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THE EFFINERGIE® ENERGY EFFICIENT BUILDING CONCEPT

Seventeen success factors from the French experience

Effinergie®建筑能效标识概念 ：从法国经验谈成功的十七个关键因素

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1/ Concept origin
概念起源

The French Energy Efficient Buildings International Benchmark shows that the German **Passivhaus** concept and the Swiss **Minergie®** concept are the most interesting ones in Europe.

法国“建筑能效国际基准项目” 研究发现目前德国的Passivhaus 和瑞士的Minergie® 标识是欧洲最具吸引力的概念

Two **French regions** close to the two countries, Franche-Comté for Switzerland, Alsace for Germany, decided with a southern region, Languedoc Roussillon, to elaborate a French concept from these experiences.

法国同瑞士和德国接壤的法兰什—孔蒂与阿尔萨斯两个大区决定连同法国南部的朗格杜—卢松大区吸收德、瑞两国的经验来制定出一个本土的法国概念

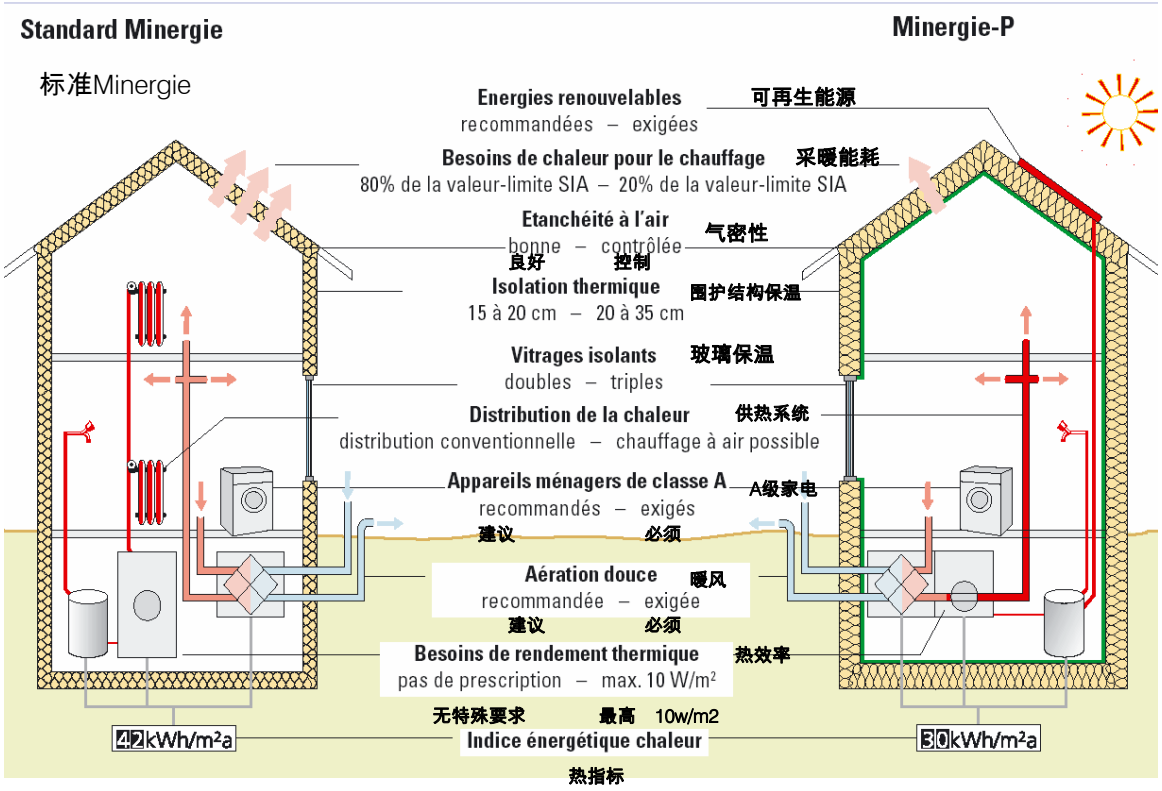
With two banks, Caisse des Dépôts and Banque Populaire, one manufacturing companies lobby dealing with building insolating enveloppe, environmental organisations and CSTB, they founded the **Effinergie® association** in March 2006.

