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Effects of the Spanish solar thermal obligation on demand, products and value chain

4th European Solar Thermal Energy Conference

Munich, 25th of May 2009

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Agenda

- eclareon profile
- Spanish Technical Building Code (CTE): an overview
- Effects on demand
- Effects on the value chain
- Effects on products
- Main lessons for future solar obligations
- Conclusions

eclareon is an international management consulting firm with a 100% focus on the booming renewable energy & energy efficiency sectors

Photovoltaics

Solar Thermal

Solar Thermoelectric

Wind

Geothermal

Bio-energy

Energy efficiency

Customer groups

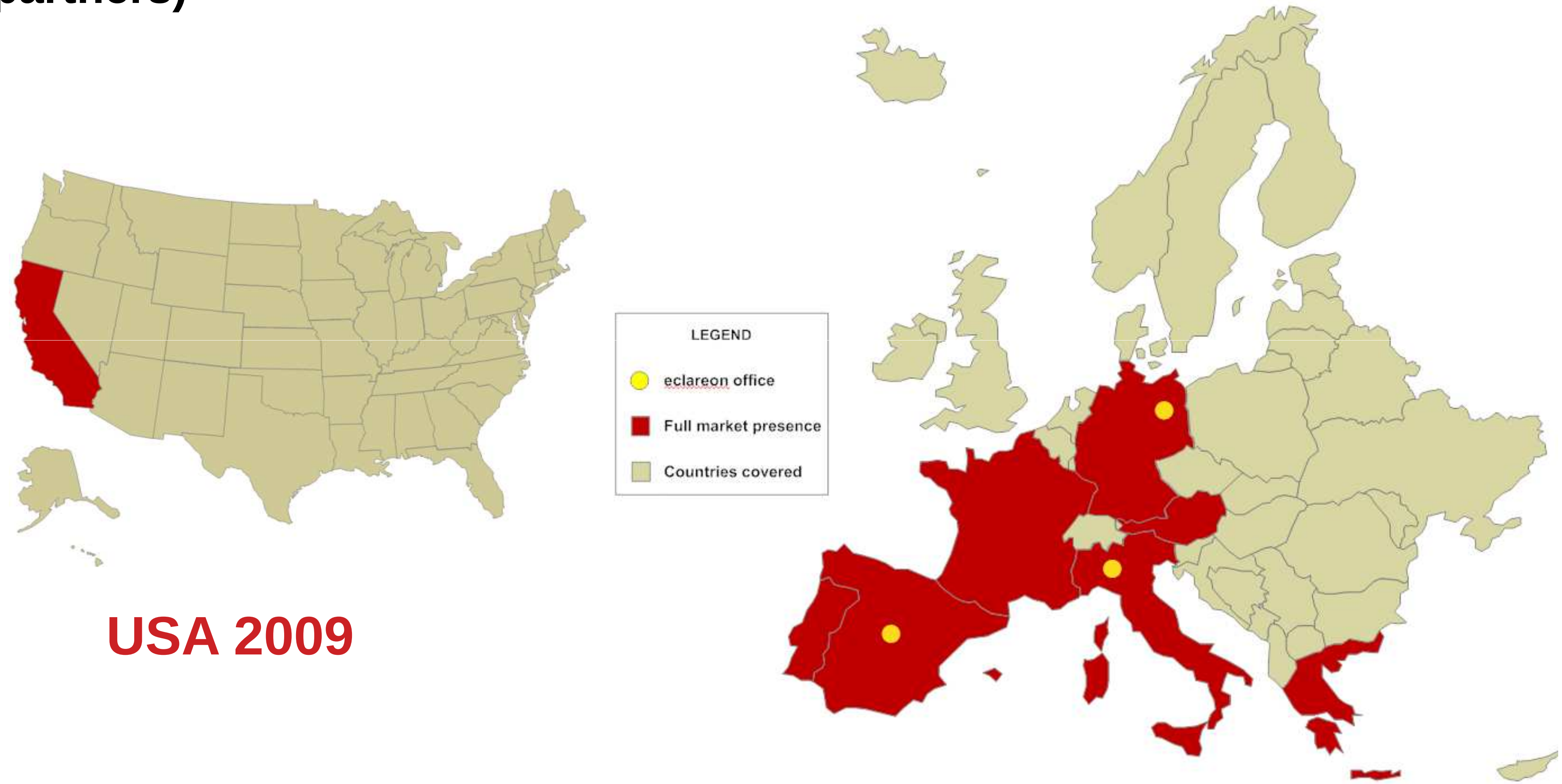
- Manufacturers
- Wholesalers & system integrators
- Project developers & installers
- Private equity firms & banks
- National ministries
- National energy agencies
- Industry associations
- Utilities

Built on experiences gathered in over 200 consulting projects completed, there are four main areas of practice

Key business areas of eclareon

Strategy consulting	Policy consulting	Mergers & acquisitions	Market intelligence
• Foreign market entry	• Policy analysis & design	• Coordination of M&A processes	• Sector studies & publications
• Commercial strategy	• Evaluation of legal frameworks	• Target screening & partner search	• Organisation of industry events
• New ventures & business planning	• International know-how exchange	• Company valuations	• Internet portals & databases
• Product development	• Elaboration & management of EU policy projects	• Commercial due diligence	• Customised information services

eclareon has three permanent offices in Berlin, Madrid and Milan, but covers main markets for renewables in Europe and America (via local partners)



Source: eclareon (2008)

