

Domal Salt Formation



Tags

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

Summary

Domal salt formations can be used in Compressed Air Energy Storage (CAES) systems. Electricity is used to inject high pressure air into these underground domal 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 domal salt formations in the United States.

Credits

CAES: The Underground Portion: Allen, Kermit. (1985). Available at <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4113158>.

Use limitations

Acknowledgment of the CAES: The Underground Portion Report and Oak Ridge National Laboratory.

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, Domal Salt, Formation, Compressed Air Energy Storage, CAES, Air, High Pressure

Citation

* TITLE domal_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 7601) Service Pack 1; ESRI ArcGIS 10.0.4.4000

CREDITS

CAES: The Underground Portion: Allen, Kermit. (1985). Available at <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4113158>.

ARCGIS ITEM PROPERTIES

* NAME domal_proj

* SIZE 0.001

* LOCATION

* ACCESS PROTOCOL Local Area Network

Extents

EXTENT

GEOGRAPHIC EXTENT

BOUNDING RECTANGLE

EXTENT TYPE Extent used for searching

* WEST LONGITUDE -99.293275

* EAST LONGITUDE -87.361816

* NORTH LATITUDE 33.053597

* SOUTH LATITUDE 26.114619

* EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM

* WEST LONGITUDE -291779.759991

* EAST LONGITUDE 767479.560164

* SOUTH LATITUDE -1428601.041854

* NORTH LATITUDE -726684.069501

* 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

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COUNTRY US

Resource Maintenance

RESOURCE MAINTENANCE

UPDATE FREQUENCY not planned

Resource Constraints

CONSTRAINTS

LIMITATIONS OF USE

Acknowledgment of the CAES: The Underground Portion 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 domal_proj

- * OBJECT TYPE composite
- * OBJECT COUNT 3

ARCGIS FEATURE CLASS PROPERTIES

- * FEATURE TYPE Simple
- * GEOMETRY TYPE Polygon
- * HAS TOPOLOGY FALSE
- * FEATURE COUNT 3
- * SPATIAL INDEX TRUE
- * LINEAR REFERENCING FALSE

Distribution

DISTRIBUTION FORMAT

- * NAME Shapefile

TRANSFER OPTIONS

- * TRANSFER SIZE 0.001

Fields

DETAILS FOR OBJECT domal_proj

- * TYPE Feature Class
- * ROW COUNT 3

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 Salt
* ALIAS Salt
* DATA TYPE SmallInteger
* WIDTH 4
* PRECISION 4
* SCALE 0

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 2013-02-01

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 2012-04-23 14:14:11
LAST MODIFIED IN ARCGIS 2013-02-01 11:32:39

AUTOMATIC UPDATES

HAVE BEEN PERFORMED Yes
LAST UPDATE 2013-02-01 11:32:39

Metadata Contacts

METADATA CONTACT

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

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TYPE both
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COUNTRY US
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Metadata Maintenance

MAINTENANCE

UPDATE FREQUENCY not planned

Thumbnail and Enclosures

THUMBNAIL

THUMBNAIL TYPE JPG

FGDC Metadata (read-only)