

# BUILDING BETTER CITIES

Photographer: Christian Bederico

Contributing to more Sustainable & Resilient Cities

 **LAFARGE**  
Building better cities™

# Cities are at the heart of development

By 2050, 70% of the world's population will be living in cities

**Major challenges put the sustainability of cities at risk!**

- Population growth
- Rapid urbanization rate
- Increasing need for housing and infrastructure
- Risk of urban sprawl



**... resulting in environmental issues that affect cities – big or small**



# Providing solutions to the problem

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- **The cement industry alone accounts for 5% of worldwide CO<sub>2</sub> emission**
  - Traditionally, purely fossil fuels were used in pyro-processing
  - Limestone, the raw material used in the production of cement, generates CO<sub>2</sub> when it is heated
- **However, we are now continuously improving our processes, reducing the share of fossil fuels and enriching our cements with CO<sub>2</sub>-neutral industrial by-products**

# Our Sustainability Ambitions 2020

## Building Communities

### Health and Safety

Reach **0** fatalities and virtually eliminate lost-time incidents

### Diversity

Have **35%** management positions held by women

### Volunteerism

Contribute **1 Million** volunteer hours per year to locally selected projects

### Local Job Creation

**75%** of our country operations implementing a plan for local job creation

## Building Sustainably

### Affordable & Sustainable Housing

Enable **2 million** people to have access to affordable and sustainable housing

### Sustainable Products & Services

Increase to **€3 billion**

per year sales of new sustainable solutions, products and services

## Building the Circular Economy

### CO<sub>2</sub> Emissions

Reduce by **33%** our CO<sub>2</sub> emissions per ton of cement compared to 1990 levels

### Non-fossil Fuels

Use **50%** of non-fossil fuels in our cements plants by 2020 (including 30% biomass)

### Reused & Recycled Materials

Have **20%** of our concrete containing reused or recycled materials

# Sustainability embedded in the value chain

from Raw Material Crushing to Integrated Construction Solutions

## Raw Materials Processing

- Fly Ash (industrial by-product) in blended cement
- Total Ash Management
- Blended Aggregates

## Production Processes

- R&D on low-clinker cement: AETHER Project
- Alternative Fuels: Biomass, Industrial and Municipal waste
- Energy optimization: TOU, Heat Recovery Systems

## Strategic Production & Logistics Hubs

- Network of strategically-located plants and logistics hubs reduces delivery time and cost
- Packaging that contains cement dust

## Sustainable Solutions

- Blended cement, Manufactured sand, Green roofs
- Hydromedia – fast draining concrete
- Collaborations on affordable, weather-resilient villages

# Reducing our CO<sub>2</sub> emissions

## Alternative Fuel

The cement industry is heavily dependent on coal. Lafarge uses sustainable alternative fuels such as rice husks and sawdust as substitutes for more than 30% of coal requirements. The Group is continuously looking for means to cut its dependence on fossil fuels by 50% by 2017.

RDF production at landfill sites has transformed the lives of the pickers, providing them with decent, dignified livelihood, and has helped clean the environment. RDF production will prolong the life of sanitary landfills hence becoming a part of the Waste Management solution for the country.



# Reducing our CO<sub>2</sub> emissions

## Total Ash Management

Lafarge has instituted procedures, installed facilities and a laboratory at GNPowder's plant to ensure that all its by-product ash are used safely and cleanly disposed of in Lafarge's cement manufacturing plants. Now, all of GNPowder's on-spec fly ash are used as such additives in the production of Type 1P or 'blended cement'.



**Coal Fired  
Power  
Plants**

**Bulk truck to  
Cement  
Plant**



**Cement  
Plant**

**Projects**



# Reducing our CO<sub>2</sub> emissions

## Environmentally Sustainable Solutions

### Lafarge Republic Portland Plus

- Blended cement that uses high quality fly ash to enhance workability and long-term durability.

*“25% lesser total environmental burden for producing Type 1P than Type 1.”*



### Production of manufactured sand

- Produced by crushing rocks extracted from quarries, thereby preserving increasingly rare river sand resources.



