Lessons from the Carbon Tax in Chile

Presentation for Carbon Outlook (CO2) Knowledge Exchange Series #2: Lessons Learned from Carbon Tax Implementation
October 7, 2021

Rodrigo Pizarro
Consultant, COTA21
rodrigo@cota21.cl
Context and Problem

- Chile has significant environmental problems
  - Climate Change
  - Atmospheric pollution
  - Congestion and motor vehicle pollution.

- Environmental policy is centered on standards and regulations.
A large share of the population is exposed to severe PM$_{2.5}$ pollution levels.

Greenhouse gas emissions increased with economic growth

GHG emissions by sector

Revenue from green taxes was low in 2014

Note: Chilean data excludes revenues from the specific tax on mining.
Source: OECD (2015), OECD Database on Instruments Used for Environmental Policy and Natural Resources Management.
Green Tax Legislation

• In September 2014, Chile passed a General Tax Reform Bill (Ley 20.780) with 3 green taxes.
• Three new taxes were introduced:
  • tax on CO$_2$ emissions from stationary sources with boilers and turbines (sum over 50MW)
  • tax on local contaminants also on stationary sources with boilers and turbines (PM, SO$_2$ and NO$_x$).
  • tax on the first sale of new cars considering the expected NOx emissions over their lifetime.
Tax Characteristics and Results

Tax Proposed and Rates
Design Elements
Results
Proposed Innovations
Lessons from Chile
Key Design Elements
Taxes on Stationary Source

The tax is based on all annual emissions of liable facilities. The CO2 and Local Pollutant tax have different rates, determined in terms of their respective marginal costs.

LOCAL POLLUTANT

\[ T_{ij} = 0.1 \times CCA_j \times CSC_{pc_i} \times Pob_j \]

- **\( T_{ij} \)**: Tax Rate of pollutant “i” in municipality “j” in US$/t.
- **\( CCA_j \)**: Air Quality Coefficient “j”.
  - SATURATED ZONE: 1.2
  - LATENT ZONE: 1.1
- **\( CSC_{pc_i} \)**: Social Cost of pollutant “i”.
  
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>PM</th>
<th>SO2</th>
<th>NOX</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST (US$)</td>
<td>0.9</td>
<td>0.01</td>
<td>0.025</td>
</tr>
</tbody>
</table>

GLOBAL POLLUTANT

\[ T = \text{USD } $5 \]

- **\( T \)**: Tax per ton US$/t.
- The tax exempts energy from biomass

There is no earmarking. Revenues go to national budget
## Tax Rate on Local Pollutants

<table>
<thead>
<tr>
<th>Municipality</th>
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<th>MP US$/ton</th>
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Is US$ 5 a ton a low tax rate?

• Consistent with Ministry of Development’s carbon pricing policy
• Reduced conflict with economic sectors.
• Acted as a signaling device
• Allowed time to develop institutional infrastructure without an unnecessary burden
• Limited price hikes for electricity
Other Relevant Design Features

- Tax on Emissions
- Definition of Liable Stationary Sources
- Point of Regulation
- Monitoring, Reporting and Verification (MRV)
- Institutional Infrastructure
What does tax on emissions mean?

• Must identify liable tax entity – who emits
• Must measure/estimate emissions at source
• Need MRV system
• Need controls and enforcement capability – at the source level
• Is it worth it?
Why is who is affected important?

Liable technologies can be observed

Liable thresholds require MRV ex ante

Boiler

Turbine

25 k tons a year of CO2
Who are the Liable Entities?

Tax defines liable facilities in terms of the combined total power capacity of 50 MW.
Liable Entities

Tax defines liable facilities as those structures that have boilers and turbines (energy generation) in terms of the combined total power capacity of 50 MW.
Liable Facility

Multiple Facilities operating in coordination also liable
What is the point of regulation?
Point of regulation

Tax based on carbon content

México, Colombia, South Africa, Sweden

Chile
How to measure emissions?

- **Measurement**
  - Direct emissions
  - Estimation
  - Continuous Emissions Monitoring
  - Direct point measurement
  - Estimation based on reporting

The key: All methods require a reporting structure for each facility.
Monitoring, Reporting and Verification (MRV)

Institutional Framework for the Governance of MRV system

- Registry
  - Registry of Facility potentially affected
  - Establish reporting requirements
  - Determine necessary information
  - Responsibility
  - Penalties
  - Technological Platform
  - Training Users
  - Regulatory Agency

- Measurement
  - Measurement methodologies protocols
  - Eg. CEMS, Emission factors
  - Base Lines (in the case of reductions)
  - Quality Control
  - Responsibilities
  - Penalties
  - Training Users
  - Enforcement Agency

