

Plan of the Modification of Public Lighting in Frosinone in Accordance with the Rule for the Limitation of Light-Pollution and Power Consumption

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Abstract. The plan for modification of public lighting in Frosinone, in accordance with the rule for the limitation of light-pollution and power consumption, is summarized. The energy saving obtained is 40% per year, equivalent to over US\$222,000.

1. Street Lighting Adaptation

In the city of Frosinone (50,000 inhabitants) there were about 7,100 street-lamps in 1997, subdivided as follows:

1. 6,400 fixtures for road lighting (2,000 cut-off);
2. 300 fixtures for artistic lighting with open optics lanterns;
3. 300 fixtures for ornamental lighting with spheres;
4. 100 beams for squares and monumental lighting with beams (prevalently symmetric).

The municipal technical office, in collaboration with the Astronomical Observatory of Campo Catino, has realized a plan to modify all street-lamps of the city within 5 years of 1997, in conformity with the rule against light-pollution. The originality of this plan lies in the fact that it is not necessary to substitute every fixture, but only to modify them, with reduced costs. Only when modification is not possible (about 600 street lamps) is there a total change of the fixtures (equivalent cost US\$55,000).

The costs of this plan, divided by category, are as follows:

1. 4,000 fixtures modified with flat tempered glass, as shown in Figure 1 (US\$5 each, total cost US\$20,000);
2. 400 fixtures must be changed integrally (US\$90 each, total cost US\$36,000);
3. 300 fixtures (old lanterns) modified with conical metallic screens as shown in Figure 2 (each US\$5, total cost US\$1,500);
4. 150 spheres must be changed completely with electrical components (each US\$75, total cost US\$11,250);



Figure 1. Modification of street lighting fixtures with a flat tempered glass to give more transmission of light onto the road, with drastic reduction of glare and light-pollution. Cost: US\$5 each.

5. 150 spheres modified with only the adoption of shielded spheres as shown in Figure 3 (each US\$30, total cost US\$4,500);
6. 100 beams modified with rectangular metal screens as shown in Figure 4 (each US\$2, total cost US\$200).

The final cost of the plan is US\$73,450, that is, 132,210,000 Italian lira.

2. Savings in Power Consumption

Saving of power consumption is another very important aim of the rule passed by the town council of Frosinone. Every year this city spends about one billion lira (equivalent to over US\$555,000) on power.

The rule approved in 1996 provides the following strategies and prescriptions for reducing power consumption:

1. Utilization of flux-reducers for installations with power lamps ≥ 150 W high-pressure sodium, or of timers for smaller installations (70 W and 100 W high-pressure sodium);
2. Substitution of all old fixtures of 250 W or 125 W mercury lamps with new fixtures using cut-off 150 and 70 W high-pressure sodium;
3. Reduction of power (from 150 to 100 W, or from 100 to 70 W) for installations which adopt the new spheres shielded in the upper half (made by



Figure 2. Modification of an open lantern “old style” with a cheap and functional conical metal screen. Dispersion flux is reduced by 50%. Cost: US\$5 each.

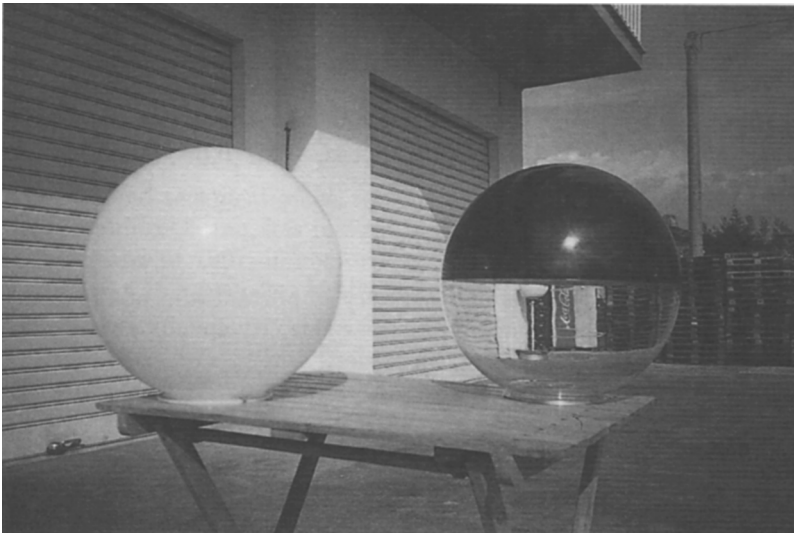


Figure 3. Modification of the most polluting light source in the world, the opaline sphere! We have utilized a new cheap shielded sphere made in Italy by MARECO LUC. Dispersion flux is reduced by 60%. Cost: US\$20-40 each.



Figure 4. Modification of a symmetric beam with a simple metal screen. No more light in the sky! Cost: US\$2 each.

MARECO) or the new lanterns cut-off (made by NERI) or modified by the technical office;

4. Monumental lighting must be turned off after 11 p.m. in solar time and after midnight in summer time.

These measures will allow an annual saving 40% (400 million lira, equivalent to more than US\$220,000). In this way it is possible to carry out an ulterior reduction of light-pollution (about 35-40%) thanks to limitation of the power engaged. All that, clearly, without introducing problems for road safety.