

SEPTEMBER 2025

CRISPPY: AN ADVANCED HYDRO SCHEDULING TOOL FOR WAPA CRSP

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BACKGROUND



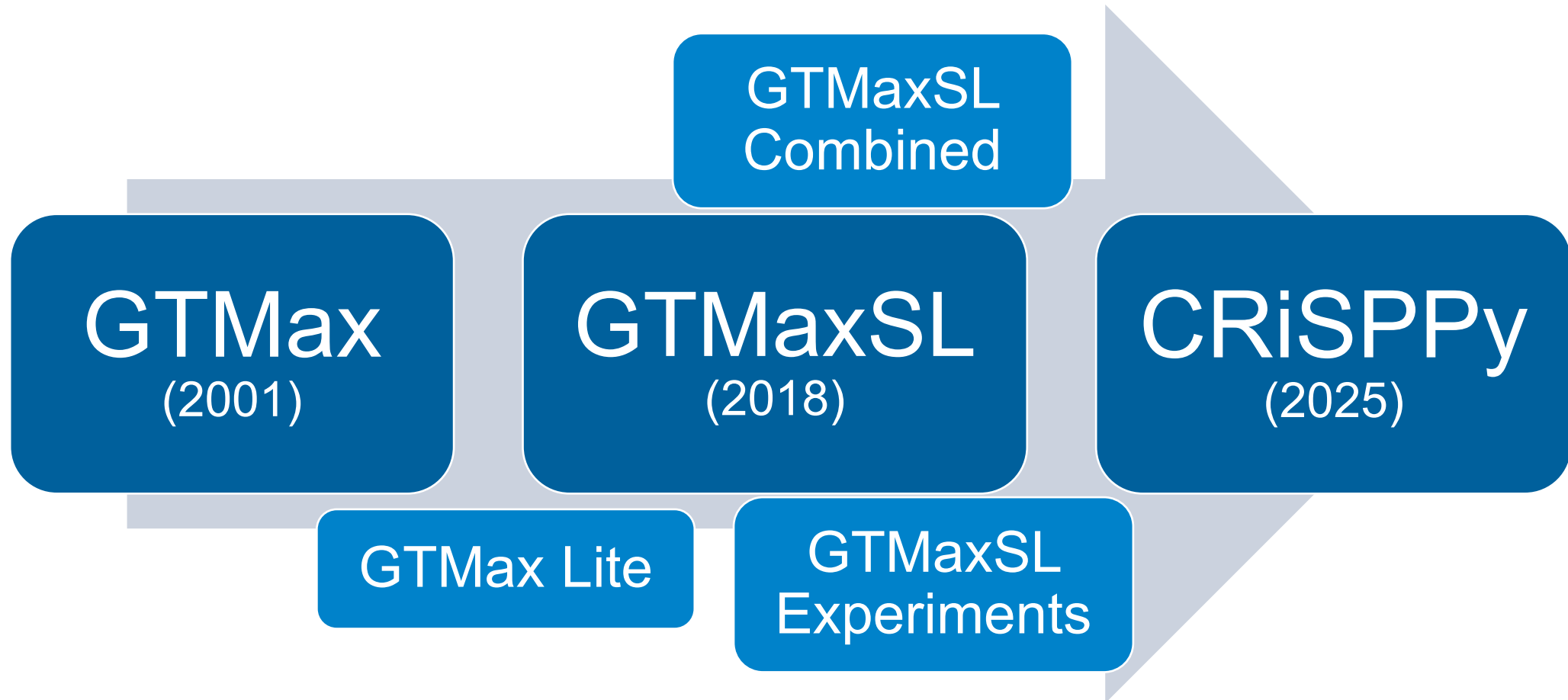
U.S. DEPARTMENT
of **ENERGY**

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BACKGROUND

From GTMax to CRiSPPy



