

# Optimizing Production to Maximize Revenue

Session 1A

Track A: Asset Management

HydroVision 2006

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- Currently Director of Sales and Marketing at Synexus Global Inc, a company specializing in development and implementation of software solutions for power companies – “Optimizing Power and Water Resources”
- Over 30 years of hydropower and other generation resources experience
- Fields of expertise include hydrology, hydraulics, hydraulic transients and computer modeling
- BSc and MSc in Civil Engineering Hydraulics from Queen’s University

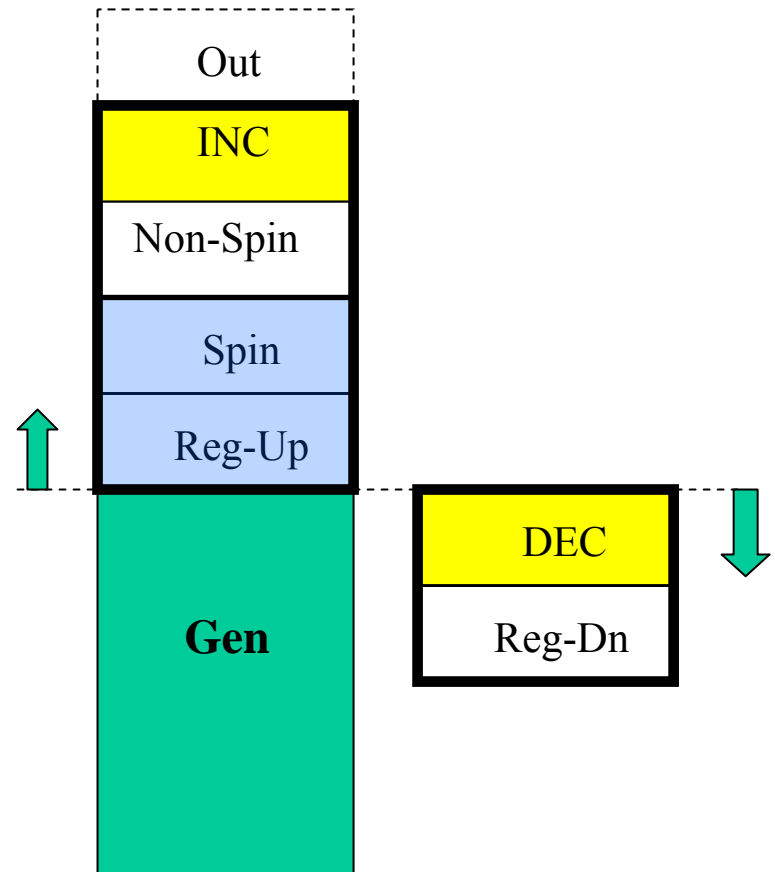


*Net*  
Optimizing Production to Maximize Revenue  
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Software Systems Can Help

# Gross Revenue Determination

- **Energy Product** 
  - Long-term
  - Short-term
  - Real-time
  
- **Ancillary Service Products**
  - **Regulation Reserve**
    - Reg Up
    - Reg Down
  - **Spinning Reserve**
  - **Non-spinning Reserve**
  - **Load Following** 
    - Increments (“Incs”)
    - Decrements (“Decs”)



# Complexities in Net Revenue Determination

- **Energy Product**
  - Long-term
  - Short-term
  - Real-time
- **Ancillary Service Products**
  - Regulation Reserve
    - Reg Up
    - Reg Down
  - Spinning Reserve
  - Non-spinning Reserve
  - Load Following
    - Increments (“Incs”)
    - Decrements (“Decs”)
- **Cost Effects**
  - Start/stop
  - O&M
- **Constraints**



