

Solar Energy and Agricultural Land in Colorado

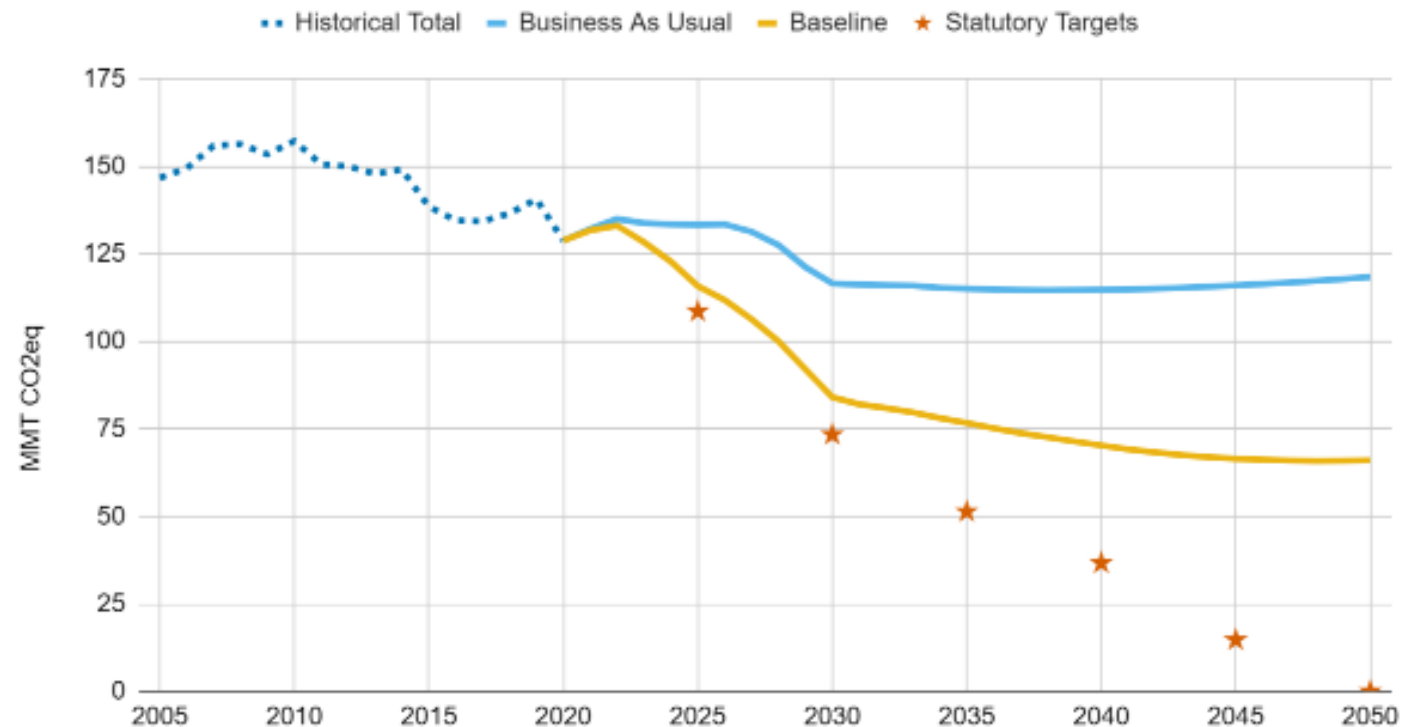
KC Becker and Jeremiah Garrick



Senate Bill 23-016

The Colorado Legislature passed targets for reducing greenhouse gas emissions:

- 26% by 2025
- 50% by 2030
- 65% by 2035
- 75% by 2040
- 90% by 2045
- Net Zero by 2050

