1. TIME FOR CHANGE
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   - Greenhouse gases
   - Infographic: What is climate change?
   - Short-Lived Climate Pollutants
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   - Infographic: Short-lived climate pollutants
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   Challenge 1: Modernisation
   Challenge 2: Public Policies
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   Infographic: A market approach for a scaled impact
   Getting organised to reduce emissions
   Infographic: Climate and Clean Air Coalition
“The Climate and Clean Air Coalition is an impressive example of a partnership that can deliver results. We must act urgently to limit carbon dioxide emissions to keep global temperature rise below two degrees Celsius. In addition, we need immediate action to control short-lived climate pollutants, not only to mitigate warming, but to reduce air pollution and improve public health”.

United Nations Secretary General, Ban Ki-moon
COP21

“The payback of this coalition’s actions is measured in reduced air pollution, improved food security, improved energy access and better health. A healthy planet is good for the health of the people of our world”.

Margaret Chan Director-General World Health Organization
The fact that climate is changing is a reality that no one disputes. Since 1950, our planet’s climate has suffered unprecedented change compared with previous decades, or even millennia.

The atmosphere and the ocean have warmed; snow and ice volumes have diminished; sea level has risen and the concentrations of greenhouse gases have increased.

This transformation in earth’s climate generates impacts that affect us in different ways and lead us to make decisions about things we previously wouldn’t have considered and requires us to plan our lifestyle differently.

The Industrial Revolution began in Great Britain during the second half of the eighteenth century; then it expanded to Europe and later to other countries, including the United States. Thereafter industries begin to settle in Latin America as part of the process of industrialisation on a global scale, that marks the beginning of a substantial increase in the use of fossil fuels and greenhouse gases emissions, the release of these gases, particularly carbon dioxide has reached concentrations of unprecedented levels in the last 800,000 years.  

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1 IPCC. Fifth Assessment Synthesis Report. 2014
Greenhouse gases

What is causing climate change?

It is certain that the climate change we face today is linked to the intensive use of fossil fuels, which is common in industry and contemporary life. The principal fuels are coal, gas and oil. For just one example: between 1970 and 2010, CO₂ emissions from burning fossil fuels and industrial processes have contributed to increase in 78% of GHG².

GHG are different types and origins both from natural processes and from human activities. The most common in these categories are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and many types of chlorofluorocarbons.

GREENHOUSE GASES (GHG) INCLUDE ALL CHEMICAL GASEOUS COMPOUNDS THAT ACCUMULATE IN THE EARTH’S ATMOSPHERE AND THAT CAN ABSORB AND REFLECT INFRARED RADIATION (HEAT). THEIR CONCENTRATION INCREASES THE TEMPERATURE OF OUR PLANET; THESE CAN BE LONG-LIVED GASES, I.E., THEY REMAIN IN THE ATMOSPHERE FOR DECADES, CENTURIES OR LONGER.

² IPCC. Fifth Assessment Synthesis Report. 2014
What is **climate change**?

A significant and long-lasting change in local or global climate patterns

GHG emissions are the highest in history and generate climate changes. The most significant sources are electricity production, industry, transportation, land use change and buildings³.

**Short-lived Climate Pollutants**

- CO₂: Carbon dioxide
- N₂O: Nitrous oxide
- CH₄: Methane
- O₃: Ozone
- HFC: Fluorocarbon
- BC: Black Carbon

**Biological processes**

- Land use change
- Deforestation

**Industrial sector**

According to IPCC, Latin America and the Caribbean contribute 10.3% of GHG emissions globally.

³ Source: EPA 2012. Report to Congress on Black Carbon
Short-Lived Climate Pollutants

These pollutants (one of them, black carbon produced by the brick industry) can be reduced in the atmosphere in weeks or few years, after which the emissions are reduced with a notable effect on global temperatures. The reduction of short-lived climate pollutants (SLCP’s) have a significant and immediate impact on mitigation of global warming and also generates huge benefits for humanity:

- It helps prevent millions of deaths each year due to air pollution.
- It avoids annual losses of almost 50 million tons of agricultural products.
- It reduces glacier thawing.
- It avoids loss of biodiversity.
- It reduces the risk of crossing the limits that lead to irreversible changes in earth’s health.

SHORT-LIVED CLIMATE POLLUTANTS (SLCP), also called short-term climate forcers, are compounds whose life time in the atmosphere is less than homogeneously mixed GHG. The main SLCP’s are black carbon (BC), methane (CH₄), tropospheric ozone (O₃) and some hydrofluorocarbons (HFC)⁴.

