



# WEAM4i

Water & Energy Advanced  
Management For Irrigation

## **WEAM4i Successful Case Studies**

## **Price prediction module**

### **WEAM4i Final Conference April 6<sup>th</sup> 2017, Barcelona**

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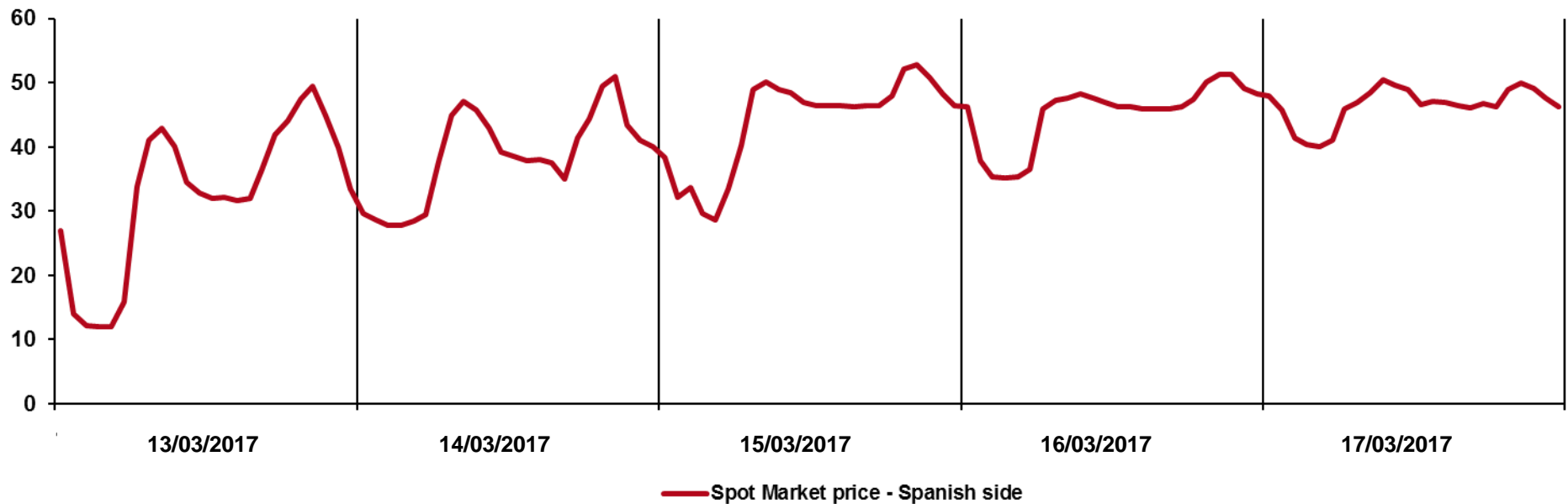
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# Overview