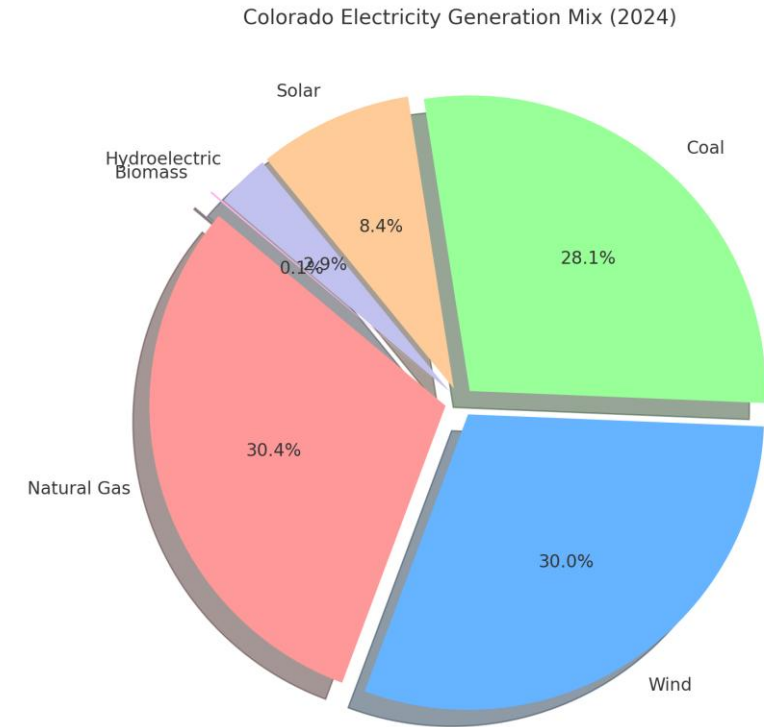


Where are we now?

Colorado is **slightly falling short of our** goals and will likely only achieve ~89% of our 2025 goal

- We will reach **only ~23–24% reduction by 2025**
- The 26% goal will not be met until 2027 under status quo
- Solar is cited by the EIA as cheaper than wind, geothermal, coal, biomass, and nuclear when considering capital costs and fuel costs

Source: EIA Annual Energy Outlook - LCOE



Source: [EIA data](#)



The remaining need...

- **A balanced mix of rooftop, community, and utility-scale solar plus wind and storage is essential to reliably meet state law in a cost effective and dependable manner.**
- NREL estimates approximately 6.3 acres/MW for large scale solar development
 - Meaning with current technologies, we need between 69,000-82,000 additional acres of solar in Colorado, about 4-5 times the current acreage of solar across Colorado.

Can we put all the solar on roofs?

- In addition to the other benefits of distributed energy, **it isn't economically realistic to meet all of our need with just solar on rooftops**
- [According to COPIRG](#), as of 2022 Colorado had tapped ~4.8% of the rooftop solar potential
 - Adjusting for growth over the last 3 years, **we are at around ~7-8% of our rooftop potential**
 - Rooftop solar made up for about 3.5-4% total generation in 2024

Rooftop will negate some of the estimated ~60-80,000 acres needed but rooftop solar alone would be **far more expensive**, require **significant infrastructure upgrades** to achieve and a large **workforce buildout along with far more electricians** than we currently have in Colorado



Wait 80,000 acres is a lot!

It is, but let's put that into perspective:

- **Total: 64 Counties, 66,330,835 acres of land**
 - **Total Farmland:** 30,213,899 acres
 - **Cropland:** 10,479,125 acres
 - **Pastureland:** 18,877,254 acres
 - **Irrigated Land:** 2,287,808 acres
- **Total Classified Soils:** ~16,143,182 acres
- **Total projected solar development:** 60,000-80,000 acres
- Golf courses occupy about 33,000 acres

Where is solar now?

