



I-WEST and the Four Corners Rapid Response Team

Capabilities & Partnerships Enabling a Just and Equitable Energy Transition

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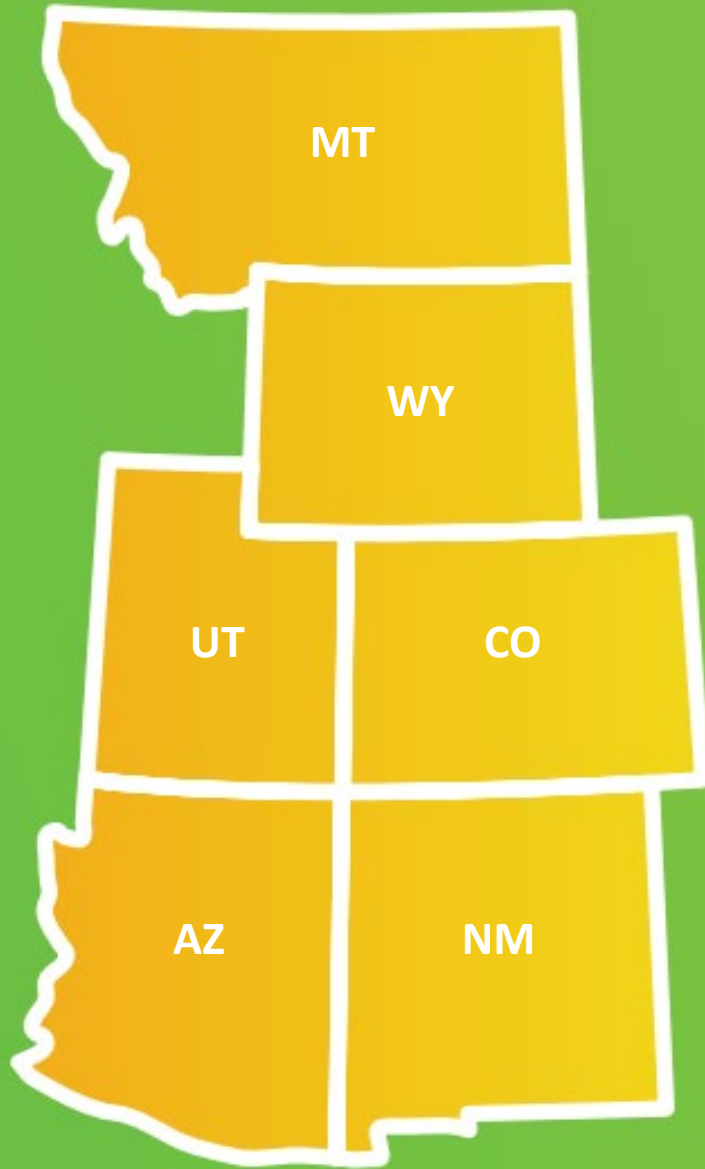
March 23, 2023

Western Tribal Carbon Management Technologies Strategies Forum



Intermountain West Energy & Sustainability Transitions





Develop a regional roadmap to carbon neutrality

Why these states?

- Shared geographical, environmental, and demographic attributes
- Characterized by fossil fuel-based economies and share challenges related to climate
- Major producers and exporters of fossil-based energy and highly vulnerable to social and economic disruptions as a result of energy transition
- Positioned to emerge as leaders in new energy economies

Build regional coalitions

- Successful energy transition strategies depend on effective planning and implementation at the local level
- A place-based approach engages regional stakeholders to assess societal readiness in tandem with technology readiness
- Explicitly considering policy, revenue and jobs, workforce, equity, and EESJ is key
- Regional coalitions are critical to roadmap implementation and technology deployment



Engage regional stakeholders

Workshops

- State-based for broad stakeholder engagement
- Sovereign nations/tribal focused
- Technology-based for project leader and utility leader engagement

Seminar Series

- Featuring thought leaders on a broad range of energy-related topics
- Regional experts on energy and water

Website

- Information on energy transition for a broad and diverse audience
- I-WEST resources made widely available
- Searchable catalog of regional projects and initiatives to facilitate coalitions

Listening Sessions

- One-on-one conversations with regional stakeholders



Melanie Kenderdine
Gigaton Needs, Gigaton Challenges



Jason Sandel
Rocky Mountain Natural Gas Production and a New Hydrogen Economy



José Benitez
Deep Decarbonization and Energy Markets Modeling at the DOE Office Fossil Energy and Carbon Management



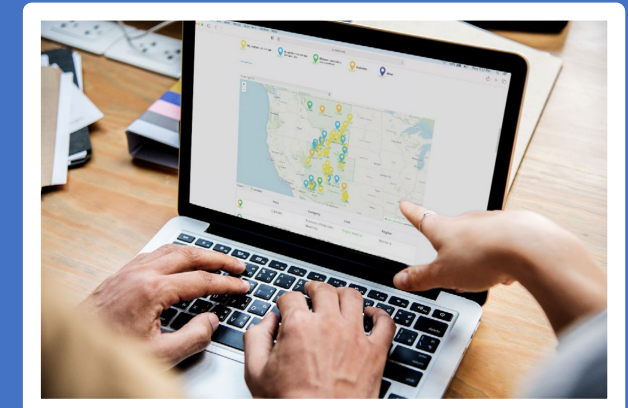
Dr. L. Ruby Leung
Projecting Regional Climate Change and its Impacts in the Western U.S.



