Lean, Radically Simple Emission Inventories

ADEQ Arizona Department of Environmental Quality

Introduction

- LEAN and Continuous Improvement
- Kaizen process
- Point Source EIs
- Area Source EIs

LEAN & CONTINUOUS IMPROVEMENT

- ADEQ's mission: To protect and enhance public health and the environment of Arizona
- ADEQ seeks to accomplish mission through two guiding ideals:
  1. Our "True North" – what we want our organization to be
  2. The "ADEQ Way" – 10 behaviors that guide our daily work
- ADEQ Lean Management System (ALMS) - Adoption of lean management techniques into a coherent management system

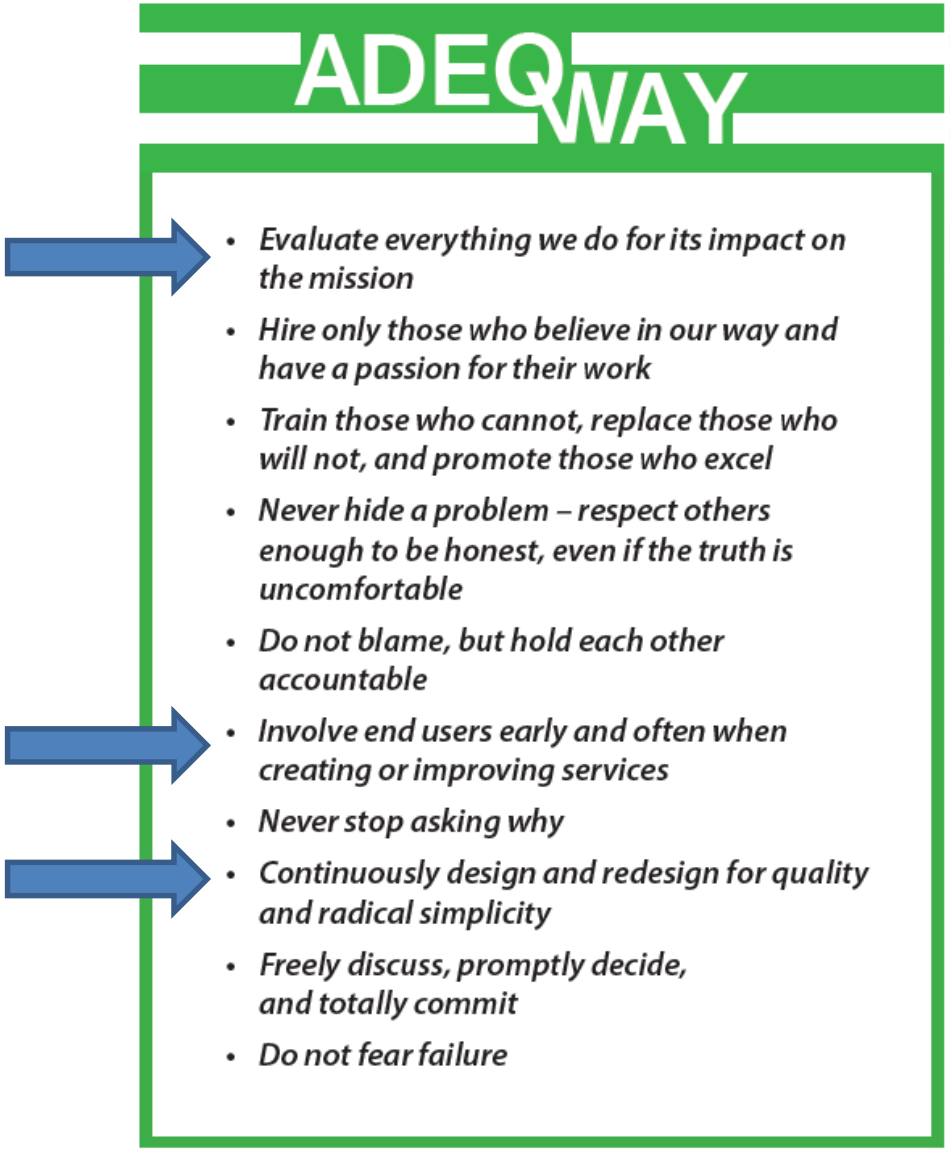
ADEQ Lean Management System

- Each employee receives >40 hours of training on the management system and lean principles
- ADEQ's Office of Continuous Improvement develops and delivers training and provides staff coaching
- ADEQ culture empowers employees to look for improvement opportunities to reduce waste and increase productivity

Arizona DEQ's True North

To be the number one state in the nation in:

- Balanced, leading-edge environmental protection,
- Technical and operational excellence, and
- Radical simplicity for customers and staff



KAIZEN PROCESS

What is a Kaizen?

