sustainability

MDPI

Article

The Contribution of Peripheral Large Scientific Infrastructures to Sustainable Development from a Global and Territorial Perspective: The Case of IFMIF-DONES

Virginia Fernández-Pérez [1] and Antonio Peña-García [2,*]

[1] Department of Organización de Empresas I, University of Granada, 18071 Granada, Spain; vfperez@ugr.es
[2] Department of Civil Engineering & PI UGR "DONES Preparatory Phase" (CE Ref. 870186), University of Granada, 18071 Granada, Spain
* Correspondence: pgarcia@ugr.es

Abstract: Large scientific infrastructures are a major focus of progress. They have a big impact on the economic and social development of their surroundings. Departing from these well-known facts, it is not trivial to affirm whether the global contribution to Sustainable Development (SD) is higher when they are built in peripheral and not highly developed provinces instead of capitals and rich areas. Besides the economic impact on depressed areas, other SD-related parameters like the attachment of young and skilled people to their homeland, the avoidance of uncontrolled migrations from rural to dense urban zones, the growth of new focuses of knowledge independent from the lines of research established in the universities of the capitals, the indirect impact of auxiliary infrastructures and others must be analyzed. Concerning the next implementation of the "International Fusion Materials Irradiation Facility—Demo Oriented Neutron Source" (IFMIF-DONES) project in Granada (Spain), one depressed and tourism-dependent zone, an analysis and comparison with similar infrastructures were done and presented.

Keywords: sustainable development; global sustainability; scientific infrastructures; Post-COVID-19 Scenario

Citation: Fernández-Pérez, V.; Peña-García, A. The Contribution of Peripheral Large Scientific Infrastructures to Sustainable Development from a Global and Territorial Perspective: The Case of IFMIF-DONES. *Sustainability* **2021**, *13*, 454. https://doi.org/10.3390/su13020454

Received: 16 December 2020
Accepted: 2 January 2021
Published: 6 January 2021

1. Introduction

Science and Technology have been acknowledged for a long time as key motors to foster progress and well-being. However, the way scientific and especially technological development has been focused has evolved from an absolutely results-oriented philosophy to a more global perspective including not immediate benefits. The first philosophy lasted from the Industrial Revolution in the early 19th century until the third quarter of the 20th century, whereas the new perspective taking Environment and Sustainability as the main factors has been a constant trend for about 40 years.

Although there has been no single inflection point from the first to the current philosophy, we might be able to find one remarkably important milestone in the so-called Brundtland Report: "Sustainable development must meet the needs of current generations without compromising the ability of future generations to meet their own needs" [1].

The recent compilation of the Sustainable Development Goals (SDGs) [2], which summarizes and attempts to channel the efforts toward a better world, is fully applicable to the technological development and the infrastructures built to get it. Thus, besides the expected scientific and technical advances, the actions and projects with a strong technological background should bring highly qualified employment, investments and economic prosperity for the territory contributing to the achievements of the SDGs. Table 1 summarizes the SDGs and their official labels.

Table 1. United Nations Sustainable Development Goals (SDGs) [2].

	SDG
1	No Poverty
2	Zero Hunger
3	Good Health and Well-being
4	Quality Education
5	Gender Equality
6	Clean Water and Sanitation
7	Affordable and Clean Energy
8	Decent Work and Economic Growth
9	Industry, Innovation and Infrastructure
10	Reduced Inequality
11	Sustainable Cities and Communities
12	Responsible Consumption and Production
13	Climate Action
14	Life Below Water
15	Life on Land
16	Peace and Justice Strong Institutions
17	Partnerships to Achieve the Goal

In this scenario, it is really important to compile information and foresee the economic and social consequences of each project in order to support or disregard those decisions dealing with their implementation and the way to do it, including its location, timetable, public investment and other factors.

Thus, the role and responsibility of governments and public administrations have remarkably changed because now it is clearly understood and accepted that [3,4]:

(1) The environmental impacts and the demand for natural resources must be limited.
(2) Productive models must be based on technology allowing sustainable processes.
(3) Sustainable Development requires organizational structures that must be adapted accordingly.

The so-called "Circular Economy", more and more deeply implemented in Engineering processes going from design to decommissioning [5,6], is a good example.

Attending to its significance and dimension (environmental, social and economic) [7], it could seem that Sustainable Development is a holistic concept, and technology focused on the SDGs cannot be understood out of a global framework. Certainly, SDGs cannot be achieved from isolated perspectives, and some transversal branches of Science and Technology closely related to them are claiming for global visions [8]. However, it is important to keep in mind that a global perspective of technology is fully compatible and even necessary for territorial sustainable development exclusively focused on concrete areas.

