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MARKET RESEARCH

SMART CITIES IN SPAIN: A VISION OF TECHNOLOGICAL ADVANCEMENT

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Contents

MARKET OVERVIEW

SMART CITIES – SPAIN

Smart cities are rapidly becoming a global phenomenon, and Spain is no exception to this transformative trend. In recent years, the Smart Cities market in Spain has gained significant momentum, driven by innovative projects and a burgeoning interest in adopting advanced technologies to enhance urban living.

Growth and Projections:

The growth of Spain's Smart Cities market is a compelling narrative that reflects a nation's commitment to technological progress. Projections indicate that by 2023, the revenue in this sector is poised to reach approximately US$0.94 billion. This substantial figure underscores the rising enthusiasm for smart city solutions and demonstrates Spain's readiness to invest in its urban future.

Compound Annual Growth Rate (CAGR):

Between 2023 and 2028, the Smart Cities market in Spain is projected to maintain an impressive compound annual growth rate (CAGR) of around 11.77%. This steady and sustained growth indicates that Spain is not just embracing smart technologies but is also actively working towards their integration into the fabric of its urban environments.

Market Volume by 2028:

Looking further ahead, it is anticipated that by 2028, the Spanish Smart Cities market will have expanded significantly, reaching an estimated market volume of approximately US$1.64 billion. This projection reflects a commitment to the long-term development of smart city infrastructure and solutions.

Global Comparison:

While Spain's Smart Cities market is on a positive trajectory, it's important to compare it with the global landscape. In 2023, the United States is expected to lead the world in Smart Cities revenue, with an estimated total of US$11.12 billion. While Spain's market is growing steadily, it remains smaller in scale compared to larger economies like the United States.

Innovative Projects:

Two cities in Spain, Barcelona and Madrid, have emerged as pioneers in the country's smart city initiatives. Barcelona, for instance, has embarked on groundbreaking projects focusing on sustainable urban mobility, efficient energy management, and digital governance. Madrid, on the other hand, is actively working on initiatives related to smart transportation systems, improved public services, and citizen engagement through technology.

Key Drivers:

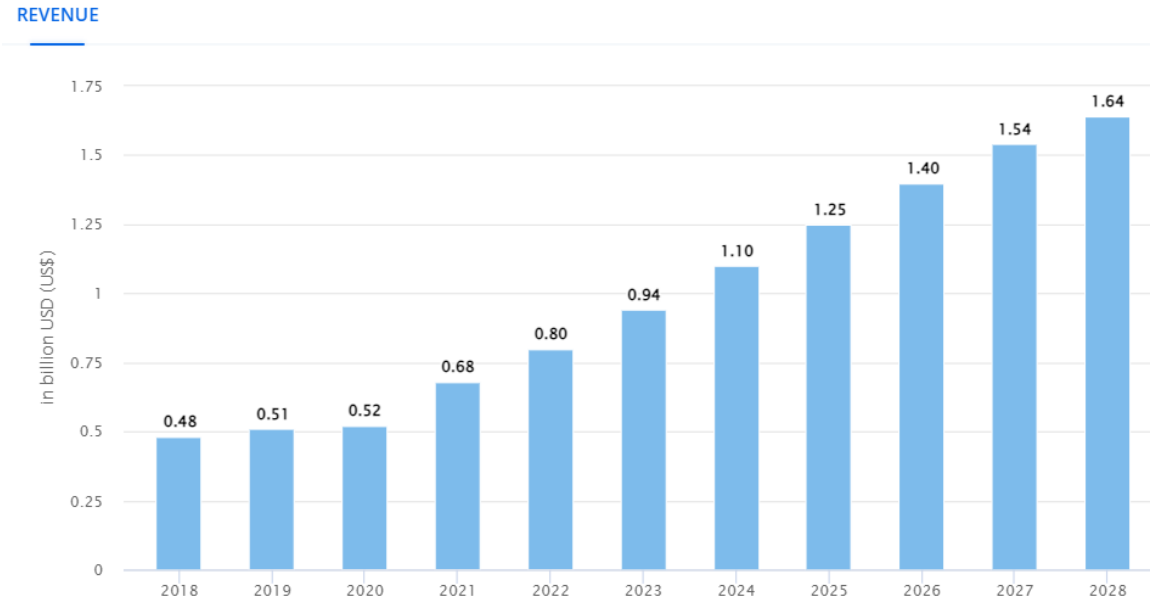
Several factors are driving the growth of Spain's Smart Cities market. The country's increasing urbanization rate, coupled with a strong emphasis on sustainability and improving residents' quality of life, are primary motivators. Additionally, government support and funding for smart city projects, as well as collaborations between the public and private sectors, play a pivotal role in catalyzing innovation and implementation.

Challenges and Opportunities:

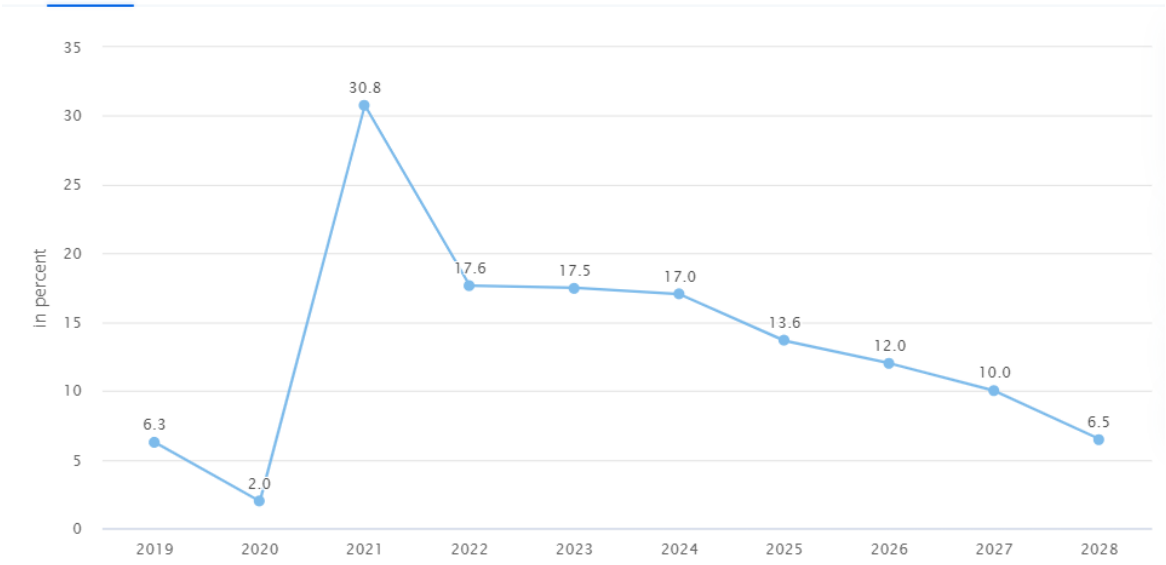
Despite the promising growth, Spain's Smart Cities market faces its share of challenges. Ensuring robust cybersecurity measures, safeguarding data privacy, and addressing infrastructure requirements are pressing issues. However, these challenges also present opportunities for technology companies, startups, and investors to contribute to the development of smart city solutions and infrastructure.[1]

[1] (Smart Cities - Spain, n.d.)

