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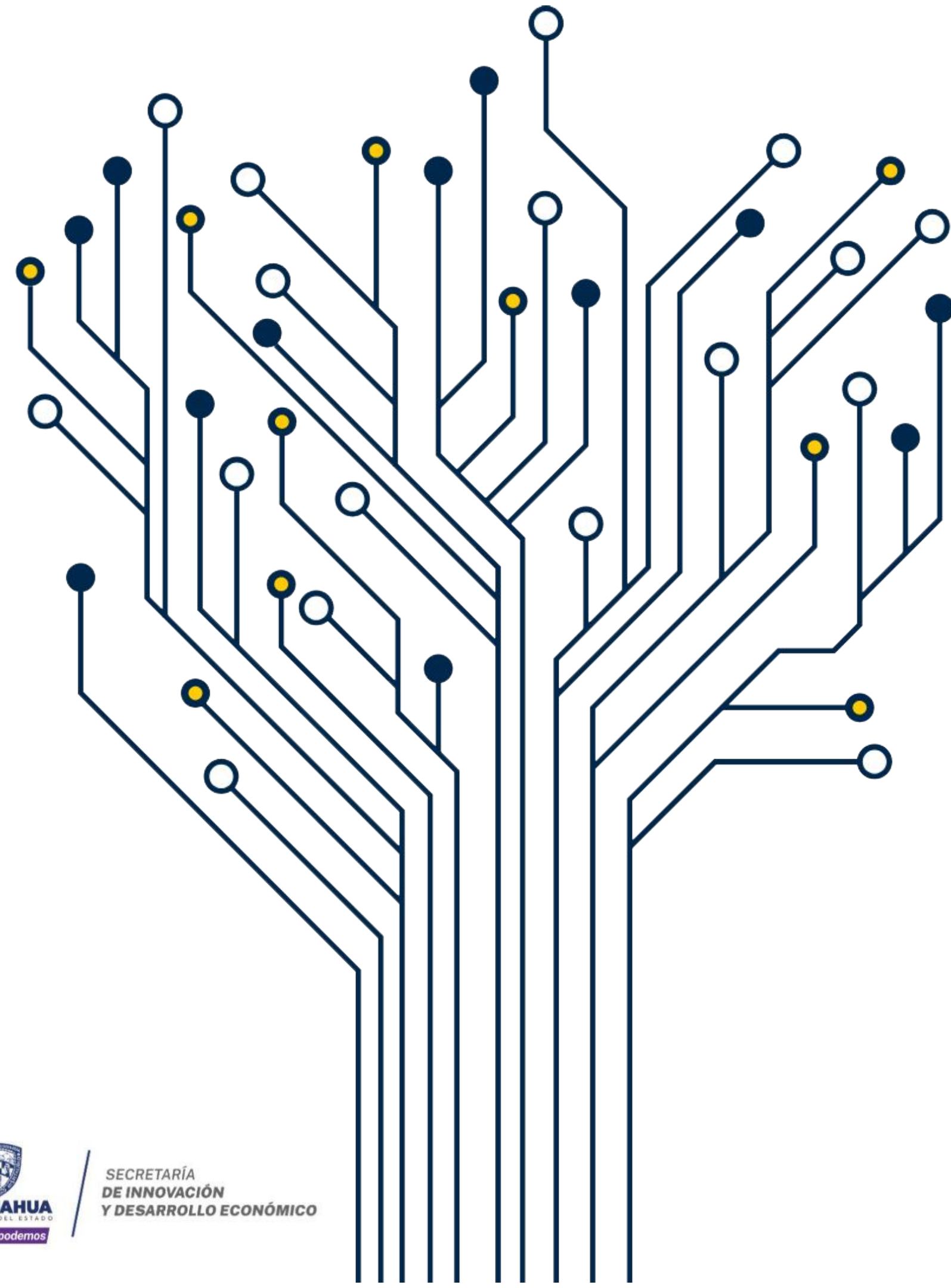
Climate tech ecosystem mapping for the state of Chihuahua, Mexico

Final report

June 2025



SECRETARÍA
DE INNOVACIÓN
Y DESARROLLO ECONÓMICO





OUR MISSION

To power entrepreneurs, enterprises, and ecosystems in emerging markets with the business tools to succeed—and scale impact.

As an independent, solutions-driven nonprofit affiliated with the University of Michigan, we collaborate with businesses, mission-driven organizations and governments to strengthen markets, scale innovation and create sustainable impact. In **energy and mobility** we are dedicated to driving just transitions to clean tech, electric mobility, and sustainable energy solutions.



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Why a mapping?

OBJECTIVE

To identify players involved or planning to become involved in climate tech in the near future, better understand strengths and weaknesses of the ecosystem, and identify possible future areas of opportunity for the state of Chihuahua.

METHODOLOGY

We gathered data via online surveys (one for companies and one for ecosystem actors) and virtual key informant interviews from February to April, 2025

SAMPLE

22 companies and 29 ecosystem actors (e.g. universities, accelerators/incubators, government agencies, NGOs, etc.) responded to the survey; we conducted interviews with 13 key informants. All findings are based on this sample.

PARTNERS



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In context: WDI / Chihuahua collaboration

E-MOBILITY (2022-2023)

Development of a diagnosis and roadmap in collaboration with partners in different sectors.

INNOVATION IN E-MOBILITY (2023-2024)

Business opportunities, case studies, innovation hubs. Academic alliance with the University of Michigan, working on themes of industry and talent development.

ACADEMIC COMMERCIALIZATION (2024-2025)

Mapping the process of commercialization and development of a playbook for universities in Chihuahua interested in supporting this process.

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RELATED MAPPING

In **2022**, in collaboration with the Secretaría de Innovación y Desarrollo Económico (SIDE), WDI conducted a **mapping of the e-mobility ecosystem** in the state of Chihuahua. We reached out to 350 companies in automotive, electronics, mining, plastics, and other sectors. We heard from **62 companies**: more than half were already involved to some degree with electric vehicles (EVs), and half planned to transition to new areas in the EV value chain in the next three years. These details are not included in the findings presented in the following slides as the data is not current and does not align entirely with the questions explored here, but we share this as EVs are part of our climate tech framework.

Climate tech definition and sectors

The definition and sectors encompassed by climate tech can differ depending on the source. For this work, we used the this definition and included the following sectors:

A broad range of technologies and services focused on mitigating, adapting to, and increasing resilience against climate change.

