Southwest Regional Partnership for Carbon Sequestration

Project Overview

DE-PS26-O3NT41983

November 3, 2003

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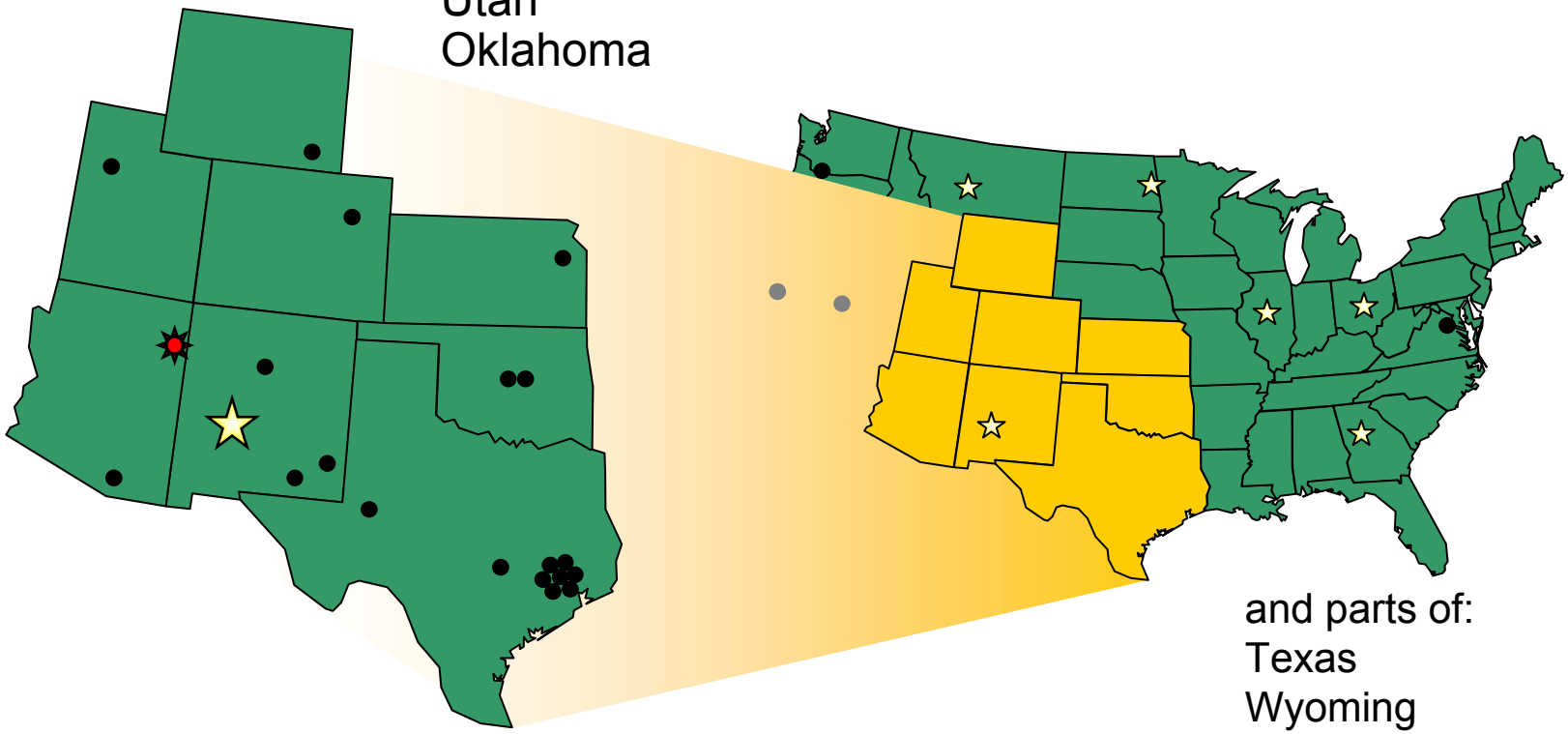
Outline

- **Who are the Southwest Partners?**
- **Description of the Southwest Region**
- **Main themes of the Southwest Partnership**
- **Organization and approach**
  - Working groups
  - Management
- **Deliverables, Timeline, Summary**

States in the Southwest Region

Region Covered:

New Mexico
Colorado
Arizona
Utah
Oklahoma



and parts of:
Texas
Wyoming
Nevada
Kansas

Partners in the Southwest Regional Partnership

State Partners

Arizona Universities & Government

Arizona Geological Survey
Arizona State University

Colorado Universities & Government

Colorado Geological Survey
Colorado State University

New Mexico Universities & Government

New Mexico Oil Cons. Division
New Mex. Bureau of Geology
New Mexico Envir. Department
NM Inst. of Mining and Technology
New Mexico State University
Dine College (Navajo Nation)

Oklahoma Universities & Government

Oklahoma Geological Survey
University of Oklahoma
Oklahoma State University
Sarkey's Energy Center

Utah Universities & Government

Utah Geological Survey
University of Utah
Utah State University
Utah AGRC
Utah Division of Air Quality
Utah Energy Office
Utah Division of Oil Gas & Mining

Industry Partners

Power utilities:

Public Service Co. of New Mexico (PNM)
Pacificorp
Intermountain Power Agency
Tucson Electric Power
Oklahoma Gas & Electric

Energy providers (oil, gas, coal):

Yates Petroleum, ChevronTexaco
Marathon, Occidental Permian
ConocoPhillips, Burlington

Gas infrastructure (CO_2 pipelines):

Kinder Morgan

U.S. Federal Government Partners

Los Alamos National Laboratory
Sandia National Laboratory
U.S. Dept. of Agriculture