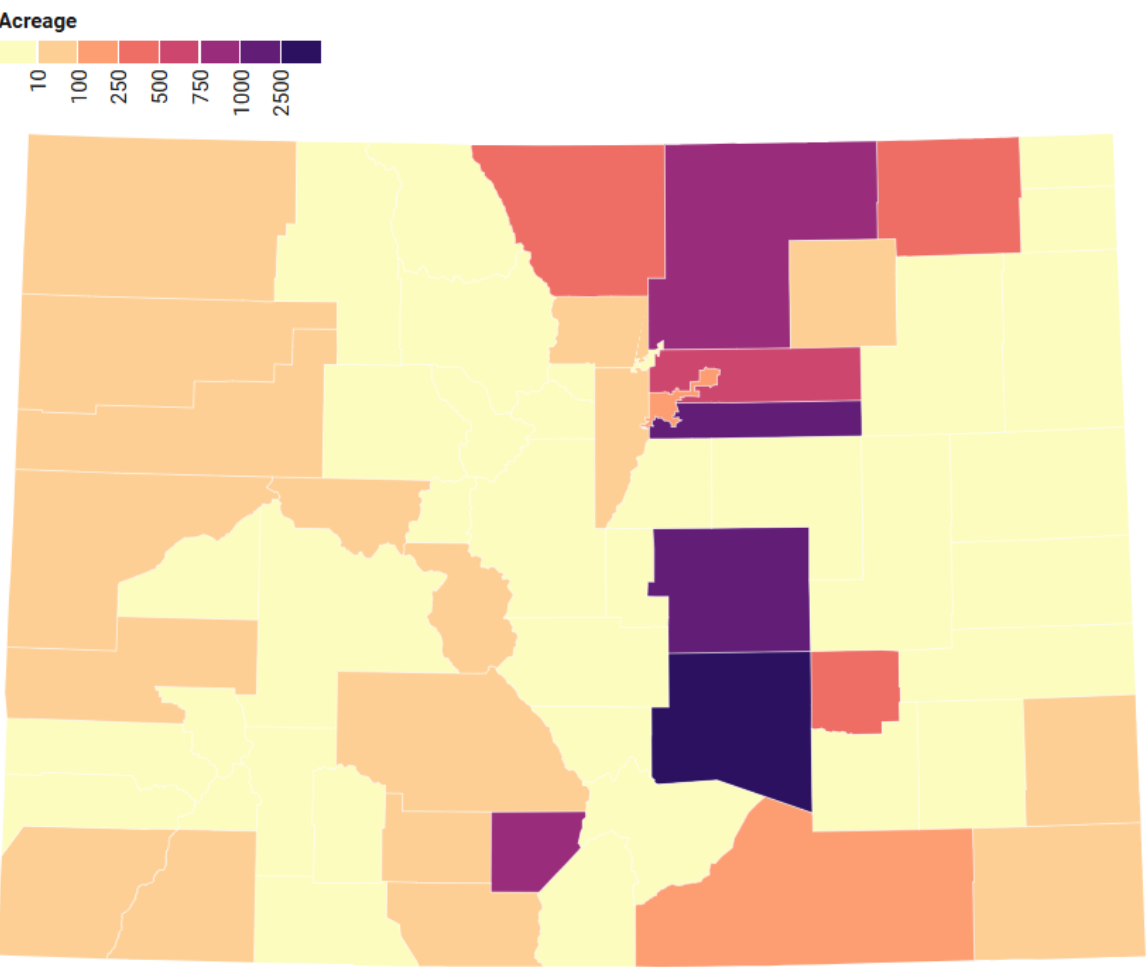
As of 2024...

