ECPA Energy and Climate Partnership of the Americas

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CENAM CENTRO NACIONAL DE METROLOGÍA


# The Mexican Case

*Víctor José Lizardi Nieto*

*General Director, CENAM*

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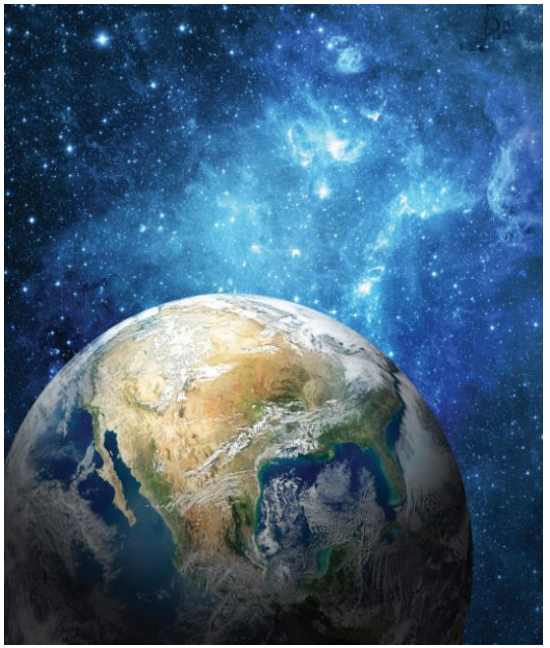
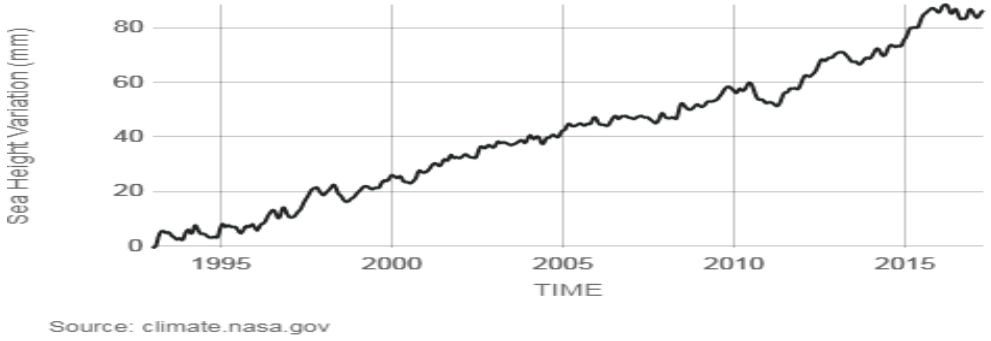
Latin American and the Caribbean are aware of the need to accelerate and intensify the actions and investments necessary for a low- carbon future.



Meeting these needs will require the concerted action of OAS Member States to increase energy efficiency and expand the use of renewable energies.


Advanced measurement infrastructure for alternative energies and improved measurements of air quality and GHGs are required.

