

CalLite Power Module

California Water and Environmental Modeling Forum,
April 11th, 2016



CalLite Power Generation

The screenshot displays the CalLite 3.00 software interface. The title bar reads "CalLite 3.00 - The Central Valley Water Management Screening Model". The menu bar includes "File" and "Help". The main menu contains "Run Settings", "Hydroclimate", "Demands", "Facilities", "Regulations", "Operations", "Quick Results", "Custom Results", "Map View", "Data Analysis" (highlighted with a red box), and "Web Map (Beta)".

Below the menu, there is an "External PDF" section with a "Power Generation" button (highlighted with a red box). The "Scenarios" section includes "Add", "Delete", "Clear All", "Compare Scenarios", and "Controls" buttons. The "Report List" section includes "Add To List", "Clear List", "Display List", "Save List", and "Load List" buttons.

The "Display" section has radio buttons for "Base", "Comparison", and "Difference". It includes "Start" and "End" date pickers for "Month" and "Year". The "Select Output" section has radio buttons for "Energy" (selected), "Off Peak Capacity", and "On Peak Capacity". There are checkboxes for "Time series plot" (checked), "Box and whiskers plot", and "Exceedance plot (Monthly/ Period of Record)". A month selection grid is present with a "Clear Checked" button. There are also checkboxes for "Monthly table" and "Summary table".

The "Summary table" section contains the following data:

Statistic	Water year type	Period	Table
<input checked="" type="checkbox"/> Avg	<input type="checkbox"/> Sac 40-30-30	<input checked="" type="checkbox"/> All years	<input checked="" type="checkbox"/> Monthly AP
<input type="checkbox"/> Max	<input type="checkbox"/> Shasta Index	<input type="checkbox"/> Dry (1928-1934)	<input type="checkbox"/> Annual AP
<input type="checkbox"/> Min	<input type="checkbox"/> Feather Index	<input type="checkbox"/> Dry (1976-1977)	<input type="checkbox"/> Monthly LC
<input type="checkbox"/> StdDev	<input type="checkbox"/> SJR Index	<input type="checkbox"/> Dry (1986-1992)	<input type="checkbox"/> Annual LC

The "Project Generation" section has tabs for "Project Generation", "Project Use", and "System Summary". It is divided into "CVP Generation" and "SWP Generation". Under "CVP Generation", there are two columns of checkboxes: "Power Plant" (Trinity, Lewiston, Carr, Spring Creek, Shasta, Keswick, Folsom, Nimbus, New Melones, CVP San Luis, O'Neil) and "Pumping Plant" (Tracy, CVP Banks, Contra Costa, O'Neil, CVP San Luis, San Felipe, CVP Dos Amigos, Folsom, Corning, Red Bluff, DMC Intertie, San Luis Other, TC Other). "Select All" and "Clear All" buttons are at the bottom.



SWP Power Facts

- Power Facilities

- Hydroelectric Power Plant.... 5
- Pumping Generation Plant... 4
- Pumping plants..... 20

- ▲ Power Plant (P)
- Pumping Plant (PP)
- Pump Generation Powerplant (PGP)
- Pump Station (PS)

