Wasserkonkurrenz
Probleme und Beispiele innovativer Problemlösungen

Competing uses of water
Issues and examples of innovative solutions

Workshop 1:
"Agriculture and water: Protection of resources and the competition for their use" .

" Water – energy nexus: energy irrigation costs".

Loccum, 18-19 de Septiembre de 2.013

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General Secretary of EIC y FENACORE

I. IRRIGATION ENERGY COMSUPTION IN SPAIN AND EUROPE

• Historically, irrigation has used surface water for flooding systems: (Romans, Arabs, water-wheels, ...)

- However, in the twentieth century, irrigation using subterranean water resulted in energy consumption.
- Consumption and energy costs are on the rise as a consequence of the efforts of Irrigation Communities to modernize, moving away from gravity systems in favour of pressurised irrigation systems (drip and sprinkler systems).

Evolution of Irrigation Systems in Spain

IRRIGATION SYSTEM	Before 2000		2012 year	
	Hectares	%	Hectares	%
Flooding (gravity)	1.973.336	59	1.020.406	29
Sprinkers and others	802.712	24	839.363	24
Drip	568.588	17	1.662.847	47
TOTAL	3.344.636	100	3.473.473	100

Source: PNR 2001 y encuesta sobre superficies y rendimientos de Cultivo ESYRCE, 2012, MAGRAMA

Changes in water and energy uses in irrigation

Year	Water used (m^3/ha)	Energy used (KWh/ha)
1950	8250	206
1970	8000	480
1980	7750	775
1990	7500	1088
2000	7000	1435
2007	6500	1560
Variation rate (%)	-21 %	657 %

Source: Corominas (2009)

Evolution of Irrigation Systems

	IRRIGATION		IRRIGATION SYSTEM (%)		
Country	Irrigable area	Irrigated Area	Flooding	Sprinkler	Dripping
Egypt		3.422.178			
France	2.723.700	1.938.730			
Germany	600.000	560.000	0%	98%	2%
Greece	1.321.340	1.161.000	36%	52%	10%
Italy	3.892.202	2.471.379	28%	51%	21%
Maroc		1.484.160	80%	10%	10%
Portugal	792.000	600.000	30%	38%	32%
Spain	3.700.000	3.473.473	29%	24%	47%
Turkey	25.853.674	4.300.000	80%	10%	10%

Source: FAO, German associations, FENAREG, ANBI, CIHEAM & EIC

Modernized irrigation

- Electricity consumption in the Spanish agricultural sector is a major production cost (>30%) and represents almost 2% of the total consumption and power bought in Spain.

– Increased energy costs for double way:
  - excessive cost of electricity prices.
  - greater power consumption

– Since 2006, energy costs have been rising. In July 2008, an EU Directive withdrew special irrigation prices…, power increased by 250% and energy by 15%. Over the following years, power and energy rose.