Gross Revenue

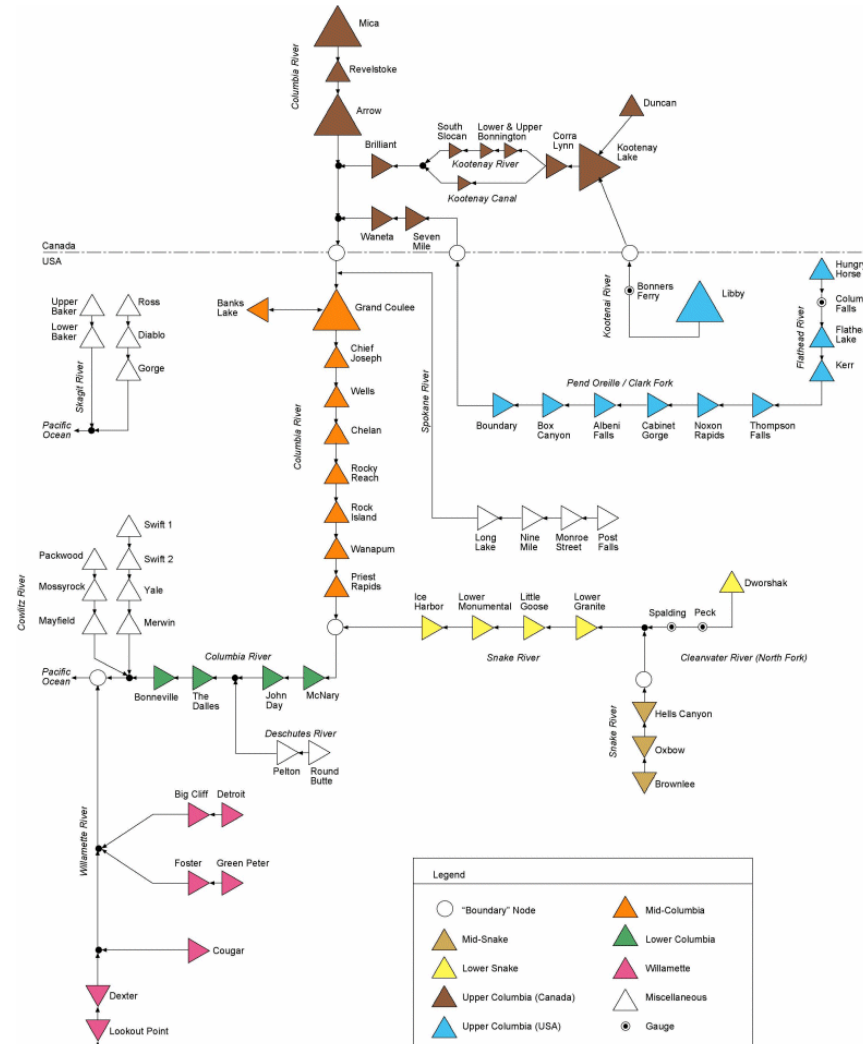
## Complexities in Constraints

- **Hydraulic**
  - Headwater and tailwater level
  - Discharge
- **Real Power**
  - Generation units
  - Generation plants
  - Generation group
- **Reactive Power**
- **Reserve Constraints**
- **Transmission limits and losses**