Moji Karimi
Synthetic Biology Meets Energy Transition: Reimagining the Heavy Industries for the Net-Zero Economy



Mike Hightower
Emerging Energy Trends and Water Use Innovation in the West



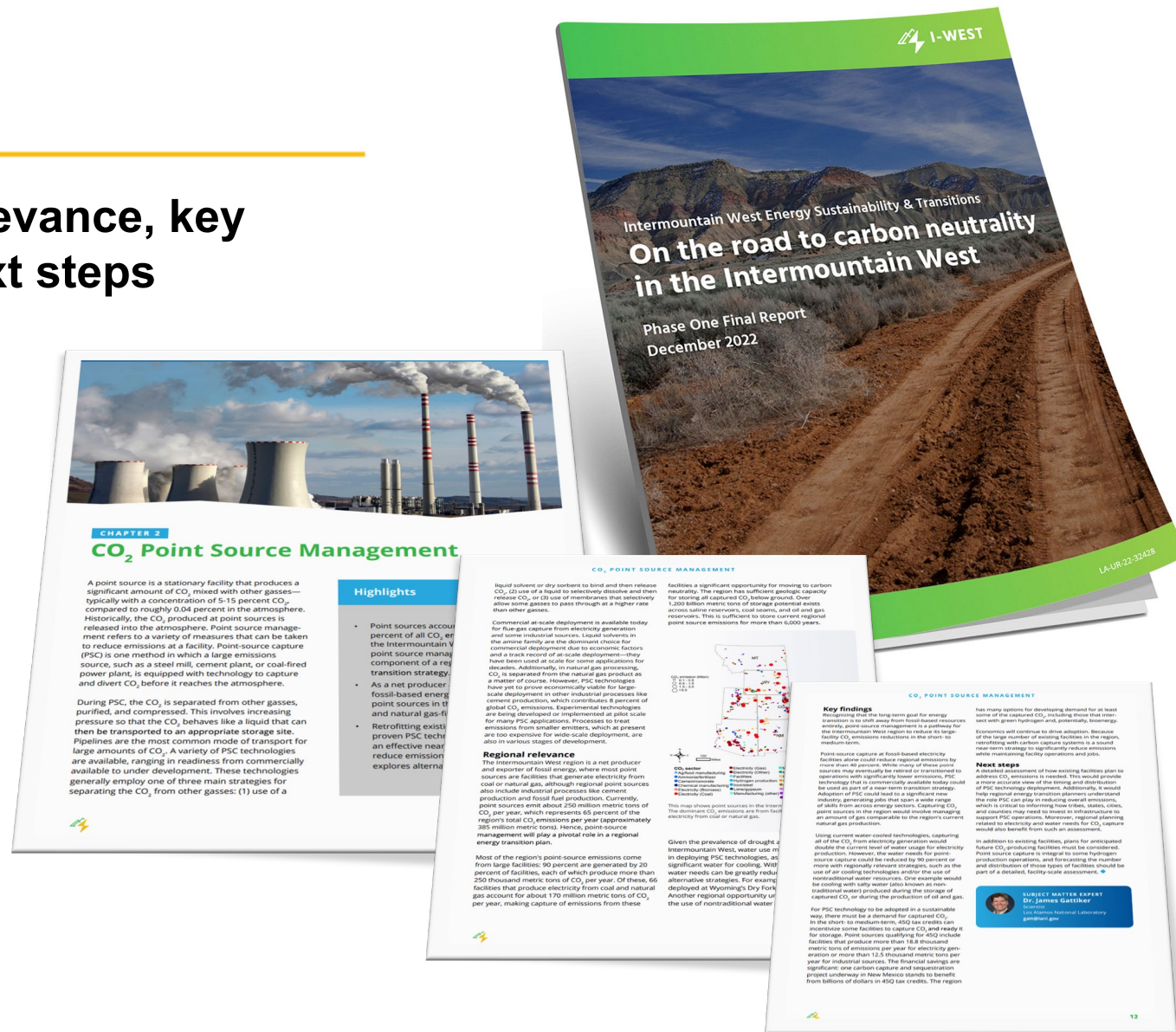
Phase-I Final Report

Public report summarizing regional relevance, key findings, and recommendations for next steps

- Regional Overview
- CO₂ Point Source Management
- Direct Air Capture
- CO₂ Storage and Utilization
- Certification
- Hydrogen Supply
- Hydrogen Demand
- Bioenergy
- Low-carbon Electricity
- Environmental, Energy, and Social Justice
- Policy
- Economic Impacts
- Workforce Impacts

Supplemented by 600+ pages of detailed reporting written for subject matter experts, available upon request.

