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Sociotechnical Controversies in AI Infrastructure Development: A Case Study

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Abstract

This project analyzes the controversy surrounding Meta's data center in Talavera de la Reina, Spain. It uses the framework of Science and Technology Studies (STS) to explore how technical, political and environmental arguments intersect in the deployment of AI infrastructure. The analysis is structured around three main controversies: the production of technical knowledge, the vision of progress and development, and the democratic legitimacy of the decision-making process. The findings reveal how scientific authority, future imaginaries, and public participation are not neutral but contested, revealing the socio-technical nature of AI infrastructures.

Keywords: AI, data center, infrastructure, pollution, controversy analysis, STS, environmental impact, Talavera de la Reina, Meta

1 INTRODUCTION

Nowadays, the environmental footprint of artificial intelligence systems has emerged as a global concern. Digital infrastructures are continuously expanding to support the increasingly data-intensive applications, like generative AI models or real time data analytics. As a result of this, questions are being raised about the sustainability of these systems. This debate is not just limited to abstract metrics like water or energy use, it is also becoming local and political. Large technological companies are building massive data centers and infrastructures in semi-rural and ecologically sensitive areas.

In this paper, I will analyze one specific case: the construction of a Meta (Facebook) data center in Talavera de la Reina, a city in Castilla-La Mancha, Spain. This project is supposed to be the largest data infrastructure of the company in Europe to date, and it promises new jobs, investments and digital modernization. However, what about the water and energy resources and the local environment? What does the affected population think about the project? Who decides how the project develops? What can we learn from this project about AI infrastructures?

In order to better understand the environmental implications of AI infrastructures, and to try to find an answer to the questions above, I have done research on a range of scientific articles and technical studies that focus on the de-

mands of AI in data centers. These sources provide detailed information about the water use of AI models and about the cooling systems that must keep the servers from overheating. For example, studies such as “Making AI Less Thirsty” or “Cooling Solutions for Data Centers” offer quantitative metrics and propose alternative models that reduce or eliminate water usage. Others, like “The Environmental Impact of Artificial Intelligence” and “Exploring the Sustainable Scaling of AI”, highlight the lack of transparency among tech companies and stress that AI's environmental impact is expected to grow significantly by 2030.

Although this technical data is useful, it is also difficult to interpret and understand by non-specialists. The language used in these scientific studies is highly technical, specific and the metrics often require expert knowledge to be fully understood. This makes that this important environmental information becomes almost inaccessible to the general public, which raises concerns about exclusion and opacity in decision-making process around digital structures. The complexity of these sources can contribute to a disconnect between the public understanding and expert planning, especially when the environmental risks are framed in strictly technical terms.

The particular case of Talavera is very interesting, since we can see there is a tension between the pursuit of technological innovation and ecological sustainability. It is easy to think of AI as an immaterial, futuristic, and clean infrastructure, but the reality is all the opposite. By focusing on this study case, I aim to go beyond generic critiques of AI pollution and explore the social, political, and technical struggles that evolve this project.

To conduct this research, I recollected a range of differ-

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ent sources including academic papers, news articles, institutional press releases, and public statements in order to analyze how the different actors involved in the project frame its meaning and implications. This approach shows that the debate surrounding AI infrastructure is not just about environmental pollution but also involves different perspectives, interests, values, and conflicting vision of the future.

2 THEORETICAL FRAMEWORK

Controversy studies analysis first emerged in the early 1970s as a methodological tool in the field of Science and Technology Studies (STS). As Hewlett et al. explain, it was developed to "challenge the traditional image of science as an accumulation of self-evident facts" (Hewlett et al., 2022), and it aimed to focus on the arguments and disputes that arise during the production of knowledge. Instead of treating scientific facts as neutral discoveries, early controversy studies wanted to show that facts are the result of complex social processes involving different actors with different interests and perspectives (Venturini, 2010, referenced in [1]). As Latour expressed, "scientific facts are not simply found but fabricated through negotiation and alignment" (Latour, 1987, cited in Hewlett et al., 2022).

2.1 The Principle of Symmetry

One of the central concepts in early controversy studies is the principle of symmetry, first proposed by David Bloor (1976) in the Strong Programme of the Sociology of Scientific Knowledge. This principle requires analysts to approach all sides of a controversy using the same analytical tools, "avoiding the temptation to assume a priori which claims are true and which are false" (Hewlett et al., 2022). Instead of considering some scientific arguments more correct or valid than others, researchers must study how their credibility or authority is constructed. Through the lens of symmetry, we can gain a deeper understanding of how scientific consensus or "truths" are negotiated within technical communities.