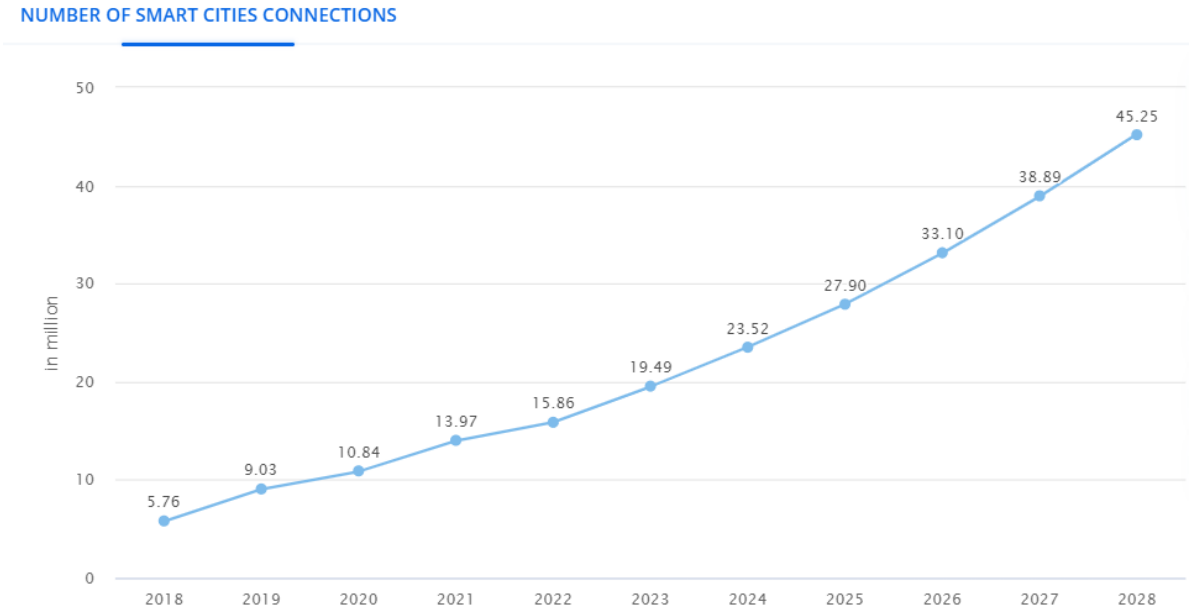
REVENUE



REVENUE CHANGE



NUMBER OF SMART CITIES CONNECTIONS



INTERNET OF THINGS

The Internet of Things (IoT) is leading in a technological revolution that is reshaping industries and daily life across the globe. Spain is firmly in the midst of this transformation, and its IoT market is a focal point of growth and development.

Revenue Projections:

The IoT market in Spain is poised for substantial revenue generation in the year 2023. Projections estimate that it will contribute significantly to the tune of approximately US$12.90 billion. This substantial figure serves as a testament to the growing integration of IoT solutions across diverse sectors in Spain, spanning from industrial applications to consumer-oriented innovations.

Dominant Segment: Automotive IoT:

Within the multifaceted IoT landscape, the Automotive IoT segment is set to take the lead in Spain. By the end of 2023, it is projected to dominate the market with an impressive volume of approximately US$3.94 billion. This underscores the pivotal role that IoT technologies play in enhancing vehicle connectivity, safety, and operational efficiency.

Growth Trends and Projections:

The trajectory of Spain's IoT market is marked by robust growth. An annual growth rate of 12.46% (CAGR 2023-2028) is anticipated, resulting in a substantial market volume of around US$23.21 billion by 2028. This consistent expansion is indicative of IoT's significance in driving Spain's digital transformation journey.

Global Comparisons:

While Spain's IoT market is on a remarkable growth path, it's valuable to contextualize it through global comparisons. In 2023, the United States is projected to lead the world in IoT revenue, with an estimated total of US$172.30 billion. This juxtaposition emphasizes that, while Spain's IoT market is substantial, it is relatively smaller compared to the scale of larger economies like the United States.

IoT: A World of Interconnected Devices:

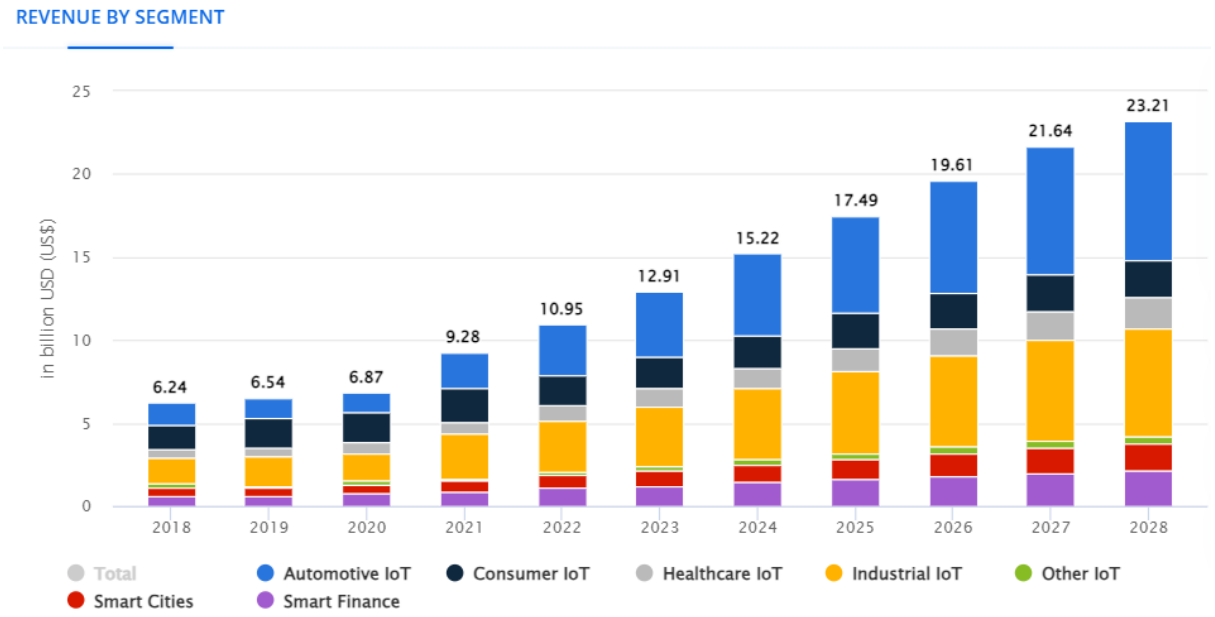
Fundamentally, the IoT market revolves around the concept of interconnectedness. Devices and systems communicate seamlessly through the internet, enabling data exchange and automation. This interconnectedness has opened new frontiers of efficiency and innovation across industries and has found its way into the fabric of daily life.

Focus Areas in Spain's IoT Market:

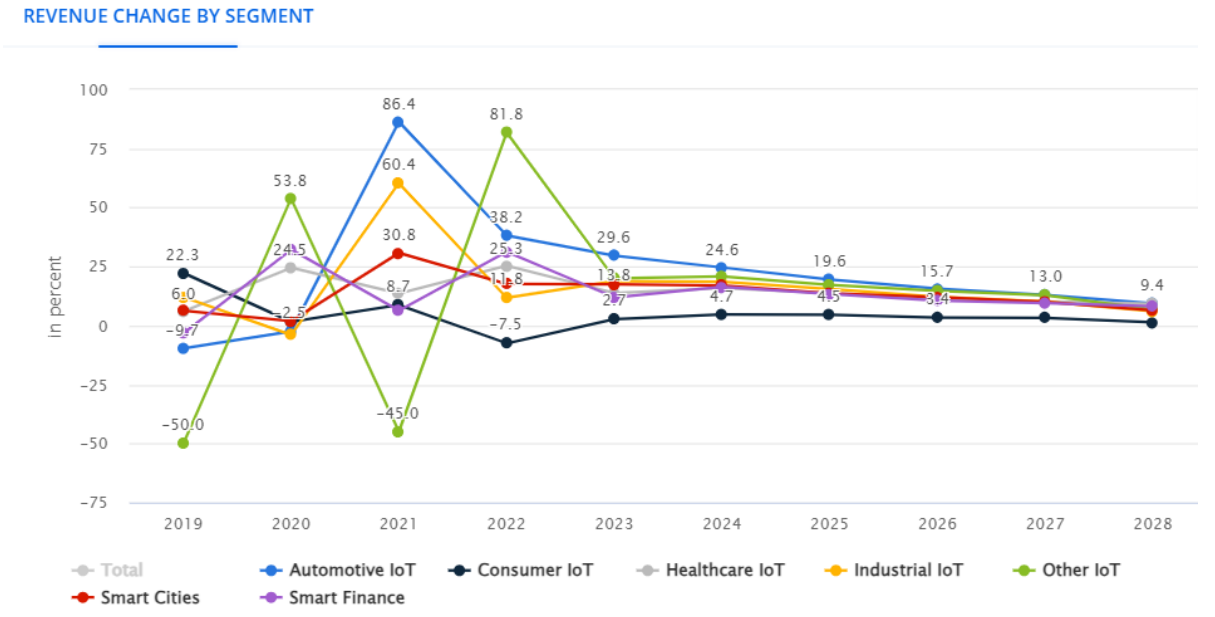
Spain's IoT landscape exhibits a pronounced focus on specific domains, with smart home automation and energy management solutions taking center stage. In the realm of smart homes, IoT technologies are leveraged to enhance convenience, security, and energy efficiency. This strategic emphasis aligns with broader sustainability objectives and the nation's commitment to optimizing resource usage.[2]

[2] (Internet of Things - Spain, n.d.)

