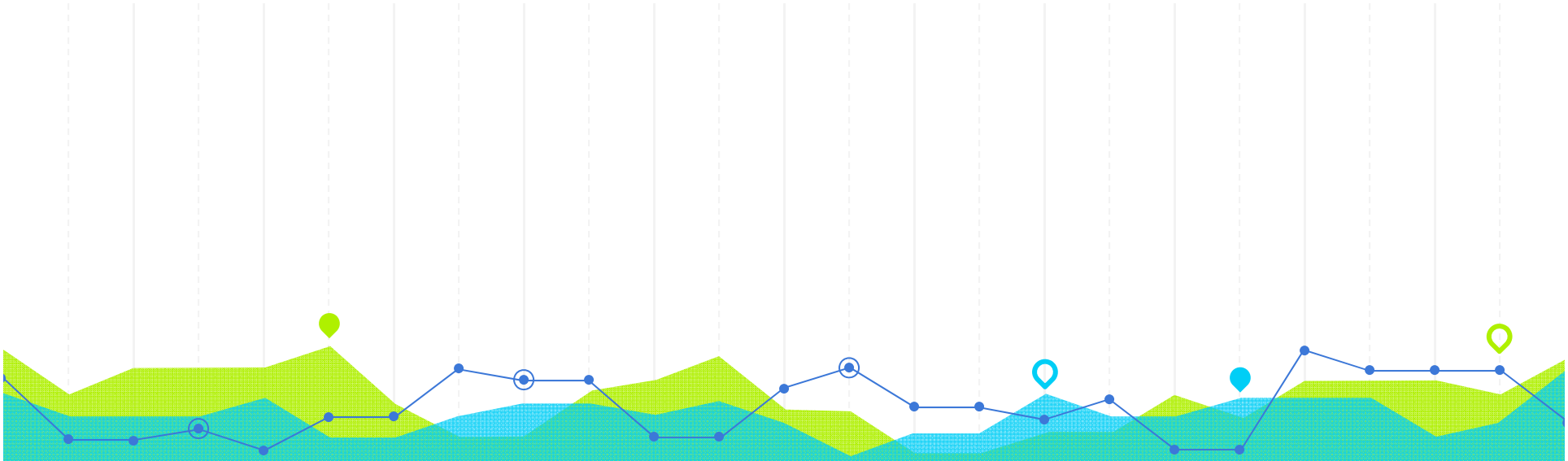
How Does The Energy Code Stack Up to Currently Rated Homes

Home Energy Rating Index Studies

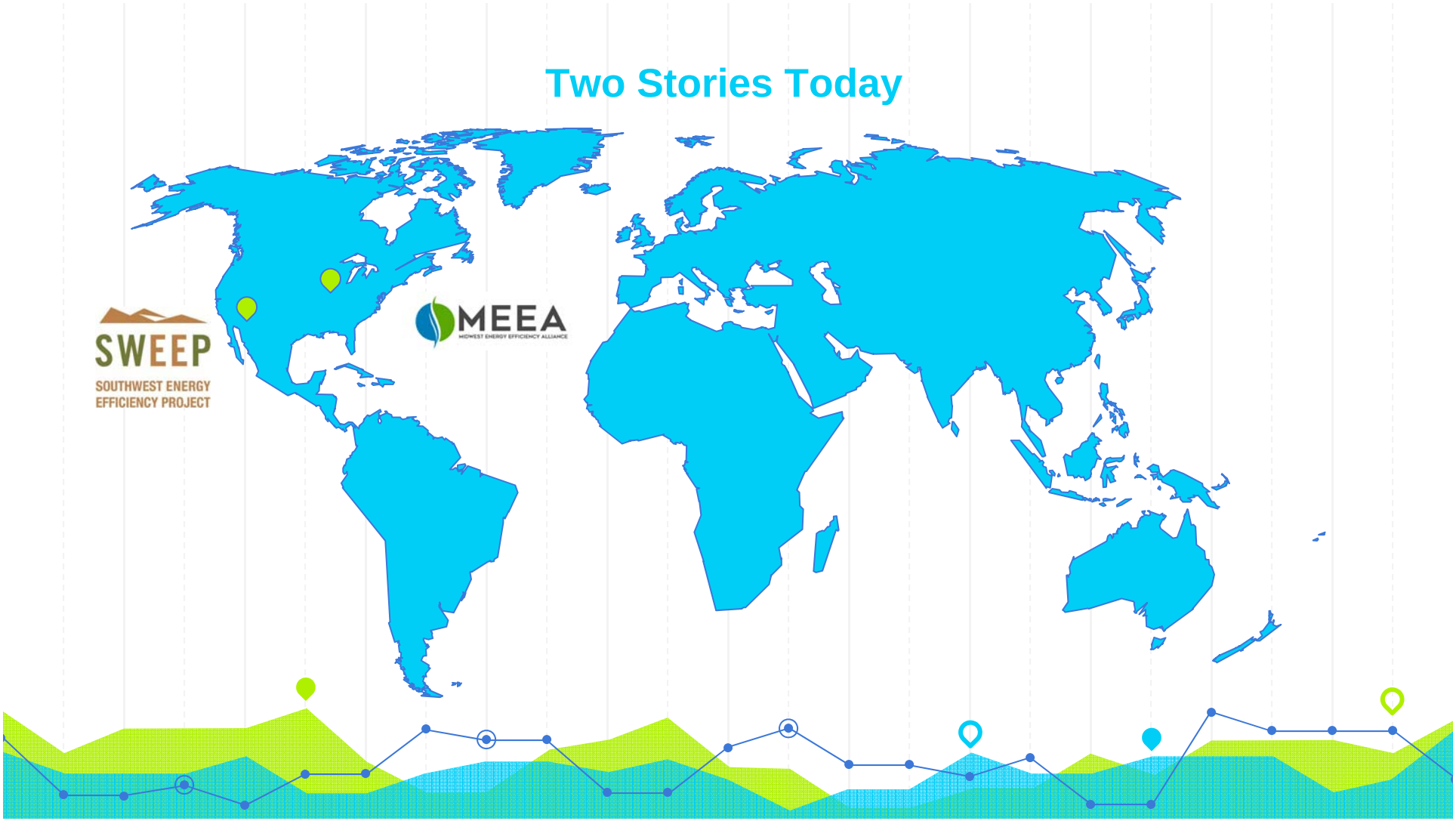


The Value of HERS Data

To Support Energy Code Compliance and Advancements

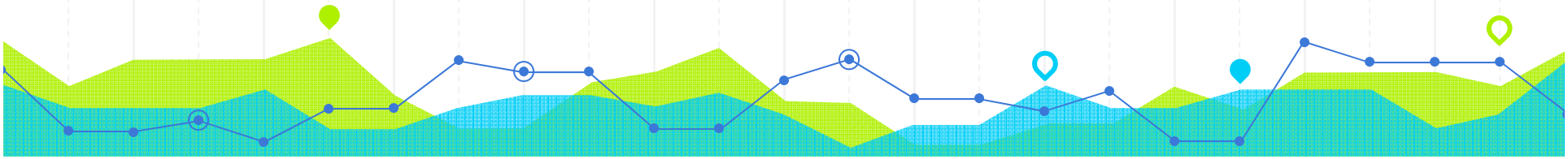
1

Two Stories Today



SWEEP

- The Southwest Energy Efficiency Project (SWEEP) is a public interest organization promoting greater energy efficiency in Arizona, Colorado, Nevada, New Mexico, Utah, and Wyoming.
- SWEEP was founded in 2001
- SWEEP has program support in 5 of the 6 states



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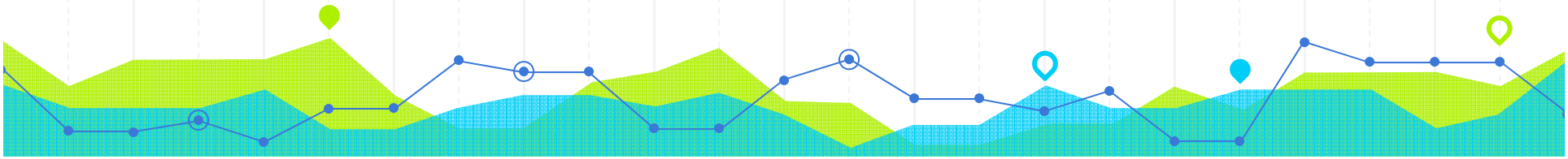
HELLO!

Following me is Isaac Elnecave

Senior Building Policy Manager



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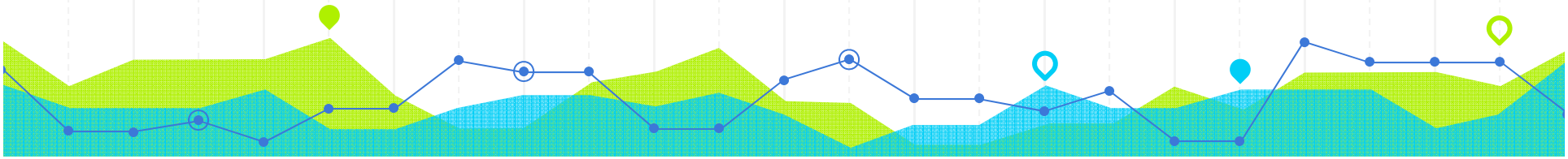
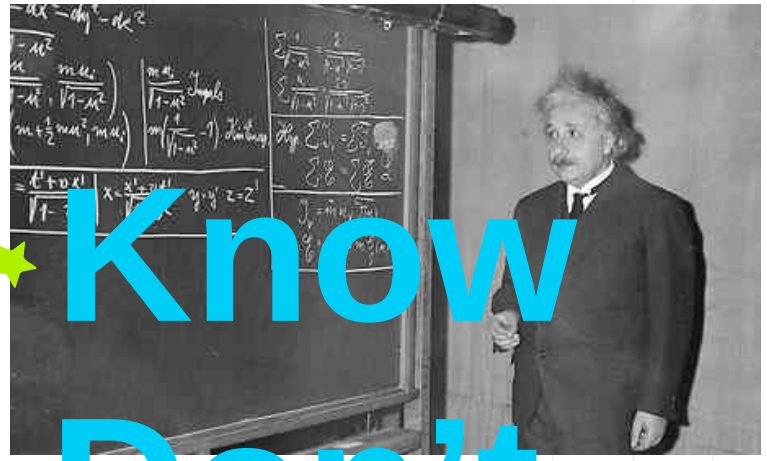
“

If we have data, let’s look at data. If all we have are opinions, let’s go with mine. – Jim Barksdale, former Netscape CEO



You Don’t Know What you Don’t Know



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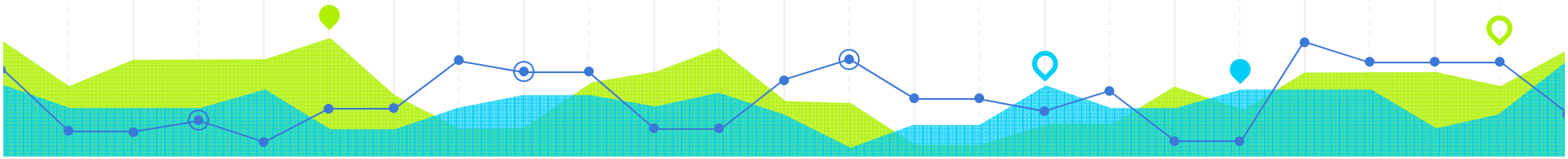
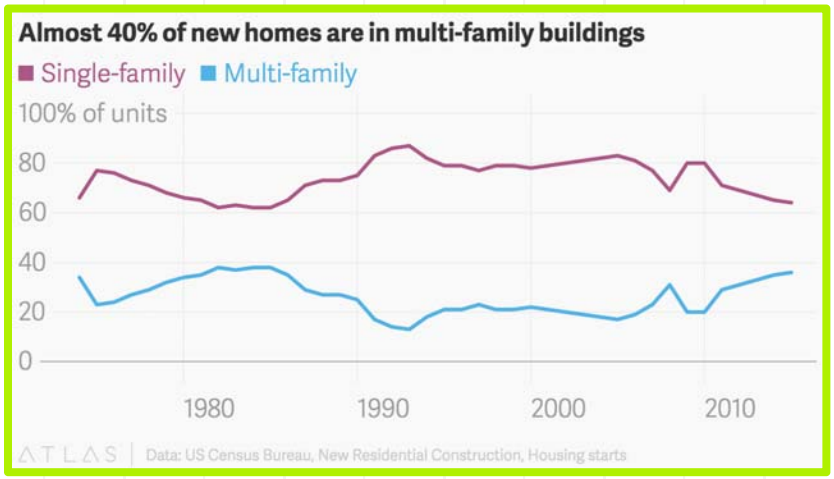
The Value of HERS Data