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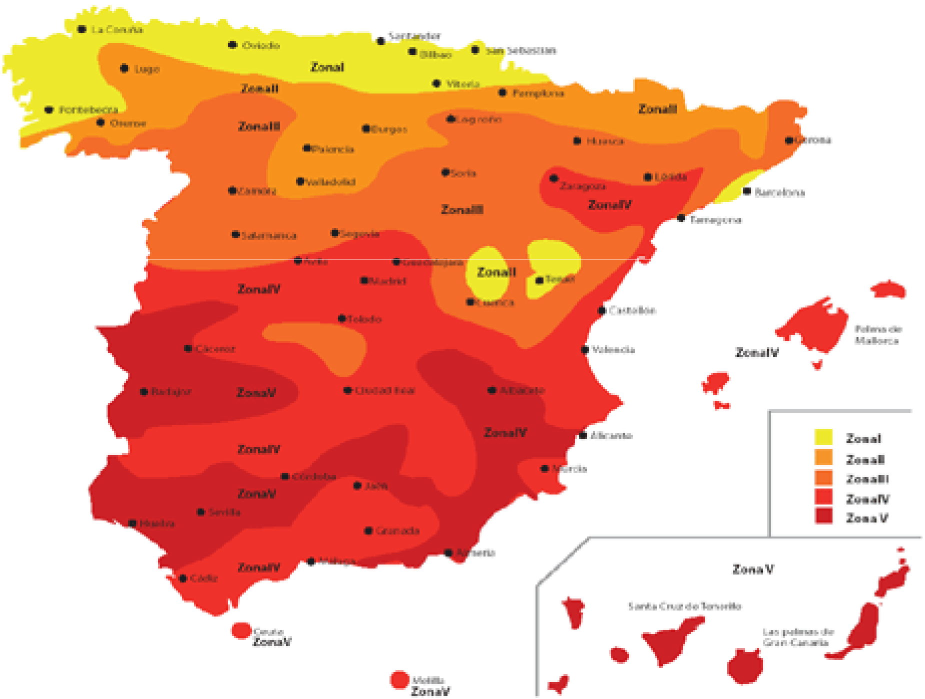
Since September 2006, the new Spanish Technical Building Code (CTE) makes solar thermal energy mandatory for new buildings and buildings undergoing major refurbishments

Spanish climate zones



- The Spanish government adopted a new Technical Building Code (CTE) in March 2006 which includes an obligation (mandatory since September 2006) to cover part of the Domestic Hot Water (DHW) demand with solar thermal energy for new buildings and buildings undergoing major refurbishments

- The solar contribution varies between 30 and 70% of the demand depending on three main factors:
  - DHW demand of the building (l/day)
  - Climate zone
  - Conventional fuel to be replaced (only for refurbishments)

Source: eclareon analysis; CTE; PER

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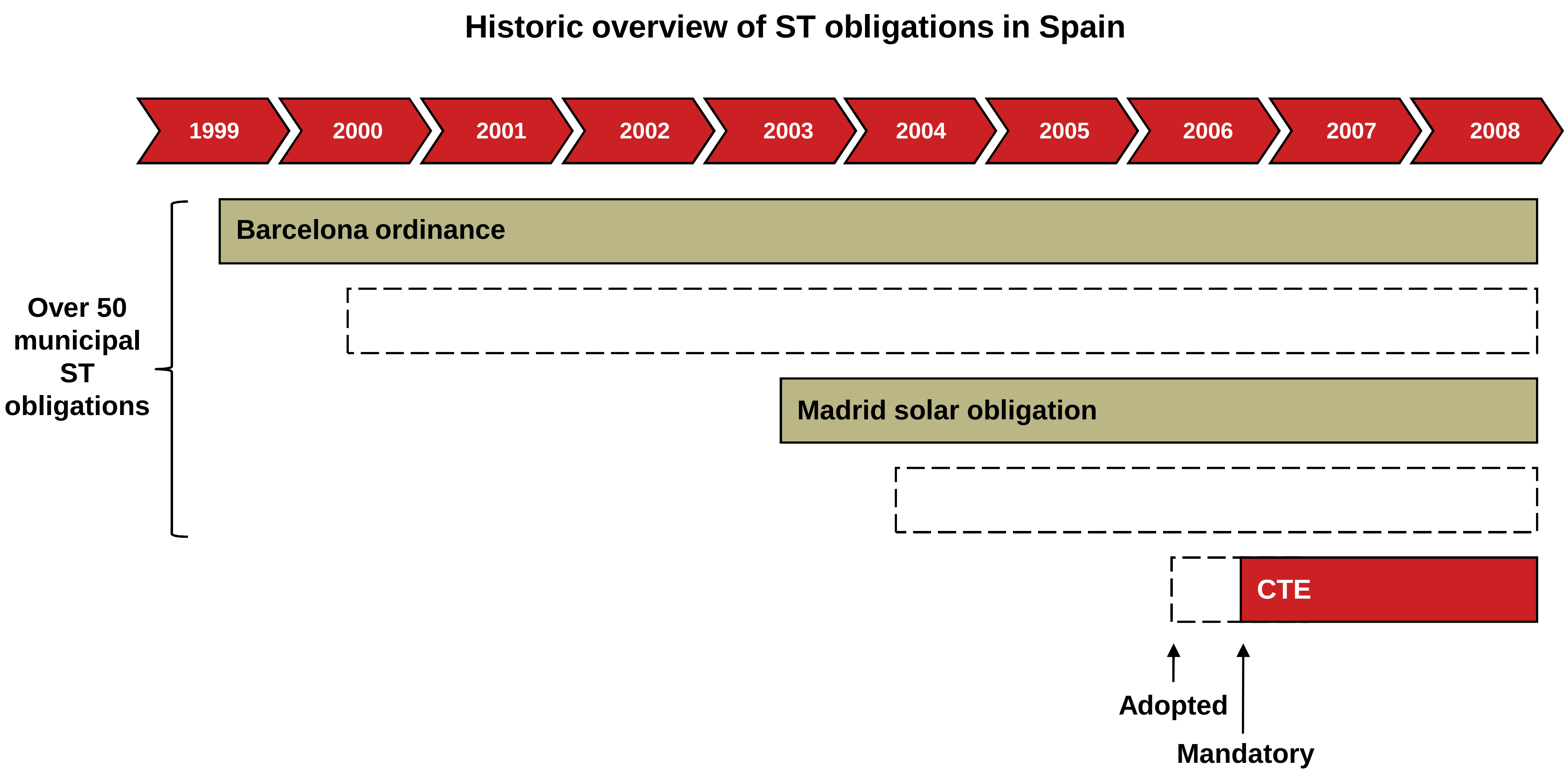
Many Spanish municipalities have created solar obligations before the entry into force of the CTE



