Performance in CO_2 emissions and energy consumption in the cement industry

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CBC 6º CONGRESSO BRASILEIRO DO CIMENTO

Associação Brasileira de Cimento Portland

SNIC SINDICATO NACIONAL DA INDÚSTRIA DO CIMENTO

19 a 21 maio 2014 ● São Paulo/SP ● Brasil

WBCSD member companies

Cement Sustainability Initiative
24 member companies

One third global cement production
Two thirds outside of China

Communication Partners

Cement Sustainability Initiative

oficemen
Agrupación de fabricantes de cemento de España

Arab Union for Cement & Building Materials

ACMP
Association of Cementitious Material Producers

Associação Brasileira de Cimento Portland

Cement Association of Canada
Association Canadienne du Ciment

中國水泥協會
China Cement Association

CEMBUREAU

CEMENT INDUSTRY FEDERATION
Cement Industry Federation Australia

PCA
Portland Cement Association

mpa
essential materials sustainable solutions
Mineral Products Association

FICEMAPCAC
FEDERACIÓN INTERAMERICANA DEL CEMENTO

JCA Japan Cement Association

SNIC
Brazilian Cement Association

Cement Manufacturers' Association

Responsibilities vs. challenges

Cement industry faces several **sustainability challenges**:

- **Can its climate impacts be well managed ?**
- **How can employee safety be improved?**
- **“Green (sustainable) building” codes are growing in importance. Is concrete a sustainable construction material?**
- **Is water use being well managed?**
- **What are the impacts of quarries on biodiversity?**

➔ By answering these questions responsibly, cement (and concrete products) will be the key to **economic and sustainable development** in our rapidly changing and expanding societies.

CSI Work Program

Agenda for Action (2002)

Measure, report, verify (+ reduce)

- CO_2 and Energy Management
- Use of fuels and raw materials
- Air emissions
- Safety
- Land use
- Communications

- Biodiversity

- Sustainable use of concrete

CSI Future review (2010)

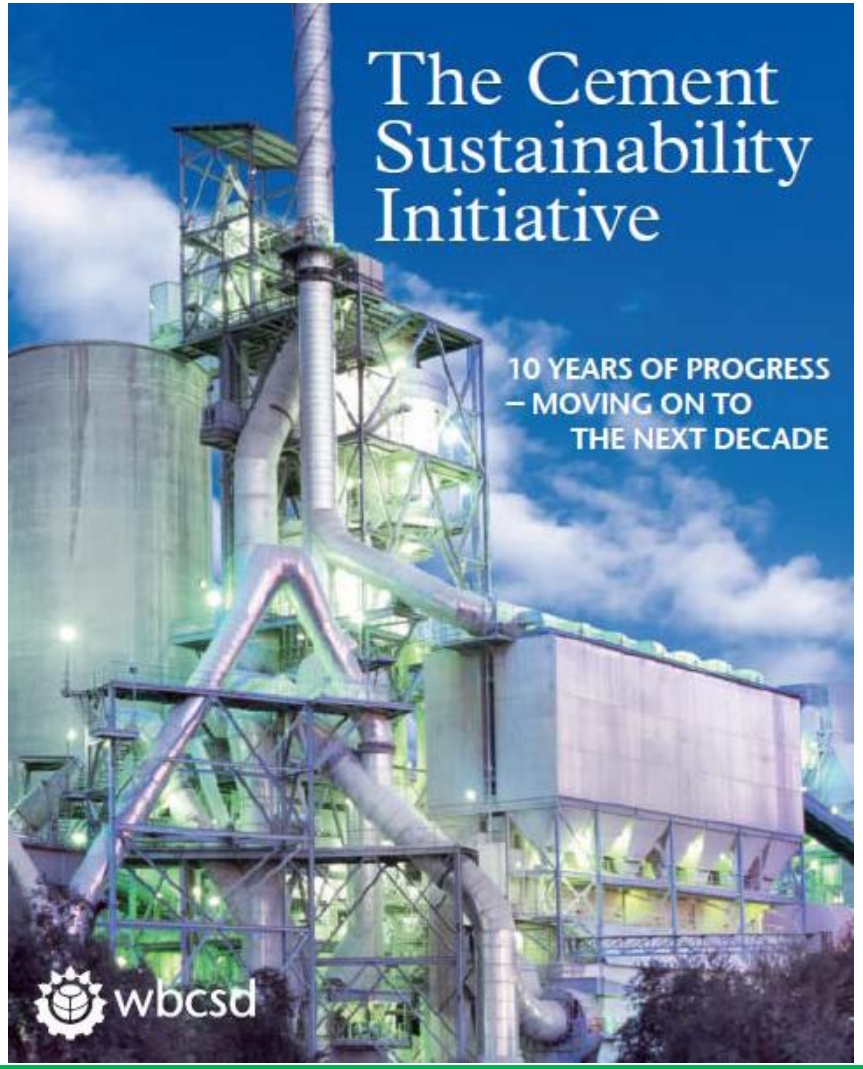
- Water
- Co-processing
- Supply chain management

CSI Progress Report (2012)

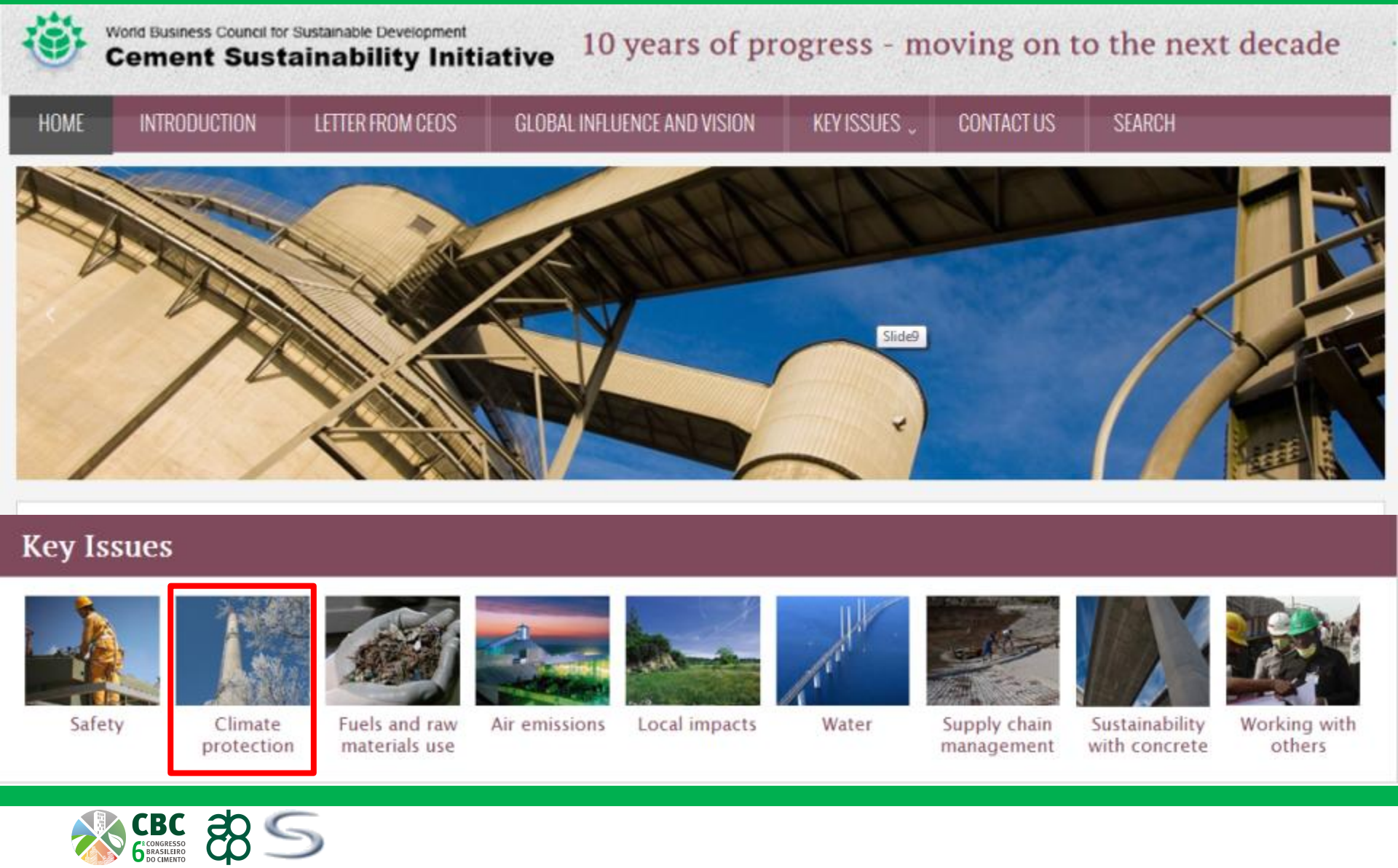
- Summarizes achievements and maps CSI vision and activities for future

