

INNOVATION AND ARCHITECTURE PUBLIC POLICIES. A REVIEW OF THE IRTA PLAN

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ABSTRACT

Irta Plan is an innovative policy instrument designed to foster architecture sustainability through knowledge transfer established by the Generalitat Valenciana in 2020. This paper analyzes its design conceptualization based on a quintuple helix approach through an in-depth analysis of the plan's objectives, strategies, and outcomes.

Drawing upon official data, the paper examines the strengths and limitations of the Irta Plan in facilitating collaboration between public administrations, academia, professionals, and industry, and the adoption of sustainable architectural solutions. It also assesses its impact on promoting innovative practices in architecture and advancing sustainability goals within the Valencian Region. By synthesizing key findings, the study offers insights into the role of public policies in driving innovation and sustainability in the built environment.

KEYWORDS

Architecture; knowledge transfer; public policies; innovation; sustainability

1. INTRODUCTION

The Irta Plan, named both after one of the most relevant natural landscapes of the Valencian Region and also as an acronym for "Innovation and Research for ecological Transition in Architecture", is a pioneer initiative set by the regional public administration to foster built environment sustainability based on knowledge transfer. This public-funded program is based on a Quintuple Helix open innovation approach to generate public value. This model encourages collaboration between academics, policymakers, civil society, industry, and overall ecosystems as a driving force to create innovative solutions through research and development that clearly could contribute to overcome major challenges we are facing.

Since its approval in 2020, the Irta Plan has opened annual calls to fund architectural projects, works and research lines that may incorporate innovative solutions with a clear environmental, economic and social impact. The investment budget has reached the level of circa 5M euro that have been distributed all over the geography of the region. The present paper aims to evaluate the impact of this public policy since it started up. This assessment could become an essential feedback to redesign, if necessary, this instrument and truly understand its impact tackling the objectives set.

2. CONTEXT

The Irta Plan was designed to contribute to the territorial resilience of the region of Valencia, aligned with the international agenda on sustainable development, to successfully face the main global challenges from a local perspective, ensuring respect for the environment, social well-being and balanced growth without compromising the quality of life of future generations. In fact, the 2030 Agenda includes among its 17 objectives the commitment to human settlements that are inclusive, safe, resilient and sustainable and calls for urgent action to combat climate change and reduce greenhouse gas emissions, placing people, planet, prosperity and peace at the center, under the motto of "leaving no one behind". To do so, Irta Plan main objective was to boost innovation as a fundamental mechanism to address the ecological transition of the built environment in an inclusive way.

This initiative was born within a scenario clearly marked by the climate emergency – also declared institutionally by the Regional Government of Valencia in September 2019 – and the need for reconstruction after the multi-scalar crisis caused by the outbreak of COVID-19 when the paradigm shift towards a sustainable model where circularity and efficient use of resources prevail becomes even more essential.

Decarbonization, as highlighted by the European Green Deal agreed upon by the European Commission in December 2019, is meant to be the cornerstone of the European Union's development strategies to guarantee a fair and prosperous society, with a modern and competitive economy, efficient in its use of resources, that will achieve climate neutrality by 2050. The diagnosis of the built environment provided by the EU offers worrying figures that highlight the need to act on the architecture we inhabit, from its design to its management. Buildings are responsible for approximately 40% of energy consumption

and 36% of CO₂ emissions in the Union, and the construction sector is the main energy consumer. Thus, achieving the Union's target of net zero greenhouse gas emissions by 2050 necessarily requires addressing this issue, as this sector is key as a driving force for recovery from the COVID-19 crisis.

However, the Irta Plan broadened a merely ecological approach to incorporate sustainability in a more holistic way, consolidating a multidimensional vision that included environmental, social and economic aspects, especially considering the close relationship between promoting the quality of architecture and the well-being of people. The key message set was clear: to invest in quality of architecture returns in societies' quality of life. In this sense, Irta Plan was designed to contribute to a green, fair and inclusive transition, implementing the necessary mechanisms to promote more sustainable architecture by boosting R&D+i as a catalyst for progress in a sector as crucial as construction, which will undoubtedly be a driving force in the reconstruction after the COVID-19 crisis.

3. POLICY INSTRUMENT CONCEPTUALIZATION

The Irta Plan was designed as a co-funding instrument that would distribute public funding all over the territory that corresponds to the region of Valencia. Established as a competitive funding procedure it aims to allocate financial resources to projects or initiatives based on their merit and ability to meet specific criteria so the subsidies will be granted in accordance with the principles of publicity, transparency, objectivity, equality and non-discrimination.