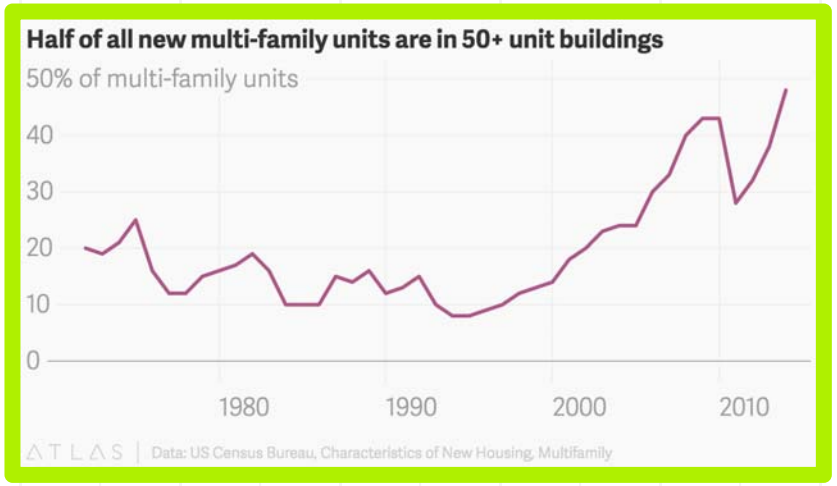
- HERS Rater
- HERS Provider
- RESNET

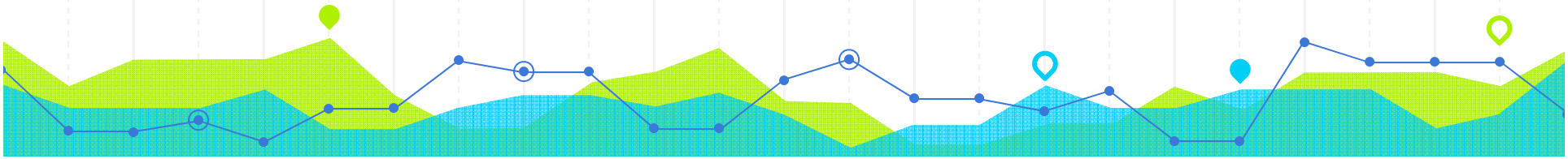
You all have invaluable data.



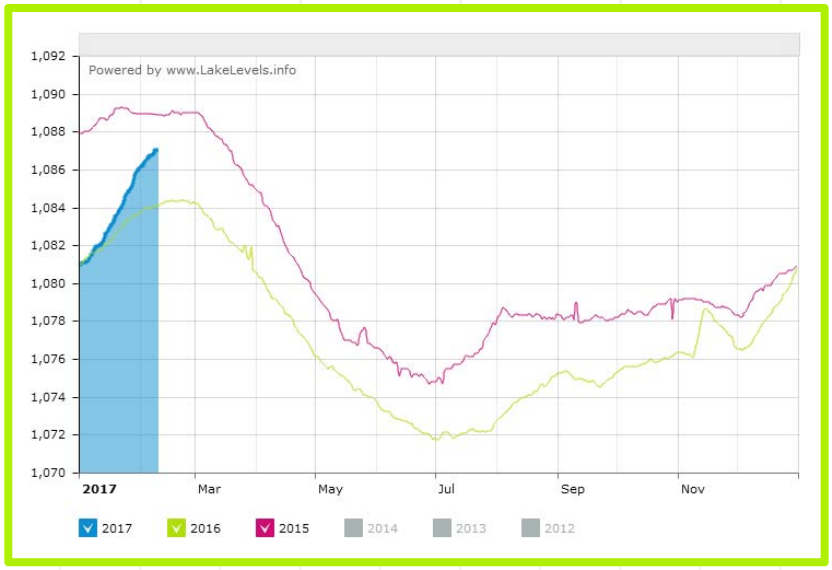
Data By Itself is Good, but When Viewed Pictorially…

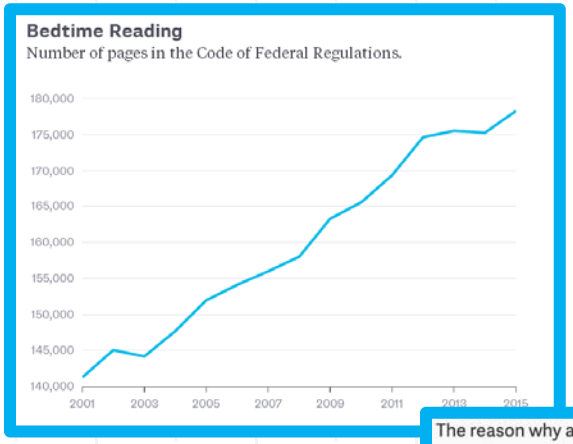


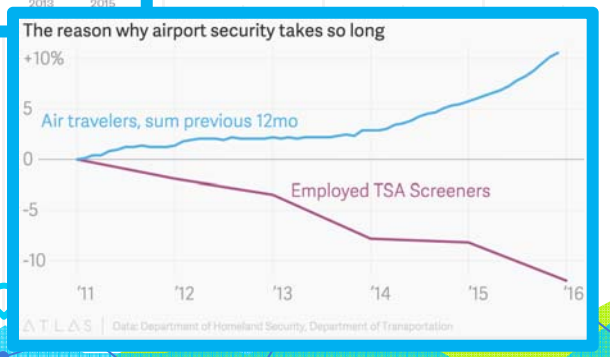




Data By Itself is Good, but When Viewed Pictorially…







The Value of HERS Data

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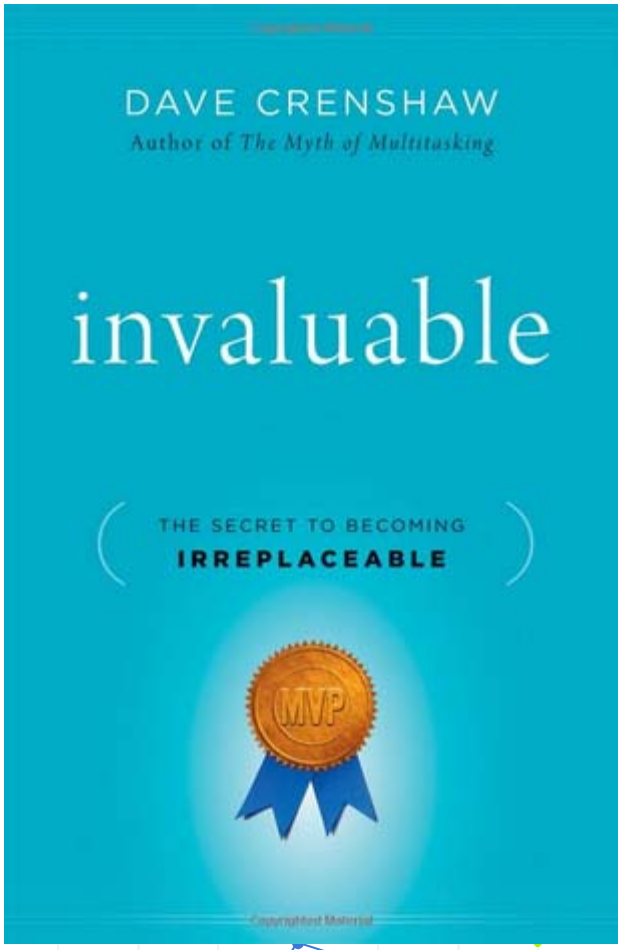
You all have invaluable data.




TheSnitch.co.uk


Credit http://www.inddist.com

SECTION R406 ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

R406.1 Scope.
This section establishes criteria for compliance using an Energy Rating Index (ERI) analysis.

R406.2 Mandatory requirements.
Compliance with this section requires that the provisions identified in Sections R401 through R404 labeled as "mandatory" and Section R403.5.3 be met. The building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table 402.1.1 or 402.1.3 of the 2009 *International Energy Conservation Code*.

Exception: Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

R406.3 Energy Rating Index.
The Energy Rating Index (ERI) shall be a numerical integer value that is based on a linear scale constructed such that the *ERI reference design* has an Index value of 100 and a *residential building* that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a 1-percent change in the total energy use of the rated design relative to the total energy use of the *ERI reference design*. The ERI shall consider all energy used in the *residential building*.

R406.4 ERI-based compliance.
Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value listed in Table R406.4 when compared to the *ERI reference design*.

TABLE R406.4 MAXIMUM ENERGY RATING INDEX

CLIMATE ZONE	ENERGY RATING INDEX
1	52
2	52
3	51
4	54
5	55
6	54
7	53
8	53

R406.5 Verification by approved agency.
Verification of compliance with Section R406 shall be completed by an *approved* third party.

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SECTION R405 SIMULATED PERFORMANCE ALTERNATIVE (PERFORMANCE)

R405.1 Scope.
This section establishes criteria for compliance using simulated energy performance analysis. Such analysis shall include heating, cooling and service water heating energy only.

R405.2 Mandatory requirements.
Compliance with this section requires that the mandatory provisions identified in Section R401.2 be met. All supply and return ducts not completely inside the *building thermal envelope* shall be insulated to a minimum of R-6.

R405.3 Performance-based compliance.
Compliance based on simulated energy performance requires that a proposed residence (*proposed design*) be shown to have an annual energy cost that is less than or equal to the annual energy cost of the *standard reference design*. Energy prices shall be taken from a source *approved* by the *code official*, such as the Department of Energy, Energy Information Administration's *State Energy Price and Expenditure Report*. *Code officials* shall be permitted to require time-of-use pricing in energy cost calculations.

Exception: The energy use based on source energy expressed in Btu or Btu per s
area shall be permitted to be substituted for the energy cost. The source energy n
3.16. The source energy multiplier for fuels other than electricity shall be 1.1.