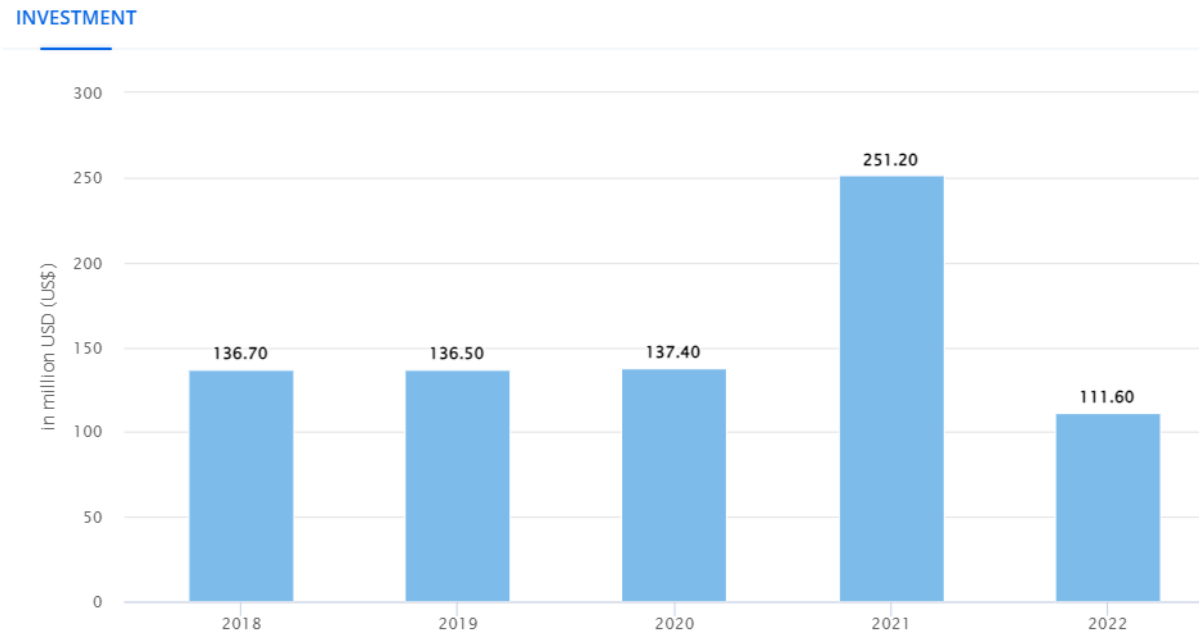
REVENUE BY SEGMENT



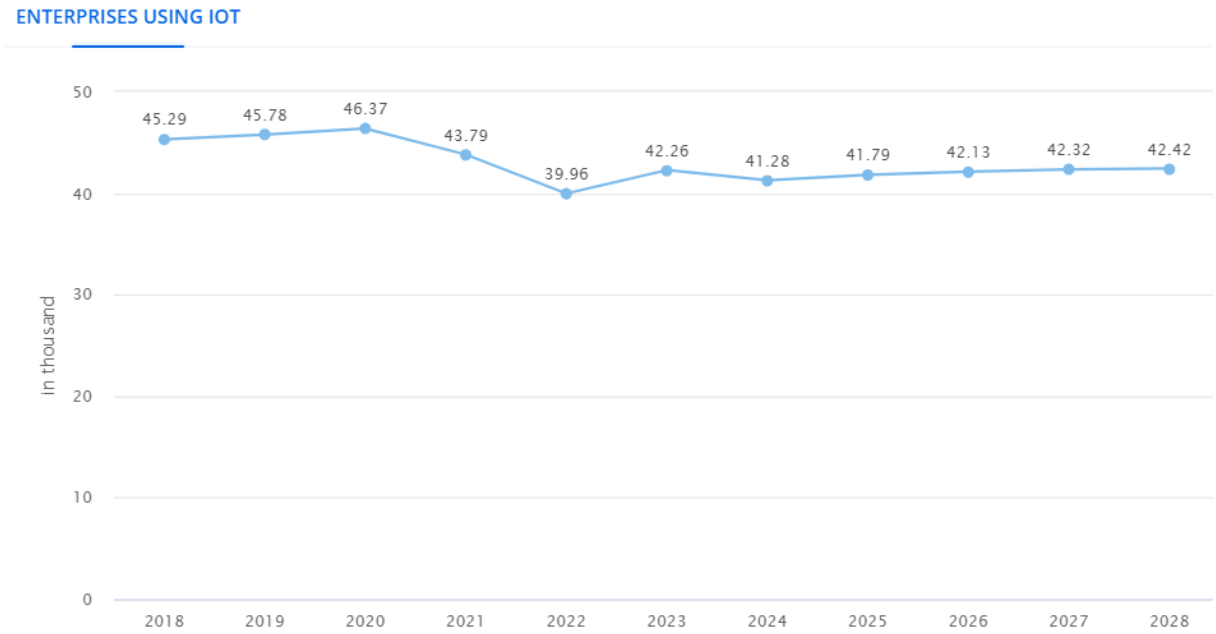
REVENUE CHANGE BY SEGMENT



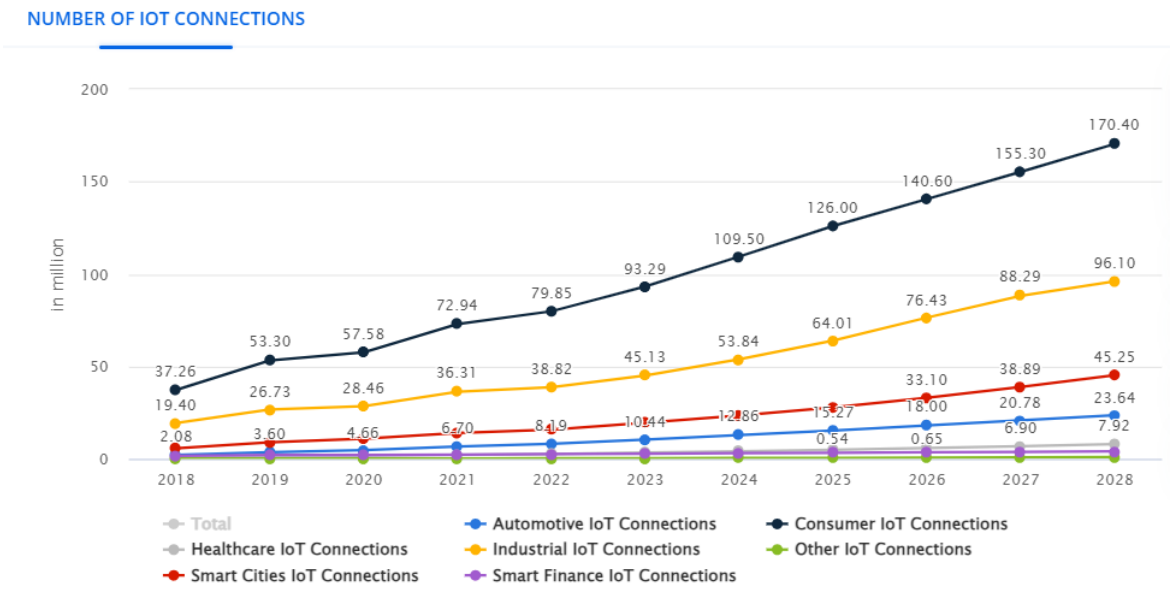
INVESTMENT



ENTERPRISES USING IoT



NUMBER OF IoT CONNECTIONS



INDUSTRIAL IOT – SPAIN

The Industrial Internet of Things (IIoT) is heralding a new era of connectivity and innovation within the industrial landscape, and Spain is firmly positioning itself on the forefront of this technological transformation. The Industrial IoT market in Spain is marked by notable highlights, growth projections, global comparisons, and a burgeoning trend toward smart manufacturing technologies.

Growth Projections:

The Industrial IoT market in Spain is primed for substantial growth in the upcoming years. Projections indicate that by the year 2023, the market is set to reach an estimated revenue of approximately US$3.60 billion. This figure serves as a compelling testament to the increasing integration of IIoT solutions within the country's industrial sector.

Steady Growth Trend:

Beyond 2023, the trajectory of Spain's Industrial IoT market remains promising. An annual growth rate of 12.41% (CAGR 2023-2028) is anticipated, leading to a market volume of approximately US$6.46 billion by the end of 2028. This steady and consistent growth underscores the pivotal role that IIoT is poised to play in shaping Spain's industrial landscape.