### Hydromedia™

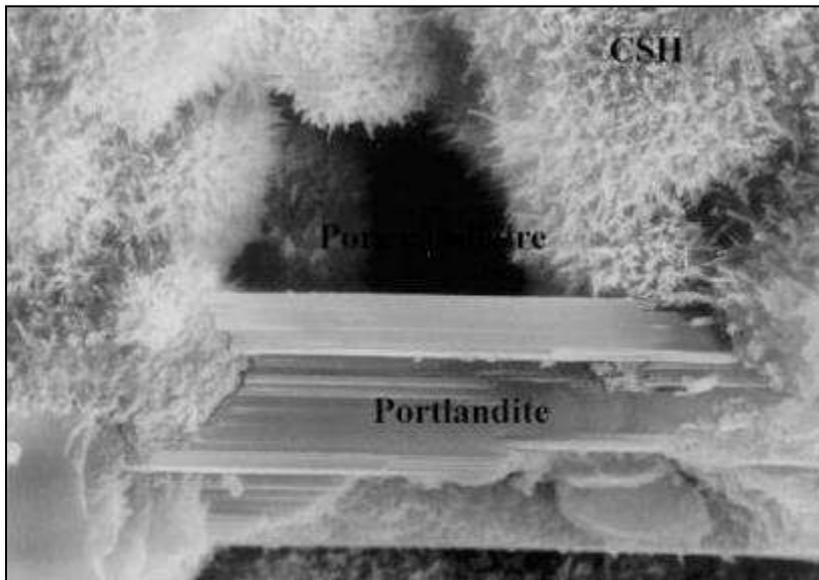
- Fast-draining concrete to minimize the impact of the natural cycle of water in an urban zone and allow rapid surface water removal during storms, thus reducing the risk of floods.



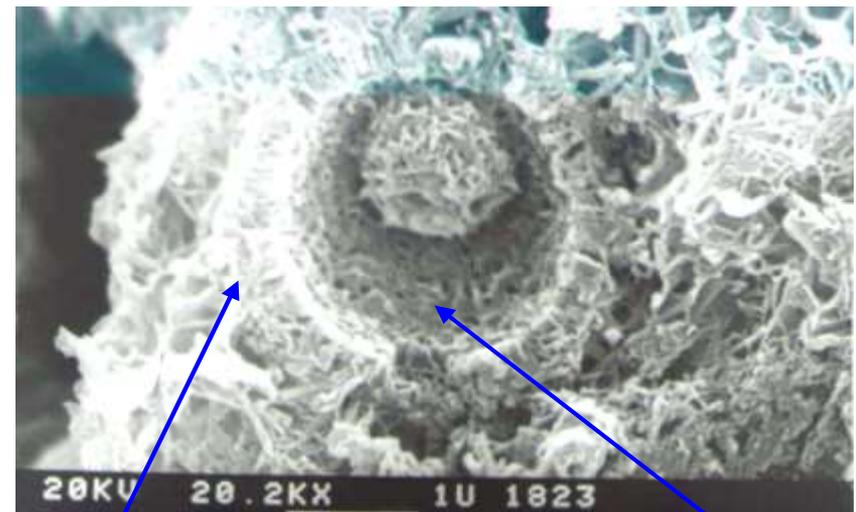
# Reducing our CO<sub>2</sub> emissions

## Cement with Fly Ash

**Use of fly ash allows a more dense concrete structure to be formed - resulting in less permeable concrete.**



**Hydrated cement without fly ash**



**Hydrates**

**Original surface of fly ash sphere**

**Hydrated cement with fly ash**

**(Fly-ash has reacted with Portlandite)**

# Reducing our CO<sub>2</sub> emissions

## Heat Recovery System

### 1<sup>st</sup> cement company in the Philippines to invest in a Heat Recovery System

A large amount of heat is produced in the manufacture of cement. At the Lafarge Teresa Plant, only a small portion of the heat generated was being utilized, with most of the heat ending up being wasted. Lafarge invested in a Heat Recovery System, installing a 4.5MW turbine to capture and use most of the waste heat to generate electricity. This is the first of its kind in the Philippine cement industry.

