



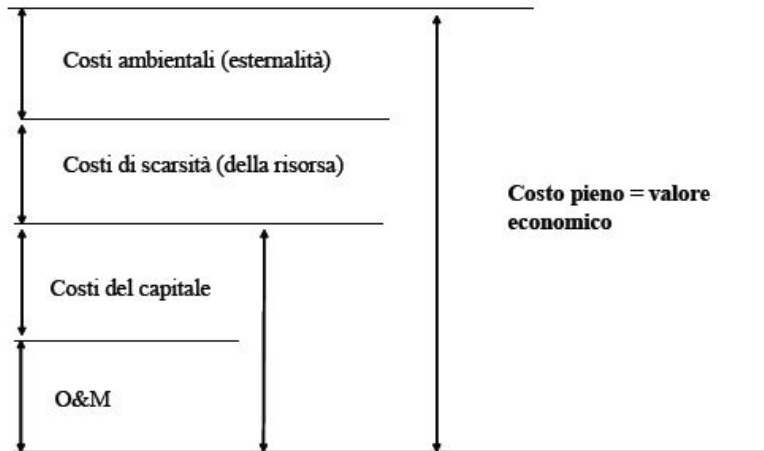
WHO NEEDS WATER? Managing drought in Alps. Climate change and Alpine water resource to be preserved

THE ENVIRONMENTAL AND RESOURCES COSTS RECOVERY AS A SOCIO-ECONOMIC TOOL TO MITIGATE THE EFFECTS OF CLIMATE CHANGE ON WATER

ALESSANDRO DE CARLI/GREEN – UNIVERSITA' BOCCONI

TORINO, 24 aprile 2024 Palazzo della Regione Piemonte Piazza Piemonte 1

Environmental and Resource Costs (ERC) in WFD



Article 9

Recovery of costs for water services

1. Member States shall take account of the principle of recovery of the costs of water services, including environmental and resource costs, having regard to the economic analysis conducted according to Annex III, and in accordance in particular with the polluter pays principle.

WATECO Definitions

Environmental costs

*the costs of damage that water uses impose **on the environment and ecosystems** and those who use the environment (e.g. a reduction in the ecological quality of aquatic ecosystems or the salinisation and degradation of productive soils).*