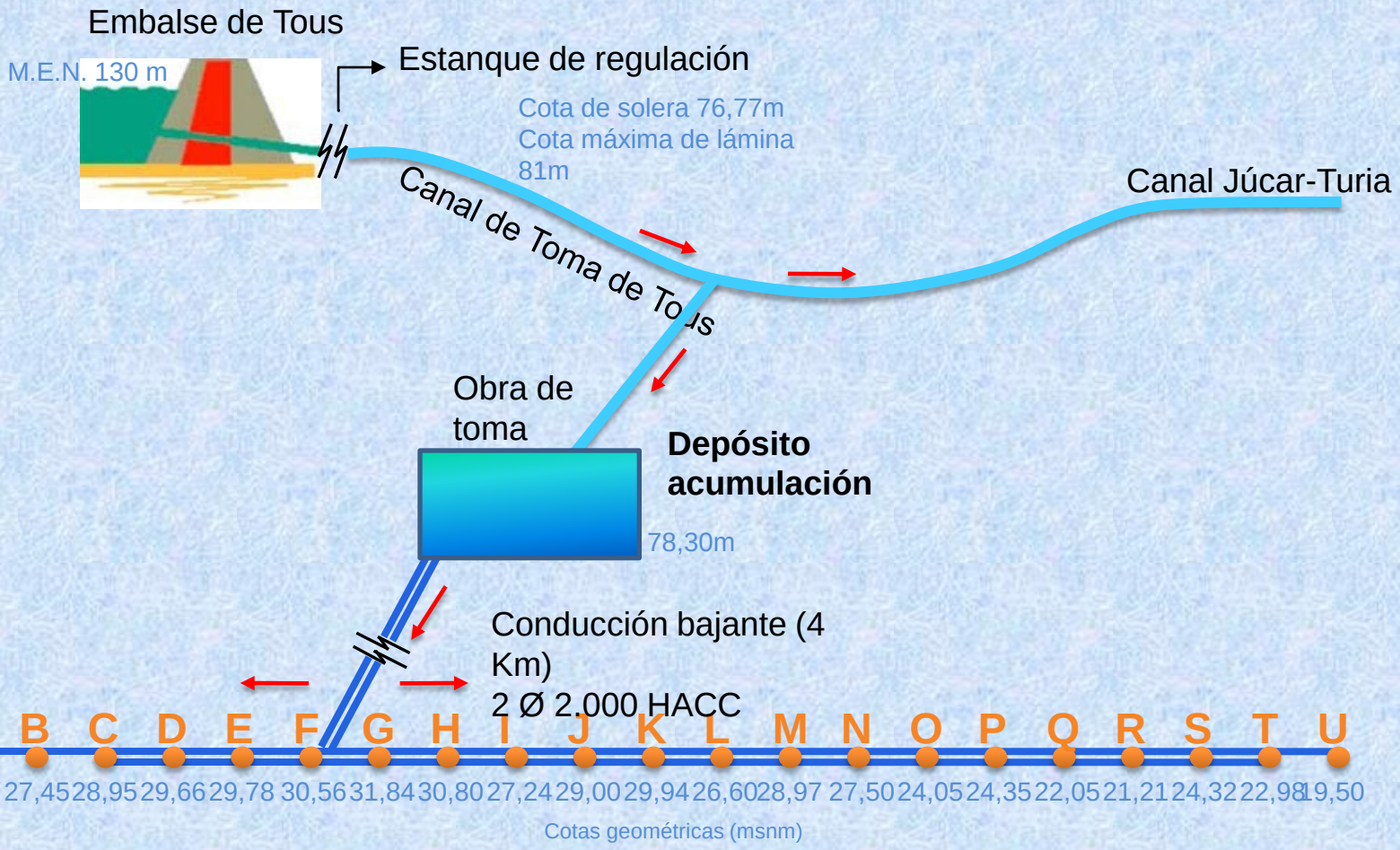
II.SOLUTIONS.-

•MINIMIZE ENERGY CONSUMPTION IN MODERN IRRIGATION SYSTEMS.

Where geography permits, the water point should be moved to 40 or 50 metres above the irrigation area in order to use the difference in height to provide natural pressure systems without energy costs.

Examples:
Canal of Aragon and Catalonia.
Royal Jucar Ditcht
Etc…

ENERGY SAVING ESTIMATE USING DRIP IRRIGATION (ARJ)



B.- Use of IT to minimize energy consumption. Aiming for efficient consumption.

A priority for EUROPE

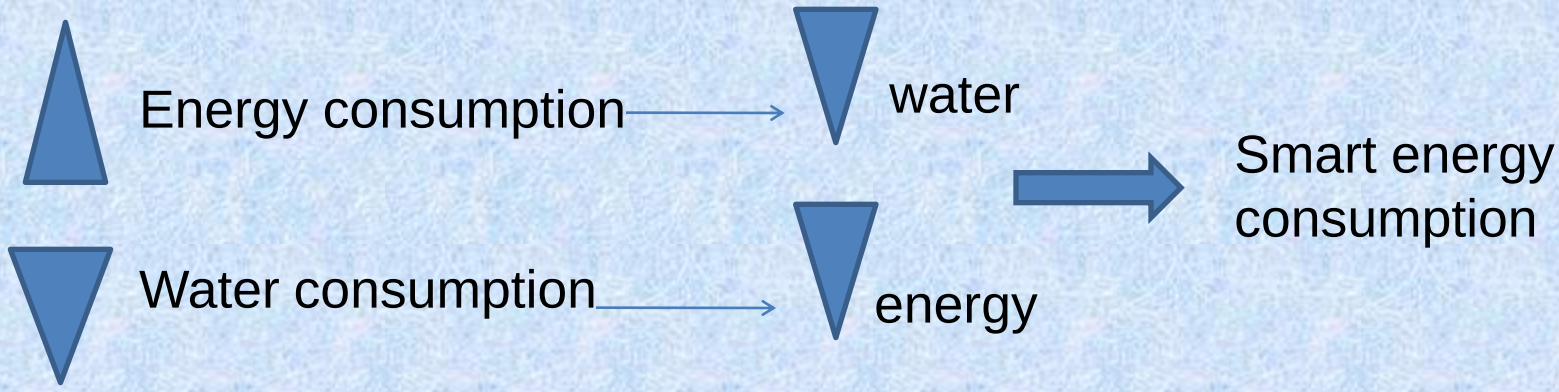
A) Directive to promote energy efficiency. October 2012

