Uruguay’s Program for Small Hydro Power (SHP) and Agricultural Resilience

Contact information:

Agr. Eng. Alicia Torres
alicia.torres@dne.miem.gub.uy
Environmental advisor
Secretary of Energy
Ministry of Industry, Energy and Minning

Eng. Martín Scarone
martin.scarone@dne.miem.gub.uy
Renewable Energy advisor
Secretary of Energy
Ministry of Industry, Energy and Minning

June, Bonn - Germany
**Overview of Uruguay**

<table>
<thead>
<tr>
<th><strong>Country name:</strong></th>
<th>República Oriental del Uruguay</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Land area:</strong></td>
<td>176,215 km²</td>
</tr>
<tr>
<td><strong>Population:</strong></td>
<td>3.4 million inhabitants</td>
</tr>
<tr>
<td><strong>Annual growth rate:</strong></td>
<td>0.3 %</td>
</tr>
<tr>
<td><strong>Density:</strong></td>
<td>19 inhabitants/km²</td>
</tr>
<tr>
<td><strong>GDP:</strong></td>
<td>USD 15,414/inhabitant</td>
</tr>
<tr>
<td><strong>Life expectancy:</strong></td>
<td>77 years</td>
</tr>
<tr>
<td><strong>Infant mortality rate:</strong></td>
<td>7.7/1000</td>
</tr>
</tbody>
</table>
Context

- Uruguay Agricultural sector
  - Produce food for 28 million people (3.4 million inhabitants)
  - 70% of national exports
  - 80% of national greenhouse gas emissions (Uruguay iNDIC aims to reduce emissions intensity in the sector)

- CC agricultural sector: frequent and severe droughts and floods

- National Plan for Climate Change 2009 define irrigation projects a strategic line for adaptation

- Energy Policy mitigation goals: 50% primary energy and 90% of electricity from renewables
Reason for project

• Contribute to resilience in the agricultural sector, using clean energy sources

• Encourage the development of multipurpose irrigation systems, SHP making more profitable the irrigation business

• Adaptation and mitigation in integrated way
  ✓ reducing climate variability risk from droughts and floods
  ✓ increase agricultural production by ensuring water access
  ✓ generating electricity while using water for irrigation
Barriers

• Lack of experience with SHP associated with irrigation dams

• Present reliable supply of electricity limits the capacity to develop new projects of generation

• Regulatory and Policy:
  – priorities in the use of water for irrigation instead of generation are needed to assure farmers their main business
  – limitations in the electricity market

• Financial: Poor experience accessing climate finance.
WHAT the program aims to do

• overcome the barriers to the development of irrigation + SHP dams, through demonstrative pilot projects

• **Phase 1 - Pilot projects**
  SHP Incorporation in existing irrigation dams to prove the concept and develop capacities, prior to scaling up

• **Phase 2**
  Scaling up in new and bigger irrigation + SHP dams
**HOW the program will do it**

- **Policy changes:**
  - enable multipurpose dams bigger than 5 MW to be self-dispatched
  - Include in the Irrigation Law under treatment in parliament
    - power generation activities
    - priority of irrigation over the generation, in multipurpose dams

- **Financial Mechanism:**
  - Phase 1: Pilots of SHP incorporation in existing irrigation dam
    - 1st pilot supported by the investment and special PPA
    - Other pilots, up to 2 MW of total power: supported by part of the investment and special PPA support
  - Phase 2: Projects of irrigation + SHP in new dams
    - investment Loan support + private funds (17 new dams)
HOW the program will do it

- Technical Assistance
  - For the final formulation of the program
  - Program follow up
  - Feasibility studies for new multipurpose dams
  - Financial analysis needed to implement phase 2.

WHO will implement

<table>
<thead>
<tr>
<th>Farmers</th>
<th>Public Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Industry, Energy and Mining</td>
<td>Ministry of Livestock, Agriculture, and Fishing</td>
</tr>
<tr>
<td>Ministry of Housing, Territorial Order and Environment (Climate Change and Water offices),</td>
<td>National Emergency System (SINAЕ)</td>
</tr>
</tbody>
</table>
Expected outcomes

Strong change in the paradigm of water resource management for Adaptation.

New players associated to achieve co-benefits (irrigation + SHP)

Innovative program, combines adaptation and mitigation to climate change and will increase productivity and return of investment.

**Adaptation** expected results:

- Reduction of risks that climate variability has for agricultural production.
- Irrigation improve crop yields (100-150% for maize, 30-50% in soybean) and 100% increase in meat and milk productivity
- Integrated management water resources improvement
Expected outcomes

Mitigation expected results:

• Reduction of emissions by substitution of fossil sources in the SHP electric energy generation
  – 92 ktCO2 – phase 1 (project life 25 years)
  – 1,000 ktCO2 – phase 2 (project life 25 years)

Country’s capabilities improvement:

• New legal frameworks approved to promote irrigation and generation
• Qualified technicians in application and maintenance of SHP.
• 200,000 new hectares irrigated in Uruguay
• New political frameworks and country’s commitments with the climate change agreements
## Program Financing

**PHASE 1:** Pilots of SHP incorporating (2,1 MW max.) in existing irrigation dams

<table>
<thead>
<tr>
<th></th>
<th>Investment</th>
<th>pay a promoted price in the PPA</th>
<th>Feasibility studies</th>
<th>Sub-Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Public contribution</td>
<td></td>
<td></td>
<td></td>
<td>8,95</td>
</tr>
<tr>
<td>Private Funds</td>
<td>2</td>
<td></td>
<td></td>
<td>2,00</td>
</tr>
<tr>
<td>International Support (Grant)</td>
<td>6,40</td>
<td></td>
<td>0,25</td>
<td>6,65</td>
</tr>
<tr>
<td><strong>Total Phase 1 (million USD)</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>17,60</strong></td>
</tr>
</tbody>
</table>

**PHASE 2 – Projects of Irrigation + SHP in new Dams**

<table>
<thead>
<tr>
<th></th>
<th>Investment to build 17 irrigating + SHP new dams</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Support (Loan)</td>
<td>153</td>
</tr>
<tr>
<td>Private Funds</td>
<td>65</td>
</tr>
<tr>
<td><strong>Total Phase 2 (million USD)</strong></td>
<td><strong>218</strong></td>
</tr>
</tbody>
</table>
Conclusions

• Profitability of the irrigation + generation project is higher than projects of only irrigation

• Program contributes in the adaptation of a key sector

• Transformational change of water resource management (irrigation + power generation)

• Program is replicable because Uruguay only stores in dams 5% of the runoff water
Conclusions

• National commitment (funds support)

• Aligned with national policies (irrigation development-adaptation, renewable energy-mitigation)

• The program needs support:
  – to enable the learning period and
  – to give visibility to the co-benefits of the concept

• The program will help to fulfill the goals in mitigation and adaptation stated in the iNDC, throughout:
  – Reducing emissions intensity and helping to deal with climate change and variability in the agricultural sector
  – Promoting renewable energy development
Thank you for your attention ...

Uruguay’s Program for Small Hydropower and Agricultural Resilience

Eng. Martín Scarone
martin.scarone@dne.miem.gub.uy
Renewable Energy advisor
Secretary of Energy
Ministry of Industry, Energy and Mining