

The Environmental Impact of Telecommuting

Anika Sonig
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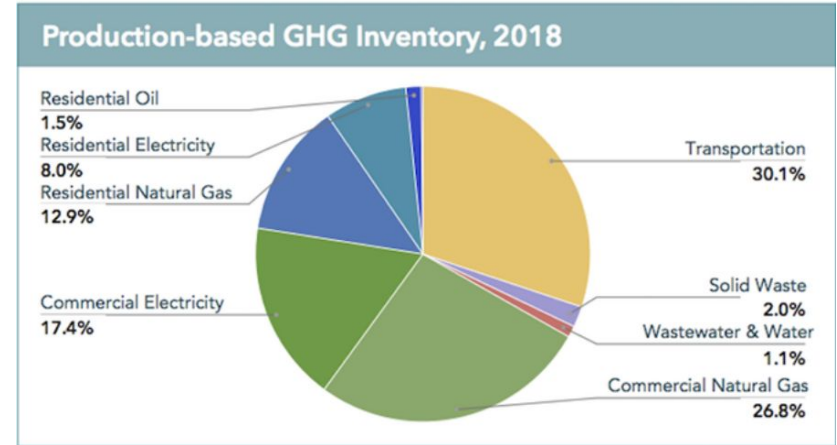
Motivation

- Flexible work schedules can reduce emissions and promote equity during COVID-19
 - Town government focus and town-wide scenario
- Action 9.8 in CAP
- Very relevant in terms of the pandemic and the future of various work environments



Background Context

- Transportation accounts for 30.1% of total GHG emissions in Princeton
- Lots of other town governments have explored telecommuting as a long-term commitment
- Ability to telework depends on multiple factors including sector, socioeconomic status, age, etc.



From the Executive Summary of the CAP, Sustainable Princeton

Methods

- Purpose: quantify emissions savings of flexible work at two levels
- Data used
 - Commuting data from town government
 - Projected fuel efficiency using ICLEI and CO2 per gallon EPA conversions
 - Census and Bureau of Labor Statistics
- Town government
 - Emissions for various scenarios based on how far employees live and number of days worked
- Town-wide
 - Baseline emissions and sector breakdown

Town Government:

$\Sigma(\# \text{ employees} * \text{annual miles per round trip per employee} * \text{miles from Princeton}) * \text{avg m. tons CO}_2/\text{mile}$

Town-wide Commuters:

$\text{number of commuters per year} * \frac{\text{annual miles travelled}}{\text{number of commuters}} * \frac{\text{mtCO}_2}{\text{miles}}$

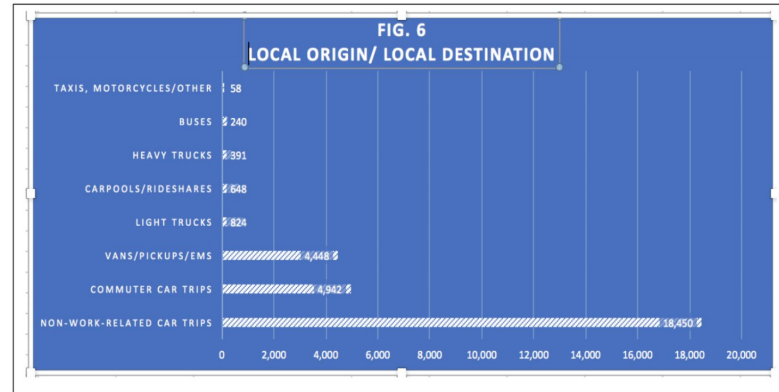
Key Results: Town Government

- Emissions **saved** based on various scenarios
- 100% of employees telecommuting 7 days/week is ideal, but may not be feasible in the long-term
- Around 0.62% of total transportation emissions

% of workers....	1 fewer day/week commuting	3 fewer days/week commuting	Working remotely (0 days commuting)
10% can change	17.40402004	52.21206012	246.530482
25% can change	43.5100501	130.5301503	463.637306
50% can change	87.0201002	261.0603006	684.41934
100% can change	174.0402004	522.1206012	870.201002

Key Results: Town-wide commuters

- 1050 mtCO₂/year are spent for resident workers who live and work in Princeton
 - Around 0.75% of total transportation emissions
- 2807 mtCO₂/year are spent for the daily workforce who drive alone (resident workers and in-commuters)
 - Around 2% of total transportation emissions



Source: Princeton Area Databank. Extrapolated from NJDOT vehicle classification counts and DVRPC traffic counts, 2011-2017.

Key Results: Sector Statistics

- Calculated the proportion and population of individuals in Princeton that would be part of each sector
- Compared to ability to telework rate published by Bureau of Labor Statistics

Category	ATUS			NLSY79		
	Ability-to-telework rate	Classification error rate	Takeup rate	Ability-to-telework rate	Classification error rate	Takeup rate
Industries						
Agriculture, forestry, fishing, and hunting	8.3	3.0	20.4	16.0	29.7	25.3
Mining, quarrying, and oil and gas extraction	55.9	28.0	26.3	15.0	0.0	52.6
Construction	17.3	2.6	13.0	21.8	6.3	10.5
Manufacturing	36.4	4.6	31.6	36.6	2.7	16.5
Wholesale and retail trade	26.9	2.1	19.3	29.3	2.4	22.8
Transportation and utilities	25.4	1.8	22.2	26.4	2.3	13.8
Information	71.2	4.2	36.9	77.3	16.8	37.3
Financial activities	77.9	17.2	29.6	75.3	11.2	27.3
Professional and business services	69.9	9.0	40.8	68.5	10.1	30.1
Education and health services	48.9	3.7	15.8	49.7	6.1	19.2
Leisure and hospitality	13.0	0.9	12.7	20.5	5.3	19.9
Other services	31.0	7.1	14.0	55.5	13.7	19.0
Public administration	65.2	7.3	16.5	54.9	3.5	13.7

Nonfarm Wage and Salary Employment	June 2020 data	
Total Nonfarm(3)	3,630,400	
proportion!!!	0.8021210782	15459.73354
Mining and Logging(3)	1500	
	0.0003314184711	6.387615776
Construction(3)	144000	
	0.03181617322	613.2111144
Manufacturing(3)	239000	
	0.05280600972	1017.760114
Trade, Transportation, and Utilities(3)	795700	
	0.1758064516	3388.417248
Information(3)	61600	
	0.01361025188	262.3180878
Financial Activities(3)	237700	
	0.05251878038	1012.22418
Professional & Business Services(3)	605700	
	0.1338267786	2579.31925
Education & Health Services(3)	636200	
	0.1405656209	2709.200771
Leisure & Hospitality(3)	210600	
	0.04653115334	896.8212549
Other Services(3)	125600	
	0.02775077331	534.8563609
Government(3)	572800	
	0.1265576668	2439.217544
		15459.73354
	farming	3813.832459

Conclusions

- Incorporating a flexible work schedule reduces emissions
- Many factors have to be considered while looking at ability to telework
- Possibilities for future work:
 - Look into where Princeton residents work and where in-commuters are from
 - Account for individuals who commute with public transport
 - Calculate town-wide emissions (based on sectors)
 - Work with local organizations to discuss ways to promote equity in various sectors

Thank You!

- Data: Town Government, Will Atkinson
- Checkers: Richard Huang, Nicolas Choquette-Levy
- Support and feedback: CAPERS team

Contact Information:

Anika Sonig

as215@rice.edu

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