

# SCAG's Sustainability Modeling Tool

Overview and Example Outputs

July 22, 2010

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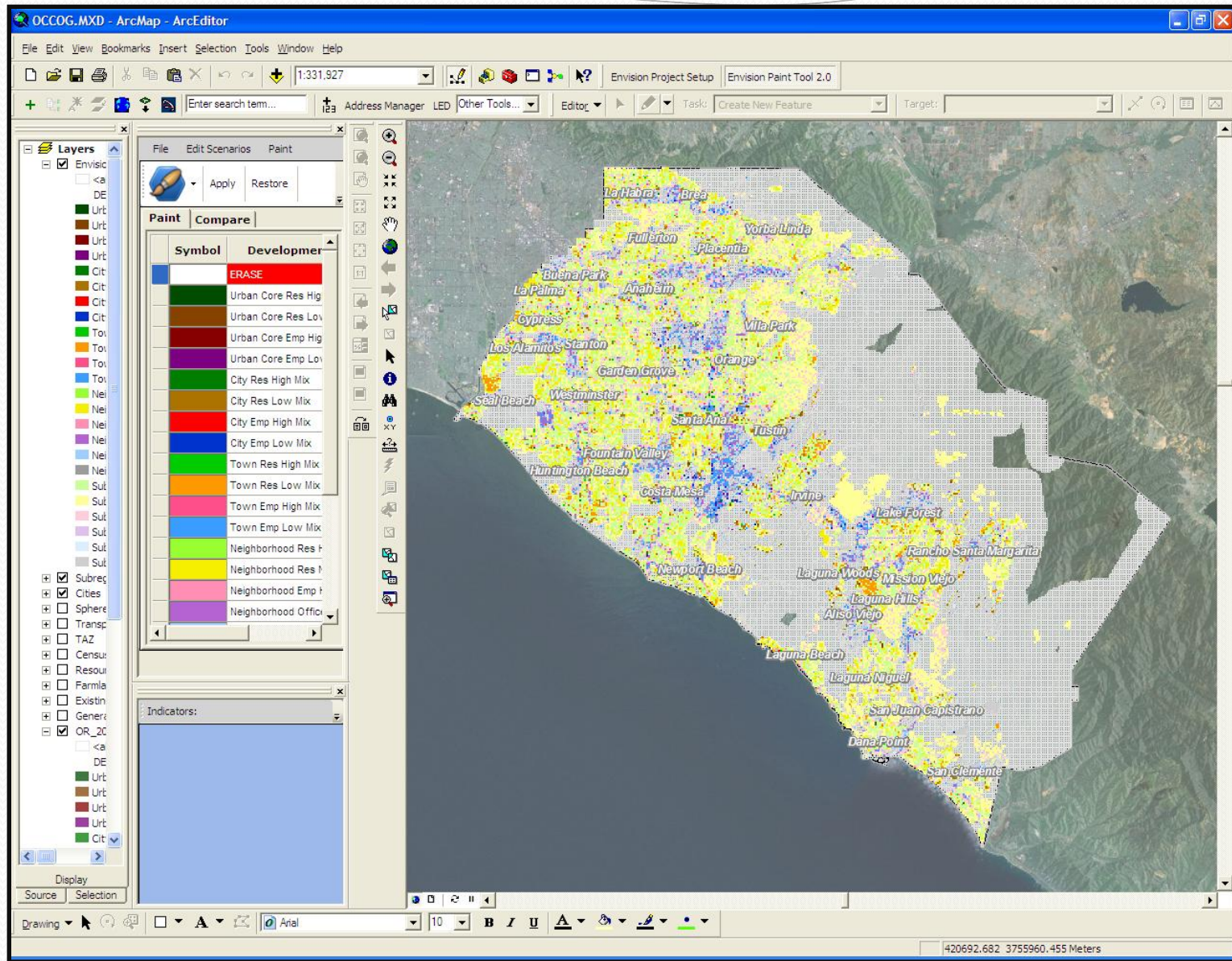
# Purpose of Tool

- SB 375 ~ agencies conducting the public outreach required as part of the development of the sustainable communities strategy (SCS) to utilize urban simulation computer modeling that creates a visual representation of the SCS and the alternative planning scenario.
- SCAG created the required tool
  - Utilizes GIS software to model vehicle miles traveled (VMT) and greenhouse gas emissions (GHG) that result from changes in land use.

