



# フランスの建築物 エネルギー効率表示制度

2014年12月9日 日仏建築会議

ブルーノ・メジュレ

## フランスにおける建築業界の影響度

- エネルギー消費量の 43%
- GHG排出量の25%
- 水消費量の16%
- 廃棄物の40%



## フランス建築業界概要

- 35万社
- 98% が中小企業
- 雇用 340万件
- 売上高1230億ユーロ
- 58% が住宅



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## フランスの低炭素政策目標

### GHG

- 2020年までに半減
- 2050年までに4分の1

### 再生可能エネルギー

- 消費ベースでエネルギー構成の23%

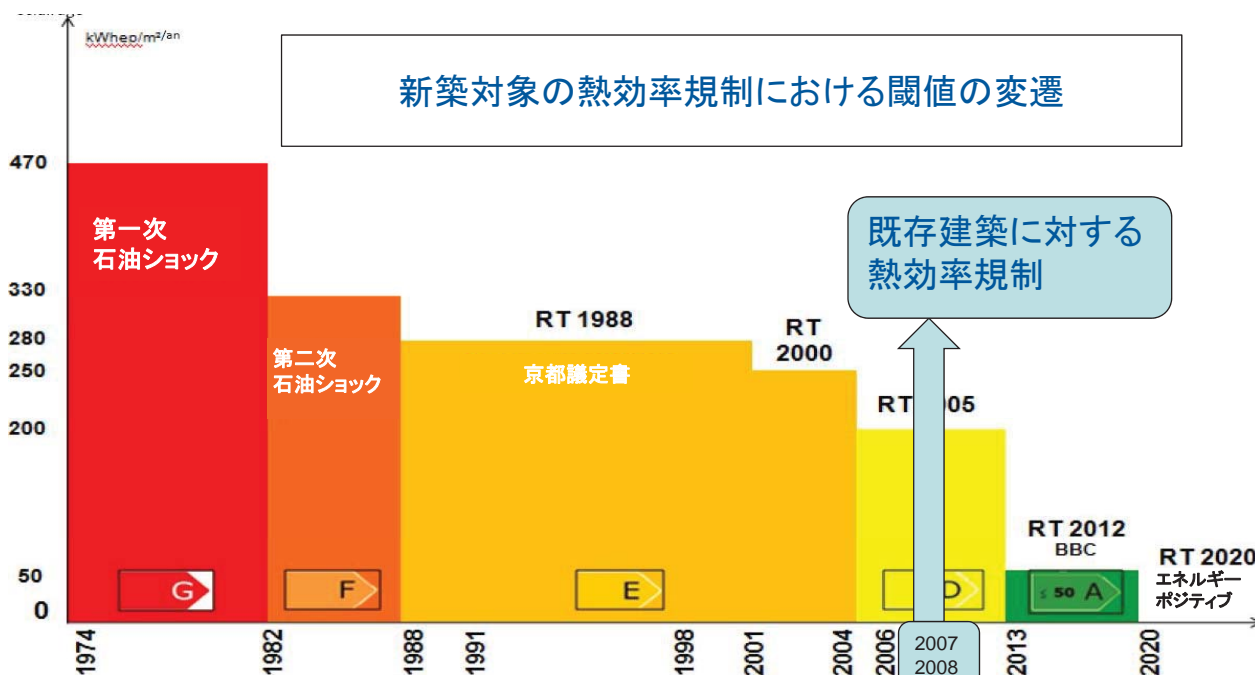
### 建設

- 2012年以後は低エネルギー建築のみ
- 2020年以降 - ポジティブエネルギー建築

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# フランスの熱効率規制の推移

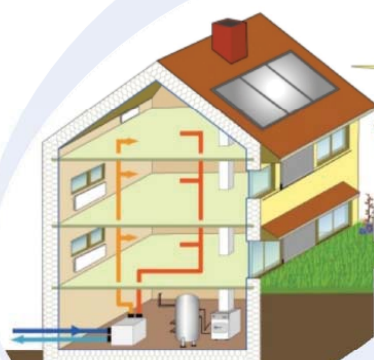


# 最新の断熱性能規制 - RT 2012

Effinergieプロジェクトにおけるいくつかの共通の解決策とパフォーマンス

Architectural design	effinergie	RT 2005
Compactness	Recommended	Not taken into account
South exposure	Recommended	To consider
Summer comfort control	Required	Often necessary

Insulation of opaque walls	effinergie	RT 2005
R Roof (in m²·K/W)	6.5 to 10	4 to 6
R Wall (in m²·K/W)	3.2 to 5.5	2.2 to 3.2
R Floor upon a system of earth (in m²·K/W)	2.4 to 4	1.7 to 2.9
R Floor upon crawl space (in m²·K/W)	3.4 to 5	2.4 to 4
Thermal bridges	Very low	Medium to low



Solar power	effinergie	RT 2005
Solar hot water output	Recommended	To consider
Photovoltaic electricity output	To consider	Rare