⁴ UNEP. Time to act to reduce Short-Lived Climate Pollutants. 2015.
Black carbon, a pollutant to eradicate

Black carbon affects human health: it generates respiratory problems and can produce asthma and lung cancer.

Its lifetime in the atmosphere varies from a few days to several weeks, but during that time, its warming potential can be between 460 and 1500 times more potent than CO₂.⁵

Black carbon influences the global warming by absorbing radiation, its dark particles release heat and increasing the temperature of the atmosphere.

It has been proven that these particles are also deposited on glaciers and snow, which contributes to surface melting.

In addition, it changes the properties of clouds and changes rainfall patterns.

Black carbon is a SLCP. It is a compound produced by incomplete combustion of fossil fuels, biofuels and biomass, primarily in diesel vehicles, cook stoves, fires, agricultural slash and burning, industrial factories and brick manufacturing.

⁵ www.aida-americas.org/sites/default/files/One%20pager%20final_1.pdf
Short-lived Pollutants

<table>
<thead>
<tr>
<th>POLLUTANTS</th>
<th>LIFE TIME IN THE ATMOSPHERE</th>
<th>IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Carbon</td>
<td>Days</td>
<td>Local</td>
</tr>
<tr>
<td>Methane</td>
<td>12 years</td>
<td>Regional</td>
</tr>
<tr>
<td>Tropospheric Ozone</td>
<td>Weeks</td>
<td>Global</td>
</tr>
<tr>
<td>Hydro fluorocarbon</td>
<td>15 years</td>
<td></td>
</tr>
</tbody>
</table>

**Source**: Time to reduce climate pollution. CCAC

Average worldwide temperatures increased around **0.85°C** during the twentieth century.

3.2 million premature deaths occur annually due to outside air pollution.


Latin America releases around 12% of the black carbon produced worldwide.

Latin American Black Carbon: 1300 Gg/year

**Source**: Tami Bond. UIUC. 10/21/2009.
2009 International Workshop on Black Carbon in Latin America.
Polluting emissions from the brick industry

Although emissions of pollutants have adverse effects on the environment, agricultural production, etc. The negative effects on human health as a consequence of brick kiln emissions are described in the following lines:

**Particulate Matter (PM$_{2.5}$)**

This pollutant is generated during biomass and fossil fuel combustion. Recent studies indicate that black carbon acts like a vehicle to transport particulate matter (PM$_{2.5}$) and other toxic compounds. Particles smaller than 2.5 microns (including black carbon) are associated with different impacts on human respiratory and cardiovascular health, and are the cause of millions of premature deaths per year, especially in emerging countries.

The World Health Organization (WHO) places air pollution among the first ten risk factors in high-middle income countries.

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8 EPA. 2012. Report to Congress on Black Carbon

Sulphur dioxide (SO₂)
Sulphur dioxide has been identified as a harmful pollutant, against health and well-being of population.

It is formed during combustion when the fuel used contains sulphur, for example coal, petroleum, diesel, among others. SO₂ emissions have negative impacts on health and contribute to the generation of sulphates as secondary pollutants in the form of PM₂.₅. SO₂ also has effects on land and fresh water ecosystems due to acidification.

In human beings, it increases the frequency of respiratory symptoms and lung disease¹⁰.

Nitrogen dioxide (NO₂)
According to WHO, nitrogen dioxide is a toxic gas that causes inflammation of the respiratory tract.

It is formed as a by-product in high temperature combustion processes.

Epidemiological studies have revealed that some symptoms of bronchitis in asthmatic children increase in relation to prolonged exposure to NO₂.

It also causes respiratory problems, like chronic pulmonary fibrosis and bronchitis and causes absorption of visible light and reduces visibility.

¹⁰ WHO 2006. Guías de calidad del aire de la OMS relativas al material particulado, el ozono, el dióxido de nitrógeno y el dióxido de azufre.
Brick Production in Latin America

Information about the characteristics of brick production in regional countries as well as production levels, types of products and technology used.

For more information:

http://redadrilleras.net/capacitaciones/
In fact, economic improvement in the region stimulates the growth of the brick industry; according to an analysis prepared by the Energy Efficiency Program for the Brick Sector in Latin America (EELA), there are approximately 45 thousand brick manufacturers in Latin America – most of them informal.

Informality has been reduced considerably in Brazil and Colombia; Peru, Ecuador, Bolivia, and Mexico started with the process of adoption of improved technologies.

