# SOP-OUTSCH.0030.0070
# Long Term Outage Economic Analysis

## Contents

**1. Objective ..... 3**

**2. Background/Introduction ..... 3**

**3. Responsibilities ..... 5**

**4. Controls ..... 5**

**5. Instructions ..... 6**

5.1 Set Up Initial Day-Ahead Study System Case ..... 6
5.1.1 Determine Transmission Line Outages to be Studied ..... 6
5.1.2 Determine Peak Load Value for Operating Day ..... 6
5.1.3 Evaluate and Print Transmission Line Outages ..... 6
5.1.4 Print out the Generator Outages ..... 7
5.1.5 Create an EMS Basecase ..... 8
5.1.6 Create an EMS Testcase ..... 8
5.1.7 Run TTC Calculator ..... 8
5.1.8 Determine “Like-day” for Resource Offer Import ..... 9
5.1.9 Create a Study Case Folder ..... 9
5.1.10 Create PROBE input files ..... 9
5.1.11 Adjust Reserve Requirements ..... 11
5.1.12 Adjust Startup/ Notification Times ..... 12
5.1.13 Add Required Manual Constraints ..... 12
5.1.14 Modify Interface Limits ..... 12
5.1.15 Identify Must Run Resource(s) ..... 13
5.1.16 Manually Change Device Status ..... 13
5.1.17 Enter any Applicable Abnormal Limits or NX-9 Limit Changes ..... 14
5.1.18 Compare Excluded Contingencies ..... 14
5.1.19 Set Up Probe Options ..... 14
5.2 Run the Initial Day-Ahead Study Basecase with the Transmission Outage Being Studied “IN-SERVICE” (i.e., Exclude the Outage) ..... 15
5.2.1 Run PROBE BaseCase ..... 15

5.3 Determine Incremental Production Cost (i.e., Include the Transmission Line Outage Being Studied) ..... 17
5.3.1 Run Additional PROBE Cases to Determine Incremental Production Costs ..... 17

**6. Performance Measures ..... 19**

**7. References ..... 19**

**8. Revision History ..... 19**

**9. Attachments ..... 20**

Attachment A – Long-Term Outage Economic Analysis Checklist ..... 21
Attachment B - PROBE Look-Ahead Study Options Set-up ..... 27
Attachment C - Casebuilder Set-up and Operation ..... 43
Attachment D - PROBE Batch Mode Set-up and Operation ..... 51

# 1. Objective

Evaluate long-term transmission outages for a given Operating Day based on anticipated loads, network configuration and Resource outages to determine economic cost per outage.

Reposition transmission outages that exceed an incremental production cost of $200,000 per week as appropriate.

A Planned Transmission Outage request that is submitted ninety (90) days or greater in advance of the start date and takes a Major Transmission Element (MTE) out-of-service (OOS), is subject to a Long Term Outage Economic Analysis evaluation. This procedure is performed as necessary, Monday through Friday, excluding weekends and holidays.

# 2. Background/Introduction

This procedure is intended to provide instructions for performing an economic analysis of transmission outages in the Long Term using the PoRtfolio Ownership Bid Evaluation (PROBE) application. PROBE can calculate the production cost within a twenty-four (24)-hour period (multiple days can be studied simultaneously). This economic analysis can determine the production cost impact of an individual outage through case comparison analysis and can project Locational Marginal Prices (LMPs) and Resource commitment. By providing an assessment of potential market inefficiencies at least ninety (90) days in advance of the start date of the transmission outage, the Transmission Owner (TO) and Market Administration are afforded an opportunity to evaluate actions that could alleviate the economic exposure. These actions include coordinating Resource and transmission outages, advanced notifications to affected parties and publicly posting the outage information, if permissible under the ISO New England Information Policy.

Triggers:

- A Planned Transmission Outage request that is submitted ninety (90) days or greater in advance of the start date and takes an MTE OOS may receive a Long Term Outage Economic Analysis evaluation. Some equipment identified as an MTE does **not** create congestion but imposes requirements on local Resources. Through reliability studies and system experience, the Long Term Outage Coordination (LTOC) Department will determine when an MTE outage causes adverse economic impact. The LTOC staff may then perform an economic analysis evaluation as necessary for planned long-term outages (both transmission and Resource based on the outage scenario). This procedure is performed as necessary, Monday through Friday, excluding weekends and holidays.

Inputs:

- Resource offers
- Increment offers and decrement bids (use is optional)
- Transmission outages
- Load Forecast
- Operating Reserve Requirements
- Interface limits
- External tie-line bids
- Resource requirements for reliability/voltage
- Resource reductions
- Resource outages

Outputs:

- Outage cost determination
- PROBE case reports
- Long Term Outage Economic Analysis Checklist - Attachment A

Applications/Systems/Tools

- PROBE
- CaseBuilder
- Generation Requirements for Transmission Constraints (GRT) spreadsheet
- ISO Outage Scheduling software
- EMS Powerflow/STCA
- EMS DoubleC
- Total Transfer Capability (TTC) Calculator

## 3. Responsibilities

The Outage Coordinator, Long-Term Outage Coordination, performs this procedure.

## 4. Controls

1. System Access

   PROBE, CaseBuilder, EMS, and TTC Calculator access is required and obtainable through the Enterprise Access Management software with the appropriate approvals.

# 5. Instructions

## 5.1 Set Up Initial Day-Ahead Study System Case

*5.1.1 Determine Transmission Line Outages to be Studied*

1. The Outage Coordinator shall DETERMINE transmission outages to be analyzed from the "Economic Study Tracking" spreadsheet by performing the follow actions:

   A. OPEN the Long-Term Outage Coordination SharePoint site.

   B. OPEN the "Economic Study Tracking" spreadsheet located in the Documents folder.

   C. Using the following criteria, DETERMINE which transmission line outage should be studied:

      (1) Submitted ninety (90) days or greater in advance of the start date

      (2) Is an MTE

      (3) Imposes greater requirements than local Resources

   D. RECORD the transmission outage that is to be studied on Attachment A – Long-Term Outage Economic Analysis Checklist along with study-date(s).

   E. If applicable, the Outage Coordinator shall also SELECT any other Long-Term Outage of significant interest for study.

*5.1.2 Determine Peak Load Value for Operating Day*

1. Using the 50/50 loads or a more appropriate load level, the Outage Coordinator shall CROSS REFERENCE the Operating Day date with a peak load value and RECORD the "Projected Peak Load" on Attachment A – Long-Term Outage Economic Analysis Checklist.

*5.1.3 Evaluate and Print Transmission Line Outages*

1. The Outage Coordinator shall EVALUATE transmission outages for the study-day(s) as follows:

   A. OPEN the ISO Outage Scheduling software application.

   B. From the top menu bar, SELECT "Reports/Transmission/ISO Report".

   C. In the "Filter" box, SELECT the "Custom" button in the "Date Range" box.

   D. In the bottom left-hand box titled "End Date On or After" ENTER the start date.

   E. In the upper right-hand box titled "Start Date On or Before" ENTER the end date.

   F. For the "Outage Status", SELECT the following:

(1) "Interim Approved"

(2) "Approved"

(3) "Implemented"

(4) "Study"

(5) "Negotiate"

G. SELECT "Generate" and VERIFY an Excel spreadsheet appears showing the filtered transmission line outages.

H. PRINT "Outages".

I. INSPECT transmission outages for the study period.

*5.1.4 Print out the Generator Outages*

1. The Outage Coordinator shall PRINT the Generator Outages for study-date(s) as follows:

A. OPEN the ISO Outage Scheduling software application.

B. From the top menu bar, SELECT "Reports/Generation/Generation Outage Summary".

C. In the "Filter" box, SELECT the "Custom" button in the "Date Range" box.

D. In the bottom left-hand box titled "End Date On or After" ENTER the start date.

E. In the upper right-hand box titled "Start Date On or Before" ENTER the end date.

F. For the "Outage Status", SELECT the following:

(1) "Approved"

(2) "Implemented"

G. For the "Priority Status", SELECT "ALL"

H. For the "Constraint", SELECT "ALL"

I. For the "Asset Name", SELECT "ALL"

J. SELECT the "Generate" button and PRINT an EXCEL spreadsheet

*5.1.5 Create an EMS Basecase*

1. The Outage Coordinator shall CREATE an EMS Basecase with the study outage "In-Service" as follows:

> **NOTE**
>
> Refer to SOP-OUTSCH.0030.0025 - Perform Long Term Outage Coordination - Transmission for instructions to create a basecase within EMS.

   A. From the appropriate Powerflow Basecase, CREATE a Basecase that reflects the study-day(s) with the study outage in-service

   B. EXPORT to PowerWorld as an Aux file

*5.1.6 Create an EMS Testcase*

1. The Outage Coordinator shall CREATE an EMS Testcase with the study outage "Out of Service" as follows:

   A. From the EMS Basecase that was created in the previous step, CREATE a Testcase that reflects the study-day(s) with the study outage "Out of Service".

*5.1.7 Run TTC Calculator*

1. Using the TTC Calculator, the Outage Coordinator shall DETERMINE Basecase interface limits (e.g., Connecticut Import Proxy value) as follows:

   A. LOG into TTC Calculator

   B. SELECT the "HE" peak hour of the day (or another depending on the study)

   C. SELECT "Day Ahead" for Target Application

   D. SELECT the study Basecase that was exported from the EMS program

   E. ENTER a description for the case

   F. SELECT interfaces for study (usually "All")

   G. SELECT "Run"

   H. When the TTC Calculator has finished processing, PRINT the results and/or SAVE as .pdf to case folder

   I. When each interface calculation is verified as valid:

      (1) COPY the appropriate values into a GRT Spreadsheet

      (2) PRINT for later use

   J. For the interfaces that are impacted from an outage:

(1) COPY steps above for Testcase as appropriate

(2) RE-RUN the TTC Calculator

*5.1.8 Determine "Like-day" for Resource Offer Import*

1. Using the Projected Peak Load determined in step 5.1.2 REVIEW historical load forecast reports and LOCATE a day that approximately clears the referenced peak load.

   A. REVIEW historical loads that are emailed from the Forecaster and perform the following:

      (1) SELECT one of the following:

         a. A weekday or weekend day that matches the 50/50 peak load value

         b. The latest offer data depending on the normalcy of the data

      (2) CONSIDER using the offer data from a comparable month/season from the previous/current year.

   B. RECORD day on Attachment A – Long-Term Outage Economic Analysis Checklist.

*5.1.9 Create a Study Case Folder*

1. The Outage Coordinator shall CREATE a new study case folder:

   A. START "Remote Desktop Connection"

   B. LOG IN to production server: TARAENFPRD1

   C. NAVIGATE to appropriate user directory

   D. CREATE a new study case folder with the appropriate name (e.g. "batch_run_MM_DD-MM_DD" or "MM_DD_YYYY" or "1845_Line_outage", etc.).

*5.1.10 Create PROBE input files*

1. CREATE PowerWorld model and a contingency file (if desired) for the PROBE market run as follows:

   A. LOAD all-lines-in basecase to EMS Powerflow and run solution

   B. CLICK "Data Retrieval" and enter appropriate Savecase Title to include the network model number and date (example: ALI_2.X.XX_Jan26)

   C. CLICK "Model File" to create the PowerWorld model file. The letters "model_pf_pwrflow" will be automatically appended

   D. PERFORM one of the following actions:

- COPY EMS all-lines-in basecase into STCA and RUN solution
- USE the contingency case that is automatically updated via the control room

E. CLICK "Data Retrieval" and enter appropriate Savecase Title to include the network model number and date (example: ALI_2.X.XX_Jan26).

F. CLICK "Generate PowerWorld Contingency File" and VERIFY the letters "ctgs_stca" are automatically appended to the resulting file.

**NOTE**

CaseBuilder will create a folder for each study-day selected (e.g., if five (5)-day spread is selected, then five (5) separate daily folders will be created with custom files for that day). Only one (1) market (source) day is allowed per CaseBuilder run. If more than one (1) source day is desired for batch run studies, then CaseBuilder will need to be run as many times as market (source) days are needed.

2. The Outage Coordinator shall CREATE PROBE input files with CaseBuilder as follows:

A. START remote desktop connection

B. LOG into TARAENFPRD1

C. OPEN the "C" drive

D. OPEN the "IT DA Supported Apps" folder

E. OPEN the "Shortcut to CaseBuilder" file

F. In the upper left-hand corner, SELECT the "Export files" icon

G. In the "Study Mode" box, SELECT "PROBE - Long Term Economic Look Ahead"

H. In the "Case Name" box, ENTER the appropriate name

I. In the "Destination Folder" SELECT the appropriate destination folder to store the data (and currently STORE the respective destination folders in your personal folder on TARAENFPRD1).

J. SELECT the Start/End dates of the study

K. SELECT the data source day for bids and offers

L. SELECT the proper "N-1 Contingency Override file" (this can either be a specific contingency file that was created by the user or the contingency file that is automatically created "ctgs_rtca_autorun_rtca_ems")

M. SELECT the proper "Network Model File"

N. SELECT the proper "Zonal Factors File"

O. SELECT the appropriate "Forecast File"

P. To create files, SELECT the "RUN (Export)" button

Q. CLOSE the CaseBuilder program

*5.1.11 Adjust Reserve Requirements*

1. As necessary, ADJUST the reserve requirements as follows:

A. OPEN the "reserve_requirements.csv" file

B. ENTER the appropriate reserve requirements applicable to the available Resources

*5.1.12 Adjust Startup/ Notification Times*

1. If this is a one (1) day study, ADJUST the startup/notification times and PERFORM the following:

   A. OPEN the "bid_data.csv" file

   B. SET all start-up times and notification times to "0"

   C. SAVE the file

2. If this is a multiple day scenario, ADJUST only the first day and PERFORM the following:

   A. OPEN the "bid_data.csv" file

   B. SET all start-up times and notification times to "0"

   C. SAVE the file

*5.1.13 Add Required Manual Constraints*

1. ENTER any constraints (e.g., stability limits, external tie limits or Resource limitations) determined from the transmission/Resources outages into the "flowgate_override.csv" file

   A. As necessary, REFER to Transmission Operating Guides

*5.1.14 Modify Interface Limits*

1. MODIFY interface limits with appropriate values from the GRT spreadsheet as follows:

   A. OPEN the "flowgate_override.csv" file and as appropriate, CHANGE the interface values derived from the GRT spreadsheet

   B. If running Batch Mode, as appropriate, COPY the data into the other days flowgate override files

*5.1.15 Identify Must Run Resource(s)*

**NOTE**

Under the Forward Capacity Market (FCM), a Must Run Resource can only be committed up to its Capacity Supply Obligation (CSO).

