# Best Practices for SCS Scenario Development

## Scenario Calibration

When calibrating a base scenario, your key task will be adjusting the coefficients in Setup/parameters.csv. In this effort, it is helpful to keep an eye on performance indicator values (which can be reviewed in Logs/performance.log) and how they compare to target values. For reference, some relevant indicators from the 2018 SCS are included in the log file so observed results can be immediately compared to target values.

In general, the following method has tended to yield favorable results in the calibration process:

1. Establish and set targetYear
2. Begin the calibration process by setting the following parameters, which can be characterized as the “conceptual” variables that craft a scenario:
   1. Cube\_P
   2. HiDenPercentile
   3. RedevMinDen
   4. wtInfill
   5. wtCons
   6. wtDensity
   7. wtVMT
   8. wtBike
   9. wtTransit
   10. wtSOV
3. Next, run the tool and check the results in Logs/performance.log. Calibrate the results in roughly the following order:
   1. Get Infill roughly close to target by adjusting penaltyInfill
   2. Reduce/increase Redev% by increasing/decreasing penaltyRedev
   3. Reduce/increase MU by decreasing/increasing adjMU
   4. Reduce/increase MF by increasing/decreasing adjSF
   5. Reduce/increase TOD or DT by decreasing/increasing adjTOD or adjDT
   6. Reduce/increase RES DEN by increasing/decreasing penaltyDensity
   7. Reduce/increase Infill by increasing/decreasing penaltyInfill

Once the results are satisfactory for the target year, the tool can be run for any supported year by keeping all parameters constant except for targetYear.

## Scenario Strategy Implementation

Once a base scenario is calibrated, you can create variations on that base (i.e. scenarios) by tweaking certain parameters. There are five land use strategies referenced in the SCS to affect scenarios. Below is a general guide for how to implement these strategies:

* Limit Growth Footprint:
  + wtDensity: add +1 for moderate, +2 for priority
  + adjTOD: +0.01 for moderate, +0.02 for priority
  + adjDT: +0.01 for moderate, +0.02 for priority
* Efficient Land Uses:
  + adjMU: +0.02 for moderate, +0.04 for priority
* Equitable Redevelopment:
  + penaltyRedev: -0.04 for moderate, -0.08 for priority
* Range of Housing Options:
  + adjSF: -0.04 for moderate, -0.08 for priority
* Conserve Resource Land:
  + wtCons: +1 for moderate, +2 for priority

## Futures Implementation

### Implementing Futures in FutureGrowth

Once a scenario is calibrated, its parameters file can easily be adjusted to implement a Future by updating the following parameters:

* adjPOP: an adjustment factor that affects the population growth target
* adjEMP: an adjustment factor that affects the employment growth target
* adjRESDEN: an adjustment factor that affects residential density of all new growth
* adjEMPDEN: an adjustment factor that affects employment density of all new growth
* adjVacRate: an adjustment factor that affects residential vacancy rate region-wide (very sensitive)
* adjUrban: an adjustment factor that determines the percentage of additional population and employment growth granted to (or taken from) Fresno and Clovis at the expense (or to the benefit) of the other cities and the unincorporated areas.

These values can be derived by comparing base REMI results to like results from an implemented Future. See the REMI implementation guide for more information.

Currently, the three Futures can be implemented as follows:

* Extreme Climate:
  + adjPOP: -0.019351417
  + adjEMP: -0.200306
  + adjVacRate: 0.0002
* High-Tech Innovation:
  + adjPOP: 0.164432794696993
  + adjEMP: 0.536010943628289
  + adjVacRate: -0.0016
* Regulatory Challenges:
  + adjPOP: -0.100436402629223
  + adjEMP: -0.261768521551282
  + adjVacRate: 0.001

### Implementing Futures in PopulationSim

The Futures summary spreadsheet provides a COVID\_P value. If this value is greater than 0, you may implement it in a PopulationSim run by setting these two variables in RunAll.bat:

* SET RUN\_WORKER\_ADJ=YES (currently line 27)
* SET COVID\_P=x.xx (replace x’s with desired value, currently line 66)

Currently, the three Futures can be implemented as follows:

* Extreme Climate:
  + COVID\_P: 0.063933
* High-Tech Innovation:
  + COVID\_P: 0 (not implemented)
* Regulatory Challenges:
  + COVID\_P: 0.040625

### Implementing Futures in Project Scenario Tool

Finally, the Futures summary spreadsheet also provides an Inflation value. This value can be entered into Funding Inflation (SUMMARY:J7) to generate summaries for an updated constrained project list.

Currently, the three Futures can be implemented as follows:

* Extreme Climate:
  + Inflation: 1.74%
* High-Tech Innovation:
  + Inflation: 2.39%
* Regulatory Challenges:
  + Inflation: 1.84%

## Documenting and Recording Results

The most critical outputs can be found in Setup/Outputs and include the following files:

* PopulationSim input files:
  + countyData.csv
  + gq\_maz.csv
  + mazData.csv
  + tazData.csv
* ABM input files:
  + FCxx\_Base\_SE\_Detail.csv
  + Maz\_20xx\_parks.csv

In addition, Setup/Data/devtable.csv is also important, as it represents parcel-level development information that is relevant to spatial analysis, and of course Setup/parameters.csv is important as well.

The following methodology for documenting and saving tool results is recommended to ensure thorough recordkeeping balanced with storage considerations:

* For each scenario, create a folder in Scenarios. In this folder, copy the files Setup/parameters.csv and Setup/Data/devtable.csv. Also, create a subfolder for each target year.
* In each subfolder, copy both the Output folder and the Logs folder for the relevant run.