Idle Reduction Technologies for Ambulances
North Central Texas Council of Governments

About

A voluntary association of, by and for local governments, established to assist in regional planning

Serves as the Metropolitan Planning Organization (MPO) in the DFW region

Houses the DFW Clean Cities Coalition, which works to improve air quality and reduce petroleum consumption in the transportation sector
Air Quality 101
Clean Air Act

Requires Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for six criteria pollutants:

- Carbon Monoxide (CO)
- Lead (Pb)
- Nitrogen Dioxide (NO$_2$)
- Ozone (O$_3$)
- Particulate Matter (PM)
- Sulfur Dioxide (SO$_2$)
# DFW Ozone Non-Attainment Areas

## Ozone Monitor

<table>
<thead>
<tr>
<th>Ozone Monitor</th>
<th>Monitor Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arlington Municipal Airport</td>
<td>1</td>
</tr>
<tr>
<td>Cleburne Airport</td>
<td>2</td>
</tr>
<tr>
<td>Corsicana Airport</td>
<td>3</td>
</tr>
<tr>
<td>Dallas Executive Airport</td>
<td>4</td>
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<tr>
<td>Dallas Hinton St.</td>
<td>5</td>
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<tr>
<td>Dallas North No. 2</td>
<td>6</td>
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<tr>
<td>Denton Airport South</td>
<td>7</td>
</tr>
<tr>
<td>Eagle Mountain Lake</td>
<td>8</td>
</tr>
<tr>
<td>Frisco</td>
<td>9</td>
</tr>
<tr>
<td>Ft Worth Northwest</td>
<td>10</td>
</tr>
<tr>
<td>Granbury</td>
<td>11</td>
</tr>
<tr>
<td>Grapevine Fairway</td>
<td>12</td>
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<td>Greenville</td>
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</tr>
<tr>
<td>Italy</td>
<td>14</td>
</tr>
<tr>
<td>Kaufman</td>
<td>15</td>
</tr>
<tr>
<td>Keller</td>
<td>16</td>
</tr>
<tr>
<td>Midlothian CFW</td>
<td>17</td>
</tr>
<tr>
<td>Parker County</td>
<td>18</td>
</tr>
<tr>
<td>Pilot Point</td>
<td>19</td>
</tr>
<tr>
<td>Rockwall Heath</td>
<td>20</td>
</tr>
</tbody>
</table>

## Map

![Map of DFW Ozone Non-Attainment Areas](image)

Legend:
- Metropolitan Planning Area
- Counties Designated Nonattainment Under 2008 8-Hour Ozone NAAQS
- Counties Designated Nonattainment Under 2015 8-Hour Ozone NAAQS
- Ozone Monitoring Sites

October 2018
8-Hour Ozone Historical Trends
DFW Nonattainment Area

As of October 22, 2018

1997 Standard < 85 ppb (Revoked)

2008 Standard ≤ 75 ppb (Moderate by 2017)

2015 Standard ≤ 70 ppb¹ (Marginal by 2020)

¹Attainment Goal - According to the US EPA National Ambient Air Quality Standards, attainment is reached when, at each monitor, the Design Value (three-year average of the annual fourth-highest daily maximum eight-hour average ozone concentration) is equal to or less than 70 parts per billion (ppb).
How is Ozone Formed?

Emission Source Categories

Point Sources

Area Sources

Oil and Gas

Biogenic Sources

Non-Road Engines

On-Road Vehicles

Off-Road Engines

Volatile Organic Compounds (VOC)

Oxides of Nitrogen (NOx)

= Ozone

Optimum conditions for the formation of ozone include high temperatures and low winds. Sections are not to scale and are for illustrative purposes only.
Nitrogen Oxides (NO$_x$) Emission Sources

Total NO$_x$ = 296.77 tons per day (tpd)

On-Road Mobile: 130.77 tpd

- Light-Duty Vehicles (Passenger Cars and Trucks): 50.8 tpd
- Medium-Duty Trucks: 14.86 tpd
- Heavy-Duty Trucks: 65.11 tpd

Source: TCEQ, 2017 Dallas-Fort Worth 8-hour Ozone Attainment Demonstration State Implementation Plan
# Air Quality Emphasis Areas

<table>
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<tr>
<th>High-Emitting Vehicles/Equipment</th>
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<td>Idling</td>
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<td>Hard Accelerations</td>
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<td>Low Speeds</td>
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<td>Cold Starts</td>
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<td>Vehicle Miles of Travel</td>
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<tr>
<td>Energy and Fuel Use</td>
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</tbody>
</table>
Idling Ambulances & Air Quality
Why do Ambulances Idle?

