual City Block

Conclusion: Can City Blocks be smart without smart inhabitants?

- Environment/energy is becoming a major concern at Worldwide level
- Cities are a key element of any energy efficiency strategy
- Most of the projects cannot be realized without people motivation
  - Conception
  - Realization
  - Funding
  - Operationalization
  - Governance
  - Sharing benefits
- Education will be the crucial to change mentalities
  - Explaining new technologies in simple terms
  - Introducing new living modes
- Public authorities should keep and even reinforce their support (financal/non financial)

- Thank You
- Questions?

Course contents

- The « financial » perspective
  - Lifetime evaluation => discounting values
  - Basic toolkit: NPV, (D)PB, (M)IRR, PI
  - Risk components
  - Random / probabilistic environment
    - Key variables (salary inflation, energy prices, financial incentives)
    - Monte-Carlo simulation
    - Real Options Valuation/Analysis
  - Case studies from the « Smart City Block » project

- The « accounting » perspective
  - Cutting the future on a yearly base
  - Based on statements : Balance sheet (snapshot) and P&L (movie)
  - Key profitability measurement tools: GM, ROI, ROE, EBIT(DA), Asset Rotation, leverage effect
  - Cost performance monitoring: SG&A %, R&D %, Cogs %
  - Case studies

- Funding sources of an energy efficiency project in the Brussels region

The « accounting » perspective: yearly statements

TOTAL ASSETS	LIABILITIES & EQUITY
FIXED ASSETS	Shareholders Equity
	Debt (Long Term liabilities)
CURRENT ASSETS	Current Liabilities

Balance Sheet

Net revenue:
Products
Services
Financing income
Total net revenue
Costs and expenses:
Cost of products
Cost of services
Financing interest
Research and development
Selling, general and administrative
Amortization
Depreciation
Restructuring charges
Acquisition-related charges
Total operating expenses
(Loss) earnings from operations
Interest and other, net
(Loss) earnings before taxes
Provision for tax
Net (loss) income (earnings)

Income Statement

Balance Sheet structure

- Working Capital

  Shareholders Equity + debt – Fixed Assets

- Working Capital Requirement

  Accounts receivable + Stock Account – Accounts payable

- Cash Balance

  Cash + Financial investments – short term liabilites

Balance Sheet 1

Fixed Assets	SE + LT Debt
Customer credit + Stocks	*Supplier credit*
Cash + Fin Invest	ST Fin liabilities

Balance Sheet 2

Fixed Assets	SE + LT Debt
Customer credit + Stocks	*Supplier credit*
Cash + Fin Invest	ST Fin liabilities

Balance Sheet and P&L key components

- TA = (Total) Assets
- SE = (Shareholders) Equity
- D = Debt
- r = rate of interest
- INT = financial interest (cost of Debt)
- GM = Gross Margin = Revenue – CoGS (fixed & variable costs directly linked to products/services sold: material costs, labor, supplier profit, shipping costs)
- T_C= income tax rate
- NI = Net Income
- TAX = Tax income
- EBIT = Earnings Before Interest & Tax

Key Profitability measurement tools

- GM % : $$\text{Gross Margin Percentage} = \frac{\text{Revenue - COGS}}{\text{Revenue}} * 100\%$$
- ROI (or ROA)%: $$\frac{\text{Net Income}}{\text{Total Asset}} * 100\%$$
- ROE%: $$\frac{\text{Net Income}}{\text{Shareholders Equity}} * 100\%$$

$$ROE = \frac{Net\ Income}{Revenue} * \frac{Revenue}{Total\ Asset} * \frac{Total\ Asset}{Shareholders\ Equity}$$

- EBITDA margin %:

$$\frac{\text{Earnings Before Interest,Taxes,Depreciation and Amortization}}{\text{Revenue}} * 100\%$$

Return on invested capital (ROIC)

- Return on assets (ROA)= Net income / Total assets (also called Return on Investment (ROI))
  - ROE = ROI x (TA/SE) (Equity multiplier)
  - Limitation: Net income = EBIT - Interest expense – Taxes
  - Depends on capital structure:
    - 1. Interest expense: function of interest-bearing debt
    - 2. Interest expense : tax deductible
- Preferred measure: Return on Invested Capital (ROIC)

$$\boxed{\text{ROIC} = \frac{\text{EBIT}(1-\text{TaxRate})}{\text{Stockholders' equity} + \text{Interest bearing debt}}}$$