1. The Outage Coordinator shall ENTER any Resources designated as "Must Run" for 1st or 2nd contingency reliability into the "unit_status.csv" file with a designation of "S" for the hours required.

**NOTE**

- A = Available, or offered in Economics
- P = Pool Scheduled, will appear if the unit_status.csv file is produced from a solved Day-Ahead case
- M = Must Run, meaning Self-Schedule
- U = Unavailable
- S = Manually Scheduled

2. In the "unit_status.csv" file, ENTER any identified non-fast start units committed for reliability with a designation of "S"

*5.1.16 Manually Change Device Status*

1. The Outage Coordinator shall IDENTIFY any breakers or disconnects that need to be manually entered due to any of the following:
    - overrun outages returning during the Operating Day
    - compensatory actions (e.g., Transmission Operating Guides)
    - notification from any of the System Operations Departments
    - notes in the comment section of ISO Outage Scheduling software

**NOTE**

Breakers and disconnects are entered in hour ending (HE).

2. In the "Breaker_Override.csv" file, ADD a breaker or disconnect as a new line for the appropriate time periods for each study-day

*5.1.17 Enter any Applicable Abnormal Limits or NX-9 Limit Changes*

1. If necessary, ENTER branch limit changes as new lines in the "Branch_Override.csv" file for the appropriate time periods for each study-day.

*5.1.18 Compare Excluded Contingencies*

1. CHECK the contingencies that are "Excluded" in the "Contingency_override.csv" file against the contingencies "Disabled" in RTCA and RESOLVE any discrepancies.

*5.1.19 Set Up Probe Options*

1. The Outage Coordinator shall SET UP PROBE options and SELECT reports using either Method 1 or Method 2 below:

   A. Method 1

      (1) REFER to ATTACHMENT B - PROBE Look Ahead Study Options Set-up

      (2) VERIFY options set as shown

   B. Method 2

      (1) CLICK "Import Scenario Settings" from the PROBE simulator main menu

      (2) SELECT PROBE_ViewerNE_XXX_Options.csv"

## 5.2 Run the Initial Day-Ahead Study Basecase with the Transmission Outage Being Studied "IN-SERVICE" (i.e., Exclude the Outage)

*5.2.1 Run PROBE BaseCase*

1. If running a multi-day scenario (Batch Mode), the Outage Coordinator shall REFER to Attachment D - PROBE Batch Mode Set-up and Operation
2. If running a one (1) day scenario, the Outage Coordinator shall RUN the PROBE BaseCase as follows:

   A. DOUBLE CLICK on the PROBE icon to log into the PROBE viewer program.

   B. On the Input Files tab, NAVIGATE to the study folder in the Data Directory field.

> **NOTE**
>
> After selecting the proper study folder, the pertinent files are automatically loaded into PROBE. Any files that **cannot** be found will be highlighted in pink. For "Look Ahead" study mode, the "final_dispatch", "demand_dispatch", and cleared_transactions" files are **not** needed and should be pink.

   C. In the "Date" field, VERIFY "Use Date" is **not** selected

   D. In the "Select Mode" field, VERIFY "Look Ahead" is selected

   E. SELECT "Enforce Engine Restart"

   F. SELECT "Probe Simulator" tab and VERIFY all reports are checked as desired

   G. SET the study-date in the "Study Window" tab in Simulator Options (See Attachment B - PROBE Look-Ahead Study Options Set-up, Section 12)

   H. CLICK "Create Report" only for the reports checked in this view or SELECT "Create Reports from ALL Tabs for all reports selected

   I. After the case has solved:

      (1) REVIEW the "Input Warnings Summary" for any input file error

      (2) As necessary, MODIFY any input files and RE-RUN the case as follows:

         a. CLICK "Create Custom ISO-NE Reports" button and file path

         b. SELECT the desired reports

c. CLICK "Create"

J. REVIEW all selected reports and PERFORM the following:

(1) As necessary, MAKE adjustments and RE-RUN the case

(2) When satisfied with the results, RECORD "Bid Production Cost" on Attachment A – Long-Term Outage Economic Analysis Checklist

## 5.3 Determine Incremental Production Cost (i.e., Include the Transmission Line Outage Being Studied)

*5.3.1 Run Additional PROBE Cases to Determine Incremental Production Costs*

1. The Outage Coordinator shall RUN additional PROBE cases to determine incremental production costs as follows:

   A. APPEND the Original data file with "_Basecase"

   B. COPY the data file for use with the test case

   C. INCLUDE transmission outage being studied in the "Trans_Outage.csv" file

   D. To add each Must Run Resource for the outage being studied, in the "Unit_Status.csv" file PERFORM the following:

      (1) CHANGE the Must Run Resource status to "S"

      (2) SAVE the file

   E. In the "interface_generic.aux" file, MODIFY any interface limits or Resource limitations associated with the outage being studied and SAVE the file

   F. In the "Breaker_Override.csv" file, MODIFY any breakers for the outage being studied and SAVE the file

   G. In the "Branch_Override.csv" file, MODIFY any branch limits for the outage being studied and SAVE the file

   H. Select "Enforce Engine Restart"

   I. To execute PROBE, CLICK "Create Reports" or "Run Batch Process…"

   J. For each case run, PRINT and RETAIN Production Cost, System Summary, Reserve Summary, Unit Hourly, Constraint Summary LMP Summary and Transaction Hourly Details reports

   K. RECORD the incremental Production Cost on the Attachment A – Long-Term Outage Economic Analysis Checklist

   L. SUBTRACT the "Base Case" Production Cost from the Test Case" value and EVALUATE Production Cost (less positive or more negative is a better Production Cost)

   M. If production cost delta is greater than $200,000 per week (extrapolated from a one (1) day run), NOTIFY the Manager, Long-Term Outage Coordination

N. If necessary, CONTACT the affected LCC and DISCUSS potential reschedule dates

O. If the outage was moved, WRITE a brief summary of the analysis

P. RECORD the Production Cost delta and, if necessary, the "Reposition Cost" in the ISO Outage Scheduling software application and VERIFY the "Economic" flag for the studied outage request.

Q. UPDATE the Long-Term Outage Coordination "Economic Study Tracking" spreadsheet

## 6. Performance Measures

This procedure is properly followed when the Long-Term Outage Economic Analysis Checklist is completed and applicable notifications are made.

## 7. References

ISO New England - ISO New England Inc. Transmission, Markets, & Services Tariff, Section III, ISO New England Market Rule 1 - Standard Market Design (Market Rule 1)

ISO New England - ISO New England Inc. Transmission, Markets & Services Tariff, Attachment D - ISO New England Information Policy

ISO New England Operating Procedure No. 3 - Transmission Outage Scheduling (OP-3)

SOP-OUTSCH.0030.0025 - Perform Long Term Outage Coordination - Transmission

## 8. Revision History

| Rev. No. | Date | Reason | Contact |
|---|---|---|---|
| 0 | 12/17/08 | Initial draft procedure. | Peter Harris |
| 1 | 04/02/09 | Biennial review;<br>Revised for CROW software and process changes | Peter Schroeder |
| 2 | 06/01/10 | Changed procedure ownership to Peter Bernard;<br>Deleted Attachment A from Reference Section;<br>Updated to include new FCM rules | Peter Bernard |
| 3 | 03/29/11 | Biennial review by procedure owner;<br>Updated Header copyright date;<br>Replaced Footer page numbers with Page X of Y format;<br>Section 1, updated criteria for economic analysis; Section 2, defined DASS and made minor edits; Section 5 changes: 5.1.3 changed Short Term to Long Term; 5.1.5 inserted new steps 10 & 11; 5.1.6, deleted former step 1 and added new steps 1 through 3; 5.1.12, replaced NTTR with Short Term Outage Scheduling Software; 5.1.14, replaced SAM withISO Outage Scheduling Software; 5.3.1, added new steps 12 & 13;<br>Section 7: updated references<br>Attachment A : added steps 15, 23 & 24, performed minor edits, added Commitment Decision Log sheet | Peter Bernard |
| 4 | 08/04/11 | Complete re-write to support the use of the new PROBE application for Long Term Outage Economic Analysis. | Peter Bernard |
| 5 | 04/05/12 | Updated Header copyright date, & Procedure Owner;<br>Deleted the 2nd paragraph of the disclaimer on 1st page footer;<br>Section 5, Re-write of most of Section 5 o reflect the current methodology of PROBE;<br>Attachment A, Updatedto reflect changes in Section 5;<br>Attachment B, Options were entirely updated;<br>Attachment C, added new Attachment C;<br>Attachment D, added new Attachment D | Mike Courchesne |

| | | | |
|---|---|---|---|
| 6 | 03/28/13 | Biennial review completed by the procedure owner;<br>Refined procedure to accommodate process changes, display changes and change to Option settings; | Mike Courchesne |
| 6.1 | 03/11/15 | Periodic review performed requiring no changes;<br>Made the administrative changes required to publish a Minor Revision per SOP-RTMKTS.0210.0010 Section 5.6; | Mike Courchesne |
| 6.2 | 12/20/16 | Periodic review performed requiring no changes;<br>Made the administrative changes (added required corporate document identity to all page footers) required to publish a Minor Revision per SOP-RTMKTS.0210.0010 Section 5.10; | Mike Courchesne |
| 7 | 12/11/18 | Biennial review completed by procedure owner;<br>Headers, updated Process Name and Procedure Owner;<br>Globally, made minor administrative changes and editorial changes consistent with current practices and management expectations; | Norm Sproehnle |
| 8 | 12/07/20 | Biennial review completed by the procedure owner; Updated procedure owner; | Andrew Kopacka |
| 9 | 10/26/22 | Biennial review completed by procedure owner; Updated TARA server name; minor editorial changes; | Andrew Kopacka |
| 10 | 10/23/24 | Biennial review completed by procedure owner;<br>Changed TARA server from TARAENFP1A to TARAENFPRD1;<br>Made minor editorial changes. | Andrew Kopacka |

# 9. Attachments

Attachment A – Long-Term Outage Economic Analysis Checklist

Attachment B - PROBE Look-Ahead Study Options Set-up

Attachment C - Casebuilder Set-up and Operation

Attachment D - PROBE Batch Mode Set-up and Operation

## Attachment A – Long-Term Outage Economic Analysis Checklist

**Economic Analyst** _____ **Today's Date**_____**Operating Day** _____

| Step | Complete | |
|---|---|---|
| 1. | _____ | Determine Outages to be analyzed. Print and retain transmission outage report for desired Operating Day from ISO Outage Scheduling software.<br><br>Outages to be Analyzed:<br>_____ |
| 2. | _____ | Determine peak load to be studied:_____ |
| 3. | _____ | Print out transmission line outages for study-date(s) |
| 4. | _____ | Print out Resource outages for study-date |
| 5. | _____ | Create an EMS Basecase with study outage in-service |
| 6. | _____ | Create an EMS Testcase with study outage out-of-service |
| 7. | _____ | Run TTC Calculator for Basecase and update GRT Base Spreadsheet |
| 8. | _____ | Run TTC Calculator for Testcase and update GRT Test Spreadsheet |
| 9. | _____ | Determine a day to retrieve historical Bids/Offers from<br>_____ |
| 10. | _____ | Create a folder on the TARAENFPRD1 for the outage(s) to be studied or day(s) to be evaluated<br><br>Name of Study Folder:_____ |
| 11. | _____ | Execute CaseBuilder to create input files for selected study-date(s) |
| 12. | _____ | Adjust zonal factors as desired for study-day conditions |
| 13. | _____ | Adjust Reserve Requirements as desired for study-day conditions |
| 14. | _____ | Set Start-up/Notification times to "0" for all Resources in the "bid_data.csv" file (if desired) |
| 15. | _____ | Enter any applicable Manual Constraints into the "flowgate_override.csv" file as determined using ISO Outage Scheduling software |
| 16. | _____ | Copy GRT limits into "flowgate_override.csv" file |
| 17. | _____ | Identify any Must Run Resource(s) for reliability and enter a status of "S" for the hours desired in the "unit_status.csv" file |

| Step | Complete | |
|---|---|---|
| 18. | _____ | If necessary, enter manual breakers or disconnects into the “Breaker_Override.csv” file as determined from the ISO Outage Scheduling software or transmission operating guides |
| 19. | _____ | Enter any branch limit changes as required (Revised Normal / LTE rating) into the “Branch_Override.csv” file |
| 20. | _____ | Inspect the real-time contingency file and modify the study “contingency_override.csv” file as necessary |
| 21. | _____ | Setup PROBE simulator options using ATTACHMENT B and select the study-day or first study-day if analyzing a multiple day run |
| 22. | _____ | Execute PROBE by selecting the “Create Reports” or “Create Reports from ALL Tabs” button |
| 23. | _____ | Append report names with “_date-base”, and then analyze reports, make adjustments and re-run PROBE as required |
| 24. | _____ | Record Production Cost |
| 25. | _____ | Include the outage to be studied in the “Trans_Outage.csv” file |
| 26. | _____ | Update “flowgate_override.csv” file as appropriate (interface limits, Transmission Operating Guides, etc.) |
| 27. | _____ | Update “Breaker_Override” file as appropriate |
| 28. | _____ | Update “Branch Override.csv” file as necessary |
| 29. | _____ | Designate any generation as Must Run for reliability in the “Unit_status.csv” file |
| 30. | _____ | Execute PROBE case. Analyze case, and when complete, record Production Cost, print and retain results |
| 31. | _____ | Compare Production Costs between the Basecase and the Testcase |
| 32. | _____ | For cases with incremental Production Cost greater than $200.000 notify the LCC and Manager, Long-Term Outage Coordination and, if appropriate, reposition outage to a different time period |
| 33. | _____ | Save PROBE workbook to study folder created in Step 2 and, if desired, print “Production Cost,” “System Summary,” “Reserve Summary,” “Unit Hourly Details,” “Constraint Summary,” “LMP Summary,” and “Transaction Hourly Details” reports for each case and save in hard copy folder |

| Step | Complete | |
|---|---|---|
| 34. | _____ | Write up a brief summary with outage details, assumptions and overall change in Production Cost if the outage was moved |
| 35. | _____ | Record Production Cost delta, and Reposition Cost (if necessary) in the ISO Outage Scheduling software program for the specific outage request |
| 36. | _____ | Check the “Economic” check box in the ISO Outage Scheduling software program for the outage request |
| 37. | _____ | Update the Long-Term Outage Coordination “Economic Study Tracking” spreadsheet |