Various Additional Partners

Navajo Nation
New Mexico Oil and Gas Association
Gas Technology Institute (GTI)
Electric Power Research Institute (EPRI)
IOGCC
CEED
Advance Resources International (ARI)
Western Governors Association
Petroleum Recovery Research Center (PRRC)
Waste-management Educ. & Res. (WERC)

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Description of the Southwest Region

Sources:

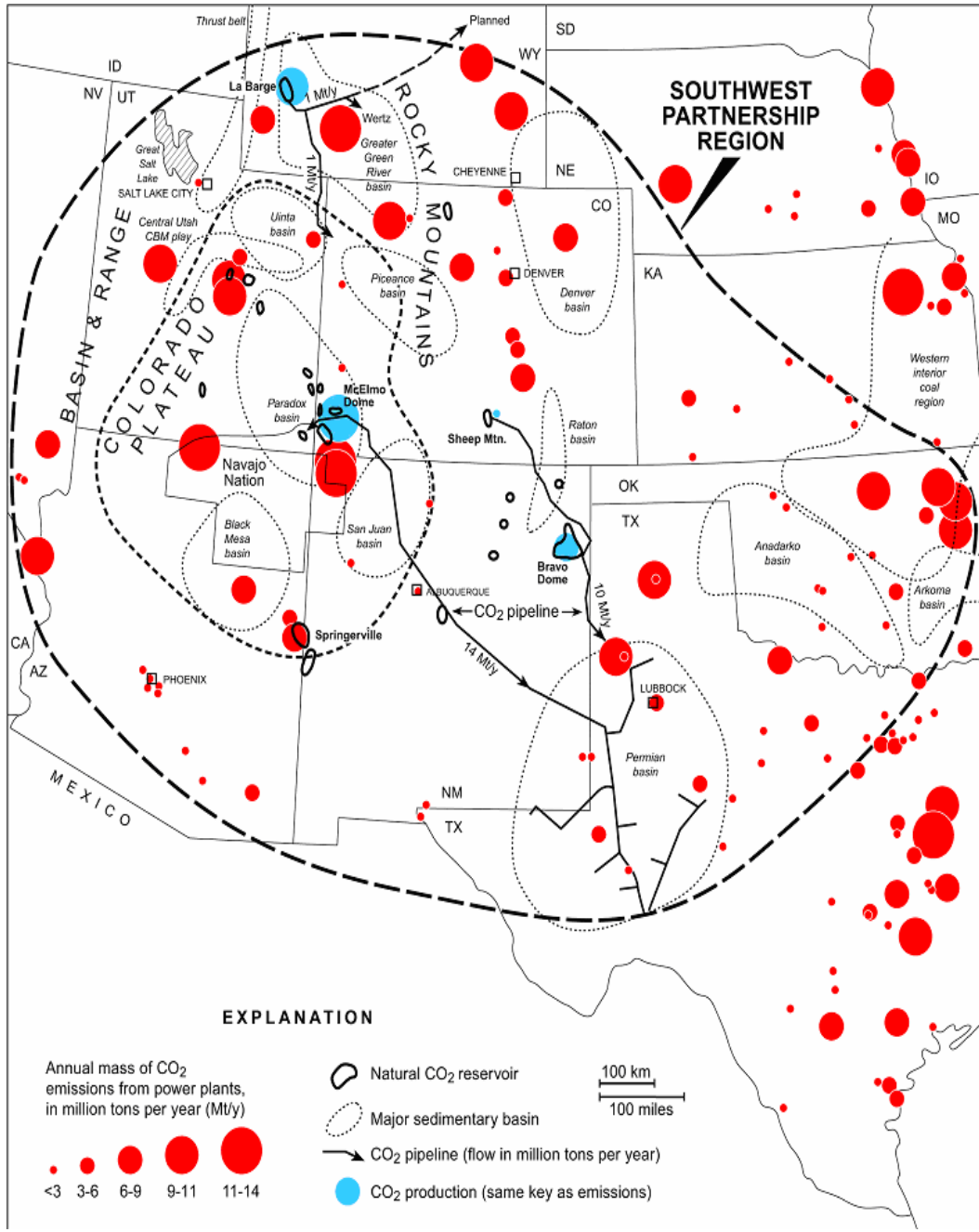
- electrical power plants
- cement and other processing plants
- urban centers
- non-point sources
  (agriculture, automobiles, etc.)

Sinks

- geologic (oil/gas reservoirs, deep saline aquifers, coalbeds, natural CO_2 reservoirs, etc.)
- terrestrial (agriculture, forests, etc.)
- mineralization engineering (surface)

