

Retrofit : How global minding help overcoming individual barriers ?

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RenQuart

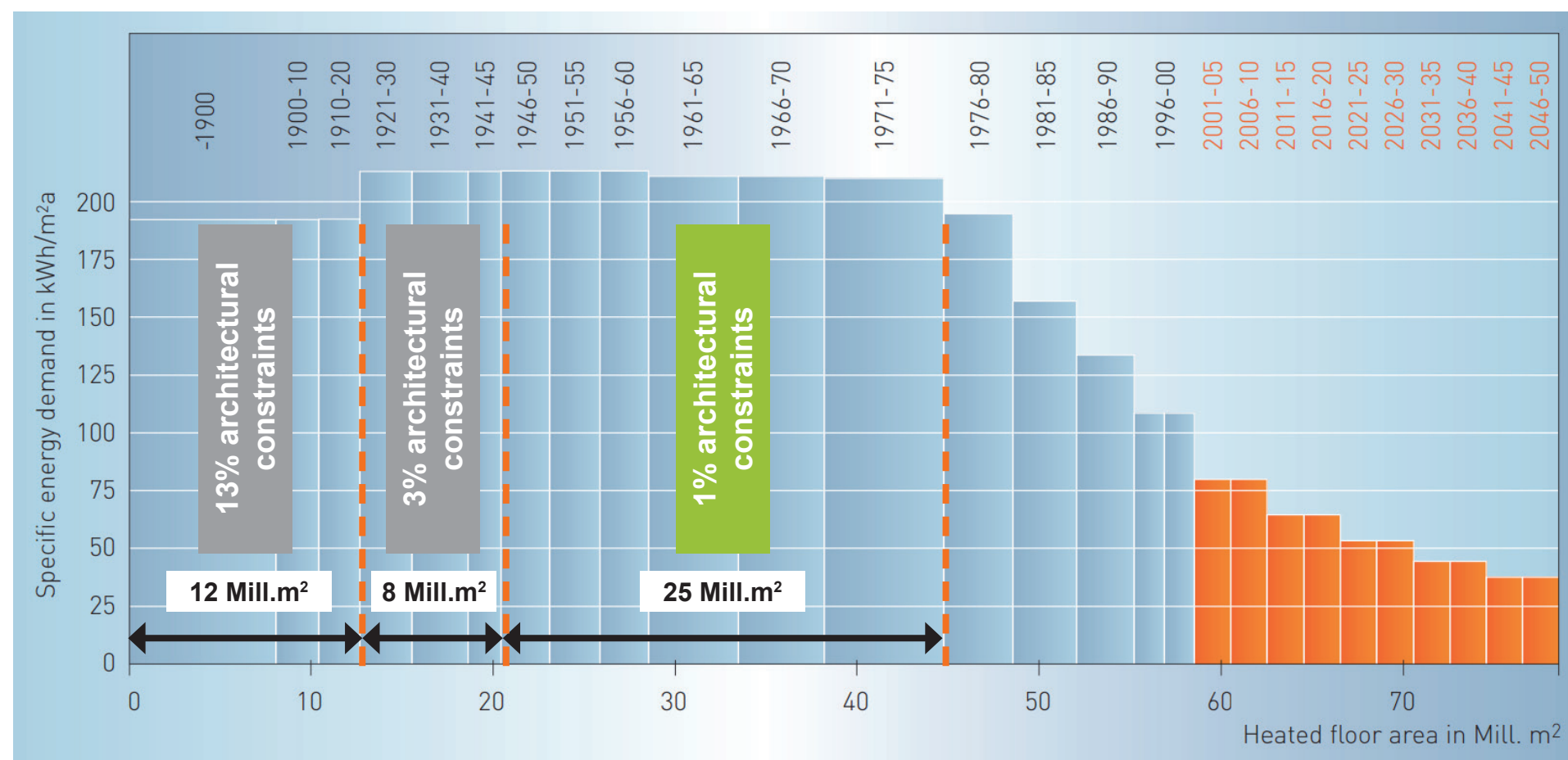
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Scoping study on benefits of building energy retrofitting at a district level instead of an individual one

IDENTIFICATION OF BEST OPPORTUNITIES

- Retrofit rate is smaller than 1% per year -

ARCHITECTURAL PROTECTION



Distribution of thermal energy needs by buildings' construction period

source : Novatantis

Buildings with worst energy performances present the least architectural constraints

In addition, they represent the biggest part of SRE built (~30-40%)



Mapping of buildings constructed between 1945 and 1980

Complementary studies, by the CREM, shows that buildings built between 1945 and 1980, are geographically gathered.

