

# Emergency, Peak-Shaving, and Demand-Response Generators

ACPAC

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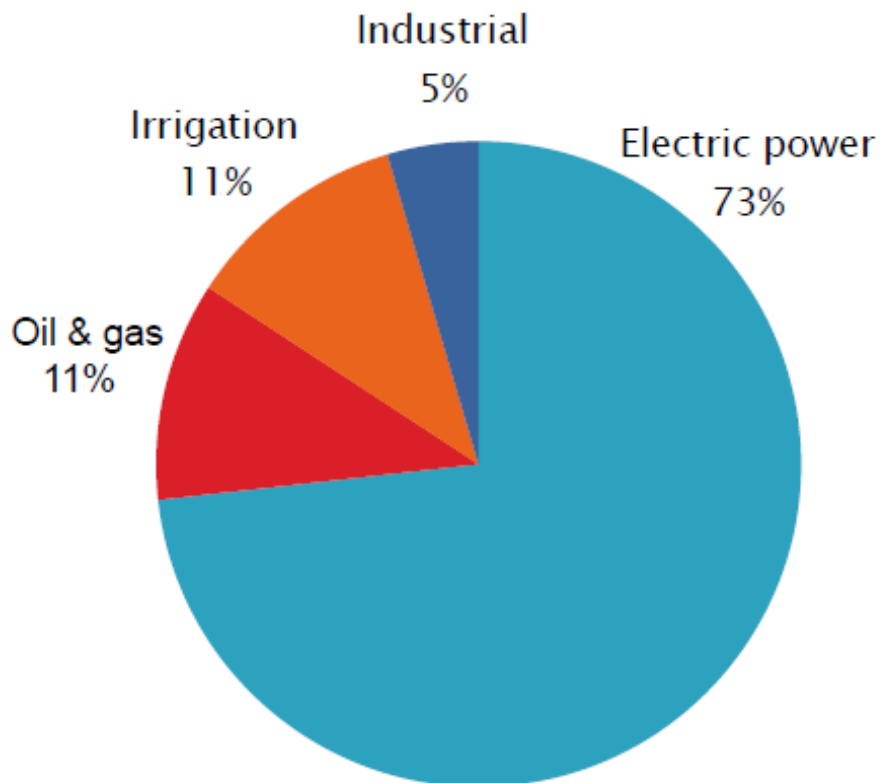
# Typical Emergency Engine

## Caterpillar 3512C Genset



# Stationary engine overview

## Applications



- 1.5 million stationary engines in U.S.
  - 78% CI; 22% SI
  - 900,000 used for emergency power
  - Located at "Area Source" or "Major Source"
- Main criteria pollutants emitted: NO<sub>x</sub>, CO, VOC, PM

# Generator Categories

## 1. Non-Emergency Generators

- Can participate in peak shaving or demand response program.
  - Ex. PJM Demand Response program thro' Curtailment Service Provider (CSP)

## 2. Emergency Generators

- Residential, commercial, institutional back-up
- Limited participation in grid 'emergency' demand response
  - Ex. Emergency Load Response Program (ELRP)

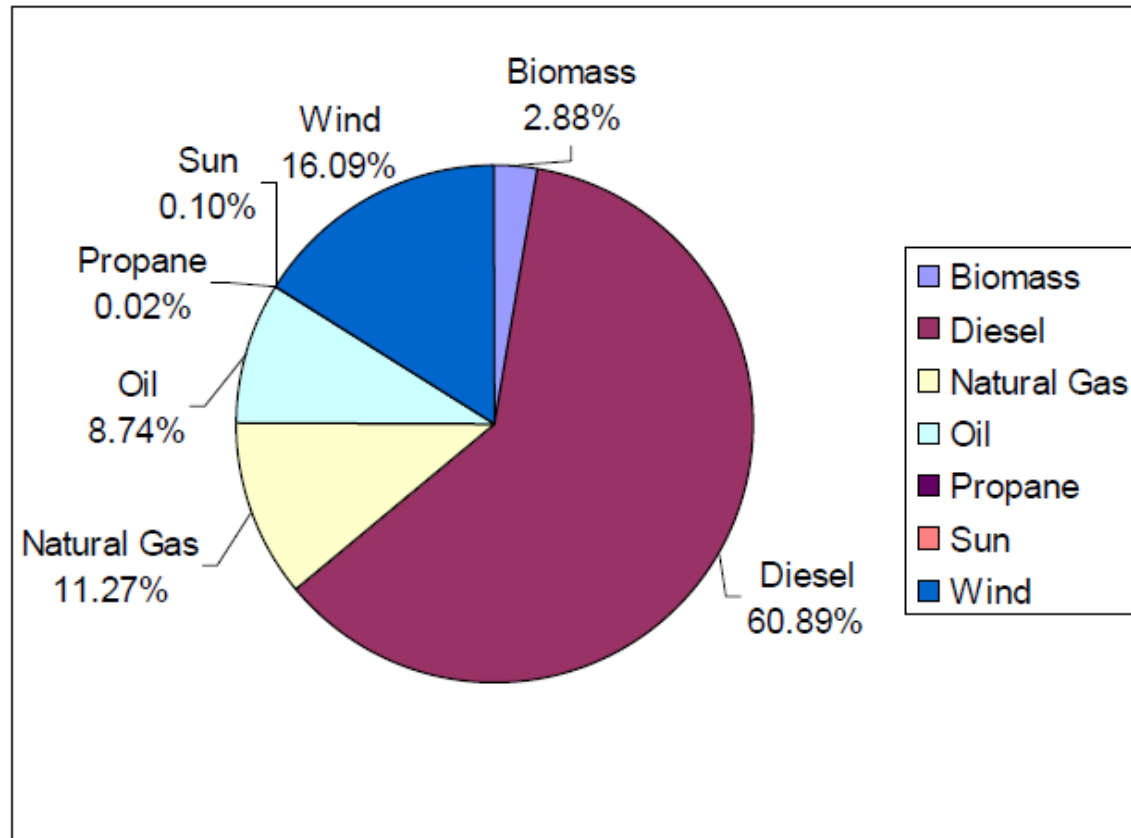
# Fuels Used

- Non-Emergency Generators
  - Majority diesel, some natural gas
- Emergency Generators
  - Permanent — diesel or natural gas
  - Portable — gasoline or propane