# GIS Based

ESRI  
ARCGIS 9.3  
software

Tools paint  
land use  
options onto  
map



# Information in Model

Local Government General Plan converted to model land use types.

For the purposes of the tool, land use is by 5.5 acre grid cell.

Model includes many layers of data:

- City Boundary
- Transportation System
- Existing and G.P. Land Use
- Aerial Photography

The screenshot displays a GIS software interface with three main panels:

- Legend Panel (Left):** Shows a hierarchical list of data layers. The 'Envision (EDIT VERSION)' layer is expanded, showing a list of development types with corresponding color swatches. The 'TAZ selection' layer is highlighted with a yellow square.
- Development Type List (Middle):** A table with columns for 'Symbol', 'Development Type', and 'Info'. The 'Neighborhood Res High Mix' entry is highlighted in red.
- Sample Images Panel (Right):** Displays a grid of sample images for different land use types, including 'Density', 'Employment Mix', 'Housing Mix', and 'Land Area'.

Symbol	Development Type	Info
	ERASE	➔
Dark Green	Urban Core Res High Mix	➔
Brown	Urban Core Res Low Mix	➔
Dark Red	Urban Core Emp High Mix	➔
Purple	Urban Core Emp Low Mix	➔
Light Green	City Res High Mix	➔
Light Brown	City Res Low Mix	➔
Red	City Emp High Mix	➔
Blue	City Emp Low Mix	➔
Light Green	Town Res High Mix	➔
Orange	Town Res Low Mix	➔
Pink	Town Emp High Mix	➔
Light Blue	Town Emp Low Mix	➔
Light Green	Neighborhood Res High Mix	➔
Yellow	Neighborhood Res No Mix	➔
Pink	Neighborhood Emp High Mix	➔
Purple	Neighborhood Office Low Mix	➔
Light Blue	Neighborhood Retail Low Mix	➔
Grey	Neighborhood Industrial Low Mix	➔
Light Green	Suburban Res High Mix	➔
Yellow	Suburban Res No Mix	➔
Pink	Suburban Emp High Mix	➔
Purple	Suburban Office Low Mix	➔
Light Blue	Suburban Retail Low Mix	➔
Grey	Suburban Industrial Low Mix	➔

Density		
Housing:	11.9	Units/...
Employment:	10.6	Jobs/...

Employment Mix		
Retail:	32.8	%
Office:	67.2	%

Housing Mix		
Multifamily:	46.6	%
Townhome:	0	%
Single Family:	53.4	%

Land Area		
Building Site:	67	%
Streets:	23	%
Civic:	4	%
Parks:	6	%

# Sample Area

SCAG provides large amount of data:

- Transit Routes
- Transit Stops
- General Plan
- Existing Land Use
- Parcels
- Aerial Imaging

Test area is located in Anaheim, along Beach Blvd. between Lincoln and Ball.

Representative of typical suburban area with older strip commercial.