LIMITS AND INNOVATIONS OF THERMAL BUILDING RETROFITTING

FACTS OF ARTISANAL BUILDING RETROFITTING

Source : Les coûts des travaux d'économie d'énergie, Edition LeMoniteur

- Investments costs are little or even not affected by a scale effect.
- Too long thermal retrofitting duration.
- Only thermal insulation is considered.

WHAT IS NECESSARY

- Lower investment costs.
- Higher productivity.
- Enhancement of the retrofitting processes.
- A completely new approach ?

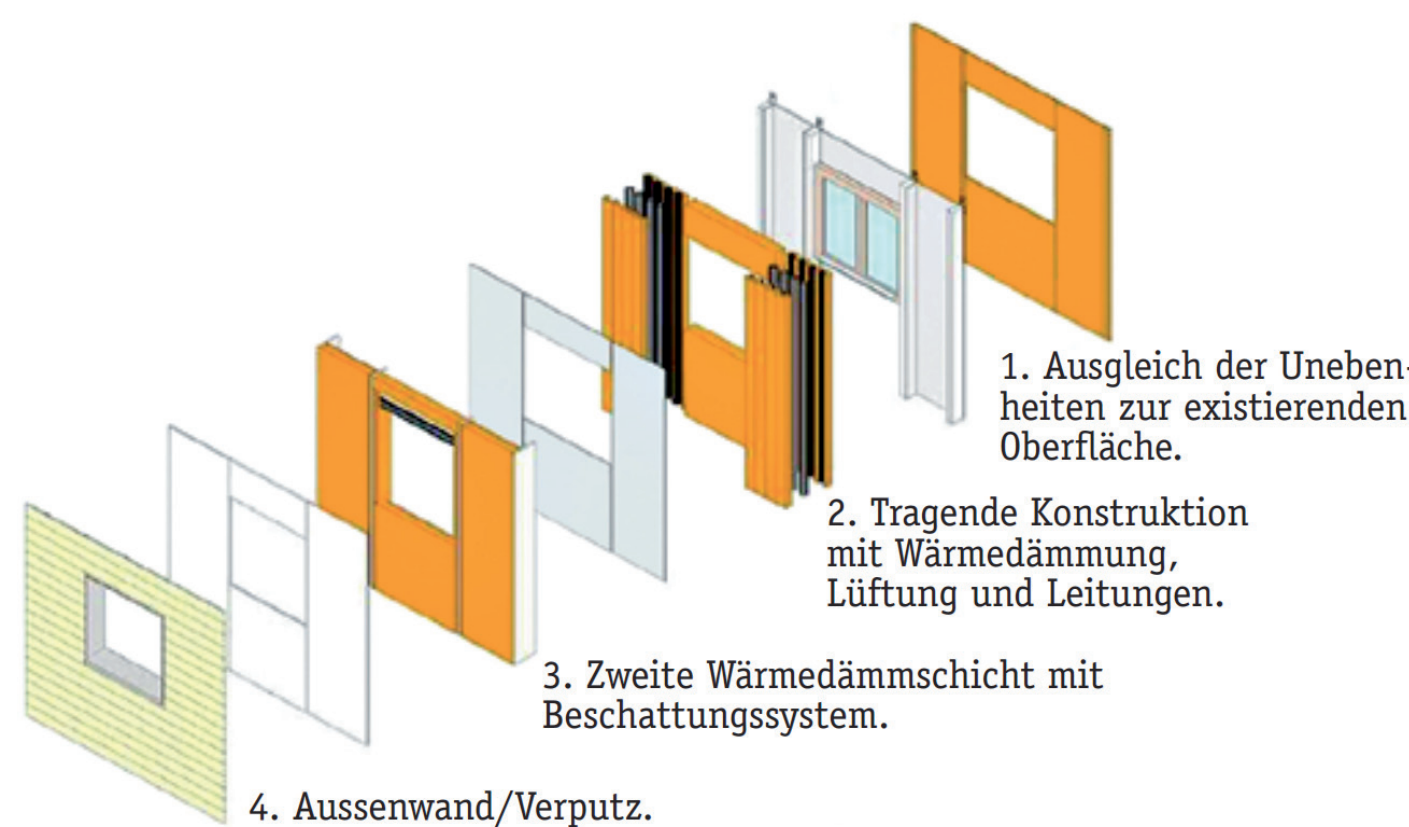
RESEARCH PROGRAMS AND EXISTING SOLUTIONS