Bay windows	effinergie	RT 2005
Uw in W/m²·K	1.7 to 0.7	2 to 1.6
Blinds	Required	Often necessary

Ventilation	effinergie	RT 2005
Low-consumption ventilators	A or B hygro-adjustable mechanical-ventilator	

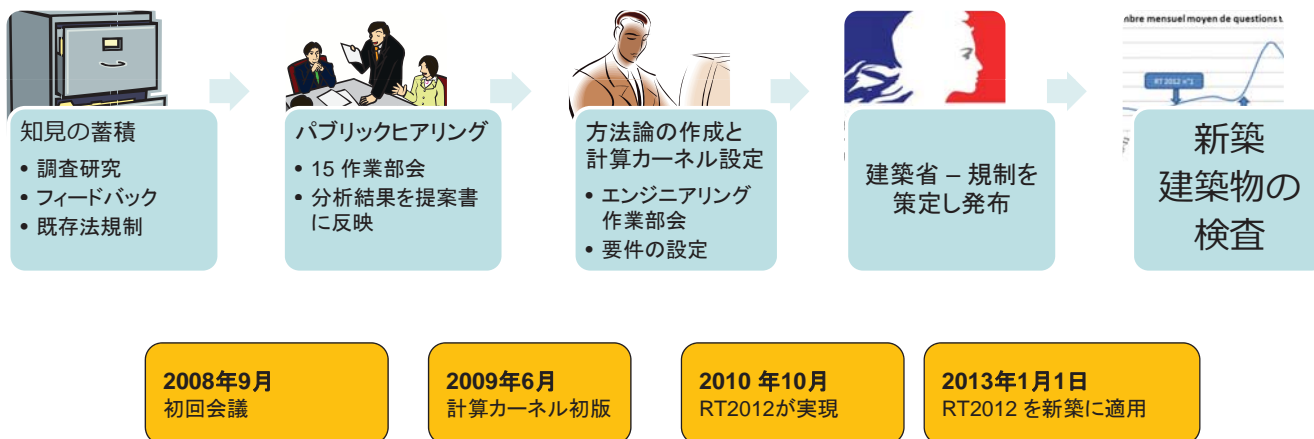
B hygro-adjustable mechanical ventilation or bypass mechanical ventilation with an exchange unit output > 80%

Heating and hot water	effinergie	RT 2005
Electricity	HP COP ≥ 3.5	Joule effect (radiant)
Gas or fuel oil	Condensing boiler	Low-temperature boiler
Wood	Automatic wood burner class 3	

- 2013年1月から既存建築全種が対象
- 制限 - 年間50kwhPE/m²
- 目標は設定 - 達成手段は自由
- 用途5種 - 暖房/冷房/照明/給湯/設備(ポンプ、ファン)

## RT 2012実現までのプロセス

### CSTB - 熱効率規制に関しフランス建築省を科学技術面で支援



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## RT 2012 : 3つの評価指標

### 3 要件

- Bbio : 建物外皮要件:  $Bbio = Bbiomax * (modulo)$
- Cep : 建物要件:  $Cep = 50 * (modulo)$
- Tic : 夏季の快適性要件:  $Tic < Tic Ref$

#### 建物外皮と建物の要件

- 地理
- 標高
- 建築物の種類



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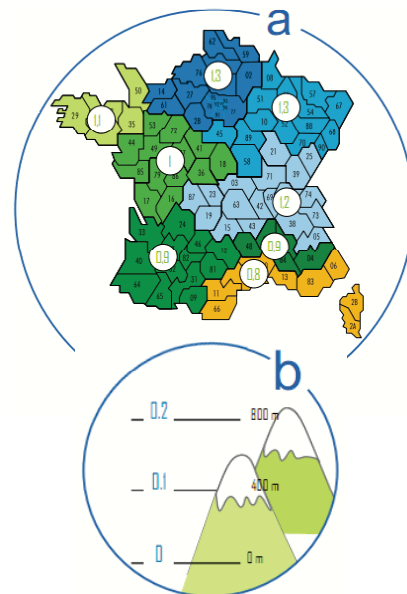
## 規制を超えて - エネルギー性能表示 (1)

### effinergie rénovation Effinergie renovation (エネルギー効率リフォーム)

- 80 KwhEP/m<sup>2</sup>/年

### effinergie + Effinergie +

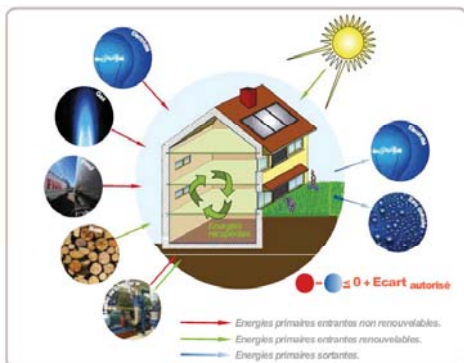
- 気密性の最適化
- 建物外皮の最適化 (Bbio = Bbiomax - 20%)
- エネルギー規制対象用途5種の消費最適化 (Cep < 40 \* (modulations) kWhEP/m<sup>2</sup>.an)
- 換気と空気質調節設備の最適化
- 他のエネルギー消費の評価
- 居住者の啓蒙