Due to its low technology, the sector has poor energy efficiency; i.e., it uses a lot of fuel to produce little amount of bricks, a good part is produced in open kilns. This generates high emissions, especially during the firing process.

Fuels used in the region are firewood, sawdust, agricultural residue, mineral coal, gas and, in some cases, tires or used oil. The most significant emissions are particulate matter – also known as suspended particles, which are generated in kilns during the firing process. Here we can also mention sulphur dioxide, nitrogen dioxide and volatile organic compounds. The impact of their presence in the atmosphere depends on the fuel, technology and production practices applied in the process. These elements have direct and indirect effects on human health, flora, fauna, and water sources, and contribute to climate change.
Brick production in Latin America

Characteristics of the brick industry

- Production is primarily artisan
- Fuels with high environmental impact are used
- Low energy efficiency
- Informality
- Difficult to access credit
- No public policy for the sector
- Lack of knowledge about appropriate technologies and good production practices.

The brick sector in Latin America produces **500 thousand jobs**. It is estimated that between 30% and 50% of production is artisan in Latin America.

Brick producers in the region

<table>
<thead>
<tr>
<th>Country</th>
<th>Annual production of bricks (x 1.000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>16,953</td>
</tr>
<tr>
<td>Argentina</td>
<td>8,667</td>
</tr>
<tr>
<td>Brazil</td>
<td>7,095</td>
</tr>
<tr>
<td>Bolivia</td>
<td>2,704</td>
</tr>
<tr>
<td>Peru</td>
<td>2,241</td>
</tr>
<tr>
<td>Ecuador</td>
<td>1,730</td>
</tr>
<tr>
<td>Colombia</td>
<td>849</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>537</td>
</tr>
<tr>
<td>Honduras</td>
<td>470</td>
</tr>
</tbody>
</table>

Annual production of bricks (x 1.000)

Fuel used

- Argentina
- Bolivia
- Brazil
- Colombia
- Ecuador
- Honduras
- Mexico
- Nicaragua
- Peru

Good practices

Description of production practices that contribute to an energy efficient production process, complementary to a more efficient kiln.

For more information:

http://redladrilleras.net/capacitaciones/#buenas_practicas
NEW TECHNOLOGIES USED BY THE BRICK INDUSTRY IN THE FIRING PROCESS ARE VERY IMPORTANT FOR GOOD ENERGY PERFORMANCE. THEY ALSO SEEK TO WORK WITH LESS ENERGY TO PRODUCE THE SAME NUMBER OF BRICKS AS WELL AS TO SAVE COSTS AND REDUCE EMISSIONS TO A MINIMUM.

Technologies developed by the brick industry in recent years reduce negative impacts on the environment, improve quality of life for people working in the industry and substantially reduce production costs. Fortunately, there are many of them that are increasingly closer to the economy of the producers.

Within the brick manufacturing process, the firing of pieces in the kilns is the main phase in terms of energy use. It is calculated that the energy expenditure of the firing process reaches 95% of the thermal energy used in the brick production. The implementation of these measures reduce the expenditure in fuel and increase the quality of products, reducing losses in the production. In addition of these more efficient kilns and good production practices improve the production process. It reduce fuel consumption and reduces emissions.

Improvements in the brick industry
Organization and management of a brick factory

PROVIDERS
- Raw materials
- Fuels
- Equipments and tools
- Kilns
- Workforce

PRODUCTION PROCESS
- Mixing
- Molding
- Drying
- Loading the kiln
- FIRING
- Unloading the kiln

FINAL PRODUCT
- Bricks
- Roof tiles

Enterprise → Formalization → Income generation

WASTE/HEAT LOSS
**Production Practices**

An appropriate set of production practices contributes to a more efficient process.

- **Combustion Chamber Design**
  - The combustion chamber of the kiln should be designed based on the type of fuel and the load to be processed.
  - A small combustion chamber fed with a lot of firewood may not receive sufficient air for combustion and lose energy.

- **Fuel monitoring**
  - Combustion is controlled by monitoring the fuel/air ratio and the temperature.
  - Continuous fuel feeding is recommended as well as observing fuel injection intensity and the colour of the flame.

- **Air Injection**
  - Can reduce firing time and fuel consumption (between 15 and 30%) and obtain better quality products.
  - Generates better heat distribution. Since lack of air (oxygen) causes high emissions, the injection of air can also reduce emissions.

- **Type of fuel**
  - Gas is recommended because it reduces particulate matter and black carbon emissions.
  - The use of chopped firewood reduces fuel consumption by up to 20%. When using biomass (firewood), it is important to confirm its legal source.