# Example Hypothetical Alternatives

## Existing Land Use

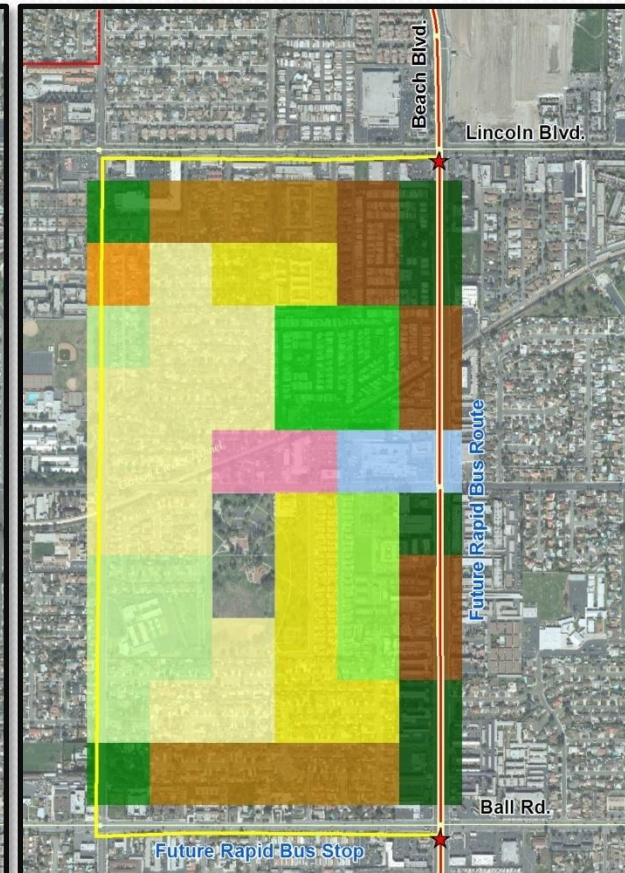
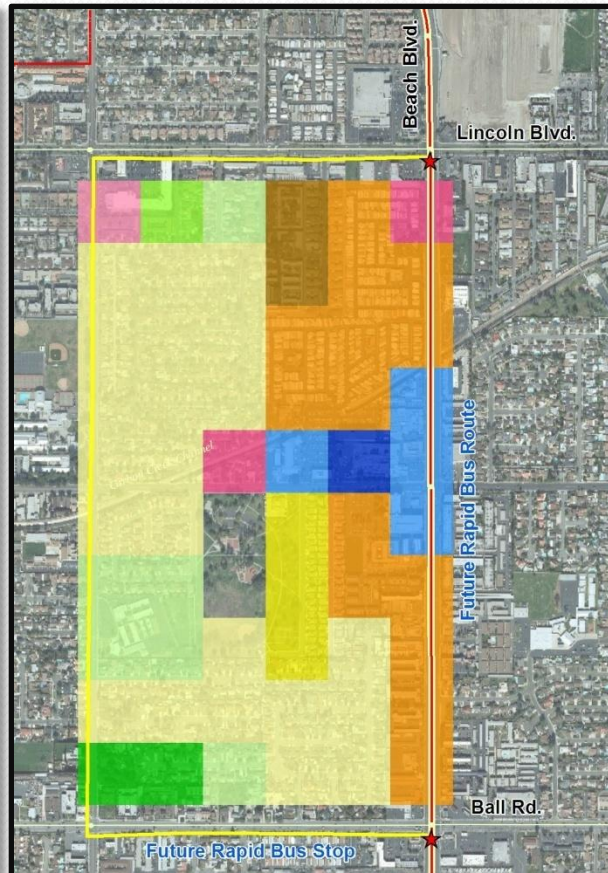
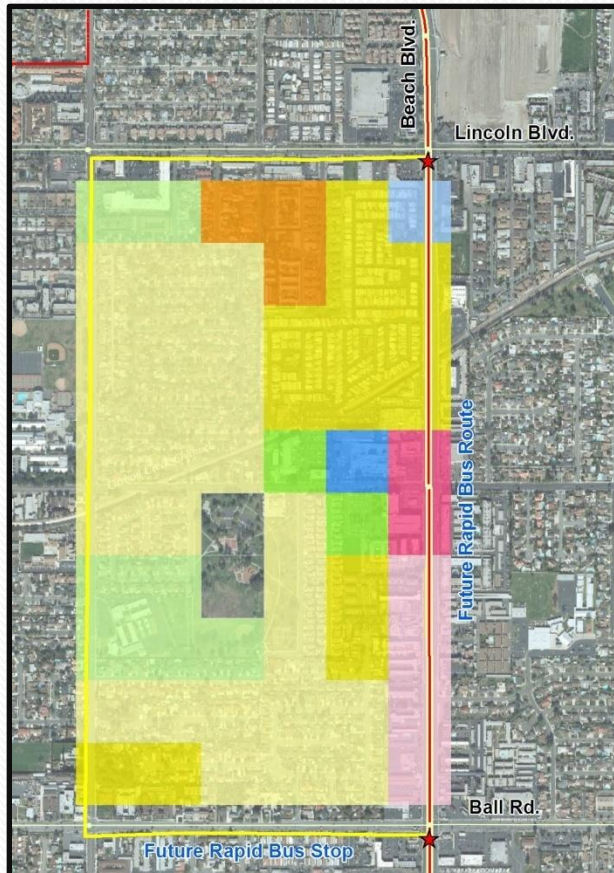
- Typical existing suburban area.
- Single-family homes with mixes of apartments and commercial.
- Strip commercial along Beach and Lincoln.