Phase-I webinar available for viewing



<https://iwest.org/>

Proposed Phase-II Framework

Place-based approach

- Economics
- Policy
- Workforce
- Energy, environmental, and social justice

Symbiotic economies

- Carbon capture, utilization, and storage
- Hydrogen
- Bioenergy

Energy sector strategies

- Electricity
- Transportation
- Industry (heavy emitters)

Technology feasibility studies

- Technoeconomic analyses
- Lifecycle analyses

Climate modeling

- Climate impacts on water availability

New scope and approaches

Expand regional partnerships

- Increase engagement with sovereign nations
- Add new regional college and university partners
- Leverage new national lab capabilities

Add technology pathways

- Solar
- Wind
- Geothermal
- Hydropower
- Nuclear

Conduct case studies

- Shift focus from assessment to application
- Sub-region analyses to assist communities with energy planning
- Higher degree of integration with policy, economics, and EESJ studies



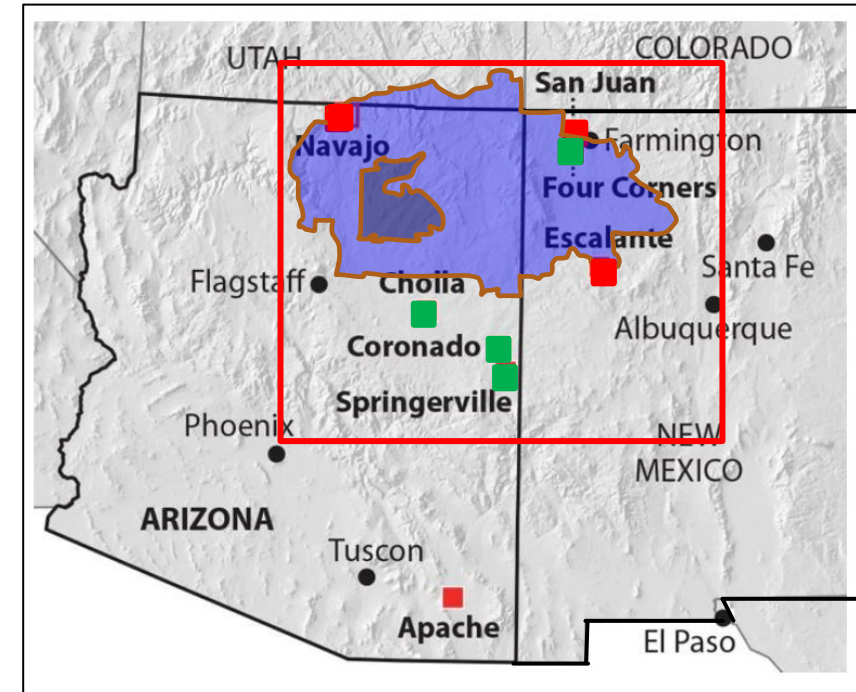
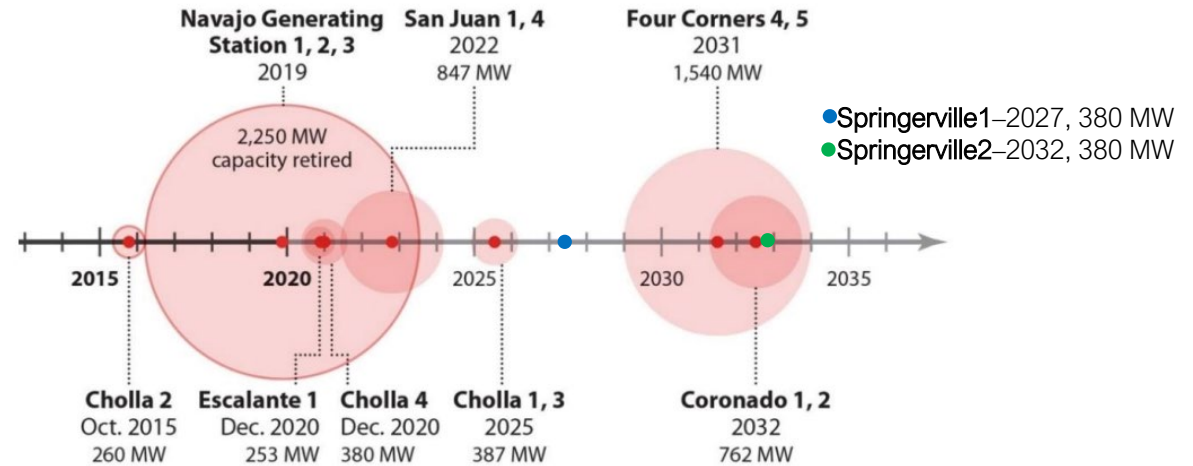


