UNEP DTU PARTNERSHIP
CENTRE ON ENERGY, CLIMATE AND SUSTAINABLE DEVELOPMENT

DESIGN, DEVELOPMENT AND CHALLENGES IN THE IMPLEMENTATION OF THE INDCS

25-26 August 2015, Mexico City

Low Carbon Development

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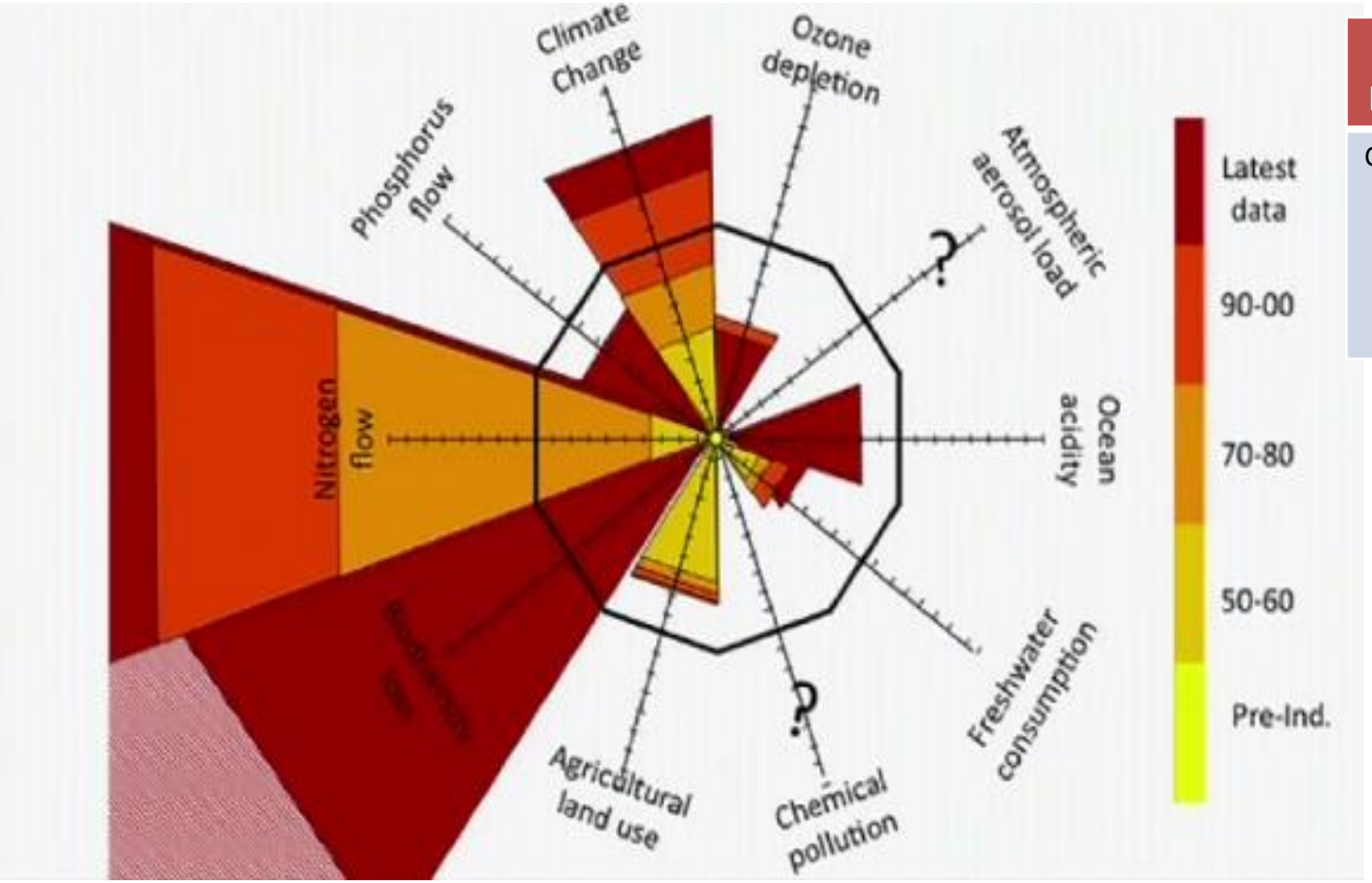
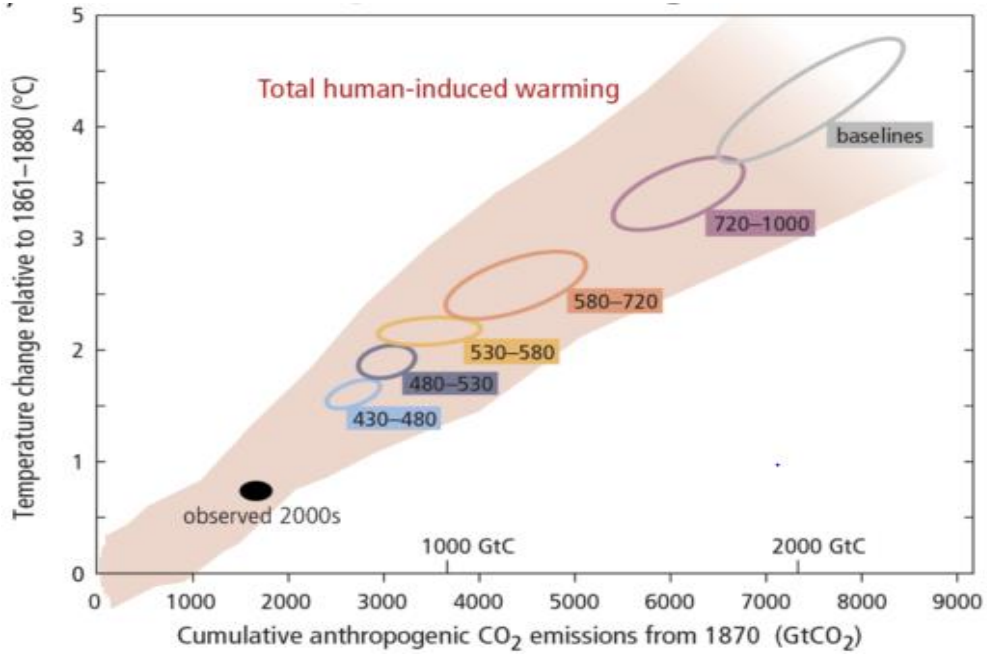
SD - Life within planetary boundaries