## General Plan

- Conversion of strip commercial to residential.
- Increased density along transit lines.

## Extremely Dense Corridor

- Conversion of all uses along transit routes.
- Extremely high density along BRT Route.
- Goal ~ minimize GHG per HH.



# Output

Data shows ~

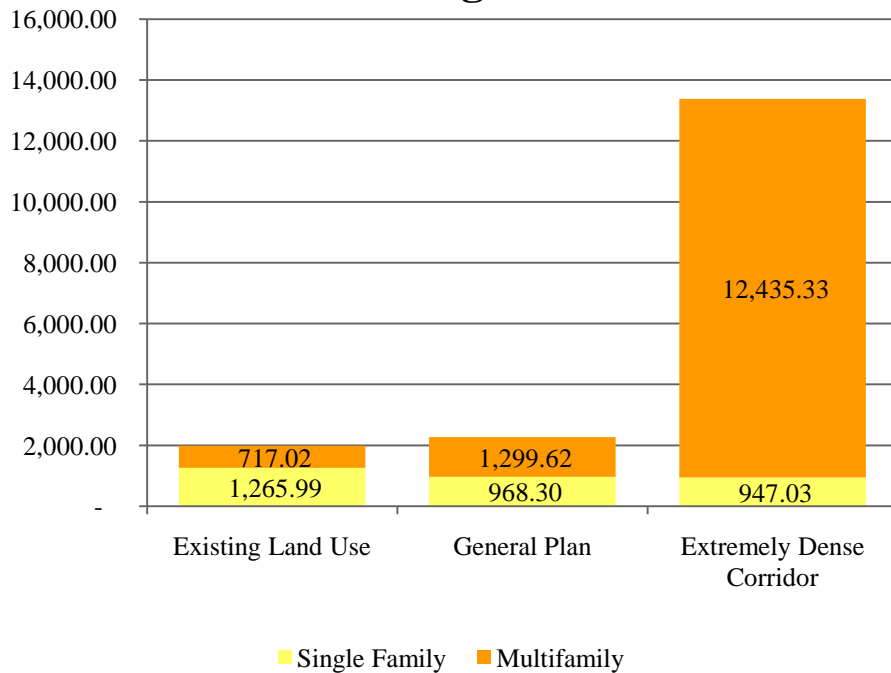
- Acreage of development
- Housing Type Mix
- Employment Mix
- Density per gross acre
- Jobs/Housing Balance
- Vehicle ownership
- VMT
- Mode Split
- GHG emissions ~ total and per household

	Existing Land Use	General Plan Land Use	Extremely Dense Corridor
<b>Acres</b>			
<b>Vacant Acres</b>	16.68	16.68	16.68
<b>Developed Acres</b>	305.80	305.80	305.80
<b>Housing Mix</b>			
<b>Single Family</b>	1,265.99	968.30	947.03
<b>Multifamily</b>	717.02	1,299.62	12,435.33
	1,983.01	2,267.92	13,382.36
<b>Employment Mix</b>			
<b>Retail</b>	483.57	446.10	4,162.84
<b>Office</b>	2,335.42	5,231.69	12,460.94
	2,818.99	5,677.79	16,623.78
<b>Density</b>			
<b>Housing Unit</b>	6.15	7.03	41.50
<b>Employment</b>	8.74	17.61	51.55
<b>Jobs/Housing Balance</b>	1.42	2.50	1.24
<b>Vehicle Ownership per Household</b>	2.00	1.92	1.61
<b>Vehicle Miles Traveled per Household</b>	44.21	42.61	35.64
<b>Travel Mode Split</b>			
<b>Drive Alone Trip</b>	58.2%	57.2%	52.8%
<b>Auto-Passenger Trip</b>	30.3%	30.1%	27.4%
<b>Transit Trip</b>	3.3%	3.5%	4.3%
<b>Non-Auto Trip</b>	8.2%	9.2%	15.5%
<b>Greenhouse Gas Emissions (Tons/Day)</b>	42.78	47.15	232.72
<b>Greenhouse Gas Emissions (Tons/Household)</b>	0.022	0.021	0.017

