Acceptance of bioenergy in Chile – an empirical analysis of public opinion

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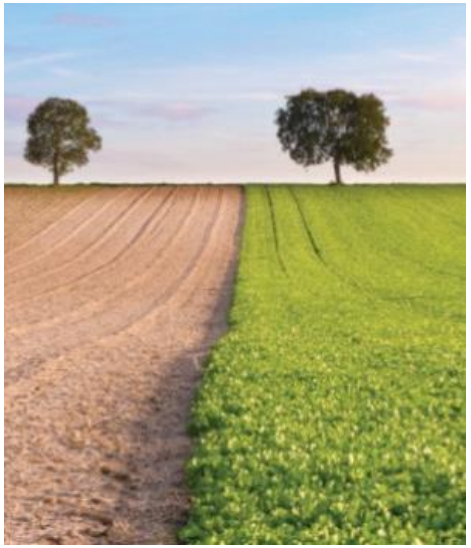
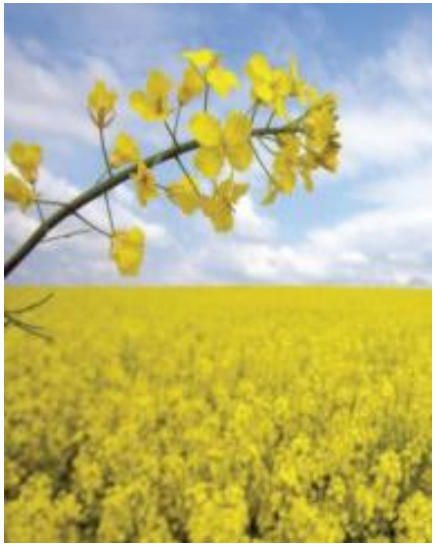
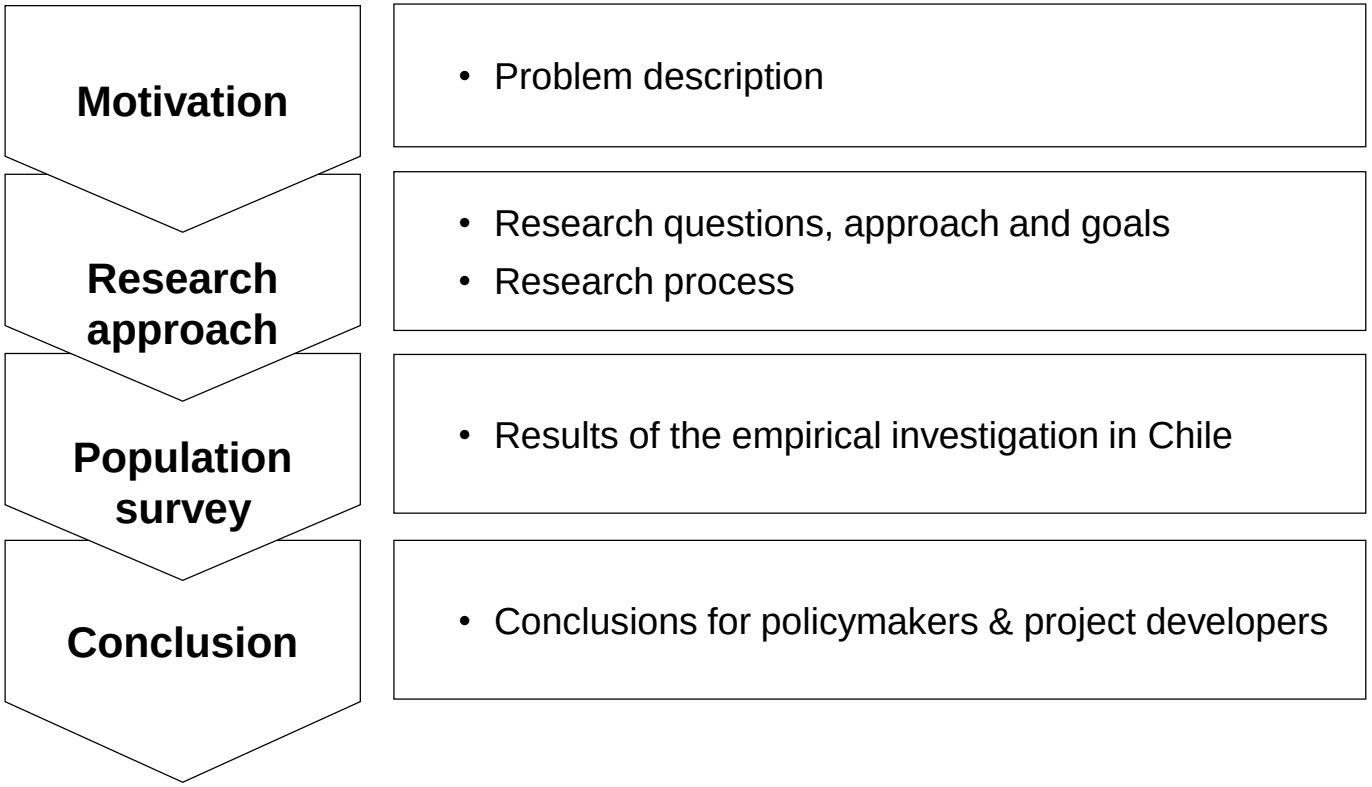




