



Agricultural Irrigation Capabilities in **Spain**



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Table of Contents

1. INTRODUCTION: SPAIN AS A GLOBAL REFERENCE IN SMART IRRIGATION	04
2. STRUCTURE OF THE ECOSYSTEM AND MAPPING OF KEY STAKEHOLDERS	05
I) CLASSIFICATION BY TYPOLOGY AND VALUE CHAIN ROLE	05
SPAIN'S IRRIGATION-RELATED BUSINESS LANDSCAPE	07
II) TERRITORIAL DISTRIBUTION OF THE SECTOR	08
III) KNOWLEDGE AND INNOVATION AGENTS: UNIVERSITIES, TECHNOLOGY CENTERS AND RESEARCH NETWORKS	11
IV) SUPPORT ENTITIES: CLUSTERS, ASSOCIATIONS, HUBS, INCUBATORS AND GOVERNMENT ENTITIES	14
VI) NATIONAL AND INTERNATIONAL INVESTORS	17
3. TECHNOLOGY, INNOVATION, AND INTELLECTUAL PROPERTY	19
I) PATENTS AND INNOVATION AREAS IN SMART IRRIGATION	19
II) ADOPTION OF ADVANCED TECHNOLOGIES AND READINESS	20
III) TECHNOLOGY READINESS LEVELS (TRL) OF SPANISH SOLUTIONS	22
IV) PARTICIPATION IN INTERNATIONAL R&D PROGRAMS	23
4. ECONOMIC PERFORMANCE AND INTERNATIONAL PROJECTION	25
I) ECONOMIC IMPACT: EMPLOYMENT AND CONTRIBUTION TO GDP	25
II) EXPORTS: VOLUME, DESTINATIONS, AND SPECIALIZATION	26
III) PARTICIPATION IN INTERNATIONAL TRADE FAIRS AND PROJECTS	30
IV) INVESTMENT, MERGERS & ACQUISITIONS, AND COMMERCIAL AGREEMENTS	31
V) INTERNATIONAL AWARDS AND RECOGNITIONS	33
5. GLOBAL TRENDS AND SPAIN'S INTERNATIONAL POSITIONING IN SMART IRRIGATION	35
V) GLOBAL TRENDS IN SMART IRRIGATION	35
VI) COMPARATIVE ANALYSIS – LEADING IRRIGATION ECOSYSTEMS	37
VII) COMPETITIVE ADVANTAGES OF SPAIN	42



Table of Contents

5. GLOBAL TRENDS AND SPAIN'S INTERNATIONAL POSITIONING IN SMART IRRIGATION	35
V)GLOBAL TRENDS IN SMART IRRIGATION	35
VI)COMPARATIVE ANALYSIS – LEADING IRRIGATION ECOSYSTEMS	37
VII)COMPETITIVE ADVANTAGES OF SPAIN	42
6. SPANISH SUCCESS STORIES	45
7. EXPERT VOICES: PERSPECTIVES ON SPAIN	48
8.- CONCLUSIONS	54
SYNTHESIS OF CAPABILITIES	54
POSITIONING OPPORTUNITIES	55
SOURCES USED	56





1.Introduction

1.Introduction: Spain as a Global Reference in Smart Irrigation

Irrigated agriculture is an economic pillar for Spain. While irrigated land represents roughly 23% of cultivated area, it generates 73.1% of the value of all crop production, 43.6% of total agricultural branch production, and 62.9% of agricultural Gross Value Added. In essence, two of every three euros available to agricultural entrepreneurs. Spain holds the largest irrigated area in the European Union and is the world leader in area under drip irrigation (58.6% of irrigated surface vs. a 6% global average).

Spain has evolved into one of the few countries worldwide able to demonstrate smart irrigation “proven at scale” under real water-stress conditions. What began as a multi-decade effort to modernize physical infrastructure, upgrading nearly 3.83 million hectares of irrigated land to 77% efficient-irrigation coverage, has evolved into a rapidly accelerating digital transformation layering telemetry, remote control, IoT sensors, analytics, and AI-driven decision-support tools onto an already robust hardware base.

This positioning is underpinned by a broad, end-to-end ecosystem: a core group of startups and leading companies across the irrigation value chain (with 57% concentrated in smart irrigation technologies: IoT, sensors and software) and a wider base of 1,357 active irrigation-linked companies. The industrial depth (hardware and manufacturing), engineering integration capacity (turnkey delivery), and expanding digital supply (platforms, analytics, remote sensing) together enable Spain to offer complete solutions, not just components.

Territorially, the ecosystem is anchored in high-intensity irrigation and scarcity hotspots (Murcia–Valencia “innovation belt”, Andalucía, Ebro Valley), where constraints have acted as a catalyst for adoption and applied innovation, including water reuse, desalination-linked practices, and advanced fertigation. A strong base of universities and technology centers sustains R&D and technology transfer, while clusters, hubs, associations, platforms and public institutions structure collaboration and scaling.

A comparative analysis against the world's leading irrigation ecosystems reveals that Spain occupies a distinctive competitive niche: it is one of the very few countries that combines large-scale efficient-irrigation hardware deployment, deep operational experience under water stress, a structured multi-actor governance model and an increasingly digital innovation supply. This makes Spain a reference not only for technology, but for institutional and governance pathways to modernization—an asset of particular value to countries in the Mediterranean basin, the Middle East, Central Asia, and Sub-Saharan Africa that are navigating similar transitions.



2. Structure of the Ecosystem and Mapping of Key Stakeholders

2. Structure of the Ecosystem and Mapping of Key Stakeholders

Spain boasts a comprehensive irrigation ecosystem, with hundreds of companies, specialized institutions, and active support networks covering the entire agricultural irrigation value chain.

1) Classification by Typology and Value Chain Role

Spain's irrigation sector value chain is underpinned by a robust base of national companies that operate across upstream, midstream, and downstream activities, distinct from broader ecosystem actors such as public agencies, research institutions, or farmer organizations

The value chain can be classified as follows:

Equipment & Solution Manufacturers (Upstream): Spain is home to leading manufacturers of irrigation equipment and components, which provide the building blocks for modern irrigation systems.

This segment includes research and development, product design, and manufacturing of irrigation components (pumps, pipes, drip emitters, sprinklers, valves, filters).

These manufacturing and engineering firms anchor the ecosystem's technology supply; many are clustered in high-irrigation regions (Murcia, Valencia, Catalonia) and collectively position Spain as a source of world-class irrigation equipment.

Smart Irrigation Technologies (IoT, Sensors & Software): A distinctive feature of Spain's ecosystem is the rise of digital solution providers that add intelligence to irrigation.

This group is supported by active R&D programs that continually introduce new technologies – like advanced filtration systems for water reuse, or IoT sensor networks for real-time soil moisture monitoring. Digital tools, combined with IoT devices, form the “smart layer” of Spain's irrigation value chain. They leverage analytics, remote sensing, and AI – often developed in collaboration with local tech centers – to enhance water-use efficiency.

The result is that Spain can supply end-to-end irrigation technology, largely with domestically developed components.





Engineering Integrators and Turnkey Project Developers: In the midstream part of the value chain, Spain benefits from numerous engineering firms, systems integrators, and contractors that design and implement complete irrigation systems. These actors bridge between technology producers and end-users by offering turnkey solutions. Many equipment manufacturers also act as integrators, providing end-to-end project execution from system design to installation and after-sales.

The midstream segment is a key strength of Spain's ecosystem. Domestically, these integrators have implemented Spain's extensive irrigation modernization over the past 20 years – upgrading nearly 2 million hectares with pressurized pipelines, on-demand supply, and SCADA remote control. Additionally, specialized civil engineering companies and consultants contribute here, working with private contractors to modernize irrigation districts (installing pipelines, automation, reservoirs) under public programs.

On-Farm Service Providers and Support (Downstream): The downstream end of the irrigation value chain in Spain involves service-oriented actors who work directly with farmers and water user groups. Here we find technical advisory companies, farm management software providers, maintenance service firms, and after-sales support teams.

Spain's cooperative system and regional agricultural extension services historically played a big role in advising irrigators.

Spain's irrigation-related business landscape

Startups and leading companies.

Out of the active companies participating in Spain's irrigation ecosystem, a total of 193¹ startups and leading companies stand out as the core drivers of the value chain.

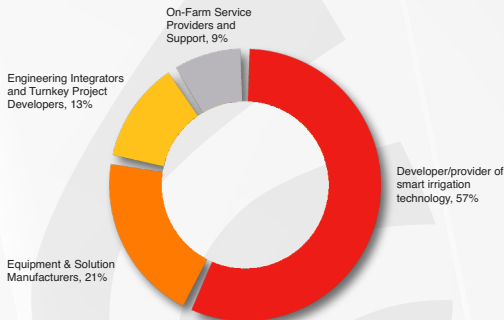
From the value chain role classification, the distribution is clearly centered toward innovation-led activities. In particular, smart irrigation technologies dominate, with 57% focused on IoT, sensors, and software. This highlights Spain's strong positioning in digital and precision irrigation, supported by an active startup environment and continuous R&D efforts.

Beyond the digital segment, 21% operate as equipment and solution manufacturers, part of the industrial base that produces essential irrigation components and reinforces Spain's global competitiveness in hardware. Meanwhile, 13% specialize in engineering integration and turnkey project development, playing a key role in implementing large-scale irrigation systems. At the downstream end, 9% provide on-farm services and support, indicating a relatively smaller but important segment focused on end-user engagement.

Census of active companies

A broader census of Spain's business landscape identifies 1,357 active companies linked to irrigation. This figure is based on aggregated data provided by INFORMA, using the CNAE classification system, which categorizes businesses and self-employed workers according to their economic activity.² The activity-based breakdown, clearly shows that irrigation is a cross-cutting sector, spanning multiple

Spanish startups and leading companies
by type, Irrigation sector (%)



Source: Prepared by the author

¹ The complete and detailed list of Startups and leading companies can be consulted in the document's ANEXES

² It is important to note a key methodological limitation: there is no specific CNAE code dedicated exclusively to irrigation. As a result, companies involved in irrigation-related activities are dispersed across numerous industry codes, such as agricultural production, water management, construction, and equipment

CNAE classifications. Rather than being concentrated in a single industry, it is distributed across installation, construction, commerce, and manufacturing activities, illustrating its breadth and economic relevance across the country.

- The distribution of the active irrigation-related companies by type of activity reveals a strong concentration in technical and construction-related services, alongside a more fragmented presence across commercial and industrial categories. The largest share corresponds to gardening and agricultural support activities (41.2%), as many irrigation-related services, such as system operation, maintenance, and advisory, are embedded within companies that directly support farming operations.

- A significant share is linked to the installation of heating, plumbing, and air-conditioning systems (12.60%), which reflects the overlap between irrigation infrastructure and broader fluid management and piping systems. This highlights how irrigation activities are often embedded within more general technical installation sectors rather than existing as a standalone category.

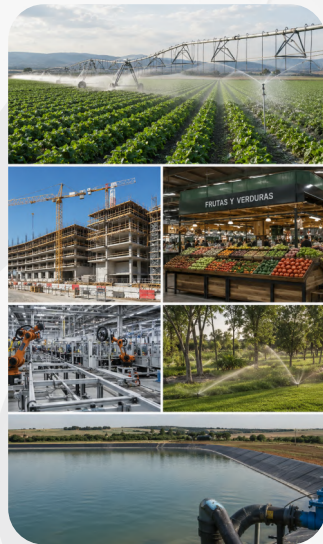
- Construction-related activities and land preparation also play a significant role, contributing to the development and maintenance of irrigation infrastructure. These segments, although smaller in percentage terms, are essential for system deployment, particularly in large-scale agricultural modernization projects.

- Commercial activities represent another relevant portion of the ecosystem. Retail trade in specialized establishments and non-specialized establishments indicates the existence of distribution channels for irrigation equipment and related products, although these are relatively limited compared to technical services

II) Territorial Distribution of the Sector

Spain's irrigation sector has a distinct geographical footprint. This territorial distribution closely mirrors regions known for intensive agriculture and water scarcity challenges – where the demand for efficient irrigation is highest and historical know-how is deepest.

