

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

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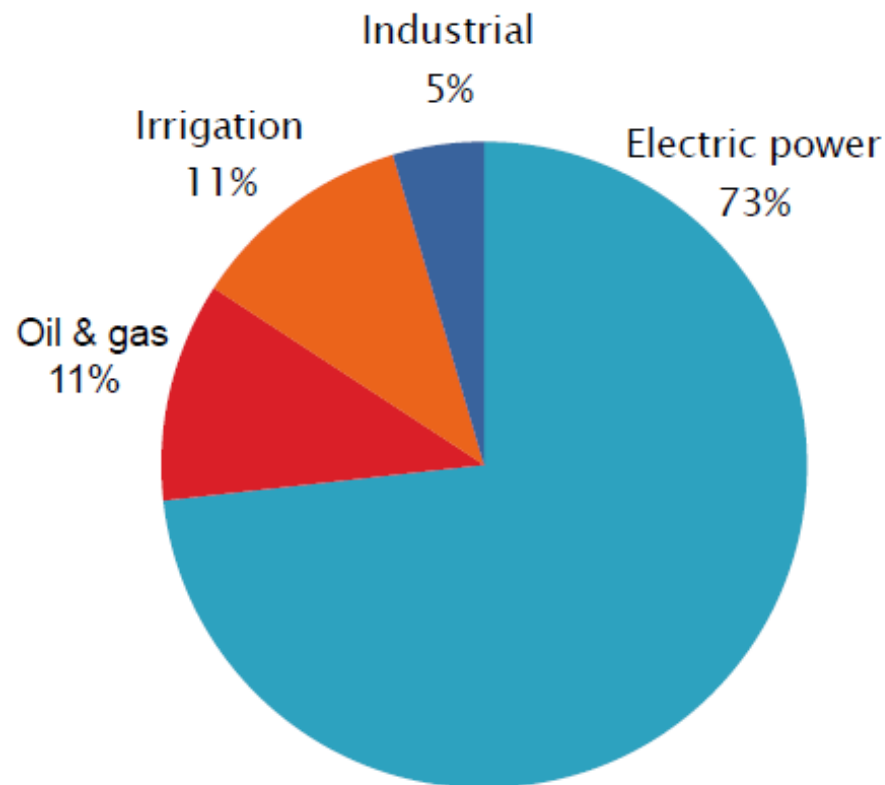
# Typical Emergency Engine

## 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. Curtailment Service Provider (CSP) –PJM Demand Response program

