



MID-OHIO REGIONAL
MORPC
PLANNING COMMISSION

111 Liberty St., Suite 100
Columbus, Ohio 43215
www.morpc.org

**NOTICE OF A MEETING
REGIONAL INFORMATION & DATA GROUP
MID-OHIO REGIONAL PLANNING COMMISSION
111 Liberty Street, Columbus, Ohio 43215**

**HYBRID MEETING
May 30, 2024, 2:30 pm**

AGENDA

Welcome & Introductions

Ethan Hug opened the meeting with a welcome to both in-person and online attendees.

Fun infographics discussion

To foster engagement, Ethan led an interactive introduction exercise centered on a data visualization of Airbnb occupancy during the April 8, 2024, solar eclipse. Attendees shared their eclipse experiences, highlighting the personal relevance of data. A second infographic showing the relationship between multifamily housing construction and rent changes across U.S. metros prompted a discussion on housing supply, affordability, and policy implications. Dave Dixon noted the importance of understanding supply-demand dynamics and suggested exploring comparative data from cities like Austin and Phoenix. A Member raised questions about Austin's development policies, prompting Dave to share insights from conversations with consultants. Member Moore added context from research on housing market dynamics, noting that building high-end housing can positively affect affordability across the market.

Call for proposals

Ethan encouraged RIDG Members to propose presentations for future meetings. The Steering Committee seeks contributions that showcase data-driven projects, technical skills, or collaborative efforts. Members were invited to contact Ethan directly with ideas or to nominate colleagues.

MORPC Updates – Dave Dixon

RDAC Working Groups Updates

Dave provided updates on the Regional Data Advisory Committee (RDAC) and its Working Groups. He outlined the Committee's role in guiding MORPC's data and mapping initiatives and described five active working groups:

- Regional Data Coaches
- Workforce & Job Quality Tracking
- DEI & Data
- Day-to-Day (annual data event planning)
- Cybersecurity
- Regional Data Coaches

William Murdock, AICP
Executive Director

Chris Amorose Groomes
Chair

Michelle Crandall
Vice Chair

Ben Kessler
Secretary

He highlighted the Regional Data Coaches initiative, which aims to support smaller governments and nonprofits with limited data capacity. The Working Group is recruiting volunteer advisors across various subject areas to provide short-term, ad hoc assistance. Dave encouraged interested Members to contact Raj Roy (RRoy@morpc.org) for more information.

Topic Discussion

Looking Forward to 2050: An Overview of MORPC's Forecasting Process

This discussion will provide an overview of the process used to create MORPC's latest forecasts. The forecasts span from 2025 to 2050 and are available for counties and Traffic Analysis Zones for most variables. While primarily supporting MORPC's evaluation of transportation projects, these forecasts are used by other communities and agencies for a variety of applications which depend on an understanding of potential changes coming to the region.

Adam Porr presented an in-depth overview of MORPC's demographic and employment forecasting process, which supports the Metropolitan Transportation Plan (MTP). The forecasts span 2025–2050 and are produced at both county and Traffic Analysis Zone (TAZ) levels. The methodology begins with county-level projections using a modified ARIMA model, which includes confidence intervals and adjustments for major developments like the Intel project. These county forecasts serve as control totals for more granular TAZ forecasts.

The process incorporates land use data, existing household and employment conditions, and a utility-based model to simulate growth allocation using Monte Carlo simulations. Adam explained how the model accounts for development potential, environmental constraints, and infrastructure access. The results are reviewed by local communities and refined based on feedback. He concluded by noting areas for future improvement, including modeling additional economic developments and climate migration.

A Member asked about the asymmetry in confidence intervals, prompting a technical explanation involving the ARIMA model's differentiation process. Another Member inquired about comparisons with other MPOs, to which Adam responded that while MORPC uses a custom model, most MPOs in Ohio use the state's cohort-component model unless they justify an alternative.

Be Sensitive: A Practical Walkthrough to Conducting Sensitivity Analysis

-- *Rob Moore, Scioto Analysis*

This presentation will cover sensitivity analysis and how to apply it in the conduct of quantitative analysis and evaluation. Included will be a demonstration on Monte Carlo Simulation, the gold standard practice of sensitivity analysis in cost-benefit analysis.

Member Moore delivered a live demonstration of Monte Carlo simulation as a method for sensitivity analysis in cost-benefit evaluations. Using a hypothetical zoning reform policy, Member Moore illustrated how to simulate a range of outcomes by assigning random values to benefits and costs within defined ranges. He showed how to calculate net present value across 10,000 simulations and interpret the results using percentiles. The demonstration emphasized the accessibility of Monte Carlo methods using basic Excel functions and highlighted their value in understanding uncertainty and robustness in policy analysis.

A Member asked about modeling non-uniform distributions, to which Member Moore acknowledged that more advanced tools like R offer greater flexibility, though Excel can be adapted with additional effort.

Closing Remarks / Adjourn

Future Meetings

- Steering Committee: Tuesday, July 9, 2024 @ 2:30pm (After RDAC)
- General meeting: August 14, 2024 @ 2:30pm

Adjourn

Please notify Lynn Kaufman at 614-233-4189 or LKaufman@morpc.org to confirm your attendance for this meeting or if you require special assistance.

**The next RIDG meeting will be August 14, 2024, 2:30 - 4:00 pm
IN-PERSON**



Mid-Ohio Regional Planning Commission

Regional Information & Data Group Attendance

May 29, 2024, 2:30 pm

Members Present

Emily Canan, One Columbus
Kirby Dearth, City of Dublin
Shoreh Elhami, City of Columbus
Michael Farrar, City of Westerville
Sam Filkins, Knox County Area Development
Foundation
Brad Fisher, Delaware County Regional
Planning Commission
Samantha Grevas, JobsOhio
Kerstin Haller, Rev1 Ventures
R. Hansard
Stephanie Joseph, SourcePoint
Mayor Jeff Kinnell, Village of Galena
Juliet Klein, Rev1 Ventures
Eric Kogge, Licking County

Robert Kramer, Southwestern City Schools
Bill LaFayette, Regionomics, LLC
Sam McLaughlin, JobsOhio
Rob Moore, Scioto Analysis
Tom Noorkah, City of Columbus
Natasha Pongonis, Envisify Global Intelligence
Julie Pruett, City of Columbus
Randy Reames, All Aboard Ohio
Brittany Ring, City of Columbus
Kyle Schaper, Licking County
Rick Wagner, City of Columbus
Fara Waugh, SourcePoint
Darlene Wildes, City of Columbus
Andrew Wilson, City of Hilliard

MORPC Staff Present

Dave Dixon

Ethan Hug

Lynn Kaufman

Adam Porr

RIDG

Regional Information and Data Group

May 29, 2024, 2:30 – 4:00pm



MID-OHIO REGIONAL
MORPC
PLANNING COMMISSION

Agenda

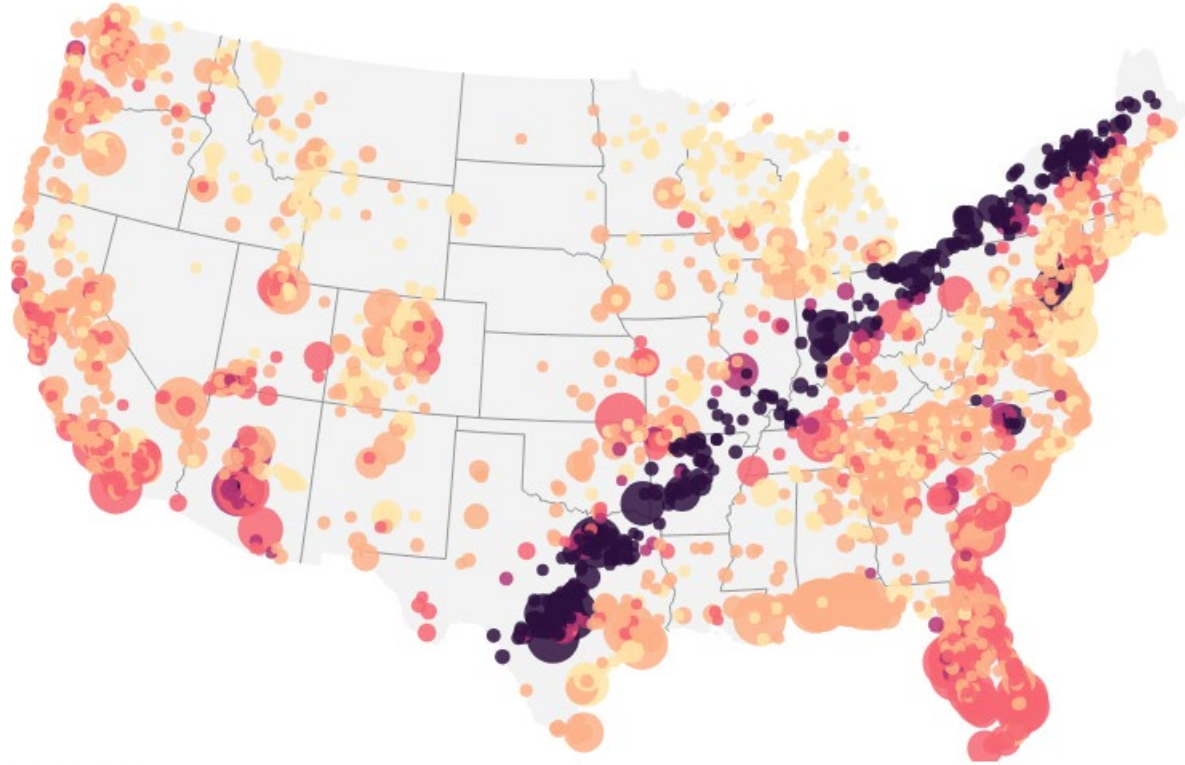
- Welcome and Introductions
 - Fun infographics
 - Call for proposals
- RDAC Updates
 - Working Groups
 - Regional Data Coaches
- Topics:
 1. Looking Forward to 2050: An Overview of MORPC's Forecasting Process
 2. Be Sensitive: A Practical Walkthrough to Conducting Sensitivity Analysis
- Closing and Future Meetings
 - Steering Committee: Tuesday, July 9, 2024 @ 2:30pm (After RDAC)
 - General meeting: August 14, 2024 @ 2:30pm

Share of Airbnb and Vrbo listings booked ahead of the April 8 eclipse



MORPC

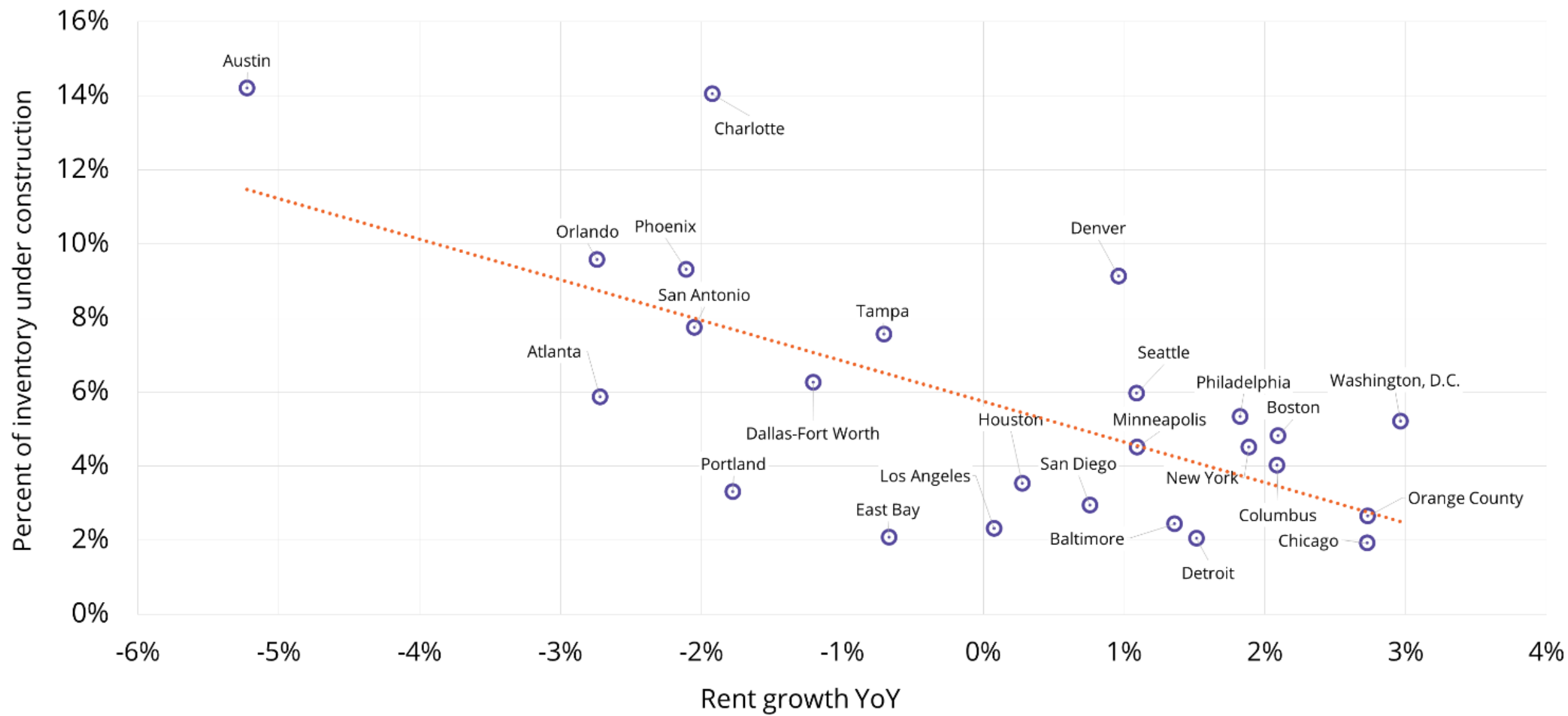
Bookings on April 7, 2024, among cities with at least 50 listings



Listings



Multifamily units under construction (percent of inventory) & rent growth in U.S. markets



*Top 25 U.S. markets, by inventory, only
Sources: AVANT by Avison Young, CoStar

Call for Proposals



- RIDG meeting Topics:
 - Share new data
 - Present on a project with emphasis on the data and approaches used
 - Discuss new data resources you recently found and guidance on appropriate use
 - Share about new data quality and limitation implementation and practices about your data or data you used
 - Cultivate technical skills or resources
 - Could you demonstrate a new software or technology for data management, analysis, or visualizations
 - Share or seek support around a technical data challenges you faced or are facing
 - Present real data challenge that you're looking to innovate and discuss solutions for
 - Demonstration of organization collaboration
 - Demonstrate and discuss how your organization and collaborated with partner organizations on shared projects, programs, or objectives
 - Present on data or analysis that could be useful to other RIDG members
 - Showcase models, scripts, or codes that analyze data (e.g. R or Python scripts) that can be publicly shared
 - Other ideas



MORPC

RDAC Updates

- Working Groups Update
- Regional Data Coaching: ADVISORS
 - Community & Economic Development
 - City and Regional Planning & Transportation
 - Education & Workforce
 - Energy & Environment
 - Housing & Real Estate
 - Parks / Recreation / Tourism
 - Poverty & Equity
 - Public Health
 - Public Safety
 - GENERAL – Data Management & Methods

For more information, please reach out to Raj Roy

rroy@morpc.org.



MORPC





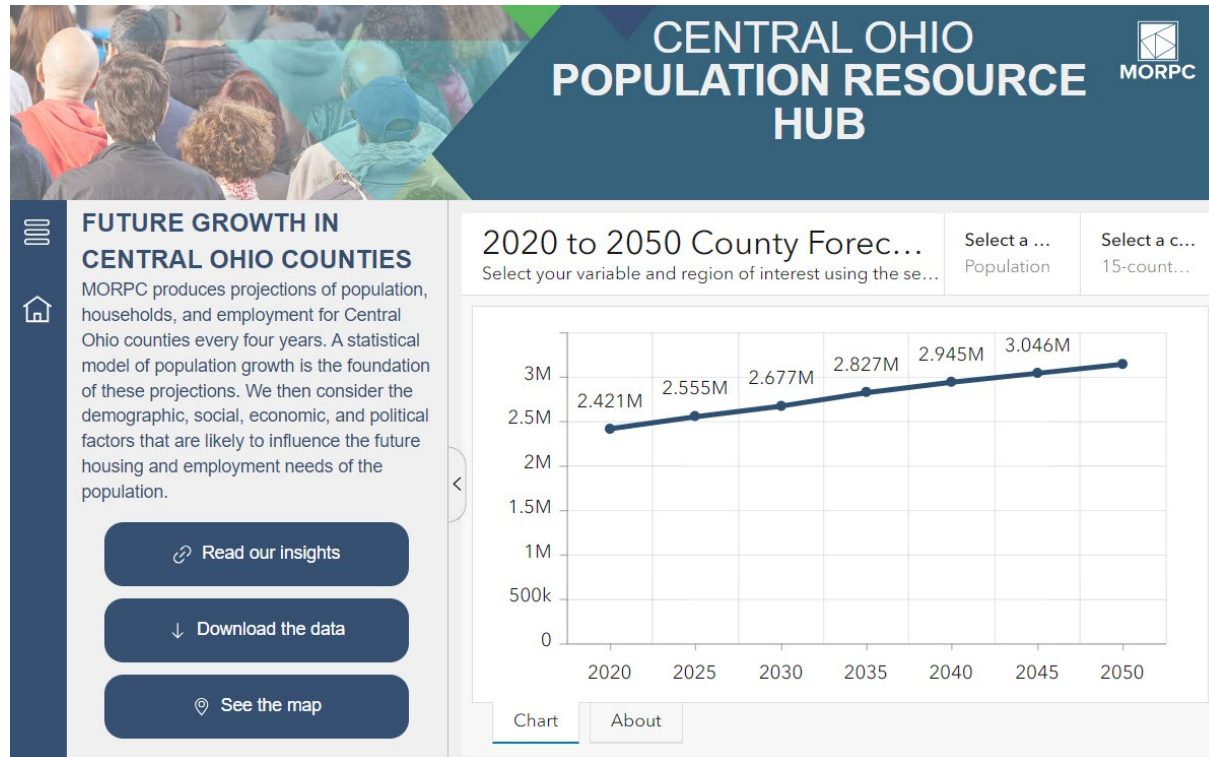
Looking to 2050: An Overview of MORPC's Forecasting Process

