



Comisión
Chilena de
Energía Nuclear

Ministerio de Energía

Gobierno de Chile

Energy Policy and Nuclear Option in Chile

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Nuclear Power in Chile, a little bit of history...



Pres. Bachelet (2007):
¿Is it reasonable to consider NP as an option for Chile?

Zanelli Committee



Sept. 2007

Zanelli Report
NP Option in Chile

1

“NP cannot be dismissed, additional studies are required”



Marzo 2010

Tokman Report:
“NP in Chile; opportunities, gaps and challenges”

2

“NP could contribute significantly to meet the future needs of the national energy matrix, in safe conditions for people and the environment and reducing projected carbon footprint of the country, and at competitive costs
→ But the country is not ready yet”

Move forward in all aspects
↓
Being able to take an informed decision regarding NP

Ministry of Energy (M. Tokman)

Consultant Group
Ministerio de Energía

CNE COMISIÓN NACIONAL DE ENERGÍA



Hiring Studies

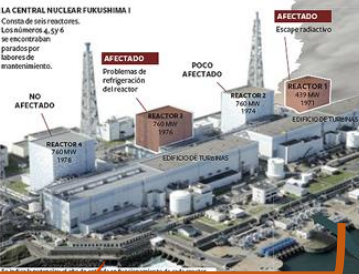


National Infrastructure Assessment

CCHEN Ministerio de Energía



LA TERCERA
Fuerte terremoto con epicentro en Concepción sacude de madrugada a siete regiones



Process stopped

Held more than 130 regional workshops,
attended by over 4,000 people

Representing different sectors of society

Advisory Committee composed of 27 people
from diverse backgrounds

→ **Process with social, political, and technical validation**



valid
energy agenda
NP option



Step 1
Energy Agenda
Ago-Dec 2014

Vision and Roadmap
Ene-Sep

- Developing/Updating studies:

- Lessons learned from Fukushima
- Nuclear technology
- Site selection criteria
- Required legal updates

Energy Roadmap

Making the draft of
Energy Policy by
the Energy Ministry

Public Consultancy
of draft document

Official document
Energy Policy 2050

Building the
vision and
Roadmap

Technical
Worktables

The view of Chile's energy sector by the year 2050:
Reliable, inclusive, competitive and sustainable.



The proposed measures and action plans shall be developed on the basis of these 4 Pillars, between now and the year 2050.

Energía 2050

Política Energética de Chile (p. 75)



Fomentar la participación de combustibles de bajas emisiones de GEI y contaminantes atmosféricos en la matriz energética.

La Agencia Nuclear... suscribe... energía nuclear puede jugar un rol... la reducción de emisiones de CO2... Chile, y a pesar que la Política Energética no descarta a priori ninguna tecnología de generación, la energía nuclear de potencia no ha sido incluida como una opción a corto plazo pues requiere de estudios en aspectos claves, como la viabilidad económica de largo plazo ante distintas condiciones legales y de mercado, los ajustes legales e institucionales requeridos, entre otros.³⁸ Estos estudios deben ser dirigidos desde la Comisión Chilena de Energía Nuclear (CCHEN) convocando a los organismos nacionales competentes. Dado esto, se establece que en el próximo proceso de evaluación de la Política Energética de largo plazo se revise la conveniencia de incorporar tecnología a la matriz de generación eléctrica.

El detalle de Planes de Acción, Metas adicionales y Actores involucrados para obtener una Matriz Energética Renovable, se encuentra en el Anexo 1, en los Lineamientos 21 a 23.

B. EXTERNALIDADES LOCALES

Un resguardo ambiental sólido forma parte esencial de una Política Energética orientada a un sistema energético sostenible. Los efectos ambientales de la generación, transmisión y dis-

tribución eléctrica, como de la explotación y el consumo de combustibles, líquidos y sólidos, considerando sus impactos ambientales que afectan a las comunidades, maneja e incorpora los aspectos participados, maneja e incorpora los aspectos participados, maneja e incorpora los aspectos participados o contemplados cuando corresponden, considerando los otros objetivos de la Política Energética asociados a la seguridad, la sostenibilidad y la competitividad que la energía le ofrece al país.

