



University of Nevada, Reno

# Semiconductors in Nevada



**Russ Renzas, Ph.D.**

Research Faculty, Electrical Engineering  
Director, Davidson Foundation Cleanroom  
University of Nevada, Reno

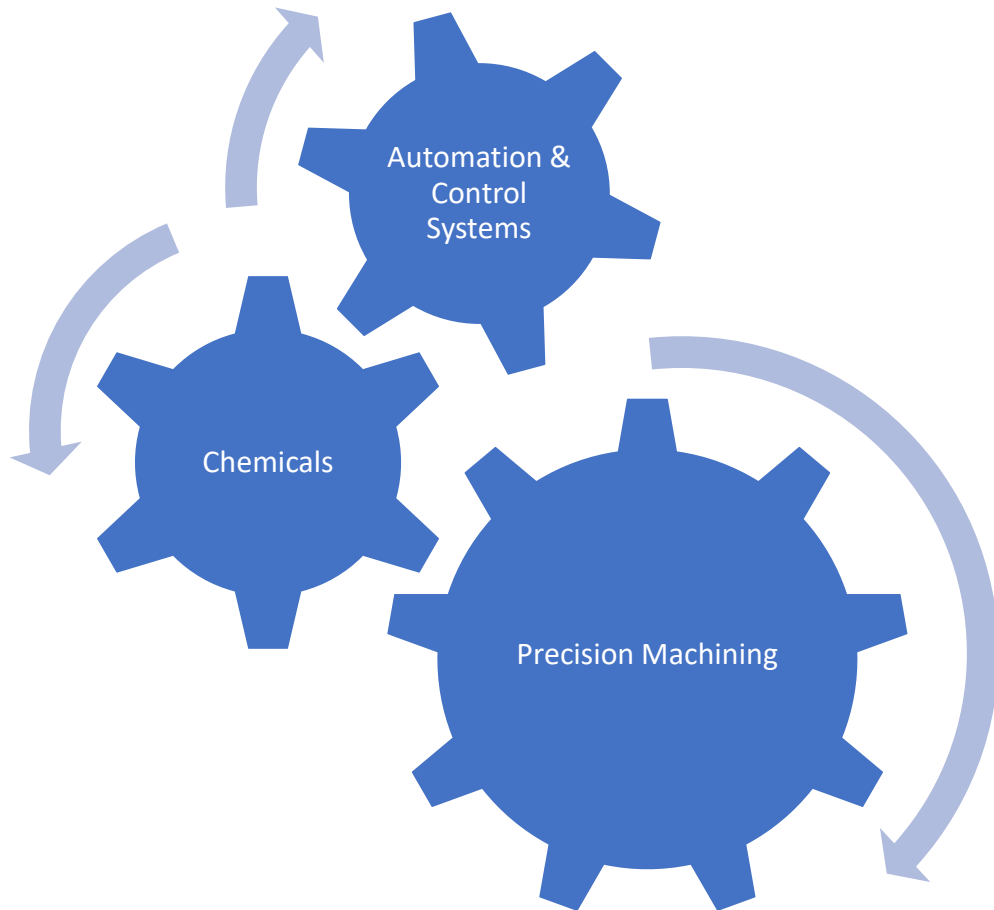
# About Me



## **Russ Renzas, Ph.D.**

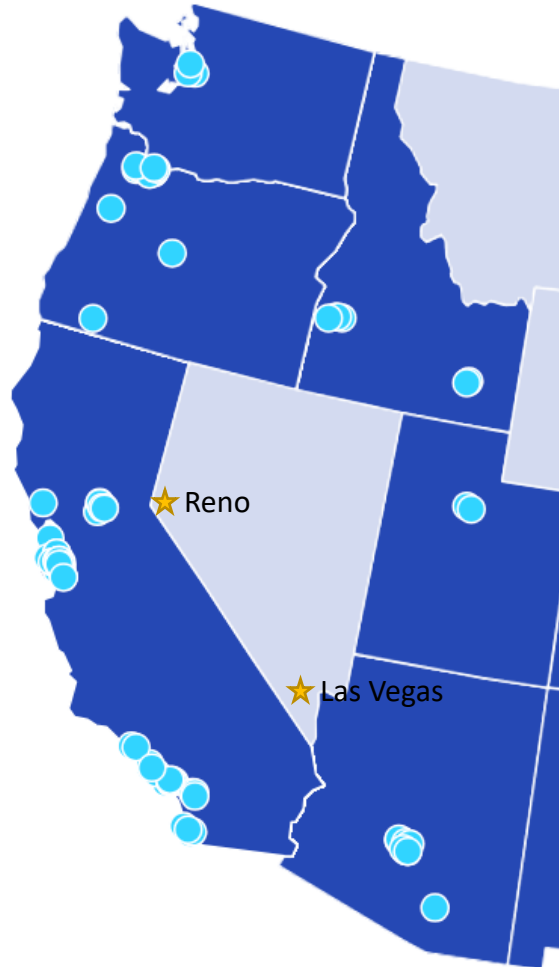
- Ph.D. Chemistry, UC Berkeley (2010), BS EE Princeton (2005)
- Created Rigetti Quantum Computing Fab-1 (NASDAQ, ~\$5B valuation)
- Oxford Instruments Plasma Technology Quantum Technology Manager
- Angel Investor & Early Employee in Materials Science Startups
- 20+ peer reviewed academic publications, 4000+ citations, 3 patents