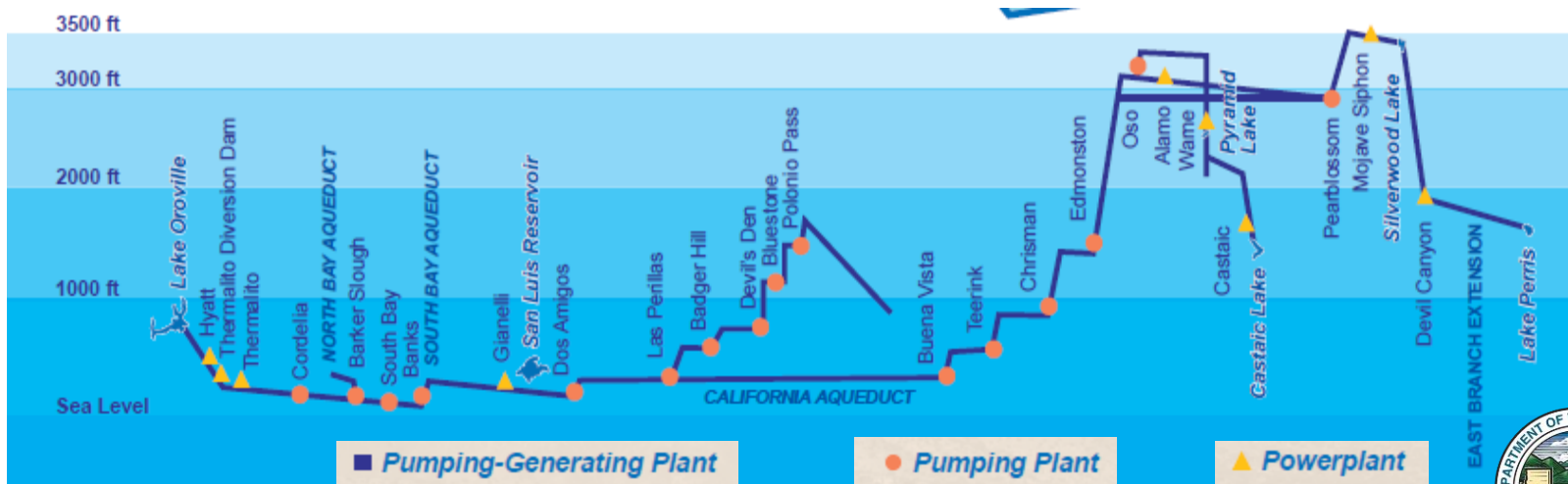
State Water Project Facilities

- 1 Hyatt PGP
- 2 Thermalito Diversion Dam P
- 3 Thermalito PGP
- 4 Barker Slough PP
- 5 Cordelia PP
- 6 Banks PP
- 7 South Bay PP
- 8 Del Valle PP
- 9 Gianelli PGP
- 10 Dos Amigos PP
- 11 Las Perillas PP
- 12 Badger Hill PP
- 13 Devil's Den PP
- 14 Bluestone PP
- 15 Polonio Pass PP
- 16 Buena Vista PP
- 17 Teerink PP
- 18 Chrisman PP
- 19 Edmonston PP
- 20 Alamo P
- 21 Oso PP
- 22 Warne P
- 23 Castaic PGP
- 24 Pearblossom PP
- 25 Mojave Siphon P
- 26 Devil Canyon P
- 27 Greenspot PS
- 28 Crafton Hills PS
- 29 Cherry Valley PS



More Facts

- Water is elevated 3,400 ft from Delta to Tehachapi Mount.
 - Edmonston lifts 1926 vertical feet (Highest single lift in the world)
- Power Generation
 - Highest (Single Year)..... 8.6×10^9 kWh
 - Average (1988-2007)
 - Generation..... 6.67×10^9 kWh
 - Purchase..... 2.66×10^9 kWh
 - Pumping Load... 6.51×10^9 kWh
- CVP operation is also power dependent



LTGen & SWPGen

- LTGen
 - Long Term Generation
 - Uses operation data of Calsim Simulation to estimate CVP power availability
- SWPGen
 - State Water Project Generation
 - Estimates SWP power availability



LTGen & SWPGen

- Visual Basic Macro based Excel spread sheet



LTGen & SWPGen to CalLite

- Recreate LTGen & SWPGen VBA logic to Jython script
- Include Jython script into CalLite run
- Allow Power Generation DashBoard in CalLite GUI to access Jython script generated data
- Displays graphs and tables of user selected facilities using CalLite GUI



Power Generation Dashboard

CallLite 3.00 - The Central Valley Water Management Screening Model

File Help

Run Settings Hydroclimate Demands Facilities Regulations Operations Quick Results Custom Results Map View Data Analysis Web Map (Beta)

External PDF Power Generation

Scenarios

Add Delete Clear All Compare Scenarios Controls

Base Comparison Difference

Display

Month Year

Start 0 0

End 0 0

Select Output: Energy Off Peak Capacity On Peak Capacity

Time series plot Box and whiskers plot

Exceedance plot (Monthly/ Period of Record)

Oct Nov Dec Jan Feb Mar

Apr May Jun Jul Aug Sep

Annual POR

Monthly table

Summary table

Statistic	Water year type	Period	Table
<input checked="" type="checkbox"/> Avg	<input type="checkbox"/> Sac 40-30-30	<input checked="" type="checkbox"/> All years	<input checked="" type="checkbox"/> Monthly AP
<input type="checkbox"/> Max	<input type="checkbox"/> Shasta Index	<input type="checkbox"/> Dry (1928-1934)	<input type="checkbox"/> Annual AP
<input type="checkbox"/> Min	<input type="checkbox"/> Feather Index	<input type="checkbox"/> Dry (1976-1977)	<input type="checkbox"/> Monthly LC
<input type="checkbox"/> StdDev	<input type="checkbox"/> SJR Index	<input type="checkbox"/> Dry (1986-1992)	<input type="checkbox"/> Annual LC

