PUBLIC, SOCIAL AND COOPERATIVE ECONOMY
MEETING THE GENERAL INTEREST
-WATER-

Pro acqua
Italian policy to get prices and governance right

Lorenzo Bardelli

29th International Congress of CIRIEC
Wien, 14 September 2012
The research Institute on public utilities **PROAQUA** was created in 1995 by Federgasacqua (currently Federutility) and the main public service companies. From the beginning it was shaped as a non-profit consortium, focused on technical and economic study and research activities, as well on support to all operators involved in reorganization processes of water sector.

In 1999 the Institute became **CRS-PROAQUA** and extended its research activities to other local public services, such as gas distribution and waste management.

In 2006 the Institute change the name in **Utilitatis pro acqua energia ambiente**. The studies commissioned by leading Institutions provided an opportunity for consortium members to be active participants in the design of future scenarios for the sector.

18 may 2011: consortium becomes a Fondation, in which FederUtility e Federambiente are founding promoters.

Wien, 14 September 2012
About Utilitatis’ publications

- **Blue Book** which includes data about the integrated water service in Italy, and analyzes the main figures (volumes, tariffs, investments, costs) taken from the 91 Industrial Strategic Plans -which are drawn up by the respective Authorities -and by the year some accounting data of the management companies.

- **Yellow Book** which is a systematic data collection on tenders carried out in distribution service of natural gas. This data collection supported by appropriate consultation and divulgation instrument. The research analyze the accounting data of management companies.

- **Green Book** studies the main economic and quantitative figures of waste industry in Italy. The last edition includes a systematic data collection on tenders carried out in waste service.

Wien, 14 September 2012
Agenda

- New model of regulation of water service
- Dimensional features of Optimal Territorial Areas
- Types of service assignment
- Economic and Financial structure of water companies
- Actual tariff computation
- Three-yearly revision process
- Investment requirements
- Families’ expenditures and affordability
- Delay
- Towards a new tariff system
- Overview on drought
New model of regulation of water service

From a model with soft regulation

CONVIRI (National Commission of Supervision of Water Resources) – Ministry of the environment

To a model with an independent Authority

AEEG (Italian Regulatory Authority for Electricity and Gas)

With the law November 2011, n. 214, Aeeeg has competences also in regulating, controlling and monitoring water services. The mentioned law provides that: “with respect to the national Agency for both regulation and vigilance of water services, the functions of regulation and control of water services are assigned to the Authority making use of the same powers given by the law November 14th 1995, n.481”.

- Main functions:
  - Definition of the method to calculate tariff
  - Definition of quality levels
  - Control over the compilation of AMDP
  - Protection of the users
Population and territory of the ATOs can be very different: in some cases they are the same as the Region’s, in other cases their dimensions are smaller than the Province, in some other cases they identify with a specific urban aggregate. The average ATO’s population is slightly more than 600,000.

Last Regional Laws are bringing to a reduction of the number of the ATOs, increasing their dimension.

### Dimensional features of Optimal Territorial Areas (ATO)

<table>
<thead>
<tr>
<th>Regione</th>
<th>N. ATO</th>
<th>Population Total (kmq)</th>
<th>Average per ATO (kmq)</th>
<th>Area (kmq) Total</th>
<th>Average per ATO (kmq)</th>
<th>N. ATO ex Last Regional Law</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piemonte</td>
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<td>25,402</td>
<td>4,234</td>
<td>6</td>
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<td>119,548</td>
<td>119,548</td>
<td>3.263</td>
<td>3.263</td>
<td>n.d.</td>
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<tr>
<td>Lombardia*</td>
<td>12</td>
<td>9,032,554</td>
<td>752,713</td>
<td>23,863</td>
<td>1.989</td>
<td>13</td>
</tr>
<tr>
<td>Trentino Alto Adige</td>
<td>-</td>
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<td>-</td>
<td>13.607</td>
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<td>-</td>
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<td>Veneto</td>
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<tr>
<td>Friuli Venezia Giulia</td>
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<td>1.965</td>
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<td>1.355</td>
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<td>Emilia Romagna</td>
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<td>582,968</td>
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<td>3.832</td>
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<tr>
<td>Umbria**</td>
<td>3</td>
<td>825,826</td>
<td>275,275</td>
<td>8.456</td>
<td>2.819</td>
<td>4</td>
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<tr>
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<td>1,470,581</td>
<td>294,116</td>
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<td>1.939</td>
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<tr>
<td>Lazio</td>
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<td>5,112,413</td>
<td>1,022,483</td>
<td>17.236</td>
<td>3.447</td>
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<tr>
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<td>1.794</td>
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<tr>
<td>Molise</td>
<td>1</td>
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<td>4,079,033</td>
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<td>19.358</td>
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<td>Basilicata</td>
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<td>9.995</td>
<td>1</td>
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<td>Calabria</td>
<td>5</td>
<td>2,011,466</td>
<td>402,293</td>
<td>15.081</td>
<td>3.016</td>
<td>1</td>
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<tr>
<td>Sicilia</td>
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<td>4,968,991</td>
<td>552,110</td>
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<td>2.857</td>
<td>9</td>
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<td>Sardegna</td>
<td>1</td>
<td>1,631,880</td>
<td>1,631,880</td>
<td>24.090</td>
<td>24.090</td>
<td>1</td>
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<tr>
<td>ITALIA</td>
<td>91</td>
<td>56,995,744</td>
<td>615,997</td>
<td>301,336</td>
<td>3.162</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Min</td>
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<td>119,548</td>
<td>1.355</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Wien, 14 September 2012
The situation in 2011 shows that 72 entrusting agreements have been carried out, concerning a population of about 49 millions inhabitants.