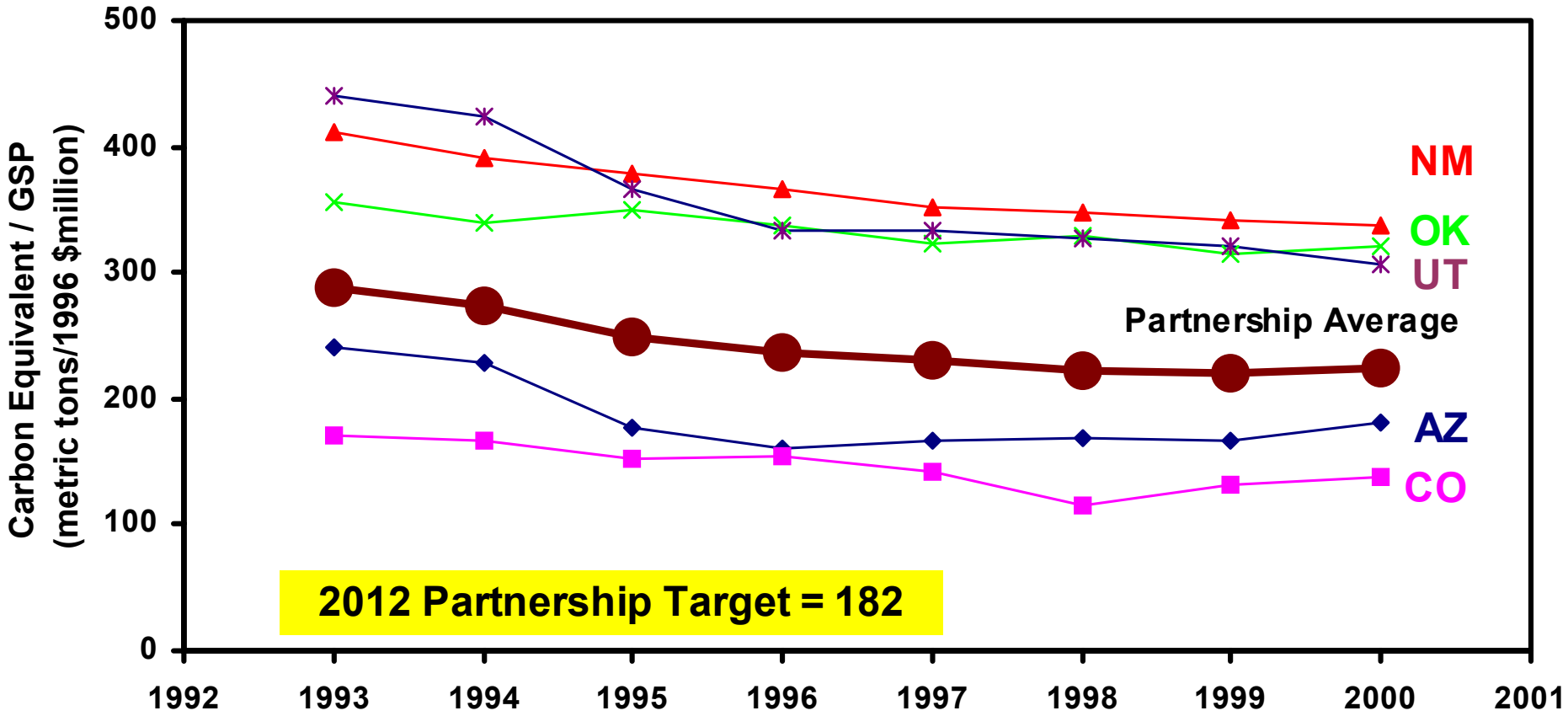
Infrastructure

- Extensive CO_2 pipeline networks



Description of the Southwest Region

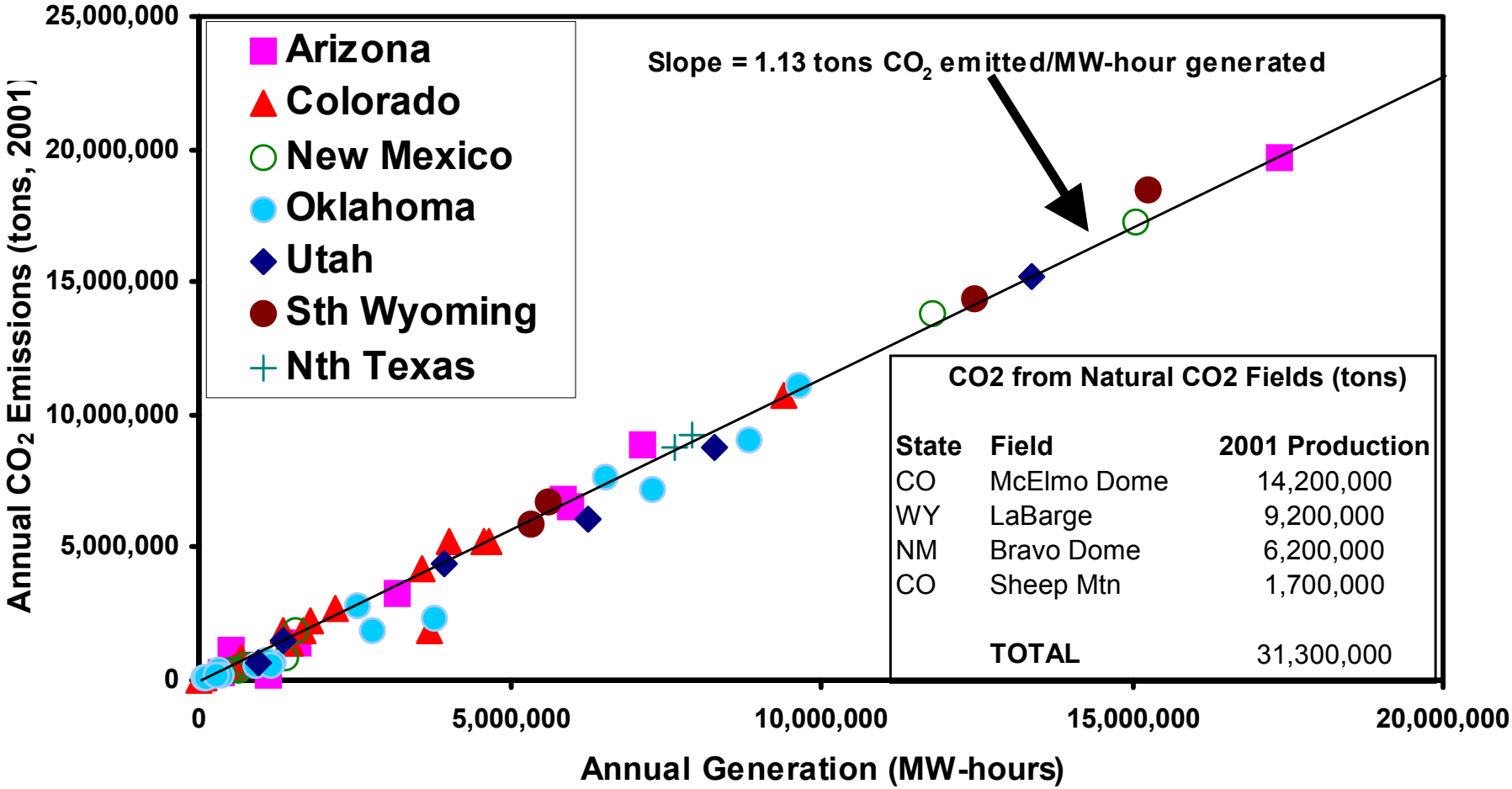
Trends in greenhouse gas intensity for the Southwest Region