Competitive funding processes offer a trifecta of benefits as they drive excellence by motivating applicants to submit innovative and impactful proposals with strong feasibility; they ensure efficient resource allocation by directing limited funds towards the most promising projects; and they

promote accountability and transparency through a clear evaluation process based on merit.

3.1. A policy instrument based on a Quintuple Helix Open Innovation Framework

The Irta Plan is considered so far, the only policy instruments designed by a regional government using the Quintuple Helix approach. This means that it promotes the generation of clusters to face complex challenges to work on missions by fostering collaboration and knowledge exchange in innovation processes. It goes beyond the traditional quadruple helix model (government, industry, academia, and civil society) by incorporating the natural environment as a crucial stakeholder.

This approach implies the active action of several stakeholders as:

- **Government:** Plays a role in setting policy frameworks, providing funding, and creating an enabling environment for innovation.
- **Industry:** Drives innovation through research and development activities, commercialization efforts, and knowledge sharing.
- **Academia:** Provides fundamental and applied research, educates the future workforce, and contributes expertise to innovative processes.
- **Civil Society:** Represents the needs and interests of citizens, promotes social responsibility in innovation, and acts as a bridge between public and private sectors.
- **Natural Environment:** Viewed as a source of resources, a recipient of innovation's impacts, and a partner in sustainable development strategies

This quintuple helix approach provides several benefits (Durán-Romero *et al*, 2020)

compared to its predecessors (three and four helixes) as it considers the relevance of natural environment. This implies encourages the incorporation of solutions that minimize ecological impact and contribute to environmental well-being, facilitates knowledge exchange across diverse actors and encourages collaboration between natural scientists, engineers, policymakers, and social scientists to develop solutions that address complex societal challenges, enabling the development of responsible and resilient innovation: By considering environmental concerns, the approach encourages innovation that meets present needs without compromising the ability of future generations to meet their own needs.

It is worth noting that it also empowers communities and fosters social inclusion as it ensures that innovation addresses the needs of all stakeholders and contributes to social equity.

3.2. Nature of the procedure

As a competitive process the Irta Plan incorporates certain features such as:

1. **Open call:** A competitive funding process begins with a public announcement inviting all interested parties to submit proposals for consideration. This ensures that a wide range of ideas and perspectives can be evaluated.
2. **Predefined assessment criteria:** The funding organization establishes clear and well-defined criteria for evaluating proposals. These criteria should align with the overall goals and objectives of the funding program.
3. **Independent review:** Proposals are reviewed by a panel of independent experts who possess relevant expertise in the field of funding. This ensures that the evaluation process is objective and unbiased.

4. Ranking and selection: Based on the evaluation of proposals, the review panel ranks them according to their merit and fit with the funding criteria. The highest-ranked proposals are then selected for funding.

5. Transparency and communication: Throughout the competitive funding process, the funding organization maintains transparency by communicating clearly with applicants about the evaluation criteria, timeline, and selection process. This fosters trust and fairness among participants.

3.3. Actions to be funded

The subsidizable actions will contribute to the ecological transition in construction, supporting the fight against climate change, betting on innovation in terms of promoting environmental, social, and economic sustainability, and considering the essential decarbonization of the built environment and the necessary transformation of the spaces we inhabit into places that promote equality and well-being. This will be achieved through the incorporation of innovative solutions that involve a transfer of knowledge and require validation in a real environment, turning the action into a living demonstrator, through measures such as:

Measures related to environmental sustainability:

- Promotion of integrated and environmentally friendly eco-design, through:
 - Passive measures of bioclimatic architectural design.
 - Active measures linked to the efficient use of resources.
- Promotion of bioconstruction and the use of natural and local materials, promoting the efficient use of local resources, which reduce the environmental footprint, minimizing the emission of greenhouse gases and the use of fossil fuels.

- Integration of circular economy principles, promoting the use of recyclable and renewable materials with a known life cycle, avoiding planned obsolescence, promoting the extension of the useful life of products, and prioritizing flexible solutions that allow adaptation and promote the resilience of spaces without losing value in the chain.

Measures related to social sustainability:

- Promotion of biohabitability as a set of measures that have an impact on the health, well-being, and quality of life of the inhabitants, such as hygrothermal, acoustic, and light comfort, air quality, or the reduction of toxins.
- Promotion of inclusive and gender-sensitive design that favors integration and mitigates social imbalance, reducing inequalities, favoring autonomous development, enhancing identification and sense of belonging to the place, as well as a habitat equity that guarantees social justice.

