

Model for Sustainable Construction- Terminal Fishing Campos DOS Goytacazes / RJ: A Case Study Seal Casa Azul

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Abstract— Nothing more current than the debates about the depletion of natural resources and the attitude of society on the problems arising from such an attitude. In construction, the situation is more delicate, given the excessive level of resources (renewable or not) extracted from nature; not to mention the high consumption of energy which cause the issue, in large quantities of greenhouse gases; or the high number of waste, some even harmful. In Brazil, sustainable construction began to be debated more vigorously from the Eco92 Conference at which culminated in the Agenda 21 (a document that shows the commitment of nations with a planning and environmental attitudes related to human productive activities). There are many questions about the challenges faced by companies in the construction and planning and control of an appropriate environmental management, the inclusion of sustainable processes in their activities; without burdening them, keeping costs within the required and planned. Some ideas come from waste minimization, or materials, manpower, money, either of time or energy. Win the company by reducing its costs, gains the environment, given that the disposal, most often occurs irregularly in wastelands or near rivers. Now, why not put the provision of important Brazilian economic activities, the benefits of an efficient engineering project in which sustainable aspects are covered in the construction and maintenance of a dedicated building for agribusiness? This study has this purpose, submit a technical proposal of clean construction and which would include sustainable aspects of a building (Processing Building) belonging to the construction project of a fishing terminal in the city of Campos dos Goytacazes / RJ. The universe of this research is related to construction of fishing terminals respecting sustainability and striving for clean building actions. This study is focused on the ongoing project in the city of Campos dos Goytacazes / RJ. The literature review presents books, articles, dissertations or theses and, behold, also, information about Seal Casa Azul and what the guidelines that best apply to this study. In particular, the gains made in choosing to build a building with sustainable premises.

Index Term— clean construction, public fishing terminal, seal Casa Azul, sustainability.

I. INTRODUCTION

Based on stated by Fernandes and Guedes [1], nothing is more current than the debates about the depletion of natural resources and the stance taken by the society against the problems arising from such attitude. In construction, the situation is even more delicate, given the excessive level of resources (renewable or not) extracted from nature; not to

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mention the high consumption of energy which cause the issue, in large quantities of greenhouse gases; or the high number of waste, some even harmful.

There are many questions about the challenges faced by companies in the "construction planning and control of environmental management, and the adequacy of sustainable processes that drive the company to this practice, reducing environmental impacts of business without generating excessive costs" [1].

"The construction sector currently contributes with a significant portion of environmental degradation from human activity" [2].

As a counterpoint to this reality, arises the "Sustainable construction, creation and responsible management of a healthy built environment, considering the ecological principles (to avoid environmental damage) and the efficient use of resources" [3].

With the need to quantify this sustainability that emerged sustainable seals.

According Marques and Costa [4], the established labels are nothing more than mechanisms to communicate to the consumer the quality levels, is the environment in which the process occurs, is directly related to the product, which is consumed. in this way, conferred certificates may come from national or foreign.

In Campos dos Goytacazes / RJ place provided for the establishment of a Public Fishing Terminal model, there is no adequate infrastructure for fish landings. Specifically in the Farol de São Tomé, where such activity is carried out wrongly.



Fig. 1 boat being pulled out of the sea dragged by tractor at Farol de São Tomé - Campos dos Goytacazes / RJ. Source: author's archive.

It is the only place in Brazil where the vessel which contains the fish is dragged by tractors, removing it from the sea and positioning it in the sand for fish landing. This procedure promotes the wear on the hull thereof, due to friction with the

sand, creating an additional maintenance costs, in addition to inadequate hygiene fish handling, as seen in Fig. 1.

The purpose of this study is to present the procedures for the certification Seal Casa Azul of Caixa Economica Federal (CEF), certificate of sustainability of a financial institution, in the form of a public company in the Brazilian federal government, as well as a technical proposal of clean construction and which would include sustainable aspects of a building (Processing building) belonging to the construction project of a fishing terminal in the city of Campos dos Goytacazes / RJ.