Trends in greenhouse gas intensity (metric tons carbon equivalent/million gross state product dollars; 1996 chained) for the Southwest Partnership region. The national average in 2002 is 185 (Klara, 2002). This region is above average because it is rich in fossil fuels. Between 1993 and 2000, the regional average carbon equivalent/gross state product declined 22%, largely because of rapid economic growth

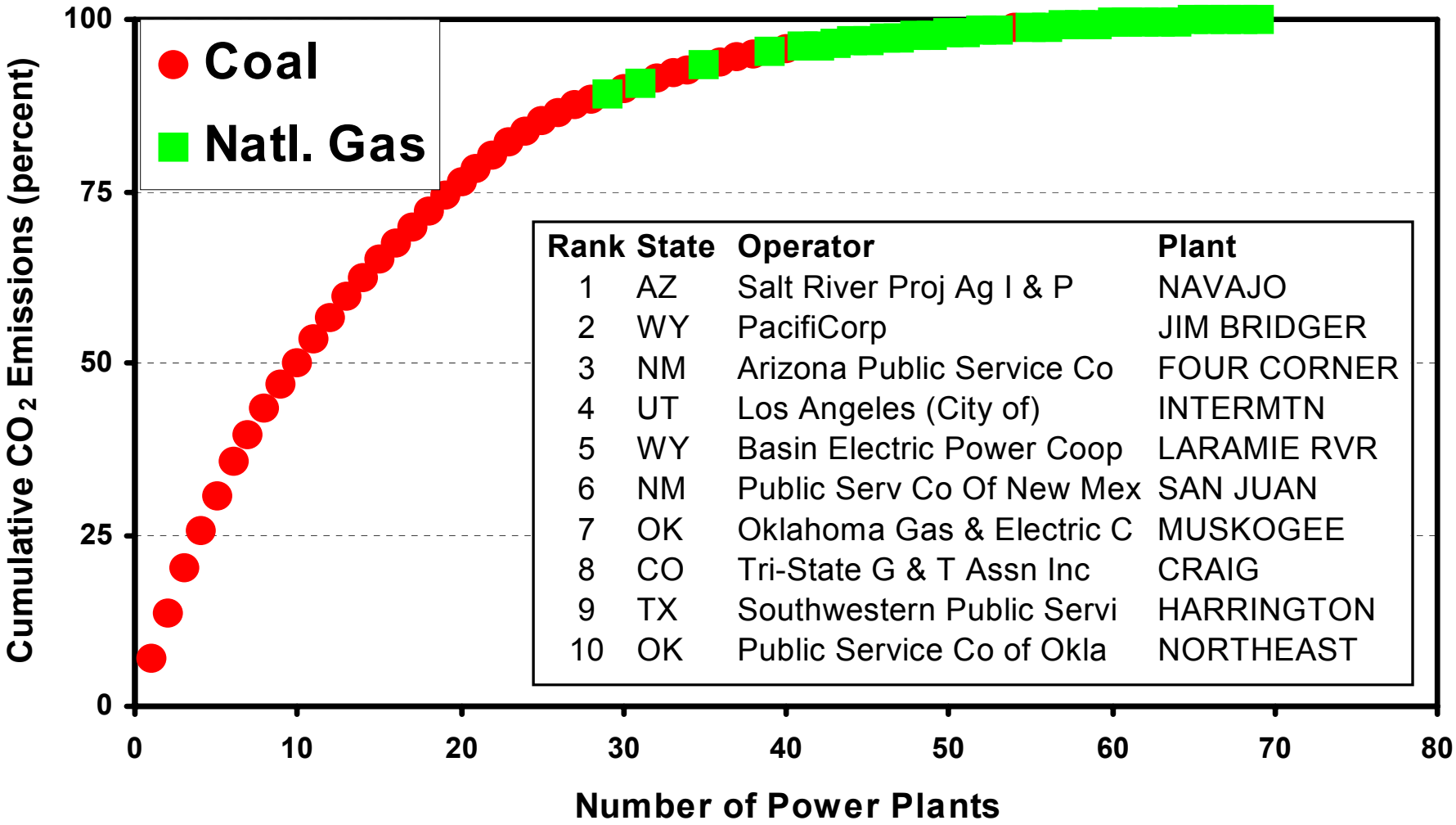
Description of the Southwest Region

CO_2 Emissions proportional to amount of electricity generated



Description of the Southwest Region

10 largest power plants in region contribute 50% of emissions!