B) EU2012 de la DG Environment - Water Scarcity & Droughts – 2012 Policy Review – Building blocks Non-Paper

Agriculture

Agriculture has been identified as the major sustainable water management issue in the implementation of the Water Framework Directive (WFD). In particular, abstraction of water for irrigation accounts for 24% of total water abstraction in Europe and can be up to 80% in some southern Member-States (EEA, 2009 water resources in Europe – confronting water scarcity and droughts). Moreover, unlike other sectors like energy production, the majority of the water abstracted is consumed and not returned to the water bodies (c. 70% according to the EEA). Thus, this sector has to be addressed as a priority when considering any action against water scarcity and droughts in Europe.

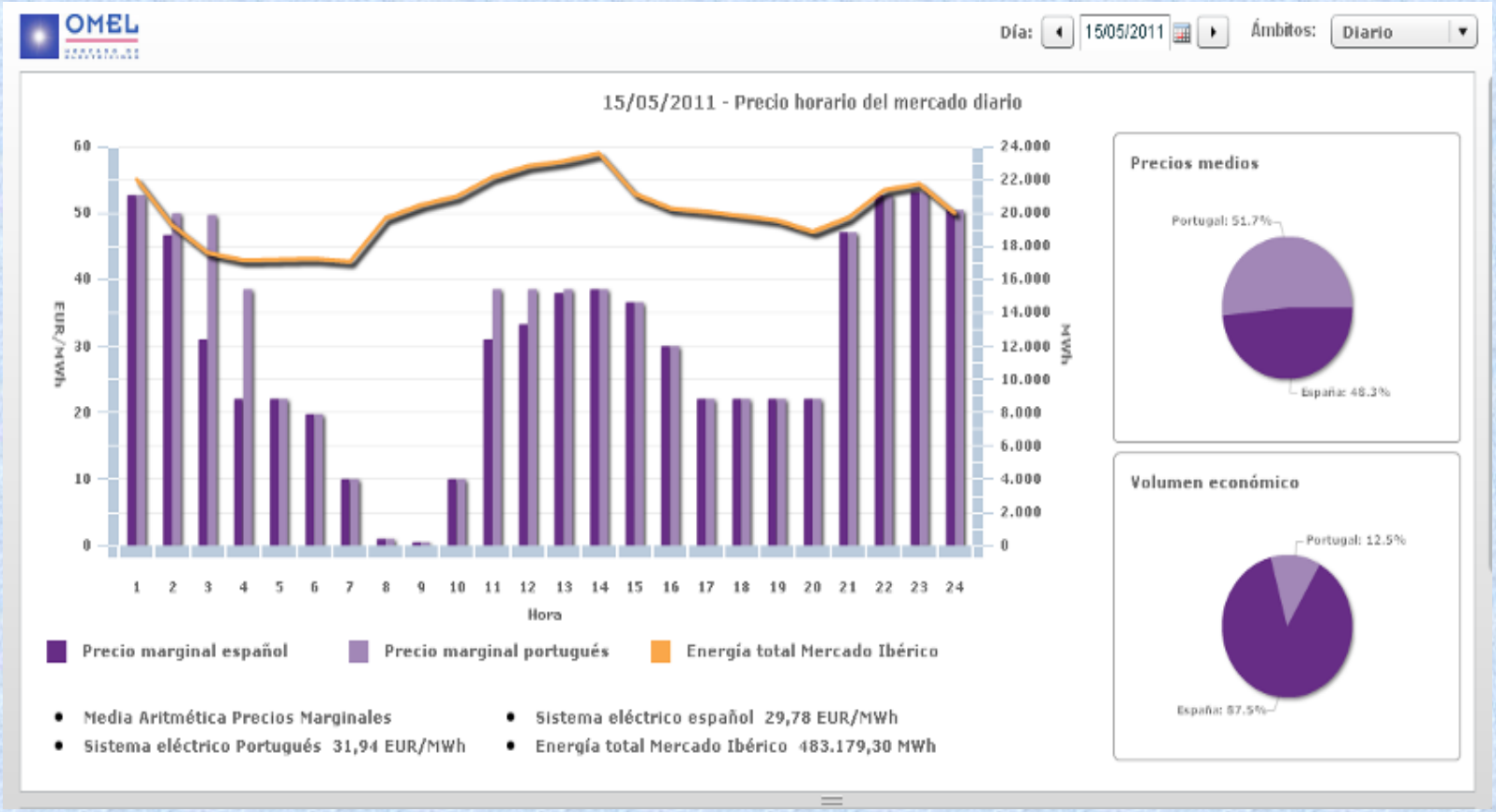
The Commission will organize with the Belgian Presidency in September a conference on the enforcement of EU water legislation in the agricultural sector with a special focus on illegal abstraction.



