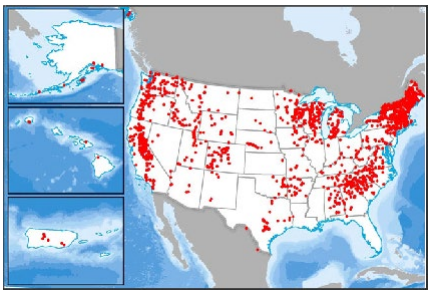
Hydropower Energy Storage Capacity



Summary

The Hydropower Energy Storage Capacity (HESC) Dataset catalogues estimates of nominal energy storage capacity based on varying levels of detail.
Dams and reservoirs were selected based on those reported in the National Inventory of Dams (NID 2019) and/or the Global Reservoir and Dam (GRanD v1.3) datasets.

Description

The Hydropower Energy Storage Capacity (HESC) Dataset catalogues estimates of nominal energy storage capacity based on varying levels of detail. Dams and reservoirs were selected based on those reported in the National Inventory of Dams (NID 2019) and/or the Global Reservoir and Dam (GRanD v1.3) datasets. These data provide a foundation for understanding available resources at existing hydropower facilities and their potential to provide storage of energy and more flexible generation. Current estimates include Level 1 (based on maximum storage capacities and hydraulic head) and Level 2 (based on historical models or observations of reservoir volume and hydraulic head). For facilities where installed capacity is known, there are also estimates for discharge duration or the length of time when a facility could provide generation at a given capacity. Essential information used to calculate the energy storage capacity and discharge duration (volume, hydraulic head, and details about the sources or records used to obtain those parameters) and summaries of historical generation (for context) are also included.

Data were acquired from the NID (2019), GRanD (v1.3), HydroLAKES (2016), Existing Hydropower Assets (2021), USACE via the Duke Nicholas Institue Reservoir Data efforts (Patterson and Doyle, 2018), USBR RISE, and the Hydropower reservoir data in the CONUS data set (Gao and Huilin, 2020). The HILARRIdatabase of links was used to cross-walk between NID, GRanD, and HydroLAKES (obtaining inventoried volumes and height characteristics). Statistics were derived for historical observed and modeled volumes/head data based on the USACE, USBR, and Gao data sets. The EHAplant data were used to obtain installed capacity and operational mode information.

Temporal Coverage: up to May 2021 (last published Existing Hydropower Assets operational plants dataset)

Credits

Hansen, C.H., G. Ghimire, and S. Gangrade. 2021. Hydropower Energy Storage Capacity Dataset. DOI:10.21951/HESC/1822833. https://hydrosource.ornl.gov/dataset/hydropower-energy-storage-capacity-dataset

Use limitations

There are no access and use limitations for this item.

Extent

West	-165.772000	**East**	-66.021670
North	61.450000	**South**	18.020830

Scale Range

Maximum (zoomed in) 1:5,000
Minimum (zoomed out) 1:150,000,000

ArcGIS Metadata

Topics and Keywords

* CONTENT TYPE Downloadable Data

Citation

TITLE Hydropower Energy Storage Capacity

PRESENTATION FORMATS * digital map

Resource Details

DATASET LANGUAGES * English (UNITED STATES)

SPATIAL REPRESENTATION TYPE * vector

* PROCESSING ENVIRONMENT Version 6.2 (Build 9200) ; Esri ArcGIS 10.8.1.14362

CREDITS
Hansen, C.H., G. Ghimire, and S. Gangrade. 2021. Hydropower Energy Storage Capacity Dataset. DOI:10.21951/HESC/1822833. https://hydrosource.ornl.gov/dataset/hydropower-energy-storage-capacity-dataset

ARCGIS ITEM PROPERTIES
* NAME hydropower_energy_storage_capacity
* LOCATION ACCESS PROTOCOL Local Area Network

Extents

EXTENT
GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -165.772000
* EAST LONGITUDE -66.021670
* NORTH LATITUDE 61.450000
* SOUTH LATITUDE 18.020830
* EXTENT CONTAINS THE RESOURCE Yes

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE -18453654.627783
* EAST LONGITUDE -7349498.685722
* SOUTH LATITUDE 2039986.803644
* NORTH LATITUDE 8729889.971149
* EXTENT CONTAINS THE RESOURCE Yes

Spatial Reference

ARCGIS COORDINATE SYSTEM
* TYPE Projected
* GEOGRAPHIC COORDINATE REFERENCE GCS_WGS_1984
* PROJECTION WGS_1984_Web_Mercator_Auxiliary_Sphere

* Coordinate reference details
  Projected coordinate system
    Well-known identifier 102100
    X origin -22041257.77387803
    Y origin -30241100
    XY scale 144148035.89861274
    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
    Latest well-known identifier 3857
    Well-known text PROJCS["WGS_1984_Web_Mercator_Auxiliary_Sphere",GEOGCS["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID["WGS_1984",6378137.0,298.257223563]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Mercator_Auxiliary_Sphere"],PARAMETER["False_Easting",0.0],PARAMETER["False_Northing",0.0],PARAMETER["Central_Meridian",0.0],PARAMETER["Standard_Parallel_1",0.0],PARAMETER["Auxiliary_Sphere_Type",0.0],UNIT["Meter",1.0],AUTHORITY["EPSG",3857]]