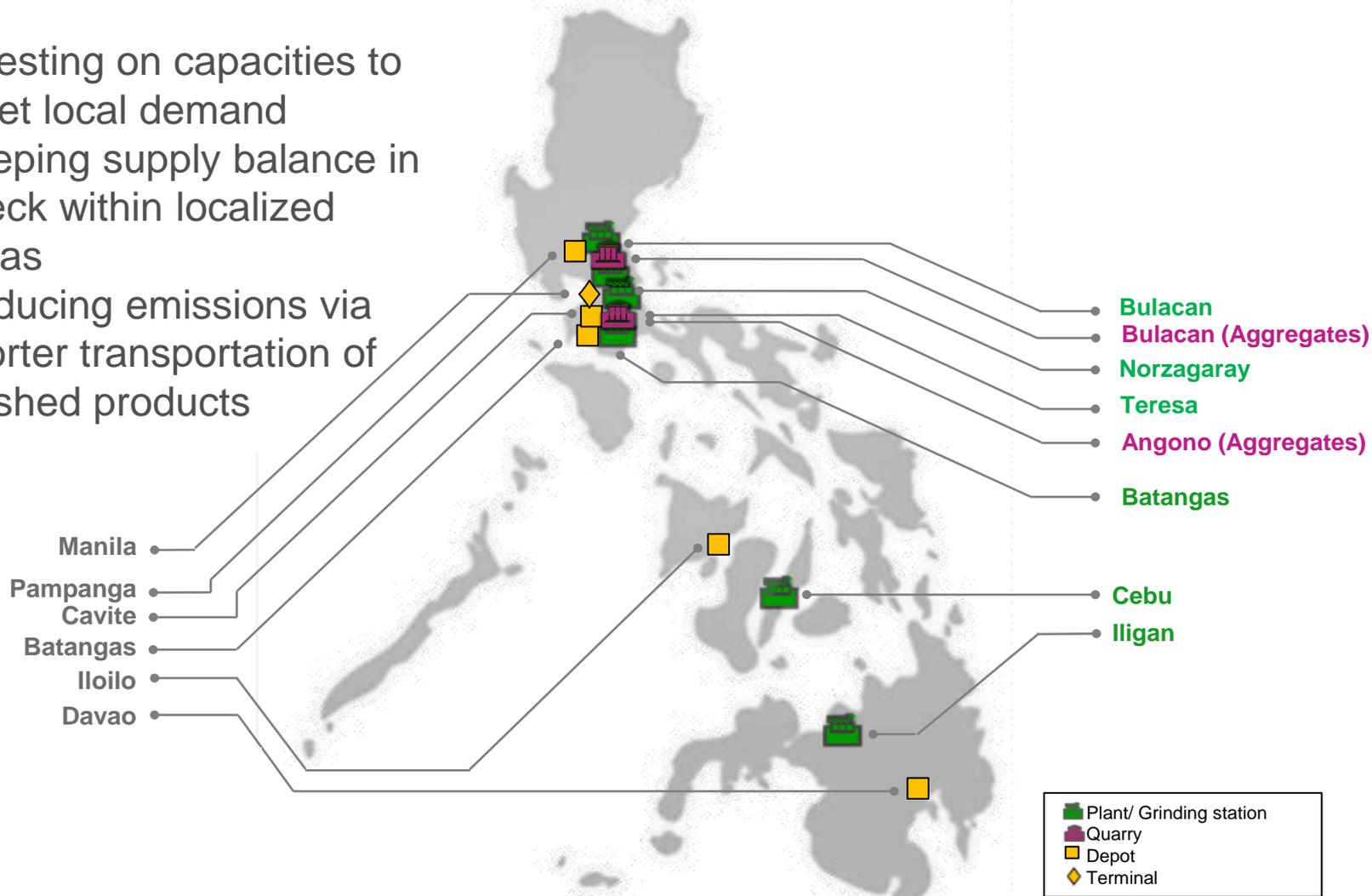


The Heat Recovery System meets approximately 30% of Teresa Plant's power requirements, thereby decreasing the plant's dependence on the power grid and cutting our CO<sub>2</sub> emissions by approximately 12,000 tons per year. It is the only approved Clean Development Mechanism (CDM) project in the Philippine cement industry.

# Reducing our CO<sub>2</sub> emissions

## Network of Strategically-located Plants and Logistics Hubs

- Investing on capacities to meet local demand
- Keeping supply balance in check within localized areas
- Reducing emissions via shorter transportation of finished products