Dealing with this situation, the industrialization of thermal retrofitting is one of the alternatives considered at this time.

By creating standardized and prefabricated modules it will offer an integrated construction process and a better return on investment.

CONCEPT

Lower retrofitting duration / Multifunctional module

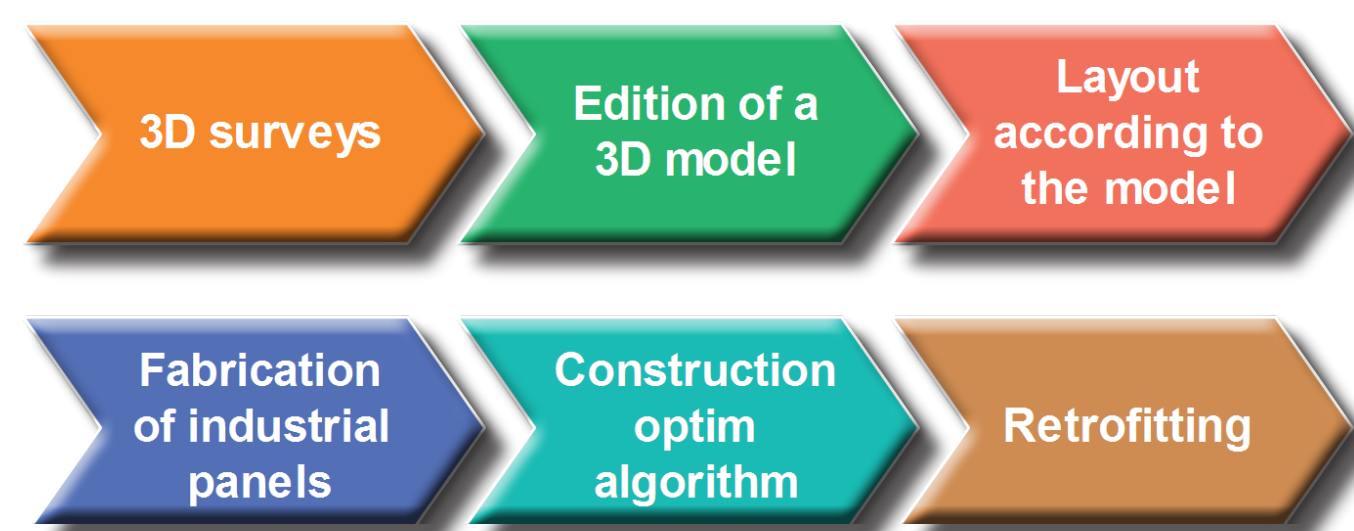


Development of new design principles prefabricated panels of CCEM-Retrofit project

Source : CCEM

INDUSTRIALIZED PROCESS BUT NOT ONLY FOR MODULES

The whole supply chain should be automated



INDIVIDUAL REFLECTION

A new building envelope is laid around the existing building.

Prefabricated module integrates ventilation and distribution systems

VS.

