

Biomass and solar thermal ESCOs development in Italy

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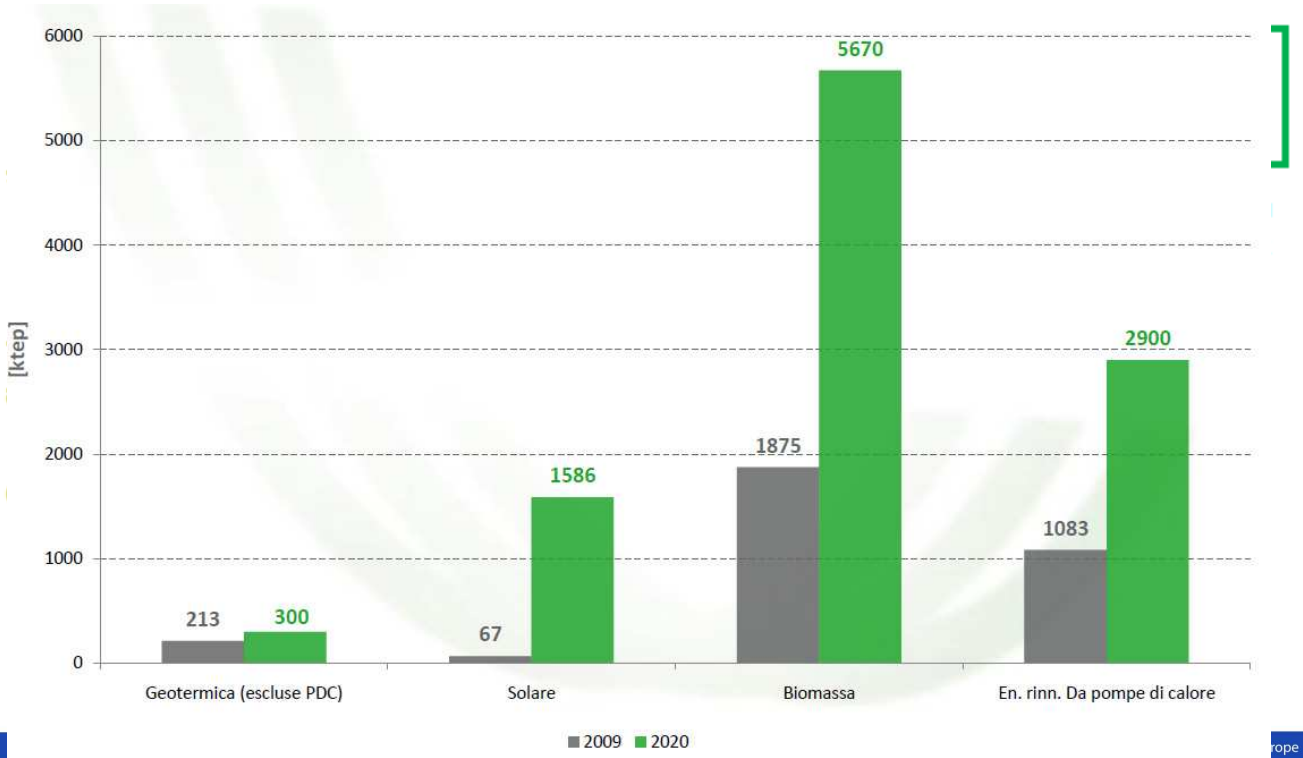
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SUMMARY

- Renewable heating in Italy: state of art and targets
- Support measures
- ESCO development in Italy
- Technical and non-technical barriers for RE and ESCOs
- Case study of biomass heating for dairy firm
- Case study of solar thermal plant for residential sector