# Nevada Focus Areas



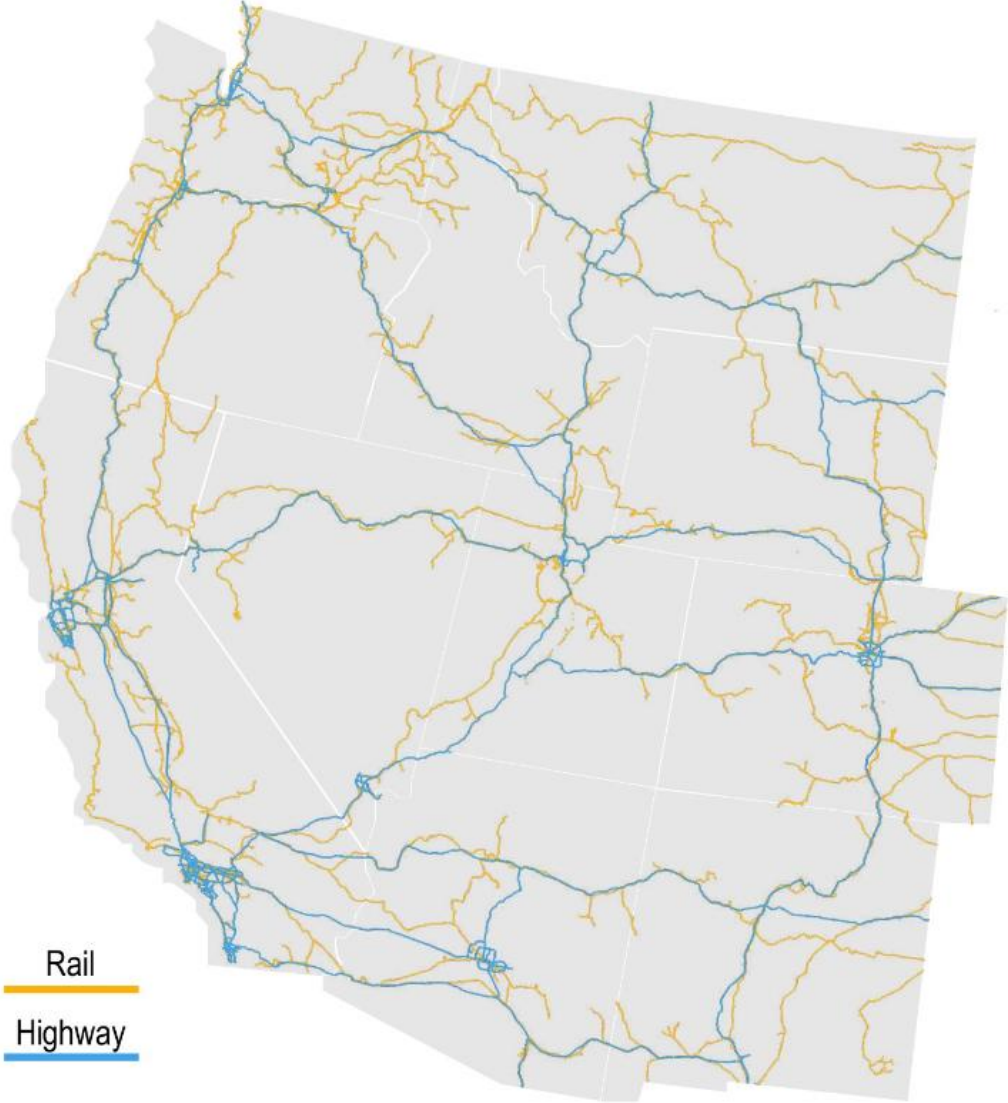
- Ideal for semiconductor equipment manufacturing & chemical supply, new fabs
- Strong existing subsystem, component & materials ecosystem
  - Low regulatory burden enables on-site testing & processing of toxic and pyrophoric chemicals
  - Close to Silicon Valley, Los Angeles, Arizona
- Untapped workforce, space for new facilities
- Access to rail, highway, pacific ports