This work was developed from a detailed research on the topic of sustainability and civil construction, to prepare an article on this very exciting and current, as well as their contributions to the industry.

II. THEORETICAL FOUNDATION

Sustainable development is what allows satisfying basic human needs also to ensure that future generations do not have this committed right and let them have the capacity to meet their own needs.

"The awareness of the limits of space and natural resources of our planet is attracting increasingly, concern for the maintenance of these resources for future generations" [5].

"Improving the sustainability of processes, in all productive sectors, is a vital strategy for ensuring the planet's resources for the future, based on the use of renewable energy, clean technology and environmental protection" [5].

According to Santos et al. [6] Brazilian society adopted conscious attitude regarding the treatment of solid waste from civil construction, belatedly, causing irreparable damage to the environment. Sustainable construction is highlighted from Eco92 the discussions that led to the elaboration of Agenda 21.

However, only in 2002, in Brazil, the National Environmental Council (CONAMA), enacts the resolution No. 307 of July 5, 2002, establishing guidelines for waste

management of civil construction; and in 2010 by Federal Law No. 12.305 of 2 August 2010, instituted the national solid waste policy [7].

More recently, from the 1990s and intensely, the issue of sustainability has potentiated in the construction segment and its evidence gives up the high quality and diversity of qualifications and certifications that support the expression "green building "or" sustainable construction ", characterized by a new construction method called Green building [8]

The need for normalization of these sustainable processes has raised the so-called "green seals" such as BREEAM (Building Research Establishment Environmental Assessment Methodology), LEED (Leadership in Energy and Environmental Design), CASBEE (Comprehensive Assessment System for Built Environment Efficiency) and Seal Casa Azul, among others [9].

Considering the presented by Castro Filho [10], it appears that the Seal Casa Azul CEF, even as a dedicated certification for housing, is the one that most closely matches the national reality, is due to its economic complexity, is the operational feasibility.

Thus, the certification was chosen to guide the specific aspects of sustainability included in the construction project of the fishing terminal processing building in Campos dos Goytacazes / RJ.

The purpose of the Seal Casa Azul, is to promote the adoption of practices in the use of natural resources in real estate, help reduce costs in maintaining them, provide greater dissemination of ideas and advantages as to the sustainable buildings. Based on the following criteria: urban quality, design and comfort, energy efficiency, water management, conservation of material resources and social practices.

The Seal Casa Azul is used in several categories, criteria and ratings, between compulsory and optional requirements, to grant certification to enterprises per their prerogatives.

Table I presents: categories, criteria and classification of enterprises, according to the prerogatives of the Seal Casa Azul.

Categories / Criteria	Classification		
	Bronze	Silver	Gold
1. Quality Urban			
1.1 Quality of surroundings - Infrastructure	mandatory		
1.2 Quality of surroundings - Impacts	mandatory		
1.3 Enhancements surrounding			
1.4 Area Recovery degraded			
1.5 Rehabilitation Properties			
2. Design and Comfort			
2.1 Landscaping	mandatory	mandatory criteria + 6 items of free choice	mandatory criteria + 12 items of free choice
2.2 Flexibility Project			
2.3 Relationship with Neighborhood			
2.4 Alternative Solution Transport			
2.5 Place for Selective Collection	mandatory		
2.6 Leisure Equipment, Social and Sports	mandatory		
2.7 Thermal Performance - Prohibitions	mandatory		
2.8 Thermal Performance - Orientation to the Sun and Wind	mandatory		
2.9 Lighting Natural Common Areas			

Table I
categories, criteria and classification of projects (b).