# Software Systems Can Help...

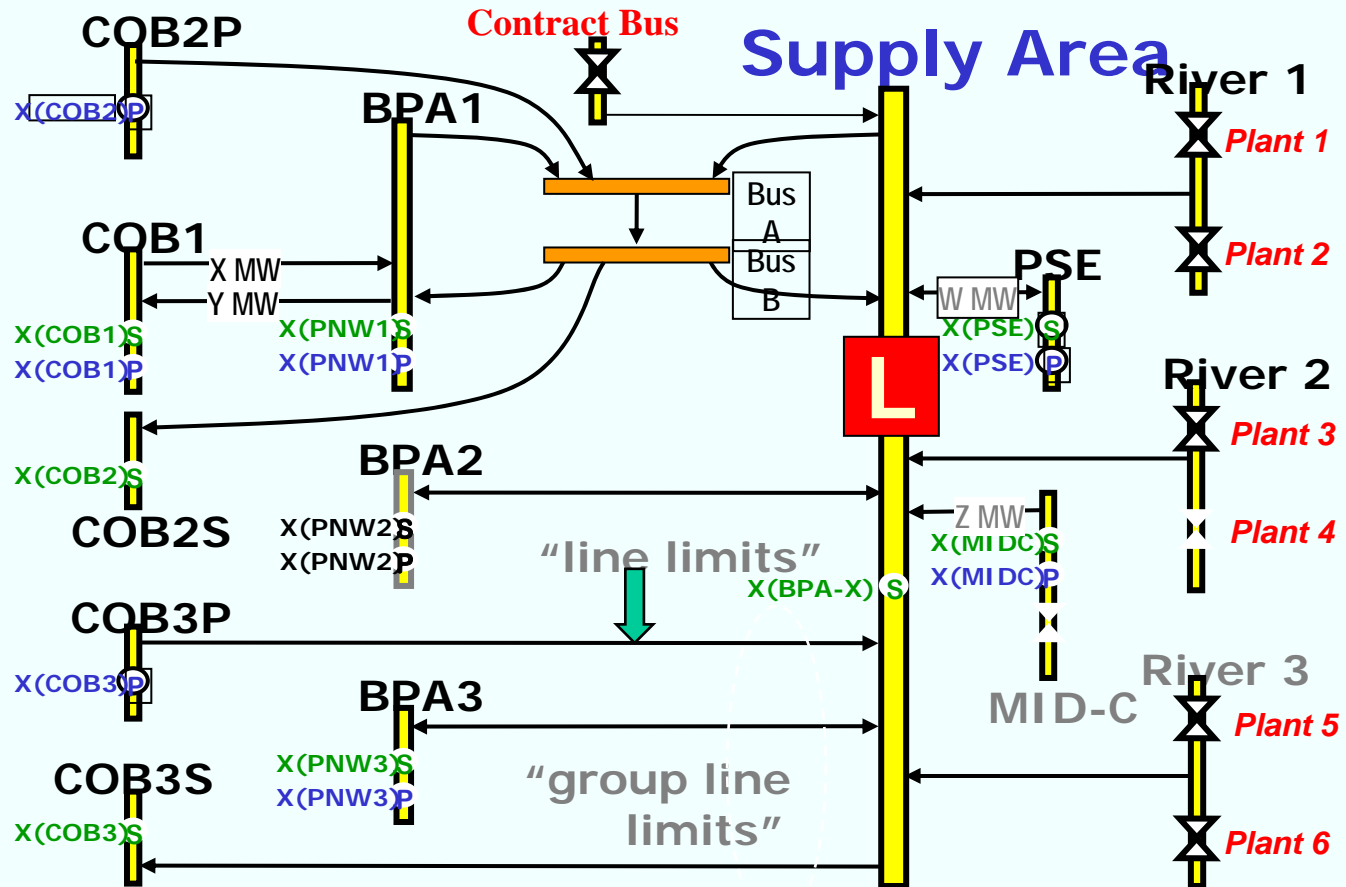
## Resolve Hydraulic Network Issues

### Columbia River System



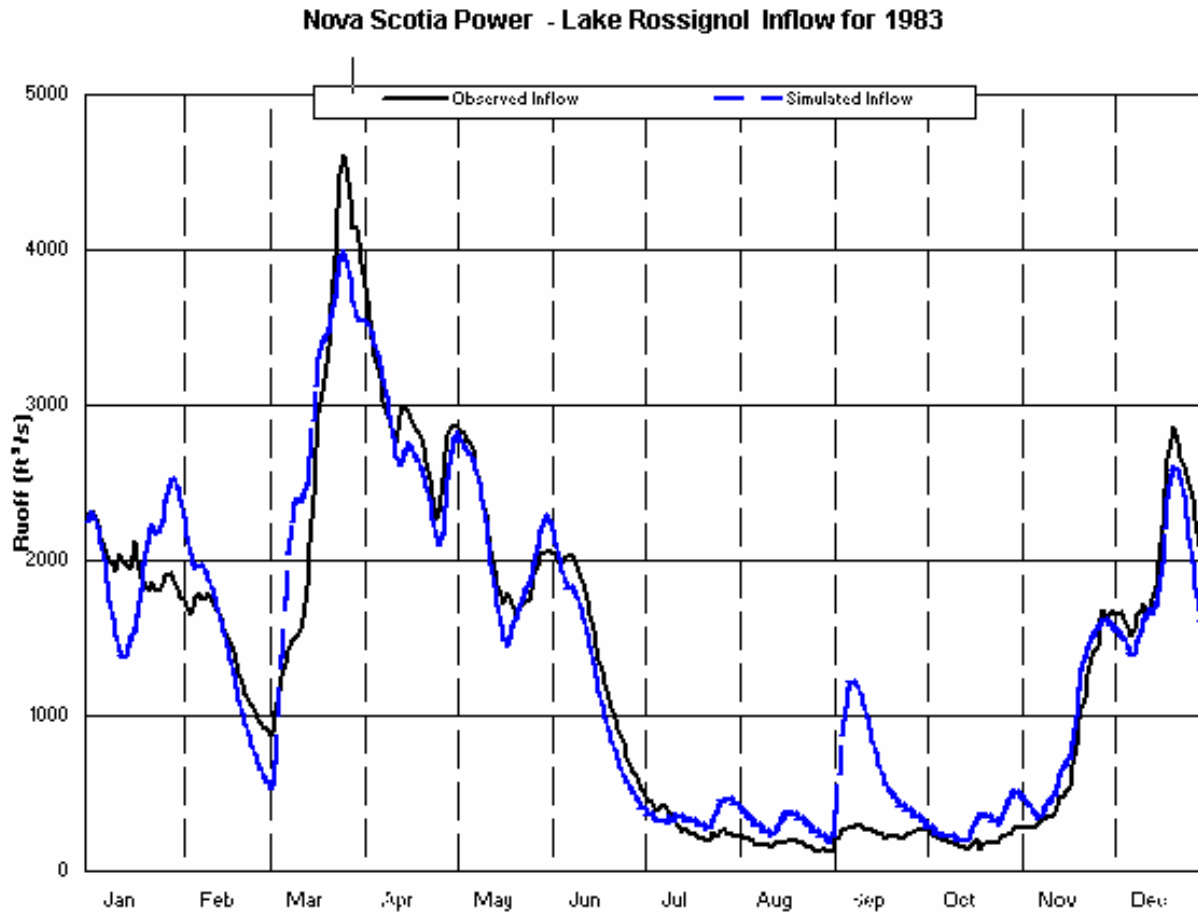
# Software Systems Can Help...

Resolve Transmission Network Issues



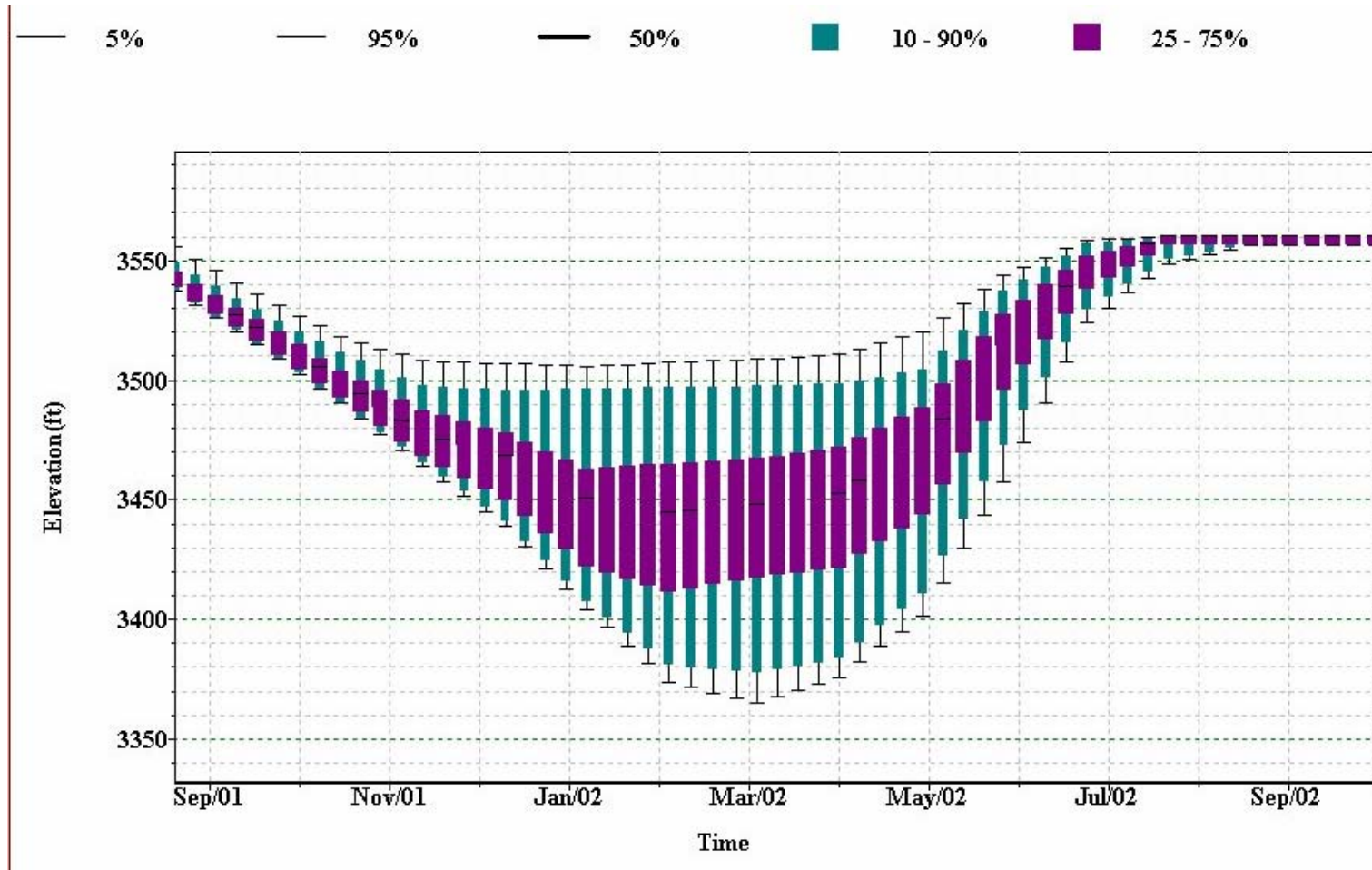
# Software Systems Can Help...