Finalmente, el rechazo ciudadano al desarrollo de nuevos proyectos de inversión se fundamenta en buena parte en aspectos ambientales, en forma consistente con los reclamos por los impactos ambientales generados por la instalación de infraestructura energética. Cabe señalar que, en los eventos deliberativos, un 70% de las personas que rechazan la construcción de proyectos energéticos en su región, lo han hecho argumentando que es por el impacto ambiental que estas producen.

Esta Política Energética reconoce que el país requiere perfeccionar y mejorar el marco regulatorio de manera periódica, a través de programas de revisión y elaboración de nueva normativa e instrumentos de gestión ambiental y estándares de sustentabilidad ambiental atinentes al sector energía, con coordinación interministerial. Estos programas deben reflejar los intereses de la sociedad, asegurar la maximización del bienestar social, así como reduciendo progresivamente las brechas existentes entre la regulación ambiental chilena y la que rige en otros países de la OCDE. Lo anterior también implicará revisar...

*“... nuclear energy has not been included as a short-term option, because it requires research on **key issues, such as its long-term economic viability in the face of various legal and market conditions, and the legal and institutional amendments required, among others. This research should be directed by the Chilean Nuclear Energy Commission (CCHEN) by drawing on competent national agencies. The next evaluation process of Chile's long-term Energy Policy will review the appropriateness of incorporating this technology into the electricity generation matrix**”...*


2020

38 IEA (2015) "Technology Roadmap: Nuclear Energy". <http://www.iea.org/publications/freepublications/publication/technology-roadmap-nuclear-energy-2015-1.html>

39 Estos y otros aspectos, son mencionados en las conclusiones del Informe del Comité de Energía Nuclear de Potencia del año 2015, "Generación Nucleo-Eléctrica en Chile, Hacia una decisión racional".


40 Este dato fue extraído del siguiente ítem del proceso de encuestas deliberativas: "¿Por qué tiene usted esta posición frente a la construcción de nuevas centrales de energía en su región?"





The Assignment: Developing required studies so that NP could be considered in the next review of the Energy Policy (2020)

The Strategy:

- Bringing together the competent institutions
 - Setting up a steering committee (MinEne+CNE+ CCHEN)
 - Organizing multidisciplinary working teams for the different areas
 - Working with universities
 - Hiring expert studies (national and international level)
 - Communicating the process
 - Promoting the debate
- 



Main tasks to be performed

- Evaluate the contribution of NP to the 4 pillars of the Energy Policy
- Address main public concerns
 - Nuclear technology safety issues...(earthquakes!)
 - Environment
 - Assess the role of NP on fighting climate change and national goals
- Evaluating Economic viability
- Enable a Public debate






Economic Viability

Would a NPP be economically viable operating in our projected energy market?

→ Our market is changing!

- National interconnection
 - Maybe regional interconnection
 - Prices dropping
 - Renewables increasing its market share
 - New Transmission law
 - New Distribution law
 - New Market Operator
- 

Economic Viability

Would a NPP be economically viable operating in our future energy market?


- Running energy demand models
- Running energy mix models
 - Would NPP be dispatched?
 - Which prices?
- Running financial models
 - NPP costs for the project in Chile
 - Would the project be profitable under those conditions?
 - Is the risk bearable?