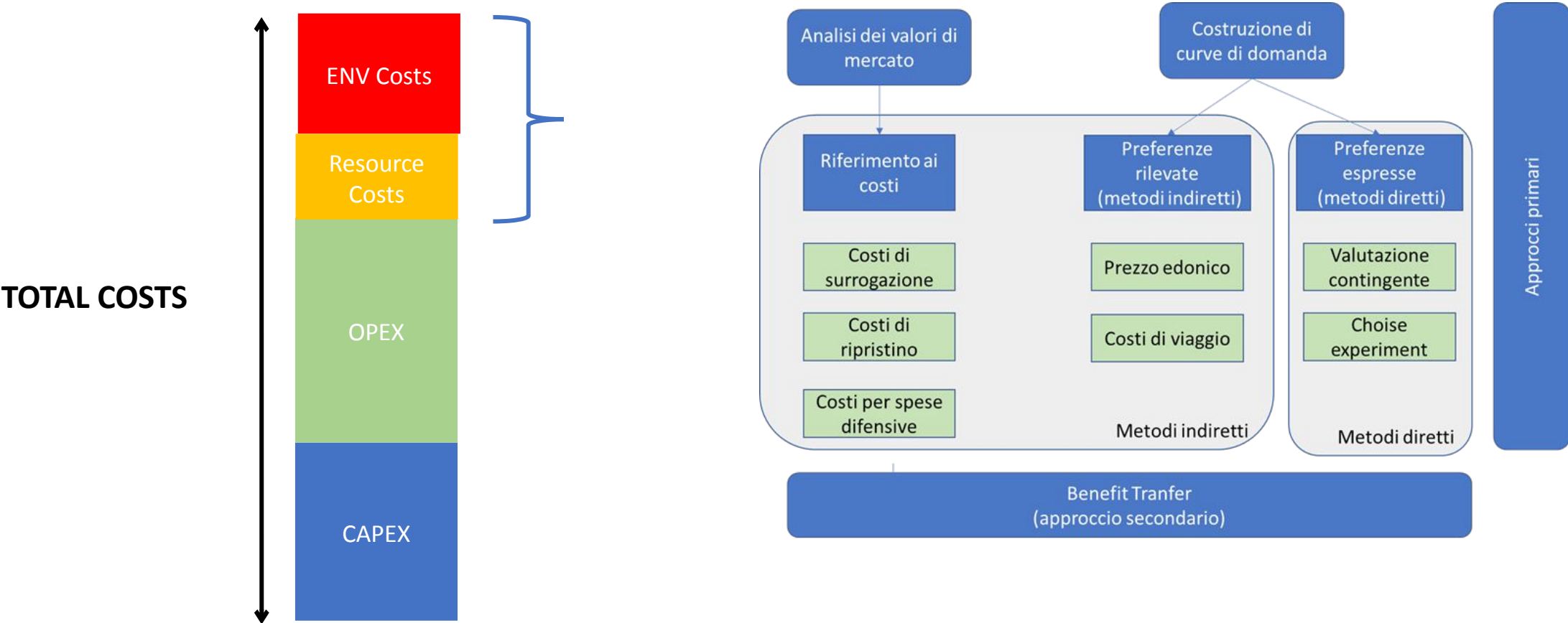
Resource costs

*the costs of **foregone opportunities which other uses** suffer due to the depletion of the resource beyond its natural rate of recharge or recovery (e.g. linked to the overabstraction of groundwater).*

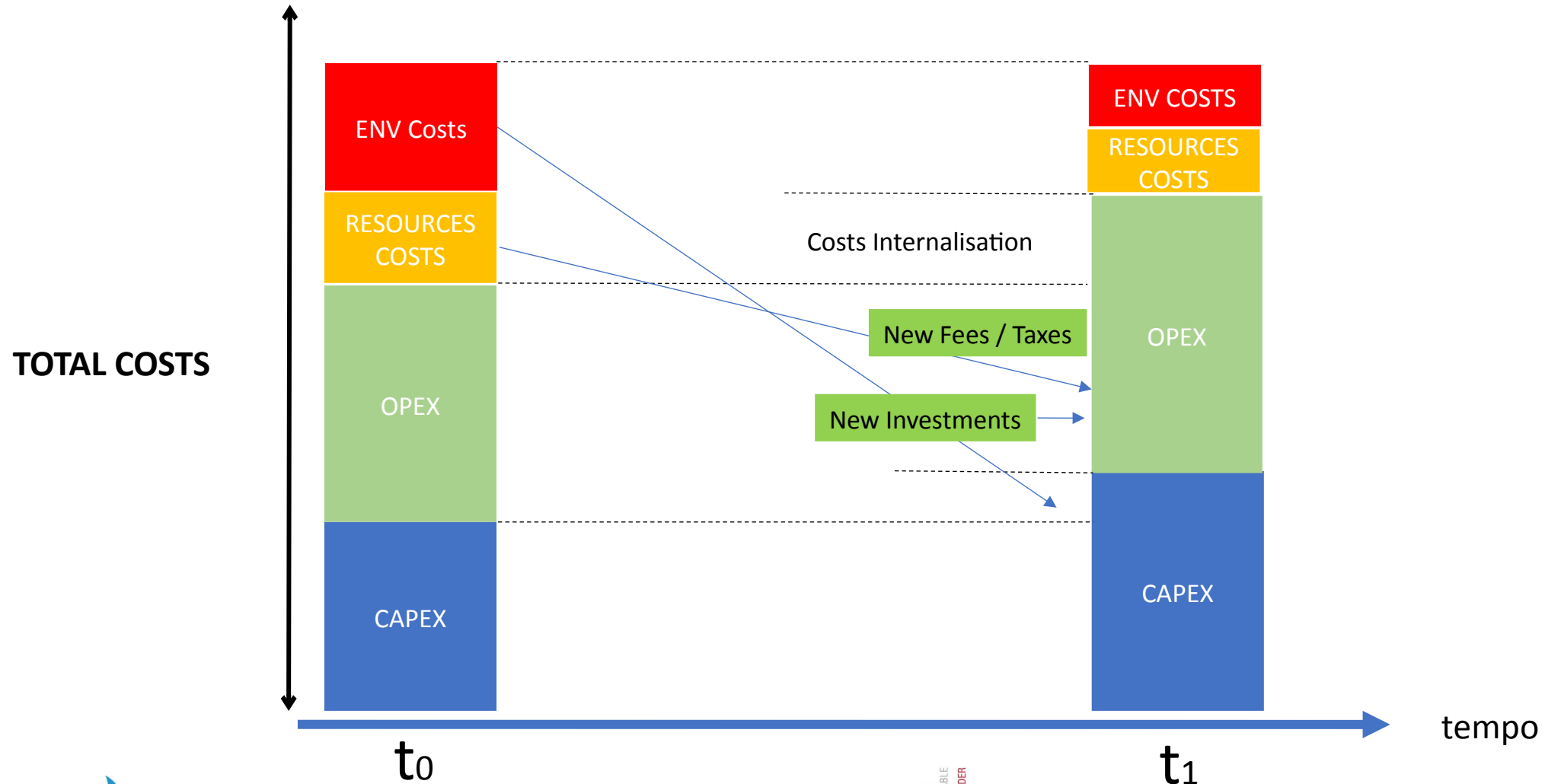
Environmental and Resource Costs in Italian Water (Resources & Services) Regulation

