



SO-PRO



Solar Process Heat in Spain Best practices

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International Training Seminar Solar Process Heat

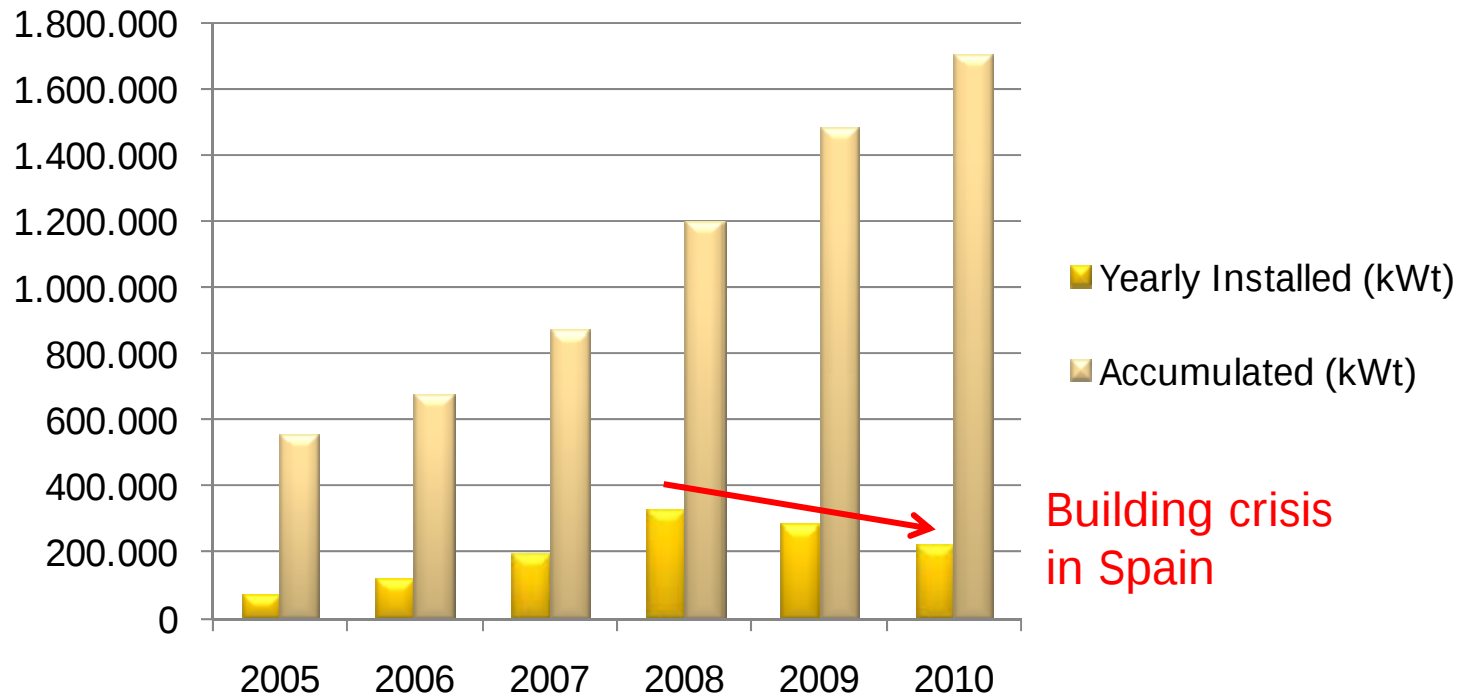
9 June 2011, Munich, Official Side-Event of  **inter solar**
connecting solar business | EUROPE



Solar Process Heat in Spain Best Practices

Situation

Solar Thermal Development during last 6 years, in kWt





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Situation

National Action Plan for RES 2011-2020



Main pillars for the development of solar energy in Spain in the next ten years:

- solar thermal energy for building sector, following the current regulation:
 - obligation of solar thermal for hot sanitary water in new buildings and solar PV in some circumstances
 - solar heating and cooling
- **solar thermal energy for industries**
- solar thermoelectric energy



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Situation

Potential of solar process heat in Spain

Study developed in 2010



Technical potential
(without economic
considerations)
59,9 TWh heat
97,4 million m2



Economic potential
(with support)
8,9 TWh heat
14,4 million m2

Solar Process Heat in Spain

Best Practices

Projects

Project 1

- Name: Solar thermal installation for Truck cistern vessels washing
- Place: Villamuriel de Cerrato (Palencia)
- System: 72 solar collectors of 1,94 m² (140 m²) and two 5.000 l accumulators (10.000 l).
- Brief description: the system is part of a new washing system, constituted by a 2 ways truck vessels washing.

