envision tomorrow™

a suite of urban and regional planning tools

SCENARIO INDICATOR + APPS

FEBRUARY 2013

Compatible with Scenario Builder Version 3.0
and Prototype Builder Version 3.1 Beta

INTRODUCTION

We believe that meaningful plans are ones you can both implement and monitor; indicators are very helpful tools for creating and evaluating scenarios, and in the future, for monitoring and evaluating a plan's performance.

WHAT ARE SCENARIO INDICATORS?

Indicators are the outputs of evaluation criteria which are are created near the beginning of the scenario planning process. They generally reflect the guiding principles as well as previously adopted community goals. Indicators may also be related to new or emerging community goals or issues: such as transit access, housing costs, or air quality. The indicators will be used during the development and evaluation of the scenarios within Envision Tomorrow to communicate the benefits, impacts and tradeoffs of different policy choices and investments.

Using Envision Tomorrow, alternative scenarios are tested and refined, and then compared and evaluated based on their indicator performance. Indicators enable Envision Tomorrow users to tie the scenario results to the community values and guiding principles.

In practice, this approach not only allows the public to visualize their region's future, final plans created using our scenario planning process will come with a dashboard of indicators so policymakers can monitor their progress and make adjustments along the way, in concert with established guiding principles and long-term vision.

LIST OF ENVISION TOMORROW SCENARIO INDICATORS:

WHAT DO THEY MEAN?

The results of each indicator mean or imply something different. Each indicator one sheet explains the **implications of its results, how it is measured** and **the relevant equation**(s) **used to calculate the results.**

SCENARIO INDICATORS

URBANIZED ACRES

WHAT DOES IT MEAN?

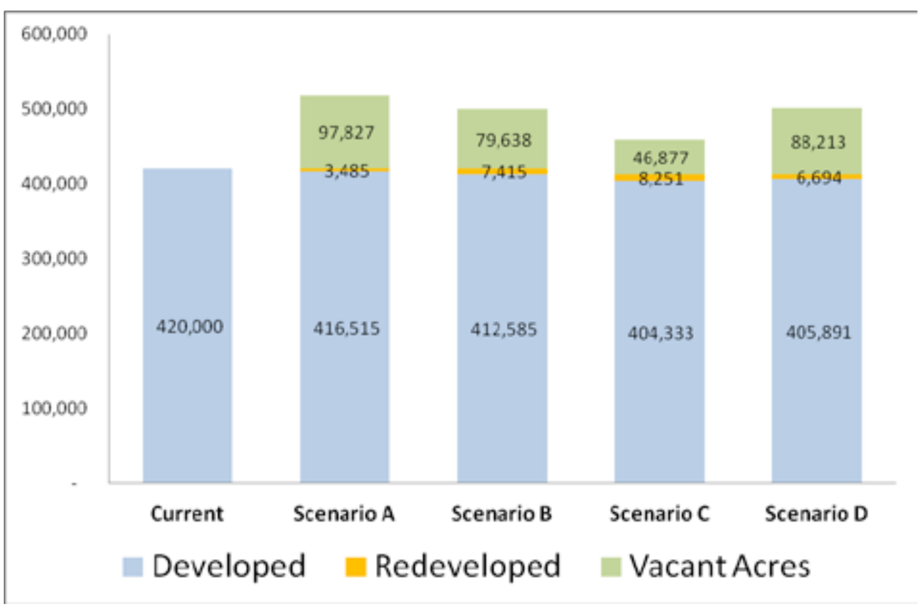
Urbanized acres is an indicator of the amount of developed land in each scenario. It may include total urbanized acres in the scenario, or incremental new urbanized acres. It can be further divided into new incremental urbanized acres on vacant land, or urbanization through redevelopment. The number of urbanized acres gives a sense of how much land would be developed under each scenario.

HOW IS IT MEASURED?

Each scenario includes a map showing the location of new development. The scenario layer is coded with the existing supply (acreage) of buildable land – both vacant and currently developed. Envision Tomorrow automatically tracks the amount of vacant and developed land that is developed in any given scenario. To get total urbanized acres for a scenario, the acres of new development are added to the number of urbanized acres for the base year. It can be reported as either total urbanized acres or incremental urbanized acres.

Example Output:

Newly Urbanized Acres



Source: Our Greater San Diego Vision

EQUATION

Sum of developed acres (DEVD_ACRE), where there is existing development (EX_LU not = AG & VAC).

And sum of vacant acres (VAC_ACRE), where new development has been painted in a scenario (DEV_TYPE > "").

SCENARIO INDICATORS

INFILL DEVELOPMENT OR REDEVELOPMENT

WHAT DOES IT MEAN?

Infill development or redevelopment indicates the extent to which new housing and buildings are developed by recycling land that already had some development on it. It indicates that older parts of the area are attracting new housing and investment. High percentages of infill development indicate that a larger proportion of growth is occurring where development has already occurred before.

HOW IS IT MEASURED?

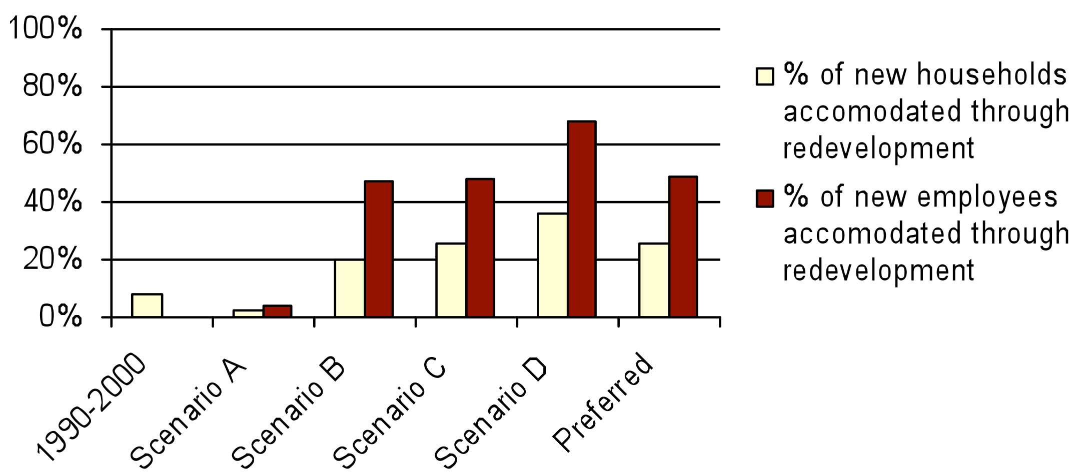
Envision Tomorrow automatically tracks the acreage of both vacant and (re)developed lands that are "painted" by the user. This depends on accurate existing land use coverage. The program tracks the amount of development on land that is classified as "developed" currently, as opposed to vacant. The number of redeveloped acres of each development type is multiplied by the number of households and employees per redeveloped acre to get new households and employees on developed land.

EQUATION

(Net Housing Density * Developed Acres) /
((Net Housing Density * Developed Acres) + (Gross Housing Density * Vacant Acres))

Example Output:

Percent of New Growth Accommodated Through Redevelopment



SCENARIO INDICATORS

COST OF NEW INFRASTRUCTURE

WHAT DOES IT MEAN?

Different types of development can have different impacts on the cost of local infrastructure. This indicator measures the cost of additional local infrastructure to support new development. It is often provided by local developers when a subdivision is built, and the costs recovered in the price of new housing or other buildings. Generally, it is more cost-effective to build streets, water and sewer lines when development is denser, as the costs per unit decrease. Infill development is less expensive if the existing infrastructure can be used, or needs replacement anyway, and more expensive if new sewer and water lines must be laid. The cost estimates in this indicator include local roads, water, sewer and storm sewer.

HOW IS IT MEASURED?

Each development type was assumed to contain a certain length of sewer, water, and local streets per acre, on average. The acres of each development type were multiplied by the infrastructure length to determine the linear feet in each scenario. Only the development on vacant land is considered, due to the great variation in infrastructure costs for redevelopment. Then the vacant linear feet are multiplied by an average estimated infrastructure construction cost per foot to get the total infrastructure costs. The infrastructure cost included local roads, water, sewer, and storm sewer. The infrastructure costs for the rural development types are often lower estimated due to lack of sewer, storm sewer, water, and sidewalk infrastructure.