CSI Progress Report

- Launched at Rio+20
  - BASD Business Day
- Limited printed copies
- Full version and Summary report
  - Summary for distribution at communication events
- Downloadable from the specific web site
http://csiprogress2012.org/



CSI Progress Report – Specific web site



Climate protection

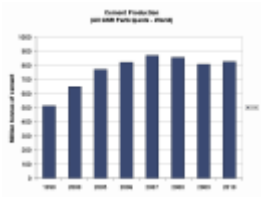
The CSI is a **leading voice** in the energy and climate debate

- Twice as much concrete (made with cement) is used around the world than the total of all other building materials; demand for cement is expected to increase continuously, particularly in emerging economies
- Cement industry is responsible for about 5% of all man-made CO_2 emissions
- Effective management of CO_2 emissions is crucial
- 4 recognized levers available:
  - Energy efficiency
  - Alternative fuels
  - Clinker substitution
  - Carbon capture and storage

CSI work on climate protection

CSI advocates the use of **Sectoral Market Mechanisms** for climate mitigation and has developed supporting tools:

Cement CO_2 and Energy Protocol
(Version 3, 2011)



Database for energy and CO_2 emissions:
"Getting the Numbers Right" (GNR)

Global Cement Technology Roadmap (with IEA),
regionally-customized versions

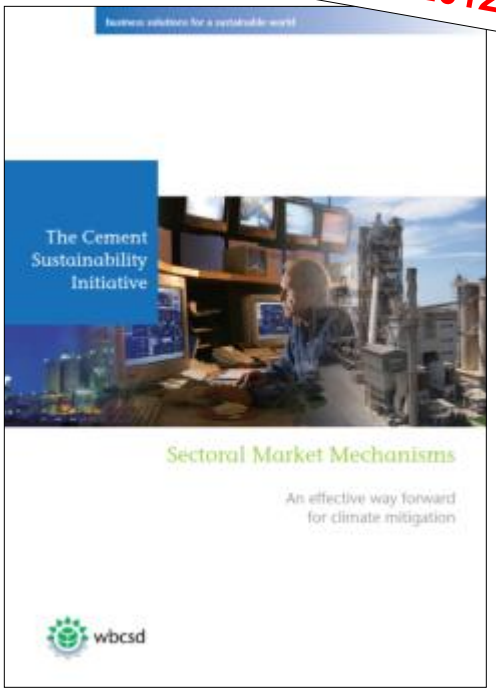
Sectoral Market Mechanisms

Sectoral market mechanisms are an effective and efficient tool for climate change mitigation as they:

- build on **national priorities** and leverage **existing emissions reduction efforts**;
- reward emissions reduction efforts with **tradable credits**; and
- need to be based on a consistent and **globally harmonized measurement, reporting and verification (MRV) system**.

National and regional systems should make a linking under a global framework possible.

First released in **June 2012**



Cement CO_2 and Energy Protocol

CSI members develop and implement climate mitigation strategies according to the highest standards

- Protocol for measuring and reporting CO_2 emissions and energy performance from cement manufacturing
- Harmonized methodology for calculating CO_2 emissions, addressing all direct and the main indirect sources of CO_2 emissions related to the cement manufacturing process
- First published in 2001, Version 3 of the protocol was issued in 2011
- Based on The Greenhouse Gas Protocol

Version 3.0 issued in **May 2011**

www.cement-co2-protocol.org/v3

“Getting the Numbers Right” (GNR)

Representative statistical information on the energy and CO_2 performance of clinker and cement production, worldwide and regionally, to serve the needs of internal and external stakeholders*.

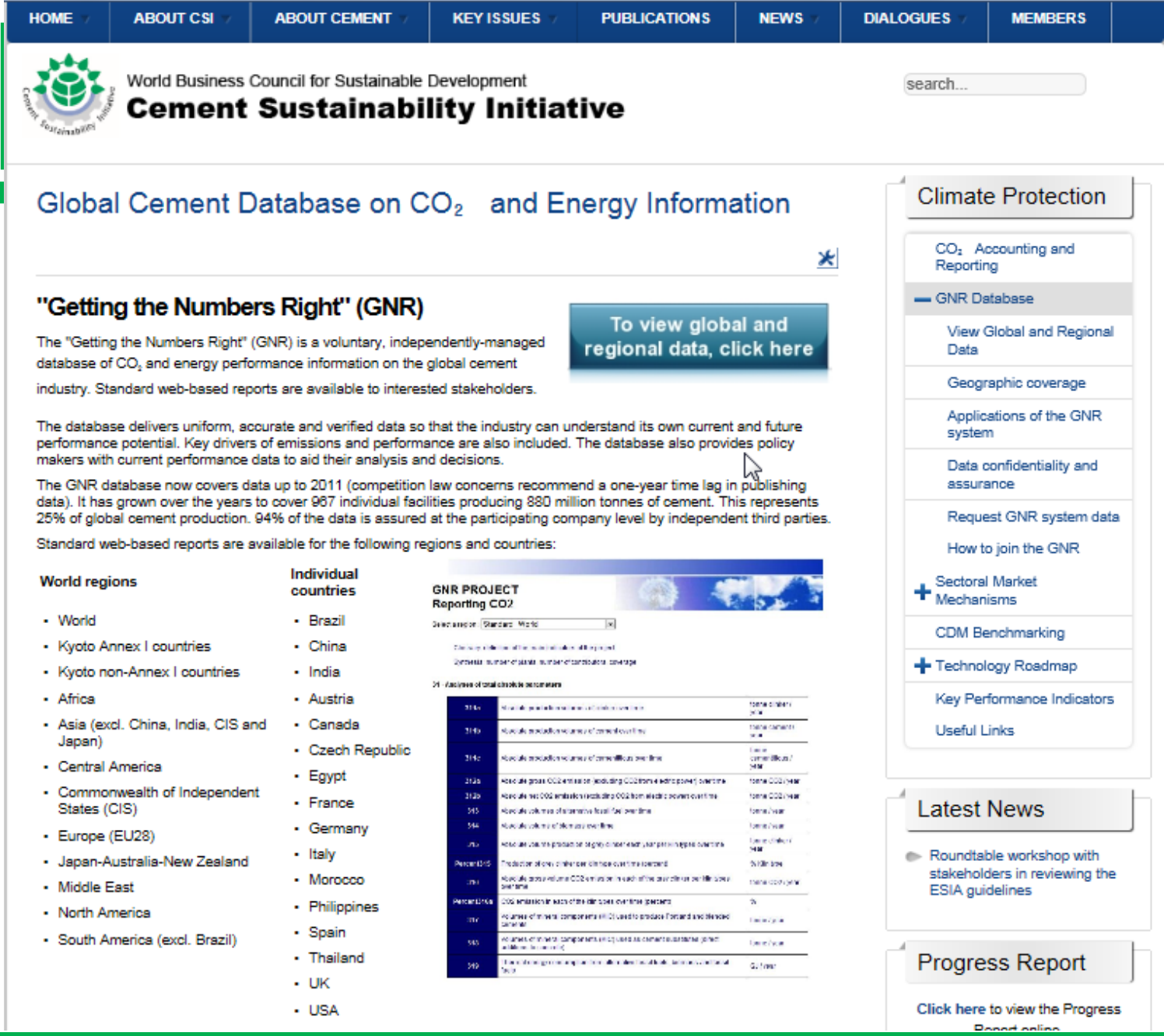
- The most comprehensive public database on CO_2 and energy information for any industry
- Based on the approach of voluntary reporting, the database complies with anti-trust laws and is managed by an independent 3rd party
- Using a common protocol for transparency in measurement, reporting and analysis
- Delivers uniform, accurate and verified data so that the industry can understand its own current and future performance potential