Interagency Working Group on
Coal & Power Plant Communities
& Economic Revitalization

INTERAGENCY WORKING GROUP FOUR CORNERS RAPID RESPONSE TEAM

IWG has identified priority communities around the nation

- Ranked list of 25 communities for near-term investment using existing federal agency programs and funding from the FY21 budget and American Rescue Plan
 - Arizona (non-metropolitan area) ranked #10
 - Farmington, NM ranked #16
- 8 coal-fired power plants exist in these areas—7 in the Four Corners alone—with 3 closures since 2019
- Complex interfaces between state and tribal governments, as well as regional agency representatives



Four Corners Rapid Response Team (4C-RRT)

- Kicked off August 25, 2022, at San Juan College School of Energy in Farmington, NM
- Federal representation
 - Deb Haaland, Secretary, Department of Interior
 - David Turk, Deputy Secretary of Energy
 - Brian Deese, Director of National Economic Council
 - Ali Zaidi, Deputy National Climate Advisor
 - Kate Gordon, Senior Advisor to the Secretary of Energy
- State and tribal representation
 - President Nez, Navajo Nation
 - Timothy Nuvangyaoma, Hopi Tribe of Arizona
 - Alicia Keyes, Secretary, NM Economic Development
- Regional stakeholders
 - 4C Economic Development
 - Navajo Technical University
 - San Juan College
 - Residents of the Navajo Nation and Farmington communities
 - Numerous clean energy project leaders



“Energy workers and communities have powered communities for generations. We are thrilled that the Biden-Harris Administration has made billions in investments available to help these communities realize new economic activities that are equitable and accessible to all.”

- Deputy Secretary Turk

Team, process, and approach

- Charter and workplan based on feedback from August kickoff meeting and subsequent listening/learning sessions
- Regular communications with the RRT via monthly meetings with regional agency representatives
- Ongoing engagement with state agencies for additional leveraging, with focus on NM to start



Office of Management and Budget/Domestic Policy Council



U.S. Department of Energy



U.S. Department of Treasury



U.S. Department of the Interior



U.S. Department of Agriculture



U.S. Department of Commerce



U.S. Department of Labor



U.S. Department of Health and Human Services



U.S. Department of Transportation



U.S. Department of Education



U.S. Environmental Protection Agency



Appalachian Regional Commission

Summary

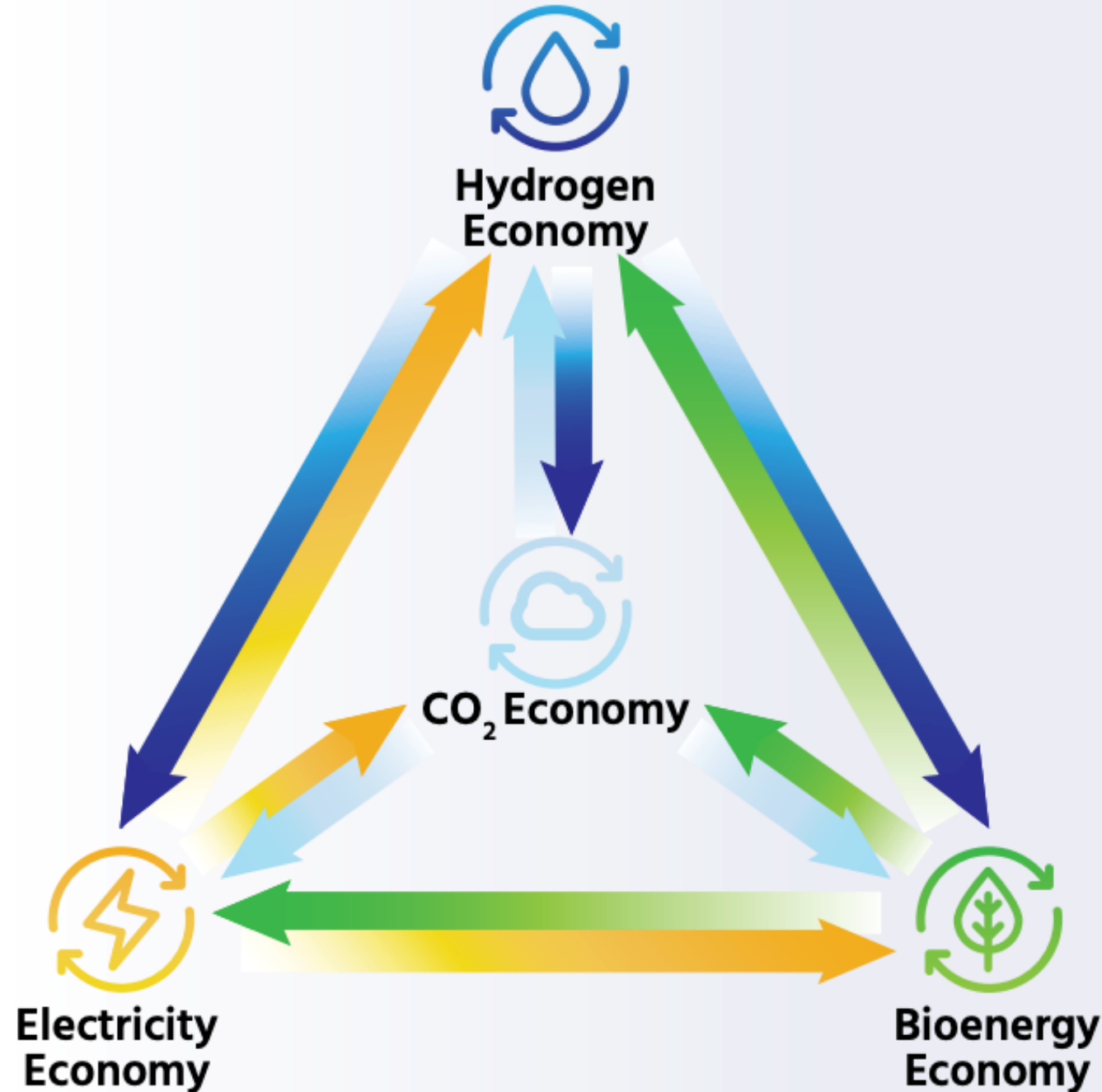
- **The Intermountain West Energy and Sustainability Transition (I-WEST) effort is aimed at developing strategies and pathways for equitable transition to carbon neutrality**
 - Thanks to U.S. DOE FECM and BETO for their support of our Phase-I effort; please see <https://iwest.org/> for our Phase-I report
 - Planning for Phase-II to engage more national labs and universities to enhance I-WEST's regional impact
- **The Four Corners Rapid Response Team (4C-RRT) is aimed at developing tactical solutions to address immediate community energy transition needs**
 - Thanks to FECM and the White House Interagency Working Group for their support
 - Actively listening, learning, networking - focusing on connecting community and regional project leaders to the IWG
 - Developing a learning network with other RRTs – focusing on establishing best practices and strategies for success in collaboration Wyoming and Illinois Basin RRTs