Adam Porr, Research & Data Officer
May 29, 2024

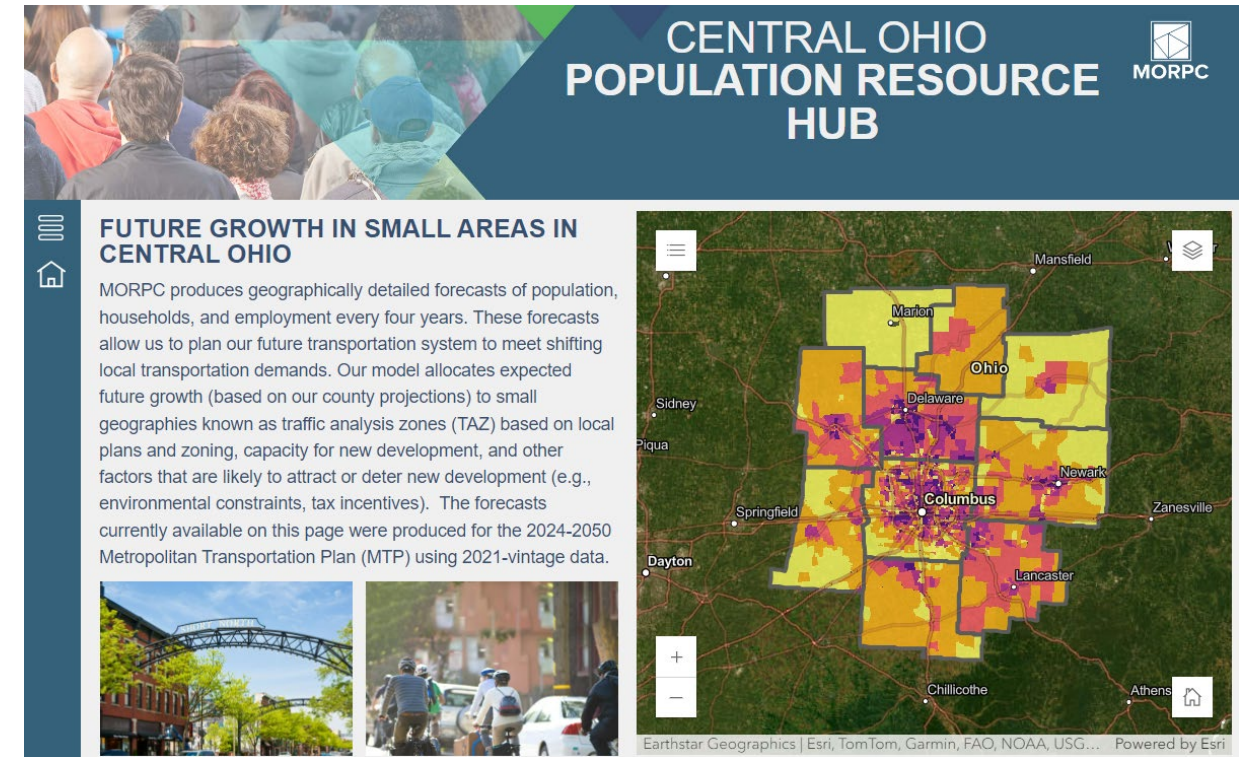


MID-OHIO REGIONAL
MORPC
PLANNING COMMISSION

Every 4 years MORPC produces two sets of forecasts



County-level
(available for 15 counties)



Traffic Analysis Zone (TAZ) level
(available for 10 counties)

Latest forecasts cover 2025 to 2050 in 5-year intervals, with 2021 baseline estimates

Find the data at <https://www.morpc.org/popdata>

The forecasts support long-range planning for transportation investments in Central Ohio.



MORPC

- Metropolitan Transportation Plan (MTP)
 - Documents transportation planning process
 - Identifies strategies and projects
- Mandated by federal law
- Led by MORPC
- Adopted by a committee of representatives from regional governments and organizations operating as the region's Metropolitan Planning Organization (MPO)
- Influences how federal funding is allocated to projects in the region
- **Forecasts help to evaluate the need for and benefits of candidate projects**

2024-2050 COLUMBUS AREA METROPOLITAN TRANSPORTATION PLAN

CHAPTER 1: PLAN PURPOSE & DEVELOPMENT

The 2024-2050 Metropolitan Transportation Plan (MTP) documents the transportation planning process of the Mid-Ohio Regional Planning Commission (MORPC) and its partners. It includes recommended strategies, including projects, that will maintain, manage, and improve, central Ohio's transportation system over the next 26 years. The MTP process is continuous, comprehensive and cooperative. The next update is scheduled for 2028.

Planning for a regional transportation system that includes roadways, transit, bicycle facilities, pedestrian facilities, rail, and multimodal connections must reflect local priorities and meet federal guidelines. Just as important, it must also consider any negative impacts on our communities, environment, and air quality.

The plan was developed with guidance from a set of regional goals established to advance the quality of life for residents in central Ohio.



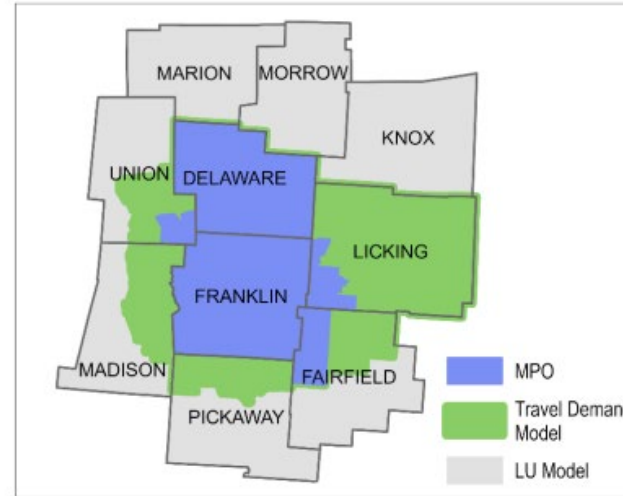
Find the plan at www.morpc.org/2024-2050-metropolitan-transportation-plan/

Our overall strategy is to start broad and general, then add specificity.

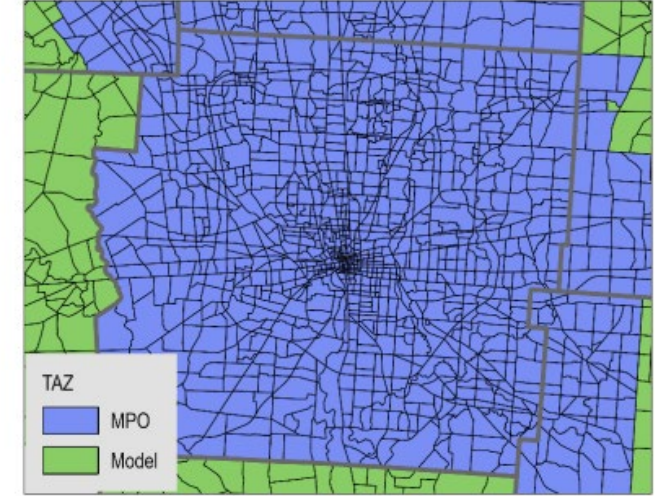


MORPC

- Rationale: Forecasts for large populations likely to be more accurate than forecasts for small populations.
- County forecasts serve as “control totals” for TAZ forecasts
- General groups serve as control totals for more specific sub-groups
- TAZ forecasts often “built up” from smaller geographies



10 County Area / MORPC MPO



Traffic Analysis Zones (TAZ)



TAZ - MAZ - GridMAZ

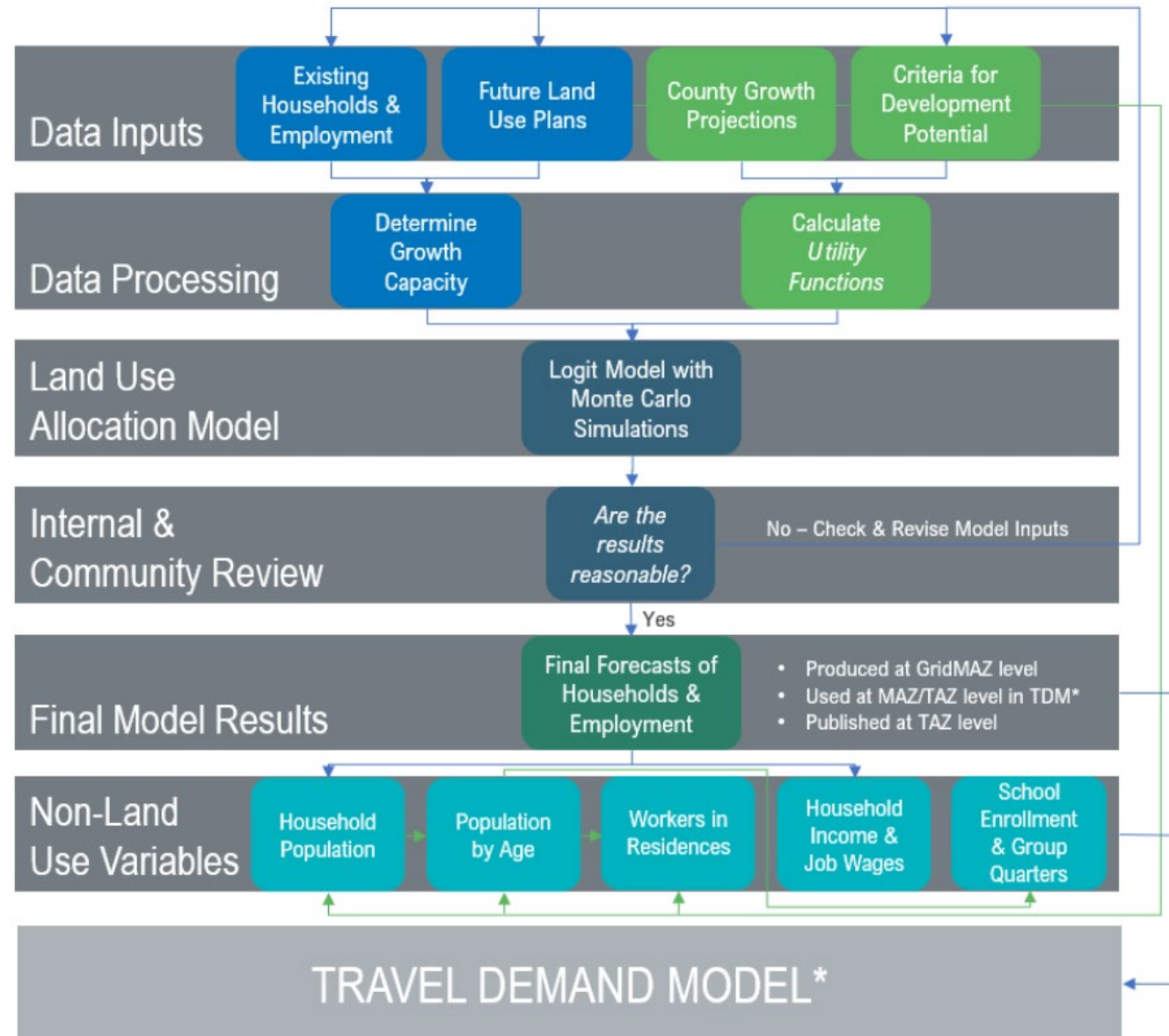


Parcels (by land use type)

The Big Picture



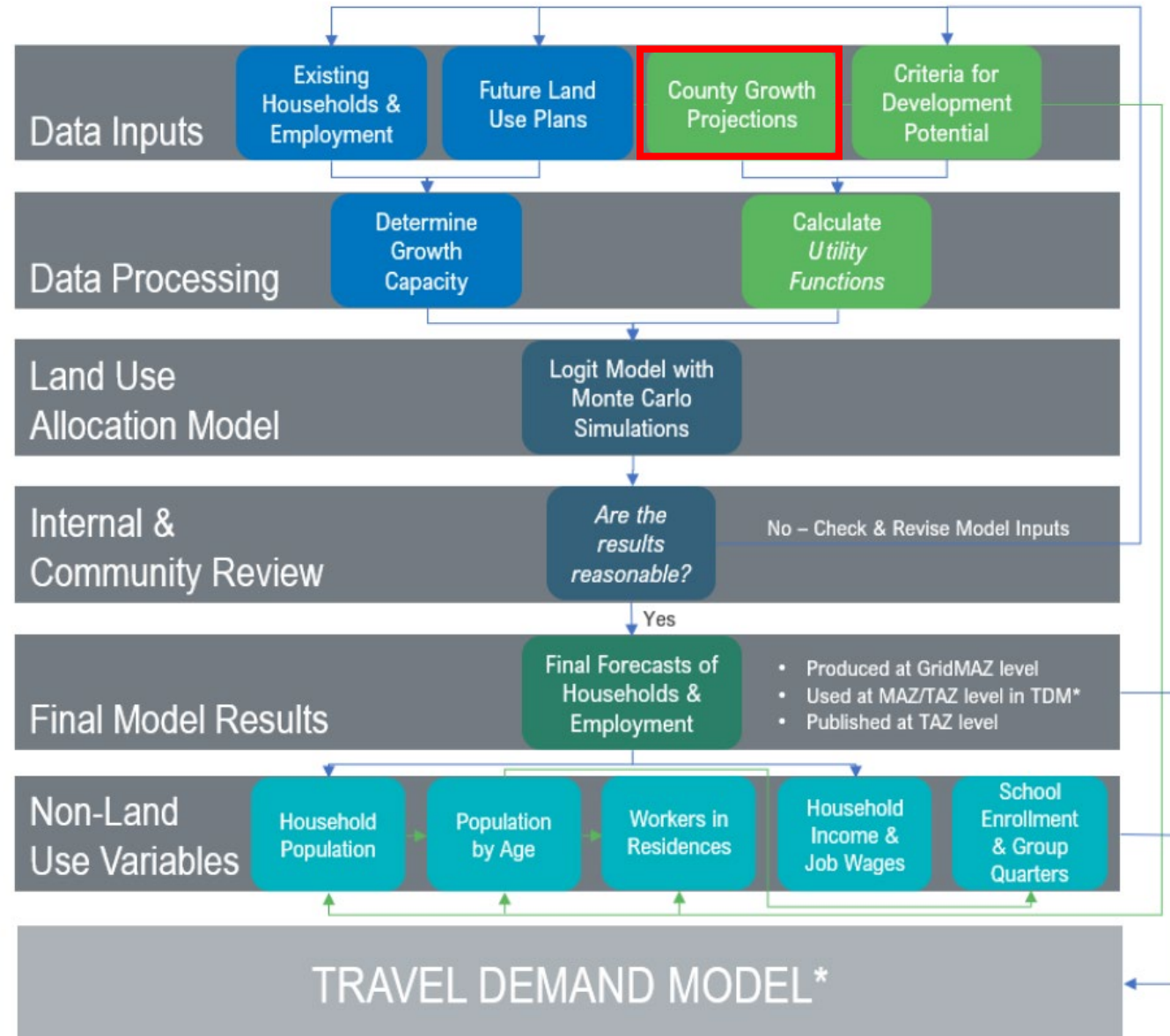
MORPC



First, county forecasts (aka “county control totals”)



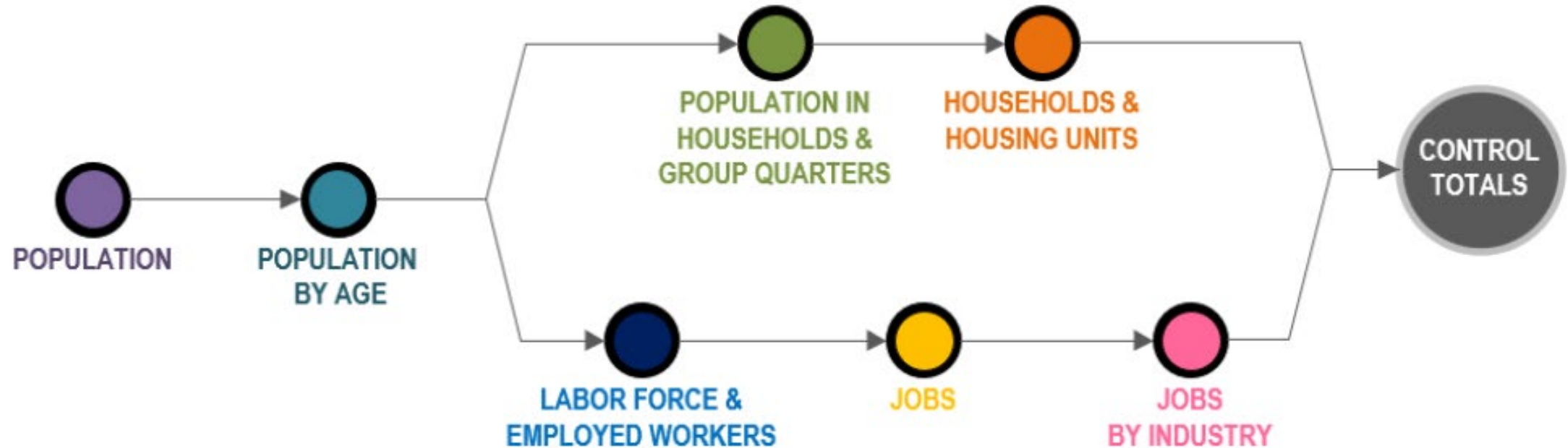
MORPC



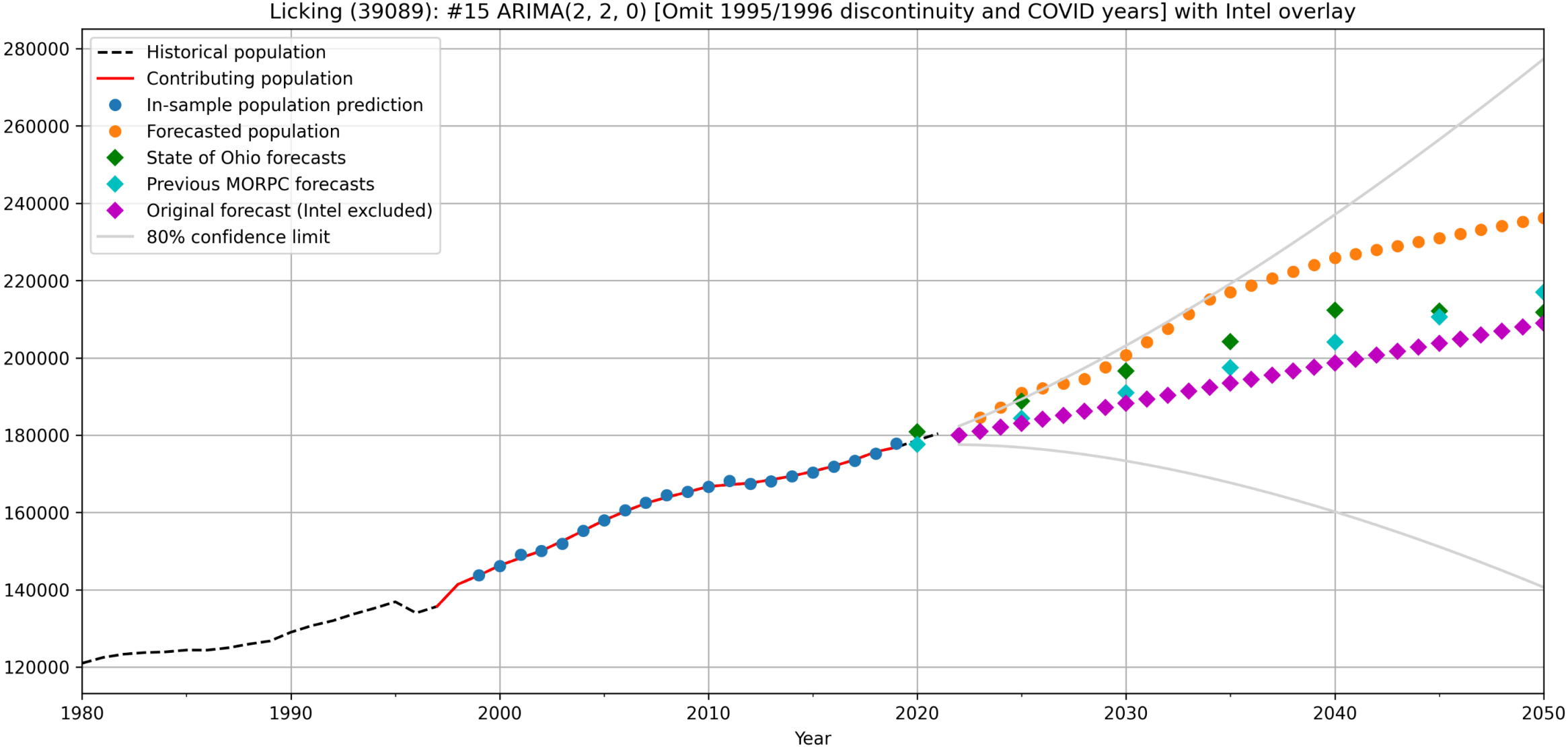
County forecasts are produced for overall population first, then broken down into subgroups.