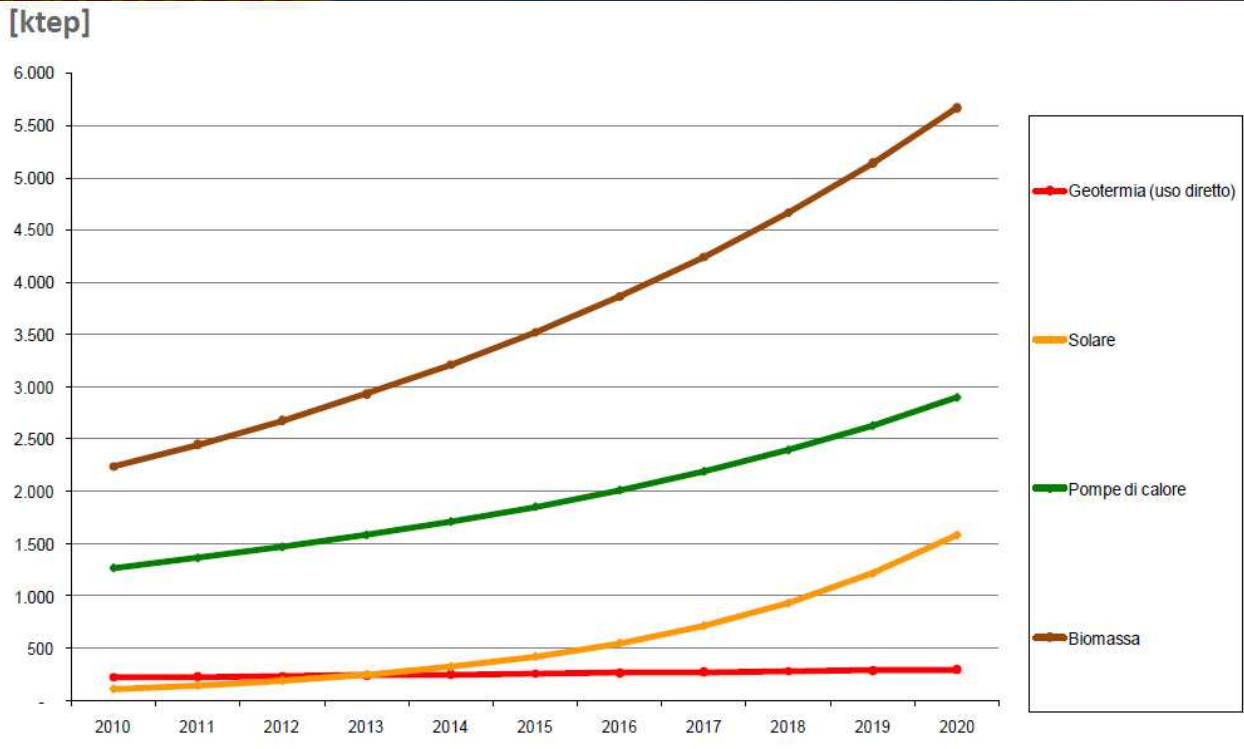
Renewable heating in Italy



rope



Renewable thermal energy - National Action Plan targets





Solar thermal in Italy

- Small scale plants (domestic applications)
- National producers cover about 35 % of domestic market (was 20% in 2006)
- Low diffusion large plants (ESCO approach)
- About 4 M m² solar panels installed by 2010
- NAP target of 8 M m²; ASSOLTERM target 20 M m² by 2020
- Big potential in agroindustrial sector (15 M m²)



Biomass heating in Italy

- 24 Mt/yr wood for energy (90% for heating); 2.5 billion Eur/yr
- 20% of residential heating covered by wood stoves
- Old and unefficient heating systems; (biomass quality)
- Poor know how about proper installation and dimensioning
- New boilers: high efficiency (96%) - low air emissions (PM 2.5 4 mg/Nm³)
- 1 million pellet stoves (< 15 kW) 10% of EU pellet market (750 kt/yr production + 250 kt/yr import)
- Development of wood fired district heating systems in Northern Italy (400 MWt – 200 plants – 750 km pipeline – 450 kt/yr local forestry woodchips)
- Decentralized generation by small scale ORC very promising (size 500 kWe-2 MWe)

PREVIOUS

- 55% tax exemption for energy savings in buildings and renewable heating (expiring end 2011)
- White certificates mechanism for energy efficiency and renewable heating
- Tax exemption for district heating and reduced VAT
- Capital grants for renewable plants (biomas boilers, solar panels)