Measures related to economic sustainability:

- Promotion of the capacity of business and private agents to carry out sustainable actions to promote public-private collaboration.
- Incorporation of products, materials, or systems that provide an improvement in competitiveness, costs, and new formats for sustainable development, with special attention to projects that bet on circular construction, according to the European Union's Action Plan for the Circular Economy.
- Integration of construction 4.0, promoting its principles of process industrialization and the incorporation of emerging technologies, incentivizing the creation of specialized jobs that improve the safety and health conditions of workers and promoting prefabrication as an industrialized and replicable construction technology.

Subsidizable actions must be aligned with the sustainable development goals and will need to demonstrate the impact on 2030 Agenda indicators affected. Three programs are established to attend the diversity of actions and are classified as:

Program 1: architectural projects.

Subsidies for the elaboration and drafting of architectural projects, which promote the incorporation of sustainable measures and enhance technological transfer and applied innovation, as added value, through the encouragement of demonstrators, so that these projects contribute to the ecological transition in the construction, supporting the fight against climate change, considering the essential hypocarbonization of the built environment and the necessary transformation of the spaces we inhabit in places that promote equality and well-being

Program 2: architectural works.

Grants for the execution of works that contribute to a necessary change of paradigm by incorporating sustainable measures and promoting technological transfer and applied innovation as catalysts of a necessary ecological transition of the spaces we inhabit, from their design to their management, acting as demonstrators of a construction model that respects the environment and people.

Program 3: applied research

Grants to finance applied research and development projects in architecture and sustainability with the aim of positively impacting society and the environment, strengthening the capacities of the innovative fabric linked to the sector and favoring the generation of new products, technologies or models that could contribute to promoting the ecological transition and increase the resilience of the built environment. This program aims to stimulate the application of knowledge, as well as to encourage collaboration between agents that generate

it as well as specialists in the transfer of knowledge and the promotion of a culture of innovation and creativity.

3.4. Criteria of selection

Establishing well-defined selection criteria is essential for a grant-giving policy instrument to ensure a fair, efficient, and impactful allocation of resources. These criteria should encompass both the merits of the proposed project and the applicant's capacity to deliver it. Project-related criteria might include alignment with the grant program's goals, innovation, potential impact, and feasibility. Applicant criteria could assess relevant experience, track record of success, and organizational capacity to manage the grant effectively. By outlining such clear criteria, the policy promotes transparency and attracts the most qualified projects and applicants, ultimately maximizing the grant program's positive impact.

Project Team Expertise

- o Experience of the interdisciplinary team, qualifications, and experience of the project drafting team and/or construction director.
- o Experience in drafting and directing eco-related projects with a focus on ecological innovation in construction
- o Academic qualifications and specific training of the interdisciplinary team related to the requirements outlined in Section 2, and official master's degrees directly related to sustainability, ecological transition, and/or the environment in construction (up to 2 points).

Technical Quality of the Project

- o Quality and clarity of the submitted material. Adequacy of the technical memory/dossier to the criteria of this order, demonstrating how the project aligns with the measures related to each

of its requirements. Special consideration will be given to the justification of the indicators that have been considered to evaluate the success of the different measures and solutions incorporated into the project (up to 3 points).

- o Contextualization, coherence, and urban integration of the architectural proposal with the environment. Evaluation of the architectural response in relation to the built environment, considering the added value it represents and the improvement of the quality of the place where it is located, taking into account the socio-cultural and natural values of the place
- o Architectural quality and interest of the project, including aspects of novelty and relevance in relation to the state of knowledge, but also clarity, simplicity, and conciseness regarding the content, development, and expected results of the project (differentiating approaches, innovation, function, contemporaneity, culture, society, maintenance, regulations, etc.).

Relevance of the Project

- o Alignment of the project or work with the Sustainable Development Goals and European directives within the framework of sustainability and ecological transition
- o Promotion of urban rehabilitation and regeneration, promoting a reasonable use of land, existing resources, and available resources, promoting a model based on sustainability and the integration of cultural, social, economic, and environmental aspects.
- o Vulnerability of the area of action

Scientific and Innovative Interest of the proposal

- o Incorporation of innovative solutions that involve a transfer of knowledge and require validation in a real environment, turning the project into a living demonstrator that, assuming

commercial, management, and/or technological risk, can report benefits that have a positive impact in terms of social, environmental, and economic sustainability. This impact must be estimated and justified, providing indicators and verification sources that allow for the evaluation of proper performance.