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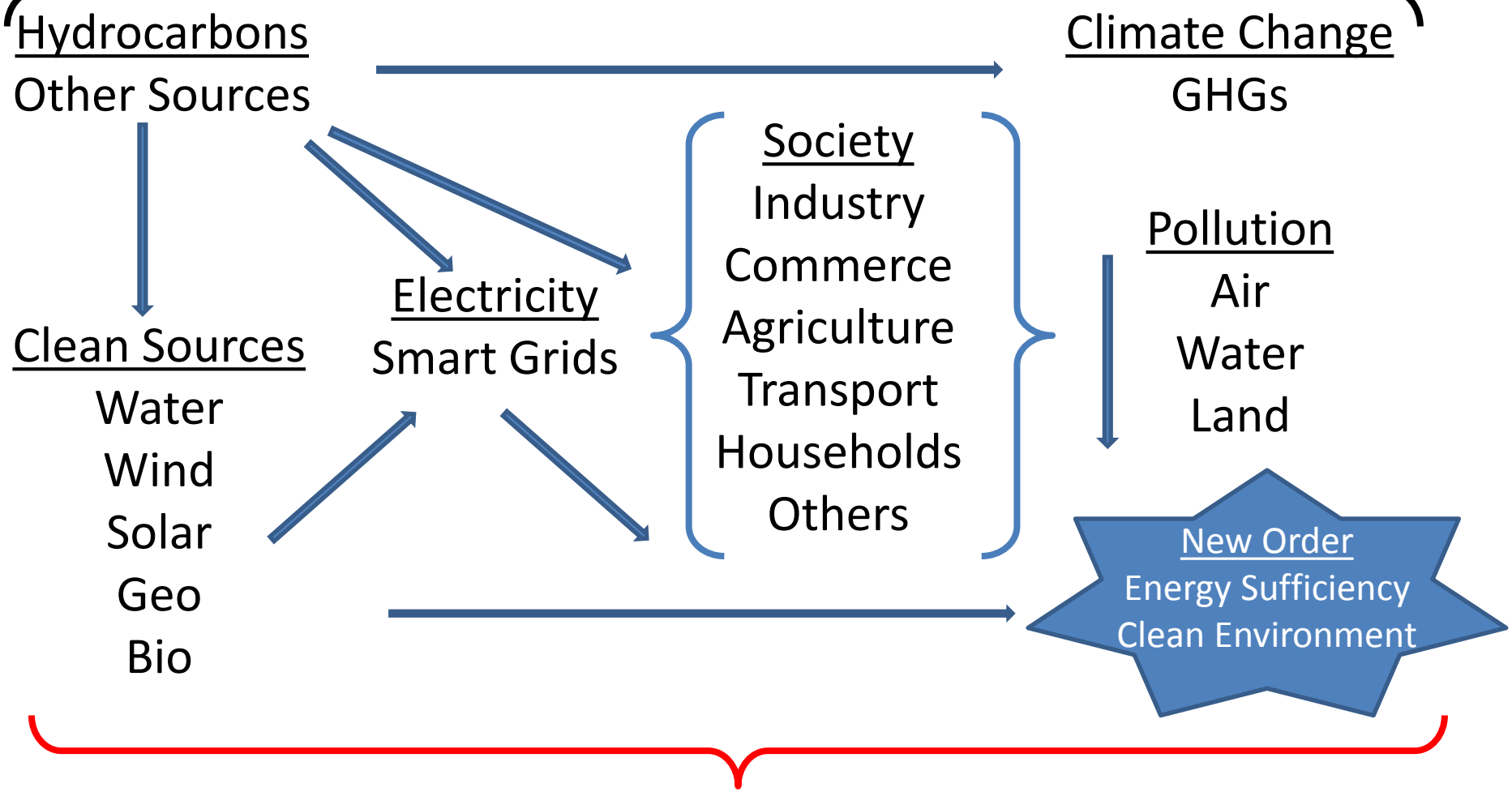
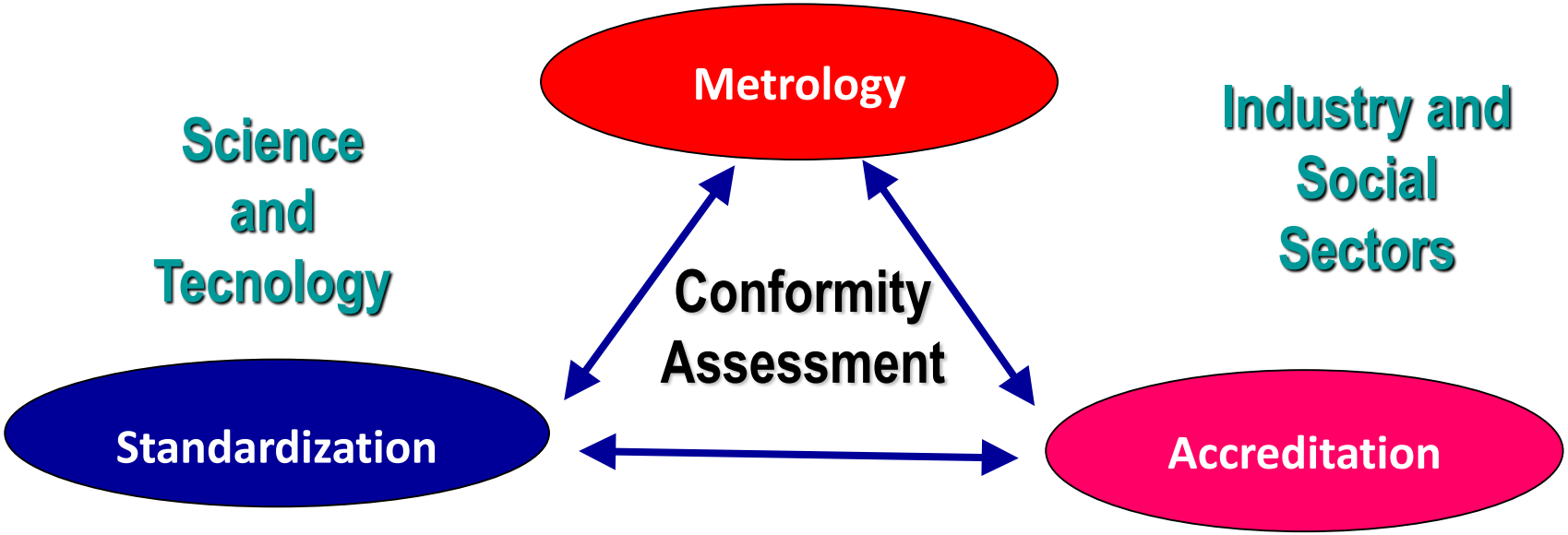
# Government-Ministries:
# Policies – Strategies – Regulations - Incentives




