

## Bedded Salt Formation



### Tags

Geology, Bedded Salt, Formation, Compressed Air Energy Storage, CAES, Air, High Pressure, United States, North America

### Summary

Bedded salt formations can be used in Compressed Air Energy Storage (CAES) systems. Electricity is used to inject high pressure air into these underground bedded salt formations. CAES uses off- peak generation to compress air adiabatically — using coolers to remove the heat caused by compression — into a reservoir located either below-ground (focus of this effort) or aboveground. When the peak builds, the compressed air is released (much like the water in a pumped hydro system), heated (the exhaust from a standard combustion turbine) and passed through an expansion turbine to drive the generator. When demand for electricity is high, the high pressure air is released from the underground cavern and used to help power natural gas-fired turbines. When demand is low or the generation potential is high, utilities can run compressors and pump air into a cavern or vessel at 750 psi. When the price of electricity goes up - the compressed air is preheated (with a natural gas fired burner) and the air is then used. The pressurized air allows the turbines to generate electricity using significantly less natural gas, in most cases as little as 1/3 the natural gas that would otherwise be required. CAES is also appropriate for load-leveling because it can be constructed in capacities of a few hundred MW and can be discharged over long (4-24 hours) periods of time. The most typical plant size demonstrated to date is around 220 MW with multiple units constructed when greater generation is required.

### Description

The geographic location of possible bedded salt formations in the United States.

### Credits

Cavern Roof Stability for Natural Gas Storage in Bedded Salt: DeVries, K., Mellegard, K., Callahan, G., and Goodman, W. (2005) DE-FG26-02NT41651. Available at [http://204.154.137.14/technologies/oil-gas/publications/Storage/41651\\_FinalReport.pdf](http://204.154.137.14/technologies/oil-gas/publications/Storage/41651_FinalReport.pdf).

### Use limitations

Acknowledgment of the Cavern Roof Stability for Natural Gas Storage in Bedded Salt Report and Oak Ridge National Laboratory.

### Extent

West -114.120906      East    -73.705601  
North    50.470852      South    23.787366

### Scale Range

Maximum (zoomed in)    1:5,000  
Minimum (zoomed out)    1:50,000,000

## ArcGIS Metadata

### Topics and Keywords

THEMES OR CATEGORIES OF THE RESOURCE boundaries, location

\* CONTENT TYPE Downloadable Data  
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

PLACE KEYWORDS United States, North America

THEME KEYWORDS Geology, Bedded Salt, Formation, Compressed Air Energy Storage, CAES, Air, High Pressure

### Citation

\* TITLE bedded\_proj  
PUBLICATION DATE 2012-07-05 00:00:00

PRESENTATION FORMATS \* digital map

### Citation Contacts

RESPONSIBLE PARTY  
ORGANIZATION'S NAME Oak Ridge National Laboratory  
CONTACT'S ROLE originator

### Resource Details

DATASET LANGUAGES \* English (UNITED STATES)  
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

SPATIAL REPRESENTATION TYPE \* vector

\* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7600) ; ESRI ArcGIS 10.0.4.4000

### CREDITS

Cavern Roof Stability for Natural Gas Storage in Bedded Salt: DeVries, K., Mellegard, K., Callahan, G., and Goodman, W. (2005) DE-FG26-02NT41651. Available at [http://204.154.137.14/technologies/oil-gas/publications/Storage/41651\\_FinalReport.pdf](http://204.154.137.14/technologies/oil-gas/publications/Storage/41651_FinalReport.pdf).

### ARCGIS ITEM PROPERTIES

\* NAME bedded\_proj  
\* SIZE 0.005  
\* LOCATION  
\* ACCESS PROTOCOL Local Area Network

### Extents

#### EXTENT

##### GEOGRAPHIC EXTENT

##### BOUNDING RECTANGLE

EXTENT TYPE Extent used for searching  
\* WEST LONGITUDE -114.120906  
\* EAST LONGITUDE -73.705601  
\* NORTH LATITUDE 50.470852  
\* SOUTH LATITUDE 23.787366  
\* EXTENT CONTAINS THE RESOURCE Yes

#### EXTENT IN THE ITEM'S COORDINATE SYSTEM

\* WEST LONGITUDE -1243583.473524

\* EAST LONGITUDE 1541647.333706  
\* SOUTH LATITUDE -1577287.801979  
\* NORTH LATITUDE 1097639.409596  
\* EXTENT CONTAINS THE RESOURCE Yes

## Resource Points of Contact

### POINT OF CONTACT

INDIVIDUAL'S NAME Olufemi A. Omitaomu  
ORGANIZATION'S NAME Oak Ridge National Laboratory  
CONTACT'S POSITION Research Scientist, Critical Infrastructure and Climate Change Research  
CONTACT'S ROLE resource provider

### CONTACT INFORMATION

#### PHONE

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TYPE postal

DELIVERY POINT One Bethel Valley Road, P.O. Box 2008, MS-6165

CITY Oak Ridge

ADMINISTRATIVE AREA TN

POSTAL CODE 37831-6165

COUNTRY US

## Resource Maintenance

### RESOURCE MAINTENANCE

UPDATE FREQUENCY not planned

## Resource Constraints

### CONSTRAINTS

#### LIMITATIONS OF USE

Acknowledgment of the Cavern Roof Stability for Natural Gas Storage in Bedded Salt Report and Oak Ridge National Laboratory.