This research presents and analyses the situation and potential effects of critical scientific and technological infrastructures on their near geographical framework from the perspective of Global Sustainability and SDGs. The particular case of the "International Fusion Materials Irradiation Facility—Demo Oriented Neutron Source" (IFMIF-DONES) is taken as an example and guide. Besides the main target of this project, that is, providing some key milestones from other perspectives parallel to the path toward clean and almost unlimited energy from nuclear fusion, it seeks to contribute to sustainable regional development in the abovementioned wide contexts of the Brundtland Report and SDGs (see Figure 1).

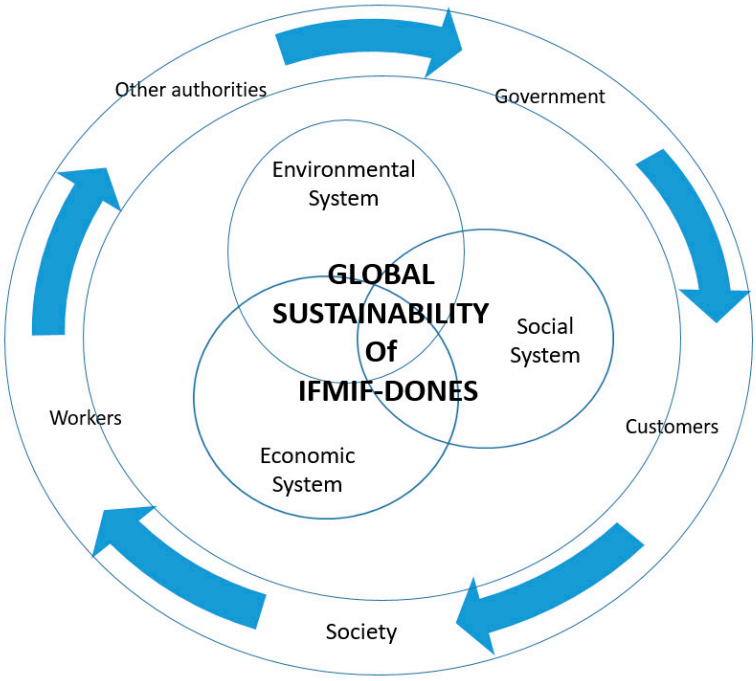

Figure 1. "International Fusion Materials Irradiation Facility—Demo Oriented Neutron Source" (IFMIF-DONES) from a global and territorial perspective. Sustainable energy economically and socially viable attending territorial necessities.

The next section will briefly present the IFMIF-DONES project and its objectives.

2. IFMIF-DONES: The Key Milestone toward the Use of Fusion Energy

2.1. The Situation with Nuclear Power

The energy inside the matter can be obtained by breaking heavy and unstable nuclei like Uranium-235 of Plutonium-239 (nuclear fission) or by fusing light nuclei like hydrogen into heavier ones (nuclear fusion). The fundamentals of both, fission and fusion, are not complex and have been understood since the 1930s. However, the technology to actually obtain energy from the nuclei is extremely complex. In the case of fission, big and complex centers have been built since the 1940s, and it is nowadays an essential energy source. In Spain, 20% of the produced energy is achieved with just seven reactors that started to work between 1983 and 1988 [9]. This 20% is not enough and additional energy from nuclear origin must be bought from other countries. However, nuclear fusion is a technical challenge, and its control to produce useful energy is still far away. This is a problem because, whilst fission requires the use, management and storage of hazardous materials, fusion is expected to be a cleaner, safer and much more efficient source of energy.

In this general framework where mankind needs more and more energy to ensure economic growth and resources for everyone without harming the environment, both the scientific community and governments around the world are working hard to control nuclear fusion and thus profit from its huge benefits.

As mentioned above, the control of fusion is very difficult from a technical point of view. There are two main limitations: (1) fusing light elements requires working in extreme conditions around 100 million °C; and (2) the neutrons arising from the nuclear reaction are extremely difficult to control, and they would quickly damage the whole installation.

Several experimental installations have tried to demonstrate the feasibility of fusion by solving the abovementioned problems one way or another. Among them, the "International Thermonuclear Experimental Reactor" (ITER, www.iter.org) is the most ambitious project up to date. It is currently under construction in Cadarache (France) and, according to the official sources of the Project, it is expected to maintain fusion for long periods of time and test the integrated technologies, materials and physics regimes necessary for the

commercial production of fusion-based electricity [10]. The fact that the ITER members are China, the European Union, India, Japan, Korea, Russia and the United States shows the high strategic interest of this experimental infrastructure and the geopolitical importance of fusion control. Figure 2 shows the state of part of the installation in December 2020.