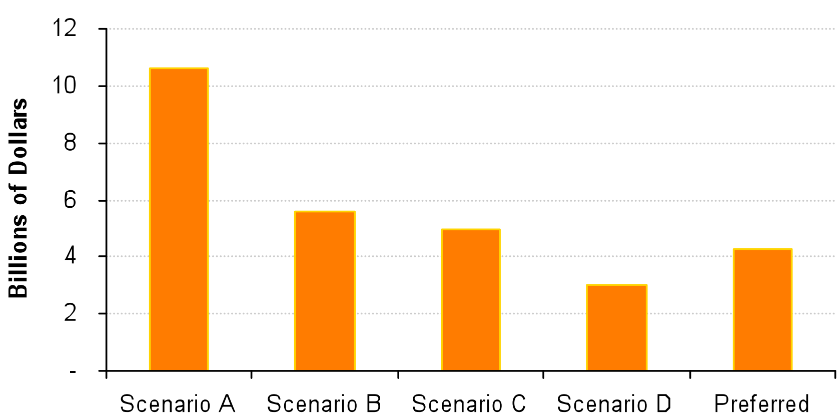
EQUATION

Example: Cost of a new roadway

Developed vacant acres * Lane miles per acre * Cost of new road per lane mile

Example Output:

Cost of New Infrastructure (New Roads)



SCENARIO INDICATORS

BUILDING VALUE AND LOCAL REVENUE

WHAT DOES IT MEAN?

Adding new housing and employment space to a community brings additional tax revenue that can be used for new infrastructure and services to support new and existing residents. Different scenarios can produce different amounts of tax revenue due to the differing values of particular building types and locations. The value of the buildings can determine the amount of anticipated tax revenue, including property tax, sales tax and TIF revenue.

HOW IS IT MEASURED?

Development types consist of buildings which have associated development costs. Once built, that cost is considered as value added to a community. Property tax is assessed as a percentage of new building value added. TIF revenue is also estimated based on the value of new development in an area and an assumption about the marginal capture within a TIF district. Sales tax is estimated by applying the average sales per square foot to the retail square footage and a local sales tax percentage. Assessing revenue per acre is helpful for understanding the value density of new development, and to compare to the infrastructure cost of development on raw land.

EQUATION

Total building value = Sum of all building development costs
Sales tax revenue = Square feet of retail * Average retail sales per sq ft * Local sales tax percentage
Property tax = Total building value * Local property tax rate per year

Example Output:
Sales Tax Revenue per Acre

SCENARIO INDICATORS

HOUSING AFFORDABILITY AND HOUSING DEMAND MATCH

WHAT DOES IT MEAN?

Because Envision Tomorrow includes the cost and details about the scenario buildings, it can readily estimate the number and types of housing units, by cost and tenure. Scenarios contain a range of housing types, and can be compared to a profile of housing needs, by income, tenure, and preference. By comparing the housing profile of a scenario against the housing needs of the population, the degree of match can be assessed.

EQUATION

Example: Measuing single-family mix

If Scenario A's single-family mix ≥ ideal single-family mix,
match score =100% and supply is met.

If Scenario A's single-family mix < ideal single-family mix,
match score = Scenario A's single-family mix / ideal single-family mix

HOW IS IT MEASURED?

The development types include detailed information about unit size and cost since each of them is composed of building types created using a pro forma. The size and cost/rent characteristics are automatic outputs of each scenario. The range of price points can be transformed into household incomes needed to afford the units. This scenario housing profile can then be compared against the "ideal future housing mix" based on the projected income levels of future residents. This allows the user to assess the level of housing match or mismatch in a given scenario. A score of 100 shows that the scenario exactly matched the housing needs of the population. Note, the ratio only measures if the need is met, and does not assess oversupply.

Example Output:

Housing Match

SCENARIO INDICATORS

HOUSING MIX

WHAT DOES IT MEAN?

Housing mix indicates whether the housing in an area is single-family, townhouse, or multi-family. This measures the variety of housing types provided, as well as the density typical of new housing types. This is a commonly used subset of the housing data, often a quick snapshot when the more complete Housing Match Indicator is not needed.

EQUATION

Example: Single-family housing percentage

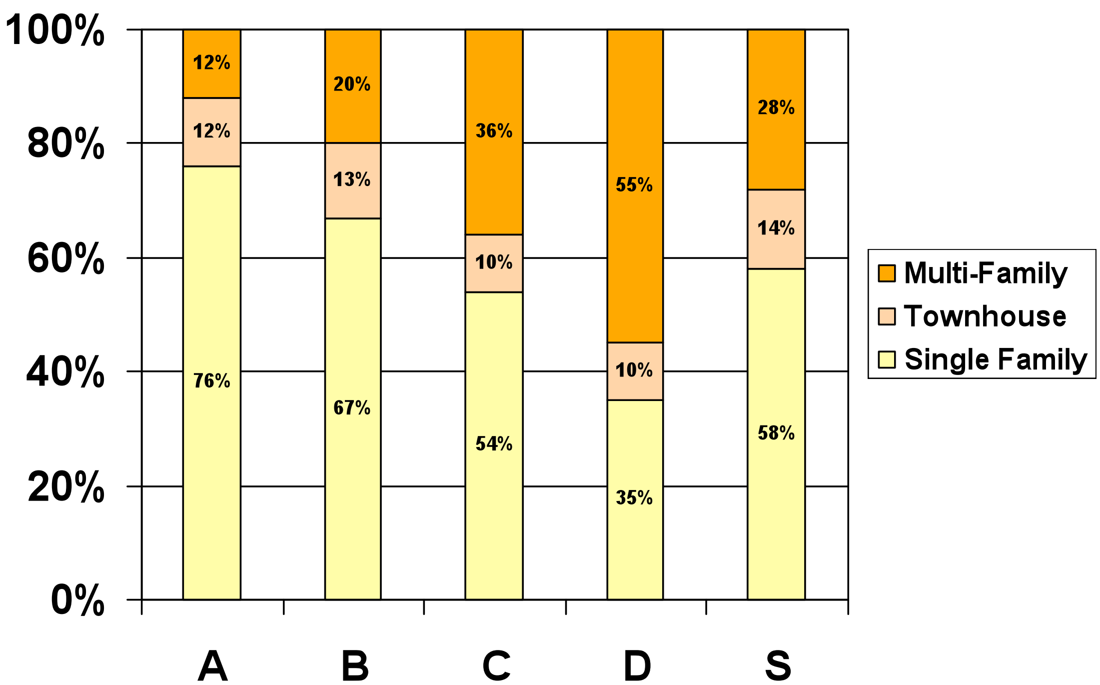
Single-family units / Total housing units

HOW IS IT MEASURED?

Each scenario contains a different mix of development types. Each development type is defined as a certain mix of building types. Therefore, each development type contains a certain mix of single-family homes, townhomes, and multi-family homes. The number of acres of each development type in each scenario were multiplied by the single-family, townhome, and multi-family percentages in each development type to come up with the number of new single-family, townhome, and multi-family households in each scenario.

Example Output:

Housing Mix



SCENARIO INDICATORS

PARKING SPACES AND COST

WHAT DOES IT MEAN?

Parking is expensive to construct and uses a significant amount of land. Estimates of the amount and cost of parking in each scenario can help municipalities understand how their regulations impact development. In addition, estimating parking within a development area can be helpful for municipalities that want to offer public parking to offset costs to private developers.

HOW IS IT MEASURED?

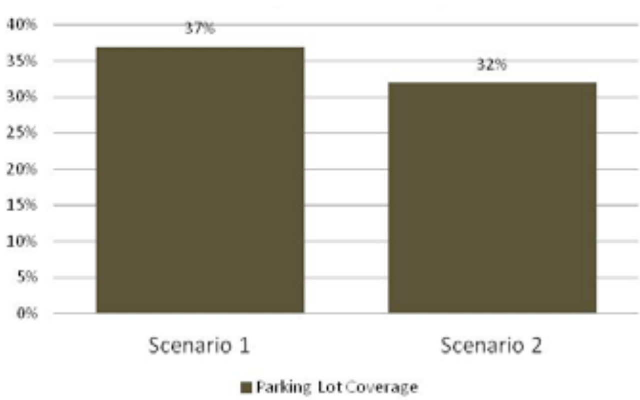
The development types include building types that have associated parking stalls, area and costs. The parking stalls, area and costs are available as an automatic output for each scenario. Users can use the subarea function in Envision Tomorrow to zoom into smaller area for more specific counts and costs.

EQUATION

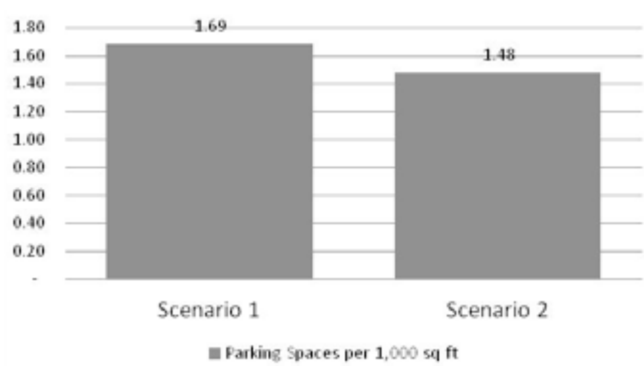
Parking Spaces per 1,000 sq ft
New parking spaces / (Total new development square footage / 1000)

Parking Lot Coverage
New parking lot area / Total new developed land area

Example Output:
Percent of New Developed Area Covered in Parking



Example Output:
Parking Spaces per 1,000 sq ft of Development



SCENARIO INDICATORS

JOBS-TO-HOUSING BALANCE

WHAT DOES IT MEAN?