Quality Infrastructure: Support to policies, regulations, interoperability…

# Pillars of the Global Quality Infrastructure



# Regional Metrology Organizations (RMOs)


**Source:** BIPM .http://www.bipm.org/en/worldwide-metrology/regional/

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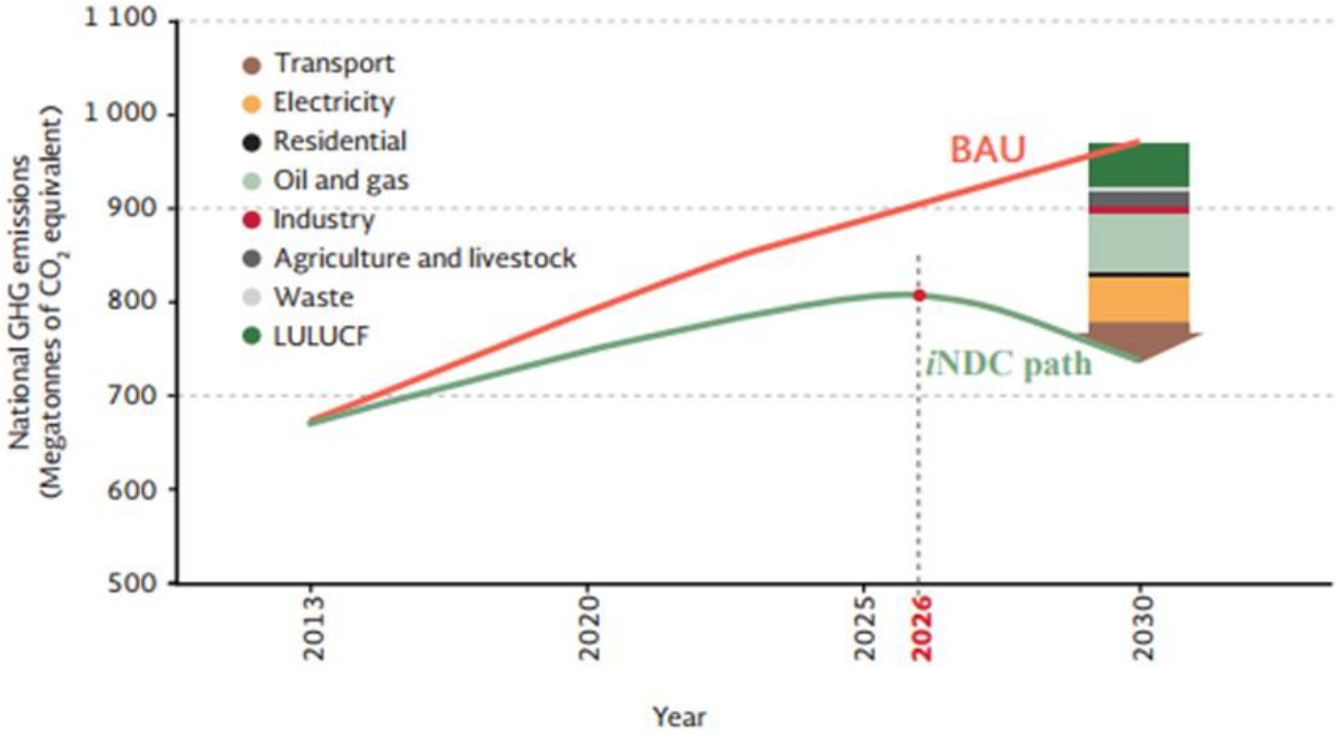
# Mexican commitment emissions of greenhouse gases under the baseline scenario (BAU) and iNDC mitigation unconditional goals, 2013-2030.




-22%

$MtCO_2e$

iNDC: Intended Nationally Determined Contribution

LULUCF:Land Use, Land-Use Change and Forestry

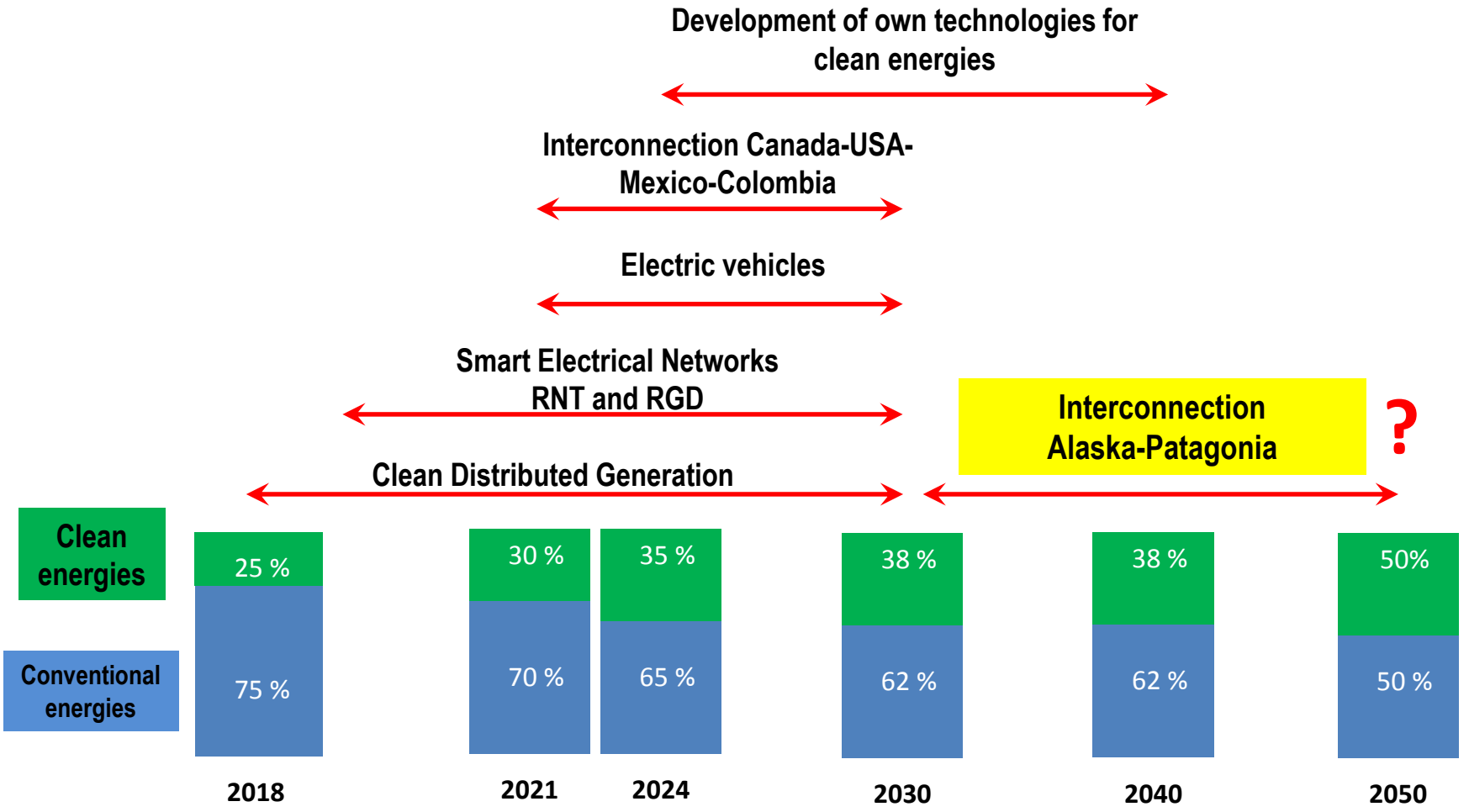
[3] Considering a BAU with no measures to address climate change.

