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Electrical Risks Reduction in Houses in the Zacatecas Municipality

ZACATECAS CIVIL PROTECTION MUNICIPAL UNIT AND SAFE HOUSE PROGRAM (PROGRAMA CASA SEGURA®).

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Summary

80% of houses in Mexico built over 15 years ago show short circuit or fire risks, therefore, awareness and electrical installations inspections are necessary.

In the State of Zacatecas, from October 2009 to June 2010, the Zacatecas Civil Protection Municipal Unit handled an average of 454 fire breakout reports in houses or businesses and 65 buildings were declared as total losses.

The Zacatecas municipality, with the application of the "Safe Housing and Businesses Program", obtained a positive effect and the number of buildings declared as total losses was reduced in a first phase by 22% and false alarms by 54%.

With the purpose of contributing to strengthening the electrical inspection process and increasing electrical safety in the Zacatecas municipality buildings, the Civil Protection Municipal Unit and the ICA-Procobre Safe House Program (Programa Casa Segura®) signed a collaboration agreement.

The Safe House Program (Programa Casa Segura®) participated in enriching the electrical installation inspection format, trained team members in basic knowledge to perform an electrical inspection, provided the equipment to meter power and directly contributed to the implementation of an "Inspection and Monitoring Plan to Diminish".

Electrical Risks. It also supported the information materials design and printing.

During the plan operation and after inspecting the electrical installation, the team members place a sticker according to the housing and businesses risk level, 33% of commercial buildings resulted as high risk. They were given a term of between 15 to 30 working days to correct the more serious problems, thus reducing the risk after complying with the indications given.

Only 11% of the verified houses obtained a green sticker which means a safe installation, 40% with low risk installation, 9% with medium risk and 40% were ruled as high risk. The people living in the houses whose electrical installations were ruled with risk in its different levels were invited to call their known electrician to perform repairs.

Thanks to this it has been possible to generate awareness between the citizens on the importance or prevention and the calls for false alarms on the subject have decreased 72%, allowing being more proactive in prevention actions.

The Civil Protection Municipal Unit has been able to reduce by 62% the primary attention expense in transportation, burns, injuries and asphyxiation derived from emergencies caused by failures in electrical installations.

In this manner, a positive economic impact was achieved by a 72% reduction in the index of buildings declared as total losses both for citizens and the Municipality.

I. Introduction and Problem Areas

According to studies performed in six Latin American countries by ICA-Procobre, 80% of houses built over 15 years ago show short circuit or fire risks, which represents a high cost in family and patrimony safety; 100% require maintenance.

The Safe House Program (Programa Casa Segura®), Latin American initiative, was born in 2006 to communicate the importance of inspections and periodic maintenance if electrical installations in Argentina, Brazil, Chile, Colombia, Mexico and Peru.

The Safe House Program (Programa Casa Segura®), sponsored by ICA-Procobre in seven cities in the country, documents this case with the purpose of sharing the actions experienced on the subject of electrical accidents prevention in homes.

The study hereby was made in the Zacatecas Municipality, in the state with the same name, which has 124 neighborhoods, 20 communities and 36 thousand 150 houses. It has an approximate population of 139 thousand 176 inhabitants, handled by the Civil Protection Municipal Unit.

On 2010, Arnoldo Rodriguez Reyes was elected as Zacatecas Municipal President, who focused his administration with a central theme: "Actions for Everyone"; highlighting the participation on the subject of prevention. To achieve his goal he was supported by the Zacatecas Civil Protection Municipal Unit, which performed the greatest part of its activities in reactive actions taking care of the population, instead of implementing accident prevention plans.

From October 2009 to June 2010, the Zacatecas Civil Protection Municipal Unit handled an average of 454 reports only on fire breakout reports in the Municipality's houses or businesses, which represented an annual average of 200 families being affected and 65 buildings being declared as total losses, said affectation originated moral, physical, economic and social damages to the persons living in these buildings.

Likewise, the Municipality spent more than $590,000 pesos in primary attention to victims of intoxication, burns, medical and auxiliary services, without considering major injuries in clinics and hospitals in the Zacatecas Municipality. In addition, 65 buildings were declared as total losses with losses over $6.5 million pesos.

It was detected that 80% of the fire breakout calls in houses and commercial buildings were due to obsolete or defective electrical installations and the remaining ones (20%) due to LP Gas leaks. Currently, the General Civil Protection Law does not contemplate performing inspections in houses as mandatory; therefore it was decided to create a pilot program under the command of the Civil Protection Municipal Unit Coordinator in September 2010.

2. Solution Methodology

2.1 PHASE ONE: SAFE HOUSING AND BUSINESSES PROGRAM

In September of 2010, the Civil Protection Municipal Unit started recruiting and selecting personnel to implement a prevention program. In addition to the essential knowledge for a team member, it was necessary to have experience in electricity, LP Gas and frameworks.

