

# RTS-GMLC

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NREL

# 1979 Reliability Test System

- ▶ RTS-79 "IEEE Reliability Test System", *IEEE PAS*, vol. 98, no. 6, pp. 2047-2054, Nov/Dec. 1979.
  - <http://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=4113721>

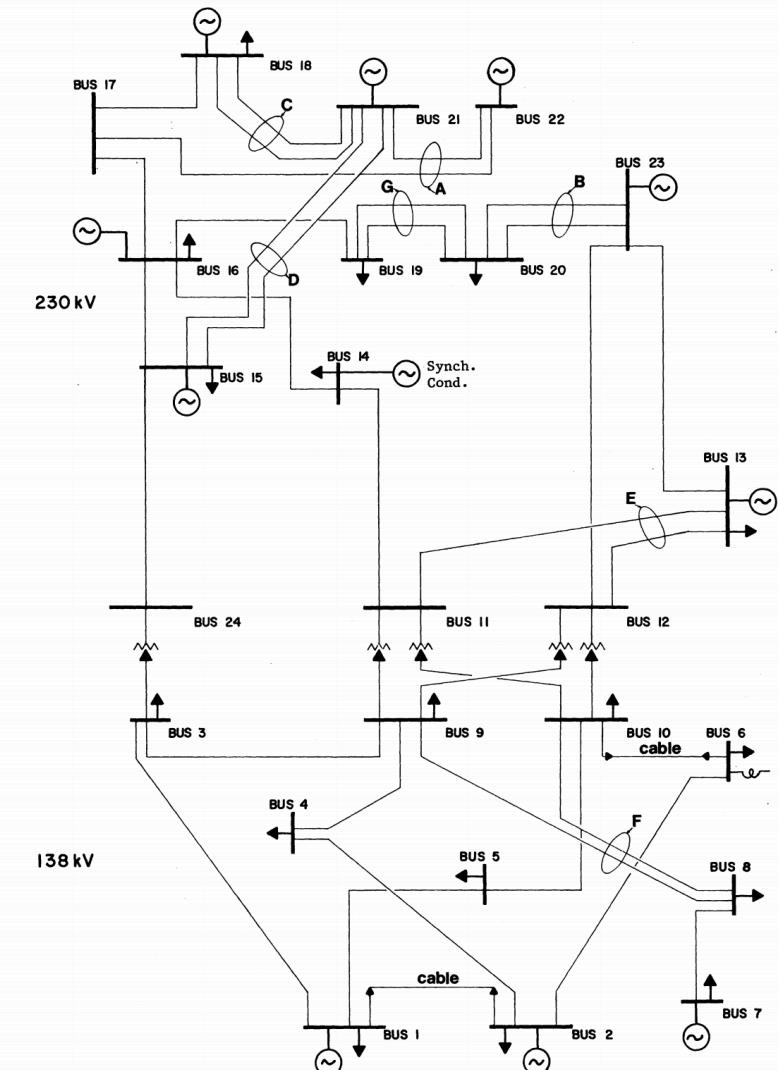


Figure 1 - IEEE Reliability Test System

# 1996 Reliability Test System

- ▶ RTS-96 "The IEEE Reliability Test System-1996. A report prepared by the Reliability Test System Task Force of the Application of Probability Methods Subcommittee", *IEEE Transactions on Power Systems*, vol. 14, no. 3, pp. 1010-1020, Aug. 2002.
  - [http://ieeexplore.ieee.org/document/780914/?  
reload=true&arnumber=780914&tag=1](http://ieeexplore.ieee.org/document/780914/?reload=true&arnumber=780914&tag=1)
  - Data available from UW Test Case Archive
    - [http://www2.ee.washington.edu/research/pstca/rts/  
pg\\_tcarts.htm](http://www2.ee.washington.edu/research/pstca/rts/pg_tcarts.htm)
  - Shortcomings:
    - Data errors
    - Intra-hourly information
    - Congestion
    - Outdated generation fleet (no Gas generation)