GLOBAL REFLECTION

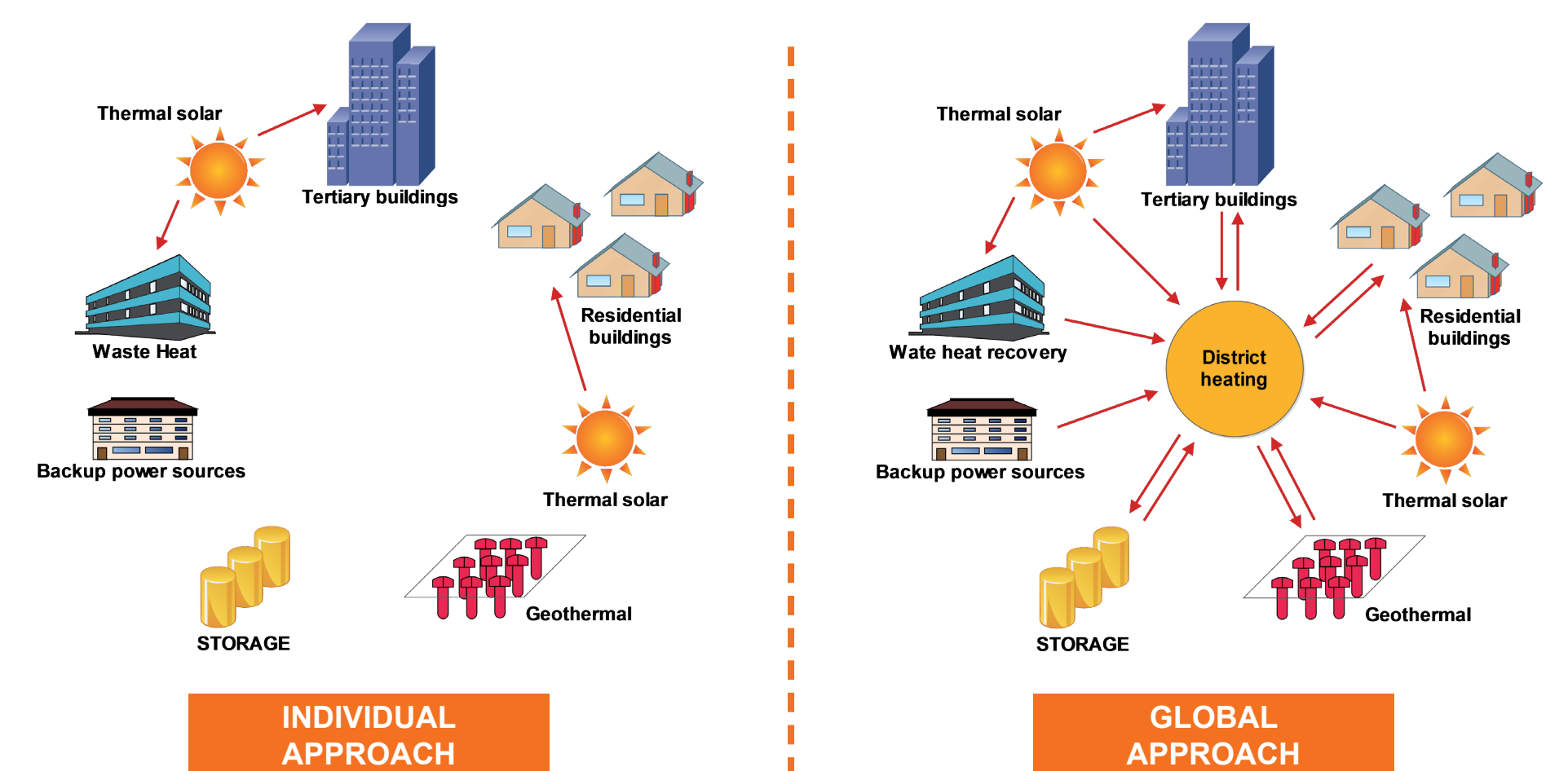
A new building envelope is laid around the existing building.