Report List

Add To List Clear List Display List Save List Load List

To Screen To Printer Both

Project Generation Project Use System Summary

CVP Generation SWP Generation

Power Plant

- Trinity
- Lewiston
- Carr
- Spring Creek
- Shasta
- Keswick
- Folsom
- Nimbus
- New Melones
- CVP San Luis
- O'Neil

Pumping Plant

- Tracy
- CVP Banks
- Contra Costa
- O'Neil
- CVP San Luis
- San Felipe
- CVP Dos Amigos
- Folsom
- Corning
- Red Bluff
- DMC Intertie
- San Luis Other
- TC Other

Select All Clear All



Display Control

Display

	Month	Year
Start	<input type="text" value="0"/>	<input type="text" value="0"/>
End	<input type="text" value="0"/>	<input type="text" value="0"/>

Select Output: Energy Off Peak Capacity On Peak Capacity

Time series plot Box and whiskers plot

Exceedance plot (Monthly/ Period of Record)

<input type="checkbox"/> Oct	<input type="checkbox"/> Nov	<input type="checkbox"/> Dec	<input type="checkbox"/> Jan	<input type="checkbox"/> Feb	<input type="checkbox"/> Mar
<input type="checkbox"/> Apr	<input type="checkbox"/> May	<input type="checkbox"/> Jun	<input type="checkbox"/> Jul	<input type="checkbox"/> Aug	<input type="checkbox"/> Sep
<input type="checkbox"/> Annual	<input type="checkbox"/> POR	<input type="button" value="Clear Checked"/>			

Monthly table

Summary table

Statistic	Water year type	Period	Table
<input checked="" type="checkbox"/> Avg	<input type="checkbox"/> Sac 40-30-30	<input checked="" type="checkbox"/> All years	<input checked="" type="checkbox"/> Monthly AP
<input type="checkbox"/> Max	<input type="checkbox"/> Shasta Index	<input type="checkbox"/> Dry (1928-1934)	<input type="checkbox"/> Annual AP
<input type="checkbox"/> Min	<input type="checkbox"/> Feather Index	<input type="checkbox"/> Dry (1976-1977)	<input type="checkbox"/> Monthly LC
<input type="checkbox"/> StdDev	<input type="checkbox"/> SJR Index	<input type="checkbox"/> Dry (1986-1992)	<input type="checkbox"/> Annual LC
<input type="checkbox"/> Median		<input type="checkbox"/> All dry periods	<input type="checkbox"/> Monthly Cap



Power Generation Dashboard

CallLite 3.00 - The Central Valley Water Management Screening Model

File Help

Run Settings Hydroclimate Demands Facilities Regulations Operations Quick Results Custom Results Map View Data Analysis Web Map (Beta)

External PDF Power Generation

Scenarios
Add Delete Clear All Compare Scenarios Controls

Report List
Add To List Clear List Display List Save List Load List

Base Comparison Difference

Display

Month Year

Start

End

Select Output: Energy Off Peak Capacity On Peak Capacity

Time series plot Box and whiskers plot

Exceedance plot (Monthly/ Period of Record)

Oct Nov Dec Jan Feb Mar
 Apr May Jun Jul Aug Sep
 Annual POR

Monthly table

Summary table

Statistic	Water year type	Period	Table
<input checked="" type="checkbox"/> Avg	<input type="checkbox"/> Sac 40-30-30	<input checked="" type="checkbox"/> All years	<input checked="" type="checkbox"/> Monthly AP
<input type="checkbox"/> Max	<input type="checkbox"/> Shasta Index	<input type="checkbox"/> Dry (1928-1934)	<input type="checkbox"/> Annual AP
<input type="checkbox"/> Min	<input type="checkbox"/> Feather Index	<input type="checkbox"/> Dry (1976-1977)	<input type="checkbox"/> Monthly LC
<input type="checkbox"/> StdDev	<input type="checkbox"/> SJR Index	<input type="checkbox"/> Dry (1986-1992)	<input type="checkbox"/> Annual LC