Supplemental Slides

Explore symbiotic economies

- Achieving carbon neutrality will require multiple pathways
- Pathways must reduce greenhouse gas emissions *and* be sustainable
- Symbiotic energy economies can be exploited to decarbonize critical energy sectors and create supply-and-demand scenarios for new energy industries





Place-based Approach

Key findings

Tenets of a place-based approach

- Knowledge of the geographical context of a region
- Well-defined interactions and channels between stakeholders
- Input and buy-in from a broad range of stakeholders and sovereign nations
- Balance diverse motivations for energy transition

Policies to enable energy transition

- Effective energy transition plans are ideally supported by policies
- Cross-state planning is essential for developing an integrated energy grid
- Integrated energy strategies can increase access to federal and state funds
- Regional coalitions can forge avenues for providing input on state and federal policy



Key findings

Economics and workforce impacts

- Economic impacts of energy transition are highly variable between counties
- Energy projects have far-reaching economic impacts and require tools for holistic evaluation and planning
- Current workforce skills are well positioned to transition, but workers are not always able to relocate for new jobs
- Regional colleges and universities are key to workforce (re)training

Energy, environmental, and social justice

- Equitable energy transition is an opportunity for innovation in governance
- Enduring partnerships with sovereign nations and regional communities are key to collaborative energy transition strategies
- Disadvantaged communities must have a voice in evaluating risks and benefits