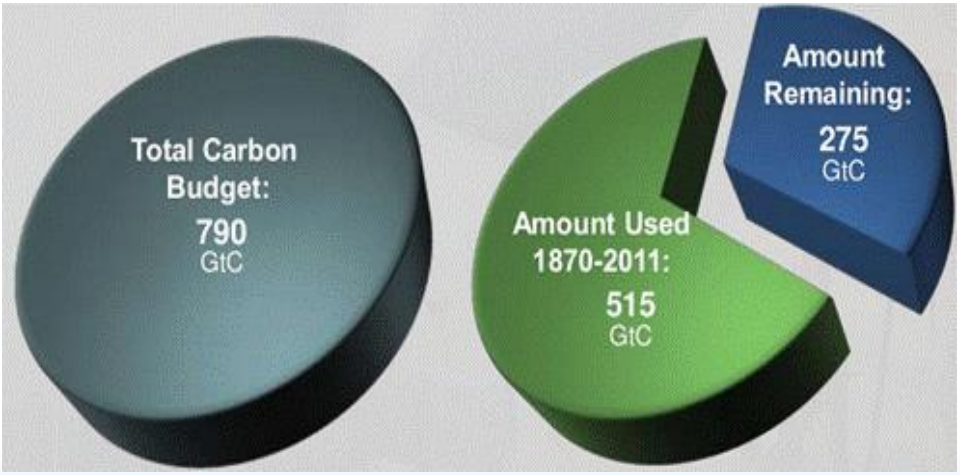
Planetary Boundaries	Boundaries quantified
Climate change	CO2 concentration in the atmosphere should be limited to 350 ppm and/or a maximum change of +1 W m-2 in radiative forcing

Source: Planetary Boundaries, Rockström et al. Nature. 2009.

SD: Life within planetary boundaries



Source: IPCC, 2013.



Source: IPCC SPM, 2013.

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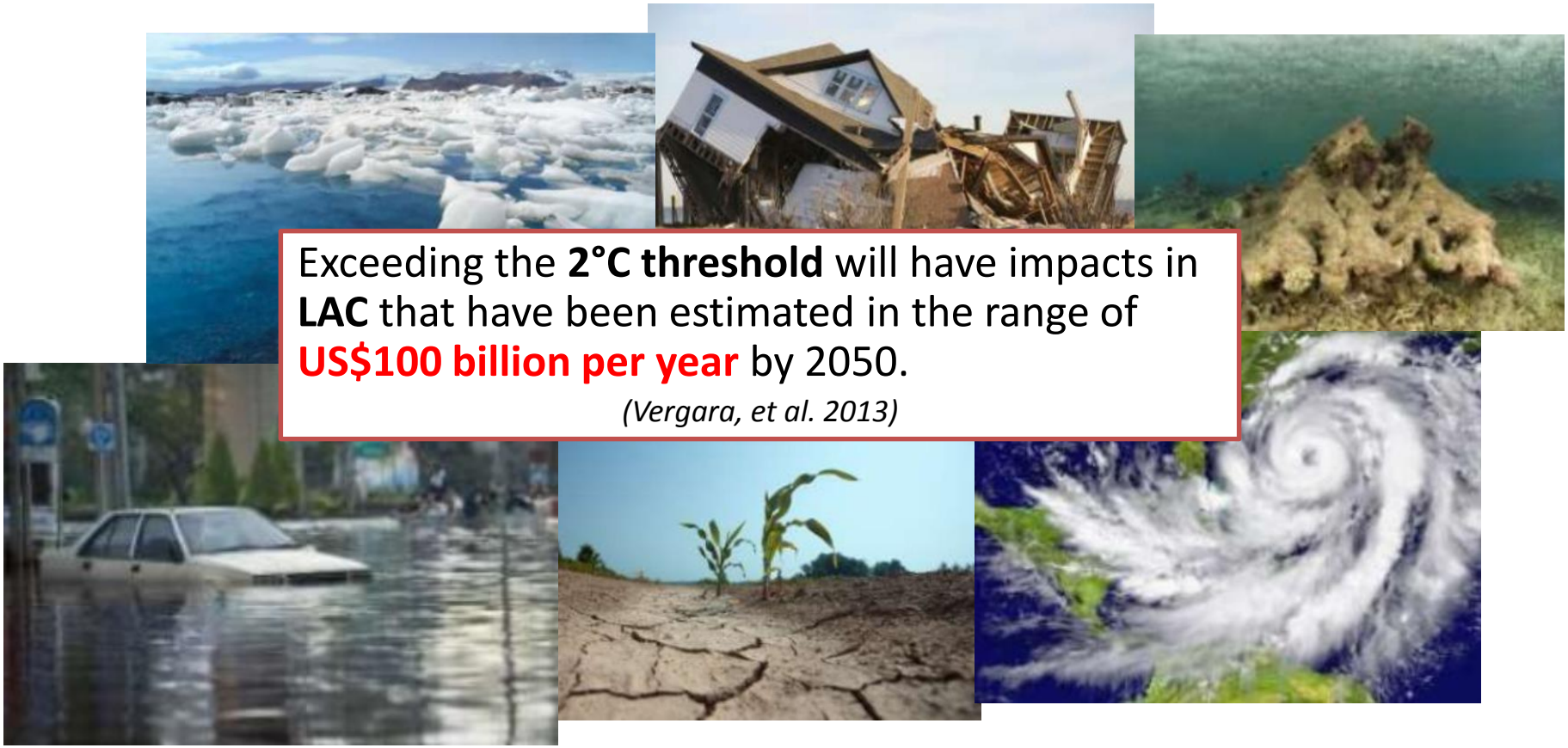
The consequences of climate change for LAC



Exceeding the **2°C threshold** will have impacts in **LAC** that have been estimated in the range of **US$100 billion per year** by 2050.

(Vergara, et al. 2013)

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Source: IPCC Synthesis Report, 2014.