- **Italian Ministry of Environment (MASE)** => Regolamento recante i criteri per la definizione del costo ambientale e del costo della risorsa per i vari settori d'impiego dell'acqua (DM 24 febbraio 2015, n. 39)
- **Italian Water Service Regulation (ARERA)** => Del. 662/2014/R/IDR 23 DICEMBRE 2014 (only for Urban Water Services)

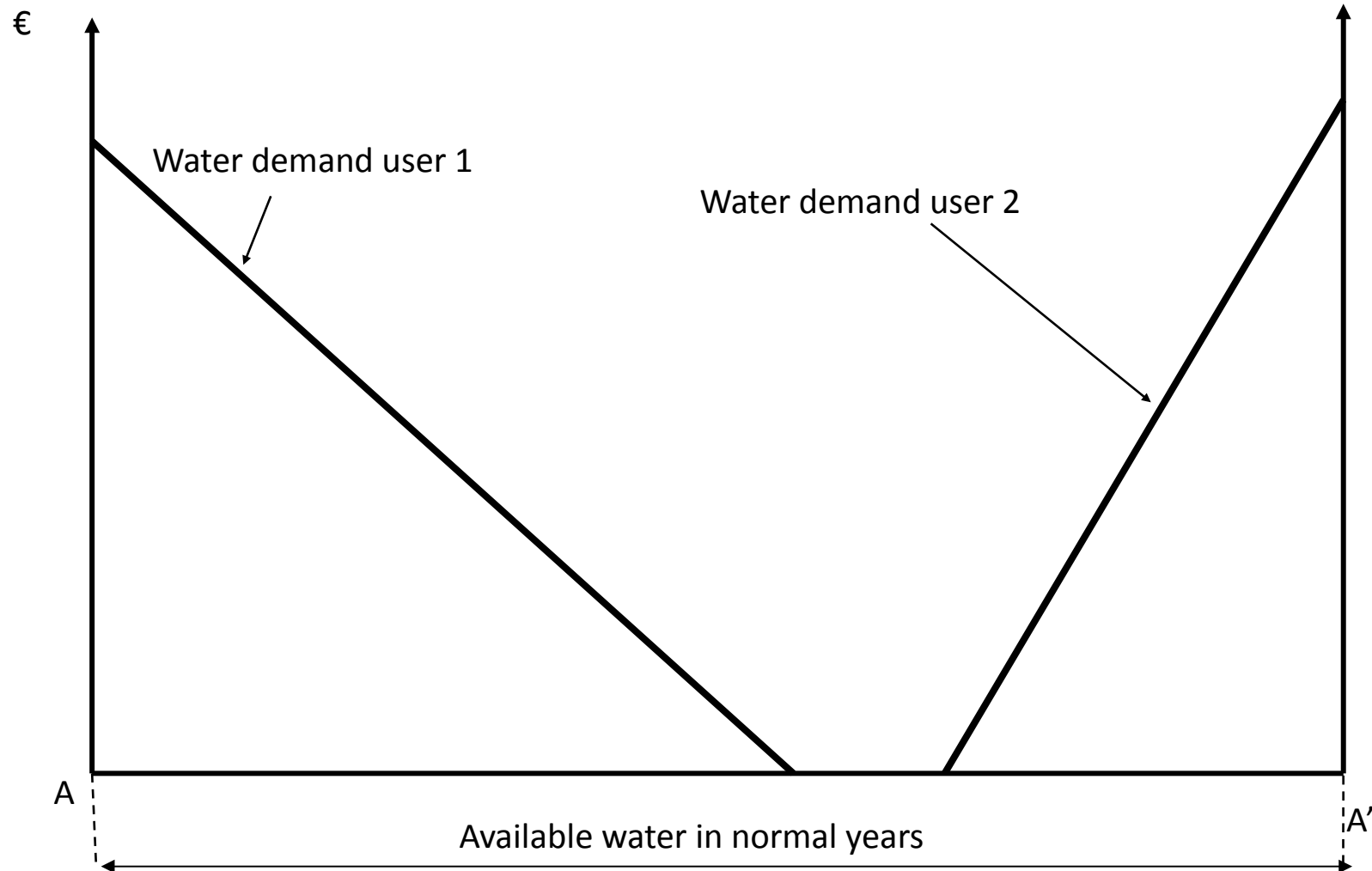
ERC Recovery in practice: How evaluate the ERC?