BACKGROUND

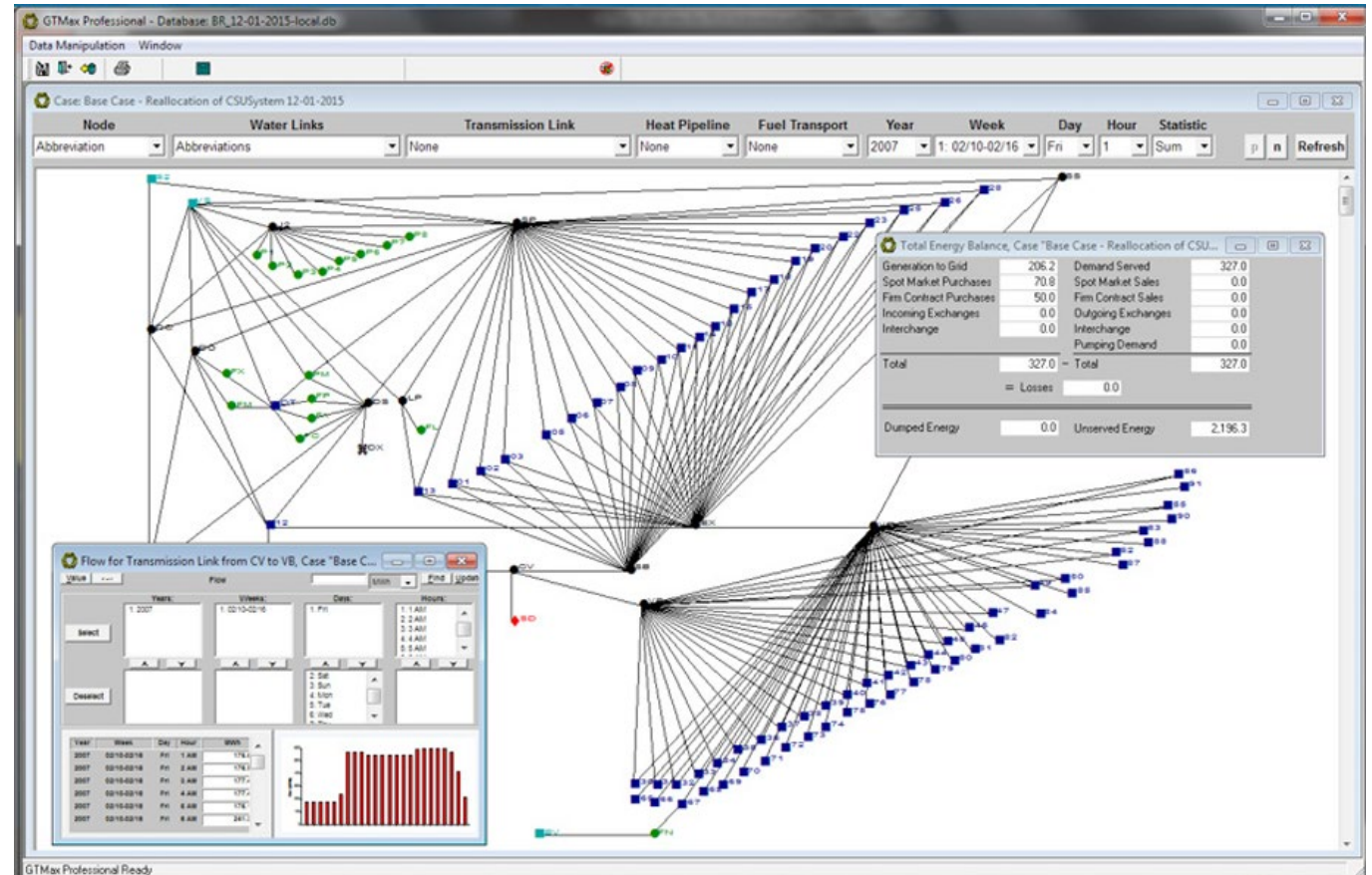
Use cases

- GTMax:
 - Experimental releases (prior to 2017)
 - 2016 LTEMP
- GTMaxSL:
 - Experimental releases (2019-2022)
 - Impact of loss of Glen Canyon
 - 24-month studies
- CRiSPPy:
 - Post-2026 EIS
 - Experimental releases (from 2023)
 - 24-month studies

