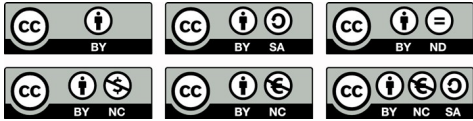




the Learning Network on Sustainable energy systems

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# Cooking with fire: DRE solutions for Family Farming context in Argentina

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## CIPAF

CENTRO DE INVESTIGACIÓN Y DESARROLLO TECNOLÓGICO PARA LA AGRICULTURA FAMILIAR

En el territorio, para sumar capacidades y promover el arraigo.

# Contents

- Argentinean Family Farming context and national energy matrix
- Public Policies around RE solutions for this social actor
- The necessity of attend to real farmers demands
- Developing RE products trough out a participatory design process: the case of an improved biomass cookstove
- New challenges and questions for future inquiry

# Argentinean Family Farming context

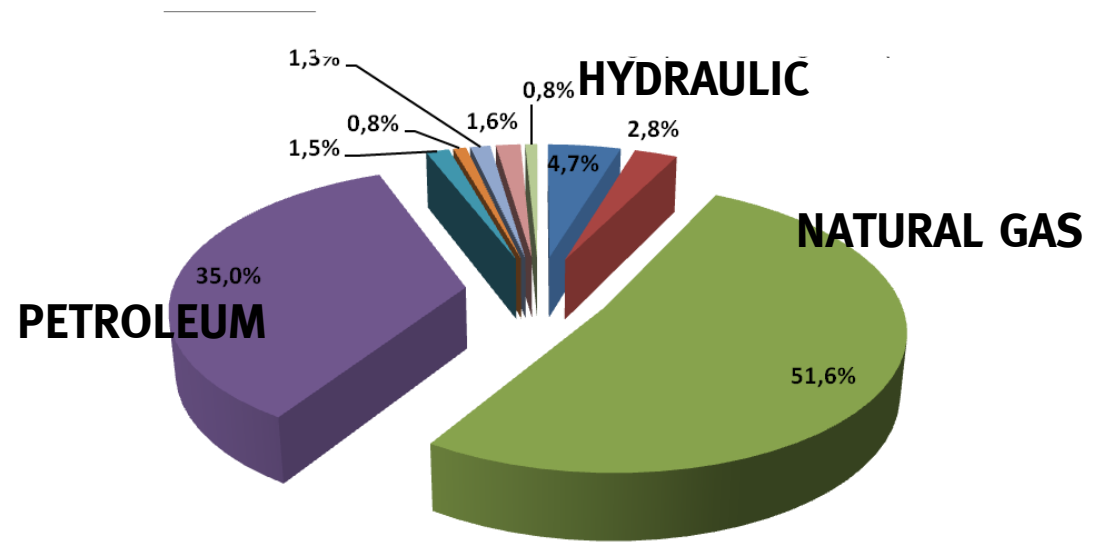
- A country basically agro-based
- More than 335.000 agriculture exploitations
- Almost 70% occupied by Family Farming (FF)
- FF access to only 13% of the lands

*(Font: INDEC 2002 / Obstchatko 2007)*



# Energy matrix and access

- More than 97% access to electrical grid
- A deeper definition about access encompass a set of minimum access to electricity and to a relatively clean, safe means of cooking (*World Energy Outlook, 2015*)



*Primary energy matrix (Energy Ministry, 2010)*



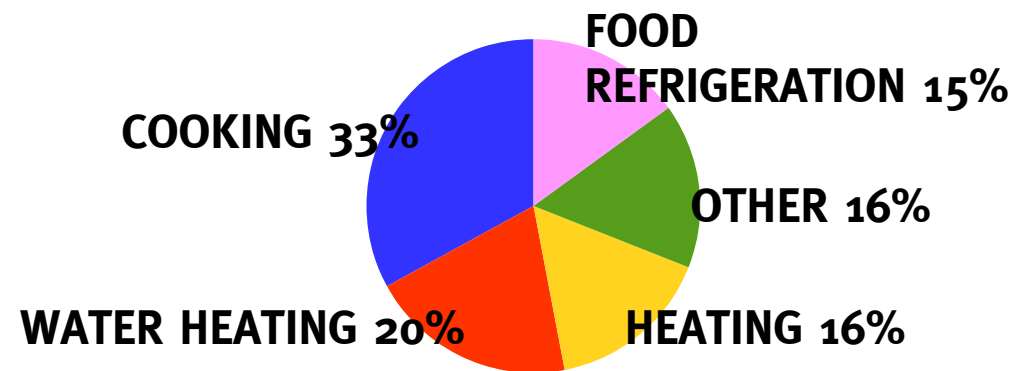


# Real energy demand

- Over the last decade public policies in energy field aim to the “electrification” of the rural areas (DRE)



- But farmers needs are related to functions that are not necessarily linked with electricity
- Question: *electrification or energification* of FF?