# Nevada: Proximity to US Semiconductor Manufacturing

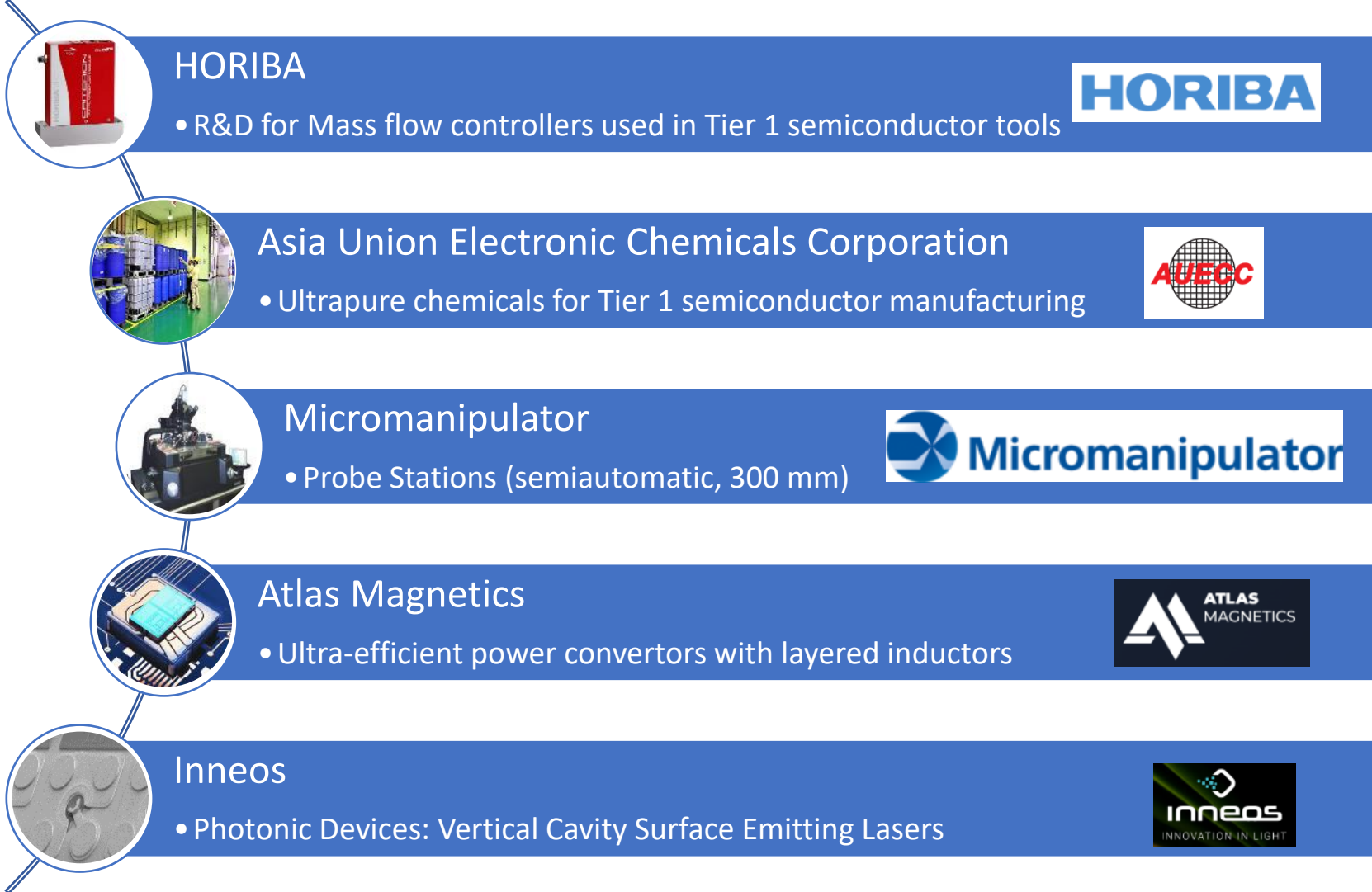


- Central Location for Supply Chain
  - Excellent rail & highway access
  - Strong existing distribution network
- Low Regulatory Burden
- Low Property Taxes, No Income Tax
- Easy Access to Top State Officials