Must always be prepared for emergency calls

Medications require a controlled-temperature cabin environment

Medical and other onboard equipment require a certain charge level

HVAC provides a comfortable experience for patients and staff

A vehicle battery’s charge level must be maintained to ensure reliable starting
Public Health & Environmental Costs

Idling ambulances is a common daily scenario

For every hour of idling, an ambulance emits 33 pounds of CO₂*

Increased exposure to toxic vehicle emissions for staff and sensitive populations.

Emissions can enter hospital facilities via air vents and open doors

Idling engines create noise pollution

*Source: https://nextcity.org/daily/entry/nyc-smart-pedastals-fight-pollution-power-fire-trucks
Costs of Idling Ambulances

Higher vehicle maintenance/operations costs
Burns 1.5 gallons of fuel/idling hour*
Accelerates the expiration of warranty coverage due to excessive engine hours (warranty expires typically after 6 months)**
Contributes to more frequent oil/diesel filter changes—costly**

Example
1. Fuel/idling hour = 1.5 gallons*
2. AVG diesel price = $3.04***

Idling Fuel Cost/hr: 1.5 x 3.04 = $4.56

**Source: http://americancityandcounty.com/fleets-content/power-pack-aims-reduce-engine-idling-related-video
***Data source: https://www.eia.gov/dnav/pet/pet_pri_gnd_dcus_r30_m.htm (Gulf Coast area, September 2018)
Technology Solutions: Idle Reduction

a) Auxiliary Power Units (APUs): battery units that store power when engine is running, and supply electrical power when engine is off

b) Electrified Parking Space: stationary systems that enable ambulances to plug in for power

c) Solar Panels: can be installed on vehicle roof to provide extra power
Case Study: Austin-Travis County, TX (EMS)

First operational model was tested in 2012. As of October 2017, 40 EMS vehicles are equipped with APUs. EMS has a contract with Stealth Power for 41 EMS vehicles. The system uses a daily average of 13.5 hours of electrical distribution.* Saves approximately 18.9 gallons of gasoline per vehicle (daily)* Eliminates approximately 4,400 pounds of CO₂ per vehicle (monthly)*

*Data and Image Source: https://www.idlereduction.com/performance/
Case Study: Euless, TX (Fire Department)*

Two electrified poles installed in 2008 and 2010

Project Cost: $9,812.75

Utilization: AVG 15-18 hours/week

The department achieved 29,963 hours of idle reduction over a 7 year span

Features
- Automatic cord release if vehicle drives off
- Any vehicle can use it as long as it installs a connection port
- Powers multiple vehicles simultaneously

*Data and Image Source: http://www.conservenorthtexas.org/case-studies/euless-texas-fire-department-idle-reduction-project
Case Study: New Orleans, LA (EMS)*

Six ambulances have been equipped with ZeroRPM idle mitigation systems, including roof-mounted solar panels (as of August 2018)

10 more ambulances are pending installation

Preliminary data (over 46 day period) on four vehicles show improvement:

- **280.6 gallons** of fuel saved (resulting in $841.61 savings)
- **3.09 tons** of CO₂ emissions reduction

*Data Source: [https://www.nola.gov/nola/media/Mayor-s-Office/Quarterly%20Check-In/First/LC-RevSummer18-EMS.pdf](https://www.nola.gov/nola/media/Mayor-s-Office/Quarterly%20Check-In/First/LC-RevSummer18-EMS.pdf)
Other Projects Getting Started

Cedar Hill EMS partnered with ZeroRPM to build an ambulance equipped with solar-panels and a special cooling system (for temp. control)

Broken Arrow, OK installed a Stealth Power system on 1 ambulance
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