Joint Research Project on Formation Mechanism of Ozone, VOCs and PM2.5 and Proposal of Countermeasure Scenario, Mexico

International Forum on Clean Cities Initiatives

Arturo Gavilán García, PhD
Director of Research of Contaminants, Chemicals, Wastes and Biosafety
National Institute of Ecology and Climate Change (INECC)

January, 2022

MEDIO AMBIENTE

SECRETARÍA DE MEDIO AMBIENTE
Y RECURSOS NATURALES

BACKGROUND

The National Institute of Ecology and Climate Change signed at the end of 2010 a scientific collaboration agreement with the Ehime University of Japan, JICA Mexico (Japan International Cooperation Agency) and JST (Japan Science and Technology Agency).

The main goal was to carry out, during 5 years, joint research to understand the processes of formation and transport of ozone, volatile organic compounds, fine suspended particles ($PM_{2.5}$) and studies of personal exposure, in the three main Mexican metropolitan areas: ZMVM, ZMG and AMM.

2011 → 2012 → 2013 → 2014 → 2015

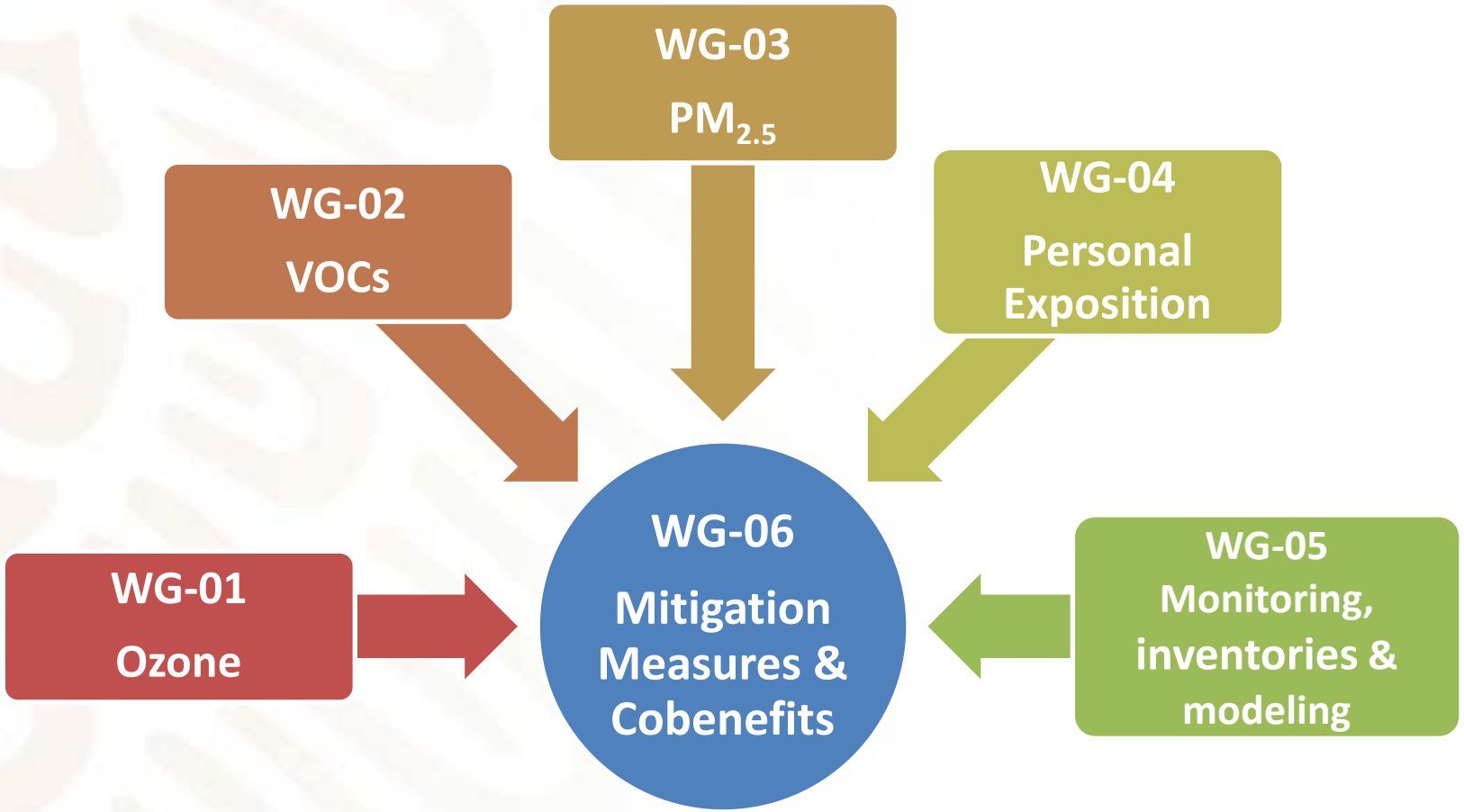
OBJECTIVES

The products of the joint research generated technical and scientific information that will be disseminated among decision makers at the three levels of government.