- The Kaizen management theory uses continuous and incremental improvement in a process to create compounded improvements in productivity while humanizing the workplace and reducing workplace complexity.
- The philosophy uses a methodical process of “Plan, Do, Check, Act” that involves all members of the organization, and external stakeholders when necessary, to simplify and improve the quality of a product.

What is a Kaizen?

- The first ADEQ SIP Kaizen event in 2013 resulted in 13 formal recommendations. Every person on the SIP team had some involvement in the implementation of these recommendations
- The goal for the 2013 Kaizen event
  - Nonattainment Area (NA) State Implementation Plans (SIP) being delivered to the EPA by the federally prescribed deadline
  - Reduction in the re-writes of SIPS
  - Reduction in total time spent developing a SIP

Nonattainment Area SIP Kaizen

- ADEQ held multiple Kaizen events focused on SIP process
  - 2013 Goals
    - Standardize work and apply project deliverables to future SIPs to improve quality and consistency of product
    - Produce SIPs that pass internal ADEQ and external EPA review and approval process
    - Maintain collaborative work environment; improving group cohesion as secondary outcome
    - Complete all project tasks and meet all milestones
  - 2016 Goals
    - Root cause analysis of bottlenecks and waste
    - Identify process improvement projects
    - Review and update upon previous Kaizen products

Emission Inventory Portion of Kaizen

- Emission Inventory Improvements
  - Templates for EI and Modeling SIP chapters
  - Inventory Preparation Plan template
  - Statewide Area Source EI
  - Excel-based project manager utility
    - Standard file structure and nomenclature
    - IPP and EI template generator
    - QA/QC and Close-Out checklists

POINT SOURCE EMISSION INVENTORIES

Annual Point Source EI Process

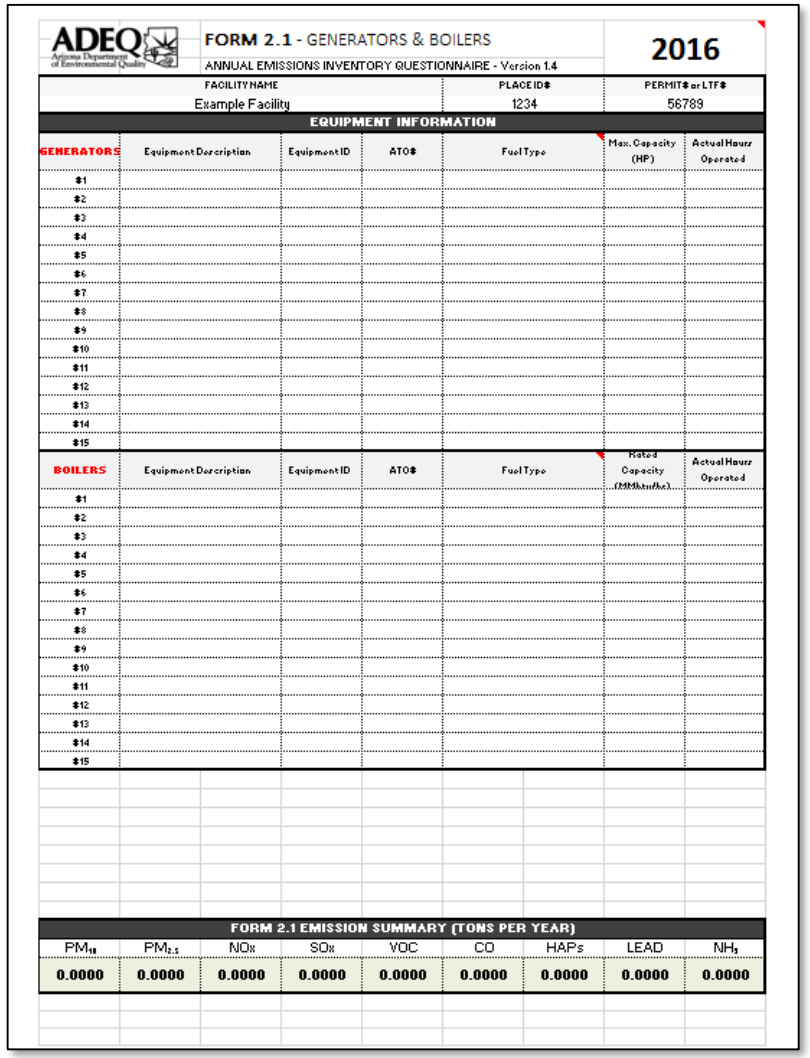
- Minor Source
  - Previous collection method (9 page Excel/PDF)
  - Current collection method (3 page Excel/PDF)
  - Future collection method (myDEQ)
- Major Source
  - SLEIS
  - SLEIS enhancement project

