INTELLIGENT RENEWABLE ENERGY MANAGEMENT SOFTWARE

Interreg Atlantic Area
HY4RES

Co-funded by the European Union

How can forecasting help users make smarter renewable energy decisions?

The decision-support software combines energy demand and renewable energy production forecasts to support energy management.

HY4RES has developed and tested this tool for four sectors*: agriculture, aquaculture, ports & energy communities.

**Based on historical data*

7 days hourly energy demand forecasts

ENERGY DEMAND FORECASTING

Transformer based model forecasting hourly energy demand **up to 7 days ahead** across four pilot sectors.

- **Aquaculture** Ireland — **97.9% R^2**
- **Irrigation** Spain — **99.62% R^2**
- **Port** Spain — **98.67% R^2**
- **Community Energy** Portugal — **98.58% R^2**

*R^2 values obtained on the validation dataset. **R^2 measures how well the model explains variations** in energy demand; it does not represent forecast accuracy.*

FROM FORECASTS TO ENERGY MANAGEMENT

DATA COLLECTION
- Energy consumption
- Weather
- Available sensor data

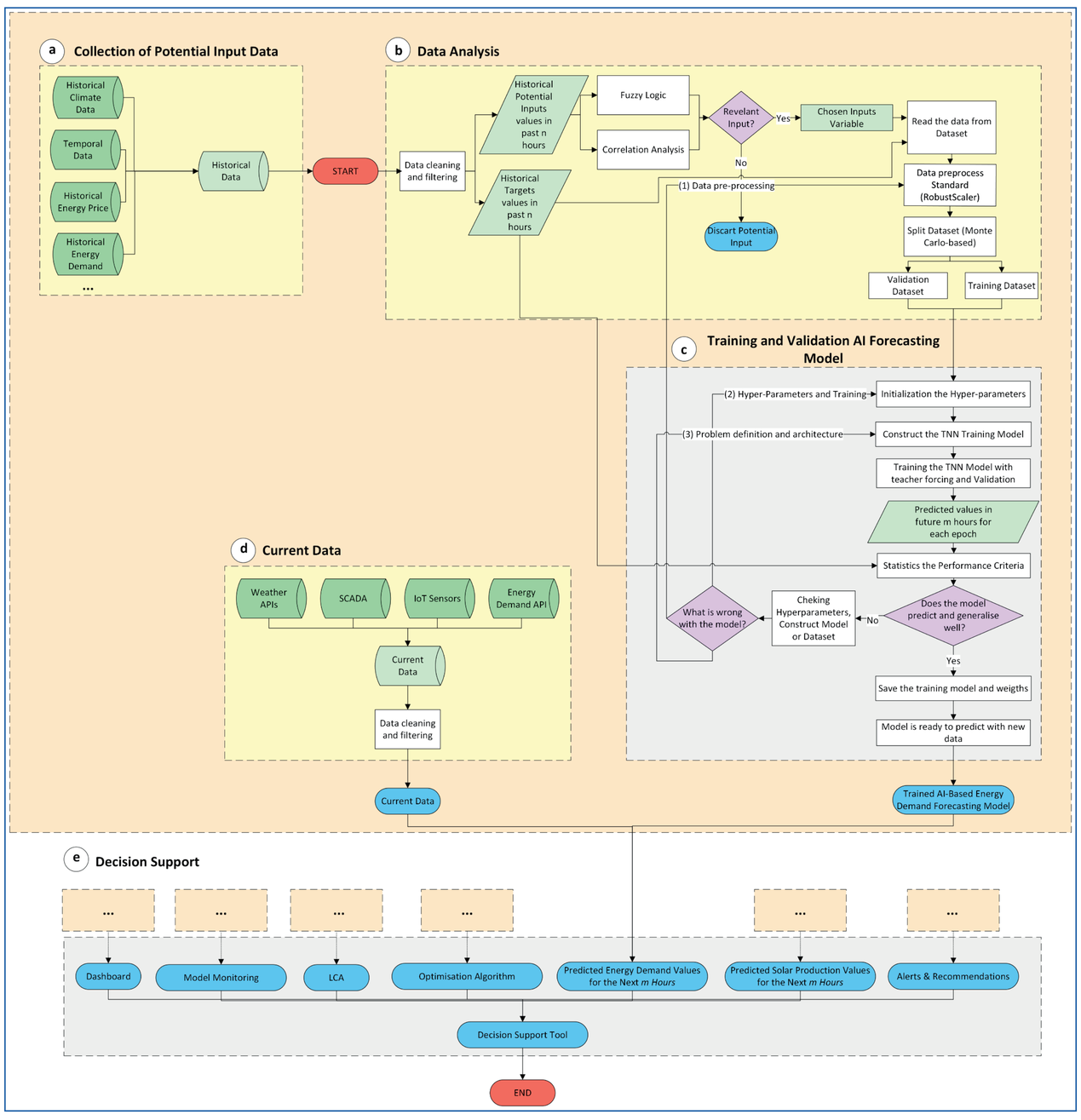
→ **FORECASTING**
- Energy demand
- Solar energy production
- Wind energy production