Sharp increase in extinction of mammals, birds, butterflies, frogs and reptiles by 2050
Mesoamerica
Latin America
Climate change hotspot
More precipitation
Less precipitation
Severely threatened biodiversity today with trend to continue in the future
Risk of desertification
Coral reefs at risk
Sea-level rise concerns and affected major cities
Malaria:
Current distribution
Possible extension by 2050
Negative agricultural changes
Changes in ecosystems
Impact on mountain regions
Melting of glaciers
Water availability reduced due to reduction in glaciers
Forest fires
Impact on fisheries
Amazonia
Lima
Cerrado ecoregion
Recife
Loss of 24% of tree species for a temperature increase of 2 degrees Celsius
Reduction of suitable lands for coffee
Rio de Janeiro
Buenos Aires
La Plata-delta
Sources: IPCC, 2007; World Resources Institute, 2007; Rogers and Randolph, 2000; Klein et. al., 2002.

Sectoral Emissions in LAC in 2012

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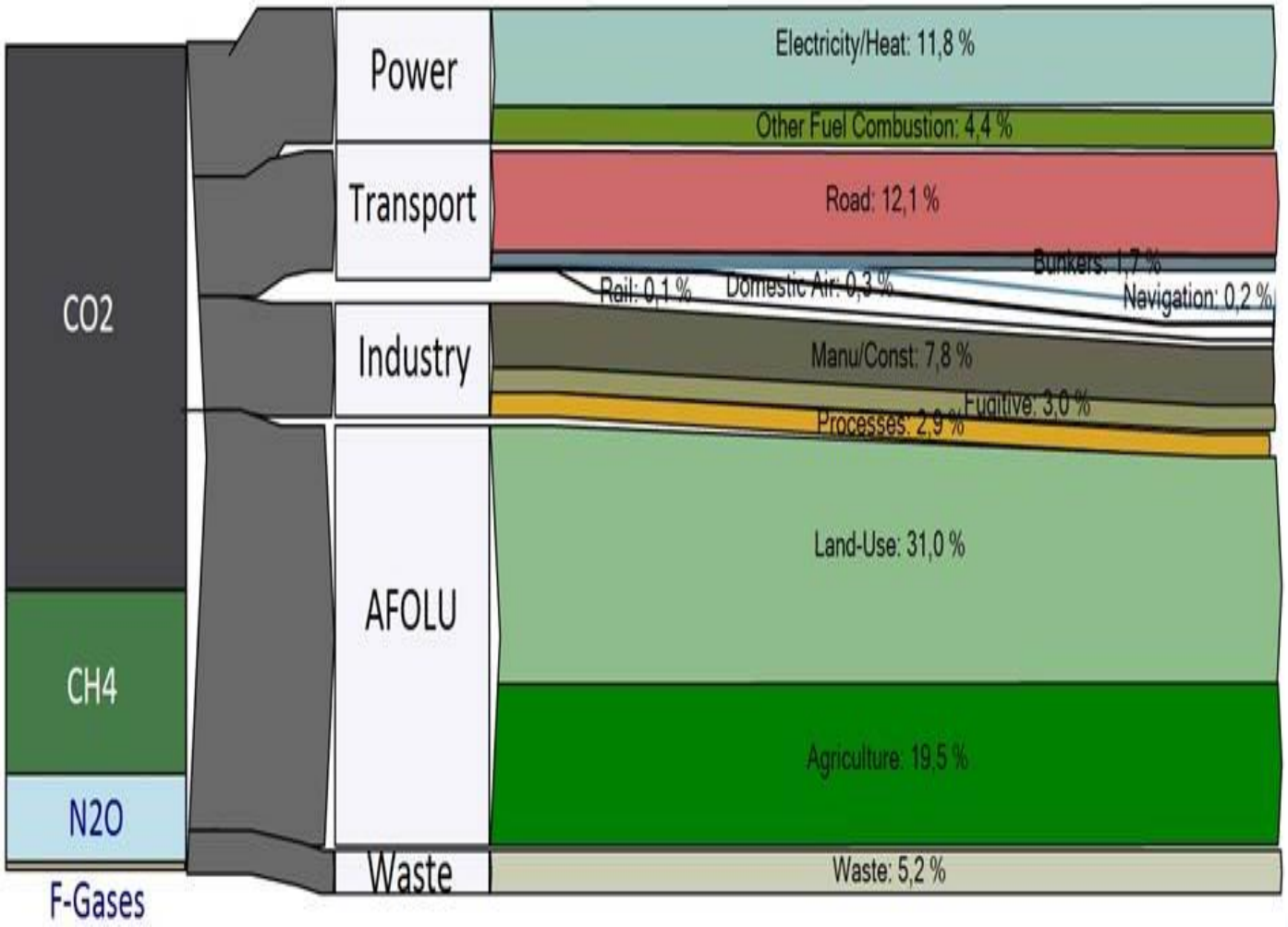
- Multiple emission sources vs. Multiple solutions
- Know mitigation potentials of the economies
- Will require holistic and bottom-up approaches
  - Inter-sectoral
  - Multidisciplinary
- Developing countries can take advantage of international financing options
- Potentialize national economic sectors competitiveness faced to a global economy influenced by carbon intensity standards



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Increased efficiency of the economy

LAC Carbon footprint

Composition and recent evolution of LAC's carbon footprint.