Source: ESTIF; CTE; eclareon analysis

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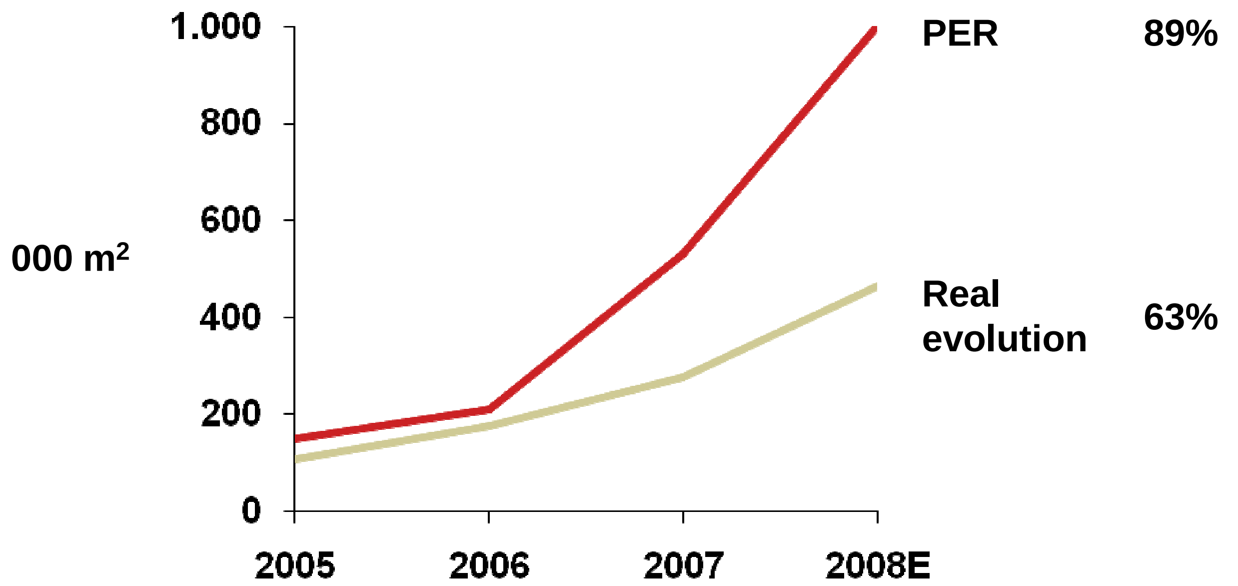
The expected explosion of the Spanish ST market driven by CTE has only taken place partially

Evolution of the Spanish ST market
(Annual installed capacity)