The balance or ratio of jobs to households in the various subareas within a region or city can be an important indicator of the health of a region. If a large mismatch exists between employment and housing in one or more subareas, then significant in-commuting and out-commuting will occur, putting pressure on the transportation system and adding to household transportation costs. The ratio is all housing relative to all jobs, not necessarily jobs where the persons in the households are employed. As jobs are a surrogate for destinations, this indicator is measuring person-destination match.

HOW IS IT MEASURED?

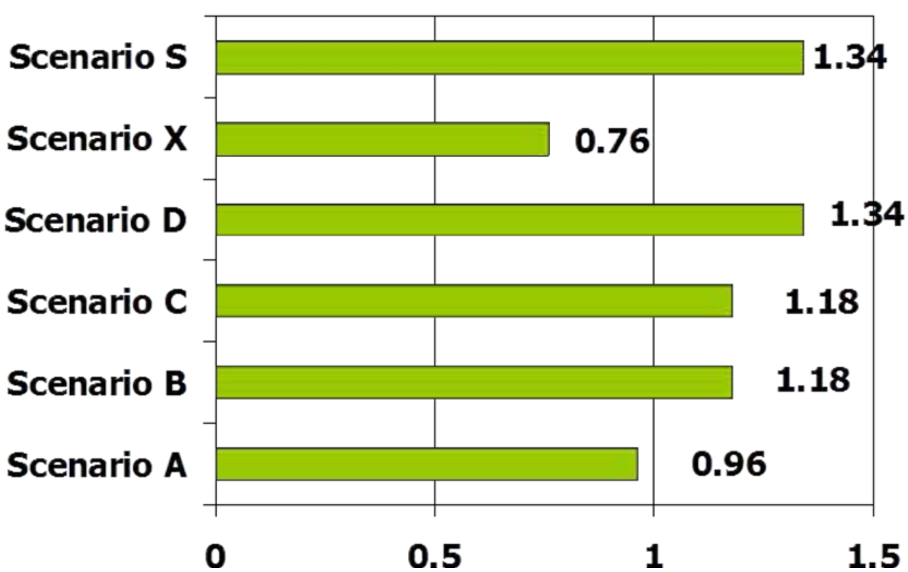
Envision Tomorrow automatically tracks the balance of both existing and new jobs and housing within the scenario layer. Users can zoom into particular subareas, cities or neighborhoods for assessment of localized jobs-housing balance.

EQUATION

Jobs-to-housing balance for new development
New jobs / New housing

Jobs-to-housing balance for all development in plan year of scenario:
Total jobs / Total housing

Example Output:
Jobs-to-Housing Balance



SCENARIO INDICATORS

DISTRIBUTION OF EMPLOYMENT SPACE

WHAT DOES IT MEAN?

The distribution of employment space is another indicator of the widely varying land use patterns in the different scenarios. The type of employment in a certain area, as well as the distribution of the types of employment across the region depends heavily on the land use pattern. Employment information also is useful for estimating relative tax burden.

HOW IS IT MEASURED?

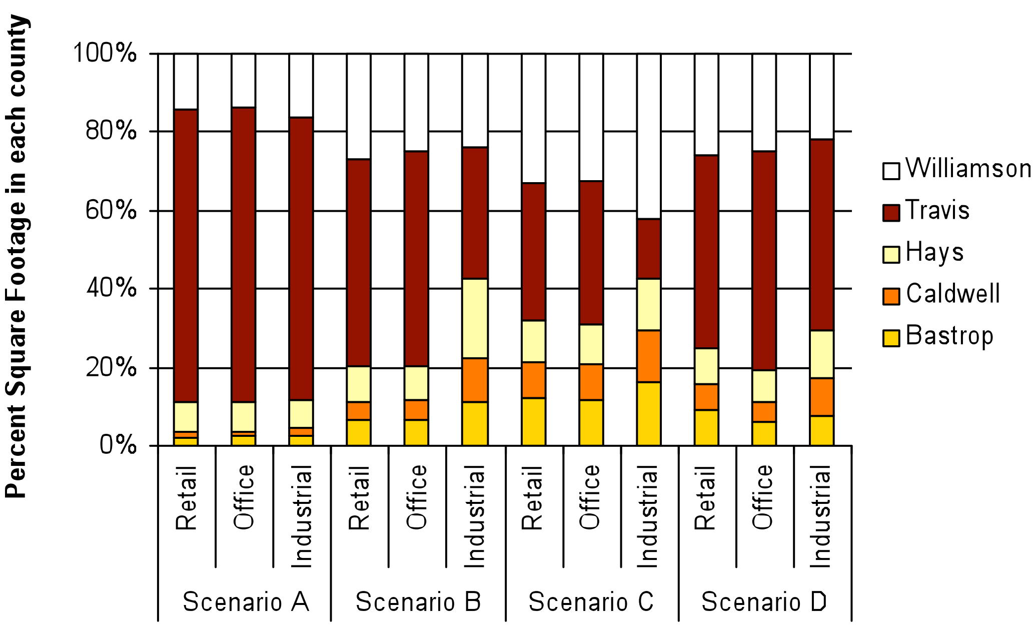
Development types consist of building types, which have employment space (sq ft) included in them. When a user paints development types in an area the associated number of new square feet by employment type are automatically tracked by Envision. The square footage distribution can be analyzed by any set of subareas using the summarize function in ArcGIS.

EQUATION

While there is no equation for this, since all of the output data is maintained spatially in the scenario layer, the results can easily be summarized by a variety of smaller geographic areas.

Example Output:

Distribution of Incremental Employment Space



SCENARIO INDICATORS

REGIONAL DENSITY

WHAT DOES IT MEAN?

Regional density is a measure of the number of people, housing units or jobs per urbanized acre or square mile in each scenario. Similar to the measurement of urbanized acres, regional density provides a general indicator of density. This is sometimes compared with existing cities, to offer a comparison. The density can either be total, or incremental.

HOW IS IT MEASURED?

Regional density is measured by dividing the number of people/units/jobs by the number of urbanized acres in each scenario. Both the urbanized acreage and population count are automatically tracked and updated by Envision Tomorrow. In addition, average FAR is automatically tracked within Envision.

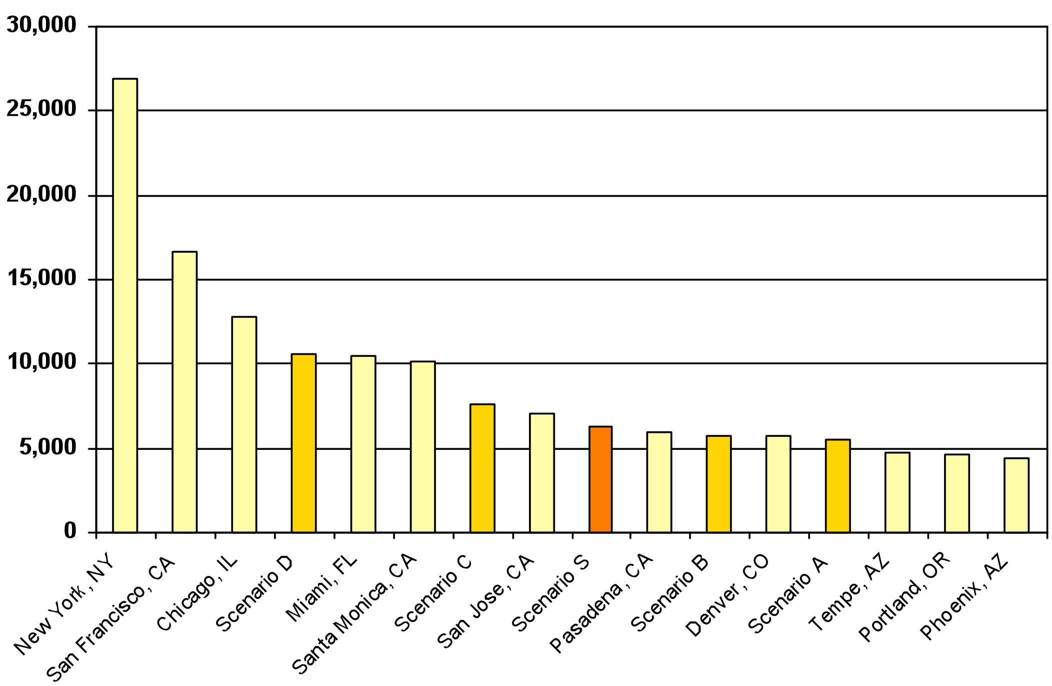
EQUATION

People per Net Residential Acre
Population / Sum of developed acres where population > 0

Housing Units per Net Residential Acre
Housing Units / Sum of developed acres where housing units > 0

Employment per Net Residential Acre
Employees / Sum of developed acres where employees > 0

Example Output:
Population Density



SCENARIO INDICATORS

CONNECTIVITY

WHAT DOES IT MEAN?