R405.4 Documentation.
Documentation of the software used for the performance design and the paramete
accordance with Sections R405.4.1 through R405.4.3

TABLE R405.5.2(1) SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Above-grade walls	Type: mass wall if proposed wall is mass; otherwise wood frame.	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed
Basement and crawl space walls	Type: same as proposed	As proposed
	Gross area: same as proposed	As proposed
	U-factor: from Table R402.1.4, with insulation layer on interior side of walls	As proposed
Above-grade floors	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
Ceilings	Type: wood frame	As proposed
	Gross area: same as proposed	As proposed
	U-factor: as specified in Table R402.1.4	As proposed
Roofs	Type: composition shingle on wood sheathing	As proposed
	Gross area: same as proposed	As proposed
	Solar absorptance = 0.75	As proposed
	Emittance = 0.90	As proposed
Attics	Type: vented with aperture = 1 ft^2 per 300 ft^2 ceiling area	As proposed
Foundations	Type: same as proposed	As proposed
	Foundation wall area above and below grade and soil characteristics: same as	As proposed

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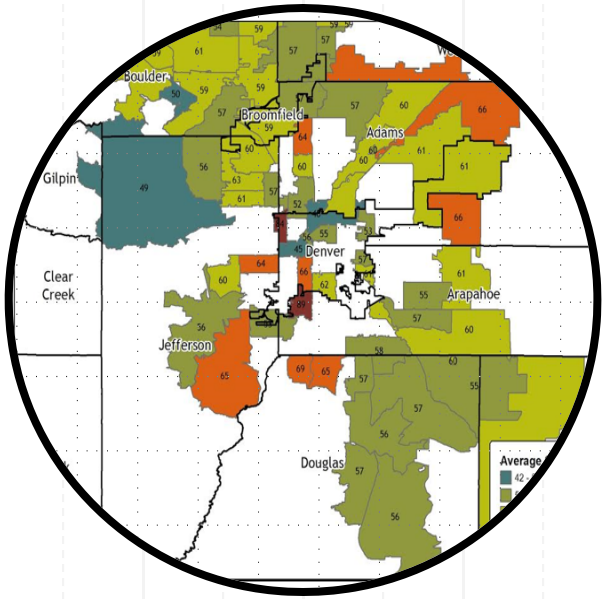
Colorado's Picture

Average Scores



Jurisdictions

	A	B	C
1	**Zip**	**Ratings**	**Average Score**
2	85383	1739	58
3	85142	1525	61
4	85298	1353	64
5	85338	824	59
6	85138	743	64
7	85140	742	48
8	85395	705	60
9	85212	647	63
10	85249	583	62
11	85143	573	66
12	85396	551	63
13	85297	531	57
14	85379	523	64
15	85658	518	63
16	85281	469	74
17	85295	458	59
18	85296	445	64
19	85326	412	66
20	85353	391	66
21	85339	388	62

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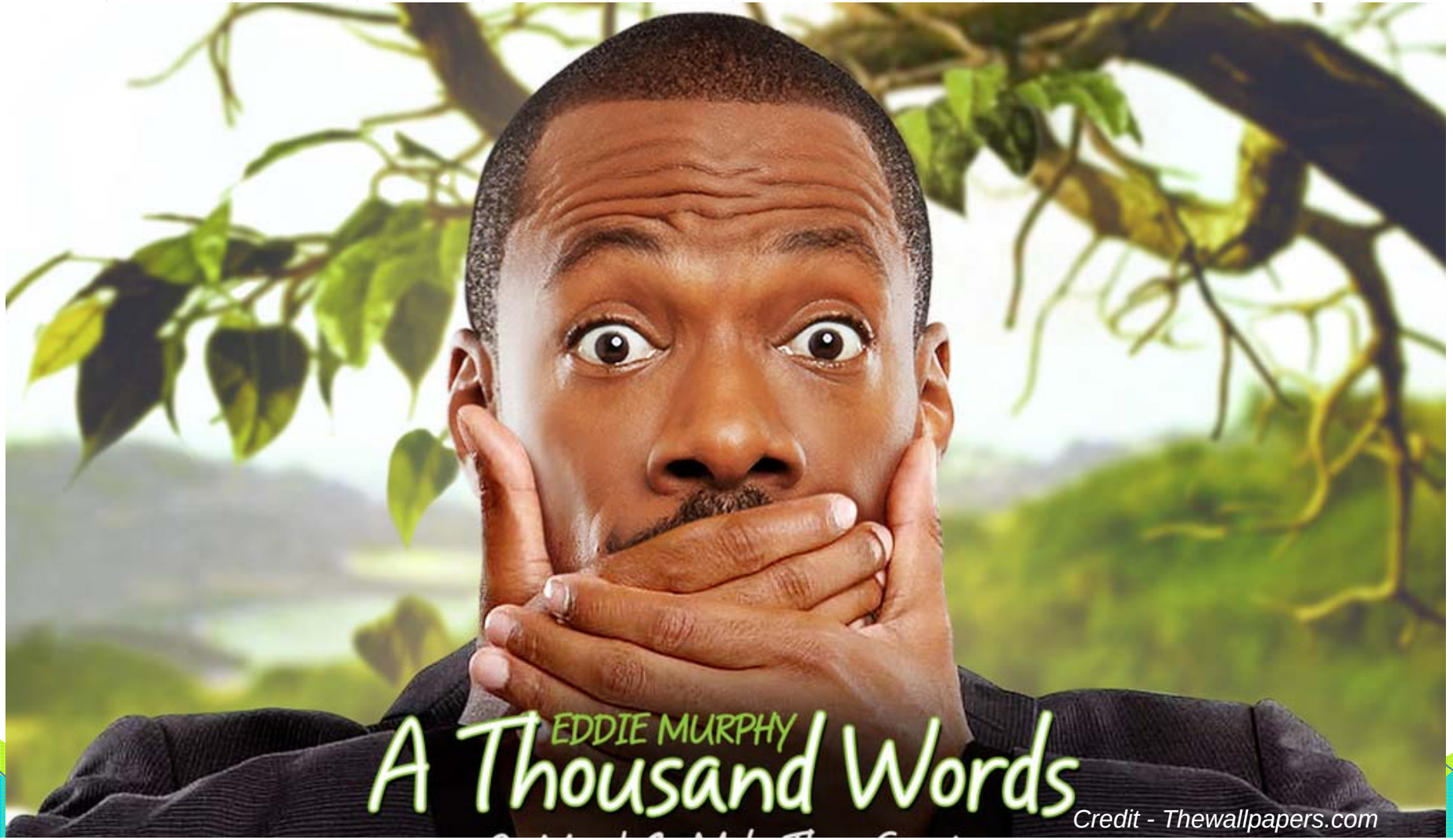
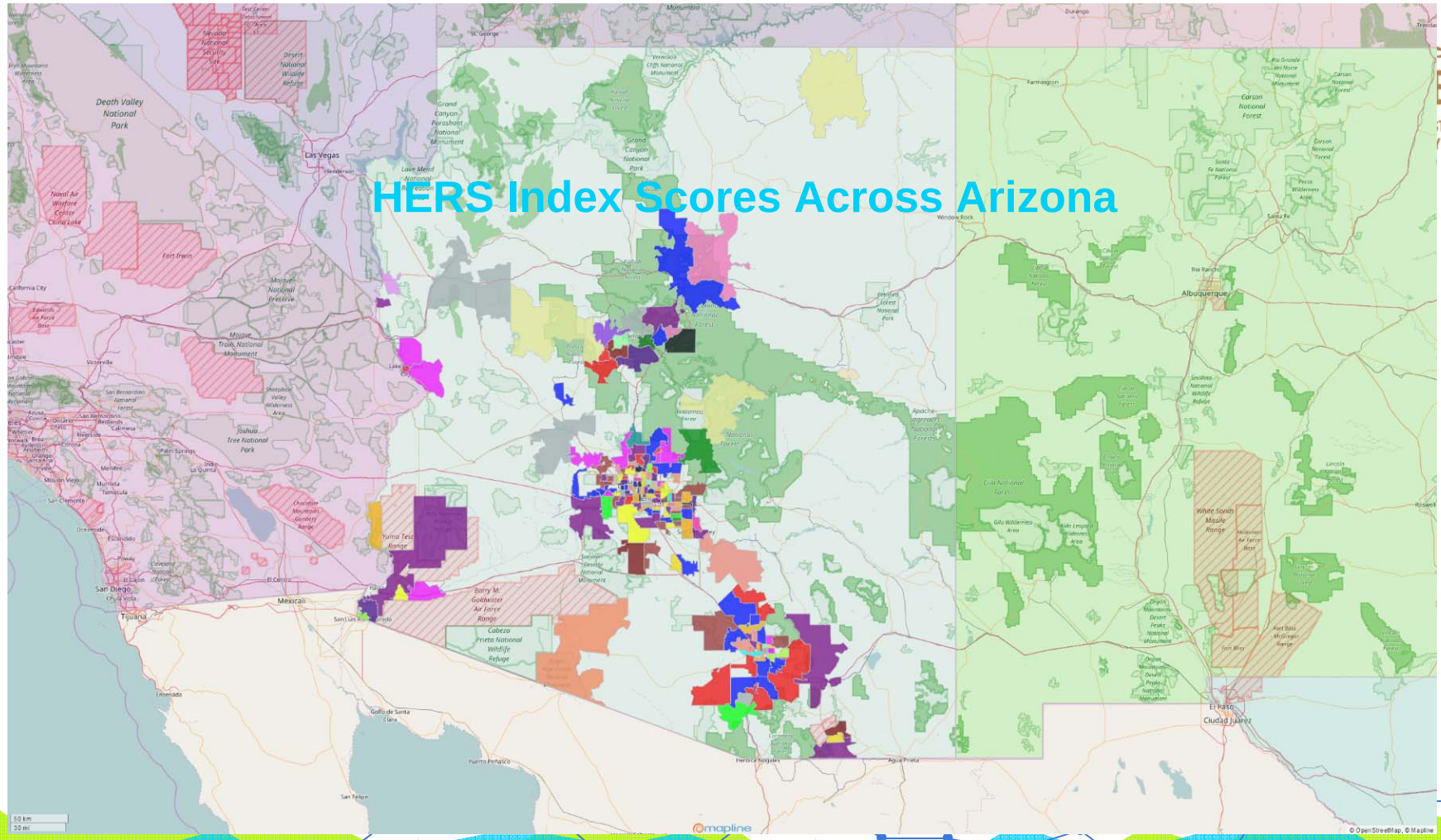
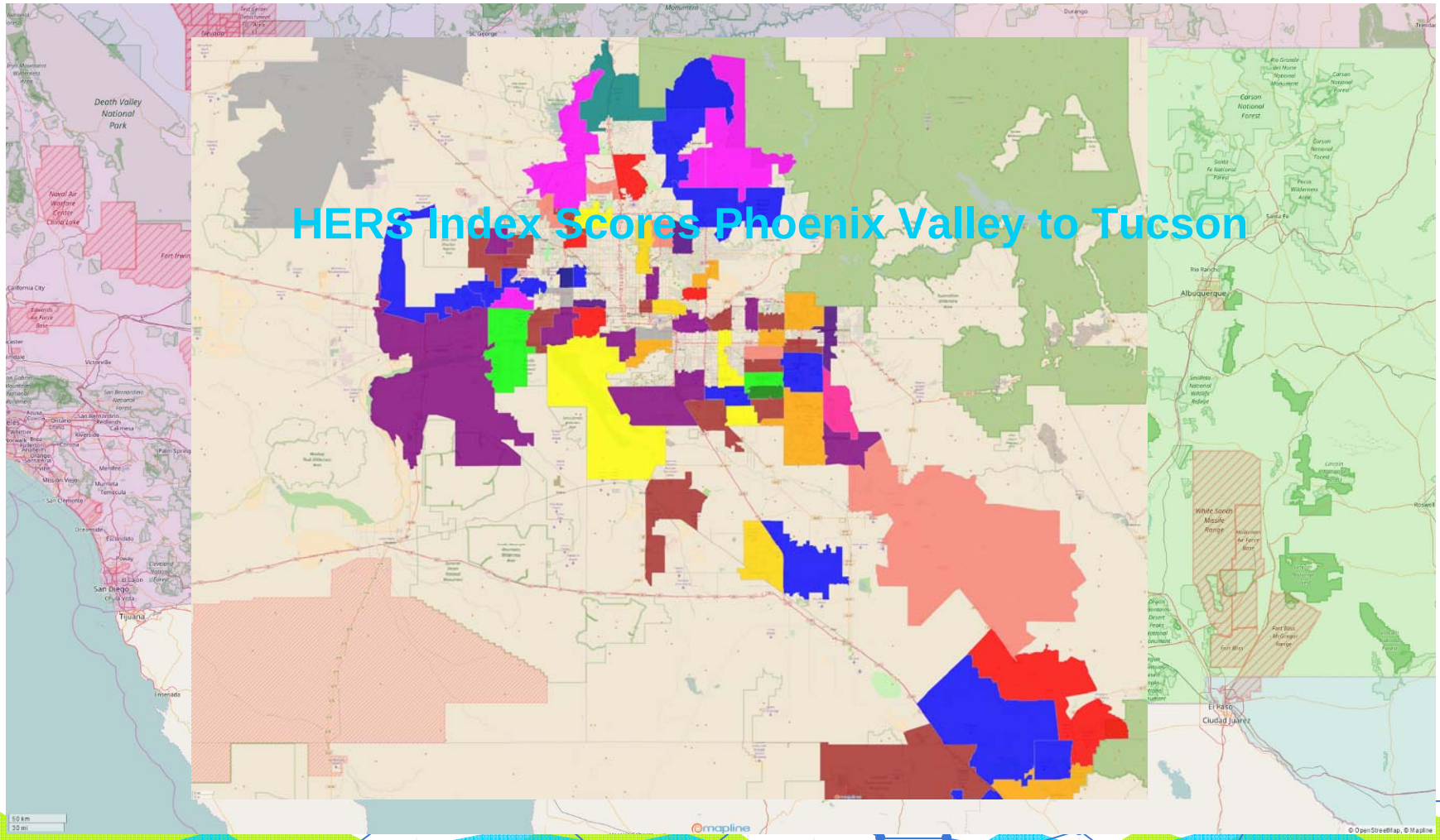