Figure 2. ITER under construction. Credit © ITER Organization, http://www.iter.org/.

ITER Organization retains copyright in the pictures and videos. Download and use of the image do not amount to a transfer of intellectual property (https://www.iter.org/media/www/downloads/av_terms_of_use.pdf).

In parallel to ITER, the "International Fusion Materials Irradiation Facility—DEMO Oriented Neutron Source", known as IFMIF-DONES (www.ifmifdones.org), is the key to solve the second shortcoming from a more specific perspective.

2.2. IFMIF-DONES: What It Is and How It Will Work

Although the target of this work is not an exhaustive technical description of IFMIF-DONES, this section will briefly describe it so that its potential impact can be situated in the right framework.

The target of IFMIF-DONES is to obtain neutrons like those to be produced in real fusion reactions without reaching the extremely high temperatures of these reactions. In other words, it is an installation where the neutrons that we want to learn how to stop will be produced. The study of their effects on different materials will be studied, and the materials that support that flux of neutrons in the best way will be selected to build the fusion reactors in the future.

To achieve that key milestone in the race to fusion, IFMIF-DONES will have three main parts:

(1) Particle accelerator, where deuterons (nuclei of hydrogen with one proton and one neutron) will be accelerated to very high speed. In the second phase, two parallel accelerators will work simultaneously.
(2) Liquid lithium target, where the accelerated deuterons will impact producing nuclear reactions whose product are neutrons with the same energy as those created in fusion.
(3) Test module, where different materials will be placed and irradiated with the neutrons.

2.3. The Situation of IFMIF-DONES: Current Development of the Project

IFMIF-DONES is expected to be installed in Escúzar, a small town in the Province of Granada (South of Spain). This is a rather economically depressed zone where most people work in agriculture or low-qualified services.

The project is expected to cost about EUR 700 million, which makes it the largest scientific infrastructure ever built in Spain. The costs will be funded by the Central Government of Spain and the Regional Government of Andalusia, the Spanish region where it will be located. Most of these national funds will come from the European Regional Development Fund, which finances lots of infrastructures in poorly developed European countries. Other funds will come from organizations like EUROfusion and other European programs.

In the first phase, already running in November 2020, the first budget of EUR 32.6 million has been transferred to the main implementing institutions of IFMIF-DONES: CIEMAT (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas) and the University of Granada, both in Spain. These EUR 32.6 million are being used to start the construction and launch the first actions. In addition, EUR 4 million more have been provided by the European Strategy Forum on Research Infrastructures (ESFRI) in this first phase.

It is interesting to remark that, together with Escúzar, there were other candidates in the European Union to host IFMIF-DONES. They were in Poland and Croatia, two countries whose economic level is lower than the European average. It is also the case in Spain. Finally, Escúzar was appointed as an EU candidate to host IFMIF-DONES, but the three potential locations considered by the EU are a good indication of the potential of critical technological infrastructures as a motor for regional development.

3. Effects of Peripheral Large Scientific Infrastructures on Social and Territorial Sustainability

Large scientific infrastructures connect with the terms of territorial social responsibility, sustainable development, social and economic sustainability and even education for sustainability [11]. Thereby, this type of project has impact and potential enough to contribute to change the territory in which they are inserted, and even far beyond.

According to Torjman [12], "human well-being cannot be sustained without a healthy environment and is equally unlikely in the absence of a vibrant economy". In this sense, the total sum of the investment planned for the first phase of construction and IFMIF-DONES will have a very positive socioeconomic and environmental impact because its implementation amounts to EUR 729.57 million, which will be executed over approximately nine years. Thus, the quality management of large projects is linked to sustainability and the development of a society and vice versa [13].

There is a growing recognition that sustainability is more than just the "green agenda", and it is considered that social practices are increasingly more important [14,15]. Nonetheless, integrated approaches to sustainability have failed to examine social sustainability in adequate detail [16]. For this reason, the scope of this research is the social impact of IFMIF-DONES and its consequences on the surroundings of the future installation. We start by defining social sustainability and how the project contributes to it.

There are several definitions of social sustainability with different ranges. From a wider perspective, the Western Australia Council of Social Services considers that "social sustainability occurs when the formal and informal processes, systems, structures, and relationships actively support the capacity of current and future generations to create healthy and livable communities" [16]. Secondly, social sustainability of a city (territorial approach) "is defined as development that is compatible with harmonious evolution of civil society, fostering an environment conducive to the compatible cohabitation of culturally and socially diverse groups and encouraging social integration, with improvements in the quality of life for all segments of the population" [17]. Lastly, regarding businesses, social sustainability is understood more generally as a business that influences individuals'

or society's well-being [18,19] or, in other words, a system that meets the expectations of stakeholders without causing harm to the well-being of society and its members [20]. Here, the idea of social sustainability is commonly interpreted as the ability to continue to stay in business through good relations with stakeholders [21].