www.wbcsdcement.org/GNR

* CSI CEOs’ decision - October 2006

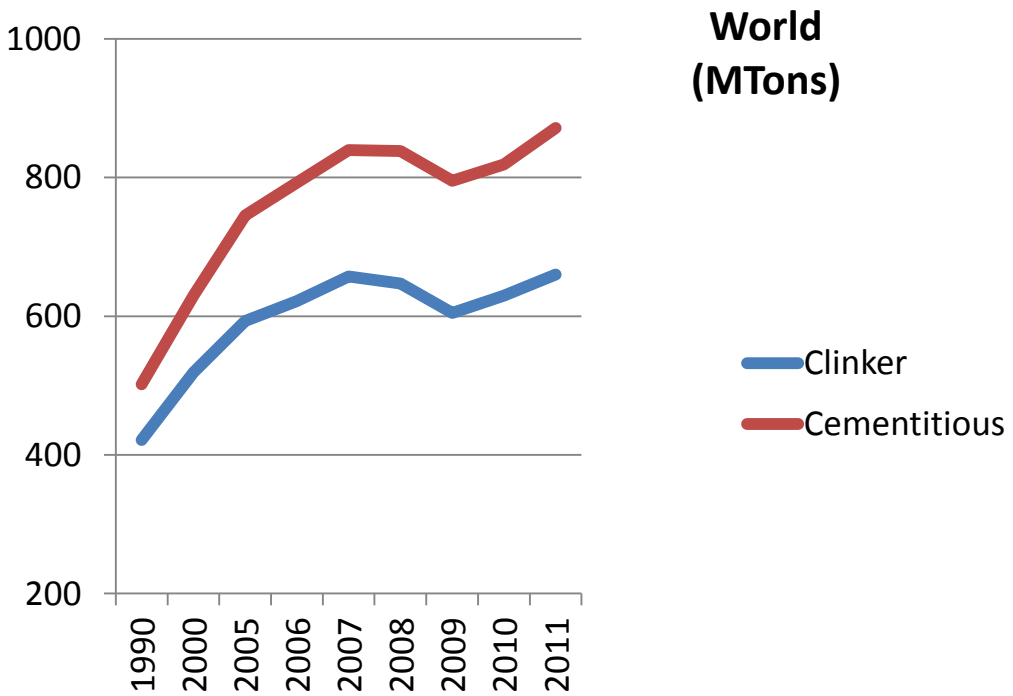
Impossible to identify or track back the individual company's reporting data.

One year interval in reporting



Data collection

- Data for
  - 1990, 2000, 2005-2011
- 2011:
  - 880 m tonnes cement,
  - 967 facilities
- 95% of data verified at company level
- Specific company reports (confidential)
- General reports published on CSI website

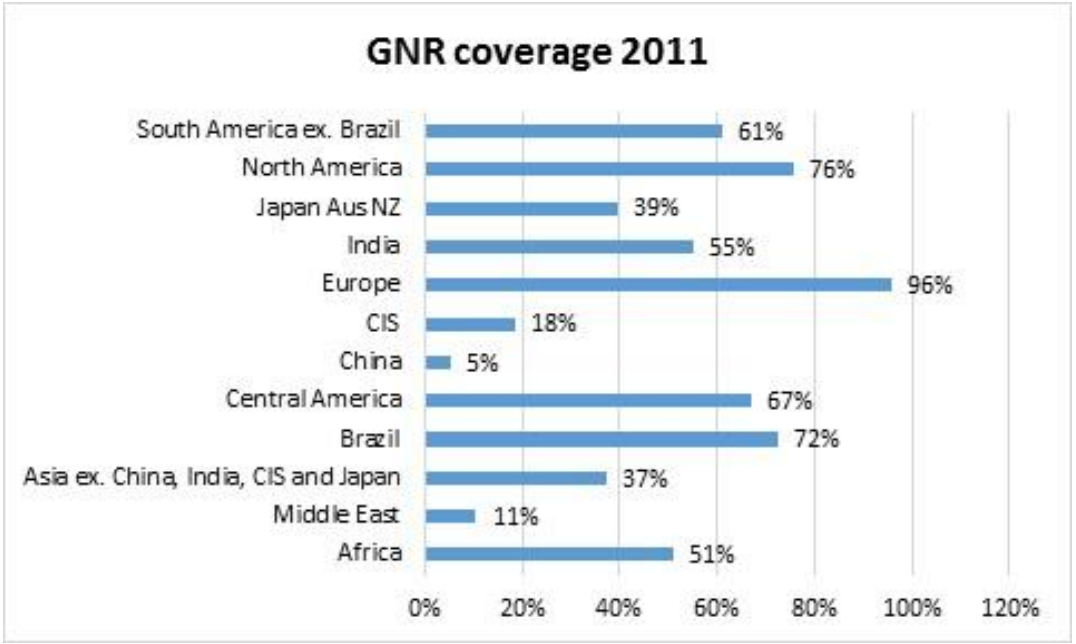


Global and regional coverage

Global coverage (2011, latest data available)**:**

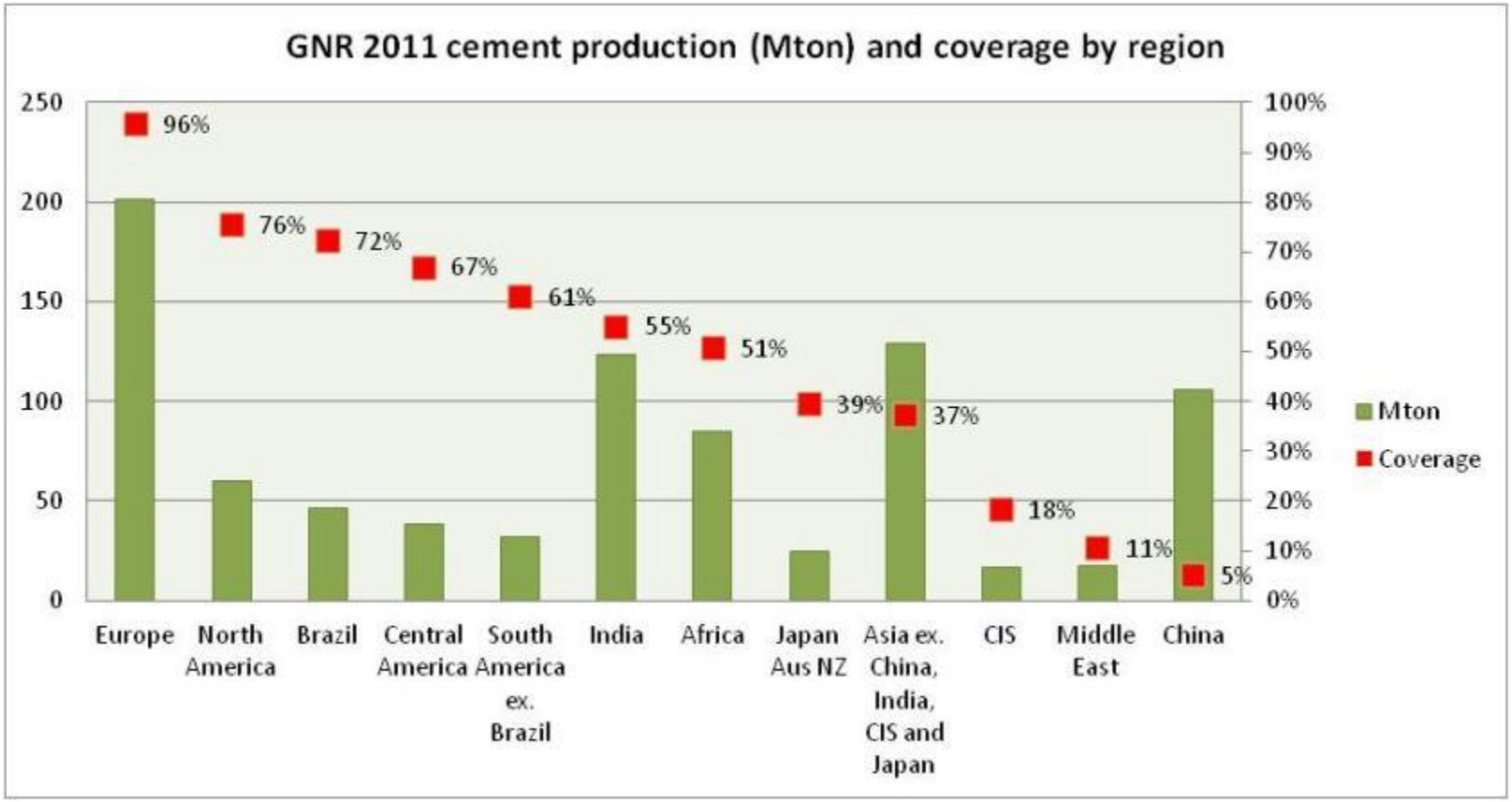
- 967 facilities
- 665 m tonnes clinker
- 880 m tonnes cement (25% of global cement production, or over 55% outside China)
- 95% of data is independently verified by 3rd parties