The Risk Reduction Plan was started under the "Safe Municipality Disaster Resistant" Program, developed by the Federal Government, in which different types of phenomena or factors are taken in consideration such as:

1. Geological
2. Hydro-meteorological
3. Chemical
4. Socio-organizational
5. Sanitary

The chemical factor, which includes urban fires and explosions, was the subject where the Facilities Inspection Municipal Program was launched: "Safe Housing and Businesses", which includes the verification of risks in a house or business in the subject of gas, structure and electrical installations. The inspection is based on a format where the team member writes down the risk items.

The "Safe Housing and Businesses" pilot project was started in randomly chosen neighborhoods with the purpose of testing the developed format. Each inspection was carried out by two persons in a period of approximately 60 minutes; each equipment covering between four and five houses per work day.

In the format the house owners were asked to have requirements similar to business owners, such as complying with fire extinguishers, first aid kit, safety measures, reducing hazards, LP gas and electrical installations structural rulings. Therefore the instrument had to be redesigned based on international building internal and external risk analysis, therefore reducing the work time by 30 minutes per unit.

The two work groups with which the project started were insufficient to cover the complete Municipality, the inspection demand surpassed the capacity of the assigned personnel, therefore from two to five work teams were added, with which it was expected to cover 50 houses per work day.

Automating the follow-up, stickers were created to be placed outside the houses and businesses already inspected by the Civil Protection Unit. This action would identify the buildings and at the same time it would allow having a more precise statistic of the visited houses.

Figures 1 and 2 | Examples of stickers placed in houses and businesses of the Zacatecas Municipality, from December 2010 to August 2011.

2.1.1 Actions with Positive Effects for the Zacatecas Municipality Image

The Municipal President's Office launched a social communications campaign to promote the "Safe Housing and Businesses" Project, achieving a positive effect for the Municipality's image.

Citizen support was an indispensable ingredient, in hard access neighborhoods, zone leaders were contacted to explain the project so they in turn could transmit the message to their neighbors, generating a positive effect among the citizens.

A support program called "Community Team Member" was created, given at every neighborhood and community, consisting of training the neighbors to act when faced with an emergency situation, but foremost to prevent them in incidents caused inside of their houses.

2.1.2 Citizens Acceptance

To improve the project's acceptance, the following measures were taken:

Prevention message:

Due to the insecurity crisis that the country is going through, citizens are afraid to allow access to the Civil Protection elements inside their homes or businesses. The Municipal President's Office worked in sensitizing the citizens regarding the insecurity they might have inside their buildings, highlighting that there are more incidents of fire in homes and businesses than incidents of crime. In this way, the people started assimilating the prevention message.

New identity:

The uniforms of the Civil Protection elements gave them an identity similar to the Police, which did not create a feeling of acceptance by the citizens; therefore they were modified with opposite colors, generating their own identity. *See Figure 3 and 4.*

Free Inspection:

Some families rejected accepting the inspection because they believed that it implied expenditures, once they discovered it was free the same housewives spread the program through recommendation to family members and friends, which produced a positive effect among the people who started calling the Civil Protection Unit to request inspections.

Figure 3 | Team member wearing the new uniform.

Figure 4 | Actions of the Zacatecas Municipal President's Office "Everyone to your neighborhood" program.

2.1.3 Communications Elements

The bets were on the governing message:

> "Prevention as a guarantee of the Zacatecan families' safety."

In an internal manner, the City Hall generated spaces within a campaign called "Everyone to your neighborhood", taking the services of the Municipal President's Office to each housing project. The municipality's internal communications tools, internet page and social networks such as Twitter were used to explain the benefits of this program.

2.1.4 Measuring Results Phase One

After measuring the impact of the actions compared with the same period the previous year, a positive effect was found since the incidents had diminished in the subjects with the following percentages. *See Figure 5*