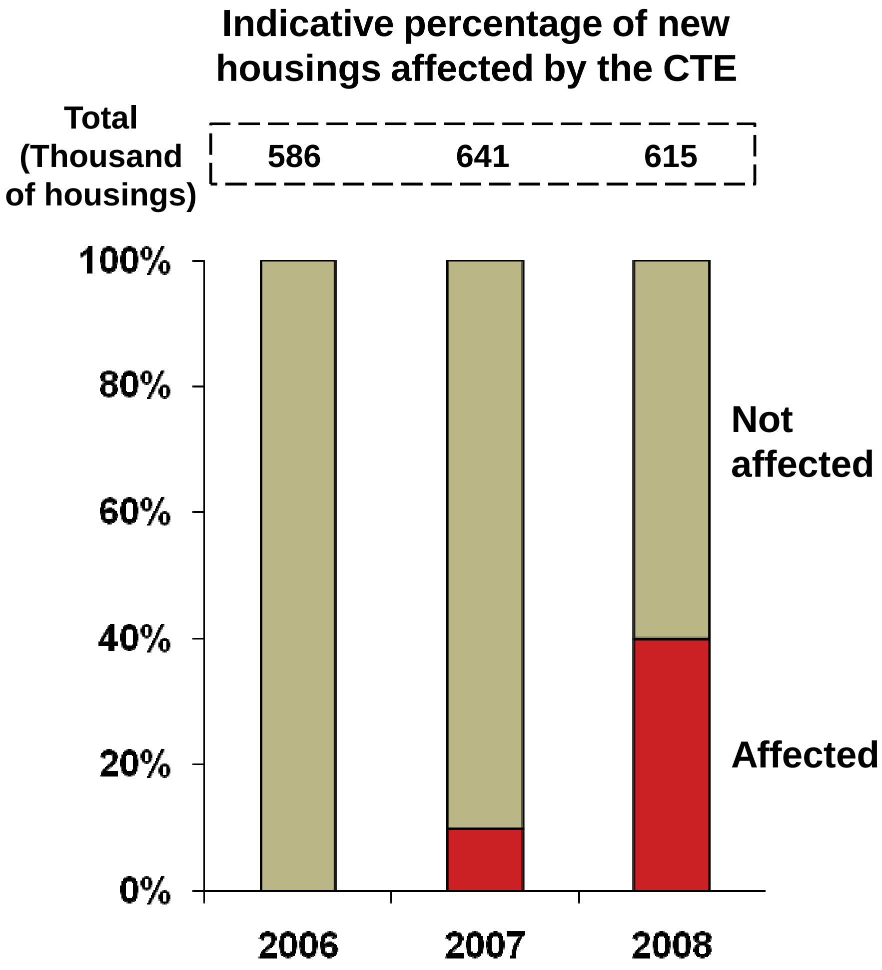


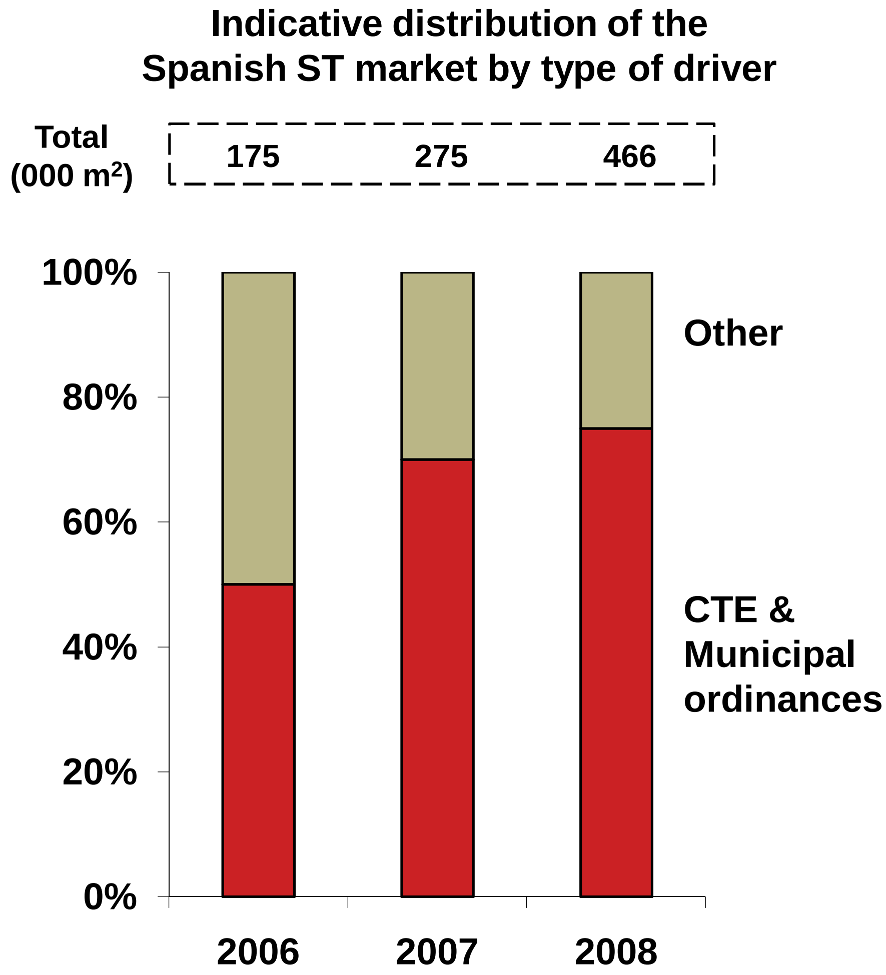
Cumulative installed capacity (000 m^2)	2005	2006	2007	2008E
PER	848	1.059	1.590	2.590
Real	795	970	1.245	1.710

- The Spanish National Plan for Renewable Energies (PER) forecasted the installation of 4.200.000 m^2 during the 2005–2010 period
  - 1.000.000 m2 were estimated to be installed during 2008
  - In total, only 466.000 m^2 were installed in 2008
- The total capacity installed until end of 2008 represented only 66% of the original PER expectations

Source: ASIT, PER 2005 – 10

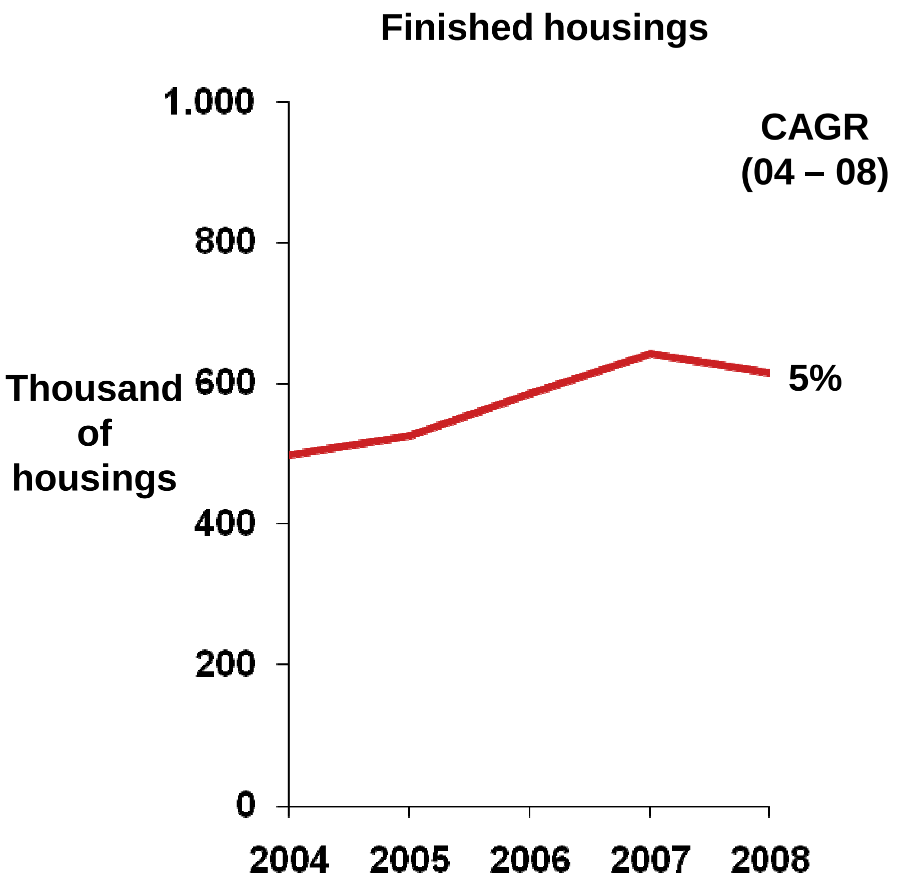
Solar obligations are becoming the key demand driver, which did not affect all housings in 2008