Rank	State	Operator	Plant
1	AZ	Salt River Proj Ag I & P	NAVAJO
2	WY	PacifiCorp	JIM BRIDGER
3	NM	Arizona Public Service Co	FOUR CORNER
4	UT	Los Angeles (City of)	INTERMTN
5	WY	Basin Electric Power Coop	LARAMIE RVR
6	NM	Public Serv Co Of New Mex	SAN JUAN
7	OK	Oklahoma Gas & Electric C	MUSKOGEE
8	CO	Tri-State G & T Assn Inc	CRAIG
9	TX	Southwestern Public Servi	HARRINGTON
10	OK	Public Service Co of Okla	NORTHEAST

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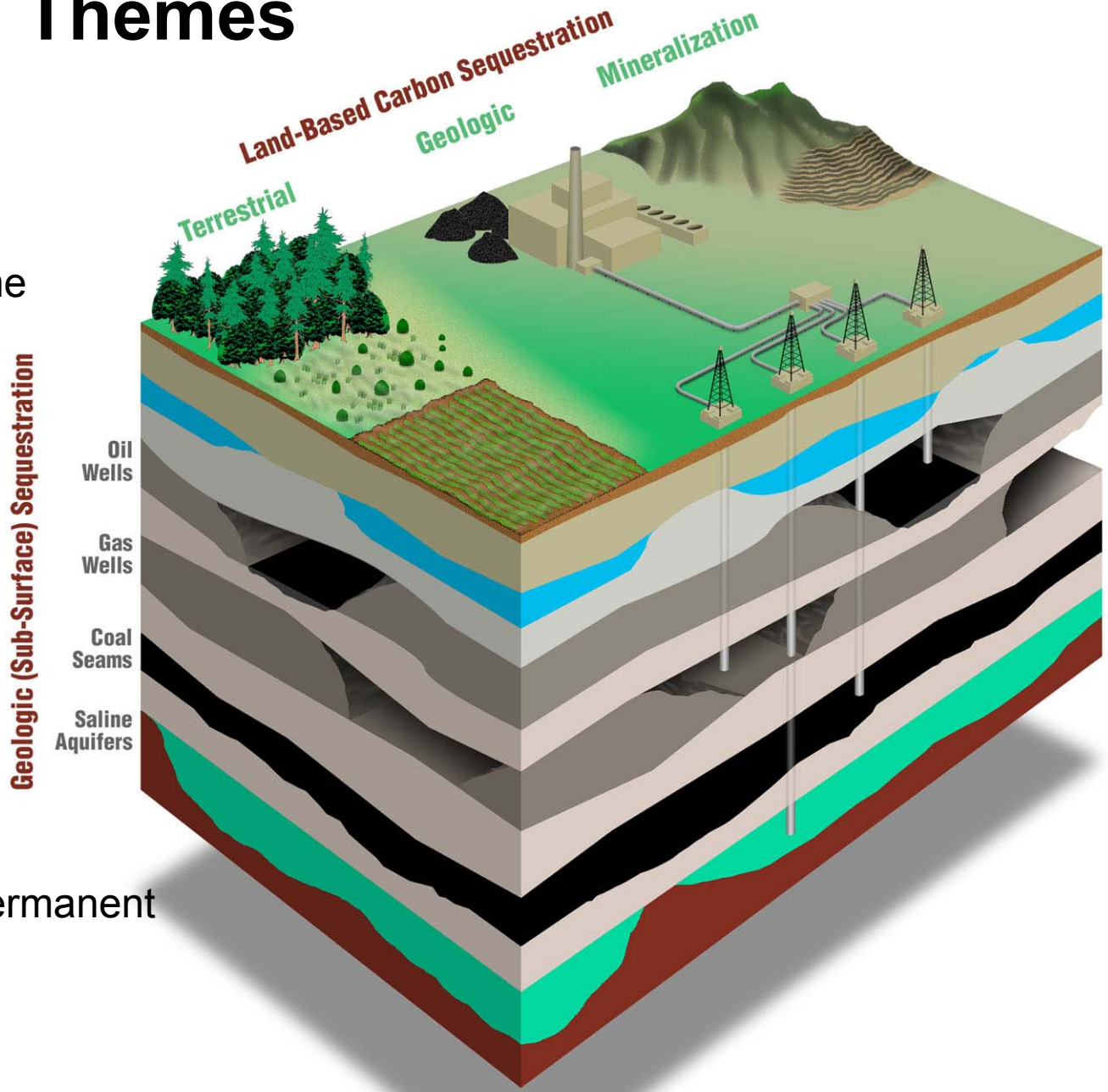
Sequestration Themes

- Geologic systems
  - Potentially large volume
- Terrestrial systems
  - Rapid implementation
- Mineralization
  - High uncertainty but permanent
  - Very large volume
  - safety / risks known