[4] Estimated as the quotient of the volume of emissions of GHG by GDP.

SEMARNAT SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES

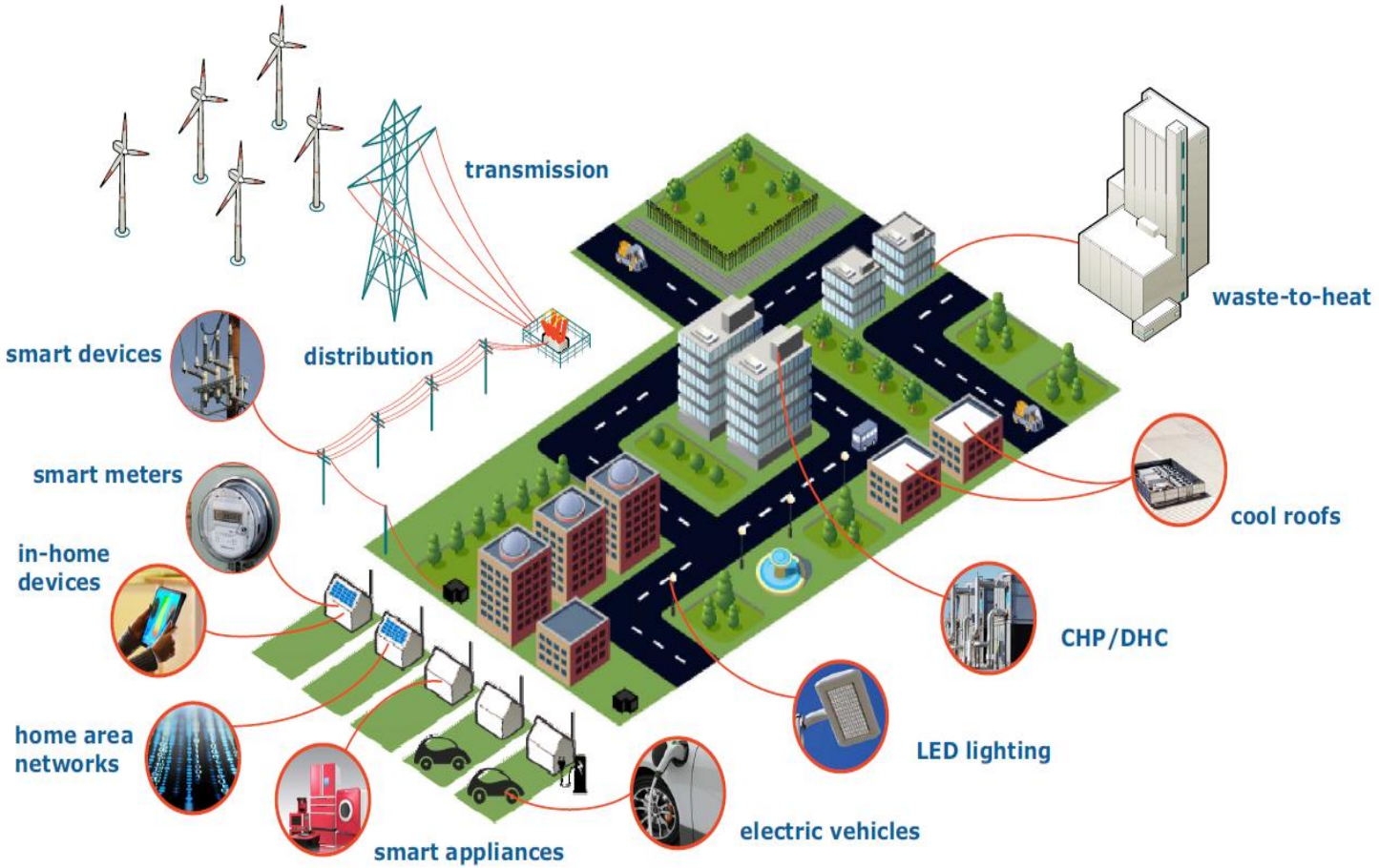
INECC INSTITUTO NACIONAL DE ECOLOGÍA Y CAMBIO CLIMÁTICO

# American continent: How we will move towards 2050




**Source:** SENER- Programa de desarrollo del Sistema Eléctrico Nacional (PRODESEN) 2017-2031.

# Urban Energy Transition



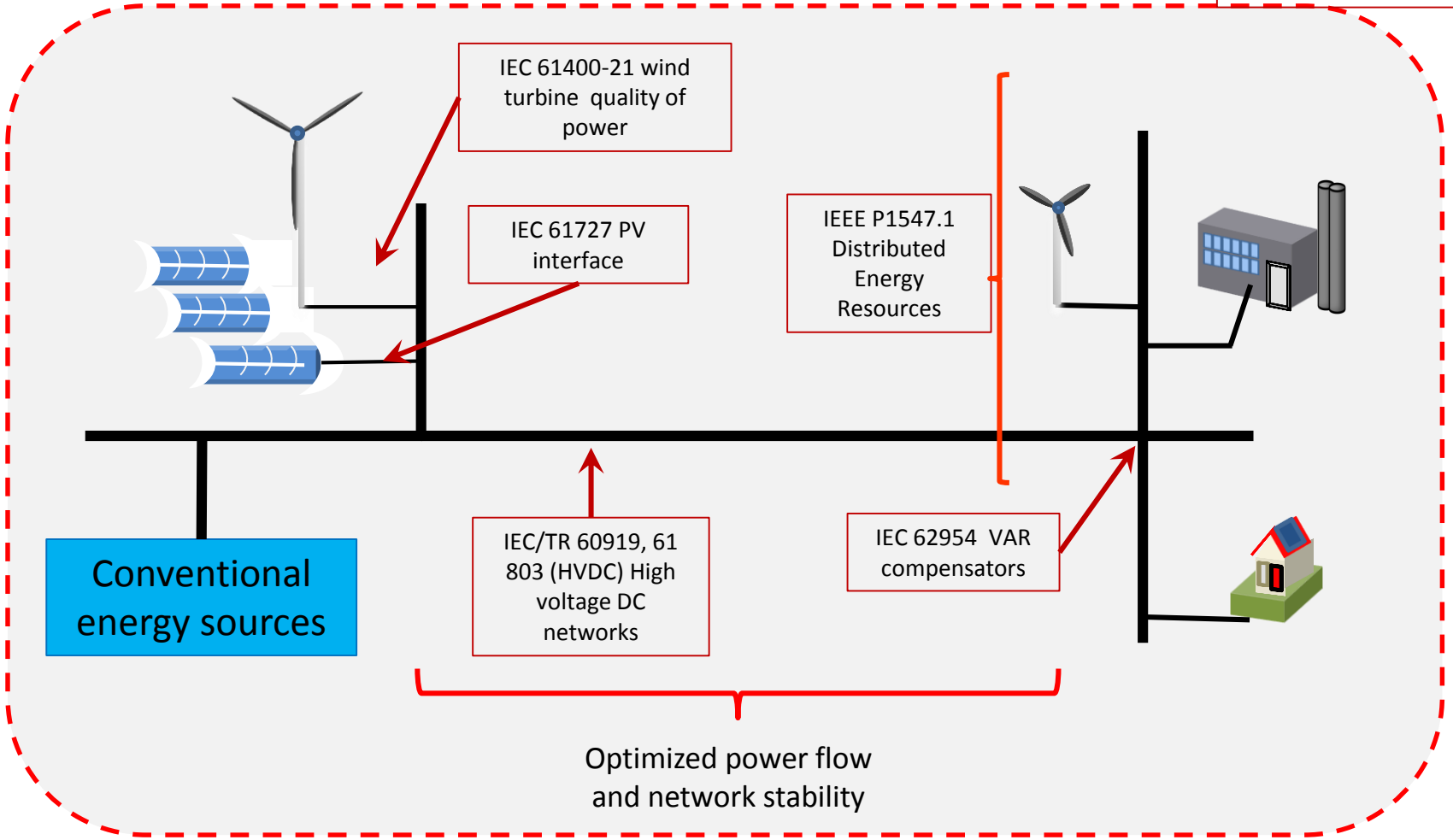

Source: Clean Energy Ministerial. Public-private Roundtables at the Sixth Clean Energy Ministerial. 27-28 May-2015. Mérida, México.

# Clean sources and their measurement needs

| Solar  | Wind  | Hydro  | Geothermal  | Biomass  | Cogeneration  |
|---|---|---|---|---|---|
| Irradiance | Wind Speed | | | Composition | |
| Temperature | Temperature | Temperature | Temperature | Temperature | Temperature |
| Pressure | Pressure | Pressure | Pressure | Pressure | Pressure |
| | Flow | Flow | Flow | Flow | Flow |
| | Heigth | Heigth | | | |
| | Density | Density | Density | | Density |
| | | Volume | Volume | Volume | |
| | | | | Heat Power | Heat Power |
| Ouput Power | Output Power | Output Power | Output Power | Output Power | Output Power |

**This is the issue of Metrology which is the science of measurements and its application is increasingly valid in the energy and climate change topics.**

# International Standards for Renewable Energy Sources



# Pillars of the Global Quality Infrastructure

SENER
SECRETARÍA DE ENERGÍA

Secretary of Energy

SE
SECRETARÍA DE ECONOMÍA

Secretary of Economy

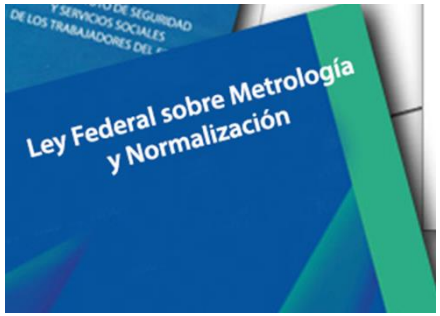
SEMARNAT
SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES

Secretary of Environment and Natural Resources

DGN

**Standardization**

**Energy Reform: Oil, Electricity, Energy Efficiency**




**Environment Agenda**

**$CO_2$ and GHG reduction**

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**Metrology**

ema®

**Accreditation**

# Solar Energy: Thermal and Photovoltaic

Metrology

Standardization

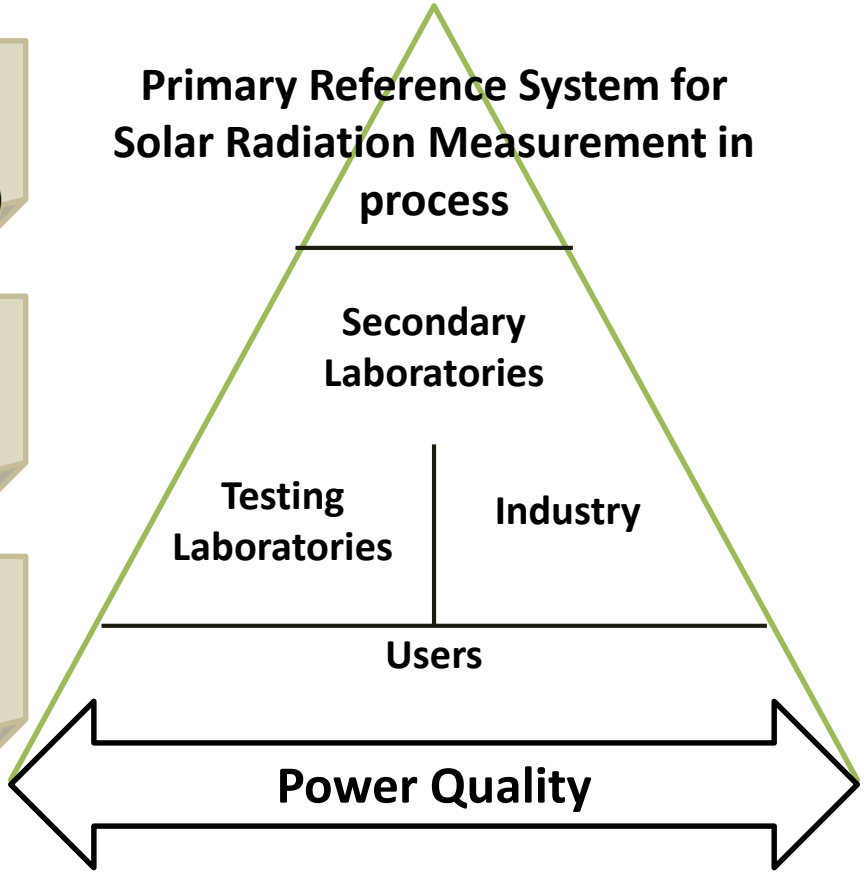
Accreditation

Certification

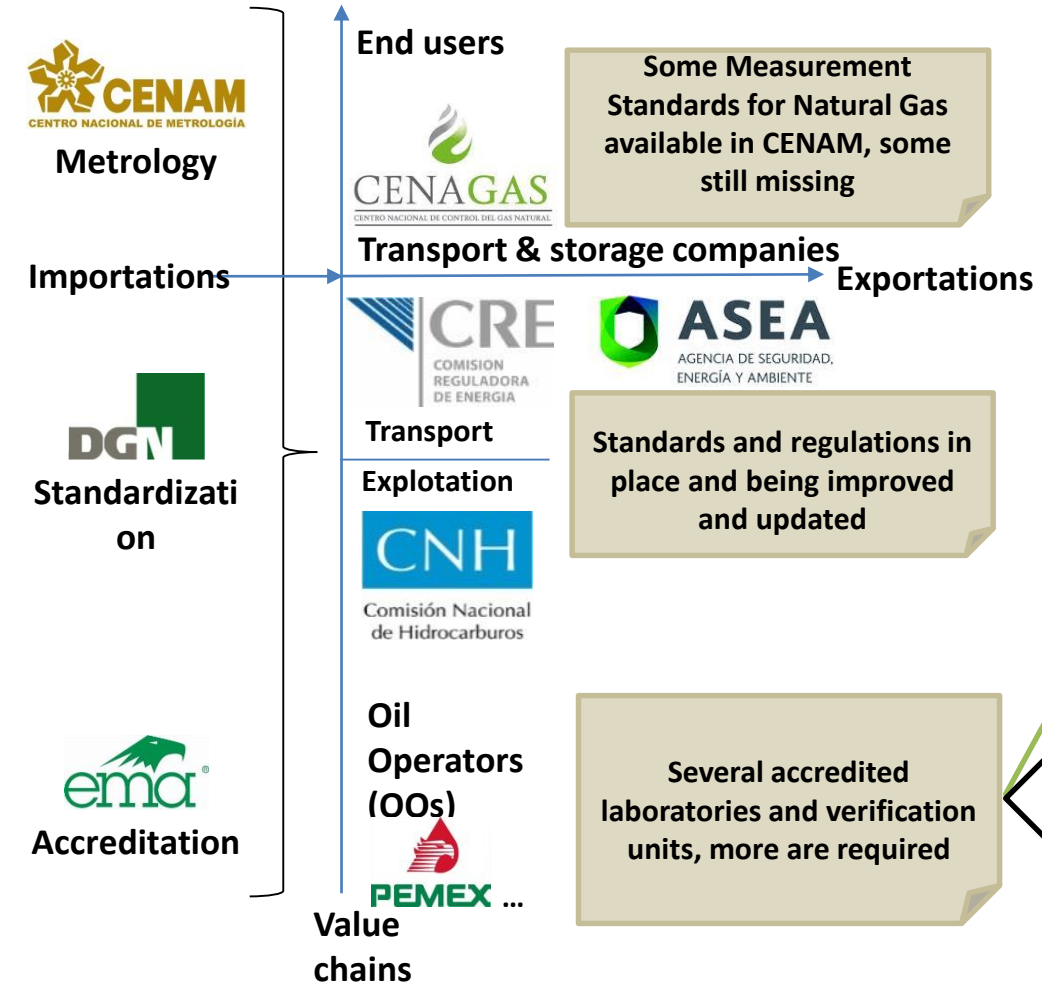
There is no national solar reference standard. (in process)

