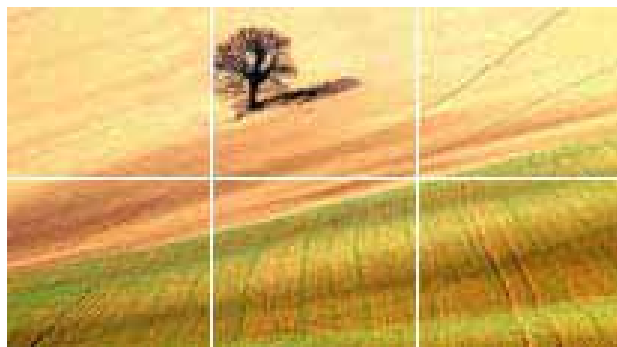


**Assessorato all'Ambiente
Comune di Padova**



Planning of energy saving and energetic efficiency interventions for the city of Padova



- **General analysis of the dimensions and inefficiencies of the electrical and thermal consumption in the city of Padova**
- **Proposal regarding efficiency interventions, energy saving and renewable energy sources**
- **Evaluation of the economic cost and benefit and environmental advantages**
- **Articulation of the study in 5 main intervention sectors:**
 - public lighting
 - traffic lights
 - buildings
 - transport
 - renewable energy

Introduction

Buildings

Public lighting
Transport

Traffic lights
Renewable energy

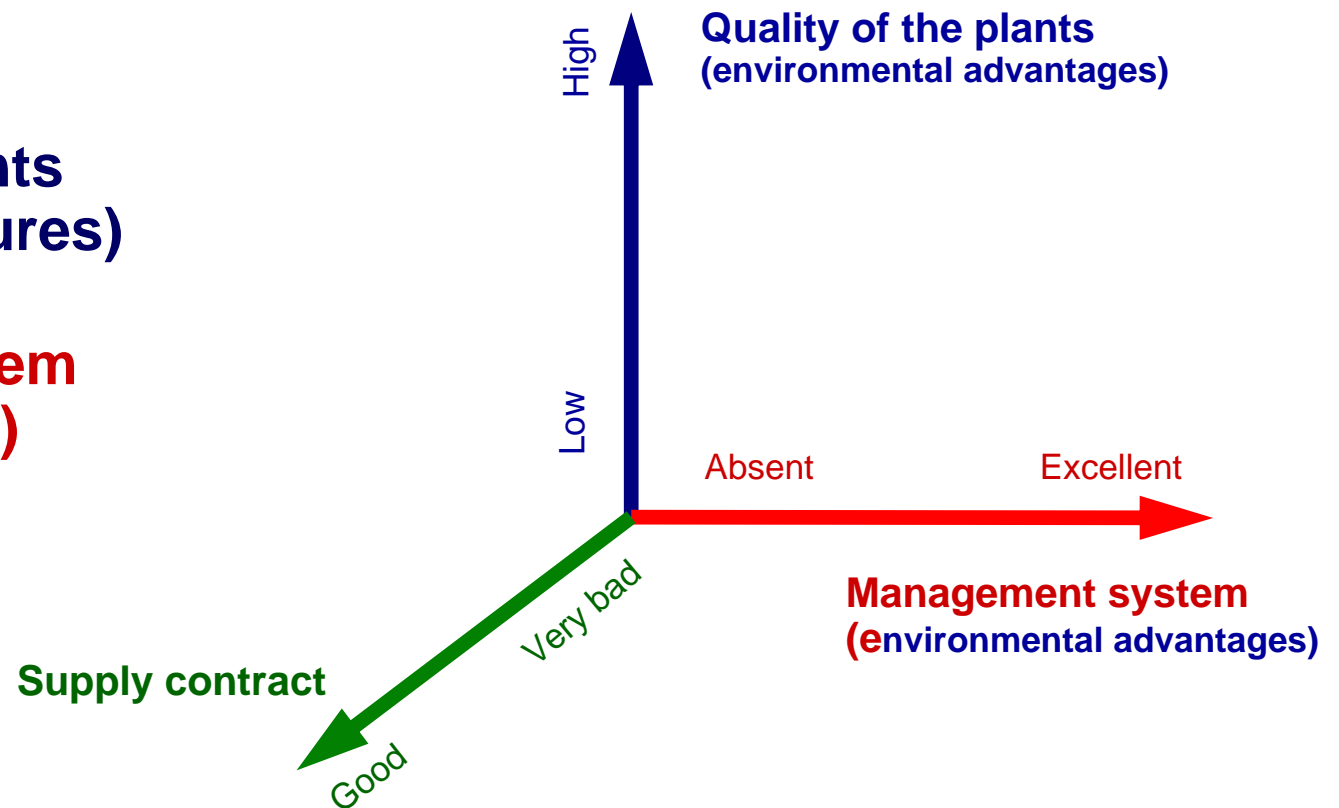
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sourced