Global Comparisons:

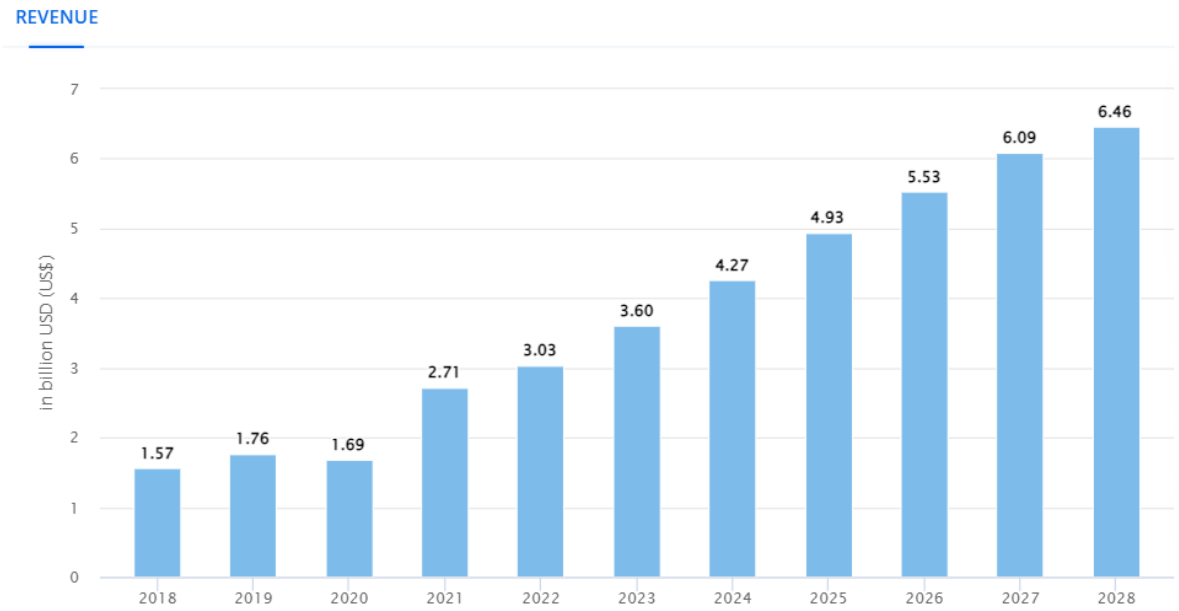
While Spain's Industrial IoT market is making significant strides, it is important to contextualize its growth on a global scale. In 2023, the United States is projected to lead the world in Industrial IoT revenue, with an astonishing estimated total of US$66.28 billion.

Spain's Growing Trend:

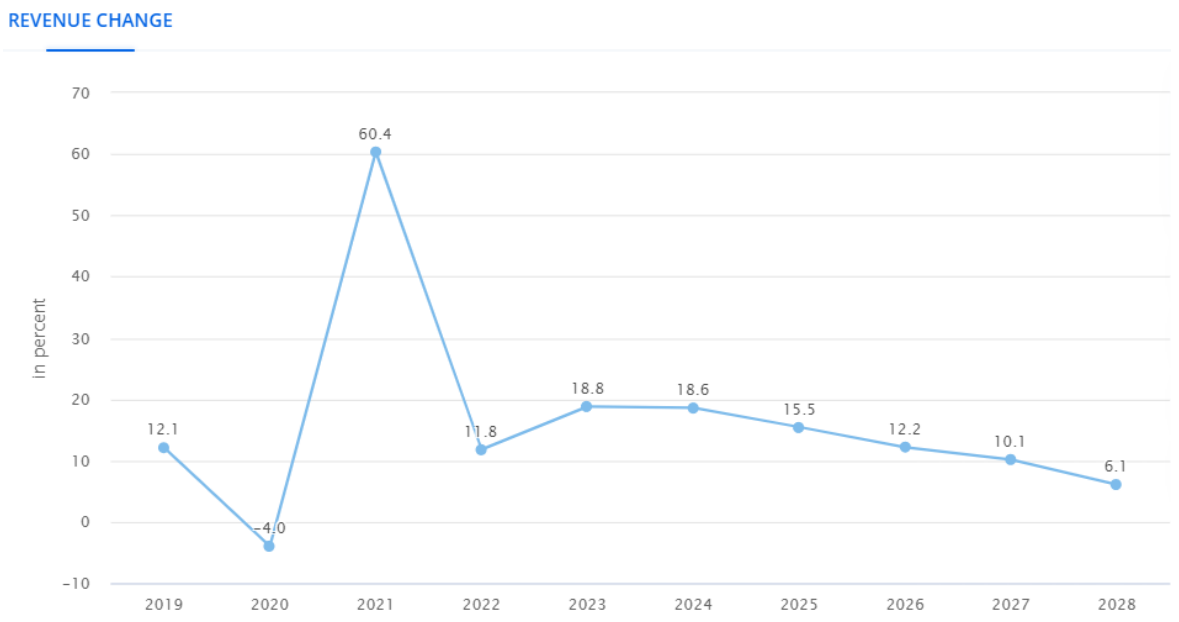
Spain's industrial landscape is experiencing a noticeable uptick in the adoption of IIoT solutions. Companies across various sectors are increasingly embracing smart manufacturing technologies to enhance efficiency, productivity, and competitiveness. This trend reflects a commitment to leveraging advanced technologies to remain at the forefront of global industrial innovation.[3]

[3] (Industrial IoT - Spain, n.d.)