(Source: Oxford Climate Tech Initiative)

Food &
Agriculture

Air &
Environment

Clean
Energy

Clean
Industry

Efficiency

Energy
Storage

Water

Transportation

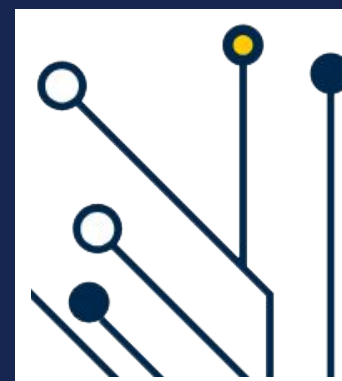
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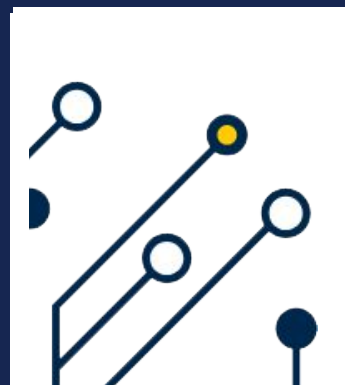
**CLIMATE
TECH TRENDS**

2.



**CHIHUAHUA
CLIMATE
CONTEXT**

3



**KEY FINDINGS
FROM THE
MAPPING**

4.



**ECOSYSTEM
MAP**



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Climate tech trends

1



Climate tech in this moment

Using technology to address climate related challenges has been around for some time, but the climate tech space is attracting a lot of interest from many different sectors recently. A convergence of environmental, regulatory, economic, and technological factors makes this an area of incredible growth and change. We explore some of these broader trends in the following pages.

Climate tech is a global topic with common threads, but climate implications and related technologies to address them can also be highly local. Therefore we also highlight key climate challenges that are relevant to Chihuahua in the following section, before we turn to the findings from the local climate tech ecosystem.

Climate tech trends and data

1

AI is a game changer

AI/ML and data analytics are transforming renewable energy, carbon reduction, and climate resilience. The profitability of companies using AI is projected to increase by 38% by 2025. (*Climate Insider*)

2

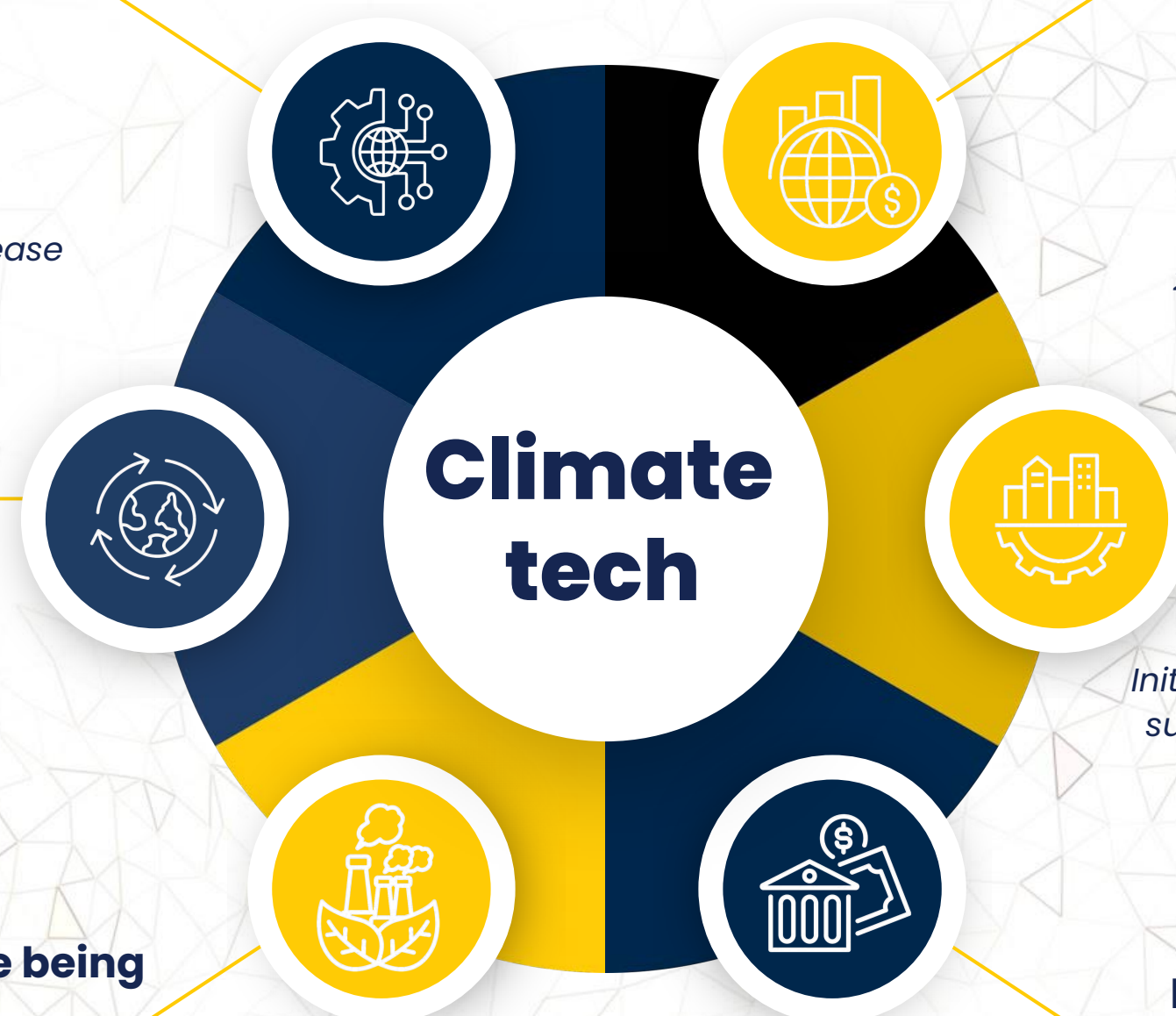
Circularity is moving from theory to practice

Large-scale adoption of recycling, upcycling, and alternative materials.

3

Clean or low-carbon energy solutions are being used to support baseload

Geothermal and nuclear energy are receiving significant investment due to their 24/7 reliability, and solar microgrids remain in vogue as a fast and scalable alternative.



4

The market for climate tech is growing rapidly

The global market is projected to reach \$37.5 billion by 2025 and \$220.3 billion by 2035 (CAGR of 24.6%). (*Future Market Insights*)

5

Monitoring for climate-resilient infrastructure is on the rise

Initiatives such as the €100 million Africa-EU partnership to support satellite-based climate monitoring, early warning systems, and water management point to this trend.

6

Innovative financing mechanisms facilitate catalytic capital

Green bonds, blended finance, and cross-border partnerships are unlocking capital for climate technology.

Growth drivers and barriers for climate tech

Driver 1: Political will and commitment + ambitious goals at national and global levels

Many countries with ambitious commitments to decarbonization – including major greenhouse gas emitters.

Driver 2: Global startup ecosystem is flourishing

More than 2,180 climate tech startups worldwide by 2025, along with strong patenting activity and a boom in climate tech incubators, accelerators, and venture studios. ([StartUs Insights](#))

Driver 3: Renewable energy cost competitiveness is growing

In Asia, renewable energy costs range from \$0.03 to \$0.08 per kWh, often producing electricity that is 29% to 81% cheaper than grid prices based on fossil fuels. ([Energy Stack](#))

Driver 4: Climate vulnerability is real

Droughts, floods, and heat waves are driving demand for adaptation and resilience solutions.



