

# A Study on Financing for Sustainable Construction Projects

D. Pramod Chakravarthi, A. Aravindan

**Abstract:** *In present scenario, Sustainability has utmost importance in the verge of climatic change worldwide. Construction industry today need to recognize that sustainable construction is becoming a greater concern. As it is the major consumer of natural resources and virgin materials. So there is an increasing demand for the sustainable designed construction projects. For any project, financing plays a crucial role and especially for the construction projects which are aiming to achieve the sustainability in their construction projects. There are many challenges involved in the financing of sustainable construction projects like risks due to different contract forms, lengthy approval process, unfamiliarity with the technologies, split incentives for owner and tenant, resistance to change, lack of education. To cater the special financial needs of sustainable projects, an innovative financial solution is Eminent. This research is a conceptual study with explorative methodology. This study proposed a possible model for financing of sustainable construction projects. This paper also completes the learning gap by recognizing and summarizing the present financing related issues in sustainable construction projects.*

**Index Terms:** *Financing, Incentives, Policies, Project, Sustainability.*

## I. INTRODUCTION

Sustainability is a most commonly used word, however Sustainability can be defined as development that meets the needs of the present generation without compromising the ability of future generations to meet their needs. There are three main components in sustainability, they are economic growth, social progress and environmental protection. The expression “green building” and “sustainable construction” can be utilized conversely as they both refer to the utilization of resources in an increasingly proficient and environmentally friendly way. The United States Environmental Protection Agency (USEPA) uses both terms to describe “the protection and restoration of human health and the environment through design, construction, operation, maintenance, renovation and construction. Sustainable construction projects can be defined as project in which construction, operation, maintenance, renovation, and demolition of a project takes place in an environment friendly way.

A vast amount of literature is available on sustainable construction, in which majority of them are concentrated on

- i. Environmental benefits.
- ii. Innovative designs.
- iii. Construction technologies.
- iv. Project management techniques.
- v. Financial Benefits

But, other major factor that is neglected in the research area is financing of the sustainable construction projects.

These days it has been broadly identified that humanity is facing different challenges such as environmental change, material depletion, and deterioration of environment. The construction sector plays a major role in it. As it is the major consumer of the energy, water and virgin materials when compared to the other industries. According to the United Nations Environment Program (UNEP), the construction sector has become a larger energy consumer that uses 40% of global raw materials and 40–50% of global energy.

Financing for sustainable construction project can be referred to boost capital investments for sustainable construction projects, or companies that are committed to support the promotion of a sustainable built environment. Idea for financing of sustainable construction project financing increased significantly after the 2016 Group Twenty (G20) Summit, in which the G20 Action Plan on the 2030 Agenda for Sustainable Development was released.

High cost and unfamiliarity with the technologies are the factors hindering the sustainable development.[1] Broader involvement of private sectors release part of the financial burden from the government. He also said that Sino – Singapore collaboration is difficult to reproduce in other sustainable cities as its required willingness. [2] Incentives is one of the most important factor that effects the implementation of sustainable construction. A better understanding of stake holder behavior and concern is the major factor for the effective implementation of policies to make sustainable construction a model practice.[3] Major problem that is identified in many studies is additional cost of the sustainable construction projects faced by developers and clients.[4] As the benefits are mostly occurred at the operational phase of structure there is no reason for the developers and stake holders to focus on sustainability, as their main focus is on short term profitability of investment[5].

## II. OBJECTIVES

1. To study and understand financing of sustainable constructions projects.
2. To give holistic view and bridge the knowledge gap concerning the adaptability of sustainable construction projects with respect to developed countries.
3. To propose a probable solution for financing of sustainable constructions.

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**D. Pramod Chakravarthi**, Department of Civil Engineering, Koneru Lakshmaiah Educational Foundation, Vaddeswaram, Guntur, A.P, India.

**Dr. A.Aravindan**, Professor ,Department of Civil Engineering, Koneru Lakshmaiah Educational Foundation, Vaddeswaram, Guntur, A.P, India

### III. RESEARCH SIGNIFIANCE

Construction industry is the major consumer of raw and virgin materials. So, everyone is looking toward environmentally friendly constructions i.e. Green and sustainable constructions. The construction sector has an important stance in forwarding the concept of sustainability into practice.

The researchers questions addressed in this study include:

- i. Different financial instrument's available for financing of construction projects their pros and cons?
- ii. To identify different challenges for financing of these special projects?
- iii. What are the possible solutions that can be implemented for financing sustainable construction projects in India?

### IV. RESEARCH METHODOLOGY

This is an explorative study about the financing of sustainable construction projects in identify the challenges for facing the financing of sustainable projects. The comparative analysis of different financing models across the nation. The secondary information / data was collected from different sources like textbook, internet, articles, research papers etc. This study was an attempt to identify possible financing solutions for sustainable designed construction projects.