The landscape can be summarized as follows:



Southeast Spain (Murcia, Valencia): The southeast is often nicknamed Spain's "irrigation innovation belt" – a region where scarce water and high-value crops drove early adoption of advanced irrigation. Murcia and the Valencian Community, in particular, host a dense concentration of irrigation technology companies and know-how. This region has the highest intensity of irrigation technology firms per km² in Spain.

Murcia, though representing only about 3% of Spain's farmland and water use, produces roughly 20% of Spain's horticulture exports thanks to irrigation efficiency. This region gave birth to drip irrigation in Europe and is home to leading firms in the sector.

The Valencian Community, with about 279,000 ha irrigated (nearly 45% of its cultivated land), is another hub, blending a rich irrigation heritage (the millennia-old huertas and canal systems) with modern digital water companies.



Southern Spain (Andalucía): Andalucía, has the largest irrigated area of any region, more than 1 million ha. It has a sizable community of irrigation firms and institutions. Almería's greenhouse-intensive horticulture relies on highly sophisticated irrigation (drip fertigation, climate control, hydroponics). The Guadalquivir River valley (provinces of Seville, Córdoba, Jaén) and coastal areas are major irrigated zones.

The region has been a focus of government-funded irrigation modernization, and several companies and experimental stations develop and trial new irrigation systems here. A notable characteristic of Andalusia's distribution is the coexistence of extensive mechanized irrigation (pivot systems for cereals) with intensive micro-irrigation (olive trees equipped with drip, berry farms using high-frequency drip).

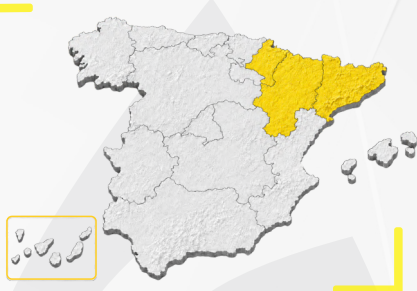


Ebro Valley (Aragón, Cataluña): The Ebro River basin in northeastern Spain constitutes another key geographic concentration of irrigation expertise. This area encompasses the country's oldest large-scale irrigation canal systems which have largely been modernized in recent decades. Local companies have developed strengths in sprinkler and pivot irrigation for field crops.

Aragón has significant irrigated agriculture (over 0.4 million ha). It hosts several water-tech companies and institutions, partially oriented to urban water but increasingly intersecting with agriculture. Aragón also boasts some of Spain's largest irrigation communities which collaborate with tech providers on pilot projects.

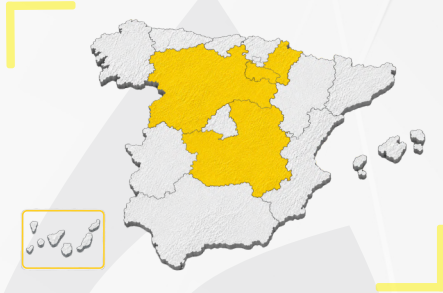
In Cataluña (Lleida/Barcelona/Girona), the irrigation ecosystem is bolstered by strong R&D and a diversified industry. Barcelona is home to water engineering firms and private entities in the water sector, including those dedicated to smart irrigation and agricultural water reuse. Catalonia's irrigated farming hubs, benefit from local innovation. innovation in the Ebro Valley.

The Ebro basin's irrigation sector is more public-sector driven (many government irrigation districts) and has benefited from public research centers. The presence of historic irrigation institutions (some communities operating continuously for over 100 years) alongside cutting-edge tech startups exemplifies the blend of tradition and innovation in the Ebro Valley.



Central and Northern Regions: Other regions also have significant irrigated areas and some local industry presence.

In the central plains of Castilla-La Mancha and Castilla y León have a combined 1.0 million ha irrigated, although more dispersed; nevertheless, these regions have pursued modernization of traditional cropping zones and host regional centers supporting farmers. Navarra and La Rioja, mix medium-scale irrigation for field crops with high-tech irrigation in vineyards and vegetable cooperatives, often sourcing technology and expertise from the larger Aragon/Catalonia cluster or via their own innovation programs. Navarra's government and accelerators have supported irrigation-related startups and the "Canal de Navarra" irrigation area spurred local firms to engage in its modernization.

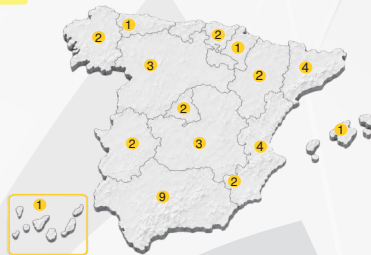


III) Knowledge and innovation Agents: Universities, Technology Centers and Research Networks

Spain's prominence in irrigation is underpinned by a robust foundation of knowledge agents – its universities, public research institutes, and technology centers that generate innovation and skilled talent. These institutions cover the gamut of irrigation-related R&D: agronomy and crop water use, civil and hydraulic engineering, sensor and ICT development, water resource management, and beyond. They frequently collaborate with industry and farming communities, ensuring that research translates into practical improvements. Key contributors in this knowledge ecosystem include:

Research and Technology Centers

There are more than 30 centers in Spain linked to the irrigation sector.³ Andalusia stands out significantly with approximately 23% of the total, consolidating its position as the leading region in this field. This leadership is closely tied to the strategic importance of intensive agriculture and water management in areas affected by water scarcity. A second tier is formed by the Valencian Community and Catalonia, each accounting for around 10% of the centers, together shaping a key Mediterranean innovation axis in irrigation. Inland regions such as Castile and León and Castile-La Mancha show a moderate but relevant presence, with about 8% each. Meanwhile, other regions including Madrid, Murcia, Galicia, Extremadura, the Basque Country, and Aragon display a more dispersed participation, and Navarra, the Canary Islands, the Balearic Islands, and Asturias have a more limited representation. Overall, the system reflects a relatively extensive network, albeit with a clear geographical specialization in areas where irrigation plays a critical role in agricultural production.



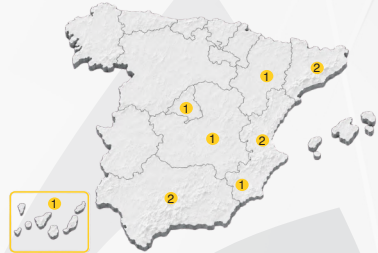
Spain's ecosystem of irrigation-related centers effectively combines high-level scientific research with applied innovation and technology transfer. Notable institutions include CENTER, for irrigation tech testing/standardization and pilots; CEBAS-CSIC, for benchmark irrigation research in arid contexts; CETAQUA, for water reuse and digital water initiatives with EU-project leadership noted in the entries. In Andalucía, several applied innovation nodes stand out for intensive horticulture and water-scarcity solutions such as and TECNOVA. In addition, technology centers such as AINIA, and CARTIF illustrate a growing focus on digitalization, sustainability, and participation in European projects, reinforcing their international projection.

³ The complete and detailed list of Research and Technology Centers can be consulted in the document's ANEXES

Universities

There are 11 mapped universities with activity in irrigation and water-related research.⁴ Andalucía, the Valencian Community, and Catalonia stand out, and once again align with Spain's main agricultural and innovation hubs, particularly along the Mediterranean corridor.

Spanish universities active in irrigation and water research demonstrate strong specialization, scientific output, and increasing international engagement. Institutions such as the Polytechnic University of Valencia (UPV) stand out through leading institutes like IIAMA, which have a strong reputation in integrated water resource management and participation in European research programs. Similarly, several universities stand out for their ties to large collaborative programmes and cross-border consortia: Polytechnic University of Madrid (UPM), University of Almería (UAL), University of Córdoba (UCO). The Polytechnic University of Cartagena (UPCT) is particularly notable for its applied and interdisciplinary approach, with research groups focused on precision irrigation and water-use efficiency.



⁴ The complete and detailed list of Universities can be consulted in the document's ANEXES

National and Regional Platforms

Platforms linked to irrigation and water management in Spain play a strategic role as coordination, knowledge-sharing, and policy-alignment mechanisms rather than as direct generators of technology or research.

These platforms can be typologized by function:

- National agenda-setting and coordination platforms that convene public–private actors to define innovation roadmaps and map capabilities in water (e.g., Plataforma Tecnológica Española del Agua (PTEA))
- Public governance/monitoring and transparency platforms that structure sustainable irrigation through shared indicators, data portals, and multi-actor forums (e.g., Observatorio de la Sostenibilidad del Regadío (OSR))
- Knowledge transfer and advisory/capacity-building platforms that scale on-farm adoption via training, demonstrations, and practitioner networks (e.g., Riego 2.0 and the national Plataforma AKIS)
- Innovation acceleration and test-bed platforms that reduce time-to-deployment by incubating solutions and validating them in real conditions (e.g., Plataforma Tierra (Grupo Cajamar))
- Multi-actor co-innovation alliances anchored in applied R&D plus professional upskilling around irrigation/fertigation (e.g., Drip2grow)
- Knowledge reservoirs and networks that broaden access to validated practice-oriented outputs (e.g., EU-FarmBook, REGACI, Organic Farm Knowledge and TP Organics).

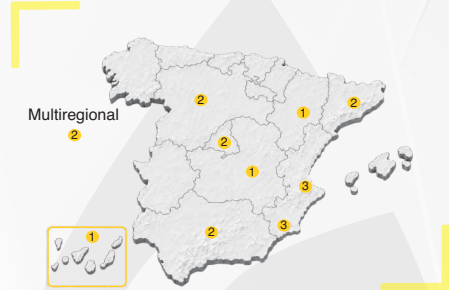
IV) Support Entities: Clusters, Associations, Hubs, Incubators and Government Entities

Spain's irrigation ecosystem benefits from a strong supporting infrastructure of clusters, innovation hubs, incubators, and industry networks. These entities foster collaboration, innovation, and business development by connecting startups, SMEs, large corporates, researchers, and investors. Not only do they provide platforms for knowledge exchange and partnerships, but they also elevate Spain's profile internationally by coordinating initiatives and speaking with a unified voice for the sector.

Clusters and Hubs.

There are 15 mapped entities linked to irrigation and water-related innovation in Spain.⁵ Andalusia and the Valencian Community emerge as the leading regions that host clusters or hubs, reinforcing their role as key territories in agri-food innovation and water management. Catalonia and Murcia also show notable representation, reflecting their strong positioning within the Mediterranean innovation corridor. The remaining hubs are distributed across regions such as Madrid, Aragón, and Castilla y León.

Clusters and hubs play a critical role in articulating collaboration, innovation ecosystems, and internationalization within the irrigation sector. Entities such as INNOVACAL Cluster, Catalonia Water Partnership (CWP) and ZINNAE – Cluster for Efficient Water Use stand out for their ability to connect companies, research institutions, and public stakeholders, fostering innovation in water efficiency, digital agriculture, and sustainability. Similarly, clusters in Murcia (AGROFOOD Murcia Cluster, AgritechMurcia) are notable for its strong orientation toward applied innovation and its links to export-oriented agriculture. In Andalucía, the Andalucía Agrotech DIH is an EU-recognized Digital Innovation Hub driving precision agriculture and irrigation digitalization through sensors and data. There are also a couple of multi-regional networks, 1.070KM HUB (Mediterranean Arc Innovation Ecosystem and Hub Iberia Agrotech (HIBA), both positioned as integrators connecting multiple nodes and accelerating projects around smart farming and water efficiency.



⁵ The complete and detailed list of Clusters and Hubs can be consulted in the document's ANEXES

Associations

Associations linked to irrigation and water management in Spain play a key role in representation, sector coordination, and advocacy. These organizations typically group together farmers, irrigation communities, companies, and other stakeholders, acting as collective voices for the sector at regional, national, and European levels.⁶

AERYD (Spanish Association of Irrigation and Drainage) is presented precisely in this role. There are also industry/macro-industry and export-oriented associations that position irrigation as an industrial competitiveness and internationalization domain, such as (AFRE) Spanish Irrigation Manufacturers Association and (AGRAGEX) Exporters of Agricultural Equipment.