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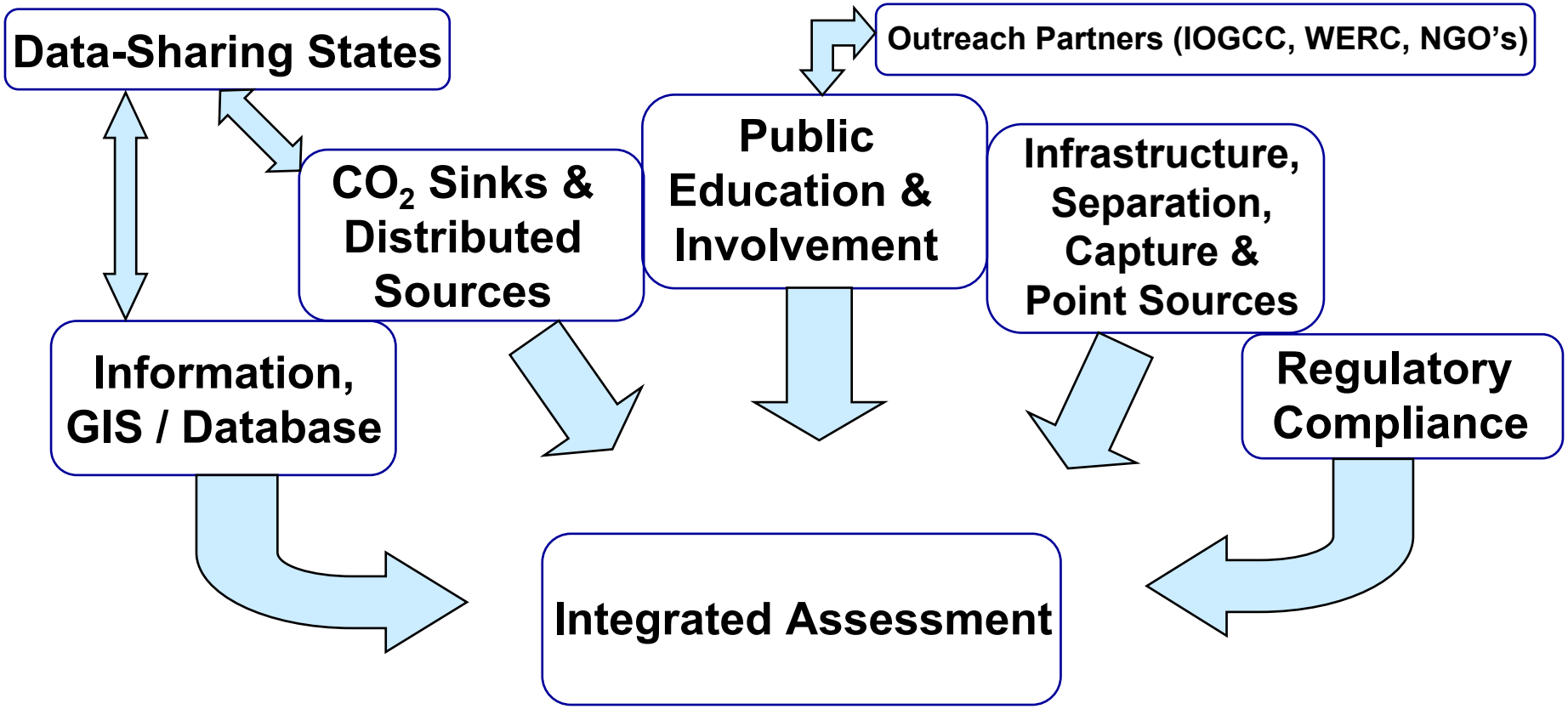
Working Groups



Information, GIS / Database Committee

Coordinator: Dennis Goreham (Utah AGRC)

- will design and maintain a Southwest regional information database (GIS-based)
- database will be used for analysis and to support a proposed integrated assessment model
- data will be accessible / downloadable through a public website
- core-data attributes that maximize portability and applicability will be established
- western states' database and/or national database is ultimate goal

CO_2 Sinks & Distributed Sources Committee

Coordinators: Richard Hughes (University of Oklahoma)
with George Guthrie (LANL), Gill Bond (NMIMT), John Stringer (EPRI) - Mineralization
Rajesh Pawar (LANL), Bill Raatz (NMIMT), Rick Allis (UGS) – Geologic
Joel Brown (USDA), Jerry Stuth (Texas A&M) – Terrestrial

- will summarize distributed CO_2 sources in the region
- will evaluate terrestrial carbon capacity
- will describe geological and mineralization sink options
- will summarize sequestration technologies available in the region
- will provide data directly to database and integrated assessment teams
- will summarize risk-factor framework
- will summarize monitoring and verification protocols

Public Education and Involvement Committee

Coordinators: Dave Curtiss and Tarla Peterson (University of Utah)

- Responsible for communicating with stakeholders, i.e., project partners, industry, NGOs, federal, state, and local policy makers, as well as the general public
- will organize and facilitate focus groups to determine public perceptions of potential risks associated with CO_2 sequestration
- facilitate three (3) mediated-modeling workshops with stakeholders
- host town hall meetings
- will create information packets for the public (mail, etc.)
- develop a handbook for identifying / implementing specific strategies
- assist in website design and implementation

Infrastructure, Separation and Capture Committee

Coordinators: Dennis Leppin (GTI) and Mike Hirl (Kinder Morgan)

- responsible for identifying and cataloguing point sources of CO_2 (e.g., power plants, cement plants, etc.)
- will assess and summarize current separation and capture technologies employed in the region
- will summarize information about costs and methods currently employed for sequestration, separation, and capture technologies
- will summarize transportation infrastructure and possible future transportation needs

Regulatory Compliance Committee

Coordinator: Lori Wrotenbery (New Mexico Oil Conservation Division)

- will summarize current state and federal regulations associated with all possible CO_2 sequestration approaches
- leverage current knowledge associated with CO_2 – EOR regulatory framework
- will outline differences in regulations, identify gaps or uncertainties, and develop a database of regulatory information and issues for implementation in the integrated assessment model

Integrated Assessment Committee

Coordinator: Orman Paananen (Sandia National Laboratories)