Regional coverage:



CIS: Commonwealth of Independent States (former Soviet Union countries)

Coverage by region in cement production volume and share of overall production

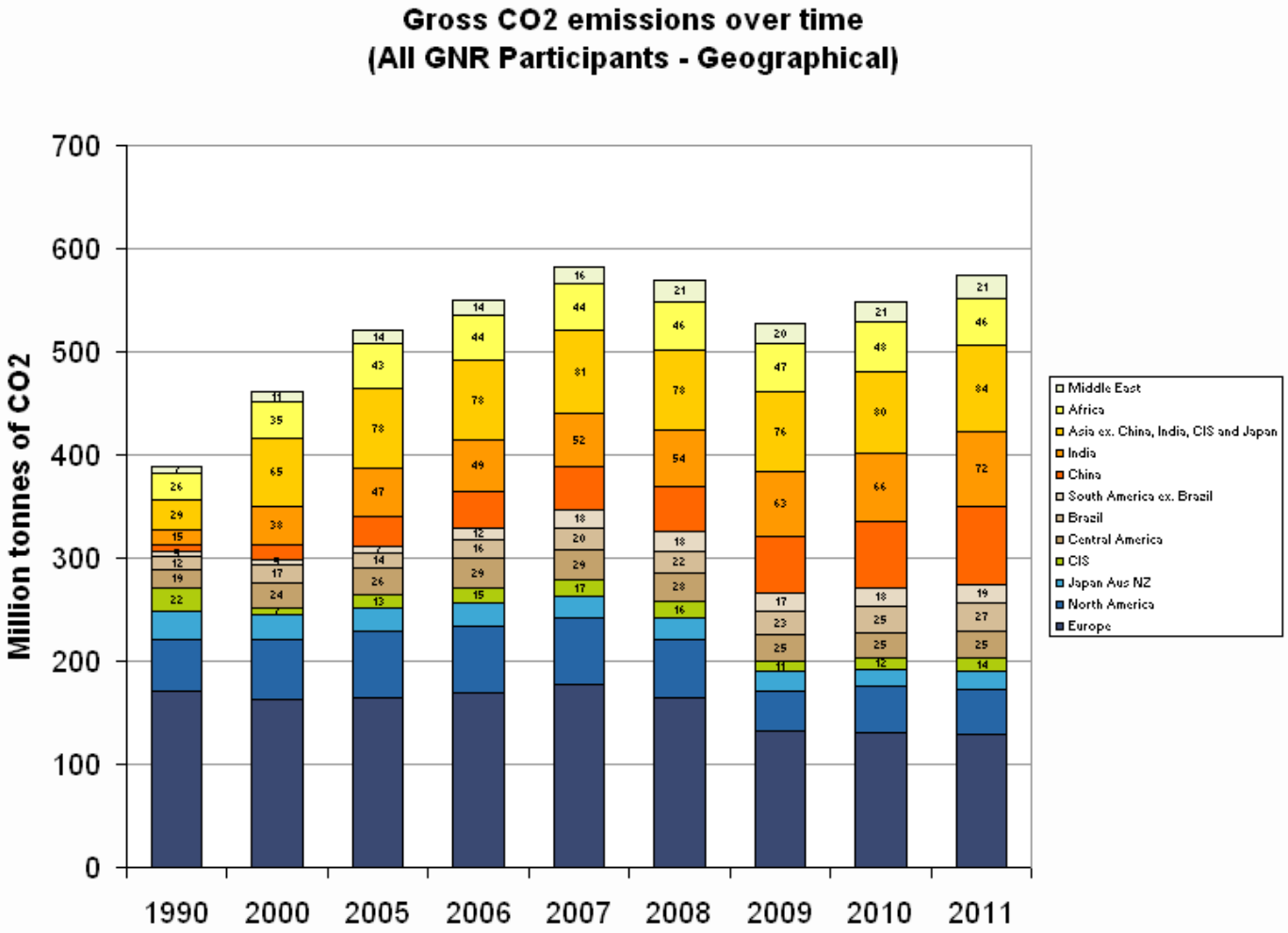


Possible to monitor evolution, by region

Need to have more than 3 companies in the same region:

- Headquartered
- Having operations and reporting CO2 emissions

Need to have more than 5 plants



Possible to extract KPIs at country level

Need to have more than 3 companies in the same country:

- Headquartered
- Having operations and reporting CO2 emissions

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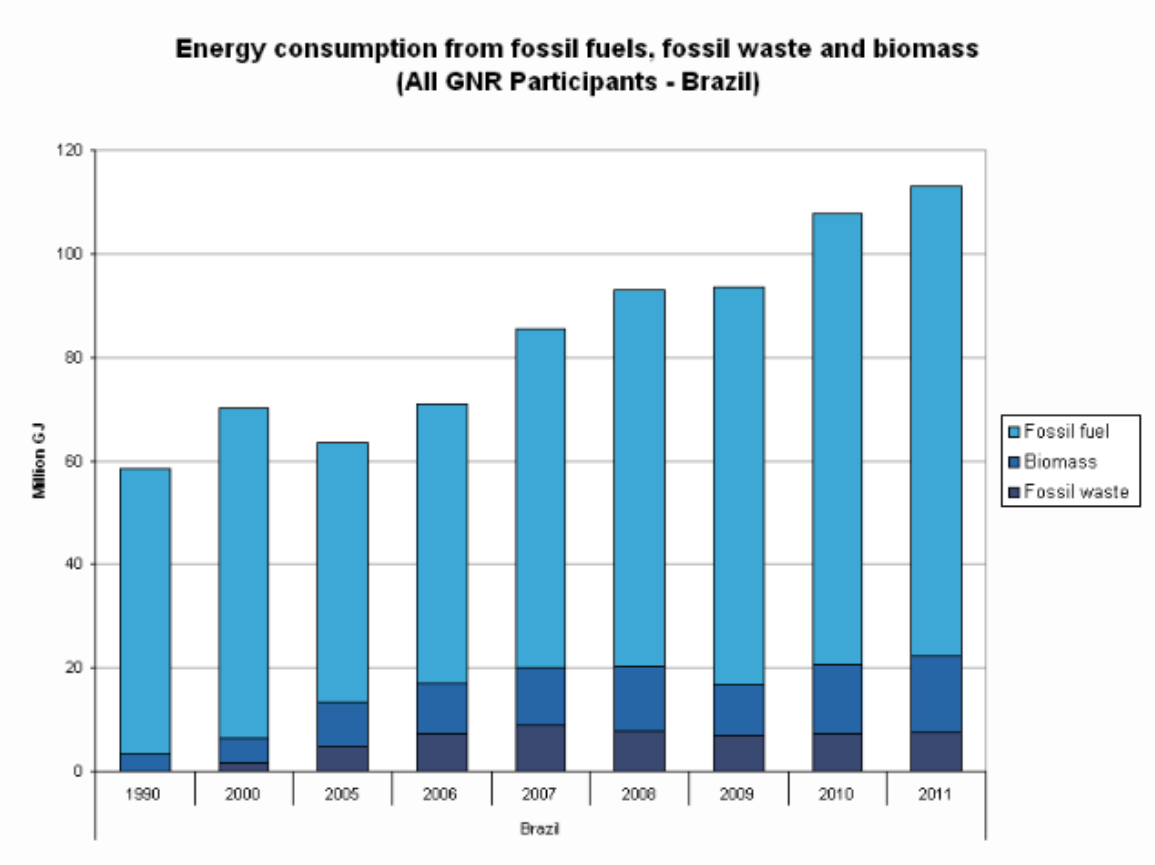
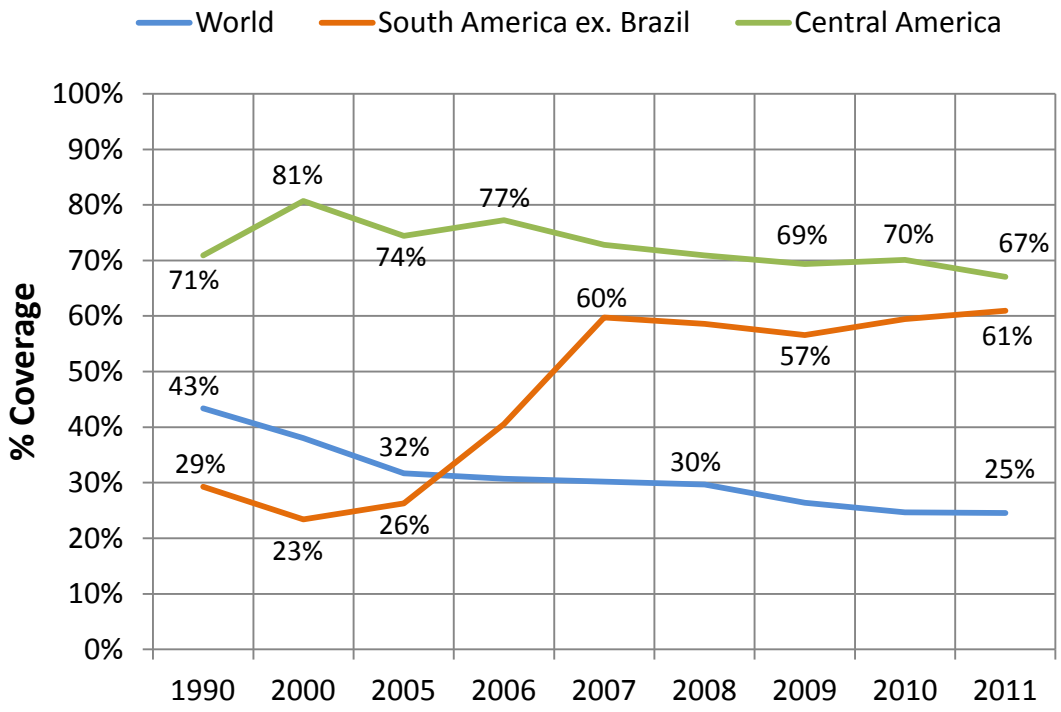
GNR Project
Reporting CO2