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## 規制を超えて - エネルギー性能表示 (2)

### Bepos-effinergie 2013



### BEPOS Effinergie

- Effinergie + 表示要件に適合
- 再生可能エネルギー以外の一次エネルギー収支が許容偏差値未満

#### 再生不能一次エネルギー収支

エネルギー収支における再生不能エネルギーの検討

#### 許容偏差値

地域や都市形態を問わず当該表示を可能とする、ポジティブエネルギーに対する偏差値

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## エネルギー表示統計

effinergie  
rénovation

建築物	認証	登録
住宅	30 027	73 617
非住宅	76	227

出典：Effinergie (2014年10月1日現在)

effinergie +

建築物	認証	登録
住宅	412	11 889
非住宅	56	19

出典：Effinergie (2014年10月1日現在)

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## 第三者認証 - HQE™

HQE (高品質環境規格) - 1992年地球サミットで初制定された持続可能な開発原則に基づいたフランスのグリーン建築規格

HQE™ 認証 - 国際登録商標でありHQE協会の専有財産

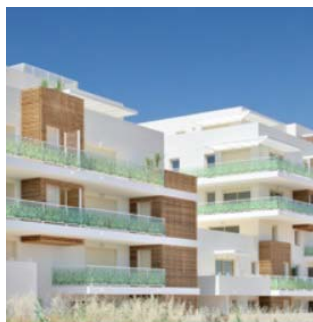
フランス国外 - 全てCerwayが運営



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## HQE™の対象



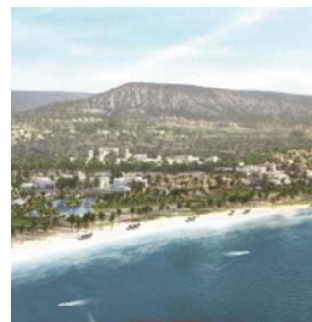
住宅建築



非住宅建築



既存の非住宅建築



持続可能な都市計画

## HQE™のアプローチ

### HQEプロセスにおける14のターゲット

#### エコ建築

1. 建物とその周囲環境との関係
2. 建材と製品選定の一体化
3. 環境影響小の施工現場

#### エコ管理

4. エネルギー管理
5. 水管理
6. 生活廃棄物管理
7. 保守修繕管理

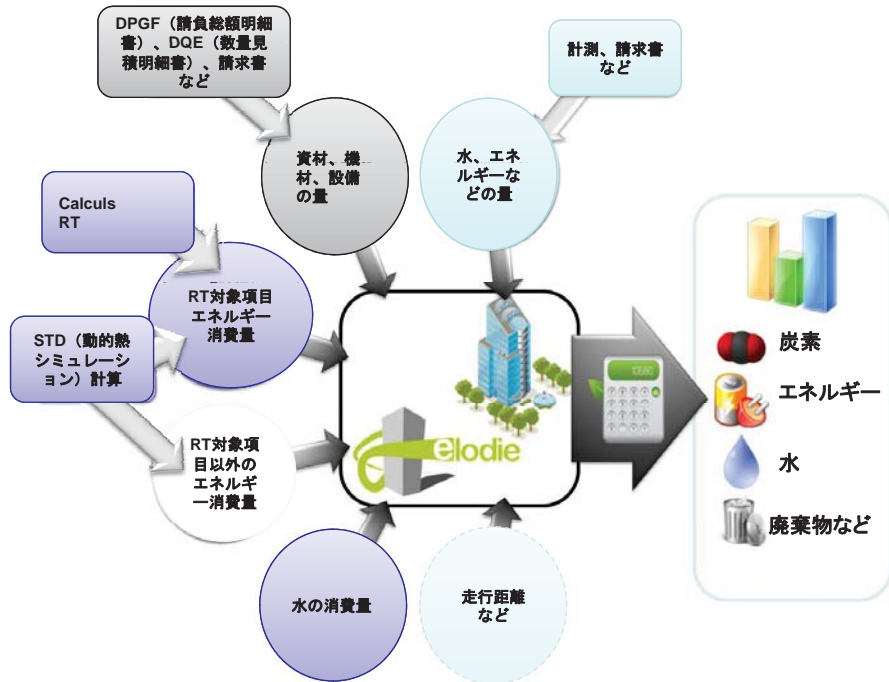
#### 快適性

8. 湿度
9. 聴覚
10. 視覚
11. 臭覚

#### 健康

12. 衛生度
13. 空気質
14. 水質

# HQE™ の新アプローチ - 性能指標ベース



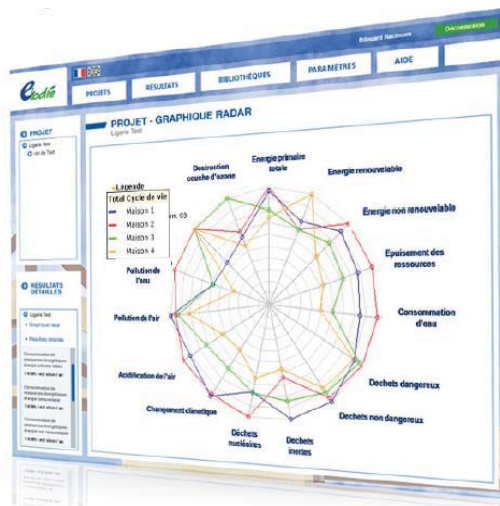
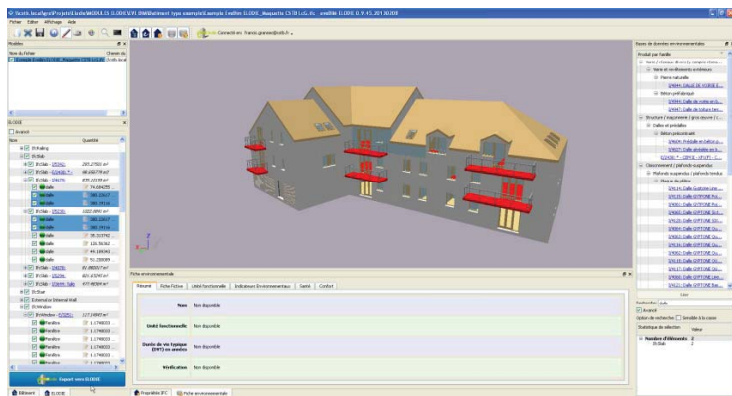
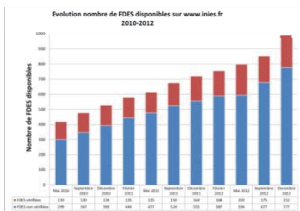
# HQE™ の新アプローチ - 性能指標ベース

## 建築物の全ライフサイクルにおける環境性能

ELODIEは建物をモデル化。規格に則してライフサイクル評価(LCA)を行えるよう設計されており、LCA専門家であるか否かを問わず、すべての建築関係者が活用できる。