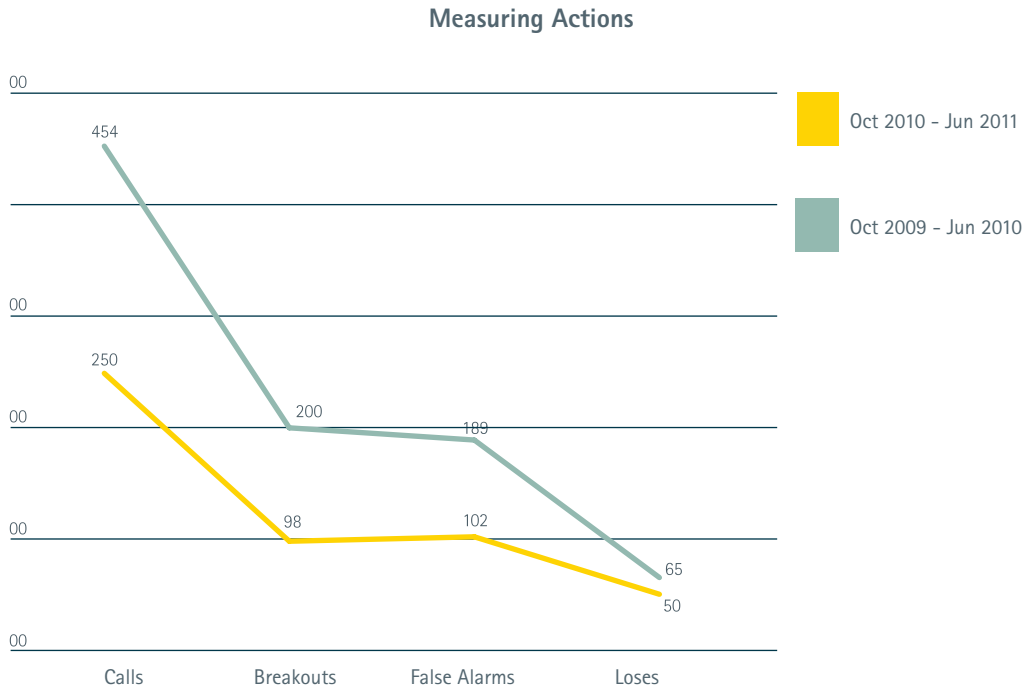


Figure 5 | Measuring Actions and Results Obtained Graph

Action	Variation
Calls	55% reduction
Breakouts	49% reduction
False Alarms	54% reduction
Buildings declared as total losses	22% reduction

In the first phase, with the Municipality's Program application, all indicators decreased: The buildings declared a total loss decreased by 22% and false alarms by 54%. Nevertheless, the percentage was still too high, requiring more actions.

2.2 PHASE TWO: PROGRAMS' SYNERGY AND INTEGRATION

2.2.1 Background

After knowing about the presence of the "Safe Housing and Businesses" Program of the Zacatecas Municipality, by the Safe House Program (Programa Casa Segura®), an official visit was arranged with the purpose of knowing the actions performed, in July 2011, starting a successful collaboration.

2.2.2 Review Process

The inspection performed during the visit was according to the selection of the Civil Protection Municipal Unit, according to their planned coverage projection. The review time took an average of 40 minutes focusing on the following items:

- LP Gas installations, in joints and hoses.
- Applying soapy water to hoses and tubing of the gas tanks.
- House's external risks.
- Electrical installation.
- Handling hazardous substances and inadequate practices by the people living in the house.

Due to its nature, the visit of the Safe House Program (Programa Casa Segura®) focused only on the electrical installation inspection process.

Figure 6
Step 1. Contact of house selection:
The team members selected the neighborhoods according to their work plans, and contacted the owners to request the family's approval to inspect the building

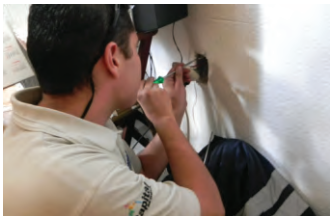


Figure 7
Step 2: Inspecting the items mentioned:
The Civil Protection team members, in groups of two, started inspecting the building's installation.

Figure 8
Step 3: Recommendations:
After finishing the inspection the appropriate recommendations were made.

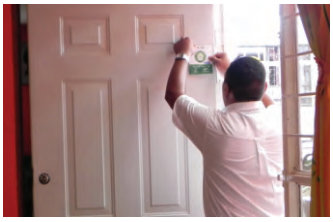


Figure 9
Step 4. Placing the sticker:
It was applied only if the house was safe in all items.

2.3 AGREEMENTS BETWEEN THE CIVIL PROTECTION MUNICIPAL UNIT AND THE SAFE HOUSE PROGRAM (PROGRAMA CASA SEGURA®)

It was observed that the items to verify in the electrical installation, in the applied format, were insufficient to determine if the house was operating in safe conditions. Therefore, it was found convenient to increase the format with items contemplated in the Current Mexican Official Standard for Electrical Installations, NOM-001-SEDE-2005.

The need to provide the team members with the necessary knowledge to be able to determine if the parts making up an electrical installation and its appliances presented adequate aspects in the daily operation was detected.

With the purpose of contributing the strengthening the electrical installation inspection process and increasing the electrical safety in buildings, the Municipal President's Office, through the Civil Protection Municipal Unit and ICA-Procobre through the Safe House Program (Programa Casa Segura®), signed a collaboration agreement.

