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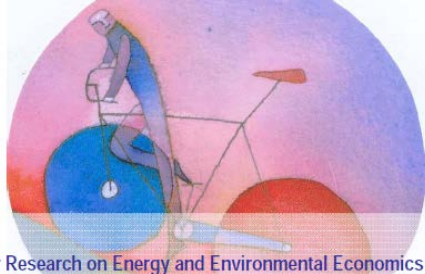
Centre for Research on Energy and Environmental Economics and Policy

recharge  **green**
BALANCING ALPINE ENERGY AND NATURE

Italian hydropower production: from rent maximization to environmental sustainability

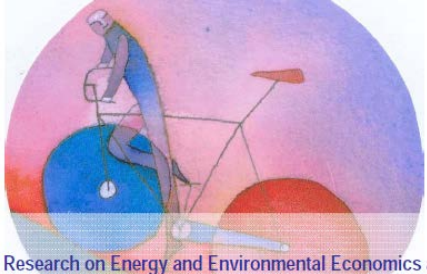
Federico Pontoni

Brig, November 12, 2013

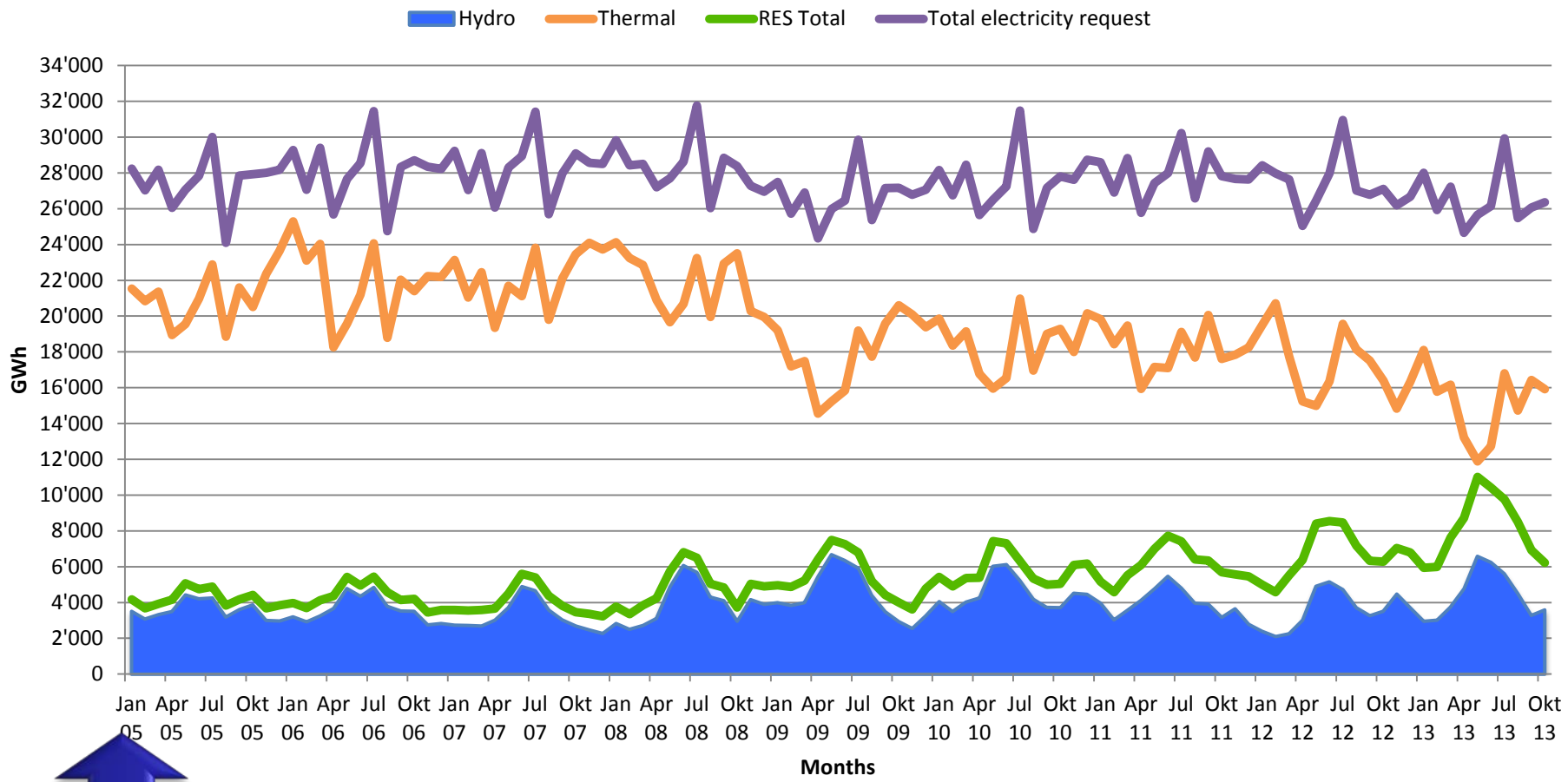


Insights

- The actual design of the EU power market generates a significant trade-off between profit maximization and environmental sustainability:
 - Incentives stimulate overinvestment in small hydropower schemes;
 - Marginal price in the Power Exchange makes extremely profitable for big hydropower schemes to vary monthly and hourly their production;
- This situation is exacerbated in Italy, given its structural overcapacity and its sluggish consumption;
- Besides environmental regulation, there is the need to introduce economic incentives to promote ecofriendly hydropower production, **by introducing performance-based environmental fees**;
- The concession renewal which is going to take place in the next years could be the occasion to reform the structure of the Concession fees.