Prefabricated module integrates ventilation and distribution systems

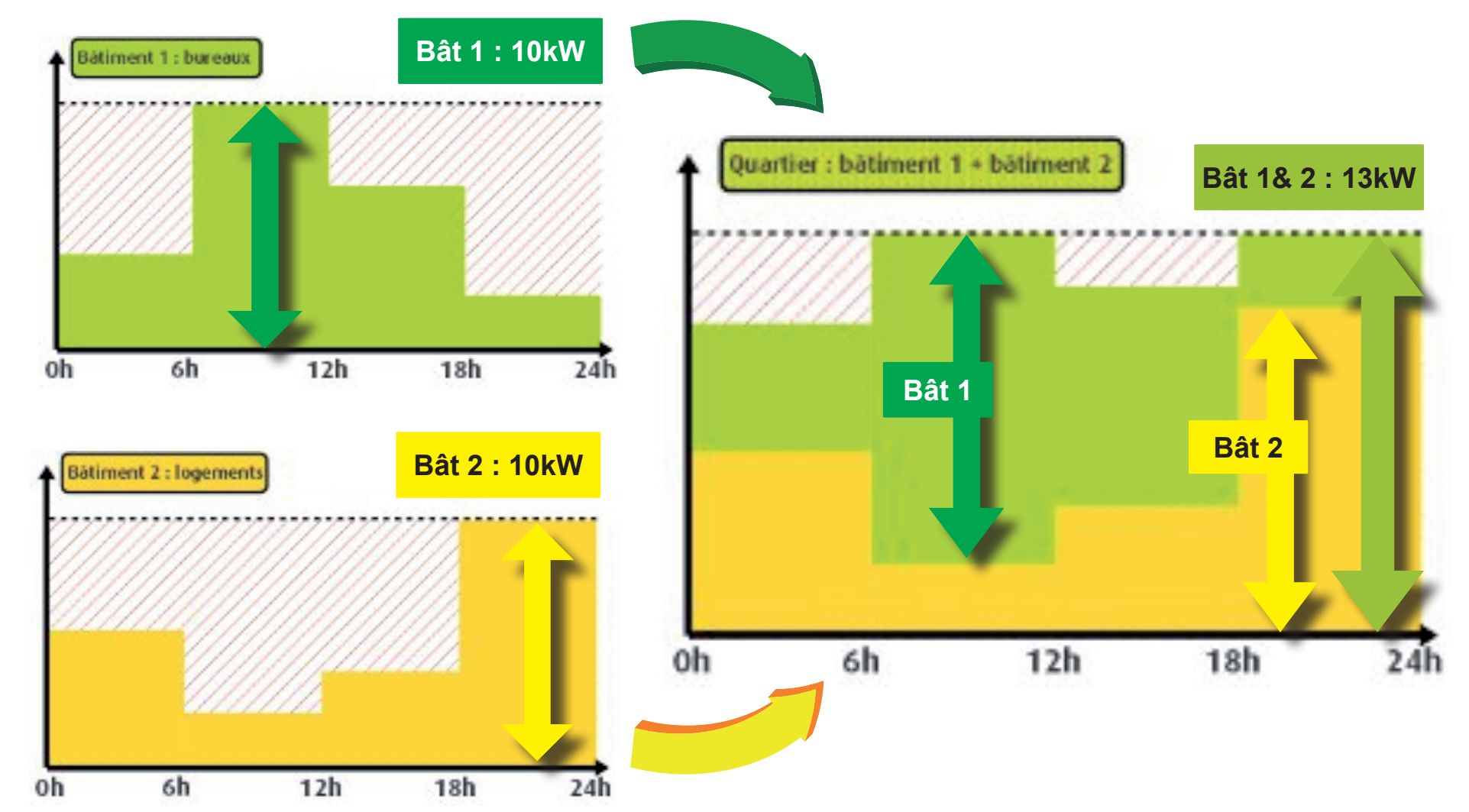
Buildings are connected through the modules distribution system

