GEOTHERMAL DEVELOPMENT IN NICARAGUA
POLICIES AND LEGAL-REGULATORY FRAMEWORK

Dr. María Eugenia Meza
Eng. José Francisco Ruiz Cordero
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Human Development:
- Expansion of people's opportunities and capacities, guaranteeing effective respect for their rights and liberties.
- Improvements in health and education.
- Guarantee, from government institutions, the set of opportunities for subsistence, life and effective exercise of liberties to allow human beings to reach their full potential.
- This is a fundamental approach of the Citizen Power Development Model in our country.

A decrease in dependence on imported oil and harnessing of the potential of our available renewable resources, such as geothermal, hydropower, wind, solar and biomass.
### Impact of the Policies

#### 2013 Estimated Economic Impact

<table>
<thead>
<tr>
<th>Projects</th>
<th>Effective Capacity</th>
<th>Plant Factor</th>
<th>Annual projected power generation (energy)</th>
<th>SUBSTITUTION OF FUEL (FUEL OIL)</th>
<th>PERCENTAGE SHARE OF THE TOTAL DEMAND</th>
<th>Commercial Operation Commencement Date</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BIOMASS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INGENIO SAN ANTONIO</td>
<td>30,00</td>
<td>0,43</td>
<td>113,10</td>
<td>171,80</td>
<td>18,90</td>
<td>2,9%</td>
</tr>
<tr>
<td>INGENIO MONTE ROSA</td>
<td>30,00</td>
<td>0,58</td>
<td>151,80</td>
<td>230,70</td>
<td>25,40</td>
<td>3,9%</td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>60,00</strong></td>
<td><strong>0,56</strong></td>
<td><strong>264,90</strong></td>
<td><strong>402,50</strong></td>
<td><strong>44,27</strong></td>
<td><strong>6,8%</strong></td>
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<tr>
<td><strong>GEOTHERMAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SAN JACINTO-TIZATE FASE I</td>
<td>36,00</td>
<td>0,93</td>
<td>293,29</td>
<td>445,70</td>
<td>48,90</td>
<td>7,4%</td>
</tr>
<tr>
<td>SAN JACINTO-TIZATE FASE II</td>
<td><strong>36,00</strong></td>
<td><strong>0,93</strong></td>
<td><strong>293,29</strong></td>
<td><strong>445,70</strong></td>
<td><strong>48,90</strong></td>
<td><strong>7,4%</strong></td>
</tr>
<tr>
<td>MOMOTOMBO</td>
<td>*<strong>27,50</strong></td>
<td><strong>0,96</strong></td>
<td><strong>231,26</strong></td>
<td><strong>351,43</strong></td>
<td><strong>38,74</strong></td>
<td><strong>5,9%</strong></td>
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<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>99,50</strong></td>
<td><strong>0,94</strong></td>
<td><strong>817,83</strong></td>
<td><strong>1242,83</strong></td>
<td><strong>136,54</strong></td>
<td><strong>20,7%</strong></td>
</tr>
<tr>
<td><strong>HYDROELECTRIC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LARREYNAGA</td>
<td>*<strong>17,20</strong></td>
<td><strong>0,35</strong></td>
<td><strong>53,12</strong></td>
<td><strong>80,70</strong></td>
<td><strong>8,90</strong></td>
<td><strong>1,4%</strong></td>
</tr>
<tr>
<td>HIDROPANTASMA</td>
<td><strong>12,00</strong></td>
<td><strong>0,50</strong></td>
<td><strong>52,76</strong></td>
<td><strong>80,20</strong></td>
<td><strong>8,80</strong></td>
<td><strong>1,3%</strong></td>
</tr>
<tr>
<td>CENTROAMÉRICA</td>
<td>*<strong>50,00</strong></td>
<td><strong>0,39</strong></td>
<td><strong>171,20</strong></td>
<td><strong>260,10</strong></td>
<td><strong>28,60</strong></td>
<td><strong>4,4%</strong></td>
</tr>
<tr>
<td>CARLOS FONSECA</td>
<td>*<strong>50,00</strong></td>
<td><strong>0,39</strong></td>
<td><strong>170,50</strong></td>
<td><strong>259,10</strong></td>
<td><strong>28,50</strong></td>
<td><strong>4,3%</strong></td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>129,20</strong></td>
<td><strong>0,39</strong></td>
<td><strong>447,58</strong></td>
<td><strong>680,10</strong></td>
<td><strong>74,80</strong></td>
<td><strong>11%</strong></td>
</tr>
<tr>
<td><strong>WIND</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMAYO I</td>
<td>39,90</td>
<td>0,35</td>
<td>121,70</td>
<td>184,90</td>
<td>20,30</td>
<td>3,1%</td>
</tr>
<tr>
<td>AMAYO II</td>
<td>23,10</td>
<td>0,41</td>
<td>82,10</td>
<td>124,70</td>
<td>13,70</td>
<td>2,1%</td>
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<tr>
<td>EOLO</td>
<td><strong>37,50</strong></td>
<td><strong>0,40</strong></td>
<td><strong>131,19</strong></td>
<td><strong>199,30</strong></td>
<td><strong>21,90</strong></td>
<td><strong>3,3%</strong></td>
</tr>
<tr>
<td>BLUE POWER</td>
<td><strong>39,60</strong></td>
<td><strong>0,42</strong></td>
<td><strong>145,70</strong></td>
<td><strong>221,40</strong></td>
<td><strong>24,40</strong></td>
<td><strong>3,7%</strong></td>
</tr>
<tr>
<td><strong>SUBTOTAL</strong></td>
<td><strong>140,10</strong></td>
<td><strong>0,40</strong></td>
<td><strong>480,69</strong></td>
<td><strong>730,37</strong></td>
<td><strong>80,34</strong></td>
<td><strong>12,3%</strong></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>428,80</strong></td>
<td></td>
<td><strong>2011,00</strong></td>
<td><strong>3055,80</strong></td>
<td><strong>335,95</strong></td>
<td><strong>51,1%</strong></td>
</tr>
</tbody>
</table>

