Opportunities for US-China Cooperation
中美合作机遇

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Topics 主题

- The Status of Intellectual Property
  知识产权状况
- Efficiency Increases on New Coal-fired Power Plants
  新建燃煤电厂的效率提高
- Formation Pressure Management (https://www.netl.doe.gov/research/coal/carbon-storage/natcarb-atlas)
  地层压力管理 (https://www.netl.doe.gov/research/coal/carbon-storage/natcarb-atlas)
- Q&A
  答疑

Intellectual Property 知识产权保护

TMP was originally produced by ACTC. The final TMP document of ACTC was taken as the common file for the five consortia in CERC.

双方技术管理协议最初由清洁煤联盟制定。这份文本被作为中美清洁能源研究合作五大联盟的共同指导性文件。

IP 知识产权

1. TMP provides for protection of background IP, agreement on rights, and provides means for resolution of disputes; [1]

   技术管理计划规定保护北京知识产权，就权利达成协议，并提供解决纠纷的办法;

2. The “Technology Management Plans”, with government endorsements, are “groundbreaking”; [2]

   政府支持的“技术管理计划”是“开创性的”;

3. It provides a channel of interest sharing and disputes solution for IP management in Sino-US collaborative research. [3]

   为中美合作研究提供了知识产权管理利益共享与纠纷解决渠道.

1,2 Quoted from CERC Co-chair Dr. Robert C. Marlay‘s Address at the Opening of 2nd CERC Workshop on Intellectual Property, February 26, 2013. 1,2引用CERC联盟主任Robert C. Marlay博士在第二届CERC知识产权研讨会开幕式上的讲话，2013年2月26日。

3 CERC Mid-term Evaluation Report. CERC中期评估报告

Rankine Cycle Efficiency 朗肯循环效率

- U.S. Coal-fired Fleet ~33% thermal efficiency HHV
  美国燃煤机组大约33％的热效率HHV
- Longview Power ~40% thermal efficiency HHV (fuel quality dependent) and high availability
  朗维电厂功率大约40％热效率HHV（取决于燃料质量）和高可用性
- The 7% improvement in thermal efficiency over average U.S. coal fleet decreases all emissions/kWh, including CO_2, by 7%
- 与美国平均水平相比，热效率提高了7％，包括二氧化碳在内的所有排 放量/千瓦时降低了7％
- VEPCO's Greenville Station received approval from VA DEQ with an initial HHV heat rate of 6457 BTU/kWh or 53%, and no less than 52% in year 6
- VEPCO的格林维尔电站获得VA DEQ的批准，最初的HHV热耗率为6457BTU / kWh或53％，第6年不低于52％

2007-2015 US Generation and Emissions Data
2007 - 2015年美国发电和排放数据

原动机平均测试热量
2017-2015 Btu每千瓦

常规发电厂排放量（十亿公吨）

						Average Tested Heat Rates By Prime Mover 2007-2015 Btu per Kilowatthour HHV								Emmissions From Conventional Power Plants (Billion Metric Tons)							
			Renew																		
		MWhrs		Coal	η	Coal		NatGas	η	NatGas				CO_2		SOx		NOx			
		x 10^9		Steam	%	Tons x10^9		CC	%	cuft x 10^9											
2007		2.504	0.009	10375	33	0.765		8403	42	2.736				2.547		0.904		0.36			
2008		2.475	0.113	10378	33	0.76		8305	41	2.73				2.484		0.783		0.33			
2009		2.373	0.147	10414	33	0.721		8160	42	2.911				2.269		0.597		0.24			
2010		2.472	0.179	10415	33	0.689		8185	42	3.29				2.389		0.541		0.249			
2011		2.461	0.219	10444	33	0.615		8152	42	3.446				2.287		0.485		0.241			
2012		2.339	0.28	10498	33	0.638		8039	42	4.102				2.157		0.371		0.215			
2013		2.388	0.324	10459	33	0.624		7948	43	3.97				2.174		0.361		0.216			
2014		2.382	0.344	10428	33	0.54		7907	43	3.895				2.168		0.345		0.21			
2015				10495	33	0.498		7878	43	4.745				2.031		0.255		0.182			
		-5%	382%				-35%				173%				-20%		-28%		-51%		