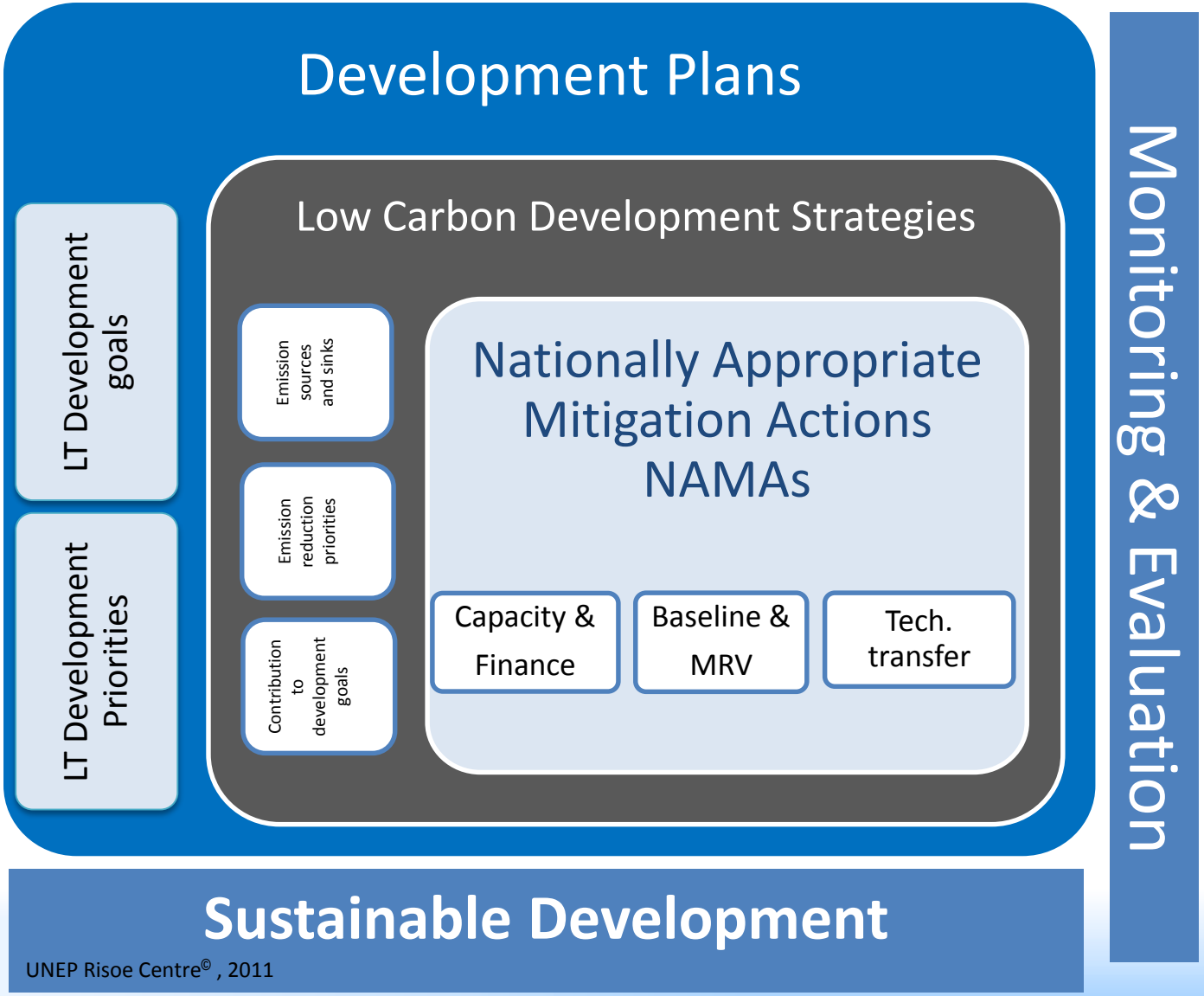
Category	2000 [MtCO2e]	2012 [MtCO2e]	Percent change	Driver
Total	4103.19	4622.27	12.7	
Electricity/Heat	378.43	544.18	43.8	Carbonization, economic growth
Industrial Processes	86.11	135.1	56.9	Industrialization, economic growth
Manuf/Construction	296.68	358.91	21.0	Economic growth
Transportation	392.39	586.55	49.5	Motorization, urbanization
Agriculture	763.96	901.42	18.0	Population growth, Global food demand
Land/Forestry	1,646.82	1430.96	-13.1	Reduced deforestation

Source: CAIT, 2012

Low carbon development

- Defining a strategy in context of medium to long term development plans:
  - Decouple economic growth from GHG emission growth
  - Reduce the carbon intensity of the economy
  - Leapfrog the high-carbon development path of today's business-as-usual trajectory

in the context of...



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Decarbonisation of power generation

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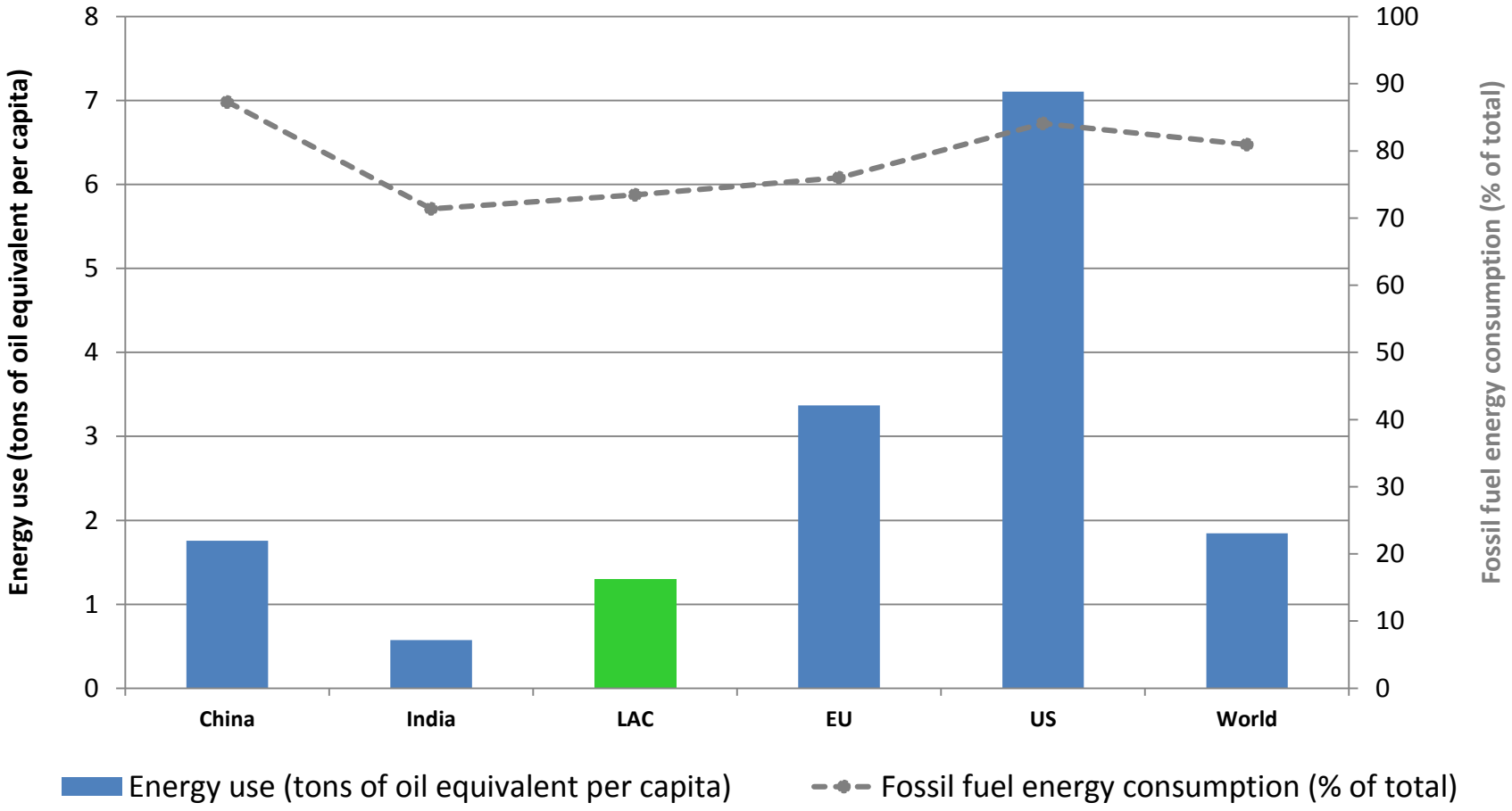
LAC role on global energy use