Connectivity is an indicator of how connected the street system is. It has been well established in the literature that well connected street system leads to both lower congestion and lower travel, since there are more routes available for trips that are made. In addition, a well-connected street system allows more direct routes from origin to destination, which encourages walking, biking and shorter auto trips. As such, connectivity is an important input variable to many travel models, and other indicators within Envision such as the travel indicator.

HOW IS IT MEASURED?

Each development type has user-defined average block size and street type characteristics which result in a measurement of intersection density. A base measure of intersection density is calculated in GIS and included in the scenario layer. The development types are assigned intersection density based on the average block size in the development type spreadsheet. Areas that are not painted are assumed to maintain their current street characteristics.

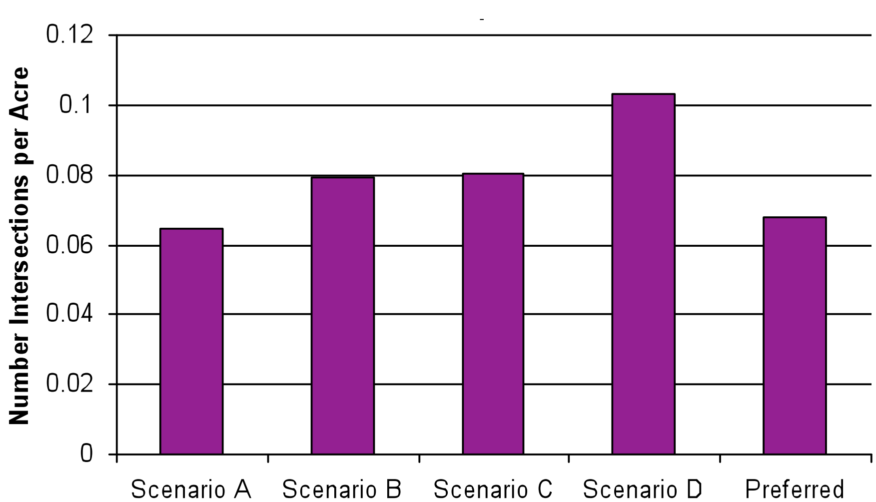
EQUATION

Intersections / Square mile of planning geography

Note: Planning geography could be parcels, census blocks or some other user-defined geography.

Example Output:

Incremental Intersections per Urbanized Acre



SCENARIO INDICATORS

URBAN PARKS PER CAPITA

WHAT DOES IT MEAN?

The existence of urban parks can greatly contribute to the quality of life of a region's residents. Urban parks are more accessible to more people than rural nature preserves, and can be accessed without a car. Therefore, urban parks impact people's day-to-day lives by providing a refuge from the city within an urban area. A good way to compare the amount of parkland of several areas is to measure the park acreage per 1000 residents.

HOW IS IT MEASURED?

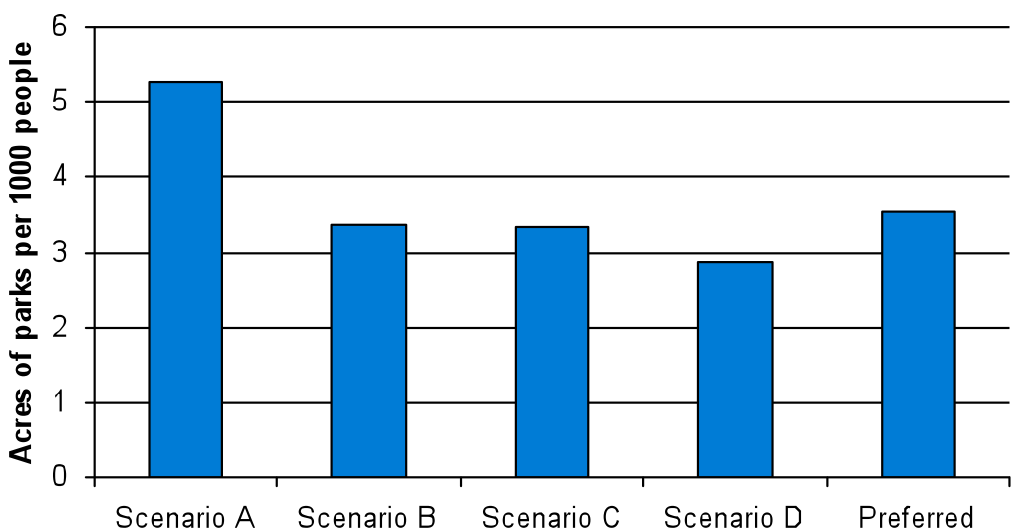
Each scenario contains a different mix of development types. Each development type is defined to include a certain amount of parkland, as a percentage of acreage. The number of acres of each development type of each scenario is multiplied by the percentage of parkland in each development type to determine the number of new acres of urban parks within a scenario. Existing parks must be identified as well for calculating existing parks per 1,000 acres. This ratio can also be compared with other urban areas for perspective.

EQUATION

New Open Space per Capita
New open space acres / New population

Total Open Space per Capita
Total open space acres / Total population

Example Output:
Incremental Acres of Urban Parks per Capita



SCENARIO INDICATORS

LOSS OF AGRICULTURE AND RANGE LAND

WHAT DOES IT MEAN?

These two indicators measure the loss of agricultural and range land to development. Some people say that maintaining these land uses nearby is important for several reasons. Others say that there is plenty of agricultural and range land, and we shouldn't be concerned with its loss. Regardless, once it is subdivided and developed, it is lost as a crop producing resource. These lands also perform some functions of open space, providing habitat for certain species and relief from the sense of enclosure found in urban areas.

HOW IS IT MEASURED?

The loss of agricultural land and range land is calculated by summarizing the acres of new development on vacant lands that fall within the agricultural and rangeland classifications of the land cover layer. This same methodology can be applied to a range of important lands, such as environmentally sensitive lands.

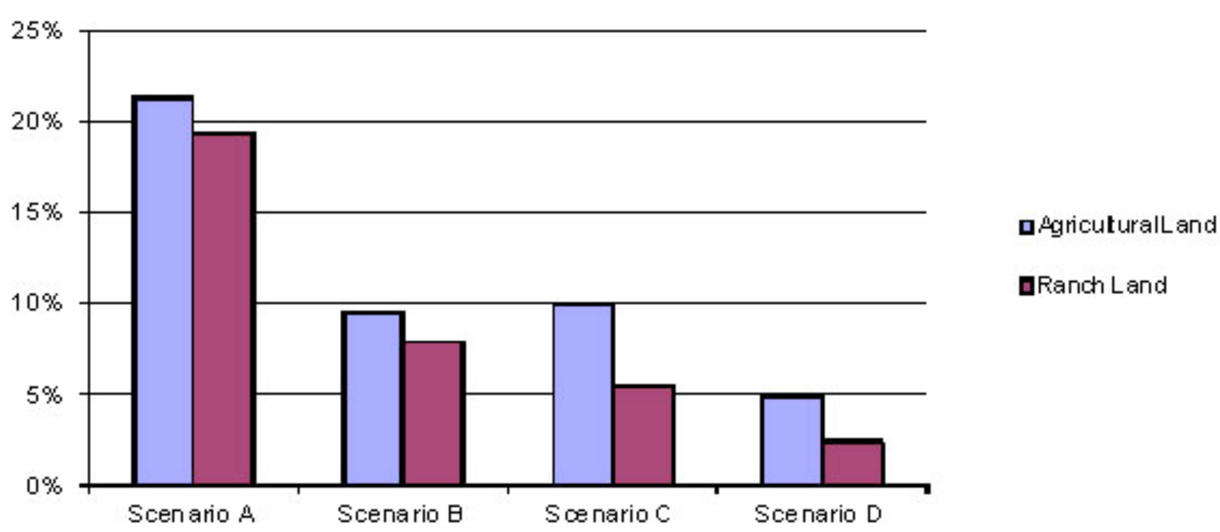
EQUATION

There is no equation for this indicator since the types of land where users may want to assess relative impact is so large. However, the scenario results are spatially distributed in the scenario layer, a quick summary of how new growth impacts a variety of sensitive areas can be calculated using common ArcGIS tools such as select by location or spatial joins.

Alternatively, the user can actually pre-populate the scenario layer with a variety of fields that contain the amount of unique sensitive lands in each planning geography. For example, a scenario layer based on parcels can include an attribute field that includes the number of acres of wetlands in each parcel. The user then can quickly summarize how many acres of wetlands have been "painted," or had a value assigned in the "dev_type" field.

Example Output:

Percent Loss of Agricultural and Range Land



SCENARIO INDICATORS

ACRES OF IMPERVIOUS SURFACE

WHAT DOES IT MEAN?