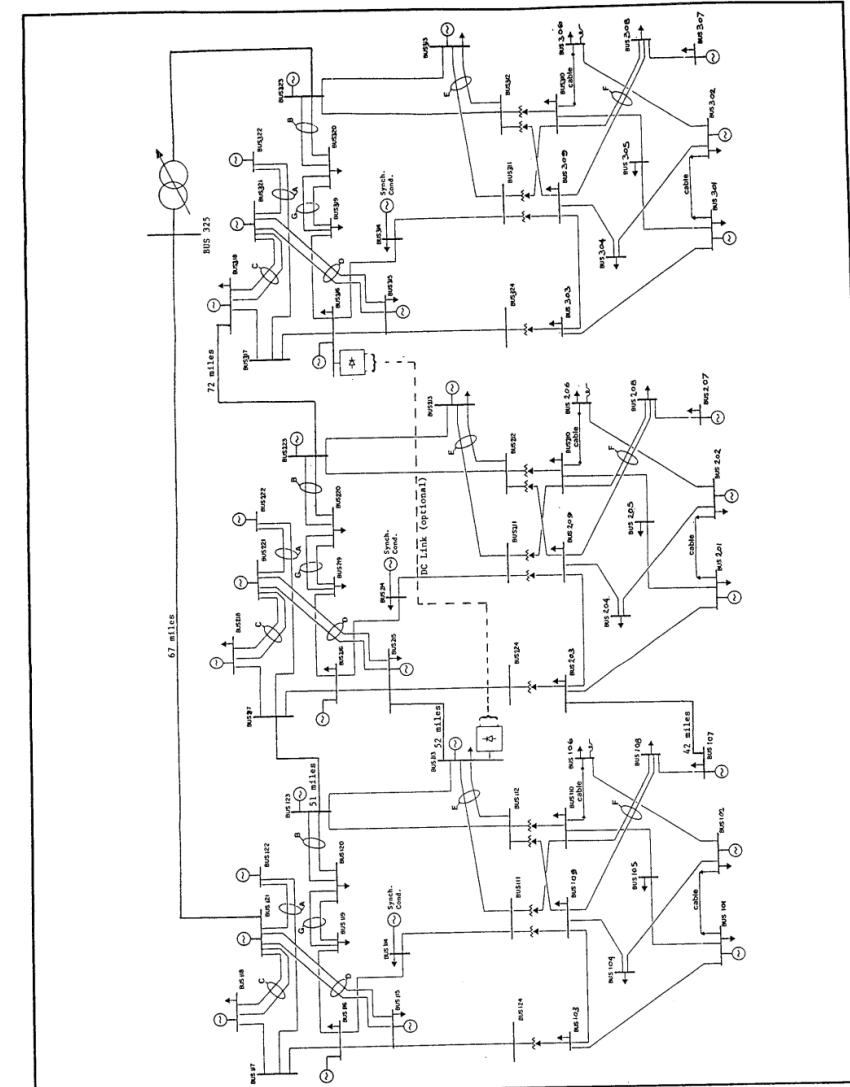


Figure 4 - IEEE Three Area RTS-96

# NESTA

► The NICTA Energy Systems Test Case Archive (NESTA)