To Screen To Printer Both

Project Generation Project Use System Summary

CVP Generation SWP Generation

Power Plant

- Trinity
- Lewiston
- Carr
- Spring Creek
- Shasta
- Keswick
- Folsom
- Nimbus
- New Melones
- CVP San Luis
- O'Neil

Pumping Plant

- Tracy
- CVP Banks
- Contra Costa
- O'Neil
- CVP San Luis
- San Felipe
- CVP Dos Amigos
- Folsom
- Corning
- Red Bluff
- DMC Intertie
- San Luis Other
- TC Other



Power Generation/Use Panels

Project Generation | Project Use | System Summary

CVP Generation | SWP Generation

Power Plant

- Trinity
- Lewiston
- Carr
- Spring Creek
- Shasta
- Keswick
- Folsom
- Nimbus
- New Melones
- CVP San Luis
- O'Neil

Pumping Plant

- Tracy
- CVP Banks
- Contra Costa
- O'Neil
- CVP San Luis
- San Felipe
- CVP Dos Amigos
- Folsom
- Corning
- Red Bluff
- DMC Intertie
- San Luis Other
- TC Other

Select All | Clear All



CVP Generation

Project Generation | Project Use | System Summary

CVP Generation | SWP Generation

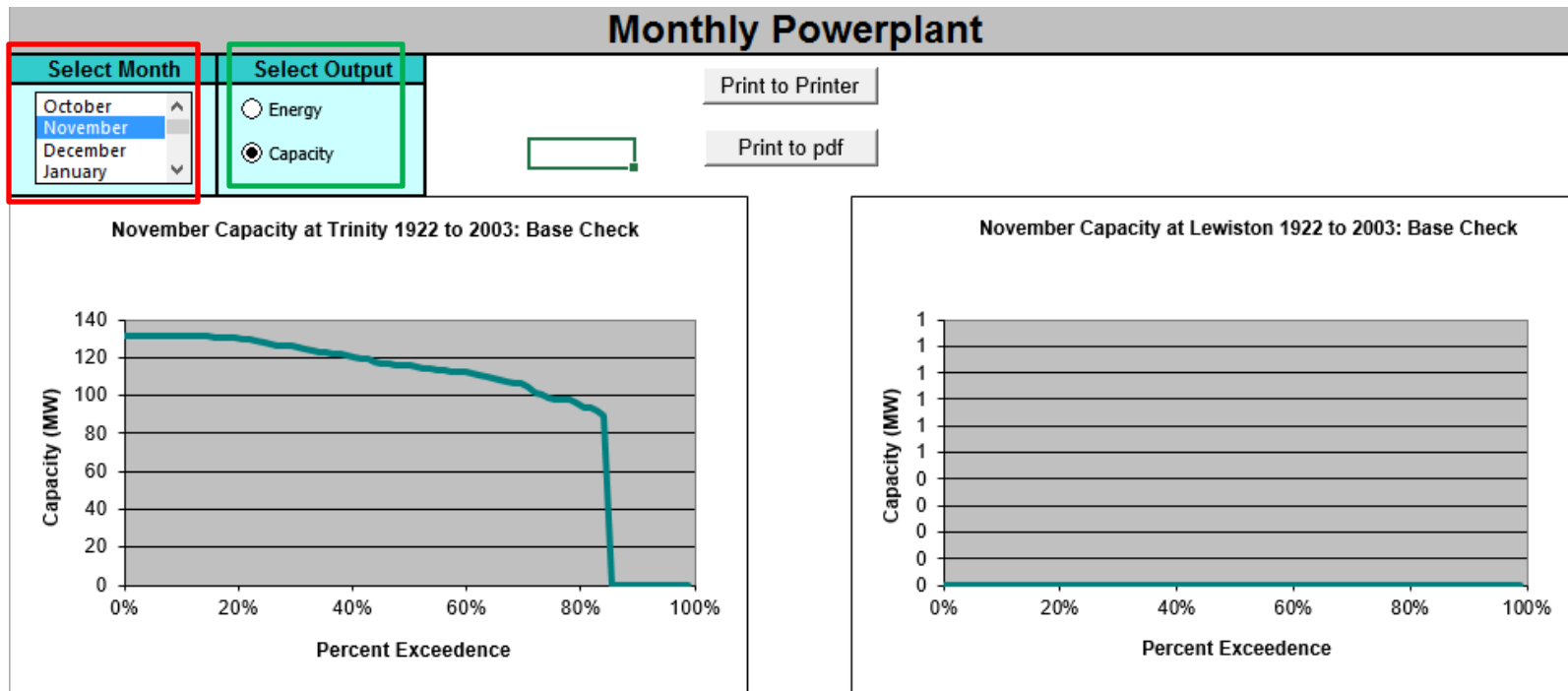
Power Plant	Pumping Plant
<input checked="" type="checkbox"/> Trinity	<input type="checkbox"/> Tracy
<input checked="" type="checkbox"/> Lewiston	<input type="checkbox"/> CVP Banks
<input type="checkbox"/> Carr	<input type="checkbox"/> Contra Costa
<input type="checkbox"/> Spring Creek	<input type="checkbox"/> O'Neil
<input type="checkbox"/> Shasta	<input type="checkbox"/> CVP San Luis
<input type="checkbox"/> Keswick	<input type="checkbox"/> San Felipe
<input type="checkbox"/> Folsom	<input type="checkbox"/> CVP Dos Amigos
<input type="checkbox"/> Nimbus	<input type="checkbox"/> Folsom
<input type="checkbox"/> New Melones	<input type="checkbox"/> Corning
<input type="checkbox"/> CVP San Luis	<input type="checkbox"/> Red Bluff
<input type="checkbox"/> O'Neil	<input type="checkbox"/> DMC Intertie
	<input type="checkbox"/> San Luis Other
	<input type="checkbox"/> TC Other