EDDIE MURPHY
A Thousand Words
Credit - Thewallpapers.com

HERS Index Scores Across Arizona




HERS Index Scores Phoenix Valley to Tucson
Death Valley National Park
Naval Air Weapons Center China Lake
Fort Irwin
California City
Victorville
San Bernardino National Forest
Riverside
Palm Springs
Menifee
Mission Viejo
Murrieta
Temecula
San Clemente
Oceanside
Escondido
Poway
El Cajon
San Diego
Chula Vista
Tijuana
Ensenada
Cleveland National Forest
Carson National Forest
Santa Fe National Forest
Pecos Wilderness Area
Rio Rancho
Albuquerque
Sevilleta National Wildlife Refuge
White Sands Missile Range
Holloman Air Force Base
Fort Bliss McGregor Range
El Paso
Ciudad Juárez
50 km
30 mi
mapline
© OpenStreetMap, © Mapline

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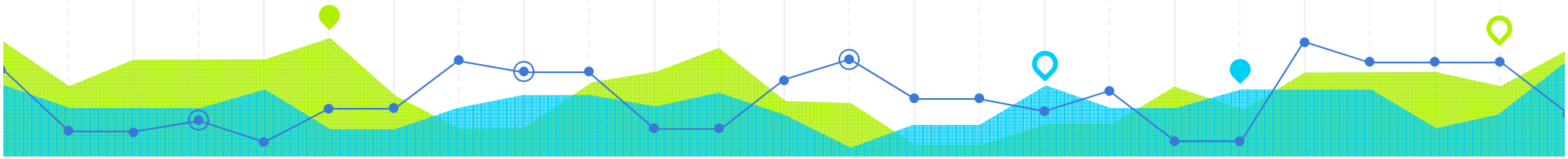
Not everything that can be counted counts, and not everything that counts can be counted

– Albert Einstein



Where the Rating Scores Fall

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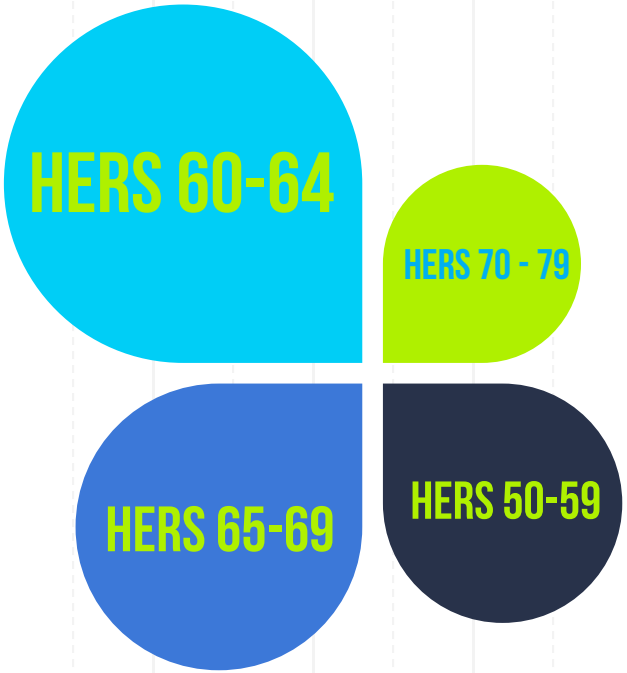