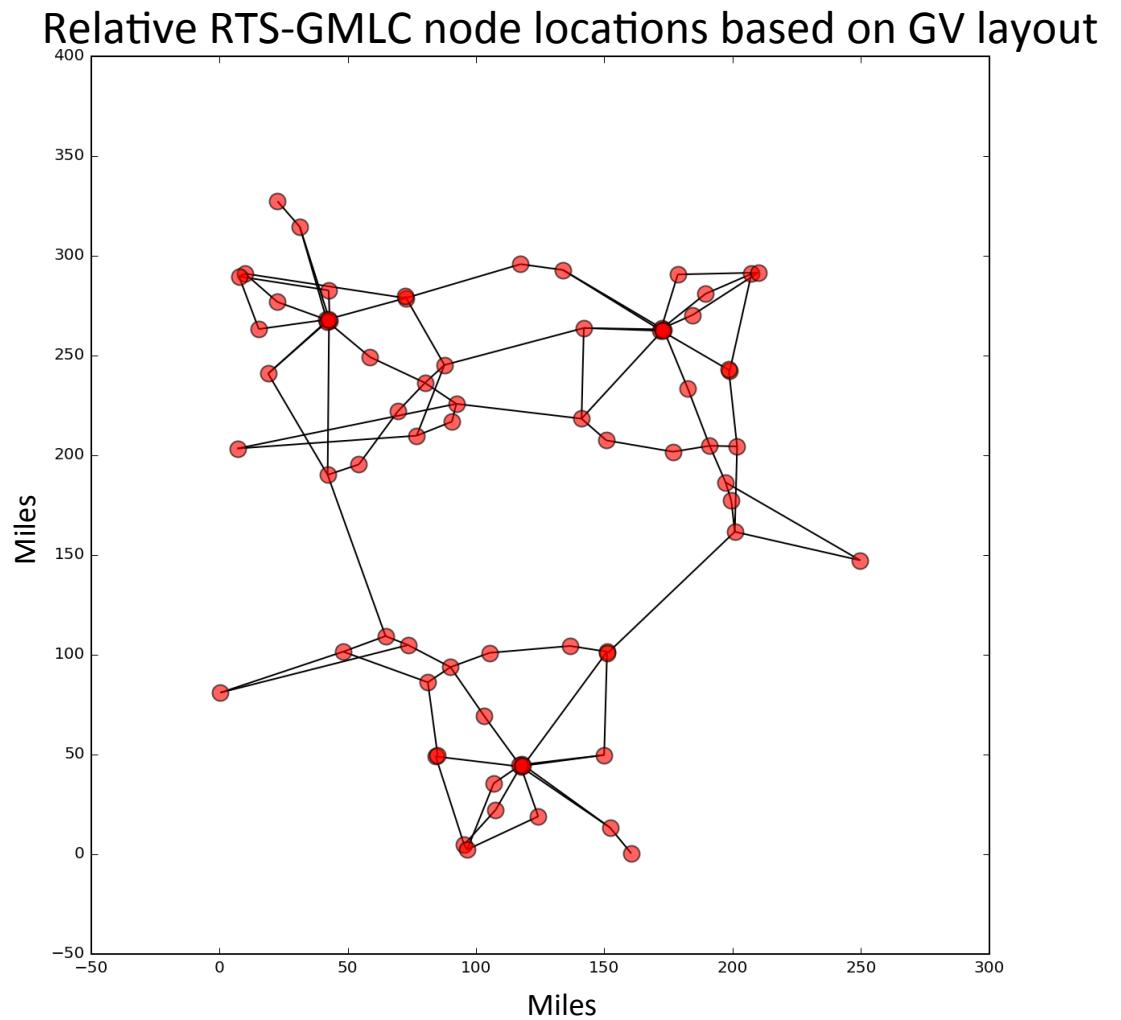
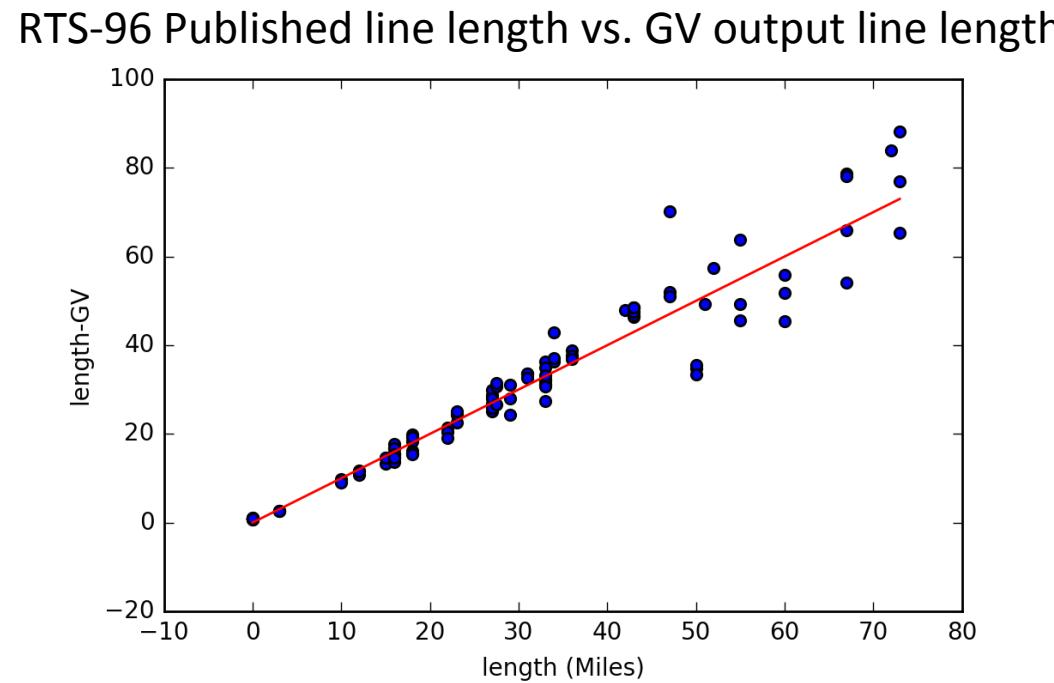
- <https://github.com/NICTA/nesta>
- Fixes some data errors
- Introduces some congestion via the changes documented in Hedman et.al (  
<http://smartgridcenter.tamu.edu/ratc/web/wp-content/uploads/2014/10/J7.pdf>)
  - Remove the following transmission lines: 111-113, 211-213, and 311-313
  - Reduce the capacity of lines 114-116, 214-216, and 314-316 to 350 MW, each
  - The bus load for nodes 13, 14, 15 ,19, and 20 should be changed to the following in each region:
- Add the following generating units in each region:

Bus	Demand
13	745 MW
14	80 MW
15	132 MW
19	75 MW
20	53 MW

Bus	Gen Capacity
1	100 MW
7	100 MW
15	100 MW
15	155 MW
23	155 MW

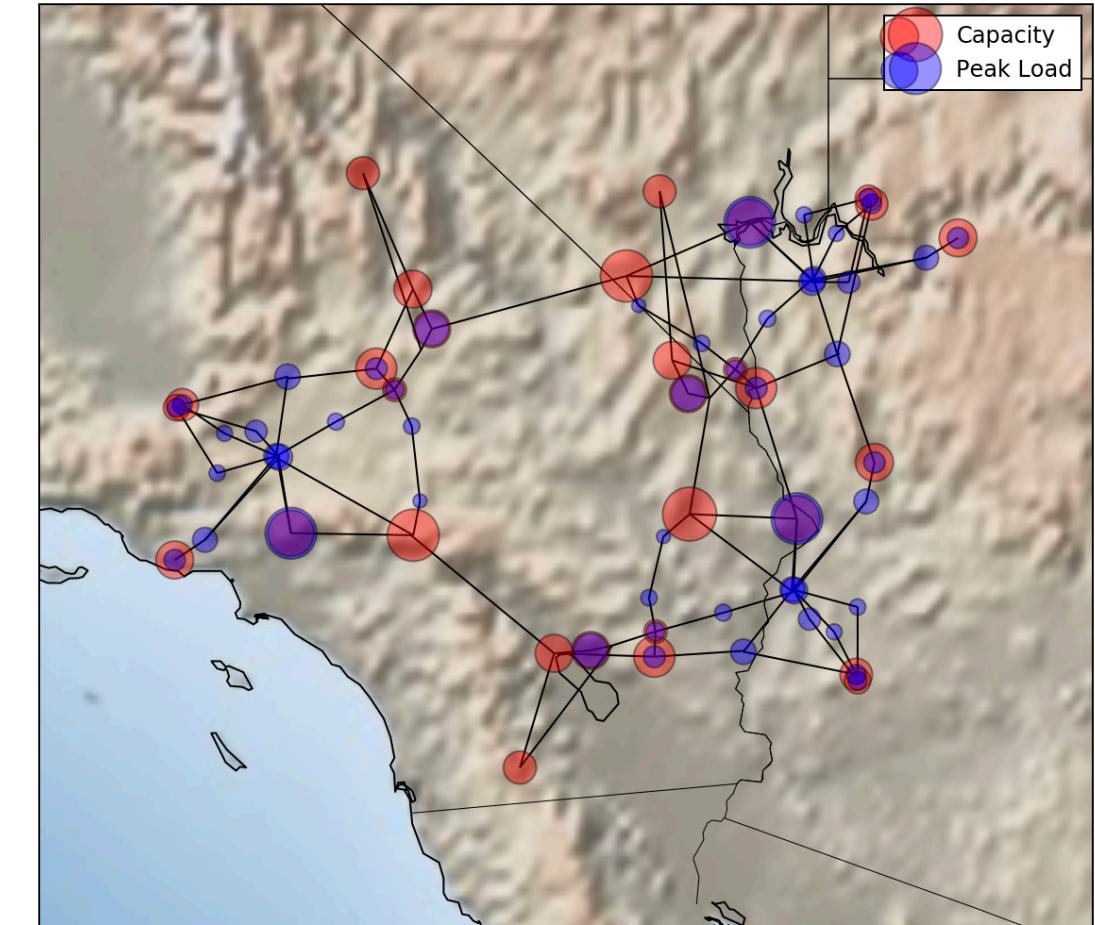
## Line distances used to create relative node locations

- RTS-96 has published line lengths
  - Use GraphViz and networkx (python package) to determine relative node locations while attempting to respect line lengths.