Agenda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• Problem description
Research approach
• Research questions, approach and goals
• Research process
Population survey
• Results of the empirical investigation in Chile
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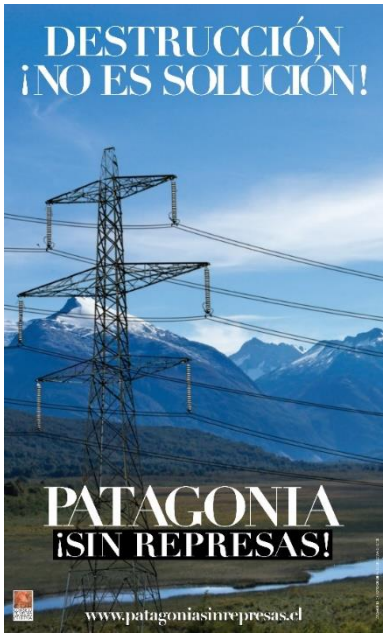
Motivation



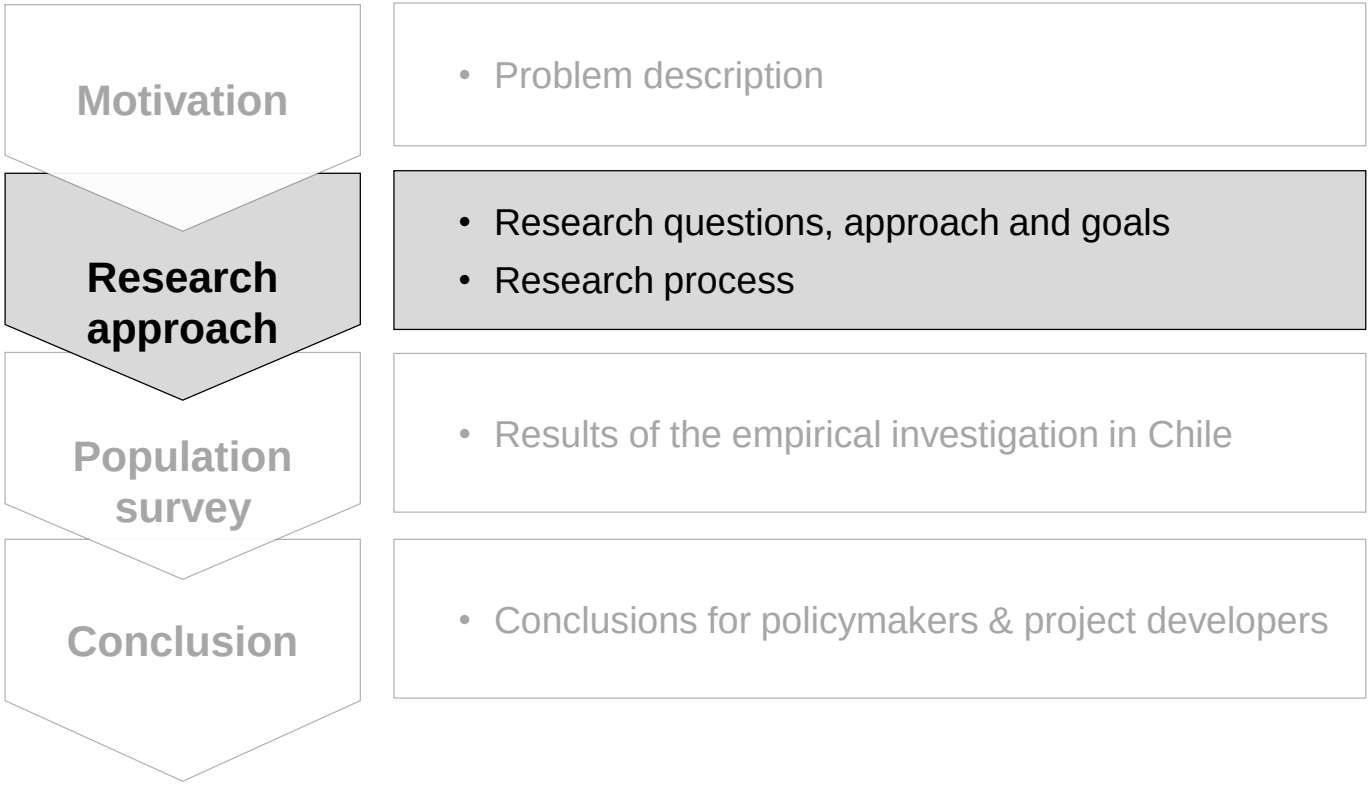
Public acceptance is critical

- Transformation of the geographic energy landscape through **decentralization** of energy conversion
- **High impact** of renewable energy installations in **fragile and unique nature**
- **Low involvement** of local communities so far