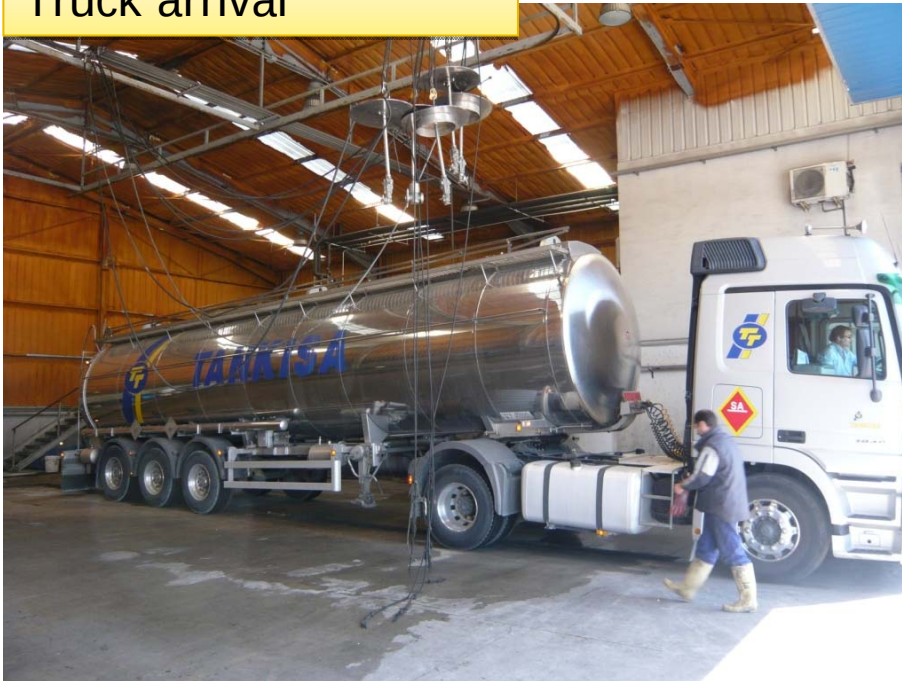


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Projects

Project 1

Truck arrival



The cleaning system

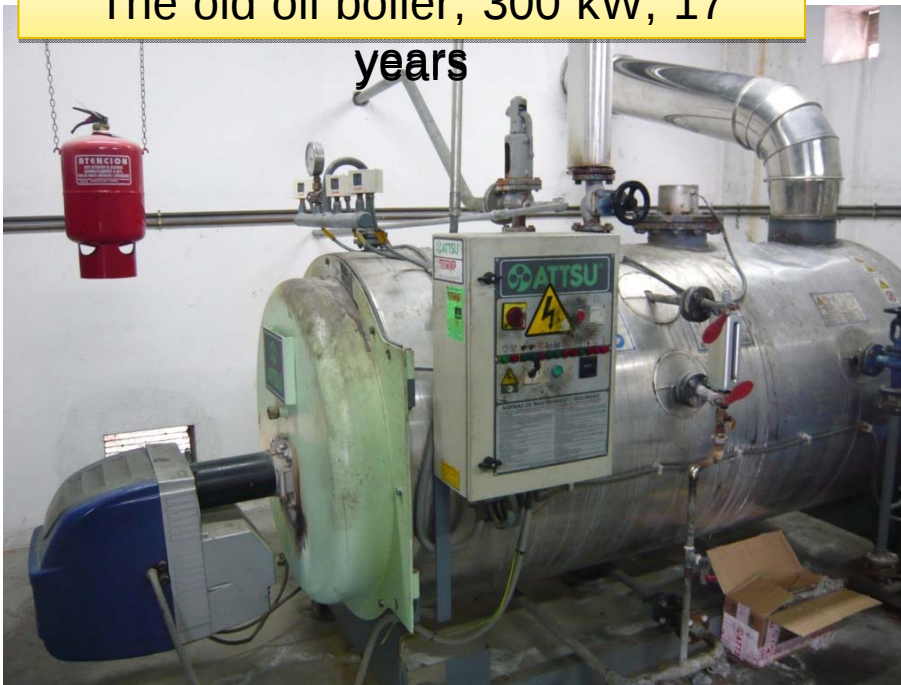


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Projects

Project 1

The old oil boiler, 300 kW, 17
years



Conventional accumulation



Solar Process Heat in Spain Best Practices

Projects

Project 1

Collectors field, 72u, 140m²



Accumulation 2 x 5.000 l



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Project 1

Circulation pumps and exchanger



Primary circuit:

Flow: 4.190 l/h

Load losses: 9,05 m.w.c.

Pump: GRUNDFOS UPS 40-180 F

Secondary circuit:

Flow: 4.190 l/h

Load losses: 4,0 m.c.a.

Pump: GRUNDFOS UPS 32-60F

Heat exchanger:

83,8 kW (600 W/m²)