### V. RESULT AND DISSCUSION

The Financial vehicles identified for sustainable designed construction projects

Following are the financing vehicle's that can be widely for sustainable construction projects, they are

1. Bank loans
2. Green Bonds
3. Private Capital
4. International assistance Program
5. Government Funds and tax Refunds

**Banks:** Banks are the major source for financing any kind of Needs. They provide financing in long term, and short term as well as secured, unsecured, subsidize, and concessional loans. Nearly from two decades different financial institutions like State Bank of India (SBI) had launched a financing scheme for encourage customers to choose green housing rather than conventional housing which are certified by rating agencies such as Indian Green Building Council(IGBC), Leadership in Energy & Environmental Design(LEED)India, The Energy and Resource Institute(TERI). ICICI Bank launched Vehicle Finance scheme for purchase of cars using renewable energy sources like Compressed Natural Gas (CNG) and Liquid Petroleum Gas (LPG) with a subsidy of 50% in interest rate

Pros:

- Bank loans are flexible
- There are different loan terms and loan types like short term and long term

Cons:

- High cost
- Complicated procedures
- Limited credit amount.

**Green Bonds:** A Green bond is a debt instrument specially earmarked to be used for financing climate and environmentally friendly projects. The Green Bonds popularity was increasing day by day in an exponential rate. The International green bond market has increased from \$34 billion in 2014 – to \$41 billion in 2015 – to \$81 billion in 2016 – to more than \$150 billion in 2017 – it reached nearly over \$250 billion in 2018. World Bank was the first financial institution to issue green bonds from 2008 and issued over \$3.5 billion in debt especially for causes related to environmental change. From past ten years from 2008-2018, the World Bank's green bond program till now provided over \$10 billion from the issuance of green bonds, issuing over 130 bonds in 18 difference currencies during the same ten-year period. The commonwealth of Massachusetts in April 2017 sold over \$1 billion green bonds and use the funds for developing water infrastructure in the State. India being a developing country has a bond market operating in the young stage. The first Indian bank to issue Green Infrastructure Bonds in India was Yes bank. It had issued GIBs worth 1,000 crore rupees in 2015.

Pros:

- Lower Costs compared to banks.
- Possibility to boost greater amount of money and activate social assets.

Cons:

- Higher Financial Risk of the investment to investors.
- Strict restriction in terms and conditions.

**Private Capital:** Sustainable projects require large amount of financing for a long term. The budgets introduced by the governments are helpful for these kinds of financing, but there are some obstacles in this method. So, private investment is required for financing sustainable construction projects. The private investment is mainly done by the corporate's, Individual Investors, Hindu Undivided Families (HUF), Cooperative Trust's etc. who has a desire towards the sustainable future.

Pros

- Easily adjustable
- The responsibility is transferred to private sectors which reduces financial hardship on the government.

Cons

- Hard to find another financier if the existing one withdraws due to un precedent events
- Higher living cost for inhabitants

**International Assistance Programs:** There are many internationally renowned financings institutions like World Bank, European Investment Bank, Asian Development Bank, European Bank For reconstruction and Development provides a number of programs to promote sustainable development around the world. For Instance, the Sino - Singapore Tianjin Eco city has received an International assistance of USD 6.16 million from Global Environment Trust Fund for this project. The financial aid provided by these programs is limited to certain extent. This international



program helps these projects to attract more capital from private investors. The main reason for this is because an international assistance program is sanctioned to a project only when it undergoes a strict set of assessment process and satisfies all the required conditions.

Pros:

No necessity to payback.

Cons:

Aimed at concentrated projects only and are not accessible for all projects.

**Government funds and Tax Incentives:** Recent studies provided an insight that lack of incentives is one of the most prominent factors effecting the endorsement of sustainable construction projects. Some of the common practice are density and height bonuses. These are the main incentives that are being used to attract the developers, stakeholders, and investors. On the other hand, there are some problems in implementing such as lack of specialized staff, Proper mechanism of evaluating these projects.

Pros:

No necessity to payback.

Cons:

Majorly relying on government policies.

**Floor Area Ratio & Height Bonuses:** FAR & Height Bonuses are used to benefit developers for additional unit permits in the form of either the Floor/Area Ratio (FAR) or height bonuses. For example, in India Floor Area Ratio offered for green buildings range from 0.15 for LEED Certified, to 0.25 for LEED Silver and 0.35 for LEED Gold or Platinum certifications.

**Tax abatements:** Tax abatements targets to activate contractors for building green by reduction and for some cases by providing exemption in taxes for a specified period of time (IGBC). In other words, tax abatements are provided so the developer/contractor can benefit or increase their revenues. In practice the tax benefits cannot be used in a year, so flexibility has to be provided.