# Rail and Highway Linkages



# Reno-Area Semiconductor Companies Today (subset)



# Nevada's Supply Chain in Action



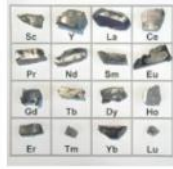
VALVES

TMS INTEGRATED GAS SYSTEMS

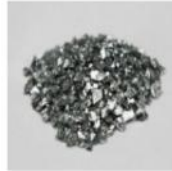
CHEMICAL DELIVERY SYSTEMS



SPUTTERING TARGETS



RARE EARTH MATERIALS



SEMICONDUCTOR MATERIALS

**Advanced Specialty Gases**

An **Iwatani** Company



**HORIBA**



**D700T**  
Des. Performance Pressure  
Innovative Mass Flow Module



11000 Series Stainless  
Steel Gate Valves

**ANATECH USA** PLASMA TECHNOLOGY  
Hummer® Sputtering Tools Innovative Plasma Systems



## Hummer BC-20 Coating System

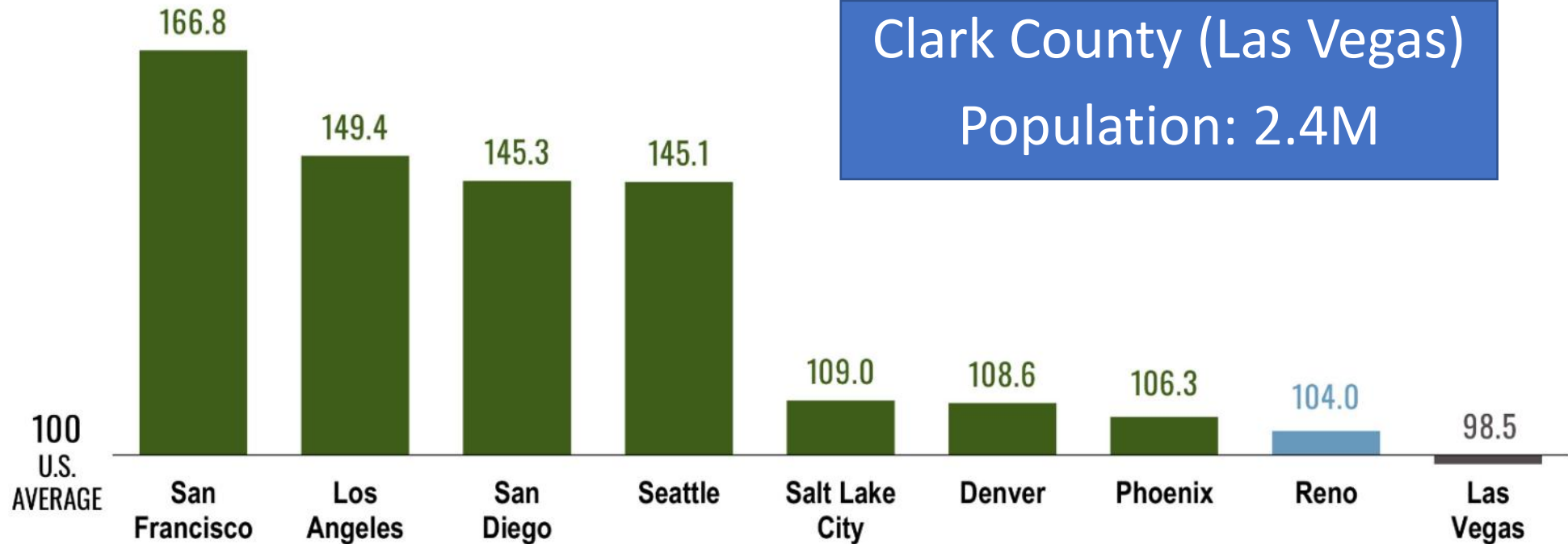


# Population & Cost of Living



## COST OF LIVING

Western Metro Areas | 2024



Washoe County (Reno)

Population: 507k

Clark County (Las Vegas)

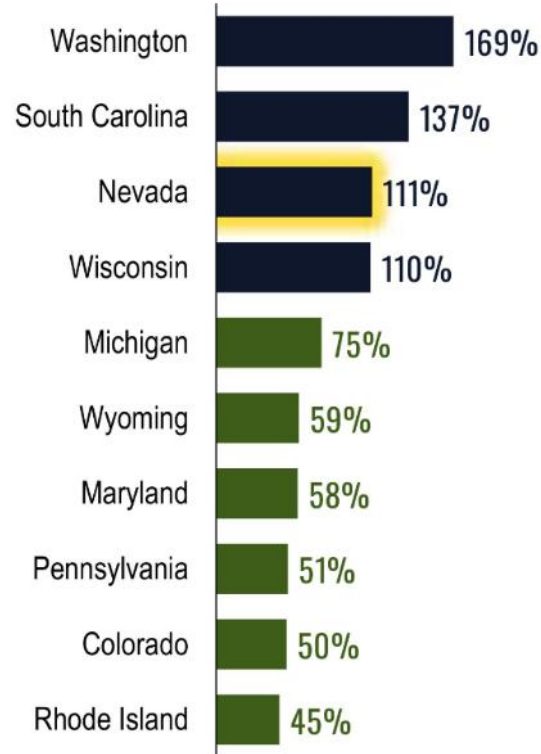
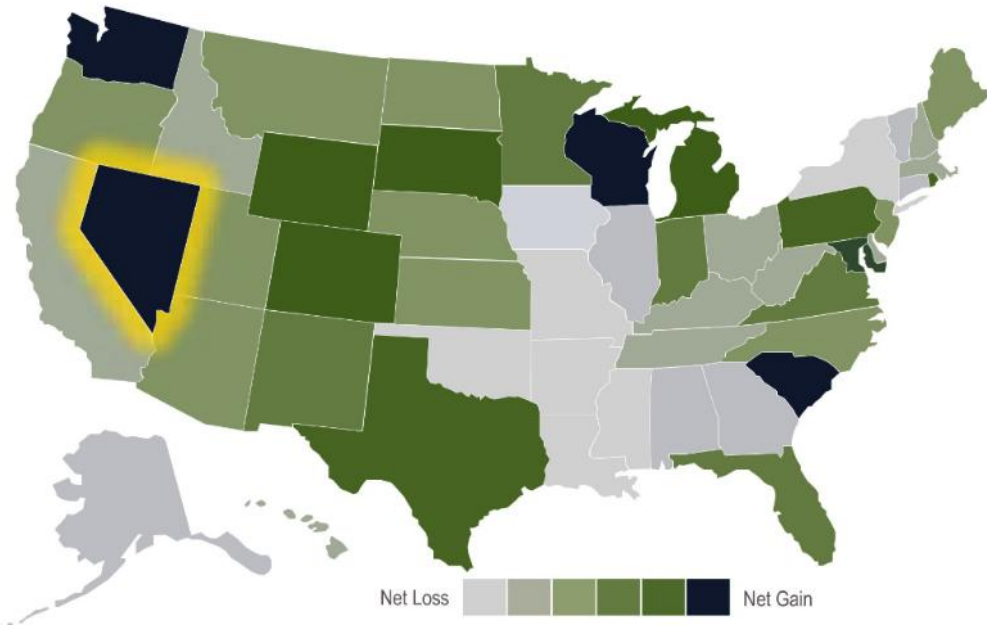
Population: 2.4M