ELODIEは多基準方式であり、建築物の環境性能を総合的に審査可能であり、建築性能の判断と評価における科学的な支援ツールとなる。

環境影響に寄与するすべての要因を考慮することができ、研究活動を高度化するモジュール式のツールでもある。ニーズに合わせて進化し続けており、間もなく室温快適性、音響、ライフサイクルコストの調査も可能となる。





# HQE™ 認証書

**HQE™** Certifié par CERWAY

## CERTIFICAT

N° 0000106  
Delivré le 04.07.13

**HQE™ EXCELLENT**

ÉNERGIE ET ÉCONOMIES	★ ★ ★ ★
ENVIRONNEMENT	★ ★ ★ ★
SANTÉ ET PROTECTION	★ ★ ★ ★
CONFORT D'USAGE	★ ★ ★ ★

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PROJET : LE MILLENIUM  
 DÉLIVRÉ À : GLOBAL CARE  
 SITUATION : WARSAW - Poland  
 TYPE DE BÂTIMENT : Offices  
 CYCLE : Construction  
 ÉTAPE : Design

This certificate confirms the building meets the requirements of a level of performance defined in the certification technical scheme 2013 each of the following four themes: Energy, Environment, Health, Comfort.

Patrick NOSSENT  
Président

# 世界に広がるHQE™ 認証



- 📍 HQE™ certified or in the process of being certified, operations 認定済みもしくは認定手続き中の認証活動
- 🌍 « Aqua » certified operations, through our partner, Fundação Vanzolini 提携団体Fundacao Vanzoliniを通じた認定済み認証活動

# HQE™ 認証の数字早分かり

Via Crespi 26 - HQE™ certified - Milan/Italie  
SRL BNP PARIBAS Real Estate  
Property Development Italy SPA - Arch. Studio Valeriani



## 266,000

世界全体の認証件数

Eolis - Certified HQE™ - Brussels / Belgium - CB Richard  
Ellis Investors. Arch.: Assar Architects.