Point Source EI - Current Process

- Notification letter mailed to permittees (~400 facilities)
- Two reporting mechanisms depending on permit classification:
  - Major Sources → online (SLEIS)
  - Minor Sources → manual (Excel or PDF)
- Minor Source downloads form (Excel or PDF), fills out, prints, mails to ADEQ
- ADEQ receives, reviews, and manually enters emission totals in local Access database

Point Source EI - Current Process Cont'd

Reporting Form (Excel)



ADEQ Arizona Department of Environmental Quality

FORM 2.1 - GENERATORS & BOILERS — **2016**

ANNUAL EMISSIONS INVENTORY QUESTIONNAIRE - Version 1.4

FACILITY NAME	PLACE ID#	PERMIT# or LTF#
Example Facility	1234	56789

EQUIPMENT INFORMATION

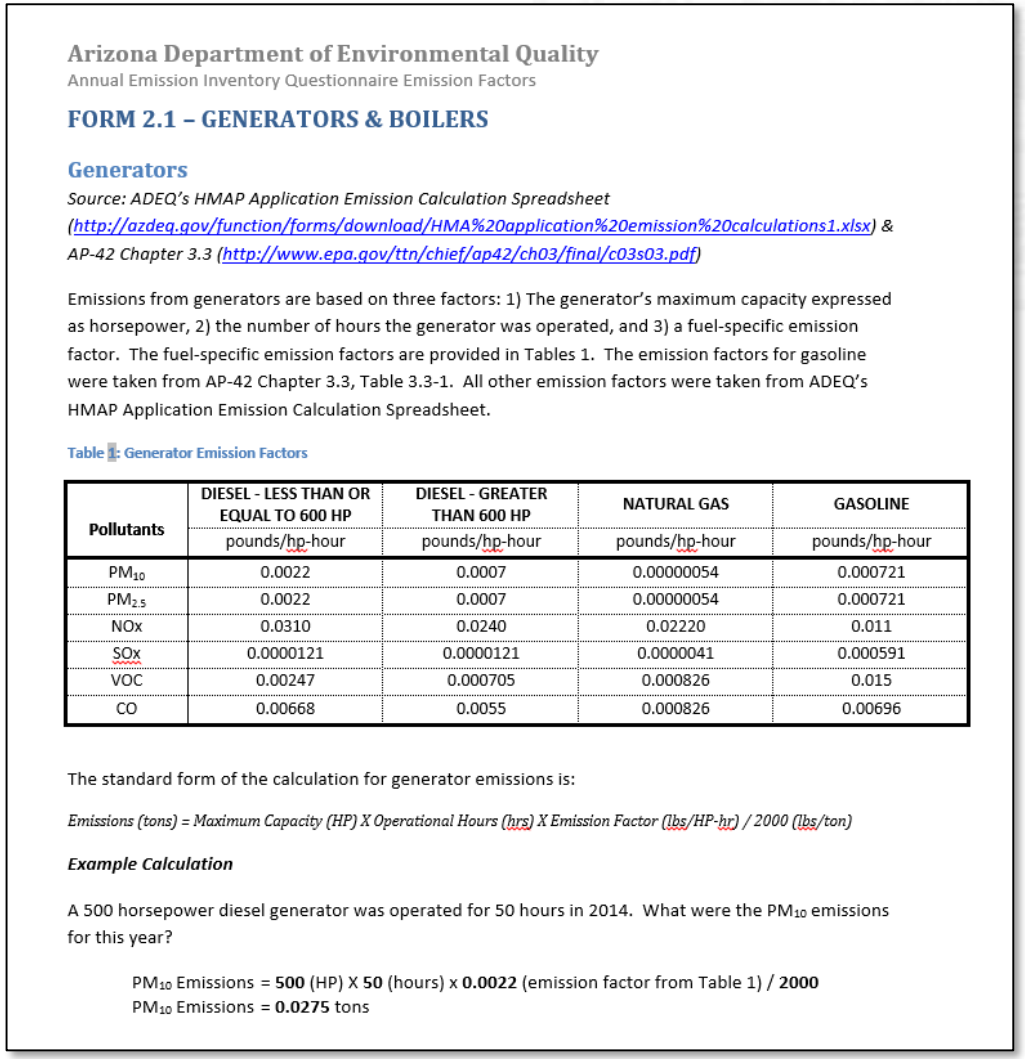
GENERATORS	Equipment Description	Equipment ID	ATO#	Fuel Type	Max. Capacity (HP)	Actual Hours Operated
#1						
#2						
#3						
#4						
#5						
#6						
#7						
#8						
#9						
#10						
#11						
#12						
#13						
#14						
#15						