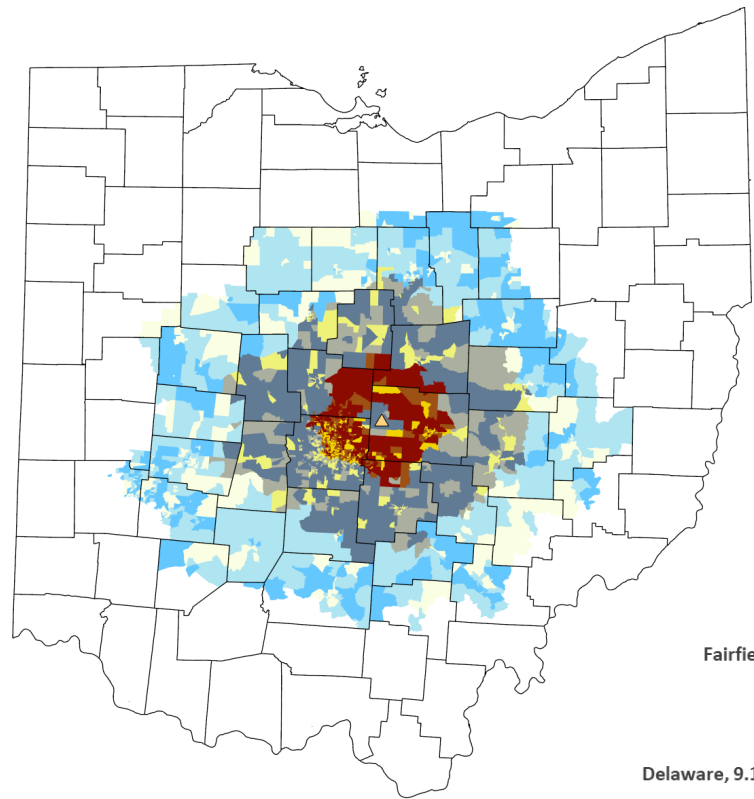
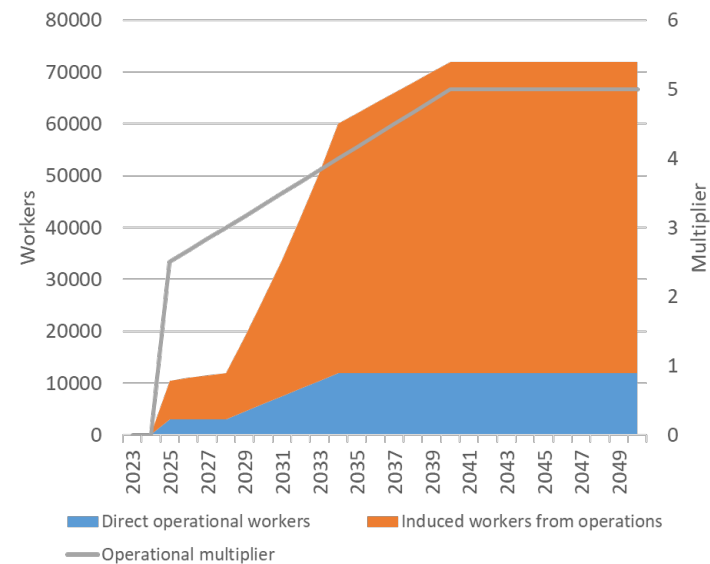
MORPC



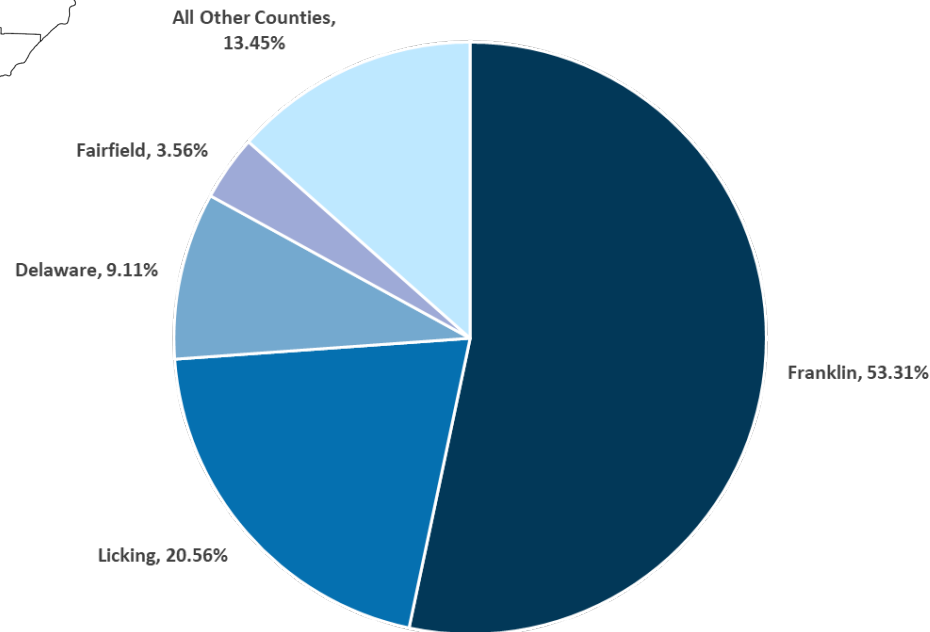
Overall population forecast example (Licking County)



For the first time, we attempted to account for anticipated economic development (Intel)



% Intel Employment by County of Residence



Our method deviates from the more typical method used by the State of Ohio

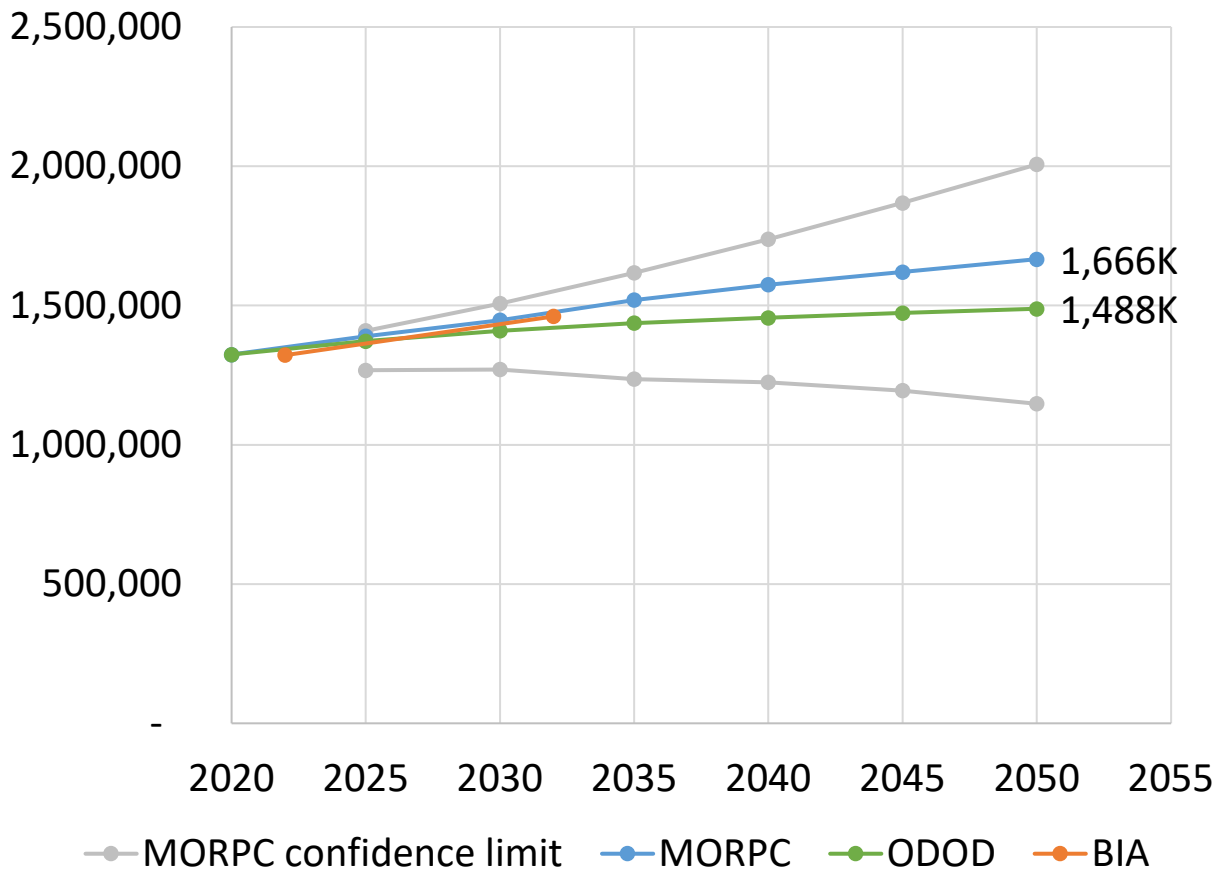


Ohio Department of Development	MORPC
Cohort component model	Modified ARIMA statistical model
Total population built up from projections of sex-age cohorts	Total population forecasted directly
Assumes constant birth, death, and migration rates.	Assumes overall historic trends will continue. (Migration expected to compensate for changes in natural increase.)
Rates determined from recent history	Trend parameters determined from recent history
Produces nominal total population, population by age, population by sex	Produces nominal total population and confidence interval
Accounts for generational population patterns (existing generations only)	Ignores generational population patterns
Intentionally excludes non-historic factors	Attempts to include certain non-historic factors (Intel factory)

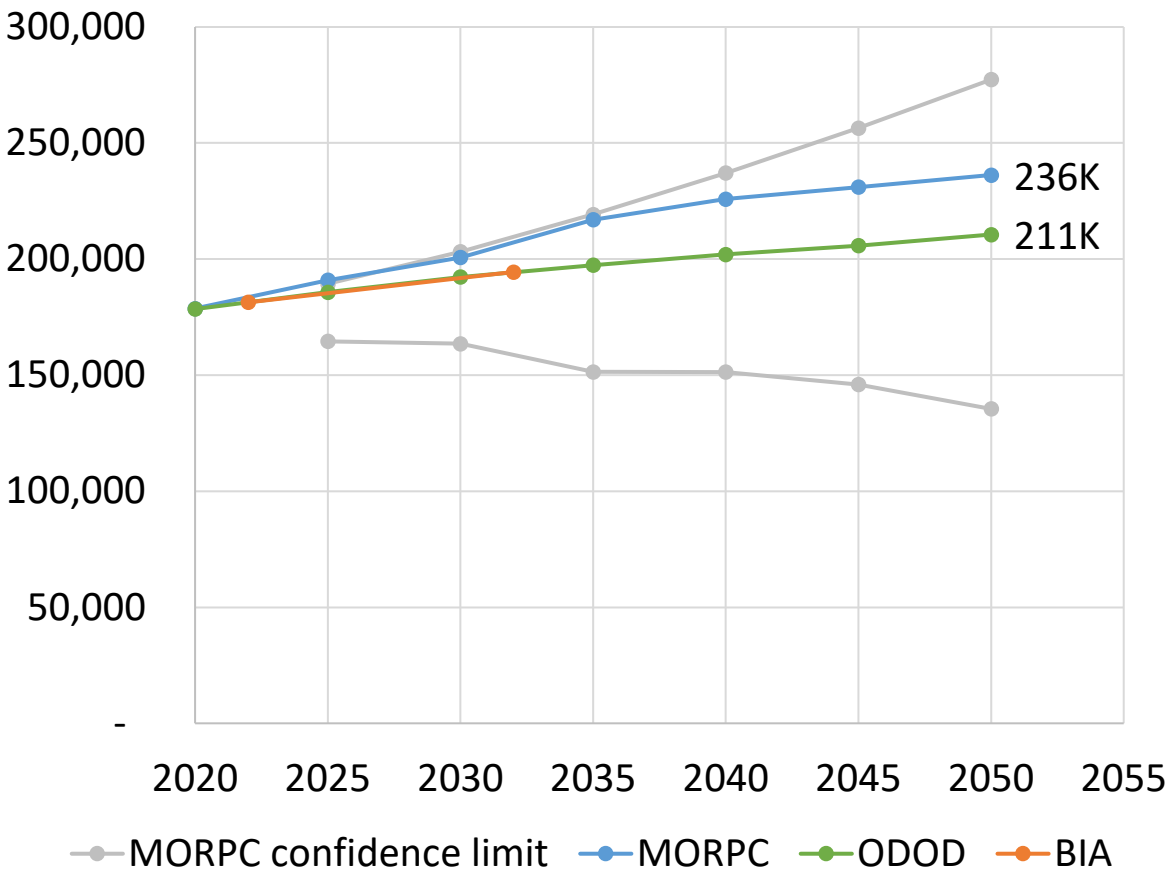
Our method tends to produce more optimistic estimates than the cohort-component method



Franklin County



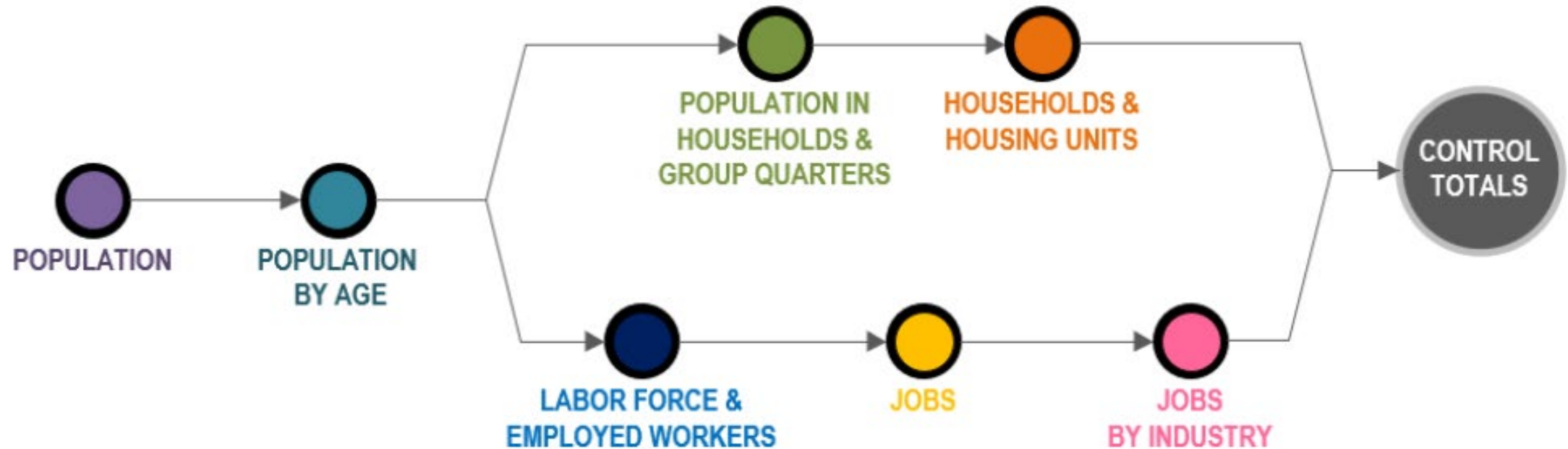
Licking County



Once we have overall population, we can forecast subgroups based on certain assumptions.



