**Create a Commercial Land Mask  
*Summary:***

* Create a 200 m resolution boolean grid representing likely commercial land use based on locations of known commercial facilities and the ratio of night time to day time population
* This grid will be used for two purposes:
  + To resample/reallocate commercial load from service territories to counties
  + To identify the distribution of available wind resource within a given county for commercial areas

***Processing***

Notes:

* ArcGIS processing performed in ./mxd/commercial\_land\_mask\_us.mxd. and ./mxd/commercial\_land\_mask\_resampling\_us.mxd
* In Postgres, processing performed in S:\mgleason\DG\_Wind\SQL\commercial\_load\commercial\_land\_mask sql files

Steps:

* In ArcGIS, calculate night time/day time population ratio grid from Landscan 2011
  + Calculate night/day instead of day/night for two reasons: 1) consistency with the residential land mask process, 2) areas with no day time population will show up as no-data, which is good because we want to ignore them
  + If done naively, areas with no daytime population will either show up as NoData or zero (when night time population is zero). To make sure they always show up consistently as No data, use:
  + Raster Calculator: Con(IsNull("conus\_day") != 1,"conus\_night"/"conus\_day")
    - 🡪 F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\nightpop\_to\_daypop\_ratio\us\_nd\_ratio
    - F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\nightpop\_to\_daypop\_ratio\hi\_nd\_ratio
    - F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\nightpop\_to\_daypop\_ratio\ak\_nd\_ratio
* Load ratio raster to postgres --> dg\_wind.ls2012\_popratio\_nightday\_us\_100x100
* Isolate known commercial locations using navtec points with factypes associated with commercial building types and hsip points with 2-digit naics codes associated with commercial activities --> dg\_wind.hsip\_and\_navteq\_commercial\_facilities
* Create a version of the commercial locations where all points are buffered by 90m (but polygons remain unchanged)🡪 dg\_wind.hsip\_and\_navteq\_commercial\_facility\_buffers
* Export results to three shapefiles (too large to put to one shapefile ) 🡪
  + S:\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\commercial\_facility\_polygons\hsip\_and\_navteq\_commercial\_facility\_buffers\_partN.shp
* In ArcGIS, merge the three shapefiles into a single geodatabase feature class 🡪
  + F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\commercial\_facility\_polygons\commercial\_facs.gdb\commercial\_facilities\_combined
* Dissolve the merge feature class, add a field “commercial”, and calculate it = 1
  + F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\commercial\_facility\_polygons\commercial\_facs.gdb\comm\_facilities\_dissolved
* Convert to Raster (Polygon to Raster with cell center option)
  + F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\commercial\_facility\_polygons\comfac\_us
* In postgres, Extract daytime/nighttime pop ratio to the commercial facilities (points only) --> dg\_wind.hsip\_and\_navteq\_commercial\_pts\_conus\_pop\_ratio\_nightday
* Review distribution in R and in ArcGIS to determine a reasonable threshold for nighttime/daytime pop that can be used to isolate commercial areas
  + Cut it at <=1.05
  + This provides some overlap with residential to account for mixed use (e.g., shops on the bottom floor and apartments above), it also corresponds to fairly well to observed patterns in the distribution of ratios at known commercial points and observed geographic patterns
* In ArcGIS, Reclassify the ratio grid using the threshold identified in the previous step to create a first cut at the boolean commercial grid
  + In arcgis, raster calculator:
    - Con(IsNull("us\_nd\_ratio"),0,"us\_nd\_ratio"<=1.05)
* Combine the facilities grid and thresholded ratio grid to create the final boolean commercial raster
  + Be sure to set a raster MASK to the daypop raster to ensure that areas in Canada/mexico are ignored
  + Con(("hi\_iscom" == 1) | Con(IsNull("comfac\_hi"),0,1),1)
  + 🡪 F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\combined\commask\_us
* In ArcGIS, resample/project to 200 m resolution and registration consistent with gcf data with nearest neighbor resampling
  + 🡪 F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\combined\commaskus200m
  + \*\* this is the final commercial land mask
* Convert to points
  + F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\combined\comm\_points.gdb\comm\_points\_200m\_us
* Export points to ASCII txt file
  + F:\data\mgleason\DG\_Wind\Data\Analysis\commercial\_land\_mask\combined\comm\_points\_200m\_us.txt
* Load grid and points to postgres for further analyses
  + Grid 🡪 dg\_wind.commercial\_land\_mask\_500x500
  + Points 🡪 wind\_ds.pt\_grid\_us\_com