---------- DATASET SELECTION AND SETUP ----------

NOTE: The Logistic_Regression_Model.py script MUST be executed
prior to running the Cellular_Automata_Model.py script.
If one wishes to execute the model over states that
contain zero commercial wind farms (Louisiana, Mississippi
Alabama, Georgia, South Carolina, Kentucky), states that possess
wind farms in only one grid cell at all but the highest spatial
resolutions (Arkansas, Florida, Virginia, Delaware, Connecticut,
New Jersey, Tennessee), or states at low spatial resolutions at which
too many predictors were removed due to collinearity (Rhode Island
at the 100th or 80th percentile), the Logistic_Regression_Model.py
script must be executed for the CONUS.

Specified study region: Indiana
Specified wind farm density: 85 acres/MW
Specified wind power capacity: 100th percentile (525 MW)

The constraints and neighborhood effects from the previous model run
have not been changed. A hexagonal neighborhood range of 3
grid cell(s) is thus retained, along with the following constraints:
['No wind farms within 2000 meters of an airport.', 'No wind farms within 15000 meters of a power plant.', 'No wind farms within 500 meters of a major road.', 'No wind farms more than 20000 meters from a major road.', 'No wind farms within 500 meters of a major transmission line.', 'No wind farms more than 20000 meters from a major transmission line.', 'No wind farms in grid cells with an average wind speed 80 meters above ground less than 3 meters per second.', 'Wind farm development is prohibited in grid cells shared by military bases.', 'Wind farm development is prohibited in grid cells shared by national parks.', 'Wind farm development is prohibited in grid cells shared by USFWS critical habitats.', 'Wind farm development is prohibited in grid cells shared by USFWS wildlife refuges.', 'Wind farm development is prohibited in grid cells shared by tribal land.']

The following predictor configurations were selected by the user:
['Full', 'No_Wind']

The user specified a custom gained wind farm capacity of 2500 MW every 5 years,
which based on model resolution (100th percentile, 525MW) translates to 5 new wind farms per model iteration.

---------- SCENARIO CONSTRUCTION ----------

The following are the scenarios selected by the user
(see Model Instructions for scenario details):
['CLIMATE_CHANGE', 'DEMOGRAPHIC_CHANGES', 'SOCIOPOLITICAL_LANDSCAPE', 'NATURAL_AND_CULTURAL_PROTECTION']

---------- MODEL PROJECTION: Null ----------

Filepath to the constructed hexagonal grid map:

D:\Dissertation_Resources\Model_Testing\Constraints_and_Neighborhood_Effects\Hexagon_Grid_85_acres_per_MW_100th_percentile_Indiana.gdb\Hexagon_Grid_85_acres_per_MW_100th_percentile_Indiana_Constraints_Neighborhoods

---------- MODEL PROJECTION: Full ----------

Coefficient changes under the selected scenario when applying the Full predictor configuration:

| | Predictors | Coeff_Change_(%) | ... | Coeff_2045 | Coeff_2050 |
|---|---|---|---|---|---|
| 0 | Avg_Elevat | 0 | ... | -0.523482 | -0.523482 |
| 1 | Avg_Temp | 10 | ... | -0.294820 | -0.265338 |
| 2 | Avg_Wind | 10 | ... | 2.118074 | 2.329882 |
| 3 | Bat_Count | -10 | ... | -0.130263 | -0.143289 |
| 4 | Bird_Count | -10 | ... | -1.610006 | -1.771007 |
| 5 | Critical | -10 | ... | 0.241107 | 0.216996 |
| 6 | Type_15_19 | 0 | ... | 0.793625 | 0.793625 |
| 7 | Historical | -10 | ... | -0.157192 | -0.172912 |
| 8 | Military | 0 | ... | 0.589572 | 0.589572 |
| 9 | Mining | 0 | ... | -1.431692 | -1.431692 |
| 10 | Nat_Parks | -10 | ... | -0.618871 | -0.680758 |
| 11 | Near_Air | 0 | ... | 0.285588 | 0.285588 |
| 12 | Near_Plant | 0 | ... | 0.080833 | 0.080833 |
| 13 | Near_Roads | 0 | ... | 0.156328 | 0.156328 |
| 14 | Near_Sch | 0 | ... | -0.258780 | -0.258780 |
| 15 | Near_Trans | 0 | ... | 0.523574 | 0.523574 |
| 16 | Near_Hosp | 0 | ... | 0.284254 | 0.284254 |
| 17 | Fem_15_19 | 10 | ... | 0.006586 | 0.007245 |
| 18 | Hisp_15_19 | 10 | ... | 0.529305 | 0.582236 |
| 19 | Avg_25 | 10 | ... | -0.069519 | -0.062567 |
| 20 | Whit_15_19 | -10 | ... | 0.506229 | 0.455606 |
| 21 | Dens_15_19 | 0 | ... | -0.034292 | -0.034292 |
| 22 | Plant_Year | 0 | ... | -0.324657 | -0.324657 |
| 23 | Dem_Wins | 10 | ... | -0.285427 | -0.256884 |
| 24 | supp_2018 | 10 | ... | 1.457957 | 1.603753 |
| 25 | Prop_Rugg | 0 | ... | -1.061243 | -1.061243 |
| 26 | Trib_Land | -10 | ... | -0.175184 | -0.192702 |
| 27 | Unem_15_19 | 0 | ... | 0.498987 | 0.498987 |
| 28 | Wild_Refug | -10 | ... | 0.413504 | 0.372153 |
| 29 | Farm_Year | 0 | ... | -0.196794 | -0.196794 |

[30 rows x 9 columns]

Predictors removed from the model based on having a constant value in all grid cells: None

Filepath to the constructed hexagonal grid map:

D:\Dissertation_Resources\Model_Testing\Constraints_and_Neighborhood_Effects\Hexagon_Grid_85_acres_per_MW_100th_percentile_Indiana.gdb\Hexagon_Grid_85_acres_per_MW_100th_percentile_Indiana_Constraints_Neighborhoods

QADI table produced by comparing projections forced by the
Null versus Full predictor configurations:

Grid Cell Projections (Null Configuration)

Grid Cell Projections (Full Configuration)

| | NoFarm | Y(2025) | Y(2030) | Y(2035) | Y(2040) | Y(2045) | Y(2050) | Sum |
|---|---|---|---|---|---|---|---|---|
| NoFarm | 357 | 0 | 1 | 1 | 2 | 2 | 1 | 364 |
| Y(2025) | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 5 |
| Y(2030) | 0 | 1 | 2 | 2 | 0 | 0 | 0 | 5 |
| Y(2035) | 0 | 0 | 0 | 1 | 3 | 1 | 0 | 5 |
| Y(2040) | 0 | 1 | 0 | 1 | 0 | 1 | 2 | 5 |
| Y(2045) | 3 | 0 | 0 | 0 | 0 | 0 | 2 | 5 |
| Y(2050) | 4 | 0 | 0 | 0 | 0 | 1 | 0 | 5 |
| Sum | 364 | 5 | 5 | 5 | 5 | 5 | 5 | 394 |

*Quantity Disagreement: 0* *Allocation Disagreement: 31*

*QADI Index: 0.079*

---------- MODEL PROJECTION: No_Wind ----------

Coefficient changes under the selected scenario when applying the No_Wind predictor configuration:

| | Predictors | Coeff_Change_(%) | ... | Coeff_2045 | Coeff_2050 |
|---|---|---|---|---|---|
| 0 | Avg_Elevat | 0 | ... | 0.074983 | 0.074983 |
| 1 | Avg_Temp | 10 | ... | -0.320944 | -0.288849 |
| 2 | Bat_Count | -10 | ... | -0.255154 | -0.280669 |
| 3 | Bird_Count | -10 | ... | -1.802695 | -1.982965 |
| 4 | Critical | -10 | ... | 0.222165 | 0.199948 |
| 5 | Type_15_19 | 0 | ... | 0.674383 | 0.674383 |
| 6 | Historical | -10 | ... | -0.235184 | -0.258702 |
| 7 | Military | 0 | ... | 0.601035 | 0.601035 |
| 8 | Mining | 0 | ... | -1.223741 | -1.223741 |
| 9 | Nat_Parks | -10 | ... | -0.407217 | -0.447939 |
| 10 | Near_Air | 0 | ... | 0.256439 | 0.256439 |
| 11 | Near_Plant | 0 | ... | 0.151401 | 0.151401 |
| 12 | Near_Roads | 0 | ... | 0.112543 | 0.112543 |
| 13 | Near_Sch | 0 | ... | -0.207303 | -0.207303 |
| 14 | Near_Trans | 0 | ... | 0.524056 | 0.524056 |
| 15 | Near_Hosp | 0 | ... | 0.442366 | 0.442366 |
| 16 | Fem_15_19 | 10 | ... | -0.026683 | -0.024015 |

| | | | | | |
|---|---|---|---|---|---|
| 17 | Hisp_15_19 | 10 | ... | 0.704906 | 0.775397 |
| 18 | Avg_25 | 10 | ... | -0.101550 | -0.091395 |
| 19 | Whit_15_19 | -10 | ... | 0.516311 | 0.464680 |
| 20 | Dens_15_19 | 0 | ... | -0.179760 | -0.179760 |
| 21 | Plant_Year | 0 | ... | -0.320183 | -0.320183 |
| 22 | Dem_Wins | 10 | ... | -0.264187 | -0.237768 |
| 23 | supp_2018 | 10 | ... | 1.826726 | 2.009399 |
| 24 | Prop_Rugg | 0 | ... | -1.605261 | -1.605261 |
| 25 | Trib_Land | -10 | ... | -0.113987 | -0.125385 |
| 26 | Unem_15_19 | 0 | ... | 0.566459 | 0.566459 |
| 27 | Wild_Refug | -10 | ... | 0.138113 | 0.124301 |
| 28 | Farm_Year | 0 | ... | -0.175766 | -0.175766 |

[29 rows x 9 columns]

Predictors removed from the model based on having a constant value in all grid cells: None

Filepath to the constructed hexagonal grid map:

D:\Dissertation_Resources\Model_Testing\Constraints_and_Neighborhood_Effects\Hexagon_Grid_85_acres_per_MW_100th_percentile_Indiana.gdb\Hexagon_Grid_85_acres_per_MW_100th_percentile_Indiana_Constraints_Neighborhoods

QADI table produced by comparing projections forced by the
Null versus No_Wind predictor configurations:

## Grid Cell Projections (Null Configuration)

Grid Cell Projections (No_Wind Configuration)

| | NoFarm | Y(2025) | Y(2030) | Y(2035) | Y(2040) | Y(2045) | Y(2050) | Sum |
|---|---|---|---|---|---|---|---|---|
| **NoFarm** | 357 | 0 | 1 | 2 | 2 | 2 | 0 | 364 |
| **Y(2025)** | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 5 |
| **Y(2030)** | 0 | 1 | 2 | 1 | 1 | 0 | 0 | 5 |
| **Y(2035)** | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 5 |
| **Y(2040)** | 2 | 0 | 0 | 0 | 1 | 0 | 2 | 5 |
| **Y(2045)** | 2 | 0 | 0 | 1 | 0 | 1 | 1 | 5 |
| **Y(2050)** | 3 | 0 | 0 | 0 | 0 | 1 | 1 | 5 |
| **Sum** | 364 | 5 | 5 | 5 | 5 | 5 | 5 | 394 |

*Quantity Disagreement: 0*

*Allocation Disagreement: 28*

*QADI Index: 0.071*