Source: World Bank, 2015

Current energy overview in LAC

- The 2012 electricity demand in Latin America is estimated at about 1.43 PWh. This represents an increase of 50% since 2000 (EIA 2015)

- The demand for electricity can be projected to be in the range of 3.1 PWh to 4.3 PWh by 2050 and in the range of 5.2 PWh to 5.8 PWh by 2075 (IIASA 2015)
  - Even the lower range of this bracket will require major investments in power infrastructure, including generation capacity, transmission lines, regulation stations and other ancillaries, probably in the accumulated range of US$ 3 to 4 trillion by 2050, at current costs.

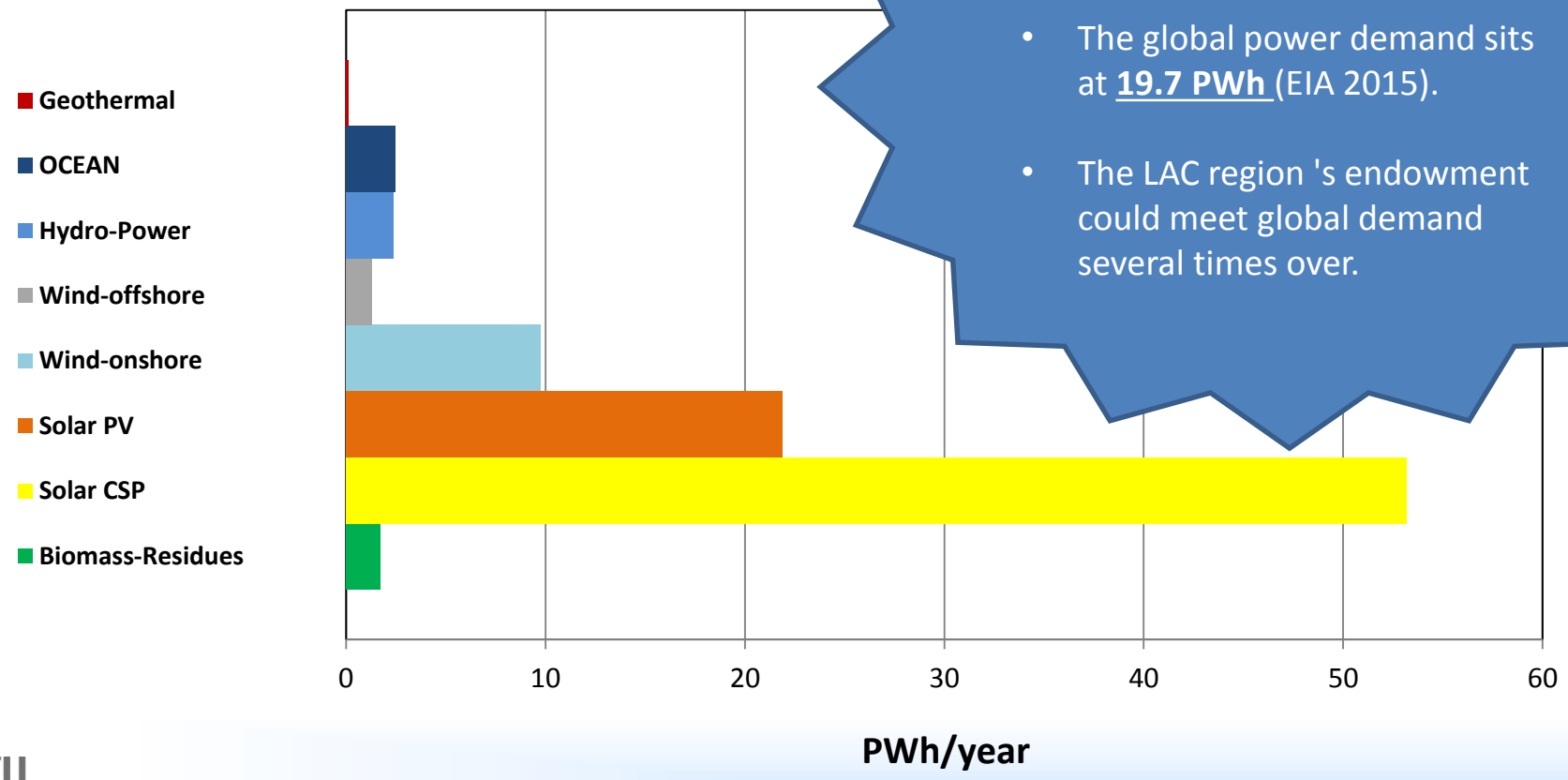
- Current demand in the region is met through the operation of an installed power generation capacity estimated at 335 GW, representing 7% of the global capacity. About 55% of the total is from renewable sources, the overwhelming majority of which, 171 GW being hydropower

- At a global scale, the power sector of the region is by far the least carbon intensive
  - Beyond hydropower, other renewables are increasingly entering the power market in LAC. In 2013, 642 MW of other renewables, or about half of new capacity requirements, entered into operation in the region in continuation of what seems to be a lasting trend

Renewable Resource Endowment LAC

1. Energy generation

- The region's endowment of renewables is estimated to be at about **93 PWh** (Ecofys 2009)
- The global power demand sits at **19.7 PWh** (EIA 2015).
- The LAC region 's endowment could meet global demand several times over.



