

The Mexican Experience in the Social Housing Sector and Programs for Green Housing

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Synopsis

The interest in social housing in this millennium Mexico faces challenges of climate change with government and international programs to sustainable housing. Programs like "Green Mortgage" managed to massively reduce the energy consumption in housing on a national scale and were recognized as examples of good practice internationally.

Since the beginning of the process of urbanization, social housing in Mexico and Latin America policies and passing through different models. The model house isolated that was built in the last decades, replicated thousands of times on the outskirts of the Mexican metropolis, defragment not only the cities but also life for Mexican families and impact negatively on their built and natural environment [1]. Social housing, after being a successful model for the lower and middle classes in Mexico, suffered a gradual decline to become an object of speculation for the housing market? (What is the scope of the new programs for housing and more sustainable cities? Luke responsibilities and tasks can take funding and international cooperation institutions? (What responsibilities are for Mexican municipalities and its population?

Complex and Energetic Consumption

According to UN data, current world population is 7.2 billion people. Between 2000 and 2013, global population was rising 16% or 8,900 people each hour. The augmentation energetic consumption 31% in the same period. The energetic consumption in the countries of credits via development by 72%, i.e. more than double the world average [2].

Increased consumption of resources and energy worldwide, especially in emerging countries, this process accompanied urbanization. A half century 3 of 10 people lived in cities. By 2030, majority of overall population no longer will live in rural areas but in urban areas. The degree of urbanization in Latin America is 70 % when urban expansion occurs in the periphery [2]. However, phenomenon of the sprawled cities is seen in both the north and south of the planet, in formal developments, "satellite" or informal settlements known as favelas, or slums type neighborhoods. Informal urbanization is characterized by the absence of government and plantation aimed a shifter pair of non-urban land use and racialization, and built in auto disposition construction without infrastructure [3-5]. However, the formal developments of the last decades have worked with the same pattern of changes in agricultural land use in the peripheries of cities under ideology of the maximum use of each plot, with pure construction houses. While both houses lack a comprehensive urban plantation, parks and public transport connections in the neighborhoods the inhabitants created

infrastructure, services and employment. The "housing developments" exclude mosaic lands pure and serve as dormitories cities.

The lack of urban infrastructure and the dwelling in precarious conditions are two of the most serious problems of Latin American cities. There is a great demand for new housing that can don't perform with the limited resources it has most of population [6].

Fragile governments without adequate resources or no interest to an urban plantation for a common benefit, under fair and sustainable criteria allowed construction of the dwelling, which ultimately makes a commercial matter - cities are again in the hands of investors with their own interests. Today we face a phenomenon a wild urban development that has generated sub and fragmentation urbanization poor marginalized areas and dormitories cities against exclusive areas and gated communities for the wealthy sector and minority population. This development causes negatives impacts on urban, environmental, social and economic terms; thus indirectly affects competitiveness of cities nationally and internationally.

"Between 1980 and 2010 the total area of cities correction 92% while only 96% population creation, generation situation that the fault pair published a policy of land use and higher densification, resulting in a speculation sleep / to urban, large tracts of interurban bald for housing developments as far from urban sprawl. Consequently, very little media environment friendly cities have fostered [7].

Social Housing in Mexico

With 77.8 million residents in their cities, Mexico has a grade of 72.3% urbanization. Between 1900 and 2010 urban population is multiplication 55 times, from 1.4 to 79 million. In 2013, the count reported 112 million people and the country has 59 metropolitan areas. 11 cities hosting over 1 million people. In Metropolitan Area of Mexico Valle live about 22 million inhabitants are 20% I casein Mexican population [8]. (Figure 1)

The social interest housing in Mexico originated in the dwelling for the worker, issued at the beginning of the last century by obligation patrones. The era of the housing design intended for country walks empez6 workers with otorgation of credits to State workers to or acquisition construction housing and creation 1925 National Mortgage Bank Urban and Public Works in 1933 (today National Bank Public Works and Services).



Figure 1: Social Housing 1964 Tlatelolco housing complex

The housing projects that were built were influenced by idea modern European city, and multifamily housing projects in buildings 3-25 floors that were located within open and green spaces, with up to 12,000 apartments of different sizes and categories, which included education common spaces, culture, commerce and recreation.