## Spatial Reference

### ARCGIS COORDINATE SYSTEM

\* TYPE Projected  
\* GEOGRAPHIC COORDINATE REFERENCE GCS\_North\_American\_1983  
\* PROJECTION NAD\_1983\_Lambert\_Conformal\_Conic

#### \* COORDINATE REFERENCE DETAILS

#### PROJECTED COORDINATE SYSTEM

X ORIGIN -35214300

Y ORIGIN -28218500

XY SCALE 127891215.42584959

Z ORIGIN -100000

Z SCALE 10000

M ORIGIN -100000

M SCALE 10000

XY TOLERANCE 0.001

Z TOLERANCE 0.001

M TOLERANCE 0.001

HIGH PRECISION true

WELL-KNOWN TEXT PROJCS["NAD\_1983\_Lambert\_Conformal\_Conic",GEOGCS

["GCS\_North\_American\_1983",DATUM["D\_North\_American\_1983",SPHEROID  
["GRS\_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT  
["Degree",0.0174532925199433]],PROJECTION["Lambert\_Conformal\_Conic"],PARAMETER  
["False\_Easting",0.0],PARAMETER["False\_Northing",0.0],PARAMETER["Central\_Meridian",-  
96.0],PARAMETER["Standard\_Parallel\_1",20.0],PARAMETER  
["Standard\_Parallel\_2",60.0],PARAMETER["Latitude\_Of\_Origin",40.0],UNIT["Meter",1.0]]

#### REFERENCE SYSTEM IDENTIFIER

\* VALUE 0

#### Spatial Data Properties

##### VECTOR

\* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only

##### GEOMETRIC OBJECTS

FEATURE CLASS NAME bedded\_proj

\* OBJECT TYPE composite

\* OBJECT COUNT 13

##### ARCGIS FEATURE CLASS PROPERTIES

\* FEATURE TYPE Simple

\* GEOMETRY TYPE Polygon

\* HAS TOPOLOGY FALSE

\* FEATURE COUNT 13

\* SPATIAL INDEX TRUE

\* LINEAR REFERENCING FALSE

#### Distribution

##### DISTRIBUTION FORMAT

\* NAME Shapefile

##### TRANSFER OPTIONS

\* TRANSFER SIZE 0.005

#### Fields

##### DETAILS FOR OBJECT bedded\_proj

\* TYPE Feature Class

\* ROW COUNT 13

##### FIELD FID

\* ALIAS FID

\* DATA TYPE OID

\* WIDTH 4

\* PRECISION 0

\* SCALE 0

\* FIELD DESCRIPTION

Internal feature number.

\* DESCRIPTION SOURCE

ESRI

\* DESCRIPTION OF VALUES Sequential unique whole numbers that are automatically generated.

##### FIELD Shape

\* ALIAS Shape

\* DATA TYPE Geometry

\* WIDTH 0

- \* PRECISION 0
- \* SCALE 0
- \* FIELD DESCRIPTION  
Feature geometry.
- \* DESCRIPTION SOURCE  
ESRI
- \* DESCRIPTION OF VALUES Coordinates defining the features.

#### FIELD Id

- \* ALIAS Id
- \* DATA TYPE Integer
- \* WIDTH 6
- \* PRECISION 6
- \* SCALE 0
- FIELD DESCRIPTION  
Attribute ID

#### FIELD Perimeter

- \* ALIAS Perimeter
- \* DATA TYPE Double
- \* WIDTH 19
- \* PRECISION 0
- \* SCALE 0
- FIELD DESCRIPTION  
Perimeter

#### FIELD Area

- \* ALIAS Area
- \* DATA TYPE Double
- \* WIDTH 19
- \* PRECISION 0
- \* SCALE 0
- FIELD DESCRIPTION  
Area

#### OVERVIEW DESCRIPTION

ENTITY AND ATTRIBUTE OVERVIEW The data was generated by georeferencing image (static) data areas from multiple sources.

#### Metadata Details

- \* METADATA LANGUAGE English (UNITED STATES)
- \* METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

SCOPE OF THE DATA DESCRIBED BY THE METADATA \* dataset

SCOPE NAME \* dataset

\* LAST UPDATE 2012-07-05

#### ARCGIS METADATA PROPERTIES

METADATA FORMAT ArcGIS 1.0

METADATA STYLE ISO 19139 Metadata Implementation Specification

STANDARD OR PROFILE USED TO EDIT METADATA FGDC

CREATED IN ARCGIS FOR THE ITEM 2012-04-23 14:13:06

LAST MODIFIED IN ARCGIS FOR THE ITEM 2012-07-05 90:11:70

AUTOMATIC UPDATES  
HAVE BEEN PERFORMED Yes  
LAST UPDATE 2012-04-26 11:20:21

#### Metadata Contacts

##### METADATA CONTACT

INDIVIDUAL'S NAME Kevin Hlava  
ORGANIZATION'S NAME Argonne National Laboratory  
CONTACT'S POSITION GIS Assistant/Specialist  
CONTACT'S ROLE point of contact

##### CONTACT INFORMATION

###### PHONE

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###### ADDRESS

TYPE both

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CITY Argonne

ADMINISTRATIVE AREA IL

POSTAL CODE 60439

COUNTRY US

E-MAIL ADDRESS khlava@anl.gov

#### Metadata Maintenance

##### MAINTENANCE

UPDATE FREQUENCY not planned

#### Thumbnail and Enclosures

##### THUMBNAIL

THUMBNAIL TYPE JPG

FGDC Metadata (read-only)