BENEFITS OF A SYSTEMIC DISTRICT SCALE APPROACH

ON SYNERGIES EXPLOITATION



ON ENERGY SYSTEM DESIGN AND OPERATION

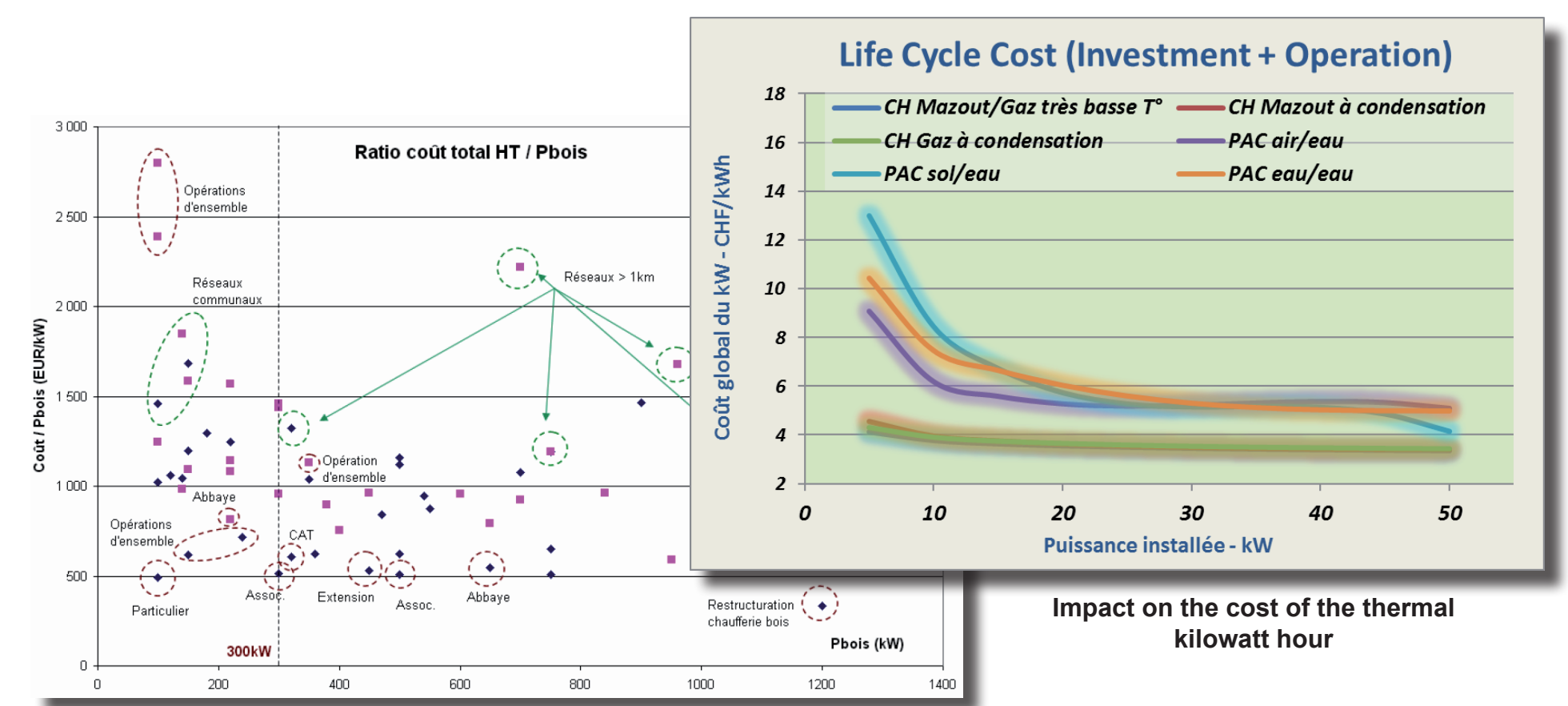


Impact on the heating system load curves and the maximal needs

Source : <http://www.cete-ouest.developpement-durable.gouv.fr>

Systemic approach at district scale, taking benefits of complementarities between different heat demand load curves, lead to more efficient solutions

ON LIFE CYCLE COST (INVESTEMENT + OPERATION)