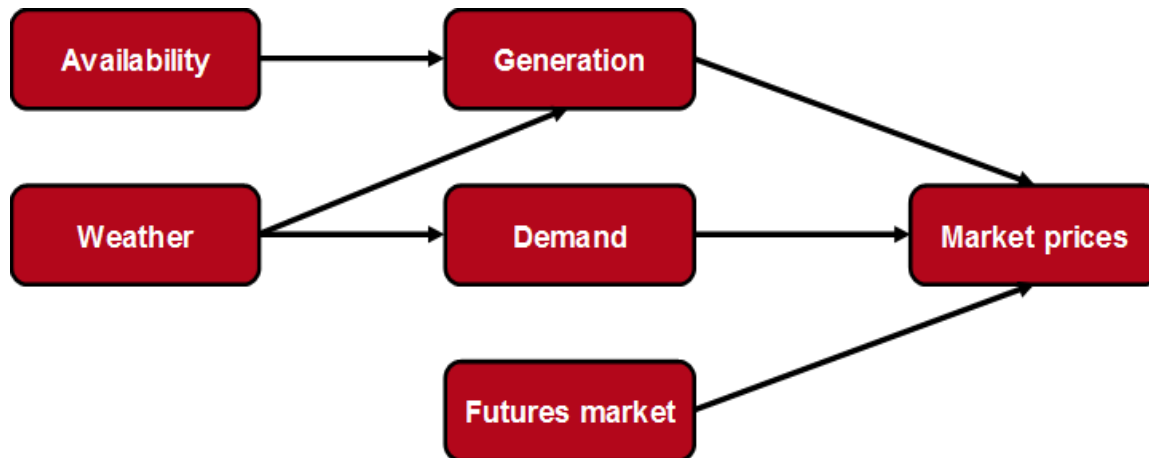
Spot Market price - Spanish side



- Energy is a key cost input for irrigators
- Energy costs vary significantly from day to day in the day-ahead market
- Irrigators are typically flexible to choose the best time to water crops thanks to irrigation infrastructure (ponds, etc.)

# Description of the Price Prediction Module

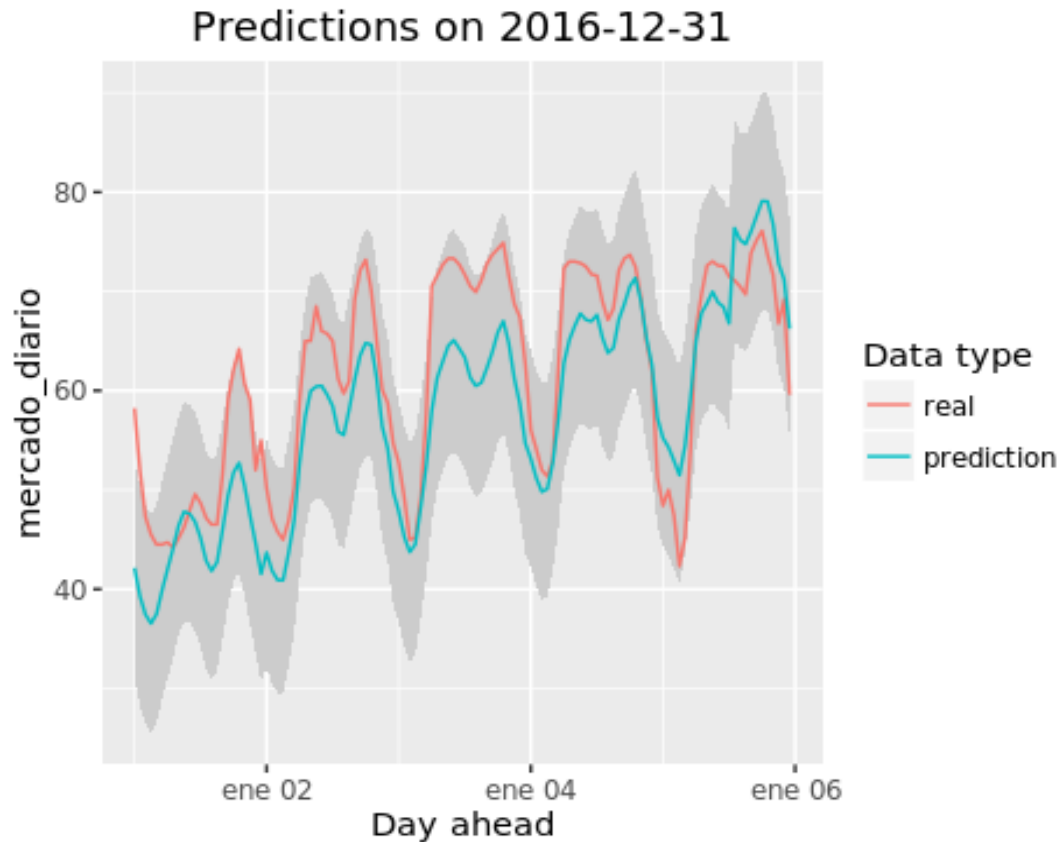
Diagram of the price prediction module



- The objective of the prediction model is to estimate the hourly electricity market price five days ahead
- In order to predict the market prices is needed an estimation for the next five days of:
  1. Availability of generation technologies, that impact on energy generation
  2. Meteorological variables, which affect energy generation and demand
  3. Price reached on the Futures markets