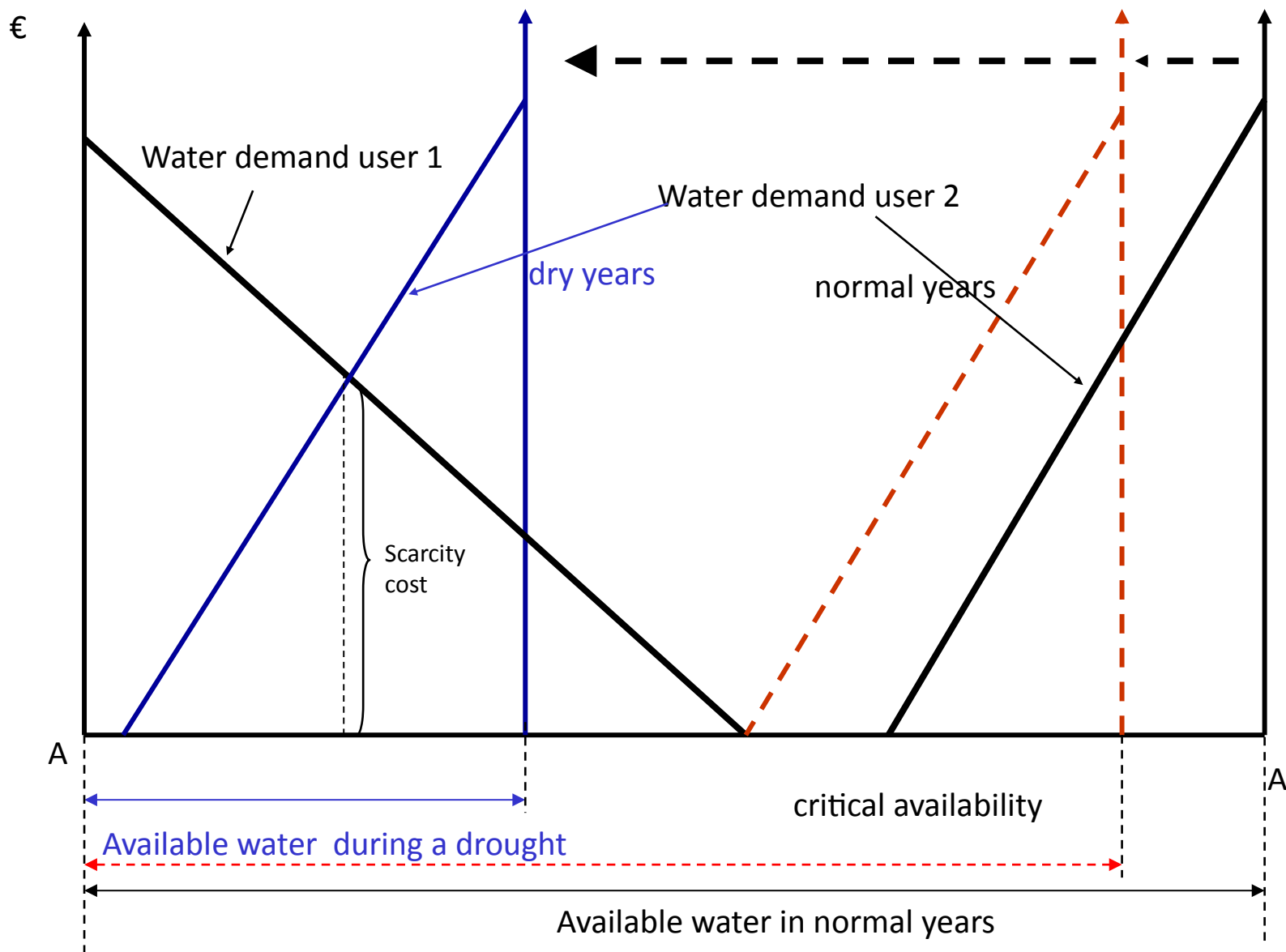
ERC Recovery in practice: How recover the ERC?