The agricultural sector could benefit from the variability of costs in the electricity system, but it is necessary to introduce technology and a regulatory framework that fosters the smart consumption of electricity.

Current context

- As a result primarily of the variability in wind power production, energy market prices are highly variable. Even so they can be scheduled 30 hours in advance of the daily market. Irrigation is the only water use that can adapt its own water demand to the energy market prices.



What are we proposing?

– Digitization of irrigation networks and introduction of information and communication technologies (IT) to:

  - Perform simulations to optimize set point flows and energy consumption.
  - Observe network defects (bottlenecks, leaks, etc.) from measured values and generate alerts.
  - Once irrigation is scheduled, adapt it daily and weekly depending on agricultural or crop restrictions, water consumption and energy costs.

– Use the purchasing and negotiating power of the agricultural irrigation sector through the establishment of an central electricity purchasing.

– Pilot installations in other Irrigation Communities in different EU member states

Objetives and scope

– Establish a system that allows farmers and irrigation communities to use water more efficiently and to optimize energy costs.

– For this reason, the system must take into account a number of variables:

- Water required by crops at any one time.
- Restrictions on the irrigation infrastructure.
- Hourly energy rates.
- Current irrigation scheduling (conditional, by turns, etc ...).

Benefits to the Sector.

- ✓ Improving water efficiency (less water) both irrigation communities and individual irrigators.
- ✓ Improving energy efficiency (lower energy and water consumption).
- ✓ Significant reduction in unit energy costs (€ / kWh) and total.
- ✓ Joint technological innovation and environmental improvement of irrigation systems.
- ✓ Use of ICT as a mechanism for improving sustainability and efficiency.

New European Project: WEAM4i (“ Water & Energy Advanced Management for Irrigation”).

- Agriculture sector is accountable for 30% of the total water consumption in Europe, but reaches up to 70% of total water consumption in several southern European states. In recent years, most of the effort has been focused on water efficiency, without taking care of energy aspects, resulting in some cases in a significant increase in energy consumption, both per irrigated surface and per unit volume of water.

- EIC is actively taking part in the implementation of the European WEAM4i project.