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Projects

Project 1



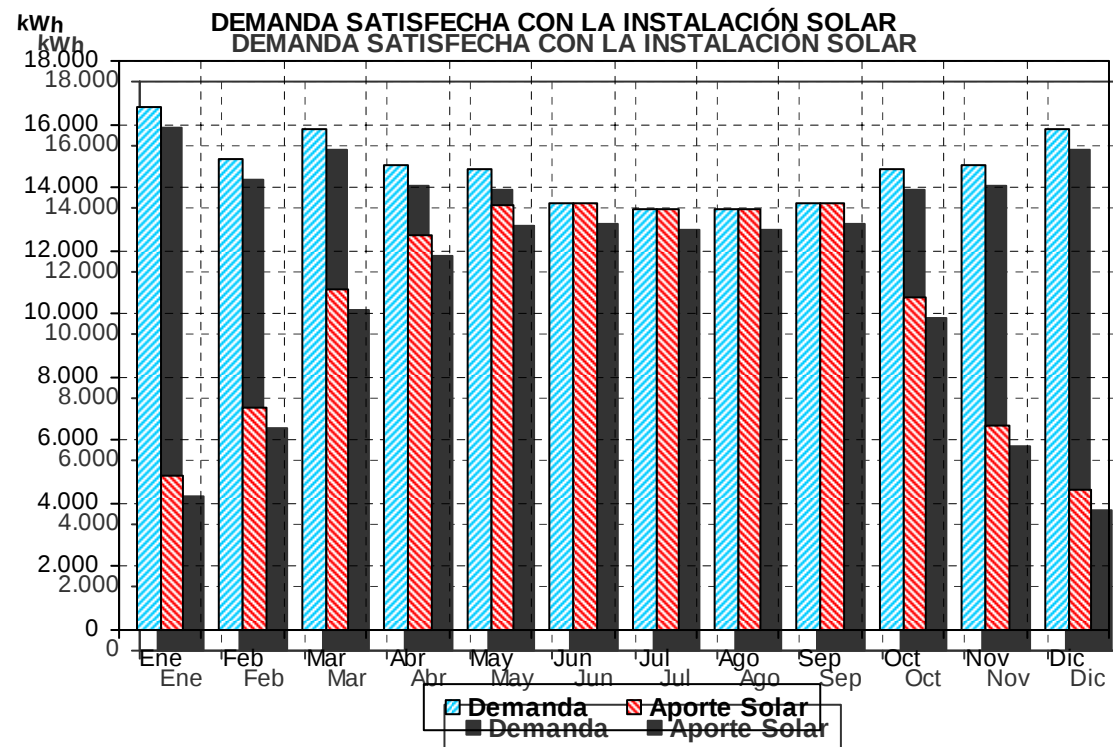
Steam comes out after cleaning



Solar Process Heat in Spain Best Practices

Projects

Project 1





Solar Process Heat in Spain Best Practices

Projects

Project 1

Investment	Subsidy	Final Cost
85.374 €	34.150 €	51.224 €

Savings	Pay-back
7.161 €/year	7 years

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Project 2



- Name: Solar thermal installation for iberic products (ham and pig products)
- Place: Jerez de los Caballeros
- System: 120 solar collectors of 2,03 m² (252 m²) and two 15.000 l accumulators (total 30.000 l).
- Brief description: the system provides heat to hot water for cleaning and washing: floors, plastic trays, food.