Many opportunities

- Large **unused potentials** for renewable energies
- Overcome **dependence on energy imports**
- **Job creation** in rural communities
- **Increase energy security** through decentralization

Agenda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Research questions, approach and goals

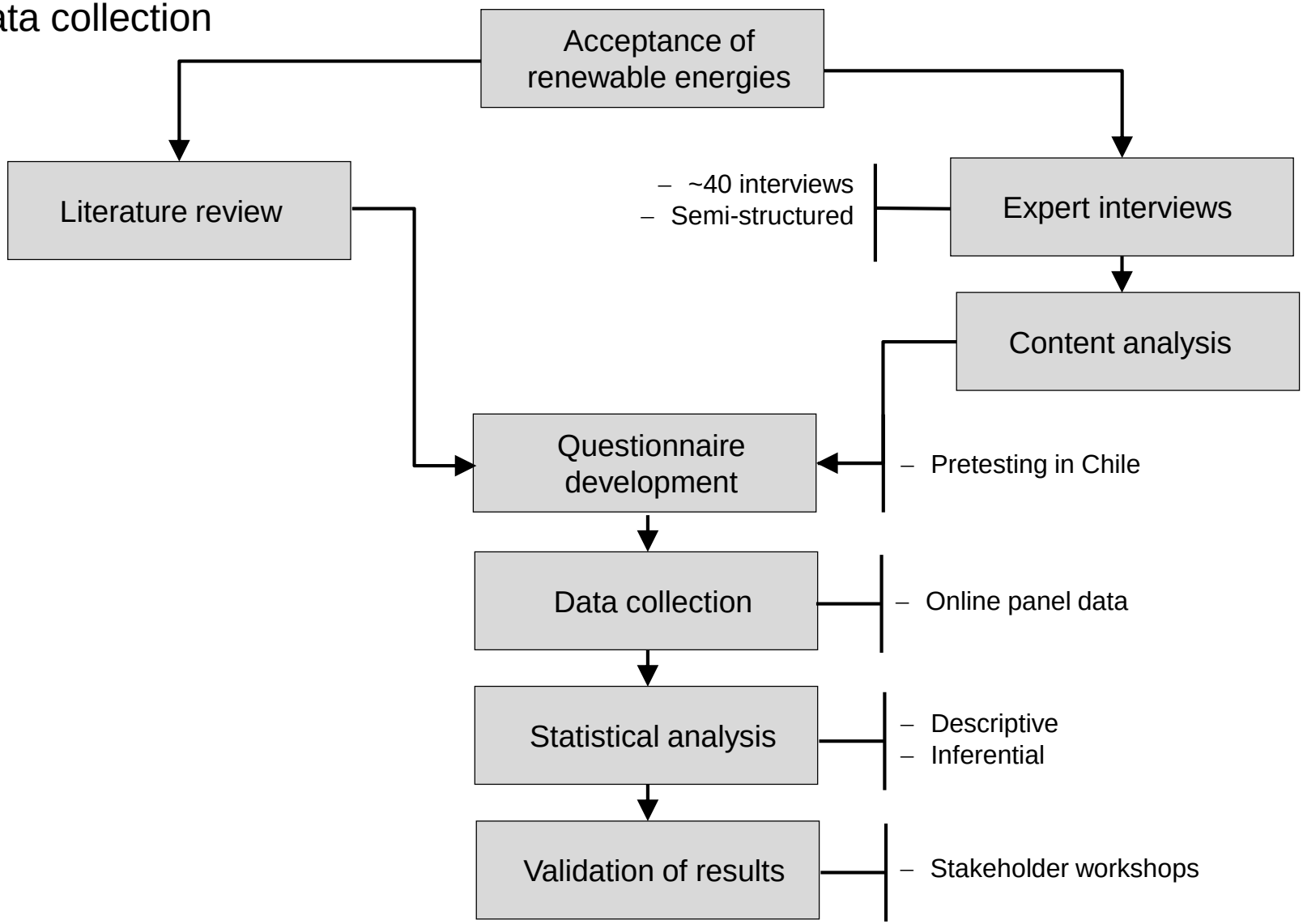
Empirical research questions
1. Is bioenergy **accepted** by the Chilean population? Is there public **disposition to act**? 2. Is public acceptance influenced by the **distance of the plant** to the respondent's home? 3. Which **factors are influencing** public acceptance of biomass combustion plants?