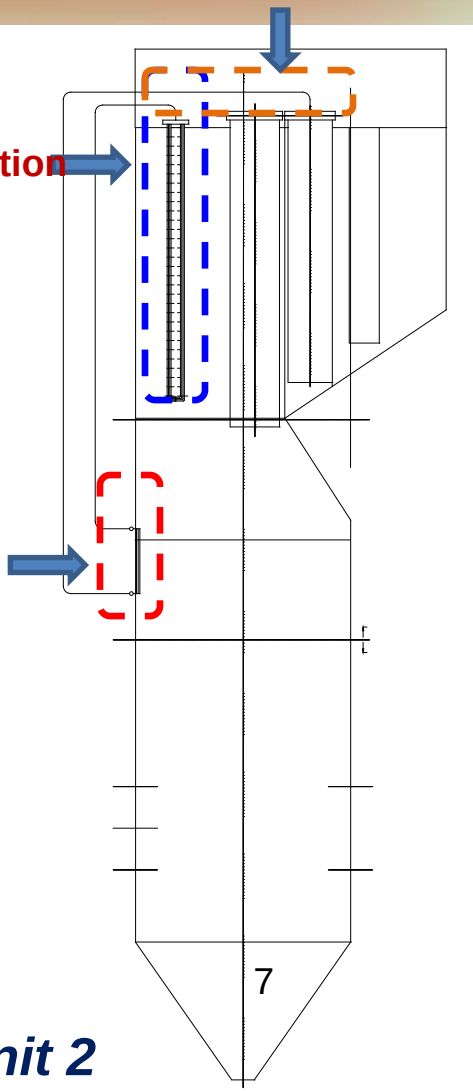
U.S.EIA 2017 Annual report

美国能源信息署 2017年度报告

U.S.–China Clean Energy Research Center
中美清洁能源联合研究中心

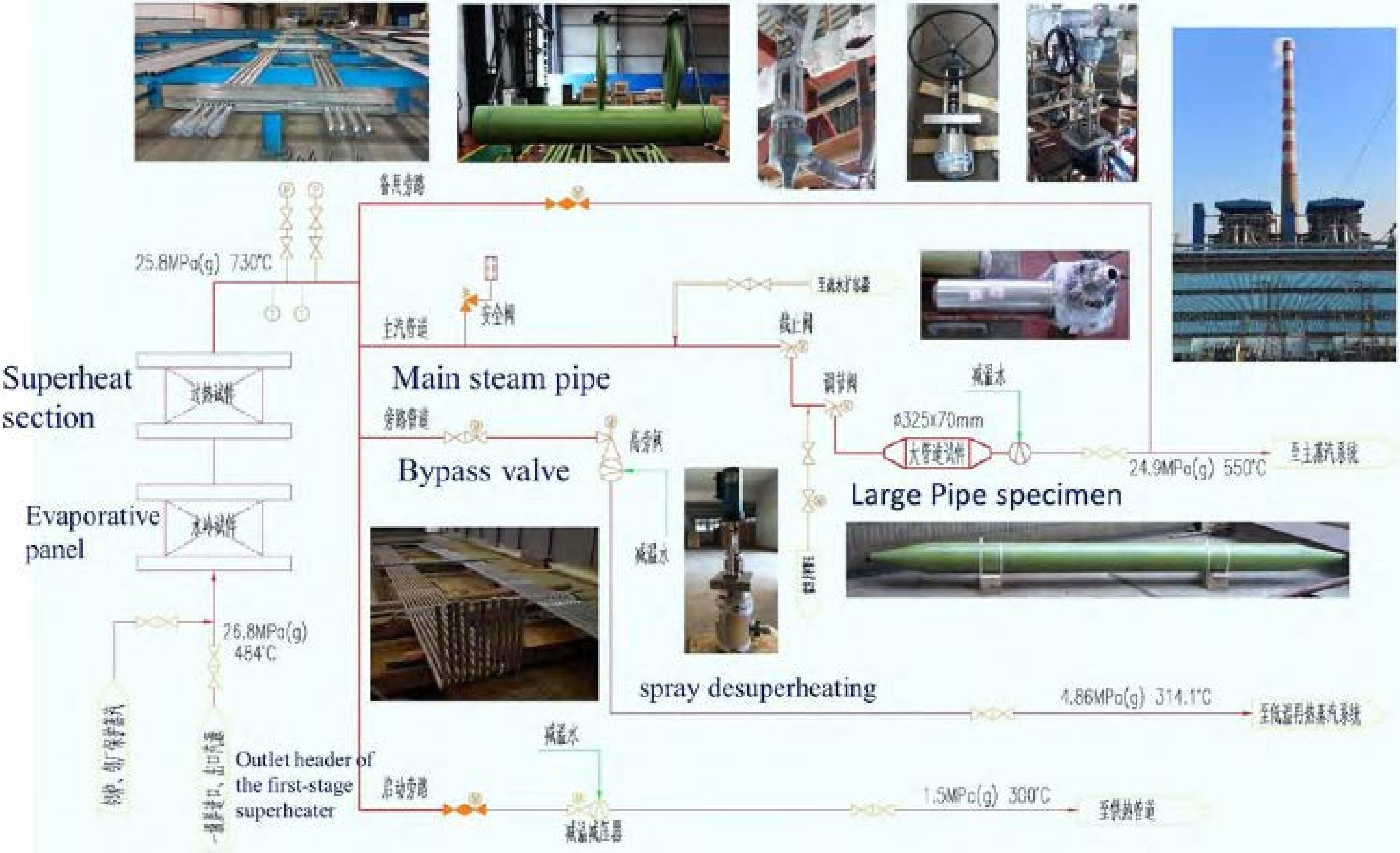
USC MATERIAL TESTING

- **Boiler type 锅炉类型:** *two pass boiler*
- **Steam capacity蒸汽容量:** *10.8 t/h*