Progress in coverage of GNR

- ✓ **Worldwide coverage is dominated by China (>50% of total production) – reporting by Chinese CSI members will bring global coverage to ca. 35%)**
- ✓ **In Central America GNR % coverage remained almost constant from 2005, around 70%.**



Source: CSI

Coverage GNR	
Latin America and the Caribbean	**68%**
World	**25%**

Good Progress, well documented

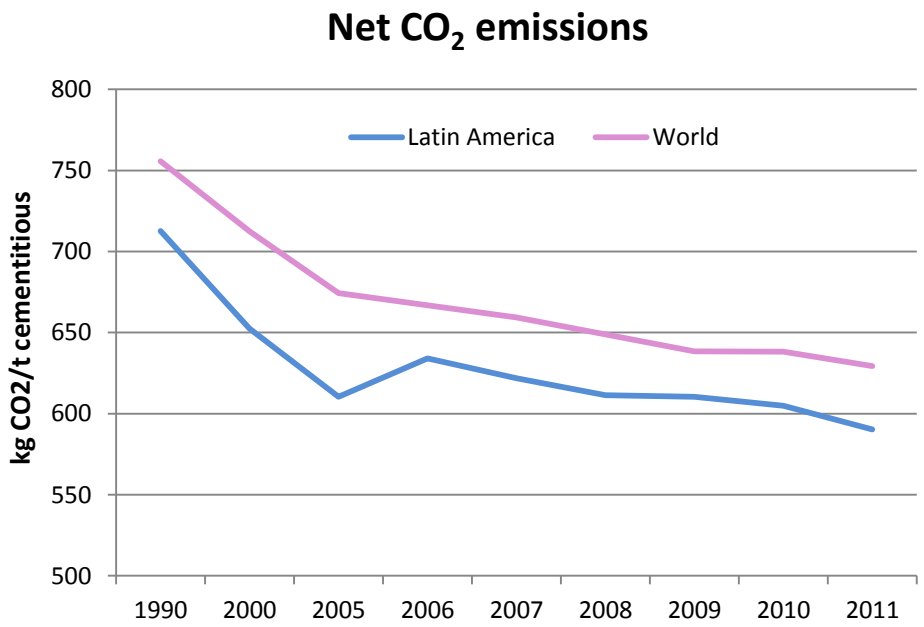
All GNR participants, World	1990	2000	2005	2011	% change
Net CO_2 / tonne clinker, kg/tonne	907	862	846	**825**	-9
Net CO_2 / tonne cementitious, kg/tonne	756	713	674	**629**	-17
Heat consumption, MJ/tonne clinker	4,260	3,750	3,690	**3,560**	-16
% alternative fuel (incl. biomass)	2.0	5.2	8.0	**13.3**	+650
Clinker/cement ratio, %	83	81.9	78.8	**75.6**	-9
Electricity consumption kWhr/tonne cement	116	114	112	**107**	-8

Progress in Net CO_2 emissions ($kg\ CO_2/t$ cementitious)

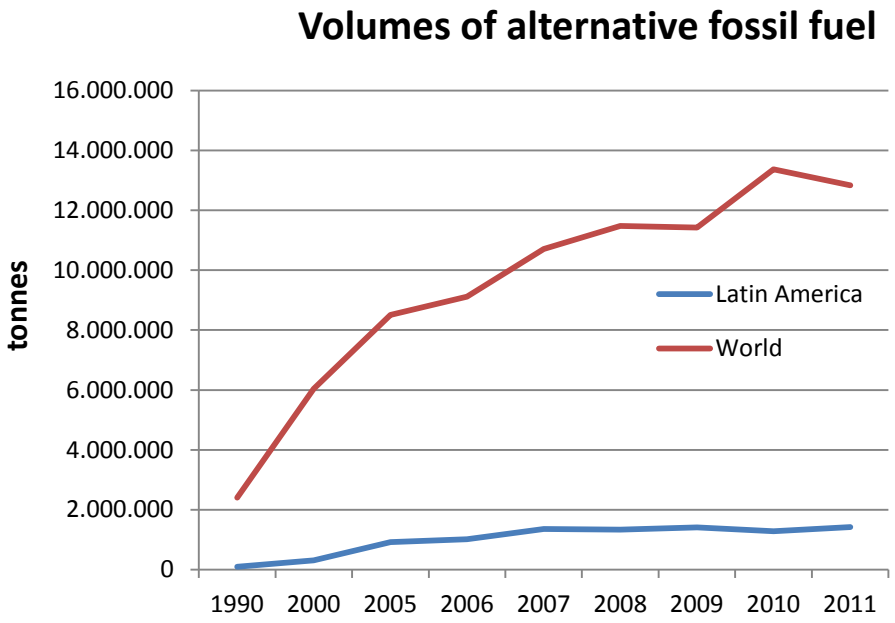
- Reductions in specific net CO_2 emissions per tonne of cementitious product (1990-2011)

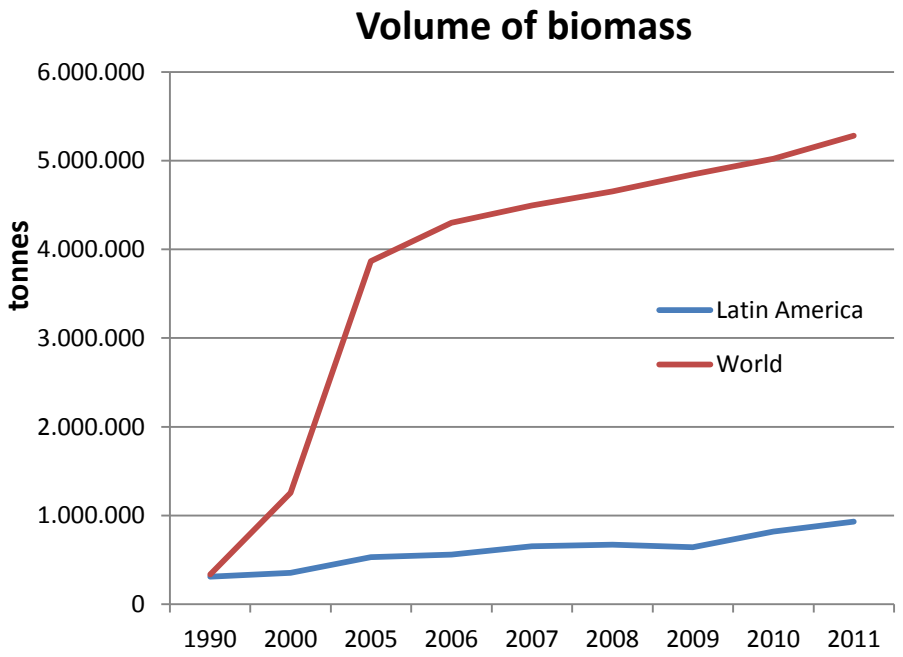
✓ Globally: from 756 kg/tonne to 629 kg/tonne (17%)