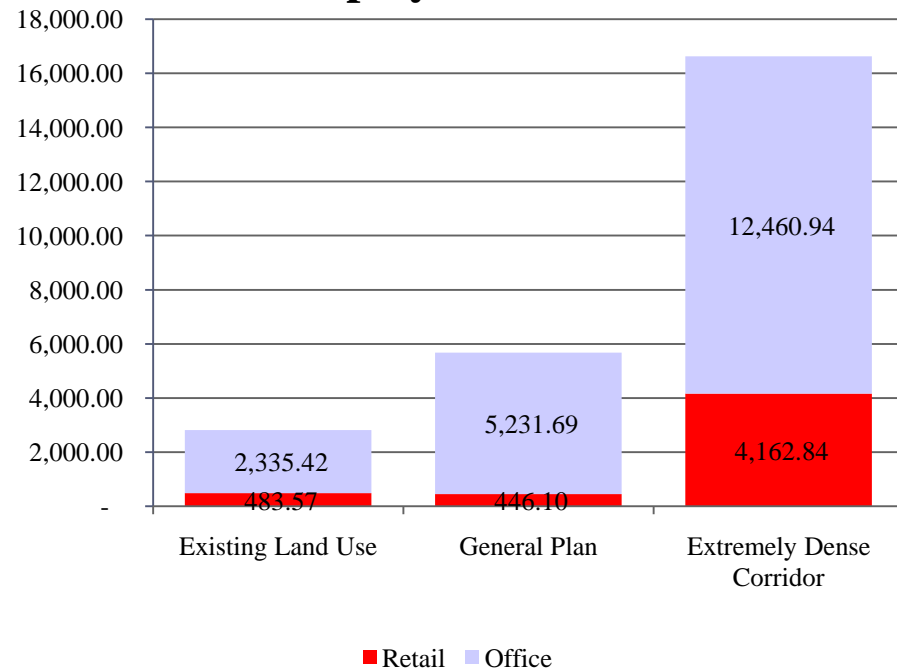
# Illustration of Outputs

- Overall housing and employment increase for each of the future scenarios.
- Large increases is in multiple family housing and office employment.
- Extremely dense corridor alternative provide substantial increase in housing and employment.