在两家银行(法国国家信托银行与国民银行) ,建筑节能保温产品生产企业，以及多个环保组织和CSTB的共同努力下，于2006年3月注册成立了Effinergie® 协会

1/ Concept origin
概念起源

The association chose a concept close to the Minergie® one, which is less demanding than the German Passivhaus concept:

协会成立初期推出的概念接近瑞士Minergie® one的水平，其对能效的要求比德国的Passivhaus 要低一些



Renewable energy
可再生能源
Heating needs
热负荷
Airtightness
气密性
Thermal insulation
围护结构保温
Insulating glazing
窗户保温
Heat distribution
供热系统
Household appliances
住宅家电
Ventilation
通风
Thermal efficiency needs
热效率
Energy consumption
能源消耗

See http://www.minergie.ch

1/ Concept origin
概念起源

The Minergie® concept is **easier to implement on the market** than the Passivhaus one.
Minergie® **标识概念比** Passivhaus**概念在市场上更容易实施**
Created in 1991, the Passivhaus label represents 1% of the new annual German construction.
自1991**年创立以来，** Passivhaus **标识占德国每年新建建筑的**1%
Passivhaus is for the moment more a reference concept to inspire solutions than to be implemented itself on the market.
与其说是直接被用来在建筑市场上实施，Passivhaus **更多的是为其他新的概念提供一个解决手段的参照标准**
Created in 1998, the Minergie® label represents 20% of the new annual residential Swiss construction.
自从1998**年设定以来，** Minergie®**标识占瑞士每年新建居住建筑的** 20%.

First success factor: to choose among different concepts, the easiness of implementation on the market is a priority criterion
第一个成功的要素：是否在建筑市场上易于实施是从众多的能效概念中进行选择的首要条件

1/ Concept origin
概念起源

Before the significant impact on the market, three steps are usually required: **testing, concept definition, dissemination.**

在对市场造成显著影响之前必须经历三个阶段：测试、概念确定和传播

If a country defines a concept from another already existing one, testing is not essential.

如果某国定义一个从别国引进的既有的概念，那么便没有对测试的硬性规定.

In France, the Effinergie® concept has been specified before testing:

Country	Label 标识	Testing 测试	Concept 概念	Dissemination 传播推广
Switzerland 瑞士	*Minergie®*			
Germany 德国	*Passivhaus*			
France 法国	*Effinergie®*			

Second success factor : to define a concept from another already existing one allows to avoid the testing step

第二个成功的关键因素：根据既有的成功案例的经验来定义概念可以避免重复测试的步骤

1/ Concept origin
概念起源

But when a concept is defined without preliminary testing, it has to be improved from experience.

但是如果一个概念或理念没有经过一个前期测试的过程，那么它必须**从经验实践中逐步完善提高**.

One example: when the first Effinergie® label version was created, renewable energy production (photovoltaic, wind turbine…) in the building was not limited.

举例来说：当第一个Effinergie®标识最初创立的时候，没有对建筑中可再生能源(光伏电池, 风电…)的产量作出一个具体的限制

It was possible to compensate bad insulation by high renewable energy production, which is a bad technical solution.

Now, to obtain the label, the renewable energy maximum production is 12 KWh par m^2 and year.

这导致有些房屋可以采用提高可再生能源的份额来弥补较低的热工性能，而这不利于那些有助于提高能效的技术的推广

现在,为了得到这个标识，可再生能源最低产量要达到每平方米每年12 KWh

Third success factor : the concept has not to be rigid, it has to be improved through learning from experience.

