

EPA NONROAD MODEL

Geographic Allocation and Growth Methodologies

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Geographic Allocation Basic Approach

- Technical report available at:
<http://www.epa.gov/oms/nonrdmdl.htm>
- Geographic allocation of engine populations accounts for how many and what types of equipment are being used in a certain location
 - » Default data allocates to the county level
 - » NONROAD can allocate equipment populations to the subcounty level, but user must provide fractions to allocate from the county to subcounty level

Geographic Allocation Basic Approach

- National engine/equipment populations from Power Systems Research (PSR)
 - » PSR has state and county level numbers but methodology used to derive them is proprietary
 - » Publicly available data used as much as possible to allocate populations, including population, business activity, and geographic data
- PSR national populations allocated outside NONROAD to county level using county-specific surrogate indicators
- County populations are then aggregated to produce default state population input files

Geographic Allocation Basic Approach

- NONROAD allocates state level default population input data down to the county level for each equipment type using the county-specific surrogate indicators
 - » $\text{Equip. Pop}_{\text{county}} = \text{Equip. Pop}_{\text{state}} \times \frac{\text{Surrogate}_{\text{county}}}{\text{Surrogate}_{\text{state}}}$
- Allocating equipment populations is surrogate for allocating activity
 - » NONROAD only has one activity level (hours/year) for each equipment type for all of U.S.
- Option for user to specify own state/county surrogate indicators, populations, or activity
 - » Equipment category or by individual equipment types

Geographic Allocation Application-Specific Surrogate Indicators

- Residential Lawn and Garden (except snowblowers) : 1 & 2 unit single family homes from 1990 Census (draft model)
 - » Final version adjusted by 1997 human population estimates
- Commercial Lawn and Garden (except snowblowers): number of employees in landscape and horticultural services (SIC 78)
 - » U.S. Census County Business Patterns 1995 (CBP)

Geographic Allocation Application-Specific Surrogate Indicators

- Snowblowers
 - » Same as above, but plan to adjust by annual average snowfall data from NOAA for final version
 - » Set to zero for counties and states in draft version
- Construction: F.W. Dodge database of total construction dollar value by county
 - » Census Bureau tracks value but only at MSA level
 - » CBP number employees does not address inter-county movement of equipment
- Agricultural: acreage of harvested cropland
 - » Source: Census Bureau: USA Counties Database 1996

Geographic Allocation Application-Specific Surrogate Indicators

- Light Commercial Equipment
 - » Census CBP, number of wholesale establishments (SIC 50)
- Industrial
 - » Census CBP, number of employees in manufacturing (SIC 20)
- Oil Field Equipment
 - » Census CBP, number of employees in oil and gas extraction (SIC 1300)

Geographic Allocation Application-Specific Surrogate Indicators

- Logging
 - » Draft version: number of employees in logging (SIC 2410) plus number of employees in saw and planing mills (SIC 2420)
 - number of employees in saw and planing mills allocates to urban areas in some cases
 - » Final version will only use number of employees in logging

Geographic Allocation Application-Specific Surrogate Indicators

- Recreational Marine
 - » Boats not necessarily used in county where purchased, registered, or stored
 - » Draft version uses water surface area
 - Doesn't account for navigational limitations or max. number of boats that can fit on waterbodies
 - » Effort will be made to refine water surface area method or find a better method
 - » EPA open to ideas & suggestions for default surrogate allocation indicators
 - » Local data is probably best alternative

Geographic Allocation Application-Specific Surrogate Indicators

- Recreational Equipment (except snowmobiles and golf carts)
 - » Problem similar to recreational marine
 - » Have not been able to find ideal surrogate indicator at county level
 - » Draft using number of RV park/camp establishments (SIC 7030) from Census CBP
 - Only placeholder because these data appear to be incomplete
 - » EPA open to ideas and suggestions for defaults
 - » Local data is probably best alternative

Geographic Allocation Application-Specific Surrogate Indicators

- Snowmobiles
 - » Allocation method not complete in draft version
 - » Draft version reports national population and emissions, but zeroes out state and county level information
 - » Final version contains state population data limited to states with snow, based on registration data from International Snowmobile Manufacturers Association
 - » Allocated to counties using same indicator as other recreational equipment
 - » Local data may be best alternative

Geographic Allocation Application-Specific Surrogate Indicators

- Golf carts
 - » Draft version uses number of employees at public golf courses (SIC 7992) from Census CBP
 - » These data have significant gaps
 - No data available for many states
 - » Final version will use number of public golf courses.