# Workforce Education



## BRAIN GAIN

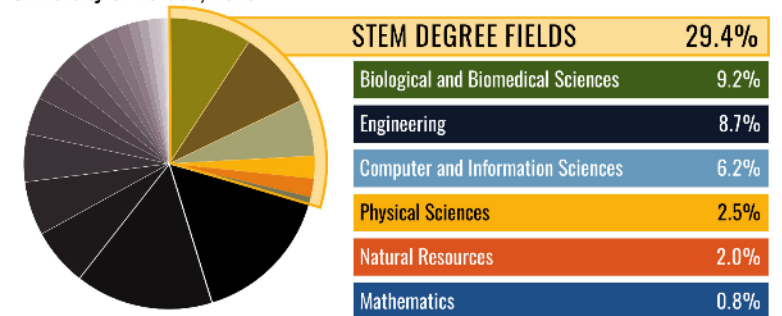
### Top 10 Educational Gains



- 35% of current Northern Nevada residents hold Bachelor's or above
  - 48% of newcomers
- 37% of newcomers to Northern Nevada come from California

### DEGREES AWARDED BY FIELD

University of Nevada, Reno

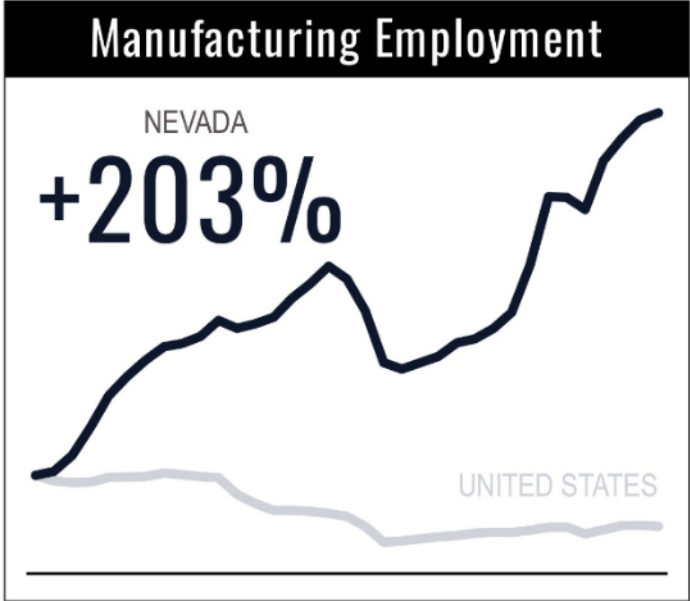
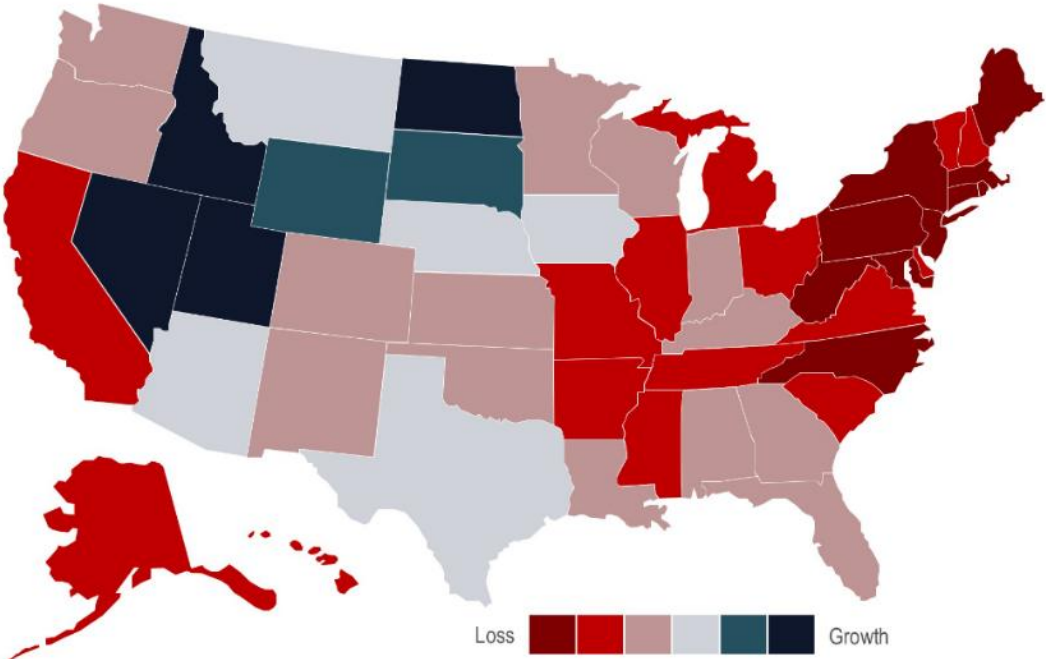