*Calculated based on a fuel oil price of **US$110 per drum** and an average yield of 15.67 kWh/gallon of fuel oil.*
CURRENT STATUS OF GEOTHERMAL PROJECTS

- PROJECTS IN OPERATION PHASE
  - MOMOTOMBO, in operation since 1983
    Installed Capacity 78 MW
    PP: 9 PR: 6
  - SAN JACINTO TIZATE, in operation since 2005
    Installed Capacity 72 MW
    PP: 7 PR: 3
  - CASITA-SAN CRISTÓBAL OPERATION CONCESSION
    IN DEVELOPMENT STAGE

- PROJECTS IN EXPLORATION PHASE
  - Managua-Chiltepe

- PROJECTS WITHOUT CONCESSIONS
  - El Hoyo-Monte Galán
  - Volcán Cosigüina
  - Volcán Telica-El Ñajo
  - Tipitapa
  - Isla de Ometepe
  - Caldera de Apoyo, Caldera de Masaya
  - Volcán Mombacho
# 2013-2027 Generation Expansion Plan

<table>
<thead>
<tr>
<th>PROJECTS</th>
<th>Resource</th>
<th>YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASUR (ingenio)</td>
<td>Biomass</td>
<td></td>
</tr>
<tr>
<td>Biomasa 1</td>
<td>Biomass</td>
<td></td>
</tr>
<tr>
<td>Biomasa 2</td>
<td>Biomass</td>
<td></td>
</tr>
<tr>
<td>Montelimar</td>
<td>Biomassa</td>
<td></td>
</tr>
<tr>
<td>Alba Rivas</td>
<td>Wind</td>
<td></td>
</tr>
<tr>
<td>MMV 35 MW</td>
<td>Fuel Oil</td>
<td></td>
</tr>
<tr>
<td>MMV 35 MW</td>
<td>Fuel Oil</td>
<td></td>
</tr>
<tr>
<td>MMV 35 MW</td>
<td>Fuel Oil</td>
<td></td>
</tr>
<tr>
<td>MMV 35 MW</td>
<td>Fuel Oil</td>
<td></td>
</tr>
<tr>
<td>Casitas</td>
<td>Geo</td>
<td></td>
</tr>
<tr>
<td>Apoyo</td>
<td>Geo</td>
<td></td>
</tr>
<tr>
<td>Chiltepe</td>
<td>Geo</td>
<td></td>
</tr>
<tr>
<td>Mombacho</td>
<td>Geo</td>
<td></td>
</tr>
<tr>
<td>Boboké</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Hidro Pantasma</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Larreynaga</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Tumarín</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Piedra Puntuda</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>El Carmen</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Copalar Bajo</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Valentín</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Salto Y-Y</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>El Diamante</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Piedra Cajón</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>Corriente Lira</td>
<td>Hydro</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>1162</td>
</tr>
</tbody>
</table>
COMPLEMENTARY STUDIES

UBICACIÓN DE NUEVAS ÁREAS GEOTÉRMICAS PARA MEDIA Y BAJA ENTLALPIA

- Lugar: Santa Bárbara
  Ubicación: Norte del País
  Temperatura: 97°C

- Lugar: Macuellizo
  Ubicación: Norte del País
  Temperatura: 73.3°C

- Lugar: Costigüina
  Ubicación: Occidente del País
  Temperatura: 41.4°C

- Lugar: Cerro Juan Sapo
  Ubicación: Occidente del país
  Temperatura: 55.8°C

- Lugar: San Francisco Libre
  Ubicación: En las costas del lago Xolotlán
  Temperatura: 87.2°C