2.2 Two Main Approaches

Controversy studies have evolved to include two main analytical approaches:

2.2.1 Scientific and Technical Disputes

This approach focuses on how empirical observations, experimental methods and data interpretation are debated by experts. Hewlett et al. describe this as the study of "how scientific controversies emerge, unfold, and are resolved within laboratories, research institutions, and expert panels." (Hewlett et al., 2022). It is closely related to the original principle of symmetry.

2.2.2 Sociopolitical Conflicts

The second approach focuses on the social and political dimensions of controversies. According to Venturini, controversies are "moments when the social order is questioned and renegotiated" (Venturini, 2010, , referenced in [1]). These disputes involve not only scientific disagreement but

also conflict over ethics, values and governance. As Hewlett et al. (2022) note, in these cases "controversy analysis becomes invaluable because it illuminates how expert knowledge is mobilized, contested, and sometimes manipulated to serve diverse political or economic interests." This approach emphasizes how scientific knowledge is embedded in and affected by social and political contexts.

2.3 The Concept of Black Boxing

The concept of black boxing, introduced by Latour (1987), is essential for understanding the long-term evolution of controversies. Black boxing refers to the process by which a scientific fact or technology becomes stabilized and is taken for granted. Once "black boxed," the complex negotiations and disputes that led to its acceptance are no longer visible or questioned. In the context of current global concerns about AI's environmental impact, applying controversy analysis to the Talavera case becomes highly relevant. AI systems continue to grow and require increasingly large data centers, making debates around energy and water consumption more urgent. Although the Talavera controversy might seem like a local issue, it reflects broader tensions between technological expansion and ecological limits. As Hewlett et al. argue, studying controversies allows us to "better understand the socio-technical systems that shape our world." (Hewlett et al., 2022)

2.4 Applying Controversy Analysis to the Talavera Case

The construction of Meta's data center in Talavera de la Reina is a compelling case to apply controversy analysis. It involves a wide range of actors: technical experts focused on resource management, corporate and political leaders promoting economic growth, and local residents concerned about environmental impacts. Using controversy analysis enables us to examine how "facts" are constructed, challenged and legitimized according to the interests and strategies of these actors. As Venturini (2010, , referenced in [1]) states, controversy analysis "invites us to follow the actors without prejudging their rationality," allowing us to trace how certain claims gain dominance over others in public and institutional debates.

2.5 Conclusion of the Framework

In summary, controversy analysis provides a powerful framework for examining the Meta data center project. It reveals the links between scientific knowledge, political interests, environmental concerns and social values. Drawing on concepts such as symmetry and black boxing, and informed by the frameworks proposed by Hewlett et al. (2022) and Venturini and Munk (2021), this approach allows for a richer understanding of how sociotechnical controversies unfold. Ultimately, it contributes to broader debates on the role of technology in society, offering critical insights into how we might balance innovation with ecological responsibility and democratic legitimacy.

3 METHODOLOGY

The methodology was divided into two main stages: data collection and data analysis.

3.1 Data Collection

The first phase involved the identification and selection of relevant sources that would allow for a contextual understanding of both the technical and sociopolitical aspects of the case.

3.1.1 Keyword Definition

To find appropriate materials, a search based on specific terms both in English and Spanish was done. The searches included: “Meta data center Talavera de la Reina”, “Centro de datos Meta Talavera”, “Water consumption data centers”, “AI water footprint”, “IA Pollution”, “Pollution of Data Centers”, “Pollution Talavera de la Reina data center”.

3.1.2 Search Tools

The main search tool used was Google, due to its broad access to institutional and journalistic content. To complement this, Google Scholar and academic databases were used to find academic articles and scientific papers.

3.1.3 Selection Criteria

The selection of sources was based on the following criteria:

- Relevance to the environmental, political, or technical dimensions of the case.
- Timeline, prioritizing materials published between March 2022 and January 2025.
- Credibility and authorship, always giving preference to institutional, academic, and institutional sources.

Most of the sources collected in this phase consist of journal articles from local and national newspapers, institutional communications (like press releases), etc.

3.1.4 Time Frame

The analysis covers documents and public discourse produced between March 2022 (when the project was publicly announced) and January 2025, coinciding with the most relevant phases of planning, public reaction, and implementation of the project.