✓ Latin America: from 713 kg/tonne to 590 kg/tonne (17%)



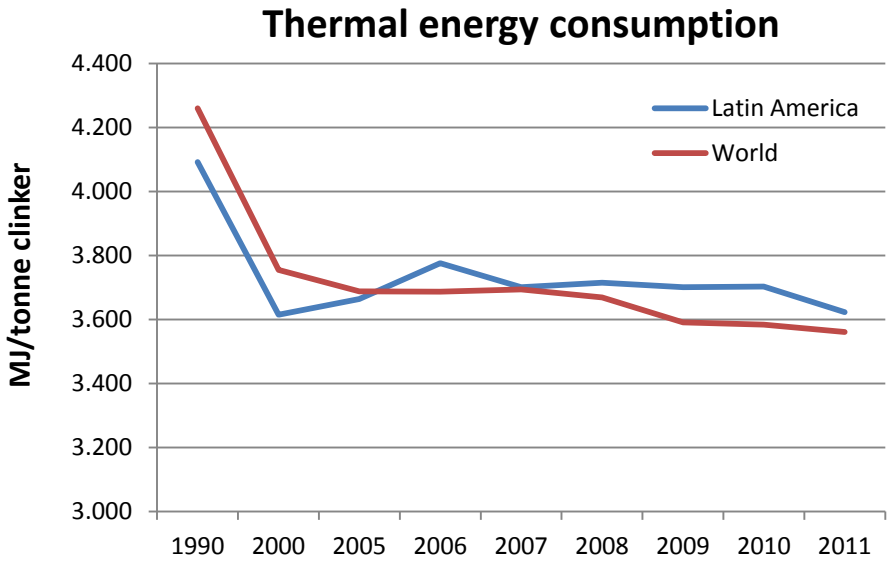
Alternative fuel use





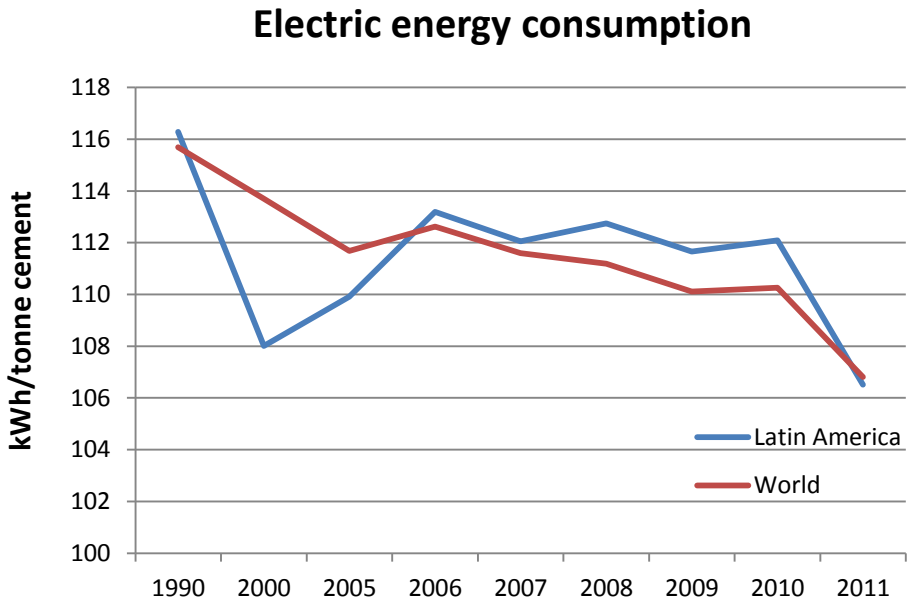
- ✓Globally (2011): 12,8 million tonnes of alternative fossil fuels and 5,3 million tonnes of biomass used
- ✓Latin America (2011): Out of the 929.835 tonnes of biomass co-processed in Latin America, 77% corresponded to Brazil;
- ✓This high share matches Brazil's participation in cement production in Latin America and the Caribbean, equivalent to 60%.

Energy efficiency (Thermal energy)



- ✓ Between 2007 and 2010, the consumption of thermal energy per tonne of clinker in Latin America remained almost constant at around 3.700 MJ/t clinker. In 2011 this number deceased by 2,2%, reaching 3.623 MJ/t clinker.
- ✓ In 2011, the average thermal energy consumption per tonne clinker in Latin America was slightly higher than the global average (+1,7%). This variation is product of the difference in the type of technology used, such as dry kilns with preheater and without precalciner, which are less efficient than those equipped with an additional precalciner.
- ✓ The results demonstrate that Latin America has already started to improve the energy efficiency in its processes, like its counterparts in industrialized nations.

Energy efficiency (Electric energy)



- ✓ Between 2006 and 2010, the electric energy consumption in the Latin American cement industry was slightly higher than the global average by nearly 1%.
- ✓ In 2011, the electric energy consumption per tonne of cement in Latin America matches the global average, 107 kWh/t cement.
- ✓ This, together with the thermal energy consumption, indicates that the Latin American industry is very capable and migrating towards more energy-efficient technologies.

Queries to GNR

From:

- Universities,
- Governmental Authorities
- Consultants,
- NGOs,
- Industry.

- GNR is a mainstream support to policy makers around the world.
- No other sector provides such a service

	Received	Answered
2007	3	3
2008	28	20
2009	18	10
2010	14	5
2011	7	3
2012	5	3
2013	7	3

http://wbcsdcement.org/gnr

GNR as a resource for NAMAs / sectoral mechanisms

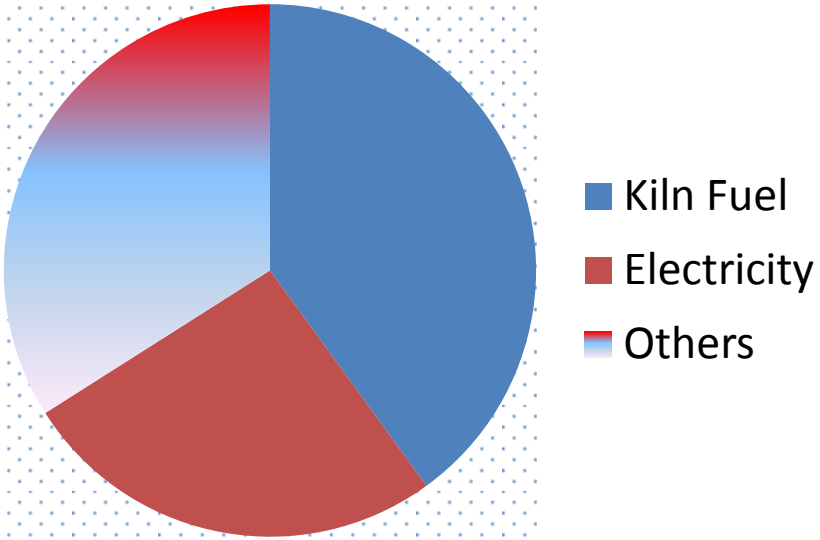
- CSI input being solicited by:
  - UNFCCC: Standardized baselines methodology
  - World Bank: Partnership for Market Readiness (PMR)
  - European Commission: New Market Mechanisms
  - National initiatives (NAMAs): e.g. Tunisia, Saudi Arabia, Vietnam

GNR is the only available industry database that can inform such processes

Performance monitoring with GNR

KPIs available in company reports	
Kiln Fuel	Electricity
Kiln Economy	Consumed in making clinker
% Alternative Fuel	Consumed in milling cement
% Biomass	% Clinker