BACKGROUND

GTMax (2001)

- Versatile (different systems)
- Model both water and power networks
- Requires installation of:
 - GTMax
 - Oracle database
 - Lingo solver
- Solver license: ~\$10k



BACKGROUND

GTMaxSL (2018)

- Specialized
- Excel-based
- No database/software installation
- Requires installation of Lingo solver
- Solver license: ~\$10k
- Many spreadsheets
- Case studies entangled with software

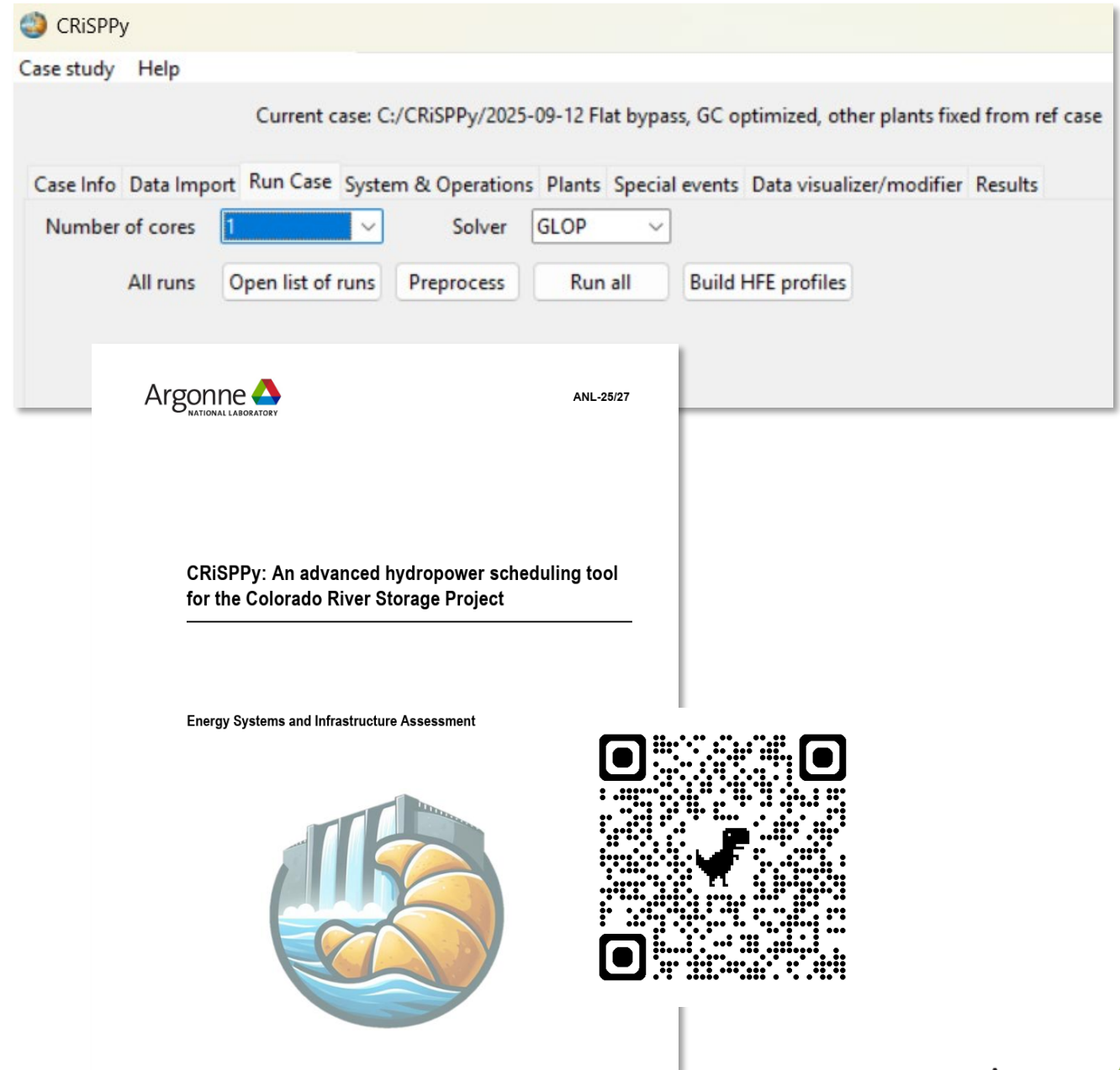
The screenshot displays the GTMaxSL Excel spreadsheet interface. The top section contains input parameters for the model, including 'Run FGSSARR Optimization?' (FALSE), 'Use Fixed FG Inputs?' (TRUE), 'Run SLIP Optimization?' (TRUE), and 'In SLIP Run Include FG Gen?' (TRUE). The 'Run ID' is 11, 'Year' is 2025, 'Month' is 9, and 'Hydro Trace' is 0. The 'Operating Criteria' are set to 'Preferred-2017'. The 'Model Operating Criteria' section includes 'Adjust inputs for CY Min Elev Violations?' (TRUE), 'Adjust inputs for low GC Monthly Releases?' (TRUE), 'Only Run the Initial FG Iteration' (FALSE), and 'AHP Run?' (FALSE). The 'Number of Days' section shows a table with columns for Holiday, Sun, Mon, Tue, and Wed, with values 1, 4, 4, 5, and 4 respectively. The 'Number of Runs' section shows 'Number of Runs' as 11 and 'Runs with TRUE' as 11. The 'Ave Run Execution Time (sec)' is 10, 'Total Run Time (hrs)' is 0.18, and 'Percent complete' is 100.00. The bottom section contains a table of simulation results with columns for Run ID, Date, Hydro, Price Projection, Operating Criteria, and Load. The table lists 12 runs, all with 'TRUE' for the 'Run ID' column, and 'Most Likely Energy Prices' for the 'Price Projection' column. The 'Operating Criteria' are 'Preferred-2017' and the 'Load' is 'Old_SHP'. A green box labeled 'Run Selected Combinations' is overlaid on the bottom right of the spreadsheet.