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Projects

Project 2

The old oil boiler, 1080 kW, 14 years



Burner detail



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Projects

Project 2

Collectors field, 72u, 140m²



Accumulation 2 x 15.000 l



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Projects

Project 2

Collectors field details



Solar Process Heat in Spain Best Practices

Projects

Project 2

Collectors field details



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Projects

Project 2

Collectors field details



Solar Process Heat in Spain Best Practices

Projects

Project 2

Collectors field details



Solar Process Heat in Spain Best Practices

Projects

Project 2

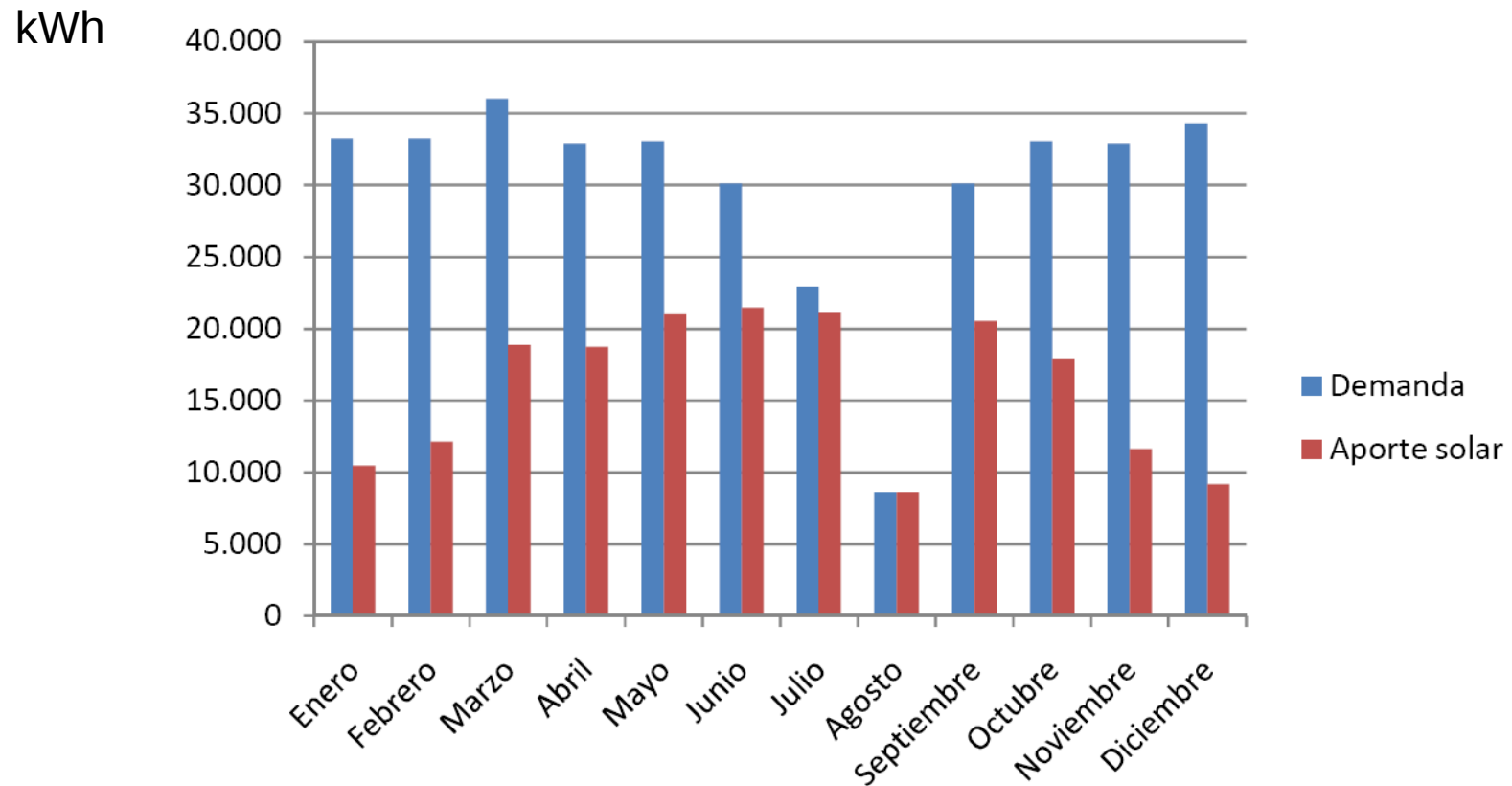
3 ways-valve and exchanger



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Projects

Project 2





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Projects

Project 2

Investment	Subsidy	Final Cost
175.000 €	61.250 €	113.750 €

Savings	Pay-back
13.760 €/year	8,3 years

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Projects

Project 3

- Name: Solar thermal installation for car industry
- Place: Valladolid
- System: 120 solar collectors of 2,03 m² (244 m²) and three 5.000 l accumulators (total 15.000 l).
- Brief description: the system provides heat to the painting process