Additionally, there are irrigator-user federations and water-user syndicates that aggregate thousands of irrigators to influence allocation rules, investment priorities, and infrastructure decisions. The file includes a national federation (FENACORE) and multiple regional/basin federations (e.g., FECOREVA in Valencia; FERAGUA in Andalucía; FEREBRO in the Ebro; FERDUERO in the Duero).

Government Entities

Government Entities are primarily responsible for governance, regulation, planning, and large-scale management of water resources.⁷

At the top, MAPA (Ministry of Agriculture) is framed as the actor that formulates and executes irrigation policy and channels investment through national plans and instruments such as SEIASA. MITECO (Ministry for Ecological Transition) is positioned as the environmental-water authority that steers hydrological planning and sustainability rules through basin plans and oversight of the river basin authorities, including rules that affect allocations and environmental compliance.

Also, at basin level, the river basin authorities (Confederaciones Hidrográficas) appear as operational regulators: they allocate rights, manage major infrastructure, coordinate drought measures, and embed user participation into planning cycles.

⁶ The complete and detailed list of Associations can be consulted in the document's ANEXES

⁷ The complete and detailed list of Government Entities and Hubs can be consulted in the document's ANEXES

Incubators and Accelerators

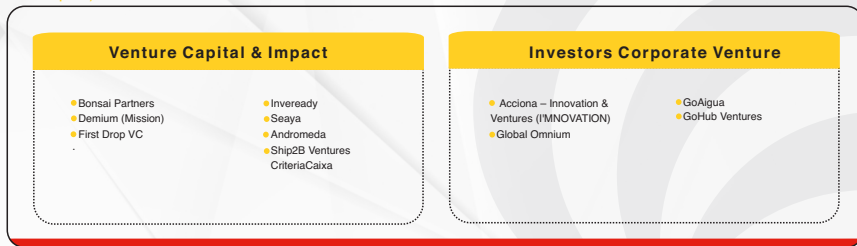
Spain's irrigation innovation pipeline is being supported through a mix of specialised water accelerators, together creating both supply (new ventures) and demand (pilots, institutional partners, and investment) for smarter agricultural water management.⁸

- Water-specialised incubators with pilots and mentoring (e.g., Cajamar Innova, EIT InnoWise Challenge Lab)
- Corporate/open-innovation programs that treat smart irrigation and water efficiency as core challenge areas (e.g., Agrobank Tech, GoHub by Global Omnium, Orizont)
- Regional public-private ICT hub networks that repeatedly host agritech and water-management ventures in irrigation-intensive territories (e.g., EIT Climate-KIC)

VI) National and International Investors

The Spanish irrigation ecosystem is increasingly supported by a vibrant investment landscape, which includes both national investors (public and private) and international capital.

National investors (based in Spain):



⁸ The complete and detailed list of Incubators and Accelerators and Hubs can be consulted in the document's ANEXES

Public innovation Funding



- CDTI (Centro para el Desarrollo Tecnológico e Innovación) – Innvierte program
- ENISA (Empresa Nacional de Innovación)
- Generalitat de Catalunya – Agrotech VC Fund
- Generalitat Valenciana –Climate Fund (IVF)
- PRIMA (Partnership for Research & Innovation in the Mediterranean Area)
- SODENA (Sociedad de Desarrollo de Navarra)
- Spanish Government (PRTR – NextGen Funds for Water/Agriculture)

International investors:

Specialist Vcs

- Aqua-Spark
- BayWa Venture
- Burnt Island Ventures
- Climentum Capital
- Emerald Technology Ventures

EU and multilateral public financiers

- European Bank for Reconstruction & Development (EBRD)
- European Innovation Council (EIC) – Accelerator
- Programme European Innovation Partnership 'Water' (EIP Water)
- European Investment Bank (EIB)
- International Finance Corporation (IFC) – World Bank Group



3. Technology, Innovation, and Intellectual Property

3. Technology, Innovation, and Intellectual Property

I) Patents and Innovation Areas in Smart Irrigation

Spain's agro-industrial sector, which includes irrigation, exhibits a unique innovation profile characterized by high specialization but relatively low patent output.

As of 2024, Spanish agro-industrial firms generate about 2.2 patents per €1 billion of revenue, far below the EU average of 6.7 and the US level of 26.9. In relative terms, Spain registers 67% fewer patents than the European average in these sectors. Contributing factors include an industry structure dominated by SMEs and cost/complexity barriers to patenting.

The Spanish irrigation innovation ecosystem spans a range of cutting-edge fields, often integrating digital and engineering solutions to optimize water use. Based on patent landscapes and industry reports, the leading technology categories driving innovation in agricultural water management include:

IoT Sensors &
Remote Monitoring

Automation &
Smart
Control Systems

Remote Sensing &
AI for Precision
Agriculture

Integrated Water
Management
Platforms

Drip Irrigation and
Advanced Sprinkler
Systems

Water Recycling
and Desalination
for Agriculture

Spain filed 171 agricultural-sector patent applications in 2024, compared to 4,561 by the entire EU and 9,921 by the United States. Despite fewer patents, Spain has widely adopted advanced irrigation technologies on the ground, reflecting a robust innovation ecosystem. When adjusted for the country's overall innovation size, Spain demonstrates a Revealed Technological Advantage (RTA) of 2.3 in water-related technologies such as Efficient water utilization, the highest specialization index among European nations. In essence, a Spanish inventor is more than twice as likely to be working on water/irrigation innovations than the global average innovator.

In other words, inventions related to irrigation and other agricultural water management, make up a disproportionately large share of Spain's innovation output relative to its total patenting activity. This suggests that despite a smaller volume of patents, Spain punches above its weight in irrigation, agritech and watertech innovation, likely reflecting national priorities to address water scarcity, efficient irrigation, and climate resilience in agriculture.

II) Adoption of Advanced Technologies and Readiness

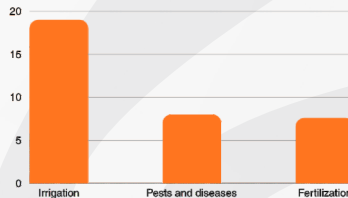
Source: Prepared by the author with data obtained from Spain's "Observatorio de Digitalización" In recent years, the country has embarked on a "silent revolution" in digitalizing irrigation systems to confront water scarcity, rising costs, and climate pressures. Advanced technologies – from IoT sensors and AI-driven decision support to satellite monitoring and automation – are increasingly being adopted in Spanish irrigation networks, albeit with significant variability across regions and farm sizes.

Roughly 70% of Spanish irrigators have incorporated at least some digital technology, such as sensor networks, automated valves, or data platforms, into their water management. Also, notably, almost 90% of the agricultural sector now collect data on their production processes, indicating a broad trend toward data-driven agriculture.

The calculation of the irrigation water supply necessary for irrigated crops using mobile applications is more widespread. 19.0% of farms in the irrigated agricultural sector use this type of tool. Only 13.5% of the irrigated agricultural sector uses more sophisticated tools to support remote irrigation control.

Other technologies such as sensors is growing but remains moderate, particularly for soil monitoring (33.3%), while more advanced tools like satellites (4.9%) and drones (1.5%) have still very limited adoption.

Farms' use of digital tools in the agricultural sector, by type (%)



Source: Prepared by the author with data obtained from Spain's "Observatorio de Digitalización"

Spain's government and EU recovery funds are pouring unprecedented investments into smart irrigation. The 2024 PERTE program for Water Digitalization granted €74 million to 125 irrigation community projects deploying telemetry, real-time monitoring, and analytics. These projects alone cover over 1 million hectares – about one-quarter of Spain's irrigated area. Supported solutions include universal telecontrol (adopted by 97% of participating water user associations), soil-moisture sensor networks (57%), GIS-based irrigation management apps (70%), and other cutting-edge tools.

The following table summarizes adoption of key digital technologies in Spanish irrigation, along with their common use cases and evidence of their uptake, based on recent data:

IoT Sensor Networks	Becoming widespread on modern farms and schemes; 57% of new irrigation projects include soil moisture monitoring systems. Many large irrigated areas have dozens to hundreds of sensors deployed; smaller farms catching up.
Automation & Remote Control	Very high in community irrigation systems: e.g. 97% of water user entities in a national program are adopting remote valve control and telecontrol [retema.es]. Many individual farms use automated drip timers; true field robotics are rare (mostly experimental).
Data Analytics & AI (DSS)	Moderate but growing: large farms and tech-savvy cooperatives use cloud-based irrigation scheduling tools; smaller farms rely on simpler apps. AI adoption is mostly in pilot projects and among 10–15% of advanced producers.
Remote Sensing & GIS	Significant use by cooperatives, agronomic services, and projects. 20–30% of large farms utilize satellite-based advisory services; 70% of new projects are building GIS/dashboard apps. Drones used for high-value crops (vineyards, orchards) in several regions..
Advanced & Emerging Tech (digital twin models, blockchain, new sensors, etc.)	Largely in R&D or pilot phases. A few digital twin pilots for irrigation networks are in progress. Blockchain applications in ag are being tested (traceability of agri-products; potential for water sharing records). Novel sensors (nano-sensors for water quality, etc.) at prototype stage in labs.

Source: Prepared by the author

III) Technology Readiness Levels (TRL) of Spanish Solutions

Spanish solutions for agri-water management span the full spectrum of technology readiness. The sector has a robust pipeline of innovation at every stage.

Early-Stage Research Innovations (TRL 1–4)

- Nanotech & biotech for irrigation: e.g. nano-formulated fertilizers, crop breeding for drought resistance.
- Blockchain use for water rights trading: conceptual frameworks and small-scale demos.
- Quantum computing for optimization: theoretical studies (e.g. CSIC exploring water allocation algorithms).
- Next-gen sensors: graphene-based moisture sensors, nutrient biosensors under development in labs.

Intermediate / Demonstration-Phase Technologies (TRL 5–7)

- AI-based irrigation DSS: Algorithms tested with pilot farmers to fine-tune models.
- Digital twin models: e.g. simulation of Canal de Bardenas to optimize operations (prototype by Spanish engineers).
- Autonomous drone irrigation checks: trial projects in greenhouses and research farms.
- Integrated platforms: Startups combining IoT + weather + GIS in user-friendly apps, tested by early adopters.
- Automated irrigation systems: Off-the-shelf kits (sensors + controllers) adopted by innovative farms and irrigation communities; thousands sold annually by Spanish vendors.
- Farm management & IoT platforms: Numerous solutions in commercial use, though continuously improved with feedback.
- Precision irrigation equipment: e.g. multi-crop drip systems, self-cleaning filter tech, etc., deployed on progressive farms.

Mature / Commercial Technologies (TRL 8–9)

- Drip and sprinkler irrigation hardware (ubiquitous in Spain's fields).
- Basic automation: fertigation units, irrigation controllers, SMS-based alarm systems.
- Simple digital tools: weather apps, digital notebooks, standard farm software.
- Professional monitoring services: e.g. companies offering turn-key sensor installation and data management to farms as a service.

Sources: Compiled from industry reports, government program data (MITECO, MAPA) on project funding phases, and CORDIS Datasets.

IV) Participation in International R\&D Programs

Spanish companies, universities and research centers are prominent in projects targeting irrigation efficiency, smart farming, and water-saving technologies.

Spanish researchers and firms have participated in dozens of EU multi-national projects. A comparative analysis shows Spain outperforms or matches its European peers, ranking just behind science powerhouses Germany, the UK, and France in overall R&D funding, but leading in project coordination.