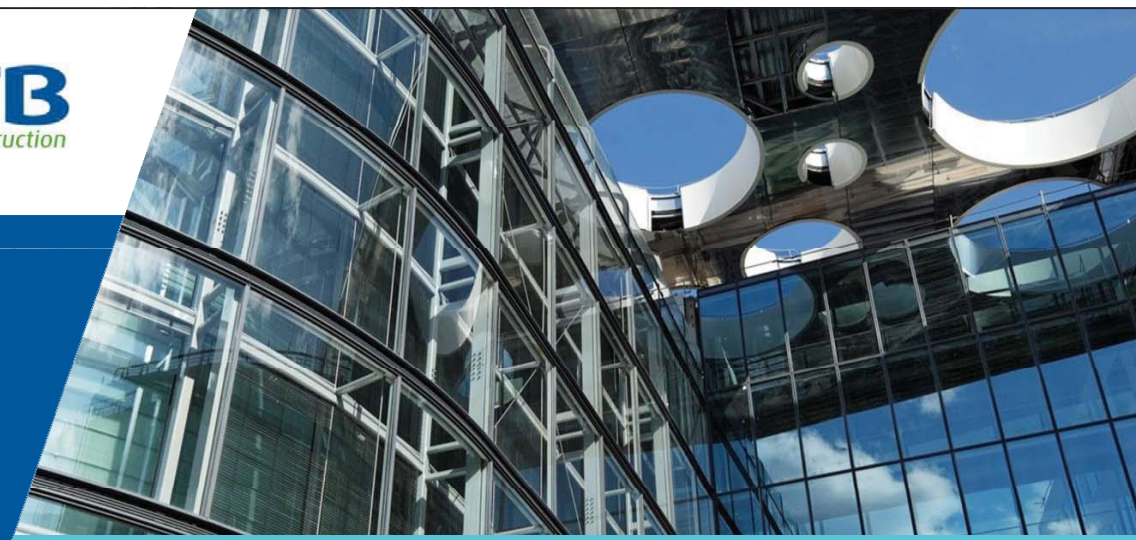


HQE™認証(今日現在)

## 43

百万平米が  
認証床面積

Thank you for your attention!  
ご清聴ありがとうございました



# Building energy efficiency labeling system in France

Japan France Colloquium 2014 – December 9

Bruno MESUREUR

## Impact of the building sector in France

- **43% of energy consumption**
- **25% GHG emissions**
- **16% water consumption**
- **40% waste production**



## The French construction sector in a nut shell

- 350 000 companies,
- 98% SMEs
- 3.4 million jobs
- €123 billion of turnover
- 58% residential



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## The targets of the French low carbon policy

### GHG

- Divided by 2 by 2020
- Divided by 4 by 2050

### Renewable energy

- 23% of energy consumption within the energy mix

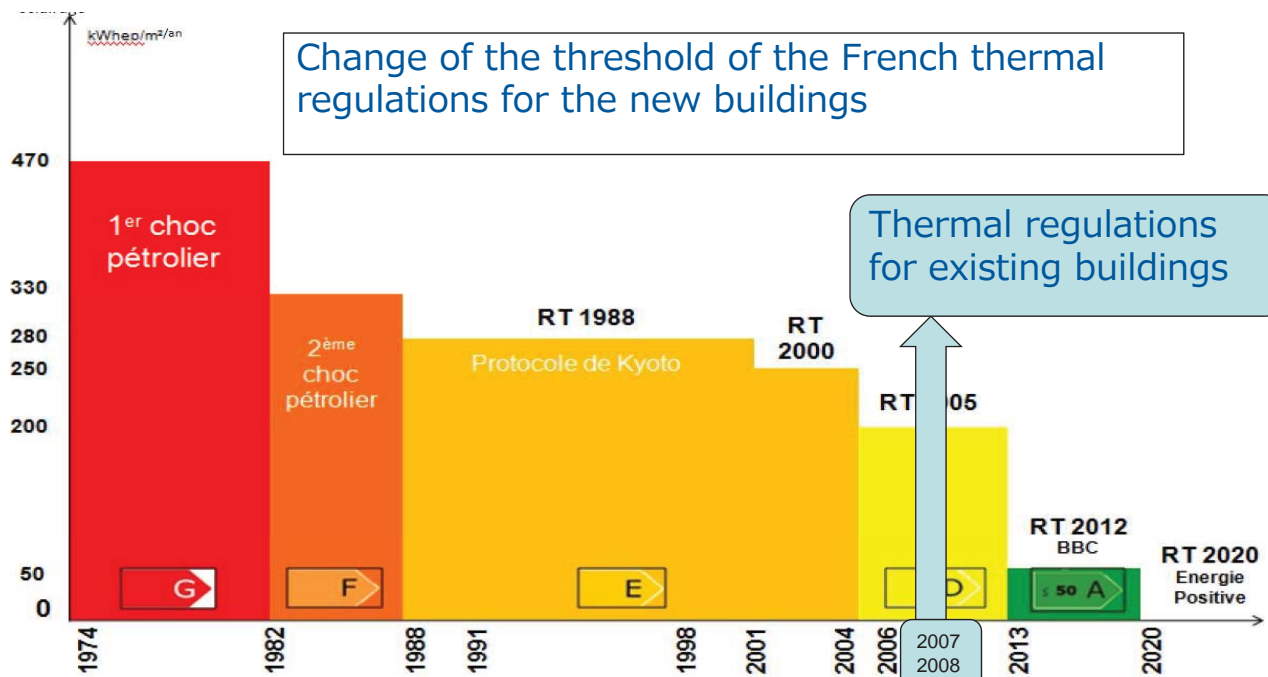
### Construction

- Only low-energy consumption buildings from 2012
- Positive energy buildings from 2020