- **Production capacity生产能力:** *320 MWe*
- **Burner type 锅炉类型:** *wall fired system*
- **Fuel 燃料:** *bituminous coal*
- **SH steam temperature 蒸汽温度:(540 C)** *725° C*
- **SH steam pressure蒸汽压力:** *26.8 MPa*



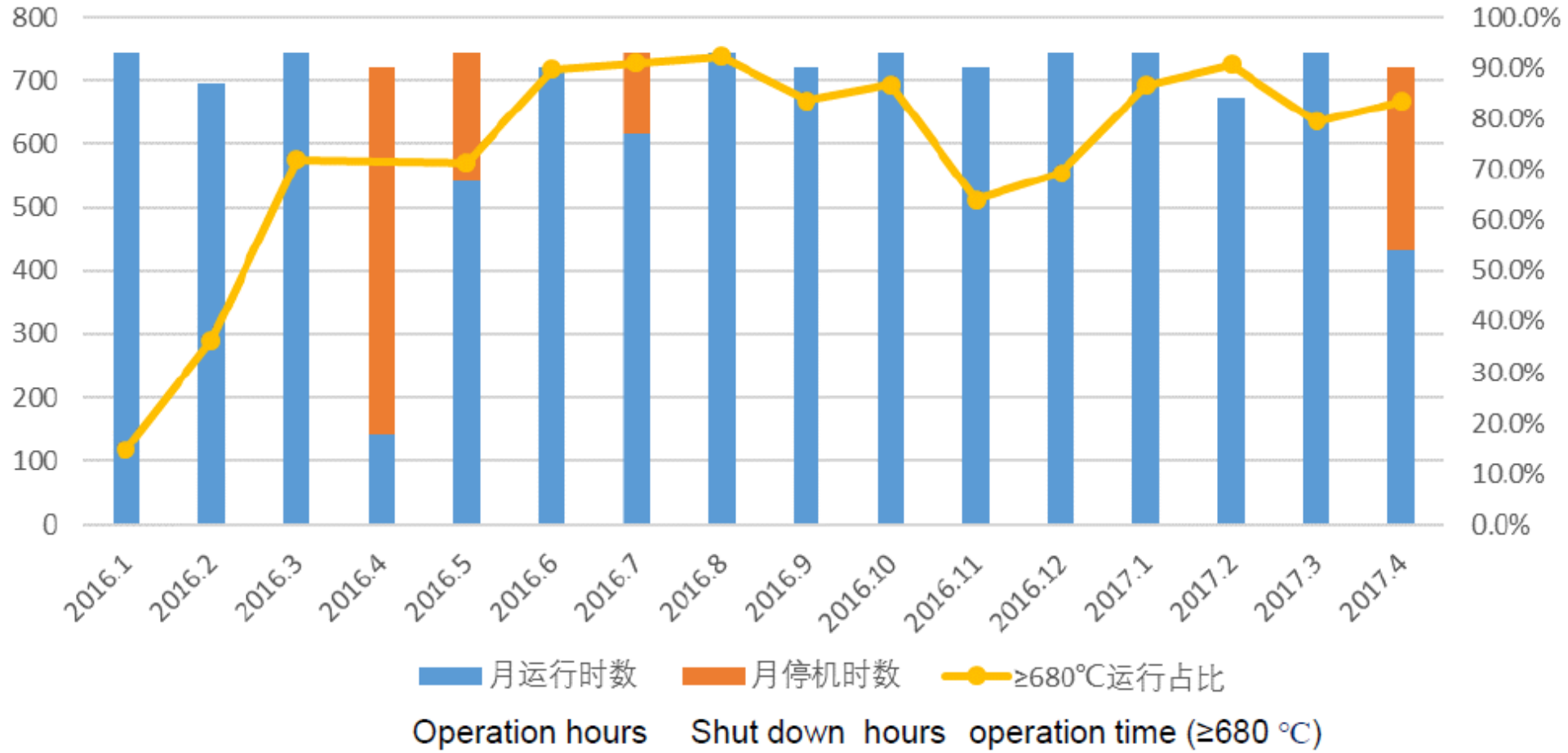
Host site : ***Huaneng Nanjing thermal power plant, unit 2***