**Fee waivers:** Fee waivers implemented by reducing the fee required for municipalities for building permits and approval of the certification. The main goal is to decrease extra costs for obtaining a certificate. The level of certification decides the percentage of fee reduction applied. Several drawbacks can be observed during the implementation of fee waivers. There is a necessity of technically sound employee for the assessment and the monitoring of the applications received in the government organization.

**Awards and Marketing Assistance:** The local government should provide the Awards and Marketing assistance to the projects which are qualified for the prescribed green building criteria which includes both financial and marketing benefits. This Research also studies two case for financing of special purpose projects one national and another international i.e, Power Finance Corporation and London Green Fund for a better understanding of the concept so that some possible solution for financing sustainable construction projects can be done.

**Case Study1: London green fund-** The London Green Fund (LGF) is an example of European Regional Developmental Fund (ERDF) for financing the green infrastructure projects to reduce the carbon emissions in the

London city and make the London city a leading world capital with low carbo emissions. The London Green Fund (LGF) consist of three major diversified financing areas such as energy efficiency, waste water sector and green housing. The LGF collects money from private investors, public and equity from equity also. The LGF provided finance for city's first plastic recycling plant. In this study, the concentration is particular on the financing of the success parameters of the LGF. The study identifies the difficulties in funding a new sector under present market conditions. A number of amendments have been made to LGF so that it can capture varied number of opportunities and challenges. For example, getting Finance for complex green infrastructure projects and locating where the market drawback occurs with changing public sector borrowing rates is a cumbersome process. Till date LGF has invested EUR 479.7 million in 15 projects with a combined project value EUR 800 million. Several factors have contributed to the success of the London Green Fund, a solid procedure and necessary adjustments to the strategy, the long-term vision and commitment of stakeholders should be high to meet the challenges in establishing and delivering such a humongous task. Table I provides the snapshot of LGF.

Table I A Snapshot of LGF

|                            |                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Name                       | London Green Fund (UK)                                                                                                                |
| Funding Source             | European Regional Development fund                                                                                                    |
| Type of Funding Instrument | Equity and Debt                                                                                                                       |
| Financial Size             | EUR 479.7 million                                                                                                                     |
| Focus sector               | Energy efficiency and waste                                                                                                           |
| Final receiver             | Public organizations and private companies                                                                                            |
| Collaboration              | Greater London Authority (GLA), London Waste and Recycling Board, European Investment Bank (EIB), pension funds and private investors |
| Results                    | Targets: 28,000 tonnes of CO2 saving p.a.; 245,000 tonnes of waste diverted from landfill p.a.; 100 jobs created.                     |

The LGF is operated by European Investment Bank (EIB) on behalf of the Great London Authority. It was setup using 'holding fund model' and they do not invest directly into the projects but they provide smaller amounts to the urban development funds. The following are the main success factors of the London green fund, they are

- Long term vision and commitment to overcome the problems in setting up a new funding process which is untested.
- Experience and knowledge of Holding Fund Manager.

**Case Study 2: Power Finance Corporation (PFC)-** Power Finance Corporation (PFC) Ltd. is a Schedule-A Navratna Company and is a leading Non-Banking Financial



Corporation in India. PFC is a specialized finance corporation institution in power sector with around 20% market share in India. Designated as a "Nodal Agency" for development of Integrated Power Development Scheme (IPDS), Ultra Mega Power Projects (UMPPs) and "Bid Process Coordinator" for Independent Transmission Projects (ITPs). It provides consultancy & advisory services in strategic, financial, regulatory and capacity building skills under one umbrella. Table II provides a snapshot of PFC

**Table II: A Snapshot of PFC**

| Name                       | Power Finance Corporation                                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Funding Source             | Rupee denominated bonds                                                                                                                  |
| Type of Funding Instrument | Equity and Debt                                                                                                                          |
| Financial Size             | INR 38,274 Crore                                                                                                                         |
| Focused sector             | Power and Allied Infrastructure Products                                                                                                 |
| Final Receiver             | Public organizations and private companies                                                                                               |
| Collaboration              | Government of India                                                                                                                      |
| Main Results               | Targets:<br>Solar Energy of 100 GW and the Wind Energy of 60 GW by 2022 under "Corporate Social Responsibility & Sustainability Policy". |

The PFC provides finance for the power projects which aim for the renewable power projects like solar and wind. Recently under the "Corporate social Responsibility & Sustainability Policy" PFC is ready to finance for 100 GW of solar Energy and 60 GW of wind energy.

## VI. CHALLENGES

There are many challenges involved in the financing of sustainable construction projects like

- 1) Risks due to contract forms.
- 2) Lengthy approval process.
- 3) Unfamiliarity with the technologies.
- 4) Split incentives for owner and tenant.
- 5) Resistance to change.
- 6) Lack of education.