## Single Day Production Cost Summary Sheet

| | Case Name | Production Cost | Difference | Comments |
|---|---|---|---|---|
| Basecase | | | | |
| Scenario 1 | | | | |
| Scenario 2 | | | | |
| Scenario 3 | | | | |

## Production Cost - Multi-Day (batch run) Analysis

Case/Scenario Name:

| Day | Basecase Production Cost |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

| Scenario 1 Production Cost | Difference | Comments |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Total Delta | | |

Case/Scenario Name:

| Scenario 2 Production Cost | Difference | Comments |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Total Delta | | |

Case/Scenario Name:

| Scenario 3 Production Cost | Difference | Comments |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Total Delta | | |

## Unit Commitment Difference Logsheet

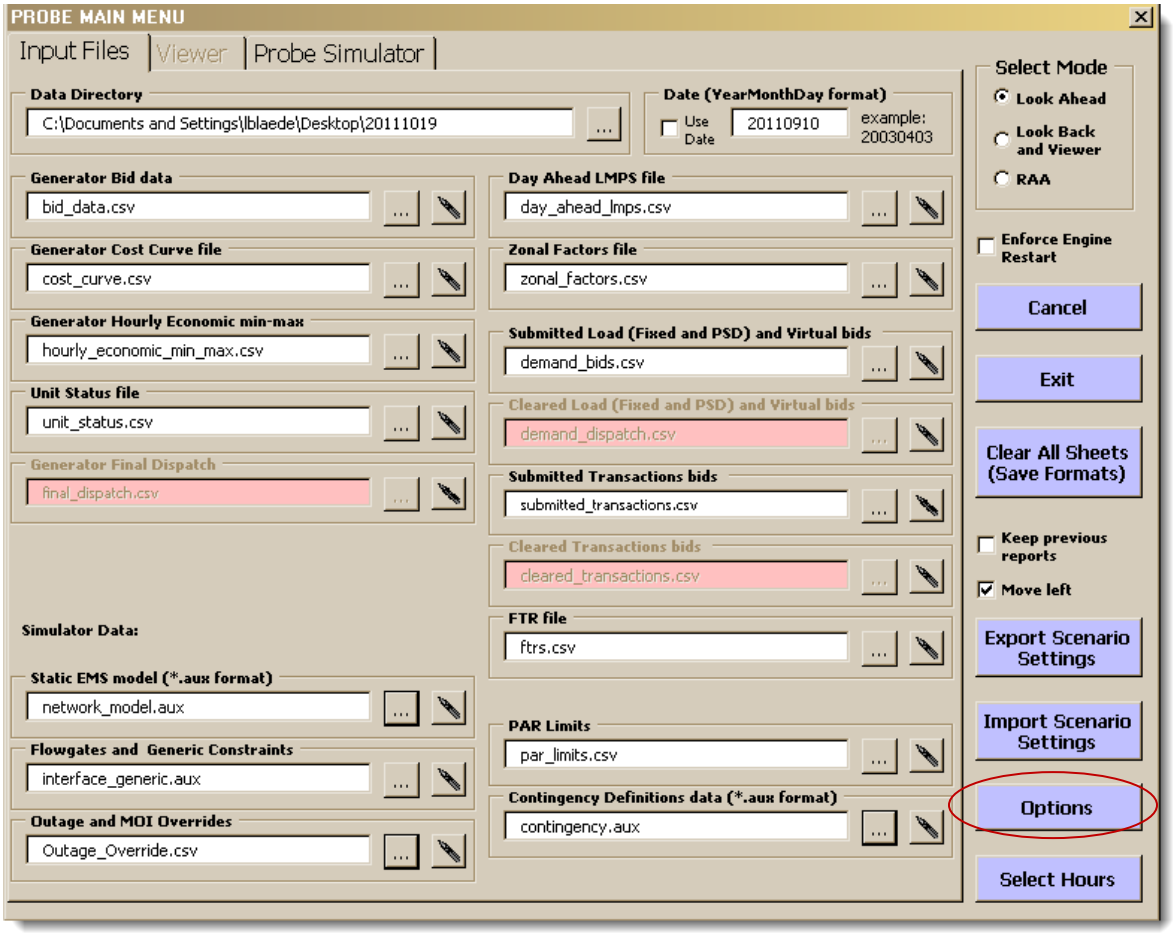
| Commitment Differences | | | | |
|---|---|---|---|---|
| Case | Unit | On / Off | HE Begin | HE End |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## Attachment B - PROBE Look-Ahead Study Options Set-up

The following steps are used to set up PROBE for a Look-Ahead study using a fixed load forecast.

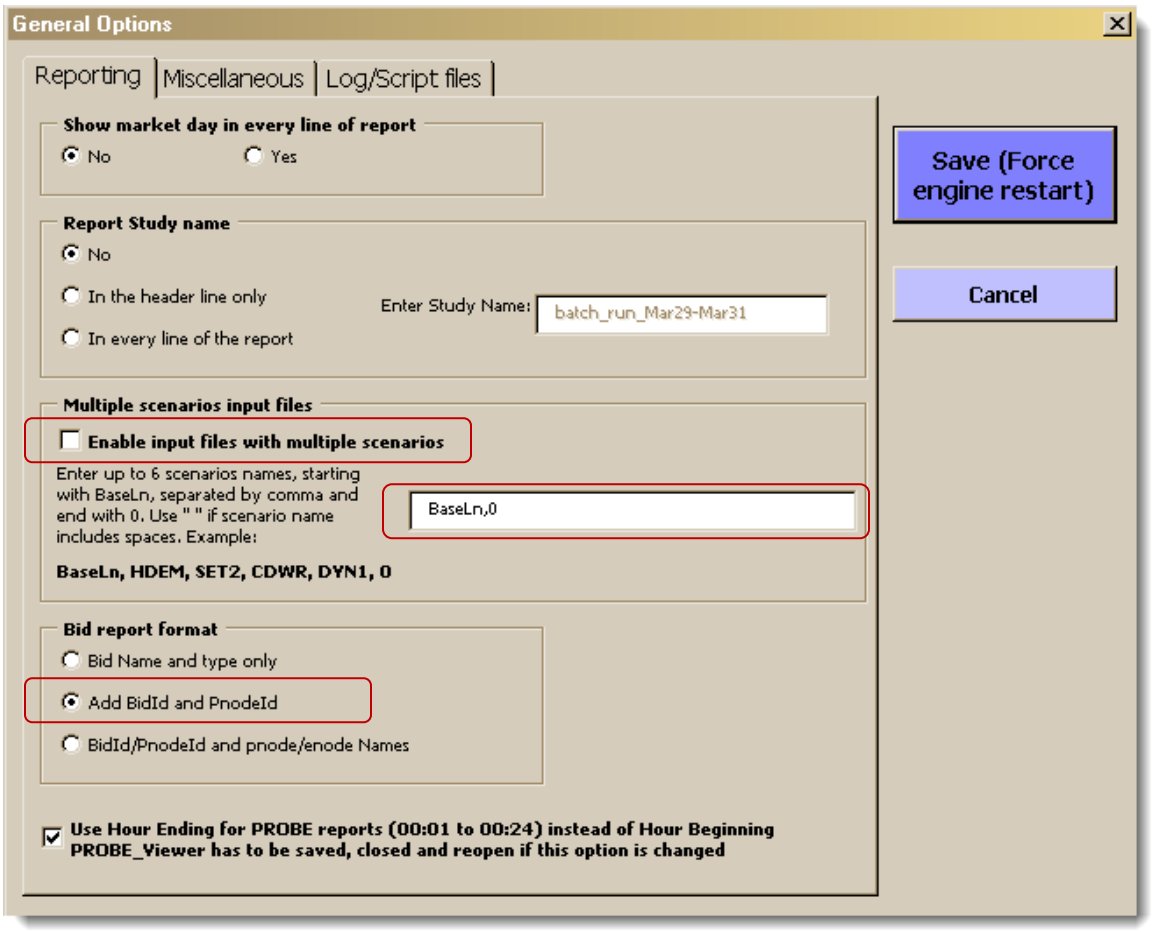
PROBE General Options:

Once PROBE has been saved, these options will also be saved.



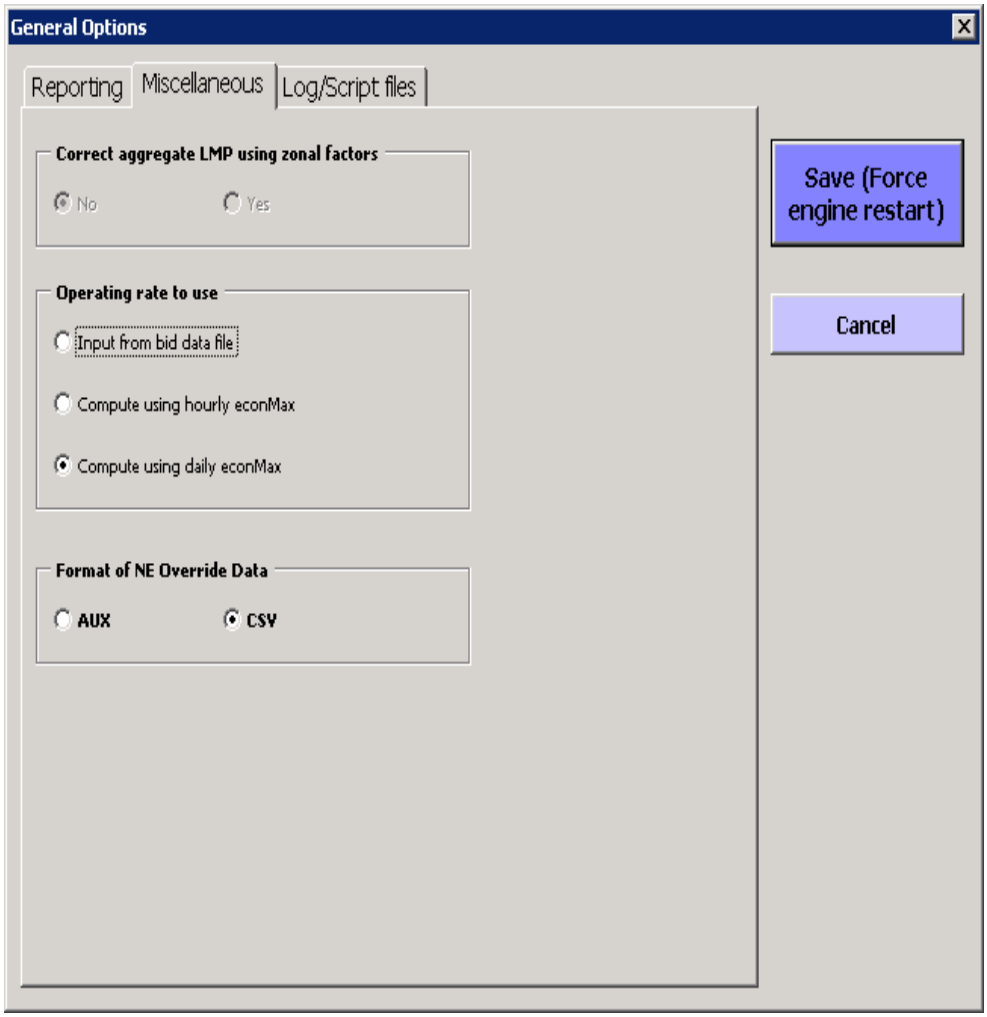
1. Reporting Tab

   SET selections as shown. If it is desired to use multiple scenarios, ENTER scenario names and CHECK the box.



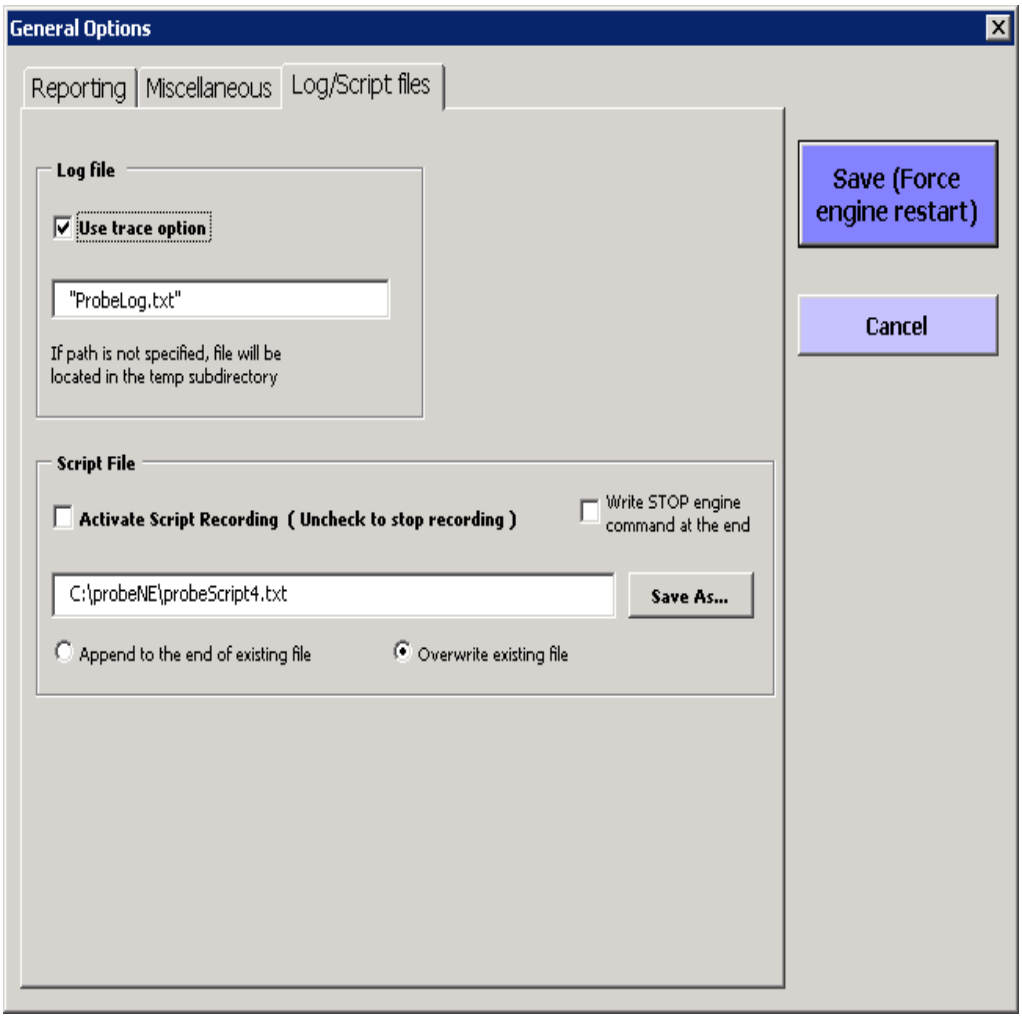
2. Miscellaneous Tab

SET selections as shown.