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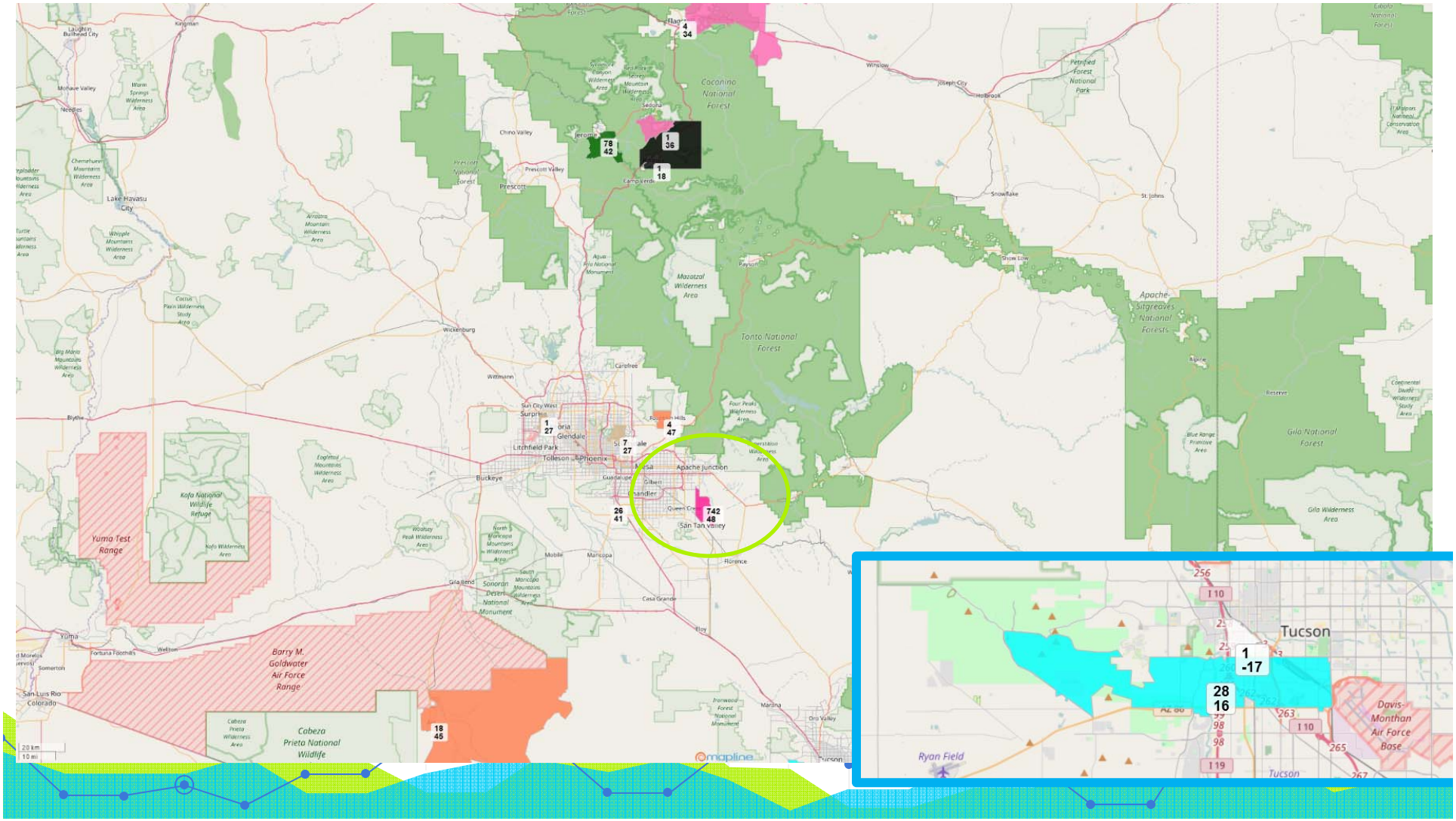
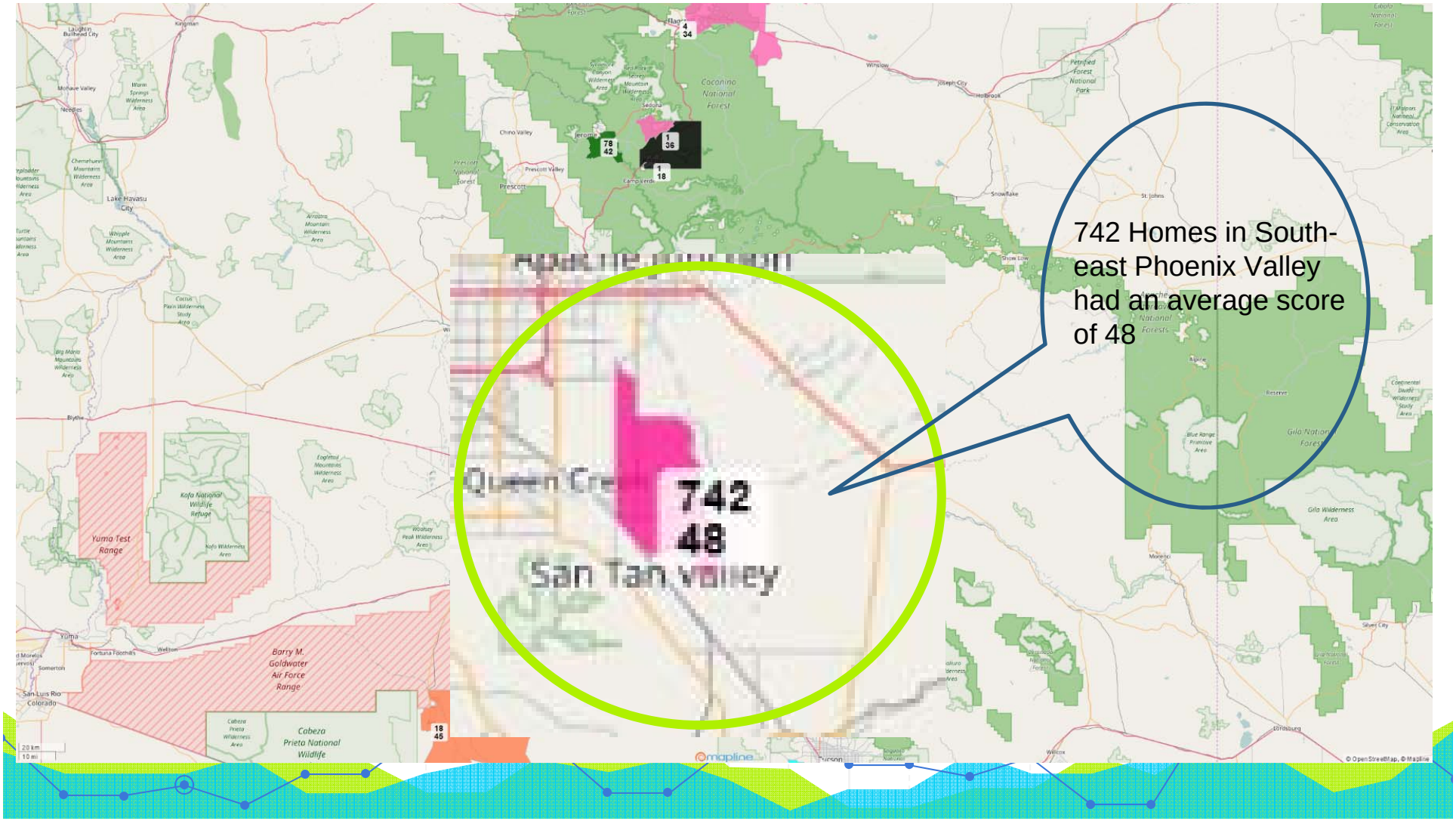
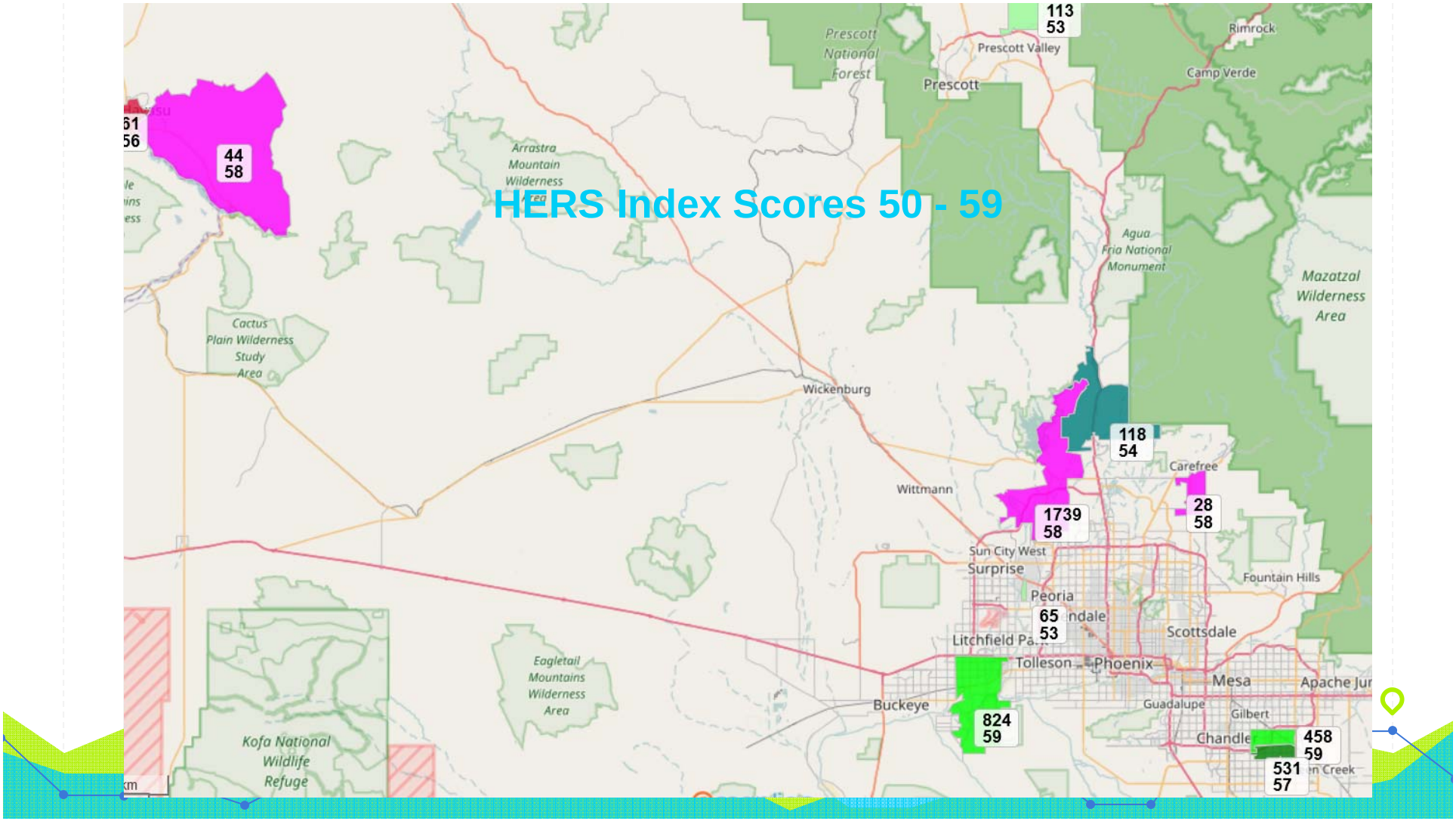
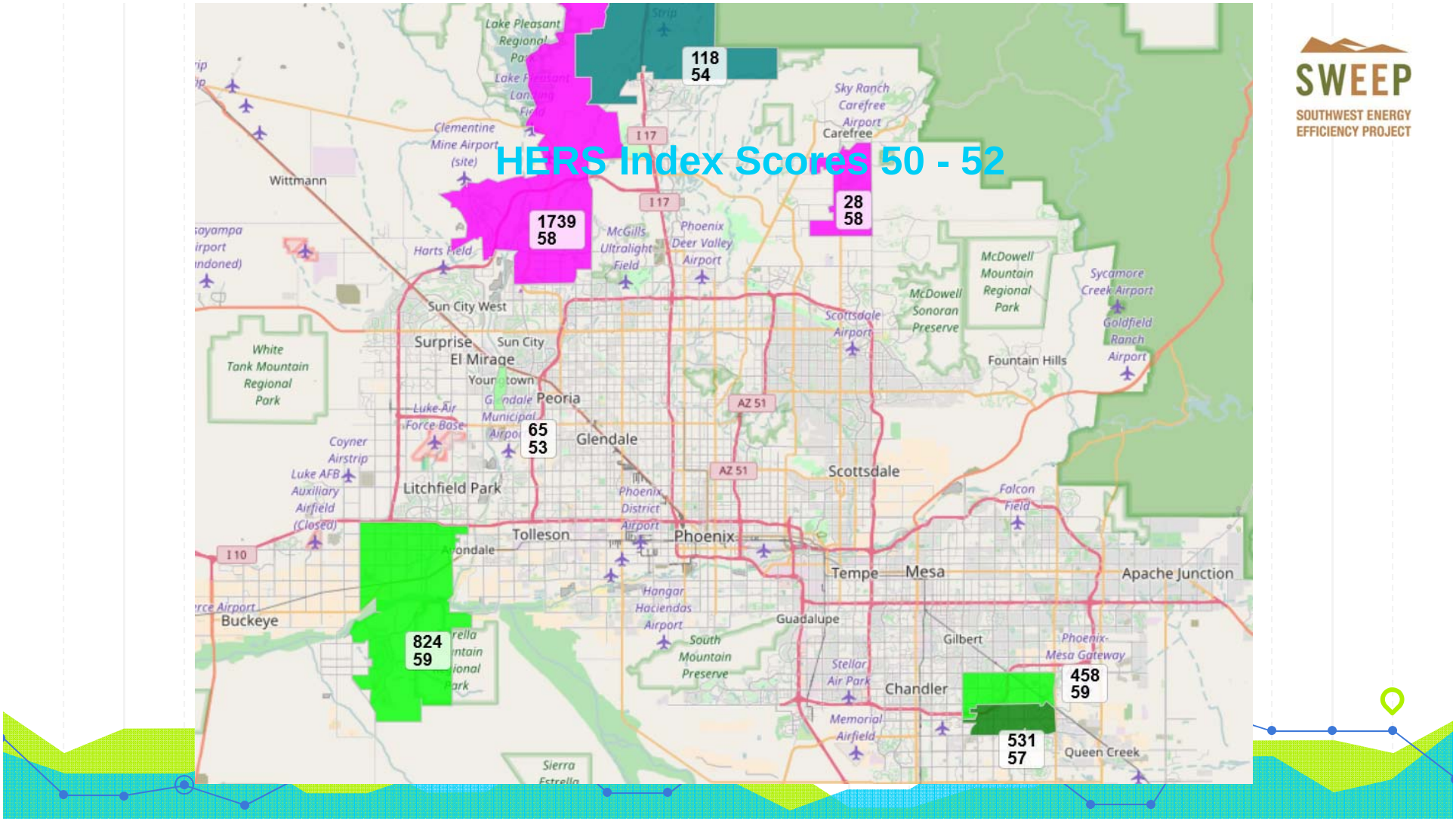
23,784
Over 3 years!


Coconino National Forest
Tonto National Forest
Mazatzal Wilderness Area
Apache Sitgreaves National Forests
Gila National Forest
Petrified Forest National Park
Prescott
Prescott Valley
Chino Valley
Sedona
Flagstaff
Winslow
Joseph City
Holbrook
Show Low
Snowflake
St. Johns
Payson
Lake Havasu City
Kingman
Needles
Mohave Valley
Wickenburg
Wittmann
Carefree
Surprise
Glendale
Litchfield Park
Tolleson
Phoenix
Apache Junction
Buckeye
Gilbert
Queen Creek
San Tan Valley
Florence
Casa Grande
Eloy
Maricopa
Mobile
Gila Bend
Yuma
Somerton
Wellton
San Luis Rio Colorado
Blythe
Yuma Test Range
Kofa National Wildlife Refuge
Barry M. Goldwater Air Force Range
Cabeza Prieta National Wildlife
Sonoran Desert National Monument
Four Peaks Wilderness Area
Superstition Wilderness Area
Blue Range Primitive Area
Gila Wilderness Area
Tucson
Ryan Field
Davis-Monthan Air Force Base
1 27
4 47
7 27
26 41
742 48
18 45
4 34
78 42
1 36
1 18
1 -17
28 16
20 km
10 mi
mapline


742 Homes in South-east Phoenix Valley had an average score of 48
742
48
San Tan Valley
Queen Creek
Yuma Test Range
Barry M. Goldwater Air Force Range
Cabeza Prieta National Wildlife
Kofa National Wildlife Refuge
Coconino National Forest
Prescott
Lake Havasu City
Yuma
Flagstaff
Sedona
Gila Wilderness Area
Petrified Forest National Park
Mapline
© OpenStreetMap, © Mapline


HERS Index Scores 50 - 59
113
53
44
58
118
54
28
58
1739
58
65
53
824
59
458
59
531
57
Prescott National Forest
Prescott
Prescott Valley
Rimrock
Camp Verde
Arrastra Mountain Wilderness Area
Agua Fria National Monument
Mazatzal Wilderness Area
Cactus Plain Wilderness Study Area
Wickenburg
Wittmann
Carefree
Sun City West
Surprise
Fountain Hills
Peoria
Litchfield Park
Scottsdale
Tolleson
Phoenix
Mesa
Apache Jct
Buckeye
Guadalupe
Gilbert
Chandler
Eagletail Mountains Wilderness Area
Kofa National Wildlife Refuge