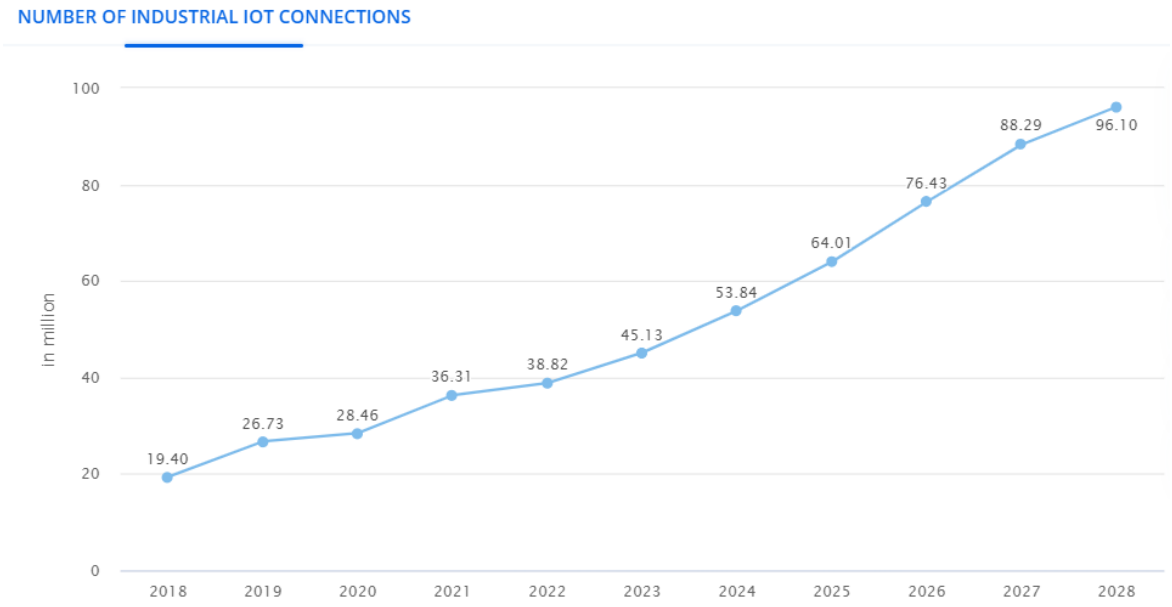
REVENUE



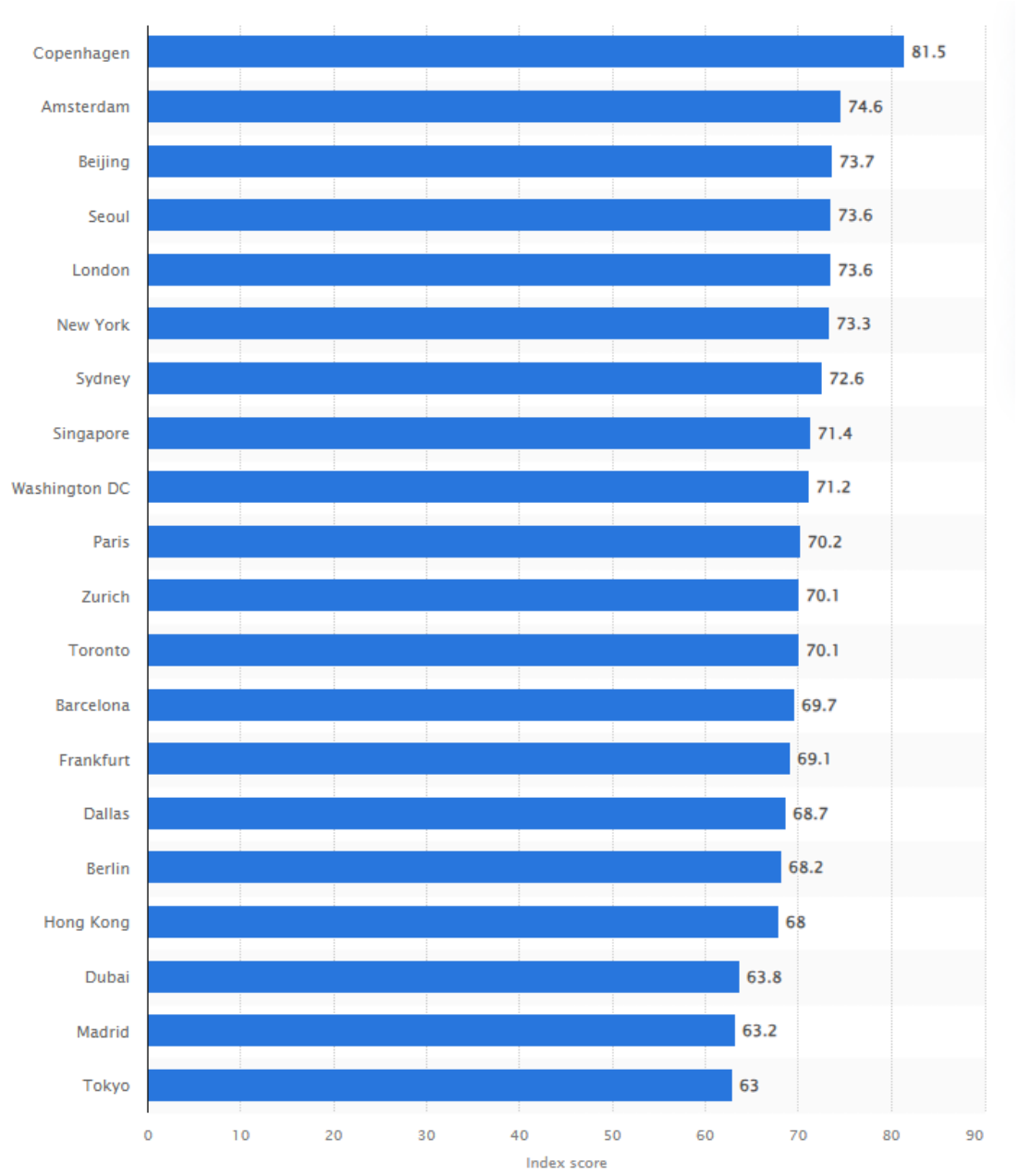
REVENUE CHANGE



NUMBER OF INDUSTRIAL IoT CONNECTIONS



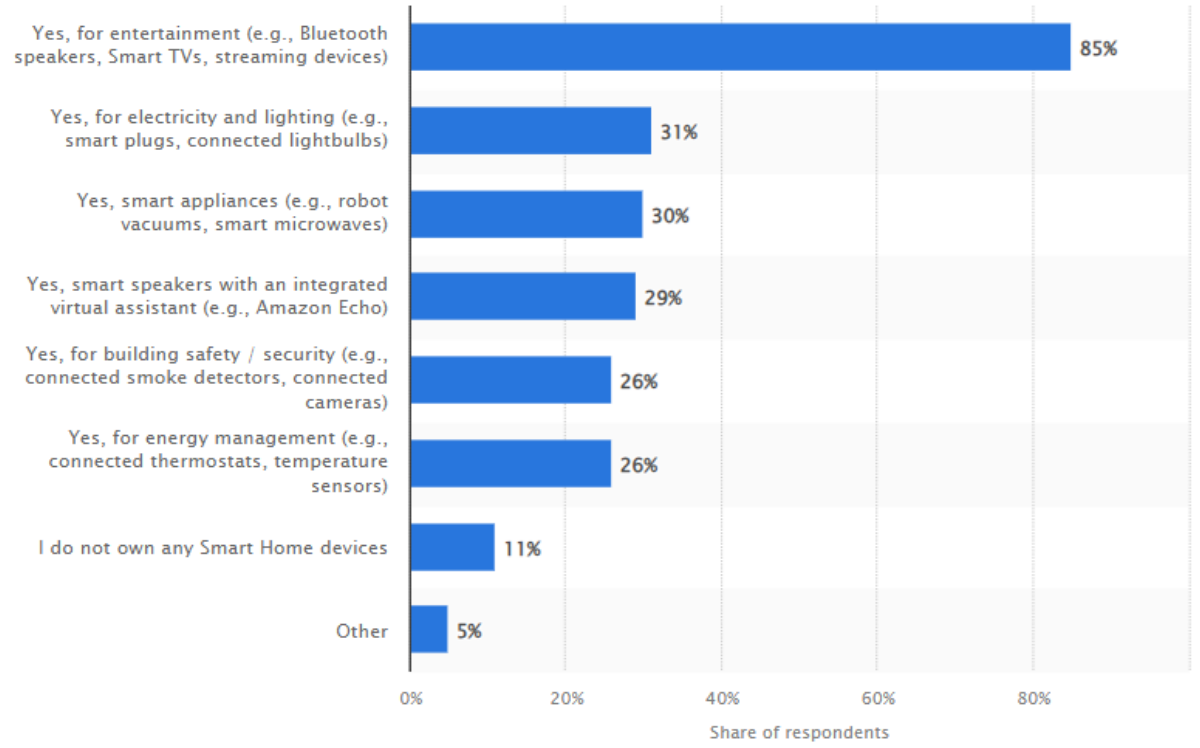
SMART CITY DIGITAL CAPABILITY RANKING WORLDWIDE 2022



In 2022, the leading global digital city on the index ranking shown here was Copenhagen with a score of 80.3. Seoul, Beijing, Amsterdam, and Singapore rounded out the top 5 for the best digital cities.[4]

[4] (Smart city digital capability ranking worldwide 2022, n.d.)

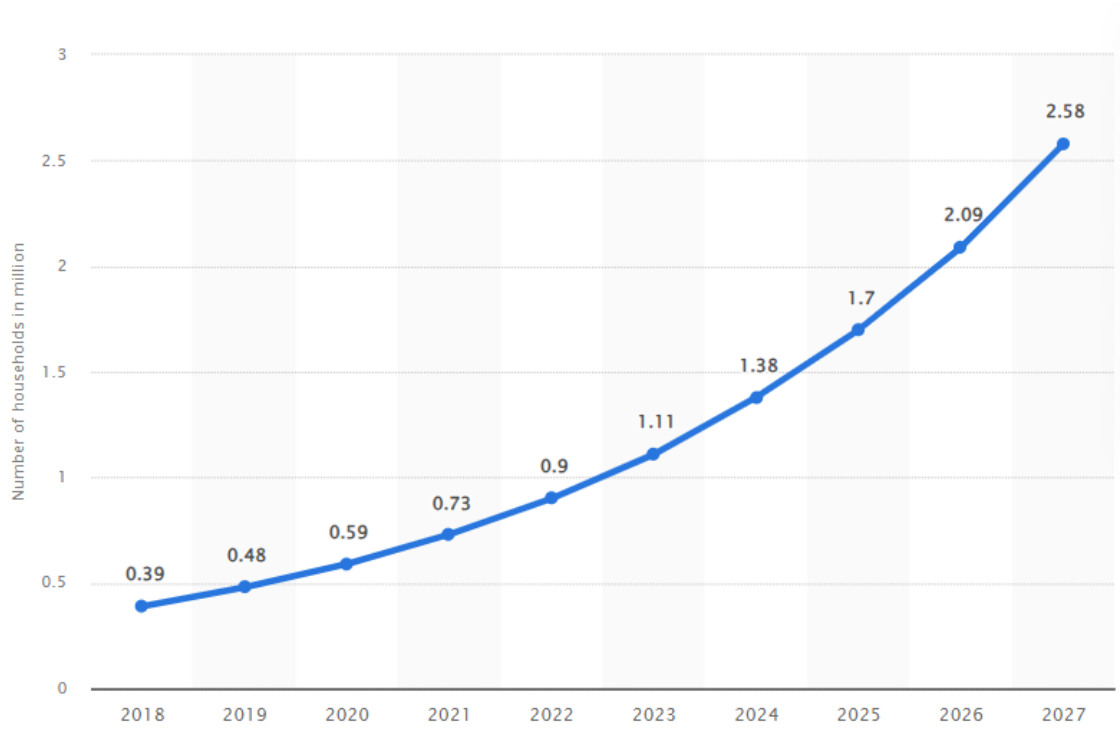
SMART HOME DEVICE OWNERSHIP IN SPAIN 2023



When asked about "Smart home device ownership", 31 percent of Spanish respondents answer "Yes, for electricity and lighting (e.g., smart plugs, connected lightbulbs)". This online survey was conducted in 2023, among 2,025 consumers.[5]

[5] (Smart home device ownership in Spain 2023, n.d.)