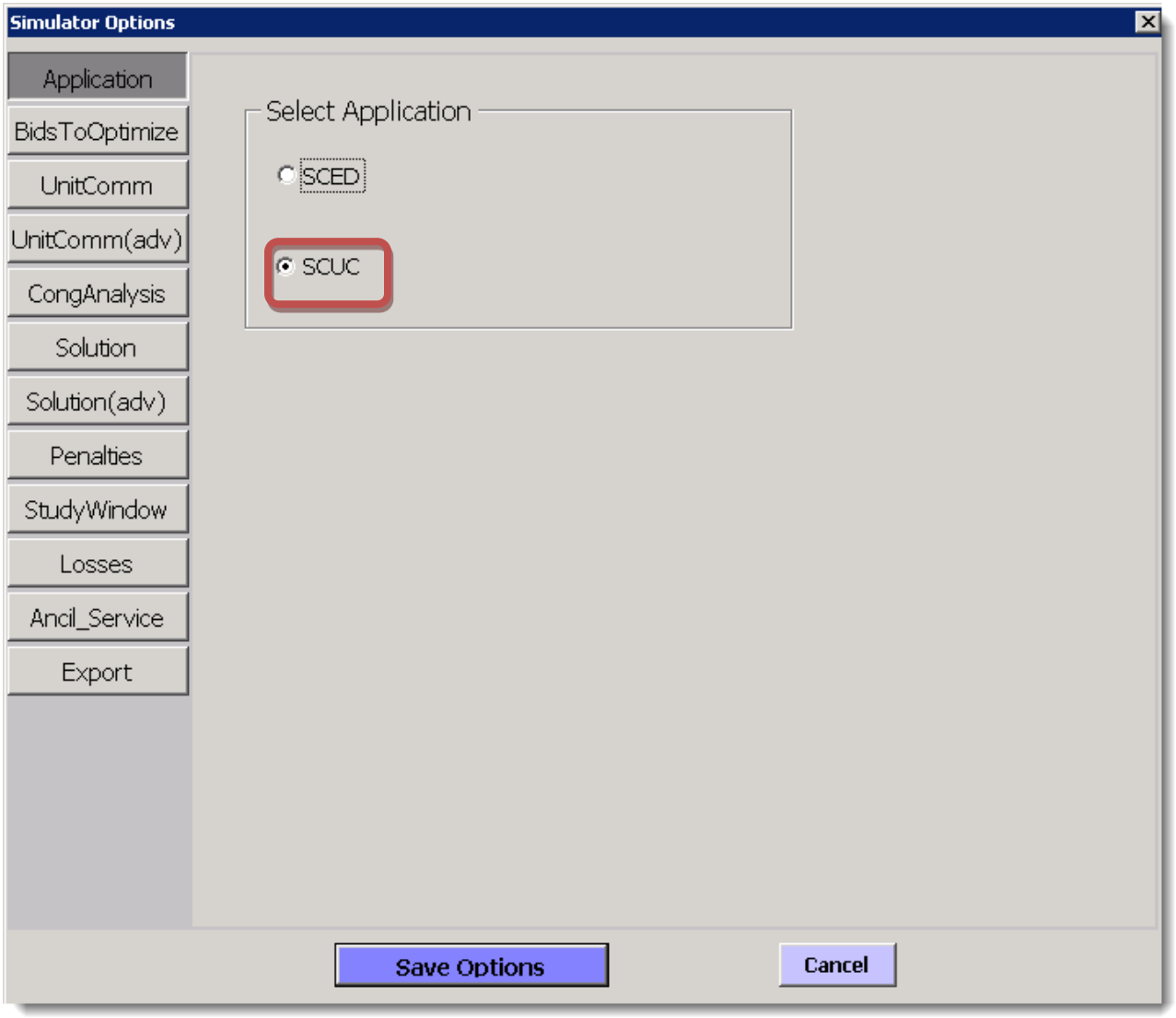


3. Log/Script files Tab

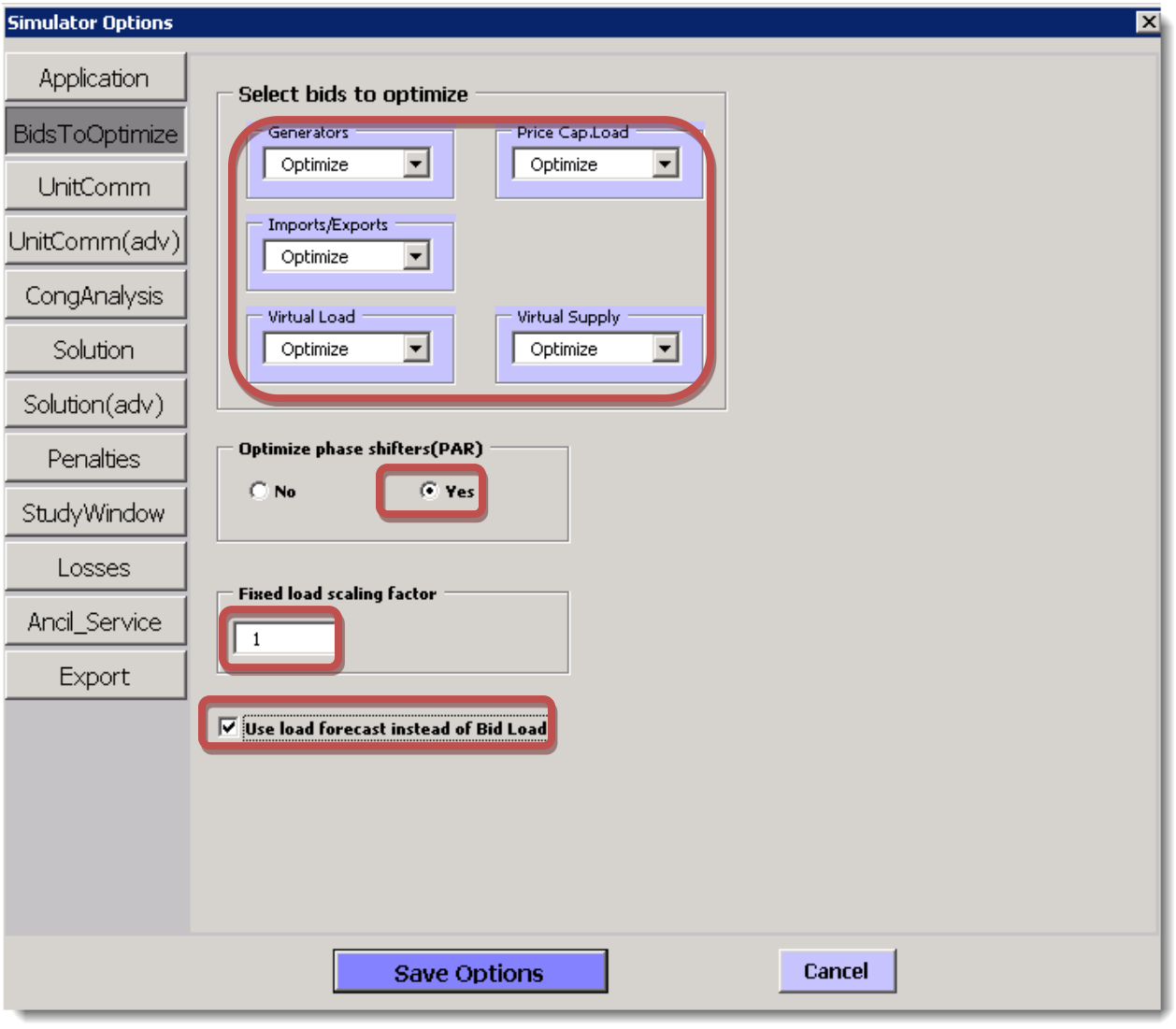
SET selections as shown.



4. Application Tab
   a. SET to SCUC (Security Constrained Unit Commitment) for unit commitment from scratch



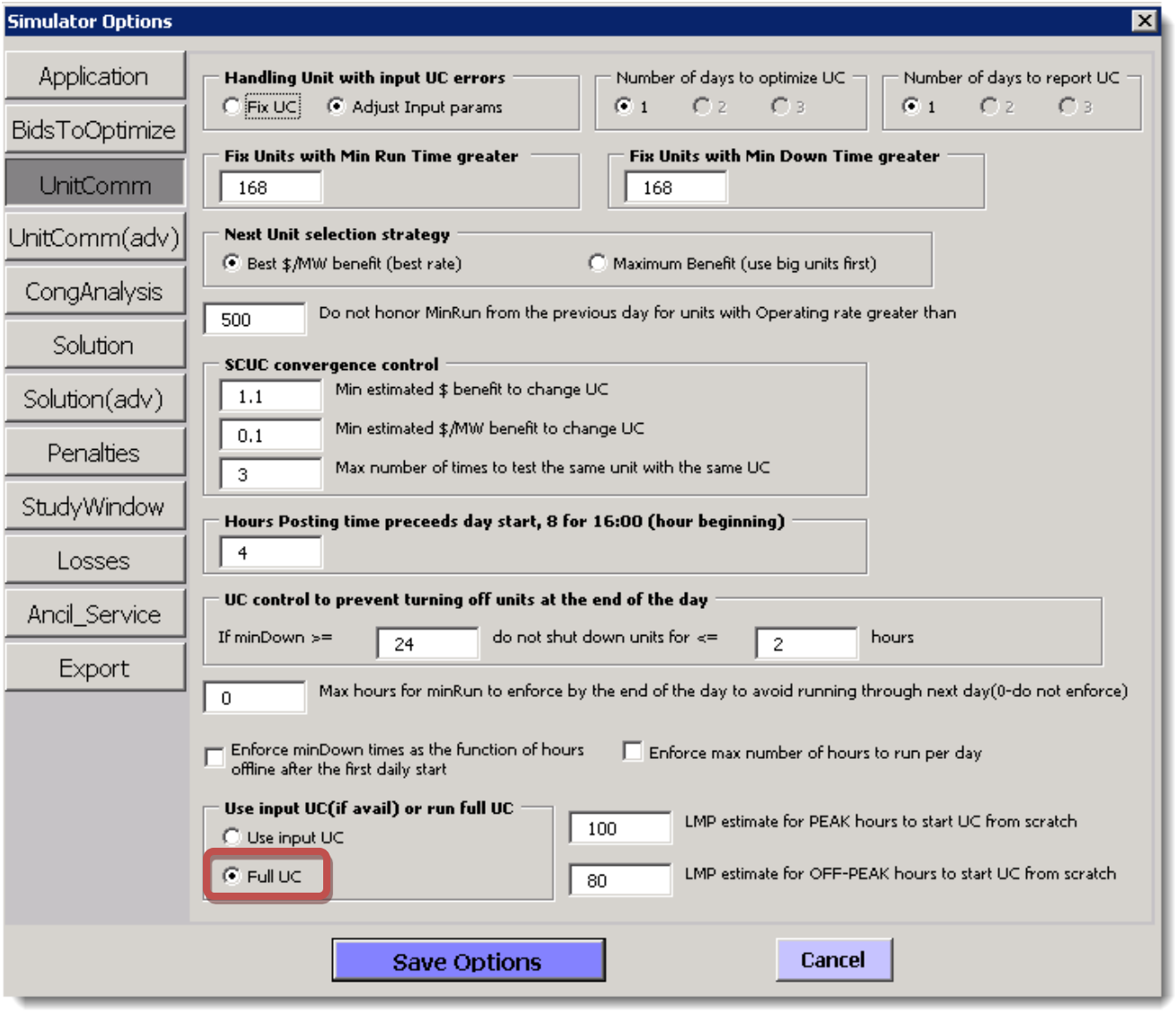
5. Bids ToOptimize Tab
   a. SET “Select bids to optimize” to “Optimize”
   b. SET Optimize phase shifters(PAR) to “Yes”
   c. SET “Fixed load scaling factor” to “1” to account for losses as the load forecast includes them but it is desired that PROBE calculates marginal losses separately
   d. SELECT “Use load forecast instead of Bid Load”