# Ensure geographic and temporal coincidence of weather driven data

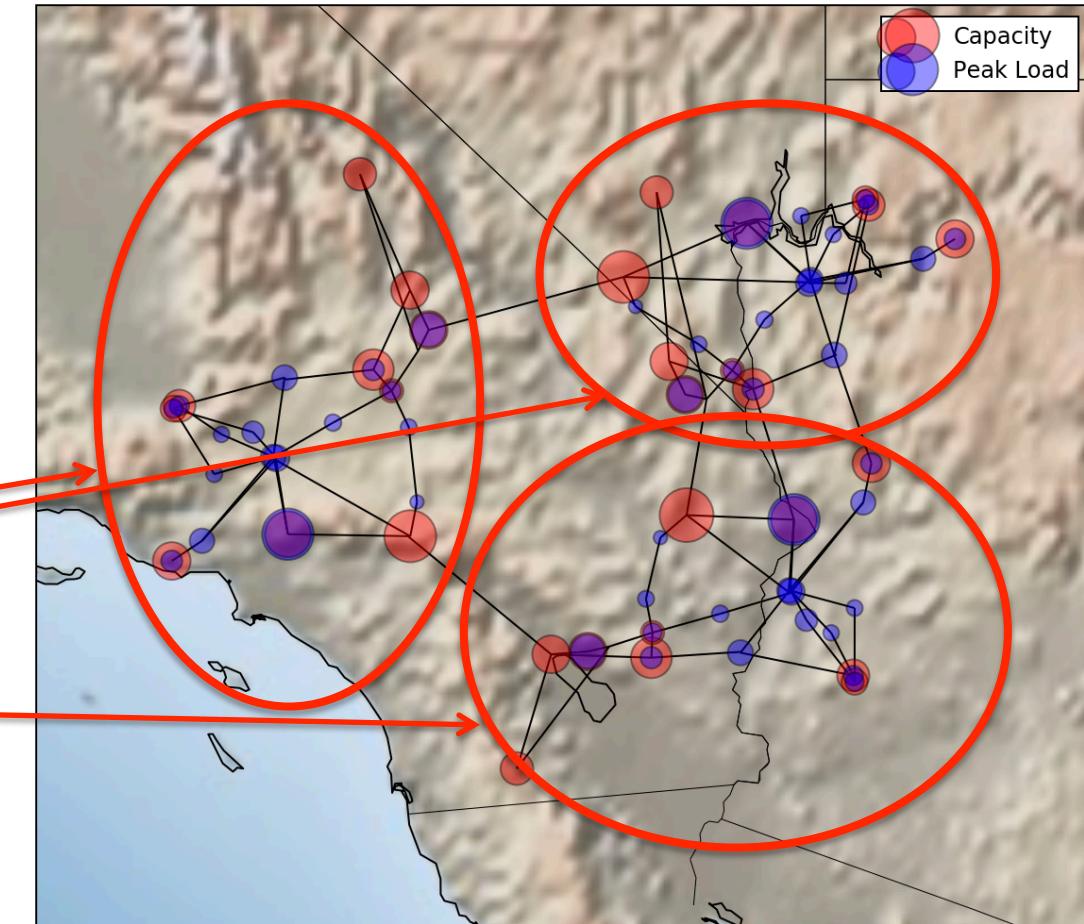
- ▶ Use RTS-GMLC relative node locations from GraphViz
- ▶ Arbitrary choice: geographic region in SW United States that roughly covers L.A. to L.V.
  - Good solar resource
  - Good wind resource
  - Available demand and hydro data profiles