- will develop a dynamic systems model using data gathered from other working groups
- model will quantitatively compare CO_2 sequestration technologies and qualitatively compare options for policy decision-makers
- committee will specifically create alternative “What if?” scenarios based on efficiencies, costs, etc., and rankings will be assessed
- model resolution will be tailored to reflect information available in database (optimization)
- model will be used to assess future transportation needs

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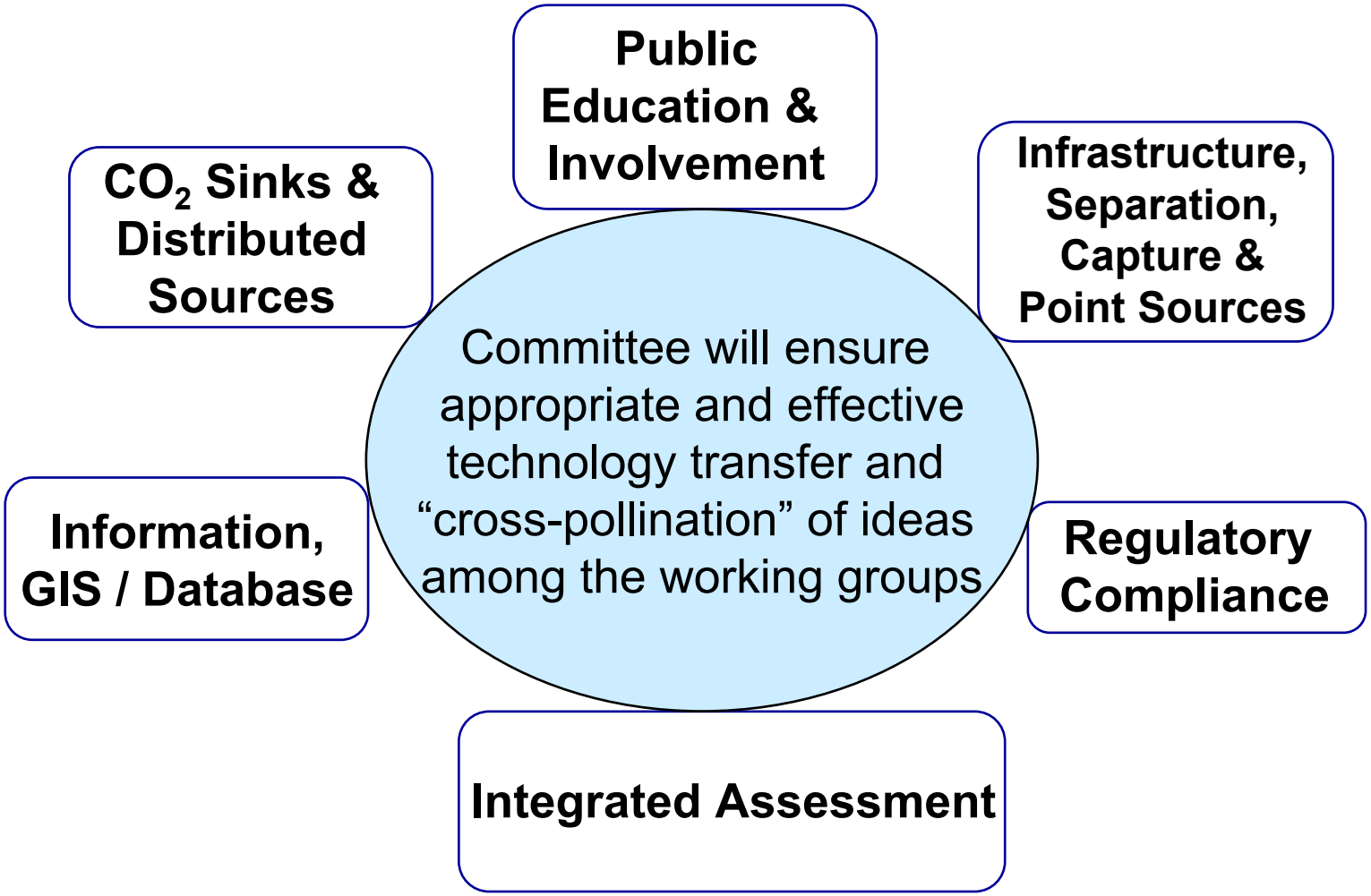
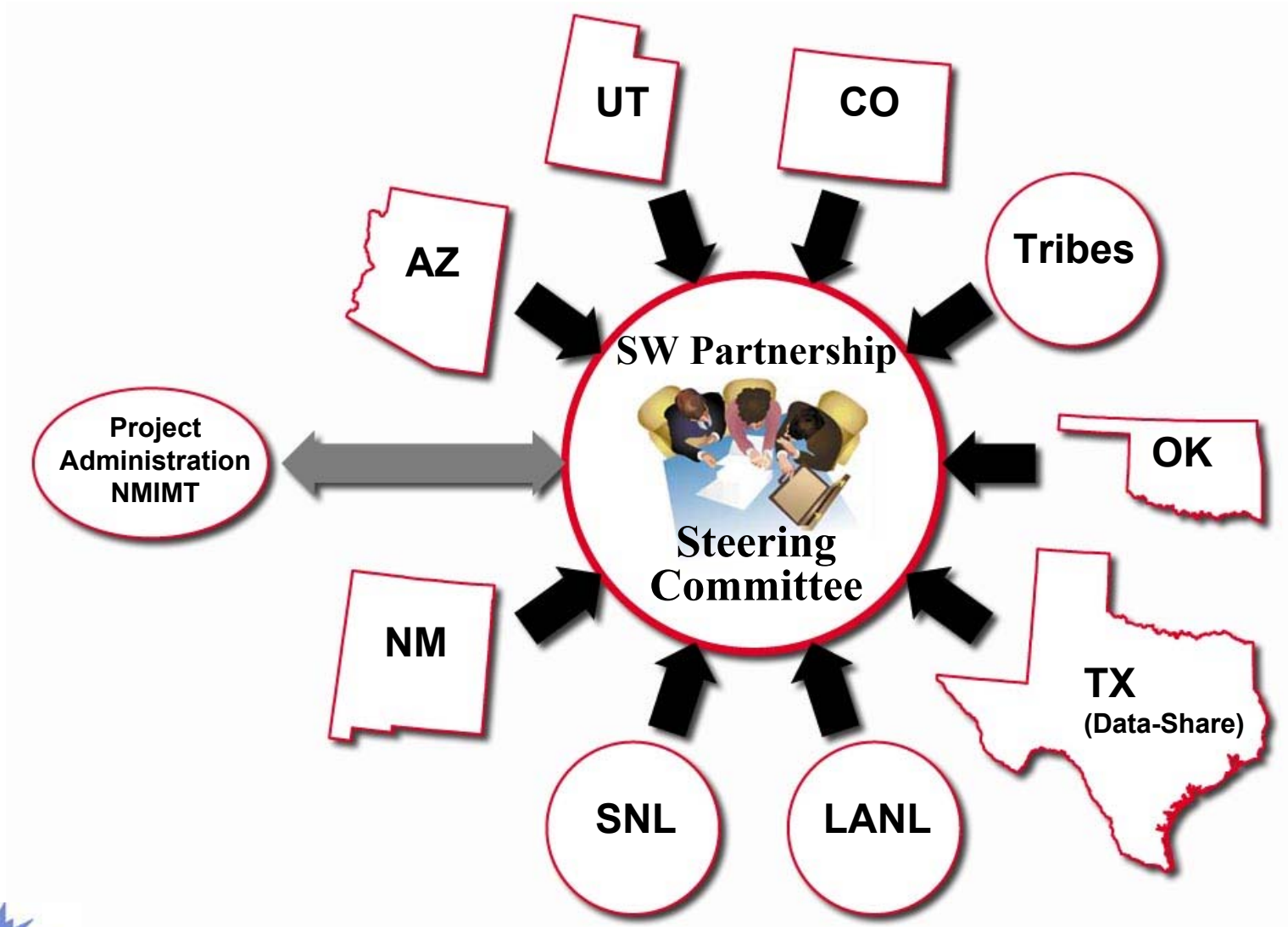
Committee of Working Group Coordinators