- Report
  - Structure of Report
  - Eg. Requires information, dates
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- Verification
  - Verification System
  - Standards required for verifiers
  - Standards, criterion for verification.
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- Trade/Offset
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Institutional Framework for the Governance of MRV system
Institutional Infrastructure in practice

- Law 20.780
- Regulatory Statute (30 dic 2016)
- Measurement Protocols (SMA)
- Notification of Facilities (MMA)
- Registration System (RETC)
- Development of a System of Reporting (SMA)
- Design of a Verification System (SMA)
Institutional Infrastructure

Major Institutional Framework

MRV Institutional Framework

- Regulatory Framework of Climate Change Policies
- Regulatory Framework CPI
- Institutions
- Others

MRV

- Registry, Measurement, Reporting, Verification, Trade
- Enforcement and penalties
Results
Results: Liable Facilities

2017 RESULTS

REVENUES $191.189.575: 88% CO₂ and 94% power generation.

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>NUMBER OF FACILITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generadora</td>
<td>55</td>
</tr>
<tr>
<td>Pesquera</td>
<td>14</td>
</tr>
<tr>
<td>Celulosa/Papel</td>
<td>7</td>
</tr>
<tr>
<td>Agrícola</td>
<td>7</td>
</tr>
<tr>
<td>Maderero</td>
<td>4</td>
</tr>
<tr>
<td>Minería</td>
<td>1</td>
</tr>
<tr>
<td>Energía</td>
<td>1</td>
</tr>
<tr>
<td>Petroquímica</td>
<td>2</td>
</tr>
<tr>
<td>Químico</td>
<td>2</td>
</tr>
<tr>
<td>Cervecería</td>
<td>1</td>
</tr>
</tbody>
</table>

30
0
RESULTS

Revenue: 191.1 MM USD
Facilities: 94

MM USD

CO2 | Particulate Matter | Sulpher Dioxide | Nitrogen Oxides

88% | 8% | 3% | 1%
## CO2 Coverage

<table>
<thead>
<tr>
<th>CO2 Tons (mm)</th>
<th>Tax (2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>85,1</td>
<td></td>
</tr>
<tr>
<td>38,5</td>
<td>40</td>
</tr>
<tr>
<td>14,3</td>
<td>2,5</td>
</tr>
<tr>
<td>32,3</td>
<td></td>
</tr>
<tr>
<td>6,6</td>
<td></td>
</tr>
<tr>
<td>13,7</td>
<td></td>
</tr>
<tr>
<td>4,5</td>
<td></td>
</tr>
<tr>
<td><strong>109.9</strong></td>
<td></td>
</tr>
</tbody>
</table>
Revenues (2018) on stationary source: US$186 mm

Contaminants

- CO2: 88%
- PM: 3%
- Nox: 1%
- SO2: 1%

Sectors

- Energy: 93%
- Wood/Pulp: 3%
- Fisheries: 3%
- Others: 1%

Rodrigo Pizarro, 8rpizarro@gmail.com
Impact 2017-2018

<table>
<thead>
<tr>
<th></th>
<th>2017-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>-1%</td>
</tr>
<tr>
<td>CO2 emissions</td>
<td>-1,10%</td>
</tr>
<tr>
<td>PM emissions</td>
<td>-7%</td>
</tr>
<tr>
<td>Nox emissions</td>
<td>-2%</td>
</tr>
<tr>
<td>Sox emissions</td>
<td>-0,01%</td>
</tr>
</tbody>
</table>

Rodrigo Pizarro, 8rpizarro@gmail.com
# Revenue 2020 (USD) 2020

<table>
<thead>
<tr>
<th>Etiquetas de fila</th>
<th>PM- USD</th>
<th>NOX - USD</th>
<th>SO2 - USD</th>
<th>CO2 - USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>2,992,575</td>
<td>2,622,626</td>
<td>879,032</td>
<td>97,756,571</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>1,221,953</td>
<td>1,210,927</td>
<td>9,282</td>
<td>36,497,350</td>
</tr>
<tr>
<td>Petcoke</td>
<td>292,623</td>
<td>155,013</td>
<td>69,081</td>
<td>17,235,885</td>
</tr>
<tr>
<td>Petroleum</td>
<td>1,098,979</td>
<td>215,564</td>
<td>105,013</td>
<td>8,059,988</td>
</tr>
<tr>
<td>Biomass</td>
<td>3,711,897</td>
<td>895,019</td>
<td>129,556</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,318,027</strong></td>
<td><strong>5,099,149</strong></td>
<td><strong>1,191,964</strong></td>
<td><strong>159,549,794</strong></td>
</tr>
</tbody>
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## Emissions 2020 (Tons)