- First meeting with partners was held at EIC offices on March 15th

- The project is the result of the HISPATEC company’s concept schema based on "smart consumption" and is focused on two priorities within the EIP on Water:
- Water-energy nexus
- Decision support systems and monitoring

WEAM4i concept

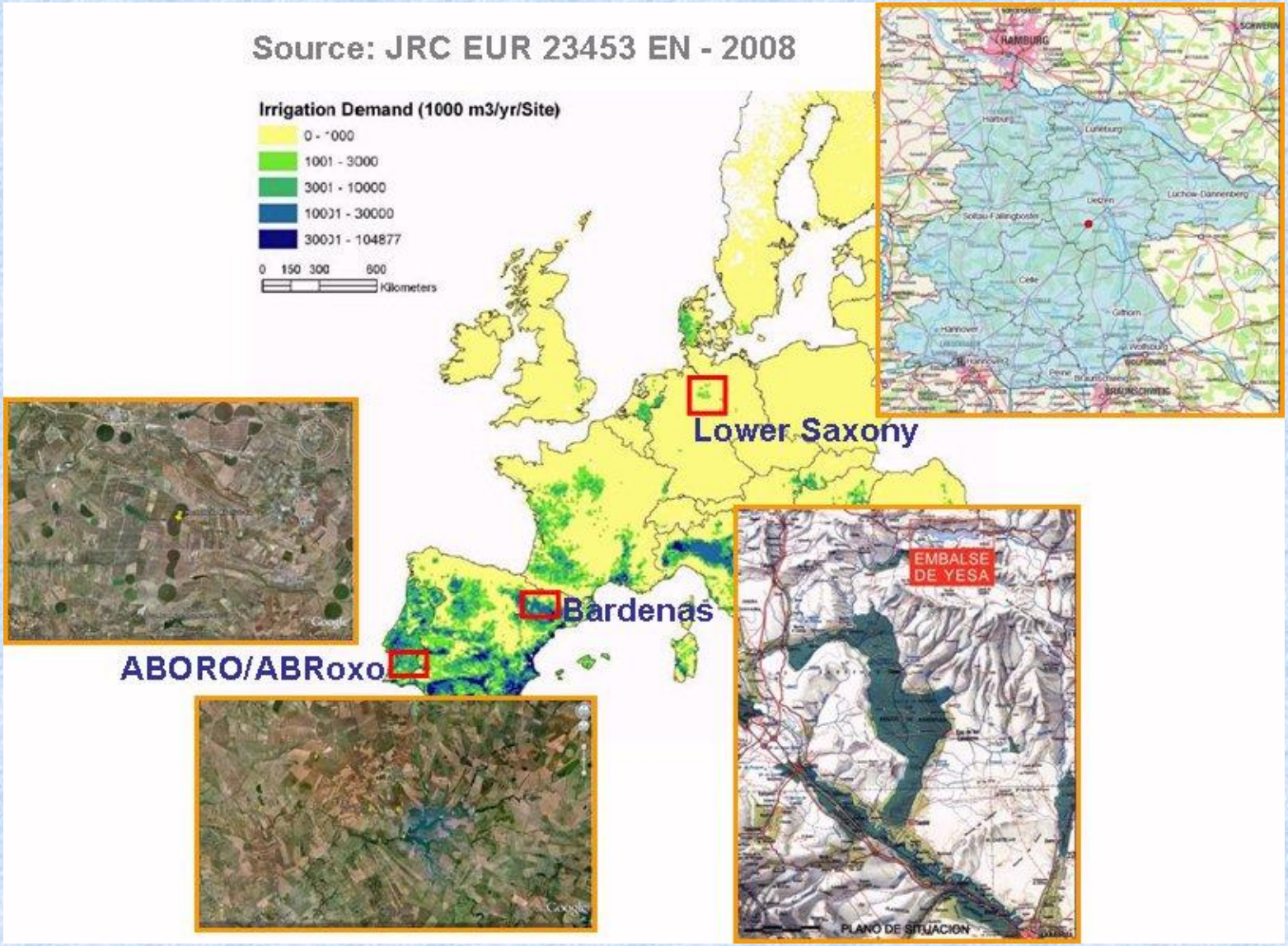
- Thus, the main concept to be developed is the water demand-side management according to available energy offer. In order to develop this concept, the following is required:
- A water demand forecast, and consequently, an associated energy demand forecast
- Instruments for aggregating the energy demand in order to trade in the energy market
- And finally, an ICT platform to support the information.