Impervious surface can have a negative impact on the health of a region's waterways. Instead of soaking in and filtering through the soil, rainwater runs off impervious surfaces, washing many polluting substances such as pesticides and oils into streams and other aqueous habitats. Increasing impervious surface runoff also increases the volume of runoff, and the speed which the water is delivered to streams, resulting in higher peak flows. This can be mitigated by better development practices.

EQUATION

Impervious Acres
Parking + building footprint + road acres

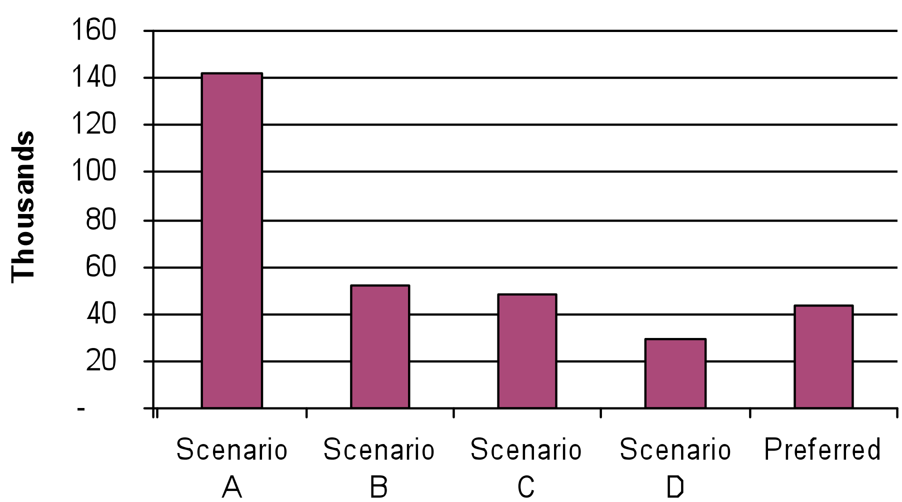
Percent Impervious Cover
(Parking + building footprint + road acres) / All land area acres

HOW IS IT MEASURED?

Each prototype building contains site-level impervious surface from building footprints and parking. In addition, each development type contains impervious surface area from streets and civic use. These elements are automatically summarized into an impervious surface coverage percentage for each development type. The number of new acres of impervious surface is automatically calculated by applying this percentage to newly developed acreage in a given scenario. This is combined with the existing impervious surface layer to assess total impervious surface between scenarios. The results can be easily exported for use in other models, such as storm water models.

Example Output:

Acres of Impervious Surface



SCENARIO INDICATORS

IMPERVIOUS COVER IN SPECIAL AREAS

WHAT DOES IT MEAN?

Impervious cover can have very different impacts depending on where it occurs. For example, increasing impervious cover in an aquifer recharge zone can impact aquifer capacity and quality, as well as surface water quality. Impervious cover increases in some watersheds, or parts of watersheds may have known adverse effects. Because of this Envision Tomorrow can be set to to report impervious cover in one or more polygons within the scenario.

EQUATION

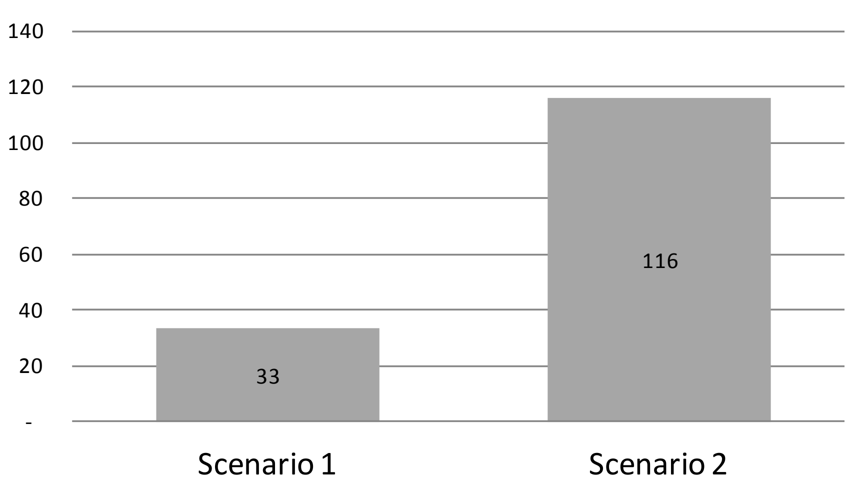
Similar to the loss of sensitive agricultural land indicator, there is no equation for calculating this indicator. However, each of the attributes of a scenario can be applied spatially to the scenario layer automatically. Impervious acres can be applied to the scenario layer and the user can quickly assess how much new impervious area has been added to specialized areas like aquifer recharge zones.

HOW IS IT MEASURED?

Each building type contains site-level impervious surface from buildings and adjacent parking. In addition, each development type contains street and civic use impervious surface area. These elements are automatically summarized into an impervious surface coverage percentage. Tracking the impervious area within these areas can be achieved quickly by assigning a unique attribute to the scenario layer for all cells within the aquifer zones or other zones and using the subarea function within Envision to view the scenario results only within those zones.

Example Output:

New Impervious Cover in Aquifer Recharge and Contributing Zones



SCENARIO INDICATORS

BUILDING ENERGY USE

WHAT DOES IT MEAN?

Building energy use measures the energy used for heating and cooling, hot water, and lighting, as well as general electricity use (computers, appliances, etc.). Building energy use can be costly in terms of both household budgets and environmental impact, so it is useful to compare the energy efficiency of buildings in each scenario. This is measured in terms of the amount of energy consumed per household or employee per year.

EQUATION

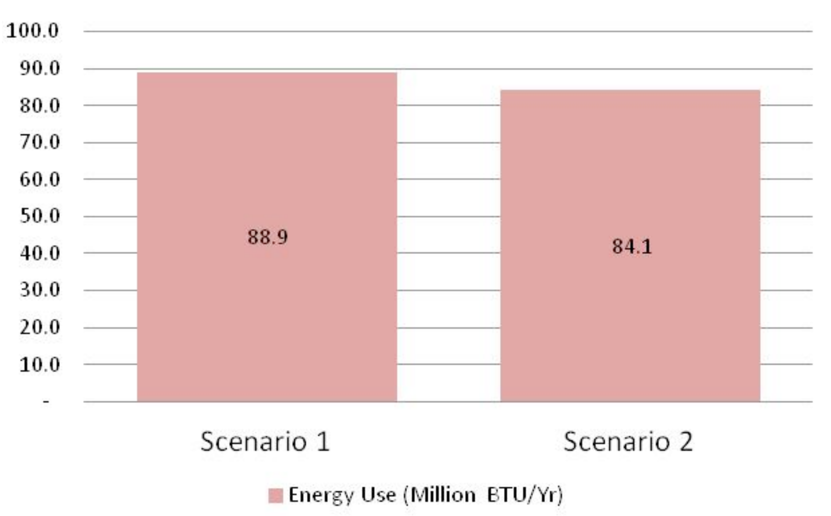
Building energy use is calculated based on several models developed by the University of Utah using the RECS data described above. The models include both heating and cooling models for single-family detached, single-family attached, other residential, commercial, office and public buildings. Each model includes specific coefficient values for a range of input variables by building type which are included in tables within the scenario spreadsheet for easy future updates.

HOW IS IT MEASURED?

The Residential Energy Consumption Survey from the U.S. Energy Information Administration provides regional averages for residential energy use per household. The regional average is weighted for each development type based on household square footage. The Commercial Buildings Energy Consumption Survey provides regional averages for commercial energy use per employee, broken down by employment type. A weighted average is calculated for retail, office, and industrial. These assumptions for both housing and employment are applied at the building level and automatically aggregated to the scenario level for evaluation. The user is able to easily change assumptions to better calibrate results for their locality.

Example Output:

Energy Use per Household



SCENARIO INDICATORS

CARBON EMISSIONS

WHAT DOES IT MEAN?

Carbon dioxide is one of the major contributors to global climate change and many communities are seeking to reduce their carbon footprints over time. To determine the carbon impact of buildings in a scenario, we can measure the amount of carbon dioxide emissions per household or employee per year from building energy use. The amount of carbon dioxide produced depends on the energy sources used for heating and electric systems. Coal emits more carbon dioxide per unit of energy than natural gas, while wind and solar emit no carbon dioxide at all.

HOW IS IT MEASURED?