Barrier 1: Inconsistent or unclear policy frameworks, lack of incentives, and regulatory delays can undermine project viability and delay implementation.



Barrier 2: High technology costs, resistance to paying green premiums, and underdeveloped markets hinder adoption. There is a significant funding gap in the early stages.



Barrier 3: Most global capital is concentrated in developed markets, limiting access to financing for emerging market projects. Risks such as political instability, currency fluctuations, and transaction size deter investors.



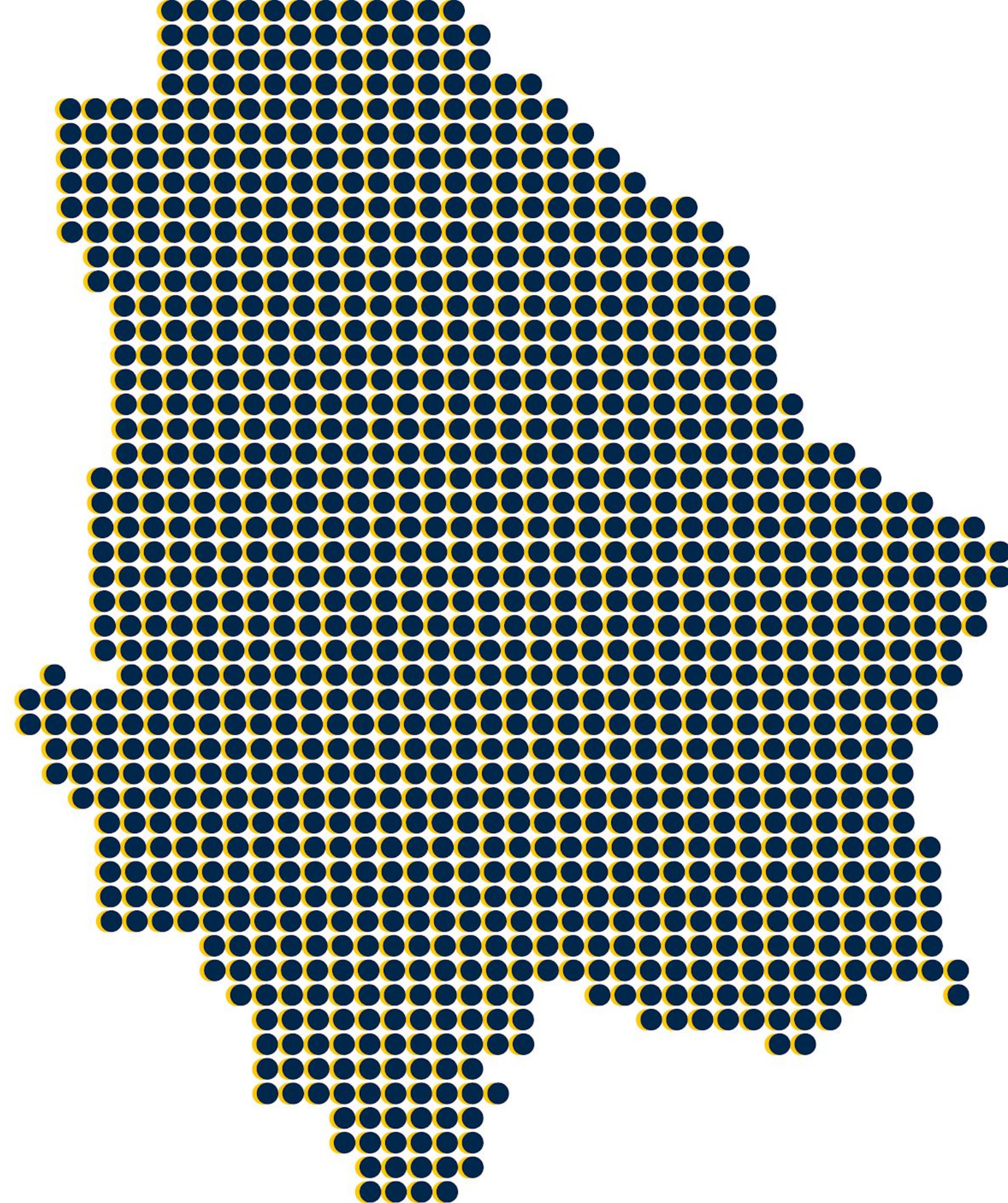
Barrier 4: Shortage of skilled labor and technical expertise, lack of depth in climate science, intellectual property, and commercialization support.



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Chihuahua climate context

2





Chihuahua climate challenges

Sector	Relevance	Climate Concerns
Food & Agriculture	Chihuahua has <u>1.7 million hectares</u> under agricultural production. Cattle are raised on <u>72 percent</u> of the state's land area.	Severe droughts led to an <u>11.6 percent drop</u> in agricultural activity in Northern Mexico in Q1 of 2024. Drought periods cause severe crop, animal, and economic losses: for example, <u>3.7 billion pesos lost and 180,000 cattle deaths</u> in Chihuahua in 2011.
Water	Around <u>45 percent</u> of Chihuahua is considered desert, and the state relies on key reservoirs for municipal, agricultural, and industrial use.	More than <u>64 percent</u> of Mexico's territory is experiencing drought, with northern states like Chihuahua getting hit the hardest. Major water sources are at extremely reduced capacities, like La Boquilla dam, which reported a volume at <u>22.41 percent</u> of its capacity, and Bustillos Lagoon, which reported a volume at <u>50 percent</u> of its capacity.