2.3.1 Safe House Program (Programa Casa Segura®) Contribution

Among the contributions of the program sponsored by ICA-Procobre-Mexico the following stand out:

- Enriching the electrical installation inspection format.
- Training the Civil Protection team members in basic electrical knowledge in order to perform an electrical inspection.
- Providing equipment to measure electrical current.
- Direct practical training in houses.
- Working jointly to implement an "Inspection and Monitoring Plan to Reduce Electrical Risks".
- Printing labels according to the risk.
- Printing informative material.
- Printing electrical safety campaign posters.

2.3.2 Civil Protection Municipal Unit Contribution

In turn, the Civil Protection Municipal Unit contributed with:

- Modifying and adopting the enriched format.
- The working staff for training.
- Implementing the "Inspection and Monitoring Plan to Reduce Electrical Risks".
- Implementing the communications campaign "Electrical Risks in the Zacatecas Municipality" in the printed press, television and radio.
- Strengthening the Electrical Risks in the Zacatecas Municipality Communications Campaign, following the material provided by the Safe House Program (Programa Casa Segura®).
- Gathering data to make the first census and monitoring the first diagnoses applied.

2.3.3 Joint Actions

The Safe House Program (Programa Casa Segura®) team designed an easy to follow electrical installation inspection format, applicable to houses and businesses, with the purpose of supporting the team members, helping the visual inspection based on the Mexican Official Standard NOM-001-SEDE-2005. Said tool will serve to set up parameters similar to the "Inspection and Monitoring Plan to Reduce Electrical Risks".

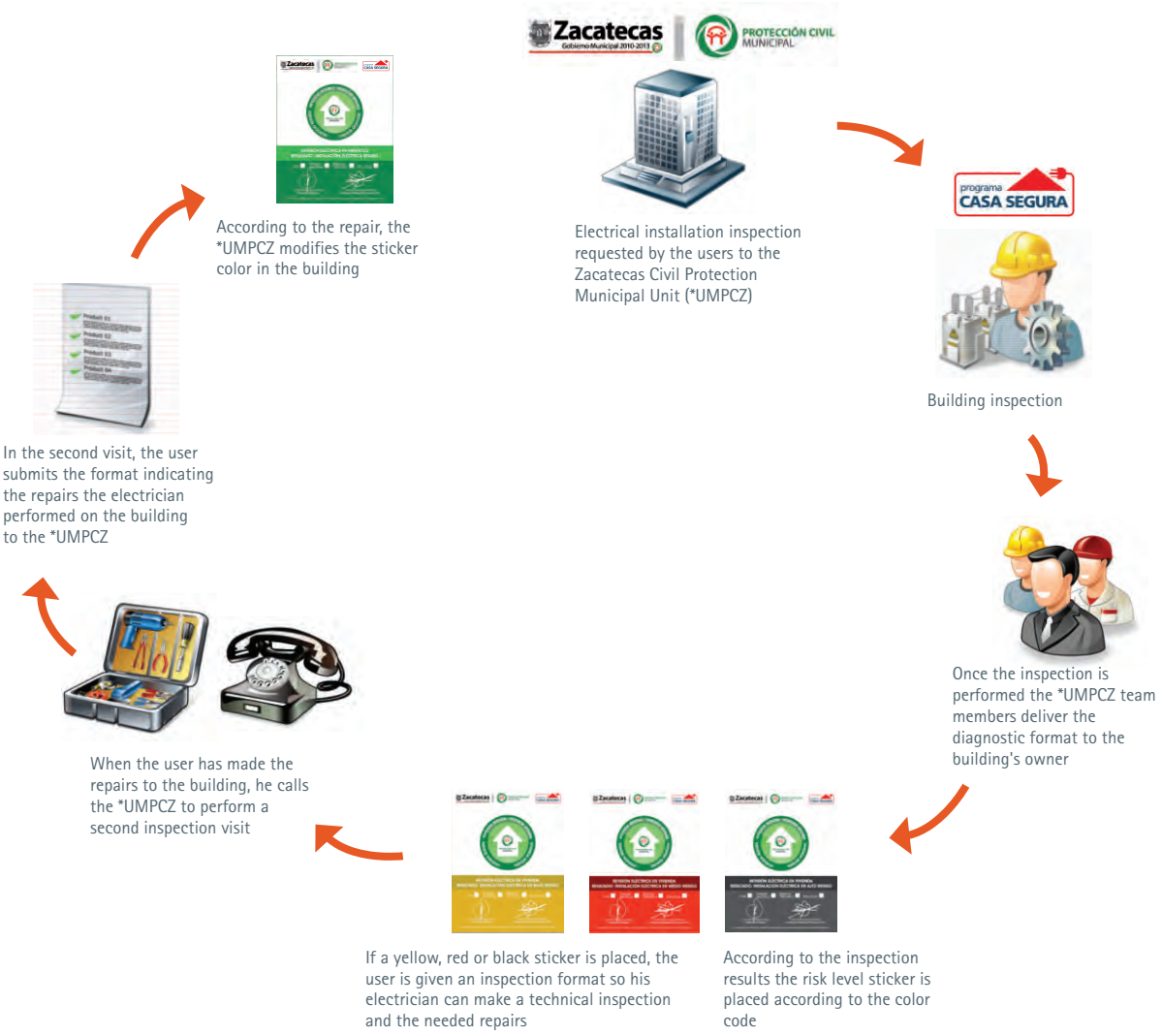
The initial action, implemented by the Civil Protection Municipal Unit, allowed placing "Safe House or Business" stickers only in the buildings, which were deemed safe as a result of the inspection. However, it was complicated identifying the previously inspected that did not meet the minimum safety requirements, without a label that reminded the owners of the risk level in which they were.