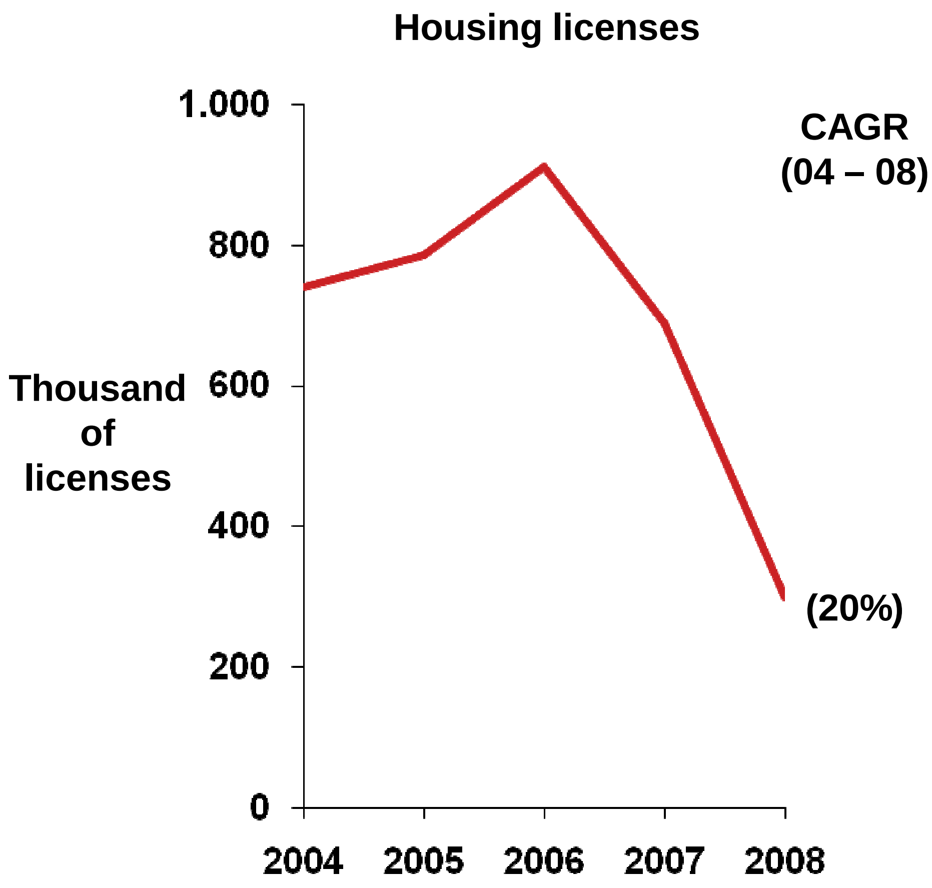




Source: ASIT; INE

However, the growth effect of CTE has been partially offset by the shrinking housing market





Source: eclareon analysis; INE

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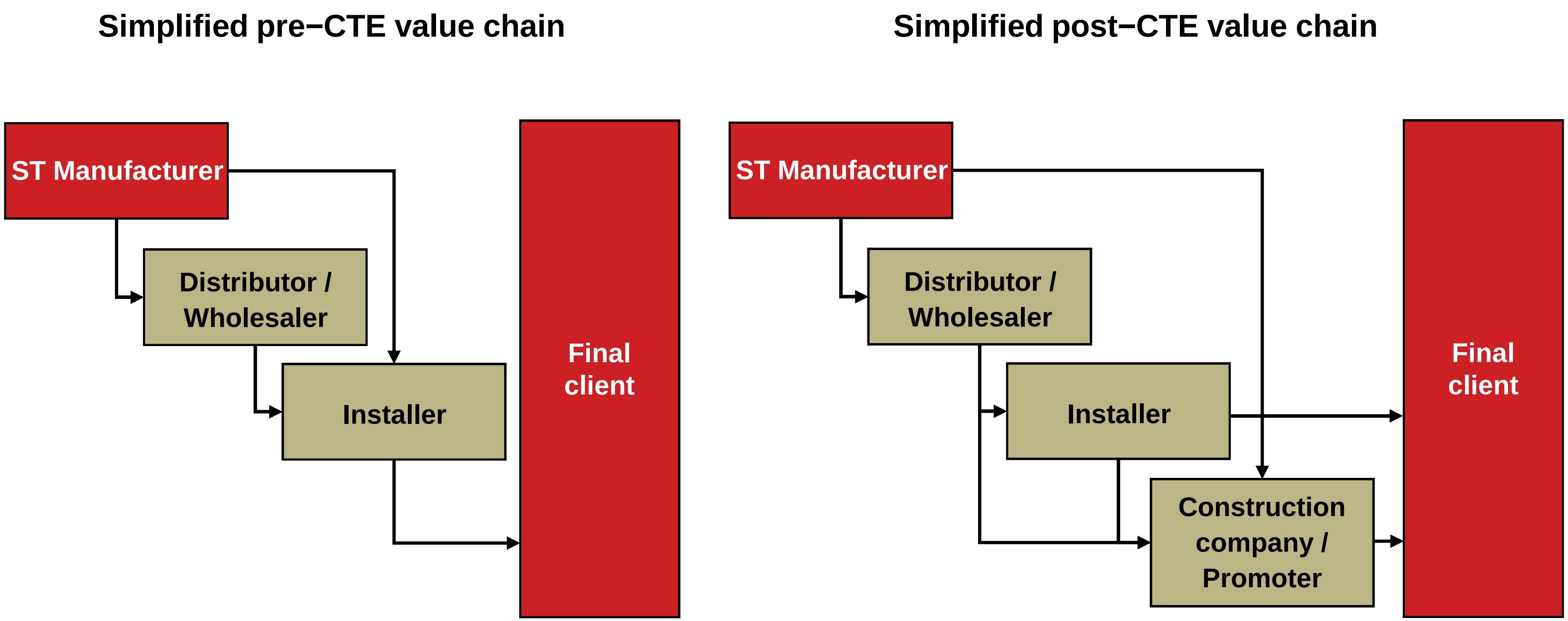
The CTE has provoked the entrance of construction companies into the Spanish ST market



Source: eclareon

This important modification of the value chain will lead to a significative redistribution of the market shares