Source: Ecofys, 2014

Renewable Resource endowment LAC

2. **Favorable regulatory frameworks:**

- In LAC a number of policies and regulations have been established to promote market entry of NRTs: feed-in tariffs;
- alternative or complementary approach to procurement policies
- other tools are used that strengthen the enabling environment for renewable energy
- A big potential for regional grid modernization

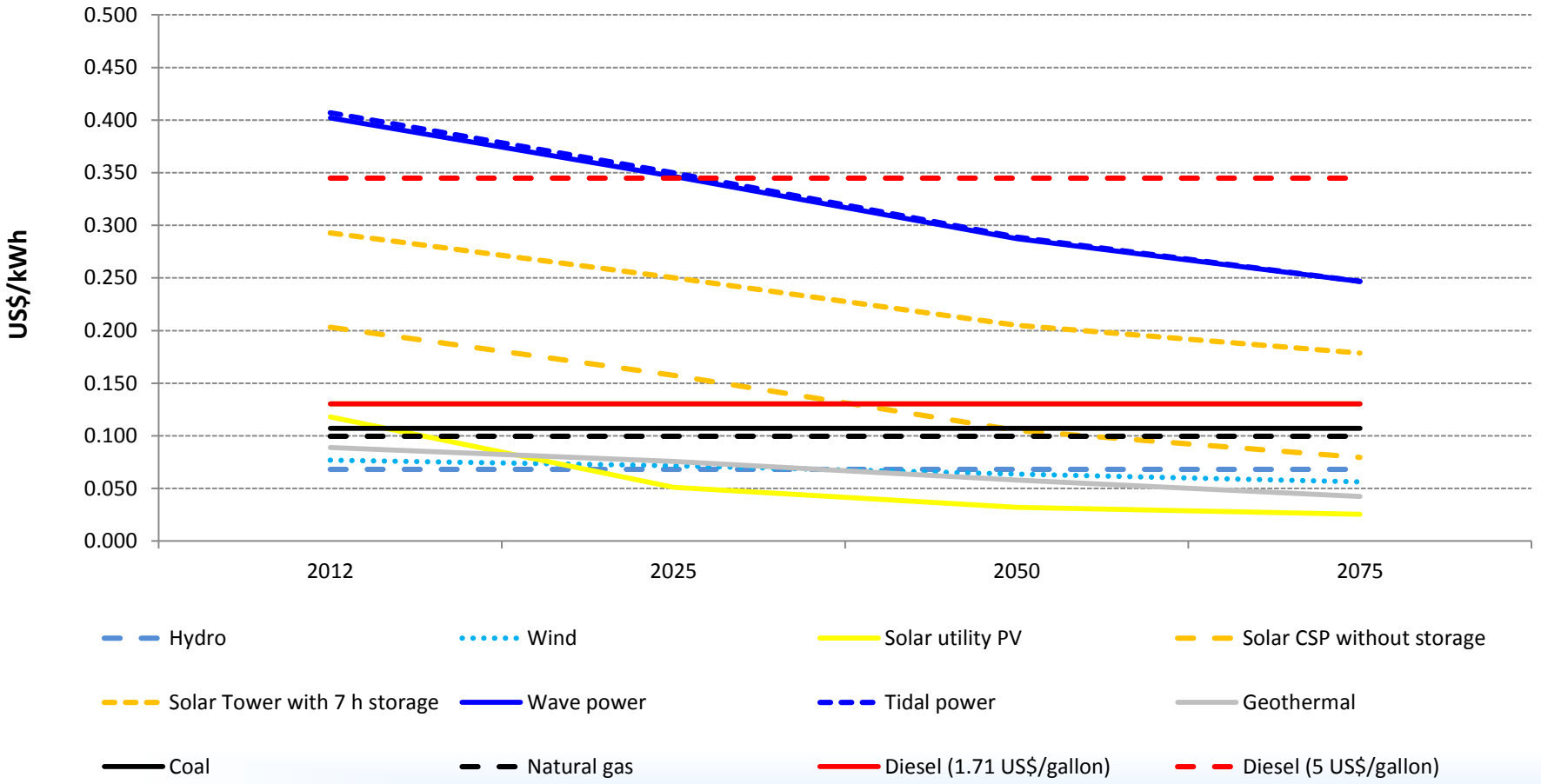
Renewable Resource endowment LAC

3. Market size for renewables is increasing

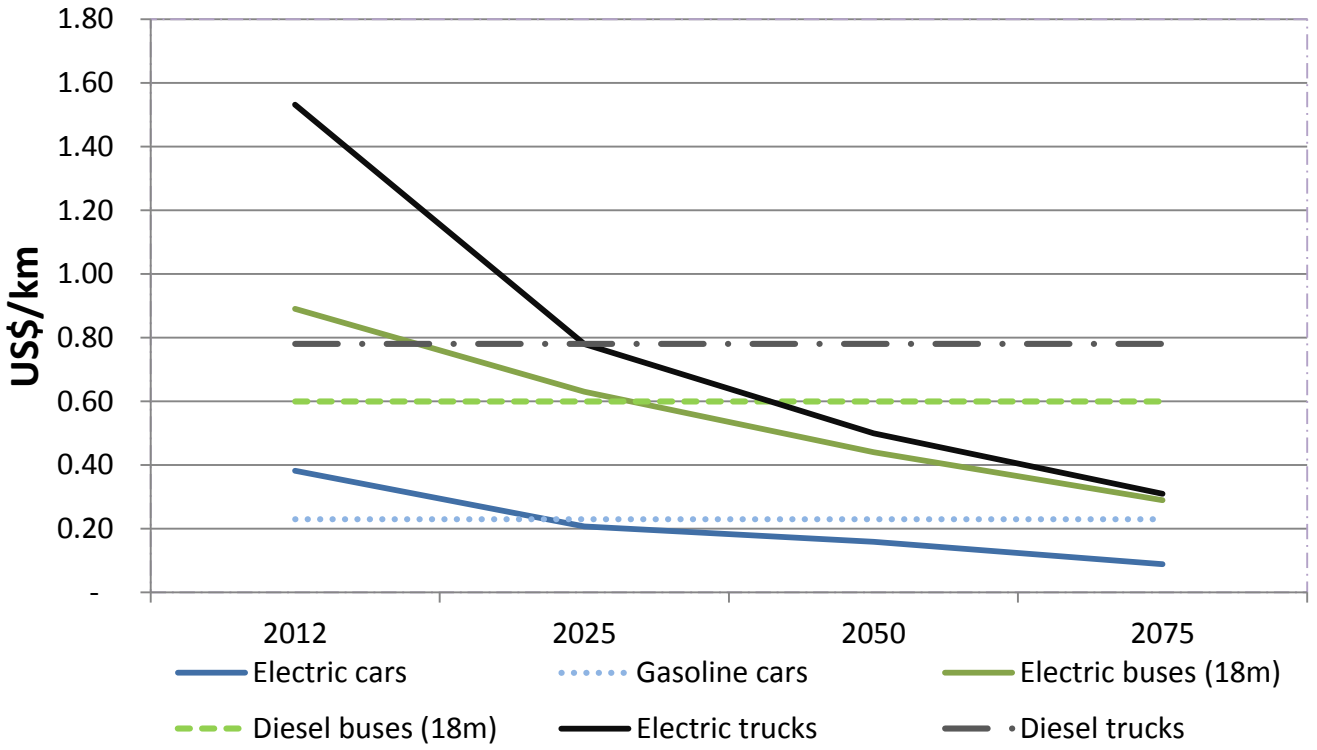
- From 2004 to 2014, investments in renewables grew from US$40 billion/ year to US$270 billion/year (FS-UNEP BNEF 2015).
- In Latin America, while still representing a small fraction of the total, the capacity in renewables other than hydro and biomass (non-traditional renewables,) has also been rapidly growing.
- From 2000 to 2012, installed capacity for non-hydro renewables in the region has increased by 330% (EIA 2015).
- Evidence indicates that wind and solar can compete and outperform gas under levelled–play conditions