→ IAEA models

→ Evaluating scenarios considering Energy Policy priorities and guidelines



Public Opinion

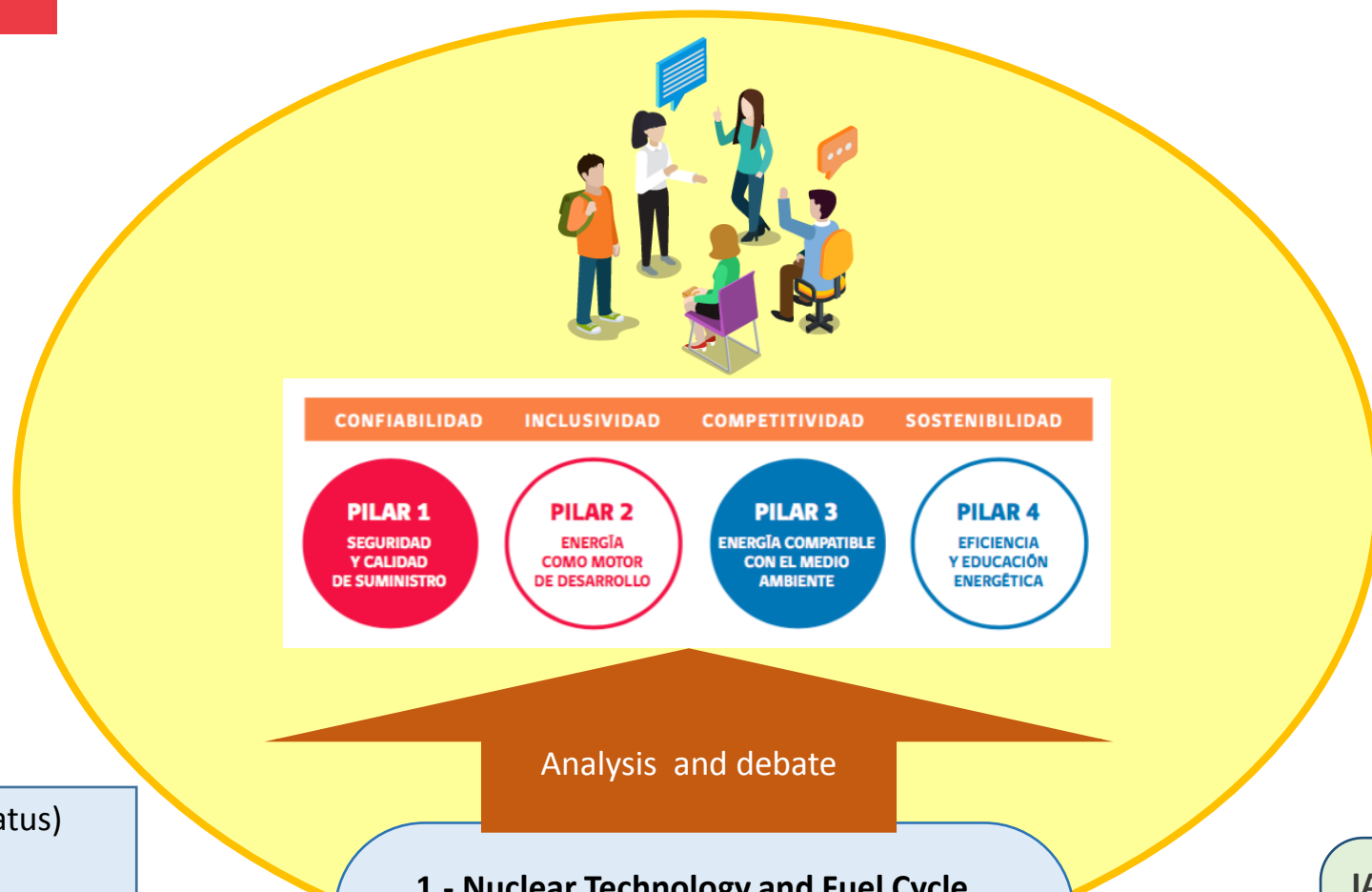
- We're starting from scratch
 - With unfavorable opinion about NP
 - With high ignorance about NP, and energy in general
 - It's popular to be renewable
- Need to learn how to communicate about nuclear so an informed debate could be possible.
- Hired a study to be ready by the end of this year.
- 



Hiring expert studies

- Nuclear Technologies (safety status)
- Environmental impacts of NE
- Communication strategy
- Legal framework update requirements
- Socioeconomic impacts

Communication Strategy



- 1.- Nuclear Technology and Fuel Cycle
- 2.- Economic viability
- 3.- Nuclear Safety
- 4.- Environmental Impacts
- 5.- Site Selection considerations
- 6.- NE Infrastructure requirements
- 7.- National capacity for managing complex industries and emergencies

IAEA Cooperation Projects



IAEA
International Atomic Energy Agency

Universities/Thesis



Main Challenges

- Many “moving pieces” in our energy market → not easy to project
- Installed belief that NP is not an option for highly seismic countries
- Not easy to take political decisions that are unpopular
- We have never performed a serious public debate about NP because there’ve always been some “missing information” yet to be developed

.....would 2020 be the time?