RECENT

- Legislative decree 28/2001 (incentives for thermal renewables) including revision of white certificates mechanism
- Legislative decree 115/2008 (energy service contracts)

- 1) **Mandatory use of renewables in new buildings and main refurbishment (art. 11)**
- 2) Simplified authorizative procedures for renewable heating in buildings
- 3) **Feed in fariff for small scale renewable thermal energy and for small scale energy efficiency measures (art. 28)**
- 4) **Revision of white certificates mechanism (extended timeline) (art. 29)**
- 5) Incentives for bio-methane fed into gas network (art. 21)
- 6) **Special fund for new district heating networks (art.22)**
- 7) **Special fund for technological and industrial development including rational use of energy (art.32)**

- About 100-150 ESCO in Italy (no registry for detailed data)
- 90% of ESCOs small enterprises (often manufacturers)
- 9 ESCOs dominate the market (linked to the facility management sector)
- 3 main associations (AGESI, ASSOESCO and FEDERESCO)
- Sectors: industry, residential and tertiary buildings, street lighting, co-generation, renewable energy generation
- Dlg 115/2008: introduces energy service contracts (diffused in public sector and healthcare)
- Biomass ESCOs present in Northern Italy (district heating)
- Solar thermal Escos still at infancy

- Heating measurement
- Technologies reliability (mostly for CHP plants and biomass plants)
- Air emission levels (biomass)
- Know-how about installation and plants dimensioning (biomass-solar integration)
- Storage-logistics and biomass supply and handling (mainly in urban areas and where space is a constraint)

- Supporting measures reliability
- Difficult public procurement rules and authorization
- Financing issues (specific financial products for biomass)

BIOMASS SPECIFIC

- Biomass markets reliability and quality standards
- Social acceptability (biomass) and authorizative issues
- VAT for wood chips (20%)
- Competing use of biomass for electricity (high incentives available for electricity)

SOLAR SPECIFIC

- Small size of projects and high transaction costs
- Development of PV (feed in tariff)
- Securing energy demand
- Landscape constraints

Barriers for solar thermal systems

- The extraordinary development of PV sector (feed in tariffs) in Italy limited the diffusion of solar thermal systems
- Solar thermal cooling very promising but still at infancy
- Thermal energy meters installation and costs could be a barrier for small plants (in case of ESCO approach)
- Need to secure energy demand in supply contracts
- Obstacles in urban areas with landscape constraints (still not solved by current

biomass heating plant for industrial application



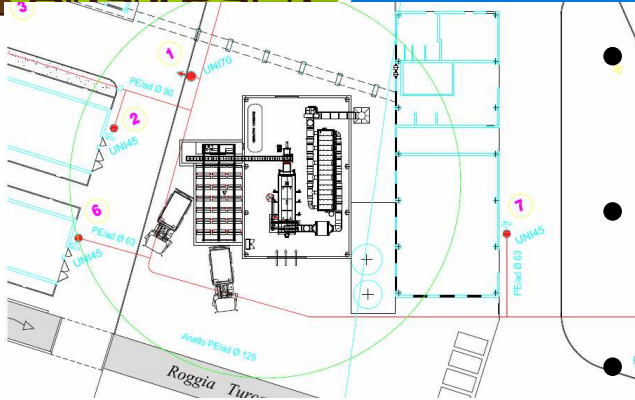
Description of the ESCO operation

Baseline

- Use of steam at 10 bar
- Consumption 8 t/h - 24 hr/day
- 360 days/year
- Use of BTZ fuel (9.700kcal/kg)
- Cost of BTZ fuel 0,4€/kg
- Annual consumption 4.200 t/yr
- Biomass boiler - 5.810 kW size (steam 12 bar)
- Biomass storage tank 500 mc
- Air emissions abatement with scrubbers (dust < 15mg/Nmc)
- Existing boilers used as a back up