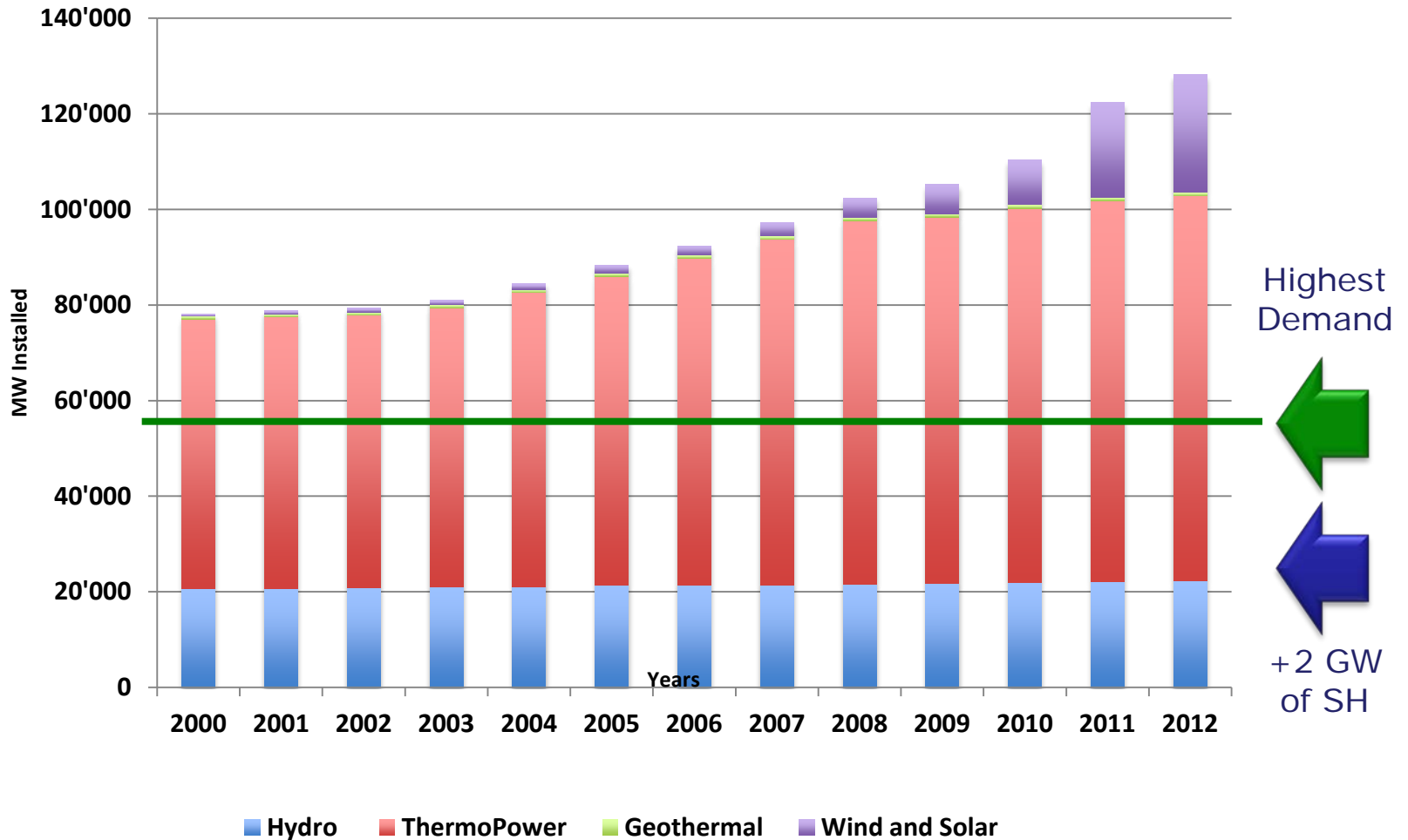


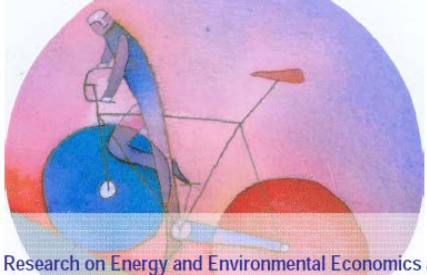
Monthly demand (Gwh)