The specific objectives are to support:

- Design of public policies.
- Identify measures that contribute to the reduction of emissions of atmospheric pollutants and greenhouse gases.
- Improve air quality in the three major metropolitan areas of Mexico.

ORGANIZATION



Working groups

PARTICIPATING INSTITUTIONS

- Secretary of Environment and Natural Resources
- Secretary of the Environment of the Mexico City Government
- Secretary of Sustainable Development of the Government of Nuevo León
- Secretary of the Environment and Territorial Development of the Government of Jalisco
- National Center of Metrology
- National Commission of Water, National Meteorological Service
- Center of Atmospheric Sciences of the National Autonomous University of Mexico
- Metropolitan Autonomous University, Iztapalapa Unit
- Center of Research and Assistance in Technology and Design of the State of Jalisco
- Technology Institute of Monterrey
- Autonomous University of Nuevo León

RESULTS

INECC
INSTITUTO NACIONAL DE ECOLOGÍA Y CAMBIO CLIMÁTICO

MEDIO AMBIENTE
SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES

Sample Preparation

Chromatography

Elements Specthrometry

Toxic VOC

GMO

Personal Exposition

Particles

Gravimetry

JICA

Calibration & Tranference of Staandards – Ozone National Standard

STOCKHOLM CONVENTION

Minamata Convention on Mercury

JST

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

CENAM
CENTRO NACIONAL DE METROLOGÍA

愛媛大学
EHIME UNIVERSITY

RESULTS

Ozone

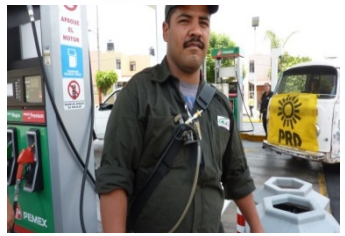
- Generation of technical and scientific information from short campaigns to measure vertical profiles of ozone concentration in ZMVM, ZMG, AMM.
- Proposal for a permanent ozone-sounding program in the country.

VOC

- Chemical characterization of ambient air samples at the three sites and a VOC diagnosis to determine its contribution and association with its potential emission sources.

Particles

- Caracterización de las concentraciones de componentes químicos presentes en partículas PM2.5 en los tres sitios, en base a campañas de muestreo.



RESULTS

Personal Exposition

- Concentrations of pollutants to which users of public transport (trolleybuses) are exposed, in the so-called Zero Emissions Corridor (Central Axis) in Mexico City.
- Gasoline dispensers in the urban area of the City of Guadalajara, Jal.

Modeling

- Development of air quality models for each of the Metropolitan Area of the Valley of Mexico, Guadalajara and Monterrey.

Policies

- Development of scenarios for co-benefit measures to mitigate air pollution and climate change.
  - Vapor recovery in the gasoline sales process.
  - Application of vehicle verification programs.
  - Enforcement of stricter emission limits on diesel units.
  - Control of liquefied petroleum gas emissions.
  - Promote low-carbon transport systems.

RESULTS

ZMVM

- Evaluation of co-benefits in the “Zero Emissions Corridor” in CDMX.
- Migration from the MCCM Model to the WRF-CHEM Photochemical Model in CDMX to evaluate scenarios and control measures.
- Collaboration Agreement with CAMe to replicate the SATREPS project in the 7 CAMe states.

AMM

- Information was obtained on the concentration of Particles and VOCs for the design of the PROAIRE of Nuevo León.
- Evaluation of co-benefits in the Ecovía de Monterrey.
- Creation of capacities for sampling and analysis in Local Government.

ZMG

- Evaluation of co-benefits in gasoline service stations in Guadalajara, as an element for the installation of vapor recovery systems.
- Creation of capacities for sampling and analysis in Local Government.

ON GOING ACTIVITIES

- Inclusion of the capacities obtained by Mexico in the PROAIRE 2016-2025 of Nuevo León.
- Collaboration agreement with the CAMe for the development of campaigns during the period 2019-2024.
- Inclusion of the use of the skills learned in the Institutional Work Program of the INECC 2019-2024.
- Acquisition of new equipment.

THANK YOU!

MEDIO AMBIENTE

SECRETARÍA DE MEDIO AMBIENTE
Y RECURSOS NATURALES

ESTADOS UNIDOS MEXICANOS