Chihuahua climate challenges

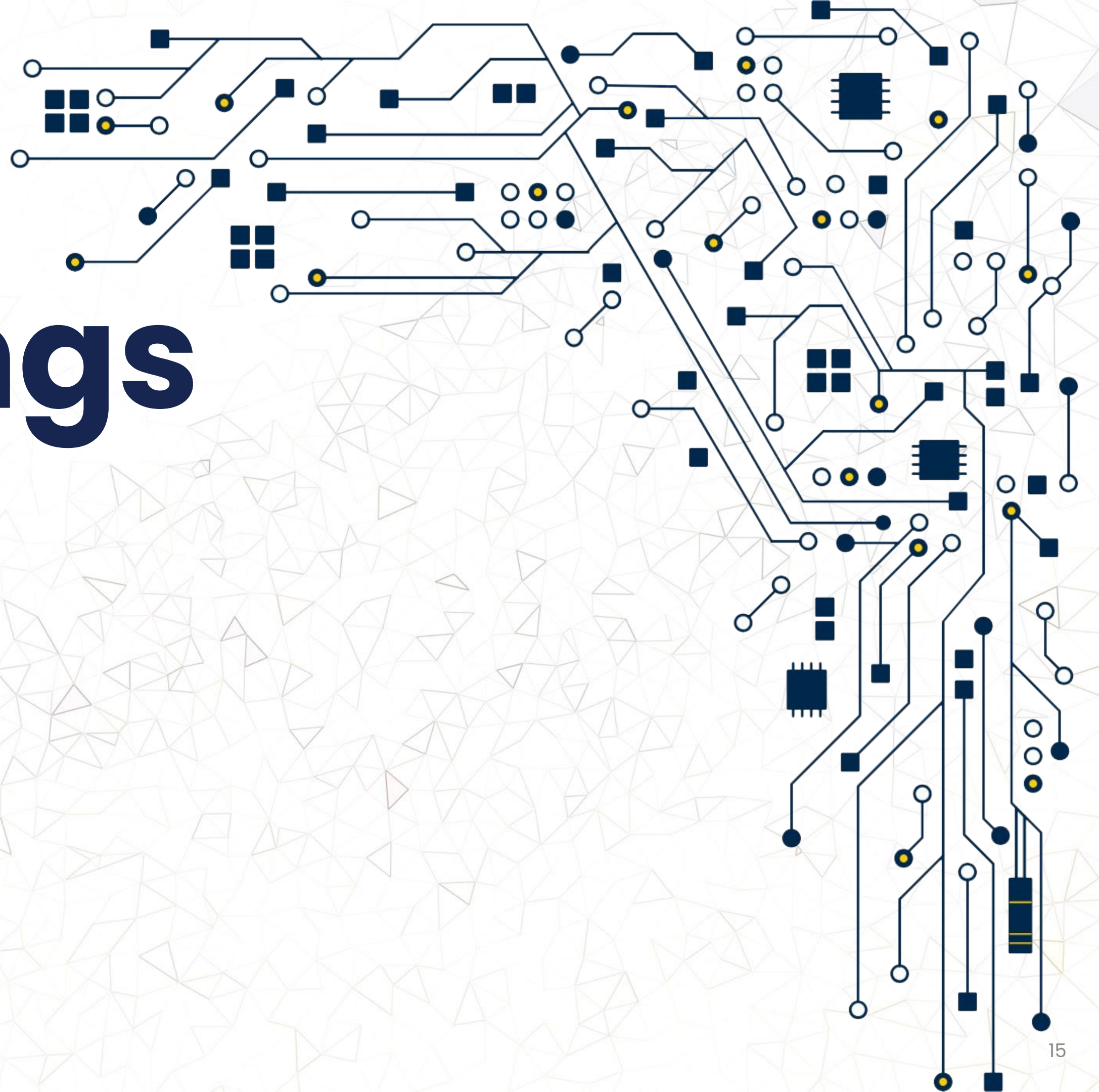
Sector	Relevance	Climate Concerns
Air & Environment	In 2020, the population of the state of Chihuahua was over <u>3.7 million</u> .	<u>Dust storms</u> in Chihuahua, exacerbated by desertification and land degradation, further degrade air quality and impact human health Air pollution in Ciudad Juárez contains <u>elevated levels</u> of ozone, carbon monoxide, and PM10 that exceed nationally established optimal ranges, <u>posing significant risks to human health</u>.
Industry	Per the 2019 Economic Census, manufacturing was the economic sector with the highest income in Chihuahua, at <u>\$307B MX, or 38.7 percent</u> of total income. Ciudad Juárez hosts more than <u>600 industrial buildings</u>.	<u>91 percent</u> of industrial parks in Mexico had power supply failures in 2023. Companies in Mexico increased production of hazardous waste from <u>76,838t to 277,037t</u> between 2013 and 2023.

Chihuahua climate challenges

Sector	Relevance	Climate Concerns
Energy	Reports have shown Chihuahua has a higher-than-average energy burden (the percentage of a household's gross income spent on energy costs) at <u>3.8 percent</u>, which would be even greater without energy subsidies. Industrial electricity prices in Mexico are higher, on average, than, for example, in Brazil. In 2024, Brazilian business saw electricity prices around <u>0.122 USD/kWh</u>, while Mexican businesses saw a rate of around <u>0.205 USD/kWh</u> the same year.	As of 2021, Mexico's <u>primary energy production</u> relied heavily on fossil fuels. Chihuahua is situated within the "solar belt," making it favorable for development with solar radiation of <u>5.5 to 8.5 kWh/m²</u>. The cost of energy could be reduced through <u>further deployment of renewable energy</u>.
Transport	As of 2024, Chihuahua was Mexico's <u>top exporter</u>, a position the state has held for 12 years, making the transport of goods vital to its economy. In 2020, <u>61.3 percent</u> of individuals in Chihuahua used their own vehicle to get to work, signifying the importance of private vehicle use.	Breaking down energy-related carbon dioxide emissions by sector in Mexico, transport comes in the highest with a <u>30 percent</u> share. Given Chihuahua's reliance on private vehicles and freight transport to support its export-driven economy, this dependence on high-emitting modes of transport poses a significant climate challenge.



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Key findings from the mapping

3

What the mapping entails

PLAYERS

In the following pages, we describe key characteristics of companies and other actors (i.e. organizations that support the ecosystem) in the climate tech ecosystem in the state of Chihuahua, including the areas of climate tech in which they currently engage or plan to engage, climate tech products and services, and more.

ECOSYSTEM

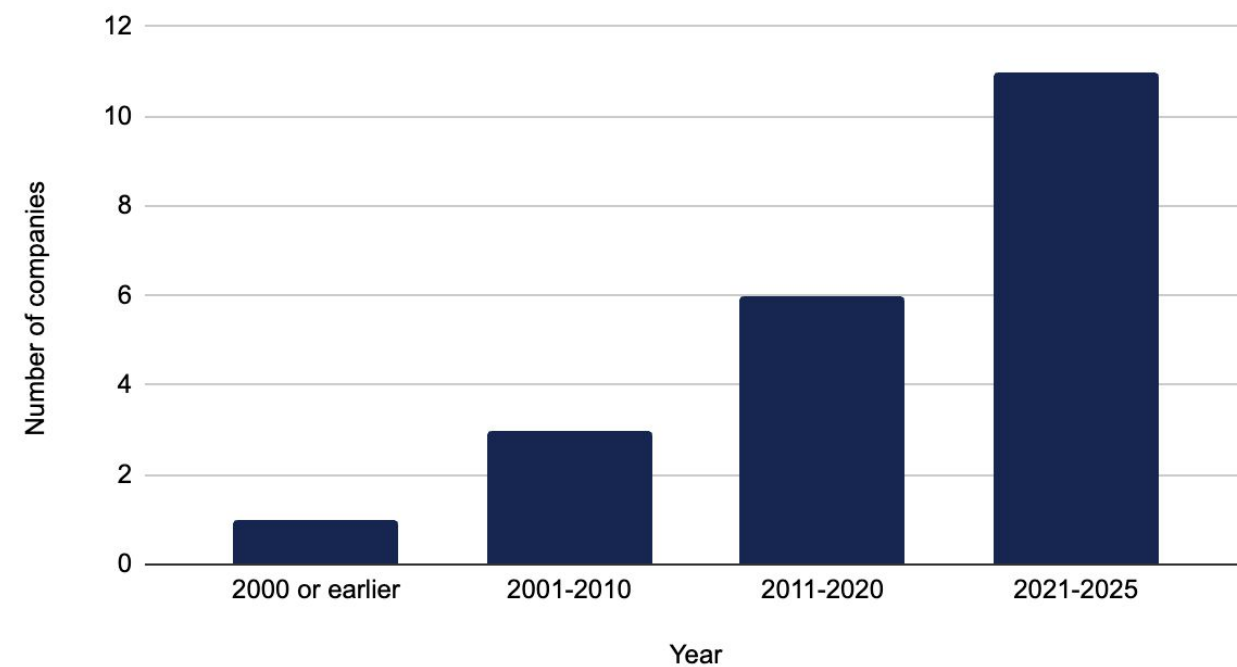
We then describe features of the local climate tech ecosystem, including strengths and gaps along six dimensions.