6. UnitComm Tab

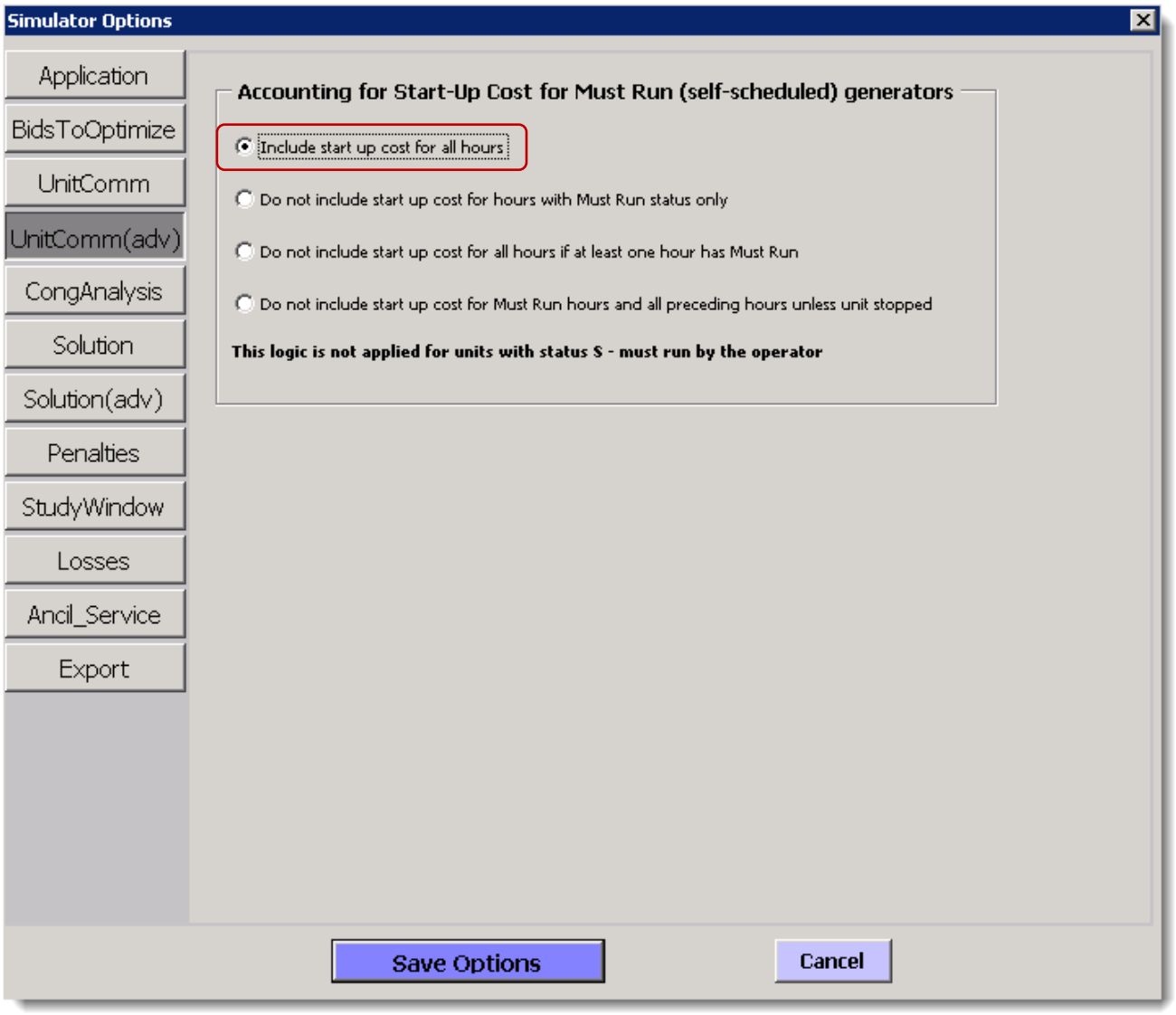
a. SELECT “Full UC” to perform unit commitment from scratch.

b. Verify all other settings are as shown below. Adjustments may be made as analysis shows that this may be necessary.

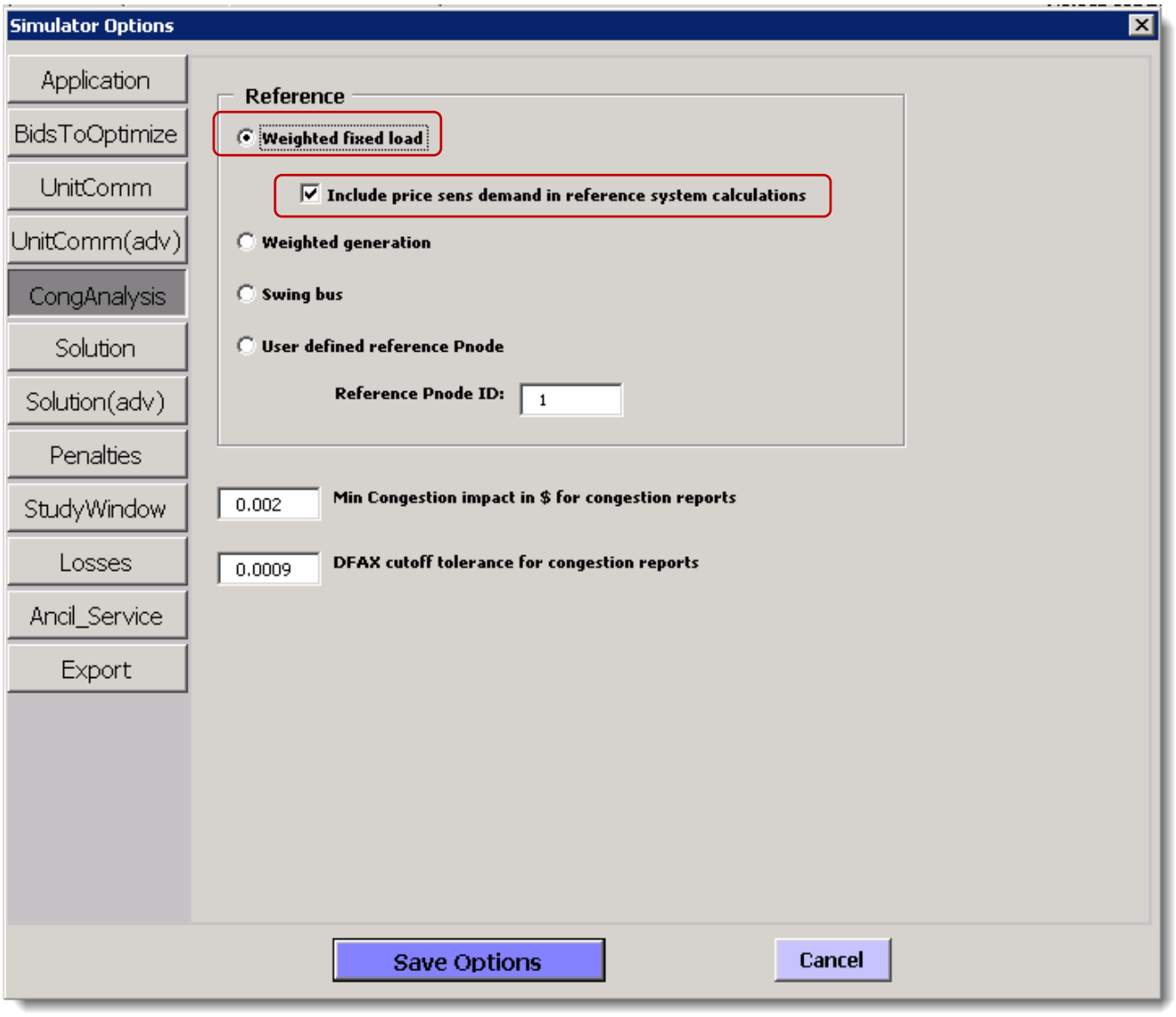



7. UnitComm(adv) Tab

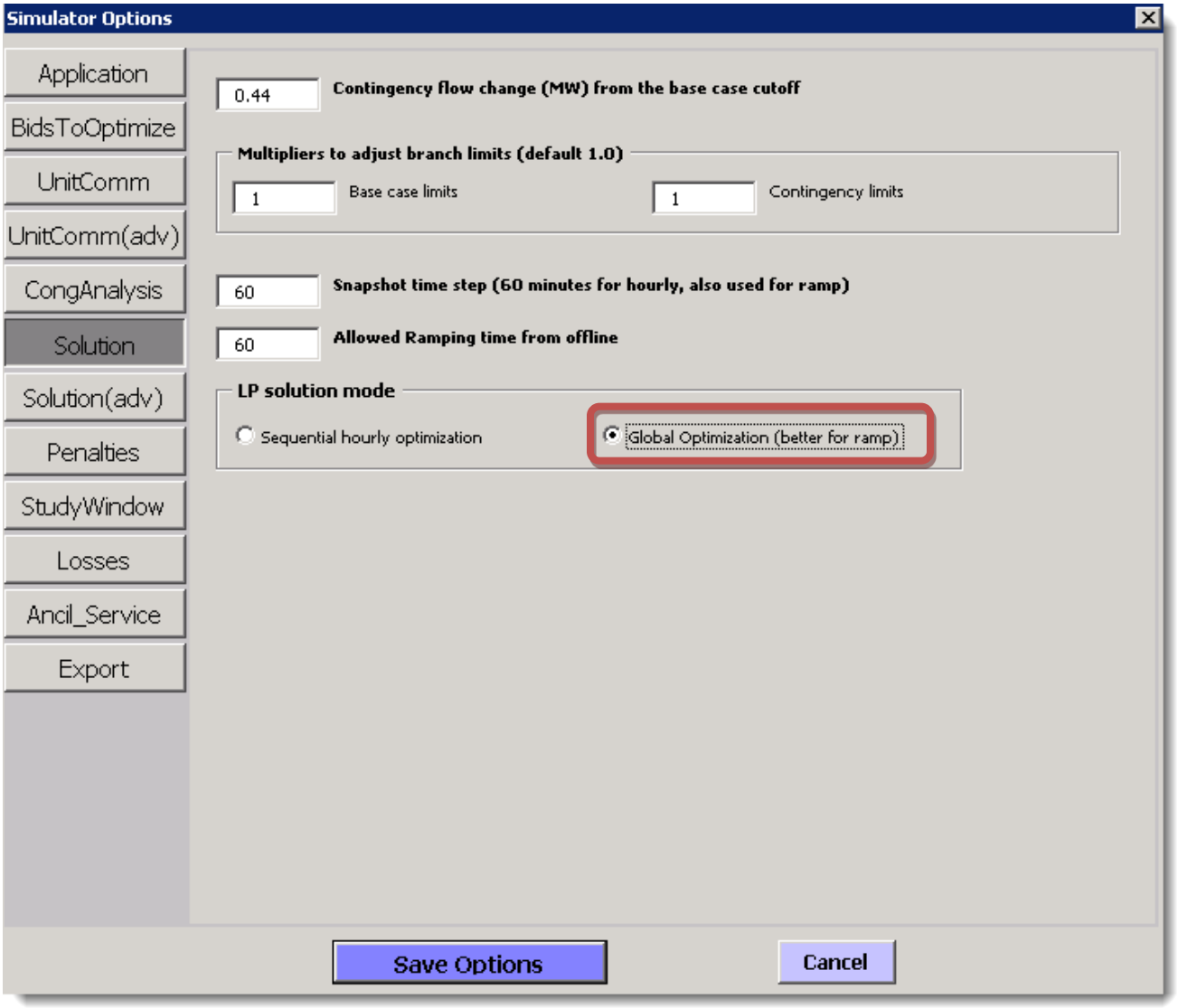
a. SELECT “Include start up cost for all hours”



8. CongAnalysis Tab
   a. SELECT “Weighted fixed load” and SELECT “Include price sens demand in reference system calculations”
   b. All other selection inputs should be as seen below

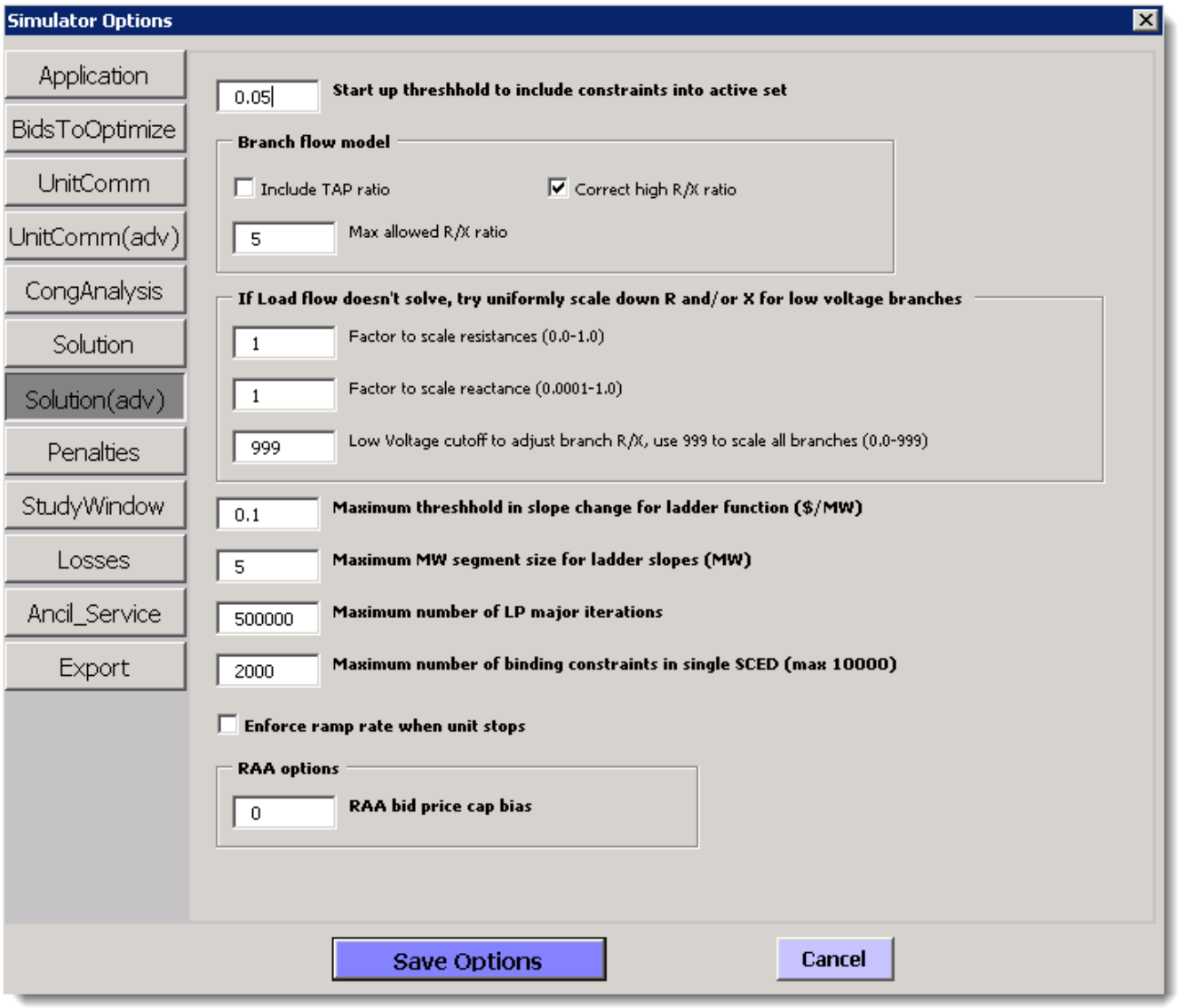


9. Solution Tab
   a. SELECT “Global Optimization” (better for ramping Resources)
   b. All other selection inputs should be as shown below