- Lugar: Caldera de Apoyo y Mombacho
  Ubicación: Departamento de Masaya y Granada
  Temperatura: 95°C

- Lugar: El Basurero
  Ubicación: Boca de Sábalo
  Temperatura: 66.6°C

- Lugar: Waslala
  Ubicación: RAAN
  Temperatura: 88°C

- Lugar: Puerto Viejo
  Ubicación: RAAN
  Temperatura: 80°C

- Lugar: Boaco-Teustepe
  Ubicación: Aguas Claras
  Temperatura: 45.3°C

- Lugar: Aguas Calientes
  Ubicación: San Miguelito
  Temperatura: 81°C

- Lugar: Las Maravillas
  Ubicación: Boca de Sábalo
  Temperatura: 84°C
The execution of geothermal projects requires the participation of experts to improve project supervision.

Thus, for many years the Government of the Republic of Nicaragua, through the MEM, has been developing national and international training programmes, at both introductory and advanced levels (Cuba, El Salvador, Iceland, Italy, Japan, Mexico, New Zealand), focused on professional development in the different areas related to geothermal energy.

In 2008, the Government of the Republic of Nicaragua and the Government of Iceland signed a partnership agreement, “Strengthening Geothermal Capacities”, with three components: a) Training of personnel related to geothermal energy, b) Technical assistance, c) Installation of a geochemical laboratory. This laboratory is accredited under the ISO 17025 standard.
LEGAL FRAMEWORK FOR GEOTHERMAL ENERGY
MAIN ELECTRICAL SUB-SECTOR REGULATIONS

- INSTITUTIONAL
  - Law No. 290, “Law on Organisation, Competences and Procedures of the Executive Power”, and its amendments and implementing regulation:
  - Decree No. 583 (2006), “Law Creating ENATREL” and its amendments: State transmission company that operates the SIN and administers the National Electrical Market through the CNDC.
  - Law No. 612, Amendment and Addendum to Law No. 290. This law creates MEM as the governing body for country's energy and mining sector.

- ELECTRICAL INDUSTRY

- GEOTHERMAL ENERGY
  - Decree 45-2010, Implementing Regulation of Law No. 443.

- ENVIRONMENT
The Ministry of Energy and Mines (MEM) is the governing body for the country's energy and mining sector. Among other responsibilities, MEM grants licenses and concessions for exploration and exploitation of natural resources.

The purpose of Law No. 443 is to foster and establish the basic conditions to regulate the activities involved in exploration and exploitation of the country's geothermal resources exclusively for the generation of electricity. Direct negotiation is established as the only channel for the granting of concessions for geothermal resources, with MEM authorised to invite bids from national and foreign investors.

Concessions for exploration are granted in a 100-km² area for a period of three years, extendable for another two years; concessions for exploitation are for a 20-km² area, with the possibility of enlarging this by an additional 20 km², for a period of 25 years, extendable for another 10 years.

Geothermal resources are national assets according to the CN and other laws of the republic.

The Government promotes, regulates and establishes the activities inherent in exploration and exploitation of geothermal resources. All activities covered by the Law related to exploration and exploitation of geothermal resources are matters of national interest.

Natural and legal persons can freely conduct preliminary investigations for exploration and exploitation of geothermal resources with prior authorisation from MEM.

It is the responsibility of MEM to execute the policies and strategies approved by the Executive Branch, as well as to administer and apply Law No. 443 and its Implementing Regulation.
CONCESSION CONTRACTS FOR EXPLORATION
3 years, +2-year optional extension. Use of Inherent and Preferential Law

CONCESSION CONTRACT FOR EXPLOITATION
25 years, extendable for another 10

Generation License for 30 years
Can be extended for 30 years

Pre-investment
Exemption from Temporary and Final Import Taxes
Local Purchases Required

Construction
≈ 4 years
Exemption from Temporary and Final Import Taxes
Local Purchases Required

Commercial Operation
26 years
Exempt from Income Tax (30%) for 10 years
Exemption from municipal income taxes for 5 years

CONCESSIONS FOR EXPLORATION AND EXPLOITATION OF GEOTHERMAL RESOURCES
The National Assembly approved Law 532: “Law for the Promotion of Electricity Generation Using Renewable Resources”, Published in Official State Gazette No.102 of 27 May 2005, which establishes the following incentives for generation projects that harness the country's renewable energies for public electricity service.