Run ID	Date	Hydro	Price Projection	Operating Criteria	Load
1	11/1/2024	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
2	12/1/2024	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
3	1/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
4	2/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
5	3/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
6	4/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
7	5/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
8	6/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
9	7/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
10	8/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
11	9/1/2025	0	Most Likely Energy Prices	Preferred-2017	Old_SHP
12					

BACKGROUND

CRiSPPy (2025)

- Specialized
- Contained in one app
- Case studies separated from software
- No installation required
- Powerful open-source solvers: GLOP, SCIP
- Parallelized runs
- Documented





CRISPPY Colorado River Storage Project Python Model

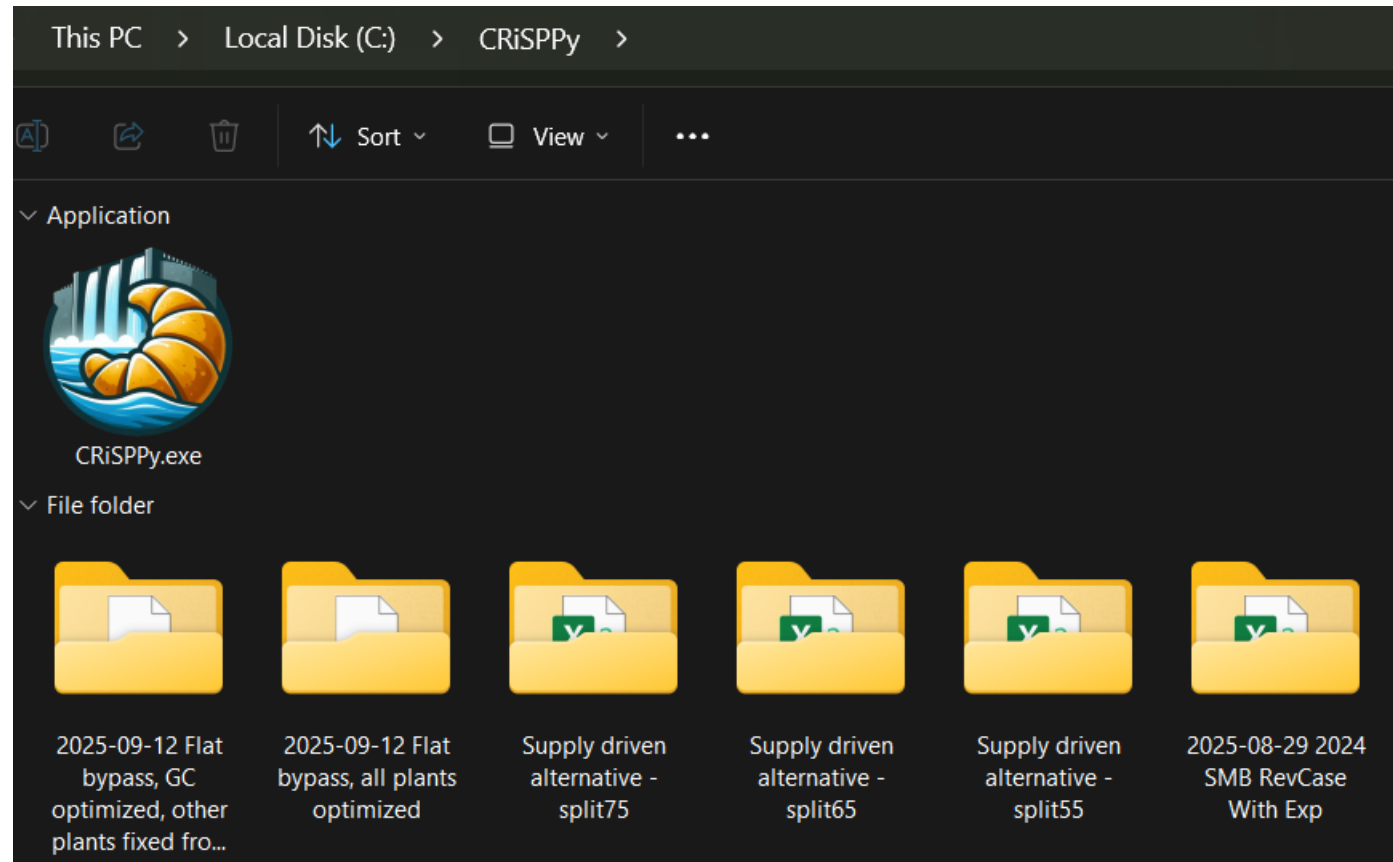
CRISPPY

File structure

One app



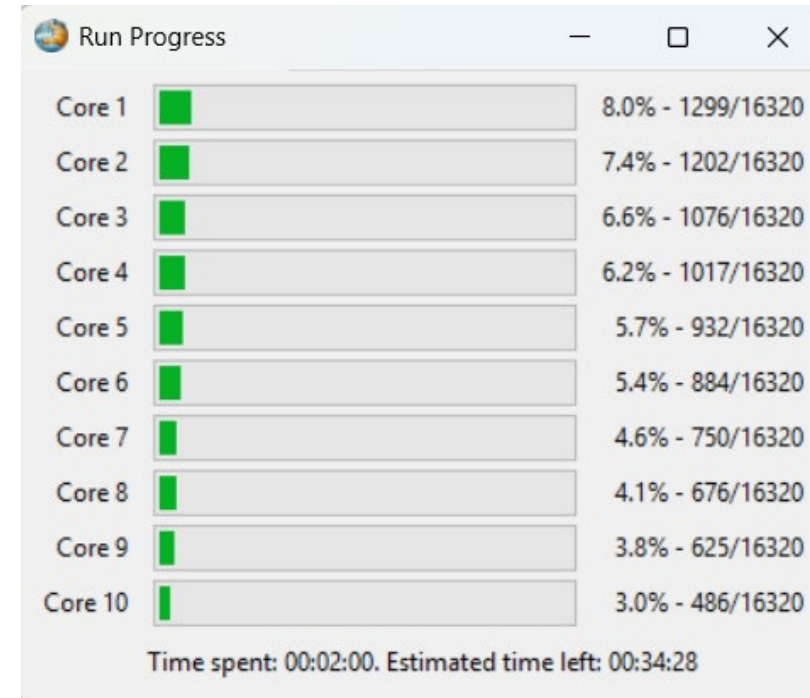
Your case studies



CRISPPY

Performances

- 24-mth study
~**20 seconds** solving time
- Post-2026 EIS alternative
~**500,000 runs**
~**90 minutes** solving time
- GTMaxSL solving/processing time estimate:
1,000-10,000 hours