BOILERS	Equipment Description	Equipment ID	ATO#	Fuel Type	Rated Capacity (MMBtu/hr)	Actual Hours Operated
#1						
#2						
#3						
#4						
#5						
#6						
#7						
#8						
#9						
#10						
#11						
#12						
#13						
#14						
#15						

FORM 2.1 EMISSION SUMMARY (TONS PER YEAR)

PM_{10}	$PM_{2.5}$	NOx	SOx	VOC	CO	HAPs	LEAD	NH_3
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Emission Factor Appendix



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Annual Emission Inventory Questionnaire Emission Factors

FORM 2.1 – GENERATORS & BOILERS

Generators

Source: ADEQ's HMAP Application Emission Calculation Spreadsheet (http://azdeq.gov/function/forms/download/HMA%20application%20emission%20calculations1.xlsx) & AP-42 Chapter 3.3 (http://www.epa.gov/ttn/chief/ap42/ch03/final/c03s03.pdf)

Emissions from generators are based on three factors: 1) The generator's maximum capacity expressed as horsepower, 2) the number of hours the generator was operated, and 3) a fuel-specific emission factor. The fuel-specific emission factors are provided in Tables 1. The emission factors for gasoline were taken from AP-42 Chapter 3.3, Table 3.3-1. All other emission factors were taken from ADEQ's HMAP Application Emission Calculation Spreadsheet.

Table 1: Generator Emission Factors

Pollutants	DIESEL - LESS THAN OR EQUAL TO 600 HP	DIESEL - GREATER THAN 600 HP	NATURAL GAS	GASOLINE
	pounds/hp-hour	pounds/hp-hour	pounds/hp-hour	pounds/hp-hour
PM_{10}	0.0022	0.0007	0.00000054	0.000721
$PM_{2.5}$	0.0022	0.0007	0.00000054	0.000721
NOx	0.0310	0.0240	0.02220	0.011
SOx	0.0000121	0.0000121	0.0000041	0.000591
VOC	0.00247	0.000705	0.000826	0.015
CO	0.00668	0.0055	0.000826	0.00696

The standard form of the calculation for generator emissions is:

Emissions (tons) = Maximum Capacity (HP) X Operational Hours (hrs) X Emission Factor (lbs/HP-hr) / 2000 (lbs/ton)

Example Calculation

A 500 horsepower diesel generator was operated for 50 hours in 2014. What were the PM_{10} emissions for this year?