第三个成功的关键因素：概念不是僵化的，它将随着实践经验的增加而不断完善提高

2/ Targets
目标

The two requirements to get the Effinergie® label are very simple:
Effinergie®标识有两个相对简单的要求

Firstly, the **maximum energy consumption of the building for five uses of energy must be 50 Kwh per m² and per year for new buildings and 80 Kwh per m² and per year for refurbished buildings.**
第一，新建建筑中五个最主要的用能总和不超过50 Kwh/平米/年，节能改造的建筑中相应用能不超过80 Kwh/平米/年

The results are mentioned in primary energy KWh per “hors oeuvre” m²: useful surface plus other interior surface.
这里所指的能耗是一次能源消费的概念，其对应的是“每m²净建筑面积”：即使用面积加上墙体，结构，和公共部分的面积

The five uses of energy are: space heating, hot water, ventilation, lighting and air conditioning.
五个最主要的用能分别是：采暖、生活热水、通风 、照明和空调.

2/ Targets
目标

The Effinergie® label performance is 50% of the current 2005 French rules for new buildings.
达到Effinergie®标识能效标准的房屋能耗比法国目前的新建建筑节能标准要低50%

Secondly, the building air permeability should be less than 0,6 m3 per hour and m² for individual houses and 1 m3 per hour and m² for flats.
其二，独立式住宅建筑的气密性达到每小时换气次数小于0.6m3,公寓式建筑则要小于1 m3 /h.

Fourth success factor : the label requirements have to be simple and in limited number.
第四个成功的关键因素：标识的各项要求必须简单明了，并且其数量必须精简

2/ Targets
目标

Switzerland is a small and rather homogeneous country. The Minergie® label has one energy consumption requirement for the whole country.

瑞士是一个发展较为均衡的国土面积很小的国家， Minergie® 标识中对能耗的要求适用于瑞士全境.

France gets three types of climate:

法国全境覆盖三个气候带：

- Continental 大陆性气候
- Oceanic 海洋性气候
- Mediterranean 地中海气候

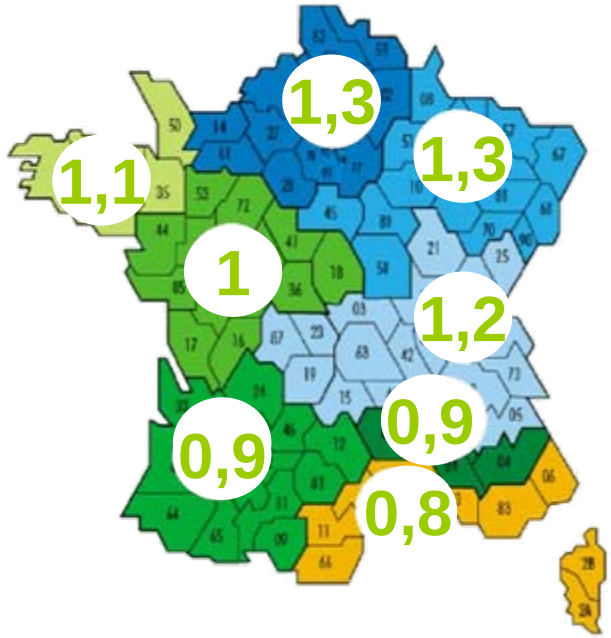
It is necessary to define different requirement levels according to the climate zones.

因此必须根据各个气候带的特点制定不同的规范

2/ Targets
目标

effinergie
Mieux construire et rénover pour protéger l'environnement
Qualité de vie et économie d'énergie

requirements according to the climate zone:
标识对各个气候带的要求：
New buildings: 新建建筑
- 65 Kwh/m².y in the North
  北部为65 Kwh/m².y
- 40 Kwh/m².y in the South
  南部为65 Kwh/m².y
Refurbished buildings 节能改造建筑
-104 Kwh/m².y in the North
北部为104 Kwh/m².y
64 Kwh/m².y in the South
南部为65 Kwh/m².y
Fifth success factor: label requirements must be adapted to the climate
第五个成功的关键因素： 标识的要求必须与当地的气候相适应



2/ Targets
目标

The requirements must also be adapted to the altitude. The Effinergie® label requirements for a 50 Kwh/m².y type new building:

同时标准也要适应相应的海拔高度. Effinergie® 标识对于50 KWh左右的要求

- Plus 400 meters: 55 Kwh/m².y
  高于400米： 55 Kwh/m².y
- Plus 800 meters: 60 Kwh/m².y
  高于800米： 60 Kwh/m².y

Requirements for a 80 Kwh/m².y type refurbished building:

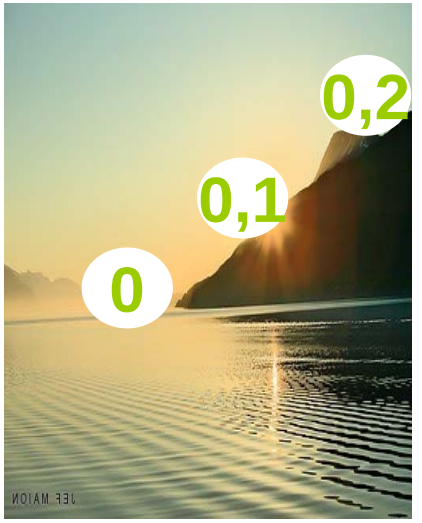
对于改造后的既有建筑80 KWh左右的的要求

- Plus 400 meters: 88 Kwh/m².y

高于400米： 88 Kwh/m².y

- Plus 800 meters: 96 Kwh/m².y

高于800米： 96 Kwh/m².y



Sixth success factor : label requirements must be adapted to the altitude

第六个成功的关键因素：标识的要求要适应当地的海拔高度

3/ Process and use
过程和使用

Some examples of good questions specified in the "How to manage an Effinergy® project" Guide
举例来讲，在*Effinergy®*项目管理中提出的有益的问题对建筑开发的下列程序有指导性

Briefing
前期调查准备

What is the experience expected from the contractor team in the field of low energy buildings ? What does the team know regarding the label requirements ? Do they work with an expert in energy efficiency ?
我们可以从低能耗建筑的承包商和建筑企业那里积累哪些经验？建筑商是如何看待建筑能效标识的？他们是否和建筑节能专家并肩工作？

Has the client planned fees in order to let the contractor team perform an energy efficiency optimization ?
业主是否在项目预算中考虑了建筑企业在能效优化方面的投资？

Has the client mentioned the wish to carry out devices to highlight the responsibility of the future users (building use notice, meters visibility, energy consumption per use)?
业主是否表示希望安装相关的装置 来明确划分将来各个使用者的相关责任 (建筑使用指南,计量表, 相关用能的规定)?

Seventh success factor: the client has to be motivated by energy efficiency and has to chose motivated partners
第七个成功的关键：业主必须有提高建筑能效的动力，并且选择有志于该计划的合作伙伴

3/ Process and use
过程和使用

Design
设计

Is the heat engineer in charge at the very beginning of the project ?
工程师是否从开始阶段便参与了项目的设计？

Have the architect and the heat engineer optimized the building and its equipments by studying the whole means: compactness, management of solar contributions in all seasons, inside zoning, high insulation, thermal bridges limitation, air tightness, choice of equipments, choice of energy ?
建筑师是否和暖通工程师一起合作对设备和建筑中各个环节进行了考虑，诸如：集约度、各个季节太阳能的利用、建筑内部分区、高质量的围护结构保温、冷桥的处理、气密性、设备的选择以及能源种类的选择？

Has the designer and the heat engineer informed the client of the choices impacts on investment and operating costs and also on the management and maintenance of the building and its components ?
建筑师和暖通工程师是否告诉业主各种投资选择的影响以及建筑及其设备运行管理的成本和后果？

Have the designer mentioned in the construction contracts that an air permeability test will be performed on the building ?
建筑设计者是否在建设合同中提到建筑运行中的气密性检查？

Eighth success factor: a new relationship is necessary between the architect and the heat engineer and between the two of them and their partners
第八个成功的关键：必须建立一种建筑师同暖通工程师的新型合作关系，而且他们和其他合作伙伴的合作也同样重要

3/ Process and use
过程和使用

Construction
施工建设

Is an intermediary air permeability test is planned in order to easily implement the eventual corrective measures ?

