



MARSOL Workshop Technical Solutions for Managed Aquifer Recharge



Wednesday, March 11th 2015. 10 h.
Centro cultural "Las Fuentes", C/ Alta, nº 21 -23. Gomezserracín (Segovia)
Activity to involve groundwater users.

Collaborate:



This initiative takes place in the framework of "FP7-ENV-2013 MARSOL (GA 619 120). Demonstrating Managed Aquifer Recharge as a Solution to Water Scarcity and Drought (WFD)" with the support of the European Commission, however it reflects the views only of the authors, and the Commission cannot be held responsible of any use which may be made of the information contained therein.

<http://www.marsol.eu/>



Comisión Europea

Within the framework of MARSOL project (FP7, Water Innodemo call) are intended activities regarding "Training of project participants' staff, researchers, industry/SMEs, and end users on Managed Aquifer Recharge (MAR) and new developments in this field, to foster knowledge among all project partners and to ensure that the project's RTD and DEMO results effectively reaches the end-users." In this context, the main objectives for this training workshop are:

- To expose the technical solutions applied by the partner's expertise regarding each demo-site, studying the applicability to be used in other equivalent environments.
- Exposition of successful construction criteria (specific designs, materials...)
- Exposition of successful water management criteria, mentioning the "must" as well as the "must't".
- Criteria for cleaning and maintenance of the existing structures lengthening the infiltration capacity and the life-span of the structures.
- Other criteria that the expert speakers could include in their presentations regarding technical solutions, benchmarking, indicators and dissemination procedures.
- Response to all the questions that could arise along the full workshop.

The activity is directed to MARSOL partners, technicians, practitioners, public authorities, farmers and irrigation communities' board, as well as students and the population in general.

Important notice: As it is a rural area, speakers will employ a colloquial language in their expositions.

PROGRAM

10:00 – 10:10	Welcome. Mr. Enrique Herranz. ATE. President of the Carracillo Irrigation Community. Chairwoman: Ms. Elvira del Pozo Campos. Agronomic Engineer (TRAGSATEC)
10:10 – 10:35	• Minicourse imparted by some international expert (TBC).
10:35 – 10:55	Arenales MAR facilities construction. Design and materials employed • Mr. Roberto Fernández García. Agronomic Engineer (TRAGSA) (TBC)
10:55 – 11:15	Water management techniques and solutions for Los Arenales aquifer • Dr. Enrique Fernández Escalante. Hydrogeologist (TRAGSA, MAR to MAR-kEt)
11:15 – 11:35	MAR and water harvesting in Smart cities. Architectonical designs and solutions • Mr. Ignacio Prieto Leache. Architect (TRAGSATEC, DINA-MAR)
11:35 – 12:00	Coffee break
12:00 – 12:20	Low impact MAR activities and benchmarking • Dr. Jon San Sebastián Sauto. Biologist (TRAGSATEC, DINA-MAR)
12:20 – 12:40	MAR, energy efficiency and use of alternative energy systems for irrigation. Tech. solutions • Mr. Francisco de Borja González Herrarte. Agronomic Engineer (TRAGSA)
12:40 – 13:00	ICT's solutions for MAR activities • Mr. Mariano Navarro de la Cruz. Tele-communications Engineer (TRAGSA-WIRE AG)
13:00 – 13:20	Technical solutions for MAR experiences in Spain. State of the art and future panorama • Dr. José Antonio de la Orden. Mining Dr Engineer (Spanish Geological Survey). (TBC).
13:20 – 13:35	Premiere of the film "MAR Technical solutions in Arenales aquifer"
13:35 – 14:00	Open debate. Rapporteur: D ^a Elvira del Pozo Campos (TRAGSATEC)
14:00	Closing. Sra. D ^a . Laura del Río Arranz. Mayor of Gomezserracín (TBC).

TBC: To be confirmed.

This schedule, approved in principle, might be subject to modification. Organized by:



Comisión Europea

Energy efficiency and use of alternative energy systems for irrigation. Tech. solutions

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*<http://www.marsol.eu>



Índex

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2. ENERGY EFFICIENCY IN IRRIGATION
3. PUMPING ENERGY REQUIREMENTS
4. E. EFFICIENCY IN “LOS ARENALES”
5. CONCLUSIONS



TECHNICAL SOLUTIONS FOR
MANAGED AQUIFER RECHARGE

MARENALES

INTRODUCTION

What does energy efficiency mean?