Reference system identifier
* Value 3857
* Codespace EPSG
* Version 8.8(9.3.1.2)

Spatial Data Properties

Vector
* Level of topology for this dataset geometry only

Geometric objects
Feature class name hydropower_energy_storage_capacity
* Object type point
* Object count 2075

ArcGIS Feature Class Properties
Feature class name hydropower_energy_storage_capacity
* Feature type Simple
* Geometry type Point
* Has topology FALSE
* Feature count 2075
* Spatial index TRUE
* Linear referencing FALSE

Distribution

Distribution format
* Name File Geodatabase Feature Class

Fields

Details for object hydropower_energy_storage_capacity
* Type Feature Class
* Row count 2075

Field OBJECTID

* ALIAS OBJECTID
* 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 fid_1
* ALIAS fid_1
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DamID
* ALIAS Dam ID
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD DamName
* ALIAS Dam Name
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD Lat
* ALIAS Lat
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD Lon
* ALIAS Lon
* DATA TYPE Double

* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD FlagType
* ALIAS Flag Type
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD InstllCap
* ALIAS Installed Capacity
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD MaxVol
* ALIAS Max Volume
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD MaxVolSrc
* ALIAS Max Volume Source
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD MinVol
* ALIAS Min Volume
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD MinVolSrc
* ALIAS Min Volume Source
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD MaxH
* ALIAS Max Hydraulic Head
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD MinH
* ALIAS Min Hydraulic Head
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD MaxHSrc
* ALIAS Max Hydraulic Head Source
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD MinHSrc
* ALIAS Min Hydraulic Head Source
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD NmEnrgy01a
* ALIAS Nominal Energy Calculated Using Max Reported Storage Capacity
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD NmEnrgy01b
* ALIAS Nominal Energy Calculated Using Minimum Reported Storage apacity
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD NmEnrgy01c
* ALIAS Nominal Energy Calculated Using Half of Max Reported Storage Capacity
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE

FIELD NmEnrgy01d
* ALIAS Nominal Energy Calculated Using Half of Min Reported Storage Capacity
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur01a
* ALIAS Discharge Duration Using NmEnrgy01a
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur01b
* ALIAS Discharge Duration Using NmEnrgy01b
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur01c
* ALIAS Discharge Duration Using NmEnrgy01c
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur01d
* ALIAS Discharge Duration Using NmEnrgy01d
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisMaxVol
* ALIAS Historical Max Volume Stored in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisMinVol
* ALIAS Historical Min Volume Stored in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisMeanVol
* ALIAS Historical Average Volume Stored in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisMedVol
* ALIAS Historical Median Volume Stored in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisVol_25
* ALIAS Historical 25th Percentile Volume
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisVol_75
* ALIAS Historical 75th Percentile Volume
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisMaxH
* ALIAS Historical Max Hydraulic Head in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisMinH
* ALIAS Historical Min Hydraulic Head in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0

* SCALE 0

FIELD HisMeanH
* ALIAS Historical Average Hydraulic Head in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisMedH
* ALIAS Historical Median Hydraulic Head in Reservoir
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisH_25
* ALIAS 25th Percentile Head
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisH_75
* ALIAS 75th Percentile Head
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD HisSrc
* ALIAS Source of Historical Storage Volume and Hydraulic Head
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD HisPeriod
* ALIAS Time Period Used to Calculate Historical Statistics of Volume and Hydraulic Head
* DATA TYPE String
* WIDTH 254
* PRECISION 0
* SCALE 0

FIELD NmEnrgy02a
* ALIAS Nominal Energy Calculated Using Historical Max Reservoir Volume
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD NmEnrgy02b
* ALIAS Nominal Energy Calculated Using Historical Minimum Reservoir Volume
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD NmEnrgy02c
* ALIAS Nominal Energy Calculated Using Historical Mean Reservoir Volume
* DATA TYPE Double
* WIDTH 8

* PRECISION 0
* SCALE 0

FIELD NmEnrgy02d
* ALIAS Nominal Energy Calculated Using Historical Median Reservoir Volume
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD NmEnrgy02e
* ALIAS Nominal Energy Calculated Using 25th Percentile Volume/Head
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD NmEnrgy02f
* ALIAS Nominal Energy Calculated Using 75th Percentile Volume/Head
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur02a
* ALIAS Discharge Duration Using NmEnrgy02a
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur02b
* ALIAS Discharge Duration Using NmEnrgy02b
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur02c
* ALIAS Discharge Duration Using NmEnrgy02c
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur02d
* ALIAS Discharge Duration Using NmEnrgy02d
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur02e
* ALIAS Discharge Duration Using NmEnrgy02e
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DisDur02f
* ALIAS Discharge Duration Using NmEnrgy02f

* Data type Double
* Width 8
* Precision 0
* Scale 0

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 2022-02-22

ArcGIS metadata properties
Metadata format ArcGIS 1.0
Metadata style FGDC CSDGM Metadata
Standard or profile used to edit metadata FGDC

Created in ArcGIS for the item 2022-02-22 10:43:12
Last modified in ArcGIS for the item 2022-02-22 11:34:44

Automatic updates
Have been performed Yes
Last update 2022-02-22 10:43:12