PM_{10} Emissions = **500** (HP) X **50** (hours) x **0.0022** (emission factor from Table 1) / **2000**
PM_{10} Emissions = **0.0275** tons

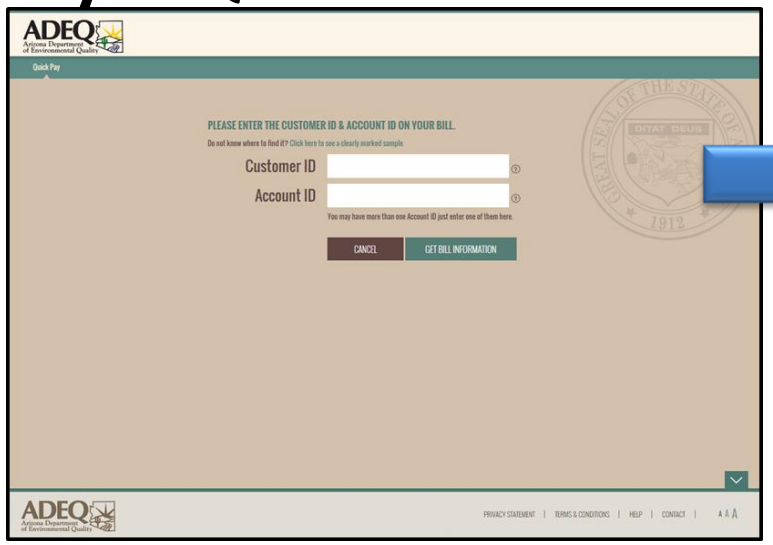
myDEQ – Current Process

- **RCRA EPA ID No.** — Digitally file EPA Form 8700-12 or modify/deactivate/reactivate EPA ID for hazardous waste generation
- **Water Quality Self Monitoring Reporting Forms (SMRF)** — Digitally submit SMRF data
- **Electronic Discharge Monitoring Report (e-DMR)** — Digitally submit your DMR data
- **Crushing & Screening (C & S), Concrete Batch Plant (CBP) and Hot Mix Asphalt Plant (HMAP) General Permit** — Apply for and manage Permits online
- **QuickPay —** Pay ADEQ bills online
- **Underground Storage Tank (UST) Preapproval**

Point Source EI – Future Process

- myDEQ will serve as one-stop-shop for all agency business
- Facilities can apply for permit, submit compliance reports, and submit annual emission reports
- myDEQ will interface with SLEIS, ADEQ's major source reporting application