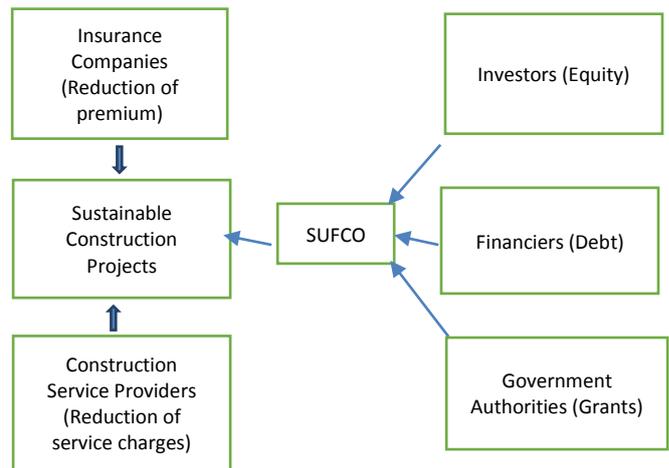
**Financial Barriers for Financing Sustainable Construction projects:** Investor primary goal is to make good benefits or to get better returns on investment. The investment in this kind of projects can be returned in the operation stage as the benefits of project occur at later stage. As investors prefer a short duration, more over long duration tends to be accompanied by uncertainties regarding project success and exposing the project to greater risks. The sustainable building projects has many obstacles in private financing like longer duration for payback, relatively high interest and increased initial cost. There is no clear mechanism to recognize a sustainable structural project. To retrofit for existing building into a sustainable building there is no financing available. Therefore, a support for sustainable construction project from government end is necessary to remove such financial barrier.

## VII. POSSIBLE FINANCING MODEL

### *Financing model for sustainable construction projects:*

The sustainable financing company (SUFCO) can be a private or public entity. This can be funded through equity, debt and grants.

Equity investments generally demand higher rate of returns than bonds but are stable source of funding. The level of equity is determined in the financing process since it is a limiting factor to obtain debt. Equities have two sources for funding internal source of equity from the company itself and external source of equity from the investors outside the company, generally this can be observed in the companies that are listed on the stock exchanges. Only equity is not sufficient for financing the required investments, at this point the external equity is acts as a supplement one. This can be a great option for the long-term investors who look for long term capital appreciation with low risk. Flow chart 1 gives the details about the finance through creation of sustainable financing company.



**Flow chart 1. Finance through creation of sustainable financing company (SUFCO)**

A SUFCO can also be debt financed by commercial banks, corporate bonds and international financial institutions like International Finance Corporation (IFC), United Nation (UN), etc. Bank loans can be processed faster, yet they are less luring than other debt instruments because of their short maturity time then to more refinancing operations for long term maturity projects such as sustainable construction projects.

Corporate bonds can offer two advantages. First varying maturity allows better matching of maturity on the balance sheets. When ratings are good, bonds are cheaper way to finance. Sustainable /green bonds can be created for investment in the sustainable construction projects. Holders of such bonds can be public, corporate, and Public Provident Funds etc. Investment of International Financial institution is an interesting development as the source of low interest rate loans and due to their presence, it attracts large number of private investors and reduce the borrowing.



## VIII. CONCLUSION

Over the coming decades the world should adopt to environmental change and rapidly increasing population that place increasing strain on the construction projects as they are major contributors of climate change. In this, paper the sustainable financing company (SUFCO) has cracked the following

- It has increased the participation of private investors
- Activate Public support.
- This model increases the third-party involvement by improving the concept of sustainable financing.
- Reinforcement of the public sector role will increase in the initiation of such projects.
- Risks due to the uncertainties of the completion of the project are eliminated.
- Returns on the investments are secured with the government Guarantee.

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## AUTHORS PROFILE



**D. Pramod chakravarthi** received the Bachelor's degree in civil engineering from S R K Institute of technology, Vijayawada, A.P. India in 2016. He is pursuing Master of technology degree in Construction

Technology and Management from Koneru Lakshmiiah Educational Foundation (Deemed to be University), Vaddeswaram, Guntur District, Andhra Pradesh, India. He actively participate in workshops and seminars in and around the university.



**Dr. A. Aravindan** working as Professor in Department of Civil Engineering at Koneru Lakshmiiah Education Foundation (Deemed to be University), Vaddeswaram, Guntur district, Andhra Pradesh, India. He has completed Master of Technology in

Environmental Engineering in 2007 and Ph.D. in Environmental Engineering from Anna University in 2017. His research interests include Solid waste management and Hazardous waste management of Environmental Engineering. He has published 7 research papers in international journals and conferences and guiding 7 number of Ph.D. scholars, guided 6 number of masters and 2 number of bachelor's dissertation work. He is a lifetime permanent member of IE (Institute of Engineers), ISRD (International Society for Research and Development) and ISTE (Indian Society of Technical Education).