- **Ceramic Pug (dough/clay)**
  - Some types of fuel can be mixed into the ceramic pug itself, such as carbon dust, petcoke, peat, waste paper fibre and sawdust.
  - This can reduce fuel consumption by 10 to 15% and increase product mechanical resistance.

- **Arrangement of pieces**
  - The appropriate distribution of the ceramic pieces within the kiln can improve the heat distribution and the quality of the products.
  - This practice can help reduce fuel consumption and operation time by as much as 5%.

- **Thermal insulation**
  - Thermal insulation systems can increase kiln efficiency.
  - Appropriate sizing and sealing of walls, doors and kilns also contribute to greater energy savings.

- **Identification of clay properties**
  - It is important to know the particle size, plasticity and characteristics of the clay to be used when it is dried.
  - If a laboratory analysis is not available, these measurements can be taken using simple practices.
In the process of **brick manufacturing**, the **firing phase** in the kilns is the principal phase in terms of energy.

### Firing Technology

<table>
<thead>
<tr>
<th>Kiln</th>
<th>Investment level US$ (x10³)</th>
<th>Production capacity thousands</th>
<th>Fuel used</th>
<th>Specific energy consumption MJ/kg product</th>
<th>First quality pieces %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Efficiency Kilns</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open pit kiln (caieras)</td>
<td>0.5 - 2.5</td>
<td>7-70</td>
<td>Firewood</td>
<td>3.5 - 5.5</td>
<td>15 - 30</td>
</tr>
<tr>
<td>Open kiln without walls with moving fire</td>
<td>2.5</td>
<td>-20 - 60</td>
<td>Coal</td>
<td>2.5 - 3.5</td>
<td>15 - 30</td>
</tr>
<tr>
<td>Volcano (open kiln used in Bolivia)</td>
<td>2.0</td>
<td>10-142</td>
<td>Natural Gas, Coal, Firewood, Sawdust</td>
<td>3.0 - 4.0</td>
<td>15 - 30</td>
</tr>
<tr>
<td>Open with fixed walls (caipira)</td>
<td>2.3 - 15</td>
<td>2 - 60</td>
<td>Firewood</td>
<td>3.0 - 5.0</td>
<td>20 - 40</td>
</tr>
<tr>
<td>Paulistinha (down draught kiln used in Brazil)</td>
<td>28 - 46</td>
<td>50 - 75</td>
<td>Firewood, Sawdust</td>
<td>2.5 - 4.0</td>
<td>50 - 70</td>
</tr>
</tbody>
</table>

**Source:** EELA Programme
Efficient kilns

Mobile\(^\text{12}\)

Firing time in this kiln is short compared with traditional kilns because the modules are made of lightweight material.

This process involves less structure to heat which represents short firing and cooling periods.

The loading and unloading time is reduced because this kiln moves on rails over the brick load. Operators do not have to enter into the kiln, and this reduces the labour risks. This kiln generates about 90% first quality products and can operate with biomass, gas, coal or oil as fuel.

**Vertical shaft brick kiln**

This kiln, called the VSBK, consists of a vertical chimney where the bricks are stacked in packets of approximately 300 units.

When the packets descend, they move past the firing chamber and, upon reaching the bottom, the bricks cool and are unloaded.

Once the bricks are ready, the load descends and the next packet reaches the firing chamber. The bricks are unloaded at the bottom, and the process is complete.

There are several packets in the kiln, and their descent takes between 14 and 20 hours, according to labourer ability and experience. This kiln is easier to control, is more efficient, and usually use coal in between the brick layers. It has a short production cycle compared to other kilns.

The VSBK can produce solid and structural bricks, it cannot make bricks with holes or thinner products, like roof tiles or floors. Its low fuel consumption and the design lead to low emissions, so it is considered energy efficient.

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13 Adapted design: Greentech Knowledge Solutions, Swiss Agency for Development and Cooperation (SDC). Factsheets about brick kilns in South and South-East Asia. Dec, 2013
The tunnel is a continuous kiln with low pollution levels where the material is moved on carts through the kiln. The concept for this kiln corresponds to the idea of establishing a fire zone and passing the products to be fired along a heating curve. This process means an advantage of energy savings in cooling and preheating as well as the labour savings in loading and unloading the bricks and a quicker firing phase.

Its length varies from 70 to 150 metres. Fuel is supplied through the top using a transport system that completely reduces pollution at this phase. It has limited use in Latin America due to its high investment cost and production scale demanded, it provides a high energy yield and productivity: this is possible thanks to its configuration and heat recovery during the process.

