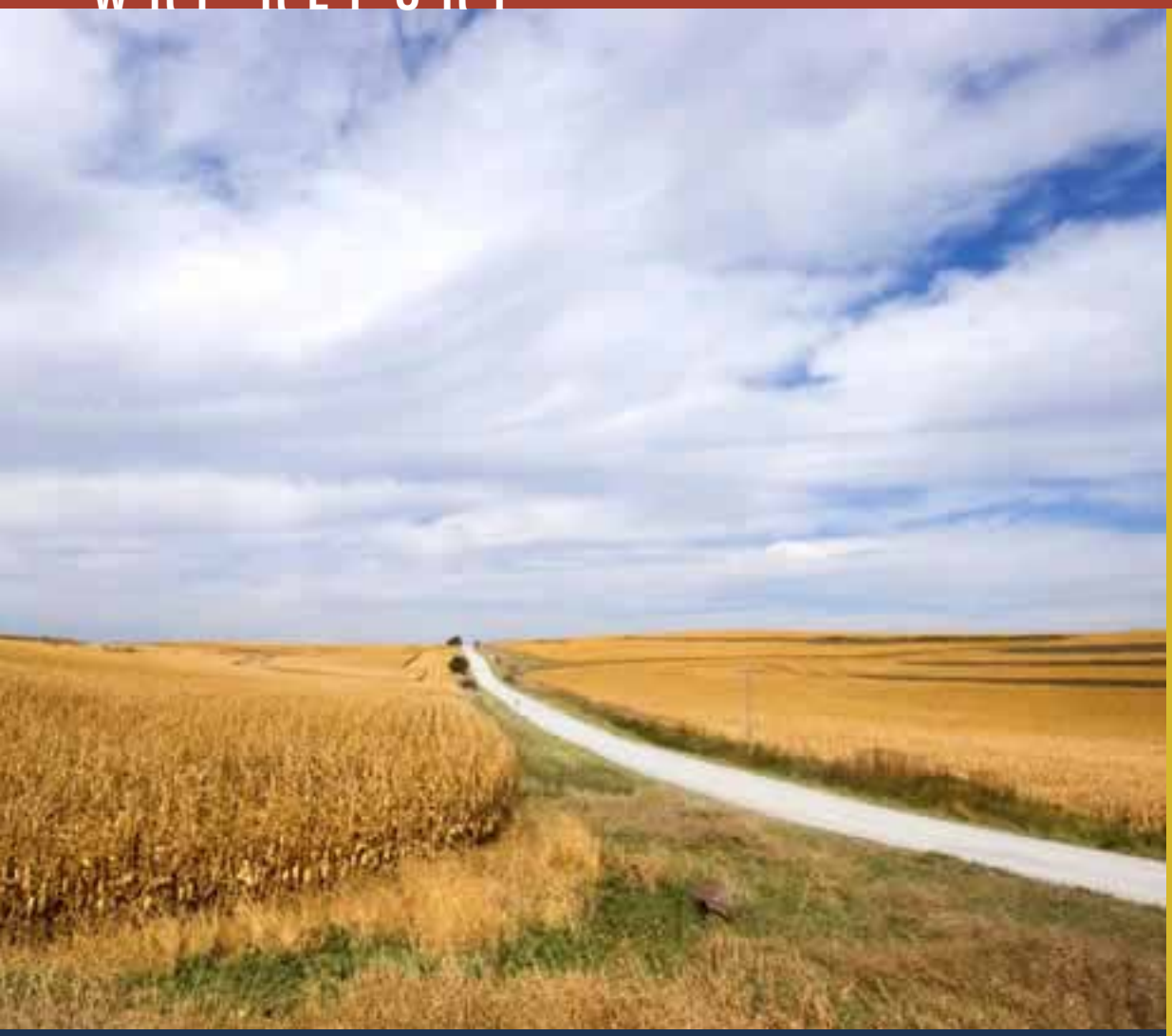
WORLD RESOURCES INSTITUTE

WRI REPORT



ILLINOIS

INDIANA

IOWA

MICHIGAN

MINNESOTA

MISSOURI

OHIO

WISCONSIN

CHARTING THE MIDWEST

An Inventory and Analysis of Greenhouse Gas Emissions in America's Heartland

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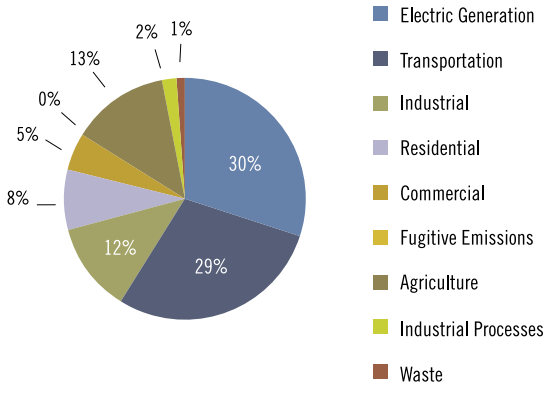
Note