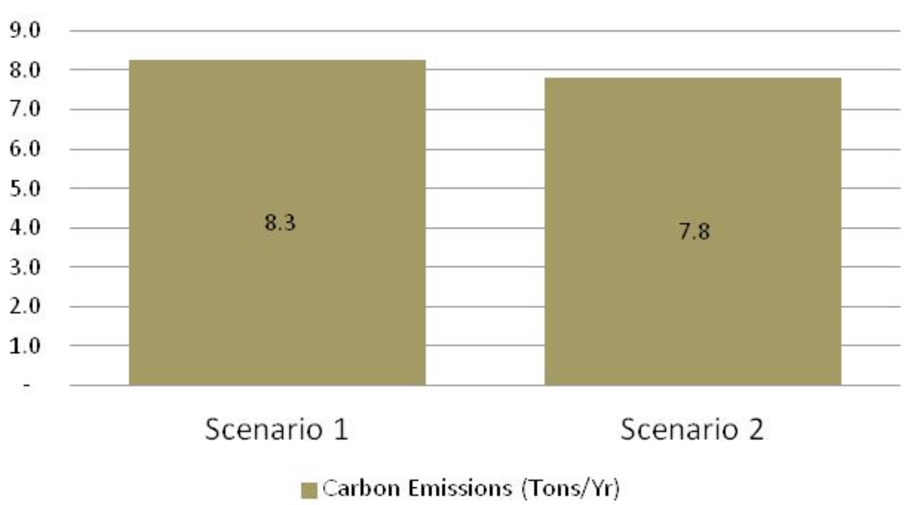
The Energy Information Administration provides values for tons of carbon dioxide emitted per million BTUs of energy use for each energy source (coal, propane, natural gas, etc.). The local mix of energy sources is used to determine the local value for carbon dioxide emissions, which is then applied to the building energy use figures. The user is able to easily change assumptions to better calibrate results for their locality.

EQUATION

Building Carbon Emissions = Total Building Energy Use * ((Fuel Type A % * Fuel Type A CO2 Tons per Year) + (Fuel Type B % * Fuel Type A CO2 Tons per Year))

Example Output:

Carbon Dioxide Emissions per Household



INTERNAL WATER CONSUMPTION

WHAT DOES IT MEAN?

Water consumption has a major impact both financially and environmentally. Water bills can make up a large proportion of household utility costs, and excessive water consumption can put a strain on water supplies and infrastructure, especially in regions with water scarcity. Internal water consumption by households and employees is therefore a key measure of sustainability.

HOW IS IT MEASURED?

National averages for water consumption per household by housing type and per employee by employment type are used to calculate an overall average for each scenario. The existing Envision Tomorrow model is being updated as part of the collaboration with both University of Utah and University of Texas at Austin. The user is able to easily change assumptions to better calibrate results for their locality.

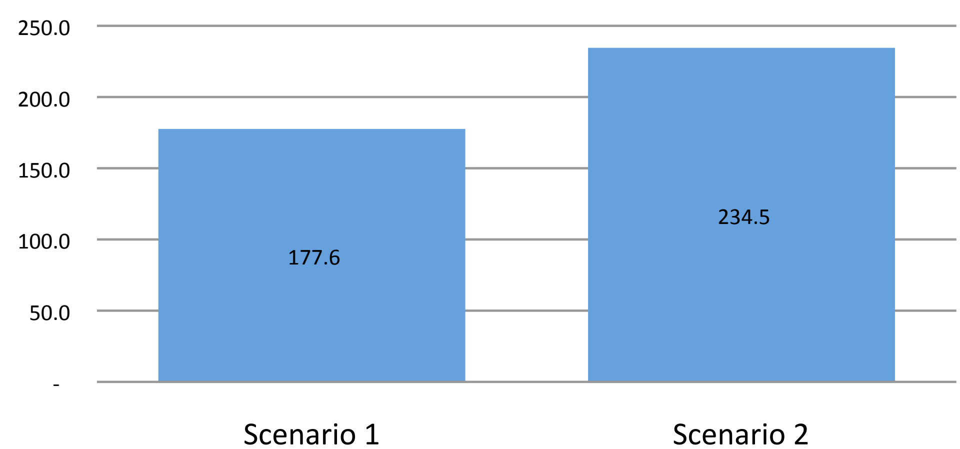
EQUATION

(Housing unit count by type * Gallons of internal water use by housing type per day)
+ (Employee count by type * Gallons of internal water use by employee type per day)

Note: A lookup table containing multipliers is included in the scenario spreadsheet and can be changed by users.

Example Output:

Internal Water Use per Household (gal/day)



LANDSCAPING WATER CONSUMPTION

WHAT DOES IT MEAN?

Water consumption has a major impact both financially and environmentally. Water bills can make up a large proportion of household utility costs, and excessive water consumption can put a strain on water supplies and infrastructure, especially in regions with water scarcity. A major driver of water use by households is the need to water yards and other landscaped areas.

HOW IS IT MEASURED?

A standard measure for the amount of water required per square foot of landscaped area is applied to the calculated amount of landscaping in each scenario to determine the total landscaping water consumption. The user can set maximum watered area assumptions and adjust the assumed amount of water used. The resulting landscaping water consumption is automatically calculated for each scenario.

EQUATION

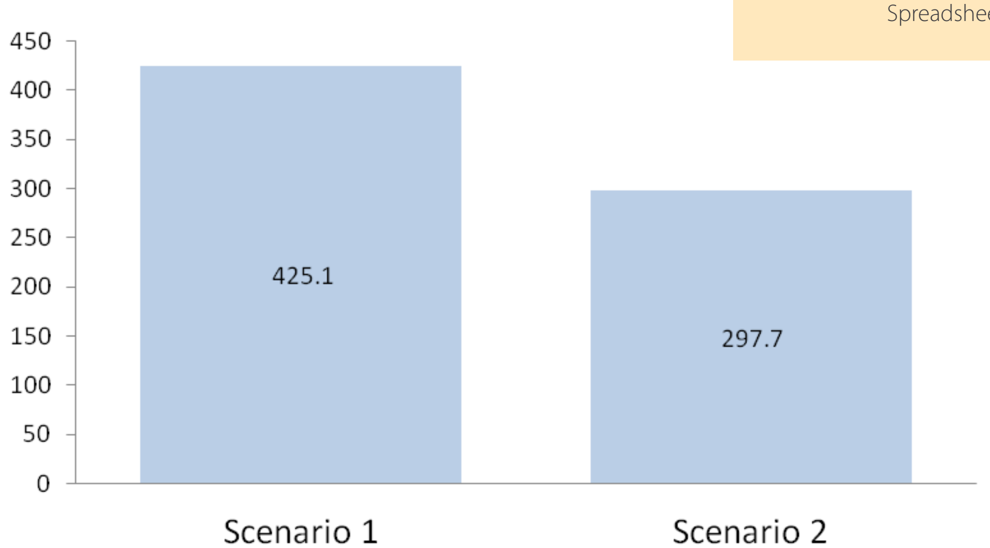
Building landscaped area (limited in size by maximum lawn area) * Gallons of water use per square foot of landscaped area per day

Notes: There is a user-defined input for "maximum lawn area" that can be included which restricts the lawn or landscape area assumed to be watered. For instance, a rural single family home may have a 5 acre lot size, but not all of it may be irrigated lawn or garden.

A lookup table containing multipliers is included in the Scenario Spreadsheet and can be changed by users.

Example Output:

Lanscaping Water Use per Household (gal/day)



SCENARIO INDICATORS

SOLID WASTE PRODUCTION

WHAT DOES IT MEAN?

Solid waste such as garbage, recycling, food, and yard waste requires both infrastructure and energy for transmission and disposal. Reduction of household and business solid waste production can reduce municipal costs as well as improve household budgets.

HOW IS IT MEASURED?

National averages for solid waste production per household by housing type and per employee by employment type are used to calculate an overall average for each scenario. The resulting solid waste production is calculated for each scenario automatically. The user is able to easily change assumptions to better calibrate results for their locality.

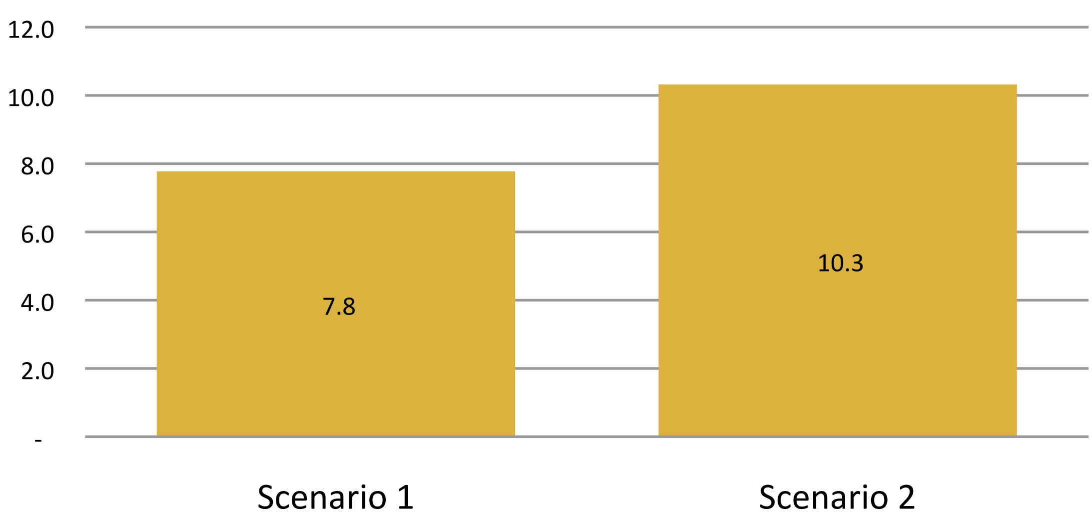
EQUATION

(Housing unit count by type * Pounds of solid waste produced by housing type per day)
+ (Employee count by type * Pounds of solid waste produced by employee type per day)

Note: A lookup table containing multipliers is included in the scenario spreadsheet and can be changed by users.