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Projects

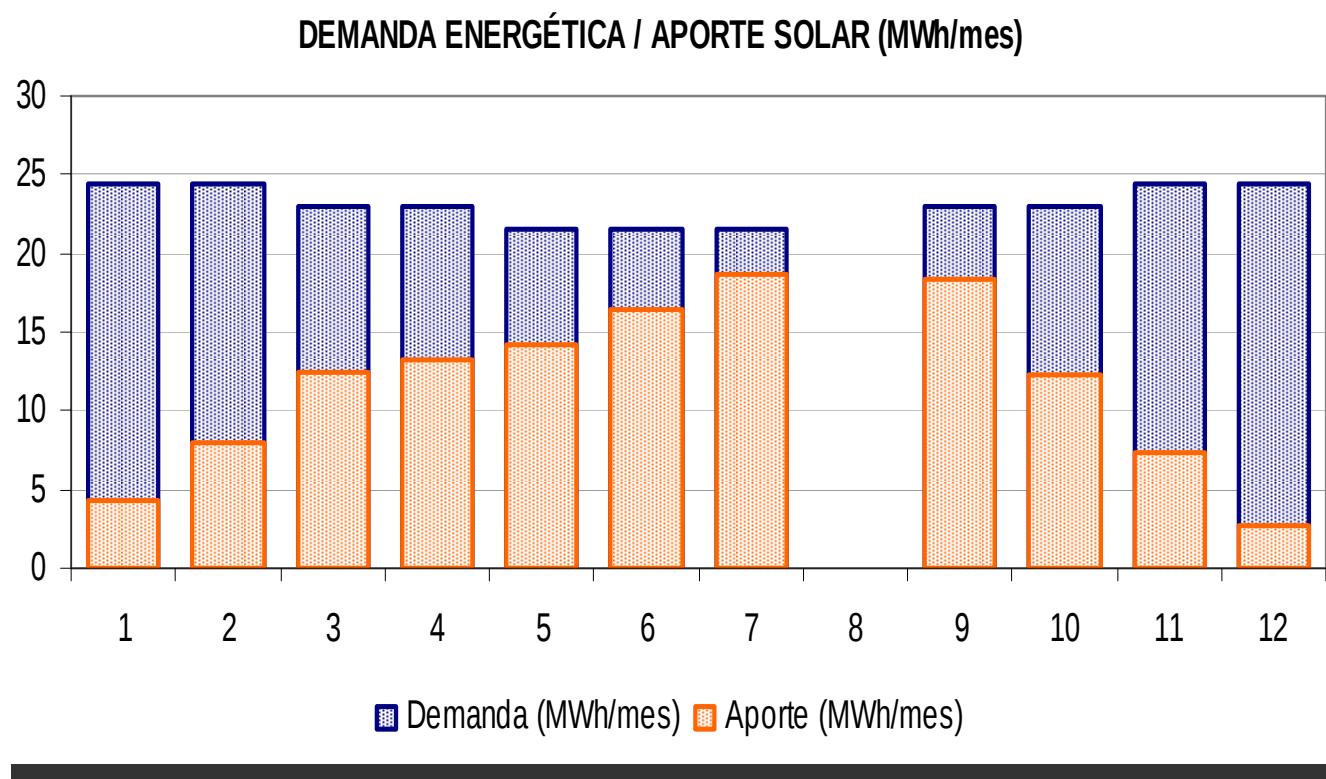
Project 3



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Projects

Project 3





Solar Process Heat in Spain Best Practices

Projects

Project 3

Investment	Subsidy	Final Cost
147.577 €	45.076 €	102.501 €

Savings	Pay-back
9.200 €/year	11 years