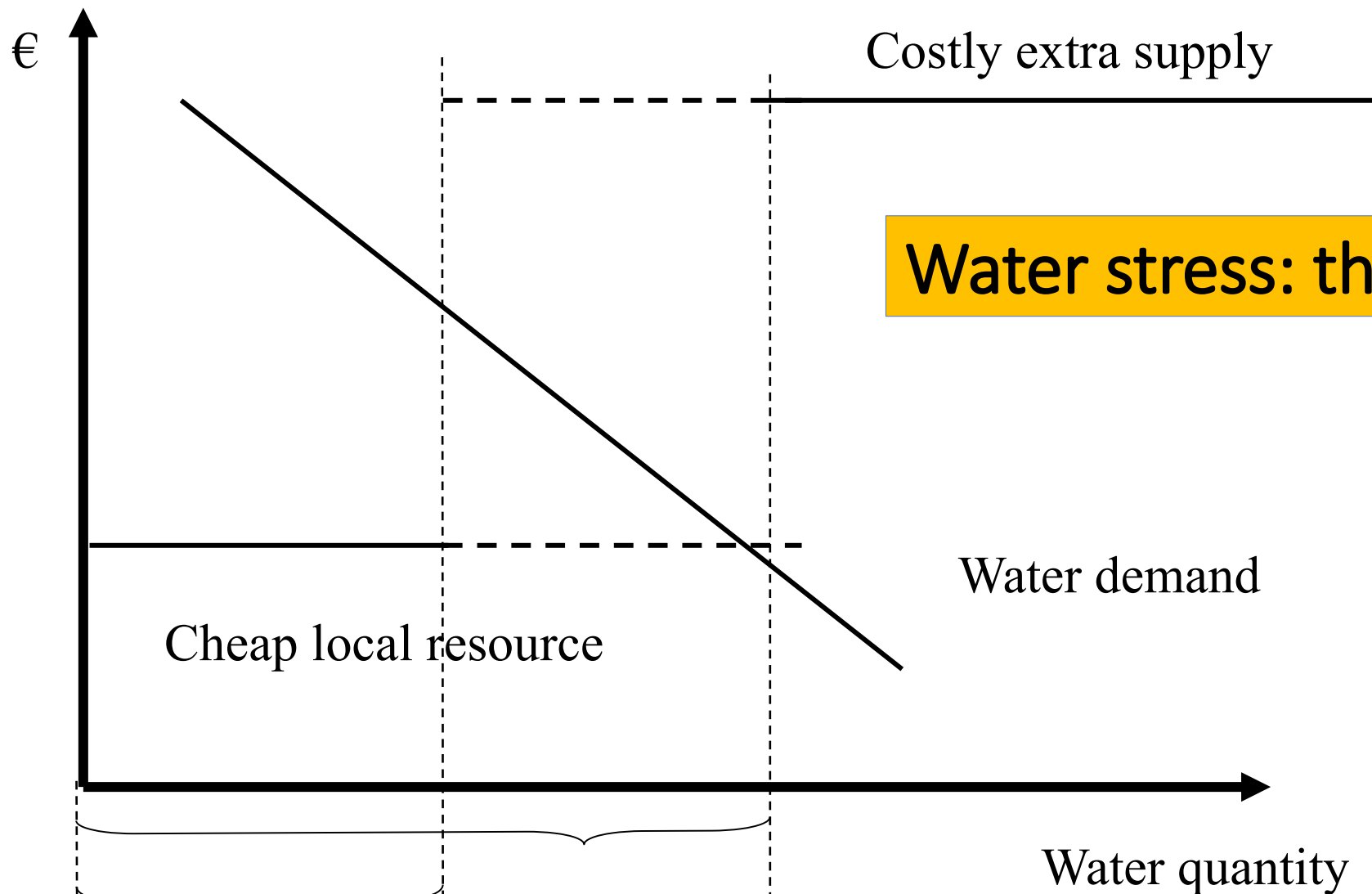


A situation where $ERC = 0$

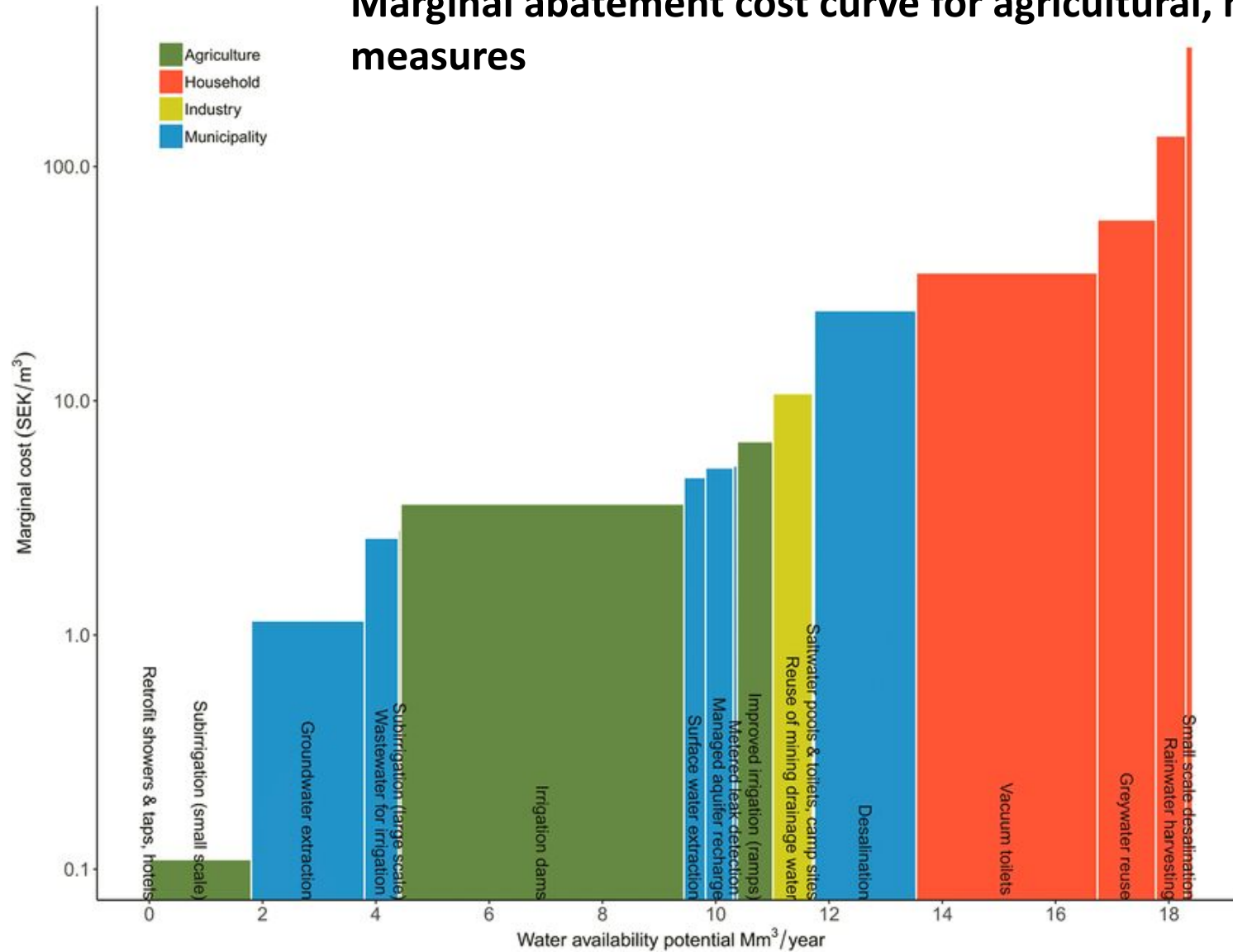


Critical availability and ERC





Marginal abatement cost curve for agricultural, household, industrial and municipal measures



Sjöstrand, Karin & Lindhe, Andreas & Söderqvist, Tore & Dahlqvist, Peter & Rosén, Lars. (2019). Marginal Abatement Cost Curves for Water Scarcity Mitigation under Uncertainty. Water Resources Management. 33. 10.1007/s11269-019-02376-8.

Impact Analysis of new Abstraction fees (Piedmont)

Global Issues in Water Policy 28

Paolo Turrini
Antonio Massarutto
Marco Pertile
Alessandro de Carli *Editors*

Water Law, Policy and Economics in Italy

Between National Autonomy and EU
Law Constraints

 Springer