All these definitions reflect the development that social sustainability covers the broadest aspects of public and private activities and the effects that they have on employees, customers, suppliers, investors, and local and global communities, thus protecting all stakeholders and fairly respecting social diversity [22].

On the other hand, the key to achieving the sustainable development of a territory (territorial sustainability) is an understanding and modeling of its identity [23,24]. Sustainable territorial development can refer to different levels, and in particular to regional and local or relative to a country, continent or the entire world economy. Many researchers of social sustainability have focused mainly on urban studies from both academic and policy perspectives [25,26].

In this work, we review social sustainability from the perspectives of peripheral development. Ezcúzar and its province, Granada, have quite specific socioeconomic indicators as shown in the next sections. Therefore, it is necessary to work in this dependent context due to the influence of the relevance of the project through the perspective of social and territorial sustainability. Table 2 compares both cities in terms of population and economy.

Table 2. Comparison between the village of Escúzar and the city of Granada (Province Capital). Source: Instituto de Estadística y Cartografía de Andalucía 2019 https://www.juntadeandalucia.es/institutodeestadisticaycartografia/sima.

	Granada	**Escúzar**
Total population	232,462	791
Population under 20 years old (%)	18.3	17.7
Relative increase in population in 10 years	−0.8	−4.7
Public infrastructures	155 schools, 10 libraries, 21 medical centers, 1 public university.	1 school, 2 nurseries, 1 medical center.
Economy	Wide variety of services: 22,917 businesses with economic activity and 13,406 places to host (tourism). Some agriculture and industry.	Mainly agriculture. Recently, some industry.
Rate of unemployment	23.2	23.8

In the next sections, the specific foreseen impact of IFMIF-DONES on the territory and its contribution to social and territorial sustainability, as well as the duly relationship with the SDGs, and the interconnection between all are analyzed.

4. The Overall Impact of IFMIF-DONES at Different Levels

The implementation of a scientific infrastructure like IFMIF-DONES, the largest in Spain ever, has effects at various levels: worldwide, European, national, regional and local.

(1) Global level: Given that the expected output of IFMIF-DONES will be the decision about the most suitable materials to construct the future fusion reactors, its impact at the global level will be to permit the development of fusion energy, which is expected to have a very high efficiency producing energy from non-hazardous fuels.

(2) European Union level: The EU is one of the parts of the Broader Approach with Japan. This treaty is the framework toward fusion energy, where the EU has put a large amount of funds over the years. Furthermore, the major part of the funds financing IFMIF-DONES come from European programs like EUROfusion, ESFRI and, mainly, the European Regional Development Fund (EFDR). Therefore, the successful

construction and operation of IFMIF-DONES will be a success for the European scientific policy.

(3) National level: The expected location for IFMIF-DONES is in the South of Spain. The Spanish Government has managed all the different eventualities in order to successfully become the European candidate to host the Project. Furthermore, the Spanish Government is dedicating a remarkable part of its EFDR to fund IFMIF-DONES, which demonstrates a clear willingness. In this scenario, the increase in the number of contracts and the attraction of highly specialized construction and technological enterprises are a very worthy output of the project for Spain. Furthermore, the rise of Spanish research centers in important indicators and rankings like Shangai and others is another attractor and motor for progress.

(4) Regional level: The Regional Government of Andalusia is carrying out the first investments of the project implementation at 50% with the Central Government. The origin of these funds is mainly the EFDR with some additional investment from its own budget. The expected impact will be also financial and scientific, but there is one particularity: the IFMIF-DONES project can become the needed boost for the shift of a mainly tourism-based economy to a knowledge-based one.

(5) Local impact: Given the particularities of the territory where IFMIF-DONES is expected to be built and developed, it is necessary to enter in more details.

The Province of Granada and its surroundings are characterized by:

(1) High dependence on agriculture, tourism, construction and its related areas (hotels, bars, restaurants, etc.) (REF: Instituto de Estadística y Cartografía de Andalucía. Explotación de la Encuesta de Población Activa del INE.2020-3er trimestre. Thousands people).

(2) Low rate of industrialization and big companies (industrial production index 90,1 and yearly variation −14,1).

(3) Big cultural gap between young and older people. Whilst most young people have studied at a university, most people above 60 have not even got undergraduate formation.