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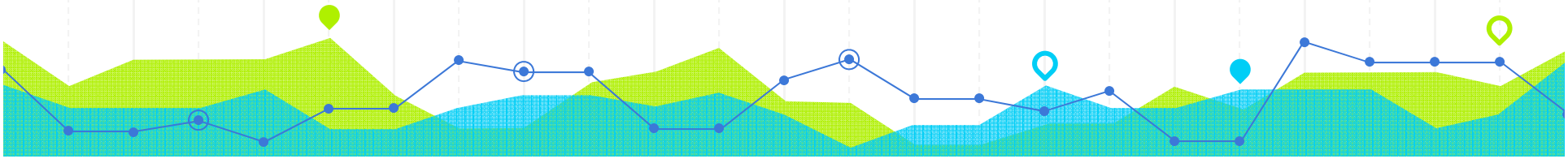
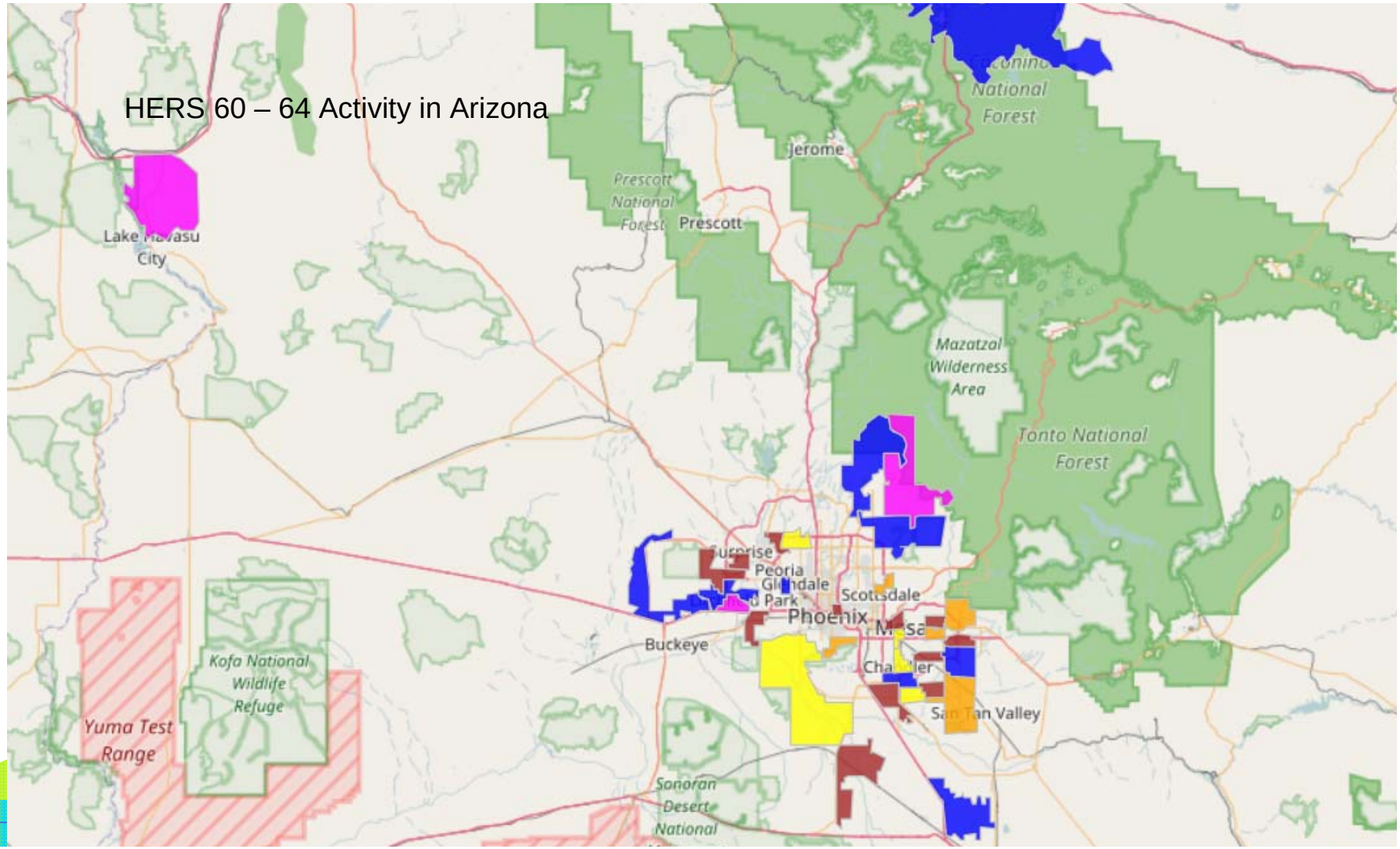
Where Scores Lined Up Across Arizona

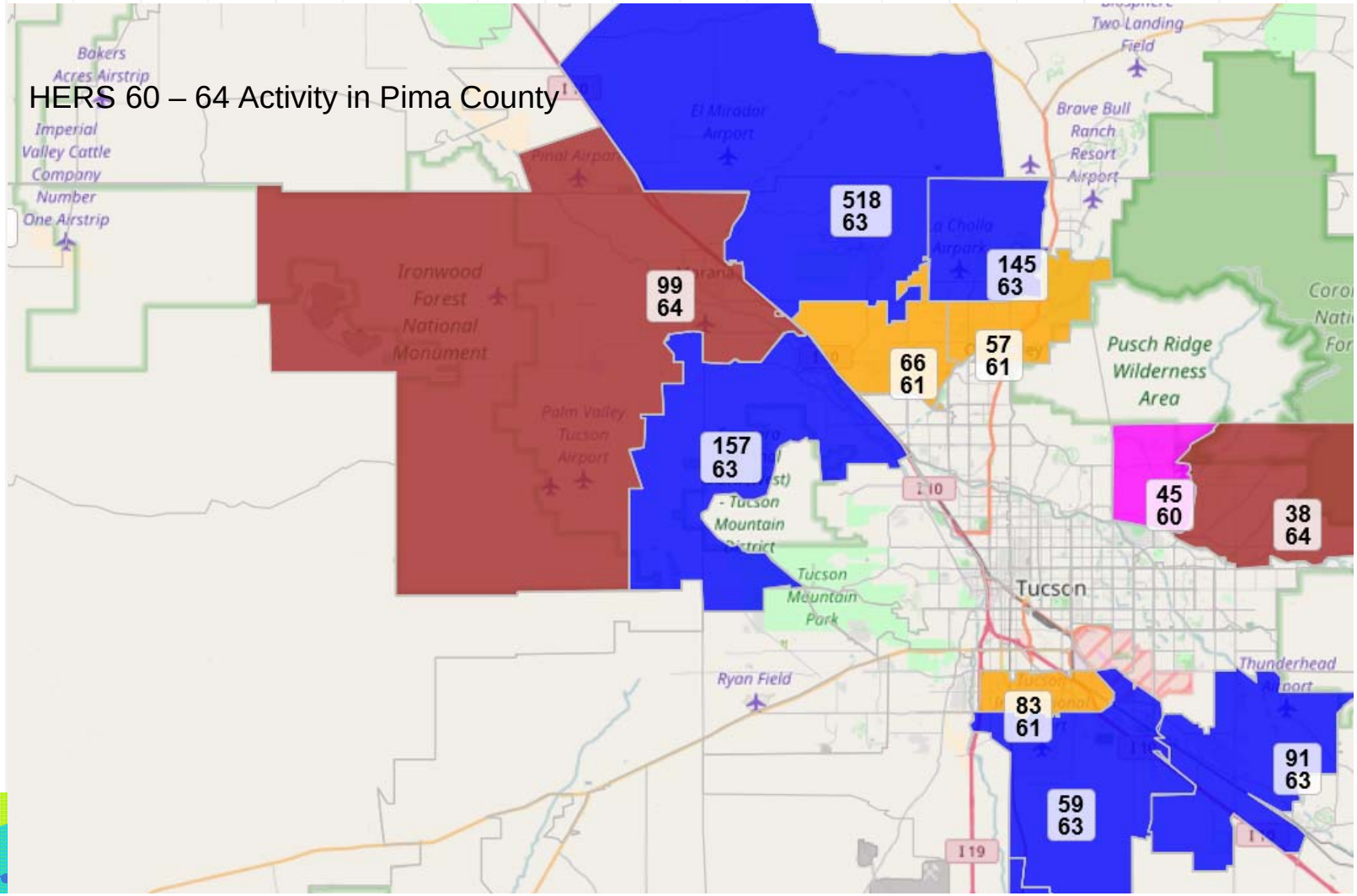
	State	Phoenix/Maricopa County	Tucson
50-59	3,981	3,763	0
60-64	12,634	10,693	1,647
65-69	4,328	3,491	458