- o The proposed solutions may be of various kinds: implementation of new typological models, systems that favor proper management and maintenance of the intervention, mechanisms for raising awareness and consciousness among users, tools that favor universal integration and accessibility, as well as technologies, facilities, construction systems, materials, products, or any initiative in accordance with the objectives pursued by this order. Aspects such as the level of experimentation or the commercial application of patents may be valued.

Sustainability

- o Inclusion of objectives and measures that promote the ecological transition, promote the resilience of the spaces we inhabit, and favor the integration and well-being of people.
- o Based on the nature of the project, the transfer of knowledge and applied innovation will be favored, therefore, the proposal must incorporate the necessary indicators and verification sources to evaluate the response of the proposed solutions.

Measures related to environmental sustainability and decarbonization as the following ones:

- Integration into the proposal of the principles of the circular economy, prioritizing the use and reuse of available resources and reducing the need for raw materials according to the European Union's Action Plan for the Circular

Economy and the Spanish Circular Economy Strategy "España Circular 2030".

- Incorporation into the proposal of the principles of Bioconstruction, using low-environmental impact or ecological systems and materials, of natural origin and local products

Regarding program 3, devoted to research initiatives, the evaluation criteria slightly differ, incorporating other questions as the following ones:

Project Team Expertise

- o Qualifications, experience, and interdisciplinarity of the research project team.

Scientific-Technical Merit of the Research Project

Degree of innovation of the proposal

- Novelty and originality of the research approach and methodology.

- Potential to advance knowledge and understanding in the field of study.

- Contribution to the development of new technologies, products, or processes. Contribution to the challenge posed by this call for proposals:

- Alignment of the research project with the specific objectives and priorities of the program.

- Potential to address significant societal or environmental challenges.

- Contribution to the advancement of sustainable development goals.

Expected knowledge transfer results:

- Potential for dissemination of research findings to the scientific community.

- Opportunities for collaboration with industry or other stakeholders.

- Potential for societal impact and application of research findings.

Obviously, the experts consider additional aspects as:

- Clarity and quality of the submitted research proposal.

- Experience of the project team in conducting successful research projects.

- Adequacy of the research budget and resources.

- Ethical considerations and compliance with relevant regulations.

Overall, the evaluation process aims to identify research projects with high scientific-technical merit, strong potential for innovation, and clear relevance to the program's objectives. The selected projects are expected to make significant contributions to the advancement of knowledge and the development of sustainable solutions for societal challenges. It is necessary to highlight that the procedure to award the funding incorporates the participation of an external and independent assessment body composed by experts that will ensure the quality of the program by evaluating the proposals received according to the established criteria.



Figure 1. Pla IrtA. Source: (Generalitat Valenciana, 2023)

4. LEGAL FRAMEWORK

Irta Plan funding is regulated by the provisions of the Law 1/2015, of February 6, of the Generalitat, for Public Finance, Public Instrumental Sector and Grants and specifically by the *Order 6/2020, of September 24, of the Vice Presidency Second and Ministry of Housing and Bioclimatic Architecture, which approves the regulatory bases for subsidies to projects, works and applied research and product development, to boost the ecological transition and innovation in the built environment. Irta Plan to boost innovation and applied research for the ecological transition in architecture* published on September 29th, 2020.

This aforementioned order establishes the regulatory bases, which will govern the procedure for managing and awarding subsidies to projects and works, new plant and rehabilitation, as well as applied research and product development projects, which promote the incorporation of sustainable measures and they promote technological transfer and applied innovation as added value in the built environment, through the promotion of demonstrators. These regulatory bases were framed in the Strategic Plan for grants for the period 2020-2023 approved by Resolution of May 11th, 2020, and published in the Official Gazette of the Valencian Community of May 13, 2020. These regulation was updated by resolution date June 20th, 2024 to cover the new Strategic Plan for 2024-2026, where the Irta Plan is still considered. However, the plan has not been called during 2024.

5. BUDGET

The funding of the subsidies was charged to budget application 14.03.02.431.60, line S1719000 of the Generalitat Valenciana. The maximum overall amount of the subsidies to be granted each year will be determined in accordance with the budgetary provisions provided for the execution.

Attending to the nature of the objectives pursued, the program is designed under a multi-year budgetary framework with future annuities subject to the existence of adequate and sufficient credit. Since the plan was implemented, the budget amount devoted to Irta calls has been increased to meet the growing demand (table 1).