↑ First year of full functioning of the Power Exchange

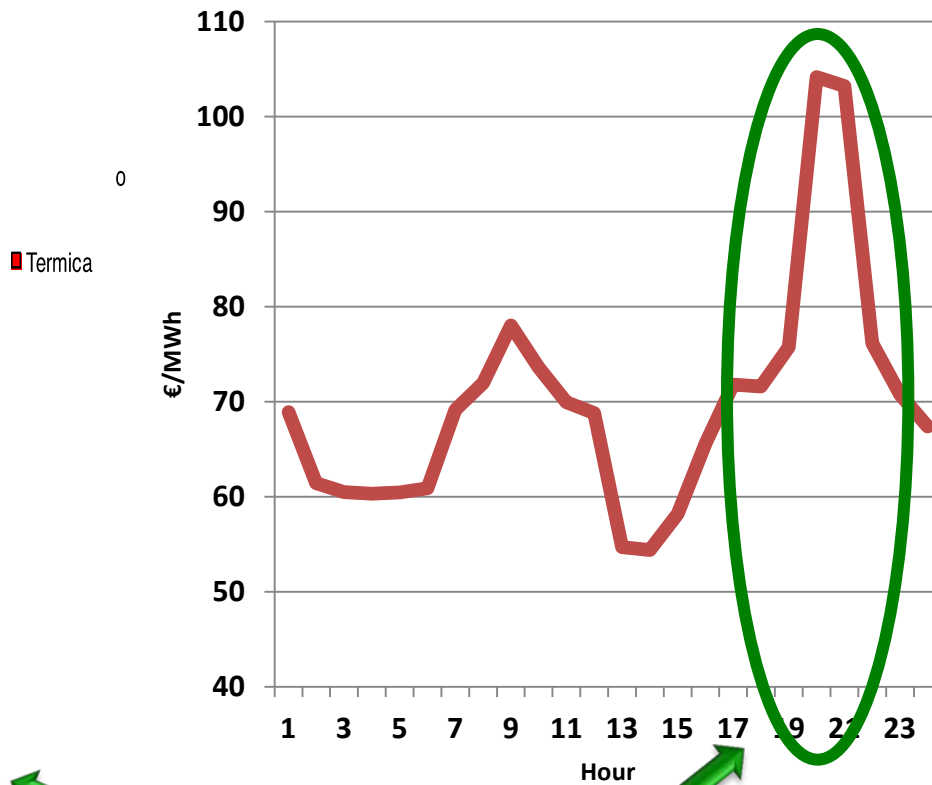
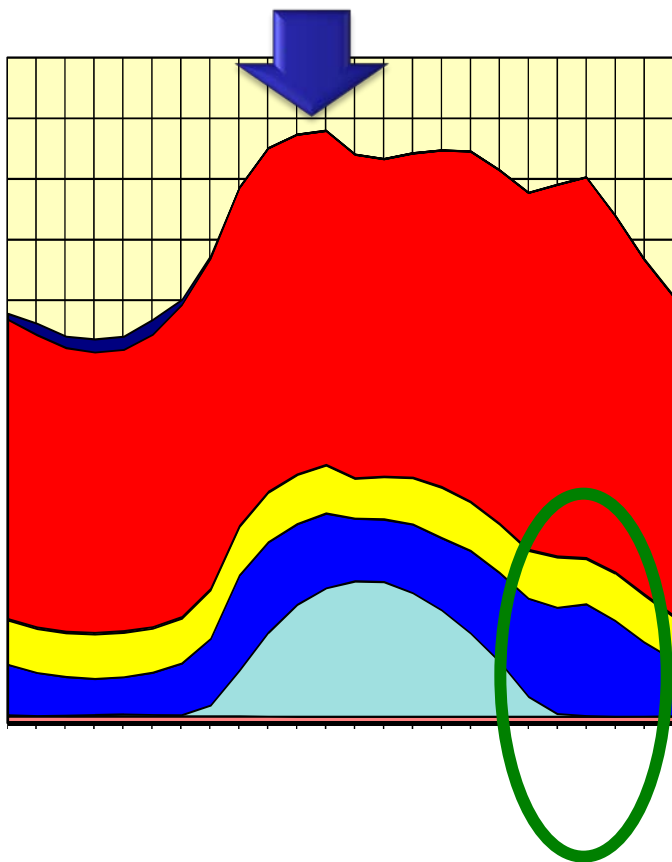
Evolution of the Installed Capacity (MW)



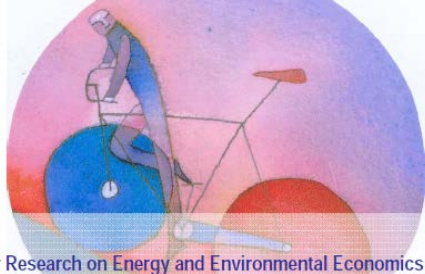


Market outcome, September 6, 2013

Monthly peak 49 GW

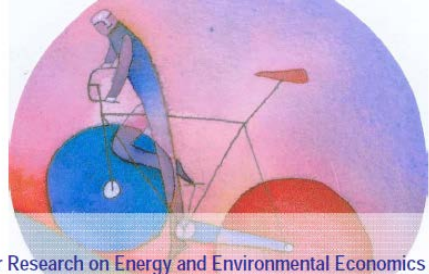


The sunset effect!



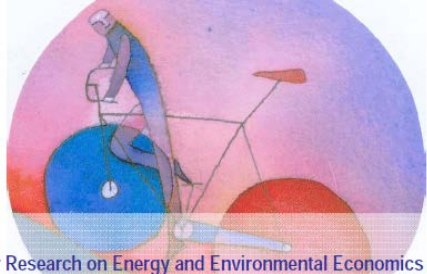
Concession renewal: moving towards the right direction?