Table I: categories, criteria and classification of projects (b)			
Categories / Criteria	Classification		
2. Design and Comfort	Bronze	Silver	Gold
2:10 Ventilation and lighting Bathrooms Natural			
2:11 Adaptation to Physical terrain conditions			
3. Energy Efficiency			
3.1 Low Power Lamps - Private Areas	Required w / HIS - up to 3 s.m.		
3.2 Economizers devices - Areas common	mandatory		
3.3 Solar Heating System			
3.4 Heating Systems Gas			
3.5 Individualized Measurement - Gas	mandatory		
3.6 Efficient Elevators			
3.7 Efficient Appliances			
3.8 Alternative Sources Energy			
4. Resource Conservation Materials			
4.1 Modular Coordination			
4.2 Quality of Materials and Components	mandatory		
4.3 Industrialized components or Precast			
4.4 Ways and Anchors reusable	mandatory		
4.5 Management in waste in Construction and Demolition (RCD)	mandatory		
4.6 Concrete with Strength optimized			
4.7 Blast Furnace Cement (CPIII) and Pozzolan (CPIV)			
4.8 Paving with RCD			
4.9 Facade of Serviceability			
4:10 Wood Planted or Certified			
5. Water Management			
5.1 Individualized Measurement - Water	mandatory		
5.2 Economizers devices - Flush System	mandatory		
5.3 Economizers devices - Aerators			
5.4 Economizers devices - Flow Restricted Action Valve			
5.5 Water Utilization storm water			
5.6 Water Retention storm water			
5.7 Infiltration Water storm water			
5.8 Areas permeable	mandatory		
6. Social Practices			
6.1 Education Management RCD	mandatory		
6.2 Environmental Education employees	mandatory		
6.3 Personal Development employees			
6.4 Professional Training of employees			
6.5 Inclusion of workers sites			
6.6 Community Participation in the Development of Project			
6.7 Guidance for Residents	mandatory		
6.8 Environmental Education Residents			
6.9 Training for Management enterprise			
6:10 Actions to Mitigate Social Risk			
6:11 Actions for Employment and Income Generation			

mandatory criteria + 6 items of free choice

mandatory criteria + 12 items of free choice

This terminal has for purpose meet the fishermen of artisanal and industrial fleet of the municipality and other surrounding. The project includes: commercial sector, processing industry (main aim of this study) and infrastructure sector.

According Talento [11], public fishing terminals are structures that seeks to support the logistics of the production process of fish, having the processing suitable locations, as well as aid to vessels.

Public Fisheries terminals are a fundamental part of the fishing infrastructure in the country.

"Fishing is one of the first extractive economic activities in the world and over the years has won its place in the economy, participating in the Gross Domestic Product (GDP) result of some municipalities and state, but especially in the national" [6].

Marques and Costa [4] explains that a marine environmental management system is necessary, not only in Brazil, but in a structured formal there is world-view of the numerous activities linked to the fishing industry.

"Historically artisanal fisheries, is one of the main economic activities of coastal communities, being responsible for a large number of jobs" [12].

"Part of the fish consumed [in Brazil] is from the artisanal fisheries, mainly activity performed by families of the coastal region and have relevance in social, economic and cultural context in the country" [13].

Dominguez et al. [12] states that artisanal fisheries suffer contrasts, compared to industrial, regarding techniques, the habitats in which they operate, exploited stocks, among others. Although it is a secular activity, there are numerous challenges: lack of investment, autonomous labor or self-employment.

According to Mendonça [14] even identifying significant number of activities along the Brazilian coast, artisanal fishing as a productive segment, has low recognition by national funding agencies, although it has a great socio-economic importance within the sector in relation to large number of jobs in coastal communities.

"In Brazil, fisheries management initiatives have sought greater involvement of resource users in decision-making on the alternative as management processes to centralized model in the state" [15].

To establish a fish processing plant in the region, many will be minimized or even extinct problems. By promoting a minimal logistic structure, general improvements in fishing

activity will be observed as a reduction in work accidents, better sanitary conditions for fish and handling, among others.

III. METHODOLOGY

According to the Ministry of Brazilian Fisheries and Aquaculture, the TPP's infrastructure are of great importance for the development of aquaculture and fisheries production chain. Since its services range from the reception, unloading, washing, sorting, weighing, storage, processing to marketing of fish.

The information contained herein is derived from plants and existing specifications in the project, which should be identified and adapted according to the criteria of the Seal Casa Azul.