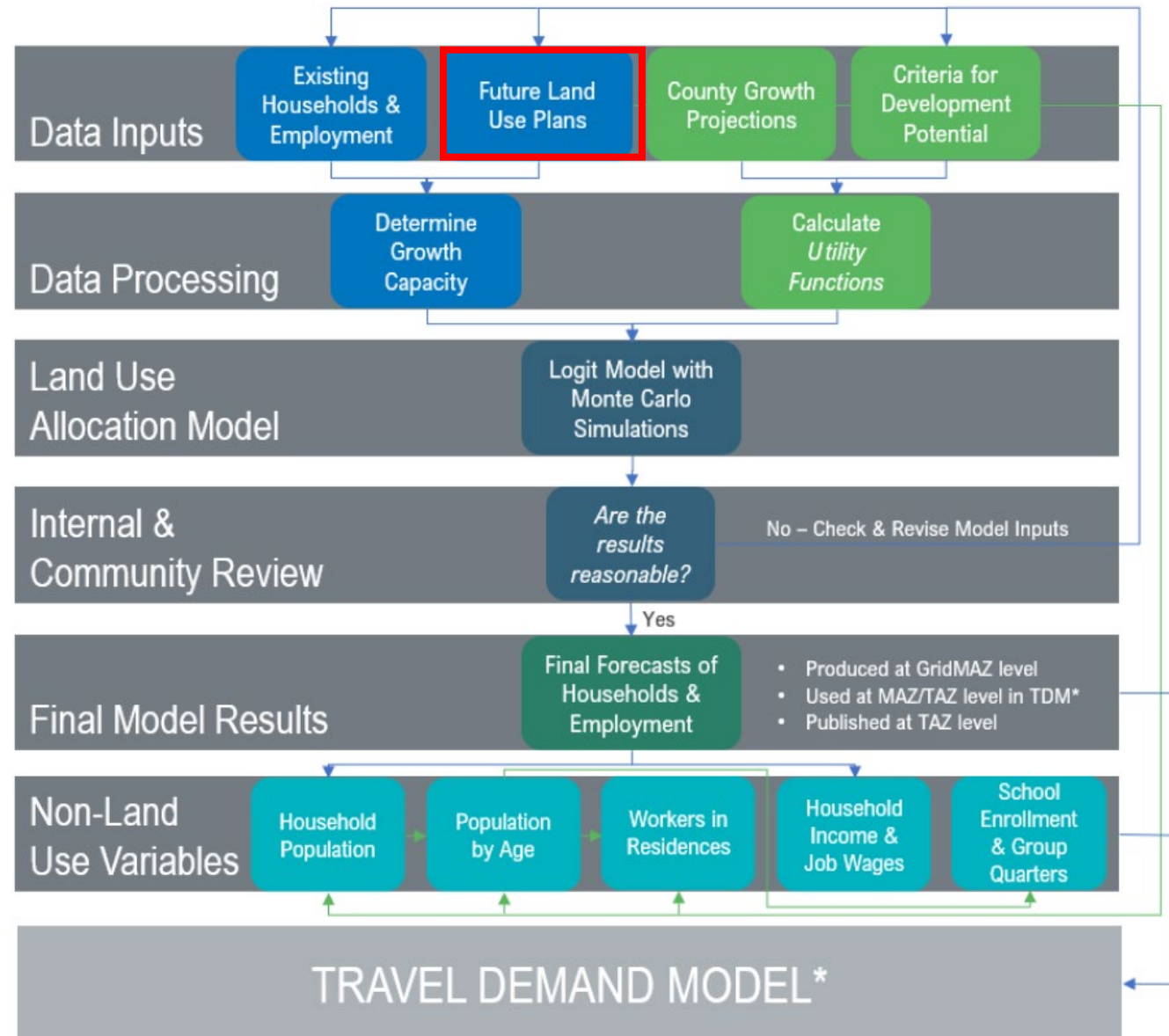
MORPC



Next up, land use

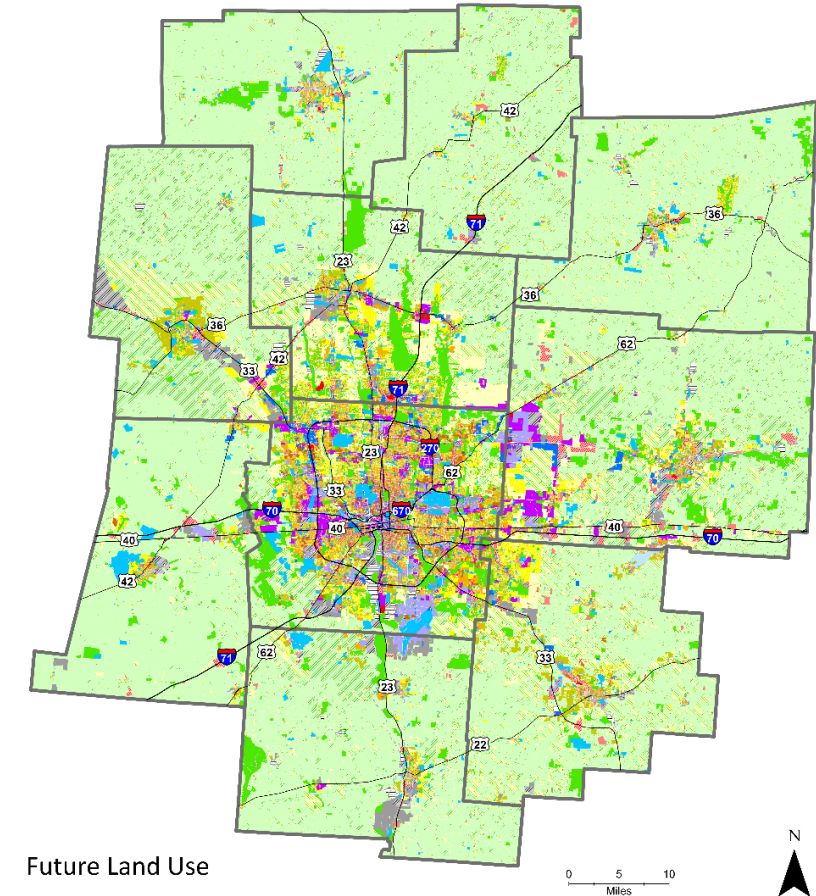
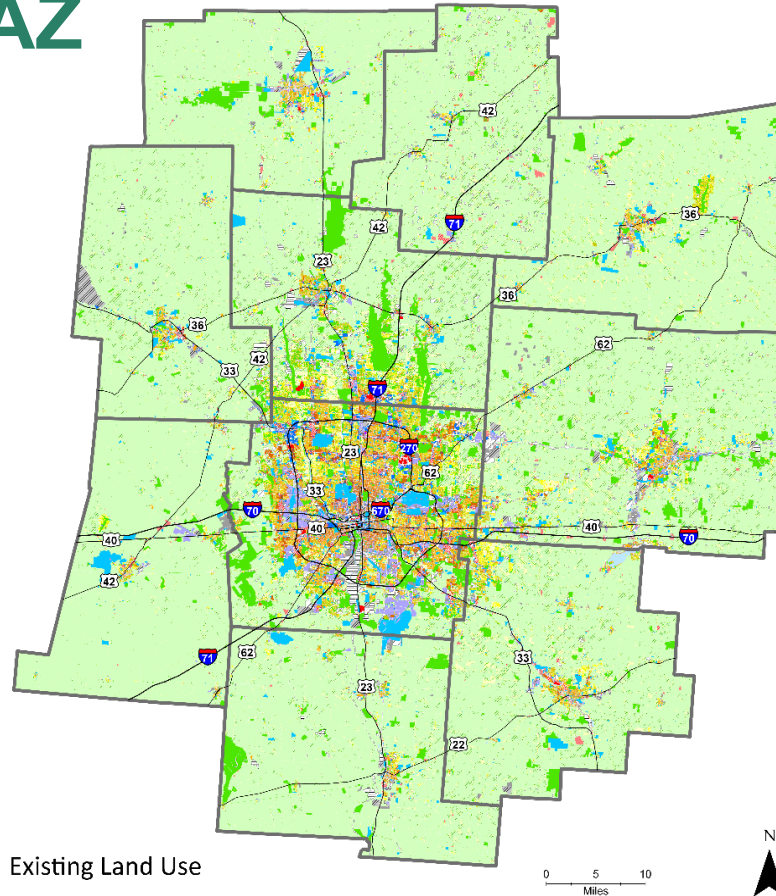
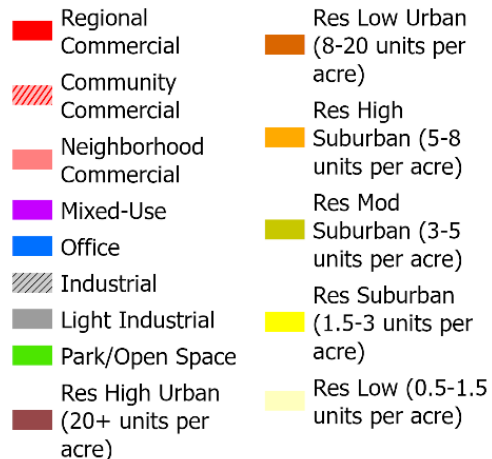


MORPC



Land use is assigned to parcels based on auditors' data and community plans then summarized by GridMAZ

- Existing LU based on parcel data for 10 counties
- Future LU based on land use plans for 10 counties
- Uses are converted to MORPC standard land use classification system
- Determine mix of LU type by GridMAZ for existing and future

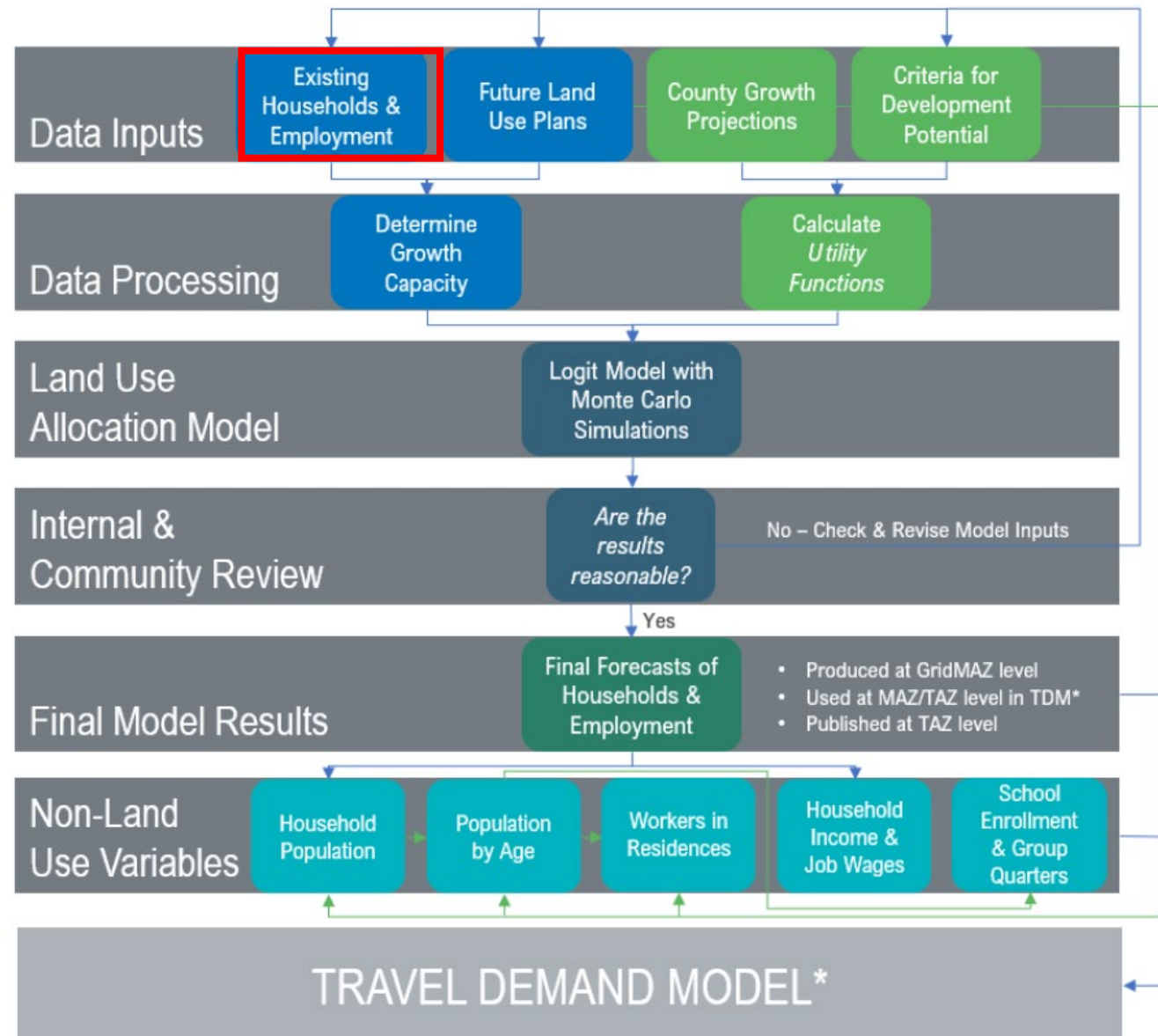


MORPC

Next: Existing conditions for households and employment



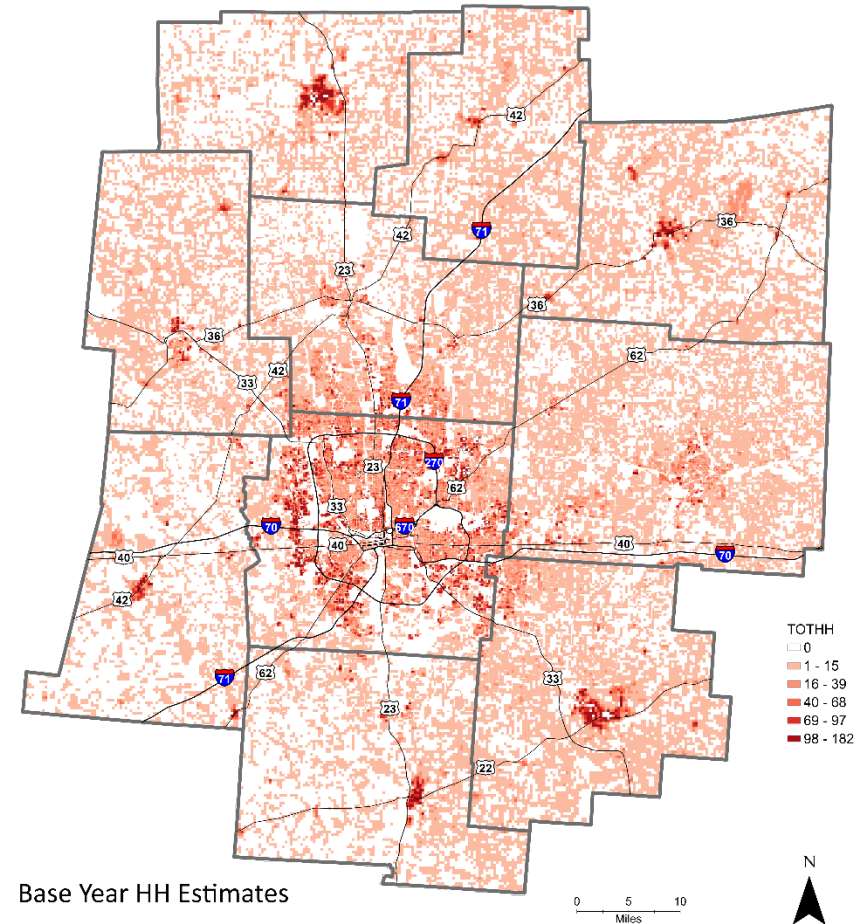
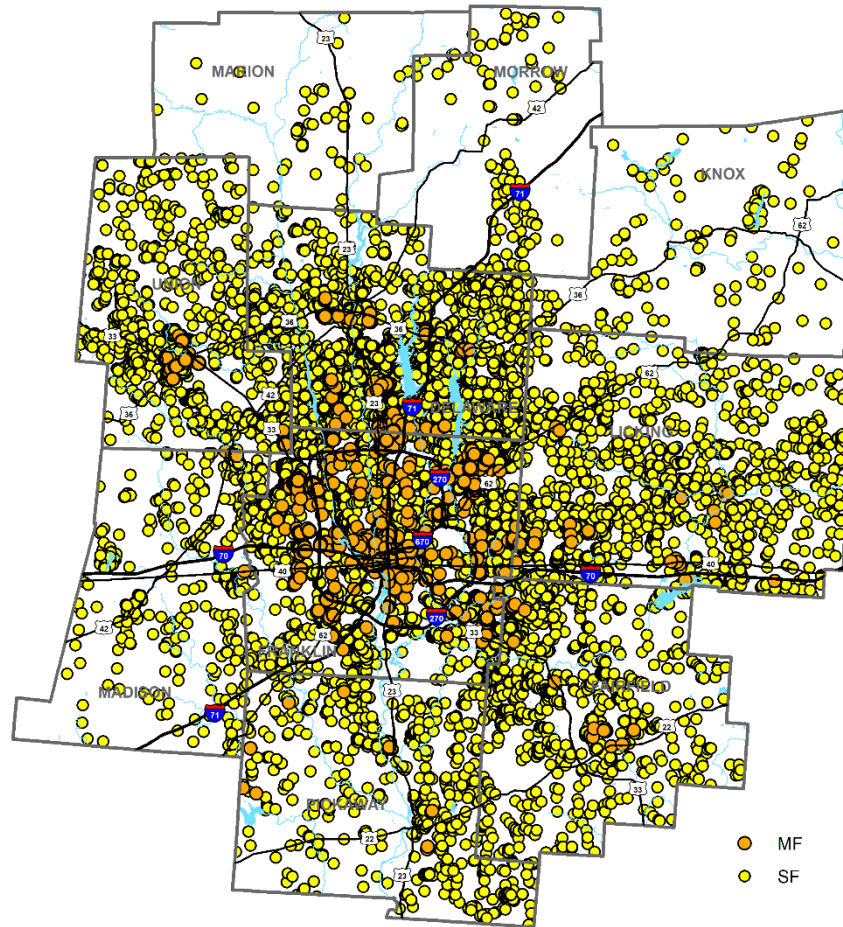
MORPC



Existing households are estimated from Census data and building permits from local jurisdictions