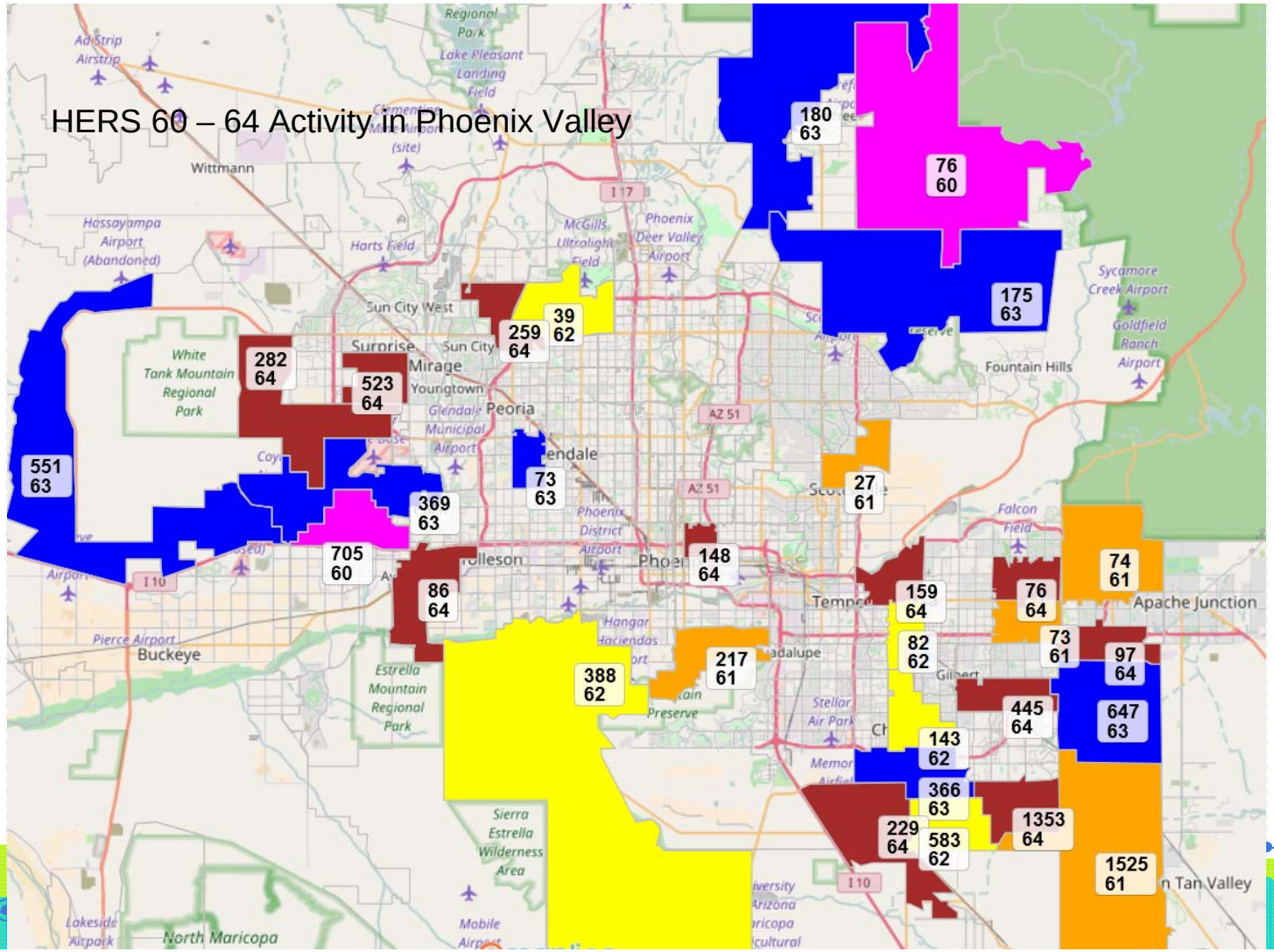
HERS 60 – 64 Activity in Arizona



HERS 60 – 64 Activity in Pima County



HERS 60 – 64 Activity in Phoenix Valley



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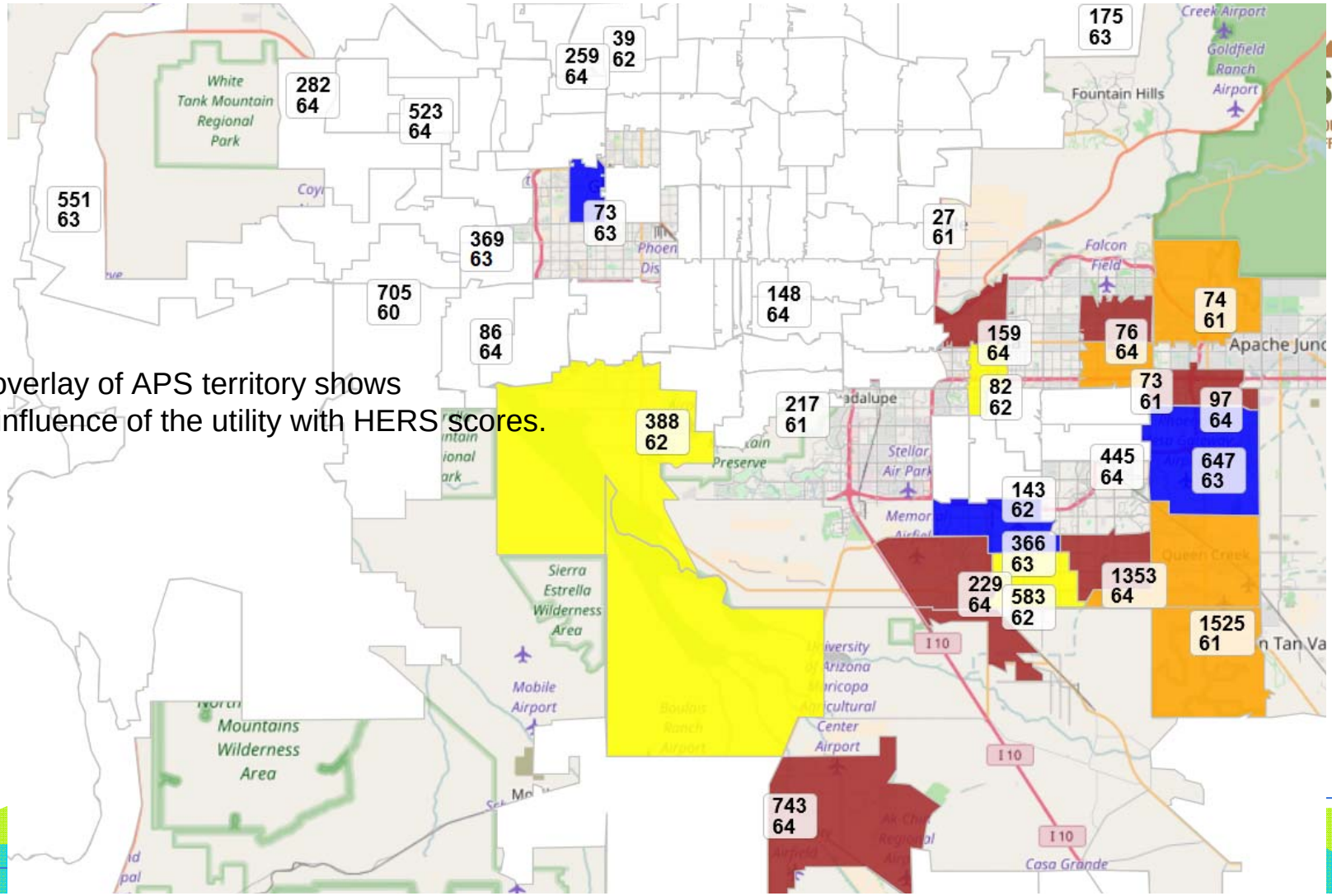
An overlay of APS territory shows the influence of the utility with HERS scores.



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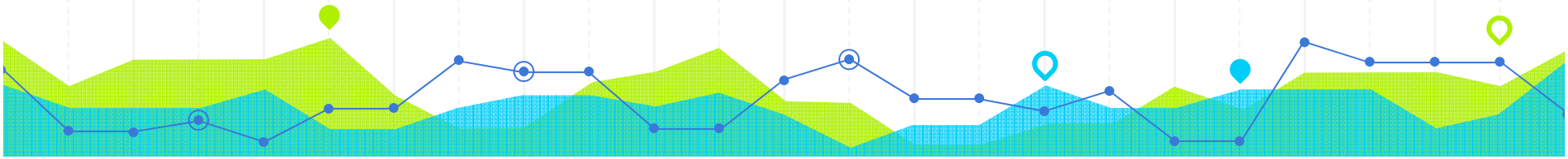
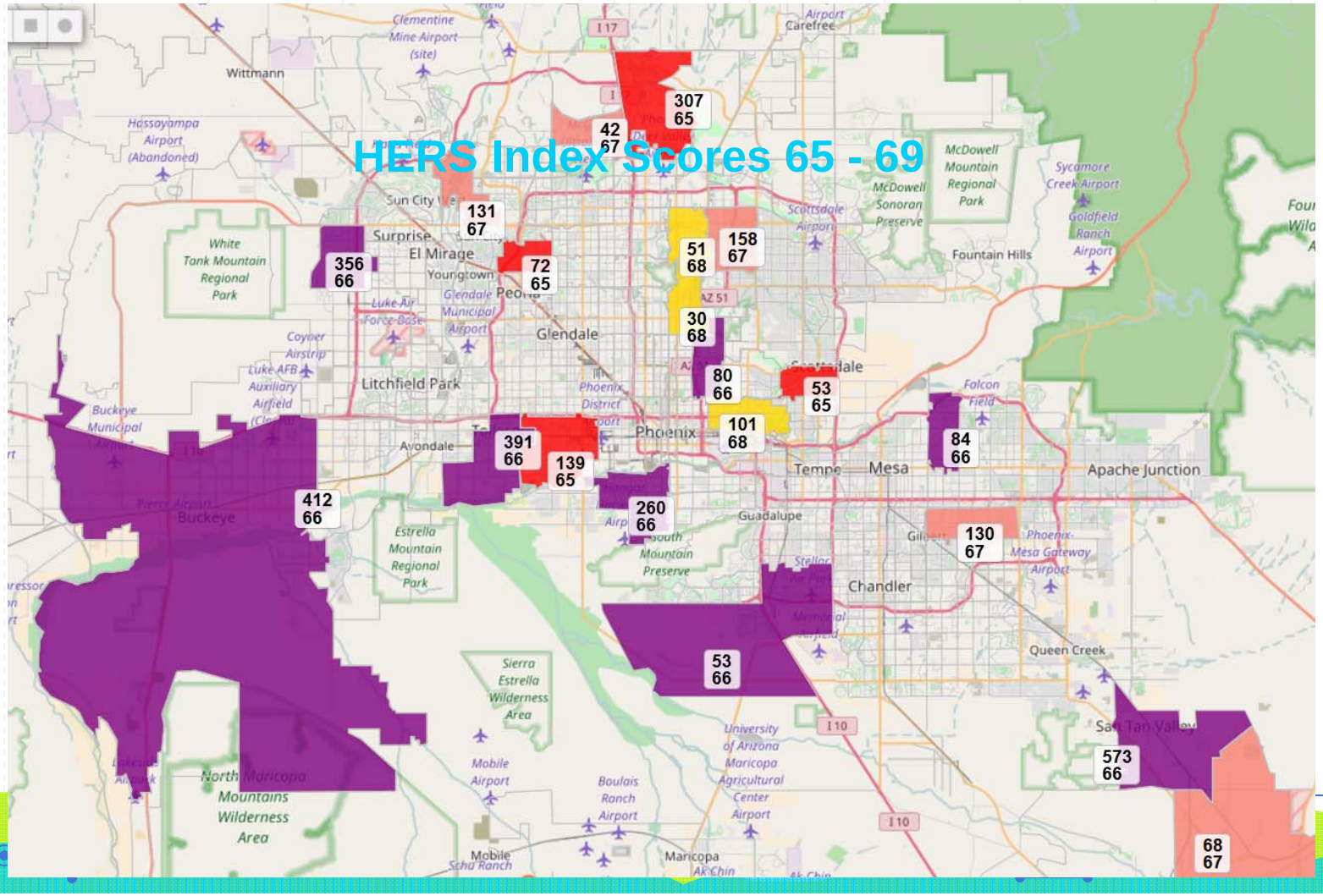
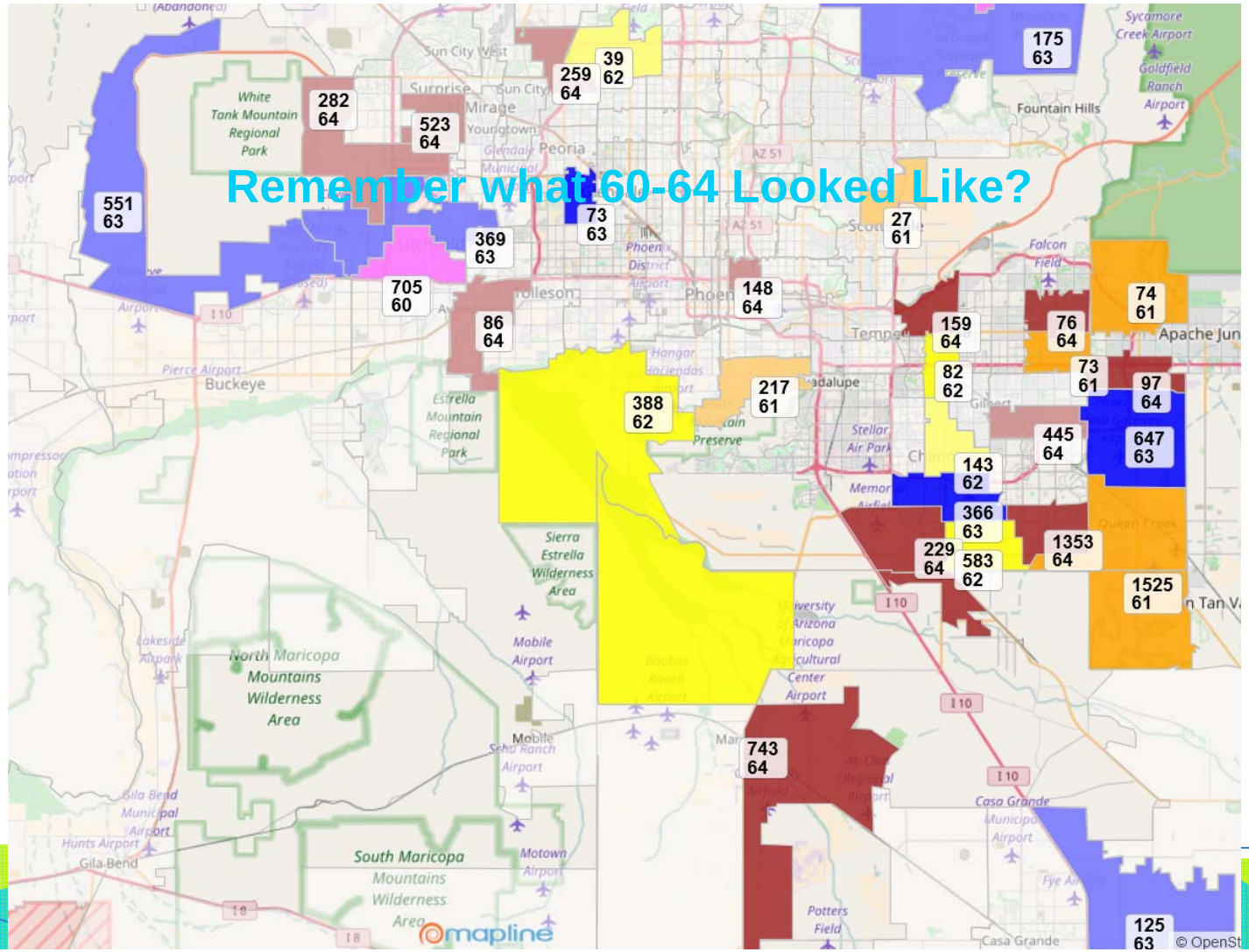
“I keep saying that the sexy job in the next 10 years will be statisticians, and I’m not kidding.” – Hal Varian, chief economist at Google