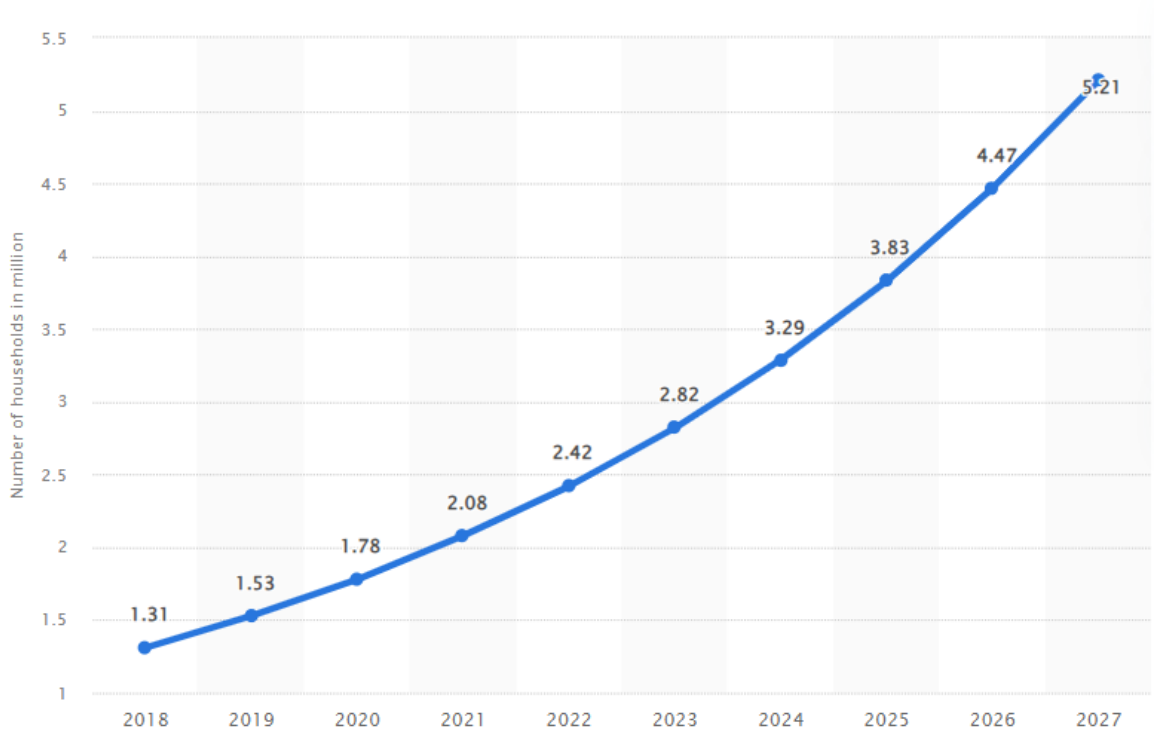
NUMBER OF USERS OF THE SMART HOME SEGMENT CONTROL & CONNECTIVITY IN SPAIN 2018-2027



The number of households in the control & connectivity segment of the smart home market in Spain was forecast to continuously increase between 2023 and 2027 by in total 1.5 million households (+135.14 percent). After the fourth consecutive increasing year, the household number is estimated to reach 2.58 million households and therefore a new peak in 2027. Notably, the number of households of the control & connectivity segment of the smart home market was continuously increasing over the past years.[6]

[6] (Number of users of the smart home segment control & connectivity in Spain 2018-2027, n.d.)

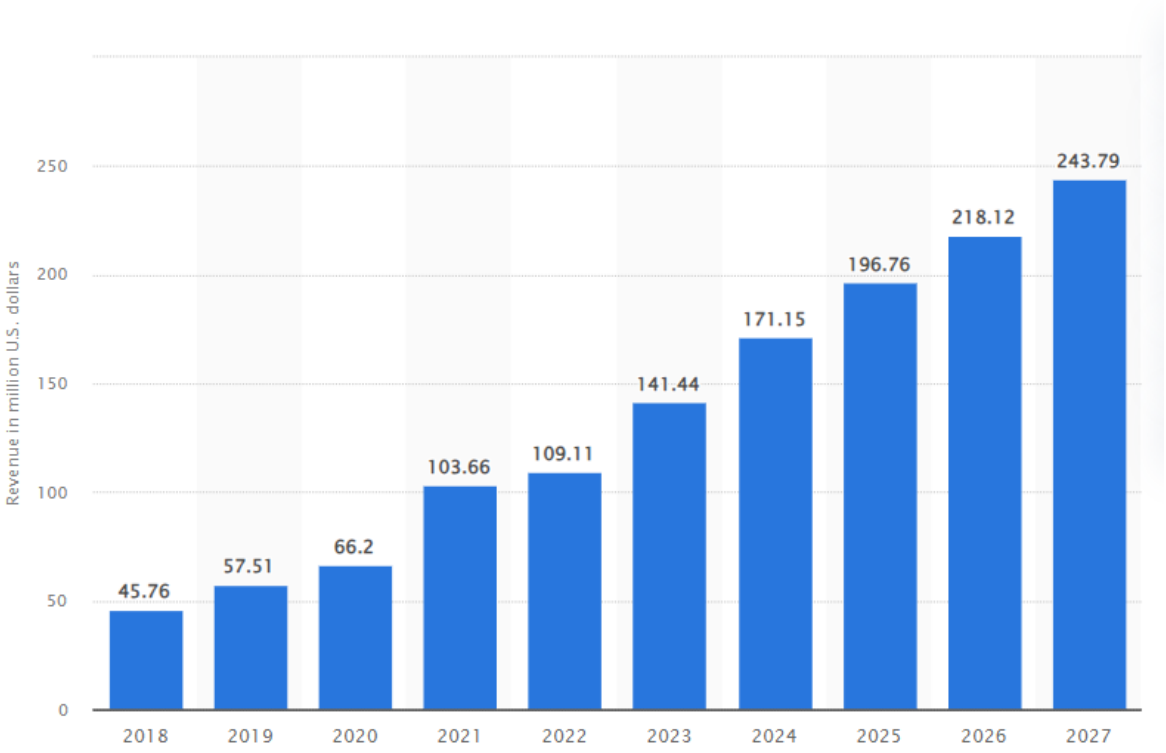
NUMBER OF USERS OF SMART HOME MARKET IN SPAIN 2018-2027



The number of users in the smart home market in Spain was forecast to continuously increase between 2023 and 2027 by 2.4 million households (+85.11 percent). After the fourth consecutive increasing year, the user number is estimated to reach 5.21 million households and therefore a new peak in 2027. Notably, the number of users of the smart home market was continuously increasing over the past years.[7]

[7] (Number of users of smart home market in Spain 2018-2027, n.d.)

REVENUE OF THE SMART HOME SEGMENT CONTROL & CONNECTIVITY IN SPAIN 2018-2027



The revenue in the control & connectivity segment of the smart home market in Spain was forecast to continuously increase between 2023 and 2027 by in total 102.4 million U.S. dollars (+72.4 percent). After the fourth consecutive increasing year, the revenue is estimated to reach 243.79 million U.S. dollars and therefore a new peak in 2027. Notably, the revenue of the control & connectivity segment of the smart home market was continuously increasing over the past years.[8]

[8] (Revenue of the smart home segment control & connectivity in Spain 2018-2027, n.d.)

SPAIN'S COMPREHENSIVE EFFORTS TOWARDS SMART CITIES DEVELOPMENT

The Spanish government has embarked on a multifaceted journey to foster the development of smart cities throughout the country. These initiatives and programs reflect a holistic approach that encompasses various aspects of urban living and technological advancement, with the ultimate aim of enhancing the quality of life for citizens.