Colorado had ~14,326 acres of active solar projects located in 39 counties

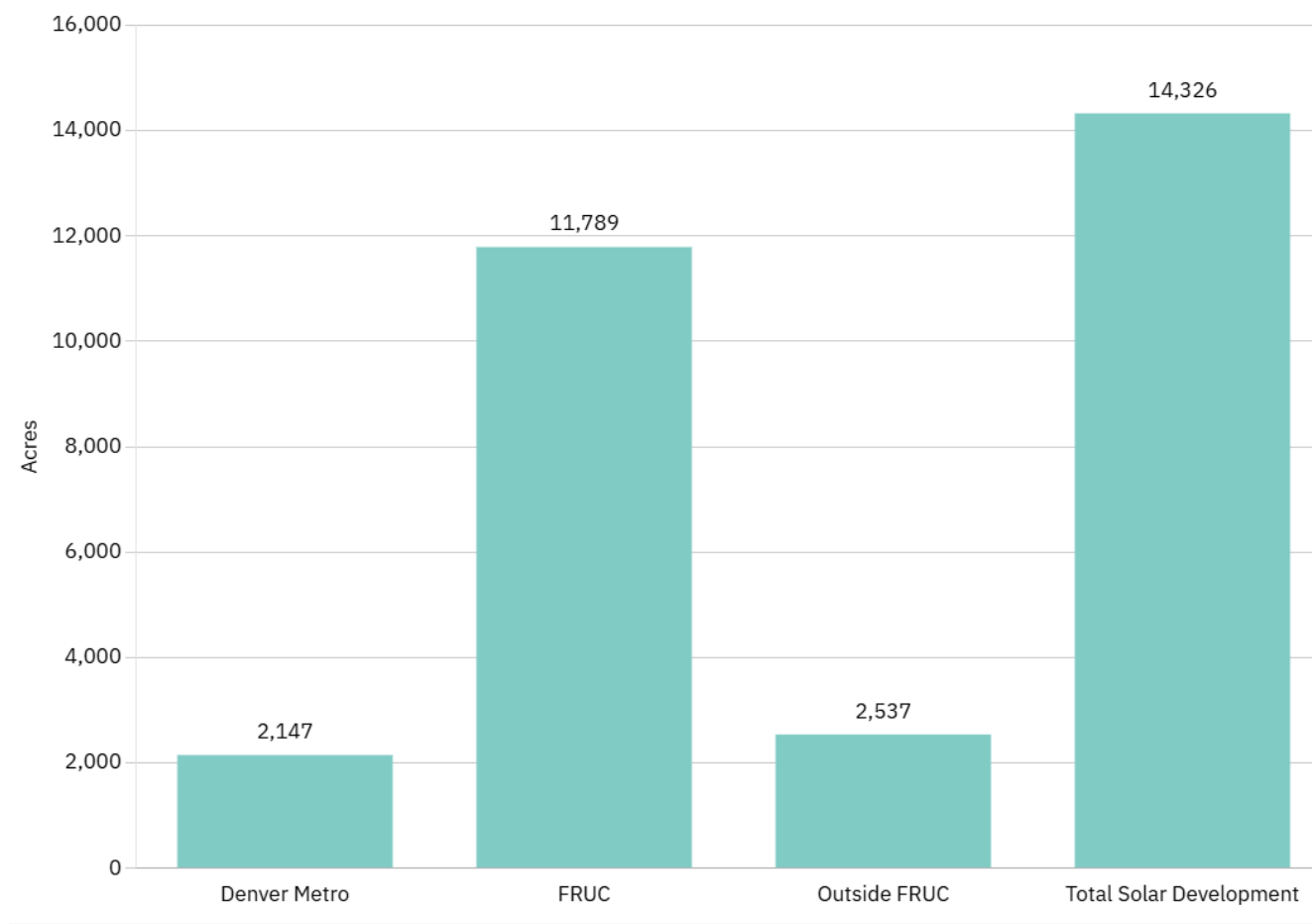
- **~46.75% located in Pueblo County**
- **~89.53% located in just 8 counties** (Adams, Alamosa, Arapahoe, Crowley, El Paso, Logan, Pueblo, and Weld)
- **~82.29% is located in the Front Range Urban Corridor (FRUC)**
 - ~693 acres on average per county
- Counties containing solar outside of the FRUC average ~101 acres each
- 25 counties have no ground-mounted solar projects
- Over 145 arrays: 8 agrivoltaics
 - 6 agrivoltaic CSGs, 2 agrivoltaic utility-scale systems