Research approach
Collect representative, empirical data on public acceptance for renewable energy technologies in Chile, focusing on bioenergy and biomass combustion plants

Research goals
Conclusions and recommendations for policymakers and project developers for the management of public stakeholders of bioenergy projects in Chile

Research process

Data collection



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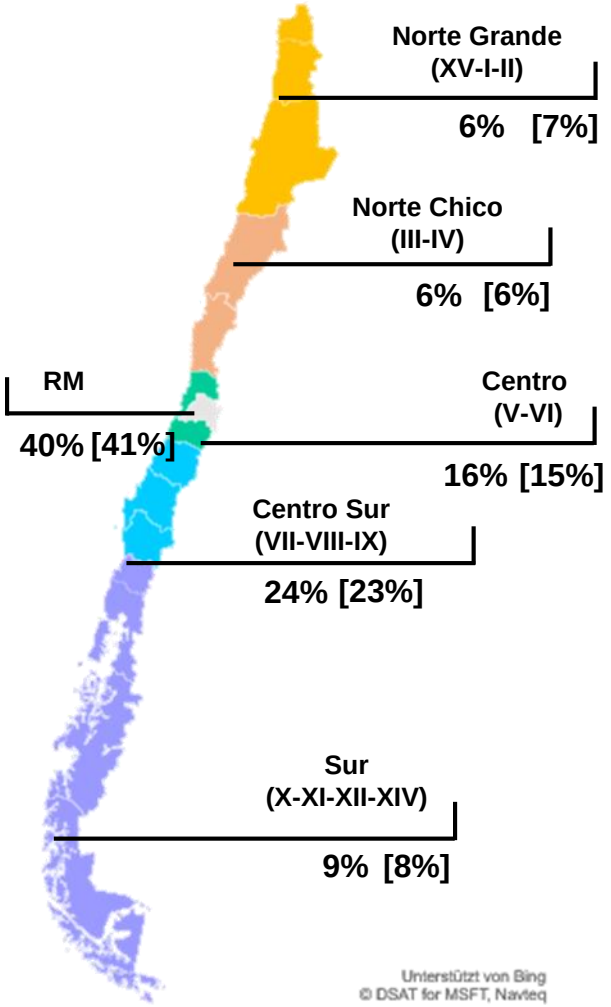
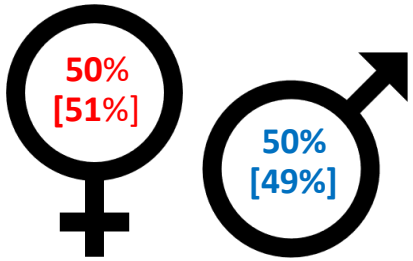
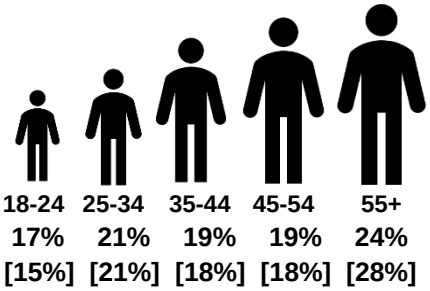
Population survey

Sample with statistical data [in brackets*]







Data collection

- Survey carried out in **November 2017**
- **Online survey** (18+)
- **Data collection company:** Netquest

Representativeness

- Dataset with **~1,200 respondents**
- Good representation for Chile with regard to
  - Age
  - Gender
  - Social class
  - On level of the 15 regions

* Instituto Nacional de Estadísticas Chile (INE), 2017. PAÍS Y REGIONES TOTAL: ACTUALIZACIÓN POBLACIÓN 2002-2012 Y PROYECCIONES 2013-2020. http://www.ine.cl/estadisticas/demograficas-y-vitales (accessed 29 November 2017).

* Adimark, 2017. MAPA SOCIOECONÓMICO DE CHILE.

Topics covered by the survey (~100 questions)

Knowledge of REs*

[Conocimientos acerca de las energías renovables]

REs* in the neighborhood

[Sistemas de energías renovables en tu barrio]

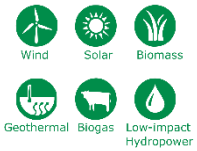
Heating of houses

[Calefacción de tu vivienda]

Social issues & participation

[Téma social y participacíon]

Evaluation of REs*



[Valoración energías renovables en general]

Evaluation of small PV**

[Valoración de las instalaciones fotovoltaicas a pequeña escala]

Evaluation of large PV**

[Valoración de las instalaciones fotovoltaicas a gran escala]

Evaluation of wind energy

[Valoración de la energía eólica]