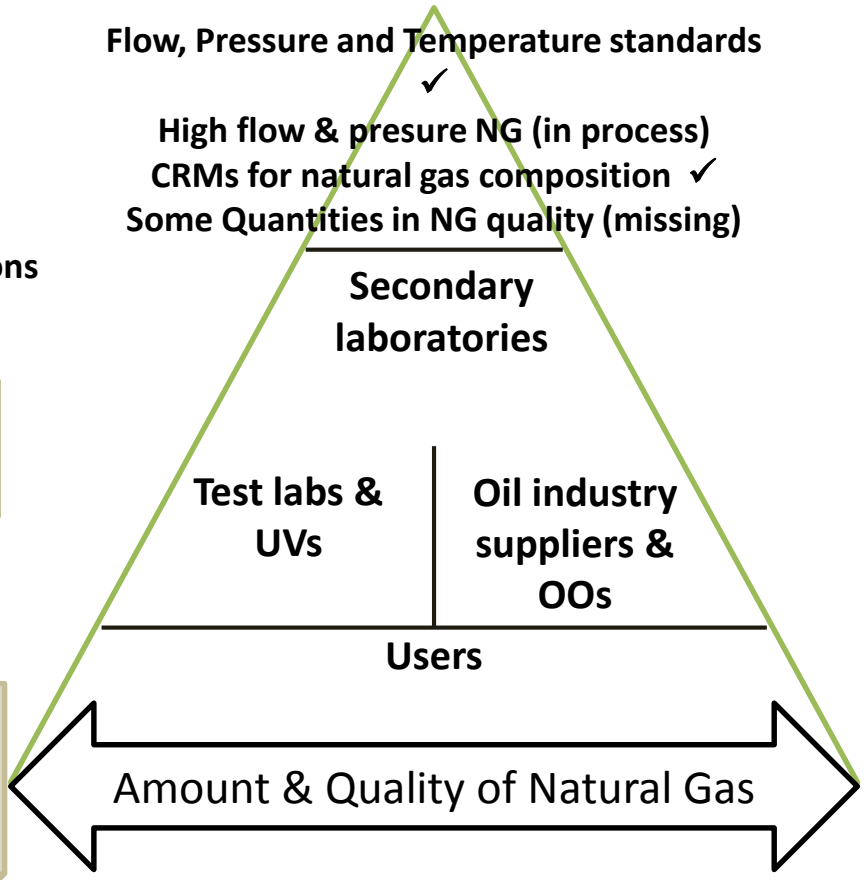
There is no national standards.

There is no accredited laboratories yet.



# Amount and quality of natural gas



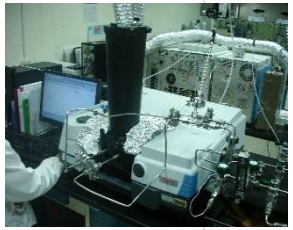



# Climate sciences and clean air: national infrastructure for policies

BIPM commitment

FT-IR in 1 or 2 years

FT-IR now



PT Stack tests

## STACK EMISSIONS

- Traceability & PTs
- Legal metrology
- Traceability
- EPA equivalent protocol of CGMs
- Evaluation of EPA gas mixtures
- LA mobile emission project

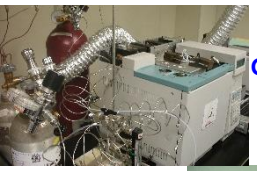
Vehicle exhaust emission technology evaluation

## AIR QUALITY

- OAS-NIST LA project on AQ
- LA projects: PT and low price sensors
- Traceability of VOCs
- Ozone and MoU with INECC (air pollutants)
- Emissions (traceable local emission factors of GHG inventories)

GC-PCR-FID for VOCs

SRP-29 UV Photometer



GC for GHGs

## GHGs

- Inmissions (traceable tests of GHGs)

Latinamerican GHG project

NIST commitment (10 CRMs)