3.1.5 Sources Selection

The recollection of data was divided into three main topics: studies of how AI pollutes, articles about the case of Talavera, and articles about controversy studies.

AI Pollution Sources: Throughout the data collection process, a total of 28 scientific and technical documents related to artificial intelligence, data center infrastructures and environmental impact, mainly focusing on water and energy consumption were reviewed. From these 28 articles, 10 were selected. They were the most relevant for the research, based on their analytical depth, clarity, presence of

empirical data and relevance to the case study. Also, both scientific and technical articles, as well as more easy to understand and social articles were selected to have variety. To be more specific, 5 scientific papers with numerical data, 2 review or theoretical articles, 2 technical reports or institutional summaries and 1 journalistic science communication were collected. This combination of sources enabled to triangulate perspectives from empirical science, technical analysis, and critical environmental discourse. The selected sources also reflect the asymmetry in data access and interpretation, as many of the more accessible reports lacked methodological transparency — a point that aligns with the concerns of controversy analysis around expert authority and the construction of knowledge.

The other 18 articles were discarded due to different reasons: limited or repetitive information, too general focus, lack of scientific rigor and information or accessibilities like paywalls.

Talavera Case Sources: In order to trace the public and political evolution of the Meta data center project in Talavera de la Reina, a total of 13 sources were selected and analyzed. These consisted of regional newspaper articles, official statements from political institutions, and public responses from civil society organizations. They were published between 2022 and early 2025, covering both the announcement, planning, environmental assessment and institutional approval of the project, as well as the public responses it generated. The sources were classified by type as follows: 5 institutional and political communications, 6 local press coverage of environmental or social impacts and 2 statements and critiques of civil society actors. The Environmental Impact Assessment was also selected, mentioned in some of the sources by the actors (and mentioned later in this paper). This set of sources enabled a discursive reconstruction of the project’s development, illustrating how different actors framed the project, responded to criticism and justified their positions.

Controversy Analysis Sources: In addition to empirical and case-specific documents, this project also draws on two foundational theoretical sources in the field of Science and Technology Studies (STS), particularly relevant for controversy analysis. These references were essential to conceptualize and apply the analytical categories used throughout the study. The selected texts were chosen for their methodological relevance, clarity in defining the principles of controversy mapping, and their alignment with key concepts such as symmetry, black boxing, and co-production of knowledge. No texts were excluded, as these two documents were deemed fully aligned with the analytical framework of the project. It consisted of 1 academic book and 1 research article or paper. These two sources were particularly relevant for building the theoretical framework and shaping the analytical point of view of the controversy in the case of Talavera.

3.2 Data Analysis

After collecting and selecting the sources, a manual analysis was performed to identify the key actors involved, their positions, and the types of knowledge and values they promote. No software or automated tools were used in this process, the analysis was performed through close reading

and interpretative comparison of texts.

3.2.1 Actor Identification

The key actors were identified based on their presence in the public debate. These include:

- Meta (the promoting company)
- The regional and municipal government of Castilla-La Mancha and Talavera de la Reina
- Environmental groups.
- Technical staff and local experts.
- Local civic groups and residents.

3.2.2 Discourse Classification

To continue, the sources were organized based on the type of knowledge and values they expressed. This include:

- Technical knowledge (e.g., Environmental Impact Assessment, official reports)
- Political discourse (e.g., development promises, institutional legitimacy)
- Ecological claims (e.g., water needs, biodiversity)
- Civic or ethical perspectives (e.g., democratic participation, environmental justice)

3.2.3 Application of the Symmetry Principle

In line with David Bloor's principle of symmetry, all perspectives (whether institutional, corporate, scientific or popular) were analyzed with the same conceptual tools. The goal was to understand how legitimacy and authority are constructed through discourse, not to determine who is "right".

3.2.4 Temporal Mapping

To trace and identify the evolution of the discourse and its key points, a timeline was created. This helped situate the controversies within a dynamic sequence of events and actor responses.

3.2.5 Analytical Categories

The final analysis was structured around three key dimensions, each corresponds to one central controversy explored in the study:

- Expertise and Production of Knowledge.
- Visions of Progress and Development.
- Democratic Participation and Public Legitimacy.

By combining media and institutional sources with academic literature, this methodology aims to go beyond the surface level reports and to uncover the underlying political, ecological and discursive dimensions of the Meta data center project. With this case study, we are able to explore how environmental controversies around AI are shaped, not only by facts and figures, but also by different narratives, interests and power relations.