Renewable Resource endowment LAC

3. The changing economics of renewable energy generation



Electrification of the transport sector



Note: Estimates are including a credit for avoided cost of air pollution.

- Transport is responsible for 34% of energy use in LAC; and of 0.56 GT CO2e/year;
- the energy demand by transport is expected to be in the range of 15 to 24 Exa-joules by 2075.
- Most of the fuel used by the sector and the associated GHG emissions are linked to road transport both for passengers and freight
- the region is highly urbanized - most people still move via public (read low carbon per passenger) transport
- Electrification of the truck fleet in the region would result in major reductions in emissions. The electrification of the car fleet is likely to become the most economically attractive in the short term

Land-Use, land use change

	Wood Forest Products	Non-Wood Forest Products	Ecotourism income	Improved Agricultural Output	Reduction of Food Security Premiums	Carbon Storage	Total NPV [US$/ha]
LAC wet forests and agricultural lands							
(avg all degrees, methods)	332	472	212	135	15	506	**1,671**
Planted restoration of managed forests in wet biomes							
Moderately degraded forests	1,140	-	-	-	-	324	**1,464**
Assisted regeneration of natural wet forests in wet biomes							
Moderately degraded	-	1,825	842	-	-	893	**3,560**
Agroforestry in wet biomes							
Moderately degraded	-	-	-	590	53	(29)	**615**
LAC dry forests/savanna and agricultural lands							
Planted restoration of managed forests in dry biomes							
Moderately degraded forests	15	-	-	-	-	(119)	**(104)**
Assisted regeneration of natural wet forests in dry biomes							
Moderately degraded	-	36	457	-	-	302	**795**
Agroforestry in dry biomes							
Moderately degraded	-	-	-	1,651	85	(356)	**1,380**

Source: WRI, 2015

Industry

Industry Sector	Options deployed (% of total emissions reduction from deployment of options in 2050)	Reduction Potential [%]
Iron and Steel	• Advanced technologies without CC and rebuild (45%) • Retrofit solutions without CCS (34%) • Stove flue gas recycling with CCS (8%) • Steam and power production system upgrades (5%) • Improved site and sector integration (4%) • Others (4%)	60
Chemicals	• CCS (combustion) (49.4%) • CCS (process) (13.1%) • Energy efficiency (11.8%) • Other innovations (10.2%) • Decarbonised methane as fuel (5.2%) • Others (10.4%)	79-88
Oil Refining	• Carbon Capture and Storage (CCS) – Part 1, applied to CHP and Hydrogen generation plant (34.7%) • Carbon Capture and Storage (CCS) – Part 2, applied to FCC stack (21.1%) • Waste heat and energy recovery (18.1%) • Motors, pumps, compressors and fans (6%) • Others (20.1)	64
Cement	• Carbon capture (61.7%) • Fuel switching to biomass (27.7%) • Cementitious substitution (3.7%) • Others (6.9%)	33-62
Glass	• Electric melting (37%) • Fuel switching (26.8%) • Recycling (18.1%) • Others (18.1%)	90-92
	• Carbon capture (39.1%) • Recycling (18.2%) • Electric melting (15.4%) • Improved furnace design (10%) • Oxy-fuel (6.4%) • Others (6.9%)	

Total reduction:
112 $MtCO_2e$

Total Investment:
1951 million US$

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The Road to zero-Emissions in LAC

The route to fully decarbonize the economy by 2050 includes the following actions:

- Full decarbonisation of the power sector;
- Mass electrification of the transport sector;
- Grid integration of the regional economies;
- Expansion of the power system to absorb the new demand by transport;
- Zero net deforestation;
- Restoration of about 200 million Ha of degraded land through a combination of natural and assisted reforestation, agroforestry and sylvo-pastures;
- Partial electrification of industrial energy demand;
- improvements in energy efficiency in all sectors.

Transformation for SD

- Change investment mind-set in general – involve private sector
- Elinor Ostrom, Nobel laureate of economics, shows empirically across the world that we can govern the commons if we **invest** in **trust**, **local action-based partnerships** and **cross-scale institutional innovations**, where local actors, together, can deal with the global commons at a large scale.
- Use crisis leading into opportunities. Let's use the crisis to build new partnerships, involve actors locally, transforming these into a key component of sustainable planning.
- Invest in changing behaviour; in education
- "What is the playing field on the planet? What are the planetary boundaries within which we can safely operate?" and then backtrack innovations within that. But of course, the drama is, it clearly shows that incremental change is not an option.

What to transform?