Thanks for your attention

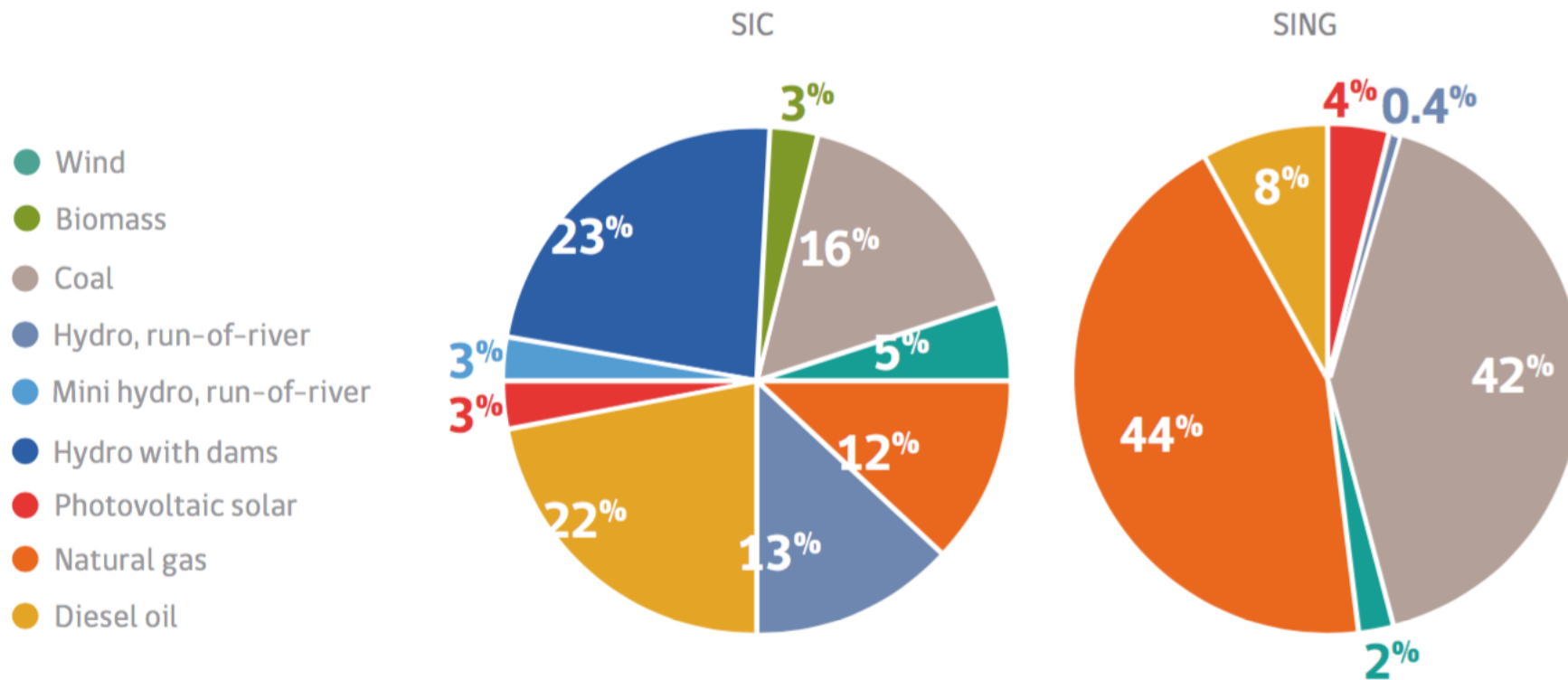
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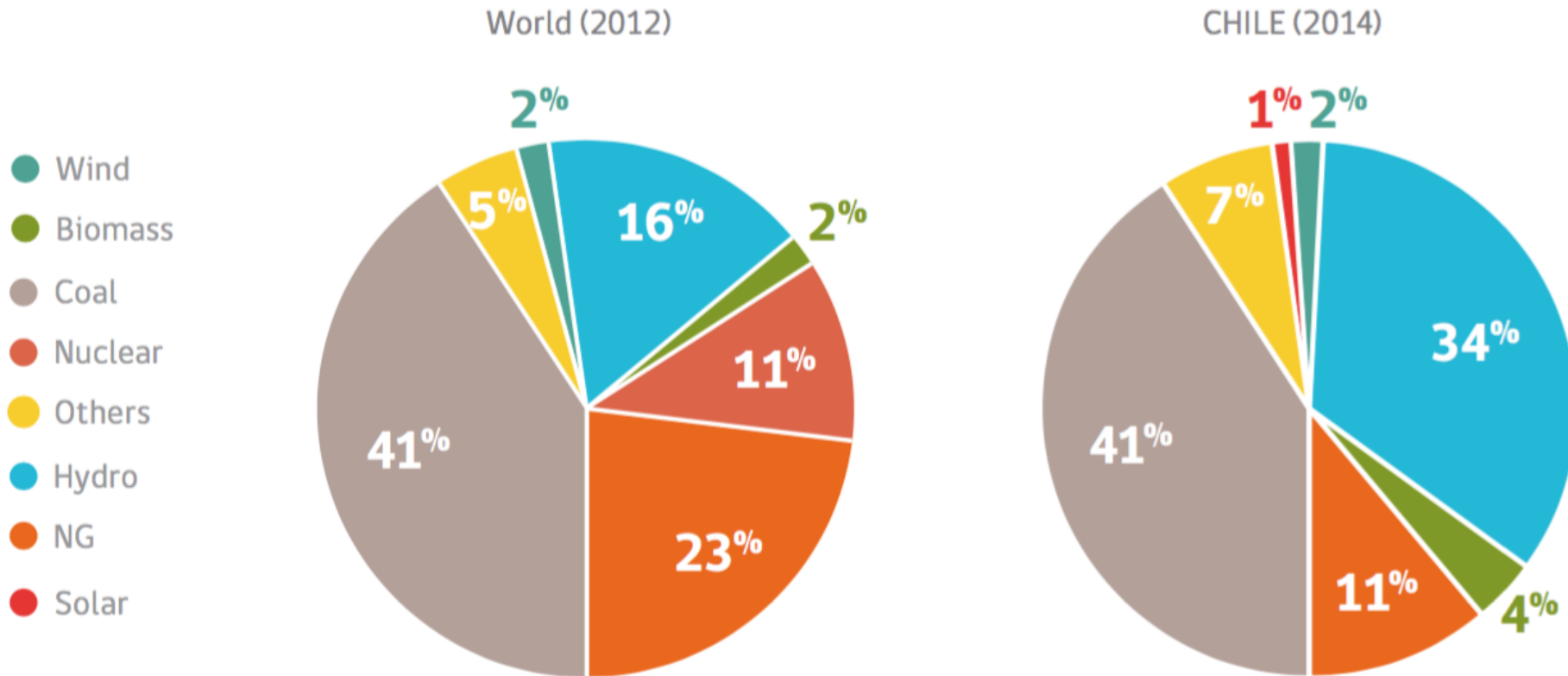