在施工过程中是否进行气密性检查以便可以及时发现问题并且最终提出矫正的方案？

Have the products and equipments performances be checked to be in accordance with the thermal survey ?

建筑设备和产品的能效是否和前期热工调查的要求相吻合？

Have the technical details been sent to the relevant construction firms ? Have the details been discussed with the firms?

具体施工建设的企业是否收到了详细的技术方案？设计方是否就这些技术细节同建设方进行了讨论？

Is an intermediary works receipt planned before the laying of face works and the shutdown of pipe ducts in order to observe the quality of insulating material laying, pipes and cables routing and the quality of eventual air tightness membranes?

是否在墙面和管道敷设完毕之前进行中期的工程质量验收，这样可以对保温材料，管线以气密半透膜的性能进行观测，可以及时发现问题避免返工.

Ninth success factor: air tightness must be a priority for the construction firms

第九个关键因素：房屋气密性必须被建筑企业作为优先考虑的因素考虑

3/ Process and use
过程和使用

Commissioning
跟踪监测

Have the air flow rate of ventilation systems been adjusted, has the commissioning report been written?

空调系统的气流是否根据实际需要来调节，是否有定期跟踪监测的报告？

Have heating systems regulation and programming equipment, domestic hot water production and air control been adjusted ?

采暖系统的调节和程控装置，室内生活热水和空气监控是否被及时调节？

Has a building management guide be written for the Facilities manager ? Does it include the whole technical information for a regular equipments maintenance?

是否为设备管理人员准备了房屋建筑管理指导手册？是否提供了调节设备的技术细节说明？

Is there a use notice for the users?

是否为房屋使用者提供了使用导则？

Tenth success factor: a successful commissioning is important to maintain the planned performances during the management of the completed building

第十个成功的关键：在房屋竣工之后的使用阶段，有效的跟踪监测手段能保证建筑能效始终维持在规定的水平以上

3/ Process and use
过程和使用

Building use and maintenance
建筑使用和维护

Is there a use and maintenance notice for the users including energy features ? Was it presented to the occupiers ? This notice is supposed to point out particularly the following points :

是否为使用者提供了建筑使用和维护指南，包括能源使用？有没有向住户介绍？指南特别应该包括以下几点：

Management control of the temperature by describing systems and their use method at the users disposal

应该向用户介绍室内空气温度控制和调节系统及其使用方法

Use of domestic hot water and energy cost of the different behaviours

室内生活热水与不同消费行为下的能源成本

Maintenance frequency of heating systems and maintenance contract necessity

有关采暖系统的定期维护和保养合同十分必要

Necessary maintenance of mechanical ventilation systems

机械通风装置的维护

The choice of household appliances (refrigerator, freezer, washing machine…)

家用电器的选择(冰箱, 冰柜, 洗衣机…)

Eleventh success factor : the quality of the use and of the maintenance is essential to meet the energy efficiency targets.

第十一个成功的关键：正确的使用和维护房屋对保证能效水平起着至关重要的作用

4/ Architectural and technical solutions
建筑与技术措施

Architecture **建筑**	effinergie Mieux construire et rénover pour protéger l'environnement Qualité de vie et économie d'énergie	Current French 2005 regulation **2005年法国建筑节能规范**
Compactness **集约性**	*Recommended* ***建议***	*Not taken into account* **未考虑**
South orientation **南向**	*Recommended* ***建议***	*To be considered* **考虑**
Summer comfort **夏季舒适性**	*Essential* ***主要***	*Often necessary* ***大多情况下必要***

Twelfth success factor: a bio-climatic architecture is highly recommended for an energy efficient project