myDEQ



SLEIS

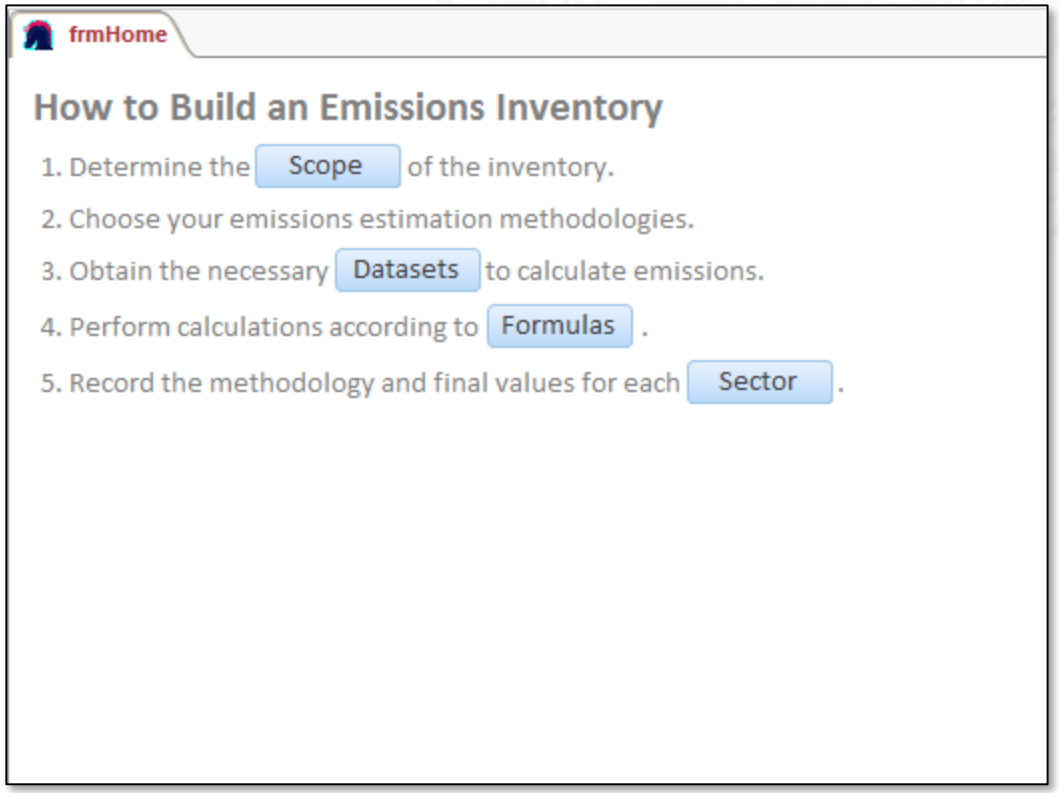
CAER

EPA

AREA SOURCE EMISSION INVENTORIES

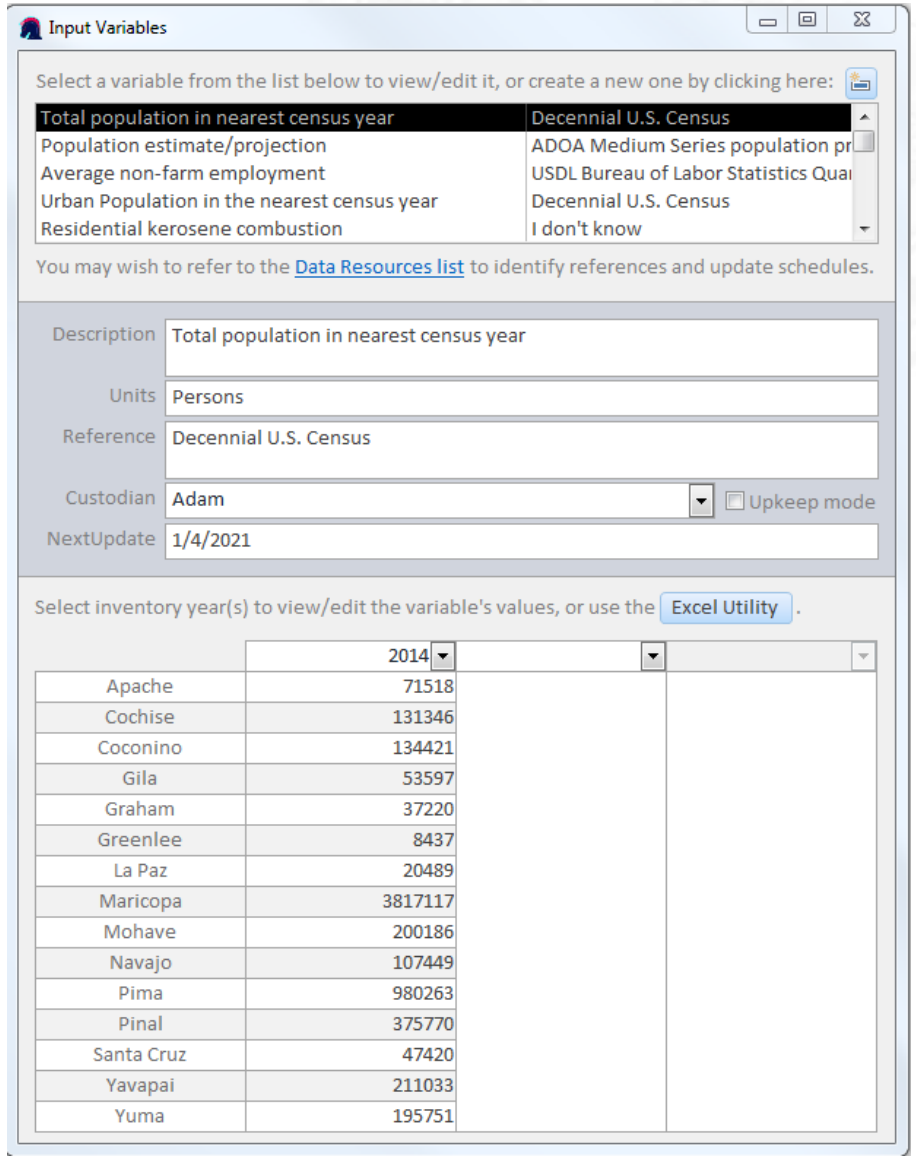
Area Source EI Process

- Access-based application developed by ADEQ EI staff
- Database to store datasets, formulas, reviews, and emissions data
- UI with various utilities streamlines data-entry and reduces duplicative work