The team members, through the "Safe House and Business" Program will perform inspections in neighborhoods that have not yet been supervised with the purpose of generating a risks map, locating the neighborhoods with greater age and vulnerability. In this manner, it will be possible, through the "Inspection and Monitoring Plan", to detect the evolution of the demographic density and the Program's impact.

The "Inspection and Monitoring Plan to Reduce Electrical Risks" allows the Civil Protection Municipal Unit to:

- Differentiate, through four color stickers, the risk level in which the Municipality's buildings are.
- Classify the Municipality's buildings risk level.
- Allow the Municipality to have a map of the most vulnerable zones or buildings that might endanger their occupants.
- Reinforce the Municipality's actions in the prevention culture and electrical maintenance.
- Allow the Municipality to have a more timely control of the ground usage licenses.

Figure 10 | Inspection and Monitoring Plan to Reduce Electrical Risks Process



The Municipal Unit Civil Protection Communications team designed an informative brochure where the causes for electrical accidents in the home are identified. It will allow citizens to identify them through precise signals when a risk exists.

Jointly with the Zacatecas Municipality Social Communication, the new labels for the "Inspection and Monitoring Plan to Reduce Risks" were also designed. Such material was later printed by the Safe House Program (Programa Casa Segura®).

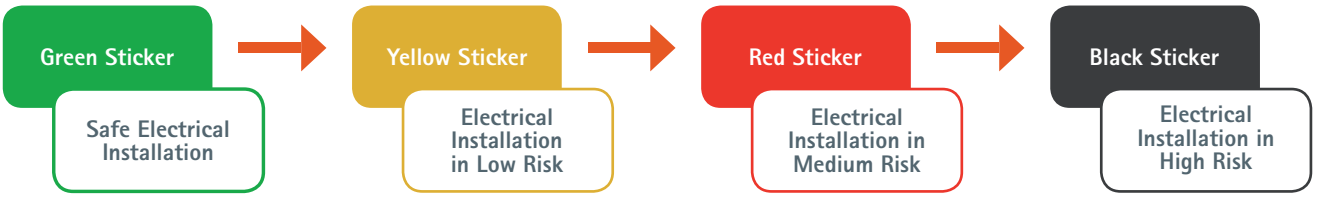


Figure 11 | Stickers for houses and businesses, Color Coded According to the Risk.

At the end of the theory course (40% of the training), the team members practiced the knowledge acquired by applying the electrical inspection format, accompanied and advised by the direct instructor in the field.

With the Civil Protection Municipal Unit already trained, the implementation of the Inspection and Monitoring Plan was launched:

- The new electrical installation inspection format was applied.
- The first stickers were placed.
- The building owners were given a copy of the inspection results.
- The owners of properties upon which yellow, red and black stickers were placed were invited to call their trusted electrician to make the repairs.
- Once the owner made the electrical installation repairs, the unit performs a follow-up visit to modify the sticker color.

Figure 12 | Inspecting and placing electrical risk color coded stickers

Figure 13 | Examples of billboards placed all over the City

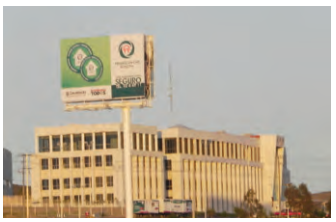


Figure 14 | Examples of billboard placed all over the City

Figure 15 | Posters in public and commercial establishments in the Municipalities

Figure 16 | Posters in public and commercial establishments in the Municipalities

Figure 17 | Posters in public and commercial establishments in the Municipalities

3. Analysis and Results

3.1 BENEFITS AND ACHIEVEMENTS FOR THE CIVIL PROTECTION MUNICIPAL UNIT

Nine months after the implementation, the initiatives have brought positive results for the Unit. Training 30 team members have allowed a faster progress in the Municipality's buildings installations inspection.