第十二个成功关键：生态气候建筑在建筑能效项目中被大力推崇

4/ Architectural and technical solutions
建筑与技术措施

Insulation **围护结构保温**	effinergie	Current French 2005 regulation **2005年法国建筑节能规范**
R Roof (m^2.K/W) **屋顶R值**	*6,5 to 10*	*4 to 6*
R Wall (m^2.K/W) **墙体R值**	*3,2 to 5,5*	*2,2 to 3,2*
R Ground (m^2.K/W) on earth platform **与地面接触的楼板R值**	*2,4 to 4*	*1,7 to 2,9*
R Ground (m^2.K/W) on crawl space **底层架空楼板R值**	*3,4 to 5*	*2,4 to 4*
Thermal bridges **冷桥**	*Very limited* ***非常有限***	*Limited to medium* ***限制到一般水平***

4/ Architectural and technical solutions
建筑与技术措施

Windows **窗体**	effinergie Mieux construire et rénover pour protéger l'environnement Qualité de vie et économie d'énergie	Current French 2005 regulation **2005年法国建筑节能规范**
Uw (W/m².K)	*1,7 to 0,7*	*2 to 1,6*
Solar protection **遮阳**	*Essential* ***充分考虑***	*Often necessary* ***大多情况下必要***

Thirteenth success factor: an energy efficient building envelope has to be much more insulated than a current one

第十三个成功的关键：未来的高能效的建筑的保温水平比现有的做法将不断提高

4/ Architectural and technical solutions
建筑与技术措施

Solar energy 太阳能利用	effinergie	Current French 2005 regulation 2005年法国建筑节能规范
Solar hot water production 太阳能热水供应	*Recommended* *推荐*	*To be considered* *需要考虑*
Photovoltaic electricity production 光伏发电	*To be considered* *需要考虑*	*Rare* *几乎没有*

Fourteenth success factor: solar hot water is highly recommended, photovoltaic has to be considered

第十四个成功的关键：太阳能热水供应应该大力推荐，光伏发电在合适条件下应当予与考虑

4/ Architectural and technical solutions
建筑与技术措施

	effinergie	Current French 2005 regulation 2005年法国建筑节能规范
Ventilation 通风	Low consumption fan Mechanical ventilation A category or Double flow with an exchanger output of more than 80% A级节能机械通风装置，或热交换率超过80%的双向流排气	Mechanical ventilation A or B category A类和B类机械通风

Fifteenth success factor: mechanical ventilation is highly recommended, double flow ventilation has to be considered in rigorous climate

第十五个成功关键：机械通风要得到大力推荐，双向流通风系统在寒冷地区尤其需要考虑

4/ Architectural and technical solutions
建筑与技术措施

Heating and domestic hot water **采暖和生活热水**	effinergie Mieux construire et rénover pour protéger l'environnement Qualité de vie et économie d'énergie	Current French 2005 regulation
Electricity **电采暖**	*Heat pump with an output of more than 3,5* ***热泵能效系数大于3.5***	*"Joule effect" equipment* ***"焦耳效应"设备***
Gas or fuel **天然气、燃油**	*Condensation boiler* ***冷凝锅炉***	*Low temperature boiler* ***低温锅炉***
Wood **木头**	*Automatic wood boiler class 3* ***3级自动燃木锅炉***	

Sixteenth success factor: efficient heat pumps or wood boilers or condensation Gas boilers are recommended

第十六个成功的关键：能效系数高的热泵或者燃木锅炉，以及冷凝锅炉都应当大力推荐

5/ Economical aspects
经济问题

In Switzerland, if the difference between the initial cost of the building and the initial cost of a usual building is more than 10 %, the building is not labeled Minergie®.

在瑞士，如果节能建设项目的初投资比普通建筑要高出10%以上，那么该建筑不能被赋予Minergie®标识.

The initial cost of the first energy efficient buildings designed and built by a construction team (client, architect, heat engineer, construction firms, facilities manager) is often high, because the team needs to learn how to make brief, design, construction and management of an energy efficient building.

高能效建筑的初始投资一般会较高，因为建设项目各方(包括业主, 建筑师, 暖通工程师, 施工单位, 项目和设施管理人)需要学习如何合作来优化节能建筑的设计，施工和管理等各个环节.