4 CONTROVERSY ANALYSIS

Moreover, the Talavera case is an example of how scientific and technical controversies can quickly become involved in different social concerns. While technical reports might quantify the water use of the data center, ecologists interpret these numbers as different problems, like environmental justice or sustainable technologies. Although it is important to use a symmetrical approach and give equal importance to technical arguments, in this particular case of Talavera de la Reina, using a broader socio-political approach to study the controversy analysis could be more appropriate. If we apply this idea to the Talavera case, we can see how Meta's narrative about innovation and development might dominate over the concerns raised by environmental actors, as well as how certain "facts" have more visibility depending on the media coverage, regulatory decisions and the public sentiment. If we use this concept in the case of Talavera, we can think that in the future the data center will be normalized as part of the local infrastructure, and its environmental impact will be accepted by all the actors involved in all the previous debates. However, if we use controversy analysis we need to keep these disputes into account, exposing the power dynamics that created that technological development.

4.1 Expertise and Production of Knowledge

A central controversy in the Talavera case is the problem over who has the authority to define valid knowledge. We can think that technical knowledge is the foundation of decision-making, since the project was approved based on documents like the Environmental Impact Assessment (EIA) which institutional actors describe as objective and rigorous. For instance, on March 22, 2024, the Regional Government declared the project "impeccable" from a legal and environmental perspective, using the EIA as its main proof. However, environmental organizations such as *Ecologistas en Acción* strongly argue this authority. On May 10, 2023, they argued that the water consumption estimates in the EIA were incomplete and did not reflect long-term sustainability. These groups criticized the lack of transparency in the report's methodology, asking for independent studies and new evaluations. This aligns with the idea that scientific expertise is constructed and contestable, not neutral or universally accepted. This dynamic is very complicated and it has internal disagreement within institutional structures. For example, the urban planning and legislation regional government proposed changes to the electrical grid layout in March 2024 to mitigate wildlife impact. Similarly, local technical staff raised concerns about urban planning and resource use, although these voices received significantly less media attention than political leaders. This shows that not all technical voices are equally visible or influential. The controversy reflects the principle of symmetry (Bloor, 1976), which claims that all kinds of knowledge should be analyzed with equal rigor. It also supports Jasanoff's (2004) idea of co-production, where science and politics evolve together rather than separately.

Dynamic Example:

- May 9, 2023 – The mayor of Talavera claims: "It is absurd to question this project because of water usage."

- May 10, 2023 – Ecologistas en Acción respond by denouncing the water projections as flawed and misleading.
- December 14, 2023 – The Tajo River Basin Authority and SEO/BirdLife submit technical objections; the EIA is updated to reduce projected water usage.

Actors and Expertise:

- Actor: Regional Government
 - Type of Knowledge Used: EIA, technical reports
 - Claim to Authority: Institutional legitimacy
 - Challenged By: Environmental groups, local experts
- Actor: Meta
 - Type of Knowledge Used: Corporate forecasts, internal data
 - Claim to Authority: Tech authority and innovation claims
 - Challenged By: Civic actors, NGOs
- Actor: Environmental Groups
 - Type of Knowledge Used: Counter-expertise, ethics
 - Claim to Authority: Transparency and long-term vision
 - Challenged By: Institutions, media narratives
- Actor: Local Technical Staff
 - Type of Knowledge Used: Urban analysis, resource planning
 - Claim to Authority: Scientific neutrality
 - Challenged By: Marginalized by political leadership

In conclusion, this controversy remains partially open. Institutional knowledge still dominates the decision-making process, but it is still being argued by other actors. The legitimacy of the project's technical foundation is not universally accepted.

4.2 Visions of Progress and Development

Another major controversy is how the project is framed as a symbol of economic progress and digital transformation. Since its announcement, the Regional Government and Meta have presented the data center as a turning point for Talavera. On June 7, 2022, President García-Page described it as a potential “revolution” for the city, and on October 3, 2024, Mayor Gregorio reaffirmed this, calling it “a turning point.” These narratives emphasize job creation, future competitiveness, and regional modernization. Meta reinforced this narrative through statements that stress sustainability and innovation. On March 17, 2022, its Iberian director declared the company's commitment to innovation and environmental responsibility. In January 2025, the announcement of a new “City of Artificial Intelligence”