Executive Steering Committee



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Summary of Major Goals

Goal 1: Characterize the Southwest Region

Goal 2: Assess and Initiate Public Outreach and Acceptance

Goal 3: Identify and Address Implementation Issues for Phase II

Goal 4: Identify and Rank Sequestration Options for the Southwest Region

Draft Timeline Table for Deliverables

Working Group	1st Qtr Oct – Dec	2nd Qtr Jan – Mar	3rd Qtr Apr - Jun	4th Qtr Jul - Sep	5th Qtr Oct – Dec	6th Qtr Jan – Mar	7th Qtr Apr – Jun	8th Qtr Jul – Sep
Sinks and Distributed Sources	-Data scale, standards, type -Minimum data required for model		- CO_2 source data assembled	- CO_2 sink data assembled				Final Reporting
Infra/Sep/Cap/ Point Sources	-Data scale, standards, type -Minimum data required for model		- CO_2 source data assembled - Pipeline information assembled		- Separation and capture data assembled			Final Reporting
Regulatory Compliance	-Data scale, standards, type	-Baseline regulatory framework assembled	-Preliminary analysis of differences, gaps and uncertainties			Regulatory Analysis completed		Final Reporting
Public Involvement	- workshop content defined - workshop invitations sent - website content designed	-Workshop #1 (public view of end states) -Public Website implemented	-Workshop #2	-Townhall meetings scheduled and materials developed -1st draft of info packet circulated to all TCs	-Info packets revised -Final draft of info packet completed	-Workshop #3	- Mediated modeling completed	Final Reporting
Information, GIS / Database	-Data scale, standards, type -Minimum data required for model	-Team GIS database implemented	-Draft public GIS database implemented		-Public GIS database implemented		- Public GIS database completed	Final Reporting
Integrated Assessment	-Data scale, standards -Minimum data requirements reported	- Regionalize model	-Model implemented - CO_2 source data assembled		-All data and protocols implemented in model	- Model finalized	- Sequestration technologies evaluated and ranked	Final Reporting
All Working Groups	Team website implemented				-Risk factors assigned	-Gap analysis of monitoring and verification protocols completed		Final Reporting
All Working Groups					- Draft Phase II Action plan completed	- Phase II Action plan completed		Final Reporting




Some “take home” points:

- The Southwest Partnership sequestration strategy is projected to meet desirable GHG-intensity reduction goals prior to 2012

- The Southwest Region has natural attributes that suggests an optimum sequestration strategy that accounts for
  - existing infrastructure
  - experience handling, emplacing, and living with underground CO_2 (esp. via EOR)
  - regional water limitations in the south

- The Partnership will use a comprehensive integrated assessment strategy as well as a novel outreach approach

Southwest Representatives in Attendance
(Breakout Session Participants)

- George Guthrie (LANL)
- Dennis Goreham (Utah AGRC)
- Dave Curtiss (University of Utah EGI)
- Howard Meyer (GTI)
- Susan Hovorka (Texas BEG)