This learning process, through several successive projects, allows the construction of such buildings with less than 5% of increasing of the initial cost. Such an investment is easily reimbursed by a lower operation cost. Energy efficient approach needs thinking through a life cycle cost analysis.

而这个学习过程，随着成功案例数量的增加和经验的累计，将可以使此类建筑的初始投资的增加控制在5%以下.这样通过运行费用的节约使得初始投资的回收周期较短.因此高能效建筑项目需要采用全生命周期的成本分析方法.

Seventeenth success factor: through a life cycle cost analysis, an energy efficient building is almost always profitable. A learning process of the construction team allows a low level of supplement of initial cost.

第十七个成功的关键：通过全生命周期的成本分析方法，投资高能效建筑几乎总是有利可图的. 建筑团队的学习过程可以帮助降低初投资的费用.

6/ The success factors
取得成功的关键因素

A/ THE CONCEPT
概念

1/ To choose among different concepts, the easiness of implementation on the market is a priority criterion 是否在建筑市场上容易操作实施是从众多的能效概念中进行选择的首要条件

2/ To define a concept from another already existing one allows to avoid the testing step
根据既有的成功案例的经验来定义概念可以避免重复测试的步骤

3/ The concept has not to be rigid, it has to be improved through learning from experience 概念不是僵化的，它将随着实践经验的增加而不断完善提高.

4/ The label requirements have to be simple and in limited number
标识的各项要求必须简单明了，并且其数量必须精简

5/ Label requirements must be adapted to the climate
标识的要求必须与当地的气候相适应

6/ Label requirements must be adapted to the altitude
标识的要求必须与当地的海拔高度相适应

6/ The success factors
取得成功的关键因素

B/ PROCESS AND USE
过程和使用

7/ The client has to be motivated by energy efficiency and has to chose motivated partners 业主必须有提高建筑能效的动力，并且选择有志于该计划的合作伙伴

8/ A new relationship is necessary between the architect and the heat engineer and between the two of them and their partners 必须建立一种建筑师同暖通工程师的新型合作关系，而且他们和其他合作伙伴的关系也同样重要

9/ Air tightness must be a priority for the construction firms
房屋气密性必须被建筑企业作为优先考虑的因素考虑

10/ A successful commissioning is important to maintain the planned performances during the management of the completed building
在房屋竣工之后的使用阶段，有效的跟踪监测手段是使建筑能效始终维持在规定水平以上的保证

11/ The quality of the use and of the maintenance is essential to meet the energy efficiency targets. 正确的使用和维护的质量对保证能效水平起着至关重要的作用

6/ The success factors
取得成功的关键因素

C/ ARCHITECTURAL AND TECHNICAL SOLUTIONS
建筑和技术方案

12/ A bio-climatic architecture is highly recommended for an energy efficient project
生态气候建筑在建筑能效项目中被大力推崇

13/ An energy efficient building envelope has to be much more insulated than a current one 未来的高能效建筑的维护结构保温水平必须比大大超过现有的

14/ Solar hot water is highly recommended, photovoltaic has to be considered 太阳能热水供应应该大力推荐，光伏发电必须予与考虑

15/ Mechanical ventilation is highly recommended, double flow ventilation has to be considered in rigorous climate
机械通风要得到大力推荐，双向流通风系统在寒冷地区尤其需要考虑

16/ Efficient heat pumps or wood boilers or condensation Gas boilers are recommended 能效系数高的热泵或者燃木锅炉，以及冷凝锅炉都应当大力推荐

D/ ECONOMICAL ASPECTS
经济问题

17/ Through a life cycle cost analysis, an energy efficient building is almost always profitable. A learning process of the construction team allows a low level of supplement of initial cost.

通过全生命周期的成本分析方法，投资高能效建筑几乎总是有利可图的. 建筑团队的学习过程可以帮助降低初投资的费用.

Thank you for your attention

谢谢关注

Any question ?

问题？