A majority (34) of entrusted operators are public owned companies (in house); slighter numbers (12) occur for mixed ownership (public-private) companies, while 13 are quoted enterprises. There are only 6 concessions to third parties. In 7 cases we have other form of service assignment.

A law requiring liberalization of water sector was introduce in 2008. Such a policy is a way to get resources into the sector given that public funds are scarce. Its implementation has been held up by regional challenges to its constitutionality (but its legality has been confirmed by the Constitutional Court) and it was finally repealed by a referendum in 2011.
Economic and Financial structure of water companies

- Trend of investment expenditures on return
- Yearly variation (%) of expenditure in deprecations
- Yearly variation (%) of operating costs

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Actual tariff computation on the basis of the so called Method

- Tariff computation rule (with all variables at constant value):
  \[ T_n = \left( \frac{C + A + R}{VE} \right)_n \]  
  where
  \( T_n \) is the real average tariff forecast in the area plan for the year \( n \);
  \( C \) is the total amount of operational costs;
  \( A \) is the part of depreciation;
  \( R \) is the return on invested capital;
  \( VE \) is the volume supplied in the year \( n \) according to the plan forecast.

- Tariff growth constraint:
  \[ \frac{T_n}{T_{n-1}} \leq (1 + K_n) \]  
  where \((1 + K_n)\) is the limit to price growth for year \( n \)

- By writing [2] through [1]:
  \[ \frac{(C + A + R)_n}{(C + A + R)_{n-1}} \leq (1 + K_n)(1 + ve) \]  
  where \( ve \) indicates the percentage variation in the forecast of the volumes supplied in the two periods considered.

The actual constraint on the growth of the total amount of cost components included in the tariff may be relaxed in the plan through a forecast of growth in the volumes supplied.

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Operating Cost, Estimated Operating Cost and Planned Operating Cost

- Objective: reduce operating cost to promote investments

- Calculation of Estimated Operating Cost

  - Distribution

    \[ COAP = 1.1 \times (VE)^{0.67} \times (L)^{0.32} \times (IT)^{0.1} \times e^{\left(0.2 \frac{Utdm}{UT}\right)} + EE + AA \]

    \[ IT = 100 \times \frac{\sum_{i=1}^{N} (V_i Cu_i) + Vnt \times 0.01}{\sum_{i=1}^{N} V_i + Vnt} \]

  - Sewerage

    \[ COFO = 0.15 \times (L_f)^{0.4} \times (Ab)^{0.6} + EE \]

  - Treatment

    \[ COTR = \sum_{i=1}^{n} \alpha_i (Ct)^{\beta} \times A_i \times F_i \]

Wien, 14 September 2012
**Trend of the planned tariffs (TRM - real average tariff)**

<table>
<thead>
<tr>
<th>Geographical area</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2015</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>North - West</td>
<td>1.20</td>
<td>1.25</td>
<td>1.30</td>
<td>1.43</td>
<td>1.49</td>
</tr>
<tr>
<td>North - East</td>
<td>1.55</td>
<td>1.61</td>
<td>1.66</td>
<td>1.76</td>
<td>1.92</td>
</tr>
<tr>
<td>Centre</td>
<td>1.58</td>
<td>1.63</td>
<td>1.69</td>
<td>1.75</td>
<td>1.85</td>
</tr>
<tr>
<td>South</td>
<td>1.44</td>
<td>1.47</td>
<td>1.49</td>
<td>1.54</td>
<td>1.53</td>
</tr>
<tr>
<td>Islands</td>
<td>1.46</td>
<td>1.50</td>
<td>1.54</td>
<td>1.62</td>
<td>1.68</td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>1.43</td>
<td>1.47</td>
<td>1.52</td>
<td>1.61</td>
<td>1.68</td>
</tr>
</tbody>
</table>

**Dynamic of the tariff components**

- **Exogenous costs**
- **Operating Costs**
- **Cost of capital**

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+ 17.5%
TRM (real average tariff) for ATO - cluster analysis

- Planned tariff for year of service assignment
- Planned tariff for dimension of Optimal Territorial Areas and duration of the planning document

- Higher tariff in Optimal Territorial Areas with older service assignments
- Inverse correlation between tariff levels and dimensions of the Optimal Territorial Areas

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Three-yearly revision process

- "Three-yearly revision" is a planning instrument, more up to date in relation to the characteristics of the territory, to the changing needs of the service, to the new critical issues in the use of water resources.