There are very few or no information about Public Fishing Terminal (TPP) in the State Department of Fisheries and Supply of Rio de Janeiro, and in the state there is no TPP in operation today. The rest of the literature review, as well as the elaborate proposal, has the scientific foundation: articles, books and others.

According to Yin [16], this research it is a case study because of the adoption of qualitative data obtained through analysis of real situations, in order to explore, illustrate and indicate occurrences introduced the assessed context of a single object.

Sustainable seal was chosen for building projects of national nature, to serve as an experimental model to justify the sustainability of the complex construction project, since it is geared to housing units and not for industrial buildings.

Analyses were performed in the executive projects to verify compliance with the criteria of the Seal Casa Azul, based on 53 criteria established by Seal Casa Azul of Caixa Economica Federal, 19 mandatory requirements, it identified over 12 free choice that is best suited to the specific characteristics and requirements of the project, to obtain the Gold Rating.

As was mentioned in the previous session, the Casa Azul Seal has its criteria divided into six categories as explained in Table II.

Table II

Summary of the categories of the Seal Casa Azul. Source: Castro Filho [10]

Urban Quality	The first stage of enterprise planning. It is the right choice of location with: integration of housing with the city and meeting the needs of future residents.
Design and Comfort	Aspects related to the project planning and conception of the project: adaptation to climatic conditions; Adaptation to the physical and geographical characteristics of the site and the terrain; And forecast spaces for specific uses and purposes.
Energy Efficiency	Measures to make the use and operation of buildings more efficient in relation to energy conservation: more efficient equipment; alternative energy sources; Economizers devices.
Conservation of Material resources	Evaluates the rational use of building materials; Defines actions to avoid waste and reduce the amount of work waste; Encourages the use of planted or certified wood.
Water Management	It evaluates aspects related to the reduction of water consumption, through the use of saving devices and management of water use in the building.
Social Practices	It seeks to promote the sustainability of the enterprise through actions involving: entrepreneurs; builders; workers; Residents and future residents.

These Casa Azul Seal categories become relevant as an environmental policy of large corporations and government organizations are formulated with ecologically efficient guidelines.

The Casa Azul Seal is divided into three classifications, Brass Seal, Silver Seal and Gold Seal. Such classifications correspond to how much the project or enterprise is more engaged with the question of sustainability. The Bronze Seal is acquired when the project met all the mandatory requirements of the Casa Azul Seal. The other two seals, both the Silver Seal and the Gold Seal, need to meet, in addition to the mandatory requirements, six or more optional requirements respectively.

Because it is a government project and of great social, ecological and economic impact, the Gold Seal was chosen.

IV. ANALYSIS OF PROJECT

In Fig. 2, has the outline of the fishing terminal, highlighting the processing building, which will feature an approximately 900 m² of built area project, which is composed of a building for the administrative (local responsible for all relevant documentation), female and male changing rooms to meet the staff who work in fish processing, including toilets for people with special needs.