Geographic Allocation Application-Specific Surrogate Indicators

- Aircraft Ground Support Equipment
 - » Draft version uses number of employees in air transportation (SIC 4500) from Census CBP
 - » For final version, investigating the use of DOT landing/takeoff data at airports with commercial operations
- Railroad Maintenance Equipment
 - » Draft version uses 1990 human population
 - » Investigating better alternatives

Geographic Allocation Application-Specific Surrogate Indicators

- Underground mining equipment
 - » Draft version uses number of employees in metal mining (SIC 1000) from Census CBP
 - » Final version will use indicator more appropriate to underground mining
 - number of employees in coal mining (CBP 1200)
- AC/refrigeration equipment
 - » Used on Truck Trailers
 - » Draft version uses 1990 human population
 - Human population consistent with where this equipment operates

Proposal for Activity Guidance

- Effort proposed for FY99 to develop guidance on how to collect local activity data
 - » Focus first on recreational equipment and marine pleasure craft
 - » Effort includes QA of guidance by using it to collect local activity data in a couple of counties

Growth Factors

- Technical Report available on EPA Web Page (NR-008)
- We recently revised the method as a result of comments on the original Tech. Report
 - » Will post a revised Tech. Report soon
 - » Revisions are also described in the paper submitted for this meeting

Growth Factors Two Possible Approaches

- Economic Indicators
 - » Bureau of Economic Analysis growth forecasts
- Historical Population Growth
 - » Extrapolate based on historical growth in nonroad equipment populations

Growth Factors

Option 1: Economic Indicators

- Use Bureau of Economic Analysis growth forecasts for major sectors of the economy
- Match those sectors to the nonroad equipment that would be used in each sector

Growth Factors

Option 2: Historical Population Growth

- Project future growth by extrapolating from historical growth in nonroad equipment populations
- Population growth estimated from Power Systems Research (PSR) PartsLink database
 - » Includes historical engine population estimates for 1989-1996
 - » Allows for segregation by market sector, application type, fuel type, and horsepower

Growth Factors

Reasons for Choosing Historical Approach

- Provides a more direct measure of change than economic forecasts
 - » BEA can't be used to project market shifts
 - Shift from gasoline to diesel engines
 - Shift from lower to higher hp
 - Increased mechanization
 - » BEA may tend to under-predict growth

Growth Factors

Historical Population Growth - Limitations

- PSR database may contain errors
 - » Errors have bigger impact as one goes to finer grained breakdown of population
 - » Can limit impact by not going to extremely fine detail
- 1989-1996 may not be representative
 - » Includes periods of low and high economic growth

Growth Factors Comments and Changes

- We received two sets of written comments on the Tech. Report
 - » Still under review

- Major change
 - » Draft model used an exponential growth function; proposed final model will use a linear function
 - » Results in substantial decrease in long-term (2020-2030) projected populations

Growth Factors Projected Annual Growth Rate Comparison (1996-2010)

Market Segment	BEA	PSR				
		Total	Diesel	Gasoline	LPG	CNG
Construction	1.2%	2.3%	3.2%	0.2%		
Farm	2.0%	2.6%	3.0%	1.8%		-10.2%
Industrial	1.8%	2.7%	3.7%	-4.0%	3.8%	
Lawn & Garden	0.9%	2.4%	6.8%	2.4%		
Light Commercial	1.8%	4.0%	4.5%	3.8%	8.7%	4.2%
Logging	0.6%	4.5%	-1.0%	5.0%		
Railway	3.4%	2.6%	4.4%	1.4%		
Recreational	0.9%	0.7%	3.3%	0.6%		

Growth Factors Exceptions

- Aircraft ground support equipment
 - » Investigating using FAA landing/takeoff data to develop growth projections
- Oil field equipment
 - » PSR data indicated such a steep decline that oil field equipment would disappear by 2006
 - » Without other evidence that this will happen, we are using the BEA projections of GSP from domestic oil production

Growth Factors State and Local Factors

- Draft NONROAD only contains national growth factors
- We plan to include the state growth factors in the final NONROAD
 - » Proposed method - use ratios of projected BEA state or regional growth rates to BEA national growth rates to adjust NONROAD national growth rates
- States that have their own estimates of state or local growth could substitute them subject to EPA SIP Guidance