Chapter 18

Environmental and Resource Costs Assessment and the Case for Reforming the Italian System of Water Abstraction Charges

Vito Frontuto, Silvana Dalmazzone, Paolo Mancin, Alessia Giannetta,
and Davide Attilio Calà

$$\sum_{i=1}^N C_i^E = (1 + \alpha_i + \beta_i + \varepsilon_i) Q_i^A C^A + \gamma C^P$$

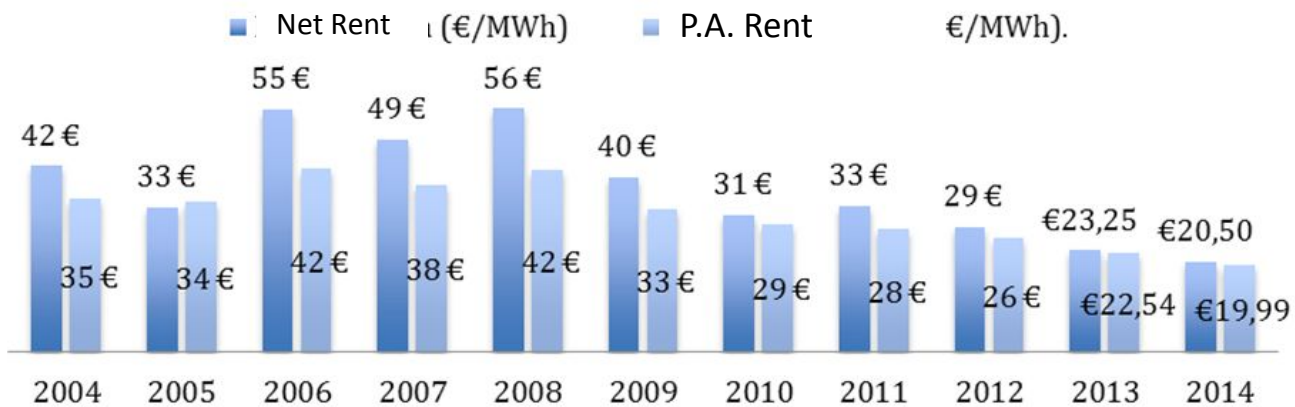
Table 18.9 Current and simulated revenues

Sector	Revenues 2017 (€)	Simulated revenues (€)	Average difference (€)	Average variation (%)
Irrigation and agriculture	3,512,602	25,973,720	6395.45	17.12
Commercial	282,301	318,646	19.68	0.13
Household	1,030,374	2,970,673	1170.97	0.67
Energy	46,266,146	46,266,146	0	0
Industrial	5,944,309	6,367,245	390.31	0.43
Total	57,035,732	81,896,430	1522.87	13.68