(4) An outstanding university, the fourth largest in Spain, with more than 60,000 students and 7000 professors, researchers and administrative staff [10]. It is at the top of Shangai ranking in some disciplines [12]. In addition, there are a few top research centers mainly linked to the university, but few job opportunities for their graduates.

(5) Few but good hospitals. Some of them at the highest national level in some specialties.

(6) High rates of unemployment (Granada: 108,100 unemployed, unemployment rate 25.94%; Andalusia: 932,300 unemployed, unemployment rate 23.80%).

The consequence of this configuration in the Province of Granada, where IFMIF-DONES is expected to be built, is a high rate of public/private employees, most of the employees of private companies working in tourism-related jobs, and a socioeconomic and cultural framework where the University of Granada is, by far, the main actor. Other provinces around Granada, like Almería, Jaén or Málaga, have also a big dependence on tourism, but their industry and/or agriculture has more relative weight.

In this particular territorial framework, the potential territorial yields of IFMIF-DONES are:

(1) Implementation of new high-technology private companies and stimulation of existing ones to work as suppliers during construction and operation of the facility.

(2) Stimulation of regional construction companies.

(3) Creation of highly qualified jobs for local graduates and additional jobs of services for non-graduate local workers currently in unemployment.

(4) Creation of new lines of research complementary to the ones of the University and the research centers in the area.

(5) Improvement of auxiliary infrastructures.

In spite of the good perspectives, the desired yields of the installation of IFMIF-DONES in the Province of Granada is not immediate and, obviously, not direct for these companies and citizens that are not prepared to offer the needed services. In addition, given that the vast majority of the contracts will be decided after public concurrence, enterprises and workers from other parts of Spain and even from all over the world could be hired. Table 3 below shows a schematic analysis of positive, negative and uncertain points regarding the implementation of IFMIF-DONES in the site of Escúzar.

Table 3. Threats, opportunities, weaknesses and strengths regarding the implementation of IFMIF-DONES in the site of Escúzar.

THREATS	OPPORTUNITIES
- Regulatory changes impacting the installation - Local reluctance from the side of neighbors - Low utilization - Difficulty to find suppliers nearby	- International awareness of the necessity of clean and sustainable energy - Compromise of financing from Central and Regional Governments - New lines of research for the local University - Investments in the area (auxiliary infrastructures, etc.)
WEAKNESS	**STRENGTHS**
- Difficulty attracting highly qualified human resources - Technical difficulties inherent to such complex and large Project - High budget demands. Very high budget needed - Potential high dependence on certain people whose know-how is essential	- Optimal location of the facility - The goal of the project is to facilitate the control of clean and sustainable energy, which is in line with the SDGs - Application of previous know-how that can be used now - Possibility of extending the research of IFMIF-DONES to other sectors like health, communications, etc.

In summary, the yields of the installation of a critical scientific and technological facility like IFMIF-DONES are expected to be very high, but its contribution to really sustainable development and the relevant SDGs are not free of risks and uncertainties and will need big efforts and careful preparation at all the levels.

In the next section, the potential contributions of IFMIF-DONES to the SDGs are presented and analyzed.

5. The Impact of IFMIF-DONES on Social Sustainability and SDGs

Beyond the impact of IFMIF-DONES from the pure perspective of financial profitability and yields, it is interesting to focus on aspects not frequently included when studying large scientific and technological infrastructures. In this sense, the analysis from the perspective of social sustainability is more frequent in other frameworks more related to actions to eliminate poverty, inequality, etc.

Theoretically, social sustainability as a concept covers broad societal issues [27] and has various interpretations in different fields [28]. Laureate Amartya and Sen identified five dimensions in social sustainability—equity, diversity, social cohesion, quality of life and democracy and governance—which have been considered in determining if a business or a project is socially sustainable. However, these have been extended in many studies. It has also been acknowledged that the social dimension of the SDGs needs further development [15].

In this section it is shown that large scientific and technological infrastructures are an efficient instrument for social sustainability through their direct impact on specific SDGs, using Khan's classification [29]. As it is evident from his table, numerous authors point toward similar themes as they remain the primary constituents of social sustainability.

Table 5 below summarizes the main impacts.

Table 4. Impact of IFMIF-DONES implementation on socioeconomic indicators and specific SDGs. Adapted from Khan [29].