# Why an improved cookstove?

- Bottled gas is the most common fuel off-the grid, BUT when farmers cannot afford its increasing price they turn to wood energy for cooking and water heating
- Practices around fire have a very long *socio-technical trajectory* (Garrido, 2010; Thomas, 2009)

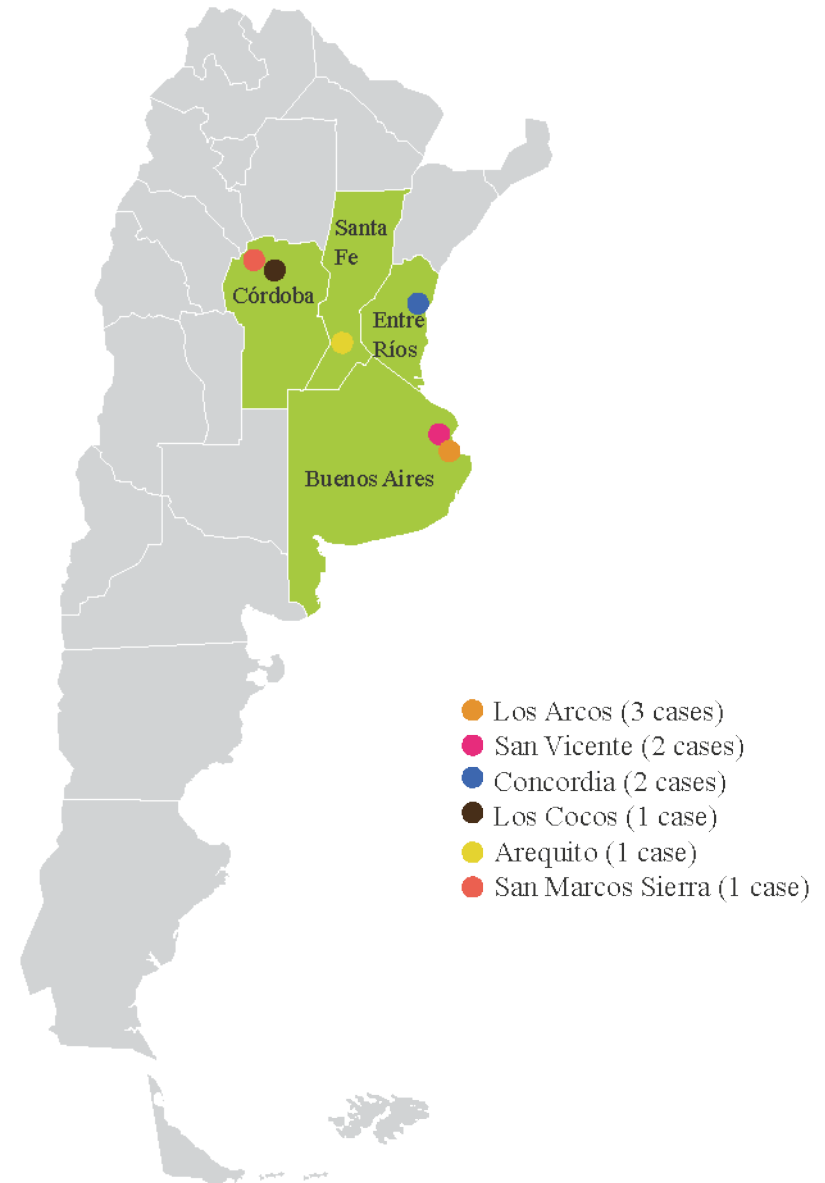


# A cookstove for Pampeana Region

- Studying 10 representative cases of the area, the design emerges as a response to satisfy energy demands of cooking, fostering a better manage of wood as a renewable resource.

Questions tackled:

- *Which aspects are considerate to establish the design guidelines?*
- *How this aspects can turn into design criteria for the current cookstove?*



# Methodology

1. Determining key aspects to establish the function of the device: 80% of the farmers interviewed established cooking as the first wood usage



2. Analysis of the current equipment present in the households: including current equipment and its nature, classifying them in self-construction, adapted and bought