# Results

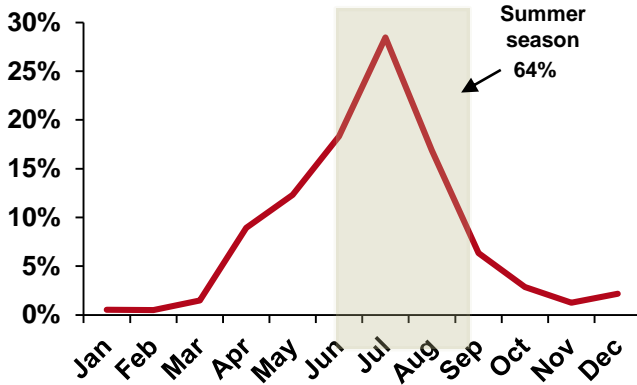


- The price prediction module forecasts 120 hour prices (with UTC timestamps), available daily to the DSS system
- The module has been designed to have a relative error below 10%
- On December 31<sup>st</sup> the module was run, being 9% the mean relative error

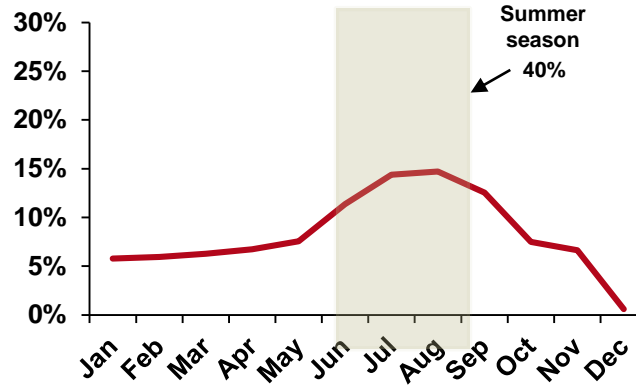


# Learned lessons

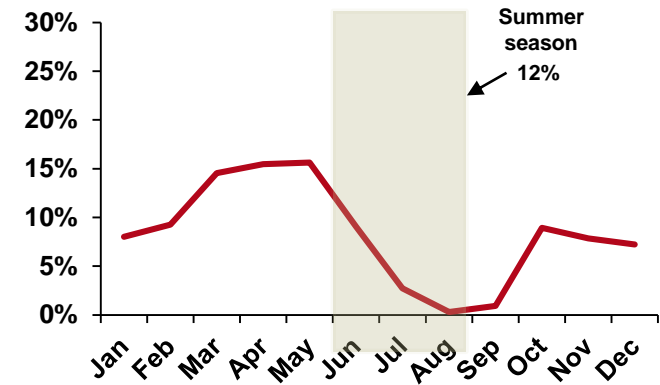
### Energy consumption - Zaragoza



### Energy consumption - Valencia



### Energy consumption - Huelva



— Energy consumption - Zaragoza

— Energy consumption - Valencia

— Energy consumption - Huelva



+7.9 %



-0.1 %



-0.9 %

Indexed vs. Fixed (2012-2016)

- In order to use the forecasting tool, irrigators should have an indexed-price supply contract
- Creara has analysed three irrigation communities with different consumption profile in order to identify the geographical areas where indexed-price contracts are more convenient than fixed-price ones
- Indexed contracts are interesting for irrigation communities where irrigation in summer does not exceed 40% of the annual energy consumption