Topics on Social Sustainability	Promotion of Social Sustainability IFMIF-DONES	Promotion of Sustainable Development Goals (SDGs)
Human health and well-being/well-being of generations	The ultimate goal of IFMIF-DONES is to provide the keys to build fusion reactors that will produce clean energy, avoiding the emission of pollutants and greenhouse gasses and their negative effects on the health and well-being of present and future generations.	Goal 3
Basic needs and quality of life	The expected shift from the primary sector to highly qualified jobs will mean higher incomes and better heritage in the economy and better quality of life.	Goals 1, 2, 3, 6, 7 and 8
Social Coherence	IFMIF-DONES is in agreement with the recent attempt from regional, national and European levels to transform the region into a digital green-economy-based one.	Goals 1, 4, 5 and 10
Social justice and equity		Goals 1, 2, 3, 4 and 5
Democratic/engaged government and democratic society		
Human rights		
Social inclusion	More opportunities for everyone. Access to more opportunities for disadvantaged classes.	Goals 1, 4 and 5
Diversity	The region of Escúzar will pass from a closed structure formed by several families (around 700 inhabitants) to a more heterogeneous one due to the move of foreign engineers and workers of the facility.	Goals 5 and 10
Decline of poverty		
Social infrastructure	The infrastructures complementary to IFMIF-DONES (roads, telecom, new schools) are expected to be remarkable.	Goal 9
Social capital	The social capital of the original population of Escúzar will be enriched. More open-minded perspectives of life and formation will be brought with new visitors and inhabitants.	Goal 11
Behavioral changes	The shift to a new productive framework and the arrival of people from other countries to the region will bring behavioral changes.	Goals 5, 10, 12 and 13
Preservation of socio-cultural patterns and practices	The abovementioned changes can in no way cause the disappearance of the socio-cultural patterns and practices of the original population. The necessary bodies and practices for cultural preservation must be created and fostered.	Goals 4, 10 and 11

Table 5. Impact of IFMIF-DONES implementation on socioeconomic indicators and specific SDGs. Adapted from Khan [29].

Topics on Social Sustainability	Promotion of Social Sustainability IFMIF-DONES	Promotion of Sustainable Development Goals (SDGs)
Participation (including stakeholder participation)	The local and regional institutions will have a strong and permanent presence and participation in all the aspects of the DONES environment.	Goal 16
Human dignity		
Safety and security	Better infrastructures, safer roads, etc.	Goal 9
Sense of place and belonging	Regional pride of one infrastructure that will be a key milestone toward nuclear fusion will undoubtedly reinforce the sense of place and belonging.	
Education and training	More schools and more international students will be a challenge for education and training, which will be improved.	Goal 4
Employment	Many workers, qualified and not qualified, will be needed and hired during several decades.	Goal 8
Community involvement and development, community resilience	One of the main targets of the University of Granada, as an implementing body of the project, is community involvement. For this reason, continuous activities to communicate to the community what is being done are being carried out.	Goal 16
Fair operating practices	The final target is the decrease in uncontrolled energy consumption and emission of hazardous substances. Therefore, IFMIF-DONES will result in fair operating practices in industry, transport and other key activities.	Goals 12, 13, 14 and 15
Capacity for learning	The activities of the University of Granada result in deeper know-how in scientific and operational terms based on continuous retrofit.	Goal 4
No structural obstacles (to health, influence, competence, impartiality and meaning-making)		

6. Conclusions

Large scientific and technological infrastructures have impacts on many aspects of human communities. These aspects go from international to territorial levels and also from economic to social perspectives, including a wide variety of intermediate levels.

These impacts are even greater when the infrastructures have deep implications as experimental nuclear fusion facilities. The necessity of cleaner, safer and more efficient energy from the atomic nuclei is a key milestone in the long way to really sustainable development. The current rate of development requires huge amounts of energy whilst the worrying situation of the environment, the negative effects on human health and the lack of more and more natural resources leaves the question of energy as one of the main challenges for the upcoming decades.

In this framework, the "International Fusion Materials Irradiation Facility—Demo Oriented Neutron Source" (IFMIF-DONES) is a unique project to test different material

candidates for the construction of future fusion reactors. In other words, without the results of IFMIF-DONES, access to fusion energy will be impossible during this century.

Departing from this evidence and trying to enlarge the spectrum of positive effects at all levels, large projects like IFMIF-DONES should incorporate targets and strategies beyond the classic social responsibility in order to satisfy the necessities of the territories. Thus it is essential to create added economic and environmental value whereas, in parallel, creating social value [29]. This ensures sustainable economic success in the territory.

There is a mutual relationship between territory and project because the project prospers when the society prospers and vice versa: new enterprises, better houses, schools, businesses, etc., that equally generate new projects. This is one of the reasons why all big projects should foster the achievement of the relevant Sustainable Development Goals (SDGs) in a broad and integral perspective.