Programme	Spanish Participation	Notable projects
Horizon 2020 (2014–2020)	98 EU R&D projects related to "irrigation" were funded under the Horizon 2020 programme alone, Spanish participants took part in most, often as key partners or coordinators. Spanish actors also play key roles in the PRIMA partnership (Mediterranean water and agriculture research) and numerous LIFE program projects focused on water efficiency.	• MASLOWATEN project (2015–2018) • RichWater project (2016–2018)
Horizon Europe (2021–2027)	In the ongoing programme, Spain's performance overall is on track to match or exceed H2020 . As of 2023, Spain's return rate is provisionally around 11%, again among the top 4 countries in Europe. Dozens of new projects focusing on digital precision irrigation are currently underway with Spanish involvement. This ensures continuity in international collaboration going forward.	• RAINS project (2024–2028) • Water-Farm 2025 DIGIPrecise
PRIMA (2018–2028)	Spain is a core member of the Partnership for Research and Innovation in the Mediterranean Area (PRIMA) and hosts its Secretariat in Barcelona. Spanish agencies (CDTI and the State Research Agency) co-fund PRIMA projects and support national applicants. Numerous Spain-led consortia win PRIMA grants addressing topics like irrigation efficiency, drought-tolerant crops, and sustainable water reuse.	• NATMed

LIFE Programme

Spain has been one of the top beneficiaries of LIFE funding across all themes. Numerous LIFE projects related to efficient irrigation, water-saving and climate adaptation have Spanish beneficiaries.

- LIFE TRIPLET (2023–2026)
"Irriman" project

EUREKA, Eurostars and Bilateral Programs

Spanish companies also internationalize their R&D through EUREKA network projects and Eurostars, which support market-driven innovation among SMEs. Spain's innovation agency CDTI actively promotes these programmes. Spanish involvement in EUREKA clusters and bilateral initiatives has enabled additional collaborative projects on irrigation technology adapted to global markets.

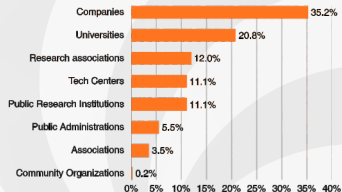
- Sun4Water project (2025–2027)

Spanish Participant Composition in EU Projects

The breadth of Spanish involvement can be visualized by looking at the distribution of funding among different entity types in Horizon 2020 (a proxy for their level of participation).

Spanish consortia typically include a blend of academia, companies, and end-user groups, each fulfilling complementary tasks.

Distribution of funding among different Spanish entity types in Horizon 2020 (%)



Source: Prepared by the author with data obtained from Spain's CDTI Results publications

The background is a composite image. The top half features a world map with a blue grid overlay, surrounded by various data visualization elements like line graphs, bar charts, and pie charts. The bottom half shows a lush green agricultural field with a center pivot irrigation system, set against a sunset sky with mountains in the distance.

4. Economic Performance and International Projection

4. Economic Performance and International Projection

I) Economic Impact: Employment and Contribution to GDP

Spain's irrigation sector constitutes one of the pillars of the country's agricultural economy. Irrigated land covers approximately 3,778,058 hectares according to the ESYRCE 2024 survey, roughly 23% of cultivated land.

The country holds the largest irrigated area in the European Union and is the world leader in area under drip irrigation, with 58.6% of its irrigated surface using localized systems compared to a 6% global average.

Contribution to GDP and Gross Value Added (GVA)

MAPA indicates Spain's primary sector represented 2.5% of GDP in 2024, with a GVA of €40,412 million (+7.9% versus 2023). The agricultural branch specifically recorded a GVA (VAB) of €38,517 million (+13.2%), a Production of the Agricultural Branch (PRA) of €67,483 million (+2.9%).

A detailed analysis of Grupo Cajamar stipulates that irrigated agriculture's generates 73.1% of the value of all crop production, 43.6% of total Production of the Agricultural Branch (PRA) and 62.9% of the entire agricultural Gross Value Added (GVA). The economic logic is clear: irrigation's weight is greater in value than in volume because access to water enables a shift toward higher-value crops (horticulture, fruit, citrus) in addition to raising physical yields per hectare. In the study's words, irrigation "generates practically two of every three euros available to agricultural entrepreneurs"

Spillover Effects on Related Sectors

Beyond direct agricultural GVA, irrigation sustains a broad economic ecosystem:

■ **Agro-industry and food processing:** The food manufacturing sector is Spain's largest manufacturing branch, with Spain ranking as the fourth EU country by turnover and accounting for approximately 12% of EU food industry revenue. Its turnover grew approximately 3% in 2024. Irrigated farms supply the raw materials (vegetables, fruits, olives, grapes, sugar beet) that sustain this industrial base.

■ **Exports:** Spain is the world's 8th-largest food exporter. The agri-food system generates a commercial trade surplus of approximately €20,000 million annually. Without stable irrigated output, these export volumes would be unattainable.

■ **Water services:** The broader Spanish water sector generates 38,000 direct jobs and accounts for 0.3% of production inputs across other economic sectors, according to Fundación Aquae. Irrigation is the dominant water-using activity, absorbing roughly 80% of national water withdrawals.

■ **Upstream industries:** Irrigated farming drives demand for fertilizers, agrochemicals, seeds, greenhouse materials, irrigation hardware (pumps, filters, drip lines), and solar-powered pumping systems, creating substantial intermediate demand.

■ **Infrastructure investment:** An ongoing irrigation modernization plan mobilizing public-private investment exceeding €2,400 million between 2022 and 2027 underscores the strategic priority Spain accords to this area. Also, FENACORE has identified a further €3,000-million deficit in hydraulic works of general interest already planned but not yet executed, including 27 dams foreseen in hydrological plans.

Employment Impact

MAPA reports that Spain's agricultural sector employed approximately 680,200 in 2024, the fourth-highest volume in the EU, representing 3.4% of total national employment. Because irrigated agriculture accounts for the vast majority of crop production value (73.1%) and a still larger share of agricultural income, the bulk of Spain's agricultural workforce is directly or indirectly dependent on irrigated production systems.

The Federación Nacional de Comunidades de Regantes de España" (FENACORE) FENACORE estimates that irrigation alone employs 4% of the active population. This figure is somewhat higher than the 3.4% share recorded in official statistics for total agricultural employment; the difference likely reflects FENACORE's inclusion of closely associated activities such as irrigation community management, on-farm technical services, and seasonal workers captured under broader labour surveys.

II) Exports: Volume, Destinations, and Specialization

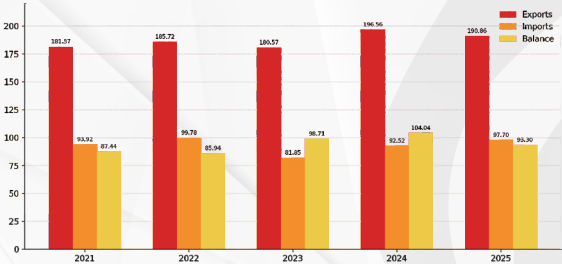
Spain has a significant presence in the international market for exports related to irrigation, driven by a technologically advanced agricultural sector and the need to optimize water use.

ICEX compiles and disseminates Spain's official external trade statistics into its own sectoral classification, which allows exports to be analyzed by economic activity and industrial specialization. Within this framework, we can find irrigation equipment.⁹

Trade Balance

Spain's irrigation equipment exports reached a value of EUR 191.1 million in 2025. Overall, the sector's trade balance has remained positive, reflecting consolidated export activity. These figure sits within a broader Spanish agricultural equipment export ecosystem valued at €3,422 million in 2024, which grew 4.33% year-on-year according to AGRAGEX, the Spanish Association of Agricultural Machinery Manufacturer-Exporters.

Trade balance of irrigation equipment in Spain (2021–2025), million euros



Source: Prepared by the authors with data obtained from ICEX (ESTACOM)

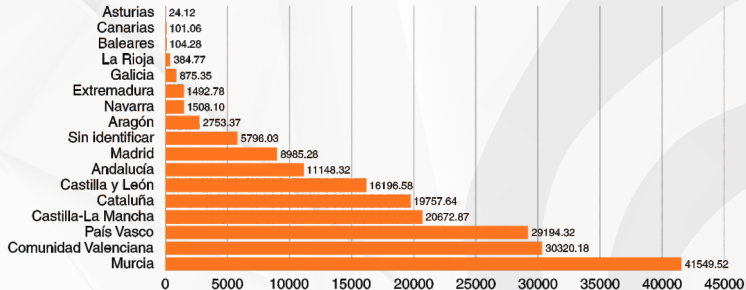
The trade surplus in irrigation equipment declined to reach EUR 93.3 million. It can also be observed that the years with the strongest balance (2023 and 2024) do not necessarily coincide with the highest export levels but rather are largely explained by the evolution and behavior of imports.

⁹ It is important to note that this figure covers a specific trade nomenclature category, "irrigation equipment", and therefore represents a narrow but well-defined proxy for the sector. The broader agricultural technology universe, generates substantially higher export volumes when measured collectively.

Export by provinces

The territorial distribution of irrigation equipment exports within Spain shows a high concentration in certain autonomous communities, reflecting specialization and the geographic location of firms in this sector.

Distribution of spanish irrigation exports by province (2025), in thousands of euros



Source: Prepared by the author with data obtained from ICEX (ESTACOM)

Notably, Murcia, Comunidad Valenciana, País Vasco, Castilla-La Mancha, and Cataluña stand out, together accounting for a significant share of total exports. A second tier includes Castilla y León, Andalucía and Madrid with relevant but smaller shares.

Destination

At the global level, Spanish exports of irrigation equipment show a high concentration in Europe, which accounts for nearly 49% of the total exported value in 2025, consolidating its role as a key market.

These are highly concentrated in a small group of countries, France, Italy, Germany, Greece, and the Netherlands.

In second place is the Americas, whose participation has become more relevant in recent years, reaching almost 30% and evidencing sustained expansion toward this region. Africa, for its part, has lost weight within the export structure, decreasing from 29% in 2021 to 17%.

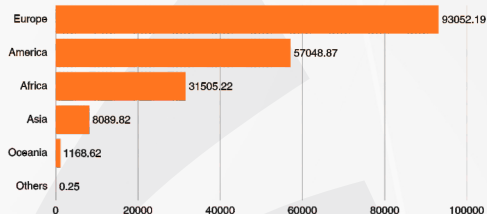
Exporting Companies

Spain's irrigation and agricultural technology sector has a broad and active exporting base. According to Agritech Murcia, in the Region of Murcia alone, 152 companies exported agricultural technology (a much broader export category¹⁰) in the first eleven months of 2025, representing 4.13% of the national total.

The more concentrated core of specialized manufacturer-exporters is represented by AGRAGEX, which has 107 member companies spanning the sub-sectors of machinery, components, irrigation, crop protection, greenhouses, fertilizers, post-harvest, silos, livestock equipment, animal health and nutrition, forestry, and biomass.

According to INFORMA, of the 1,357 active irrigation-related companies, about 6% carry out export activities.

Spanish irrigation exports by region (2025), in thousands of euros



Source: Prepared by the author with data obtained from ICEX (ESTACOM)

¹⁰ This includes irrigation equipment, crop protection systems, agricultural machinery and components, and livestock equipment.

III) Participation in International Trade Fairs and Projects

Over the past decade, Spanish companies have expanded their global market presence through high-profile participation in leading trade fairs and exhibitions across Europe, the Americas, the Middle East, and Asia. At least 10 key global fairs and conferences annually include Spanish companies, pavilions or delegations backed by ICEX and industry associations.