Installed Capacity: 20,375 MW in 2015 (SIC & SING)



Electricity Generation





Average Marginal Cost

- Sept 2016:
 - SIC: 49,3 US\$/MWh
 - SING de 64,3 US\$/MWh
- Average year 2016:
 - SIC: 63,6 US\$/MWh
 - SING 61,8 US\$/MWh
 - National: 63,1 US\$/MWh



Electricity tender

- Auctioned: 12.430 GWh/yr
 - 84 companies participated
 - 5 blocks
 - Average price: 47,6 US\$/MWh,
 - 2/3 of winner are wind y solar.
-
- Last year's auction: US\$ 79,3
 - 2013: 40% higher




Energy Policy main pillars

Pillar 1: Quality and Security of Supply:

1. Security and Flexibility of Centralized Production
2. Decentralized Production and Active Management of Demand

Pillar 2: Energy as a Driving Force for Development:

1. Inclusive Energy Development
 2. Equitable access to Energy Services and Quality of Life
 3. Territorial Inclusiveness
 4. Competitiveness in the Energy Sector
- 



Energy Policy main pillars

Pillar 3: Environmentally-friendly Energy :

1. Renewable Energy Matrix (60%/2035 ; 70%/2050)
2. Environmental regulatory framework
3. Energy and Climate Change (30% by 2030)

Pillar 4: Energy Efficiency and Energy Education:

1. Energy efficiency
 2. Education and Energy Culture
- 