# Example - Maryland DGs

## Percentage Capacity by Fuel Type



Source: Distributed Generation Facilities Certified in Maryland, 2009. PowerPoint presentation. Peng Wu. Johns Hopkins University. Integrated Resource Planning Division, Maryland Public Service Commission.

# Questions

- Are generators permitted and are emissions tracked and reported?
- Is generator use increasing?
- Do emergency and demand-response generators contribute significantly to poor air quality on hot 'high electricity demand days' in summer?
- What are the results and recommendations of OTC/MARAMA/NESCAUM/VDEQ investigations?
- What are current state regulations?



# State Inventory Status--Incomplete

State	Emergency Units	Non-Emergency DG Units	Year
DC	327 permits	1	2012
MD	Unknown	549	2009
VA	Unknown	318	2007

## Emissions from Distributed Generators:

- Northern Virginia: 396.1 tons annual NO<sub>x</sub> emissions for 2007
- DC: Not available
- Suburban MD: Not available

- DC: Source--DDOE staff. Note--DC has only approved one DG unit. Number reflects emergency unit permit applications as of 2012.
- MD: Source—Peng Wu, MDPSC. Note--10 units are renewable energy.
- VA: Source—VDEQ. Includes all DG units and any others producing over 10 tons/yr. in Criteria Pollutants



# Ozone Implications

- Emissions from generators is significant.
  - > 9 tons of NO<sub>x</sub> can be emitted in one event/day in Maryland.
- Generators often operate on hot summer days; hot days tend to coincide with high ozone and fine particle days. Operating generators on hot days makes already bad air quality even worse.
- Demand Response (DR) programs provide financial incentives for the use of uncontrolled backup generators (mostly diesel powered) on the hottest summer days, which produce more NO<sub>x</sub> per unit of power compared to the generation of electricity from well-controlled power plants.

# State Regulation Comparison

	Non-Emergency Engines		Emergency Engines		
	Permit Threshold	Limits	Permit Threshold	Limits/ Requirements	Demand Response
<b>DC</b>	Very few permitted	Discretionary	500 hrs/yr. (inc. 100 hrs for maintenance)	<ul style="list-style-type: none"> <li>Emissions estimates</li> <li>maintenance</li> <li>report fuel usage</li> </ul>	Not allowed, but a proposal being considered
<b>Maryland</b>	Permit for >500 HP  Add all load-shaving engines ≥ 100 hp	<ul style="list-style-type: none"> <li>Existing Load Shaving Unit (before 2009) – NOx emission std of 1.4 g/bhp-hr; Limited to 10 hours (May-Sep)</li> <li>Report hours &amp; generation</li> </ul>	Varies by county (Ex. Montgomery-Permanent residential)	Varies by county (Ex. Montgomery-decibel limit; Site plan)	Grid Emergency Only
<b>Virginia</b>	Permit for all DG engines	Tier 4 Emiss. Std; Annual emissions limits	Varies by county	<ul style="list-style-type: none"> <li>500 hrs/yr.</li> <li>Ann. emiss. limits</li> <li>Records</li> <li>Varies by county (Ex. Arlington-decibel limit)</li> </ul>	Grid Emergency Only

# Additional State Information

## DC

- Many back-up generators that need permits have not applied
- Recently proposed legislation to allow emergency engines 15 hours for peak shaving

## MD

- Participation in Demand Response (DR) is expected to double from 2012 to 2015 (DR includes demand reduction)

## VA

- Number of generators has been increasing; utilities actively recruiting

# Is Generator Use Increasing?

- Anecdotally, many state and local staff think it is
- Generator installers estimate a doubling in business in the last 5 years
- Residential generator use (and some commercial) reportedly increasing after blackouts caused by recent storms, heat waves, lack of grid reliability

# Recent Investigations

## NESCAUM 2003 Report recommendations

- Update emissions standards & air permitting requirements
- Regulate diesel generators in DR programs
- Improve regional coordination; data collection

## OTC Modeling Committee HEDD Workgroup

- 2009: Draft paper discussed need for comprehensive DG inventory; episodic vs. seasonal modeling

# Recent Investigations, cont'd

## VDEQ

- 2010: Developed comprehensive 2007 DG emissions inventory and seasonal emission profiles for OTC model

## MARAMA

- 2012: Memo analyzing impact of RICE rule changes on criteria pollutants
- “Engine emissions contribute only a small amount to annual emissions, but a disproportionate amount during the time of the worst air quality.”

## Northeast State Senators

- 11/2012: Letter to EPA advising against raising emergency engine hours without additional controls

# Conclusions

- Generator impact on air quality is a concern
  - EPA Rule change may adversely affect air quality
- Need data for stationary area source generators
  - Number of generators by horsepower category
  - Hours of operation
  - Emissions by horsepower category
- Explore potential regulations to address generator emissions