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# French thermal regulations over the years



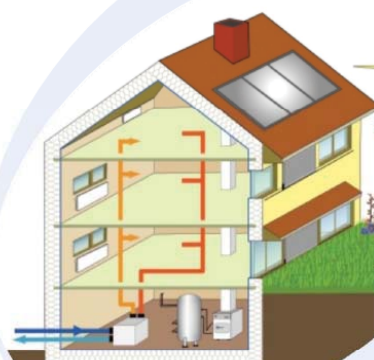
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# The latest Thermal Regulation : RT 2012

Several common solutions and performances in effinergie projects

Architectural design	effinergie	RT 2005
Compactness	Recommended	Not taken into account
South exposure	Recommended	To consider
Summer comfort control	Required	Often necessary

Insulation of opaque walls	effinergie	RT 2005
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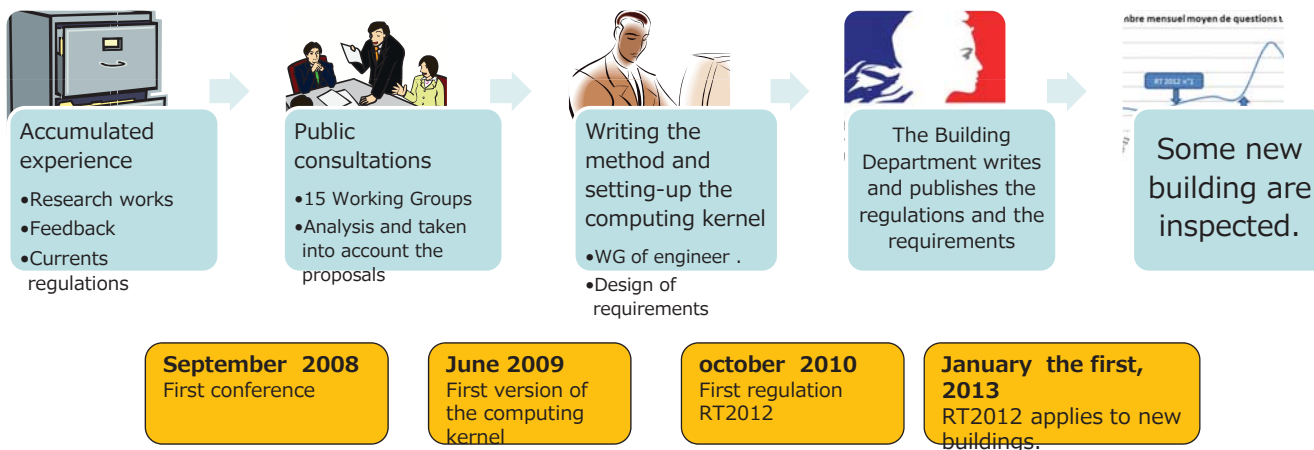
Heating and hot water	effinergie	RT 2005
Electricity	HP COP ≥ 3.5	Joule effect (radiant)
Gas or fuel oil	Condensing boiler	Low-temperature boiler
Wood	Automatic wood burner class 3	

- As of January 2013 for all existing building types
- Limit of 50kwhPE/m²/year
- Set goals and let freedom means to achieve
- 5 consumption uses: Heating, cooling, lighting, hot domestic water and equipments (pumps, fans)

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## Process to achieve the RT 2012

**CSTB is the technical and scientific support of the French Building ministry for the thermal regulations**



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## RT 2012 : three evaluation indicator

### 3 requirements :

- Bbio : requirement on envelope:  $B_{bio} = B_{biomax} * (\text{modulo})$
- Cep : requirement on building:  $Cep = 50 * (\text{modulo})$
- Tic : requirement on summer comfort:  $Tic < Tic Ref$

The first two requirements are modulated as a function of :

- geographical area
- altitude
- type of building



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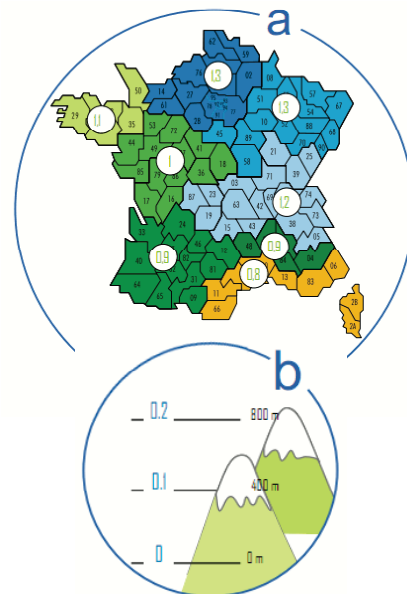
## Beyond regulation: energy labels (1)