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Creating a case study

Create a case study

Name of the case study

Folder location

From To

Traces Prices Loads

Number of months: 408 Number of runs: 489,600

Plants to model ☒ GC ☐ BM ☐ MP ☐ CY ☐ FG ☐ FN

Time representation ☒ 168 hours per month ☐ All hours in a month

Create

CRISPPY

Streamlined data import process

CRiSPPy

Case study Help

Current case: C:/CRiSPPy/2025-09-12 Flat bypass, GC optimized, other plants fixed from ref case Saved Save

Case Info Data Import Run Case System & Operations Plants Special events Data visualizer/modifier Results

Import folder C:\CRiSPPy Bulk Import

Import period From July 2024 To November 2024

Traces All Prices All Loads All

	Import option	Specific file/folder/RunID		Bulk import
Monthly hydrology	From Hydrologic database (observed)		☒ Bulk	Import
Load profile	Default load file		☒ Bulk	Import
Project Use Load	C:/CRiSPPy/Supporting tools/Project Use.xlsx		☒ Bulk	Import
Other generation	From Small Hydro V1		☒ Bulk	Import
Price profile	From Daily Deals Reports		☒ Bulk	Import
Plant availability	From CRSP and LAP Unit Availability		☒ Bulk	Import

Monthly release unit ☒ AF ☐ TAF

CRISPPY

Reservoir operating rules

CRiSPPy

Case study Help

Current case: C:/CRiSPPy/2025-09-12 Flat bypass, GC optimized, other plants fixed from ref case Saved