MAP

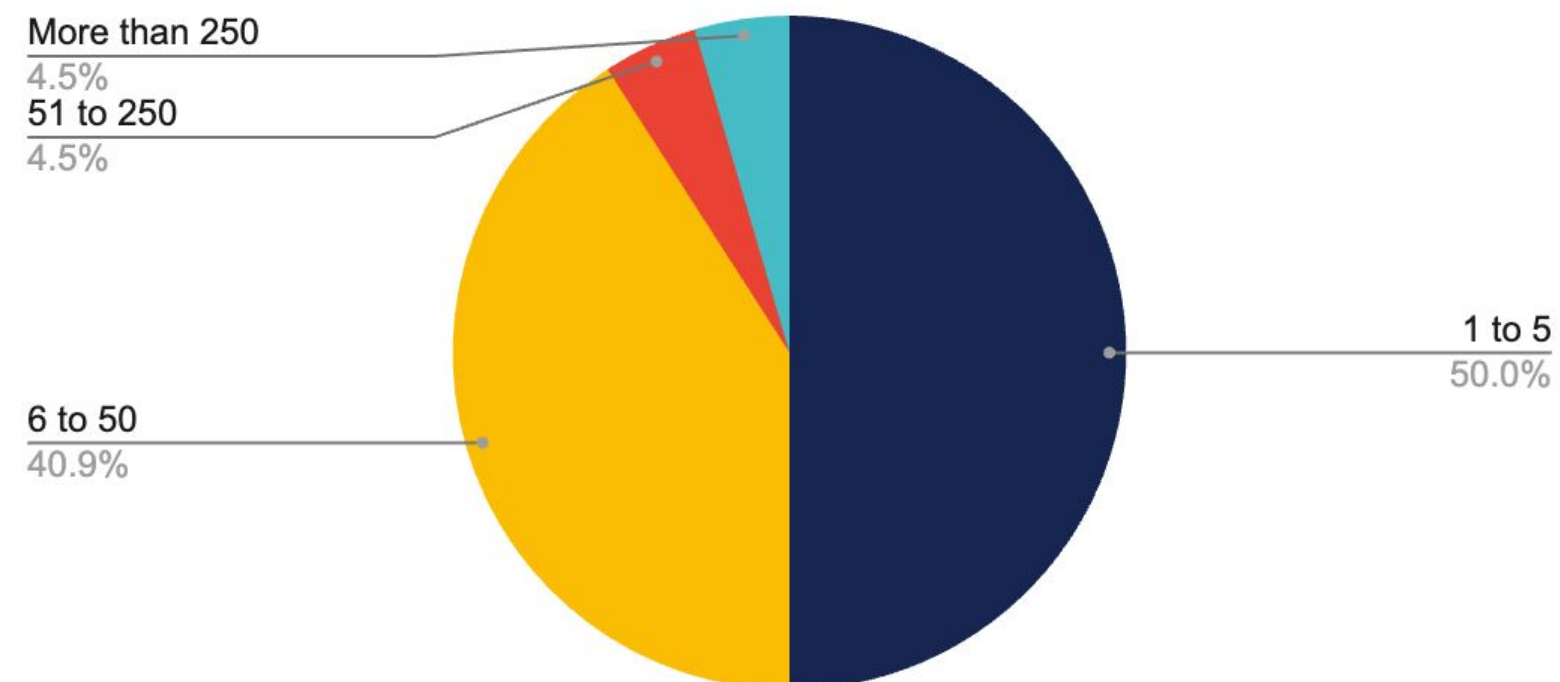
Finally, we present an online, interactive map with over 80 organizations in the Chihuahua climate tech ecosystem and highlight key connections and areas of involvement in climate tech.

Players: companies

Year founded



Company size (number of employees)



NEW ENTRANTS

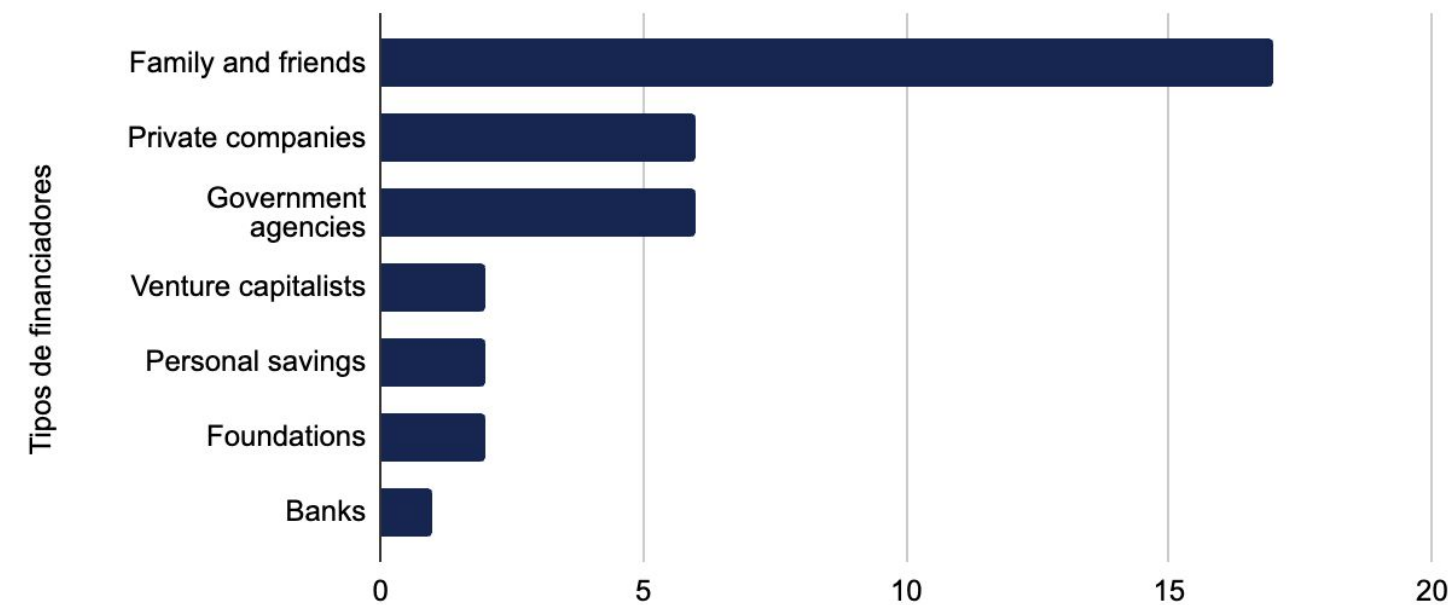
Half of the climate tech companies have been founded in the past 5 years, indicating new entrants to the sector and the state.