# Manufacturing: 12.4% of Reno Employment (vs 9.4% US)

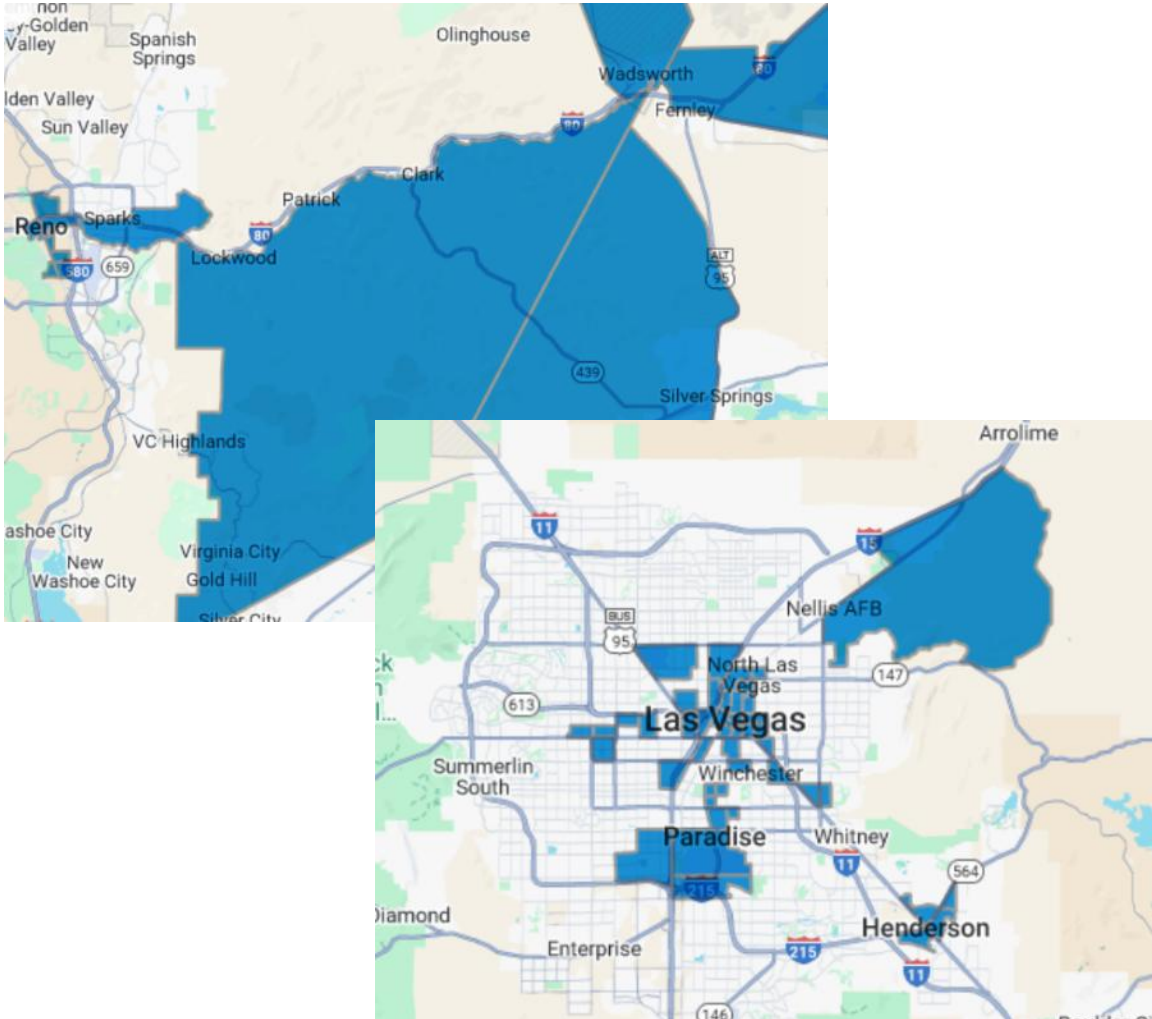


## MANUFACTURING EMPLOYMENT GROWTH

United States | 1990 - 2024



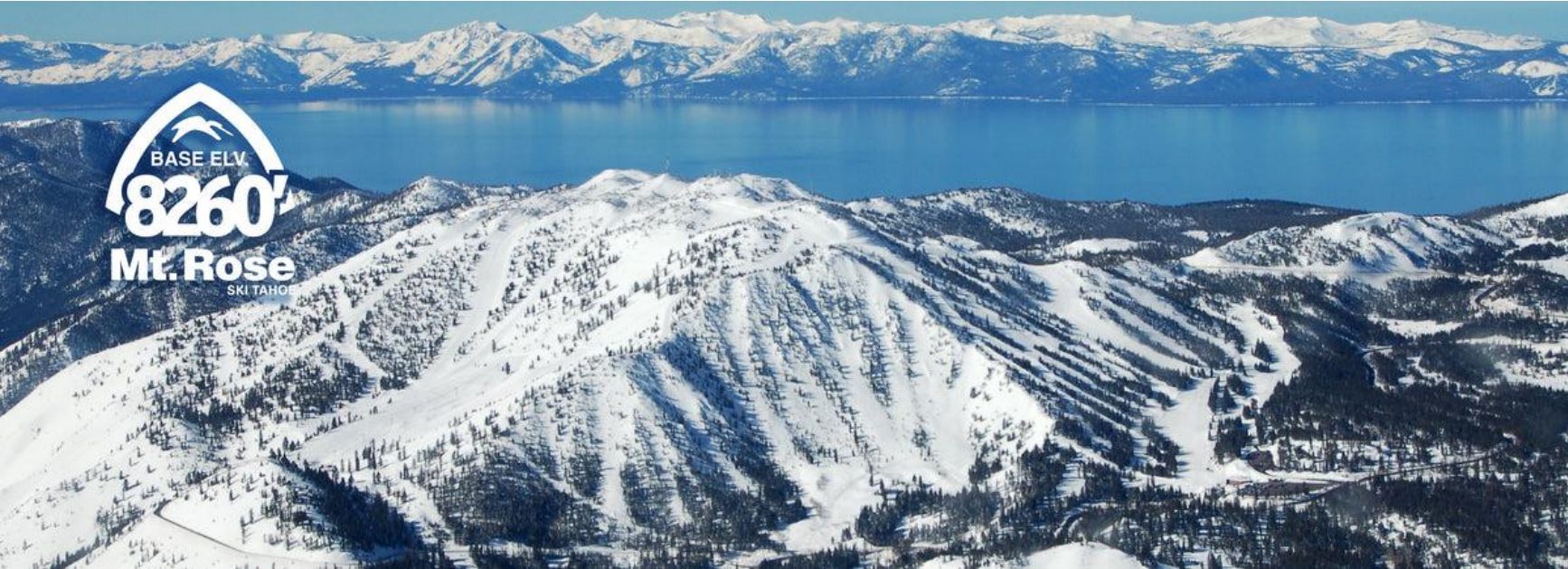
# Economic Opportunity Zones in Nevada



- Deferred capital gains
- 10% step-up in basis after 5 years
- Full step-up in basis after 10 years
- Additional tax benefits in rural areas

<https://www.dentons.com/en/insights/articles/2025/july/25/opportunity-zones-get-new-life>

# High Quality of Life

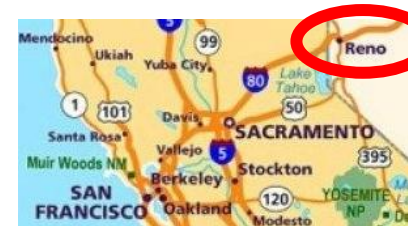


Red Rocks, Las Vegas



# Nanofabrication in Reno

- **Top Small City in US**
  - 18% population growth since 2010 (now 500k)
  - Federal Tech Hub for Batteries
  - Silicon Valley → 4 hrs
- **Growing University**
  - 16k undergrad, 4k grad student
  - Enormous regional importance
  - Untapped workforce pool for nanofabrication
- **New Nanofabrication Facility**
  - First multiuser academic facility in N. Nevada
  - 3k sqft facility, Class 100 Litho, Class 1000 majority



**University of Nevada welcomes a new nanofabrication lab to campus**



The University of Nevada, Reno College of Engineering is celebrating the grand opening of a new industry and nanofabrication lab on campus.