Examples of this era are the Town Center President Miguel Aleman, the Housing Complex Tlatelolco, the Multi President Juarez and Constitution condo in Monterrey. These testimonies of a well-planned built and equipped to the lower and middle classes, urban design have suffered a gradual decline for several decades, made worse by the great 1985 earthquake hit in Mexico City.

In the second half of the twentieth century and other laws were declared the first and bancos⁴ institutions were created to address population pressure and saber floor housing demand, whereas from 1950 strong process urbanization population in Mexico and almost is duplic⁶ until 1970, with demand for three million new homes. From decade of the 60 state programs emerged to bridle the economy, population growth and massive migrations from rural areas to the cities, systematizing a housing policy.

In 1972 Fonda de National Workers Housing and with a financing system to acquire cheap housing credits constituent [2]. Consequently, security and Social Services Service Workers (ISSSTE) and the Fonda de Housing Authority is credit to grant mortgage credits to employees Gobierno. En this context, also emerge early homebuilders as SARE and GEO Group, today represent the leading developers in the market for the dwelling (1.1 % and 8.5 % respectively in 2012).



Figure 2: Social housing and affordable housing developers in auto construction in 2010.

Against the overall economic changes in the 80 state decreased participation in housing programs and promoted private participation.

The 1985 earthquake with its serious consequences within a shifter and changes in architecture, housing and urban development in Mexico. With the policies of President Carlos Salinas (1988-1994) privatization soil and began negotiations facilitated saber soils and soils which remain until today as housing developments, subject of speculation land sold by private investigators and funded with housing credits.

In 2000, as part of proposed from hood of President Vicente Fox Quezada, an annual rate of funding of 750,000 dwellings proposed, achieving growth of 2.35 million homes in its administration, claiming a rate of 2,300 dwellings by majority on the periphery of cities. These developments responded by Idaho to massive demand to the dwelling, and time allowed the same policies that were replicated with developments anonymous millions of isolated on the outskirts of cities, without equipping them with adequate infrastructure, services and green areas houses. (Figure 2)

However, today only 40% of the dwelling is built and formally registered, 60 % of the dwelling in Mexico is Auto construction, since

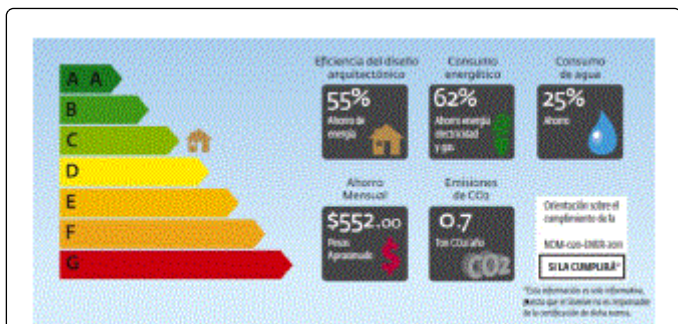


Figure 4: Ecological bread evaluation green housing Sector NOM-020-ENER-2011.

NOM-020-ENER-1011 establishes the minimum conditions to be met by limiting housing thermal heat gains to reduce the burden of refrigeration necessary and, therefore, the electrical system consumption.

The labeling of buildings that meet the same standard should be displayed at the entrance of each.

In the area of buildings, the NOM-020-ENER-2011 is the most impact. In his contexts have developed programs and tools especially for social housing in Mexico. The standard is required from the National Institutes of housing as a mandatory requirement for housing finance. This form generates a massive impact throughout the house that is being built with credits: forces the housing construction sector to develop houses with improved conditions and equipment as to guarantee a certain thermal comfort through a design) and the application insulating materials, also the installation of measures to save energy gas and water. The benefit is brought directly to the person entitled through savings in energy consumption and achieving climatic comfort in your home while the mitigated emissions are calculated and applied in international conventions and programs such as the Clean Development Mechanism CDM NANA, in the context of mitigation heating global.