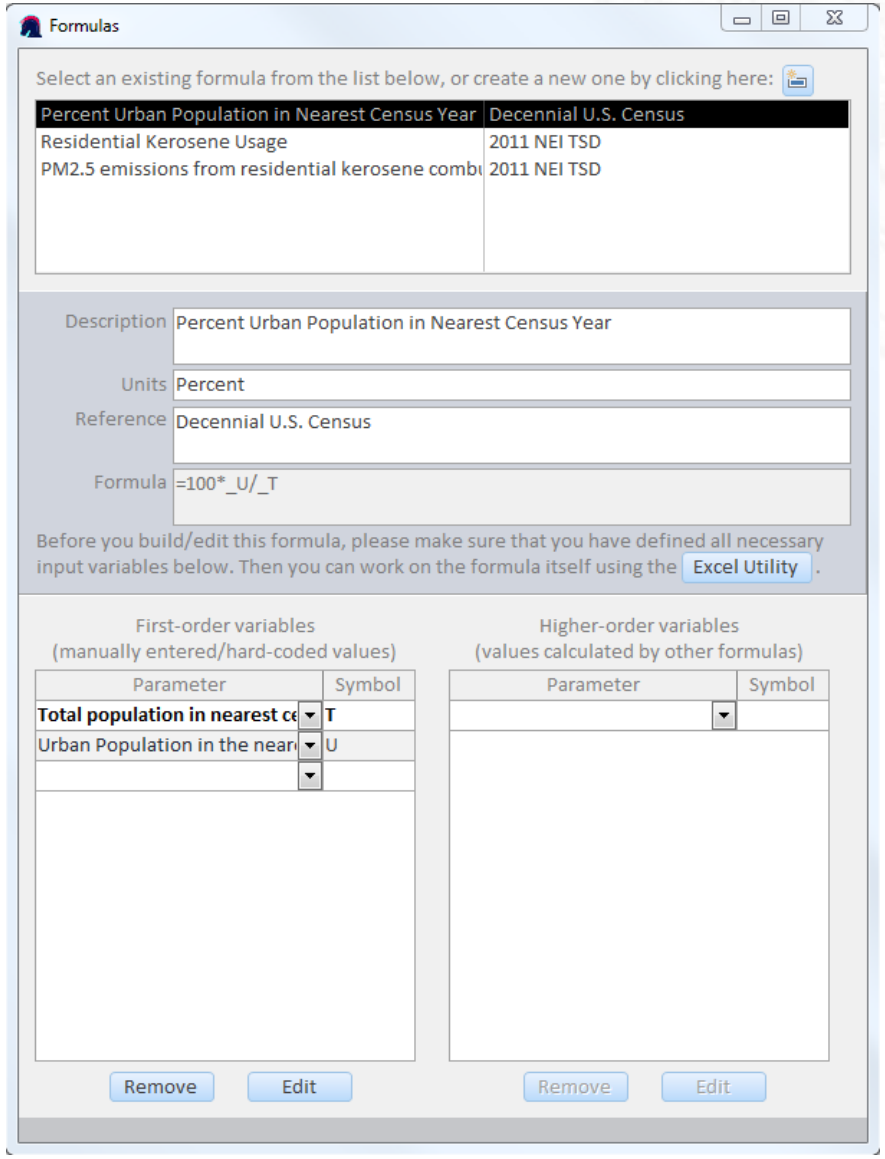
Area Source EI Process - Cont'd

- Scope
  - Define temporal and spatial scope of inventory
- Datasets
  - Define, store, and re-use datasets such as population or employment