NB: ROIC = ROA (gross) (1 - Tax rate) = ROE of a all equity financed firm

Financial leverage

- Balance sheet: TA = SE + D
- Income statement: NI = EBIT - INT- TAX
- Interest expense INT = r * D (Interest expense = Interest rate x Interest-bearing debt)
- Taxes TAX = (EBIT – r* D) * T_c (Taxes = Taxable income x Tax rate)

$$ROE = \frac{NI}{SE} = \frac{(EBIT - rD)(1-T_c)}{SE}$$

$$= \frac{(EBIT)(1-T_c)}{SE} - \frac{rD(1-T_c)}{SE}$$

$$= \frac{(EBIT)(1-T_c)}{TA} * \frac{(D+SE)}{SE} - r(1-T_c)(\frac{D}{SE})$$

$$= ROIC * (1+\frac{D}{SE}) - r(1-T_c)(\frac{D}{SE})$$

$$= ROIC + (ROIC - r(1-T_c)) * (\frac{D}{SE})$$

- *Financial leverage magnifies ROE (proportionally to $\frac{D}{SE}$ multiplier) only when*
  - *ROA (gross) is greater than the interest rate on debt or in other terms when*
  - *ROIC is greater than debt interest less fiscal gain on interest charges (r*(1-Tc))*

Leverage Effect

	A : Firm without Debt	B : Firm with Debt
Shareholders Equity (SE)	1.000.000	500.000
Debt (r = 4%) (D)	0	500.000
Total Asset (TA)	1.000.000	1.000.000
EBIT	100.000	100.000
Interest (INT)	0	20.000
Result before Tax	100.000	80.000
Tax (T_c = 30%) (TAX)	30.000	24.000
Net Income (NI)	70.000	56.000

Leverage Effect

- $ROE_A = \frac{70.000}{1.000.000} = 7\%$

- $ROE_B = \frac{(EBIT - INT)*(1- T_c)}{SE} = \frac{(100.000 - 20.000)*(1 - 0,3)}{500.000} = \frac{56.000}{500.000} = 11.2\%$

$$ROE = ROIC + (ROIC - r(1 - T_c)) \times \frac{D}{SE}$$

- $ROE_B = \frac{100.000*(1-0.3)}{1.000.000} + (7\% - 4\%*(1-0.3))*500.000/500.000 = 11.2\%$

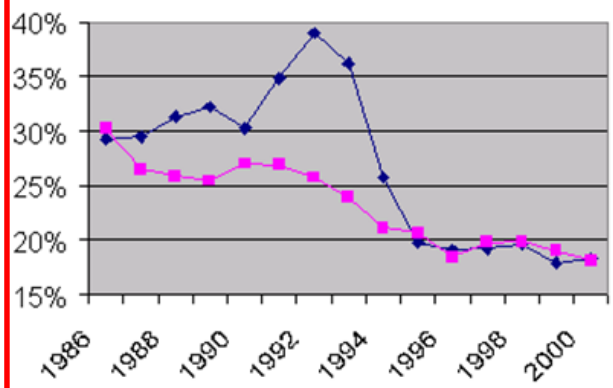
Cost performance monitoring

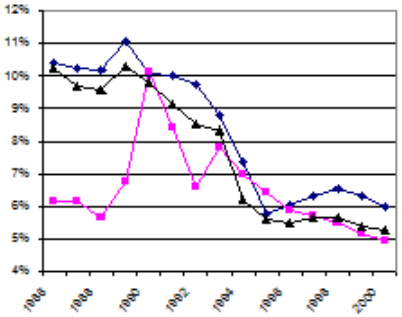
- Time evolution for one single company (past/future)
- Comparison to the average/median for the industry peer group
  - R&D%: $\frac{Research\ \&\ Development\ costs}{Revenue} * 100$
  - CoGS%: $\frac{Cost\ of\ Goods\ Sold}{Revenue} * 100$

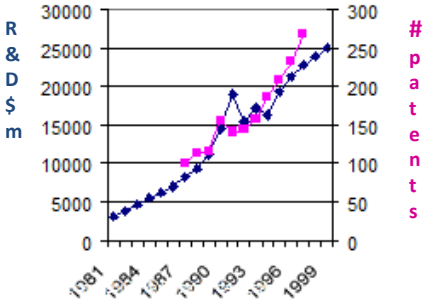
The example of the I.T. industry reaching « maturity » in the early '90s

SG&A% : $\frac{Selling, General\ \&\ Admin\ costs}{Revenue} * 100$

R&D% : $\frac{Research\ \&\ Development\ costs}{Revenue} * 100$







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SIC: 2911 - PETROLEUM REFINING
State location: TX | State of Inc.: **NJ** | Fiscal Year End: 1231
formerly: EXXON CORP (filings through 1999-11-30)
(Assistant Director Office: 4)
Get **insider transactions** for this **issuer**.