Acreage of Solar by County



Solar Development by Region



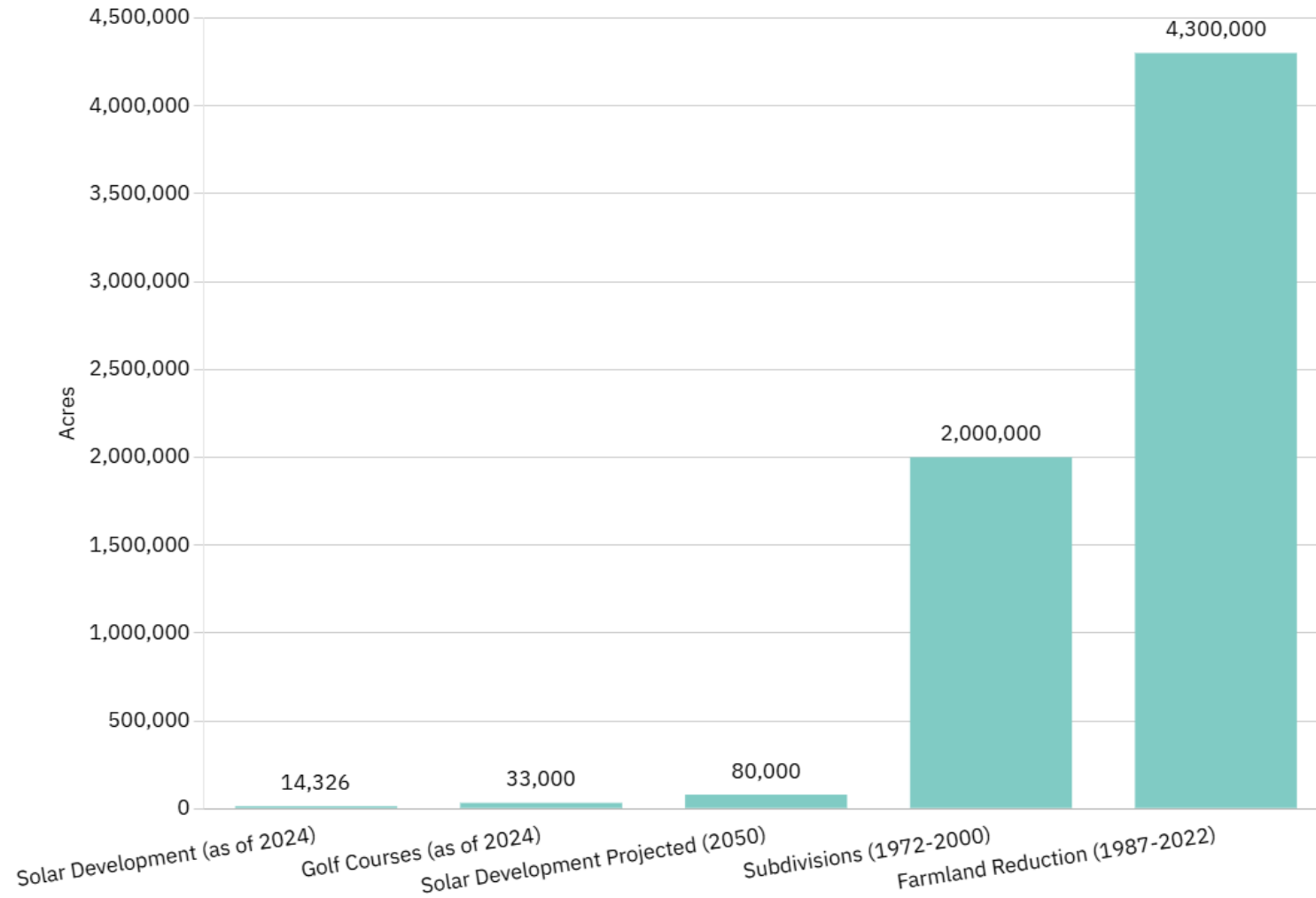
Is solar driving farmland reduction?

Between 2017 and 2022, Colorado experienced a net decline of approximately 1.6 million acres of farmland (–5.1%).

- 10 counties account for over 90% of the net farmland reduction by acreage (see table to the right).

- Addressing these trends will require comprehensive land-use planning and growth management, not limiting energy development
- Even in the highest situation, El Paso County, over 1200 acres were on Not Prime / non-farmland classified soils

County	Farmland Reduction	Solar Facilities (on all lands)
Baca County	235,609 acres	27.82 acres, 0.012%
Prowers County	209,079 acres	42.09 acres, 0.02%
Crowley County	193,595 acres	420.68 acres, 0.217%
Otero County	158,256 acres	9.06 acres, 0.006%
El Paso County	139,293 acres	1,819.02 acres, 1.31%
Huerfano County	114,258 acres	0 acres, 0%
Cheyenne County	112,408 acres	0 acres, 0%
Weld County	111,590 acres	757.91 acres, 0.679%
Conejos County	97,227 acres	20.41 acres, 0.021%
Elbert County	89,027 acres	0 acres, 0%



Farmland reduction is a concern, but limiting energy growth will only hinder tax-revenue, secondary sources of income, and increase our energy costs across the state.

It will not have a significant impact on the underlying pressures on farmland such as water availability, economics, and sprawl.

Key Takeaways:

- Meeting energy demand reliably, dependably, and cost effectively requires both distributed and large-scale buildout of solar and energy storage
- Solar's projected footprint in order to meet this demand is manageable, but requires collaboration between all stakeholders
- Limiting the buildout of solar energy will not impact the greater pressures on farmland reduction in Colorado and as of 2024 shows no meaningful correlation
- Agrivoltaics and dual-use of land are great and should continue to be explored as a secondary income for farmers and ranchers across the state and for community solar gardens, but will raise costs and should be decided on a case-by-case basis

Stay in Touch

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