Not intended to represent existing infrastructure

# Ensure geographic and temporal coincidence of weather driven data

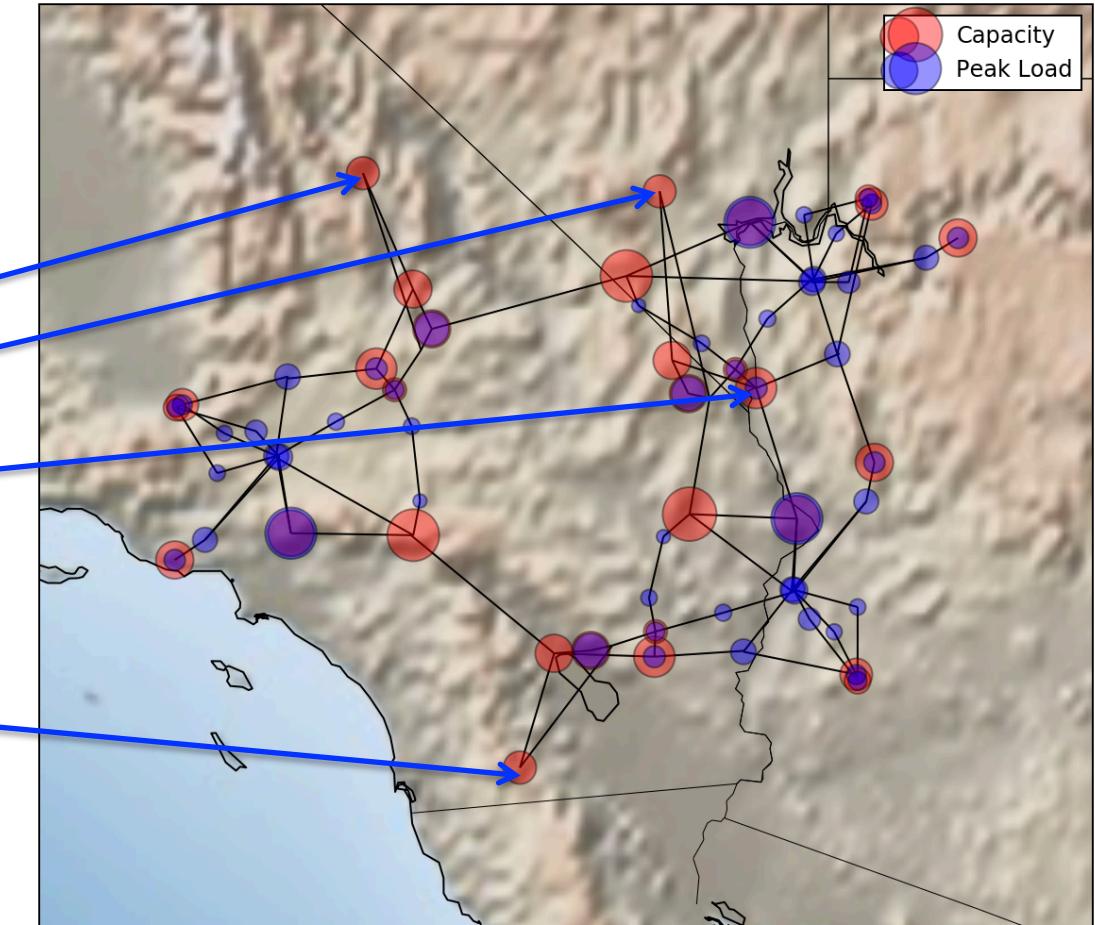
- ▶ Regional load profiles (hourly and 5-minute)
  - Load profile data from WECC TEPPC 2024 case used for the “Low Carbon Grid Study”
    - <http://www.nrel.gov/docs/fy16osti/64884.pdf>
  - Profiles normalized to peak regional RTS demand values
- ▶ LA Division of Water and Power
- ▶ Nevada Energy
- ▶ Arizona Public Service Company