Business Address
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10-K	Documents Interactive Data	**[Cover]**Annual report [Section 13 and 15(d), not S-K Item 405] Acc-no: 0001193125-12-078102 (34 Act) Size: 25 MB	2012-02-24	001-02256 12638257
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Form 10-K *- Annual report [Section 13 and 15(d), not S-K Item 405]*

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Period of Report
2013-12-31
Filing Date Changed
2014-02-26

Interactive Data

Document Format Files

Seq	Description	Document	Type	Size
1	FORM 10-K	xom10k2013.htm	10-K	8327998
2	EXTENDED PROVISIONS FOR RESTRICTED STOCK UNIT AGREEMENTS-SETTLEMENT IN SHARES	xom10iiia3.htm	EX-10.(III) (A3)	31757
3	STANDARD PROVISIONS FOR RESTRICTED STOCK UNIT AGREEMENTS-SETTLEMENT IN CASH	xom10iiia4.htm	EX-10.(III) (A4)	197363
4	SHORT TERM INCENTIVE PROGRAM, AS AMENDED	xom10iiib1.htm	EX-10.(III) (B1)	57370
5	EARNINGS BONUS UNIT INSTRUMENT	xom10iiib2.htm	EX-10.(III) (B2)	16896
6	EXXONMOBIL SUPPLEMENTAL SAVINGS PLAN	xom10iiic1.htm	EX-10.(III) (C1)	52066
7	EXXONMOBIL SUPPLEMENTAL PENSION PLAN	xom10iiic2.htm	EX-10.(III) (C2)	67562
8	EXXONMOBIL ADDITIONAL PAYMENTS PLAN	xom10iiic3.htm	EX-10.(III) (C3)	72579
9	2004 NON-EMPLOYEE DIRECTOR RESTRICTED STOCK PLAN	xom10iiif1.htm	EX-10.(III) (F1)	44029
10	COMPUTATION OF RATIO OF EARNINGS TO FIXED CHARGES	xomexhibit12.htm	EX-12	64752
11	CODE OF ETHICS AND BUSINESS CONDUCT	xomexhibit14.htm	EX-14	23212
12	SUBSIDIARIES OF THE REGISTRANT	xomexhibit21.htm	EX-21	184698
13	CONSENT OF PRICEWATERHOUSECOOPERS LLP, INDEPENDENT REGISTERED PUBLIC ACCOUNTING	xomexhibit23.htm	EX-23	11093
14	CERTIFICATION (PURSUANT TO SECURITIES EXCHANGE ACT RULE 13A-14(A)) BY CHIEF EXEC	xomexhibit311.htm	EX-31.1	14344
15	CERTIFICATION (PURSUANT TO SECURITIES EXCHANGE ACT RULE 13A-14(A)) BY PRINCIPAL	xomexhibit312.htm	EX-31.2	14342

EXXON MOBIL CORPORATION
FORM 10-K
FOR THE FISCAL YEAR ENDED DECEMBER 31, 2013

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FINANCIAL SECTION

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- Legal Situation
- Legal form
- Incorporation date
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- Location
- Industry
- Directors
- Auditors
- Ownership data
- Financial data
- Number of employees
- Ratios
- Accounts type & availability
- Stock data
- Category of companies
- Updated
- Custom Data
- All companies

Default home page

Home > Search by key financials & employees

Key financials | Detailed local GAAP format | Global format | Notes | Social balance sheet | Capital

The variables from the Key Financials apply to all companies & associations

Select a variable:

- Turnover
- Net added value
- P/L for the period after taxes (+/-)
- Cash flow
- Shareholders funds / Social funds
- Net current assets
- Total assets
- EBIT
- EBITDA
- Current ratio
- Shareholders liquidity ratio
- Solvency ratio (%)
- Profit margin (%)
- Return on shareholders funds (%)
- Return on capital employed (%)
- Average number of employees
- Others...