Key Initiatives and Programs:

1. **Spanish Smart Cities Network (RECI):** Established in 2011, the Spanish Smart Cities Network (RECI) serves as a collaborative platform for municipalities. Its mission is to promote the development of smart cities in Spain by facilitating the exchange of experiences and best practices. RECI focuses on critical areas such as energy conservation, sustainable mobility, e-Government, attention to people, and security.
2. **National Smart Cities Plan:** Approved in 2015, the National Smart Cities Plan is a pivotal initiative that encompasses several vital goals. It seeks to promote the growth of the Smart Cities technology industry, improve the delivery of public services to citizens, and stimulate the development of an international technology industry. The plan operates along three core lines of action: standardization, innovation, and entrepreneurship, as well as public-private collaboration.
3. **Ministry of Economic Affairs and Digital Transformation Program:** This program is instrumental in promoting the growth of the Smart Cities technology industry and aiding local entities in their transformation processes towards Smart Cities and Destinations. It aligns with the broader national strategy of nurturing innovation and technology adoption within urban environments.
4. **Spanish Federation of Municipalities and Provinces (FEMP):** The FEMP plays a vital role in fostering collaboration and financing programs. It serves as an umbrella organization that coordinates collaborative financing initiatives, public-private partnership projects,

and provides access to resources and financing for urban development.

5. **Civitas City of the Year Award:** Spain's commitment to sustainable mobility was recognized on the European stage when it received the Civitas City of the Year award from the European Union. This prestigious accolade highlights Spain's efforts in promoting sustainable mobility practices within its cities.
6. **Digital Skills and Literacy Programs:** Spain has recognized the importance of digital skills and literacy in today's interconnected world. To ensure citizens can fully leverage the opportunities offered by the internet, programs have been developed to enhance digital literacy and skills across the population.
7. **Access to Funding:** Spain has actively sought funding through various calls and national plans to further the development of smart cities. For instance, seven Spanish cities have secured substantial funding from Horizon Europe, the EU's research and innovation program, to pioneer innovation processes aimed at achieving climate neutrality by 2030.[9][10][11][12][13]

SPAIN: LEADING THE WAY IN SMART CITIES

Spain has emerged as a global leader in the realm of smart cities, with a strong commitment to fostering innovation and enhancing the quality of urban life. The country's dedication to creating smart, sustainable, and connected cities is evident through various initiatives, collaborations, and the active participation of public and private sectors. Spain's impressive presence in the IESE Cities in Motion Index and its extensive network of smart cities are a testament to its success in this domain.

[9] (SPANISH SMART CITIES MODEL, n.d.)
[10] (Spanish Smart Cities and the National Plan for smart cities, n.d.)
[11] (Smart cities' development in Spain: A comparison of technical and social indicators with reference to European cities, n.d.)
[12] (National Smart Cities Plan of Spanish Ministry of Industry, Energy and Tourism highlighted at Greencities Forum in Malaga, n.d.)
[13] (SMART SUSTAINABLE CITIES IN SPAIN: THE COMMITMENT TO A GREEN ECONOMY, n.d.)

IESE Cities in Motion Index (ICIM): Spain boasts numerous cities that have earned their place in the prestigious IESE Cities in Motion Index (ICIM). This index evaluates the development of 183 cities across 92 countries in nine key areas, including human capital, social cohesion, economy, governance, environment, mobility, urban planning, international prominence, and technology. Cities such as Madrid, Barcelona, Valencia, Malaga, Seville, Palma de Mallorca, La Coruña, Zaragoza, Bilbao, and Murcia are shining examples of Spain's prowess in urban development and innovation.

Red Española de Ciudades Inteligentes (RECI): Spain has nurtured a network of over 60 smart cities under the banner of the Red Española de Ciudades Inteligentes (RECI). This network facilitates the exchange of experiences and expertise among cities, fostering a sustainable management model and improving the quality of life through environmental protection and sustainability. RECI represents a collaborative platform where Spanish cities join forces to drive innovation and urban development.

Exemplary Smart City Projects in Spain: Spain's commitment to smart cities is evident in the multitude of innovative projects that have been undertaken across the country:

- **Seville's Sustainability Ambitions**: Seville is at the forefront of sustainability with over 200 projects and a substantial budget of 155 million euros dedicated to smart city and sustainability objectives. These include achieving a zero-energy balance, efficient water management, smart waste management, sustainable transport, and an increased emphasis on transport intermodality and e-mobility. The Smart City Brain, a big data platform in Seville, stands as a remarkable achievement, enabling the interoperability of diverse urban technologies and services.
- **Madrid's Traffic Transformation**: Madrid has harnessed the power of IoT in its smart parking technology, which has significantly alleviated traffic congestion and improved transportation efficiency.
- **Barcelona's Sensor Revolution**: Barcelona's adoption of sensor technologies has revolutionized city services, providing citizens with enhanced services and improving overall quality of life.

- **Valencia's Cloud Integration**: Valencia's claim as Spain's first fully integrated Smart City is substantiated by its use of an open Cloud platform that consolidates municipal services. This platform enables efficient monitoring of various city functions, from traffic management to energy usage and weather conditions.
- **Santander's Sensor-Driven Efficiency**: Santander's extensive use of over 12,000 sensors has enabled efficient governance and cost savings. The SmartSantander project, funded by the EU, demonstrates the city's commitment to cutting-edge smart city technology.

Beyond the Index: Further Examples of Smart City Initiatives:
Additional Spanish cities have implemented forward-thinking smart city solutions:

- **Valladolid**: The city utilizes sensor-based smart lighting, optimizing energy usage while reducing light pollution.
- **Vitoria-Gasteiz**: Smart waste management is a success story here, as sensors monitor waste containers and optimize collection routes, leading to cost savings and reduced emissions.
- **Malaga**: Advanced traffic management, using sensors and cameras to monitor and regulate traffic flow, has resulted in reduced congestion and improved air quality.
- **Palma de Mallorca**: Smart irrigation, driven by soil moisture sensors, ensures efficient water usage and healthier plant life.[14][15][16][17][18][19][20]

Supporting Smart Cities in Spain: A Comprehensive Approach

The Spanish government has been unwavering in its support for the development of smart cities, employing a multifaceted strategy that

[14] (Madrid, Spain Launches IBM Smarter Cities Project, n.d.)
[15] (Seven Spanish cities have been selected to take part in a mission aimed at developing climate-neutral cities, n.d.)
[16] (Smart cities' development in Spain: A comparison of technical and social indicators with reference to European cities, n.d.)
[17] (Santander: The Smartest Smart City, n.d.)
[18] (Discover the Top 5 of Smart Cities Spain 2020, n.d.)
[19] (SMART SUSTAINABLE CITIES IN SPAIN: THE COMMITMENT TO A GREEN ECONOMY, n.d.)
[20] (Spain: Taking the Concept of Smart Cities to the Next Level, n.d.)

encompasses various initiatives and plans. These efforts are driven by a commitment to advancing technology, improving citizens' lives, and fostering sustainable urban development.

The National Plan for Smart Cities: At the forefront of these initiatives is the National Plan for Smart Cities, spearheaded by the Ministry of Economic Affairs and Digital Transformation. This plan serves as a comprehensive framework aimed at several key objectives:

1. **Technology Industry Development:** One of its primary goals is to promote the growth of the Smart Cities technology industry. This entails nurturing innovation and technological advancements within the urban landscape.
2. **Assisting Local Entities:** The plan is designed to assist local municipalities in their transformation processes towards becoming Smart Cities and Smart Destinations. It offers support to these entities as they navigate the complexities of adopting cutting-edge technologies and sustainable practices.
3. **Enhancing Citizen Lives:** Central to the plan is the aspiration to provide Spanish Smart Cities with new technological solutions that enhance the lives of their citizens. This encompasses a wide range of innovations that contribute to improving the quality of life.
4. **Sustainability Focus:** Recognizing the critical role of cities in greenhouse gas emissions, the plan places a special emphasis on sustainability. It aims to develop solutions that align with evolving citizen needs and the changing nature of urban living, creating an adaptable foundation for shaping the future of cities.
5. **Public-Private Collaboration:** The plan has garnered support from different levels of public administration and actively promotes public-private collaboration. This collaborative approach ensures a holistic and well-coordinated effort towards smart city development.

The Spanish Smart Cities Network (RECI): In tandem with the National Plan for Smart Cities, the Spanish Smart Cities Network (RECI) was established in 2011. This network serves as a collaborative platform for municipalities, with more than 140 participating municipal councils. Its objectives include:

1. **Promoting Smart Cities:** RECI is dedicated to promoting the development of smart cities in Spain, providing a forum for cities to share experiences and collaborate on sustainable management models.
2. **Focus Areas:** The network concentrates its efforts on key areas such as energy conservation, sustainable mobility, e-Government, attention to people, and security. These pillars serve as the foundation for driving innovation and progress.