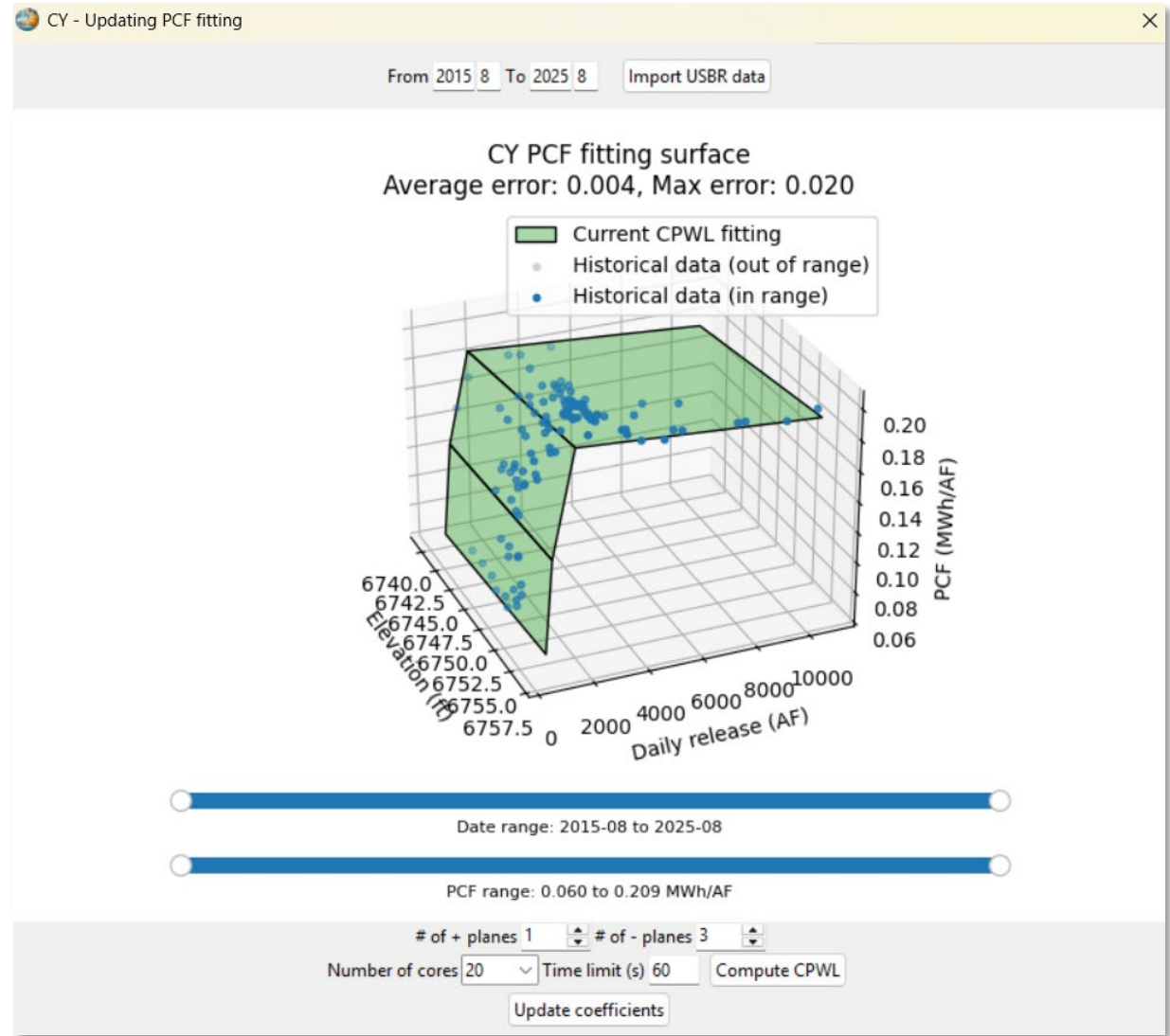
Case Info Data Import Run Case System & Operations **Plants** Special events Data visualizer/modifier Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly multiplier (cfs/24hr/TAF)	9.0	9.0	9.0	9.0	9.0	10.0	10.0	10.0	9.0	9.0	9.0	9.0
Max flow change (cfs/24hr)	8000.0											
Minimum flow rate (cfs)	5000.0 anytime, and 8000.0 between hours 7 to 18											
Maximum flow rate (cfs)	25000.0											
Maximum ramp up (cfs/hr)	4000.0											
Maximum ramp down (cfs/hr)	2500.0											
Saturday fraction	0.85											
Sunday fraction	0.85											
☒ Saturday ≥ Sunday release volume												
☒ Same 24-hr flow pattern on weekdays												
☒ Same 24-hr flow pattern on Saturdays												
☒ Same 24-hr flow pattern on Sundays												