- The number of Spanish exhibitors at IFAT (Munich, Germany), the world's biggest water/environment trade fair, reached 85 companies in 2024 – 16 more than the previous edition.
- Spain, often via Fluidex and ICEX, organizes a national delegation at Aquatech (Netherlands), Leading Global Water Technology Exhibition, which biennially attracts 20,000+ water professionals and 800+ exhibitors. Spanish water-tech suppliers (pump and valve manufacturers, irrigation solution providers, digital water startups) regularly appear, benefiting from ICEX support to co-exhibit under a unified Spain banner.
- WETEX (Dubai, UAE) is the Middle East's premier water and clean energy expo. Spanish participation, coordinated by Fluidex with ICEX support, has become routine. Spanish firms use WETEX to target the Gulf market with offerings in desalination, irrigation automation, and solar-powered water systems.
- Spanish agricultural machinery and irrigation system manufacturers consider Agritechnica (Hanover, Germany), World's Largest Agricultural Machinery and Technology Fair, a strategic event for global market reach. In 2023, roughly 30 Spanish manufacturers exhibited under the coordination of AGRAGEX, noting that irrigation technologies have ever greater prominence at the event.
- Spain achieved a record participation at Growtech (Antalya, Turkey), the Leading Eurasian Greenhouse & Irrigation Exhibition, in 2023 with 24 Spanish companies joining the AGRAGEX-coordinated national pavilion. These included drip irrigation specialists, greenhouse and fertigation companies, and agri-input firms.
- While not agriculture-specific, the Smart City Expo World Congress (Barcelona & global spin-offs), often highlights water and smart irrigation tech. In 2025, nearly 40 Spanish tech firms, some with water/irrigation solutions, exhibited under the Spain Pavilion.
- Spanish companies and institutions also attend a range of other international forums, such as the World Water Forum and World Irrigation Forum. In Latin America and Africa, Spanish technology providers often participate in trade missions and fairs, such as “Expo Agroalimentaria Guanajuato” in Mexico, and Africa Water Week, through ICEX programs.

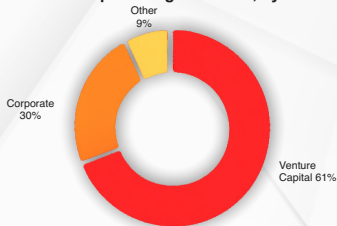
IV) Investment, Mergers & Acquisitions, and Commercial Agreements

According to aggregate data available from Dealroom, investments in Spanish agrifoodtech (which includes irrigation tech) attracted around €179M in 2024 in Spain. Investments in Europe have decreased from the previous 3 years. Global geopolitical uncertainty has led to a more conservative investment landscape, leading investors to focus on other regions and, at the same time, facing additional difficulties in raising capital.

Investments allocated specifically to irrigation tech are modest with almost €3M, representing 1.65% of agrifoodtech investments.

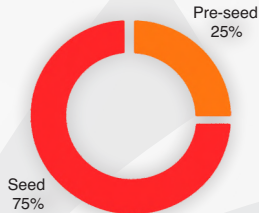
As for the investment phase, the Spanish irrigation sector remains predominantly early-stage, with pre-seed and seed phases, accounting for 25% and 75% of the investments rounds respectively. the absence of growth-stage investment suggests that the sector has yet to generate a critical mass of ventures capable of attracting larger capital commitments.

Investments in Spanish agrifoodtech, by investor type (2024) (%)



Source: Prepared by the author with data obtained from Dealroom

Investments in Spanish agrifoodtech, by round size (2024) (%)



Source: Prepared by the author with data obtained from Dealroom

There is also a clear predominance of venture capital funds (61%) in financing irrigation-related ventures in Spain, complemented by a relevant, though secondary, participation of corporate investors (30%).

Almost 25% of investors are domestic, while the other 75% that make up international investors are mainly located in Europe.

Even so, the number of dedicated agri-tech startups that directly or indirectly address irrigation in Spain stands more than 200.

There has been an increasing number of startups participating in funding rounds that have emerged from incubation programs or grants. This highlights the role played by these support mechanisms in the development of startups, where not only capital is offered but resources such as training, networking and access to new markets are provided.

Notable companies that have received investment are:

Name	Market	Investor
Lama Sistemas de Filtrado	Water filtration systems for agricultural and industrial use	H2O Innovation
RIS Iberia	Specialized irrigation systems, manufacturing, and distribution services	Aksia Group
ITC	Dosing pumps and water quality solutions for industrial, agricultural, and water treatment applications	Verder
Idrica	Specializes in water cycle management, using data analytics to simplify processes and accelerate digital transformation in utilities	Xylem
Widhoc Smart Solutions	Innovative solutions for agriculture, focusing on optimizing water management and efficient crop production	-
Metos Iberia (Pessl Instruments)	Wireless, solar-powered smart agriculture monitoring systems	Lindsay Corporation
Plantae	Plantae® is a wireless technology focused on agriculture and professional gardening to optimize water by increasing productivity through ground humidity sensors and other parameters	Turkish
Agrow Analytics	AI-based platform for precision irrigation recommendations	Demium Capital

Source: Prepared by the author with data obtained from Dealroom

V) International Awards and Recognitions

Spanish companies, technologies, and projects in irrigation and agricultural water management have earned numerous international awards, underscoring the country's reputation for innovation, sustainability, and excellence.

Through Spain's profile today is that of a country punching above its weight to become a global reference in innovative irrigation and water resource management, highlighted by these key factors:



Some major awards and recognitions in the sector achieved by Spanish entities over roughly the past decade, categorized by type of accolade, are:

Global Water Industry Awards: GWI's annual awards regarded as the premier global honors in the water sector. In 2023, Aqualia, was crowned “Water Company of the Year” at the GWI in Berlin.

Innovation & Technology Competitions: Spanish innovators have excelled in international contests focused on agri-water technology and sustainability.

■ The EIT Food “Water Scarcity” program , a Europe-wide competition to identify solutions to water scarcity challenges. In 2021, all three winning teams were Spanish companies

● Agrow Analytics (Málaga) – Winner in the Agriculture category for an AI-driven irrigation optimization platform that helps farmers save water through predictive, autonomous irrigation management.

● Fibsen (Valencia) – Winner in Water Supply category for its fiber-optic smart sensors to monitor water networks in real time

● Bluephage (Barcelona) – Winner in Infrastructure category for its breakthrough bacteriophage-based water quality testing technology.

■ The Global Entreprs Awards, in 2021, a Spanish-supported project, the Technified Irrigation Project (PIT) for small farmers in Ecuador (financed by AECID), was nominated among the world's top sustainability initiatives

Trade Fair & Industry Honors: Many international trade fairs and industry bodies confer awards for innovation, and Spanish firms have frequently been laureates:

- In 2022, Riegos Iberia received a sustainability award at FIMA Zaragoza (European Award for Sustainable SME).
- Also in 2022, RITEC was honored with the European Award for Business Quality and Commitment for its advanced irrigation systems.
- Spanish manufacturer Regaber was awarded by the Irrigation Association (USA) for introducing new efficient drip-line technologies in international markets.

Sustainability & Social Impact Awards: Spanish initiatives that combine irrigation with sustainability and social impact have earned recognition.

- The International Water Association (IWA) honored the Catalonia-based collaboration “Gavà Circular” with the 2022 Project Innovation Award.
- Hydroconta was a 2021 finalist of the Global Climate Action Awards for its smart irrigation metering solution that reduces water waste.





5. Global Trends and Spain's International Positioning in Smart Irrigation

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V) Global trends in smart irrigation

Irrigated agriculture has become essential to fulfill food security and economic stability, being also the principal destination of water resources. As a result, smart irrigation has emerged as a response to simultaneous pressures: environmental challenges such as water scarcity associated with climate change and frequent droughts, higher food demand caused by population growth, and rising energy costs. Its future sustainability depends on infrastructure modernization, technological innovation, and coordination between users, enterprises and administrations. Hence, agricultural systems are driven to produce more with less water and less energy. In this context, smart irrigation is undergoing a transformation resulting in a series of global trends that will redefine how water is managed, technology is adopted, and decisions are made:

- **From physical modernization to digital management of irrigation:** After decades focusing on infrastructure modernization through investment in conduits, pipes, and filtration systems, water efficiency has improved. However, a key limitation persists: the lack of real-time information and telecontrol still limits truly optimized management. As a response, the current wave of modernization is therefore digital: smart irrigation is evolving through systems incorporating by sensors, meteorological stations, smart meters and cloud platforms, aiming to improve decision-making and management.
- **Data becoming an strategic asset:** Smart irrigation is increasingly “data-led”. Remote reading, telemetry and hydraulic control enable accurate readings of water consumption, reduce human error and improve traceability and control of irrigation networks. Without this operative data, water efficiency depends on manual decisions or estimated approximations, limiting the capacity to respond to incidents, leaks or deviations.
- **Integrated platforms and decision support systems as core of irrigation modernization:** Integrated digital platforms that combine remote control with decision support systems (DSS) have become essential to achieve digital transformation, enabling data centralization, advanced analysis, process automation and improved decision-making. Smart irrigation is moving away from relying on fixed calendars or empirical criteria toward informed decisions adjusted to real and changing conditions.
- **AI applied to agriculture:** Artificial Intelligence is gaining ground as a tool in use cases that directly impact operations, such as prediction and optimization, early pest detection, yield estimation and ground planning. It depends directly on data quality, which not only supports the technology but also determines its reliability and credibility among users.

VI) Comparative Analysis – Leading Irrigation Ecosystems

Spain occupies a strong position in global agricultural irrigation, combining large-scale adoption of efficient irrigation hardware with deep operational experience in water-scarce environments.

A comparative analysis between Spain and other leading irrigation ecosystems is essential to separate structural context from performance and to produce an objective global positioning. Countries face very different combinations of water scarcity, institutional arrangements, farm structures and innovation capacity; without a comparative lens, it is easy to underestimate Spain's strengths. Dimensions used for this comparative analysis are:

Dimensions used for this comparative analysis are:

- 1. Technological maturity and digital adoption** assesses the sophistication and diffusion of smart irrigation.
- 2. Ecosystem cohesion and collaboration for innovation** examines whether firms, research centers, universities and public agencies collaborate through structured platforms and international programs.
- 3. Water governance and management frameworks** evaluates the rules and institutions that allocate water, enforce sustainability objectives and coordinate public-private action.
- 4. Business presence and internationalization** reviews the depth of the company base and the ability to compete globally through exports, projects and partnerships

Proven at Scale

Spain has modernized 3.83 million hectares of irrigated land to 77% efficient-irrigation coverage, making it one of the few countries in the world that can demonstrate large-scale transformation under real water-stress conditions.

Technological maturity & digital adoption

Where Spain Stands

Spain's adoption of modern irrigation hardware ranks among the highest globally. Over 80% of Spain's irrigated land now operates under efficient pressurized systems. Spanish regions with chronic water stress have been early adopters of digital tools and smart platforms.

Spain is also pushing digitalization of basin management, framed through the PERTE for digitalization of the water cycle and involving basin authorities.

Broad efficient-irrigation coverage and implementation capacity

Engineering + modernization programmes + basin digitalization

How Spain compares

Israel

Precision-at-scale under

Government and sector initiatives explicitly deploy next-generation precision irrigation tools and systems for crop-specific decision support; Israel's water system also relies heavily on treated effluent reuse feeding agriculture.

United States

High tech supply, uneven adoption

Large scale of irrigated agriculture and high value concentration; innovation includes AI/remote sensing efforts, but diffusion varies across regions and systems.

Netherlands

Data-driven controlled environments

Data-driven and autonomous cultivation using sensors and AI, with emphasis on water/nutrient efficiency and circular systems creates the world-leading greenhouse horticulture sector.

Chile

Mid, incentive-driven diffusion

Technological modernization in irrigation remains partial. Adoption of efficient irrigation is accelerated mainly through public co-financing instruments and project pipelines rather than a deep domestic R&D base.

Ecosystem cohesion & collaboration for innovation

Where Spain Stands

Spain irrigation ecosystem features multi-actor coordination: farmer associations organized through irrigation communities, equipment manufacturers, research groups, public agencies, and ICT firms.

Spain also participates actively in EU-funded innovation networks that disseminate innovative solutions and builds capacity for smart irrigation.

Spain's ecosystem enables structured collaboration and data-driven management

Broad and diverse set of actors + user participation

How Spain compares

Israel

High cohesion, centralized-operational

A national water company with innovation emphasis and a water authority infrastructure framework support rapid scaling of operational innovation. Israel's overall R&D intensity (the world's highest) sustains continuous patent generation and technology spin-offs in irrigation.