Select All | Clear All

Double-click item to display



CVP Generation Monthly



CVP Generation POR

Period of Record Powerplant

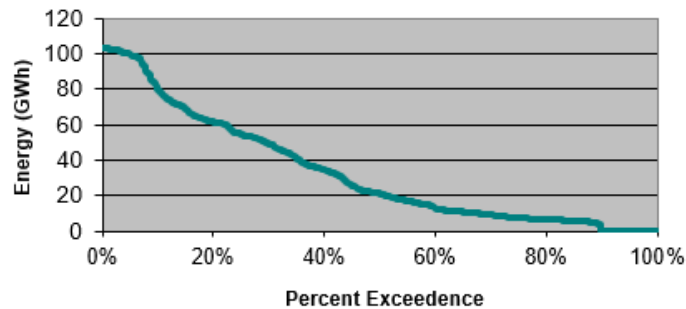
Select Output

- Energy
- Capacity

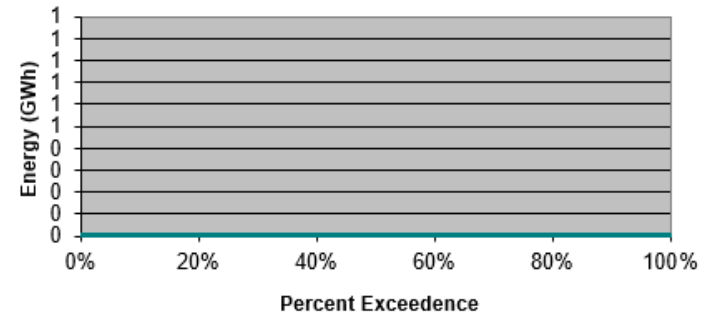
Print to

Print to pdf

Monthly Trinity Energy 1922 to 2003: Base Check



Monthly Lewiston Energy 1922 to 2003: Base Check



CVP Generation

Project Generation | Project Use | System Summary

CVP Generation | SWP Generation

Power Plant	Pumping Plant
<input type="checkbox"/> Trinity	<input checked="" type="checkbox"/> Tracy
<input type="checkbox"/> Lewiston	<input checked="" type="checkbox"/> CVP Banks
<input type="checkbox"/> Carr	<input type="checkbox"/> Contra Costa
<input type="checkbox"/> Spring Creek	<input type="checkbox"/> O'Neil
<input type="checkbox"/> Shasta	<input type="checkbox"/> CVP San Luis
<input type="checkbox"/> Keswick	<input type="checkbox"/> San Felipe
<input type="checkbox"/> Folsom	<input type="checkbox"/> CVP Dos Amigos
<input type="checkbox"/> Nimbus	<input type="checkbox"/> Folsom
<input type="checkbox"/> New Melones	<input type="checkbox"/> Corning
<input type="checkbox"/> CVP San Luis	<input type="checkbox"/> Red Bluff
<input type="checkbox"/> O'Neil	<input type="checkbox"/> DMC Intertie
	<input type="checkbox"/> San Luis Other
	<input type="checkbox"/> TC Other