In this work, based on the forecasts and current advances in the implementation of IFMIF-DONES in a rural zone of the South of Spain, we highlighted that, besides the well-known financial outputs and profits, large scientific and technological infrastructures are an efficient instrument for social sustainability through their direct impact on specific SDGs.

Furthermore, the asymmetrical social and economic impact of large scientific and technological infrastructures is also a matter of major concern. Whilst life conditions of people are not highly improved in big and developed regions, in small peripheral provinces with low average incomes, the effect on social sustainability, directly contributing to the achievement of certain SDGs, is very remarkable. Thus, people with a medium-to-high socioeconomic level and a wide variety of job opportunities may have some improvements in their conditions, but not great changes. On the other hand, unemployed people without a high level of studies and/or very limited options to change their jobs can experience big changes that will be transmitted to the rest of society through their big change in incomes, way of life and others.

Urban centers could be spaces where the sources of employment are larger than in rural spaces. As technology develops, the workforce has to be more specialized and therefore a greater gap will be generated between regions. Therefore, the migration for years of the rural population toward the cities is narrowing the labor market of these areas dedicated to agriculture, which is reducing the difference in income and opportunities between the rural and urban population. Thus, land attachment could also be favored with this kind of project that produces high returns to the territorial area in which it would be implanted.

As regards asymmetrical impact, institutions should treat laws and regulations of the projects as opportunities for improvement, development and sustainability, insisting on ethical behavior in their interactions with stakeholders [30]. However, trust and collective action are core topics because sustainability derives from accessible and inclusive processes. An integrated perspective on sustainability is thus implicated in more effective social sustainability, which in turn relies upon attention to local contexts and ideas.

Furthermore, the development of a territorial identity seems basic not only for avoiding offshoring risks but also because new implementations require specific characteristics and demanding rules for service quality in the territory. The regional and local identity among citizens, politicians and society in general allows an integrated approach to environmental and social sustainability that represents an added value when considering the attraction of future investments.

In summary, besides its important technical implications and its contribution to the control of fusion energy, IFMIF-DONES is expected to become an engine fostering the development of a depressed area thus demonstrating some hypotheses and becoming a great field experiment in social and economic sustainable development.

Author Contributions: Formal analysis, A.P.-G. and V.F.-P.; Funding acquisition, A.P.-G.; Investigation, A.P.-G. and V.F.-P.; Methodology, A.P.-G. and V.F.-P.; Project administration, A.P.-G.; Resources, A.P.-G.; Visualization, V.F.-P.; Writing—original draft, A.P.-G. and V.F.-P. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the European Commission as part of the project "DONES Preparatory Phase" (Ref. 870186).

Institutional Review Board Statement: Not relevant.

Informed Consent Statement: Not relevant.