In the regulatory framework also presented the Normatividades (INMX) techniques that define specifications: to date there are 13 norms that apply to the housing sector: 4 Rules are for equipment (water heater refrigerators, washing machines, bombast, 3 Rules relating to equipment Acondicionado air, 3 Rules to insulating materials and thermal envelope, and 3 Standards for lighting [9]. (Figure 4)

For being certification of products, processes and services and > DSTE CONUEE a Promotion Program certification; FIDE (Fidecomiso for Amoco Energy Electrical that issues stamps to products that directly or indirectly in the energy saving electric & Infiniti posing list Eco technology suppliers to apply within the Green Mortgage. for the evaluation of sustainable housing Incite created the Sustainability of Housing (ISV) and a system for saving evaluation energy and a home, housing system Evaluation Green (Sieved).

Programmed for Sustainable Housing

In 2006 the first construction Integral Sustainable Urban Development (DUIs) to quarks, as part of the Federal Government cooperation with various Secretaries and national financial institutions. The OUTS are defined as areas of integrally planned developments,

contribute to land use planning and promote a more orderly urban development. Just and sustainable. Tobitacionales developments are enriched with green areas, bikeways. Public squares and disposition of certain technical infrastructure, educative and social prevent Ambient connectivity public transport systems



Figure 5: Set Ceylan sustainable housing

Azcapotzaco, Mexico DF a set abandoned in an industrial area, renovadopor Infiniti in 2012.

740 apartments in 37 buildings 65m² 5 story 1,200m² green areas, and 5% local commercial plazas. Photovoltaic cells, treatment and recycling of rainwater and gray water, basic equipment for saving water and electricity, natural gas and flats ecology were installed.

From 200th began the first national programs for sustainable housing with the program 'This is Your Casa'de CONAVI and leHipoteca Verde' Infiniti.

The "This is Your Cast Program started in 2007 for people with low incomes and mess 2009's define sustainability guidelines and parameters as a function of the typology of housing and bioclimatic zone. Considering five categories: Site analysis, efficient use of energy, efficient use of aqua. Proper waste management and maintenance of equipment and facilities on their results and the design of the program in partnership with Green Mortgage, CONAVI and INFONAVIT were galadonados in 2009 with the International Award for Energy Efficiency to Save Energy (Alliance to Save Energy).

In 2012 separation of housing included location, facilities (health centers, garden of children, primary and secondary schools), residencies (typology, density, living space) and competitiveness (free areas, systems transpose, eco technology).

To determine the amount of subsidy, considering the value of the home and the score awarded based on information obtained with the Single Housing Register (UVR). (Foundation IDEA. 20131. (Figure 5)

RIN9ktr0 (4X) Housing - RUV nitro The RUV was developed in 2004 in Infiniti established for housing in Mexico, based on this tool can Lamar strategic decisions and project a plane chin development and housing finance.

Green Mortgage

Infiniti mansion in 2007 a program also photo of al- lipoteca Verde ' to boost housing supply with ecological criteria. The beneficiaries could purchase additional credit to install environmental technologies

that generate diminution energy consumption and ague gas compared to traditional homes [10].

Hipnreca Verde is an additional credit amount Infiniti stops the entitled, according to their purchasing capacity. You can buy a home that has Eco technologies yielding savings on household spending by the decrease in the consumption of electricity, gas and ague. Fielismth Materials, accesodos and equipment that generate savings in the consumption of gas, water and electricity in economic benefit of accredited, certified by a competent authority in compliance with national standard, if dictums techno efficiency and quality or interational standards.

The packages to install environmental technologies in housing according to all 3 zones definition climatic that qualified for the Mexican Reptilian and were as follows (Table 1):

Eco-technology	Cool climates	Normal Climate	warm climate
saving keys	x	x	x
Watered shutter	x	x	x
Toilet valvuladole	x	x	x
POWER SAVE Lamps	x	x	x
Solar Heater			
Heater gas passing			
air conditioning (AA)			

Table 1: Eco technological Green Mortgage in 2006-2010

The greatest impact the warm by use of thermal insulation which use lower periotic Air Conditioning apportion the energetic consumption network register Opera areas. At the same time, resulting in economic savings and improved comfort is thermic deck in a positive impact on the standard of housing.