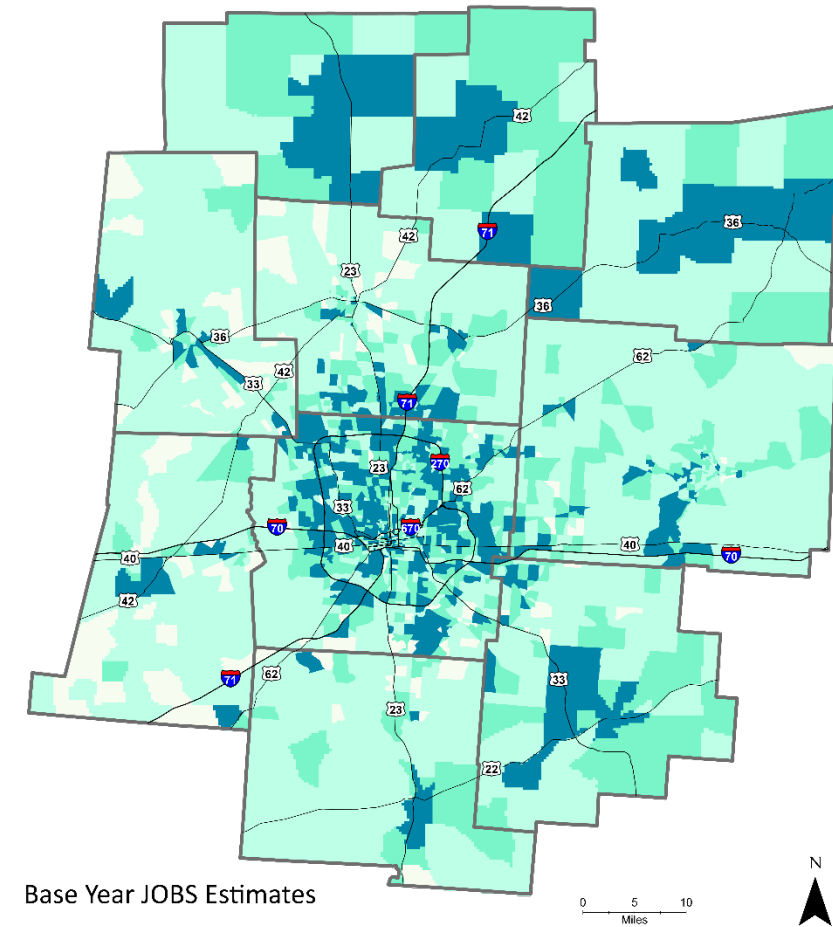
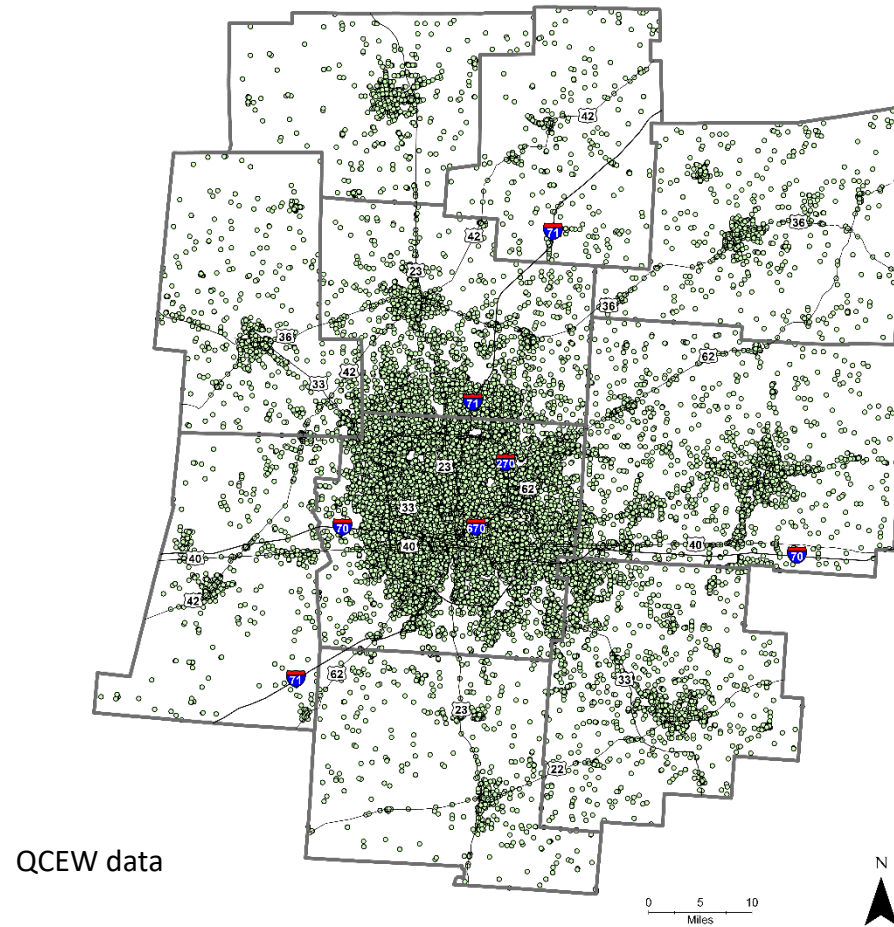
MORPC



Existing jobs are estimated from QCEW point-level employer data



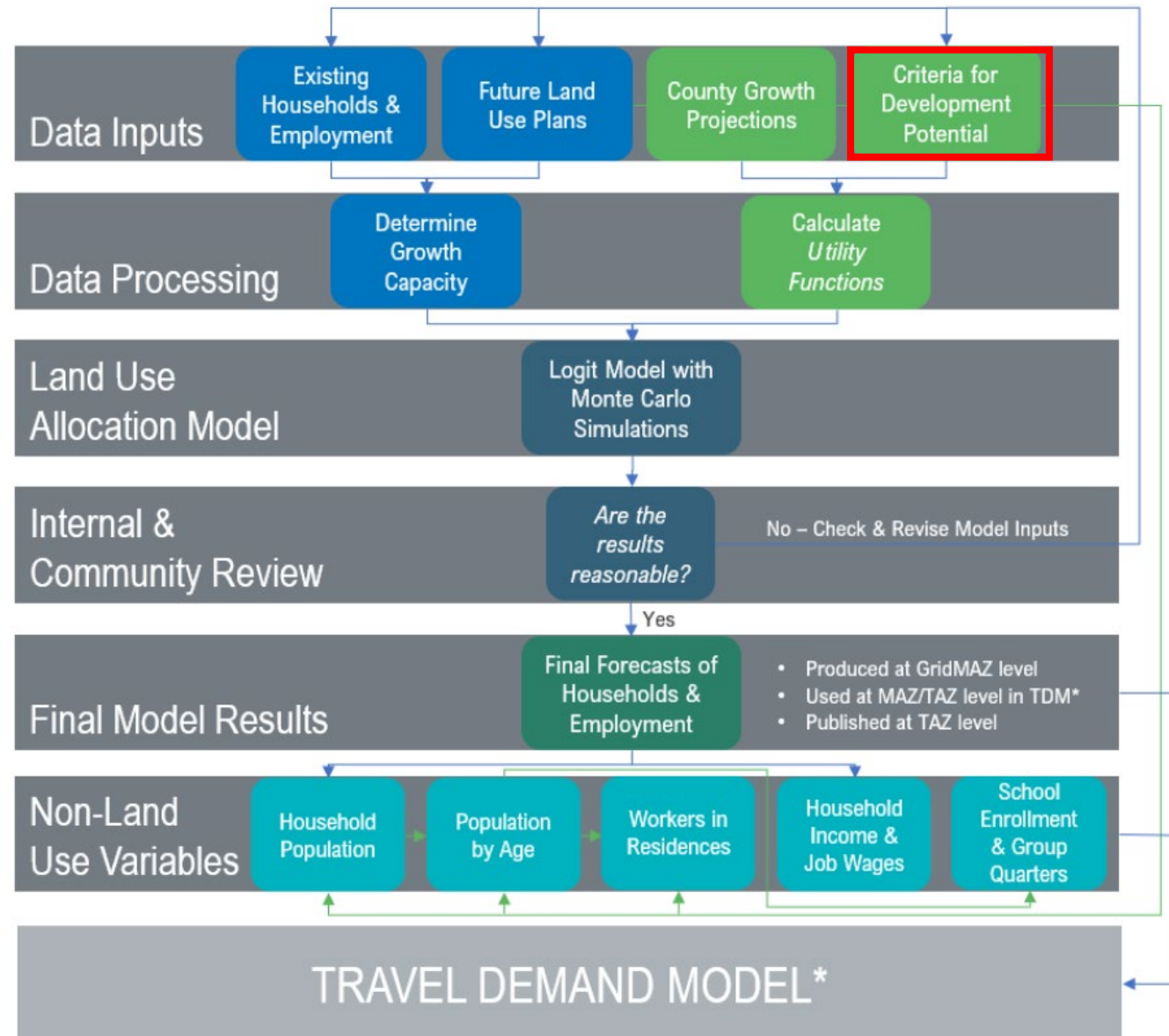
MORPC



Next: Criteria for development potential



MORPC



Each GridMAZ is given a utility score based on a weighted combination of criteria



MORPC

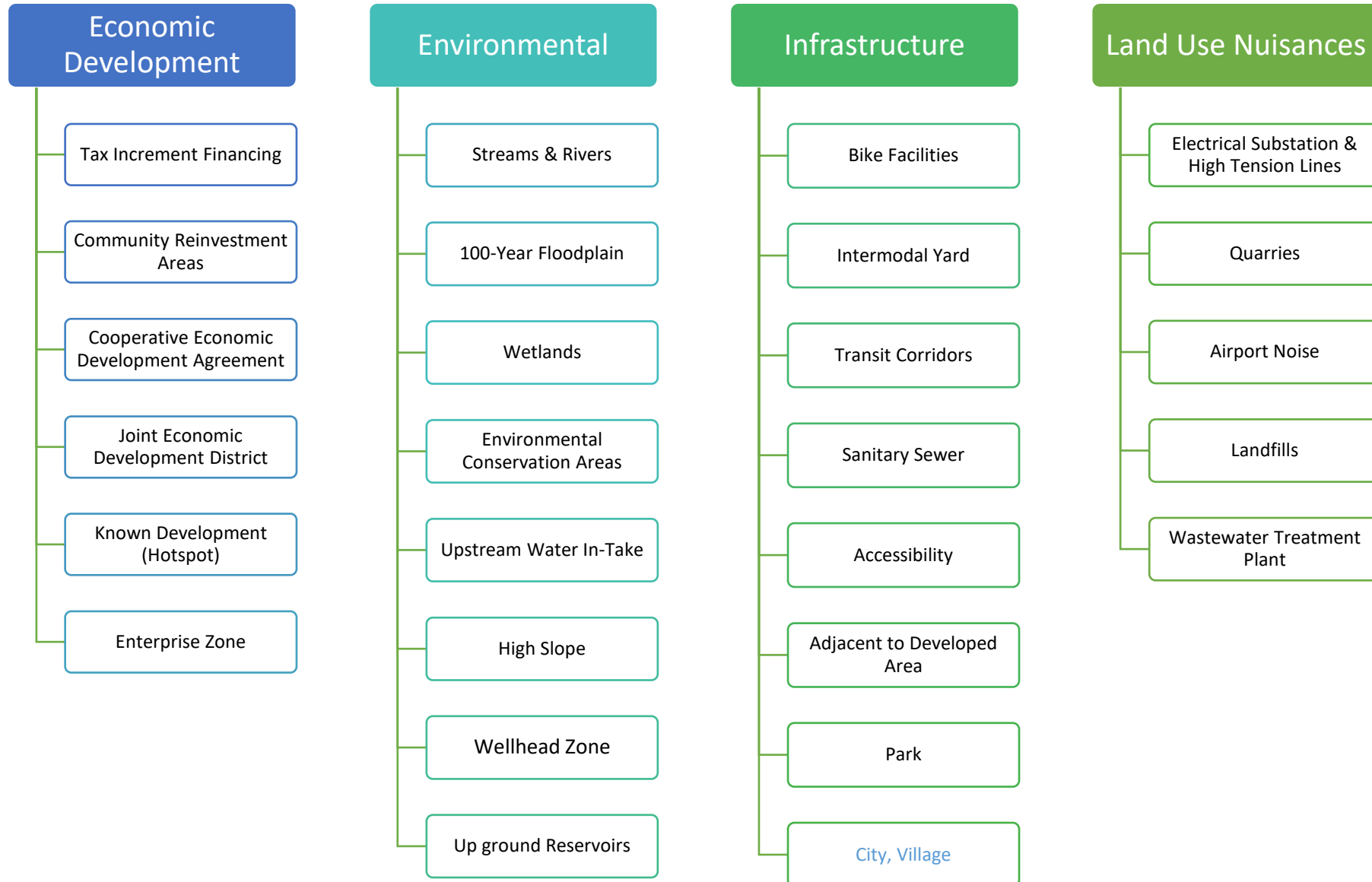


Figure 1 displays six horizontal bar charts, each representing a different land cover type: HH, OFF, RTG, RTS, IND, and OTH. The y-axis lists 35 land use categories. The x-axis represents the magnitude of the distribution, with red bars extending to the left (negative) and green bars extending to the right (positive). The charts show the relative frequency or proportion of each land use category within each land cover type.

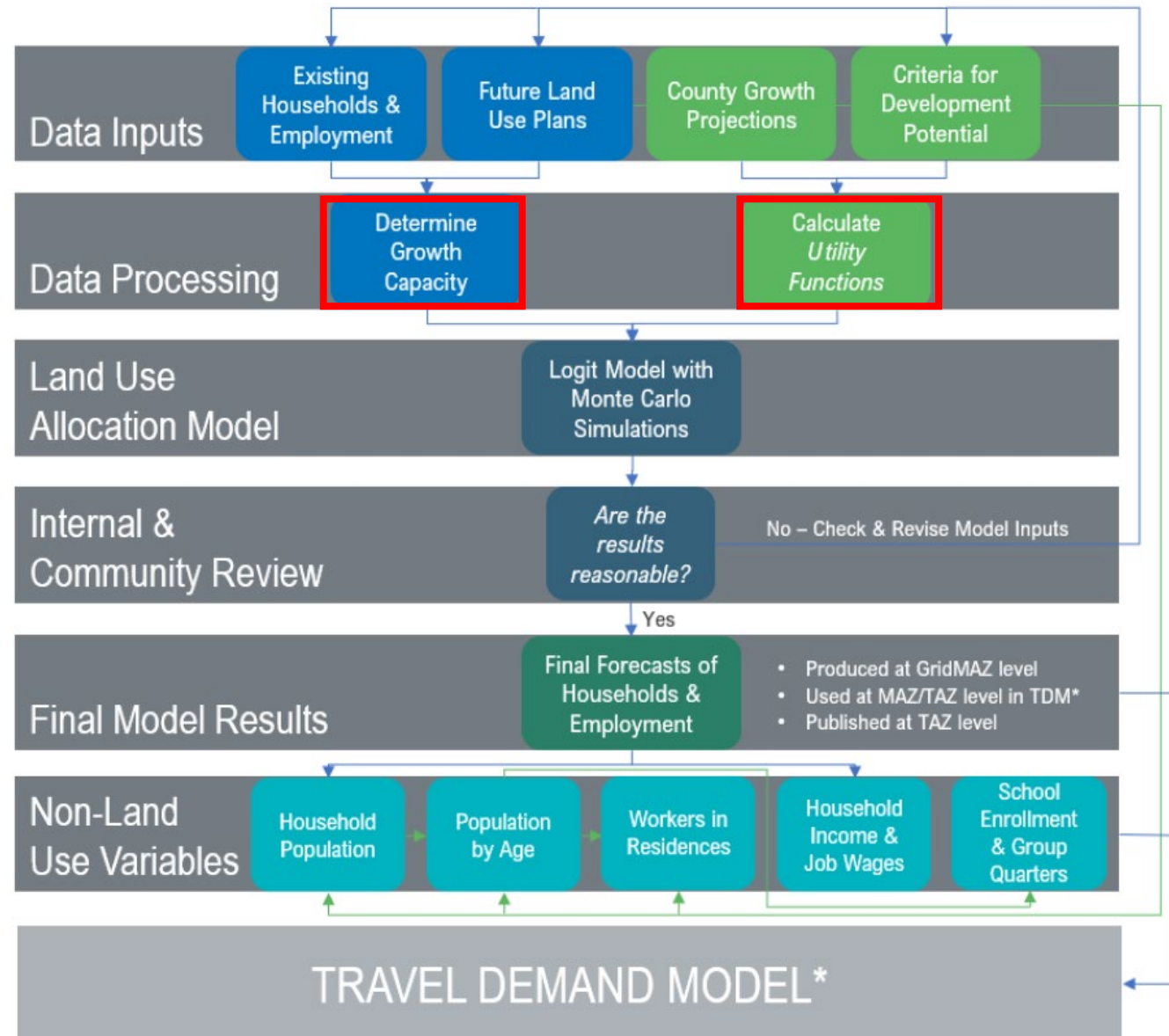
Land Use Category	HH	OFF	RTG	RTS	IND	OTH
TIF	0.00	0.05	0.05	0.05	0.05	0.05
CRA	0.00	0.05	0.05	0.05	0.05	0.05
CEDA	0.00	0.05	0.05	0.05	0.05	0.05
JEDZ	0.00	0.05	0.05	0.05	0.05	0.05
LANDFILL	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
FOREST	0.00	0.00	0.00	0.00	0.00	0.00
QUARRY	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
STREAM	0.00	0.00	0.00	0.00	0.00	0.00
EX_BIKE	0.05	0.05	0.05	0.05	0.05	0.05
PARK	0.05	0.05	0.05	0.05	0.05	0.05
YARD_H	0.00	0.00	0.00	0.00	0.00	0.00
YARD_1	0.00	0.00	0.00	0.00	0.00	0.00
UPRES	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
WELL5	0.00	0.00	0.00	0.00	0.00	0.00
WELL1	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
SEWER_H	0.05	0.05	0.05	0.05	0.05	0.05
SEWER_F	0.05	0.05	0.05	0.05	0.05	0.05
AIRPORT	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
AIRPORT_O	-0.10	-0.10	-0.10	-0.10	-0.10	-0.10
HELLBR	0.00	0.00	0.00	0.00	0.00	0.00
ESD	0.00	0.00	0.00	0.00	0.00	0.00
ECD	0.00	0.00	0.00	0.00	0.00	0.00
ELECTR	0.00	0.00	0.00	0.00	0.00	0.00
WWTP	0.00	0.00	0.00	0.00	0.00	0.00
WETLANDSNW	0.00	0.00	0.00	0.00	0.00	0.00
FLOODP100	0.00	0.00	0.00	0.00	0.00	0.00
SLOPE	0.00	0.00	0.00	0.00	0.00	0.00
SWPA	0.00	0.00	0.00	0.00	0.00	0.00
DEVPER	0.05	0.05	0.05	0.05	0.05	0.05
PDA	0.05	0.05	0.05	0.05	0.05	0.05
PCA	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
PAA	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
POPAUTO	0.00	0.00	0.00	0.00	0.00	0.00
POPTRN	0.05	0.05	0.05	0.05	0.05	0.05
EZ	0.05	0.05	0.05	0.05	0.05	0.05