“A level of performance that describes a process that uses the lowest amount of inputs (energy) to create the greatest amount of outputs (crop)”.

“Using less energy to provide the same service”

kWh/m³

Ex: consume 130 kWh per year instead of 220 kWh to pump the same amount of water (m³) in the same conditions.





INTRODUCTION

In Spain, around the 70% of all the hydric resources is used by agriculture.

Total irrigated area¹ (2013) : 3 540 000 ha (~21% of agri. area)

28 % surface

24 % sprinkler

48 % drip

Higher energy supply required

Energy used in irrigation represents almost the 2% (3700 GWh, 2011) of the total energy consumed in Spain per year (and rising).

EU policy: energy efficiency in the EU. Objectives: 20% energy savings (target for 2020)

¹*Encuesta sobre Superficies y Rendimientos de Cultivos (ESYRCE). Informe sobre los regadíos en España 2013. MAGRAMA.*



ENERGY EFFICIENCY IN IRRIGATION

How can I improve the EE of my irrigation system?

A) Reduction of water consumption

B) Adequacy of pumping and irrigation system

- ✓ Needs, design and planning
- ✓ Optimal equipment
- ✓ Energy source

ENERGY EFFICIENCY IN IRRIGATION

How can I improve the EE of my irrigation system?

A) Reduction of water consumption

- Appropriate crop-soil relationship
- Use the right amount of water at the proper time
- Consider using more efficient irrigation methods
- Control of leaks
- Tech. Solutions: water soil content, water balance monitored with sensors





ENERGY EFFICIENCY IN IRRIGATION

How can I improve the EE of my irrigation system?

B) Adequacy of pumping and irrigation system

- ✓ Needs, design and planning
- ✓ Optimising equipment
- ✓ Energy source



ENERGY EFFICIENCY IN IRRIGATION

How can I improve the EE of my irrigation system?

B) Adequacy of pumping and irrigation system

✓ Needs, design and planning

- Well knowledge of water crop demands and soil water content
- Optimal initial layout
- Proper distribution of the irrigation network
- Automatization
- Avoid the use of pressure-reducing valves

Also for irrigation communities:

- Sectorization of areas with similar characteristics (energy demand, water flow)

ENERGY EFFICIENCY IN IRRIGATION

How can I improve the EE of my irrigation system?

B) Adequacy of pumping and irrigation system

✓ Optimising equipment

- Correctly sized pumps (in number and diameter) for usual flow rates.
- Best pumping technology
- Variable speed drives on pumps
- Overcome cavitation
- Establish a periodic maintenance program
- Adaptation to non-constant flow rates
- Power factor improvement
- Sensors. Automation
- Leak detection
- Minimize water losses



Centrifugal In-line Pump



End Suction Pump



Source: www.invertedrive.com

So Source: www.arca53.dsl.pipex.com

ENERGY EFFICIENCY IN IRRIGATION

How can I improve the EE of my irrigation system?

B) Adequacy of pumping and irrigation system

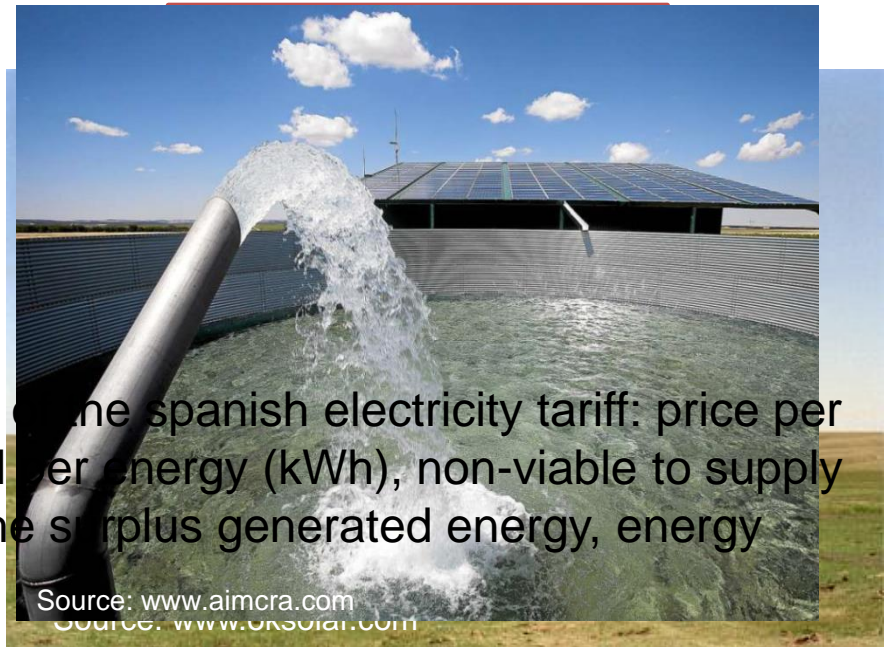
✓ Energy source

- “Conventional” energy. Electric vs Diesel pumps

- Alternative energies:

- ❖ Solar power
- ❖ Wind power
- ❖ Mini-hydraulic energy

- Depends on the conditions of the spanish electricity tariff: price per contracted power (kW) and per energy (kWh), non-viable to supply to the grid electricity with the surplus generated energy, energy time discrimination ...



PUMPING ENERGY REQUIREMENTS

Pumping energy requirements depend on:

Energy efficiency of the system

Water table depth

Height of the application

Water pressure required


Maximum water flow volume demand and frequency



MAR



E. EFFICIENCY IN “El Carracillo”



“El Carracillo”
district

CASE OF STUDY



E. EFFICIENCY IN “EI Carracillo”

El Carracillo district. Case of study. How is MAR improving the EE?

“El Carracillo” district is an intensive agriculture region of more than 4000 ha mainly focussed on horticulture industry with crops such as strawberry, carrot, potato, lettuce, leek and turnip.

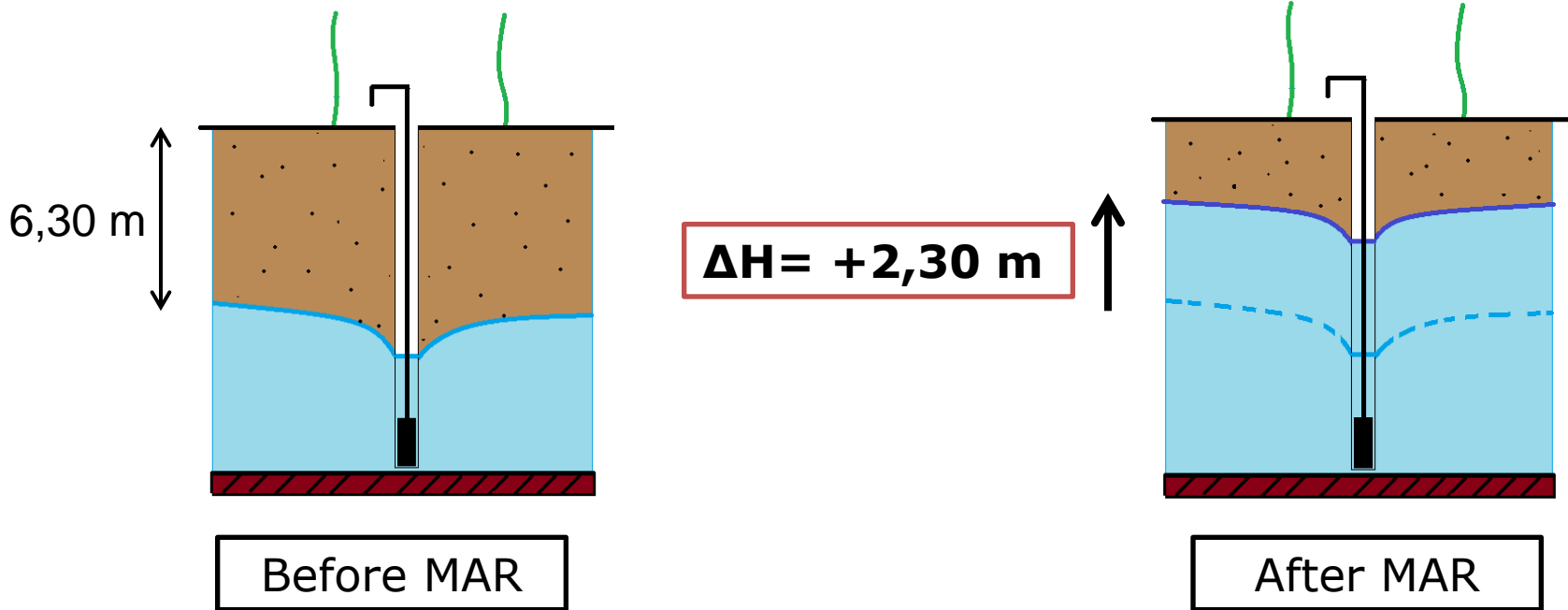
Number of wells: 314

Mean output water flow volume : 9957 m³ per well and year

Mean water table depth before MAR: 6,30 m

Mean water table depth after MAR: 4,00 m

E. EFFICIENCY IN “EI Carracillo”



What does a 2,30 m water table increment represent in energetic terms?