---

The Hoffmann kiln can be continuous or semi-continuous operation since the fire (or fuel feeding) moves toward the brick stacks in a closed circuit (circular, elliptical or rectangular) with an arched roof. The draft is provided by the effect of the chimney or a ventilator.

This kiln was patented and designed by Friedrich Hoffmann in 1858 in Germany, and his initial model was a circle around a chimney.

It has three operating zones: the firing zone where fuel is fed; the preheating zone (front of the firing zone) where the green bricks are preheated by gases recovered from the firing; and the cooling zone where the fired bricks are cooled with the air entering the kiln.

This kiln is used in several countries in Latin America with various differences in the models. Firewood consumption varies between 0.90 and 1.20 m³ per thousand pieces produced, equivalent to 1.75 and 2.67 MJ/kg. Average thermal efficiency is 50%, and it generates between 85% and 90% of first quality products.

---

CEDAN

The CEDAN kiln consists of multiple, interconnected chambers with internal use of heat among them. There is always one chamber firing during the operation; likewise, between two and five adjacent chambers loaded with material are preheated with residual heat from the chamber being fired. On the other side, the two chambers in front of the firing chamber are used to cool the load that was already fired with outside air. This air exchanges heat with the hot pieces and heats up to enter the chamber in the firing phase, acting as combustion air, which also contributes to improvement in energy yield.

Specific firewood consumption varies between 0.40 and 0.45 tons/thousand pieces produced, equivalent to specific energy consumption between 1.71 and 2.28 MJ/kg and results in an average thermal efficiency of 54%. The CEDAN kiln generates around 90% of first quality products.

Dome

Also known as circular kilns, these are closed kilns. This model can better regulate the draft which can be natural or forced.

Dry material is fed through a lateral opening. Fuel can be supplied manually through grilles placed on the kiln wall or automatically through dosifiers. The chamber is built in a circular form with walls and vaulted roof of brick; they have lateral furnaces placed uniformly where fuel is burned.

An advantage of these kilns is that neither fuel nor its residue comes into immediate contact with the product because of the separating wall and conductor of gases from the furnace. Dome kilns are regularly used in Brazil [Aboboda kilns], Colombia and Peru. The combustion gases exit the kiln through an underground duct and move toward the chimney. Commonly used fuels are branches, pieces of wood, mineral carbon and coke.

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Down draft\textsuperscript{18}

The design of this kiln arose from an adaptation of the paulistinha kiln in Brazil. When the combustion process begins in the down draft kiln, the gases produced move toward the roof of the dome; then the heat falls through the bricks; finally, it passes through small openings in the floor. The combustion gases leave the kiln through an underground duct and enter the chimney.

This kiln is rectangular with a vaulted roof. It has various points where air and fuel are provided, which are on the lateral walls.

Fuels generally used are wood, sawdust and coffee husks.

## Firing Technology

In the process of brick manufacturing, the firing phase in the kilns is the principal phase in terms of energy.

<table>
<thead>
<tr>
<th>Kiln</th>
<th>Investment level (US$ x10^3)</th>
<th>Production capacity (thousands)</th>
<th>Fuel used</th>
<th>Specific energy consumption (MJ/kg product)</th>
<th>First quality pieces (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down draft (Peru/Ecuador)</td>
<td>6 - 12</td>
<td>7 - 12</td>
<td>Firewood</td>
<td>2.8 - 3.5</td>
<td>60 - 80</td>
</tr>
<tr>
<td>Dome</td>
<td>30 - 50</td>
<td>60 - 110</td>
<td>Firewood, Coal, Sawdust</td>
<td>2.5 - 3.8</td>
<td>60 - 80</td>
</tr>
<tr>
<td>Hoffman</td>
<td>25 - 150</td>
<td>~40 / month</td>
<td>Firewood, Natural Gas</td>
<td>1.7 - 2.7</td>
<td>85 - 90</td>
</tr>
<tr>
<td>Cedan</td>
<td>200 - 260</td>
<td>~200 / week</td>
<td>Firewood, Sawdust</td>
<td>1.7 - 2.3</td>
<td>90</td>
</tr>
<tr>
<td>Mobile</td>
<td>210 - 730</td>
<td>150 - 250 / week</td>
<td>Firewood, Sawdust</td>
<td>1.6 - 2.2</td>
<td>&gt;98</td>
</tr>
<tr>
<td>VSBK</td>
<td>60 - 400</td>
<td>8 - 35 / day</td>
<td>Coal</td>
<td>0.8 - 1.0</td>
<td>96</td>
</tr>
<tr>
<td>Tunnel</td>
<td>~1.000</td>
<td>&gt;2 thousand t/month</td>
<td>Firewood, Sawdust, Coal, Petroleum coke, Natural Gas</td>
<td>1.0 - 1.5</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

**Source:** EELA Programme
Kilns

Most commonly used kilns in Latin America for brick production, including description, applications, and technical information.