Budget	Year/Call
1.462.000,00	2023
1.383.000,00	2022
1.667.410,00	2021
1.578.000,00	2020
6.090.410,00	TOTAL

Table 1. Pla Irta Budget. Source: Generalitat Valenciana, 2023)

It is important to highlight that the amount awarded in every call has been inferior to the budget provided as the proposals need to satisfy a minimum grade established in order to ensure the excellence of the program (figure 2).



Figure 2. Irta Plan total amount awarded per year. (Source: Generalitat Valenciana, 2023)

6. A MISSION ORIENTED PROGRAM

By incorporating a mission-oriented vision, innovation policies (MOIPs) have gained traction as a framework for tackling complex

societal challenges, policies, providing tools and governance structures to ensure that these initiatives are sustainable and impactful. This approach was prominently developed and championed by economist Mariana Mazzucato, who argues that government policy should be proactive in shaping markets rather than merely addressing market failures by setting time-bound objectives or “missions” that guide innovation and economic activities towards solving large-scale societal issues like climate change, health challenges, or social inequality.

By aligning policy and investment with long-term societal missions, this approach moves beyond conventional, short-term policy interventions, addressing interconnected challenges like sustainability and equity. In 2023, Pla Irta was upgraded offering a mission-oriented vision to better tackle the most relevant challenges detected.

- **Challenge 1: NBS.** Nature-based solutions and re-naturalization of the built environment

- **Challenge 2: Neuroarchitecture and biohabitability.** Strategies to promote healthy architecture and systems to measure the impact of architecture on wellness.
- **Challenge 3: Digitalization.** Sensing technology and computer-assisted maintenance management systems. Implementation of digital twins.

7. RESULTS

During the last four years, the Irta Plan has managed to fund a total of 198 proposals, distributed in a total of 85 architectural projects in Program 1, 91 works in Program 2 and 22 research projects in Program 3.

These projects have been distributed in the whole Region of Valencia. The analysis of data makes it evident that a wide percentage of the resources allocated are set in the province of Valencia -a total of 127 proposals that mean 64% of the total-. Alicante represents

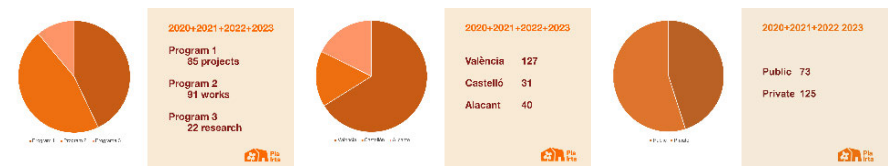


Figure 3. Pla Irta Call 2023 Results by Program, province and type of co-funding. Nuria Matarredona Desantes based on data from Generalitat Valenciana, 2023

	Awarded budget 2020			Awarded budget 2021			Awarded budget 2022			Awarded budget 2023		
	2020	2021	2022	2021	2022	2023	2022	2023	2024	2023	2024	2025
PROJECTS	75.891	282.418	0	56.781	86.737	4.503	37.368	240.464	0	8.563	161.728	0
WORKS	354.732	194.547	401.972	260.496	38.750	217.271	87.491	70.000	373.597	172.819	116.190	698.991
RESEARCH	0	0	0	88.267	143.034	0	166.692	500.604	373.597	40.000	233.927	0
	430.624	476.965	401.972	405.545	268.522	221.777	166.692	500.604	373.597	221.383	511.846	698.991
	1.309.562,30			895.844,86			1.040.895,07			1.432.222		

Table 2. Pla Irta Results. Nuria Matarredona Desantes based on data from Generalitat Valenciana, 2024

a 20% of the initiatives and Castellón a 16% of the total, what is a too similar percentage compared to the difference of population between these two provinces. It is also of interest to underline that 63% of the proposals funded come from the private sector even if the percentage to be funded is lower than for public proposals.

8. CONCLUSION

The Irta Plan is the first public promoted program in the Valencian Region that fosters knowledge transfer as a mechanism to successfully face challenges. During these past four years, it has become a catalyzer to incentivize the generation of innovation applied to architectural ecological transition, offering a holistic approach that considers the multidimension of sustainability based on a quintuple helix approach.

The vast amount of projects developed up to 2024, almost two hundred, can be considered as an indicator of a raising interest on sustainable architecture. Without any doubts, these projects are an example of innovative approaches that can clearly contribute to decarbonize our environment and to promote solutions to successfully adapt our architecture to the effects of climate change.

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