**effinergie rénovation** **Effinergie renovation:**

- 80 KwhEP/m<sup>2</sup>/year

**effinergie +** **Effinergie +**

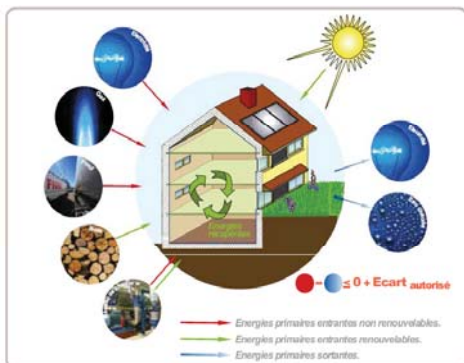
- Optimising airtightness:
- Optimising building envelope (Bbio = Bbiomax - 20%)
- Optimising energy consumption of the 5 regulatory uses (Cep < 40 \* (modulations) kWhep/m<sup>2</sup>.an)
- Optimising ventilation and air quality equipment
- Evaluate the other consumption
- Inform residents



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## Beyond regulation: energy labels (2)

**Bepos-effinergie**  
2013



**BEPOS Effinergie**

- The building must meet the requirements of Effinergie + label.
- Then, the balance of non-renewable primary energy should be less than an authorized deviation.

**Balance of non-renewable primary Energy:** consideration of non-renewable energy consumption in incoming and outgoing

**Authorized deviation:** a deviation to the positive energy to allow buildings to get the label in all regions and urban contexts

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## Energy labels in figures

**effinergie  
rénovation**

Type of building	Certified	Registered
Dwellings	30 027	73 617
Non-residential	76	227

Source : Effinergie as of 1st October 2014

**effinergie +**

Type of building	Certified	Registered
Dwellings	412	11 889
Non-residential	56	19

Source : Effinergie as of 1st October 2014

## Third part certification : HQE™

HQE (High Quality Environmental standard) is a standard for green building in France, based on the principles of sustainable development first set out at the 1992 Earth Summit.

HQE™ certification is a trademark that is registered internationally and exclusive property of the HQE Association

HQE™ certification is managed by the operator Cerway in all countries except France





## Fields covered by HQE™



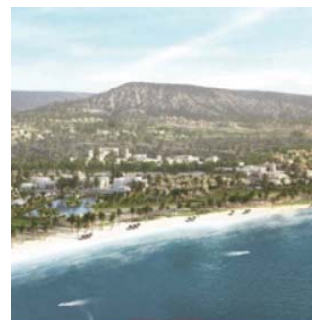
RESIDENTIAL BUILDING



NON-RESIDENTIAL BUILDING



NON-RESIDENTIAL BUILDINGS IN OPERATION



SUSTAINABLE PLANNING



## HQE™ approach

### THE 14 TARGETS IN AN HQE PROCESS

#### ECO-CONSTRUCTION

1. Relationship of building with its immediate environment
2. Integrated choice of products and construction materials
3. Low environmental impact worksite

#### ECO-MANAGEMENT

4. Energy management
5. Water management
6. Management of waste caused by activities
7. Management of servicing and maintenance