E. EFFICIENCY IN “EI Carracillo”

What does a 2,30 m water table increment represent in energetic terms?

314 wells – $Q \approx 9957 \text{ m}^3/\text{year}$ and well - $\Delta H = +2,30 \text{ m}$

	Before MAR	After MAR	MAR savings
Energy consumption (kWh)	76 430	48 430	-28 000
Energy cost (€/year)	8 180	5 180	-3 000

Energy savings of 36 %

-36%

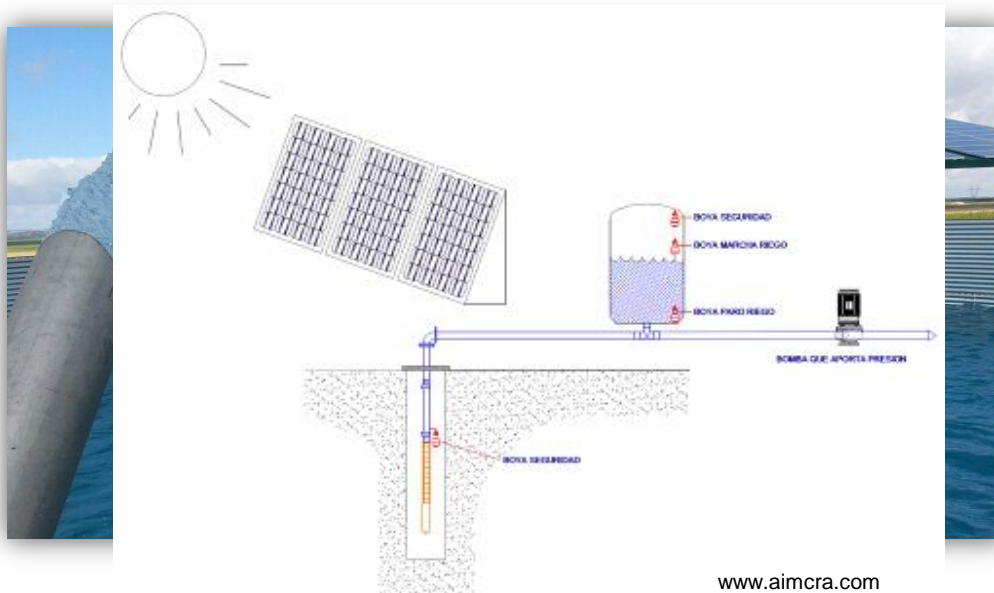


E. EFFICIENCY IN “EI Carracillo”

Solar power: Photovoltaic

- Isolated fields (vs Diesel)
- Pump power
- Deposit
- Area
- Working hours/year

- 1500 €/kWp
- Included deposit and pumps
- 10 m²/kWp
- +Maintenance
- Operating life: 25 years



www.aimcra.com



CONCLUSIONS

- Well managed MAR techniques provide savings in energy consume and for instance in energy efficiency.
- Improvements in water irrigation systems enhance the work and environmental conditions, time disponibility, and better economic results.
- Performing an energy audit can result a significant improvement in energy efficiency while saving money
- Solar energy (PV) seems to be the unique profitable alternative energy for irrigation in these regions.



TECHNICAL SOLUTIONS FOR
MANAGED AQUIFER RECHARGE

MARENALES

SPANISH TRAINING WORKSHOP
2015 MARCH



MAR SOL PROJECT
MARENALES Workshop
Technical Solutions for
Managed Aquifer Recharge



*****Thank you*****

Gomezserracín, 2015 March 11th

Collaborate:



Exmo Ayto. de Santiuste de San Juan Bautista



This initiative takes place in the framework of "FP7-ENV-2013 MARSOL (GA 619.120). Demonstrating Managed Aquifer Recharge as a Solution to Water Scarcity and Drought (WP5)" with the support of the European Commission, however it reflects the views only of the authors, and the Commission cannot be held responsible of any use which may be made of the information contained therein.

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