With the application of the program "Everyone in your neighborhood" in the macro team member, and its publication in different media, it was possible to inform the citizens more precisely how to prevent electrical accidents, which has generated a positive impact and accident reduction.

At the end of June 2012, the Civil Protection Municipal Unit team members have been able to inspect 1,352 houses and 500 commercial establishments.

The Civil Protection Municipal Unit has been able to generate awareness among the citizens on the importance of prevention and Civil Protection culture. Derived from these actions, 72% of the false alarm calls on the subject of electrical installations have decreased compared with the same period of the previous year, which has allowed them to be more proactive in more protection actions.

The Civil Protection Municipal Unit had been able to reduce by 62% the investment in primary attention in transportation, burns, injuries and asphyxiation, derived from emergencies caused by faults in electrical installations in housing and commercial buildings, which amounts to $248,000 pesos annually.

Figure 18 Inspecting the electrical installation in a house

3.2 MEASURING PHASE TWO RESULTS

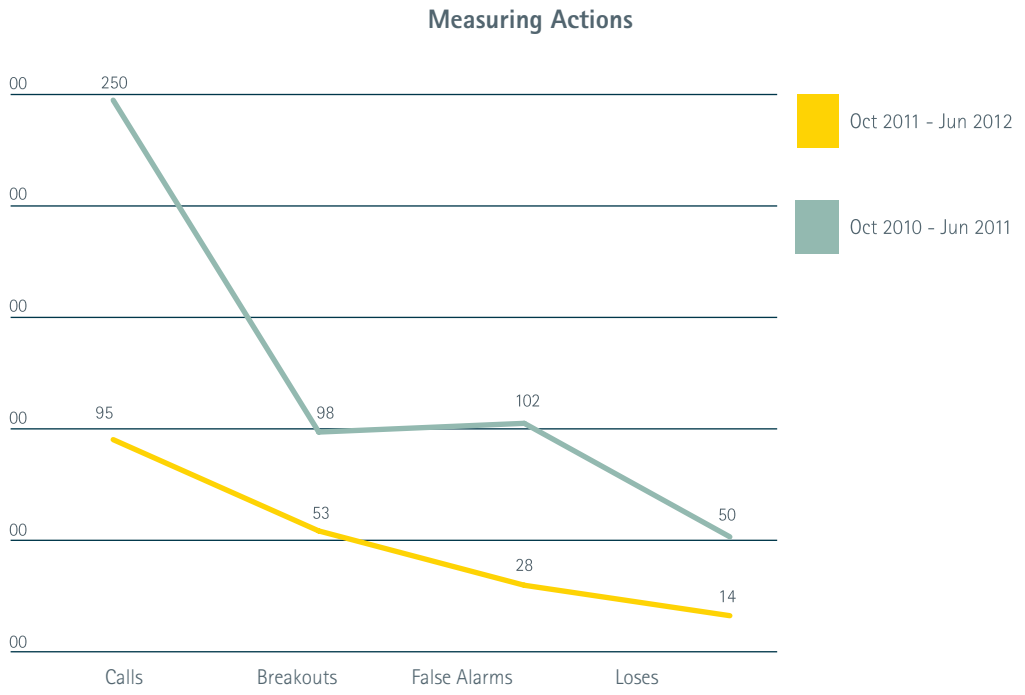


Figure 19 | Measuring Actions and Results Obtained

Action	Variation
Calls	62% reduction
Breakouts	46% reduction
False Alarms	72% reduction
Buildings declared as total losses	72% reduction

Comparing the results obtained in the first phase of implementation, in the second phase it was possible to reduce all indicators including a significant decrease in the buildings declared as total losses and false alarms to 72%, which is estimated at $4.6 million pesos.

3.3 BENEFITS FOR THE MUNICIPALITY

The actions of the Civil Protection Municipal Unit have had a very positive impact on the Municipality's image by communicating a preventive message instead of a reactive one, therefore generating a new awareness in Civil Protection.

With these actions the buildings declared as total loss derived from the electrical installations in the Zacatecas Municipality have been reduced by 72%, which results in an estimated reduction in economic losses of greater than $4,680,000.00 pesos.

3.3.1 Results of monitoring the stickers placed in houses

The Civil Protection Municipal Unit has achieved inspecting a total of 1,852 installations. The risk level faced by families in the Zacatecas Municipality, with data at the end of July 2012, is 11% in safe conditions; 40% with low risk level; 9% medium risk and 40% lives with a high risk in this heading.