## Forecast Inflows...



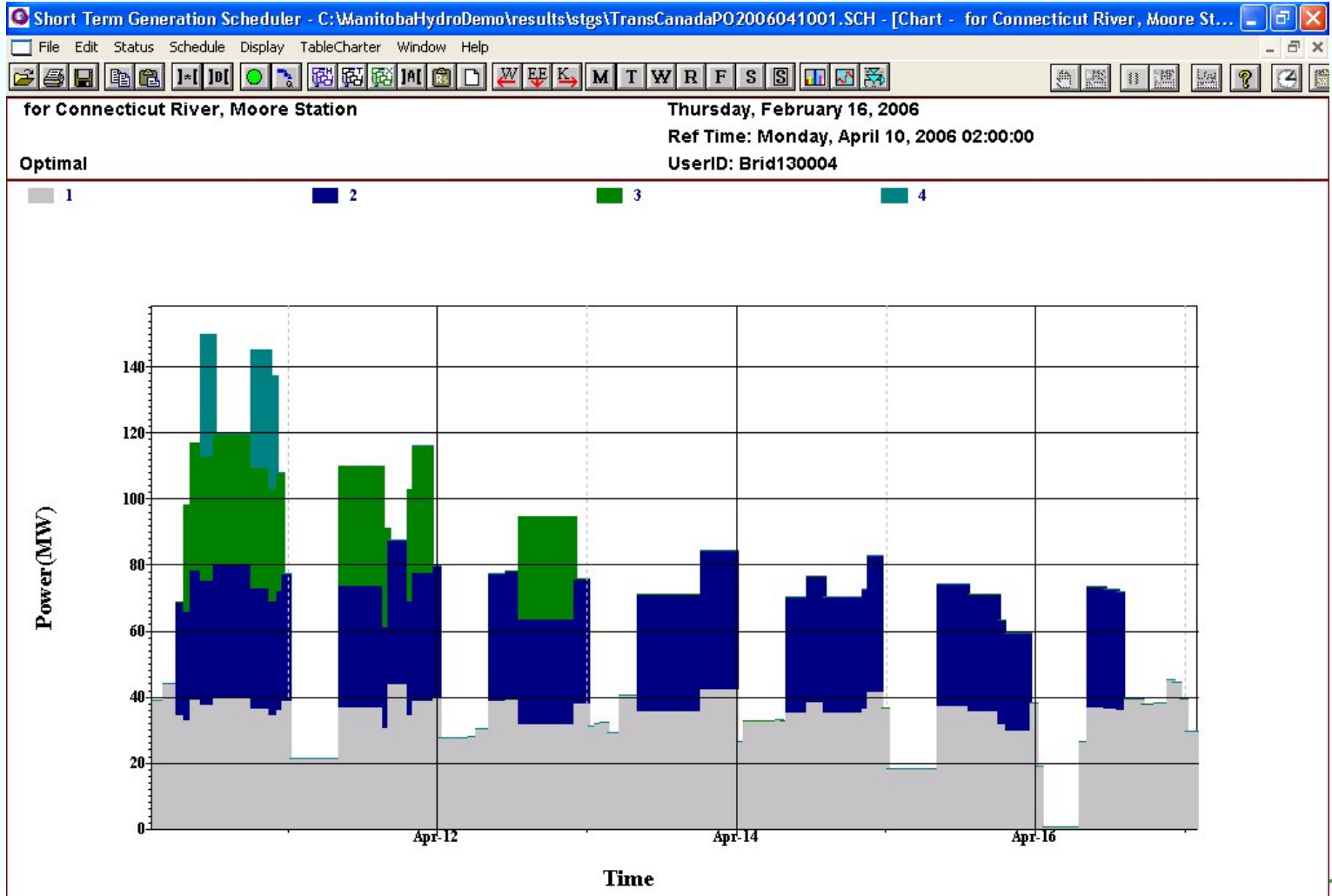
# Software Systems Can Help...