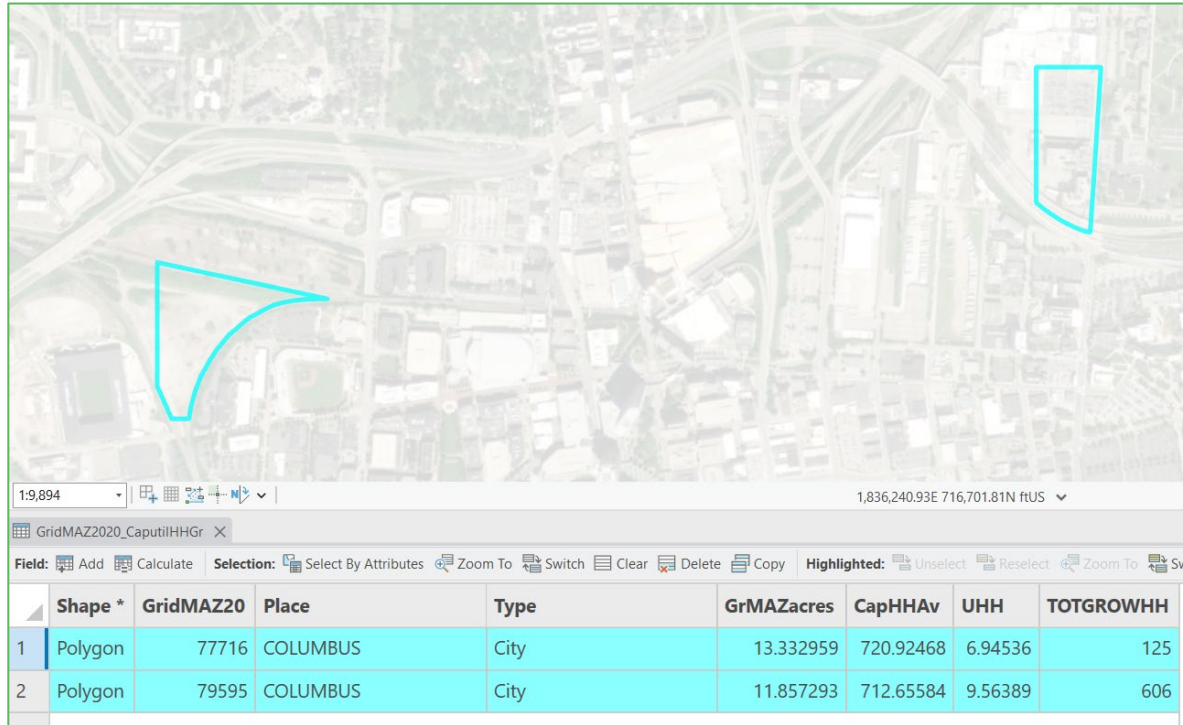
Next: Capacity vs utility



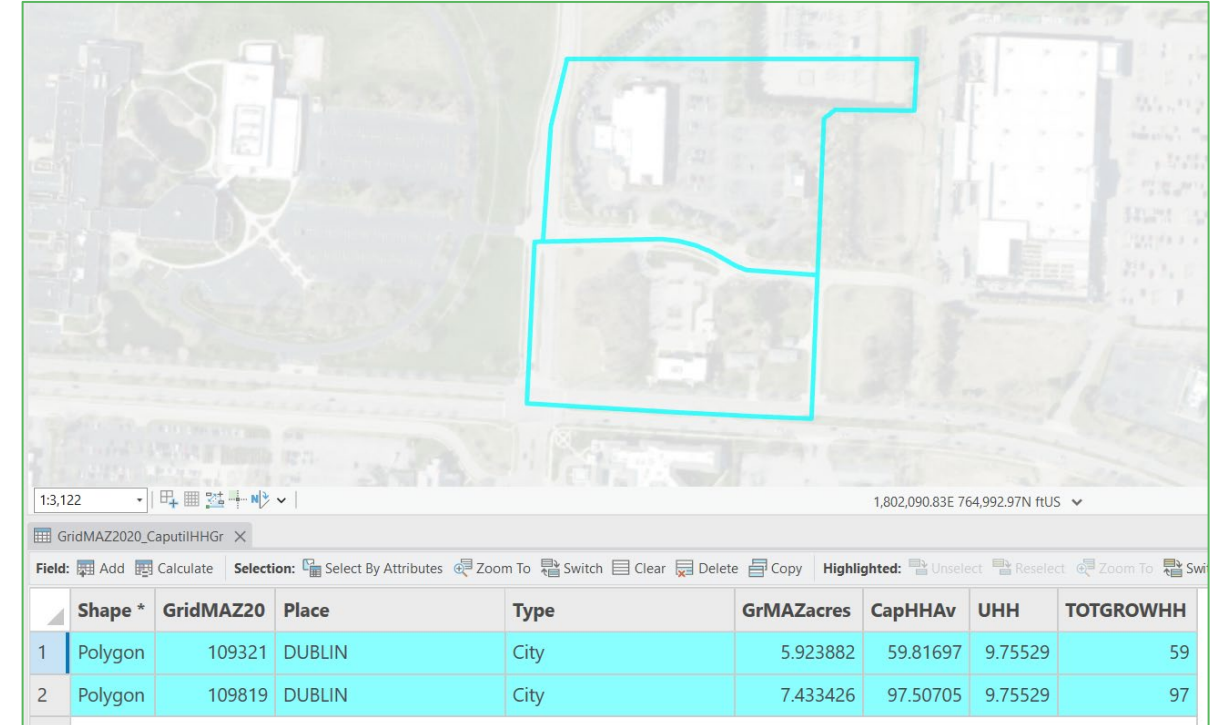
MORPC



The amount of growth allocated to a GridMAZ is proportional to its utility and constrained by its capacity



Similar Capacity, Different Utility

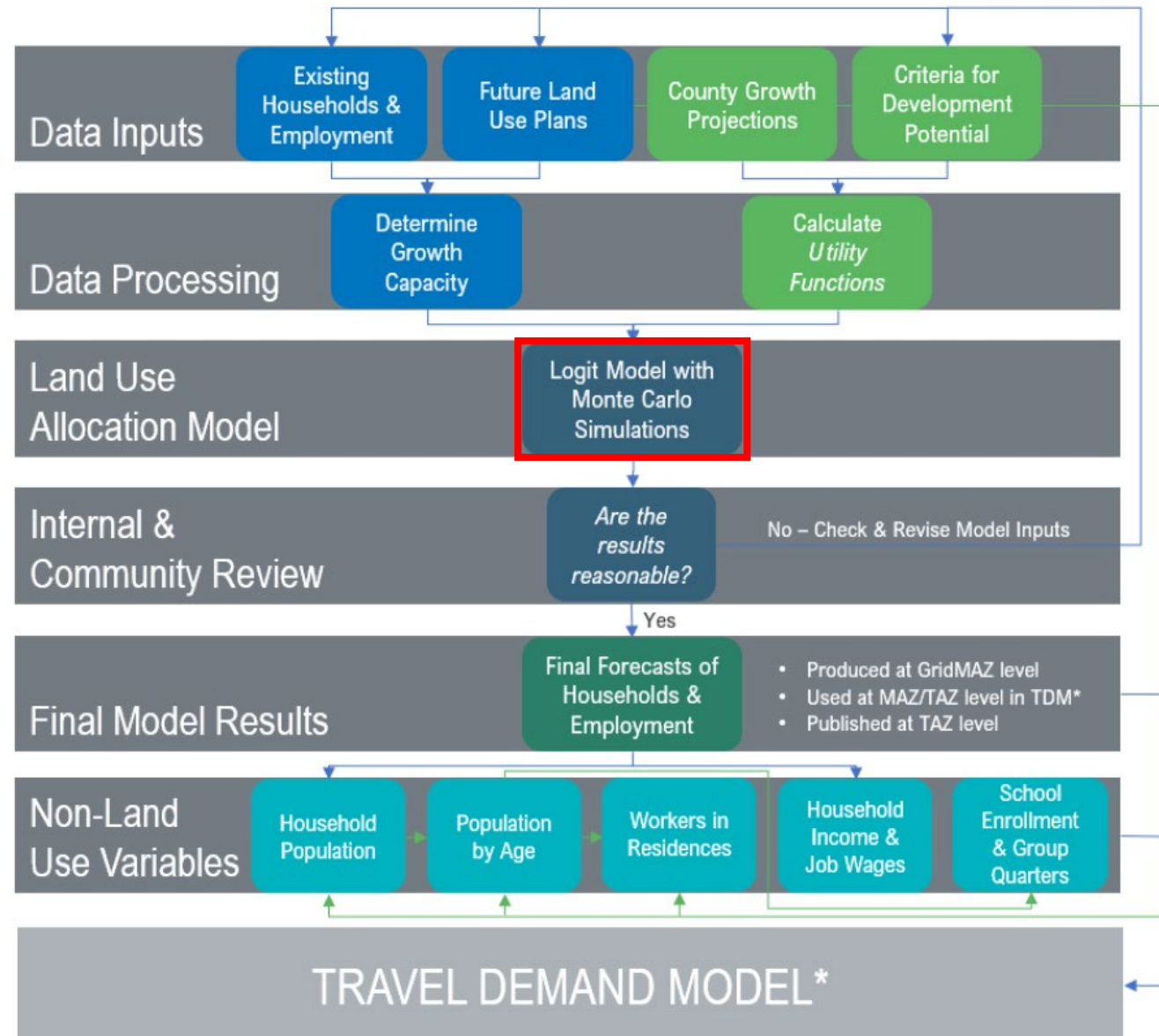


Similar Utility, Different Capacity

Next: Allocation of growth based on simulation



MORPC





Growth for each GridMAZ is the average of the results from 200 iterations of random allocations

- Logit model: the probability of a GridMAZ being selected for HH/Jobs allocations

$$Probability_{GridMAZ_i} = \frac{e^{Utility_{GridMAZ_i}}}{\sum_{j=1}^N e^{Utility_{GridMAZ_j}}}$$

- Utility function (“attractiveness”)

$$Utility_{GridMAZ_i} = \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_n X_{ni}$$

Where:

$X_{1i, 2i, \dots, ni}$ - criteria/variables for GridMAZ i

$\beta_{1, 2, \dots, n}$ - coefficients

- Monte Carlo Simulation

- GridMAZ with higher ‘attractiveness’ more likely to be selected given available capacity
- Households and jobs are allocated simultaneously
- Write out results at every 5-year increment from 2025 to 2050
- 200 simulations



Growth for each GridMAZ is the average of the results from 200 iterations of random allocations



MORPC

In other words:

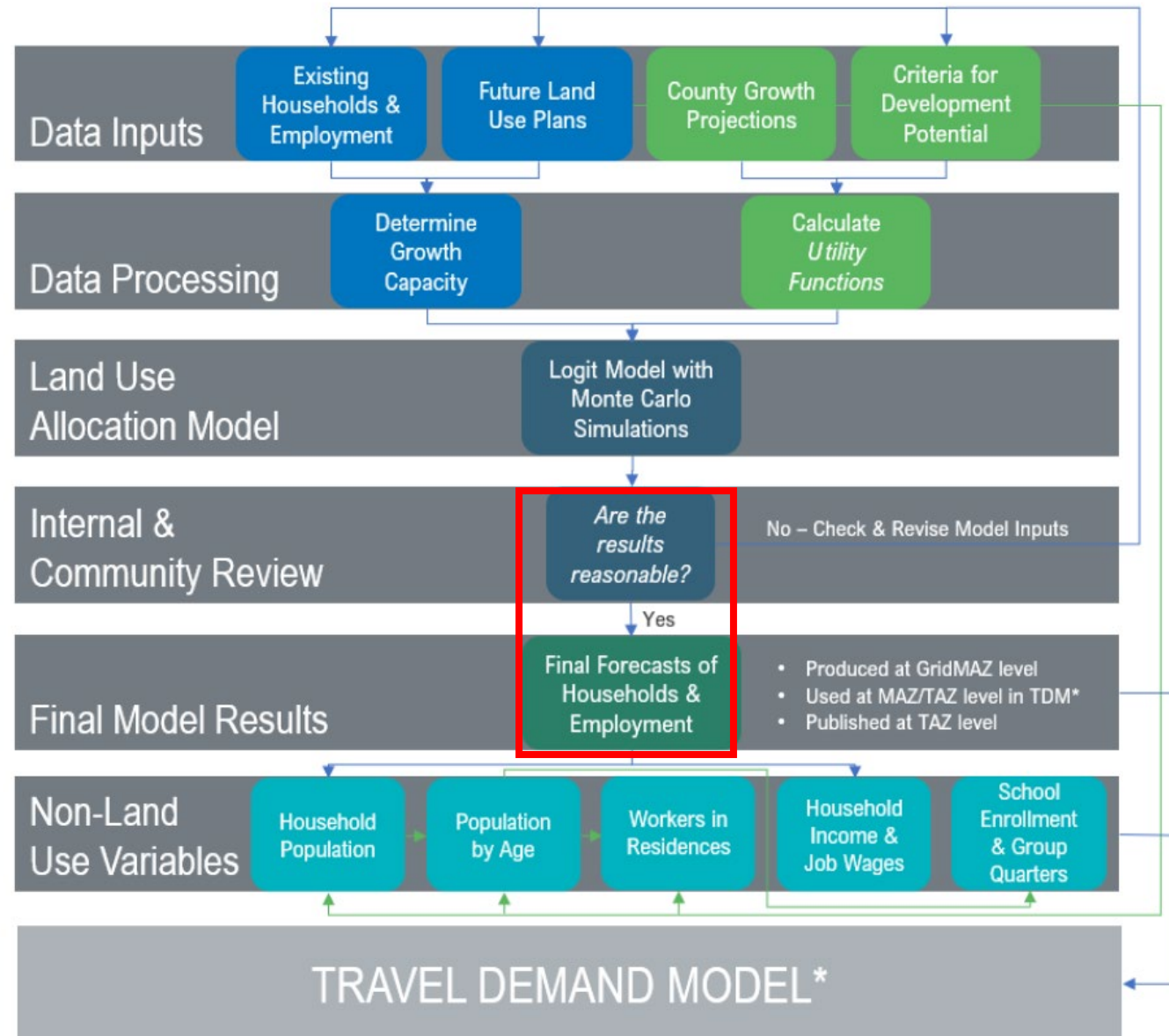
1. Two players collect their darts.
 1. One player throws for households, one for jobs
 2. Total number of darts for each is equal to the county-level growth in households and growth in jobs, respectively
2. Players each throw their darts at their own copy of the 10-county map
 1. Each aims for a GridMAZ with a preference for those having the highest attractiveness for their land use.
 2. When capacity is reached for a land use, that player can no longer throw darts at that GridMAZ.
3. When all darts are expended, the players tabulate the number of darts in each GridMAZ for both maps
4. Players repeat the game 199 more times
5. For each GridMAZ, compute the average number of darts of each type for the 200 games
6. For each land use, adjust the values for all GridMAZ such that their sum is equal to the county growth (i.e control the values to the county control total)