## Learned lessons

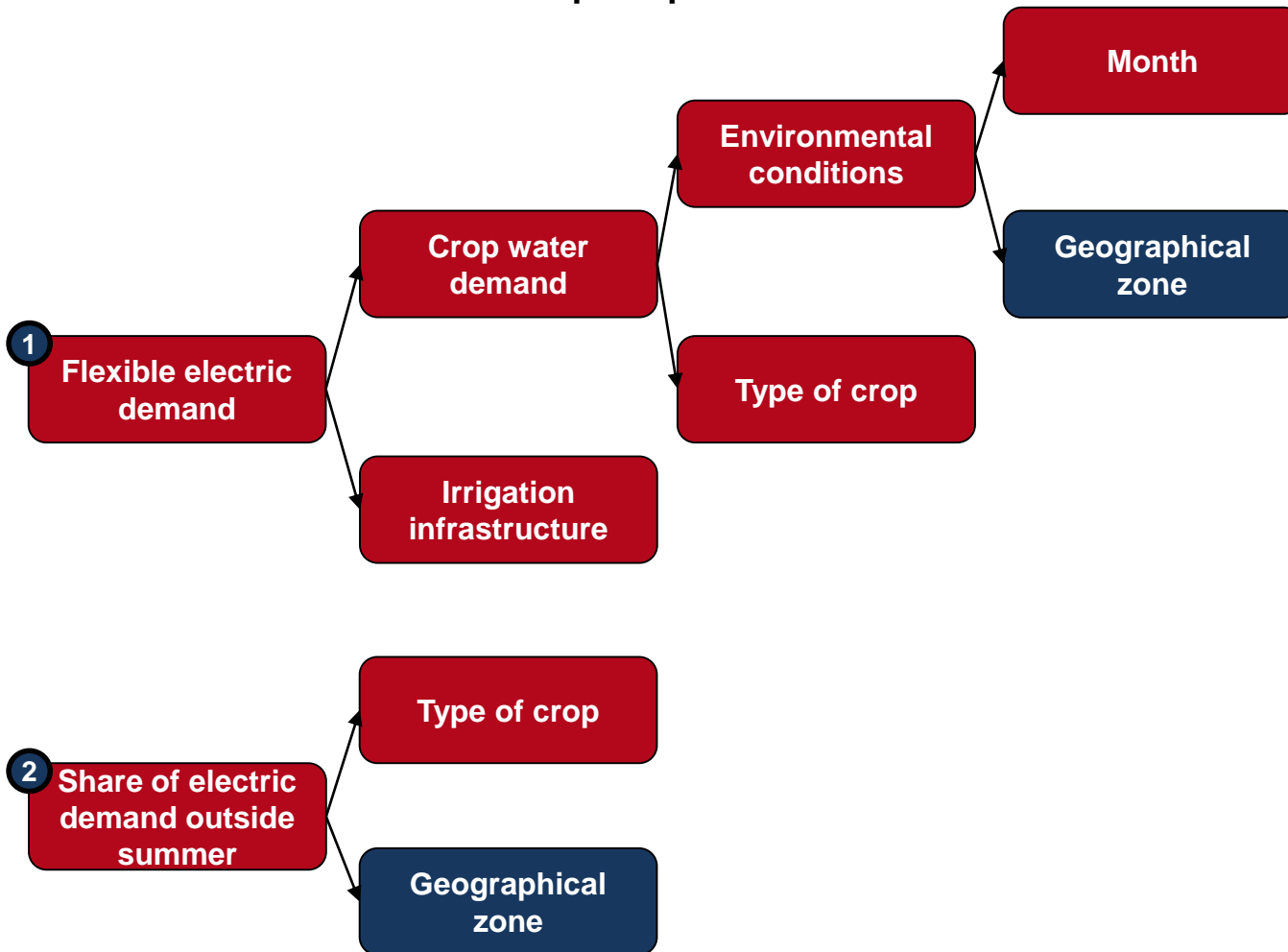
- Irrigators with a summer irrigation spend below 40% are expected to be in warm geographies:
  - Alicante
  - Murcia
  - Almería
  - Huelva
- In these areas typical crops are berries (strawberries, raspberry, blueberries, etc.) and horticultural crops (lettuce, tomato, broccoli, etc.)





# Key Messages

## Conditions to use the price prediction module



- The target clients for the price prediction tool are irrigators, meeting two conditions:
  1. Flexible energy demand
  2. Summer energy demand is below 40% of annual demand
- These conditions are expected to be in the Spanish Southeast





## Key Messages

- Using advanced statistics analysis it is possible to forecast the energy costs and thus, irrigators can take advantage of the energy market volatility
- Irrigators can reduce the price of the energy they consume if they select those days in which energy prices are expected to be lower
- This is useful for those areas in which energy spend during summer is below 40% of the total annual spend, which broadly includes the South-East regions of Spain





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This project has received funding from the European Union's Seventh Framework Programme for research, technological development and demonstration under grant agreement no No 619061