## Manage Risk of Uncertainties...



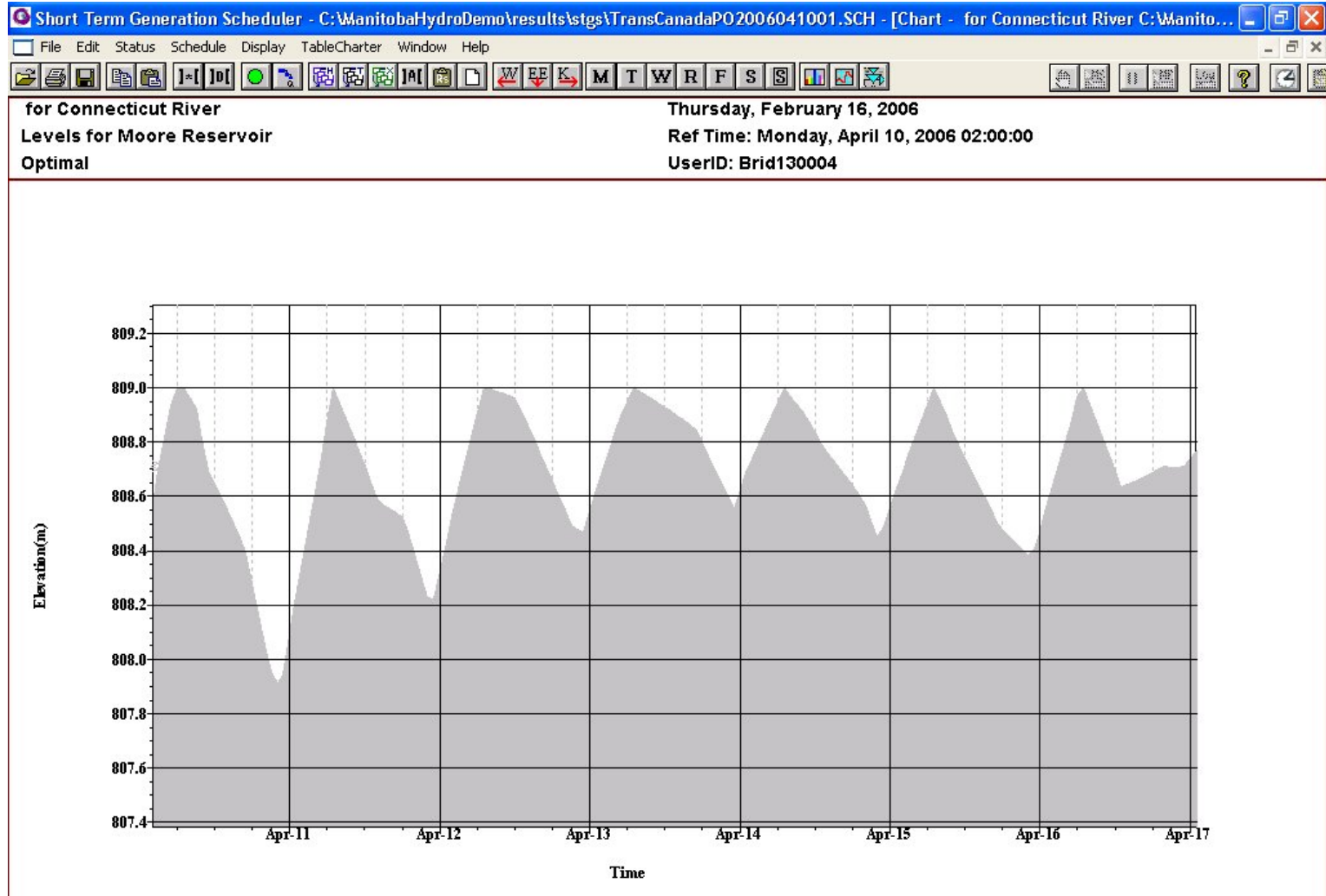
# Software Systems Can Help...

Determine Optimum Timing of Plant and Unit Generation...



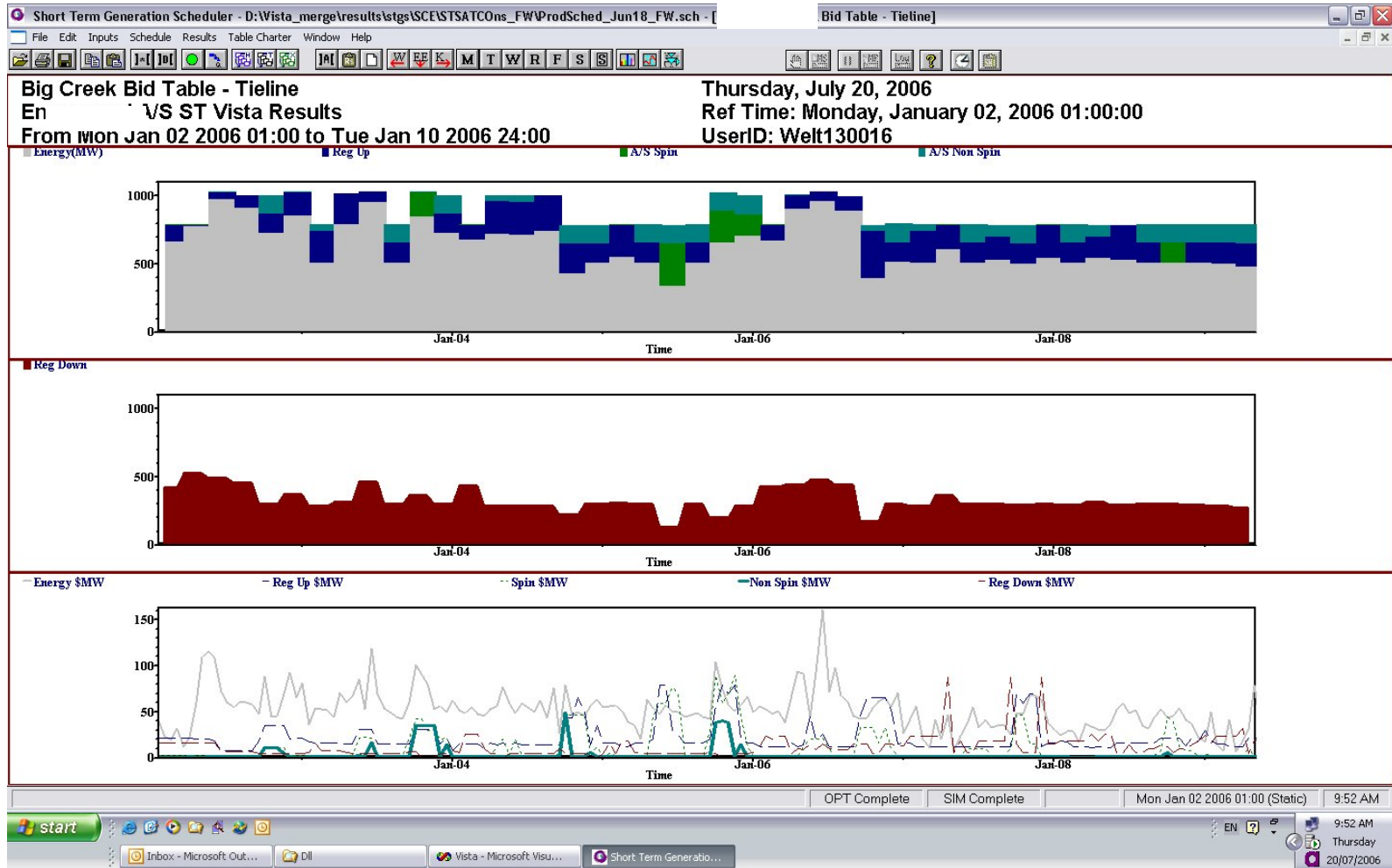
# Software Systems Can Help...