Economic parameters



Plant layout

- Investment ESCo 815.835 €
- Investment Client 50.000 €
- Biomass cost 70 €/ton
- Thermal energy selling price 35 €/MWh



Expected benefits for client

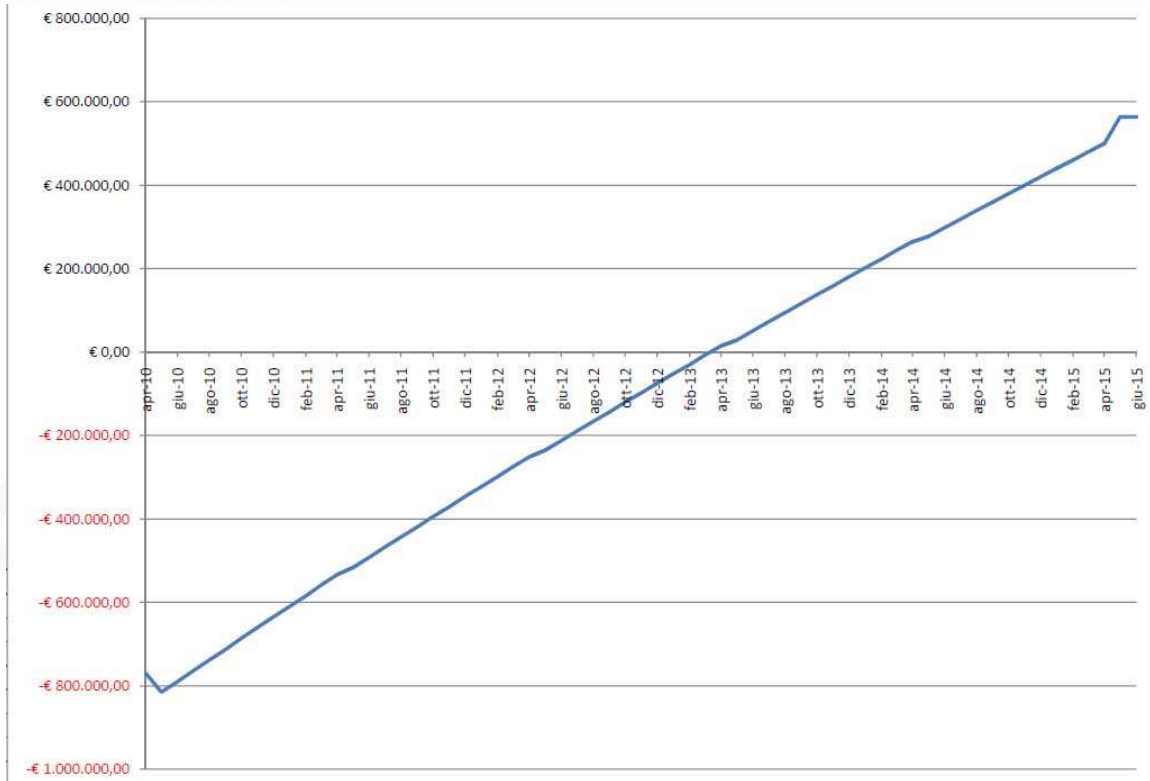
- Annual savings >270.000 €
- Cost after the 5-years contract period 70.000 €
- White certificates earnings (50%) 373.000 €/yr