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Projects

Project 4

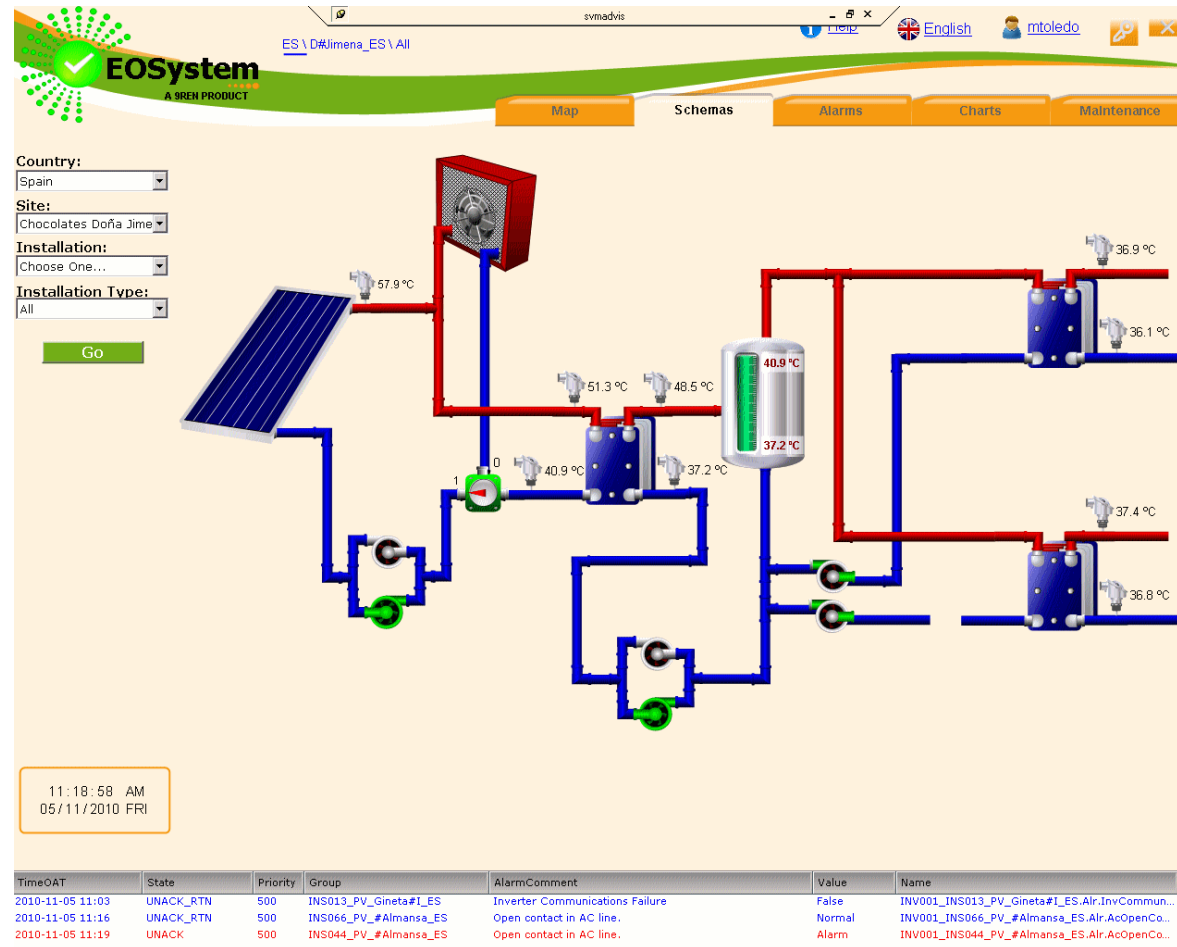
- Name: Solar thermal installation for food industry (chocolate)
- Place: Alcaudete (Jaén)
- System: 132 solar collectors of 2,01 m² (265 m²) and one 15.000 l accumulator.
- Brief description: the system provides heat to the raw material preparation and for the cleaning process