WRI data utilized in this report uniquely provide a common methodological framework for readily comparing GHG emissions across U.S. states. However, it is not the intent of this report to serve as a substitute for emission estimates that might be available from state or local agencies, where complementary or higher-resolution data sets could provide additional information. The data contained in this report may differ from those reported by individual states, but is generally comparable. Disparities in estimates of emissions between WRI and state inventories are likely a result of one or more of the following: data availability, methodologies, and data values, which could include the activity data or emission factors used to calculate GHG emissions in a particular sector.

MINNESOTA

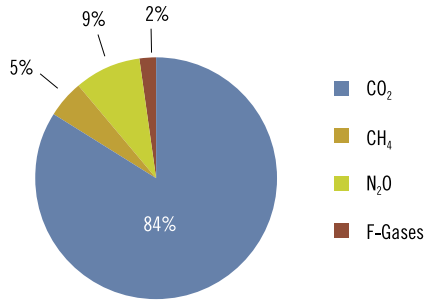
- **In 2003, Minnesota GHG emissions totaled 120 $MtCO_2e$, representing 8 percent of Midwest emissions and 2 percent of U.S. emissions.**
- **Minnesota's top-emitting sectors include electric generation, transportation, agriculture, and industrial energy use.**
- **GHG emissions from transportation increased by 43 percent between 1990 and 2003, the largest percentage increase in this sector in the Midwest. Emissions from electricity generation increased by 22 percent (approximately 7 $MtCO_2e$) over the same time period.**
- **At 4 percent, Minnesota has a higher percentage of electricity generated from renewable sources than any other Midwest state.**

Figure 4.14 | **Minnesota GHG Emissions by Economic Sector: 2003**



Source: WRI, CAIT-US (2007).

Figure 4.15 | **Minnesota GHG Emissions by Gas: 2003**



Source: WRI, CAIT-US (2007).

Minnesota is the seventh largest GHG emitter in the Midwest, and the 22nd largest in the nation in terms of absolute emissions. The state's GHG emissions represent approximately 8 percent of the Midwest's emissions and 2 percent of U.S. emissions. Minnesota's per capita emissions are about 10 percent lower than the Midwest regional average, but are comparable to the national average.

Minnesota's relatively GHG-efficient emissions profile is at least partly due to its greater-than-average reliance on zero-direct GHG-emitting sources to produce its electricity. In Minnesota, 30 percent of electricity is produced from nuclear, hydro, and renewable sources, compared to 24 percent from these sources for the Midwest as a whole. At 4 percent, a higher percentage of its electricity is generated from renewable resources (principally wind power) than any other state in the Midwest.

Approximately 71 percent of Minnesota's GHG emissions are produced by the major energy sectors: electric generation (30 percent), transportation (29 percent), and industrial energy use (12 percent). Minnesota is the only Midwest state where the GHG

Table 4.6. | **Minnesota GHG Emissions and Trends by Economic Sector: 1990-2003**

SECTOR	1990 EMISSIONS ($MtCO_2e$)	2003 EMISSIONS ($MtCO_2e$)	1990-2003 EMISSION TRENDS		
			MINNESOTA % CHANGE	MIDWEST % CHANGE	U.S. % CHANGE
Energy Sectors	*81*	*102*	*26*	*14*	*14*
Electric Generation	30	36	22	25	24
Transportation	25	35	43	20	19
Industrial	13	14	12	-11	-3
Residential	8	10	21	8	12
Commercial	6	7	13	9	7
Fugitive Emissions	--	--	--	-40	-35
Agriculture	15	15	-2	-8	0
Industrial Processes*	1	3	33	-5	8
Waste	2	1	-69	-21	-9
Total*	***99***	***120***	***20***	***11***	***13***

Source: WRI, CAIT-US (2007).

Notes: Totals exclude emissions from international bunker fuels and land-use change and forestry.