Benefits for the ESCO

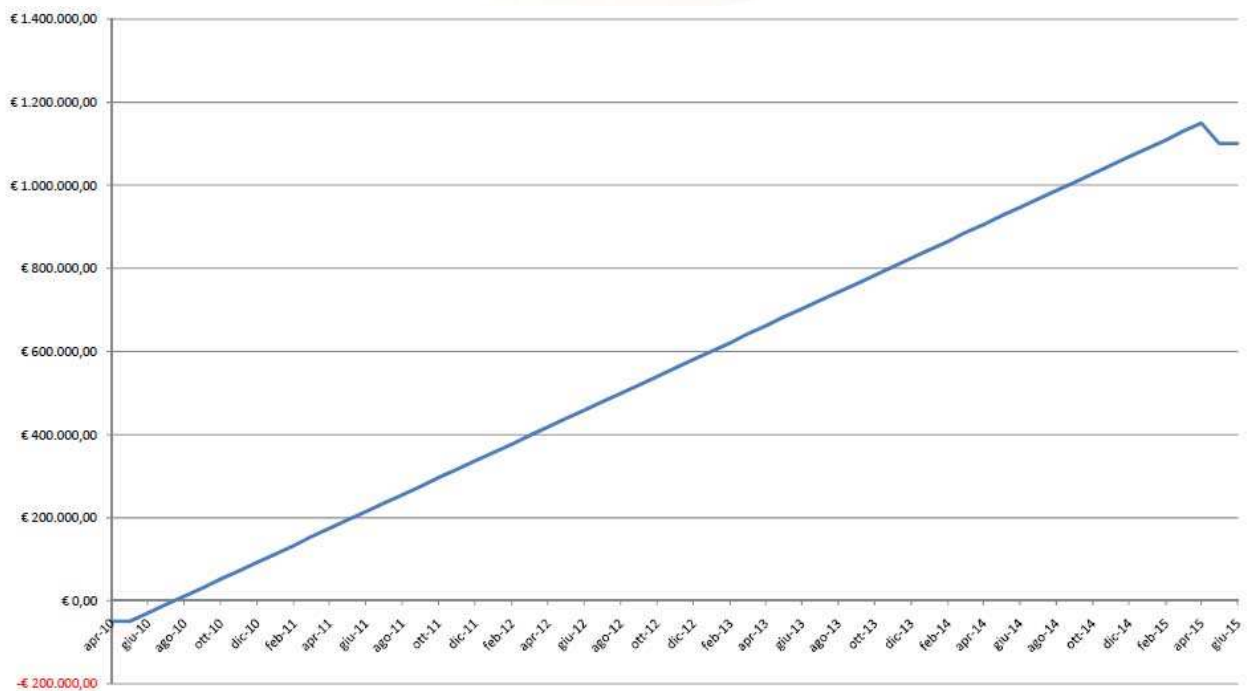
- Annual income from thermal energy sale 1.420.000€
- Annual Biomass purchase cost 1.085.000 €
- Annual O&M costs 23.800 €
- Investment allowance annual cost 163.000 €
- Annual cost of loan 20.000 €
- white certificates (50%) 373.000 €/yr



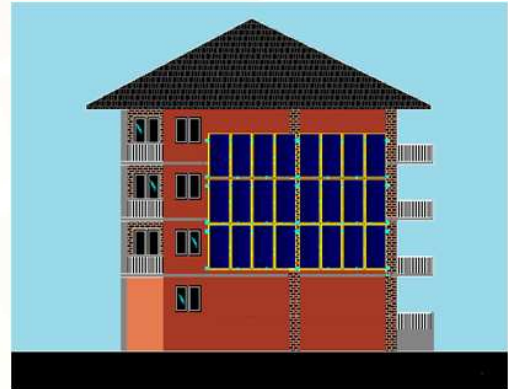
VAN and PBT for ESCO



VAN and PBT for Client



solar heating plant - residential application



Scenario I - hot water

- 8 apartments – 600 m²
- 18 panels – 38.7 m²
- facade installation
- tank 8 x 300 l
- Solar energy: 12.33 MWh/yr
- 8 x 12 kW gas boiler
- Cost of gas 0.75€/ m²
- Saved gas 1520 m³/year

Scenario II hot water + floor heating

- 8 apartments – 600 m²
- 30 panels – 64.5 m²
- facade installation
- tank 8 x 600 l
- Solar energy: 35.52 MWh/yr
- 8 x 12 kW gas boiler
- Cost of gas 0.75€/ m²
- Saved gas 1650 m³/year



