

## AQRP Monthly Technical Report

<b>PROJECT TITLE</b>	Emission Inventory Development and Projections for the Transforming Mexican Energy Sector	<b>PROJECT #</b>	19-023
<b>PROJECT PARTICIPANTS</b>	The University of Texas at Austin (UT Austin) Ramboll	<b>DATE SUBMITTED</b>	2/8/2019
<b>REPORTING PERIOD</b>	<b>From:</b> 1/1/2019 <b>To:</b> 1/31/2019	<b>REPORT #</b>	4

A Financial Status Report (FSR) and Invoice will be submitted separately from each of the Project Participants reflecting charges for this Reporting Period. I understand that the FSR and Invoice are due to the AQRP by the 15<sup>th</sup> of the month following the reporting period shown above.

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### Detailed Accomplishments by Task

#### *Task 1. Base Year Emission Inventory Estimates*

An overall strategy for developing the base year upstream and midstream emissions inventory components has been developed and is described below. The team is working to complete the data compilation and resolve remaining questions.

#### **On-Shore Well Sites (Upstream Sector)**

An initial emissions inventory for on-shore oil and gas drilling and producing well sites was developed for the Burgos and Sabinas Basins in northern Mexico for the 2016 base year. Activity surrogates obtained from Mexico's National Hydrocarbons Information Center (CNIH) and IHS Markit databases were applied by source classification code (SCC) and included, for example, well counts, production levels, and spud counts. Initial emission factors were developed based on 2014 National Emission Inventory (NEI) data by SCC and county and Western Gulf Basin oil and gas activity data from the Environmental Protection Agency's (EPA's) Oil and Gas Tool v. 1.5 or v.2. 1. It should be noted that the Western Gulf Basin in Texas is geographically contiguous with the Burgos Basin. Processes related to oil production were removed since conventional production in the Burgos and Sabinas Basins includes only gas production (no oil production). Preliminary estimates of emissions for the Burgos and Sabinas Basins did not account for differences in emissions controls between the United States and Mexico. Ramboll is currently working with Michael Ege, the TCEQ Project Liaison, to obtain additional information to update emissions rates to remove U.S. specific controls.

A similar approach is being applied for other on-shore basins, including Tampico Misantla, Veracruz, Cuencas del Sureste. However, in contrast to the Burgos and Sabinas Basins, these basins include wells with a mix of oil and gas production. The Palo Duro Basin in Northern Texas is expected to be used as the activity surrogate with the 2014 NEI as it also has substantial legacy production. Emission rates will require modification to remove U.S. specific controls.

### **Off-Shore Platforms (Upstream Sector)**

Off-shore production in Mexico has been occurring in shallow waters (<200ft) with deep water resources still under development. The 2016 CNIH data for off-shore oil and gas well sites are indicative of individual wells in contrast to off-shore data for Mexico in the EPA's 2011 air emissions modeling platform that generally represent a production complex and not wells. U.S. production and emissions data for shallow water platforms in the Gulf of Mexico from the Bureau of Ocean Energy Management (BOEM) inventory will be used to estimate emissions per unit of production at the SCC-level. As feasible, these estimates will be refined by depth distribution and comparisons between U.S. and Mexican gas to oil ratios by area. Emission factors will be applied with activity (i.e., production) data reported by the CNIH.

A literature search was conducted on flaring and venting regulations. Associated natural gas production has historically exceeded non-associated gas production in Mexico. In 2011, Mexico was ranked within the top twenty countries for gas flaring, due in particular from the off-shore Cantarell fields. The National Hydrocarbons Commission (CNH) issued technical guidelines for avoidance and reduction of flaring and venting in 2008 superseded by new guidelines in 2016.