# Methodology

## 3. Analyzing social practices around fire

USAGE



- 30% COOKING AND WATER HEATING
- 30% COOKING
- 20% COOKING AND HEATING
- 10% WATER HEATING

DEVICE



- 30% HEATER AND CLAY OVEN
- 30% SAVING-FUEL KITCHEN
- 30% HEATER
- 10% WATER HEATER AND SAVING-FUEL KITCHEN

LOCATION



- 40% INSIDE HOUSEHOLD
- 20% INSIDE AND OUT OF THE HOUSEHOLD
- 40% OUT OF THE HOUSEHOLD

SEASONALITY



- 60% IN WINTER
- 40% ALL YEAR

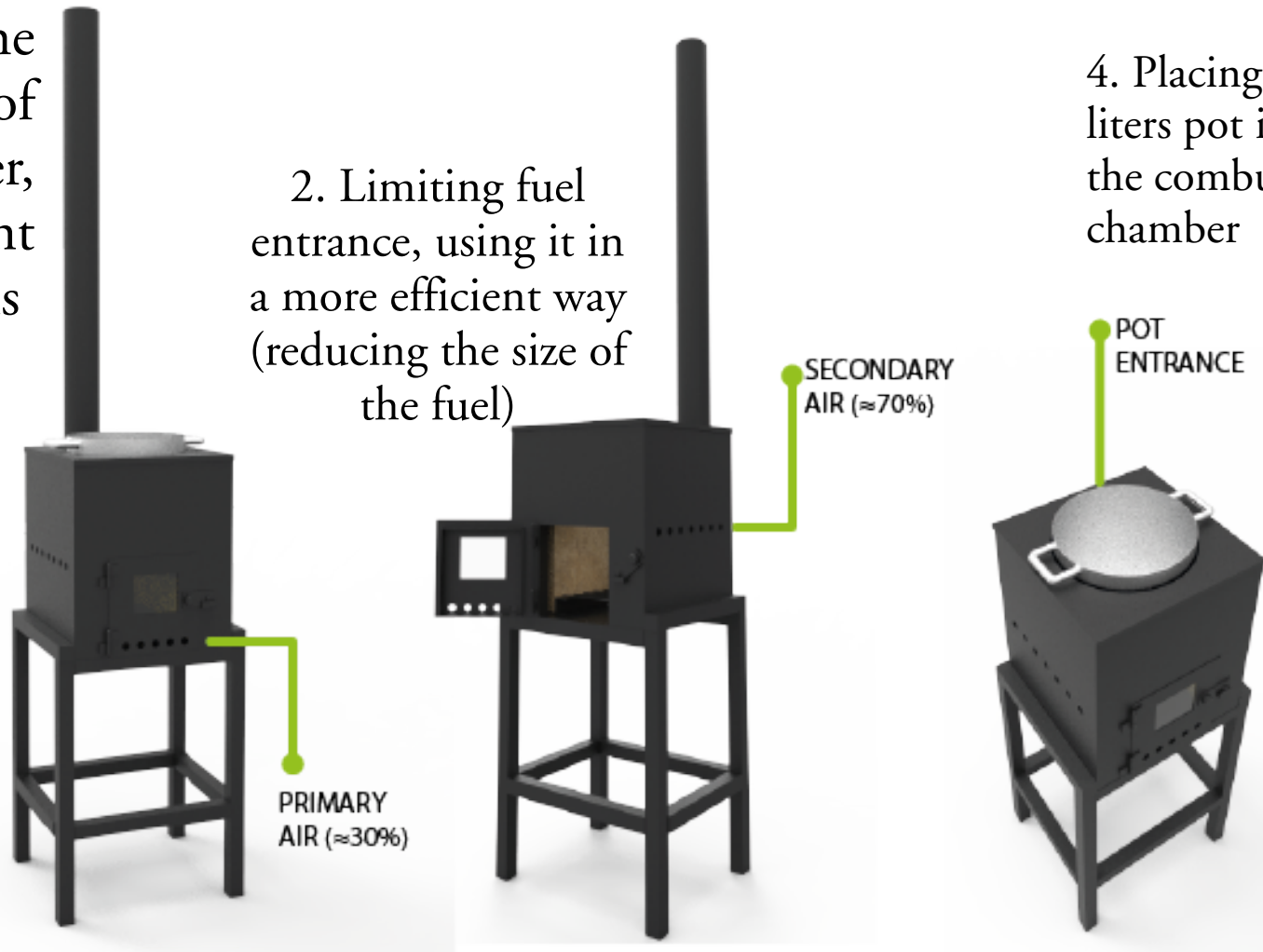
# Design criteria

1. Including the possibility of moving the heater, regarding different usage situations

2. Limiting fuel entrance, using it in a more efficient way (reducing the size of the fuel)

3. Dimensioning the combustion chamber to distribute the air entrance

4. Placing the 9 liters pot inside the combustion chamber



# Testing the prototype: The Water Boiling Test (WBT)

- A simplified simulation of the cooking process.
- To measure how efficiently a stove uses fuel to heat water in a cooking pot
- Three phases: 1) The cold-start high-power phase to boil 5 liters of water 2) the hot-start high-power phase; 3) The simmer phase, boiling the water for 45 minutes
- Results: Rate of consumption around 0,7 kg/h
- Percent of heat utilized: 37%





# Testing the prototype with farmers





# Discussion and further activities

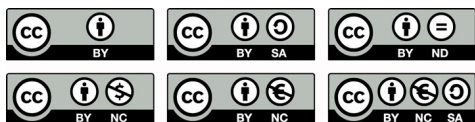
Dimensions:

1. Towards a P-SS Design approach in RE field: leading the creation of a manufacturer's chamber (CAMAF) from prototypes to marketable products
2. Efficiency issue: aims to solve technical specifications that require creativity and involve a multidisciplinary approach
3. Participatory action methods enables to co-design products, looking for usability criteria
4. How to transform wood fuels into a real, safety and sustainable option



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# Thank you!

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