Select a currency:

Select periods:

Criteria to be valid:

Search on values

Value | Minimum th EUR | Maximum th EUR | Top/Quartile

All companies with a known value

Use estimates when the value is not provided (only available for the last available year of accounts)

Searches for cos with several types of accounts are based on the unconsolidated statements [Modify filter]

Companies with no recent financial data are excluded from this search [Modify filter]

Cancel | OK

EXXONMOBIL PETROLEUM & CHEMICAL

Contact details

Polderdijkweg
2030 ANTWERPEN
BELGIUM

Subregion Antwerp
NIS Code 11002

Phone number +32 3 543 31 11
Fax number +32 3 543 34 95
Web site www.exxonmobil.com
E-mail essomazout@exxonmobil.com
Language Dutch

Show on Google Maps

Address of the foreign head office
WEST TENTH STREET 100 STAAT DELAWARE NEW CASTLE
WILMINGTON

Identification numbers

BvD ID number BE0416375270
Company number 0416 375 270
NSSO numbers 230-0824072-22
087-0824072-22

ISIN number Unlisted
Ticker number Unlisted

Legal & account information

Status Active
Legal situation Normal situation
Legal form Private company with limited liability
Date of incorporation 09/02/1977
Date of annual general meeting Third Tuesday of June
VAT Liability Yes

Last available year 2013
No of available years 10
Available accounts Unconsolidated

Industry / Activities

NACE BEL 2008

Principal code (Source: B-Information)
1920 - Manufacture of refined petroleum products

Primary and secondary code(s) (Source: Crossroads bank for entrprises)
Primary code(s):
19200 - Manufacture of refined petroleum products

Codes by source

19200	- Manufacture of refined petroleum products	(Source: NSSO)
19200	- Manufacture of refined petroleum products	(Source: V.A.T. administration)
19200	- Manufacture of refined petroleum products	(Source: National Bank of Belgium)
19200	- Manufacture of refined petroleum products	(Source: NSSO)
20140	- Manufacture of other organic basic chemicals	(Source: NSSO)
46710	- Wholesale of solid, liquid and gaseous fuels and related products	(Source: NSSO)

Full overview

It is an enterprise primarily involved in the production of refined ptroleum products. The company manages and operates petroleum refinery facilities in the Benelux region. The company's petroleum refinery in Antwerp is the largest with a processing capacity of approximately 13.5 million tonnes per year. It is also the largest solvent manufacturer in Europe and supplies numerous raw materials to the chemical sector.
The Antwerp refinery is located next to the Marshall Dockyard since 1953. The refinery receives its raw material, petroleum, from Rotterdam through the RAPL (Rotterdam-Antwerp Pipeline). Apart from producing butane, propane, liquefied petroleum gas (LPG), petrol, naphtha, kerosene, diesel oil, aromatic feedstocks, domestic fuel oil, light and heavy gasoil and raw materials for the chemical sector, the company also manufactures solvents as well as bitumen (asphalt). Since 1991, the refinery has been expanded to accomodate an alkylation plant and a higher olefins plant.
The company's special refinery plant located in Rotterdam-Botlek, on the other hand, produces an exceptionally pure form of LPG for use as an aerosol propellant. Completely odor-free, its aerosol propelants are primarily used in the cosmetics industry.