HERS Index Scores 65 - 69
307
65
42
67
131
67
356
66
72
65
51
68
158
67
30
68
80
66
53
65
101
68
391
66
139
65
84
66
412
66
260
66
130
67
53
66
573
66
68
67
Wittmann
Carefree
Surprise
El Mirage
Youngtown
Peoria
Glendale
Litchfield Park
Avondale
Phoenix
Tempe
Mesa
Apache Junction
Buckeye
Guadalupe
Chandler
Queen Creek
Fountain Hills
Scottsdale
Sun City
Hassayampa Airport (Abandoned)
White Tank Mountain Regional Park
Luke Air Force Base
Luke AFB Auxiliary Airfield
Coyner Airstrip
Buckeye Municipal
Glendale Municipal Airport
Phoenix District
Falcon Field
Phoenix-Mesa Gateway Airport
Estrella Mountain Regional Park
South Mountain Preserve
Sierra Estrella Wilderness Area
North Maricopa Mountains Wilderness Area
Mobile Airport
Boulais Ranch Airport
University of Arizona Maricopa Agricultural Center Airport
Maricopa
McDowell Mountain Regional Park
McDowell Sonoran Preserve
Sycamore Creek Airport
Goldfield Ranch Airport
I 17
I 10
AZ 51


Remember what 60-64 Looked Like?
175 63
39 62
259 64
282 64
523 64
551 63
73 63
369 63
27 61
705 60
148 64
86 64
74 61
159 64
76 64
73 61
82 62
97 64
388 62
217 61
445 64
647 63
143 62
366 63
229 64
583 62
1353 64
1525 61
743 64
125 63
Sun City West
Sun City
Surprise
Mirage
Youngtown
Peoria
Glendale
Phoenix
Tolleson
Buckeye
Fountain Hills
Sycamore Creek Airport
Goldfield Ranch Airport
Falcon Field
Apache Jun
Tempe
Gilbert
Stellar Air Park
Queen Creek
White Tank Mountain Regional Park
Estrella Mountain Regional Park
Sierra Estrella Wilderness Area
North Maricopa Mountains Wilderness Area
South Maricopa Mountains Wilderness Area
Pierce Airport
Lakeside Airpark
Mobile Airport
Mobile
Sells Ranch Airport
Gila Bend Municipal Airport
Hunts Airport
Gila Bend
Motown Airport
Phoenix Deer Valley Airport
Phoenix Goodyear Airport
Hangar Haciendas
Boulder Ranch Airport
Arizona Biocultural Center Airport
Casa Grande Municipal Airport
Potters Field
Casa Grande
AZ 51
I 10
I 8
mapline
© OpenSt

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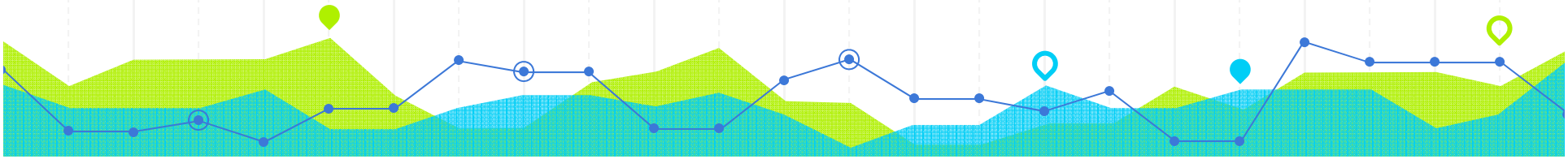
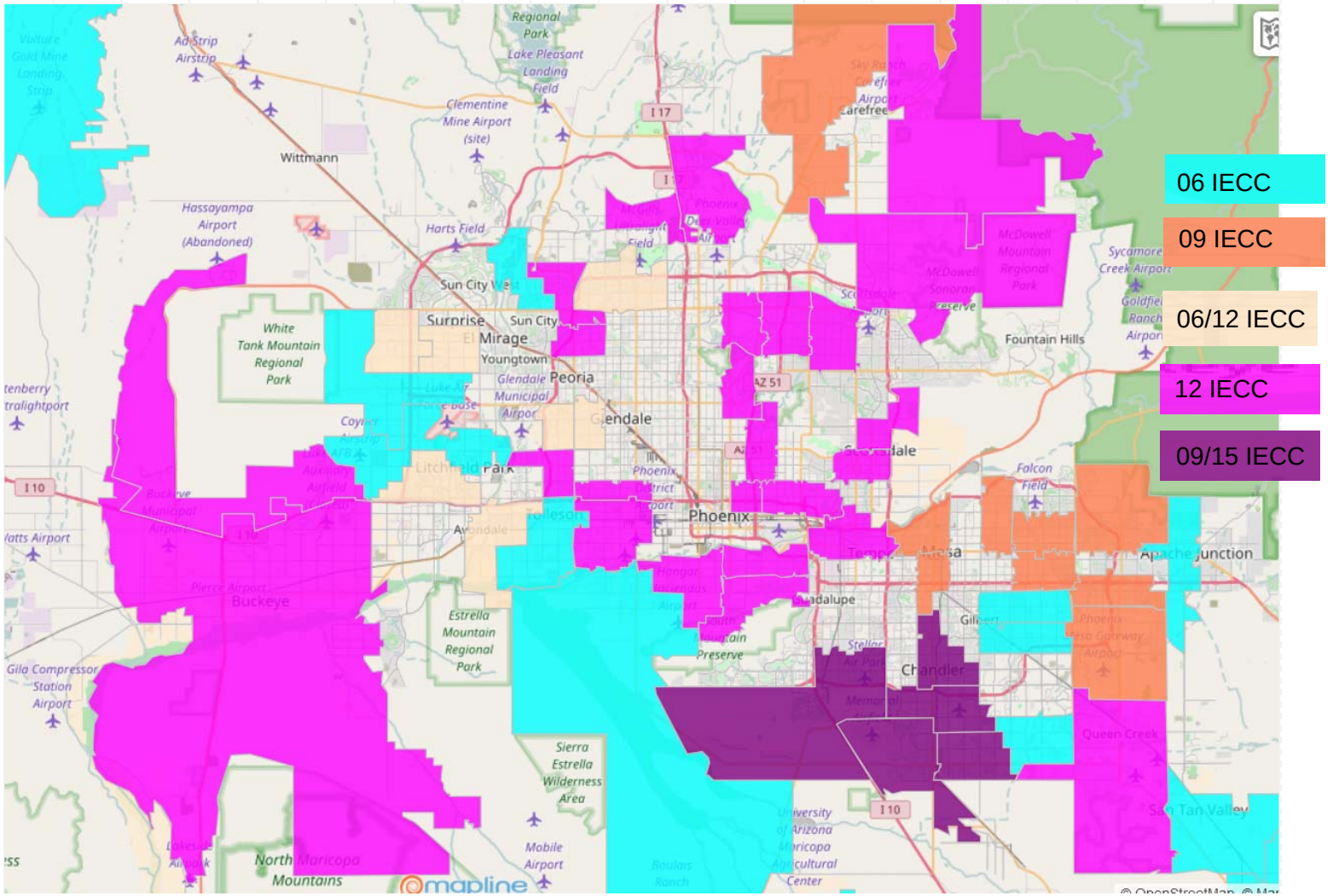
71% of construction activity occurs in communities who Have adopted the 2012/2015 IECC

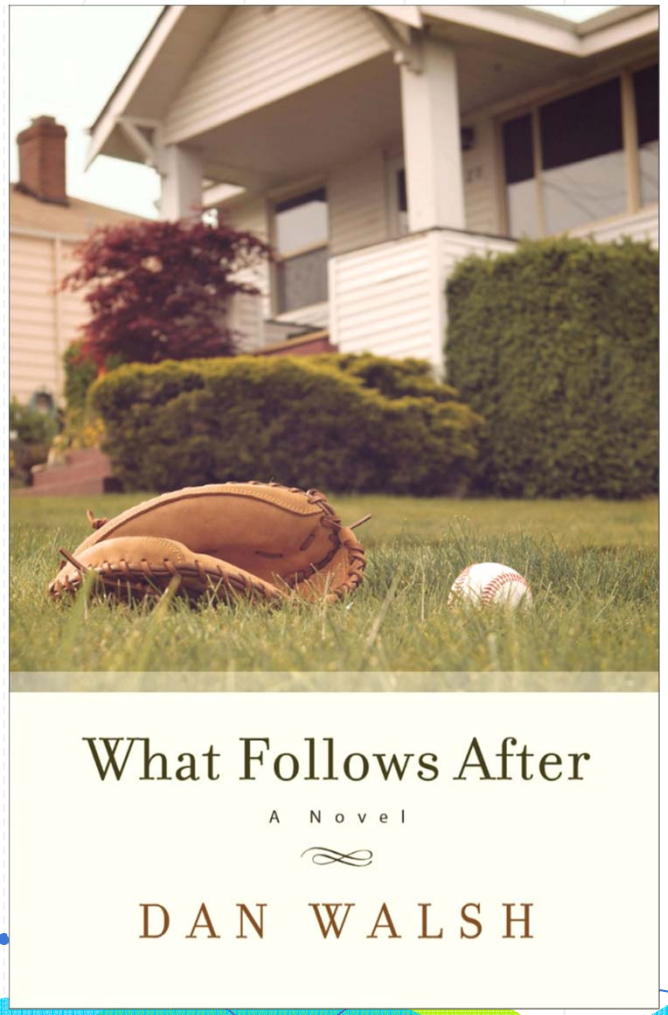
WHERE CODES LINE UP

97% **83%** **71%**




06 IECC
09 IECC
06/12 IECC
12 IECC
09/15 IECC
Wittmann
Surprise
Sun City
Mirage
Youngtown
Peoria
Glendale
Phoenix
Fountain Hills
Carefree
Buckeye
Chandler
Gilbert
Mesa
Apache Junction
Queen Creek
Litchfield Park
Avondale
Tolleson
Goodyear
Scottsdale
Tempe
Guadalupe
Sun Lakes
San Tan Valley
Harts Field
Hassayampa Airport (Abandoned)
Clementine Mine Airport (site)
Lake Pleasant Regional Park
Lake Pleasant Landing Field
Sky Ranch Carefree Airport
Sycamore Creek Airport
Falcon Field
Glendale Municipal Airport
Phoenix Deer Valley Airport
Phoenix Goodyear Airport
Phoenix Mesa Gateway Airport
Stellar Airpark
White Tank Mountain Regional Park
Estrella Mountain Regional Park
Sierra Estrella Wilderness Area
North Maricopa Mountains
McDowell Mountain Regional Park
McDowell Sonoran Preserve
South Mountain Preserve
Gila Compressor Station Airport
Mobile Airport
University of Arizona Maricopa Agricultural Center
I 17
I 10
AZ 51
mapline
© OpenStreetMap

- Next Steps



Credit - http://danwalshbooks.com

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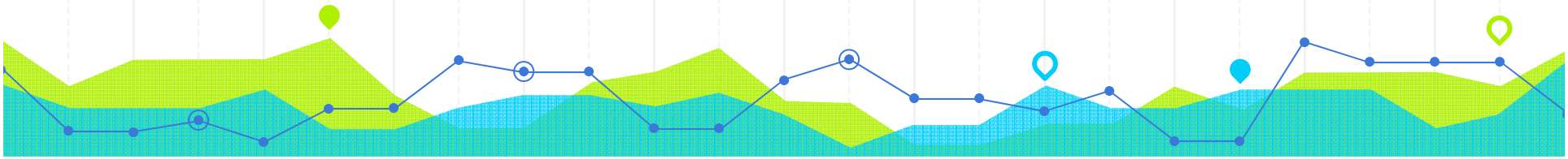
“Sometimes you can get lucky and discover low-hanging fruit with minimal effort. However, often you’ll need to go deeper than the surface-level information to uncover the valuable insights hidden within your data - Brent Dykes



THANKS!

Any questions?

You can find me at
@energymeyers/ jmeyers@swenergy.org
Southwest Energy Efficiency Project

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