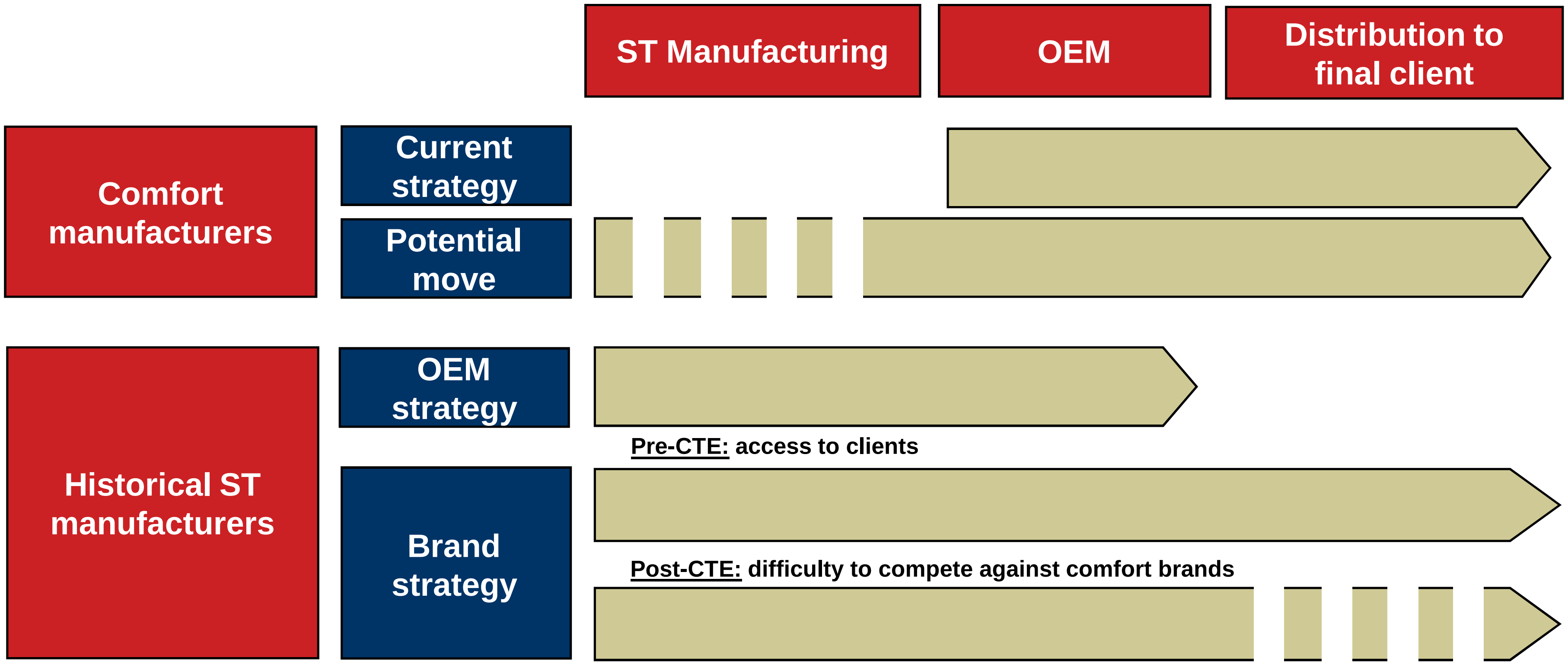
ST Value chain - Market split by final client

	UPSTREAM MARKET	MIDSTREAM MARKET	DOWNSTREAM MARKET	MARKET SPLIT (%) Pre–CTE	Post–CTE
Traditional Value chain	ST MANUFACTURER		LARGE INSTALLER / ST SPECIALIST	65-70	↓
Dominant distributor	ST MANUFACTURER	DISTRIBUTOR	SMALL INSTALLER	25-30	↑
Constructor	ST MANUFACTURER		CONSTRUCTOR	Very small	↑

Source: eclareon interviews and analysis

This new market situation will force historical ST manufacturers to redefine their strategy

Potential movements along the value chain of main ST competitors



Source: interviews and eclareon analysis

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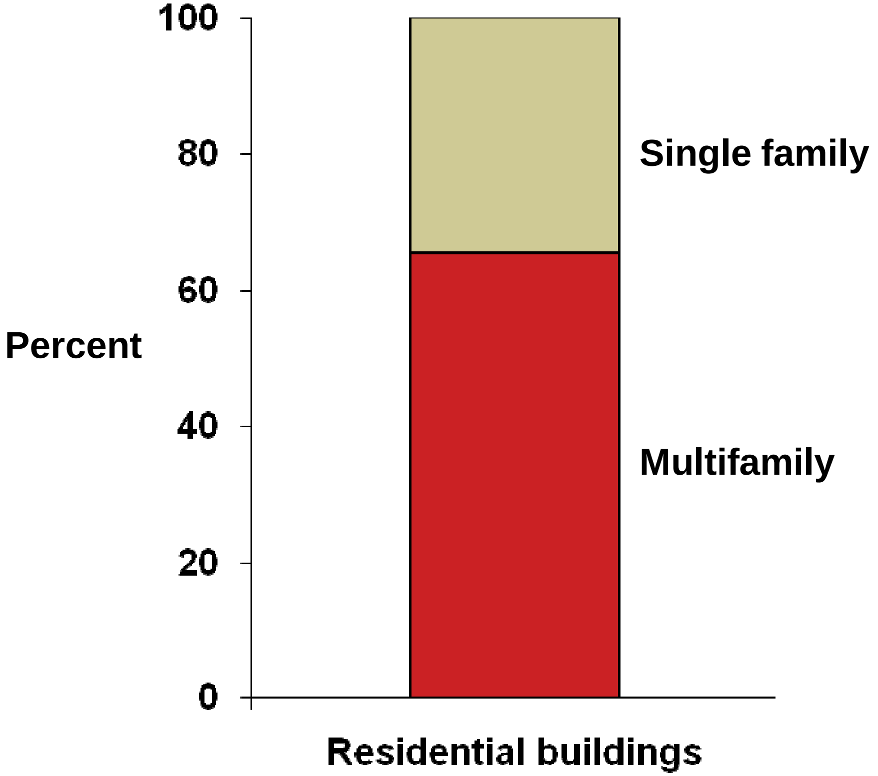
The entry into force of the CTE increases the market share of large installations

Share of existing dwellings by type in Spain



- In Spain, multifamily dwellings are more common than single houses
- CTE makes ST mandatory for new:
  - Hospitals and clinics
  - Hotels
  - Guest houses
  - Campsites
  - Gymnasiums
  - etc…