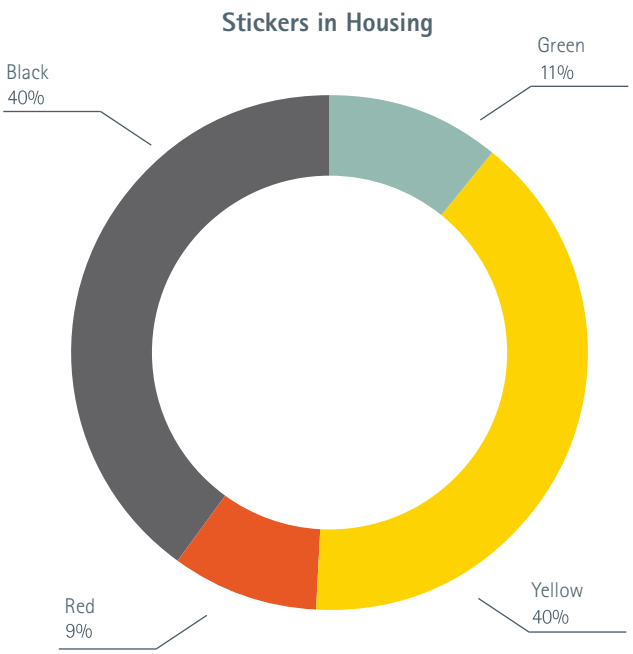


Figure 20 | Status of the 1,352 houses inspected

3.3.2 Citizens response

The population has reacted in a positive way; however since these are the first months of applying this system it has not been possible to identify yet some aspects that should be taken in consideration to continue with the program's success:

1.- Commitment by the population, due to the lack of economic resources to make the repairs inside their houses for some families.
2.- Resistance to change.
3.- Lack or trustworthy electricians to request a safe repair.

Continuing with this task is preponderant, therefore starting the work to implement Phase Three with the activation of financing schemes is required, in order for the houses in risk, of short circuit or fire, to start a repair process or updating the electrical installation in their homes thus reducing the percentage of risk.

It can be seen that only 11% of the houses inspected have safe electrical installations for their occupants. There is a similar situation all over the country; therefore it is vitally important to continue to work in electrical risks awareness for 89% of the houses in risk.

3.3.3 Results of monitoring the stickers placed in businesses

It can be seen that only 20% of the businesses inspected have safe electrical installations, the remaining ones risk the physical integrity of its visitors and employees. Many of the businesses in all the country are in a similar situation.

Of a total of 500 establishments inspected, the Civil Protection Municipal Unit found 166 in High Risk therefore placing a black sticker.

Since they are buildings that make the population vulnerable, the Civil Protection Municipal Unit granted a term from 15 to 30 working days to repair and update the electrical installations. The 166 businesses complied, faced with a closure or non renewal in the register warning.

After the corrective measures of the 33% that were placed in high risk, the distribution of the establishments was: 100 have safe conditions, 234 in low risk conditions and 166 in medium risk conditions.

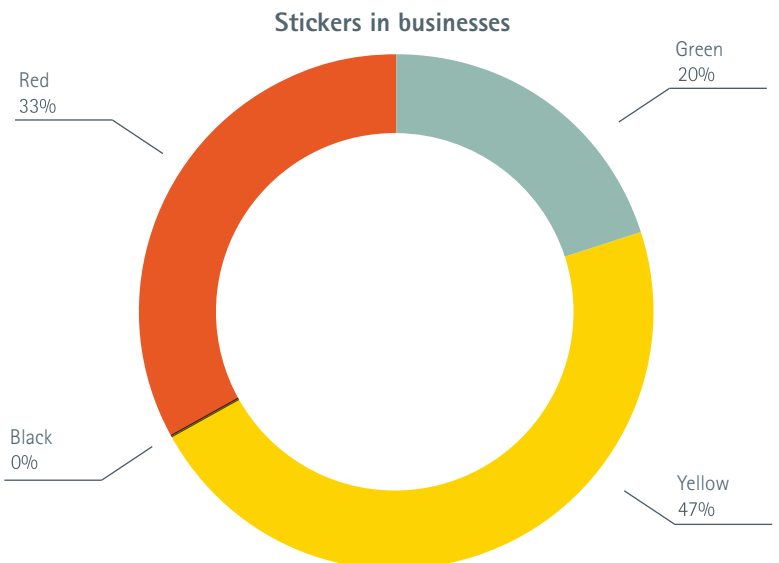


Figure 21 | Status of the 500 businesses inspected

Since these are businesses where visitors are vulnerable, the Municipality does not allow business electrical installations in high risk conditions.

3.3.4 Merchants answer

A very positive item that the Program has brought about is that it has given the Civil Protection Municipal Unit more tools to determine the risks in which the buildings are.