For temperate zones and semi flood occurring the greatest impact with the installation of solar heaters for ague saving consumption local engaged gas weight (which regularly operates in Mexico gas LPG) [2].

For 2011, the policy for the Green Mortgage, after President Fell Calderon received the United Nations Conference on Clemet saber Change (COP 16) in December 2010 in Canton where all credits dictating Toque Infiniti is changed and CONAVI subsidies oriented sedan from 2011 to sustainable housing. Thereby proyeco6 all houses were equipped with eco technology.

Green Flexible Hinte

Ames of the Green Mortgage 2011 was an additional credit granted only to those who asked. From this ark is extending all Infiniti credits, so that housing is calla buy, build, expand or remodel a Infiniti credit available ecotecnokgias green Granting credit is systematized. A dierencia before, you can now determine that ecotecnokgias package you want to install the developer or the person entitled seg0n climate zone, type of housing and credit amount.

The amount of credit Infiniti (both conventional eat green credit) fencing defined in the payment of the entitled capacity, which is posted in Deaths of Salado Minimum (VSM).

VSM - Times Salado Minima

The credits are posted Infiniti Salado Times of Minima -VW.

Green credits are given as a function of monthly income and savings goal vita / monthly beneficial economic. Through a simulator that is offered in the PAGE to meet the savings would generate them installation of each technology and adapt it to their income. Infiniti website where you will find all the Green Mortgage information saber and how to process the credit % both employers and customers can find the savings you generic installation of each technology and adapt it to their income.

The sum of the pair eco technology Fas housing should generate a minimum savings of \$ 215 pesos (17 USD / month) with a reduction of 0.78 tons of CO₂ and pair housing (calculated with an average of 3.9 persons). The minimum mantle saving par climatic zone, housing type and package you are choosing eco technology is calculated [8].

Installation and the Eco Technology Certification

For-sale and installation of eco technology there is an agreement between Infonavit and up to 52 providers currently certified for-sale and installation of eco technology. A list of Elias and is available in eco technology. For certification there is a normative framework that defines the technical specifications of materials, products and services, according to the corresponding NOM, Technical Opinion (DIT), the seals of FIDE or certification ONCCE (National Agency of Normalization and Certification Construction and Edification SC). Suppliers must demonstrate the capacity to market at a national or regional level and ensure proper installation quality equipment. Furthermore it is defined that installation of delivery and delivered eco technology) an instructive with installation and technical specifications of each of the b) warranty eco technology team with a list of service centers attention customer, c) compliance certificate standard equipment or material relevant agency.

The green mantle of credit granted provided part of mortgage credit and the payment of the entitled eco technology chosen pair as credit paid directly to providers in an installation own home. In case of the home buying and equipped with the developer eco technology par, average mortgage is repaid for couple of credit to Infonavit.

Achievements of Green Mortgage

From 2009 to 2010 alone new homes were built financial couple developers. Were awarded in two years 're Green Mortgages 251.726 ; only in 2013 were 422.660 Flexible Mortgages that ortogaron Verdes both developers and right holders. Through the Green Mortgage program Infiniti have been installed 10 million eco technology teams in more than one mill6n of homes financed with credits. With mill6n Green Mortgages, has achieved savings of 93.4 million cubic meters of water, and a thousand 442 million pesos in electric consumption and thousand 225 million pesos in gas consumption energy LP. Tambien has avoided emotion almost a mill6n bi6xido tons of carbonation.

The Green Mortgage has 9anado several awards. In September 2009 he won the 'Star of Energy Efficiency award; in 2010 one of the prizes Banking Beyond the Inter-American Development Bank (130), was also cilantro of the 12 finalists for the 2012 World Habitat Awards and recibie6 in the same afro Program recognition by the United Nations Development Programmed (UNDP) couple the best practice in application solar heaters coterie ague in housing. The Green Mortgage

program recognized nationally and this intemacion4 level and several Latin American countries have to develop program assimilates interns.