## Housing Mix



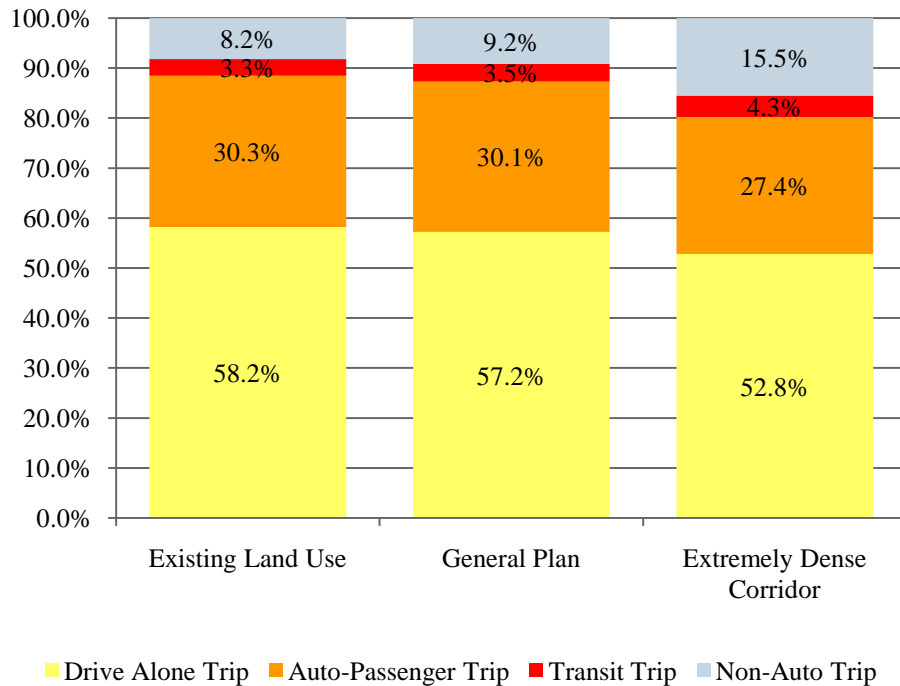
## Employment Mix



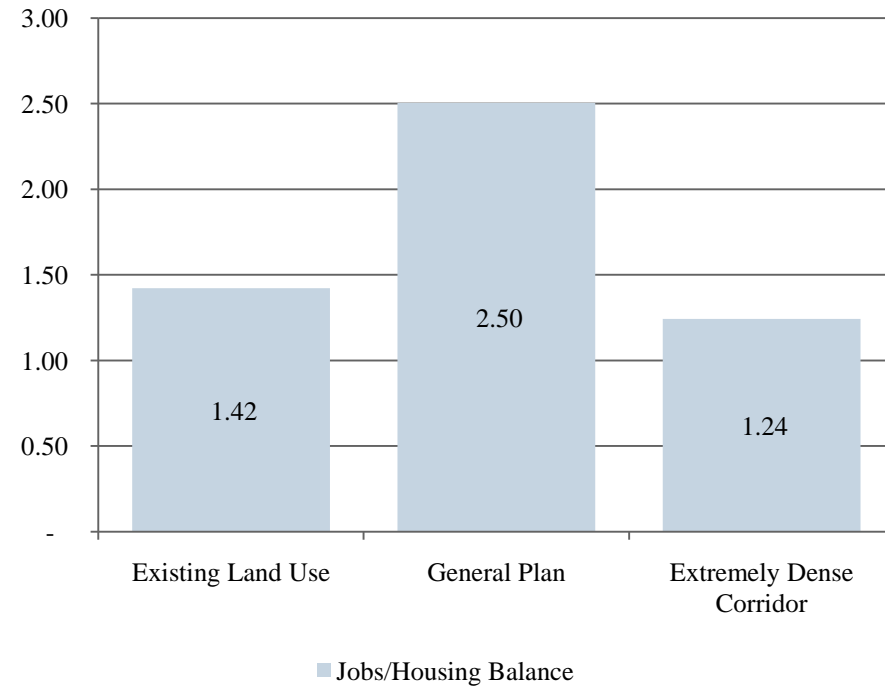
# Illustration of Outputs

- Jobs/housing balance is worse for General Plan alternatives vs. the Extremely Dense alternative.
- Some decrease in auto trips; slight increase in transit; substantial increase in non-auto trips.