United States

High diversity, variable cohesion

Large federal programmes explicitly rely on cooperative work with states, tribes and local entities; however, the ecosystem is structurally more fragmented across jurisdictions.

Netherlands

Very high, systematically structured cohesion

Innovative collaborations with residents, businesses, knowledge institutes and NGOs, creating structured coordination around freshwater and adaptation. It deploys agricultural counselors in multiple countries to facilitate knowledge exchange and identify collaboration opportunities.

Chile

Improving cohesion, still emerging
There is strengthening efforts of basin-level planning instruments and participation mechanisms; coordination challenges remain characteristic of a transition system.

Water governance & management frameworks

Where Spain Stands

Spain has a long-standing basin-management model, with strong formal institutions (basin authorities, user communities), that remains central to hydrological planning, allocation/concessions, public water domain protection and infrastructure.

However, some persistent challenges remain, such as fragmentation and political contention over inter-regional water transfers.

Spain's water governance is a complex, multi-layered system

Institutionalized basin architecture + Public-private dynamics

How Spain compares

Israel

Scarcity-governance benchmark

Treats all water as a national public resource under centralized management. Oriented around ensuring reliable supply, including large-scale reuse and system performance; official material indicates very high treatment rates and reuse orientation.

United States

Federal support, decentralized and regionally heterogeneous

Consolidates funding for conservation and resilience; it is competitive and cooperative but operates over a diverse set of legal regimes and water institutions across states.

Netherlands

Global benchmark for adaptive water governance

Explicitly targets flood safety, freshwater and spatial adaptation, with long-horizon planning and multi-actor governance.

Chile

Major legal shift

Recent reform moves toward a more public-interest model (human needs, ecosystem protection, tighter conditions on rights) while retaining hybrid features; institutional fragmentation is still a constraint.

Business presence & internationalization

Where Spain Stands

Spain's irrigation-technology sector includes a substantial manufacturing and services base, increasingly oriented toward international markets.

Spain's domestic industry also hosts significant events and has formal exporter organization capacity.

Spanish-headquartered irrigation solution providers operating in multiple geographies

Diversified international engagement + Export-enabling institutional representation

How Spain compares

Israel

Exported know-how and global partnerships

National water institutions emphasize international operations and positioning of Israel as a water-tech actor; reuse leadership underpins exportable practices and solutions.

United States

Scale and global corporate leadership

The US houses several world-leading irrigation manufacturers. The US ag-tech startup ecosystem is also significant.

Netherlands

Export superpower; strong agri-tech brand

Consistently among the largest global agricultural exporters, and official reporting frames exports and re-exports at very large scale.

Chile

Internationalization more project-based than corporate-platform based

Business sector is primarily domestically oriented, functioning more as a market for imported technology than as an exporter.

I) Competitive advantages of Spain.

Spain has established itself as a relevant actor in efficient water management and irrigation modernization, driven by demanding climatic conditions and structural water scarcity. Rather than being a limitation, this context has acted as a catalyst for innovation, fostering the development of technological solutions, governance models, and adaptable agricultural practices:

- **Experience on operating under real water constraints:** Driven by its geographic and climatic realities, Spain has accumulated expertise in the design, management, and optimization of irrigation systems under conditions of extreme water stress. In particular, the Levante region shows high levels of development despite a structural water problem (hydrological deficit). As the most arid area in the European Union (notably Murcia and Almería), digitalization is perceived as “normal,” and there are important innovation niches such as wastewater reuse. Water deficit and high costs of water makes efficiency non-optional.

In parallel, the increasing adoption of renewable energy in the agricultural sector and the sharp rise in energy costs have represented a major shock for irrigation communities, significantly increasing operating costs. Public authorities have supported adjustments in financing and have also helped communities to operate under these new economic realities.

- **Use of non-conventional water resources:** Spain has practical experience operating with multiple water sources, including reclaimed water, rather than relying exclusively on conventional supplies. The most compelling example is the Region of Murcia, where 98–99% of wastewater is reused for agricultural irrigation, according to Emilio Cobos (OTK). In addition, Spain has implemented award-recognized wastewater recovery development plans, such as a project involving the recovery of more than 100 wastewater treatment plants over 10 years, with recognition from the International Water Association, and has produced internationally visible publications that have attracted attention from countries facing similar wastewater recovery challenges.

- **Irrigation communities model:** Spain's system of irrigation communities is a distinctive and exportable asset, as it combines collective governance, efficient water management, and the ability to implement shared technological investments.

By grouping small landowners under a legal structure with decision-making capacity and collective financing, these communities achieve the scale needed to invest in irrigation infrastructure, digitalization, and modernization investments that individual farmers would often be unable to undertake on their own. This structure helps spread the cost of advanced technologies, making adoption economically viable. Irrigation communities also act as key interlocutors with public authorities, facilitating access to public funding and support programs. These characteristics make the Spanish model transferable to countries with similar agricultural structures.

■ **Water governance through River Basin Authorities:** Spain's model of basin authorities managing water in an integrated way at the river basin level is widely recognized as an international reference. In Spain, a single entity oversees inflows and outflows within the basin, facilitating efficient allocation of rights, infrastructure planning, and responses to droughts or extreme events.

■ **Agro-food export strenght:** Spain benefits from climatic advantages that combined with technified irrigation allow it to produce fresh fruits and vegetables when other European countries cannot, positioning Spain as a major global exporter.

Technified irrigation has also enabled crop transformation and the production of higher value-added goods such as wine, olive oil, pistachios, almonds, and berries. This leadership would not be possible without irrigation as a direct enabler of agricultural productivity under water scarcity. Moreover, climatic conditions combined with precision irrigation help maintain stable, high-quality outputs when demand is highest and competition from other origins is lowest, reinforcing Spain's opportunities in European and international markets.

■ **Strong scientific and technological base:** Spain has a solid scientific and technological foundation in irrigation and water management, supported by high-level research groups distributed across the country. Centers such as CEBAS-CSIC and IMIDA, as well as the Polytechnic Universities of Madrid, Valencia, and Cartagena, cover a broad spectrum from agronomy and crop water requirements to technology development. This institutional base constitutes a relevant competitive differentiator.

Irrigation and water innovation ecosystem: Spain has a structured and diverse innovation ecosystem in irrigation and water, combining thematic clusters, technology centers, universities, spin-off companies, and European and national funding mechanisms, with increasing international visibility. This ecosystem is characterized by active collaboration through projects

and networks that generate and transfer knowledge to the productive sector, creating a differentiator compared with contexts where research remains disconnected from real-world deployment. One example is OdinS, an internationalized Spanish SME that emerged from a university-based scientific foundation.

■ **Adaptability and technological integration:** Spain has demonstrated the ability to import foreign technologies and adapt them until they become locally optimized solutions. From adopting drip irrigation (Israeli origin), to fertigation incorporating Dutch technology, to data acquisition and decision-making tools, Spain has not merely replicated external models, it has developed solutions adapted to its specific crops, climates, and soil conditions.



A man in a dark suit is seen from the side, looking at a large digital display. The display shows a world map with glowing blue lines connecting various points, suggesting global connectivity or data flow. In the background, several people in white lab coats are working at desks in a modern, brightly lit laboratory or office environment. The overall scene conveys a sense of advanced technology and international collaboration.

6. Spanish Success Stories

6. Spanish Success Stories

AZUD

International presence

AZUD has a global presence in more than 100 countries through subsidiaries in Mexico, Brazil, India, China, and Singapore, supported by a worldwide distributor network and a team of more than 450 people.

R+D+I

With 30+ R+D+I projects and 3% of its turnover allocated to it, research and technological development are among the company's key pillars. Among these projects is LIFE TRIPLET, co-financed by the European Union's LIFE+ Programme, focused on monitoring crop development and sustainable management of plant health, water, and nutrients; CHECKRIGATION funded by the State Research Agency and NextGenerationEU, a digital solution for sustainable precision fertigation; and SUDIPRO, a system based on AI models for subsurface irrigation installations, funded by the Egyptian-Spanish Joint Programme and supported by CDTI.

At AZUD, knowledge is a key differentiating advantage. As its CEO, Alejandro Escolar, notes: "We rely heavily on knowledge... in the end, you have to know how to apply the product and under what conditions." This know-how encompasses the correct application of solutions, processes, and logistics that have been accumulated over the years and have enabled the company to position itself globally.

Born in Spain's Murcia region, AZUD has over 30 years of experience and operations that have enabled it to establish itself as a global benchmark in technological solutions for the efficient use of water. Within the value chain, it positions itself as a manufacturer of equipment and solutions, offering products for precision irrigation, subsurface drip irrigation, gardening and landscaping, soilless cultivation, and reclaimed water application.



Awards and recognitions

2017: Tigre Empresarial Award
Granted by the Spanish Chamber of Commerce in China, recognizing technological work in the development of industrial water management.

2020: Export Award
Granted by AGRAGEX during an International Buyer's Day.

2024: Finalist in the 2024 AEI-Agri Innovation Awards
In the category "Adaptation and mitigation in response to climate change", with the SUBALMA project, focused on alternatives to improve production techniques and sustainability in the olive oil sector.



International presence

With a presence in more than 60 countries, including Mexico, Colombia, Peru, Morocco, Egypt, Saudi Arabia, and Ethiopia. In 2026, it was a beneficiary of the grant program of the Institute for the Development of the Region of Murcia (INFO), fo-financed by the European Regional Development Fund. From October 2025 to February 2026, it carried out trade agendas in Senegal, Cote d'Ivoire, Ghana, and Nigeria. In addition, it took part in a direct trade mission to Guatemala and El Salvador organized by INFO, with technical support from Gedeth Network.

R+D+i

Collaborates with centers such as Tecnova, Agritech Murcia, CEBAS-CSIC, IMIDA, and several polytechnic universities, including Almería, Cartagena, Madrid, Valencia, and Catalunya, and it has participated in more than 100 projects, including:

- SMARTWATER (2017-2019): Smart irrigation project based on environmental monitoring in soilless crops, in collaboration with the Polytechnic University of Cartagena and CEBAS-CSIC.
- IRIS (2018): Project on the use of recycled water and irrigation water, and the development of a prototype for areas with water scarcity and semi-arid climates.

“Anything you don't measure, you can't improve”. This is highlighted by RITEC's General Director, Luis Miguel Peregrín, emphasizing the importance of data. However, it is not about measuring for the sake of measuring, but rather focusing on the data that truly generates value.

RITEC is a Spanish company specialized in the design, manufacture, and installation of fertigation systems, climate control, and agricultural projects. Within the value chain, it positions itself as an engineering consulting and integration firm, as well as a developer of turnkey projects, with more than 30 years of experience.



Awards and recognitions

2022: International Expansion Award
Granted by the Murcia Chamber of Commerce.

2022: Best Technology Company for the Agricultural Sector Award
As part of the 3rd Business Excellence Awards by La Razón.

2023: European Award for Quality and Business Commitment
In the category “Innovation and Technology in Irrigation Systems”, awarded by the European Society for Social and Cultural Promotion.



International presence

The company has implemented projects in more than 30 countries and has approximately 150 clients worldwide, with a strong presence in Latin America, where it operates in markets such as Mexico, Colombia, and Peru. This international footprint is further strengthened by its participation in the Sahara Expo 2025 fair, held in Cairo, supported by the Institute for the Development of the Region of Murcia and the European Union through FEDER funds.

R+D+i

OdinS has had an R&D&I department since 2015, focused on projects based on IoT/6G technologies, cybersecurity, distributed computing across Edge/Cloud, and data analytics (Big Data, AI). In this area, it has participated in 57 projects, including 38 international projects, 14 national projects, and 5 regional projects. These include Berries 4.0, aimed at developing an integrated system for irrigation management, nutrition, and greenhouse climate control, with the participation of CEBAS-CSIC, HIDROTEC, and RITEC; and IoT@s, focused on developing an open platform for remote control systems and the management of irrigation zones, in collaboration with EGATEL, SOTRON, TRAGSA, and INTEGRASYS. This project was funded by CDTI and supported by the Ministry of Economy and Competitiveness under the 2016 FEDER Innterconecta program. The company also maintains a network of collaborators with key stakeholders such as Microsoft, Technical University of Viena, and FOXEN.