→ **ENERGY MONITORING**
- Forecasts compared with energy performance and available production data

→ **DECISION SUPPORT**
- Energy management
- Optimisation
- Operational recommendations

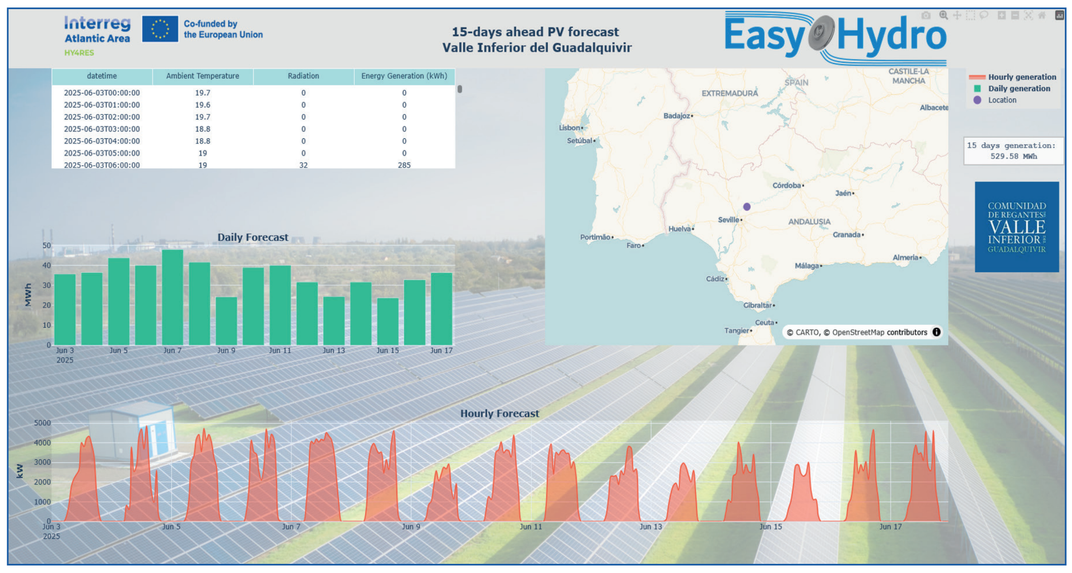
Turning forecasts into smarter energy decisions

ENERGY MANAGEMENT SYSTEM ARCHITECTURE



PRACTICAL APPLICATION

- **Application to the Valle Inferior Irrigation District**



Dedicated application
for irrigation energy management

Automated data integration
under development

Environmental and economic
indicators being explored

*The aim is to **translate HY4RES forecasting research into practical support for irrigation energy management.***