- the world is changing in many profound ways
- we need to pay attention on the drivers of change
- the bound of power to really influence sustainability relies with institutional investors, the large investors, pension funds, foundations…
- we need to look at the current development conditions:
  - the way we do investment
  - the way we do production
  - the way we produce and use energy
  - the way we use water and manage waste
  - the way how we extract natural resources
  - the way we are organized and our institutional structures….
- we need to know what we want to sustain and how we will sustain it
- are investment rules of today fit for purposes tomorrow?...

Governance and means of implementation for SD and carbon neutrality in LAC

- Adequate structures and mechanisms to support the implementation of the priorities underlying the SDGs at all levels.
- Long-term integrated visions of sustainable development are developed to guide physical, thematic and sectoral plans.
- A sustainable development cooperation framework at the international level is well established.
- Policies and plans are co-ordinated to integrate SDGs into decision-making and implementation.
- Progress towards the SDGs is tracked, and the relevant information is accessible to all and reviewed on a regular basis.
- The impact of disasters on people and property has been sharply reduced.

Thank you!!

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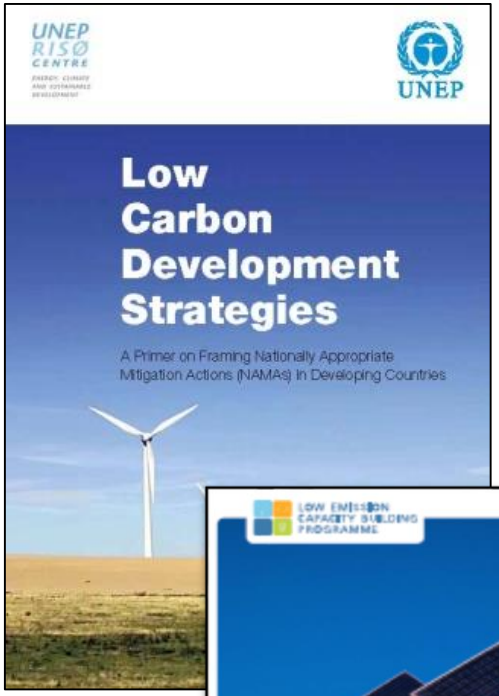

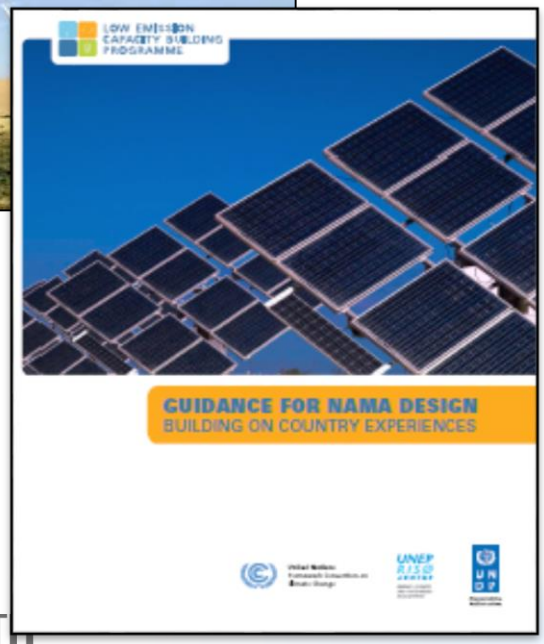

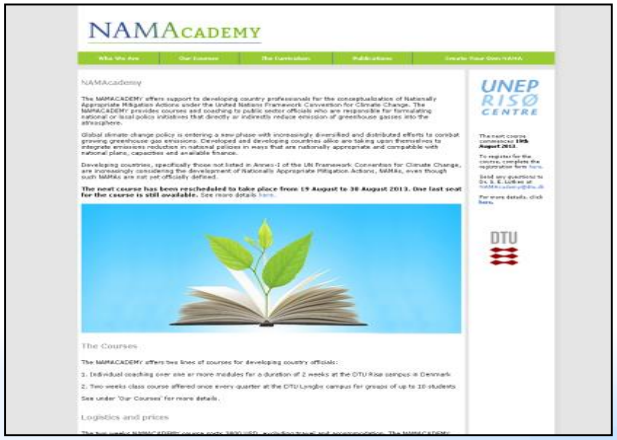

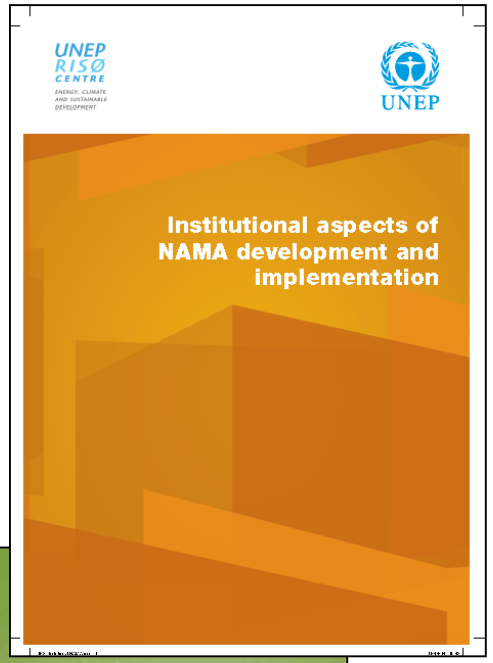

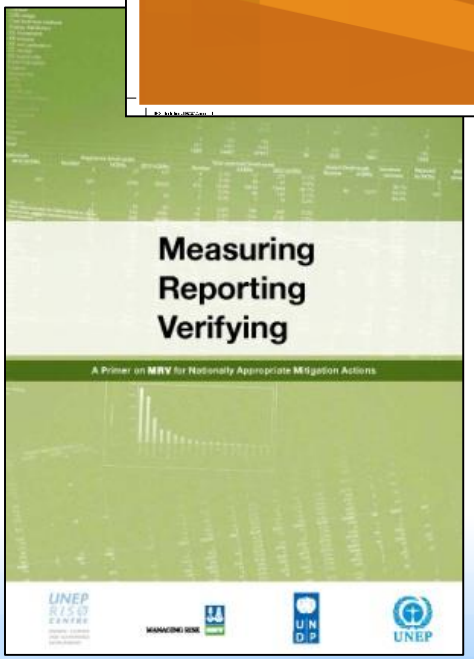

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