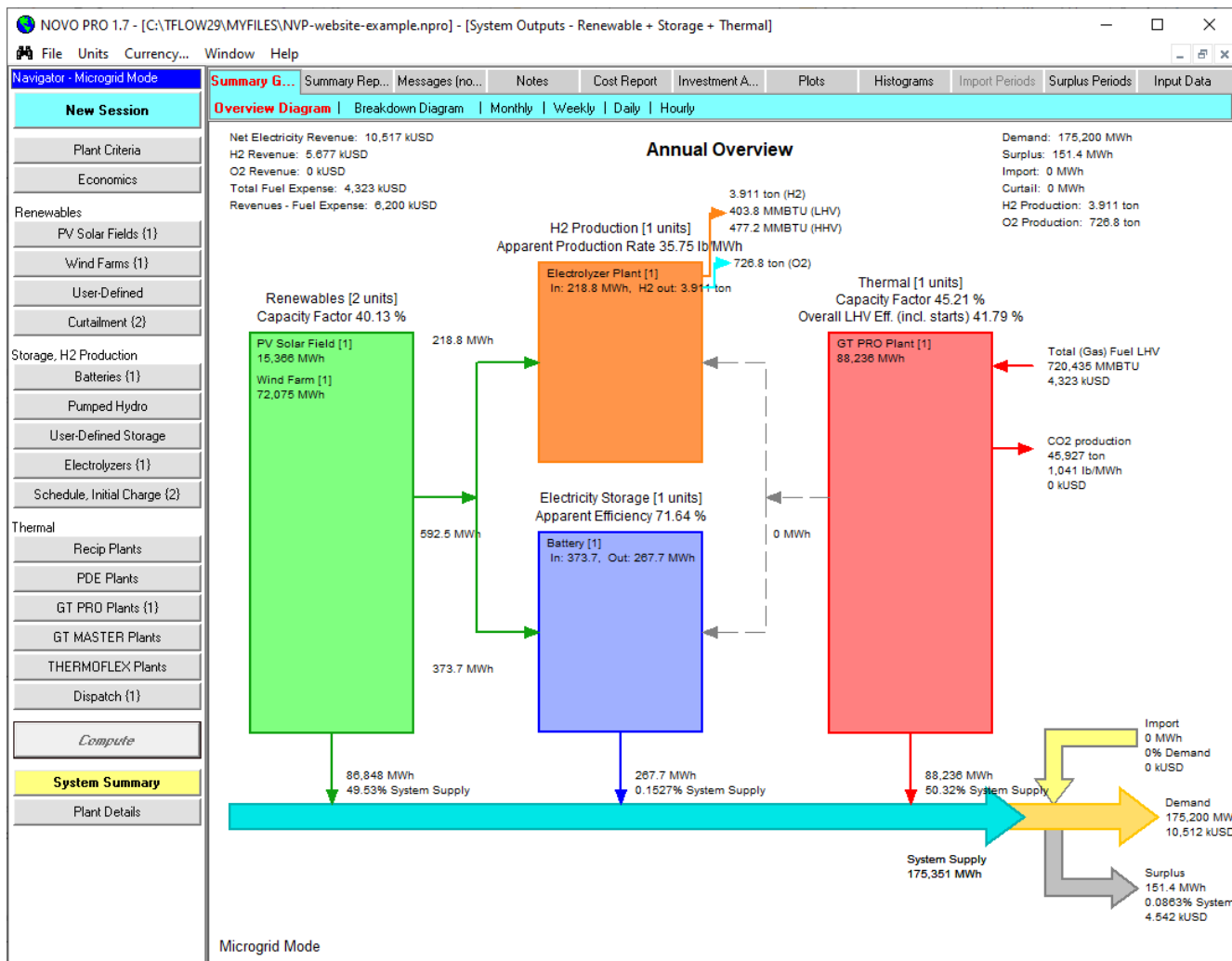


Renewable Energy System Design, Simulation, and Cost Estimation

NOVO PRO® is an **Expert Program** that automates the process of designing and simulating systems comprising solar PV fields, wind farms, batteries, pumped hydro, hydrogen storage and production, and traditional thermal power units.

NOVO PRO enables you to design and simulate a single plant with any combination of these resources, or a larger grid containing multiple resources with different performance, such as Solar fields or Wind farms in different locations and with differing irradiance and wind patterns.

