



FINANCIAL RETURNS AND COMMERCIAL SECURITY

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Historically two reasons for development

- **High value of power in the context of the period**
- **State investment**

Small Hydro 2003

**Power and electric power has never
been so cheap**

The European Commission

**The responsibility imposed by the
Renewables Directive**

Problems facing the introduction of a common framework to include Small Hydro

- **Geography**
- **Climate**
- **Inflexibility**
- **Longevity**

Guidelines

- **Profitability**
- **Security**

Tools

- **Extern E study**
- **Concept of Modified Cost**
- **Technology indicators of DG Research**
- **Profitability index**

Modified cost

Example of Spain (year 1996)

Total electricity generated (incl. renewables)	161 TWh/year
Total external costs (incl. renewables)	9.000 million E/year
Quantification of external costs	5,6 E cents/kWh
Total electricity generated (excl. renewables)	120 TWh/year
Total external costs (excl. renewables)	8.000 million E/year
Quantification of external costs	6,6 E cents/kWh
Average Spanish Externality Cost	6,6 E cents/kWh
Market Price	<u>8.8 E cents/kWh</u>
Modified Cost	15.4 E cents/kWh

High Head Investment Cost

Euros/kW

>=	100 Kw		5000
>=	250 Kw	@	3500
>=	500 Kw	@	3000
>=	750 Kw	@	2500
>=	1000 Kw	@	2275
>=	1500 Kw	@	2050
>=	2000 Kw	@	1975
>=	3000 Kw	@	1850
>=	4,000 Kw	@	1740
>=	10,001 Kw	@	1600

Production costs

**An annual charge of 3% - 5% of
Investment Cost**

Performance

Output

Nominal capacity x 8760

Say 40-55 %

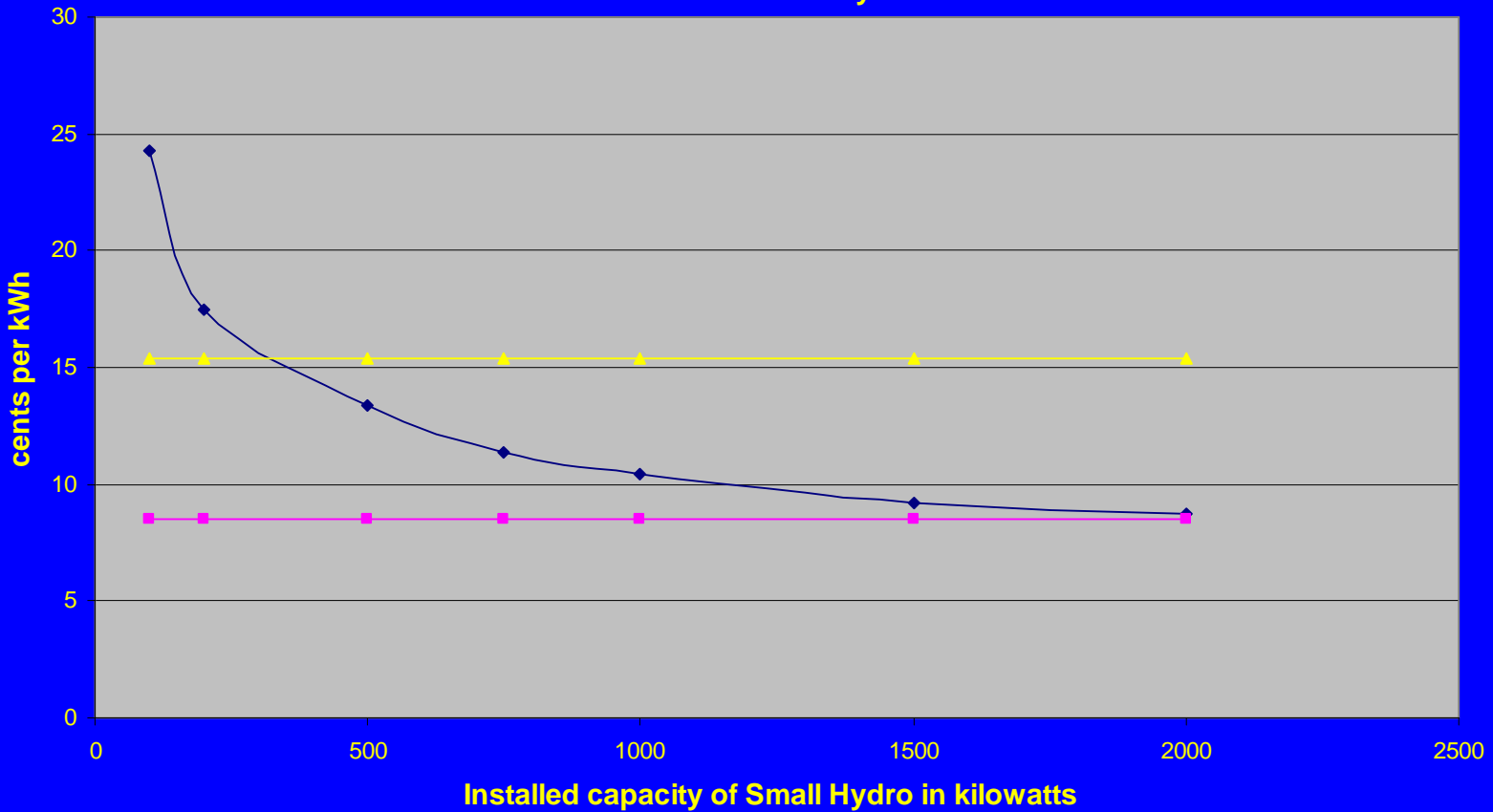
Profitability index

- The Present Value of an investment is arrived at by discounting the net income from that investment over a given period of years
- A Profitability Index indicates the amount by which the Present value exceeds the amount of the original investment

Capacity kW	750	Overall Performance	Discount rate	Output kWh
Per kW installed	ECS 2,500	40%	5.0%	2,628,000
Investment cost	ECS 1,875,000			
Years		20		
Profitability Index		0.50		
Net Present Value Required			937,500	
Present Value			2,812,500	
Net Annual Revenue Required			225,682	
Operating Cost			72,667	
Gross Annual Revenue Required			298,349	
Cents per kWh required			11.35	
Internal Rate of Return			10.36%	
Payback in years			8.3	

Cents per kWh required for Small Hydro v-a-v Price in the market place and Market price modified in line with External costs

**Overall performance 40% Discount rate 5% Profitability index 0.5
Period 20 years**



—◆— cents/kWh @40%

—■— Market price

—▲— Modified market pr.