华能集团南京热电厂，2号机组



25.8MPa(g) 730°C
Superheat section
Evaporative panel
Main steam pipe
Bypass valve
ϕ325x70mm
24.9MPa(g) 550°C
Large Pipe specimen
26.8MPa(g)
454°C
spray desuperheating
4.86MPa(g) 314.1°C
Outlet header of the first-stage superheater
1.5MPa(g) 300°C

运行情况The operation time of different temperatures



- From Jan. 17 2016 to April 18 2017, the total operation time is 10523 hours, and operation time of main steam temperature larger than 680 occupied 72.2%;
- The continuous operation time was 267 days from July 25 2016 to April 18 2017;

EOR & Storage 采油与埋存

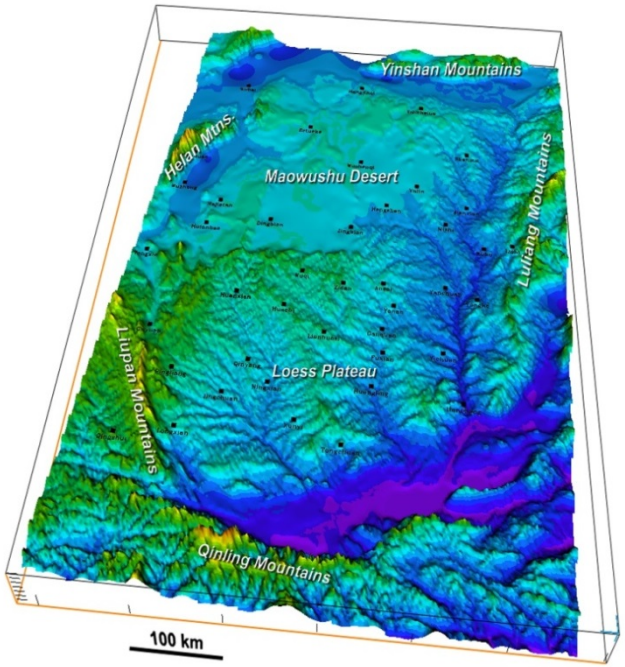
场地适宜性评价和优先级确定

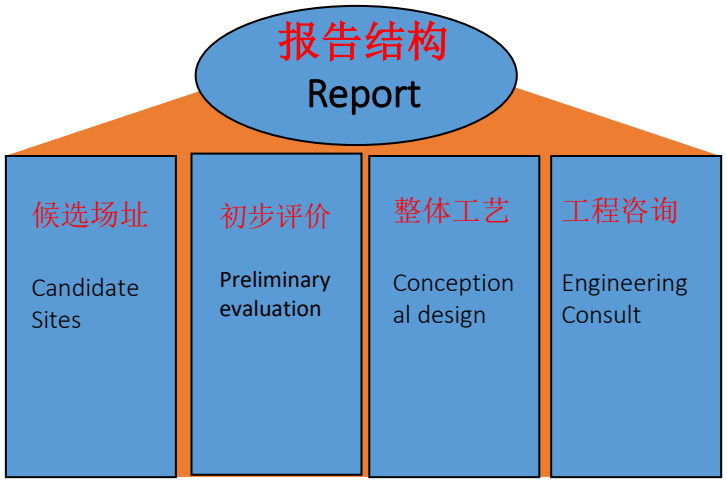
Site suitability and priority evaluations by the site screening methodology.

神华与LLNL、WVU的CO_2封存合作

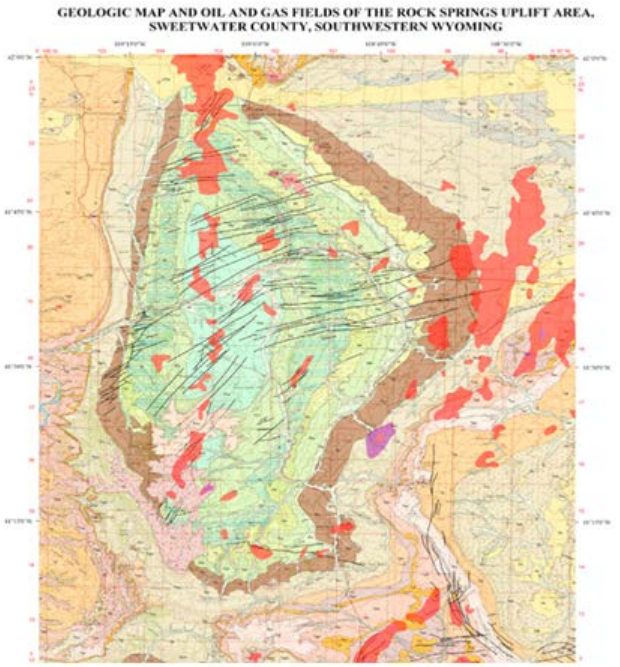
Collaboration Between Shenhua, WVU, LLNL on CO_2 storage