## 2. Emergency Generators

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

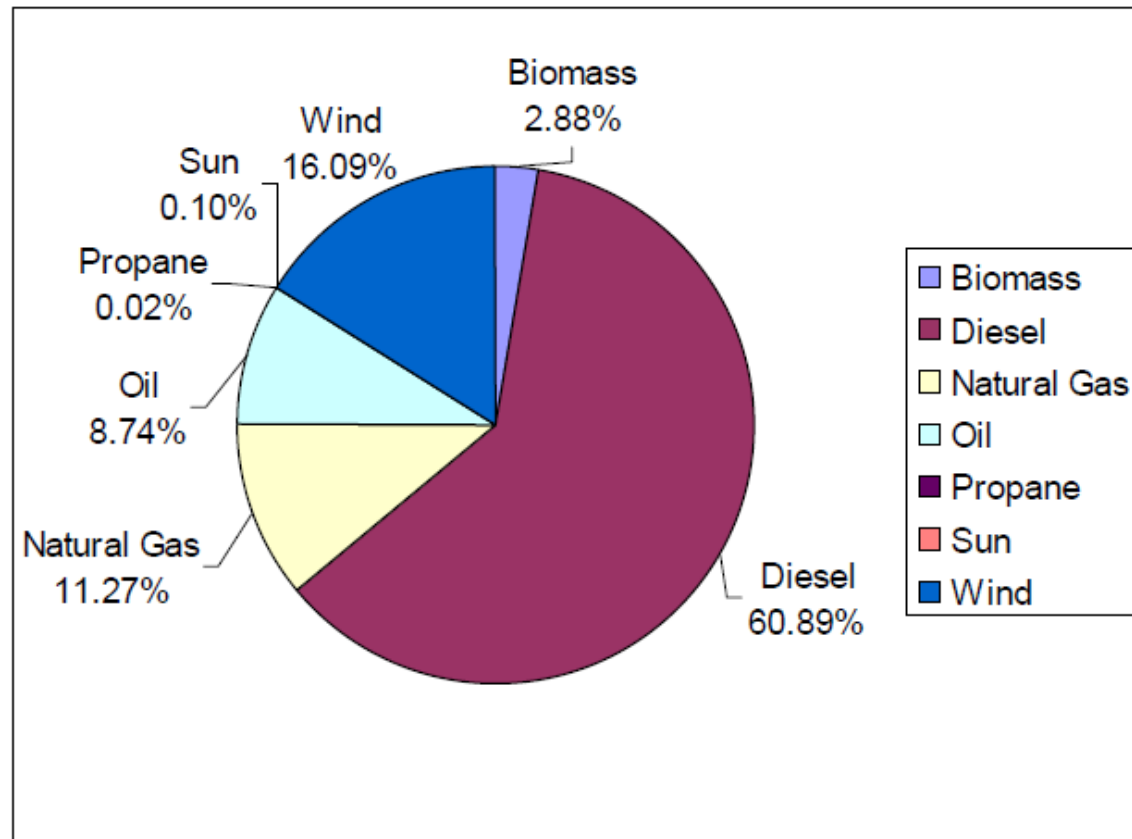
# Fuels Used

- 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?
- How might the proposed changes in the EPA RICE Rule impact air quality?

# 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
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- 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
- Generators often operated 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

# State Regulation Comparison

	Non-Emergency Engines		Emergency Engines		
	Permit Threshold	Limits	Permit Threshold	Limits/ Requirements	Demand Response
<b>DC</b>	Very few permitted	Discretionary	<1500kW, Nonroad & portable exempt	<ul style="list-style-type: none"> <li>•Emissions estimates</li> <li>•maintenance</li> <li>•report fuel usage</li> </ul>	Not allowed
<b>Maryland</b>	Permit for >500 HP	<ul style="list-style-type: none"> <li>•NOx for &lt;1,000 HP</li> <li>•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

# EPA RICE Rules (Area Sources)

**Area Sources: <10 tons/year of a single air toxic, or <25 tons/year of a combination of air toxics**

## **Existing Area Source Engines**

- <300 HP CI & <500 HP SI:
  - Maintain logbook for hours of operation
  - Regular maintenance
  
- >300 HP CI & >500 HP SI:
  - Ultra low sulfur diesel
  - Crankcase emission control requirements

## **New Area Source Engines**

- <30 liters/cylinder:
  - EPA Nonroad and Marine engine standards
  - Ultra low sulfur diesel
  
- >30 liters/cylinder:
  - EPA Large Marine engine standards

\* RICE = Reciprocating Internal Combustion Engines

# Proposed Amendments to RICE for Emergency Engines

Use	Current Regulations	Proposed Amendments
Emergencies	No limit	No Limit
Maintenance/ Readiness Testing & Emergency Demand Response (EDR)	100 hours, of which 15 can be used for EDR in emergency situations	100 hours, of which 100 can be used for EDR in emergency situations
Non-Emergencies	50 hours  Counts as part of the 100 hr/yr maintenance/EDR limit  No peak shaving or operation through financial arrangement	50 hours  Counts as part of the 100 hr/yr maintenance/EDR limit  Peak shaving allowed for existing RICE at area sources through April 16, 2017



# Impact of Proposed Changes

Change in rules are expected to

1. Increase emissions
2. Reduce costs

Increases in emissions will often occur on hot days, adversely impacting air quality

# 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