For more information:

http://redadrilleras.net/capacitaciones/#horno
Doubtless the United Nations Framework Convention on Climate Change, created in Río de Janeiro in 1992, is the first global effort to stabilise greenhouse gas concentrations in the atmosphere to a level that avoids climate change.

Political, public financing, investment and technology transfer mechanisms at the international and local levels are required to reach the target for reducing pollutants to decrease GHG.

Therefore, it is essential to establish international agreements and national policies that are backed up by those directly affected.
Latin America: Commitments to mitigate climate change

Emission limits applied

Particulate Matter EMISSION LIMITS (mg/m³)

<table>
<thead>
<tr>
<th>Country</th>
<th>Reduction in deforestation</th>
<th>Energy matrix diversification</th>
<th>Emission reduction goal</th>
<th>Biofuel production</th>
<th>Partner with CCAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARGENTINA</td>
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<tr>
<td>BOLIVIA</td>
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<td>BRAZIL</td>
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<td>COLOMBIA</td>
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<td>COSTA RICA</td>
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<td>CUBA</td>
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<td>ECUADOR</td>
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<td>EL SALVADOR</td>
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<td>GUATEMALA</td>
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<td>URUGUAY</td>
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The brick production with artisan kilns uses almost 50% more energy than a medium-efficient kiln and almost 3 times more than a high efficiency kiln.19

Source:
Commitments by company: www4.unfccc.int/submissions/INDC/Submission%20Pages/submissions.aspx

Nevertheless, part of the brick industry is not completely recognised by the countries in the region; therefore, it operates outside of public policies on social, economic and environmental issues.

This happens even though it involves an activity that contributes to strengthening the construction industry and that holds a key position in Latin American economic development in recent decades.

It is estimated that the artisan brick sector is responsible for 30% to 50% of regional production.

Latin American governments are developing initiatives to achieve compliance with agreements and commitments signed in various international forums. Therefore, the brick sector – formal and artisan – is becoming increasingly more important on the public agenda.

At next, let’s know about the policies and regulations that were developed in recent years:

20 CCAC. Report on identified past work on effective policies. 2015.
Argentina

The institution leading regulation activities in the brick industry is the Mining Secretariat, the body that created the Mesa Nacional del Ladrillo (National Bricks Board), which is a work space that seeks to regulate local and national policies in the brick industry.

Representing civil society, the Construction Chamber promotes standardised practices for brick manufacturing.

Bolivia

While there are no specific regulations for the brick industry as a whole, the Bolivian government, through the Vice Ministry for Micro and Small Enterprises, is making efforts to provide incentives for cleaner production models. Meanwhile, the EELA programme promotes, through policies and concrete actions, territorial zoning ordinances for the sector with an environmental economic approach to resolve land use conflicts. Local governments in Cochabamba and Oruro have implemented initiatives to develop the sector through incentives to producers and improvements in working conditions.
Brazil

Brazil is committed to reducing GHG emissions by 36.1% to 38.9% by 2020. A resolution from the Ministry of the Environment establishes maximum limits for air pollution emissions from stationary sources applicable to the brick industry according to production levels. This measure is effective in all states in Brazil under supervision of environmental agencies.

Some states ask brick producers to monitor emissions as a requirement to obtain or renew permits.

Colombia

The Ministry of the Environment and Sustainable Development promotes improvement in environmental performance for the brick sector.

Meanwhile, the Ministry of Mining and Energy, like in other countries, plays a key role in licensing the activity since it grants permits for exploiting clay quarries.

For the brick sector, it has issued resolutions that establish rules and standards for permitted emissions of pollutants to the atmosphere depending on sources and types of fuel; the regulation also specify the types of ducts or chimneys that brick kilns should implement to measure the gases and particles. The private Colombian bank performs a
Ecuador

Ecuador approved the Plan Nacional del Buen Vivir 2013-2017 [National Good Living Plan] which included innovative criteria for development in the energy sector with emphasis on efficient use of energy in industrial and residential sectors.

The Municipality of Cuenca has made the most progress in sector regulation.