Key Components of the National Plan for Smart Cities: The National Plan for Smart Cities is structured around several pivotal components:

1. **Standardization:** Aiming to standardize the development of smart cities in Spain, the plan emphasizes reusability and interoperability. Standardization ensures that smart solutions can seamlessly integrate and adapt to the evolving urban landscape.
2. **Sustainability:** Given the significant role of cities in greenhouse gas emissions, sustainability is a central theme. Solutions developed under the plan are designed to align with the changing needs of citizens while preserving natural resources and biodiversity.
3. **Public-Private Collaboration:** Collaboration between public and private sectors is actively encouraged, fostering a synergistic approach to smart city development.
4. **Industrial Policy:** The plan seeks to promote the growth of the Smart Cities technology industry, driving innovation and internationalization.
5. **Three Lines of Action:** The plan fundamentally consists of three overarching lines of action: standardization, sustainability, and public-private collaboration.

Enhancing Internet Access in Spanish Smart Cities

The National Smart Cities Plan in Spain is committed to improving internet access in densely populated urban areas, recognizing its pivotal role in fostering technological advancement, social inclusion, and reducing the digital divide. The plan sets out several measures to ensure that all citizens, regardless of their location, have access to high-speed internet.

Key Initiatives of the Plan:

1. **Broadband Network Deployment:** A cornerstone of the plan involves promoting the deployment of high-speed broadband networks within urban areas. This infrastructure investment seeks to ensure that high-speed internet is readily available to urban residents, thus facilitating digital connectivity and enabling access to a world of opportunities.
2. **Public Wi-Fi Networks:** The plan encourages the development of public Wi-Fi networks in accessible public spaces such as parks, squares, and libraries. This initiative not only enhances internet accessibility but also creates digital hubs where citizens can conveniently connect and access online resources.
3. **Digital Skills and Literacy Programs:** Recognizing that mere access to the internet is not enough, the plan places a strong emphasis on supporting digital skills and literacy programs. These programs empower citizens to effectively utilize digital technologies, making the most of the opportunities offered by the internet. By enhancing digital literacy, the plan aims to bridge the knowledge gap and empower citizens to fully participate in the digital age.
4. **Open Data Utilization:** The plan advocates for the utilization of open data to promote transparency and citizen participation. Open data initiatives enhance access to information, enabling citizens to engage with their communities and local governance. By fostering transparency and citizen involvement, the plan not only improves internet access but also strengthens democratic processes.

Promoting Social Inclusion and Reducing the Digital Divide:

The ultimate goal of these measures is to ensure that all citizens residing in densely populated urban areas have equitable access to the internet. By bridging the digital divide and promoting social inclusion, the National

Smart Cities Plan in Spain aims to create a more connected and technologically empowered society.[21][22][23][24][25]

[21] (SMART SUSTAINABLE CITIES IN SPAIN: THE COMMITMENT TO A GREEN ECONOMY, n.d.)
[22] (Spanish Smart Cities and the National Plan for smart cities, n.d.)
[23] (National Smart Cities Plan of Spanish Ministry of Industry, Energy and Tourism highlighted at Greencities Forum in Malaga, n.d.)
[24] (Spain: Taking the Concept of Smart Cities to the Next Level, n.d.)
[25] (Smart Cities in Spain – Policy, Sustainability, and the National Plan: New Political Measures, Agents, and Sustainability, n.d.)

THANK YOU!

References

Discover the Top 5 of Smart Cities Spain 2020. (n.d.). Retrieved from fiwoo: https://www.fiwoo.eu/en/smart-cities-spain-2020/

Industrial IoT - Spain. (n.d.). Retrieved from statista: https://www.statista.com/outlook/tmo/internet-of-things/industrial-IoT/spain

Internet of Things - Spain. (n.d.). Retrieved from statista: https://www.statista.com/outlook/tmo/internet-of-things/spain

Madrid, Spain Launches IBM Smarter Cities Project. (n.d.). Retrieved from smartcitiesdive: https://www.smartcitiesdive.com/ex/sustainablecitiescollective/madrid-spain-launches-ibm-smarter-cities-project/316481/

National Smart Cities Plan of Spanish Ministry of Industry, Energy and Tourism highlighted at Greencities Forum in Malaga. (n.d.). Retrieved from lamoncloa: https://www.lamoncloa.gob.es/lang/en/gobierno/news/Paginas/2016/20161005-greencities.aspx

National Smart Cities Plan of Spanish Ministry of Industry, Energy and Tourism highlighted at Greencities Forum in Malaga. (n.d.). Retrieved from lamoncloa: https://www.lamoncloa.gob.es/lang/en/gobierno/news/Paginas/2016/20161005-greencities.aspx

Number of users of smart home market in Spain 2018-2027. (n.d.). Retrieved from statista: https://www.statista.com/forecasts/480651/number-of-smart-homes-in-the-smart-home-market-in-spain

Number of users of the smart home segment control & connectivity in Spain 2018-2027. (n.d.). Retrieved from statista: https://www.statista.com/forecasts/483693/number-of-smart-homes-in-the-smart-home-segment-control-and-connectivity-in-spain

Revenue of the smart home segment control & connectivity in Spain 2018-2027. (n.d.). Retrieved from statista: https://www.statista.com/forecasts/483687/revenue-in-the-smart-home-segment-control-and-connectivity-in-spain

Santander: The Smartest Smart City. (n.d.). Retrieved from governing: https://www.governing.com/archive/gov-santander-spain-smart-city.html

Seven Spanish cities have been selected to take part in a mission aimed at developing climate-neutral cities. (n.d.). Retrieved from lamoncloa: https://www.lamoncloa.gob.es/lang/en/gobierno/news/Paginas/2022/20220429_climate-neutral-cities.aspx

Smart Cities - Spain. (n.d.). Retrieved from statista: https://www.statista.com/outlook/tmo/internet-of-things/smart-cities/spain

Smart Cities in Spain – Policy, Sustainability, and the National Plan: New Political Measures, Agents, and Sustainability. (n.d.). Retrieved from irma-international: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.irma-international.org/viewtitle/150106/?isxn=9781522500940

Smart cities' development in Spain: A comparison of technical and social indicators with reference to European cities. (n.d.). Retrieved from sciencedirect: https://www.sciencedirect.com/science/article/pii/S221067072200155X

Smart cities' development in Spain: A comparison of technical and social indicators with reference to European cities. (n.d.). Retrieved from sciencedirect: https://www.sciencedirect.com/science/article/pii/S221067072200155X

Smart city digital capability ranking worldwide 2022. (n.d.). Retrieved from statista: https://www.statista.com/statistics/1233774/smart-cities-ranking-government-worldwide/

Smart home device ownership in Spain 2023. (n.d.). Retrieved from statista: https://www.statista.com/forecasts/1001455/smart-home-device-ownership-in-spain

SMART SUSTAINABLE CITIES IN SPAIN: THE COMMITMENT TO A GREEN ECONOMY. (n.d.). Retrieved from beesmart: https://www.beesmart.city/en/strategy/smart-environment/smart-cities-in-spain-the-commitment-to-a-green-economy

SMART SUSTAINABLE CITIES IN SPAIN: THE COMMITMENT TO A GREEN ECONOMY. (n.d.). Retrieved from beesmart: https://www.beesmart.city/en/strategy/smart-environment/smart-cities-in-spain-the-commitment-to-a-green-economy

Spain: Taking the Concept of Smart Cities to the Next Level. (n.d.). Retrieved from IoTblue: https://IoTblue.com/story-hub/spain-taking-the-concept-of-smart-cities-to-the-next-level

Spain: Taking the Concept of Smart Cities to the Next Level. (n.d.). Retrieved from IoTblue: https://IoTblue.com/story-hub/spain-taking-the-concept-of-smart-cities-to-the-next-level

Spanish Smart Cities and the National Plan for smart cities. (n.d.). Retrieved from telefonica: https://www.telefonica.com/en/communication-room/blog/spanish-smart-cities-and-the-national-plan-for-smart-cities/

Spanish Smart Cities and the National Plan for smart cities. (n.d.). Retrieved from telefonica: https://www.telefonica.com/en/communication-room/blog/spanish-smart-cities-and-the-national-plan-for-smart-cities/

SPANISH SMART CITIES MODEL. (n.d.). Retrieved from mineco: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://plantl.mineco.gob.es/digital-agenda/Documents/Spanish-Smart-Cities-Model.pdf