SMALL AND GROWING

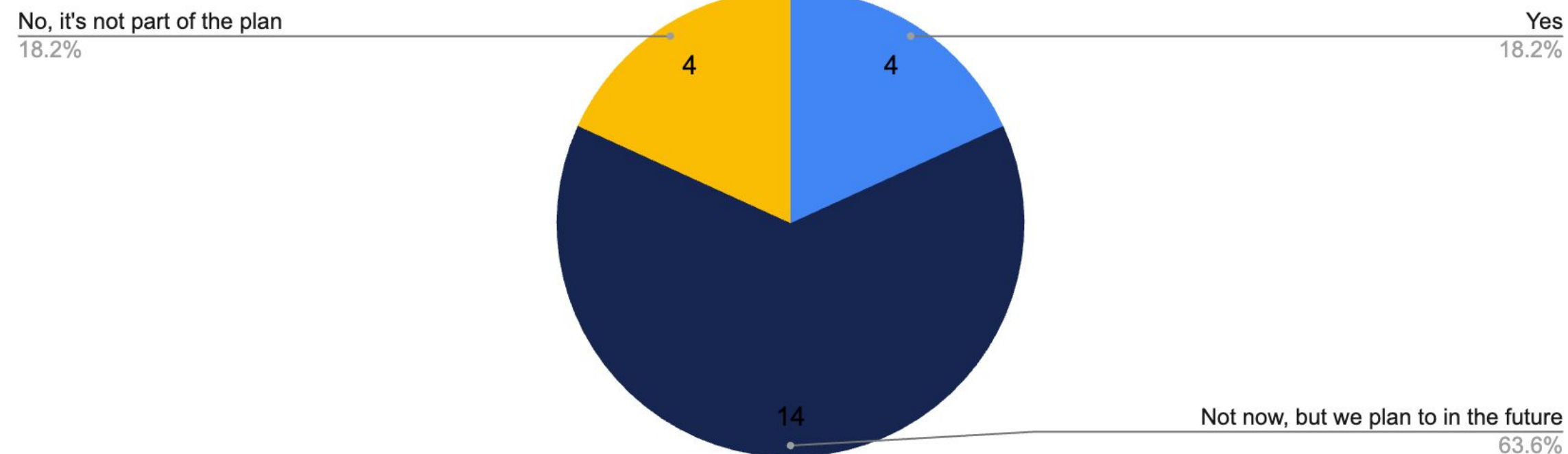
Most companies have fewer than 5 employees.

Finances

Types of funding



Is the company generating revenue from carbon credits?



NASCENT INVESTING

Most companies are primarily funded by family and friends. Others piece together grants and other investments.

CHANGING REVENUE MODELS

Over 80% of companies either generate revenue from carbon credits now or plan to in the near future.

Areas of climate tech: today

COMPANIES



Water
Energy storage
Air and environment
Food and agriculture
Clean energy
Efficiency
Clean industry
Transport

OTHER ACTORS



Efficiency
Air and environment
Water
Transport
Energy storage
Clean industry
No specific focus
Clean energy
Food and agriculture

ALIGNMENT OF AREAS

Clean energy is a big area for many actors. Also a lot of interest in food and agriculture, clean industry, water – aligned with key climate challenges and opportunities in Chihuahua.

ECOSYSTEM ACTORS

More likely to be involved in no areas in particular, or all areas, as opposed to specializing in one or a few like companies.

CONSIDER OTHER MAPPING

Though transport shows up as an area of low engagement here, we know from our 2022 e-mobility ecosystem mapping that many companies are already engaged or plan to engage in the EV value chain.

Areas of climate tech: future

COMPANIES

Water
Air and environment
Energy storage
None
Efficiency
Clean energy
Clean industry

OTHER ACTORS

Transport
Food and agriculture
Air and environment
None
Clean energy
Energy storage
Clean industry
Efficiency

STICKING TO WHAT THEY KNOW

Most companies and ecosystem actors do not plan to expand into new areas of climate tech in the near future.

SOME GROWING AREAS

Areas that may grow in activity in the future include efficiency, air and environment, and energy storage.

Current climate tech products and services

FOOD & AGRICULTURE

- Hydroponics systems
- Alternative protein sources from crickets
- Dehydrated mealworm
- Development of MVPs addressing food and agriculture production challenges
- Manufacturing of organic fertilizers
- Consulting services and training projects for improving soil quality

CLEAN ENERGY

- Products for improved water usage
- Irrigation and pumping systems
- Projects for recharging aquifers
- Water saving projects
- Leak detectors and hydrometers for measurement and monitoring
- Consulting services for comprehensive management of drinking water

WATER

- Products for improved water usage
- Irrigation and pumping systems
- Projects for recharging aquifers
- Water saving projects
- Leak detectors and hydrometers for measurement and monitoring
- Consulting services for comprehensive management of drinking water

TRANSPORT

- Electric vehicles
- Charging infrastructure for electric vehicles

Current climate tech products and services

CLEAN INDUSTRY

- New materials and sustainable packaging to decarbonize supply chains
- Manufacture of biodegradable degreasing chemicals and scale and rust removers made with plant extracts
- Comprehensive management of special handling waste

EFFICIENCY

- Energy savings

AIR & ENVIRONMENT

- Reforestation and habitat restoration
- Carbon capture projects
- Biodiversity projects

OTHER AREAS

- Automation, monitoring, compliance, data
- Management and traceability of wholesale plastic waste
- Atmospheric induction systems to stimulate rain
- Bioenergy solutions for industrial heat, helping companies decarbonize their operations and reduce energy costs
- Carbon credit sales

Planned climate tech products and services

FOOD & AGRICULTURE

- Agriculture-IOT
- Products for the efficient use of fertilizers
- Controlled insect production farms for sustainable and alternative protein and food products
- Consulting and advisory services for soil improvement
- Carbon management for crops such as walnuts or apples

CLEAN ENERGY

- Solar panel recycling

WATER

- Georadar technology for the mapping of drinking water and drainage
- Reuse of regenerated water
- Services for hydrological sustainability, management, efficiency, and water quality
- Reservoir recharging

TRANSPORT

- N/A

Planned climate tech products and services

CLEAN INDUSTRY

- GHG mitigation in the management and recovery of plastic secondary raw materials from large generators