Example Output:

Solid Waste Production per Household (lbs/day)



SCENARIO INDICATORS

WASTE WATER PRODUCTION

WHAT DOES IT MEAN?

Costly public infrastructure systems are required to collect, store, and treat waste water. Sewer systems can be overburdened by excessive waste water production and treatment systems can be very expensive to build and upgrade. Reduction of waste water production can help reduce both household and municipal costs.

HOW IS IT MEASURED?

National averages for waste water production per household by housing type and per employee by employment type are used to calculate an overall average for each scenario. The user is able to easily change assumptions to better calibrate results for their locality. Waste water production is automatically calculated for each scenario.

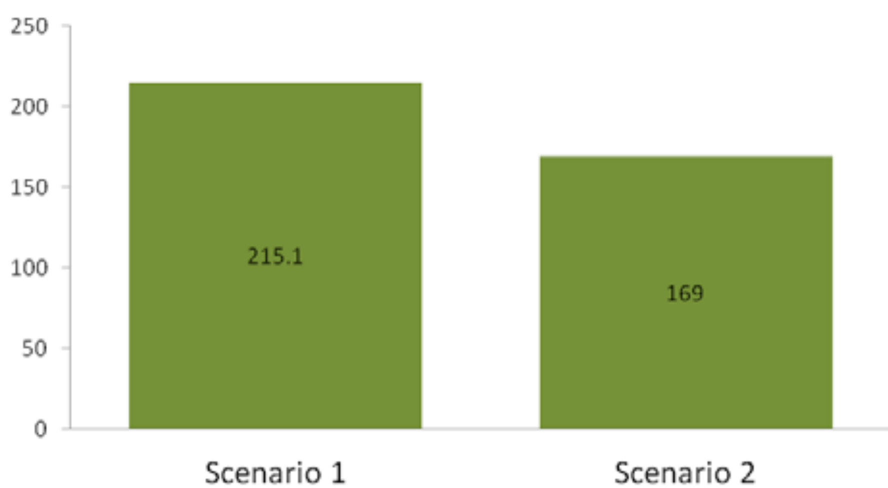
EQUATION

(Housing unit count by type * Gallons of waste water produced by housing type per day)
+ (Employee count by type * Gallons of waste water produced by employee type per day)

Note: A lookup table containing multipliers is included in the scenario spreadsheet and can be changed by users.

Example Output:

Water Water Production per Household (gal/day)



SCENARIO INDICATORS

7D MIXED-USE DEVELOPMENT TRIP GENERATION

WHAT DOES IT MEAN?

This indicator is used to estimate transportation outcomes of various development scenarios. It can show the trip generation effects of higher density, additional housing, and increased employment, for examples. It allows planners to assess scenarios based on transit trips, walking trips, vehicle trips, and total VMT.

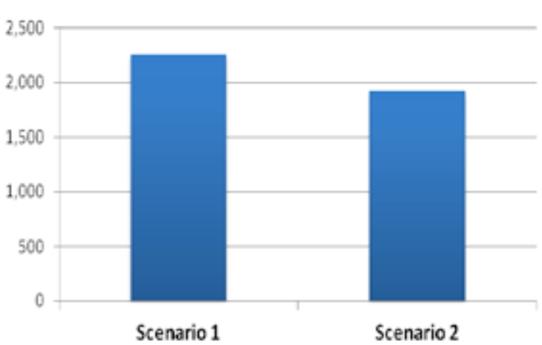
HOW IS IT MEASURED?

The 7D variables (including land use characteristics, built environment, demographics, and local and regional transit access) are used to derive trip estimates for each scenario. The model applies trip reductions and mode shifts to these initial estimates based on mixed-use efficiencies. A spreadsheet is generated showing the trips by mode, VMT, and mode split for each scenario.

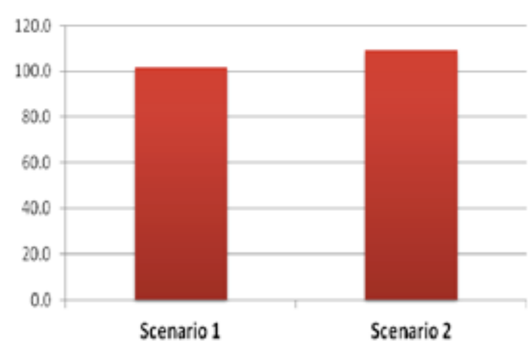
EQUATION

The 7D model includes several sets of equations. A detailed write-up will be available from Reid Ewing at the University of Utah in 2013.

Example Output:
Walk Trips



Example Output:
VMT



SCENARIO INDICATORS

REDEVELOPMENT CANDIDATE

WHAT DOES IT MEAN?

This indicator is used to find out which parcels in a given area are candidates for redevelopment in the short-to-medium term. This can help planners identify the parcels or neighborhoods that are ripe for redevelopment and predict which areas may be more suited for redevelopment at some time in the future. It can also help identify whether redevelopment candidates consist of small parcels or large parcels, and whether they are scattered or concentrated. The indicator generates a list of redevelopment candidates, but the list requires ground-truthing to eliminate historic, publicly owned, and low-value/high-income-generating properties from consideration.

HOW IS IT MEASURED?

The indicator uses two methods to determine time horizons for redevelopment potential. The depreciation schedule method compares building depreciation and land appreciation to determine when the building will become worth less than the land it sits on. The bottom quartile method identifies parcels that have low value compared to other properties in a given area. The indicator requires GIS data including a non-residential parcel layer with fields for effective year built, improvement value, land value, building lifespan, and annual land appreciation.

EQUATION

Method 1: Depreciation/Appreciation Method

Redevelopment Year =
((Improvement Value – Land Value) / ((Improvement Value / (Building Lifespan – (Current Year – Effective Year Built))) + (Land Value * (Land Appreciation / 100)))) + Current Year

3 Conditional Statements:
If ***land value*** is greater than ***improvement value***, then ***redevelopment year*** is equal to ***current year.***
If the ***current year*** minus ***effective year built*** is greater than the ***building lifespan***, then the ***redevelopment year*** is unknown. The result is 0. The building could be historic.
If the ***current year*** minus ***effective year built*** is equal to the ***building lifespan***, then the ***redevelopment year*** is the ***current year***. Otherwise the equation results in a divide by zero error.

Method 2: Bottom Quartile Method

Calculate the total value per square foot to a unique attribute field of the parcel layer:
(Building value/improvement value + land value) / Lot square feet

Instructions:
Change the symbology of the layer in ArcGIS to display the ***value per acre*** field in 4 quantiles, or quartiles. Double click the parcel layer, select the ***symbology tab***, select ***quantities*** on the left, select the field where you calculated ***total value***, change the number of classes to 4, click the ***classify button***, change the ***classification method*** to ***quantile***.

Example Usage:
Bottom Quartile Map

SCENARIO INDICATORS

ENHANCED ROI

WHAT DOES IT MEAN?

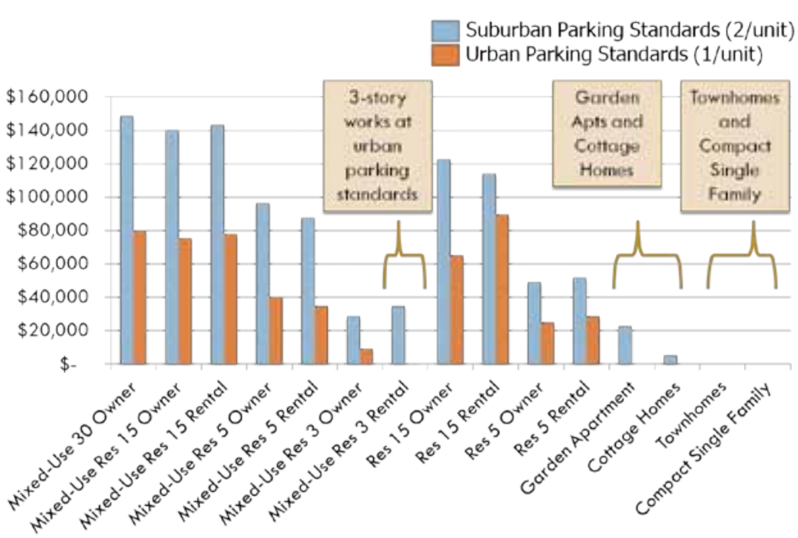
This indicator is used to analyze the market feasibility of planned building types. It helps planners determine whether zoning and development codes will actually result in desired development outcomes given current and future market conditions. It can also be used to identify how various policy changes affect building type feasibility and how much funding may be needed to make desired development types worth the investment. This can include direct subsidies for individual projects as well investments in public amenities that tend to increase average rents in a community and open up new development opportunities.

