One of the world's leading engineering and professional services firms

Active in every major infrastructure market

Creative, comprehensive, and sustainable engineering solutions

48,000 Employees

550 Offices

40 Countries
WSP’s main contribution to a sustainable economy is through the services we offer and the projects we deliver.

We know from our experience throughout the world that current codes and standards don’t necessarily account for the future we are anticipating.

That is why we believe so much in Future Ready, our global program designed to bring clarity and vision to complex challenges.
Core Business Lines

- Energy
- Transportation and Infrastructure
- Property and Buildings
- Water and Environment

**Advisory Services:** strategic, planning, and environmental planning solutions across sectors at the enterprise & program levels

**Program & Construction Management:** cross-sector range of delivery services across all project lifecycle phases

**Federal Programs & Logistics:** bringing all of WSP to the Federal market
Broad Client Base

- Enterprise Products Partners L.P.
- OXY
- Plains All American Pipeline L.P.
- Williams
- ONEOK
- Sunoco
- Energy Transfer
- Atmos Energy
- Midstream

Broad Vendor Base

- Schlumberger
- Halliburton
- Solids Control Systems
- Baker Hughes
- Nine
- Precision Drilling
- NOV
- B&B Oilfield Equip. Corp.
- Weatherford
Technical Capabilities

WSP USA Inc.

— Subsurface
  - EPA permitting and regulatory consulting
  - Well design, drilling, and completion (including procurement)
  - Well testing and maintenance
  - Plume dispersion (reservoir) simulations

— Surface
  - Groundwater modeling (LBG, Louis Berger)
  - Environmental investigation and remediation, compliance, and due diligence services
  - PM/CM services for large projects
  - Ensure compliance with RCRA administrative orders in EPA Region 7

— Power
  - Facility Energy Audits and Condition Assessments
  - Distributed Generation/Cogeneration/Combined Heat & Power
  - Energy Storage System Design and Optimization
  - Owner’s Engineer including Specification Development, RFP Process Management and Contracting Support
Technical Capabilities

WSP Global (UK)

- Full scale, full chain program management from initial development through operations
- Advisory support to investment groups and/or governmental agencies across the CCUS chain
- Engineering design of CO2 drying, compression and liquefaction plants in preparation for transportation
- Engineering design of above-ground infrastructure for CO2 sequestration sites
- Greenhouse gas emissions accounting including climate change adaptation strategies and forecasting
- Industry benchmarked project cost estimations
Previous Projects and Clients (U.S. based)

Industrial Hazardous Wastewater Disposal Wells and Related Regulatory Support
AK Steel  Air Products & Chemicals  BASF  BP  Chevron  Conoco Phillips  DOW  Du Pont  Parke-Davis  Monsanto  Lyondell/Equistar  Holly Refining  Shell Chemical Company  Solutia  Total  UOP  ISP  UEC  Ineos

CO2 Sequestration Evaluation and Related Well Applications
Duke Energy (Gibson, IN)  Duke Energy (Edwardsport, IN)  CarbonNet Foundation (Australia)  Tenaska (Sweetwater, TX)  American Electric Power (Columbus OH)  Reliant (PA)  Blue Source  Duke Energy (Moscow, OH)

Acid Gas Injection
DCP Midstream (New Mexico)  Regency Gas Partners (Texas)  Targa (New Mexico)  Enterprise Products (Texas)  AKA Energy (New Mexico)  Atlas Pipeline (Texas)  Canyon Midstream (Texas)  Halcon Resources (Texas)

Underground Gas Storage Wells and Related Operations
Sempra  ATMOS Energy  Energy South Midstream  Freeport LNG  Enbridge Bobcat Storage  Reliant Energy  Center Point Energy  Williams  Crosstex  Cardinal Gas Storage  Kinder Morgan  Oneok
Previous Projects and Clients (International)

CarbonNet Project, Victoria Gov DSDBI
The Australian government engaged WSP to undertake a transport study for the CarbonNet project in Australia. WSP (UK) looked at onshore and offshore aspects of transporting CO2. WSP (USA) looked at wellbore dynamics of injecting up to 5 Mtpa (7.6MMm3/d).

CCS on gas fired power plants, IEAGHG
WSP (UK) supported the International Energy Agency (IEAGHG) in studying the impacts of CCS technologies on the performance of a range of different types of gas fired power plants.

Calix (Europe) Ltd, TSB
Calix (Europe) Ltd needed an independent review of its developing calcium looping carbon capture technology. WSP (UK) worked with Calix to develop a successful tender for grant support.

EU NER300, European Investment Bank
WSP (UK) supported the European Union and the European Investment Bank in implementing the New Entrant Reserve competition for new and innovative renewable and CCUS projects.
Well Design Fundamentals

Integrity Comes First!

- Subsurface Tubing Safety Valve
- Tubing designed for corrosive or non-corrosive conditions
- Corrosion Resistant Alloy (CRA) Joint Integral with the Injection Casing
- Permanent Packer with Atlas® acid resistant seals and Inconel® seal bore components
- Acid Resistant Cement
- \( \text{H}_2\text{Si/CO}_2 \) injected into perforations
General Integrity Issues

• Reservoir Integrity
  ➢ Will the reservoir store CO2 for “thousands of years”? 
  ➢ Are there any current penetrations? Future? 
  ➢ Are there concerns about storage geomechanics? 
  ➢ Seismicity issues?

• Borehole Integrity
  ➢ How is the well completed? 
  ➢ Redundant safety features? SSSV, Check valves, packer, etc. 
  ➢ Casing selection. Use of CRA material?

• Surface Integrity
  ➢ Properly designed wellhead. CRA components. 
  ➢ Located near any existing (or planned) infrastructure?