Evaluation of bioenergy

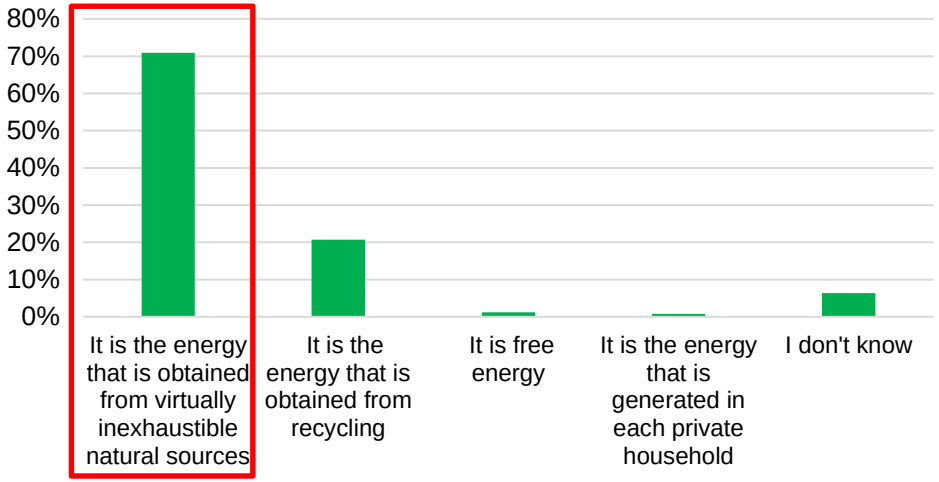
[Valoración de las centrales de biomasa

*RE = Renewable energy **PV = Photovoltaics

Results

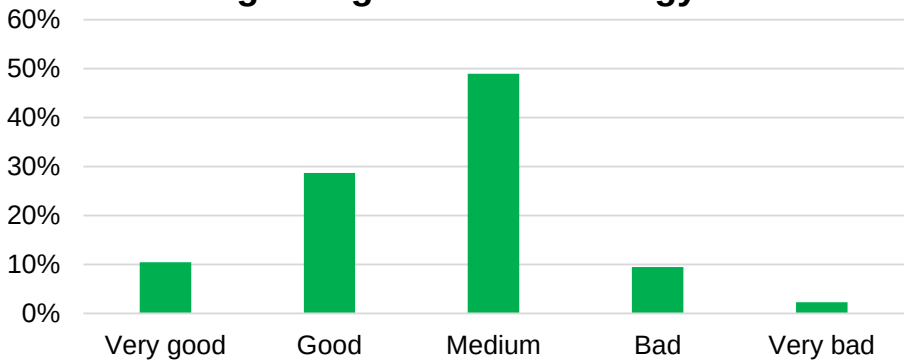
Knowledge of REs

“Based on what you know, what you have seen, read or heard, what is renewable energy?”



n=1,205

“How would you rate your general knowledge regarding renewable energy?”



n=1,205

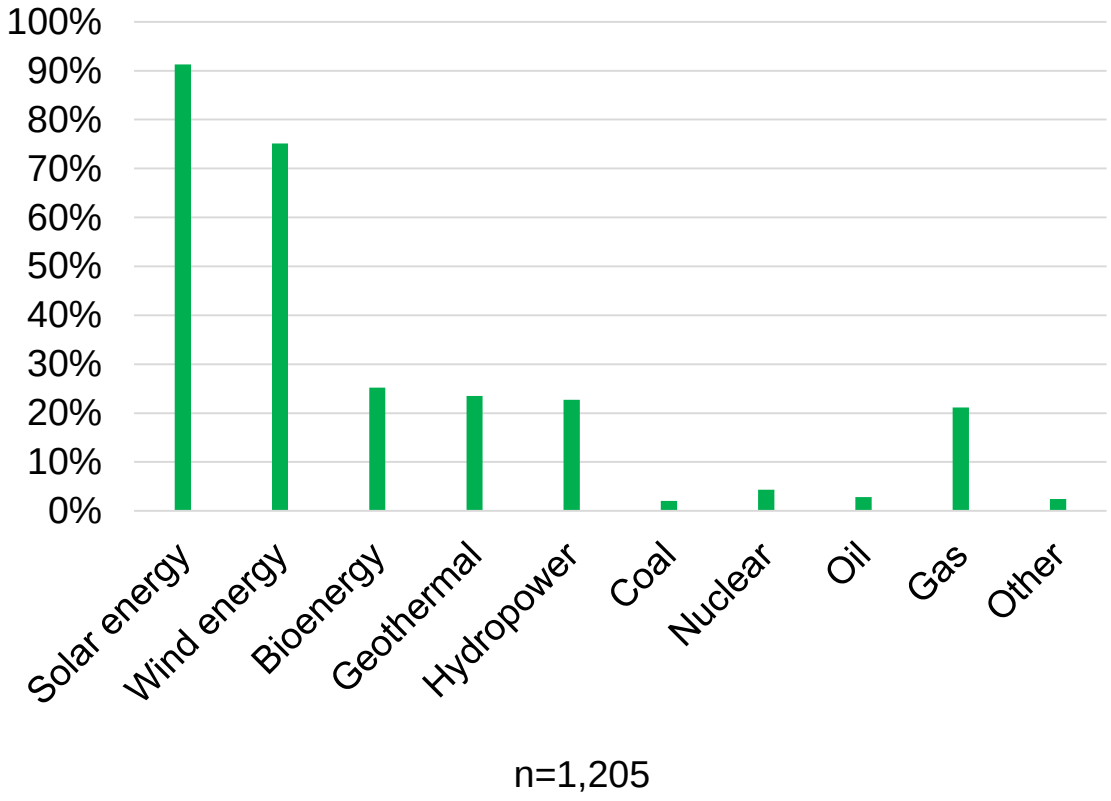
[Conocimientos acerca de las energías renovables]