Article 7

- Exemption from payment of Import Customs Duties (DAI)
- Exemption from payment of Value-Added Tax (IVA) during construction of the project.
- Exemption from payment of Income Tax (IR) for the first 7 years of operation.
- Exemption from all applicable Municipal Taxes, on a staggered basis during 10 years.
- Exemption from any taxes on exploitation of natural resources for a maximum period of 5 years after the start of operation
- Exemption from the Revenue Stamp Tax (ITF) related to construction or operation of the project or extension by 10 years

In the case of concessions for exploration and exploitation of geothermal resources, there are tax benefits, such as exemptions from final import taxes (ISC, DAI and IVA), local purchases (IVA), as well as exemptions from taxes on income (national) and revenues (municipal). Some of these benefits extend to the concession holder's contractors and subcontractors.
<table>
<thead>
<tr>
<th>TAXES</th>
<th>GEOTHERMAL</th>
<th>HYDROPOWER</th>
<th>WIND/SOLAR/BIOMASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAI</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>IVA (Importation/local purchase)</td>
<td>✓ (Law No. 443)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>ISC</td>
<td>✓</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>IR</td>
<td>✓ (10 year)</td>
<td>✓ (7 years)</td>
<td>✓ (7 years)</td>
</tr>
<tr>
<td>IBI (Municipal)</td>
<td>x</td>
<td>✓ (75%-3 years; 50%-5 years; 25%-2 years)*</td>
<td>✓ (75%-3 years; 50%-5 years; 25%-2 years)</td>
</tr>
<tr>
<td>IMI (Municipal)</td>
<td>✓ (100%-5 years)</td>
<td>✓ (75%-3 years; 50%-5 years; 25%-2 years)</td>
<td>✓ (75%-3 years; 50%-5 years; 25%-2 years)</td>
</tr>
<tr>
<td>Registration (Municipal)**</td>
<td>x</td>
<td>✓ (75%-3 years; 50%-5 years; 25%-2 years)</td>
<td>✓ (75%-3 years; 50%-5 years; 25%-2 years)</td>
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<tr>
<td>Natural assets (exploitation)</td>
<td>✓ (10 years)</td>
<td>✓ (5 years)</td>
<td>✓ (5 years)</td>
</tr>
<tr>
<td>ITF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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## Environmental Permits

<table>
<thead>
<tr>
<th>CATEGORY I</th>
<th>CATEGORY II</th>
<th>CATEGORY III</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Environmental Impact Potential</strong></td>
<td><strong>Generation of hydropower of 10 to 100 MW</strong></td>
<td><strong>Generation of hydropower of less than 10 MW</strong></td>
</tr>
<tr>
<td><strong>Generation of hydropower of greater than 100 MW</strong></td>
<td><strong>Generation of geothermal energy at any level of generation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Generation of geothermal energy at any level of generation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Generation of electricity from biomass with a generation level of greater than 10 MW</strong></td>
<td><strong>Generation of electricity from biomass with a generation level of less than 10 MW</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Generation of wind energy</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Environmental Permit

Environmental Authorisation

High Environmental Impact Potential

Moderate Environmental Impact Potential

Low Environmental Impact Potential
CONFLICT RESOLUTION METHODS

- Law No. 540, (2005), Law on Mediation and Arbitration
- ARPIs (Agreements for Reciprocal Protection of Investments)
- Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York Convention -1958)
- CIADI
- CCI (Tumarín)
CHALLENGES

- ELIMINATION OF CHARGES
  - Surface Levy
  - Steam Tax
  - Water Levy
  - Minimum compensation (0.5%)
  - Government Participation

- MANDATORY ENVIRONMENTAL TECHNICAL REGULATION

  In 2012, MEM, in coordination with MARENA and with Icelandic cooperation funds, drafted a Mandatory Environmental-Technical Regulation

- REDUCTION OF INITIAL EXPLORATION RISK

  The Government of the Republic of Nicaragua is implementing a strategy with the support of cooperating financial bodies to reduce the economic risk involved in investment in the geothermal exploration phase for the purpose of bringing projects that still lack concessions to the level of feasibility. Currently, using PNESER funds, a feasibility study is being carried out through a consortium (national and international enterprise-SKM) of the Cosigüina Volcano area (technical-economic studies and slim-hole well drilling) that will provide results.
A NEW GENERATION OF INCENTIVES

Some PGEFRs in operation, such as in the case of devices (biomass), have invested in the restructuring of agroindustrial technology, machinery and equipment that has resulted in an increase in the amount of energy produced during the year; in other words, they have increased the plant or availability factor without the tax incentives of Law No. 532.

LAW ON PUBLIC-PRIVATE ASSOCIATION?

Is it necessary for the sector?

30-MW hydropower projects are covered under their Special and Specific Law

ENERGY EFFICIENCY LAW AND PROGRAMME PROJECT
THANK YOU FOR YOUR ATTENTION