project by Substrate AI further solidified this image, with plans for €100 million in investment and hundreds of jobs. However, this vision of the future is not universally accepted. Environmental groups and other parts of society argue that this narrative does not take into account the real ecological costs and promotes a narrow, growth-centered model of development. For example, Platform for the Defense of the Tajo criticized the use of potable water in an area historically affected by drought. On June 13, 2024, activist Miguel Ángel Sánchez warned about the irreversible impacts on water reserves. This aligns with Jasanoff and Kim's (2015) concept of sociotechnical imaginaries: visions of desirable futures promoted by institutions to legitimize large-scale infrastructures. These imaginaries amplify some narratives (innovation, economic growth) while silencing alternatives such as sustainability or ecological justice. Dynamic Example:

- June 7, 2022 – President García-Page introduces the project as transformative.
- October 3, 2024 – Mayor Gregorio calls the project a turning point for the city.
- June 13, 2024 – Environmental platforms denounce water usage as unsustainable.
- January 2025 – New “AI City” is announced, reinforcing the regional digital hub narrative.

Development visions, desired futures, and trade-offs by actor/group:

- Actor/Group: Regional Government
 - Vision of Development: High-tech investment and global appeal
 - Desired Future: Digital economy and growth
 - Trade-offs Accepted: Environmental impact, minimal public debate
- Actor/Group: Meta
 - Vision of Development: Infrastructure for AI and data systems
 - Desired Future: Strategic position in Europe
 - Trade-offs Accepted: High local resource extraction
- Actor/Group: Environmental Groups
 - Vision of Development: Ecological, sustainable urban models
 - Desired Future: Water justice and democratic governance
 - Trade-offs Accepted: Slower growth, environmental protection
- Actor/Group: Technical Experts
 - Vision of Development: Balanced, evidence-based planning
 - Desired Future: Urban sustainability

- Trade-offs Accepted: Possible delays in investment timelines

To conclude, this controversy is mainly closed at the institutional level, where the dominant discourse frames the project as a symbol of modernization. However, there is still resistance from civil society and they continue to question the validity of this development model.

4.3 Democratic Participation and Public Legitimacy

The third controversy concerns the lack of meaningful public participation in the decision-making process. Despite the scale and impact of the project, local residents, civic groups, and environmental organizations argue that they were excluded from meaningful consultation. Most decisions were made through top-down procedures, without public debate or participatory processes. For example, on March 30, 2023, the Talavera City Council unanimously approved the project. On October 22, 2024, the Regional Government formalized the approval. Yet at no point were public consultations recorded or reported. Ecologistas en Acción highlighted this issue on May 9, 2023, criticizing the democratic deficit and lack of transparency. This controversy reflects Venturini's (2010, referenced in [1]) idea that controversies make visible which voices are included or excluded. It also shows concerns in STS literature about technocratic forms of governance, where decisions are based on expert or political authority rather than participatory deliberation. Here, the discourse of urgency ("strategic project", "global opportunity") served to accelerate approval and limit deliberation.

Dynamic Example:

- March 30, 2023 – Talavera City Council approves the project unanimously.
- May 9, 2023 – Ecologistas en Acción denounces lack of democratic debate.
- October 22, 2024 – The Regional Government finalizes project approval with no public consultation process reported.

Participation and Power:

- Actor: Regional Government
 - Role in Decision-Making: Central decision-maker
 - Access to Influence: High
 - Position on Public Participation: Minimal participatory effort
- Actor: Meta
 - Role in Decision-Making: Project proponent
 - Access to Influence: High (via investment and lobbying)
 - Position on Public Participation: Favors efficiency over deliberation
- Actor: Environmental Groups

- Role in Decision-Making: External critics
- Access to Influence: Low
- Position on Public Participation: Call for democratic involvement

- Actor: Civic Groups

- Role in Decision-Making: Marginalized stakeholders
- Access to Influence: Very low
- Position on Public Participation: Demand inclusion and local debate

In summary, this controversy shows a clear democratic gap. Although legally approved, the legitimacy of the project is challenged by the exclusion of civic voices and the lack of transparent deliberative mechanisms.