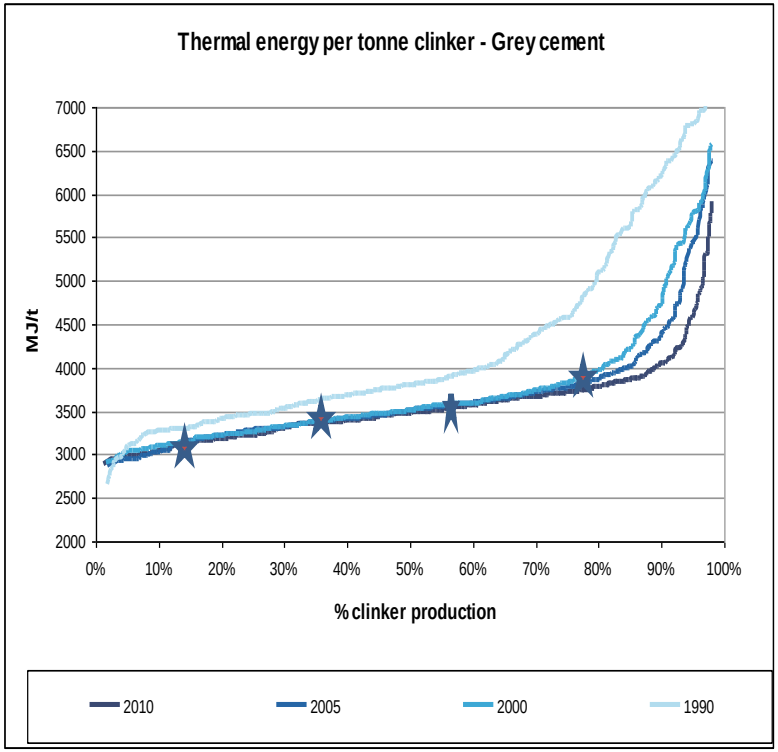
Cement Variable Costs



Company Reports are Strictly Confidential

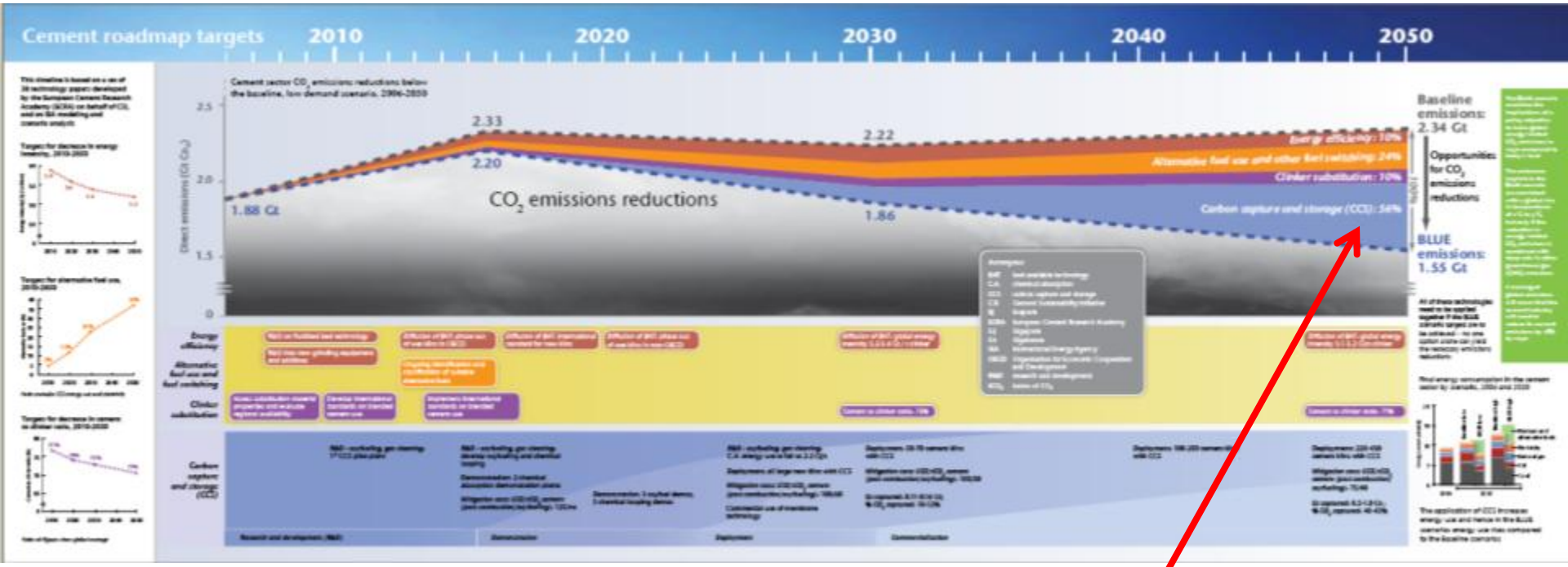
Performance Monitoring

- Participants' facilities performance clearly identified
- Performance relative to technology used also available.
- Regional analyses are also available in many cases.



Global kiln economy

Cement Technology Roadmap

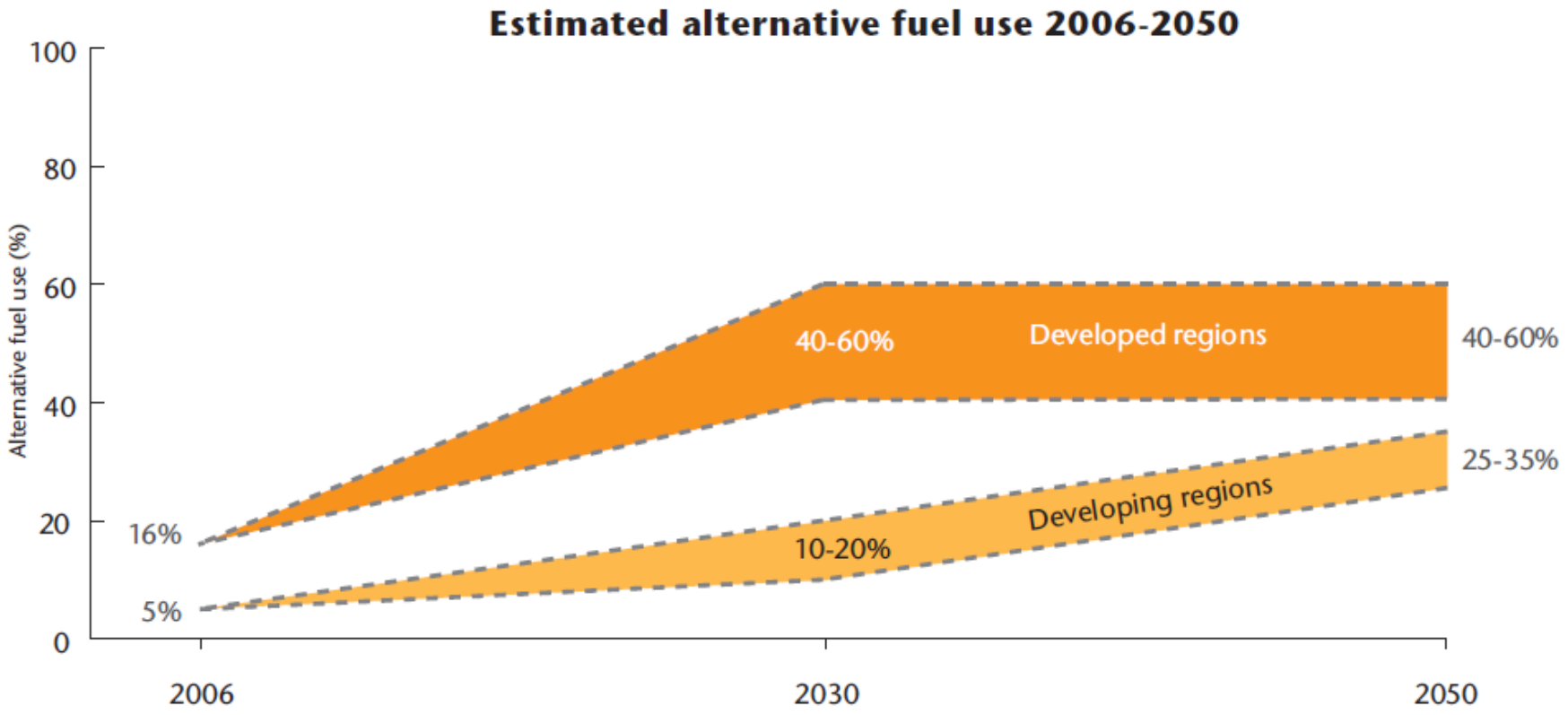


Published by IEA/WBCSD 2009

Emissions reduction levers:

- Energy efficiency
- Alternative fuels
- Clinker substitution
- CCS

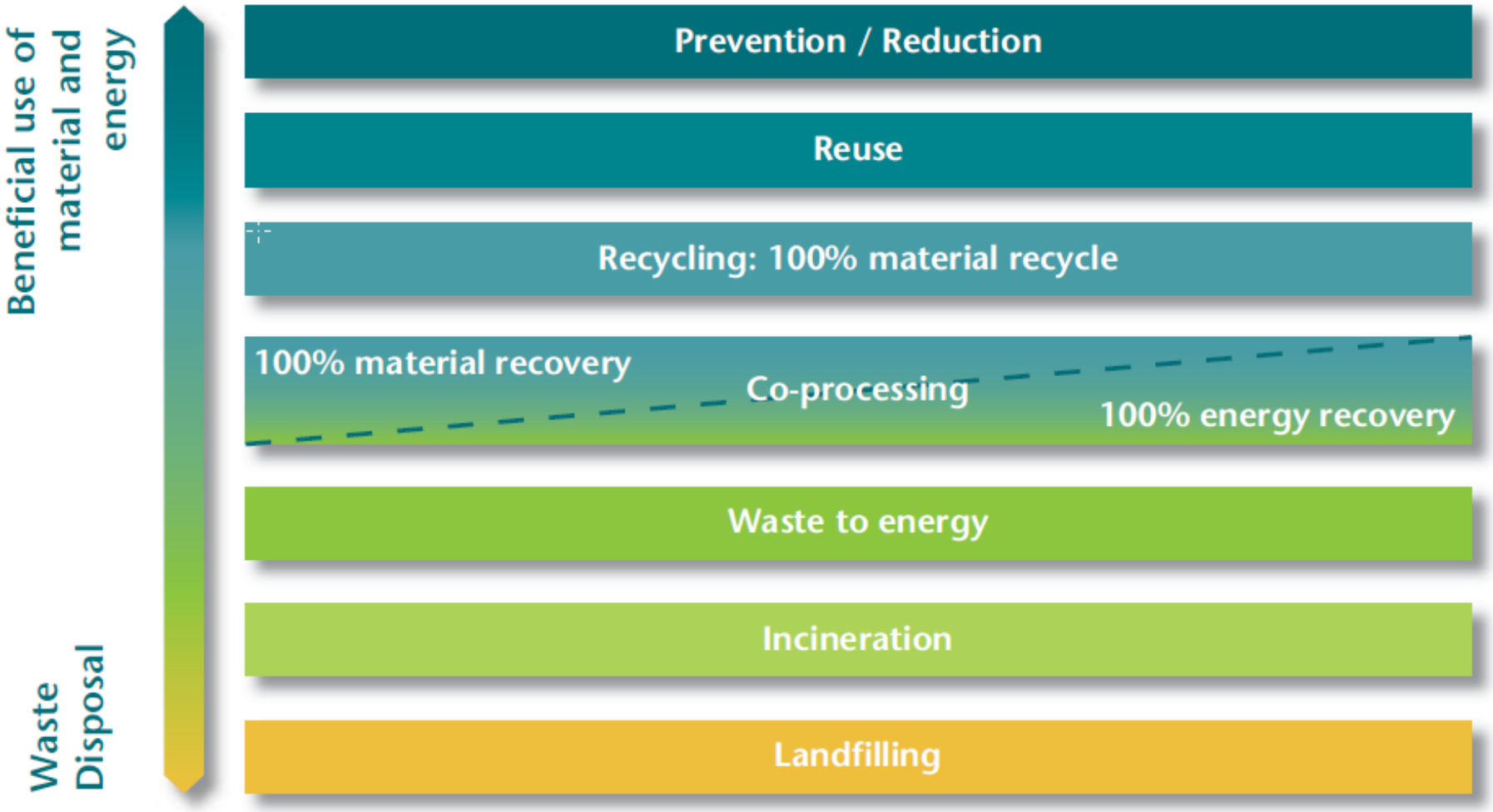
Alternative fuels potential



Source: ECRA Technology Papers (2009), Getting the Numbers Right data 2006 (WBCSD), IEA (2009)

Note: the maximum levels in each region depend on competition from other industries for alternative fuels

Co-processing hierarchy



A multi-stakeholder approach

Partner roles

item/partner	industry	industry suppliers	governments (including local municipalities)	universities	research institutes
best practice	x	x			
technology research	x $	x $	$	x	x
technology diffusion	x $	x $	$		
institutional structure	x	x	x	x	x
performance data	x				

x = leadership role and direct involvement required

$ = funding source

Regional roadmaps

Roadmap in 2009
r their scenario and

oped by regional
and CII)
ıs data (GNR)

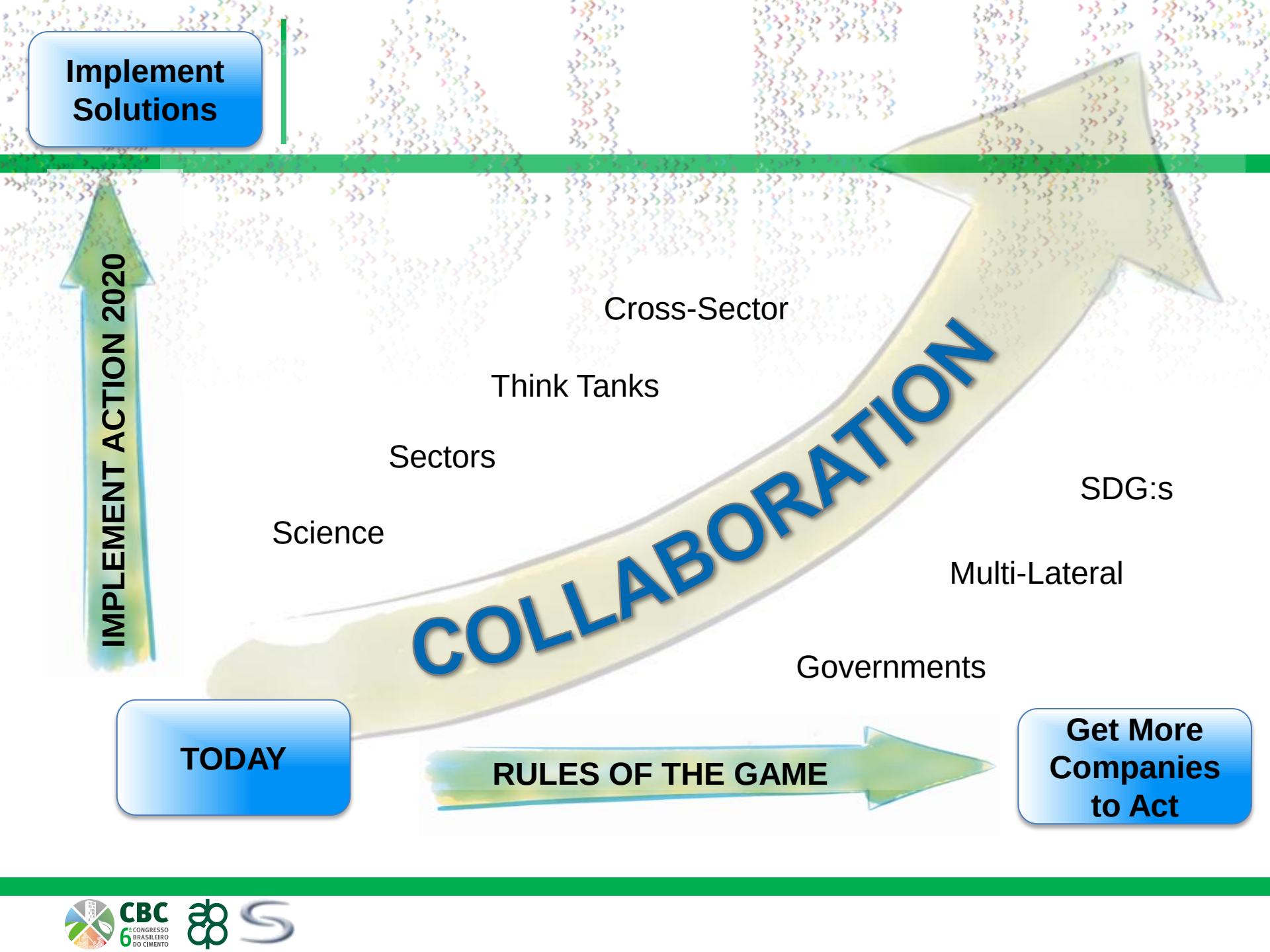
admap
er plants to
ese technologies
ps to widespread
n the country

Sustainability with concrete

Superior properties of concrete make it **a superior construction and infrastructure material**

- Concrete is the most widely used construction material
- Versatile material with important properties: strength, durability, flexibility, thermal mass, affordability
- CSI is developing:
  - Methodology for **Environmental Product Declaration (EPD)** for concrete
  - Criteria for **responsible sourcing** of concrete

www.wbcsdcement.org/concrete


Implement Solutions
IMPLEMENT ACTION 2020
Cross-Sector
Think Tanks
Sectors
Science
SDG:s
Multi-Lateral
Governments
COLLABORATION
TODAY
RULES OF THE GAME
Get More Companies to Act

THANK YOU

Philippe FONTA, CSI Managing Director
fonta@wbcsd.org

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