## Plan Hydraulic Operations...



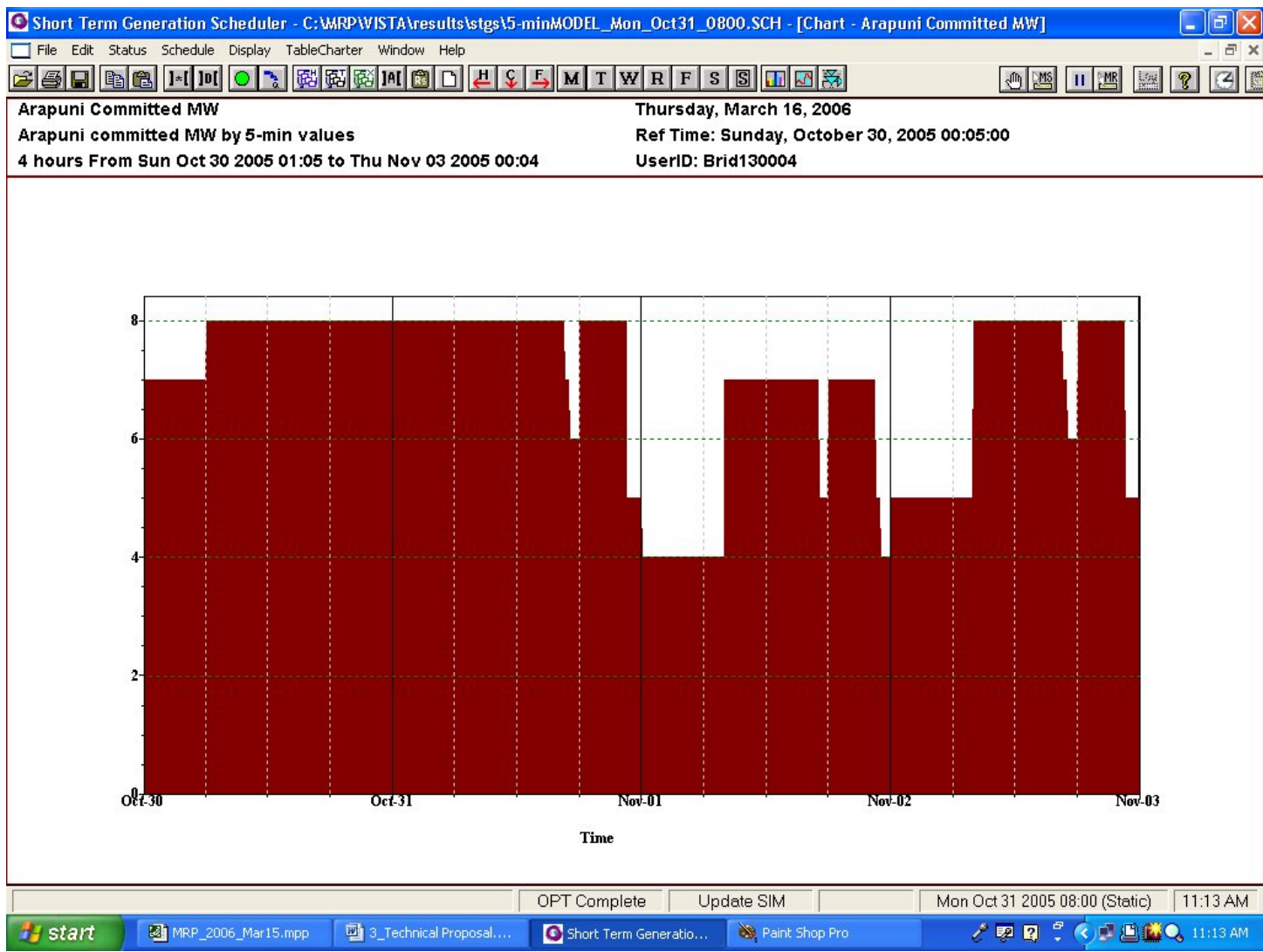
# Software Systems Can Help...