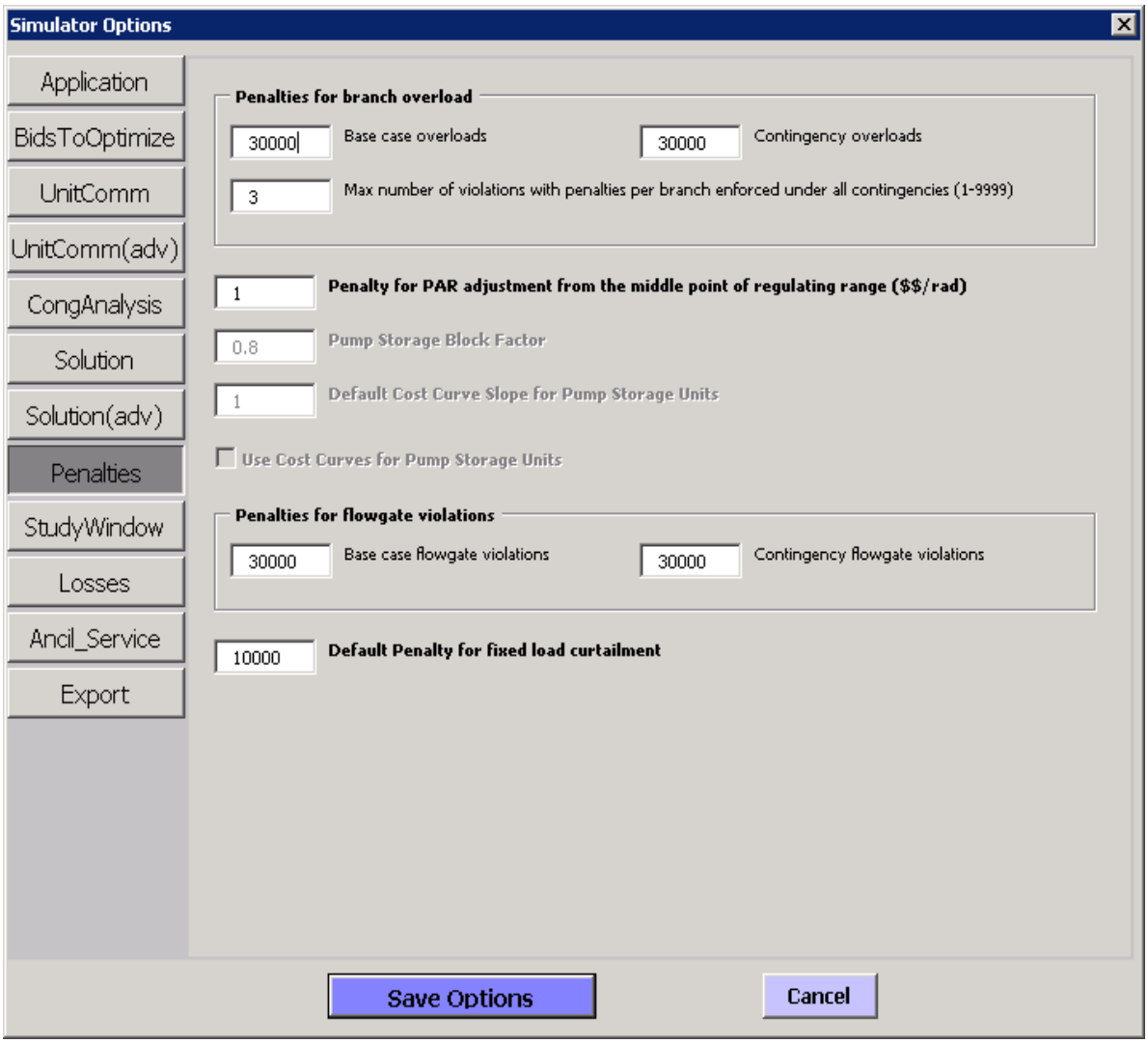
10. Solution(adv) Tab

    a. SET options as shown below



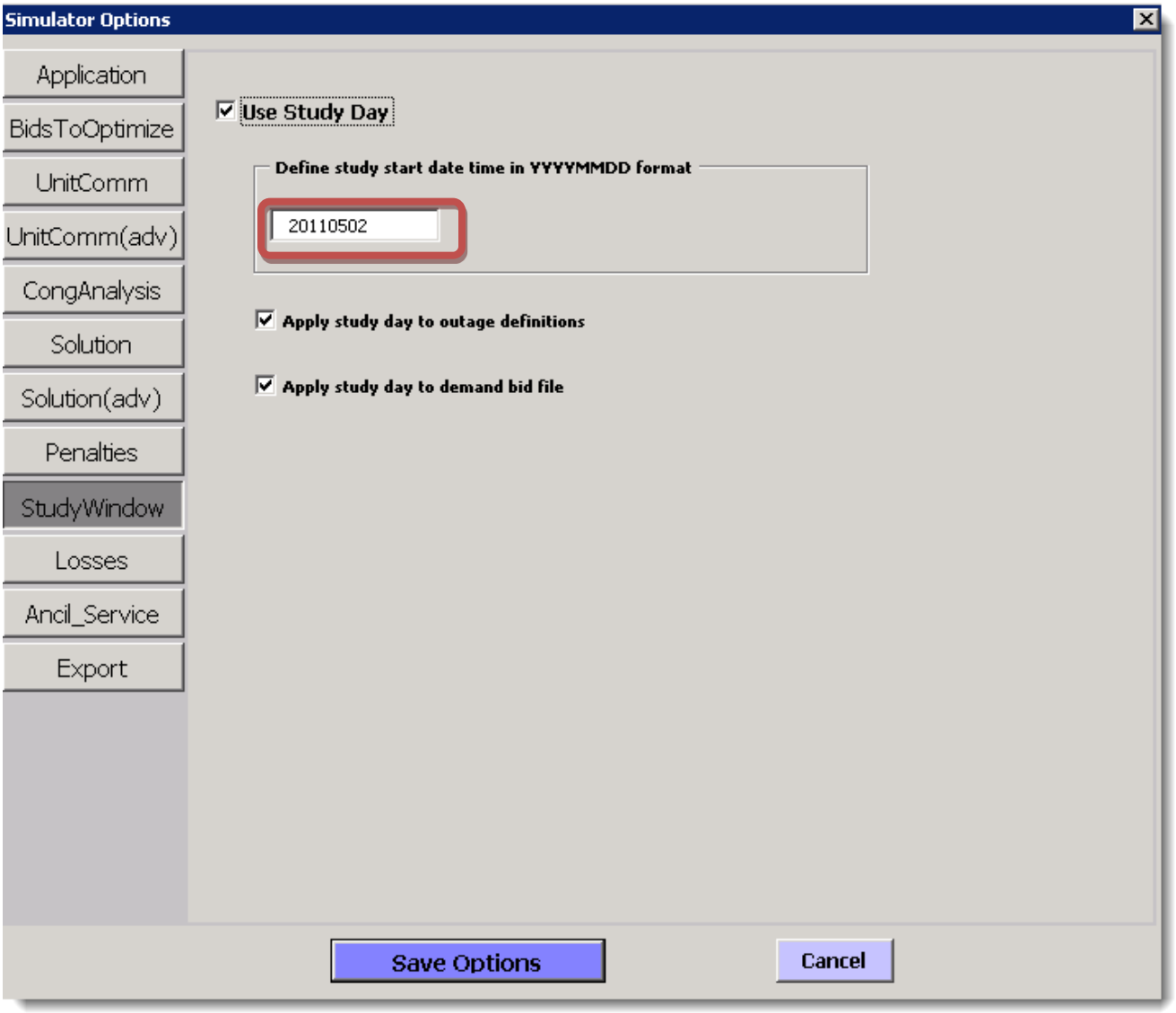
11. Penalties Tab

    a. USE default values as shown below

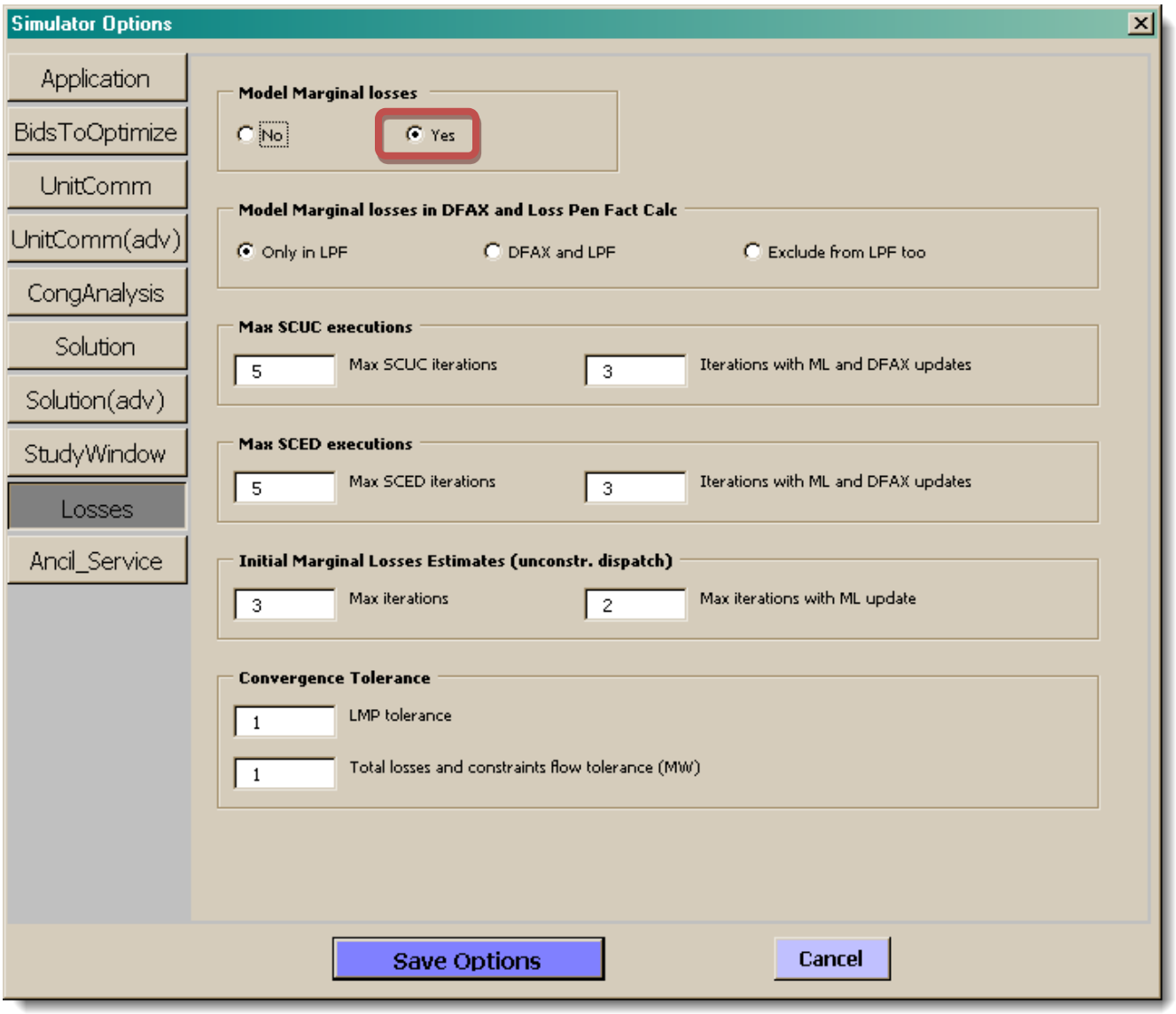


12. StudyWindow Tab

    a. CHECK all selections and SET "Define study start-date…." to future study-date or first future study-date if performing multi-day runs

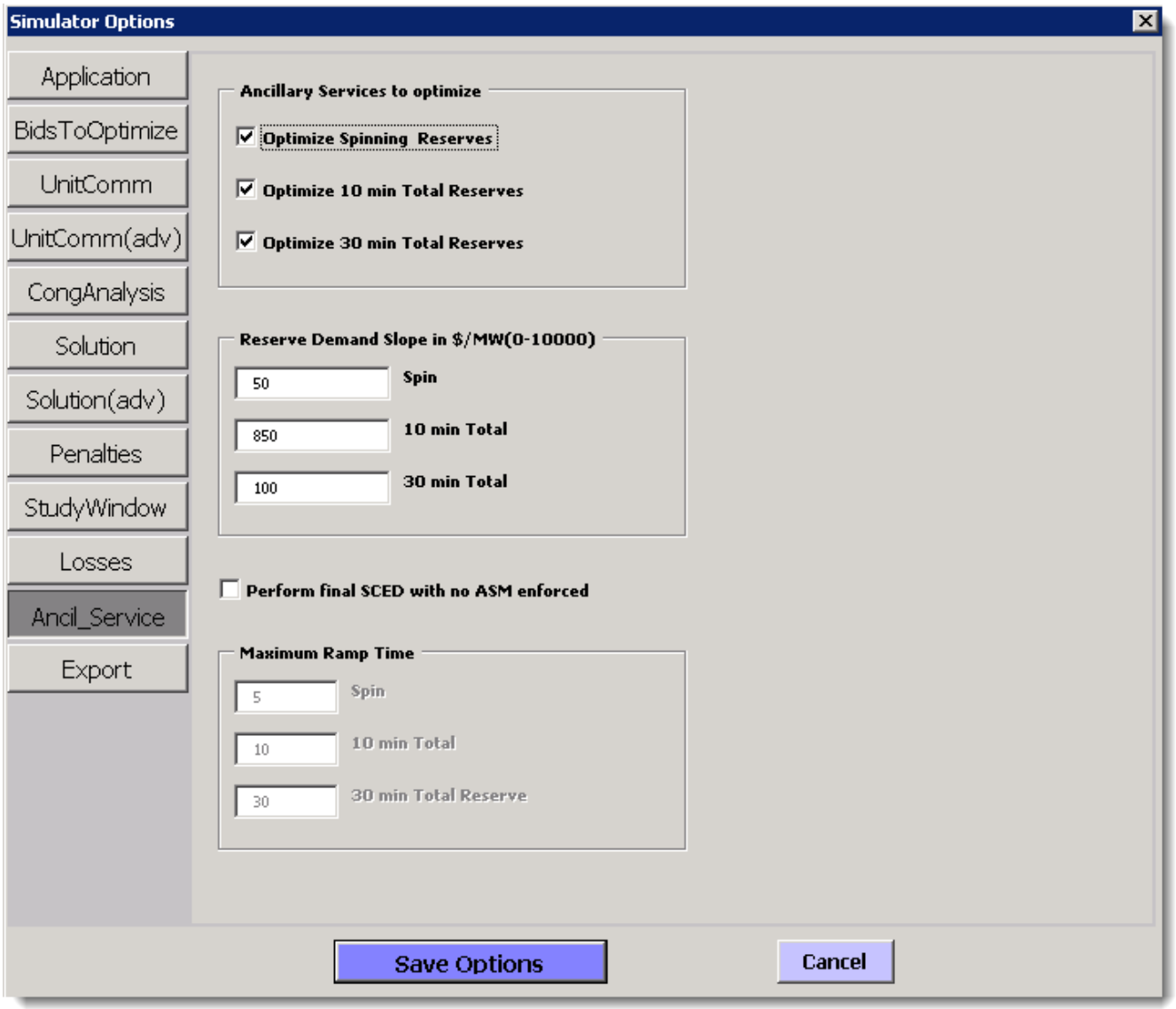


13. Losses Tab
    a. SET “Model Marginal losses” to “Yes”
    b. CHECK “Only in LPF”
    c. Other settings should be set as shown below