# Increasing our contribution through CO<sub>2</sub> sequestration

## Reforestation – National Greening Program

**850 Hectares  
reforested in 2013  
alone**

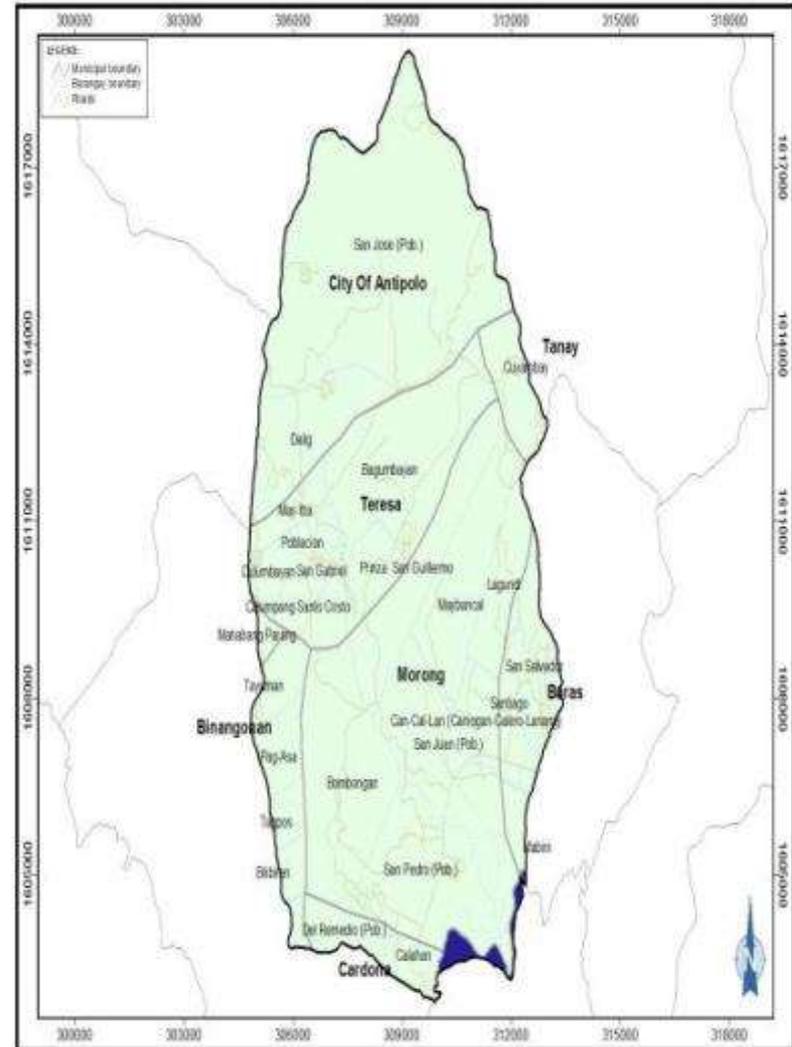
Lafarge has voluntarily committed itself to the National Greening Program of the government and has completed the planting of 850 hectares of denuded forest lands, at the same time, providing livelihood to hundreds of families. Lafarge commits to reforest 1,500 hectares by 2017.



# Preparing our operations for the potential impacts of climate change

## Developing a Morong Watershed Sustainability Plan

Aligned with Lafarge's Sustainability Ambitions 2020, this project involves the study of the effect of the Teresa Plant on the Morong Watershed and vice versa. The study will include the creation of a flood simulation model, water supply and demand data, and a strategic framework and action plan to engage stakeholders towards policy formulation.



# Preparing our operations for the potential impacts of climate change

Partnering with WWF to build the new Tubbataha Ranger Station

Situated 160 kilometers southeast of Puerto Princesa City in Palawan, the new station will feature a research building for up to eight marine biologists, whose trips have always been previously confined by the weather to summer expeditions on live-aboard boats. A library, visitor center and gift shop shall also be added to entice visitors not only to interact with the Rangers but also to provide a needed mechanism for fundraising. The complex shall also house a museum which is vital to showcase Tubbataha's rich history and even richer biodiversity.



# Preparing our operations for the potential impacts of climate change

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## Innovating and Re-Designing of Disaster Resistant High Rise Buildings

The Zuellig Building in the Makati Central Business District joins an elite group of less than a hundred buildings that have been certified Platinum by the United States Green Building Council under its LEED-CS program for Leadership in Energy and Environmental Design(Core and Shell).



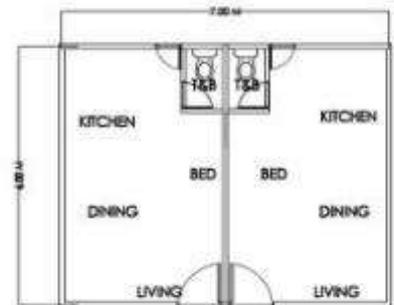
# Preparing our operations for the potential impacts of climate change

Innovating and Re-Designing of Disaster Resistant Affordable Homes with Habitat for Humanity in Daanbantayan, Cebu



**E.FLORENTINO<sup>3</sup> + Associates**  
Architects • Environmental Planners • Engineers • Consultants • Inventors

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FLOOR PLAN TYPICAL UNITS  
SCALE NTS