Future of Sustainable Housing in Mexico

The edification housing is one of the more dynamic industrial scan Mexico and contributes about 50% in the EIP of the communication indusial Granting a Millen my green credits contributes positively to this trend. The private sector contributes between 2 and 5% of cases ecological, baroque the construction will cost between 10 and 20% expensive than my construction conventional, reason why most of my shipments to sustainable architecture consulting, certifications (engaged i.e. for LEED certification) and contests for projects construction really organic. (Figure 6)

The scheme for sustainable social housing is to give small additional credits that must be repaid within a period of 5 anuses to be a viable project. The economic unarm and interest rates determine the range of eco-technologies and thus the potential economic savings. The connection between micro-level beneficioecon6micos for accredited and ecological benefits at the macro level to mitigate greenhouse gas this well done, edema directly benefit the citizens in improving thermo comfort of your home and having housing plus alpha thanks to my economic maintenance. Seguin this scheme, programs will still work the Green Mortgage, Eco Home, Housing and Name Otrosque has the opportunity to be successful in other countries.

Meanwhile, Mexico still has one of the schemes month pollutants among the countries of the Organization for Eco technology Cooperation and Development (OECD). CO₂ emissions pot kilowatt in electricity generation and heat for alms nth Mexico are the average of the OWE. Ornamented 5% of the energy produced in renewable Mexico's PEA, 2011. Energetic Reform The 2013 promises many new jobs, promises a change of non-renewable energies and renewable energy my clean. Replace the non-renewable energy to renewable energy is the second step, the first half is also implementer changing patterns pemmican reduce energy consumption, the Segiln said. Energy is best not to use".

Regarding the prevention and reduction of energy and resource sector Ulm think less of buildings technology although ecological, YMES are appointed to constructive solutions.

First of all you must include a good CLIMATE design in social housing especially constructive Solar protection the gaps) natural options (trees and open spaces) and shading and the involvement (preferably with material almost nonexistent in the Mexican market), also in distended interiors (Natural preferment limacine and sufficient feature in warm zones), rather than the diesis still minimize my social housing econ6micas remissions that predetermine developers and interest rates.

However, sustainable housing need not be reinvented with new prototypes of houses in the suburbs, there are those 5 million abandoned. The shin nature by neglect is the wake of an urban context; causing costs that exceed the family budget stop transportation to urban centers and work. The house vacated this day, neglected children, the grandmother and has no place in the 38 square meters (that are given as minimum housing space antisocial), a pager cannot light nor Where (consumed by the Air conditioning to cool the overheated house) so the vicious cycle.

There are enough good examples of Mexico and Latin America and popular vivienda social of localized space habitat, urban design and

good quality, usable open spaces combining with dignified especially habit. Only flats considerable in all existing buildings and terser a good thermal insulation (also once and acoustic insulation that also lack), solar heaters, devices and aqua save saving bulbs to be re % efficient and applied programs of mitigaciln gels. There remains the question of how the Government can Illegal these programs to 60% of the dwelling is auto construction as well as all the buildings sector represents comercialese Area of greatest opportunity for energy efficiency programs according to Standard (NOM- 008- ENER -2001, targeting buildings use residential Siberian which do not meet ciertose stand in the year 2001.



Figure 6: Housing in Mexico

Finally, many energy efficient homes still are not cities. To develop sustainable cities in the Mexican territory must be changed (the management policies floor where urban land, suburbs and rural became the objects of speculation for inverses and developers, along with municipal & responsible for define run and control of Urban Development Plans and with them the care and came to the Mexican communities.

This induced to build sustainable cities with the task of municipalities to define and build the future for poblaciort not sob but also for the country with strong cities, balanced development, which central an atmosphere of well-being and social cohesion and are able to enter the new world economy. This task must meet Mexican communities can be performed with less political impact, citizen participation and efficient technical solutions, such as treatment plants acute, efficient public transport systems and garbage collection, with pokes, green and safe spaces factors These also attract new capital and labor markets.

Adams the communication define your model decade for proximal 30% and scope of projects; Development Plans urbanization green creep areas include mines or proximity between unfamiliar family life ', offers business and leisure, and the interaction between space and natural environment construction. But let construction planning and sustainable cities in the hands of developers or international programs develops the decade by his policing and their elected governments, trabajandoa ships power of their own.

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