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<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>PM</td>
<td>5,312</td>
<td>4,942</td>
<td>3,834</td>
<td>3,453</td>
<td>-35,01%</td>
<td>-30,12%</td>
<td>-9,93%</td>
</tr>
<tr>
<td>NOx</td>
<td>50,315</td>
<td>50,340</td>
<td>47,369</td>
<td>45,164</td>
<td>-10,24%</td>
<td>-10,28%</td>
<td>-4,65%</td>
</tr>
<tr>
<td>SO2</td>
<td>43,771</td>
<td>43,731</td>
<td>41,761</td>
<td>30,572</td>
<td>-30,16%</td>
<td>-30,09%</td>
<td>-26,79%</td>
</tr>
<tr>
<td>CO2 liable</td>
<td>33,563,918</td>
<td>33,045,179</td>
<td>33,003,130</td>
<td>31,909,958</td>
<td>-4,93%</td>
<td>-3,44%</td>
<td>-3,31%</td>
</tr>
<tr>
<td>CO2 total</td>
<td>46,001,452</td>
<td>48,853,296</td>
<td>49,474,956</td>
<td>45,486,162</td>
<td>-1,12%</td>
<td>-6,89%</td>
<td>-8,06%</td>
</tr>
<tr>
<td>CO2 exempt</td>
<td>12,437,533</td>
<td>15,808,117</td>
<td>16,471,826</td>
<td>13,576,203</td>
<td>9,16%</td>
<td>-14,12%</td>
<td>-17,58%</td>
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Innovations
Tax Reform February 2020

**New Law**

Taxpayers subject to the tax ....may offset all or part of their taxed emissions, for purposes of determining the amount of tax to be paid, through the implementation of projects to reduce emissions of the same pollutant, subject to such reductions being additional, measurable, verifiable and permanent. In any case, the reductions must be in addition to the obligations imposed by prevention or decontamination plans, emission standards..

Los contribuyentes afectos al impuesto establecido en este artículo, podrán compensar todo o parte de sus emisiones gravadas, para efectos de determinar el monto del impuesto a pagar, mediante la implementación de proyectos de reducción de emisiones del mismo contaminante, sujeto a que dichas reducciones sean adicionales, medibles, verificables y permanentes. En todo caso las reducciones deberán ser adicionales a las obligaciones impuestas por planes de prevención o descontaminación, normas de emisión ...
2020 Tax Reform

Revenue: 381,9 MM USD
Facilities: 89

Revenue: 381,9 MM USD
Facilities: 89

Current Tax
Proposal
Dióxido de Carbono
Particulado
Dióxido de Azufre
OXIDOS DE NITROGENO

Resultado
- Escenario B

MODERNIZACIÓN TRIBUTARIA

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<thead>
<tr>
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<th>MODIFICADO</th>
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<tbody>
<tr>
<td>1%</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>3%</td>
<td>2%</td>
<td></td>
</tr>
<tr>
<td>8%</td>
<td>38%</td>
<td></td>
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<td>88%</td>
<td>50%</td>
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Impuesto Verde

Recaudacion: 381,9 MM USD
Establecimientos: 89

Current Tax
Proposal

Carbon Dioxide
Particulate Matter
Sulphur Dioxide
Nitrogen
Differences in Revenues is because of Local Polluntant Tax Rates:

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Entities that can generate credits

Entities that must comply with the CO2 performance standard

Tax-liable entities

Recognized credits

Buy carbon credits from recognized entities

Pay net taxes, once credits are recognized

Comply with emission standard, once credits are recognized

Registry of emission reduction projects

Criteria from Ministry of Finance to recognize credits

Institutional Infrastructure

Superintendency

MRV

Ministry of the Env.
Lessons from Chile
Lessons from Chile

1. **Political economy** is the key for implementation - propose in the context of broader tax reform.

2. **Optimum tax** rate not so relevant. Low tax may be better, at least initially.

3. **Think about cobenefits.** Combining carbon taxes with local pollutants may be relevant for domestic policy, especially LDCs.

4. **Even a low tax has an impact.** Can act as a signaling and coordination device and supports the development of an institutional infrastructure.

5. **MRV overestimated.** Often complexity is overestimated and necessary for other policies.

6. **Institutional infrastructure underestimated.** Reform of regulatory system underestimated is necessary and will serve other objectives.

7. **Success breeds new commitments and more ambition.** Can be the basis of carbon markets.

8. **Fuel approach vs Emissions Approach are complementary** rather than alternatives.
Lessons from Chile

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Thank you

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- rodrigo@cota21.cl

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