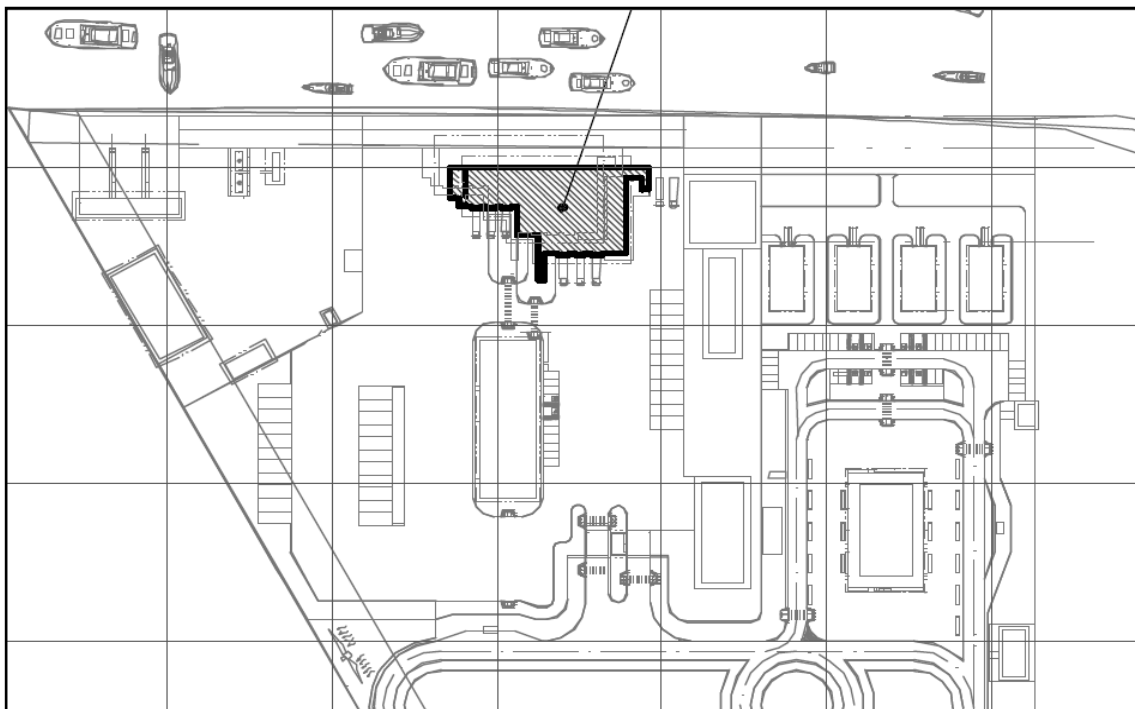


Fig. 2. Outline of the Project, highlighted the processing building. Source: Public Fishing Terminal Project Farol de São Tomé - Campos dos Goytacazes / RJ

Table III shows the 19 mandatory requirements and the choice was made to the requirements that best fit the project. requirements of 12 free choice selected for this project. The

Table III
Criteria adopted by the project. Source: Public Fishing Terminal Project Farol de São Tomé - Campos dos Goytacazes / RJ

Certification Seal Casa Azul (CEF) - Gold Seal	
Mandatory Criteria	Free Choice Criteria
<ol style="list-style-type: none"> 1. Environment Quality - Infrastructure 2. Environment quality - Impacts 3. Landscaping 4. Location for Collection selective 5. Leisure, social and sporting 6. Thermal Performance - Prohibitions 7. Thermal Performance - Orientation to the sun and wind 8. Energy-saving lamps - Private Areas 9. Saving Devices - Common Areas 10. Individual measurement for gas/water 11. Quality of materials and components 12. Forms and reusable anchors 13. Construction and Demolition Waste Management - RCD 14. Saving Devices - Discharge System 15. Permeable Areas 16. Education Management RCD 17. Environmental education for employees 18. Inclusion of local workers 19. Guidance to residents 	<ol style="list-style-type: none"> 1. Relationship with the neighborhood 2. Ventilation and natural lighting bathrooms 3. Adaptation to the physical conditions of the land 4. Solar heating systems 5. Efficient Appliances 6. Alternative energy sources 7. Economizers devices - Aerators 8. Rainwater harvesting 9. Retention of rainwater 10. Infiltration of rainwater 11. Actions to mitigate social risks 12. Actions for the generation of employment and income

The place will have the necessary pipes so there is a network of drinking water, the result of a partnership with the State Company for Water and Wastewater (CEDAE). It is planned to install a water separating unit and to prevent oil contamination of soil and water as well as a building for treating solid waste; a sewage treatment plant (WWTP) and a recycled water treatment plant (WTP). Account also with the installation of a power substation in high (Table 1, item 1.1). The project will not affect at all, the people's well-being, since the nearest residents live 2.5 km from the site (Table 1, item 1.2). And the harmony of the place in which is inserted, given its more remote location of the cities and all questions about environmental impacts have been analyzed and minimized by a previous study (Table 1, item 2.3).