OdinS highlights that the future of IoT in agriculture lies in using software that can do more with less, enabling greater optimization. In this sense, the company emphasizes that it is not about measuring for the sake of measuring, but about ensuring that the data are appropriate, calibrated, and truly reliable.

Founded in 2014, a spin-off from the University of Murcia. OdinS specializes in the design, development, and deployment of smart products and solutions for smart cities, agriculture, Industry 4.0, and infrastructure. Within the value chain, it positions itself as a field services and support provider, with expertise in IoT hardware devices and software platforms.



Awards and recognitions

2026: ESG Industry – Region of Murcia Award
In the "Future" category.

2025: Chamber Award for Innovation and Technological Development
Granted by the Murcia Chamber of Commerce.



7. Expert Voices: Perspectives on Spain

7. Expert Voices: Perspectives on Spain



Mark Smith

Director General, International Water Management Institute (IWMI)

Mark Smith leads IWMI, a CGIAR research center operating in approximately 50 countries across the Global South, focused on solving water security problems through applied research, innovation, and partnership facilitation. IWMI's work spans the full water system—from biophysical hydrology through social, institutional, and governance dimensions, making Smith uniquely positioned to assess Spain's irrigation capabilities within the broader global landscape of water challenges.

From Scarcity to Water Risk Uncertainty

The global water challenge not simply scarcity, but a broader and more complex landscape of water risks (including flooding, drought, and supply variability) whose probabilities can no longer be reliably estimated using historical data due to climate change. This has profound implications for irrigation investment decisions: the conventional cost-benefit calculus for building infrastructure is no longer reliable.

Spain is one of the global "hot spots" where this shift in water risk is most acutely felt, making the country both a test bed and a potential exporter of adaptive solutions.

Spain as a Global Reference

Spain is recognized within the international water community as one of the important Global North partners for water innovation.

Spain's experience with non-conventional water sources, particularly treated wastewater reuse and desalination, is of high relevance to regions where demand is surging, such as the Middle East and North Africa.

Business Models: The Missing Link for Technology Adoption

There is a critical importance of viable business models for irrigation technology adoption. The core question is not just whether the technology works, but whether end users can sustain its application while maintaining a viable livelihood.

This requires connecting technology suppliers, market access for produce, financing institutions, and governance structures into a coherent ecosystem.

Governance

Institutional design and governance reform are the most fundamental, and most difficult, determinants of success in water management and irrigation.

The key bottlenecks globally are agencies lacking resources, data, or mandates; weak coordination between national and local institutions; insufficient stakeholder engagement processes.

Data, AI, and Digital Twins: The Next Frontier

There is a rapidly evolving landscape in which AI is overcoming one of water management's most persistent obstacles: data fragmentation.

The breakthrough for the future may come more from data and analytics than from traditional infrastructure investment, making it easier to align the right technology choice to the right problem. This positions data-driven irrigation and decision-support tools as a high-value export opportunity for countries like Spain.

Priority Geographies for Spanish Engagement

Mediterranean-aligned geographies (North Africa and the Middle East) as natural priority regions due to shared climatic conditions.

Central Asia and Pakistan as high-impact contexts undergoing infrastructure transitions.

Additional opportunities exist in farmer-led irrigation systems in West, East, and Southern Africa, where Spain could contribute through technology, governance, and partnership models.



José María González Ortega

President, AERYD (Spanish Association of Irrigation and Drainage)

Water Engineering Expert, Tragsa Group

José María González Ortega brings a dual perspective that is rare and exceptionally valuable: decades of hands-on engineering and project execution at Tragsa—Spain's state-owned infrastructure company—combined with institutional leadership as president of AERYD, the country's foremost professional association for irrigation and drainage. González Ortega also leads international cooperation missions with AECID (the Spanish Agency for International Development Cooperation) in matters related to water management and irrigation.

Spain's Return to the International Stage through ICID

The country's full reintegration into the International Commission on Irrigation and Drainage (ICID), formalized through a convention signed with the Ministry of Agriculture. This has yielded a Spanish vice-presidency within ICID and the formation of a Spanish national committee.

Spain has been returned to where it should never have stopped being: a full member and active leader within the world's principal intergovernmental body for irrigation.

The Scale of Spain's Modernization Achievement

Between 2000 and 2025, drip irrigation coverage expanded from 17% to 58% of total irrigated area. Ten times more than sector leading Israel in absolute terms.

The country is now transitioning from "modern irrigation" to "smart irrigation", a next phase that builds on the physical modernization already completed, layering data, sensors, and intelligence onto the existing infrastructure.

International Cooperation: From Identification to Implementation

Through AECID, Spain leads technical cooperation missions to countries including Egypt, Tunisia, Morocco, Lebanon, and Jordan.

These missions serve both as identification exercises, diagnosing needs on the ground, and as reverse missions, where international delegations visit Spain to see its water management, desalination, regeneration, and irrigation systems firsthand.

Countries cannot leapfrog directly to smart irrigation without first completing basic modernization. Spain's value lies precisely in having walked that entire path, from gravity-fed systems to pressurized networks to digitalized management, and being able to guide others through each phase.

Global agenda

The international agenda is strongly focused on water and agricultural resilience under climate change, particularly regarding declining water availability.

The priority is to understand how to adapt irrigation systems to reduced resources, emphasizing efficiency, resilience, and sustainability.

Governance and institutional coordination model

Spain's success is partly attributed as result of coordinated action between key institutional actors such as Ministries, public infrastructure entities. Irrigation user associations and public execution bodies.

This integrated model has enabled large-scale modernization and investment programs, supported by European funding mechanisms.



Alberto Garrido Colmenero

Professor, Universidad Politécnica de Madrid (UPM) · School of Agricultural Engineering

Professor of agricultural economics with over 33 years of experience in research and teaching at one of Spain's most prestigious engineering schools. His career has focused on water economics and policy, irrigated agriculture, risk management, sustainability of agricultural systems, and water footprint analysis—making him one of the most authoritative national voices on the intersection of water, farming, and public policy in Spain.

Modernization: A Two-Wave Transformation

Spain's irrigation transformation began with a first wave of state-led, co-financed modernization brought pressurized and automated systems to approximately two million hectares, fundamentally upgrading the infrastructure base.

A second, ongoing wave is accelerating digitalization—integrating real-time soil and plant sensors with irrigation control systems. This has produced a sector that, has changed radically in just two decades, driven by a combination of public investment, private initiative, and farmer entrepreneurship.

High-Value Crops and Export Dynamism

Modernization unlocked a shift toward high-value Mediterranean crops—olives, vineyards, almonds, pistachios, and other tree crops—which in turn fueled Spain's growing agrifood export success.

Irrigation has enabled higher productivity, improved product quality, and stronger positioning in international markets for wine, olive oil, and nuts. Spain's agricultural trade balance has improved dramatically in just 10–15 years.

Governance and ecosystem development

Spain's water governance is among the most mature globally, anchored in its river basin authorities. The country's drought management capabilities are a genuine strength, built through decades of hard-won experience.

The country also has a strong scientific and technical base, comparable to more advanced countries, with strong groups across multiple institutions, that provides industrial capacity and globally competitive irrigation companies.

Water scarcity as a structural driver

Chronic water scarcity and recurrent droughts have been a central driver of innovation and adaptation in Spain's irrigation system.

The sector has progressively adapted through technological change, crop transformation, and improved water management practices.

Challenges and Barriers Environment:

- Groundwater overexploitation is one of the most critical challenges in Spain's irrigation system.
- Growing importance of water quality issues, particularly nitrate contamination linked to agricultural activities.
- Reducing environmental impacts without compromising agricultural productivity.
- Innovation, industry structure, and scaling
- There is a need to strengthen farmer training and technical capabilities.
- Public administration remains slow and overly bureaucratic, at times hindering rather than supporting agricultural innovation.



8. Conclusions

8. Conclusions

Synthesis of Capabilities

The evidence assembled throughout this report demonstrates that Spain possesses a mature, diversified, and internationally competitive irrigation capability set that can be articulated across five reinforcing dimensions:

Industrial and Technological Depth. Spain's value chain covers the full spectrum—from upstream equipment manufacturing (pumps, pipes, drip emitters, valves, filters) through smart irrigation technologies (IoT platforms, soil-moisture sensors, AI-based decision-support systems, satellite/remote-sensing analytics) to midstream engineering integration (turnkey project design and execution) and downstream on-farm services.

Proven Scale and Operational Track Record. Spain has modernized 3.83 million hectares—the EU's largest irrigated area—to over 80% pressurized-system coverage, with drip irrigation applied on 58.6% of irrigated surface (vs. 6% globally). Between 2000 and 2025, drip coverage expanded from 17% to 58%. This is not laboratory-scale innovation; it is transformation executed at national scale under real climatic, economic, and institutional constraints.

Strong Knowledge and Innovation Infrastructure. Technology centers, research-active universities, and leading institutions provide a continuous pipeline of applied R&D. Spain's RTA of 2.3 in water technologies, its leadership in PRIMA coordination, and its top-four positioning in Horizon Europe returns confirm disproportionate innovation specialization relative to country size.

Distinctive Governance and Institutional Model. Spain's system of irrigation communities (collective farmer organizations with legal standing, decision-making capacity, and shared infrastructure investment) and its river basin authorities (integrated water allocation and planning at the hydrological basin level) constitute a unique, exportable institutional asset. As expert voices in this report confirm, countries cannot leapfrog to smart irrigation without first completing governance and infrastructure modernization—and Spain has walked that entire path.

Demonstrated Adaptability and Integration Capacity. Spain has repeatedly shown the ability to import foreign technologies (Israeli drip irrigation, Dutch fertigation, global IoT standards) and adapt them into locally optimized, climate-specific solutions. The country's experience with non-conventional water resources, particularly treated wastewater reuse and desalination, adds a further layer of relevance for water-scarce markets worldwide.

Positioning Opportunities

Based on the global trends analysis, the comparative benchmarking, and the expert perspectives gathered, Spain's positioning opportunities can be organized along three strategic axes:

Technology and Solutions Export

Smart irrigation platforms and IoT/sensor packages represent Spain's fastest-growing and most differentiated export category. The global shift from physical modernization to digital management creates immediate demand for exactly the type of integrated solutions that Spanish firms are commercializing.

- Turnkey project delivery combining hardware, engineering integration, digital layers, and after-sales service is a high-value proposition that few competitors can match end-to-end. Spain's success stories demonstrate proven export models.
- Water reuse and desalination-linked irrigation is an emerging niche where Spain has world-class operational experience and international award recognition, positioning it strongly for MENA, Central Asian, and Sub-Saharan African markets.

Knowledge and Governance Transfer

- Spain's irrigation community model and basin-authority architecture are of high interest to countries undergoing institutional reform in water management. Spain, through ICEX, can leverage AECID cooperation missions and Spain's restored ICID leadership to offer governance advisory and institutional capacity-building as a complement to technology exports.
- The training and demonstration ecosystem (CENTER for standardized testing, knowledge platforms, university-linked pilot programs) offers a platform for incoming technical missions and reverse trade delegations, converting institutional visits into commercial pipelines.

Priority Geographies

- Mediterranean and MENA (Morocco, Tunisia, Egypt, Jordan, Saudi Arabia, UAE): Natural alignment in climate, crop systems, and water-scarcity drivers. Already active trade channels through WETEX, AECID missions, and bilateral programs.
- Latin America (Mexico, Colombia, Peru, Central America): Shared language, existing firm presence and growing public investment in irrigation modernization.
- Sub-Saharan Africa (West, East, and Southern Africa): Emerging markets with farmer-led irrigation systems and increasing donor/multilateral investment, where Spain can contribute technology, governance, and partnership models.
- Central Asia and South Asia (Pakistan, Uzbekistan): Identified as high-impact contexts undergoing infrastructure transitions, where Spain's full-path experience is directly applicable.