Ordos Basin, China
鄂尔多斯





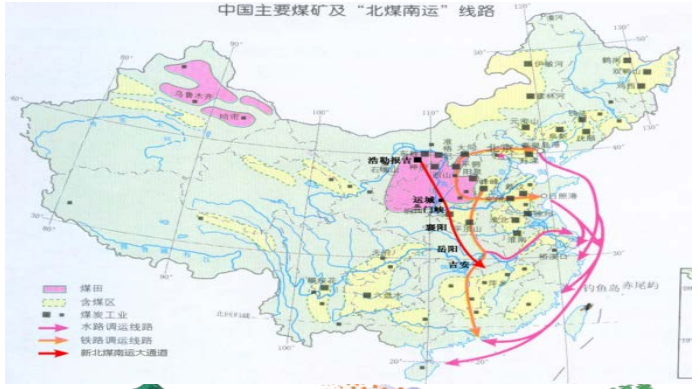
Rock Springs Uplift, USA

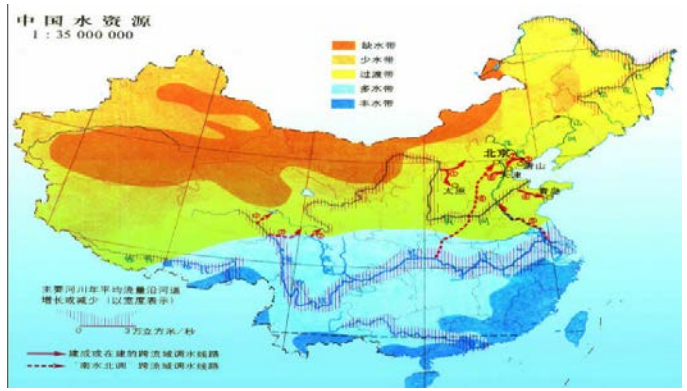


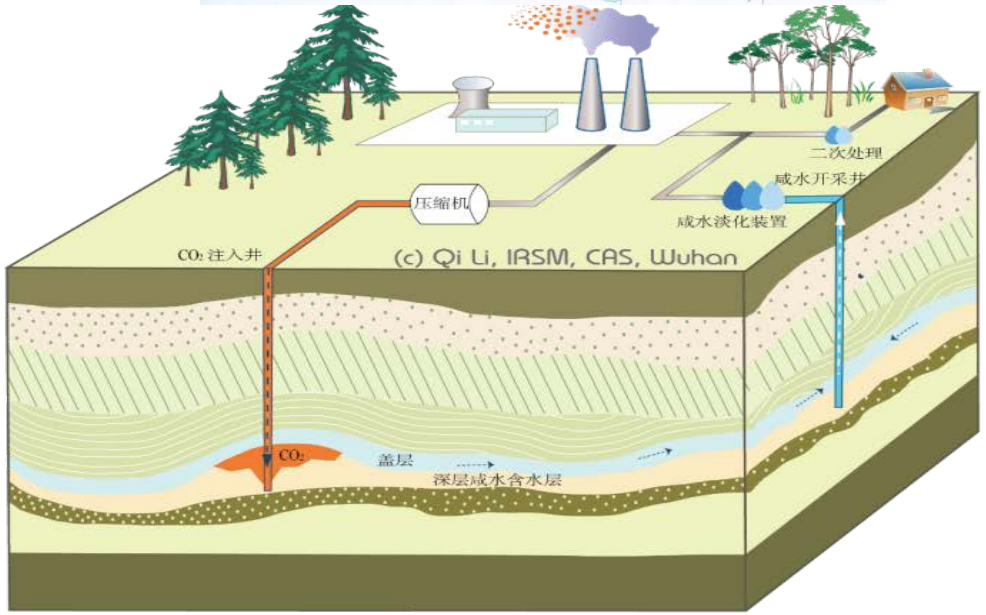
Archer Daniels Midland
Decatur, IL

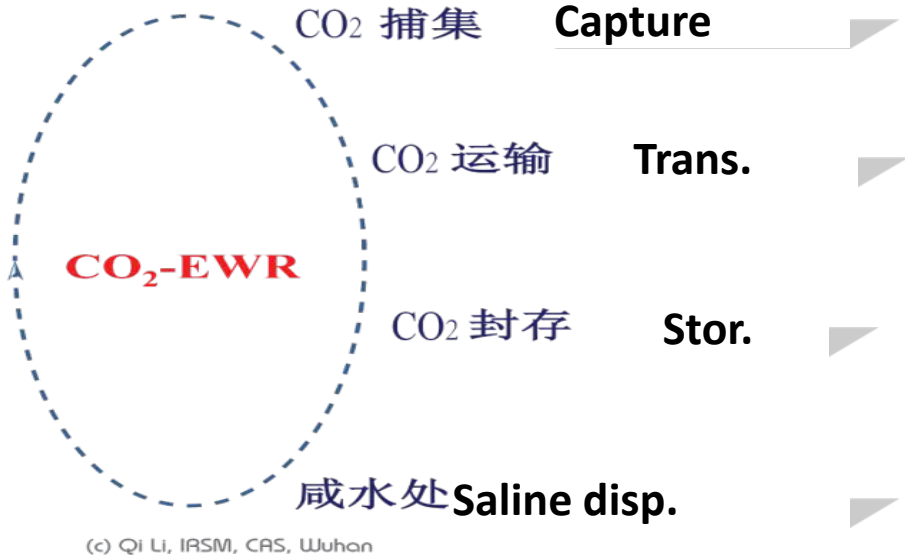
Water source utilization in west China

中国西部地区水资源利用状况









The novel CO_2-EWR CCUS technology takes the advantage of the rich deep saline aquifer resource to mitigate the pressure of water source shortage and high CO_2 emission, which has large potential of utilization.

新的CO2-EWR CCUS技术利用丰富的深部含水层资源，缓解了水源不足和高CO2排放的压力，具有很大的利用潜力。

合作示范 Example Collaboration on EWR

- Huaneng (on behalf of China ACTC) and WVU (on behalf of U.S. ACTC) sign an MOU to collaborate on a EWR project.
- 华能（代表中方洁净煤联盟）和WVU（代表美方洁净煤联盟）签署谅解备忘录，合作开展EWR项目。