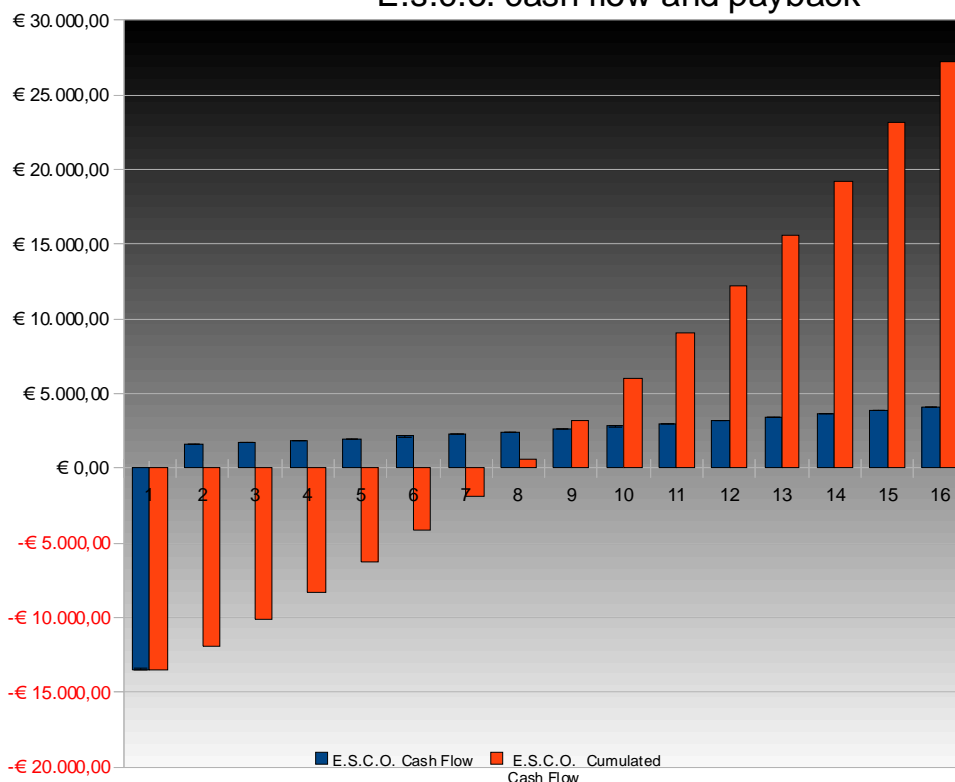
Description of the ESCO operation

- Investment carried out by the ESCO
- Cost of solar thermal plant – case I: 15,850 Eur
- Cost of solar thermal plant – case II: 62,200 Eur included cost of floor heating 120 Eur/m²
- Thermal energy sale price 70 Eur/MWh fixed for 15 yrs