Key financials & employees

Options

Columns

	Unconsolidated accounts	31/12/2013 th EUR	31/12/2012 th EUR	31/12/2011 th EUR	31/12/2010 th EUR	31/12/2009 th EUR	31/12/2008 th EUR	31/12/2007 th EUR	31/12/2 th
	B/S and P/L lines								
70	Turnover	30.494.135	32.971.882	31.815.514	25.525.951	19.968.479	29.496.841	25.867.417	23.620.
70/74-60-61	Net added value	809.268	1.039.746	877.342	966.317	685.147	930.000	1.146.641	1.033.
9904	P/L for the period after taxes (+/-)	474.454	2.784.101	2.927.947	4.170.342	5.047.906	4.643.361	2.729.022	2.863.
9904+630	Cash flow	587.655	2.934.319	3.088.883	4.278.453	5.150.109	4.712.544	2.791.692	2.914.
10/15	Shareholders funds	6.667.630	10.061.441	8.478.408	6.761.974	6.775.442	5.553.401	5.553.934	5.551.
29/58-42/49	Net current assets	686.650	613.796	277.087	-1.412.495	-3.426.484	-7.693.361	-1.802.467	-1.714.
20/58	Total assets	28.588.092	31.436.233	30.517.416	29.815.714	29.389.981	34.907.640	30.313.459	28.343.
10777	EBIT	412.248	510.000	344.025	475.573	143.764	471.576	715.884	654.
10778	EBITDA	525.449	660.218	504.961	583.684	245.967	540.759	778.554	705.
	Ratios								
	Current ratio	1,26	1,22	1,08	0,66	0,43	0,24	0,67	0
	Shareholders liquidity ratio	0,35	0,54	0,45	0,36	0,41	0,29	0,29	0
	Solvency ratio	23,32	32,01	27,78	22,68	23,05	15,91	18,32	19
	Profit margin	5,28	8,05	9,12	16,07	25,09	15,57	10,44	11
	Return on shareholders funds	24,32	26,51	34,53	61,18	74,47	83,28	48,95	51
	Return on capital employed	7,82	10,94	12,49	18,40	25,20	23,83	14,89	15
	Employees								
90	Average number of employees	2.168	2.186	2.174	2.196	2.176	2.201	2.243	2.

Global format

Options

Columns

	Unconsolidated accounts	31/12/2013 th EUR	31/12/2012 th EUR	31/12/2011 th EUR	31/12/2010 th EUR	31/12/2009 th EUR	31/12/2008 th EUR	31/12/2007 th EUR	31/
	ASSETS								
2028	Fixed assets	25.218.316	27.999.380	26.928.755	27.084.261	26.772.061	32.485.322	26.593.434	25.
10701	Intangible assets	9.137	12.286	18.038	23.415	21.388	25.518	27.974	
2227	Tangible assets	333.876	379.323	482.127	587.628	580.351	503.678	405.054	
28	Financial assets	24.875.303	27.607.772	26.428.590	26.473.219	26.170.322	31.956.126	26.160.405	25.
2958	Current assets	3.369.776	3.436.853	3.588.661	2.731.453	2.617.921	2.422.318	3.720.025	2.
3	Stocks	754.512	631.939	572.838	435.373	516.080	515.114	505.873	
10702	Debtors	1.740.161	1.791.005	1.894.659	1.404.483	1.236.856	1.101.378	1.916.289	2.
10771	Other current assets	875.102	1.013.909	1.121.164	891.598	864.983	805.826	1.297.863	

Group Practical exercizes

- www.sec.org – Edgar seach tool (*)
- Bel-First/Amadeus Demo (*)
- Group work: financial analysis of a company based on some selected ratios
  - Electrabel
  - EDF Luminus
  - Octa+
  - Lampiris

  - ExxonMobil Petroleum & chemical (Antwerp)

- (*) if network available

Course contents

- The « financial » perspective
  - Lifetime evaluation => discounting values
  - Basic toolkit: NPV, (D)PB, (M)IRR, PI
  - Risk components
  - Random / probabilistic environment
    - Key variables (salary inflation, energy prices, financial incentives)
    - Monte-Carlo simulation
    - Real Options Valuation/Analysis
  - Case studies from the « Smart City Block » project

- The « accounting » perspective
  - Cutting the future on a yearly base
  - Based on statements : Balance sheet (snapshot) and P&L (movie)
  - Key profitability measurement tools: GM, ROI, ROE, EBIT(DA), Asset Rotation, leverage effect
  - Cost performance monitoring: SG&A %, R&D %, Cogs %
  - Case studies

- Funding sources of an energy efficiency project in the Brussels region

Financing instruments for energy projects in the Brussels region

Microentreprise Microfinance	Complemntary currencies	Joint buying	Crowdfunding	Economies of scale
Third party investor	ESCO's (energy service companies)	Community Land Trust	Contrat de Quartier durable (CQD)	Green certificates
Green loans	PPP (Partenariat Public Privé)	King Baudouin Foundation	Sponsoring (CSR)	Prêts subordonnés Brusoc
Credel	Fond de Participation	Premium hunters	Brussels BATEX	Energy houses
Hydrobru	WORMS	Local authorities	Tax reduction	Passive houses/low-energy houses

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