14. Ancil_Service Tab

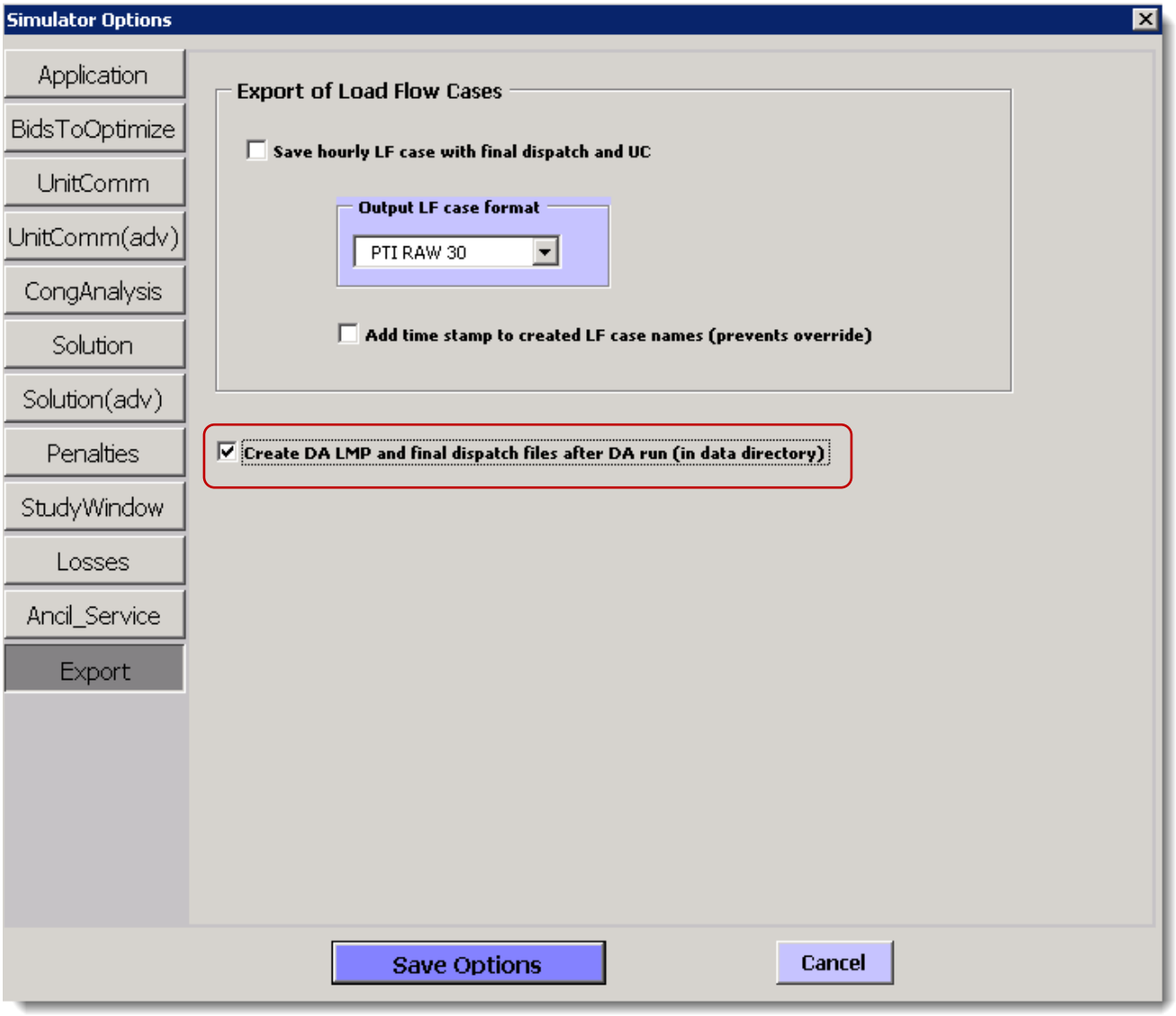
    a. If it is desired to model unit commitment for reserves, CHECK all selections for Day-Ahead simulation. UNCHECK "Perform final SCED with **no** ASM enforced" for Real-Time simulation. UNCHECK all if **not** respecting reserve requirements in unit commitment.



15. Export Tab

    a. If it is desired to export hourly load flow models, SELECT the desired format and check boxes.

    b. CHECK “Create DA LMP and final dispatch files after DA run”.



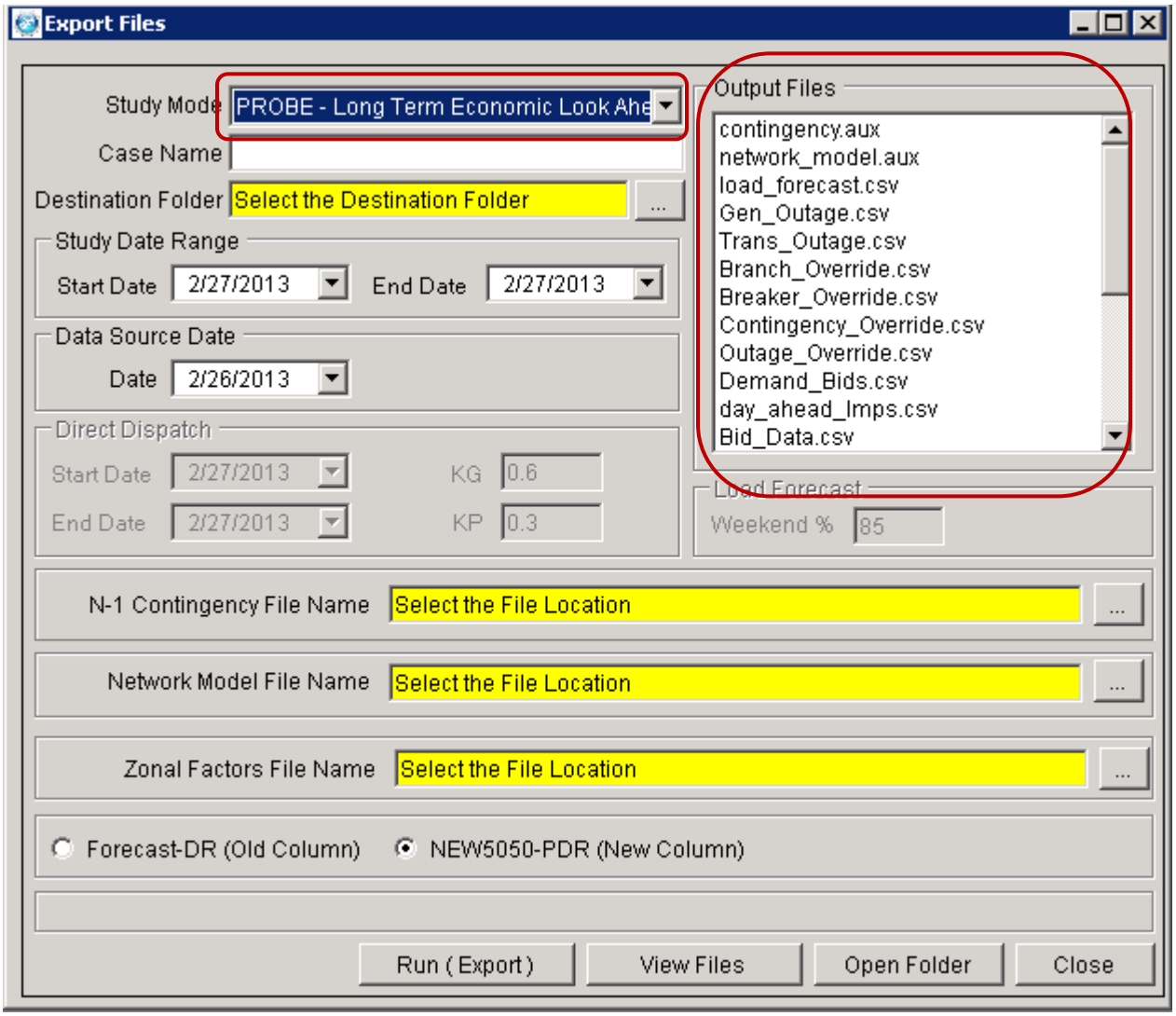
## Attachment C - Casebuilder Set-up and Operation

The following screens and steps describe the setup and operation of the Casebuilder application.

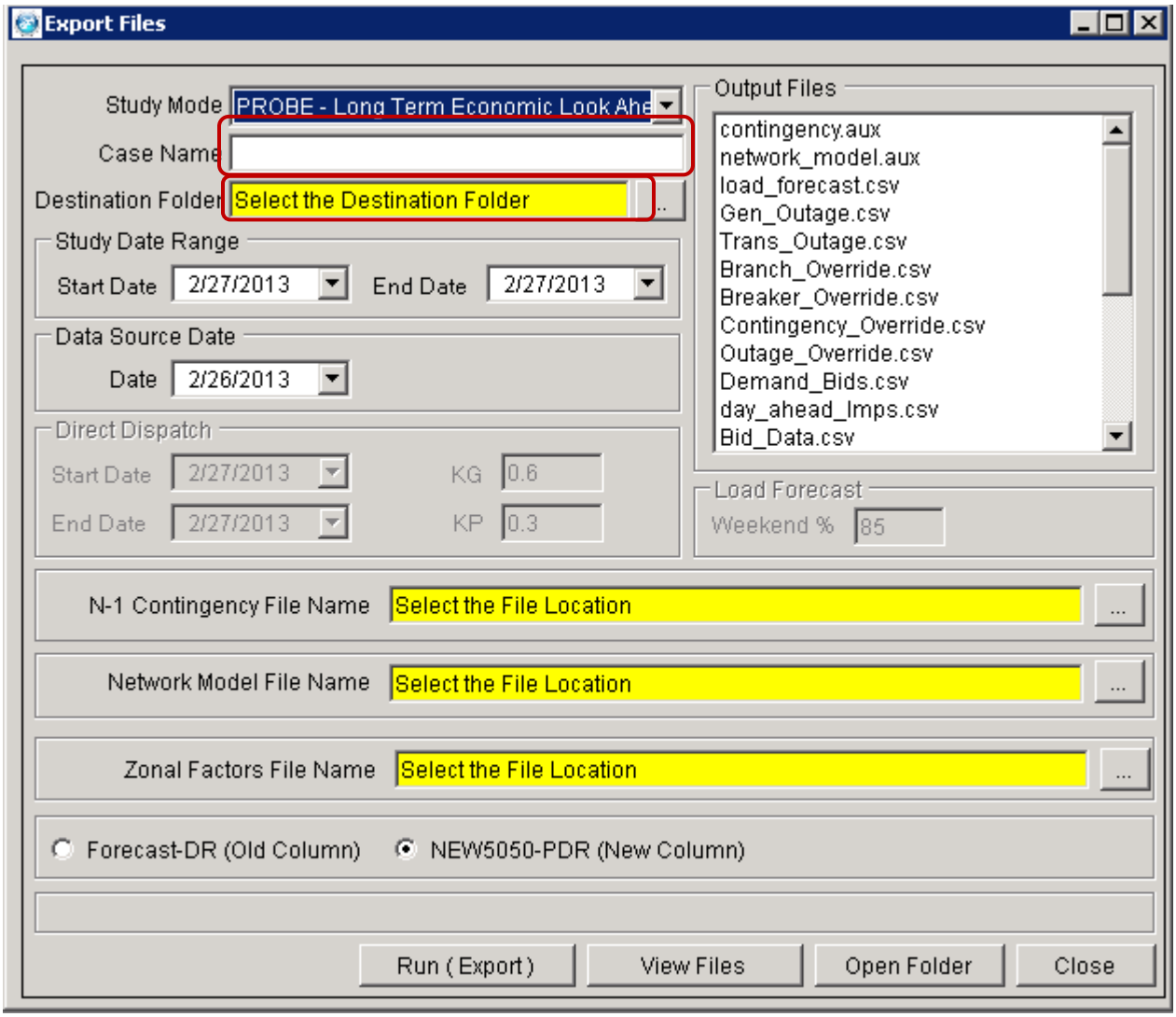
**NOTE**

The Casebuilder application provides input files for both TARA and PROBE applications and for various study modes. The input files produced are custom for the study mode selected.