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Projects

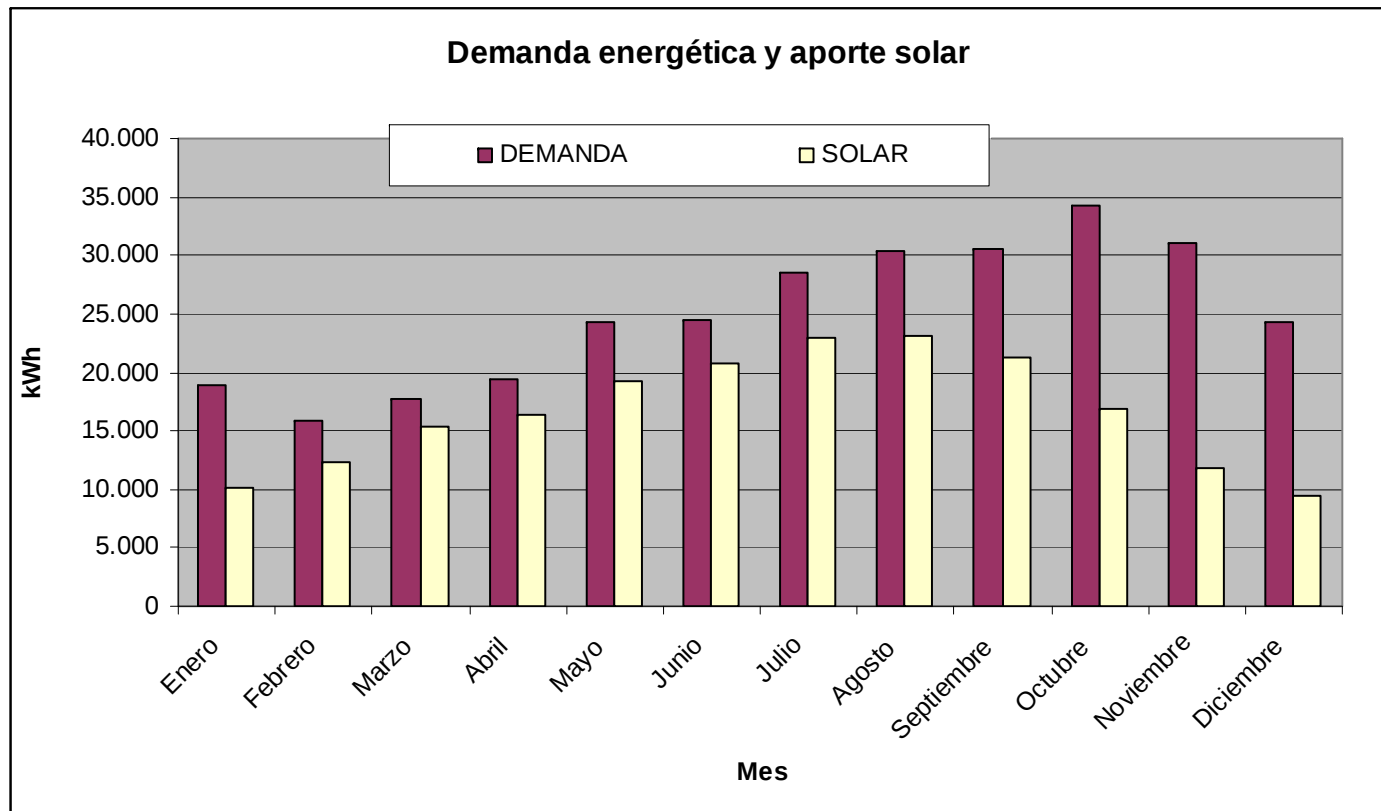
Project 4



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Projects

Project 4





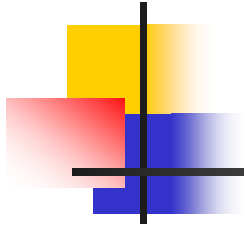
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Projects

Project 4

Investment	Subsidy	Final Cost
180.000 €	70.000 €	110.000 €

Savings	Pay-back
14.000 €/year	8 years



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THANK YOU !

You are welcomed to ask any question on Spanish situation:

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