Sources used

Sources used

AGRAGEX (2025) Récord de empresas exportadoras españolas en la feria turca-Growtech. Noticias. Access in: <https://agragex.es/record-de-empresas-exportadoras-espanolas-en-la-feria-turca-growtech/>

Agritech Murcia (2017, October 13) Riego inteligente en cultivos sin suelo. Access in: <https://agritechmurcia.com/riego-inteligente-cultivos-sin-suelo/#:~:text=El%20proyecto%20Smartwater%20tiene%20como%20objetivo%20el,en%20la%20monitorizaci%C3%B3n%20de%20diferentes%20par%C3%A1metros%20ambientales>

Agrotecnia (2025) El sector de la maquinaria agropecuaria exportó 3.422 M€ en 2024, un 4.33% más. Actualidad. Access in: <https://agrotecnica.online/el-sector-de-la-maquinaria-agropecuaria-experto-3-422-me-en-2024-un-4-33-mas/>

AZUD (2024) Proyecto Subalma en los Premios de Innovación. [LinkedIn post] LinkedIn. Access in: https://www.linkedin.com/posts/azud_proyecto-subalma-en-los-premios-de-innovaci%C3%B3n-activity-7181562054917382144-4mFi/?originalSubdomain=es

AZUD (n.d.) CHECKRIGATION. Access in: <https://azud.com/blog/checkrigation/>

AZUD (N.D.) LIFE TRIPLET. Access in: <https://azud.com/blog/life-triplet/>

AZUD (n.d.) Sobre nosotros. <https://azud.com/sobre-nosotros/>

Centro para el Desarrollo Tecnológico y la Innovación (CDTI) (2021) Resultados de la participación española en Horizonte 2020. Dirección de Programas de la UE y Cooperación Territorial. Ministerio de Ciencia e Innovación. Access in: <https://www.horizonteeuropa.es/gran-exito-de-las-entidades-espanolas-en-horizonte-2020>

Dealroom (2025) Investors. Dashborad. Access in: <https://app.dealroom.co/dashboard>

Dealroom (2025) Sectors. Dashborad. Access in: <https://app.dealroom.co/dashboard>

Dealroom (2025) Transactions. Dashborad. Access in: <https://app.dealroom.co/dashboard>

European Comission (2025) EU research projects under HORIZON EUROPE (2021-2027). Datasets. Access in: <https://data.europa.eu/data/datasets/cordis-eu-research-projects-under-horizon-europe-2021-2027?locale=en>

European Comission (2025) Europe project summaries. CORDIS - EU research results. Access in: <https://cordis.europa.eu/projects>

European Comission (2025) LIFE Public Database. LIFE Programme. Access in: <https://webgate.ec.europa.eu/life/publicWebsite/search>

European Patent Office (EPO) (2024) Innovation in water-related technologies. Observatory on Patents and Technology. Access in: <https://www.epo.org/en/about-us/observatory-patents-and-technology/technologies/water-technologies>

Fluidex (2025) AQUATECH Exhibition 2025. Access in: <https://www.fluidexspain.com/en/eventos/aquatech-exhibition-2025/>

Fluidex (2025) WETEX Exhibition 2025. Acces in: <https://www.fluidexspain.com/en/eventos/wetex-exhibition-2025/>

Forbes (2025) El sector agrario y la industria alimentaria generan en torno al 6% del empleo en España, según Unicaja. Economía. Access in: <https://forbes.es/economia/847454/el-sector-agrario-y-la-industria-alimentaria-generan-en-torno-al-6-del-empleo-en-espana-segun-unicaja/>

Fundación Aquae (2022) Agua y Empleo. Access in: <https://www.fundacionaquae.org/agua-y-empleo/>

Grupo Cajamar (2024) Observatorio sobre el sector agroalimentario español en el contexto europeo. Informe 2024. Publicaciones. Access in: <https://www.plataformatierra.es/innovacion/observatorio-sector-agroalimentario-espanol-europeo-informe-2024>

Grupo Cajamar (2024) Regadío y Seguridad Alimentaria, La situación en España. Publicaciones. Access in: <https://www.plataformatierra.es/innovacion/regadio-seguridad-alimentaria-situacion-espana>

Grupo Cajamar (2025) Análisis de las exportaciones agroalimentarias. Publicaciones. Access in: <https://www.plataformatierra.es/innovacion/exportaciones-agroalimentarias-2025>

Grupo Cajamar (2025) La aportación del regadío al sector agrario en España. Economía Agroalimentaria. Comunidad. Access in: <https://www.plataformatierra.es/comunidad/la-agricultura-un-sector-estrategico/aportacion-regadio-sector-agrario-espana-actualizacion-cifras-2023>

iAgua (2017, October 13) AZUD, Tigre Empresarial 2017. Access in: <https://www.iagua.es/noticias/espana-china/azud/17/10/02/azud-tigre-empresarial-2017>

iAgua (2025) La IFAT es una cita imprescindible para empresas de agua y de tratamiento de residuos. Noticias. Access in: <https://www.iagua.es/noticias/icex-espana-exportacion-e-inversiones/ifat-es-cita-imprescindible-empresas-agua-y>

ICEX (2025) Estadísticas Españolas de Comercio Exterior. ESTACOM. Ministerio de Economía, Comercio y Empresa. Access in: <https://www.icex.es/es/estadisticas>

Elinfo Águilas (2022, December 02) La empresa aguilena Ritec recibe el Premio Europeo de la Calidad y Compromiso Empresarial. Access in: <https://www.infoaguilas.es/post/la-empresa-aguilena-ritec-recibe-el-premio-europeo-a-la-calidad-y-compromiso-empresarial>

INFORMA (2026) Base de datos CNAE-Empresas Irrigación. Access in: <https://www.informa.es/>

Institut Cerdà (2026) Informe – Observatorio de innovación en Gran consumo 2026. Observatorio de innovación en Gran consumo. Access in: <https://www.icerda.org/observatorio-de-innovacion-en-gran-consumo/>

LifeTriplet (n.d.) EL PROYECTO LIFE TRIPLET. Access in: <https://www.lifetriplet.eu/proyecto/>

Ministerio de Agricultura, Pesca y Alimentación (MAPA) (2024) Encuesta sobre Superficies y Rendimientos Cultivos (ESYRCE). Estadísticas Agrarias, Agricultura.. Access in: <https://www.mapa.gob.es/es/estadistica/temas/estadisticas-agrarias/agricultura/esyrce>

Ministerio de Agricultura, Pesca y Alimentación (MAPA) (2024) Estrategia de Digitalización del Sector Agroalimentario y Forestal y del Medio Rural- III Plan de Acción 2024-2026. Planes y Estrategias. Access in: <https://www.mapa.gob.es/es/ministerio/planes-estrategias/estrategia-digitalizacion-sector-agroalimentario>

Ministerio de Agricultura, Pesca y Alimentación (MAPA) (2024) Informe Anual de Indicadores: Agricultura, Pesca y Alimentación. Análisis, Coordinación y Estadística. Access in: https://www.mapa.gob.es/es/ministerio/servicios/analisis-y-prospectiva/serie-indicadores/indicadores_semestre

Murcia Diario (2023, June 02) La Cámara de Murcia se viste de gala en la entrega de sus premios anuales. Access in: <https://www.murciadiario.com/articulo/murcia-economia-regional/camara-murcia-homenajea-empresas-noche-premios-anuales/20230602103153095366.html>

Murciastartup (2022) ¿Qué es AgritechMurcia? Acces in: <https://www.murciastartup.com/articulo/ecosistema/que-es-agritechmurcia/20220609180019001218.html>

Observatorio de la Digitalización del Sector Agroalimentario Español (2024) La transformación digital en la agricultura española. Publicaciones. Ministerio de la Agricultura, Pesca y Alimentación. Access in: <https://www.mapa.gob.es/es/desarrollo-rural/temas/innovacion-medio-rural/digitalizacion/publicaciones>

OdinS (2026, April 15) OdinS ha sido galardonada con el premio Cámara 2025 a la Innovación y el Desarrollo Tecnológico. Access in: <https://odins.es/noticias/odins-galardonada-premio-innovacion-desarrollo/>

OdinS (2026, March 12) OdinS recibe el Premio Futuro ESG Industria de la Región de Murcia. Access in: <https://odins.es/noticias/odins-premio-esg-industria-murcia/>

Papasseit, P. (2015, October 05) Ritec desarrolla nuevos sistemas expertos para la programación del riego de precisión. HorticulturaBlog. Access in: <https://horticulturablog.blogspot.com/2015/10/ritec-desarrolla-nuevos-sistemas.html>

Partnership for Research and Innovation in the Mediterranean Area (PRIMA) (2025) Portfolio Analysis 2018-2023. Access in: <https://prima-med.org/projects-portfolio/>

Pérez, A. (2020, March 09) Agragex reconoce la labor exportadora de Goizper, Exafan y Azud. Interempresas. Access in: <https://www.interempresas.net/Agricola/267318-Agragex-reconoce-la-labor-exportadora-de-Goizper-Exafan-y-Azud.html>

Qcom.es (2025) Fenacore: se infravalora la importancia del regadío para la economía y el empleo. Agro. Access in: https://www.qcom.es/fenacore/agro/fenacore-se-infravalora-la-importancia-del-regadio-para-la-economia-y-el-empleo_70041_3072_74105_0_1_in.html

Revista Técnica de Medio Ambiente (RETEMA) (2024) El MITECO adjudica 74 millones de euros a 125 proyectos de digitalización de regadíos. Actualidad, Agua. Access in: <https://www.retema.es/actualidad/el-miteco-adjudica-74-millones-de-euros-125-proyectos-de-digitalizacion-de-regadios>

Revista Técnica de Medio Ambiente (RETEMA) (2024) España es líder mundial en riego localizado y referente europeo en modernización de regadíos. Actualidad, Agua. Access in: <https://www.retema.es/actualidad/espana-es-lider-mundial-en-riego-localizado-y-referente-europeo-en-modernizacion-de>

RITEC (2026, March 05) RITEC refuerza su estrategia internacional gracias al apoyo del INFO y fondos FEDER. Access in: <https://ritec.es/ritec-refuerza-su-estrategia-internacional-gracias-al-apoyo-del-info-y-fondos-feder/>

RITEC (2026, March 05b) RITEC impulsa su estrategia internacional participando en la misión comercial a Guatemala y El Salvador junto al INFO. Access in: <https://ritec.es/ritec-participa-en-mision-guatemala-salvador-info/>

RITEC (n.d.) Proyecto IRIS (CEBAS). Access in: <https://ritec.es/proyectos/proyecto-iris-cebas/>

RITEC (n.d.) Proyecto OPIRIS. Access in: <https://ritec.es/proyectos/proyecto-opiris/>

RITEC (n.d.) Proyecto SMARTWATER. Access in: <https://ritec.es/proyectos/proyecto-smartwater/>

RITEC (n.d.) SOBRE RITEC. Access in: <https://ritec.es/sobre-ritec/>

Tecnología Hortícola (2021, November 16) Ritec, entre las pymes españolas con mayor crecimiento. Access in: <https://www.tecnologiahorticola.com/es/tecnologias/ritec-entre-las-pymes-espanolas-con-mayor-crecimiento#:~:text=de%20RITEC%20SL-,Una%20decena%20de%20empresas%20de%20la%20Regi%C3%B3n%20de%20Murcia%20han,oficinas%20en%20Murcia%20y%20Almer%C3%ADa>

Tecnología Hortícola (2022, February 03) Ritec obtiene el premio a Mejor Empresa de Tecnología para el Sector Agrícola. Access in: <https://www.tecnologiahorticola.com/es/tecnologias/ritec-obtiene-el-premio-a-mejor-empresa-de-tecnologia-para-el-sector-agricola>

World Intellectual Property Organization (WIPO) (2024) Intellectual property statistical country profile 2024. IP Statistics Data Center. Access in: <https://www3.wipo.int/ipstats/key-search/indicator?lang=en&tab=null>



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