Honduras

Through the Environmental Management Commission (CGA – Comisión de Gestión Ambiental) it exercises environmental regulatory control of the brick sector in compliance with the Environmental Best Practices Guide.

The Honduran Environmental and Natural Resource Secretary (SERNA – Secretaría de Recursos Naturales y Ambiente de Honduras) has included work with the brick industry in its Interagency Climate Change Committee.

Meanwhile, the Industry and Commerce Secretariat (SIC – Secretaría de Industria y Comercio) has a program...
to support micro, small and medium enterprises of the brick sector, which provides orientation and training as well as development funds. The Honduran General Law on the Environment sanctions air pollution from the presence of harmful gases, smoke, dust, or solid particles (Art. 59).

**Mexico**

Mexico has a General Law on Climate Change, and at the federal level regulates environmental conservation issues that drive ecosystem and natural resources protection, restoration and conservation.

State governments, through their Economic Development Secretariats for Social and Environmental Development and the Integrated Development Centres for the Family (DIF – Centros de Desarrollo Integral para la Familia), support the brick sector through training programmes, business momentum and resources for improving nutrition, housing and education.

**Nicaragua**

The Ministry of Transportation and Infrastructure is responsible for regulating and monitoring the construction industry, which includes artisan brick throughout the country and standardises and controls the quality of construction materials.

Nicaragua has the General Law on the Environment and Natural Resources (Law No 217), and its regulation
sets forth the rules for environmental and natural resource conservation, protection, improvement and restoration.

**Peru**

The Ministry of Production, through the Environmental Affairs General Directorate of the Vice Ministry for SME and Industry, promotes environmental best performance for these companies.

Meanwhile, the Ministry of the Environment (MINAM – Ministerio del Ambiente) is responsible for regulating emissions limits for the sector and for promoting implementation of Nationally Appropriate Mitigation Actions (NAMA). A regulation for control the atmospheric emissions in brick industry is under review; where a period of three years is proposed for artisan brick producers to comply with to the emission limits.
Public Policies

Policies implemented in Latin America applicable to the brick industry, including analysis and limitations.

For more information:

http://redladrilleras.net/capacitaciones/#politicas_publicas
5

STRATEGIES TO IMPROVE THE BRICK SECTOR
Toward a friendly brick industry

Currently there are very adequate technologies to reduce black carbon emissions. They should be implemented with the support of institutions and governments committed to change since the benefit for the brick sector as a whole would be noteworthy.22

Therefore, it is necessary to take actions that promote modernisation of the sector, that promote sustainable development, and that reduce polluting emissions.

The Brick Initiative of the Coalition for Clean Air and Climate to Reduce Short-Lived Climate Pollutants (CCAC) proposes activities that seek to transform this sector in Latin America as well as Asia and Africa.

Many mitigation measures for black carbon represent a significantly smaller expense for the States than current expenses to solve health problems of the people.

It is important to take measures to promote modernisation of the sector and promote sustainable development by reducing polluting emissions.

Thanks to data from a survey of partners of the CCAC Brick Initiative on the challenges of the sector, the following points can be mentioned as priorities for brick industry development:

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Challenges for the sector

Challenge 1: Modernisation

There has been much talk of applying appropriate and efficient technologies, and good production practices have been mentioned; nevertheless, the question arises... How can we achieve it?

There are some ways to do it:

- Generate validated information about low-cost technologies with rapid investment return to show producers the profitability of the proposed technologies.
- Articulate the actors of the value chain to promote the technological and financial credit market with brick producers with a vision of win-win.
- Demand the change from open kilns to closed kilns with chimney. To measure the emissions it is necessary to have a stack. On the other hand, open or campaign kilns are less efficient.
- Promote programmes that favour attractive credit conditions for the producer to achieve the transition from artisan to mechanised. High interest rates and lack of collateral and security guarantees are barriers for the mechanisation of the brick sector.
Challenge 2: Public Policies

Regulations or rules that promote manufacturing sectors more are those that include requirements and promote economic activity.

The brick sector is not regulated; particularly the small enterprises. Many of their production units do not have legal land title or are in highly populated urban areas. Appropriate legislation is essential for both the formal and informal industry, and that it is committed to the great changes that must be implemented. These are already on the agenda of the institutions involved in the problem of the brick industry in Latin America.

Here are some examples that have yielded good results in our region:

- Establishing atmospheric emissions limits and promoting the market for appropriate technologies pushed a significant technological change in Colombia and Brazil; however, it should be noted that governments should reduce the bureaucratic difficulties to make it easier to obtain permits, and to not become an obstacle to companies seeking to adapt changes.