## Determine Optimum Product Mix...



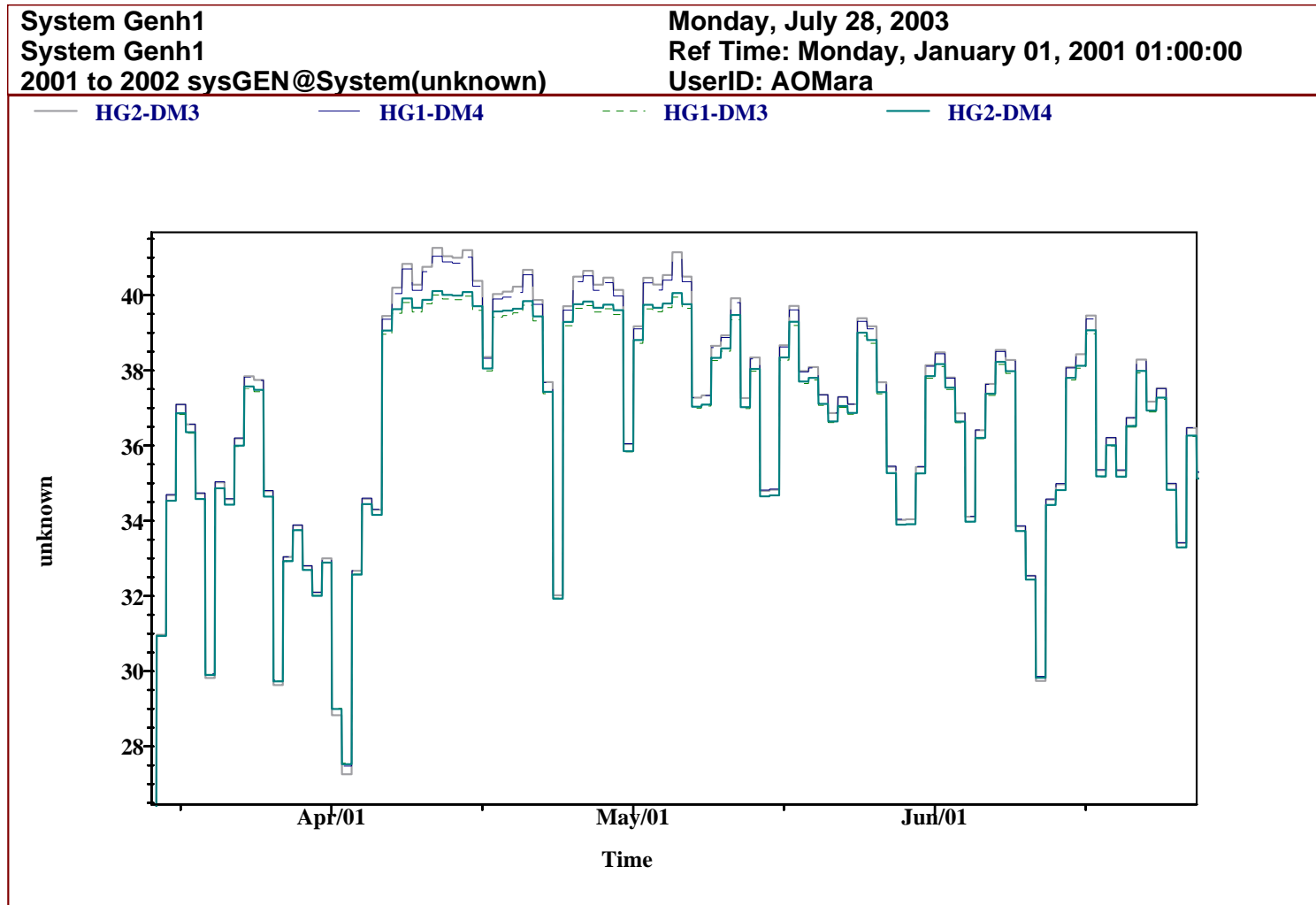
# Software Systems Can Help...

Determine Optimum Dispatch in Real-time...



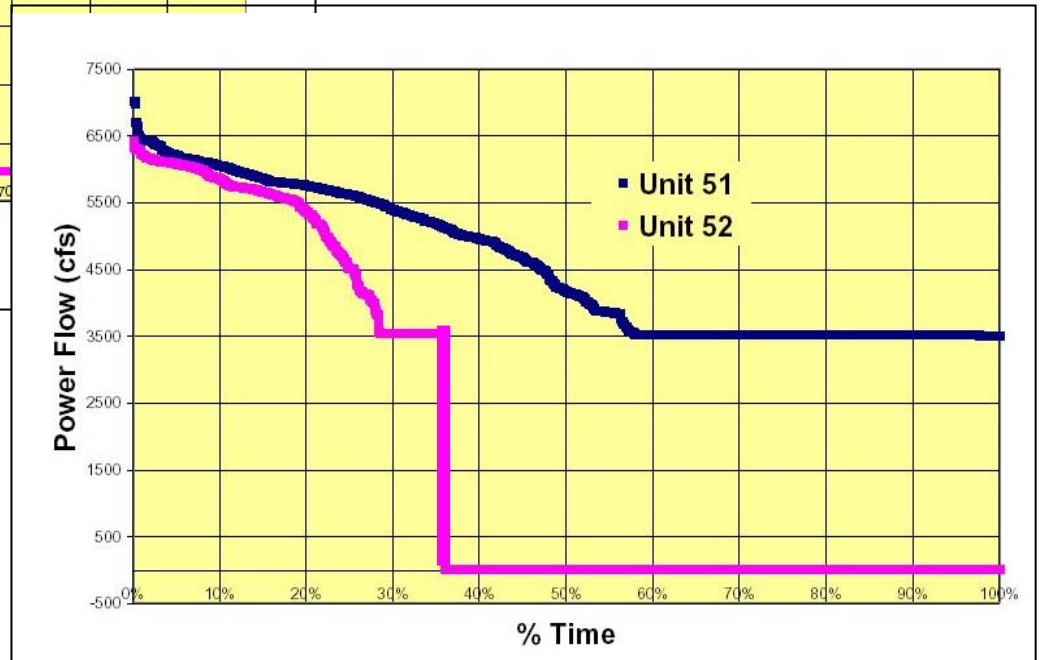
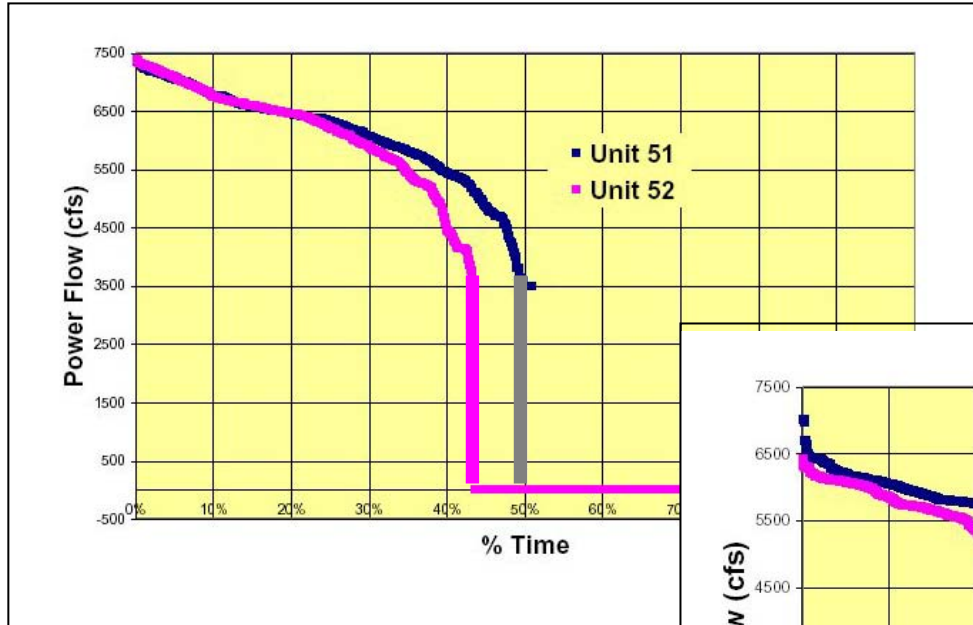
# Software Systems Can Help...