- **Knowledge**
  - **~ 70%** of respondents **answered** the question **correctly**, **~ 30% did not**
  - **Knowledge has improved: In 2016 only ~55%** answered the question **correctly** (Encuesta Nacional de Energía, 2016)
- **Self-assessment**
  - **49%** of respondents assessed their level of knowledge **as medium**
  - **39% as good or very good**
  - **12% as bad or very bad**
- **No significant correlation** between **knowledge** and **acceptance**

Results

Preferred RE technologies

“In your opinion, which energy technologies should be preferably used in the future?“



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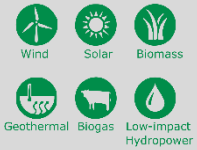
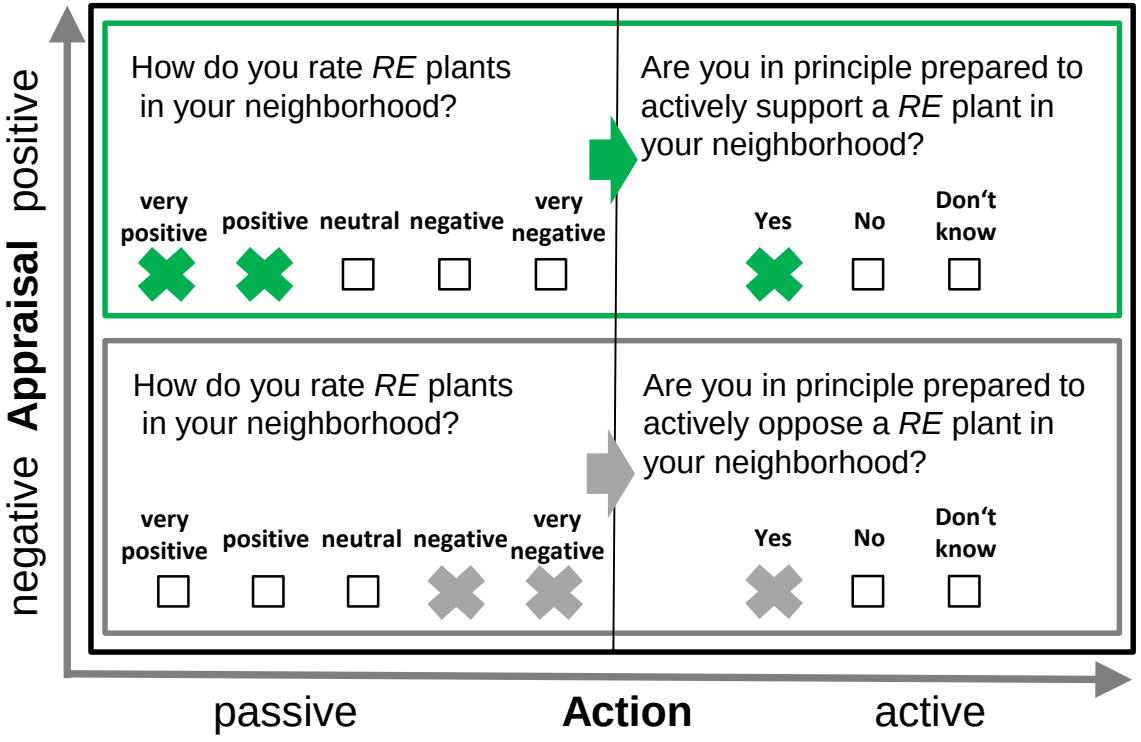


[Valoración energías renovables en general]

- **Solar** (91%) and **wind energy** (75%) enjoy **strong support** by the Chilean population
- **Bioenergy** (25%), **geothermal** (23%) and **hydropower** (23%) are supported by roughly **one fourth** of the population, on a **comparative level with natural gas** (21%)
- **Coal** (2%), **nuclear** (4%) and **oil** (3%) are far **lagging behind**