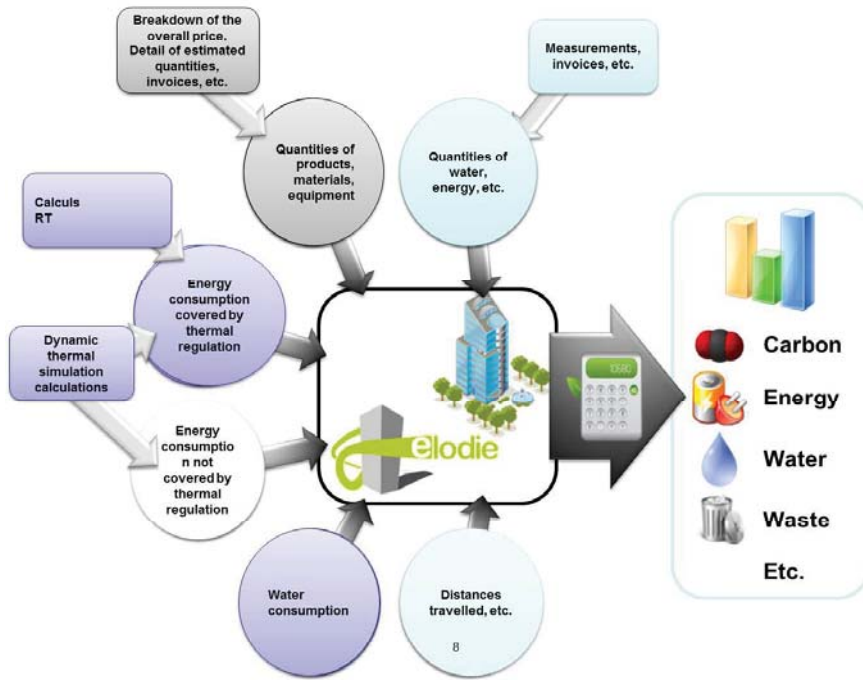
#### COMFORT

8. Hygrometric comfort
9. Acoustic comfort
10. Visual comfort
11. Olfactory comfort

#### HEALTH

12. Sanitary quality of areas
13. Sanitary air quality
14. Sanitary water quality

# HQE™ new approach based on performance indicators



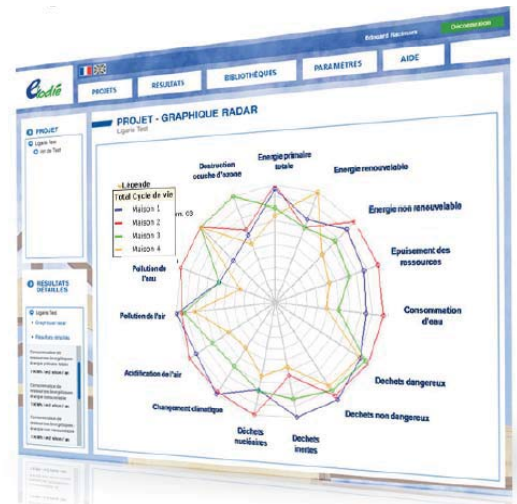
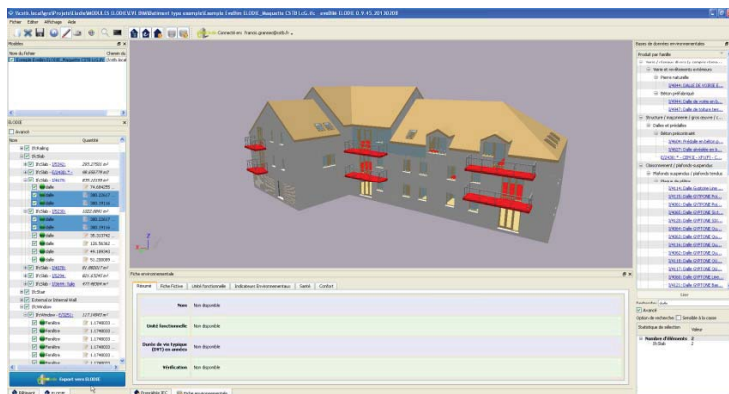
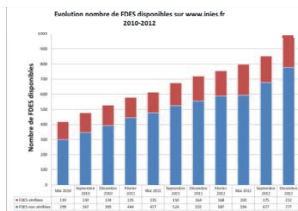
# HQE™ new approach based on performance indicators

## Whole life cycle building environmental performances

Designed to allow you to model your buildings and perform Life Cycle Assessment according to the standards, ELODIE is dedicated to all professionals, experts or not in Life Cycle Assessment.

ELODIE allows you to study globally the environmental performances of your buildings in a multi-criteria approach. ELODIE can thus scientifically assist you in your decision making and evaluation of your building performances.

We have developed for you a modular tool that offers a possibility to take into account all the contributors to environmental impacts and also to refine your studies. ELODIE is in constant development to match your needs. Soon, it will also allow you to study thermal comfort, acoustic and life cycle cost.



# HQE™ Certificate

**HQE™** Certifié par CERWAY

**CERTIFICAT**

N° 0000106  
Delivré le 04.07.13

**HQE™ EXCELLENT**

ÉNERGIE ET ÉCONOMIES	★ ★ ★ ★
ENVIRONNEMENT	★ ★ ★ ★
SANTÉ ET PROTECTION	★ ★ ★ ★
CONFORT D'USAGE	★ ★ ★ ★

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PROJET : LE MILLENIUM

DÉLIVRÉ À : GLOBAL CARE

SITUATION : WARSAW - Poland

TYPE DE BÂTIMENT : Offices

CYCLE : Construction

ÉTAPE : Design

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Patrick NOSSENT  
Président

# HQE™ certification is developing worldwide



- HQE™ certified or in the process of being certified, operations
- « Aqua » certified operations, through our partner, Fundação Vanzolini

# HQE™ certification key figures

Via Crespi 26 - HQE™ certified - Milan/Italie  
SRL BNP PARIBAS Real Estate  
Property Development Italy SPA - Arch. Studio Valeriani



## 266,000

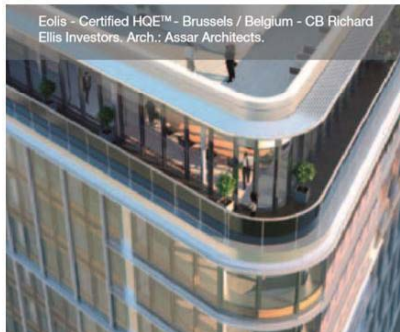
certified projects in the world

HQE™ Certification today

## 43

Millions m<sup>2</sup>  
certified

Eolis - Certified HQE™ - Brussels / Belgium - CB Richard  
Ellis Investors. Arch.: Assar Architects.



## Thank you for your attention!

ご清聴ありがとうございました