- Trend of the deviations of the variables between initial plans and revisions:
  - Increase of operating costs
  - Reduction of volume supplied
  - Reduction of investments

- *In house*
  - Volume supplied: -14%
  - Operating costs: +2%
  - Depreciations: -50%
  - Return on invested capital: -40%
  - TRM ("real average tariff"): +5%

- *Public-private companies*
  - Volume supplied: -10%
  - Operating costs: +14%
  - Depreciations: -13%
  - Return on invested capital: -20%
  - TRM ("real average tariff"): +14%
**Investment requirements**

- Planned investments for the next 30 years

<table>
<thead>
<tr>
<th>Geographical area</th>
<th>Totale 30 years (mgl€)</th>
<th>Yearly total (mgl€/year)</th>
<th>Public financing (mgl€) (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North - West</td>
<td>15.136.198</td>
<td>504.540</td>
<td>706.116 4,7%</td>
</tr>
<tr>
<td>North - East</td>
<td>13.537.169</td>
<td>451.239</td>
<td>1.204.368 8,9%</td>
</tr>
<tr>
<td>Centre</td>
<td>12.005.616</td>
<td>400.187</td>
<td>605.412 5,0%</td>
</tr>
<tr>
<td>South</td>
<td>15.858.934</td>
<td>528.631</td>
<td>1.757.482 11,1%</td>
</tr>
<tr>
<td>Islands</td>
<td>8.615.683</td>
<td>287.189</td>
<td>1.359.441 15,8%</td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td><strong>65.153.601</strong></td>
<td><strong>2.171.787</strong></td>
<td><strong>5.632.820</strong> <strong>9,1%</strong></td>
</tr>
</tbody>
</table>

- Redefinition of investments on the bases of EU objectives for 2015

<table>
<thead>
<tr>
<th>Geographical area</th>
<th>Inv. for objectives 2015 (mgl€/year)</th>
<th>Yearly Total Inv. [PdA+ objectives 2015] (mgl€ / year)</th>
<th>Inv. next 3 years (mgl€)</th>
<th>Inv. next 5 years (mgl€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North - West</td>
<td>758.021</td>
<td>1.262.561</td>
<td>3.787.682</td>
<td>4.796.762</td>
</tr>
<tr>
<td>North - East</td>
<td>532.869</td>
<td>984.108</td>
<td>2.952.323</td>
<td>3.854.801</td>
</tr>
<tr>
<td>Centre</td>
<td>557.100</td>
<td>957.287</td>
<td>2.871.861</td>
<td>3.672.235</td>
</tr>
<tr>
<td>South</td>
<td>709.361</td>
<td>1.237.992</td>
<td>3.713.976</td>
<td>4.771.238</td>
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<tr>
<td>Islands</td>
<td>338.352</td>
<td>625.542</td>
<td>1.876.625</td>
<td>2.451.004</td>
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<td><strong>Italy</strong></td>
<td><strong>2.895.702</strong></td>
<td><strong>5.067.489</strong></td>
<td><strong>15.202.466</strong></td>
<td><strong>19.546.039</strong></td>
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</tbody>
</table>

- National priorities:
  - Security of supply
  - Treatment
  - Sewerage
Investments carried out and downward adjustments of investment requirements

- Planned investments

- Planned per capita yearly investments for year of service assignment

- Lower investments in Optimal Territorial Areas with older service assignments; this is due to the downward correction of the investments originally planned
Families’ consumptions and expenditures

- Estimate of average yearly expenditure of a hypothetical family, with different volumes of water consumption, is carried out considering the tariffs of 50 water basins (29 millions oh inhabitants).