### **Natural Gas Processing Plants (Midstream Sector)**

Of the eleven natural gas plants identified as active in the IHS Markit EDIN database during 2016, eight had been included in the 2008 Mexican Emission Inventory (MXEI2008) that was used in the development of the U.S. EPA's NEI. For these plants, estimates of 2016 emissions will be based on ratio of 2016 to 2008 production/throughput. Scatterplots of facility wide emissions by pollutant from the MXEI2008 versus production among the eight plants showed approximately a linear relationship between production and emissions of most pollutants, except sulfur dioxide (SO<sub>2</sub>). This information along with plant characteristics (e.g. type, process, production information) has the possibility to be used to estimate emissions for the remaining three facilities that are not present in the U.S. NEI.

### **Natural Gas Compressor Stations (Midstream Sector)**

The team has been unable to match natural gas compressor stations in the IHS Markit database to any emission points in the NEI, suggesting they are missing. Data overlays of the compressor stations with the pipeline network were created. The IHS data appears to capture not only large compressor stations along major trunk lines but also smaller compressor stations both in-field and along pipelines. The level of information available varies for different compressor stations. For compressor stations for which horsepower information is available via IHS, per horsepower emission factors will be developed; this strategy will assume 100% (maximum) operation at each compressor location. For compressor stations on trunklines that do not have horsepower information, the team will likely assume emissions based on an average for trunkline compressor stations with horsepower data. For compressor station that are not on trunklines, a single representative gathering station from the Texas emission inventory will likely be selected as the basis for the emissions estimates. The team is working on a strategy for representing stack release parameters for compressor stations.

### **Electric Generating Units**

The team has been working on two aspects of the development of emissions estimates for Mexico's power sector, identifying and locating power plants and identifying appropriate emissions factors. The Mexican agency SENER (Secretariat of Energy) is required to issue an annual report referred to as the National Electric System Development Program (PRODESEN). The report serves as the primary planning instrument regarding generation, transmission, and

distribution of Mexican electricity. It includes descriptions of capacity and generation by technology type in active operation and planned retirements and installations of electricity generation at the unit (EGU) level for both thermal and renewable resources. The focus has been on establishing specific geographic location coordinates for thermal units that contribute to most of the total generation as the highest priority. An attempt will be made to locate remaining plants either with specific coordinates, or if infeasible they will be placed at the centroid location of the Mexican states in which they are present. Other resources that are being used to establish the location of thermal unit include the IHS Markit EDIN and North American Cooperation on Energy Information (NACEI) databases.

The PRODESEN provides generic emission factors by technology type for some (i.e., NO<sub>x</sub> and SO<sub>2</sub>) but not all pollutants of interest for the project. Mexico's Federal Electricity Commission (CFE) reported capacity, technology, and emission factors by plant for year 2014. The team is currently trying to determine the underlying source of the emission factor data and conducting comparisons with information for the U.S. power sector.

*Task 2. Mexico Bid Rounds and Future Projection Scenarios*  
No new activities to report.

**Preliminary Analysis**

As above.

**Data Collected**

As above.

**Identify Problems or Issues Encountered and Proposed Solutions or Adjustments**

None.

**Goals and Anticipated Issues for the Succeeding Reporting Period**

The team will continue to finalize the emission inventory approach and work on developing emissions estimates.

**Detailed Analysis of the Progress of the Task Order to Date**

The project is proceeding as planned.

**Do you have any publications related to this project currently under development? If so, please provide a working title, and the journals you plan to submit to.**

Yes       No

**Do you have any publications related to this project currently under review by a journal? If so, what is the working title and the journal name? Have you sent a copy of the article to your AQR Project Manager and your TCEQ Liaison?**

Yes       No

**Do you have any bibliographic publications related to this project that have been published? If so, please list the reference information. List all items for the lifetime of the project.**

Yes       No

**Do you have any presentations related to this project currently under development? If so, please provide working title, and the conference you plan to present it (this does not include presentations for the AQRP Workshop).**

Yes       No

**Do you have any presentations related to this project that have been published? If so, please list reference information. List all items for the lifetime of the project.**

Yes       No

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Submitted to AQRP by

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