Results

Local acceptance and disposition to act

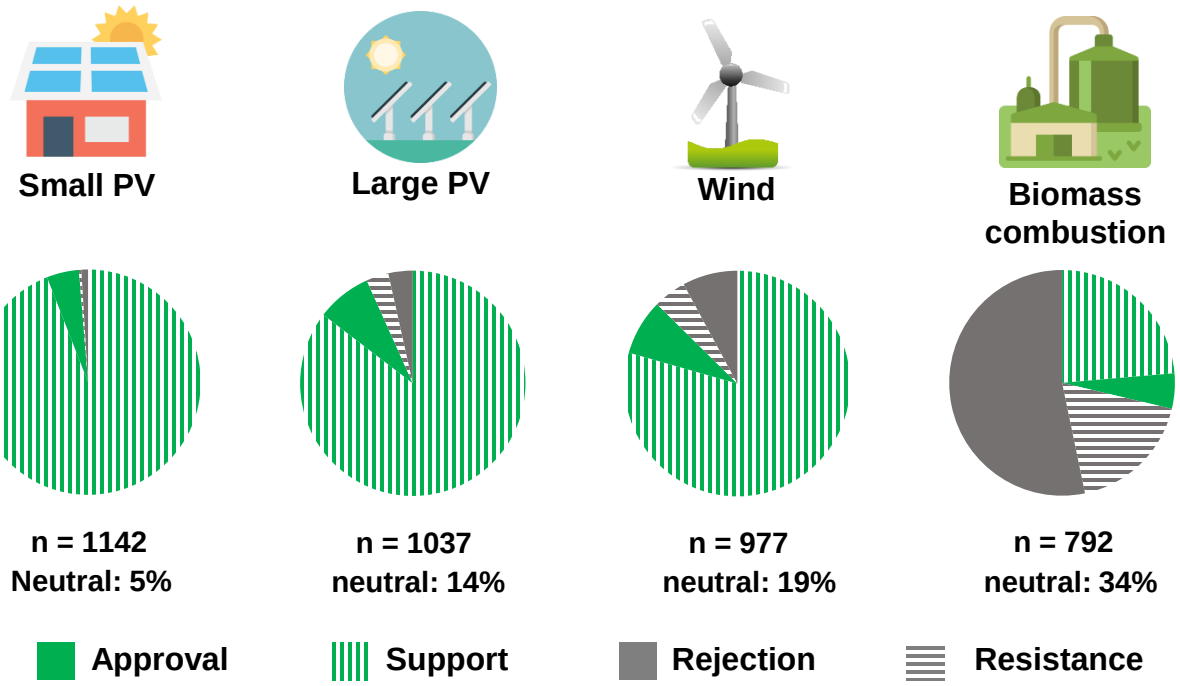


[Valoración energías renovables en general]

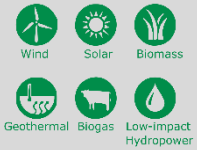
- **Acceptance model** by **Schweizer-Ries** (2008)
- Local acceptance defined by **two dimensions**
  - **Appraisal:** positive or negative
  - **Action:** passive or active

Results

Local acceptance and disposition to act



Notes:
Approval' and 'rejection' include 'support' and 'resistance' respectively.
Respondents excluded who evaluated a local plant as "neutral" or "don't know".

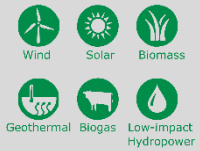


[Valoración energías renovables en general]

- **High acceptance of small-scale PV** (99%) and **large-scale PV** (93%)
- **Very high active support of small PV** (94%) and **large PV** (85%)
- **Wind energy plants** enjoy **high approval** (87%) and **high level of support (79%)**, but also **substantially more resisters** (5%)
- High level of **rejection** (71%) **and resistance** (18%) towards **biomass combustion plants**

Results

Relevance of distance to RE plants



[Valoración energías renovables en general]

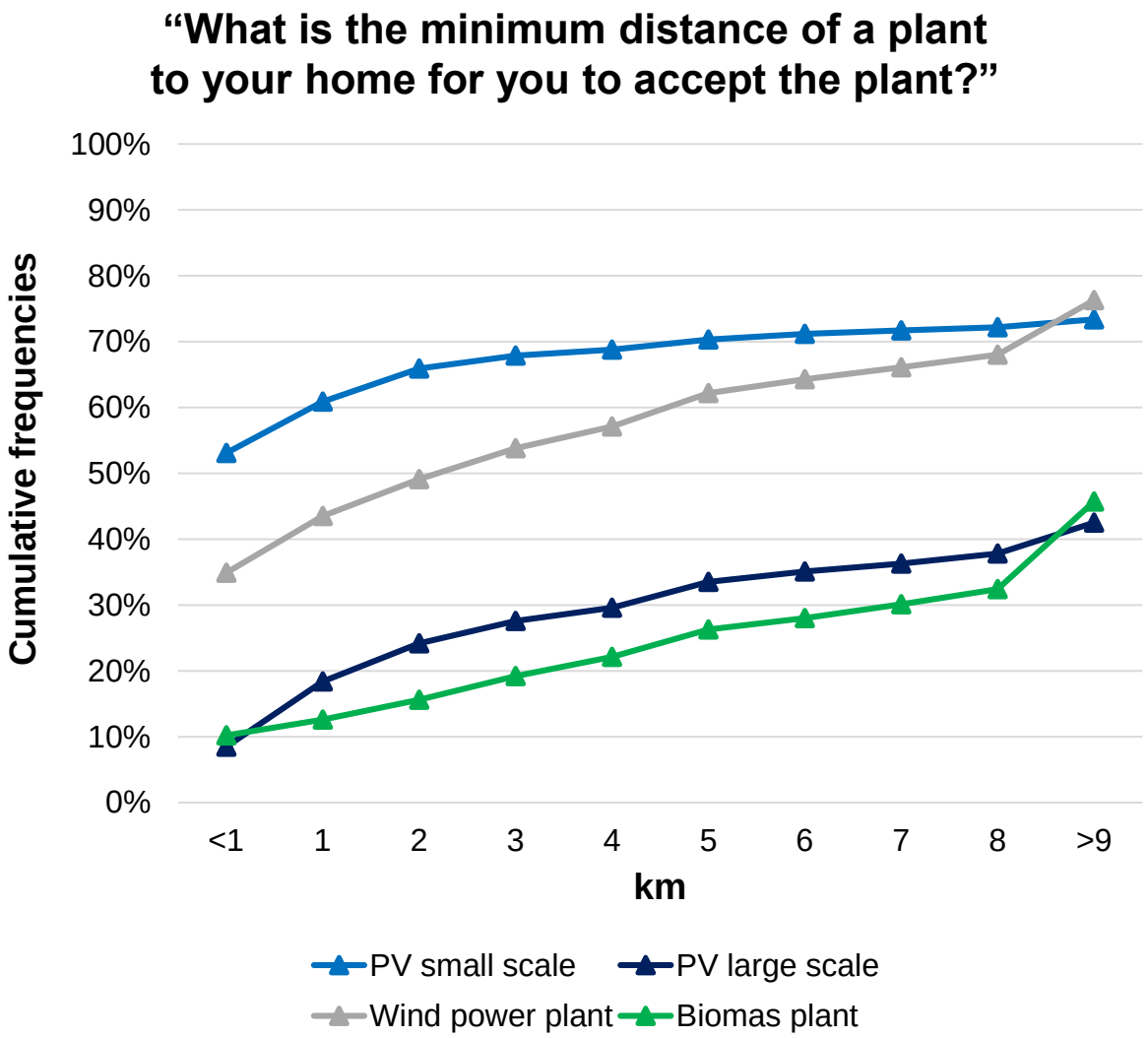
“To what extent is the distance between your house/ apartment and a […] plant important to you?”