Not intended to represent existing infrastructure

# Ensure geographic and temporal coincidence of weather driven data

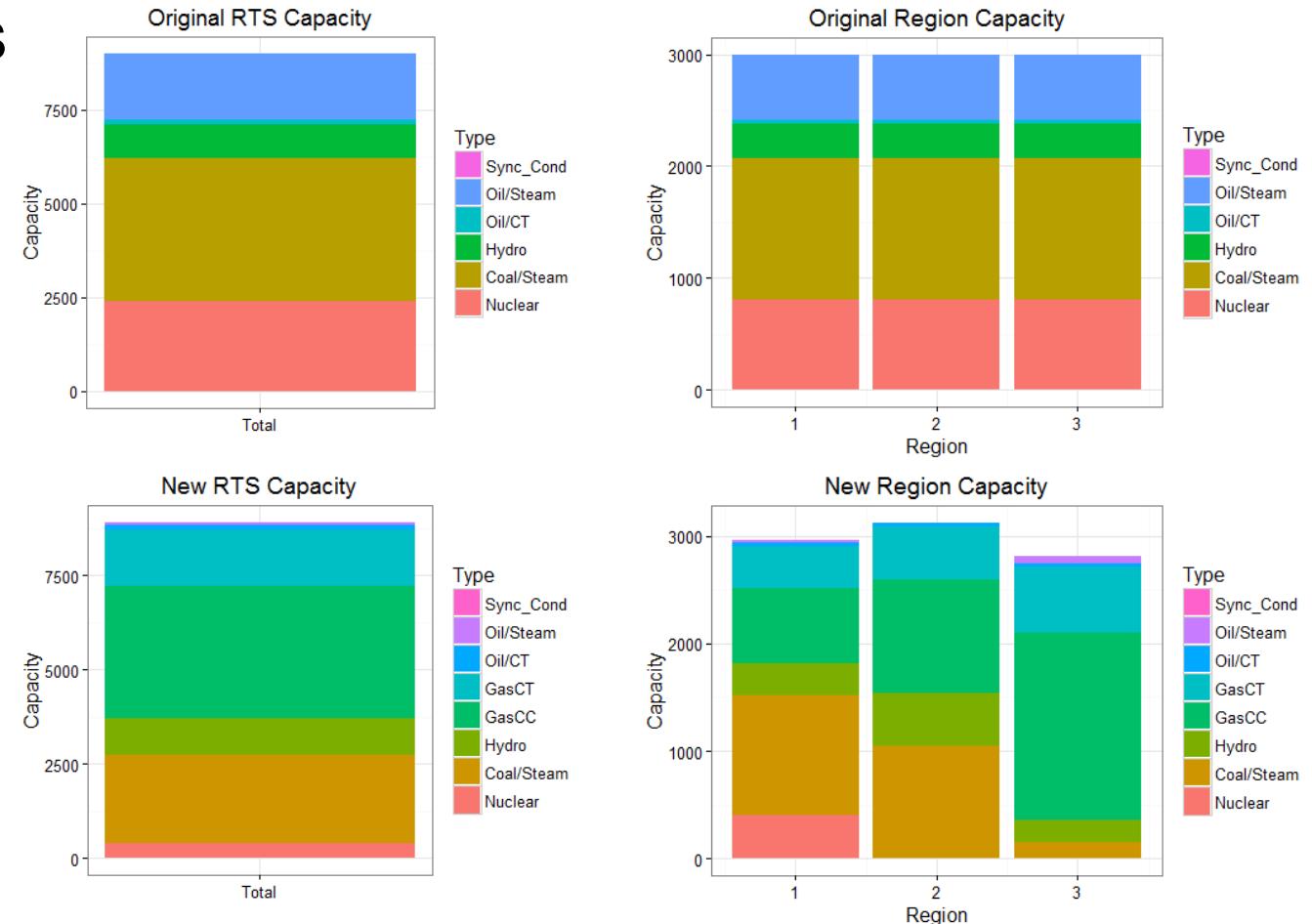
- ▶ Hourly hydro energy profiles
  - Hydro profile data from WECC TEPPC 2024 case used for the “Low Carbon Grid Study”
    - <http://www.nrel.gov/docs/fy16osti/64884.pdf>
  - Profiles normalized to RTS hydro generator capacities
- ▶ Devil Canyon Dam
- ▶ Davis Dam
- ▶ Parker Dam