→ Energy and money saving is based on the improvement of 3 distinct elements

- **Supply contract**
- **Quality of the plants (and of the structures)**
- **Management system (and maintenance)**





Buildings

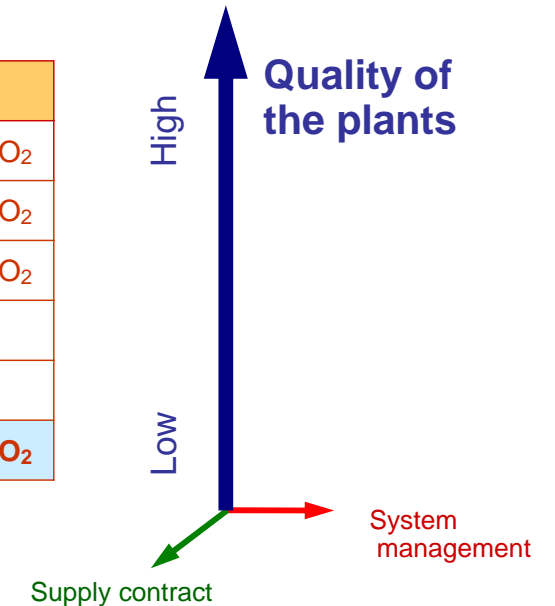
Transport

Renewable energy sources

→ Cost/benefit estimate

Investment costs		
Substitution of 12.300 plant comprehensive of lamp	3.690.000 €	= 12.300 x 300 €/each
Substitution of transformer in succession with 30 statics regulators	510.000 €	= 30 x 17.000 €/each.
Installation of the flow regulators	127.500 €	= 850 kW x 150 €/kW
Total cost	4.327.500 €	

Annual economic and environment benefits saving			
Lower consumption for greater efficiency lamps	560.000 €	5.838 MWh	3.853 t CO ₂
Substitution of transformer with statics regulators	22.500 €	235 MWh	155 t CO ₂
Installation of 100 flow regulator	45.000 €	470 MWh	310 t CO ₂
Reduction of maintenance cost (-12%)	200.000 €	-----	-----
Title of energetic efficiency (472 TEP)	47.200 €	-----	-----
Total benefit	874.700 €	6.543 MWh	4.318 t CO₂
Pay back of the investment	5 years		

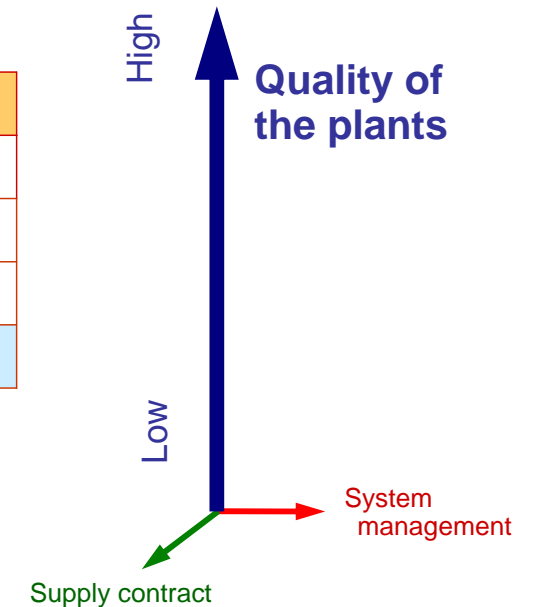




→ Cost/benefit estimate

Investment costs		
Replacement of 463 traffic lights diam. 300 mm, including supply and installation	463.000 €	= 463 x 1.000 €/lamp
Total cost	463.000 €	