Bioenergy Economy

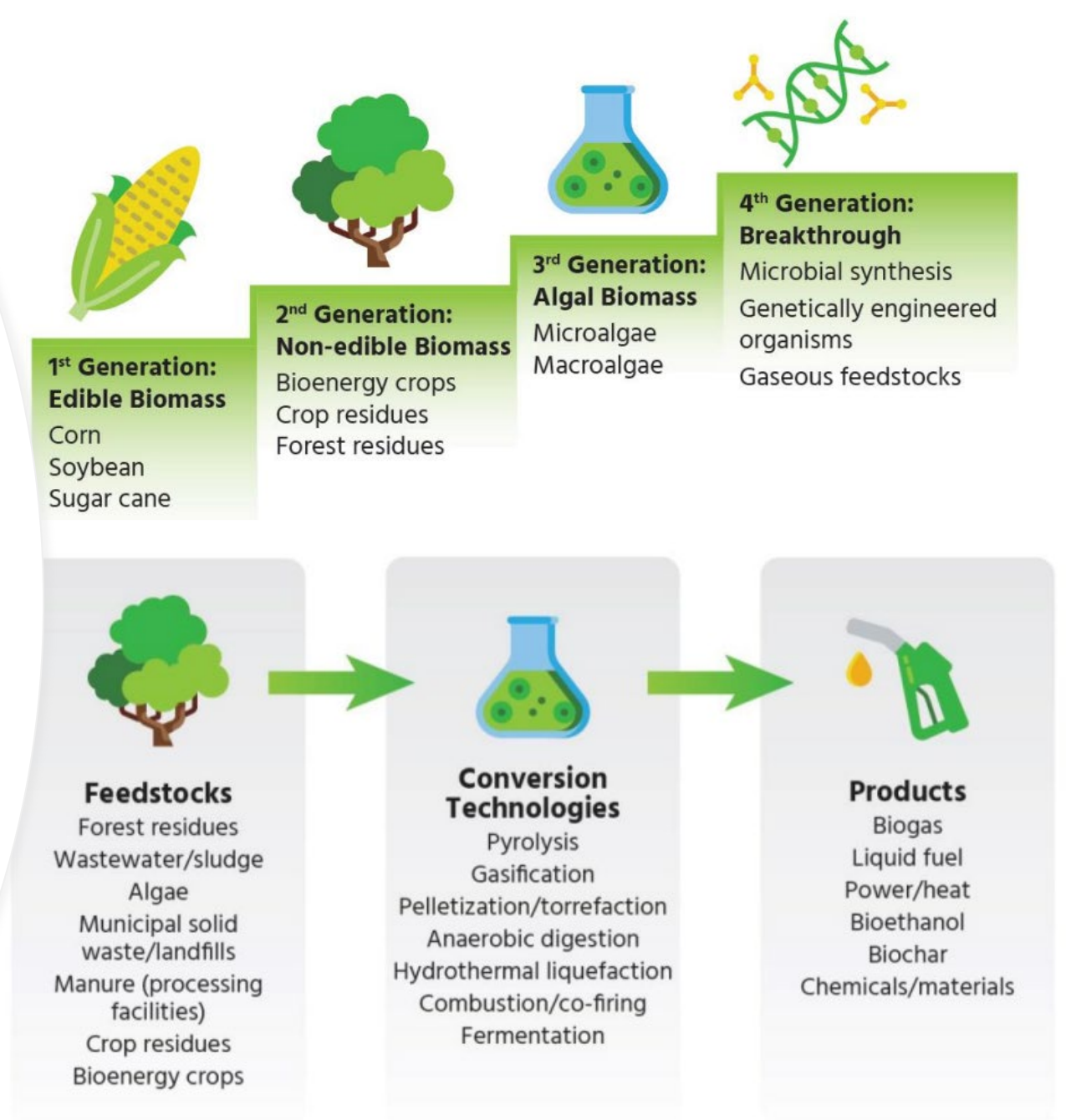
Key findings

Regional relevance

- Abundant sunshine, wind, and solar potential present opportunities for a bioeconomy
- Though currently a small sector, numerous projects are emerging
- A bioenergy economy would intersect with numerous other economic sectors to create supply and demand

Opportunities and challenges

- Opportunities exist to utilize 2nd and 3rd generation feedstocks
- Water scarcity challenges must be addressed to reduce water needs for bioenergy production
- A distributed model of small-scale technologies that engages local communities could help accelerate growth
- Workforce opportunities are emerging, and local academic institutions are critical to increase readiness