To complete all this analysis and have a broader view of the all the controversies, all the actors involved, and their point of view, we can see the following timeline:

Timeline of Actions and Arguments:

- Date: March 10, 2022 Actor: Regional Government Action or Argument: Announces that Meta is considering establishing a data center in Talavera. Thematic Link: Initial institutional support / Economic opportunity
- Date: March 17, 2022 Actor: Meta (Irene Cano) Action or Argument: "We have begun the process of building a new data center." Thematic Link: Corporate initiative / Technological expansion
- Date: March 4, 2022 Actor: Meta (Global Villacreses) Action or Argument: Requests the Regional Interest Declaration (DIR). Thematic Link: Administrative start / Investment request
- Date: April 2022 Actor: Meta Action or Argument: Land studies conducted in the Torrehierro Industrial Park. Thematic Link: Technical feasibility / Planning
- Date: June 7, 2022 Actor: Regional Government (García-Page) Action or Argument: "The CLM government has committed to Meta, and we are closer to revolutionizing Talavera." Thematic Link: Political enthusiasm / Development narrative
- Date: February/March 2023 Actor: Government of Spain (Pedro Sánchez) Action or Argument: "Technology reaffirms its investment commitment in Spain." Thematic Link: National strategy / Digital transformation
- Date: March 30, 2023 Actor: Talavera de la Reina City Council (García Élez) Action or Argument: Unanimously approves the project. Thematic Link: Local political consensus / Institutional alignment
- Date: May 9, 2023 Actor: Talavera de la Reina City Council (García Élez) Action or Argument: "It is absurd to question this project because of water usage." Thematic Link: Downplaying environmental concerns / Water discourse

- Date: May 9, 2023 Actor: Ecologistas en Acción Action or Argument: Criticizes the lack of debate regarding the project's environmental impact. Thematic Link: Democratic deficit / Public participation
- Date: May 10, 2023 Actor: Ecologistas en Acción Action or Argument: Denounces that the water consumption is excessive in a drought-affected area. Thematic Link: Environmental critique / Water use
- Date: December 14, 2023 Actor: SEO/BirdLife Action or Argument: Submits objections and requests a reduction in water consumption and compensatory measures for the affected watershed. Thematic Link: Environmental impact / Ecosystem protection
- Date: December 14, 2023 Actor: Tajo River Basin Authority Action or Argument: Confirms that Talavera's wastewater treatment plant has the capacity to handle the increased wastewater from the Data Center. Thematic Link: Environmental capacity / Neutral technical stance
- Date: December 14, 2023 Actor: Regional Gov. (Urban Planning and Legislation) Action or Argument: Publishes the Environmental Quality Report, reducing the project's projected water consumption. Thematic Link: Environmental mitigation / Impact framing
- Date: March 22, 2024 Actor: Regional Government Action or Argument: Declares that the project meets all legal requirements and is "impeccable." Thematic Link: Legal and technical legitimacy / Political endorsement
- Date: March 22, 2024 Actor: Regional Gov. (Urban Planning and Legislation) Action or Argument: Declares the Environmental Impact Assessment viable with modifications to the electrical grid layout to protect wildlife. Thematic Link: Regulatory adaptation / Biodiversity
- Date: June 12, 2024 Actor: Tajo River Basin Authority Action or Argument: Assesses the water impact and determines that the reduction in water needs makes the project viable. Thematic Link: Neutral verification / Sustainability claim
- Date: June 12, 2024 Actor: Platform for the Defense of the Tajo and Alberche Action or Argument: Questions the justification for using potable water for the facility. Thematic Link: Water justice / Criticism of resource allocation
- Date: June 13, 2024 Actor: Platform for the Defense of the Tajo and Alberche Action or Argument: Miguel Ángel Sánchez: "The amount of potable water that Meta will use is concerning." Thematic Link: Environmental concern / Local resource defense
- Date: June 13, 2024 Actor: Regional Government Action or Argument: Defends the reduction in water consumption in the Environmental Impact Declaration. Thematic Link: Technical defense / Efficiency narrative
- Date: October 3, 2024 Actor: Talavera de la Reina City Council (Gregorio) Action or Argument: "This will be a turning point for the city." Thematic Link: Optimistic framing / Urban transformation
- Date: October 22, 2024 Actor: Regional Government Action or Argument: Officially approves the project in the Regional Government Council. Thematic Link: Institutional closure / Full endorsement
- Date: December 19, 2024 Actor: Meta / Ministry of Housing and Urban Agenda Action or Argument: Purchases 190 hectares for the construction of the Data Center for €20.6 million. The Ministry states the project is designed with a sustainable approach. Thematic Link: Corporate acquisition / Green justification

The timeline of the Talavera data center project illustrates how a controversy is not simply a matter of conflicting opinions, but a dynamic process in which knowledge, authority, and legitimacy are continuously constructed and contested. From the first public announcement in March 2022 to the final stages of land acquisition and approval in late 2024, we see a clear narrative promoted by institutional and corporate actors that frames the project as a symbol of technological progress and regional development. These actors have strategically used legal instruments, environmental assessments, and public declarations to construct a discourse of inevitability and efficiency.