Hydroelectric Net Rent

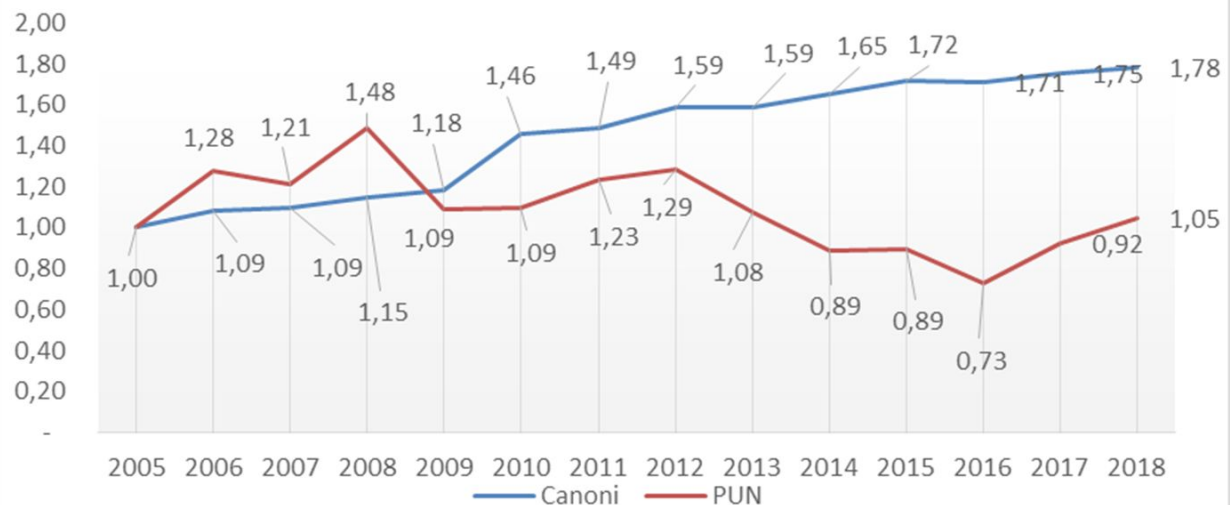
+ Income
+ Subsidies
- OPEX
- Depreciation
- Return on invested capital
= Gross Rent
- Abstraction fees (P.A. Rent)
- Taxes
= Net Rent

Ripartizione della rendita idroelettrica con peak price e stime dei costi di costruzione accertate dall'ag. del territorio



(Source: Progetto IDEA - UniUD – 2014)

Confronto andamento Canoni e PUN



Hydroelectric Abstraction Fee – A proposal (2014)

As part of a research project, financed by the Cariplo Foundation, DSE-University of Udine and CIRF had hypothesized a new fee governed by 3 drivers:

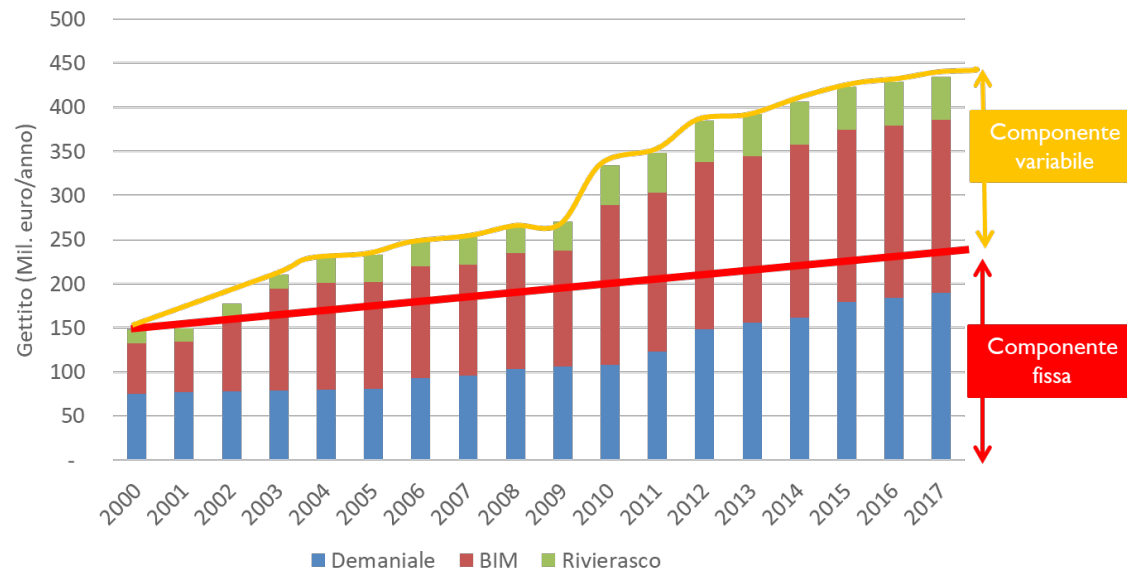
- **Concession Power** (fixed)
- **Electricity production** (variable)
- **Impact on River Ecosystem**, depending on plant management (i.e. Hydro peaking) and mitigation measures