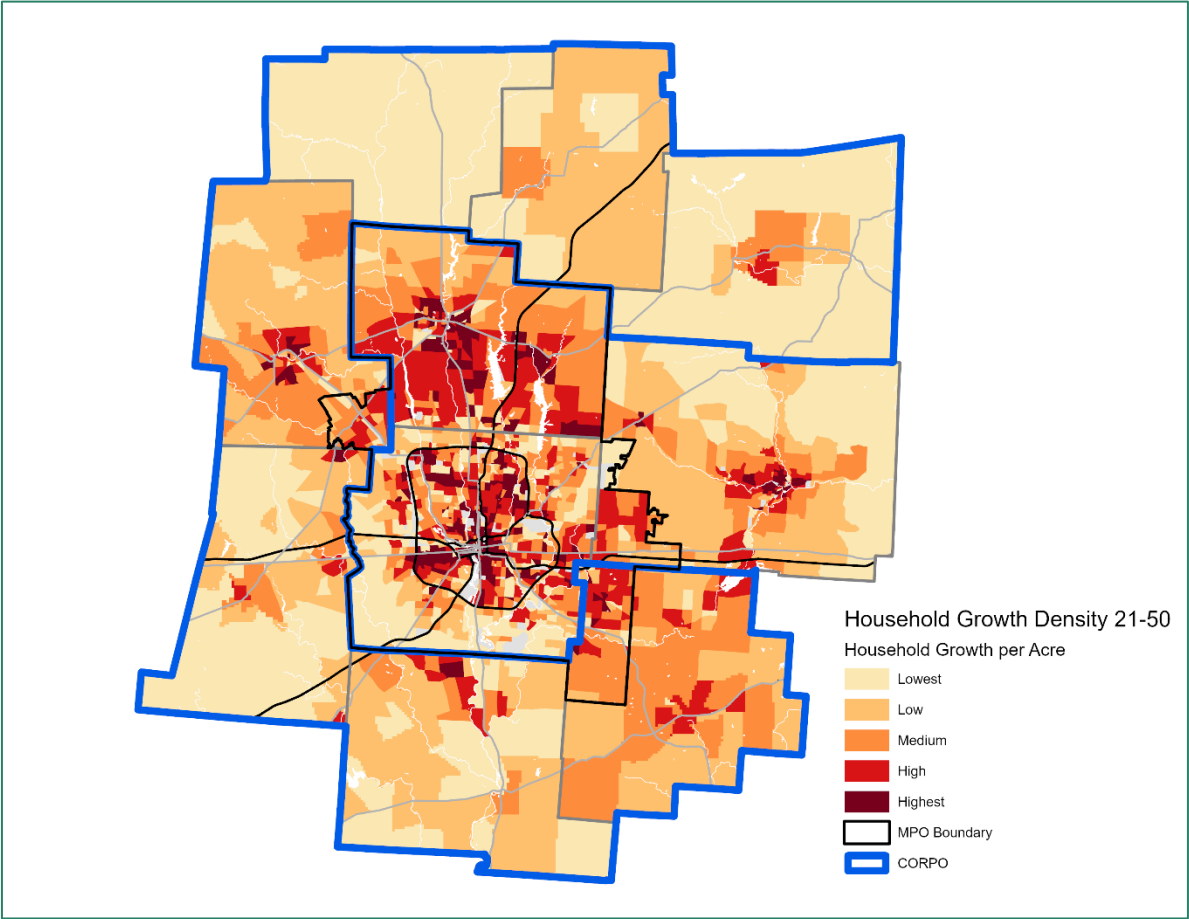
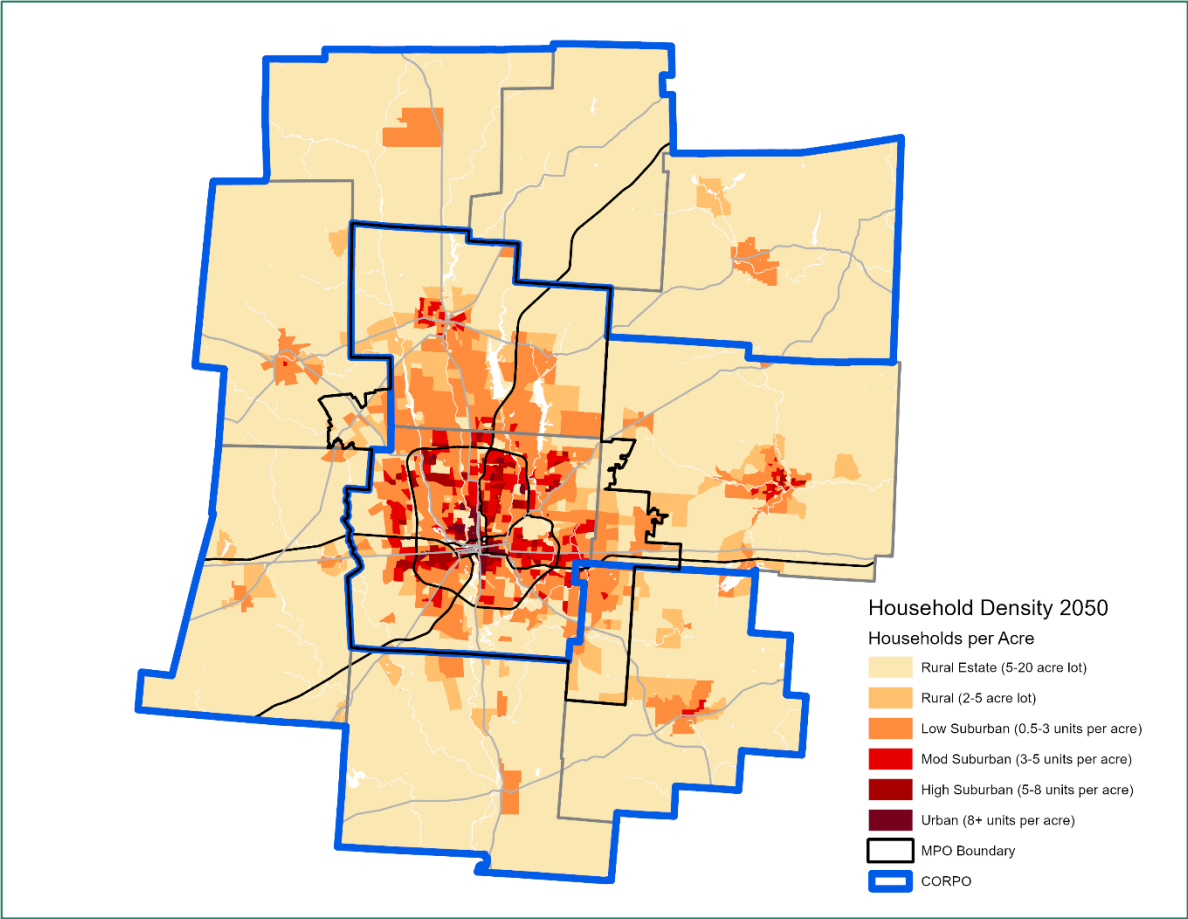
Next: Review results



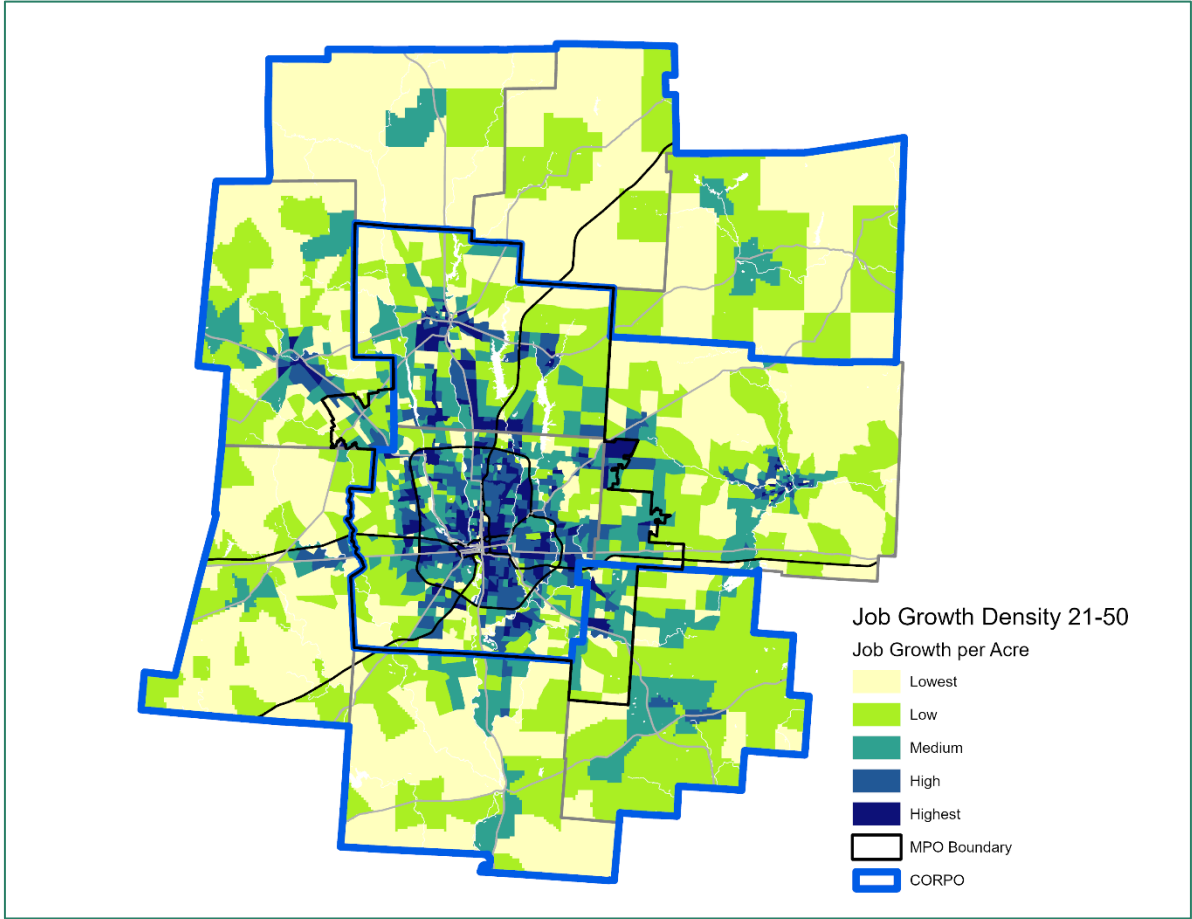
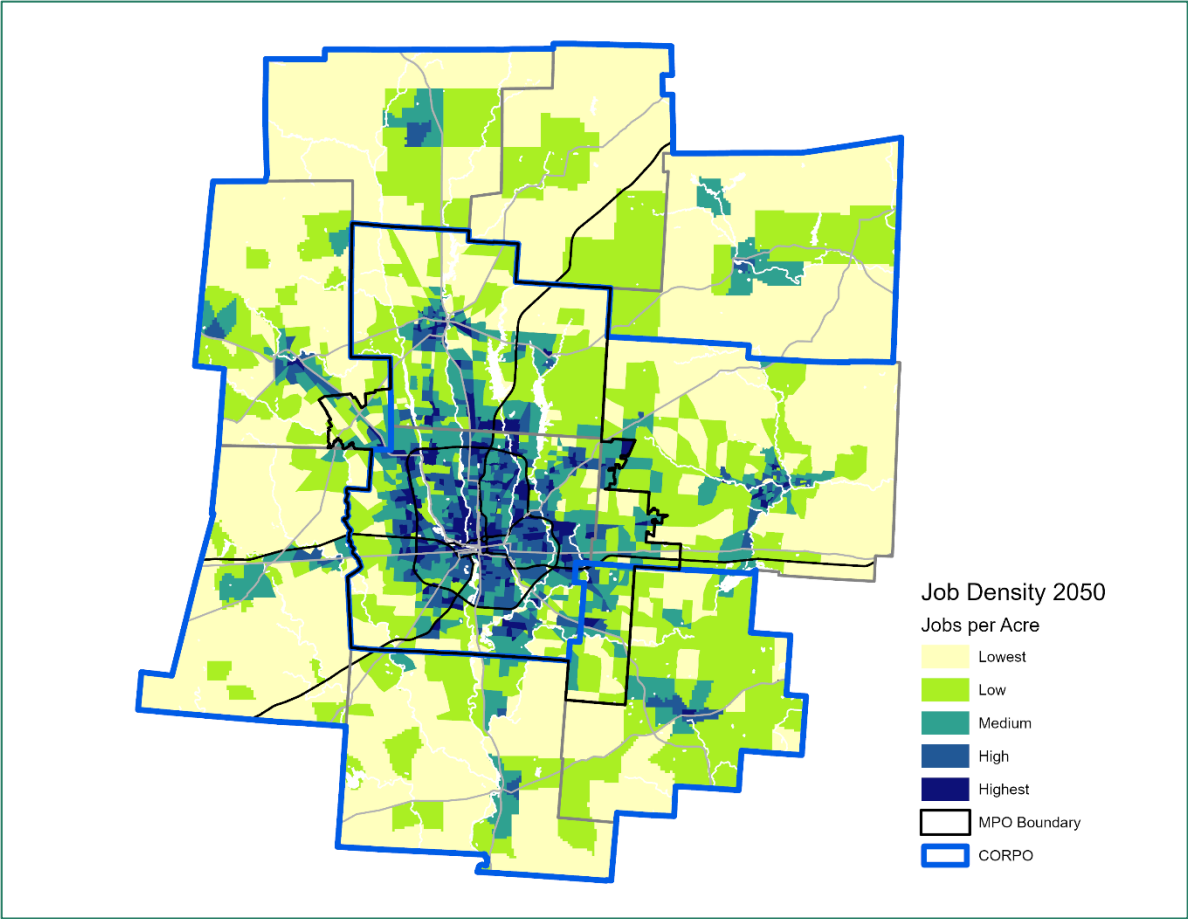
MORPC



Final Results - Households



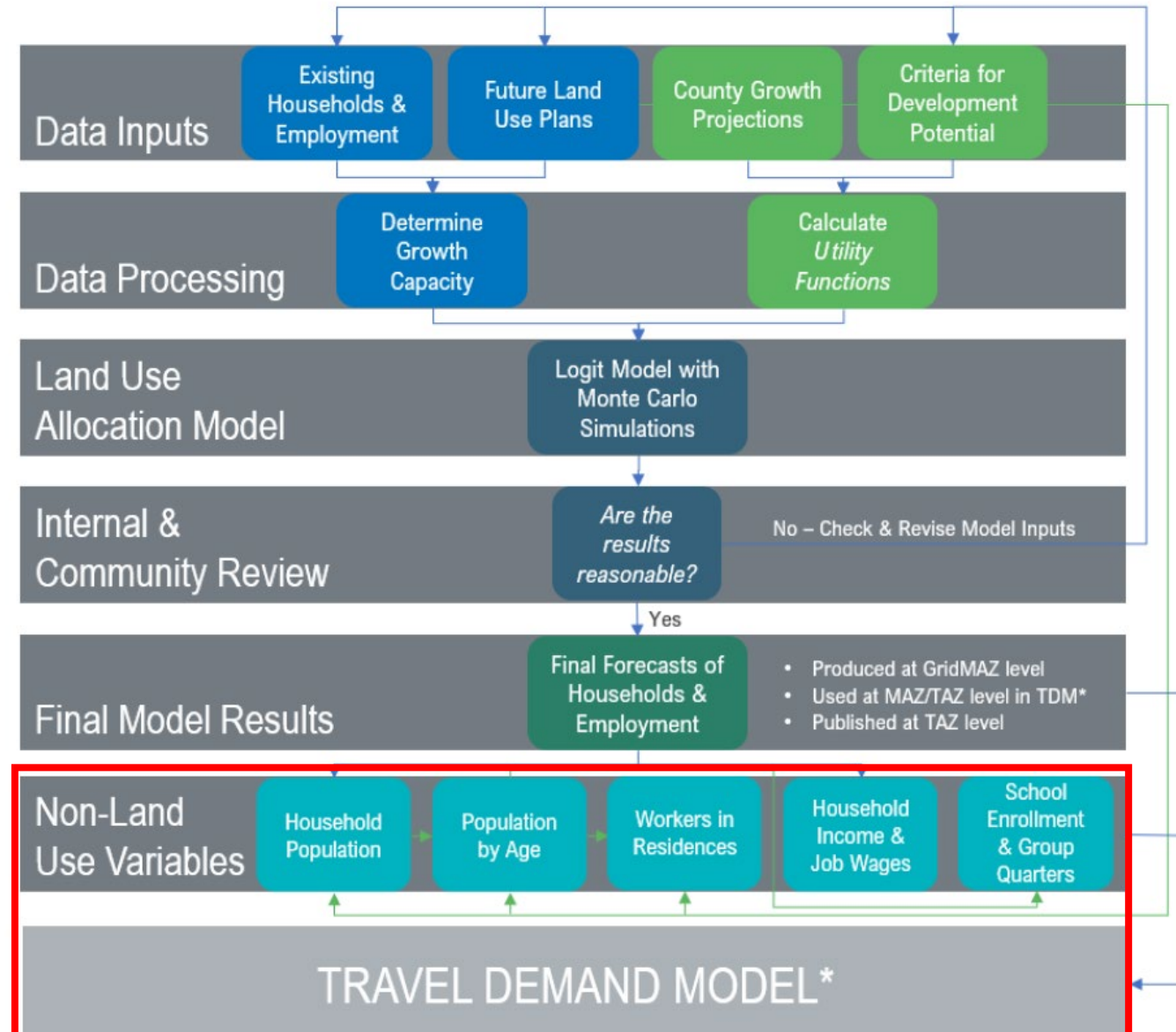
Final Results - Jobs



What's left? A lot!

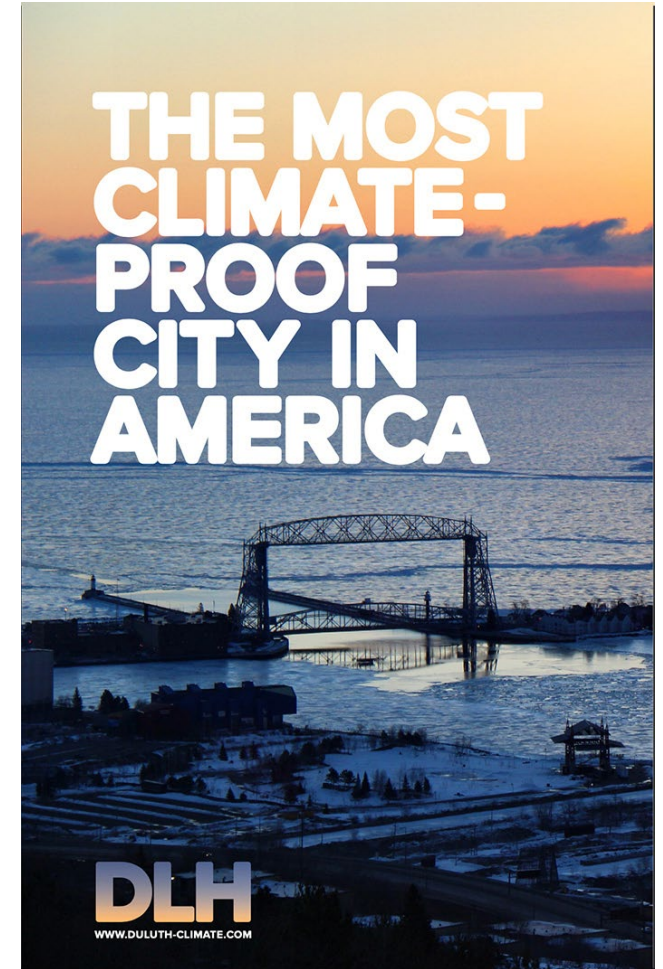
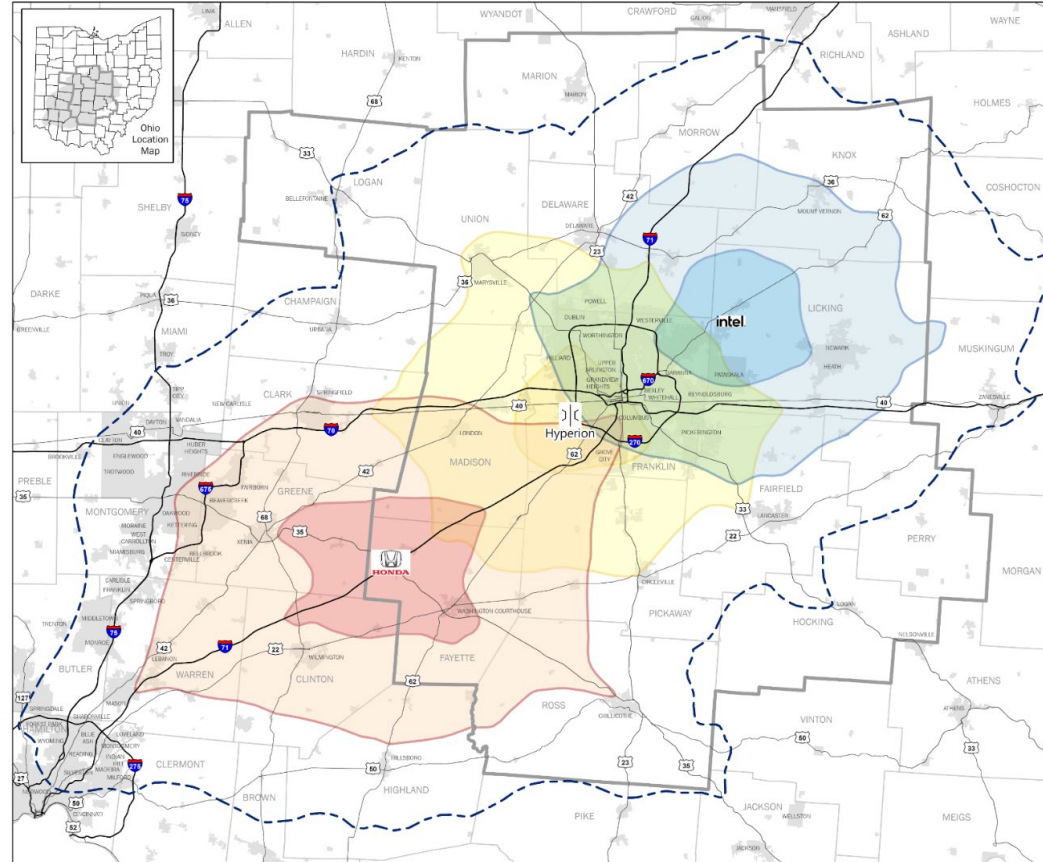


MORPC



And plenty to think about for next time.