Since the process of designing and optimizing these new complex energy systems is intrinsically intertwined with their operating cycle, the design process in **NOVO PRO** is integrated with the simulation process, with both based on computing annual system performance on an hourly basis for the entire year. The program provides a range of operating scenarios on how to operate these combined resources to meet the demand load.



NOVO PRO contains elements of Thermoflow's **PEACE®** (Plant Engineering And Cost Estimator) module, and provides capital cost estimates for all represented plant types. For any combination of generation resources and operating scenario, it rapidly computes annual performance, including fuel consumed and CO₂ emitted by any included thermal units. Results include annual cash flow and financial pro-forma, aiding informed decision making by planners and operators of complex, multi-resource energy systems.

NOVO PRO 1.7 - [C:\FLOW29\MYFILES\NOVOPRO.npro] - [Plant Criteria]

File Units Currency... Window Help

Navigator - Microgrid Mode

New Session

Plant Criteria

Economics

Renewables

PV Solar Fields

Wind Farms

User-Defined

Curtailment

Storage, H2 Production

Batteries

Pumped Hydro

User-Defined Storage

Electrolyzers

Schedule, Initial Charge

Thermal

Recip Plants

PDE Plants

GT PRO Plants

GT MASTER Plants

THERMOFLEX Plants

Dispatch

Compute

System Summary

Plant Details

Main Notes

Annual Inputs

Flat ambient, load, and pricing

Variable ambient, load, and pricing

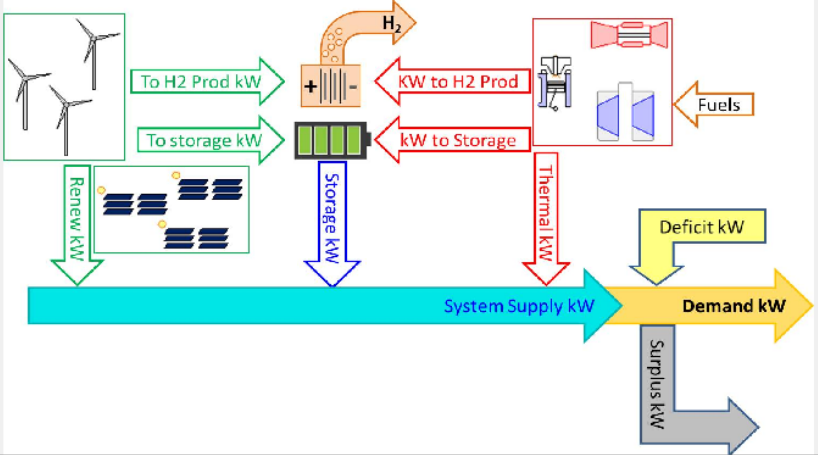
Grid Frequency

50 Hz

60 Hz

Annual Ambient Template TMY Ambient Database Other Annual Inputs Template

		Flat
Ambient temperature	F	59
Ambient pressure	psia	14.7
Ambient relative humidity	%	60
Demand power	MW	5
Demand power price	USD/MWh	60
Surplus power price	USD/MWh	30
Import power price	USD/MWh	150
Curtailed power price	USD/MWh	0
Gas fuel LHV price	USD/MMBTU	6
Oil fuel LHV price	USD/MMBTU	9
Solid fuel LHV price	USD/MMBTU	1.5
Hydrogen export price	USD/lb	0.7257
Oxygen export price	USD/lb	0



The diagram illustrates the energy system's power flows. On the left, wind turbines and solar panels provide 'Renew kW' (green arrow). This power can be used for 'To H2 Prod kW' (green arrow) and 'To storage kW' (green arrow). A battery storage unit is shown with 'Storage kW' (blue arrow) flowing out. On the right, 'Fuels' (orange arrow) feed into a thermal unit, which produces 'Thermal kW' (red arrow). This thermal power can be used for 'kW to H2 Prod' (red arrow) and 'kW to Storage' (red arrow). The 'H2' production unit is also shown. The final 'System Supply kW' (cyan arrow) is compared against 'Demand kW' (yellow arrow). The difference is shown as 'Surplus kW' (grey arrow) or 'Deficit kW' (yellow arrow).