Response category	Technology			
	Small PV	*Large PV*	*Wind*	*Bio-mass*
I am **totally opposed** to the facilities, regardless of the distance.	2%	2%	5%	39%
The **distance** of the RE plants is **not important** to me.	51%	41%	29%	9%
The distance of the RE plants is not important, but they should **not be visible** from my house.	11%	16%	19%	16%
There has to be a **minimum distance** from the RE plants to my house.	37%	41%	47%	36%

- **39%** of respondents **reject biomass combustion plants independent from their location**
- The **distance of a biomass combustion plant to their homes** is **important** for **36% of** respondents
- For **51%** and **41%** of respondents **the distance to small and large PV plants is not important**

Results

Define your Backyard in Chile



[Valoración energías renovables en general]

- **Acceptance increases with distance but remaining low acceptance of biomass plants and large PV**
- **In a 1 km distance**
  - 53% accept small PV plants
  - 44% accept wind turbines
  - 18% accept large PV plants
  - **13% accept biomass plants**
- **In a distance of 9 km or more**
  - 76% accept wind turbines
  - 73% accept small PV plants
  - **46% accept biomass plants**
  - 43% accept large PV plants

* Answers of respondents excluded, who stated that they do not accept the plant at all or who stated that the visibility is more important than distance.

Results

Multiple linear regression of acceptance of biomass combustion plants

Dependent variable	Coefficient β	Standardized coefficient
Gender (1=m)	.014	.006
Home-owner (1=yes)	.011	.005
Biomass combustion plant in vicinity (1=yes)	-.040	-.017
Advocacy renewable energies	***.073**	***.072**
Perceived benefits of biomass combustion plants	****.709**	****.493**
Perceived costs of biomass combustion plants	*****.259**	*****.182**
Perceived costs of energy crops	.019	.015
Information and participation	-.083	-.052
F	**56.259**	
R^2	.360	
Adjusted R^2	.354	

Dependent variable: *"I support biomass combustion plants in my neighborhood"*
**p<.05; **p<.01; ***p<.001 (significant results in bold)*

[Valoración de las centrales de biomasa

Significant factors

- By far most important factor is "**perceived benefit of biomass combustion plants"**
- Second important factor is **"perceived costs of biomass combustion plants"**
- Third important factor is **"general advocacy of REs"**

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Main conclusions and recommendations

Is bioenergy accepted by the Chilean population? Is there public disposition to act?

- ❖ "Extreme positions": High public support of solar and wind energy but low support of bioenergy
- ❖ Relatively high disposition to act against potential biomass combustion plants in the neighborhood compared to solar and wind energy plants

Is public acceptance influenced by the distance of the plant to the respondent's home?

- ❖ Respondents claimed rather large distances for biomass combustion plants to their homes
- ❖ But acceptance remains low: at 9 km only roughly half of respondents would accept a plant
- → Increasing the distance to the plant is not a "universal remedy"
- → Involve local stakeholders in the planning and siting process to understand their claims

Which factors are influencing public acceptance of biomass combustion plants?

- ❖ Perceived benefits of biomass combustion plants is by far strongest predictor for public acceptance
- → Future research should focus on defining those benefits and how they can be realized

Thank you for your kind attention.

Contact

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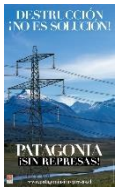
Research topics:

- Acceptance of renewable energy innovations
- Sustainable biomass value chains
- Stakeholder management

Sources of pictures and symbols



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