- Expenditure variation 2011/2010 (consumption of 150 mc): +4,3%

- Trend of per capita consumption

Average expenditure for drinking water consumption

<table>
<thead>
<tr>
<th>Geographical area</th>
<th>100 mc</th>
<th>150 mc</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Expenditure 2011 (€/year)</td>
<td>Unit price (€/mc)</td>
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<td>North - West</td>
<td>121,31</td>
<td>1,21</td>
</tr>
<tr>
<td>North - East</td>
<td>153,84</td>
<td>1,54</td>
</tr>
<tr>
<td>Centre</td>
<td>147,87</td>
<td>1,48</td>
</tr>
<tr>
<td>South</td>
<td>126,14</td>
<td>1,26</td>
</tr>
<tr>
<td>Islands</td>
<td>137,29</td>
<td>1,37</td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td><strong>136,23</strong></td>
<td><strong>1,36</strong></td>
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</table>
Monthly expenditure of a family made up of 3 components for some goods and services (year 2010)

Water price are on average quite low compared with other European countries. OECD, in its Economic Survey on Italy (2011), wrote: «water has been underpriced for a long time and both price controls and the organisational structure have prevented a rational use of resources».
Some data about delay

- Average delay in the water sector: 4.35% of turnover

- Days Sales Outstanding (days)

- Yearly variation of Days Sales Outstanding

<table>
<thead>
<tr>
<th>Cluster</th>
<th>05 Vs 04</th>
<th>06 Vs 05</th>
<th>07 Vs 06</th>
<th>08 Vs 07</th>
<th>09 Vs 08</th>
<th>10 Vs 09</th>
<th>10 Vs 04</th>
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<tr>
<td>Top</td>
<td>0.7%</td>
<td>-7.2%</td>
<td>2.9%</td>
<td>-1.7%</td>
<td>1.1%</td>
<td>-9.4%</td>
<td>-13.3%</td>
</tr>
<tr>
<td>Big</td>
<td>2.6%</td>
<td>10.1%</td>
<td>1.3%</td>
<td>-2.4%</td>
<td>7.5%</td>
<td>-9.2%</td>
<td>9.1%</td>
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<tr>
<td>Medium</td>
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<td>7.7%</td>
<td>1.5%</td>
<td>-1.6%</td>
<td>2.3%</td>
<td>-3.0%</td>
<td>17.3%</td>
</tr>
<tr>
<td>Small</td>
<td>-6.5%</td>
<td>5.0%</td>
<td>4.6%</td>
<td>-8.3%</td>
<td>0.2%</td>
<td>-4.0%</td>
<td>-9.4%</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>1.7%</strong></td>
<td><strong>-2.4%</strong></td>
<td><strong>2.4%</strong></td>
<td><strong>-2.2%</strong></td>
<td><strong>2.9%</strong></td>
<td><strong>-8.3%</strong></td>
<td><strong>-6.4%</strong></td>
</tr>
</tbody>
</table>
Towards a new tariff system: from \textit{ex ante} “\text{k regulation}” to \textit{ex post} “\vartheta regulation”

- Tariff Method for the years 2012-2013
  - Fees applied in 2012 (calculated on the base of the old Method) - and held constant in 2013 - have to be updated multiplying them by a factor $\vartheta_i^t$
    \[
    \vartheta_i^t = \frac{VRG_i^t - ARIC_{2011}^i}{\sum_u \text{tarif}_{u,i}^{2012} \cdot (\text{vscal}_{v,i}^{2012})^u}
    \]
    where
    - $VRG_i^t$ is the constraint to revenues for the enterprise $i$ in the year $t$
    - $ARIC_{2011}^i$ are non tariff revenues
    - $\sum_u \text{tarif}_{u,i}^{2012} \cdot (\text{vscal}_{v,i}^{2011})^u$ is the admitted revenue, calculated on the base of scale variables of the year 2011
  - Variance ($Rp$) between the tariffs actually applied and those which have applied with new methodology. This variance will be offset in 2014.
    \[
    Rp_i^{2012} = \vartheta_i^{2012} \sum_u \text{tarif}_{u,i}^{2012} \cdot (\text{vscal}_{v,i}^{2011})^u - \sum_u \text{tarif}_{u,i}^{2012} \cdot (\text{vscal}_{v,i}^{2012})^u
    \]
- Actually, the calculation of tariffs applied to the user is mainly driven by predictive variables, which can have significant deviations from those found in final balances.
  The new tariff system do not considers any planned variable and refers only to the variables recorded in an annuity: this could lead to not adequately consider some significant elements

Wien, 14 September 2012
Overview on drought

➢ Some definitions

▪ Meteorological drought:
  “A period of abnormally dry weather sufficiently prolonged for the lack of precipitation to cause a serious hydrologic imbalance in the affected area”. (Huschke, R.E., ed. 1959)

▪ Hydrologic drought:
  “A period of below average water content in streams, reservoirs, ground-water acquifers, lakes and soils”. (Yevjevich Vujica, Hall, W.A., and Salas, J.D., eds., 1977)

▪ Agricultural drought:
  “A climatic excursion involving a shortage of precipitation sufficient to adversely affect crop production or range production”. (Rosenberg, N.J., ed., 1979)

➢ Some action strategies

▪ to adapt technologies used (e.g. plants cooling to recycling rather than continuous-flow)

▪ to replace the water demanding activities with other non-water demanding

▪ to use systems to cover the risk of drought, such as insurance schemes to compensate for the non-delivery.
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