- Territorial zoning is a good measure for preventing conflicts since it contributes to formalisation and, therefore, to financing for technological improvement of the sector.

- Land titles are the base for economic development.

- Access to formality, in coordination with sector authorities, makes formalisation an indispensable necessity rather than a duty to be competitive in the regional market dynamic.

- Promoting the use of renewable biomass to avoid deforestation contributes to mitigation of climate change effects.

- Financial studies and studies on reducing emissions can calculate the production costs and benefits of applying the regulations developed.
Challenge 3: Actors integration

Integrating, involving and coordinating are actions that should be at the vanguard of sustainable development for any industry sector since many very different market players and levels of government take part in it.

It is not possible to regulate without involving the private sector, and the private sector cannot modernise itself if the rules are not clear.

The technological upgrade involves an enormous effort for everyone: producers, consumers, technology suppliers, decision makers, the financial system, universities, research centres, and national and subnational governments.

Therefore, a push is needed for:

- Permanent coordination among competent authorities, research institutions and enterprises so that all are promoting implementation of technological innovations and strengthening of capacities in the sector relating to company management and energy efficiency.

- Involvement of technology suppliers and financial entities with producers in the brick industry so that the latter can have access to new equipment and technologies with competitive prices. Generally, micro, small, and medium brick enterprises do not see themselves as potential customers; nevertheless the experience of the Energy Efficiency Programme for the Brick Sector in Latin America (EELA) and the CCAC Brick Initiative shows that, when they are offered technological products or correct financing, the micro-entrepreneurs have the capacity to invest.
Strategies for the sector

Strategies for technological conversion in the brick industry in Latin America, identifying barriers and opportunities in public policies and economic viability.

For more information:

http://redladrilleras.net/capacitaciones/#estrategias
A market approach for a scaled impact

Brick manufacturers need better production technology. For this purpose, the involvement of other market players—such as machinery suppliers and service providers, in addition to financial entities—is required. It is necessary to facilitate market relations and disseminate the benefits of technological changes. The market approach makes widespread technological change, increased revenue and reduced emissions possible.

Facilitate contact between producers and suppliers through national and regional events, brick-firing demonstrations, field visits and training sessions.

Promote access to local financial services such as loans, micro-loans and leasing.

Incorporate small and medium-sized brick manufacturers in an integrated system, showing that they are an attractive market for technology suppliers and financial entities.

Source: Energy Efficiency Programme for Brick Sector in Latin America to Mitigate Climate Change. EELA is a SDC Programme, implemented by Swisscontact.
Getting organised to reduce emissions

The Climate and Clean Air Coalition to Reduce Short-Lived Pollutants (CCAC) is a voluntary global partnership that unites governments, inter-governmental organisations, enterprises, scientific institutions and others to generate concrete, substantial actions to reduce SLCP emissions. The coalition works through collaborative initiatives to raise consciousness, mobilise resources and lead transforming actions in key emitting sectors.

The coalition is currently made up of inter-governmental bodies and NGOs. The first countries to join the body were Bangladesh, Canada, Ghana, Mexico, Sweden and the United States, together with the United Nations Environment Programme (UNEP).

To date, Mexico, Colombia, Chile, Paraguay, Peru, Dominican Republic and Uruguay are part of the Coalition.
In 2012, Bangladesh, Canada, Ghana, Mexico, Sweden, the United States and the United Nations Environment Programme (UNEP) launched the Climate and Clean Air Coalition to Reduce Short-Lived Pollutants.

Objectives

The Coalition’s initial focus is on methane, black carbon, and HFCs. At the same time, partners recognize that action on short-lived climate pollutants must complement and supplement, not replace, global action to reduce carbon dioxide, in particular efforts under the UNFCCC.

The Coalition’s objectives are to address short-lived climate pollutants by:

- Raising awareness of short-lived climate pollutant impacts and mitigation strategies
- Enhancing and developing new national and regional actions, including by identifying and overcoming barriers, enhancing capacity and mobilizing support
- Promoting best practices and showcasing successful efforts
- Improving scientific understanding of short-lived climate pollutant impacts and mitigation strategies

Initiatives

- Agriculture
- Bricks
- Cookstoves
- Diesel
- HFCs
- Oil & Gas
- Waste
- Assessments
- Finance
- Health
- SNAP

Actors

- Non-governmental Organizations
- Civil Society
- Governments
- Environmental Community
- Private Sector Representatives
Down draft Kiln

Zig zag Kiln