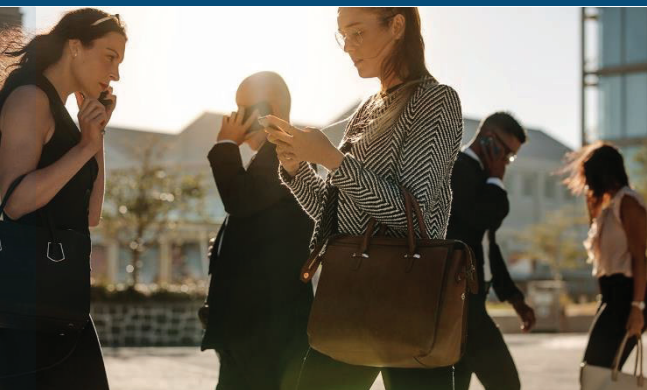# T-2. Increase Job Density

## GHG Mitigation Potential

**30%** — Up to 30.0% of GHG emissions from project VMT in the study area

## Co-Benefits (icon key on pg. 34)

## Climate Resilience

Increased density can put people closer to resources they may need to access during an extreme weather event. Increased density can also shorten commutes, decreasing the amount of time people are on the road and exposed to hazards such as extreme heat or flooding.

## Health and Equity Considerations

Increased job density may increase nearby housing prices. Jurisdictions should consider the jobs-housing balance and consider measures to reduce displacement and increase affordable housing.

## Measure Description

This measure accounts for the VMT reduction achieved by a project that is designed with a higher density of jobs compared to the average job density in the U.S. Increased densities affect the distance people travel and provide greater options for the mode of travel they choose. Increasing job density results in shorter and fewer trips by single-occupancy vehicles and thus a reduction in GHG emissions.

## Subsector

Land Use

## Locational Context

Urban, suburban

## Scale of Application

Project/Site

## Implementation Requirements

This measure is most accurately quantified when applied to larger developments and/or developments where the density is somewhat similar to the surrounding neighborhood.

## Cost Considerations

Areas with increased job density generally have higher economic gross metropolitan product (GMP) and job growth. Prosperity, measured as GMP per job, also grows faster in areas with increased job density. Decreased commute times and car use may also generate funds for public transit and reduce the need for infrastructure spending on road maintenance.

## Expanded Mitigation Options

When paired with Measure T-1, *Increase Residential Density*, the cumulative densification from these measures can result in a highly walkable and bikeable area, yielding increased co-benefits in VMT reductions, improved public health, and social equity.

## GHG Reduction Formula

$$A = \frac{B - C}{C} \times D$$

## GHG Calculation Variables

| ID | Variable | Value | Unit | Source |
|----|----------|-------|------|--------|
| **Output** | | | | |
| A | Percent reduction in GHG emissions from project VMT in study area | 0–30.0 | % | calculated |
| **User Inputs** | | | | |
| B | Job density of project development | [ ] | jobs per acre | user input |
| **Constants, Assumptions, and Available Defaults** | | | | |
| C | Job density of typical development | 145 | jobs per acre | ITE 2020 |
| D | Elasticity of VMT with respect to job density | -0.07 | unitless | Stevens 2016 |

Further explanation of key variables:

- (C) – The jobs density is based on the calculated density of a development with a floor-area ratio of 1.0 and 300 square feet (sf) of building space per employee:

$$\frac{43,560 \ \frac{sf}{acre}}{300 \ \frac{sf}{employee}} \times 1.0 \frac{sf}{acre} = 145 \frac{employees}{acre}$$

  If reductions are being calculated from a specific baseline derived from a travel demand forecasting model, the job density of the relevant transportation analysis zone should be used for this variable instead of the default value presented above.

- (D) – A meta-regression analysis of two studies that controlled for self-selection found that a 0.07 percent decrease in VMT occurs for every 1 percent increase in job density (Stevens 2016).

## GHG Calculation Caps or Maximums

*Measure Maximum*

($A_{max}$) The percent reduction in GHG emissions (A) is capped at 30 percent. The purpose for the 30 percent cap is to limit the influence of any single built environmental factor (such as density). Projects that implement multiple land use strategies (e.g., density, design, diversity) will show more of a reduction than relying on improvements from a single built environment factor.

*Subsector Maximum*

($\sum A_{max_{T\text{-}1 \text{ through } T\text{-}4, T\text{-}55}} \leq 65\%$) This measure is in the Land Use subsector. This subcategory includes Measures T-1 through T-4 and T-55. The VMT reduction from the combined implementation of all measures within this subsector is capped at 65 percent.

## Example GHG Reduction Quantification

The user reduces VMT by increasing the job density of the project study area. In this example, the project's job density would be 400 jobs per acre (B), which would reduce GHG emissions from project VMT by 12.3 percent.

$$A = \frac{400 \, \frac{job}{acre} - 145 \, \frac{job}{acre}}{145 \, \frac{job}{acre}} \times \text{-}0.07 = \text{-}12.3\%$$

## Quantified Co-Benefits

*Improved Local Air Quality*

The percent reduction in GHG emissions (A) would be the same as the percent reduction in $NO_X$, CO, $NO_2$, $SO_2$, and PM. Reductions in ROG emissions can be calculated by multiplying the percent reduction in GHG emissions (A) by an adjustment factor of 87 percent. See *Adjusting VMT Reductions to Emission Reductions* above for further discussion.

*Energy and Fuel Savings*

The percent reduction in vehicle fuel consumption would be the same as the percent reduction in GHG emissions (A).

*VMT Reductions*

The percent reduction in VMT would be the same as the percent reduction in GHG emissions (A).

## Sources

- Institute of Transportation Engineers (ITE). *Trip Generation Manual.* 10th Edition. Available: https://www.ite.org/technical-resources/topics/trip-and-parking-generation/trip-generation-10th-edition-formats/. Accessed: January 2021.
- Stevens, M. 2016. Does Compact Development Make People Drive Less? *Journal of the American Planning Association* 83:1(7–18), DOI: 10.1080/01944363.2016.1240044. November. Available: https://www.researchgate.net/publication/309890412_Does_Compact_Development_Make_People_Drive_Less. Accessed: January 2021.