EFFICIENCY

- Energy recovery from deep and surface boiler blowdowns

AIR & ENVIRONMENT

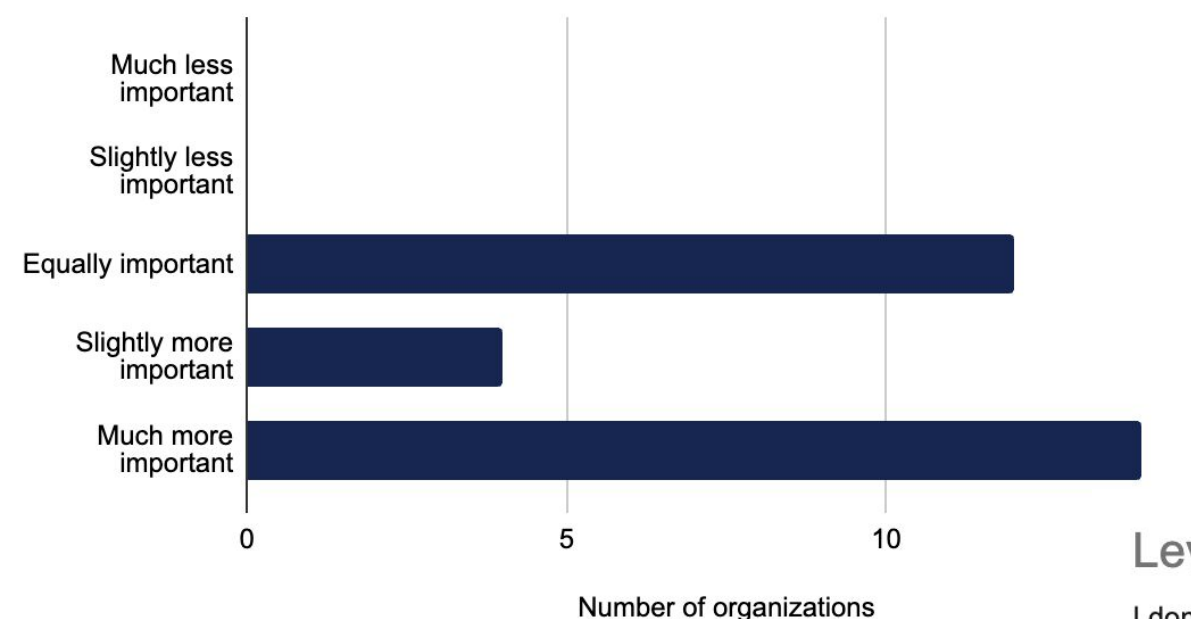
- N/A

OTHER AREAS

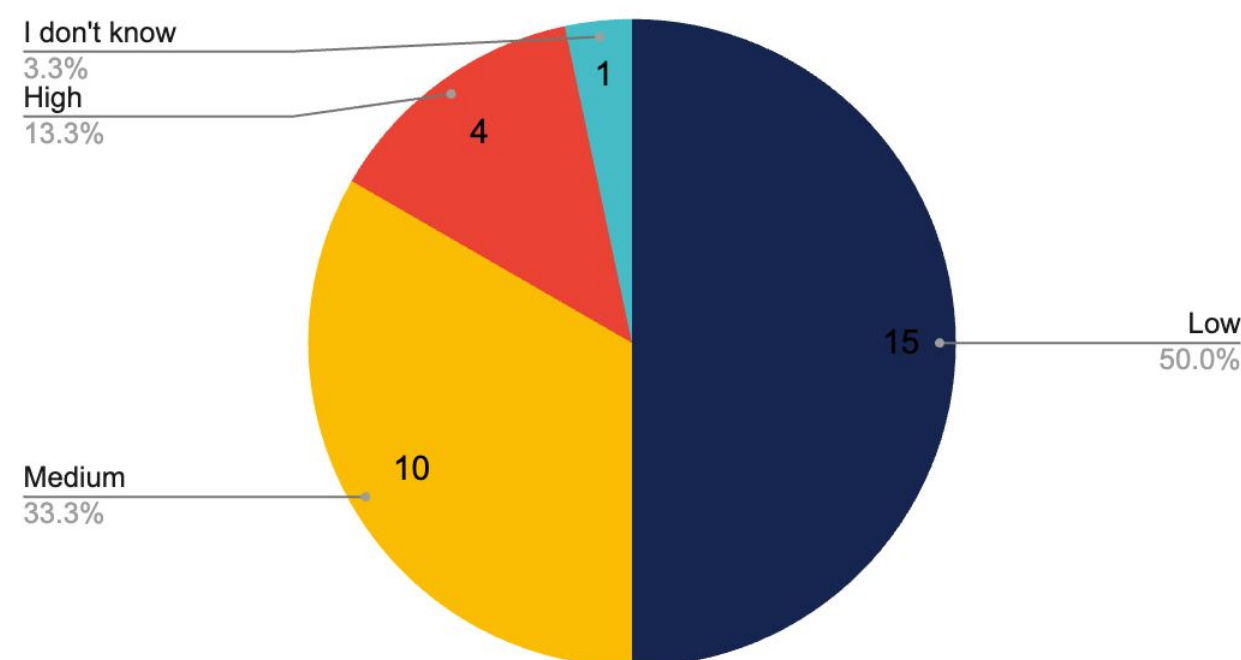
- Monitoring, automation and support for decision makers in associations, government and nongovernmental organizations
- Home automation spaces controllable with renewable and sustainable energy
- Development of carbon projects
- Carbon credits
- Remote systems for biomass management
- Development of bioplastics and soil regenerative products

Activity and prioritization of climate tech

Compared to other priority areas for my organization, climate tech is:



Level of climate tech activity in the state



AN ACTIVE SPACE

Half of the ecosystem actors said that there is a medium or high level of activity related to climate tech in the state.

HIGH PRIORITY

All ecosystem actors said climate tech was at least as important or much more important than other priority areas for their organizations.

Resources and gaps

RESOURCES



GAPS



Resources and gaps in the climate tech ecosystem, from the point of view of companies

KEY STRENGTHS

Include mentors, expertise, and public policies.

KEY GAPS

Include funding, network, public policies, and mentors.

MATTER OF PERSPECTIVE

Some of the same responses feature strongly in both resources and gaps. Different companies have different perspectives, and/or these exist but more are needed.

Programs in the ecosystem

CURRENT

Acceleration
Policy guidance
Research services
Networks
Financing
Incubation
Business consulting services
Facilities/equipment
Data
Mentoring

PLANNED

Incubation
Financing
Mentoring
Policy guidance
Data
Networking
Research services
Business consulting services
Facilities/equipment
Acceleration

Current and planned programs in the ecosystem related to climate tech

KEY CURRENT PROGRAMS

Include research services, policy guidance, business consulting services, facilities/equipment.

KEY PLANNED PROGRAMS

A lot of continuation of same programs or expansion into similar areas. Additional program types include mentoring and data.

WHAT'S MISSING?

Includes programs related to funding, networking, and incubation/acceleration, which track with gaps identified by companies.