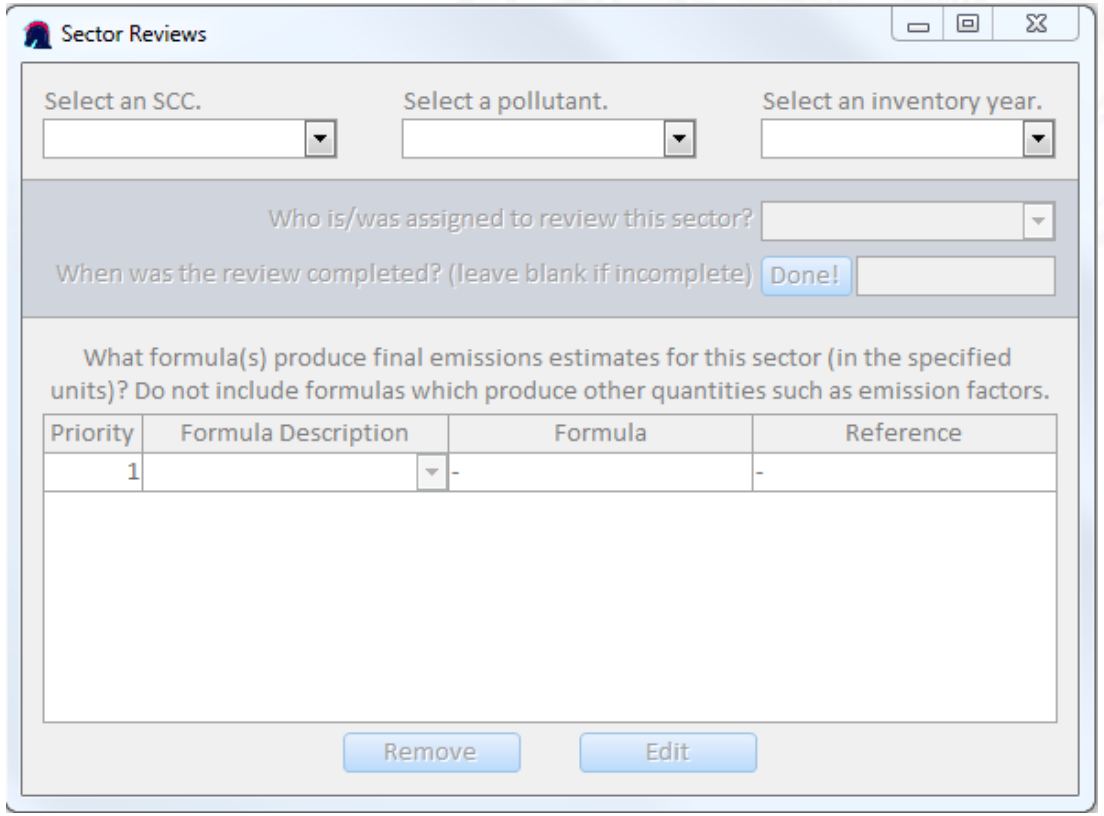
Area Source EI Process - Cont'd

- Formulas
  - Define and reuse formulas



Area Source EI Process - Cont'd

- Sector Review
  - Track reviews and define emission calculation priority



FUTURE WORK

Point Source EI – Future Work

- Currently myDEQ allows certain facilities to:
  - Apply for and manage general air permits
  - Submit air annual compliance certification
  - Submit Water Quality Self Monitoring Reporting Forms (SMRF)
  - Pay fees
- Coming to myDEQ June 2017:
  - Get a fleet station permit
  - Get stormwater permit coverage
- SLEIS enhancements (E-Enterprise Grant)
  - Minor source emission inventories
  - Compliance reports
  - Connect to SCC web service (CAER)

Point Source EI – Future Work Cont'd

- Collect emissions data through myDEQ for rock product facilities (crushing & screening, concrete batch & hot mix asphalt)
  - Will leverage data collected in compliance certification (throughput, hours of operation) to calculate emission totals
- Integrate SLEIS and myDEQ
  - Single log-in
- Additional SLEIS enhancements
  - Connections to future CAER web services

Point Source EI – Future Work Cont'd

ADEQ has been deeply involved in E-Enterprise Combined Air Emissions Reporting project

- ***QA/QC***
  - Identification and evaluation of a common set of emissions data QA/QC procedures for shared emission reporting.
- ***GHG Emissions Mapping Study***
  - Pilot study to map emission data in the EPA's national Greenhous Gas Reporting Rule (GHGRP) to example state greenhouse gas reporting program(s).
- ***TRI/NEI/SLT Program Crosswalk***
  - Research consistency and possible workflows for sharing of emissions data between TRI, SLTs and NEI -- Phase 1
- ***Emissions Data Design***
  - Establish and document a data model with basic core set of emissions-related data elements to support reporting through a common emissions form (CEF).
- ***SCC/Emission Factors***
  - Scoping study for identifying problems and solutions with SCCs and WebFIRE that will meet SLT, NEI, NATA, and CEDRI/ERT requirements under the CAER project.

Questions?

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