Large installations share will increase

Source: Ministerio de Fomento

Under a subsidised market, ST kits have been particularly popular. The CTE turns the sale of "flat collectors only" more and more relevant

ST Market by type of final product demanded

	ST Kits	"Collector only"
Target	• Existing households • Ideal for flat roofs (south) • Individual households	• New households • Mainly multi-family blocks • Usually contracted by installer • Other expensive components are acquired separately (deposits)
Weight pre-CTE	• High. Between 50-65% market share • Specially high in the South • Installers ask for the whole kit as they do not know the product	• Lower. Between 35-50% market share • Greater in cities with Solar Ordinances
Weight post-CTE	↓	↑↑

Source: eclareon interviews and analysis, market experts

Due to the boost of the “new households” market and the CTE technical limitations for serial connections, some manufacturers launched a specific “2–meters–4–intakes” collector

Main 4–intakes flat collectors in the Spanish ST market

Brand	Collector name	Size (m^2)
Schüco	SchücoSol S.2	2,7
Viessmann	Vitosol 100	2,5
Sonnenkraft	SK 500N	2,3
Chromagen	CR 12 S8	2,8
Saunier Duval	HR2 02 4V	2,0
Vaillant	auroTherm VKF 890	2,0
Isofoton	Isotherm PLUS	2,0
Wagner	EURO C32 HR	2,0
Ferroli	ECOSOLAR	2,2
Junkers	KKB 1-S	2,3
Termicol	T20 C	1,9

Source: eclareon interviews

- Due to climatic conditions, the CTE specifies strict limitations for serial connections

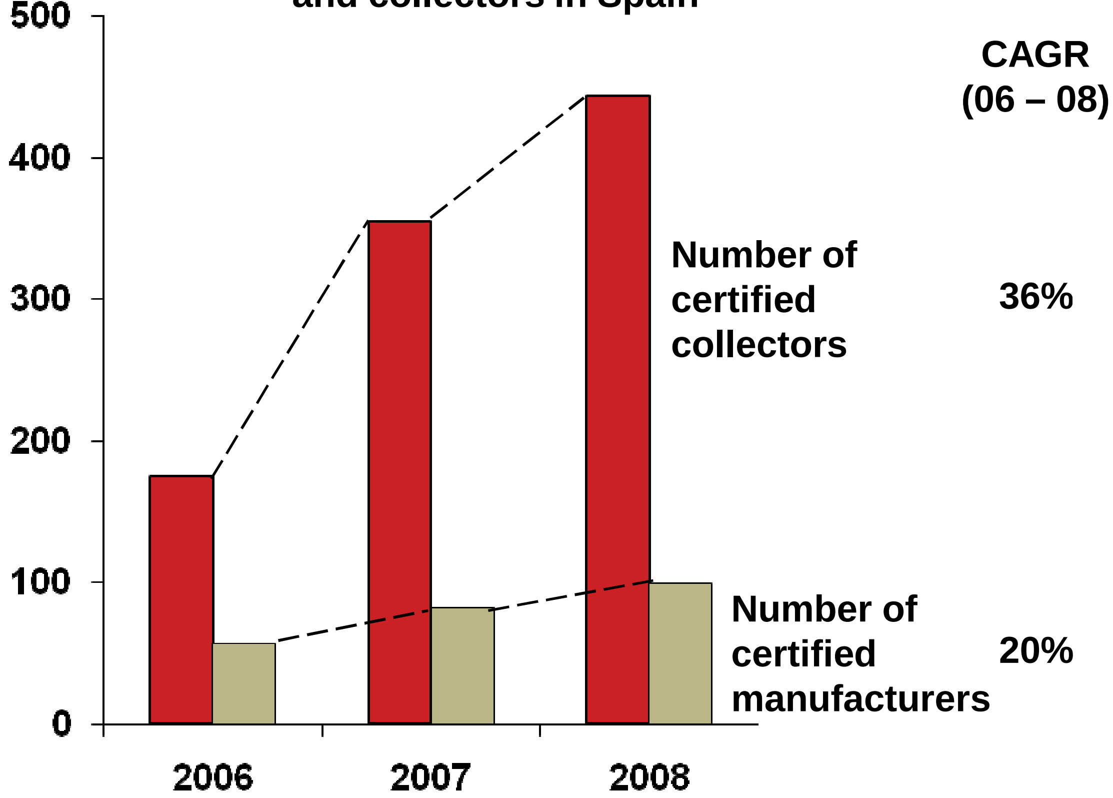
CTE limits for serial connections	
Climate zone	Maximum m^2
I & II	10
III	8
IV & V	6

- According to these limitations, no more than 2 standard-size collectors can be placed with a serial connection in zones IV and V

- Considering 67% of new households constructed in Spain in 2006 were in zones IV and V, the need for specific products indicated for parallel connections is key

The increase of competition, higher bargaining power and a less−than−expected market growth led to a significant price pressure