Select All | Clear All

Double-click item to display



CVP Use Monthly

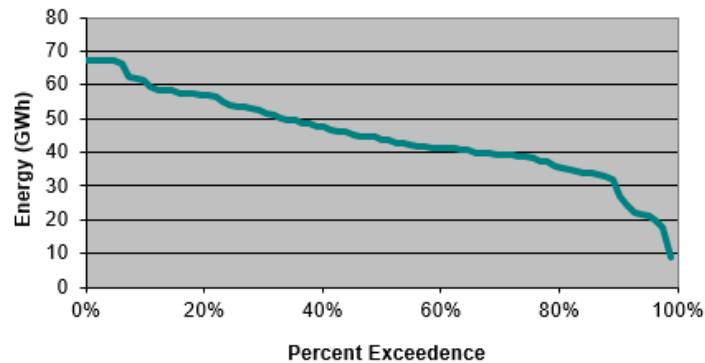
Monthly Project Use

Select Month	Select Output
October	<input checked="" type="radio"/> Energy
November	<input type="radio"/> Off Peak Capacity
December	<input type="radio"/> On Peak Capacity
January	

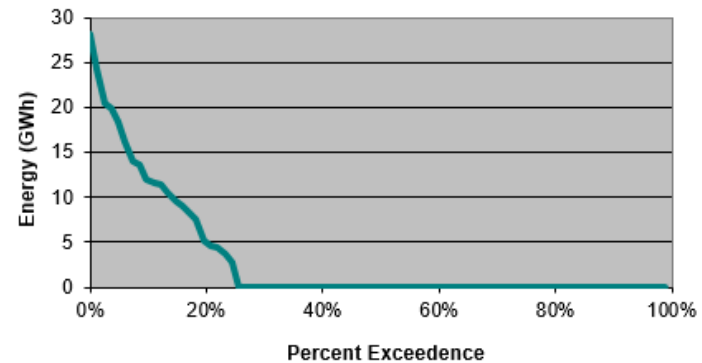
Print Graphs

Print to pdf

October Energy Use at Tracy 1922 to 2003: Base Check



October Energy Use at CVP Banks 1922 to 2003: Base Check



CVP Use POR

Period of Record Project Use

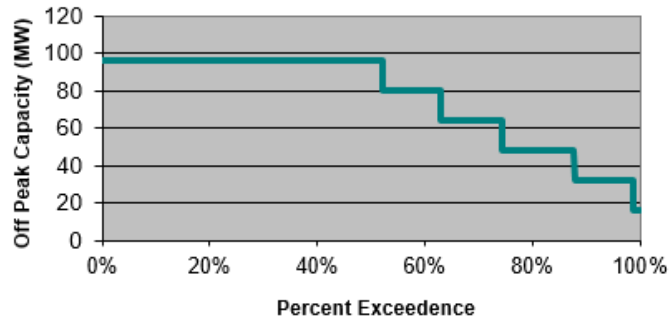
Select Output

- Energy
- Off Peak Capacity
- On Peak Capacity

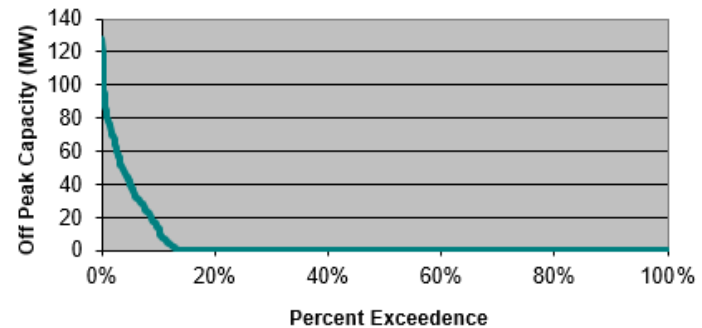
[Print to Printer](#)

[Print to pdf](#)