## MOBILE EMISSIONS

NO-QL gas analyzer

CRMs cylinder storage room

# Collaboration with environmental Authority INECC on MINAMATA convention

***COLLABORATION PROJECT OF CERTIFIED REFERENCE MATERIALS OF MERCURY***

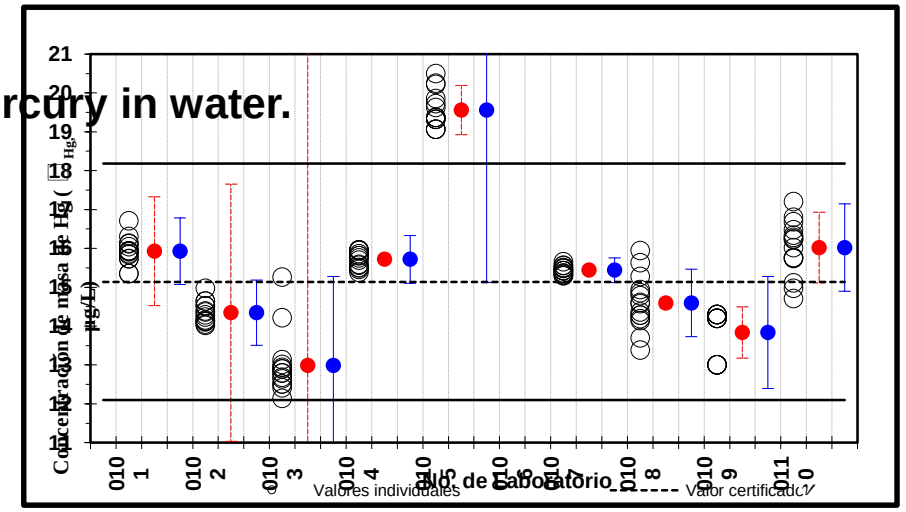
***ENVIRONMENTAL AUTHORITIES: SEMARNAT-INECC-MEXICO***

**CENAM has been collaborating with INECC-SEMARNAT in develop Measurement Method´s and Certified Reference Materials (CRM) to allow the Mexican Analytical Laboratories to use them to validate their measurement methodologies for mercury.**

**Program 2017:**

- **Developed CRM of calibrator of total Hg.**
- **Developed CRM of Hg in synthetic waste water**
- **to organize a proficiency test service**
- **to strengthen capacities for measuring mercury in water.**

**EMPIR collaboration is underway**



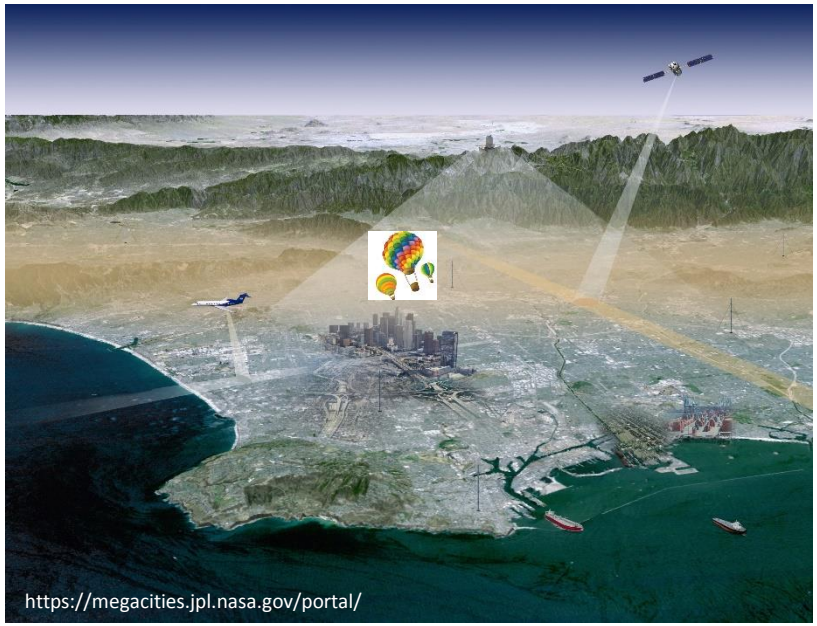
# Collaboration with Cities, Organizations and Scientific atmospheric communities

## Other relevant and rising measurement types for GHGs and air quality

GHG concentrations in Megacities

Satellites and remote sensors and local stations

Several purposes





# The Essential Climate Variables

| Domain | GCOS Essential Climate Variables |
|---|---|
| **Atmospheric** (over land, sea and ice) | **Surface:**[1] Air temperature, Wind speed and direction, Water vapour, Pressure, Precipitation, Surface radiation budget.<br>**Upper-air:**[2] Temperature, Wind speed and direction, Water vapour, Cloud properties, Earth radiation budget (including solar irradiance).<br>**Composition:** Carbon dioxide, Methane, and other long-lived greenhouse gases[3], Ozone and Aerosol, supported by their precursors[4]. |
| **Oceanic** | **Surface:**[5] Sea-surface temperature, Sea-surface salinity, Sea level, Sea state, Sea ice, Surface current, Ocean colour, Carbon dioxide partial pressure, Ocean acidity, Phytoplankton.<br>**Sub-surface:** Temperature, Salinity, Current, Nutrients, Carbon dioxide partial pressure, Ocean acidity, Oxygen, Tracers. |
| **Terrestrial** | River discharge, Water use, Groundwater, Lakes, Snow cover, Glaciers and ice caps, Ice sheets, Permafrost, Albedo, Land cover (including vegetation type), Fraction of absorbed photosynthetically active radiation (FAPAR), Leaf area index (LAI), Above-ground biomass, Soil carbon, Fire disturbance, Soil moisture. |

**Source**: https://www.wmo.int/pages/prog/gcos/index.php?name=EssentialClimateVariables

# Achievements and Challenges of the Quality Infrastructure for Energy and Climate Change in Mexico

## Achievements:

- ✓ Government Policies aligned to international agreements in both, Energy Transition (Structural Reforms) and Environmental Protection.
- ✓ Increasing interactions among the actors of the Quality Infrastructure: SENER, SEMARNAT, SE, Commissions and Agencies, Standardization, Accreditation bodies,…
- ✓ Solid basis in CENAM for accurate measurements of gas and oil, electrical energy, solar radiation, temperature, flow, etc. National Standards, Talent, Reference Laboratories…

# Achievements and Challenges of the Quality Infrastructure for Energy and Climate Change in Mexico

## Challenges:

- To Increase collaboration in the Continent through OAS, SIM and other organizations.
- To strengthen coordination among authorities and organizations responsible for regulations, standardization, metrology and conformity assessment.
- To increase measurement capabilities in different fields: CRM-GHGs, Solar Reference Systems, Wind Speed, Biofuels composition, heat power and smart grids.

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