Source: Pontoni F., de Carli A., Massarutto A., Goltara A., 2014, *Hydropower production and environmental regulation: opting for a performance-based tax approach*, Economics and Policy of Energy and the Environment, 3-2014

Impact Analysis fo Hydroelectric Abstraction Fee

In 2017, CERTeT (now GREEN) - Bocconi University realized an Impact Analysis of an hipotetical two-components fee for hydroelectric plants

$$C = (\alpha * P_{conc}) + (\beta * Income)$$



	2011	2012	2013	2014	2015	2016
Abruzzo	5,6%	15,4%	10,1%	12,4%	11,9%	16,2%
Basilicata	7,8%	8,6%	3,6%	6,7%	12,1%	8,6%
Calabria	4,7%	5,7%	5,2%	7,1%	7,4%	9,8%
Campania	5,5%	7,7%	4,5%	7,2%	8,1%	11,3%
Emilia Romagna	5,8%	6,0%	5,3%	6,0%	8,0%	10,7%
Friuli Venezia Giulia	3,9%	4,7%	5,0%	4,4%	8,0%	10,6%
Lazio	7,8%	10,3%	6,1%	14,5%	18,1%	24,1%
Liguria	6,3%	5,5%	5,0%	5,7%	9,5%	12,5%
Lombardia	3,6%	6,4%	7,1%	7,1%	9,4%	12,7%
Marche	9,9%	13,2%	8,0%	11,3%	11,0%	14,5%
Molise	11,7%	15,5%	11,4%	15,9%	19,1%	24,8%
Piemonte	7,2%	7,2%	7,1%	8,6%	12,1%	16,3%
Sardegna	6,3%	12,3%	7,1%	11,9%	25,1%	34,7%
Sicilia	13,6%	7,5%	8,8%	13,4%	7,5%	11,0%
Toscana	9,2%	8,6%	6,1%	7,5%	14,2%	19,0%
Prov. Trento	10,7%	12,3%	12,0%	12,2%	17,5%	23,0%
Prov. Bolzano	8,8%	9,8%	8,4%	9,4%	12,9%	17,2%
Umbria	5,6%	8,9%	5,0%	7,4%	9,6%	20,4%
Valle d'Aosta	5,3%	4,9%	7,3%	9,4%	10,6%	14,2%
Veneto	5,8%	6,4%	6,5%	6,8%	10,1%	13,4%
Media pesata su ricavi	6,4%	7,9%	7,5%	8,6%	11,6%	15,6%

Impact Analysis fo Hydroelectric Abstraction Fee

- In 2019, AquaLAB Foundation evaluate the impact of the binomial state fee and the additional fee on the revenues of the hydropower sector, introduced by the D.L. Semplificazioni 2019
- The simulation was carried out assuming that the new fee was already present in the last five-year period (2014-2018).

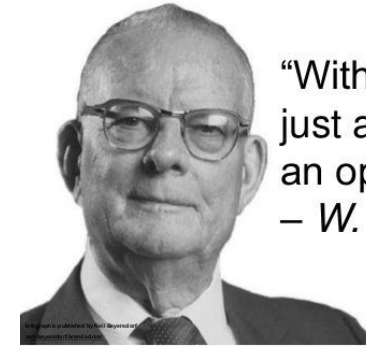
The **fee** is structured into two components:

- **Fixed** fee proportional to the concession power => *A minimum value of €30/kWconc*
- **Variable component**, proportional to standard revenues, calculated as the product of the zonal price of electricity with electricity production, net of electricity transferred to the regions.

Impact Analysis fo Hydroelectric Abstraction Fee

- As regards the fixed component, art. 1 septies sets a lower limit value for the fixed component of the state fee equal to 30 €/MW.
- In the 2018 CERTeT-Bocconi study, the value of the fixed component in 2016 was found to be 28.50 euro/kW, therefore apparently comparable to the 30 €/kW, but it was based on the hypothesis of a single fee, given by the sum of state property, BIM and riparian entities.
- The value of a fixed component, calculated from the value of the state fee in the year 2000 and increased with inflation, would be equal to approximately €24/kW.

Conclusions



“Without data you’re just another person with an opinion.”
– W. Edwards Deming

- Need to internalize ERC
- Define "standard" operating procedures based on scientific studies to assess the damage generated
- ERC recovery, also taking into account the socio-economic impact generated
- Focus on innovative tools such as PES