Monthly Tracy Off Peak Capacity 1922 to 2003: Base Check



Monthly CVP Banks Off Peak Capacity 1922 to 2003: Base Check



SWP Generation

Project Generation Project Use System Summary

CVP Generation **SWP Generation**

Power Plant

- Oroville
- Thermalito
- San Luis
- Alamo
- Mojave
- Devil's Canyon
- Warne
- Castaic

Pumping Plant

- Banks
- Dos Amigos
- Teerink
- Chrisman
- Edmonston
- Pearblossom
- Oso

Select All Clear All



Project Generation

Project Generation | Project Use | System Summary

CVP Generation | SWP Generation

Exceedance Plot

Monthly Period of Record

Oct Nov Dec Jan Feb Mar
 Apr May Jun Jul Aug Sep

Clear Checked

Select Output: Energy Capacity

Summary Table

Monthly Total Annual

Energy Generated (GWh) at Plant
 Energy Generated (GWh) and Revenue (\$1,000) at Load Center
 Generation Capacity (MW) at Plant
 Generation Capacity (MW) at Load Center
 Foregone Energy (GWh)

Select All | Clear All



Project Use

Project Generation **Project Use** System Summary

CVP Generation SWP Generation

Exceedance Plot

Monthly Period of Record

Oct Nov Dec Jan Feb Mar
 Apr May Jun Jul Aug Sep

Clear Checked

Select Output: Energy Off Peak Capacity On Peak Capacity

Summary Table

Monthly Off-Peak Energy Check (GWh)

Total Off-Peak On-Peak

Monthly Energy Use (GWh) at Pumping Plant
 Monthly Capacity (GWh) at Pumping Plant
 Annual Energy Use (GWh) at Pumping Plant
 Monthly Energy Use (GWh) and Costs (\$1,000) at Load Center
 Monthly Capacity (MW) at Load Center
 Annual Energy Use (GWh) and Costs (\$1,000) at Load Center



System Summary

Project Generation | Project Use | **System Summary**

CVP Generation | SWP Generation

Box and Whiskers Plot

Select Year Year

Exceedence Plot

Select Year Type: Calender Fiscal

Select Output

Generation at Plant Project Use at Plant

Generation at Load Center Project Use at Load Center

Summary Tables

Total Energy at Plant

Total Energy at Load Center

Generation at Load Center

System Spill Check

System Energy Check



System Summary

System Summary

Select Year

- 1999
- 2000
- 2001
- 2002
- 2003
- Means

Select Calendar or Fiscal year

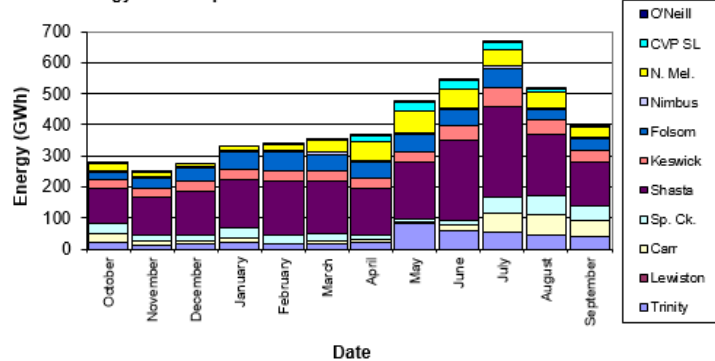
Calendar Year

Fiscal Year

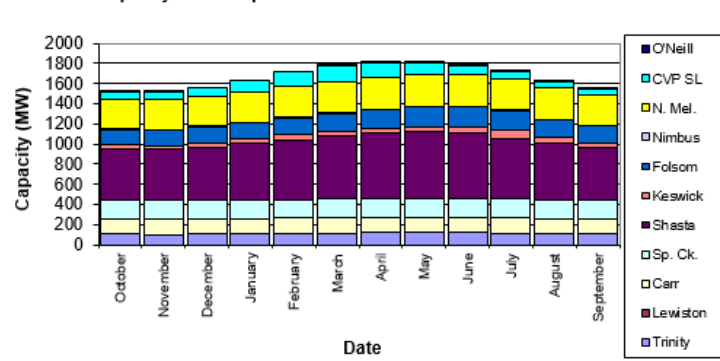
Print to Printer

Print to pdf

Energy at Powerplant for Fiscal Year Means: Base Check



Capacity at Powerplant for Fiscal Year Means: Base Check



Questions & Comments

- Acknowledge MBK Engineers contribution for transferring LTGen & SWPGen logic in Jytha Script