HOW IS IT MEASURED?

The indicator uses several kinds of data to assess the return on investment for different building types. Physical (height, unit size, parking requirements, etc.) and financial (land cost, average rents, parking costs, etc.) parameters are input into a pro-forma to determine a hypothetical developer's return on investment for a project. Leveraging tools such as loans, grants, and tax credits can be added to assess the impact of these tools on a project's return on investment. Public amenity investment can also be used as an input to determine the effect on rents and project feasibility. The ROI tool is used to create the library of building prototypes used during scenario creation.

Example Usage:

Suburban Parking vs. Urban Parking Standards (Subsidies per Unit)



EQUATION

There is no single equation for the ROI Model (Prototype Builder). The Enhanced ROI is a spreadsheet that contains many fairly simple equations. The Prototype Builder spreadsheet allows users to input building and site attributes to model the physical shell of a building. In addition, the spreadsheet utilizes cost and rent/sales price information to apply to the spaces inside the building shell and calculate a developer return (across a variety of metrics).

SCENARIO INDICATORS

BALANCED HOUSING

WHAT DOES IT MEAN?

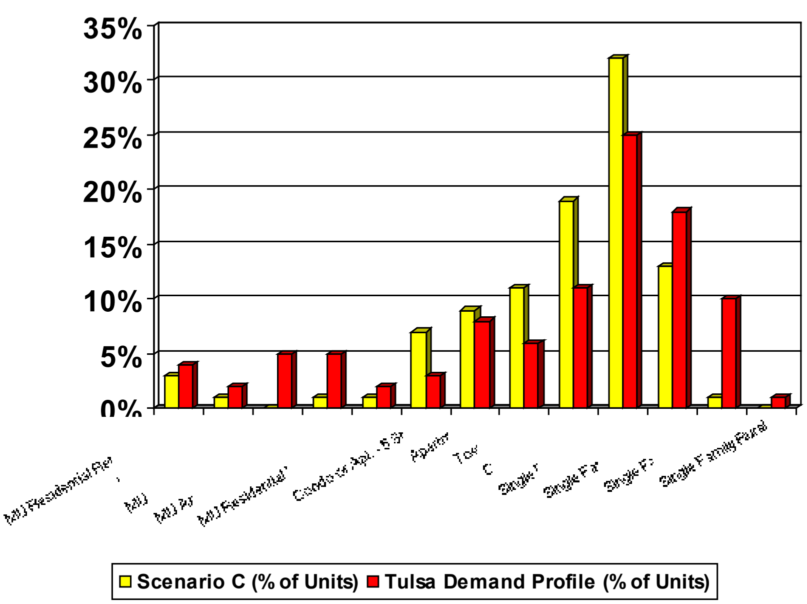
This indicator is used to analyze a community's existing housing supply, including the matches and mismatches by age, household income and tenure (rental or owner-occupied). It is also used to conduct a capacity analysis of development potential and a forecast of future age and income cohorts. Using this information, the app is used to create a series of policy and strategic recommendations for a balanced, sustainable future housing supply along with targeted goals that can be used to determine a community's future progress in implementing the plan.

HOW IS IT MEASURED?

Data from the American Community Survey is used to analyze the existing housing supply and demographics of the community. Local GIS Zoning data is used to determine the existing housing capacity, which is translated into income categories based on costs. Demographic forecasts are used to predict household growth by income category. The housing capacity is then compared to the future households to determine where matches and mismatches exist. Scenarios can be evaluated on how well or poorly their housing mix matches with anticipated future housing need. The policy recommendations are informed by household preference surveys and community goals.

Example Usage:

Comparison of Example Scenario Housing Mix to the Estimated Demand from the Balanced Housing Model



EQUATION

Similar to the Enhanced ROI indicator, the Balanced Housing indicator is an Excel spreadsheet that models current housing affordability and potential mismatches, as well as models future housing need based on forecast (total future population and households, preferably by age cohort) and existing demographic information from the US Census ACS files related to persons and households.

SCENARIO INDICATORS

WORKFORCE HOUSING

WHAT DOES IT MEAN?

This indicator is used to identify areas with an imbalance between housing and jobs, and between household income and worker wage. It will also show the impact of this spatial jobs-housing imbalance on trip generation. Scenarios can be compared in terms of how many people have the opportunity to live close to work and whether available jobs match the skill level of the local workforce.

HOW IS IT MEASURED?

The indicator uses census tract data, including number of households, workers, household income and worker income. The indicator generates summaries for each tract that include the balance within a 3-mile neighborhood. Data is aggregated for that tract and the portions of other tracts within the buffer. Jobs-worker balance and income balance are then calculated. The scenario process can be used to achieve higher levels of household to worker balance, and household income to worker wage balance.

EQUATION

Jobs Worker Balance Equation

Job Worker Balance = (Resident Workers- Workers) / (Resident Workers + Workers)

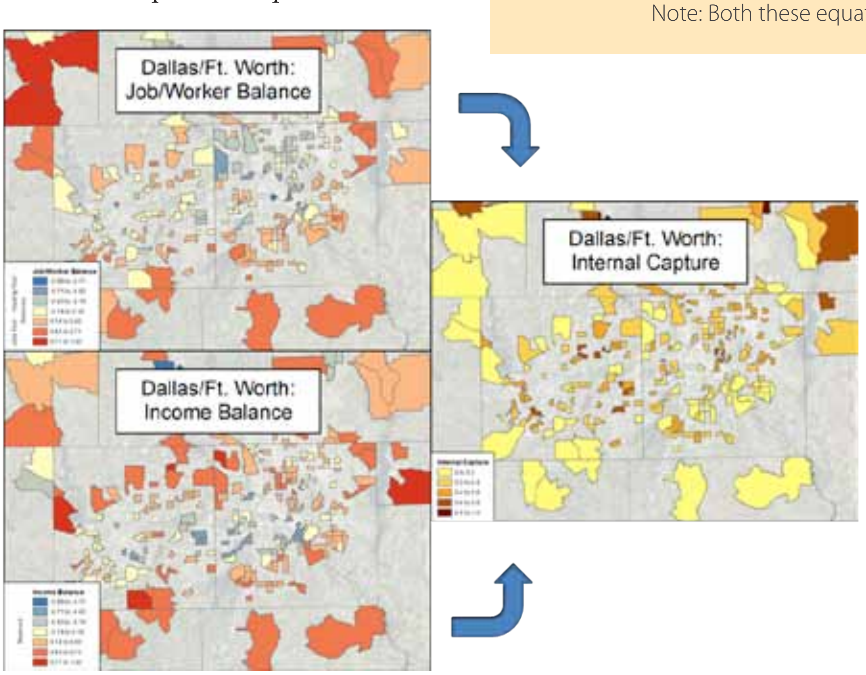
Income Balance Equation

(3-Mile weighted average income of residents - 3-mile weighted average income of workers) / (3-Mile weighted average income of residents + 3-mile weighted average income of workers)

Note: Both these equations should have a scale between -1 and 1.

Example Usage:

Internal Capture Maps



SCENARIO INDICATORS

FISCAL IMPACT MODEL

WHAT DOES IT MEAN?

This indicator is used to estimate the net fiscal impact to local governments of different development scenarios. It shows where there are opportunities to expand the tax base without needing to expand existing services. Scenarios can be evaluated based on how much positive future revenue they produce that can be invested in the community and used to leverage private investments.

HOW IS IT MEASURED?

The indicator is a stand-alone spreadsheet that integrates with the scenario spreadsheet outputs. The inputs include local tax rates, expenditures and insurance replacement value of education, utilities, and community facilities. The indicator uses this to calculate a per square foot cost of current services and infrastructure. The new development square feet for each scenario can then be assigned a cost to serve and evaluated. Total revenues and total costs generate the total fiscal revenue under each scenario.

EQUATION

The Fiscal Impact Model is a stand-alone spreadsheet that relies on user input to establish a baseline of current data and a Scenario Spreadsheet for the development program of alternative scenarios. The spreadsheet calculates a "level of service" expenditure and revenue figure per square foot of development based on the baseline data. These multipliers are applied to the scenario development program, which represents new growth, to calculate net revenues and expenditures in the future.

Example Usage:

Revenues to Costs Comparison