It is planned an elaborate landscaping work, with a total area of approximately 11mil m² (Table 1, item 2.1). native plants of the site will be used: Pitangueira, Filodentro of Amazônia, Aveloz, among other Guriri and 8000 m² of Batatais grass and fertilized land.

The project includes trash games for selective collection in each terminal environment and production area this collection is intensified given the volume of waste produced. Another aspect is adequate space with ventilation and coating for easy cleaning and selection, separation and organization of the material to be recycled (Table 1, item 2.5).

Whereas the employees of the administrative and production will dine on site, you will be offered a cup of room properly equipped with microwave and refrigerator, tables and chairs; to provide a quiet meal at all. Another aspect to highlight is the

living area, which have shall be a games that will have ping pong table, pool and other games, TV with DVD player, armchairs and chairs, so that the time of range is relaxing and stimulating to return to activities (Table 1, item 2.6).

The roof is composed of tiles in galvanized steel and thermo-acoustic insulation. The walls will receive thermal insulation in which will be used isopainel® (Thermal insulation panel) to maintain low temperatures in these areas, as a processing area and handling of perishables. The other walls are painted with self-cleaning thermal ink soften up to 30% of the heat and retains up to 96% of ultraviolet rays (Table 1, item 2.7).

Due to the specificities of the project, the processing building may not use cross-ventilation due to possible contamination of the product (fish). Therefore, the project will have central air conditioning, and solar-powered base (Table 1, item 2.8).

They're provided 29 windows made some in aluminum and others in stainless steel (extra protection against natural corrosion of the local - coastal region). The sum of the areas occupied by windows representing a total of 82.21 m², corresponding to 9.13% of the area of environment. According to John et al [17]. (2000), the minimum area to be established is 12.5% of the area of environment (lighting and ventilation). It requires the inclusion of 30.29 m² frames, to achieve a total of 112.50 m², corresponding to 12.5%, as required. Here's how readjusting suggestion of the initial project to change all windows that have a 1 meter height to 1.2 meters, and also would be placed two more windows great model, thereby achieving adequate ventilation area (Table 1, item 2.10)

In order to ensure sustainability of project execution, will be

used reusable metal stanchions, rented (Table 1, item 4.4). The coatings are of good quality and high durability, such as the industrial panel type **granilite**. The prefabricated structure and considerable part of the floors / walls come ready factory; measurement made on considerably reducing the amount of solid waste. Priority will be given to suppliers recognized for sustainable certifications: ISO 14000, among others (Table 1, Item 4.2).

The plot shows the difference of 0.9 meters, so it will be a ground with solid waste from two sources (Table 1, item 2.11 and 4.5). The first would be the demolition of existing buildings on site, expropriated by the federal government. Another would be the waste generated in the construction of the project. However, little will be, given the fact that a considerable part of the material is machined or came ready factory.

They will use LED lamps and magnetic induction, with a lifespan of 100,000 hours. All lamps have the certification of Procel, in order to ensure adequate lighting, but that provides a low power consumption (Table 1, items 3.1 and 3.2).

Through the generation of photovoltaic energy converted into electrical energy, existing showers in the bathrooms provide hot water (Table 1, item 3.3). Because it is a project that aims to meet the needs of an industry, the aforementioned questions become irrelevant and dispensable (Table 1, items 3.5 and 5.1).

Many are the equipment to be installed: mats, cold storage, central air conditioning, lighting system, ice machine (and that is produce 24 tons of ice per day). smaller equipment such as television, microwave, refrigerator and others, all with Inmetro certificate of efficiency and low power consumption will also be used (Table 1, item 3.7).

The project provides for the existence of a solar energy harvesting system using photovoltaic panels to send captured energy to the electricity network in order to obtain discount on monthly electricity consumption bill and avoiding waste of it. The forecast is 100% off for the consumed by the processing building. The investment has a payback of 04 years, and a lifetime between 25 to 30 years (Table 1, item 3.8).