In conclusion, the Talavera case serves as a vivid example of how socio-technical controversies operate as arenas where not only facts but also futures are negotiated. It demonstrates that decisions framed as technical or inevitable are in fact embedded in broader political, environmental, and cultural struggles. Understanding these dynamics is essential not only to assess the legitimacy of the Meta data center, but also to reflect on how we define and pursue collective visions of progress in an era shaped by climate urgency and digital expansion.

5 DISCUSSION

5.1 A Socio-Technical Element

The Meta data center in Talavera de la Reina can be best understood as a socio-technical element. It is a project that cannot be explained only by its technological features, since it also needs to take into account the social, political, and environmental dynamics that surround its development. While we might think that the data center is just a facility for processing and storing digital information, it also reflects broader tensions between technological innovation, ecological sustainability, and local concerns. The controversies surrounding the project reveal that the implementation of an AI infrastructure is not merely a technical matter, but a result of negotiation between conflicting interests, values and knowledge claims. As Latour (1987) emphasized, technologies do not develop in isolation; they are shaped through networks of social actors, discourses and institutional alignments. In this sense, the Talavera project exemplifies how technical systems are embedded in society, a key concern in STS literature. Decisions regarding water

and energy use, land acquisition or environmental certification are not only technical or logistical steps, they are also sites of conflict where actors dispute what counts as legitimate knowledge, what futures should be pursued, and who has the authority to decide. These controversies show how black-boxed infrastructures (like a data center assumed to be efficient, modern and neutral) are in fact the result of contested processes of stabilization, where multiple interpretations are actively silenced or excluded (Latour, 1987).

5.2 Expertise and Production of Knowledge

The first controversy around expertise and knowledge production shows that what counts as “valid” or “scientific” knowledge is not simply given, but constructed through power, visibility and institutional control. The Environmental Impact Assessment (EIA), treated by political actors as neutral and objective, becomes a tool of legitimation. However, its methodology and assumptions were strongly contested by environmental groups who proposed alternative interpretations and demanded transparency. Here we can see the application of Bloor’s (1976) principle of symmetry: rather than privileging the institutional perspective as inherently more “scientific,” this analysis treats all knowledge claims (from government institutions, Meta, and civic organizations) as socially constructed and worthy of equal analytical attention. The controversy also aligns with Jasanoff’s (2004) theory of co-production, showing how science and politics are mutually shaped. The EIA is not only a scientific document but also a political artifact that reinforces the authority of regional institutions. This dynamic further reveals a stratification of expertise: while some technical voices (such as those of municipal planners or environmental regulators) are marginalized, others (those aligned with political objectives) gain prominence. This selective amplification of certain experts over others is a key mechanism in black boxing, whereby the legitimacy of contested facts becomes naturalized and taken for granted.

5.3 Visions of Progress and Development

The second controversy centers around competing visions of progress. The institutional discourse frames the project as a symbol of modernization and digital transformation, what Jasanoff and Kim (2015) call a sociotechnical imaginary. This is not a neutral forecast of the future, but a political vision that uses high-tech development as a way to legitimize policy choices. In Talavera, this imaginary projects a future of economic growth, technological leadership and global competitiveness. However, such futures are not universally accepted. Civic and environmental actors propose alternative imaginaries based on sustainability, water justice and long-term ecological responsibility. The friction between these competing visions reflects what controversy analysis reveals: that infrastructure projects are not only about solving technical problems but about organizing societies around particular values. This conflict also illustrates how imaginaries function as tools of exclusion. The dominant narrative leaves little room for alternative concerns, and actors who oppose it are often seen as irrational or anti-progress. In this way, the institutional vision of development becomes black-boxed as “common sense,”

marginalizing dissent and silencing alternatives, a process clearly visible in the way the AI “City” was announced before fully resolving existing environmental concerns.