Low-carbon Electricity

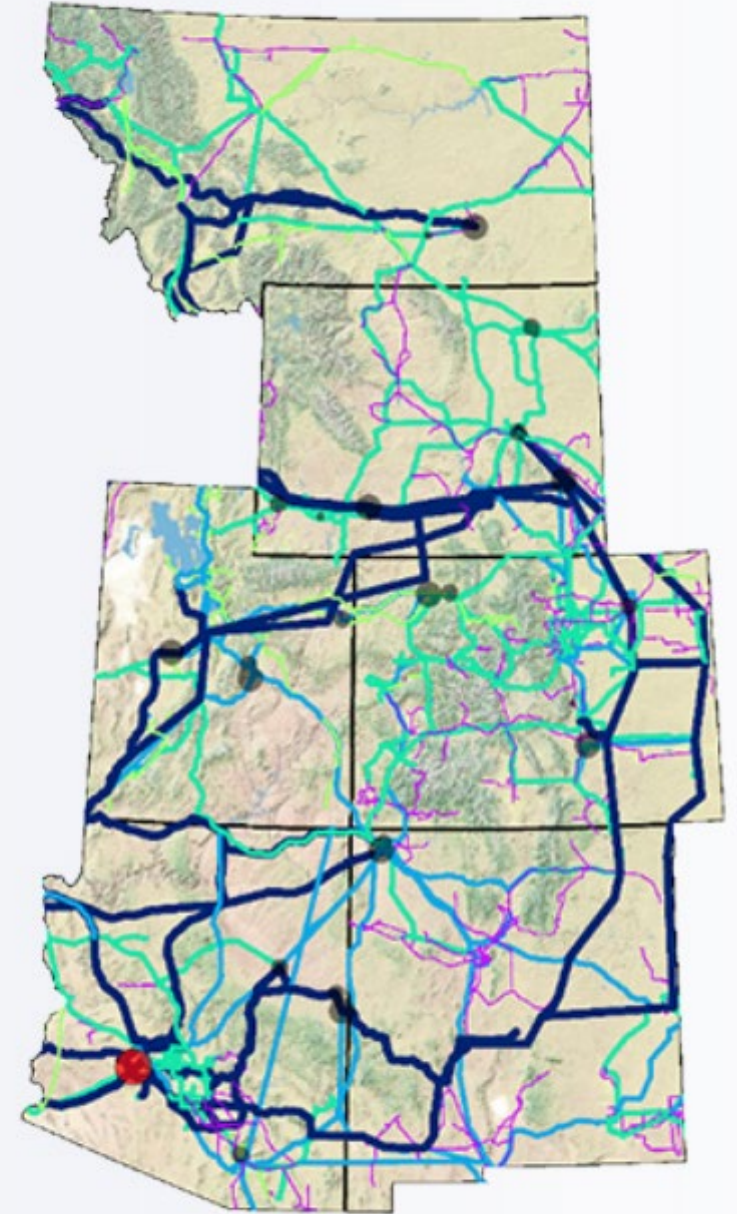
Key findings

Regional relevance

- Fossil-based power plants are the largest sources of electricity in the region, making the electricity sector a critical component of decarbonization
- Transitioning to low-carbon pathways for electricity could reduce regional emissions by roughly 80 percent
- As an energy exporter to other western states, the region is faced with rising demands for low-carbon electricity

Opportunities and challenges

- Modeling suggests the region is well positioned to pursue a variety of pathways to low-carbon electricity
- Adding new energy generation will necessitate increased transmission capacity, storage, and reserves
- Introducing renewables has created a backlog of requests for interconnection with regional transmission and distribution grids
- A regional workforce that understands energy production and inter-state energy transmission will be critical





Hydrogen Economy

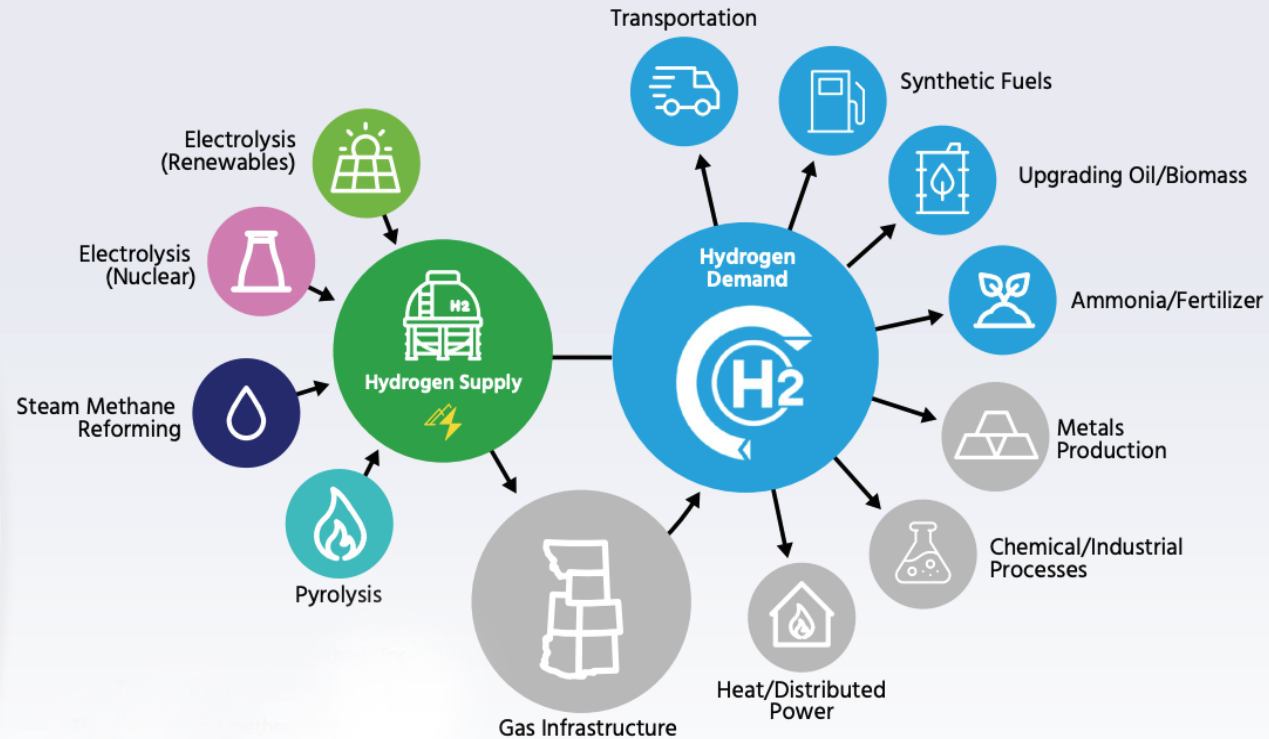
Key findings

Regional relevance

- Abundant natural resources, including natural gas, make the region ideal for large-scale hydrogen production
- Existing infrastructure and workforce could be utilized, which would reduce time and cost to scale up production
- The transportation sector represents an opportunity to create a demand for hydrogen and reduce emissions