Cash flow for ESCO – case I

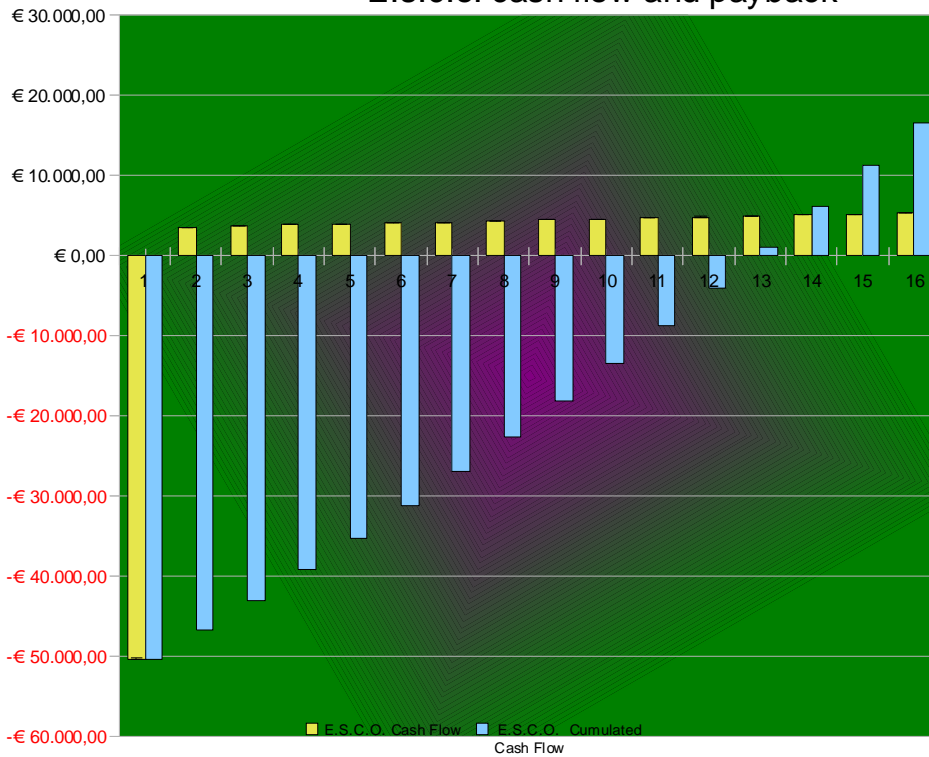
E.s.c.o. cash flow and payback





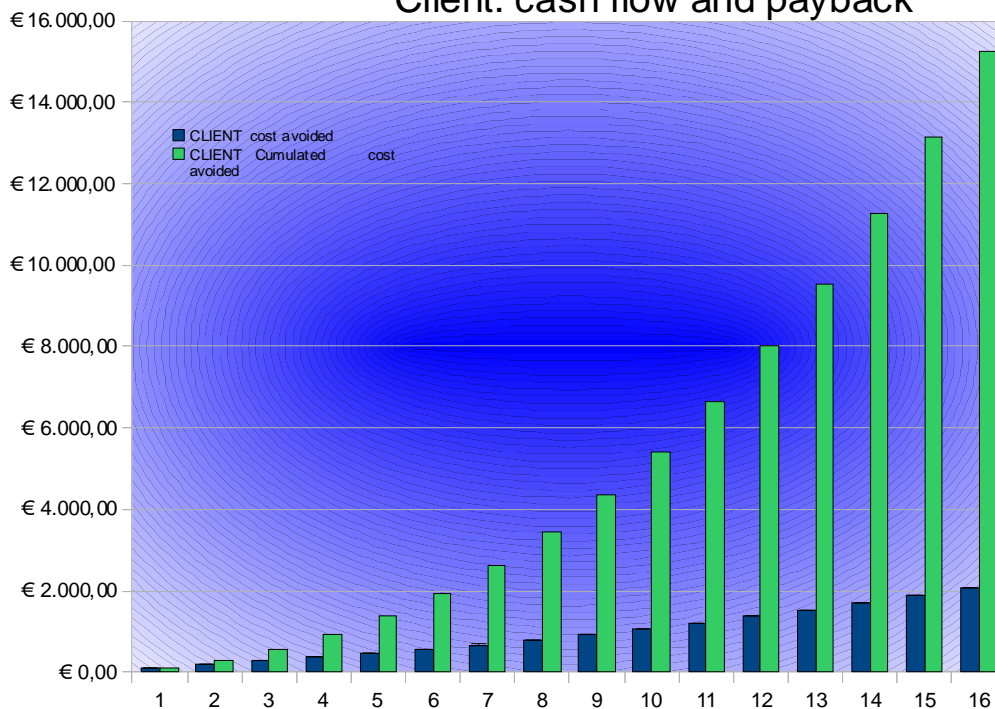
Cash flow for ESCO – case II

E.s.c.o. cash flow and payback

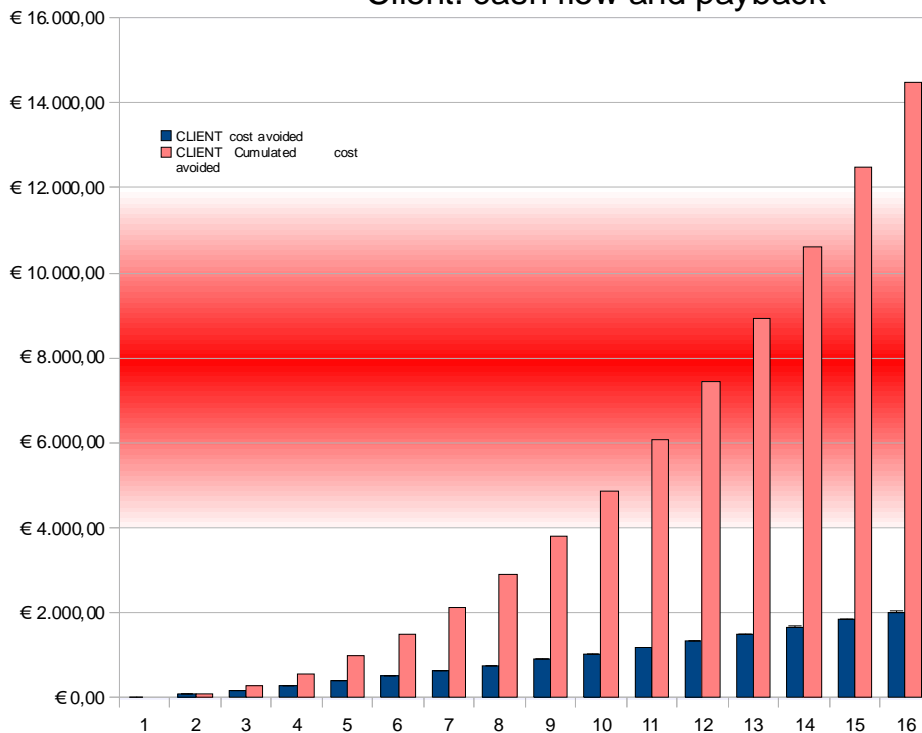


Cash flow for client – case I

Client. cash flow and payback



Client. cash flow and payback



Summary

- High potential of renewable heating in Italy
 - Aggressive targets by 2020
 - New incentives: Dlg 28/2011
- Non technical barriers to be faced
 - biomass: supply chains, sustainability
 - Solar thermal: small applications, proper installation
- Few major ESCOs in the Italian market
 - biomass ESCOs market quite developed in Northern Italy (biomass district heating plants for tertiary - residential sector)
- The ST-ESCOs market not mature



Thank you for the attention

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Renewable thermal energy – Subsidy measures for small scale plants (art 28)

- **Application:** small scale renewable thermal energy plants and energy efficiency measures built since 2012
- **Feed in tariff charged on natural gas bill and defined by specific contracts between GSE (gestore sistema elettrico) and plant owner, based on renewable heat or saved energy**
- **Further decree of Ministry of Economic Development within 6 months to put into practice the subsidy measure:**
 - minimum technical performances required (annex 2 of Dlg 28)
 - Guarantee a fair remuneration of investment and operational costs of the renewable projects
 - Incentive duration of 10 years, constant amount over the timeline
 - **Specific subsidy amounts dedicated to each technology should be introduced**



VAT SYSTEM AND CREDIT ACCESS - biomass

- According to the Resolution n°124/E of tax Agency 6° may 2009, VAT on wood chips is set at 20% instead of 10% applied in EU's countries
- Different VAT system hinders the EU trade and limits the fair competition
- Credit access represent the key factor to develop heat biomass sector
- Specific financial products for biomass plants are not available on the market, and companies are obliged to take out short loan (5-10 years) even if the plant allowance period is 15-20 years
- National law is incomplete and unreliable: continuous start and stop area bottlenek, such as long authorization procedures and high costs



INCENTIVES FOR ENERGY PRODUCTION FROM BIOMASS

- The incentive for electricity generation from biomass is very high in comparison to heat generation
- Feed in tariff for plants up to 1 MWe of 280 Eur/MWh or quota system (green certificates) with coefficient 1.8 for plants above 1 MWe
- This higher incentive for electricity is not justified by increased environmental and energetic benefits in comparison to thermal energy production
- The only electricity generation from solid biomass is not a sustainable route in comparison to only heat or CHP