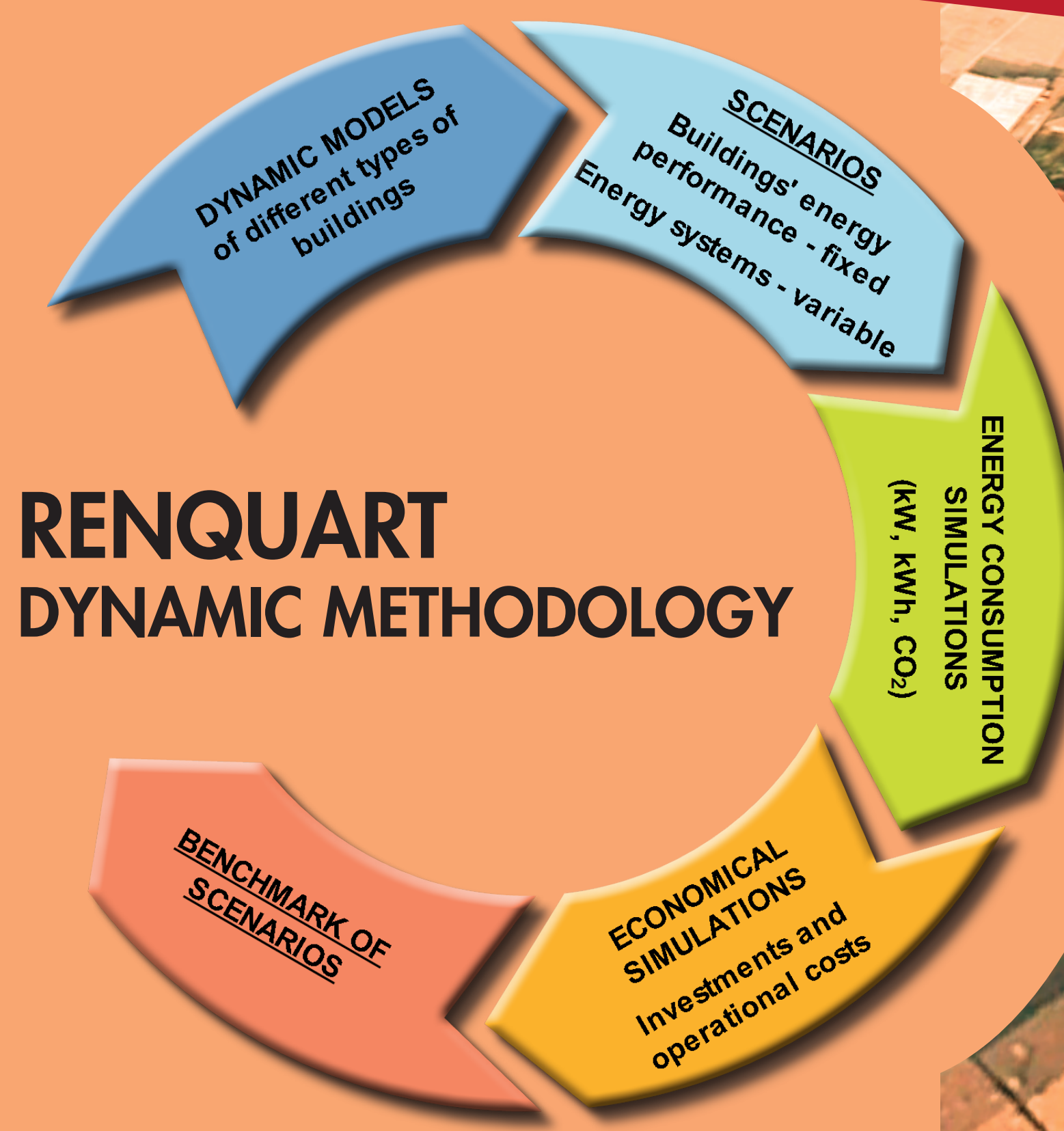


Impact on the cost of the thermal kilowatt on investment

The cost of thermal energy decreases when the power of the installation increases, considering the same system operation (2300 EFPH / year)

CASE STUDY ON ENERGY SYSTEM

STUDIES ON BUILDINGS'ENERGY NEEDS (ONGOING)



RENQUART DYNAMIC METHODOLOGY



1 ST CASE STUDY	INDIVIDUAL	GLOBAL
Systems	Individual energy retrofitting + individual air-source heat pumps	Global energy retrofitting + district heating with centralized air-source heat pumps
MWh _{ef}	150	150
MWh _{ep}	478	478
Tonnes CO ₂	273	273
Cout global (CHF)	1'779'649	1'549'692

In the first case study, energy production systems are the same. Only decentralization or centralization of the production system differed.

2 ND CASE STUDY	INDIVIDUAL	GLOBAL
Systems	Individual energy retrofitting + individual air-source heat pumps	Global energy retrofitting + district heating with centralized air-source heat pumps
MWh _{ef}	150	116
MWh _{ep}	478	369
Tonnes CO ₂	273	210
Cout global (CHF)	1'779'649	1'026'993

In the second case study, energy production systems are different. Centralized geothermal heat pumps are used in global, which is not possible in individual approach

WHAT ABOUT PEOPLE AND THEIR DECISION?