Not intended to represent existing infrastructure

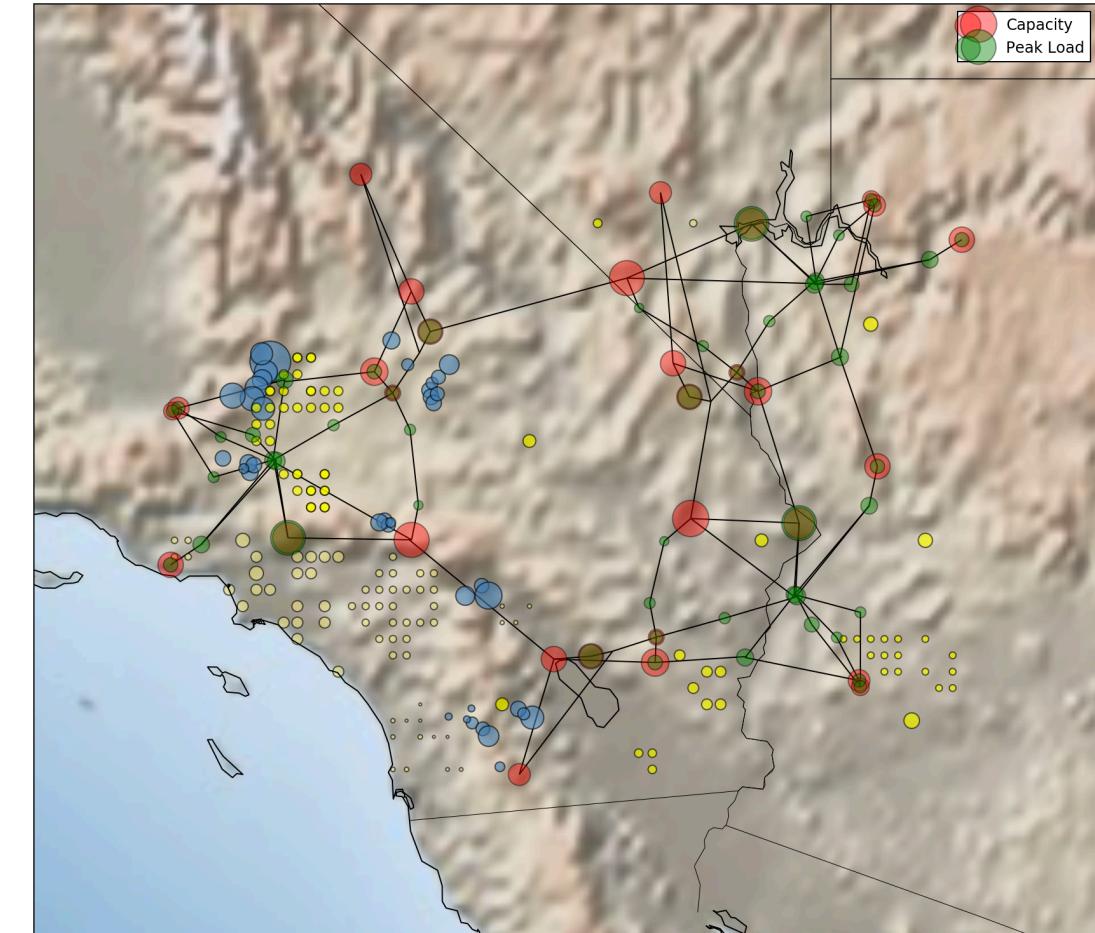
## Updated conventional generation fleet

- ▶ Added two new generator types to the RTS dataset:
  - 25 MW NG-CT
  - 125 MW NG-CC
- ▶ New generator parameters are based on:
  - Average values from WECC TEPPC 2024 case
    - Heat rates, FOR, POR, MTTR, MUT, MDT, Ramp rates, MSL
  - Wartsilla, Gas Power Journal, Siemens, GE:
    - Startup parameters
- ▶ Replaced some existing oil and coal generation with NG-CC and NG-CT generators



# Wind and Solar data

- ▶ Western Wind and Solar Integration Study phase 2
  - <http://www.nrel.gov/docs/fy13osti/55588.pdf>
  - Hourly Day Ahead forecasts representing “best available” 24-hour ahead forecast
  - 5-minute Real Time “actual” profiles
  - 80 m hub height adjusted wind turbine outputs
  - WRF re-analysis wind and DA solar profiles
  - Satellite RT solar profiles
  
- ▶ Random sampling of WWSIS-2 Wind, Utility-PV, and Rooftop-PV sites to achieve desired capacity
  
- ▶ Connection to closest RTS node location:
  - Rooftop-PV only connected to load buses



# Github.com/GridMod/RTS-GMLC

GridMod / RTS-GMLC

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Create\_PLEXOS\_database adding a node location picturer 8 days ago

HTML\_Report change file name of gen\_name\_mapping file a month ago

RTS\_Data updating PLEXOS model according to reorganization, closes #3 8 days ago

.gitignore adding a node location picturer 8 days ago

.gitmodules moving magma submodule a month ago

README.md Update README.md a day ago

RTS-GMLC\_updates.md Update RTS-GMLC\_updates.md 8 days ago

node\_re\_basemap.png adding a node location picturer 8 days ago

README.md

## RTS-GMLC

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