5.4 Democratic Participation and Public Legitimacy

The third controversy exposes a clear deficit of democratic participation. Despite the public scale of the project and its environmental implications, decisions were made without mechanisms of open consultation. This aligns with Venturini’s (2010, referenced in [1]) argument that controversies expose asymmetries in visibility and voice, allowing us to see which actors are granted influence and which are structurally excluded. This exclusion is not accidental. As Jasanoff (2003, referenced in [1]) explains, technocratic governance often replaces democratic deliberation with procedural and expert-based decisions, reducing the political to a matter of regulation and optimization. In Talavera, the framing of the project as urgent and strategic accelerated its approval and suppressed broader forms of engagement. This reflects a broader trend in the governance of technological infrastructures: the narrowing of political space under the pressure of innovation discourse and market logic. In this context, controversy analysis is not only descriptive, but normative. It can be used as a democratic tool to reveal who is heard, who is silenced, and how public legitimacy is constructed.

5.5 Black-Boxed Infrastructures

The three controversies analyzed are not isolated, but mutually reinforcing. The kind of knowledge that is legitimized serves to promote a specific vision of the future, and this vision in turn justifies excluding certain voices from the debate. Together, these dynamics contribute to the black boxing of the infrastructure: once the project is approved, its controversial origins are hidden behind a narrative of inevitability and neutrality. This is why controversy analysis is especially useful in understanding digital infrastructures like AI data centers. As Hewlett et al. (2022) point out, such infrastructures are not simply technical systems, but sites where regimes of truth, political interests and visions of society are enacted. Recognizing this embeddedness is essential if we want to develop more democratic, transparent and environmentally responsible forms of technological governance. Thus, the Talavera case shows us that AI infrastructure projects are not only about servers and data, but also about politics, legitimacy and social aspects. The controversies that surround the project show how technological decisions are taken by the alignment of expert authority, institutional power and developmental narratives, often dismissing the cost of democratic legitimacy and environmental justice. The three controversy analyses in this case are deeply related. The type of knowledge that is legitimized often is used to reinforce a specific vision of progress, and that vision is used to marginalize alternative voices limiting democratic participation. These conflicts are not just about this particular case, but they show tensions that reflect how technology, power and society are co-constructed in the age of digital expansion that we are. Identifying these connections is essential if we want to explore transparent, sustain-

able and fair forms of technological development. Instead of accepting that infrastructure projects are inevitable and purely technical, we must treat them as elements of negotiation where conflicting values, knowledge and political strategies intersect, and where democratic practices must be actively defended.

6 CONCLUSIONS

The case of the Meta data center in Talavera de la Reina reveals that artificial intelligence infrastructures cannot be treated as purely technical or environmental developments. Rather, they must be understood as sociotechnical systems, where decisions about design, location, and implementation are deeply embedded in political interests, contested forms of knowledge, and conflicting visions of the future. Throughout this project, we have analyzed how expertise is produced and disputed, how the discourse of progress is mobilized to legitimize certain actions, and how democratic participation is often reduced or bypassed in favor of efficiency and institutional control. These three controversies are not isolated; rather, they mutually reinforce each other. Institutional authority is used to define what counts as valid knowledge, which in turn supports a narrow vision of economic development and systematically excludes alternative perspectives from public deliberation. By applying the tools of controversy analysis from Science and Technology Studies (STS), particularly the principles of symmetry (Bloor, 1976), black boxing (Latour, 1987), and the co-production of science and politics (Jasanoff, 2004), this study has shown how power relations and sociopolitical dynamics shape not only the outcome of a technological project but also the very conditions through which it is justified. The Talavera case demonstrates that AI-related infrastructures, often framed as clean, neutral, and inevitable, are in fact the product of social negotiation, selective visibility, and institutional framing. Moreover, this case allows us to reflect on the broader implications of technological development in a democratic society. As shown, public infrastructures linked to AI are increasingly becoming sites where key questions of environmental justice, governance, and future-making are negotiated. However, the concentration of decision-making power and the limited role of civic voices highlight significant tensions between innovation and inclusivity. Future research could further explore how local communities can meaningfully participate in the governance of digital infrastructures, and how alternative models of sustainable technological development can be recognized and institutionalized. As AI continues to expand, it is essential to ensure that its promises of innovation are balanced by transparency, democratic legitimacy, and long-term ecological responsibility. Ultimately, controversy analysis is not only a descriptive lens, but a critical tool to interrogate the socio-political consequences of emerging technologies, making visible the struggles, exclusions and negotiations that are otherwise hidden behind a narrative of seamless progress.

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