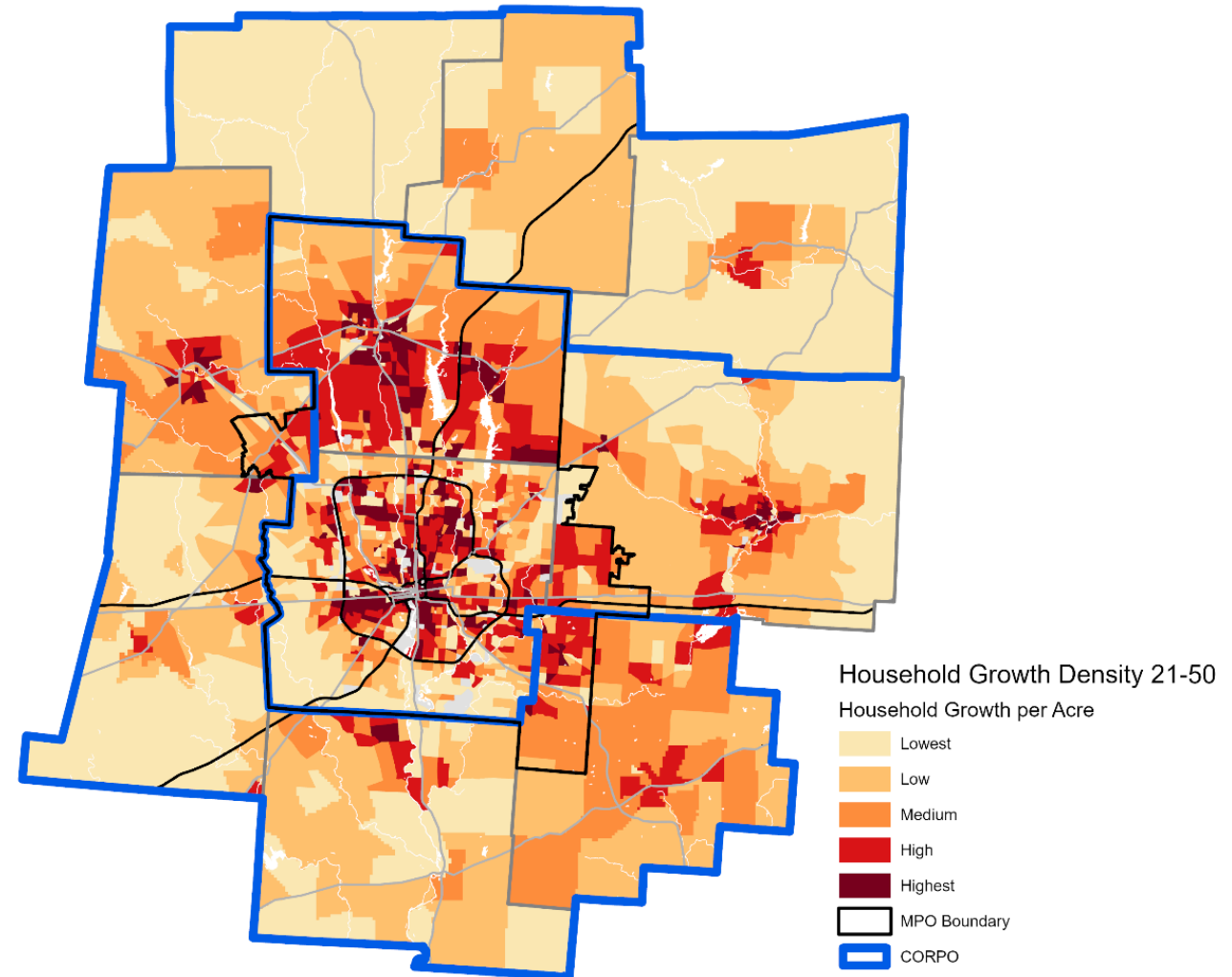
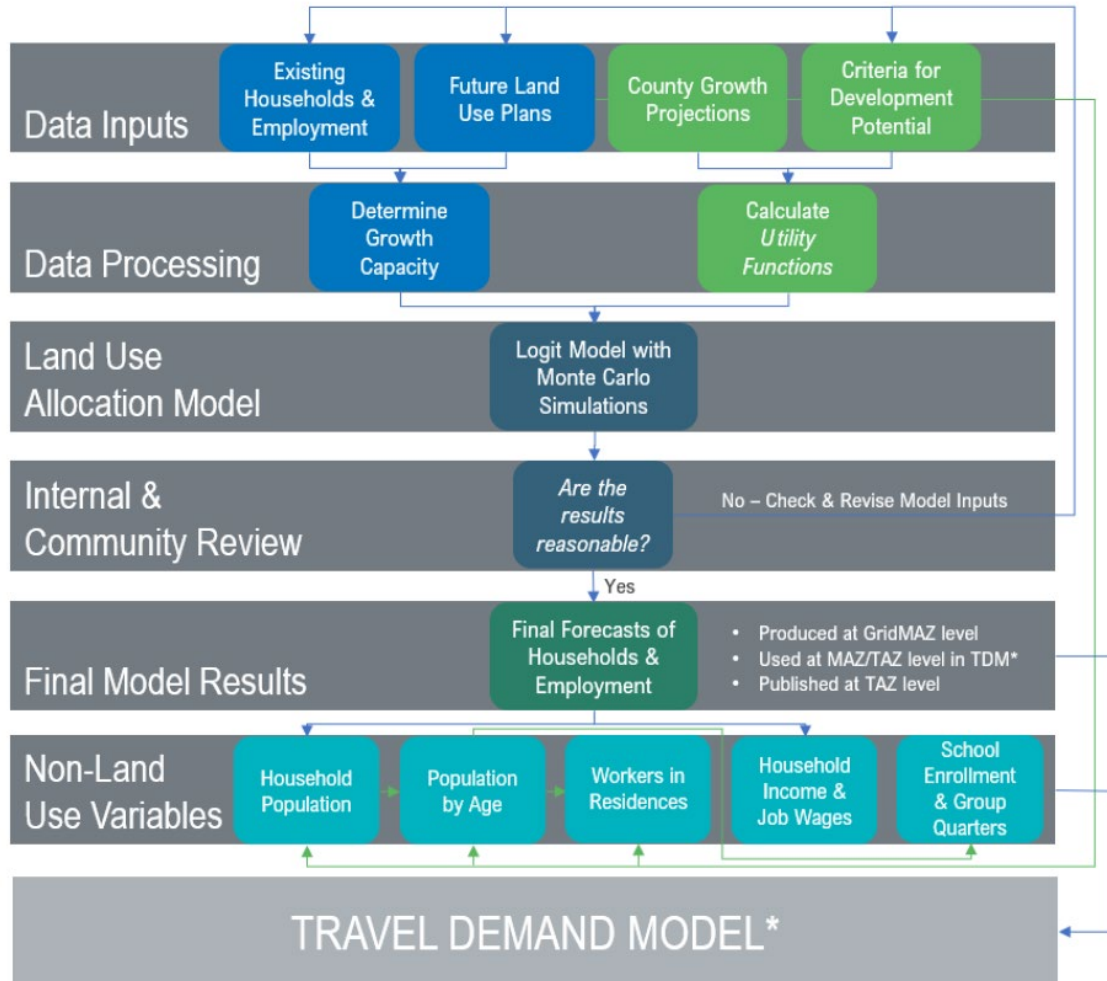
- Other economic development (Hyperion, Honda, Carmenton)
- Climate migration
- Declining natural increase
- Population decline in Ohio
- Etc.



Thanks! Questions?

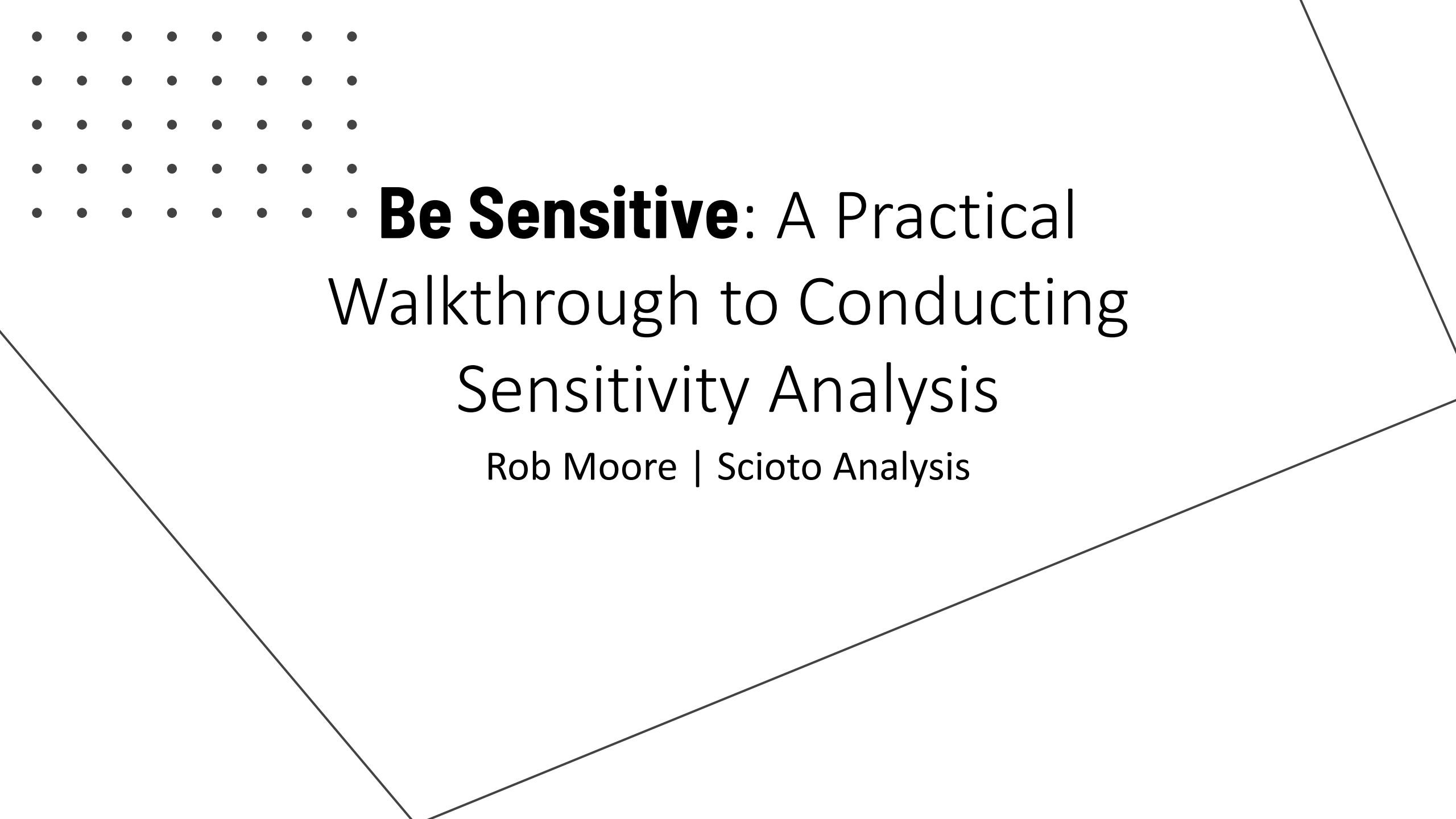


MORPC





MORPC



• • • • • • • •
• • • • • • • •
• • • • • • • •
• • • • • • • •
• • • • • • • •

Be Sensitive: A Practical Walkthrough to Conducting Sensitivity Analysis

Rob Moore | Scioto Analysis



Rob Moore, MPP

Principal, Scioto Analysis

Chair, RIDG

(614) 743-1840

rob@sciotoanalysis.com

• • Sensitivity Analysis

• • Sensitivity analysis is a tool analysts use to test the robustness of their analysis.

Sensitivity analysis can provide a range of possible outcomes for policymakers and other consumers of data to consider.

• • Sensitivity Analysis

• • Partial sensitivity analysis

Worst- and best-case analysis

Breakeven analysis

Monte Carlo simulation

• • Sensitivity Analysis

• • A **partial sensitivity analysis** takes one input and varies it. This allows analysts how it impacts the outcome.

Example: Trying different values of a statistical life and seeing how that impacts the outcome.

• • Sensitivity Analysis

• • **Worst- and best-case analysis** entails changing all the assumptions to “break” the model.

Example: Assuming low uptake and low per-person benefits from a food security program.

• • Sensitivity Analysis

- • **Breakeven analysis** entails changing assumptions until a condition is fulfilled.

E.g. $NPV = 0$ in cost-benefit analysis

This can be useful for gauging how much an input has to change for a certain outcome to happen.

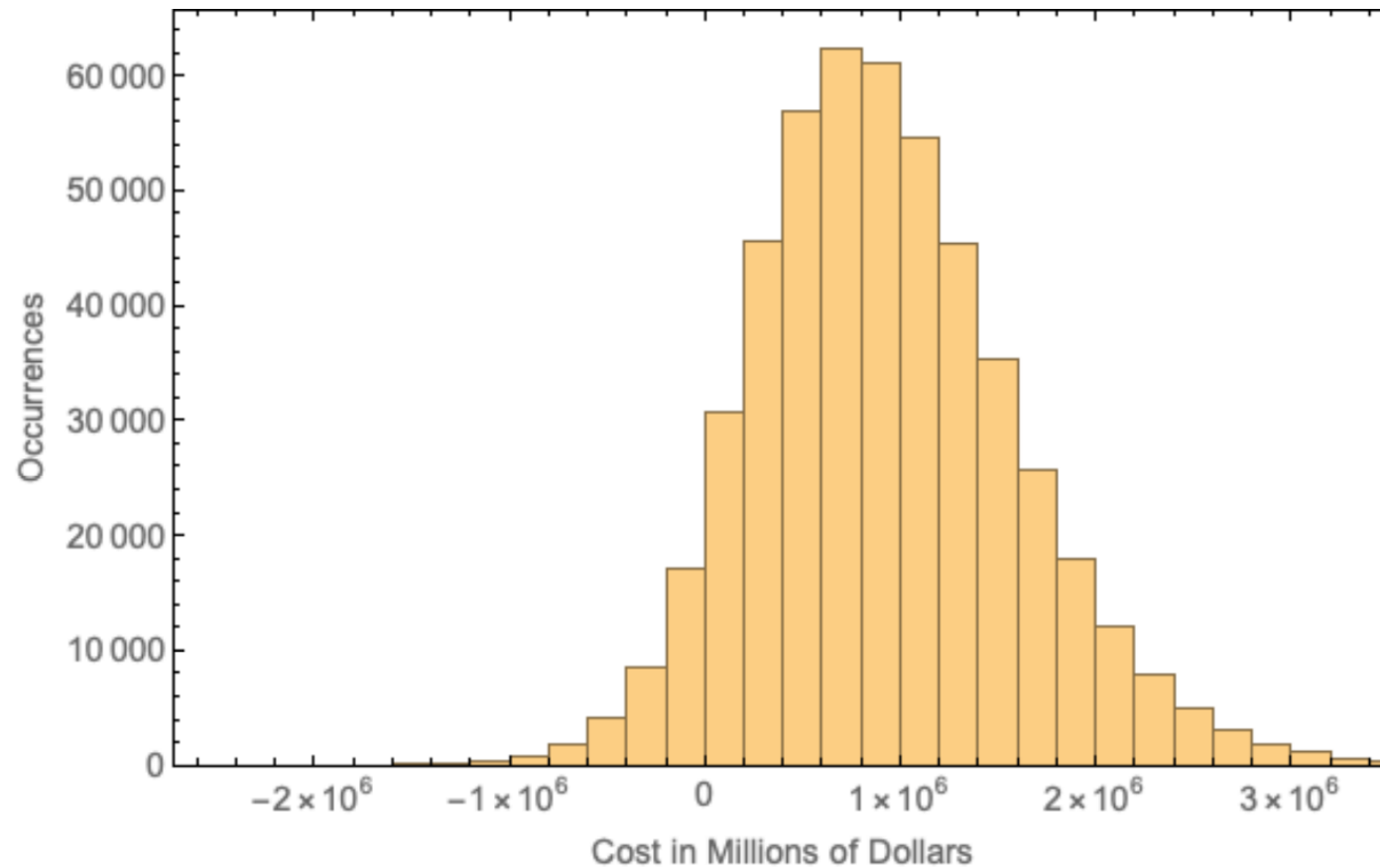
• • Sensitivity Analysis

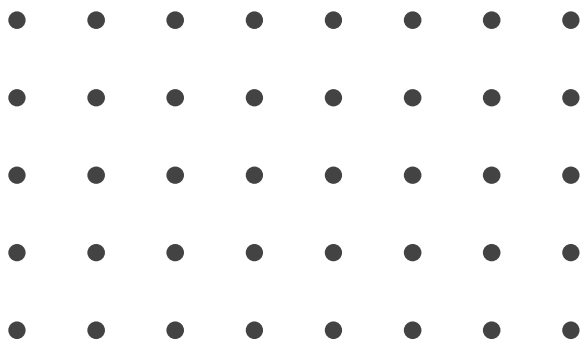
• • **Monte Carlo simulation** is the “gold standard” of sensitivity analysis.

Monte Carlo simulation randomly varies inputs and repeats this 10,000 times to ascertain a range of outcomes.

Sensitivity Analysis

The figure below is a visualization of our Monte Carlo simulation for the strong cap-and-trade policy alternative. The exact expected value here is \$922.481 billion.





Scioto Analysis

Economics | Public Policy

Thank you

- Steering Committee: Tuesday, July 9, 2024 @ 2:30pm (After RDAC)
- General meeting: August 14, 2024 @ 2:30pm



MORPC