Evolution of certified manufacturers and collectors in Spain



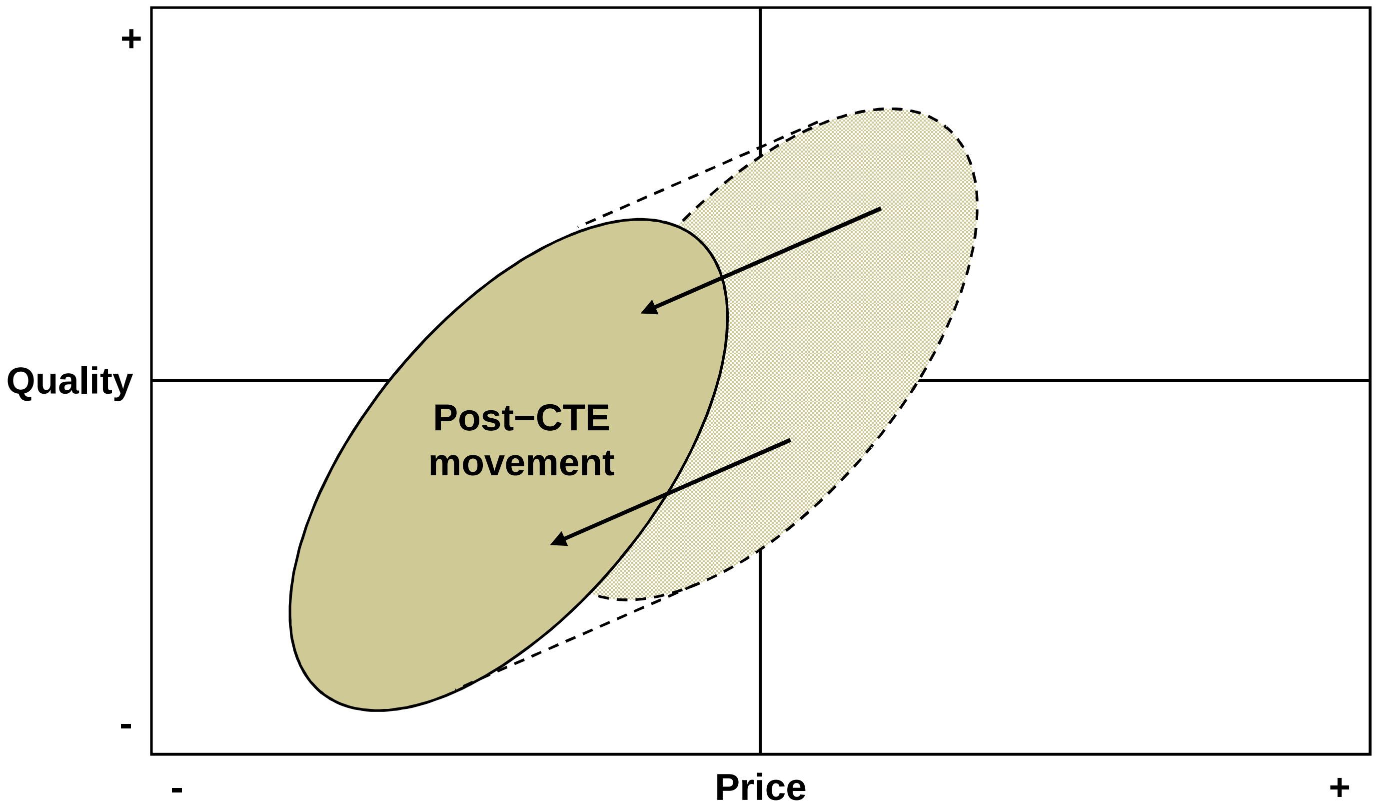
- A great number of players arrived to the ST market attracted by high growth expectations
- Market size turned out being smaller than expected
- New players (big distributors, constructing companies) have a higher bargaining power than traditional players (small and medium installers)

Significant price reduction

Source: ASIT; eclareon analysis; eclareon investigation

The entry into force of the CTE unleashed a movement towards the lower left corner of the price−quality matrix (decrease of price and quality)

Post CTE price/quality positioning (indicative diagram)



Source: eclareon analysis

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There are 4 potential ways to skip CTE compliance

Description of potential WAYS to skip CTE compliance

Absence of the STS on the project	Wrong dimensioning	Badly executed installation	Poor performance of the STS
• The project designer does not include the Solar Thermal System into the project • The Official Professional Body of Architects confers the license without the STS	• The project designer dimensions wrongly the STS	• The actually installed system does not comply the project specifications	• The STS does not fulfill the solar contribution required by the CTE due to system flaws • An inadequate maintenance can also lead to a poor performance of the STS

Source: eclareon interviews; eclareon analysis

The non fulfillment of these obligations can be motivated by 3 main reasons

Description of potential REASONS to skip CTE compliance

Legal vacuum

- If law does not clearly require the players involved to install a STS successfully, nobody will do so

Lack of control

- The law must create an official control system in order to check that the obligation previously set by law is met

Attractiveness of non- fulfillment

- Even if the law creates both a clear obligation and a control system, players could be attracted to skip compliance
- The stronger the reasons for this are, the higher the risk of not compliance (e.q. better profitability, lack of training, …)

Source: eclareon interviews; eclareon analysis

Non-fulfillment of CTE's obligations will probably be caused mainly by bad project executions and poor performance of STS

Risk analysis of the ST installation process

	Absence of the STS on the project	Wrong dimensioning	Badly executed installation	Poor performance of the STS
Legal vacuum	No risk	No risk	No risk	Small risk
Lack of control	No risk	High risk	Risk	Risk
Attractiveness of non-fulfillment	No risk	Small risk	Risk	Risk

Source: eclareon analysis

Examples of non-fulfillment of CTE are bad installation due to cost reduction and bad performance due to lack of maintenance

Main examples of not compliance

	Absence of the STS on the project	Wrong dimensioning	Badly executed installation	Poor performance of the STS
Legal vacuum	None	None	None	Small
Lack of control	None	Nobody controls the dimensioning of the STS	Actual controls don't focus on the execution	Nobody controls the performance of the STS
Attractiveness of non-fulfillment	None	Low, mainly due to lack of training	Cost reduction could lead to bad execution	Absence of knowledge of users

Source: eclareon analysis

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Conclusions

- **The expected explosion of the Spanish ST market due to the entry into force of the CTE has only taken place partially, mainly due to the slowdown in the Spanish construction market**
  - **The fulfillment of regulation has replaced the reduction of energy consumption and environmental awareness as the main buying motivation**

- **ST is not a specialist product anymore: the arrival of construction companies and big distributors has caused a significant modification of the value chain and has forced historical ST firms to redefine their strategy**

- **A greater focus on collective STS and a decrease of price and quality are the main effects CTE had on products**

- **The lack of effective controls represents CTE's main flaw. Existing controls do not guarantee:**
  - **That the solar thermal system is actually installed**
  - **That the STS complies the CTE's technical requirements**
  - **That the STS works properly**

- **Final user has not the knowledge nor the means needed to control STS's performance**

Source: eclareon