Determine Optimum Facility Upgrades...



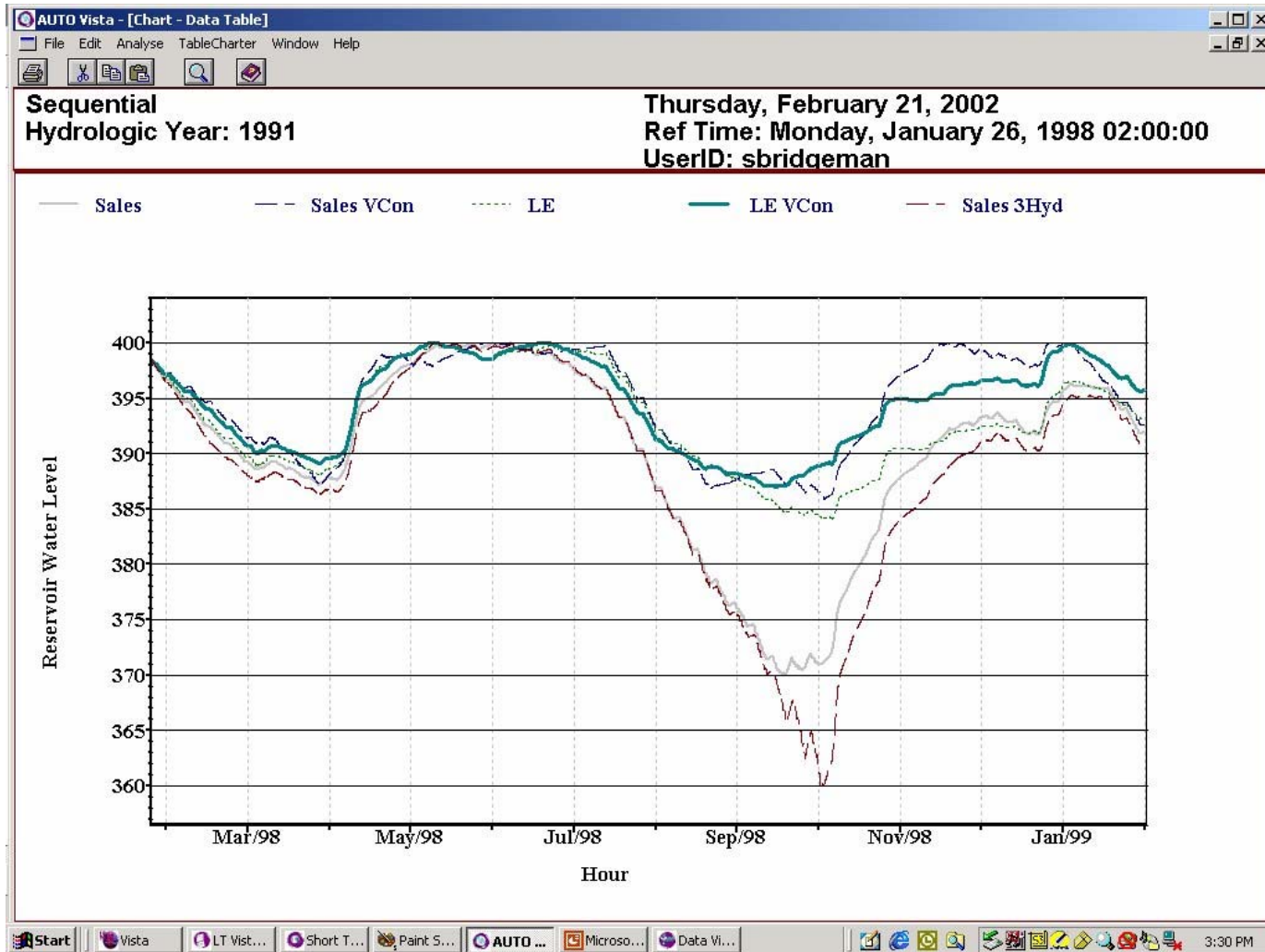
# Software Systems Can Help...

## Assess Hydro-wind Interaction...



# Software Systems Can Help...

## Water Resource Planning / Re-licensing...



Questions and Comments?