Data Availability Statement: Not relevant.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. World Commission on Environment and Development. *Our Common Future*; Oxford University Press: Oxford, UK, 1987.
2. United Nations Division for Sustainable Development Goals (DSDG). Available online: https://sustainabledevelopment.un.org/ (accessed on 30 December 2020).
3. Henriques, A.; Richardson, J. *The Triple Bottom Line: Does It All Add up? Assessing the Sustainability of Business and CSR*; Earthscan: London, UK, 2004.
4. Cardillo, E.; Longo, M.C. Managerial Reporting Tools for Social Sustainability: Insights from a Local Government Experience. *Sustainability* **2020**, *12*, 3675. [CrossRef]
5. Molina-Moreno, V.; Leyva-Díaz, J.C.; Sánchez-Molina, J.; Peña-García, A. Proposal to foster sustainability through circular economy-based engineering: A profitable chain from waste management to tunnel lighting. *Sustainability* **2017**, *9*, 2229. [CrossRef]
6. Hermoso-Orzáez, M.J.; Lozano-Miralles, J.A.; Lopez-Garcia, R.; Brito, P. Environmental criteria for assessing the competitiveness of public tenders with the replacement of large-scale LEDs in the outdoor lighting of cities as a key element for sustainable development: A case study applied with PROMETHEE methodology. *Sustainability* **2019**, *11*, 5982. [CrossRef]
7. Elkington, J. Accounting for the triple bottom line. *Meas. Bus. Excell.* **1998**, *2*, 18–22. [CrossRef]
8. Peña-García, A.; Salata, F. The perspective of Total Lighting as a key factor to increase the Sustainability of strategic activities. *Sustainability* **2020**, *12*, 2751. [CrossRef]
9. Spanish Ministry for Ecological Transition and Demographic Challenge. Available online: https://energia.gob.es/nuclear/Centrales/Espana/Paginas/CentralesEspana.aspx (accessed on 29 November 2020).
10. Available online: https://www.iter.org/proj/inafewlines (accessed on 30 December 2020).
11. Levy, N. Taking Responsibility for Responsibility. *Public Health Ethics* **2019**, *12*, 103–113. [CrossRef] [PubMed]
12. Torjman, S. *The Social Dimension of Sustainable Development, a Paper Prepared for Commissioner of Environment and Sustainable Development*; Caledon Institute of Social Policy: Ottawa, ON, Canada, 2000.
13. Hall, J.; Matos, S.; Sheehan, L.; Silvestre, B. Entrepreneurship and Innovation at the Base of the Pyramid: A Recipe for Inclusive Growth or Social Exclusion? *J. Manag. Stud.* **2012**, *49*, 785–812. [CrossRef]
14. Zink, K.J. Designing sustainable work systems: The need for a systems approach. *Appl. Ergon.* **2014**, *45*, 126–132. [CrossRef]
15. Missimer, M.; Robèrt, K.-H.; Broman, G. A Strategic Approach to Social Sustainability—Part 2: A Principle-Based Definition. *J. Clean. Prod.* **2016**, *140*, 42–52. [CrossRef]
16. McKenzie, S. *Social Sustainability: Towards Some Definitions*; Hawke Research Institute Working Paper Series No 27; University of South Australia: Magill, Australia, 2004.
17. Polese, M.; Stren, R. *The Social Sustainability of Cities: Diversity and the Management of Change*; University of Toronto Press: Toronto, ON, Canada, 2000.
18. Geibler, J.; Liedtke, C.; Wallbaum, H.; Schaller, S. Accounting for the Social Dimension of Sustainability: Experiences from the Biotechnology Industry. *Bus. Strategy Environ.* **2006**, *15*, 334–346. [CrossRef]
19. Huq, F.A.; Stevenson, M.; Zorzini, M. Social sustainability in developing country suppliers. *Int. J. Oper. Prod. Manag.* **2014**, *34*, 610–638.
20. Lindgreen, A.; Antioco, M.; Harness, D.; van Sloot, R. Purchasing and Marketing of Social and Environmental Sustainability for High-Tech Medical Equipment. *J. Bus. Ethics* **2009**, *85*, 445–462. [CrossRef]
21. Brown, D.; Dillard, J.; Marshall, R.S. *Triple Bottom Line: A Business Metaphor for a Social Construct*; School of Business Administration, Portland State University: Portland, OR, USA, 2006.
22. Vavik, T.; Keitsch, M. Exploring relationships between Universal Design and Social Sustainable Development: Some Methodological Aspects to the Debate on the Sciences of Sustainability. *Sustain. Dev.* **2010**, *18*, 295–305. [CrossRef]
23. Carta, M. Reimagining urbanism. In *Creative, Smart and Green Cities for the Changing Times*; List Lab: Trento, Italy, 2014.
24. Shao, G.; Li, F.; Tang, L. Multidisciplinary perspectives on sustainable development. Int. J. Sustain. *Dev. World Ecol.* **2011**, *18*, 187–189. [CrossRef]
25. Ghahramanpouri, A.; Lamit, H.; Sedaghatnia, S. Urban Social Sustainability Trends in Research Literature. *Asian Soc. Sci.* **2013**, *9*, 185–193. [CrossRef]
26. Weingaertner, C.; Moberg, Å. Exploring social sustainability: Learning from perspectives on urban development and companies and products. *Sustain. Dev.* **2014**, *22*, 122–133. [CrossRef]
27. Suopajärvi, L.; Poelzer, G.A.; Ejdemo, T.; Klyuchnikova, E.; Korchak, E.; Nygaard, V. Social sustainability innorthern mining communities: A study of the European North and Northwest Russia. *Resour. Policy* **2016**, *47*, 61–68. [CrossRef]

28. Vasquez, R.V.; Klotz, L.E. Social Sustainability Considerations during Planning and Design: Framework of Processes for Construction Projects. *J. Constr. Eng. Manag.* **2013**, *139*, 80–89. [CrossRef]
29. Khan, R. How Frugal Innovation Promotes Social Sustainability. *Sustainability* **2016**, *8*, 1034. [CrossRef]
30. Wolsko, C.; Marino, E.; Doherty, T.; Fisher, S.; Goodwin, B.; Green, A.; Reese, R.; Wirth, A. Systems of Access: A Multidisciplinary Strategy for Assessing the Social Dimensions of Sustainability. *Sustain. Sci. Pract. Policy* **2016**, *12*, 88–100. [CrossRef]