- The law-decree of June 22, 2012, n. 83 introduces publicity and competition requirements in the tender process. The decree foresees that the new concession will last 20 years. More, the tender procedure is structured as a beauty contest, where petitioners will have to present:
 - **A technical offer:** which means that candidates are expected to significantly ameliorate the existing infrastructures in order to increase (if possible) the production;
 - **An environmental offer:** within each project, petitioners have to show their actions to reduce their environmental impact;
 - **An economic offer:** candidates are expected to present a financial business plan in which they will show the expected revenues and a revenue sharing fee.



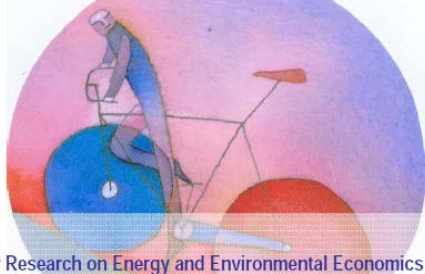
Coupling the economic and environmental offer

- **Instead of increasing concession fees**, we suggest to introduce a performance-based environmental fee (PEBEF);
- Existing environmental regulation can be seen as the minimum requirement;
- The PEBEF is a monetary mechanism that stimulates the operator to outperform the minimum requirement;
- Let's imagine that hydropower only impacts *a given environmental attribute* and that the impact can be classified into 4 classes, from "no impact" (or optimal state k^*) to $k-4$. The law requires the attainment of $k-2$, otherwise the plant is not authorized (or for, what it matters, it cannot operate);
- Then, the environmental fee is simply the cost of the downgrade from k^* to $k-2$;
- If properly conceived, the fee should stimulate the operators to reduce their impact and consequently pay a lower fee (**or no fee at all**).



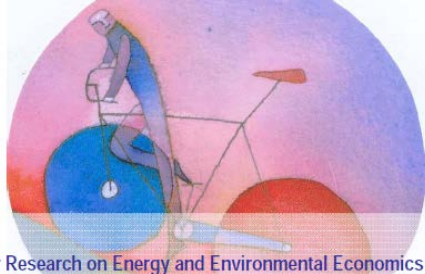
Coupling the economic and environmental offer (II)

- In other words, operators should find more convenient to invest or to adjust their management strategies than to pay the fee;
- This has clear environmental benefits but:
 - It reduces profits (*they would still earn lots of money...*);
 - It reduces the amount of money that Local Authorities and Central Authorities get;
 - It might increase electricity prices...
- Are consumers ready for that?



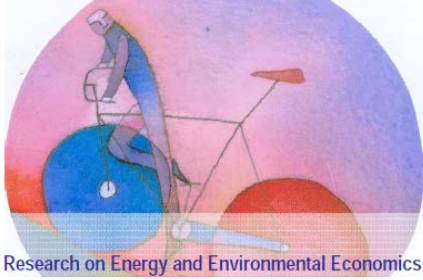
Estimating the value of the fluvial ecosystem: the Valtellina case

- Valtellina is geographically located in northern Lombardia. It is home to some 2.2 GW of hydropower plants, roughly 18% of the overall Italian hydropower capacity;
- Half of the capacity should be tendered in the next 3/4 years;
- Within a broader project, funded by Fondazione Cariplo, we have estimated households' willingness to pay to obtain a high level of ecological integrity.
- Using the Choice Experiment technique, we have interviewed a representative sample of 1,500 individuals from Lombardia



Estimating the value of the fluvial ecosystem: the Valtellina case (II)

- The Bidding vehicle was an increase in their electricity bill (we explained that a more friendly production was more expensive);
- The results are impressive: we have estimated a marginal willingness to pay to move from the actual ecological status to a high level of ecological integrity of **109 € per household per year**.
- So it seems that consumers are ready to pay more...
- *Are Authorities ready to get less?*



Thank you!

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