WEAM4i concept

- Develop an innovative water and smart energy grid for irrigation: tactical energy consumption decisions (days), introducing demand-side management and matching to available energy supply, thanks to the water storage capability (both in reservoirs or on the ground) and the 'near-almost elastic' demand from users.
- Demonstrate innovative techniques for resource efficiency at local level:
- Techniques for minimizing the operational cost of water supply infrastructures, such as strategic management (weekly)
- Techniques for saving water in the local irrigation systems and, consequently, saving energy
- Techniques for improving the ratio m3/kW ratio.

- Demonstration in 3 'demo' sites in 2 growing seasons

Demonstration sites



Demonstration sites

Demonstration site	Alqueva area	Bardenas area	Lower Saxony
Country	Portugal	Spain	Germany
Organisation name	Associação de Beneficiarios da Obra de Rega de Odivelas, and AB do Roxo	Comunidad General de Regantes del Canal de Bardenas	Landwirtschaftskammer Niedersachsen (LWK) / Chamber of Agriculture of Lower Saxony
Total Irrigated surface (ha)	ABoro: 12.000 ABR: 5.000	81.100	300.000
Water resources	Odivelas and Roxo reservoirs, Alqueva dam	Yesa dam	Groundwater
Irrigation network	Distribution network of pressurized water	Transport network + distribution network	Direct groundwater pumping to subterranean pipeline network
Irrigation technologies	Drip, sprinkler and pivot systems	80% flooding system and 20 % pressurized system –dripping and sprinkling	High pressure gun spray-jet on reel wagon (95%)
Storage	Odivelas and Roxo reservoirs	5 regulation reservoirs	None
Main crops	Olives, maize, rice, pasture, sunflower, almonds	Alfalfa, corn, winter cereal (wheat, barley), sunflower, vegetable and	potatoes, sugarbeets, grain, corn, onions, vegetables

WEAM4i consortium

1 (Coord.)	Adasa Sistemas S.A.U.	ADASA	Spain
2	Grupo Hispatec Informatica Empresarial S.A.	HISPATEC	Spain
3	Aquagri - Assistencia Tecnica e Consultoria ACE	AQUAGRI	Portugal
4	Federacion Nacional de Comunidades Regantes de España (Fenacore)	FENACORE	Spain
5	Federação Nacional de Regantes de Portugal (Fenareg)	FENAREG	Portugal
6	Instituto Valenciano de Investigaciones Agrarias (IVIA)	IVIA	Spain
7	Meteosim S.L.	MET	Spain
8	eLeaf (WaterWatch BV)	ELEAF	Netherland
9	Landwirtschaftskammer Niedersachsen (LWK)	LWK	Germany
10	LGRain GmbH	LGRAIN	Germany
11	Système Euro-Méditerranéen d'Information sur les savoir-faire dans le Domaine de l'Eau (SEMIDE/EMWIS)	EMWIS	France
12	Inergia Grupo Engineering & Architecture S.L.	INERGIA	Spain
13	Eclareon GmbH	ECLAREON	Germany
14	Comunidad General de Regantes del Canal de Bardenas	CGB	Spain
15	Hydrologic BV	HR	Netherland
16	Schulz+von der Ohe GmbH	DEROHE	Germany
17	ZIM Plant technology GmbH	ZIM	Germany

Advisory board

Scope	Member	Sector	Contact
Spain/portugal	OMIE	Energy	Rafael Gómez-Elvira González
European union	EUWMA	Water management	Jörg Janning
European Union	WssTP	Technological association	Durk Krol
Spain	CHG	Water authority	Manuel Omedas
European Union	COPA COGECA	Farmers association	Tania Runge
Belgium	EnergyVille	Smart cities	Peter Verboven
Germany	Ministry of Food, Agriculture and Consumers Protection Lower-Saxony	Public institution	Dr. Volker Garbe

Steps

- Project total budget: 8,055,000 €
- EU contribution: 5,132,500 €
- 13th September, 3rd deadline: End of negotiation with EC.
- October: Grant Agreement signature
- All partners must sign GPFs (Grant Agreements preparation Forms).
- Consortium Agreement in parallel
- Project start: Nov 2013/ January 2014.
- Project duration: 42 months.

DANKE FÜR IHRE AUFMERKSAMKEIT

THANK YOU FOR YOUR ATTENTION

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