Opportunities and challenges

- Enabling technologies that allow for use of non-potable water are needed for sustainable hydrogen production
- A better understanding of climate impacts on regional water availability is needed
- Opportunities to transition government-owned fleets could help accelerate technology deployment
- An assessment of infrastructure needs for hydrogen production, storage, and transportation is needed
- Regional concerns about environmental impacts must be addressed with lifecycle analyses





CO₂ Capture, Utilization, and Storage

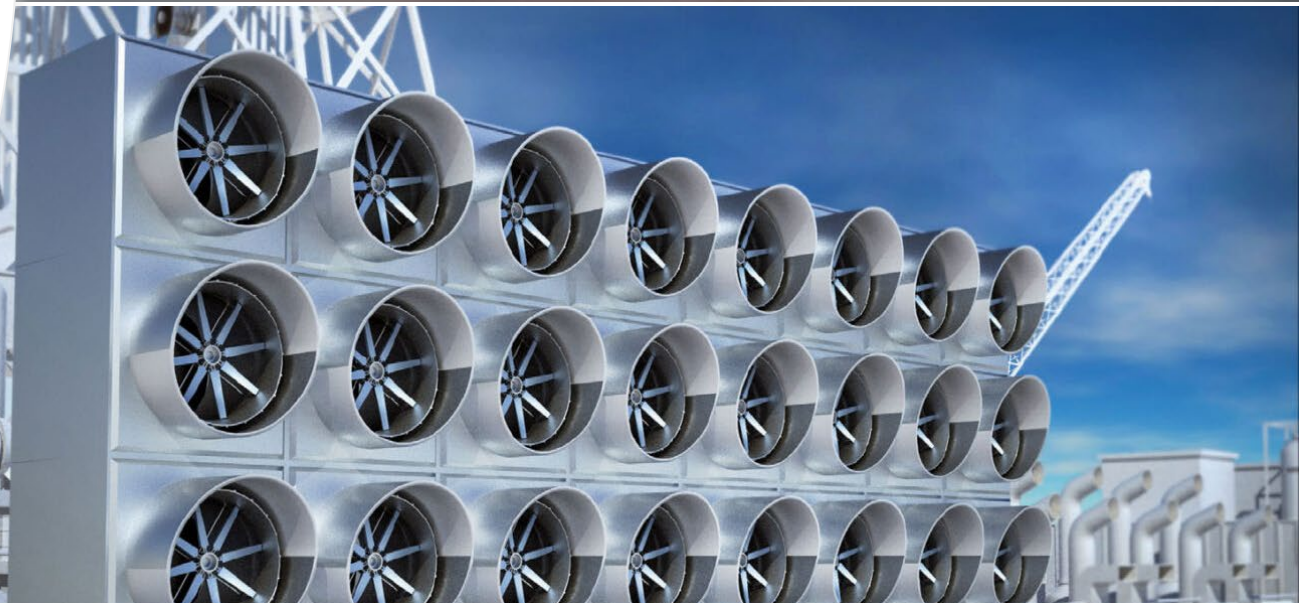
Key findings

Point source management

- Point sources account for 65 percent of regional CO₂ emissions
- Point source capture can significantly reduce CO₂ emissions in the term with readily available technology
- Opportunity exists to utilize produced water for point source capture, with enabling water treatment technology
- 45Q tax credits are key to sustainable point source capture technology adoption

Direct air capture

- Regional climate, open space, and access to renewable energy sources are ideal for DAC
- Scale-up and deployment are in early stages but progressing rapidly
- Long-term DAC will be central to developing a supply of CO₂ to support other symbiotic economies
- Infrastructure and siting needs must be evaluated in collaboration with regional stakeholders



Key findings

CO₂ storage and utilization

- Regional geologic formations have capacity to store roughly 6,000 years' worth of current emissions
- Point source capture and direct air capture technologies will create a supply of CO₂ that necessitates permanent, safe underground storage
- Tax credit incentives such as 45Q represent billions of dollars in savings for regional companies
- Stakeholder engagement is key to assessing pipeline infrastructure and addressing concerns over safety and environmental impact

Certification

- As the scale of carbon sequestration continues to grow, certification will be critical to ensuring safe, reliable, permanent CO₂ storage
- Numerous certification schemes currently exist and there is opportunity to establish an international accreditation system

