### **Renewable Energies on Irrigation Projects** Bastián E. Celis Huaiquilaf - National Commission of Irrigation, Chile.

### CONTENT

   	Tips:
I. Context	a) Some units
II. National commission of irrigation (CNR)	1 GW: 1 Giga Watts = 1000 MW 1 MW: 1 Mega Watts= 1000 kW 1 kW: 1 kilo Watts = 1000 W
III.Projects	a) 1 hectares = 1 kW app.
IV.Lines of Work	b) 1 house = 4 to 10 kW



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#### **CONTEXT: Energy and Agriculture**



 More food means more water and energy consumption. These are closely linked.

- Reducing water consumption with the technification of irrigation has implied greater energy consumption in agriculture.
- Decrease the dependence of agriculture on fossil fuels.

Agriculture consumes 2% of the world's energy.

- The main energy sources in agriculture are: Electric power and fossil fuels.
  - Agriculture depends on fossil fuels.

FIGURE 2.5. Energy consumption in agriculture, forestry and fisheries: actual data to 2012 and projections to 2030.

Source: Data based on UNSD Energy Statistics Database 2015 and FAO Food Consumption projections to 2030 (Alexandratos and Bruinsma, 2012)





#### **CONTEXT: Renewable Energies**



- Improve competitiveness
- More resilient productive systems to the market variations.
- Achieve selfconsumption, decentralization of Energy (DoE)

- Reduce electricity costs.
- Decrease the dependence on fossil fuels.
- Do not consume the water resource.
- Improvement in quality of life





#### **CONTEXT:** Renewable against conventional water consumption





Source: Water use in electricity generation for water-energy nexus analyses: The European case (Morten Andreas Dahl Larsen, Martiun Drews, October 2018).

#### **CONTEXT: Renewable Energy**

#### Photovoltaic systems.



#### It must be:

- Accessible
- > Affordable
  - > Simple

With great potential in Chile throughout the national territory.

Its versatility allows it to be installed on land, water and roofs.



Small hydroelectric plants (under 300 kW of capacity)



- Great potential in irrigation channels in Chile.
- Today's technology allows to use small water falls existing in the network of channels.





#### **CONTEXT:** Renewable Energy on irrigation projects



### NATIONAL COMMISSION OF IRRIGATION, CHILE

#### **National Commission of Irrigation**

**MAIN OBJECTIVE:** Increase and develop irrigation hectares in Chile.

Role Planner of the policies and an instrument of promotion to the efficient irrigation (Law N° 18,450).



Increase the irrigated and drained area of the country.

- Increase water security. ٠
- Increase the distribution, • conduction and application of water.

Increase the competitiveness of agricultural activities.

- Improve crop production and • productivity.
- Raise the income and quality of • life of farmers.

Source: CNR 2018

#### **National Commission of Irrigation**

- The farmer or the organization postulates the project.
- The bonus is given by prioritizing those that have the best score according to the variables established by law.
- The private builds the project.
- When it is received by a professional who inspect the project and the investments have been credited, the State reimburses the subsidy.

#### **Contest Results of Law Nº 18,450**









#### **PROJECTS – DoE**



6 MW

25% of DoE



#### Whats is DoE?

Is a strategic guideline of Chile to promote selfproduction of energy based on renewables for the residential, public and commercial sectors.

Only available for renewable energies whose installed capacity does not exceed 300 kW.

#### **DoE Benefits:**

- Most reliable and safe electrical systems.
- Better quality of service of the electric network.
- Lower production costs.
- Greater access to energy.



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#### • DIFFUSION and TRAINING

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Available on the CNR website: http://www.cnr.gob.cl Target audiences: Professionals, Irrigation consultants and Institutions

# FINAL COMMENTS

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The CNR and the subsidization of irrigation projects with SFV (Law 18,450), allows to modernize and increase the agricultural competitiveness of the country by allowing the bonus of projects with renewable energies.

Regarding of chilean farmers and its relationship with the renewables energies on agricultural application, this has had a process of assimilation and later development regarding photovoltaic parks in the energy market.

The above is due to several reasons: New technology in irrigation, Barriers, Maturation and costs.

In spite of the above, since 2012 they have been incorporated into the collective and the knowledge of farmers / irrigation consultants, resulting in a more intensive development of projects in recent years. In 2018, 171 projects were subsidized, which is equivalent to 24% of the total projects funded by the CNR.

To date, it has achieved a bonus of 756 irrigation projects with renewable energies.

- With photovoltaic (SFV) and hydroelectric systems for over \$ 20 billion in investment (MMUSD 31) and a bonus of over \$ 15,700 million (MMUSD 23).
- Regarding the irrigation projects with SFV, these have installed powers vary between 0.5 to 300 kW throughout the national territory.

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