*Due to inconsistencies in industrial processes emissions data prior to 1997, the 1990 emission value for this economic sector has been replaced with the 1997 estimate. Trend calculations for industrial processes reflect the time period 1997 to 2003.

**While the 1990 total emissions value presented here includes industrial processes emissions for 1997 as noted above, calculations of total state, regional, and national emission trends do not include any industrial processes data in order to maintain consistency between 1990 and 2003.

contributions from the electric generation and transportation sectors are nearly equal (Figure 4.14). Minnesota's agriculture sector is the third largest emitting sector in the state, contributing 13 percent of total emissions, which is relatively large in a regional context. Only Iowa has a higher total value and percentage of agriculture emissions. Consequently, CH_4 and N_2O emissions constitute 14 percent of state emissions (with N_2O comprising a greater percentage of total emissions than CH_4), while CO_2 accounts for 84 percent (Figure 4.15).

Between 1990 and 2003, Minnesota's GHG emissions grew by 20 percent, nearly double the average rate of growth for the region. This growth was due primarily to increases in emissions in the electric generation and transportation sectors (Table 4.6). Combined, these sectors accounted for an additional 17 $MtCO_2e$ in 2003, compared to 1990 totals. The 43 percent growth in the state's transportation emissions during this period exceeded that of all other Midwest states (see Minnesota State Spotlight).

Increases in these sectors most likely were partly driven by above-average growth in both population and economic output. Between 1997 and 2003, Minnesota's population grew by 6 percent, while its GDP grew by 21 percent. In both instances, calculated growth was nearly double that experienced by the Midwest region as a whole.

MINNESOTA STATE SPOTLIGHT: GROWTH IN TRANSPORTATION EMISSIONS

From 1990 to 2003, GHG emissions from Minnesota's transportation sector grew by approximately 11 $MtCO_2e$. This was the second highest growth in absolute emissions from the transportation sector among Midwest states and the largest percent increase—43 percent—in the region during this period.

Several factors can dictate trends in transportation emissions. For example, increases in population typically produce increases in the number of total annual vehicle miles traveled (VMT). If, however, VMT per capita also increases, it means individuals are also driving greater distances, which could be the result of driver habits or urban sprawl, which typically creates longer distances between residential and commercial centers. The relative numbers of different types of vehicles (e.g., cars or trucks), the characteristics of vehicles (e.g., fuel economy), and the types of vehicle fuels utilized in modes of transport (e.g., gasoline, ethanol) are also critical determinants of total GHG emissions. Emission trends in the transportation sector are likely to be affected by a combination of these variables.

Minnesota stands out in the Midwest with respect to both transportation emissions and trends in associated emission drivers (Table 4.7). Between 1990 and 2003, Minnesota's population, total VMT, and gasoline consumption experienced a larger percentage increase than any other Midwest state. Growth in emissions, not surprisingly, was also more than twice that of other Midwest states and the U.S. average. Interestingly, however, Minnesota's population did not increase as rapidly as the U.S. average, yet total percentage increases in VMT and VMT per capita were greater than those of the nation as a whole. These data, as well as additional sources (e.g., 1000 Friends of Minnesota, 2005) suggest urban sprawl may be an important driver of Minnesota's transportation emissions. Additionally, Minnesota experienced the highest growth in transportation emissions despite the fact that it had the second highest increase in ethanol consumption between 1990 and 2003, and currently has the highest percentage of ethanol in the Midwest as part of its total transportation fuel mix (see Table 3.5). Ethanol is fuel that is generally considered to be less carbon-intensive on a lifecycle basis than gasoline. (For a discussion of transportation sector emissions in the Midwest, see Chapter 3.)

Table 4.7. | Percentage Growth in Key Transportation Sector Indicators: 1990–2003

GEOGRAPHIC AREA	ENVIRONMENT		VEHICLE USE		FUEL	
	GHG EMISSIONS FROM TRANSPORT	POPULATION	VMT	VMT PER CAPITA	GASOLINE CONSUMPTION	ETHANOL CONSUMPTION
Minnesota	43%*	15%*	42%*	23%	35%*	1,068%
Rest of Midwest	18%	9%	28%	17%	18%	175%
Total United States	***19%***	***16%***	***35%***	***16%***	***23%***	***278%***

Sources: WRI, CAIT-US (2007); U.S .Census (2006); Bureau of Transportation Statistics (2007); EIA (2007).

Note: *Indicator growth in Minnesota is largest among Midwest states.