In some cases there are businesses that work without the adequate licenses for their commercial activities, therefore this Program has allowed the municipality to carry out a supervision program of the licenses granted and lower the disaster index.

Figure 22 | Stickers placed in businesses

The higher risk indicator diminished in a period between 15 and 30 days in the Zacatecas Municipality businesses after the first inspection.

4. Program Impact

The social impact in the "Inspection and Monitoring Plan to Reduce Electrical Risks", with the merger of the Safe Housing and Businesses Programs and the Safe House Program (Programa Casa Segura®) has been very positive in all aspects, both for the Municipality as for the Civil Protection Municipal Unit, and most importantly, for the general population that has benefited by lowering the accidents index and reducing the fire breakouts due to not knowing the risks implied by an electrical installation in poor conditions.

The Program's impact has been such that there are weeks where the number of inspection requests surpasses the Civil Protection Municipal Unit, therefore waiting lists have been implemented.

A positive economic impact is obtained by reducing losses by 72%, both for the Municipality as well as the rulings to citizens.

In the political subject the credibility of governors increases by sending the message of being worried by the population's welfare.

Without a doubt, it is important to continue with the actions implemented to continue being a preventive and not a reactive municipality.

5. Acknowledgements

The Safe House Program (Programa Casa Segura®) is grateful for the facilities granted to prepare this case study by the Zacatecas Municipal President's Office, the participating personnel and all the elements that make up the Zacatecas Civil Protection Municipal Unit.

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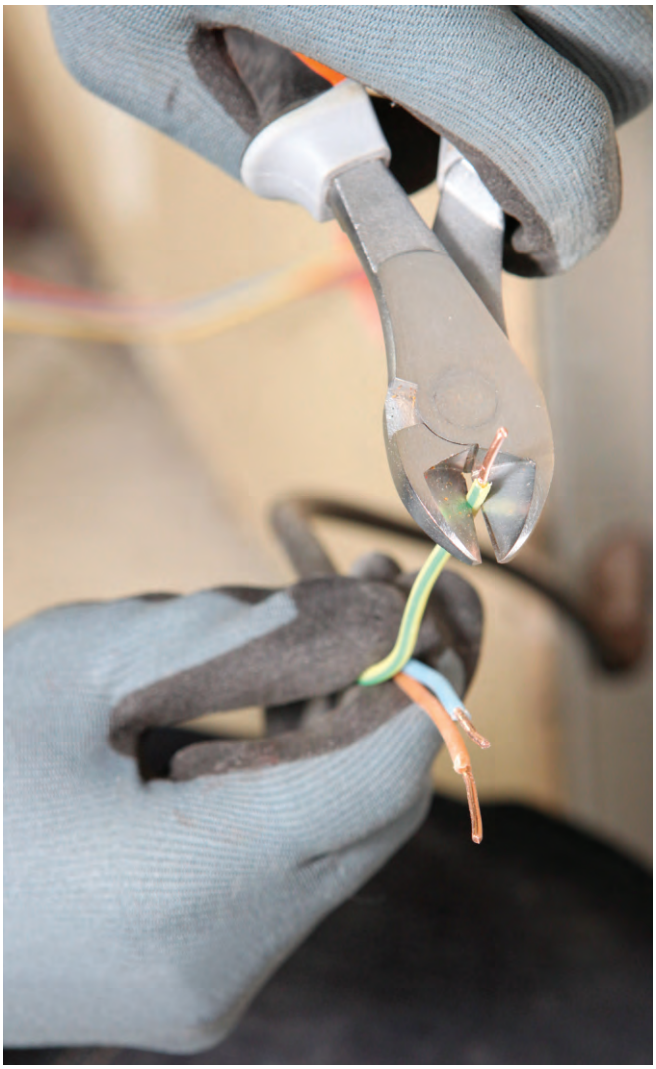
Contributing to developing a sustainable growth culture, promoting ecologic awareness and commitment to the environment.



FSC: "Forest Stewardship Council": Organization that has the purpose of promoting the good use of forest resources, through practicing responsibility with the environment, socially acceptable, economically feasible, backed by believable certification processes.

SFI: "Sustainable Forest Initiative" International independent, nonprofit organization that has a certification program based in the sustainable forest handling, biodiversity protection, water quality and the wildlife habitat.

RA: "Rainforest Alliance" Works to conserve the biodiversity and assure sustainable life media through the transformation of ground usage practices, corporative practices and consumer behavior.

RECYCLED PAPER: The use of recycled contents to manufacture new paper reduces the use of wood and represents a reduction in the amount of solid waste. All existing paper is considered as recycling products.

GREEN SEAL: Certification indicating the product contains a minimum 30% post-consumer fiber and is manufactured with a low amount of energy.

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