Summary

- 1** Climate tech ecosystem and activity in Chihuahua is present and growing
- 2** The local climate tech ecosystem is still at an early and small stage
- 3** Climate tech companies are exploring different business models and focus areas
- 4** Climate tech areas of focus are largely aligned with the local context
- 5** Ecosystem strengths and weaknesses are present across several dimensions, which will be discussed in detail later: people, know-how, network, money, government, private sector



Ecosystem: Strengths and weaknesses

We organized input from the interviews and survey respondents by six areas*.



PEOPLE



KNOW-HOW



NETWORK



MONEY



GOVERNMENT



PRIVATE SECTOR

*This framework was adapted from those developed by New Energy Nexus and CREATORS Innovation Lab.

Strengths and weaknesses of the ecosystem



PEOPLE

STRENGTHS

There is growing interest, motivation and urgency to address climate issues.

WEAKNESSES

There is a lack of specialized talent for climate tech, and a disconnect between the people who want to engage in these topics and the topics' highly technical nature.



KNOW-HOW

STRENGTHS

There are strong local academic institutions and relevant programs.

WEAKNESSES

There is a lack of data, equipment for testing and scaling, integration of cross-disciplinary concepts, as well as a disconnect between academic programs and industry needs.



NETWORK

STRENGTHS

There is a network forming and growing organically, and being a border state brings advantages.

WEAKNESSES

There is room for much more intentional collaboration, information sharing, and convening to elevate these topics and accelerate this work.

Strengths and weaknesses of the ecosystem



MONEY

STRENGTHS

There are some state and private funds for climate tech.

WEAKNESSES

Available funding is insufficient to achieve scale, there is no carbon tax or carbon market to leverage, and federal funding cuts have negative repercussions locally.



GOVERNMENT

STRENGTHS

Climate is identified as a priority at local and state levels, and government is seen as an ally by companies.

WEAKNESSES

More regulation and enforcement is needed, and federal policies hinder clean energy development locally.



PRIVATE SECTOR

STRENGTHS

There is a strong industry base, many climate tech business opportunities are relevant locally, and there is potential for high emissions reductions by implementing climate tech solutions given the current industrial mix.

WEAKNESSES

Local companies are not seen as particularly open to adopting climate tech innovation and there is a disconnect between industry and entrepreneurs.



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Climate tech ecosystem map

4



A growing ecosystem

A diverse range of actors, allies, companies, and entrepreneurs is required to build an effective and long-term climate innovation ecosystem.

Chihuahua already has stakeholders committed to climate tech and has tremendous potential to continue strengthening the local ecosystem.

With the data obtained, we developed a map that includes more than 80 organizations, including those that responded to the surveys and those mentioned by respondents in relation to their climate tech work in Chihuahua.

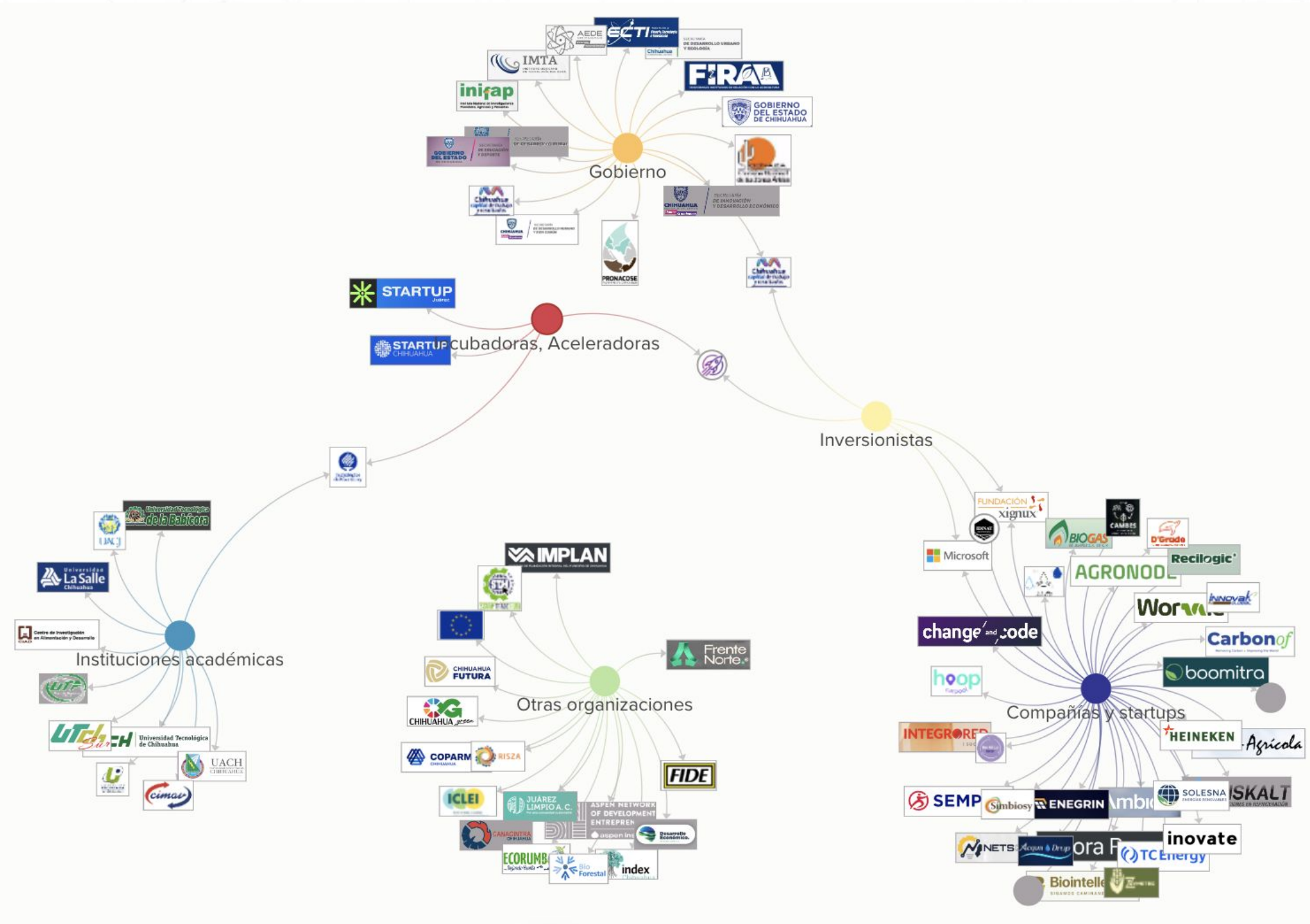


Ecosystem map

The map includes details about each organization, the areas of climate tech in which they are engaging and plan to engage, their climate tech products, services or programs, and more.

The map is intended to serve as a practical tool to help those already working or interested in climate tech to identify potential partners, allies, funders, etc. and as a visual tool to elevate this work in the state.

The map is available here:



Join the ecosystem!

If your organization is involved in climate tech in Chihuahua and wants to be part of the map, complete the survey that corresponds to your organization type: [this one](#) for companies, or [this one](#) for other actors in the ecosystem.



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