CRISPPY

Machine learning tools

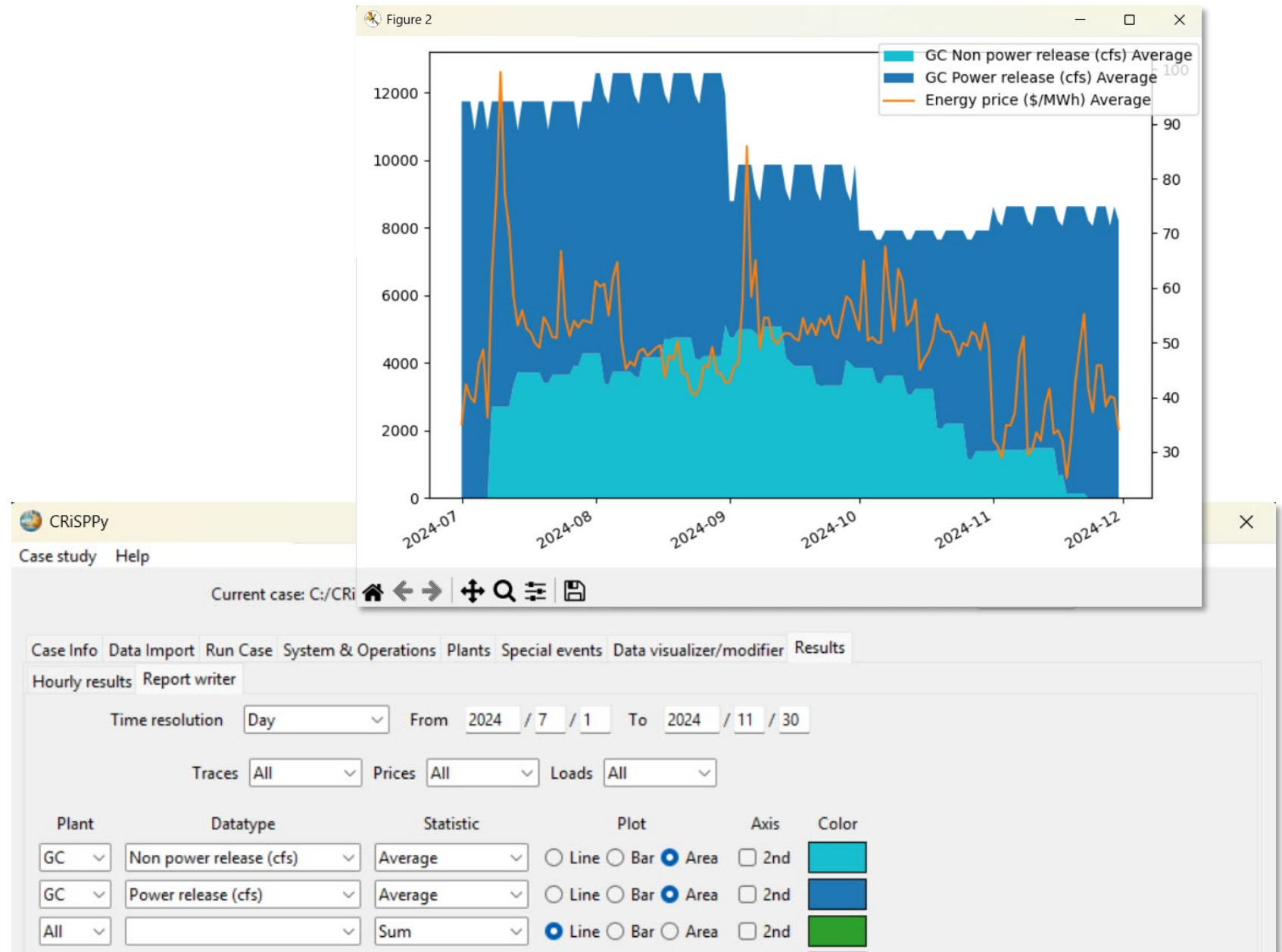
- Relation between storage volume and elevation
- Relation between elevation, release, and water-to-power conversion factor



CRISPPY

Reporting tool

- Datatype selection
- Plant selection
- Time resolution
- Statistical value





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