# Lab Photos



Bay & Chase Design. 3 Bays + Class 10k area. Gas bunker, TGMS. Additional space for 3-4 major tools, many small/support/metrology tools.

# Nanofabrication at UNR: Capabilities

Opened: April 2025.



- Lithography & Wet Benches
  - Heidelberg Maskless Aligner
  - Vapor Prime Oven, SRD, Spin/Bake
  - Acid Hood, Base Hood, 3x Solvent Hoods
- Deposition
  - E-Beam Evaporator
  - Sputterer
- Etch
  - Oxford Instruments Cobra 300 ICP RIE w/ cryo + ALE
  - Anatech Quartz Barrel Asher
- Packaging
  - Westbond Dual-Head Wirebonder
  - DragonFly PCB Printer
  - Fox Pick and Place System



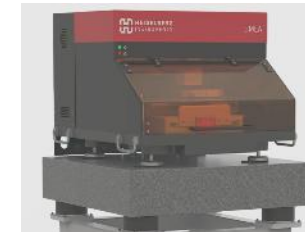
SC450-LL  
Sputtering  
System with Load  
Lock



SC2000 PVD  
Evaporation  
System



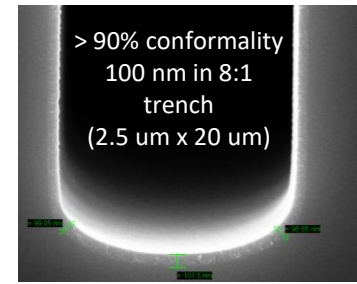
ICP RIE ALE



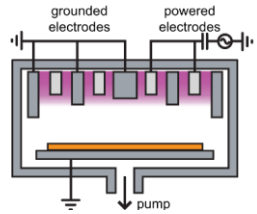
Maskless Aligner

- Metrology & Test
  - Microscopes
  - Desktop SEM
  - Filmetrics F20 Reflectometer
  - Optical Profilometer
  - Dektak Profilometer
  - 4 point probe
  - Probe Station
- Characterization
  - FIB/SEM w/ EDS, AFM, XRD, XPS

# Today's Big News: New Grant!



Compact remote plasma



Biased Electrode



Oxford Instruments PlasmaPro ASP

- Atomic Layer Deposition (ALD) key to critical layers in quantum, semi, power, and other applications
- Significantly faster (> 3x) vs comparable deposition systems while maintaining film quality
- Capable of isotropic ALE, mixed ALD/ALE processes

Source Type	Low damage	Short cycle times	Uniform
Radical Enhanced	Yes	No	No
Direct Plasma	No	Yes	Yes
Remote Plasma	Yes	No	Yes
<b>PlasmaPro ASP</b>	Yes	Yes	Yes

# Active Projects in Renzas Group

- ALE for Superconducting Qubits and Resonators
  - Oxford Instruments-funded collaboration
- ALE for improved InGaAs HEMT performance
  - NSF-funded collaboration with Minnich group (Caltech)
  - New graduate student in training for this project
- Funded NSF MRI for Oxford Instruments PlasmaPro ASP
- **Actively looking for partners for new research programs**

# Why Work with UNR & Nevada?



- Strong New Leadership in Microfabrication
  - Dean Thomas Weller: Microwave electronics expert. 45 patents. Started Aug. 2025.
  - Director Russ Renzas: Atomic layer etch & quantum expert. Silicon Valley experience.
- Close to Silicon Valley, yet not in Silicon Valley
  - Untapped source of talent, strong transportation network
  - Relaxed regulatory environment, easy to work with
- New facility: Opportunity to help set our direction for years to come
  - Especially interested in workforce development, student internships, sponsored R&D

# UNR & UNLV



Nevada offers opportunity in microfabrication, semiconductors, quantum, and photonics research & education.

Davidson Foundation Cleanroom - College of Engineering - University of Nevada, Reno

# Schedule a Site Visit



Come See Silver State Opportunity for Yourself



Alex Bacchus,  
Northern Regional Director  
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Lance Devreaux Jackson,  
International Business Mgr.  
[LDJackson@goed.nv.gov](mailto:LDJackson@goed.nv.gov)



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# WHY NEVADA?

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- ✓ **Business Friendly Environment**
- ✓ **Cost of Living**
- ✓ **Economic Growth and Stability**
- ✓ **Tax Benefits**
- ✓ **Strategic Location & Infrastructure**



# Let's Work Together!



Davidson Foundation Cleanroom - College of Engineering - University of Nevada, Reno