Processing building project establishes the construction of 02 shared bathrooms, 04 individual bathrooms for wheelchair users and 02 individual bathrooms. With the aim of reducing water consumption, will be adopted 36 toilets with dual drive exhaust system, with 3:06 liters (Table 1, item 5.2). Also aiming to reduce water consumption without sacrificing user comfort will be used aerators and drive system and self-closing taps (Table 1, item 5.3).

Based on items 5.6 and 5.7 of Table 1, suggest the creation of a storm water retention tank to be used for watering the plants existing in the processing building area, returning to the ground and therefore to supply groundwater. However, there is a study of the region in which it is mentioned a volume of whimsy rains. In this way, it is planned for the project, a water reuse system, the first part of fish processing. Whereas water

consumption is 300 m³ / day, reused water, daily, is one-third of this value (Table 1, item 5.5).

The development will have an area of approximately 48,000 m², and of this total, 11 000 m² are native vegetation of the region. In this way, we have there will be a 23% permeability area, well above the 10% required by municipal law, and also be a higher rate than required by the Seal Casa Azul (Table 1, item 5.8).

Little waste is generated in this construction project, since machined material will be used, ie a considerable part of walls and floors will ready the factory to the building site. Other waste would be produced from the demolition of some housing units on site, but as mentioned earlier, will be allocated to the flatwork (Table 1, item 6.1).

There were meetings between the technicians involved in the project, experienced regarding sustainability and environment, fishermen and their families, aiming to clarify the environmental concerns and sustainable measures provided for in the project, while meeting both counts (Table 1, items 6.2 and 6.7). Although not the case of a housing unit, such a requirement (Guidance to residents) was adapted to the project reality.

Another goal was to absorb as much of the existing workforce in the region (approximately 70% of employees), residents of the city and surrounding region, the rest refers to technicians from other regions, with qualification / experience required to ensure the success of the enterprise (Table 1, item 6.5).

V. CONCLUSION

The purpose of this project is to provide a suitable environment for artisanal fishermen of the locality, reception and commercialization of the fisheries, with ample space for technological processing: capture, cleaning, packing and shipping (Table 1, item 6.10). All this provides ways for families linked to the sector have adequate conditions of handling production, creating competitive advantages to market production; providing socio-economic development in the region (Table 1, item 6.11).

A great perspective is presented in this project, not only for fishermen, but for the entire region in which the fishing terminal will be inserted. Provide means of promoting demand for fish, generate income for the families involved and therefore foreign to the municipality.

This project is a development of the Brazilian federal government, which will be analyzed and discussed in the fields, economic, social and environmental, to check its viability. Checking that viability positively, the government will finance not only the steps that precede the construction process and the building itself, but also fund for a period determined the operation of the terminal, so that fishermen fully understand all the processes carried out in the new terminal. After this period the federal government will have a share only of the administration, together with the company,

and a public-private management.

It was proposed to analyze the existing project and indicate sustainable aspects to be included in the fishing terminal construction project in Campos dos Goytacazes / RJ. These guidelines will apply, notably to the processing building, because it is the most important building of the whole complex, for its size and impact on the production, handling and marketing of all fish in the area.

To achieve sustainable guidelines, supported by a recognized certification, it was decided to choose the Seal Casa Azul of Caixa Economica Federal (CEF).

It is a certification for housing developments, however, in the case of a national seal of sustainability, it was decided to perform adjustments to the criteria set by the EFC, applying them to project needs, to meet the demands of the terminal.

Aiming at the Gold Seal, the proposal is nothing more than a small adjustment in some respects, the initial project. It is indicated 19 required criteria, plus 12 free choice; all within the reality of the processing building design fishing terminal and their real needs.

Is worth pointing out that in some topics, are used the full guidelines of the CEF, and others, was held a small adaptation. Considerable part of the project contemplated sustainable aspects; at some points, they were made some adjustments and few inclusions were necessary.

From the presentation of this work, it is expected that the Caixa Econômica Federal (CEF), entity so respected, not only to support the implementation of this project, but also mobilize efforts to create a seal on the entity aimed at industrial buildings, such LEED or BREEAM.

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