Annual economic and environment benefits			
Reduced electricity consumption	32.177 €	287 MWh	190 t CO ₂
Reduced maintenance costs	97.230 €	-----	-----
Energy efficiency certificates(65 TEP)	6.500 €	-----	-----
Total benefit	135.907 €	287 MWh	190 t CO₂
Pay back of the investment	3,5 years		

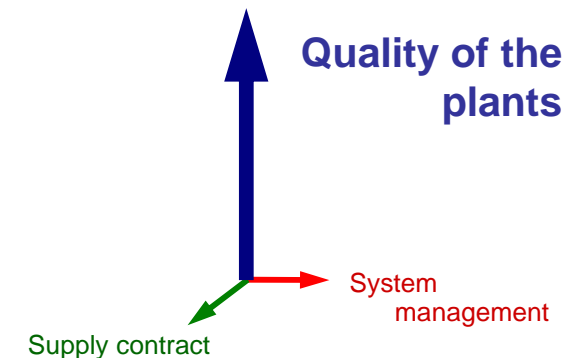




Thermal consumption

	OIL BOILERS	METHANE BOILERS	SAVINGS
Numbers of boilers	65	65	
Total power	15.672.060 kcal/h	9.202.272 kcal/h	6.469.788 kcal/h
	18.211 kW	10.693 kW	7.518 kW
Average boiler power	241.109 kcal/h	141.573 kcal/h	99.535 kcal/h
	280 kW	165 kW	116 kW
Average power heated mcr	56 W/mc	30 W/mc	26 W/mc
Total cost (2003/2004)	1.809.120 €	1.397.888 €	411.233 €

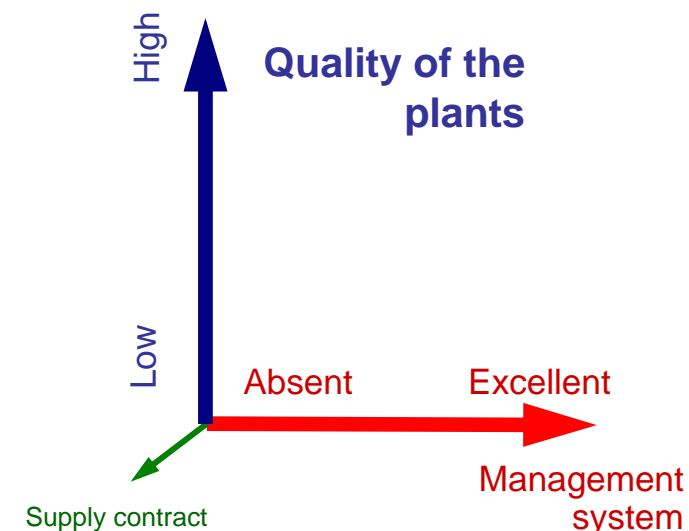
→ Transformations of the oil boilers in methane boilers





→ **EXAMPLE:** The replacement/transformation of 20 motor vehicles on petrol with bifuel vehicles (40% of the municipal vehicles with an average annual of 15.000 km) brings on a saving of 18.00-20.000€/year on the fuel expenses with an investment of 40.000 € and a return time of about 2 years

	CO (kg)	CO ₂ (t)	PM ₁₀ (g)	Ozone (kg)
Motor cars on petrol	720	56	600	48
Motor cars on methane	180	42	0	10
Emissions/ year	540	14	600	38
Variation	-75%	-26%	-100%	-80%





sources

- Introduction, where possible, of solar panel to produce hot water
- Opening of an energy efficiency and renewable counter
- Electrical energy production from photovoltaic panels covering municipal parkings
- Government subsidy of energy “account” 045€/kWh
- Estimated pay back 15/20 years - ESCO solution

Conclusion



→ All sectors have the possibility to introduce interventions for economic and environmental benefits

	Intervention costs	Annual saving	Return time
Contract renewal for electrical energy on the free market		40.000 €	
Public lighting	4.327.500 €	874.700 €	5 years
Traffic lights	463.000 €	135.907 €	3,5 years
Buildings (replacement 65 boilers)	2.000.000 €	411.000 €	5 years
Transport	40.000 €	20.000 €	2 years
	6.830.500 €	1.481.607 €	4,6 years