## Travel Mode Split



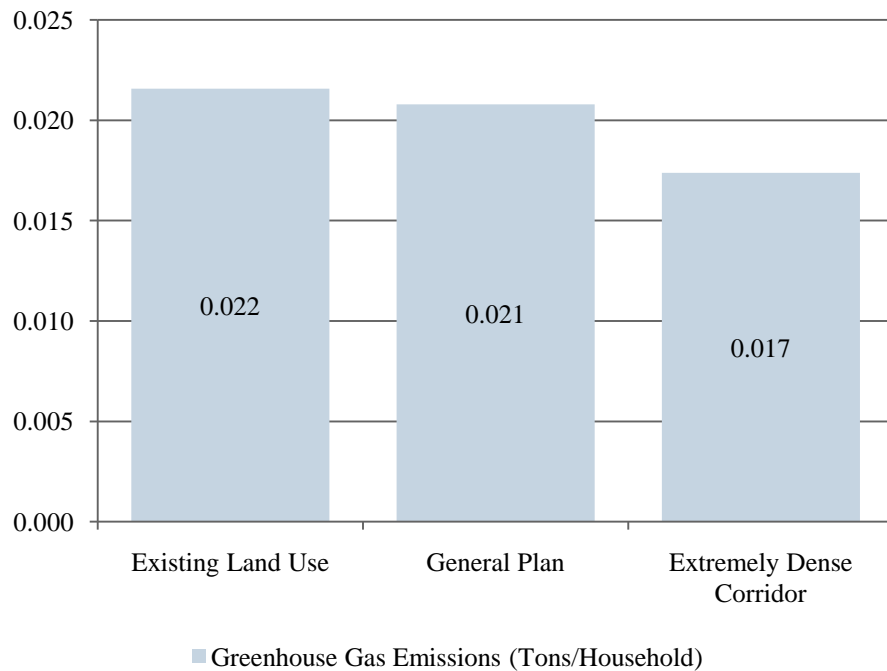
## Jobs/Housing Balance



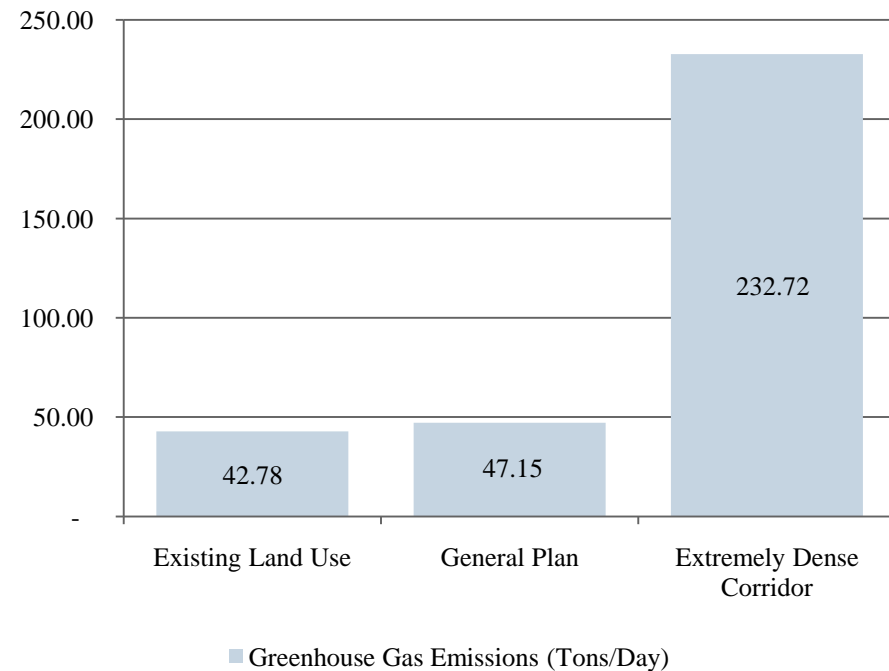
# Illustration of Outputs

- Extremely Dense alternative increases overall GHG emissions substantially but also does reduce emissions per household.
- General Plan shows increase in GHG overall and slight decrease in emissions per household.

## GHG Emissions Per Household



## Total Greenhouse Gas Emissions



# The Good News

- Exciting and robust tool for land use modeling
  - Basic set of tools for measuring one aspect of land use – GHG emissions
- Provides a good start to any agency's GIS system if they do not yet have GIS
- SCAG created the modeling tool called for by SB 375 and it can be used throughout the region.

# The Challenges

- Data quality directly relates to quality of output
  - Very time-consuming to update data
  - Data limitations (is it available and split-parcels)
  - Use of a large 5.5 acre grid cell to simplify modeling
- While simpler than the full SCAG model, the Tool is still complex and requires land use knowledge
- This is not a true 4-D model in which you can get emissions outputs – only provides magnitude of scale output (one scenario produces more or less than another scenario – the actual calculations should not be used)
- Cannot test how land use decisions perform in the region

# Other issues

- Due to complexity of modeling, it is not clear what formulas are that evaluate VMT and GHG emissions
  - Will require expertise in this area to modify the model assumptions.
- It will be easy to misinterpret the results
  - Model outputs a table of numbers and charts
  - All growth increases GHG emissions ~ including conversion of uses

Thank you!



Questions?