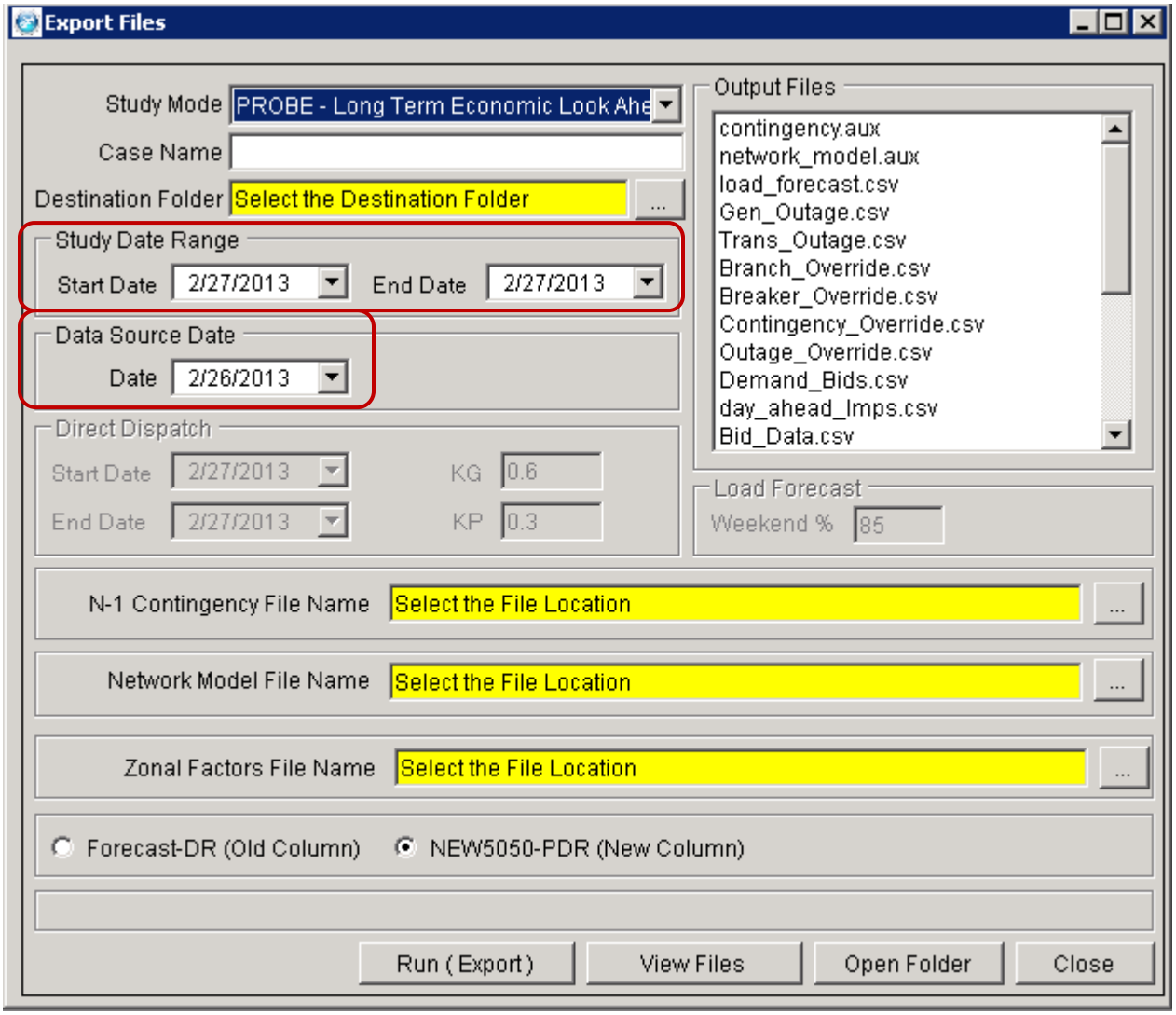
1. SELECT "PROBE – Long Term Economic Look Ahead" Study Mode. The resulting output files are displayed in the box on the right.



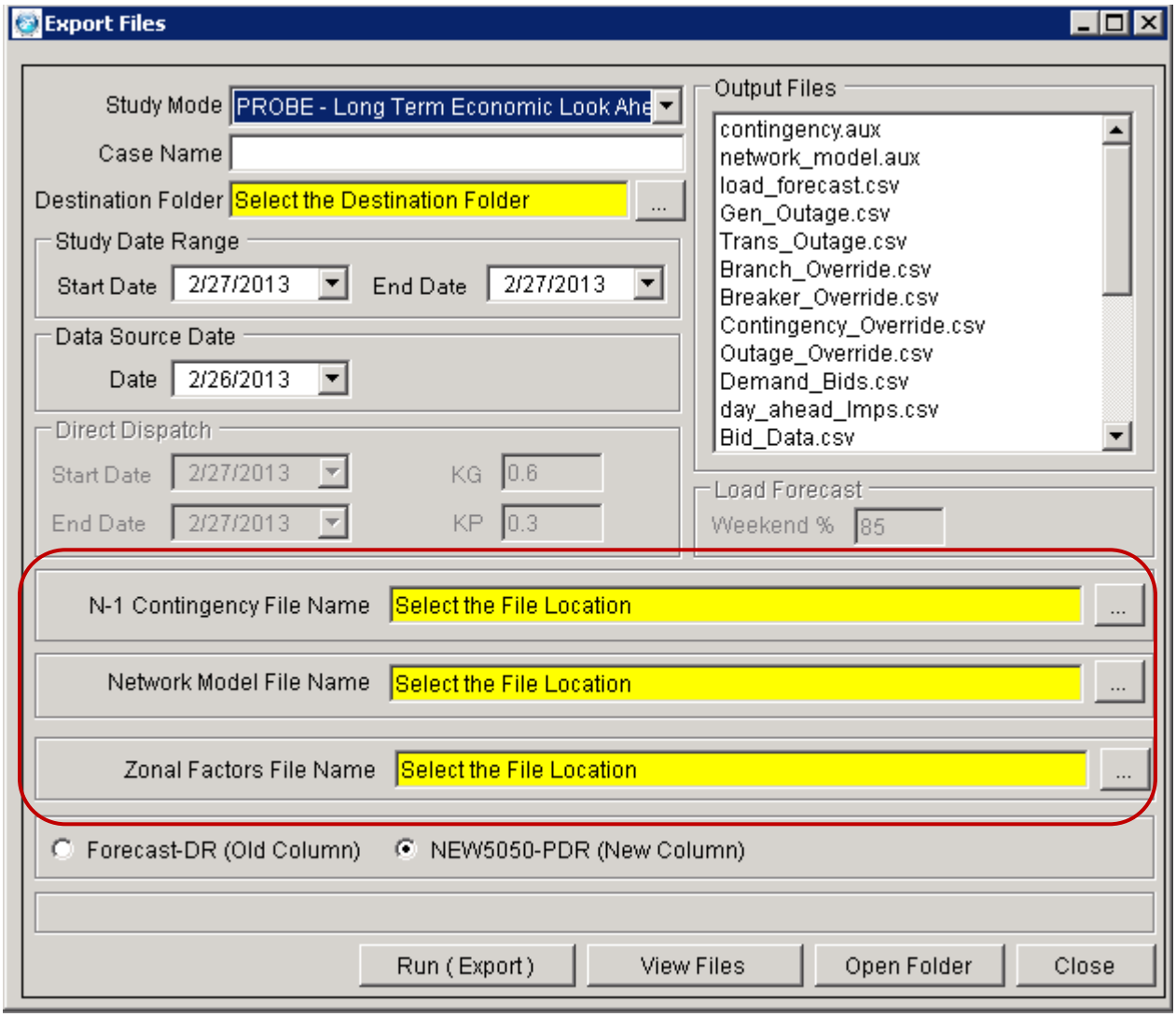
2. DEFINE “Case Name” and “Destination Folder”. The selected study-dates will be automatically appended to the resulting folder. If more than one (1) study-date is selected, there will be a folder for each study-day.



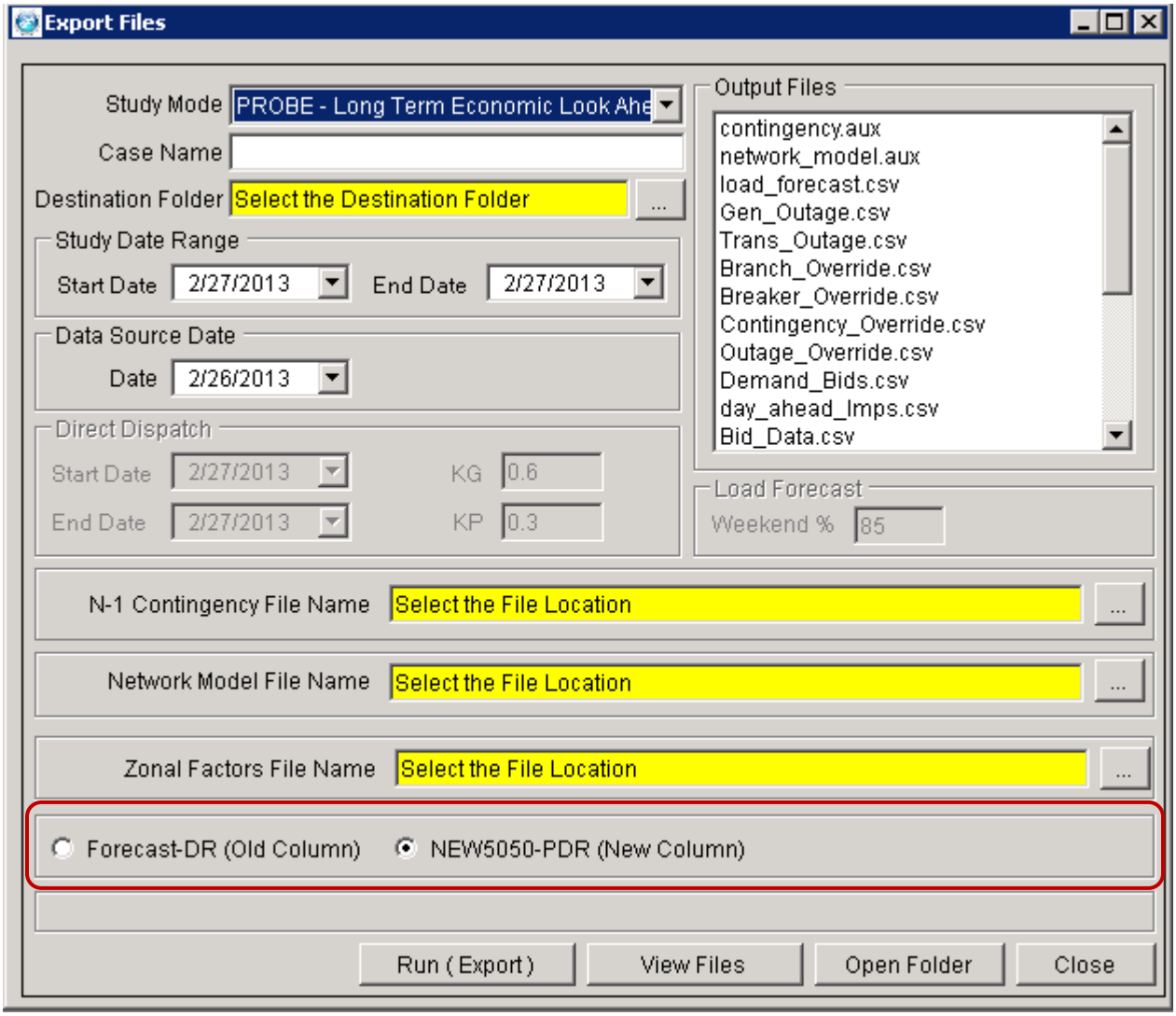
3. DEFINE "Study Date Range" and "Data Source Date" (Market Day – used for bids/offers/transactions). The Direct Dispatch selectors are **not** applicable to any of the PROBE study modes, so they are greyed out.



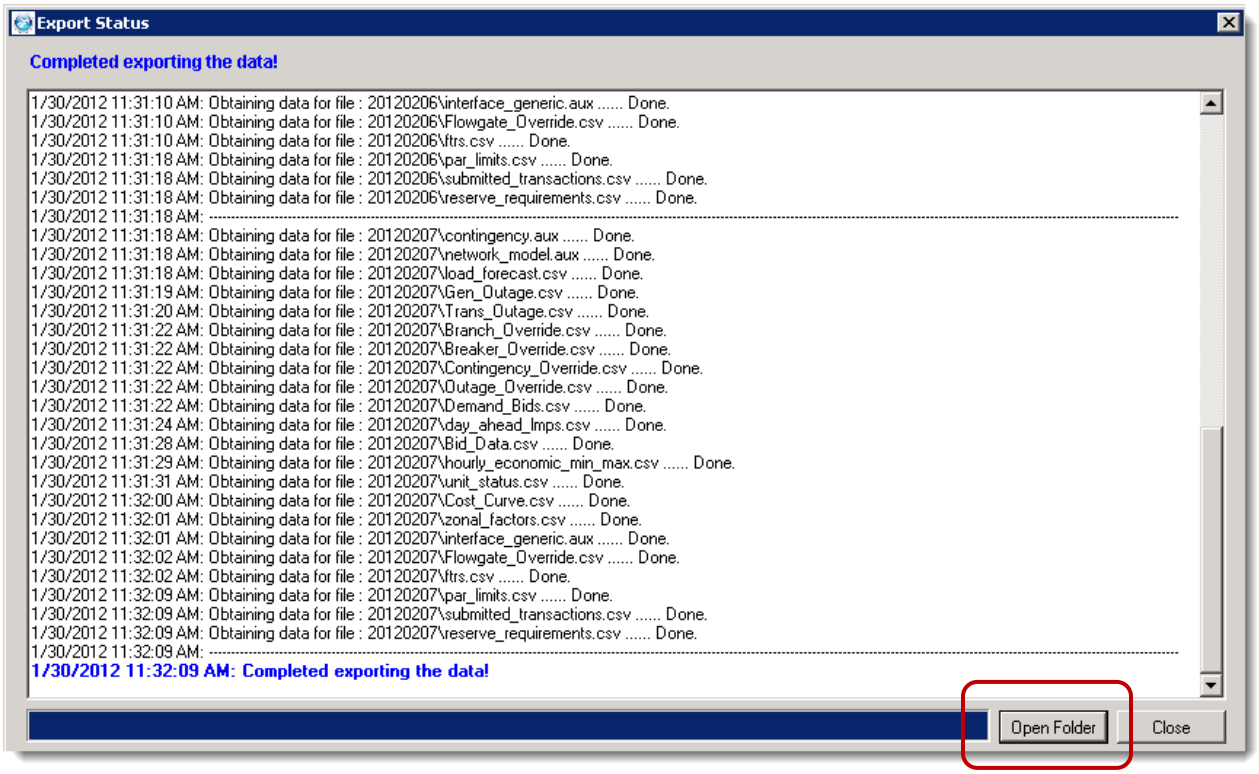
4. SELECT “N-1 Contingency File”, “Network Model File Name” and “Zonal Factors File Name”. Casebuilder will open the \\rtsmb\PowerWorld\Export folder where these files are saved when created from EMS. The zonal factors file should be chosen to match the month of the study-dates and are located in the casebuilder_manual_files folder.

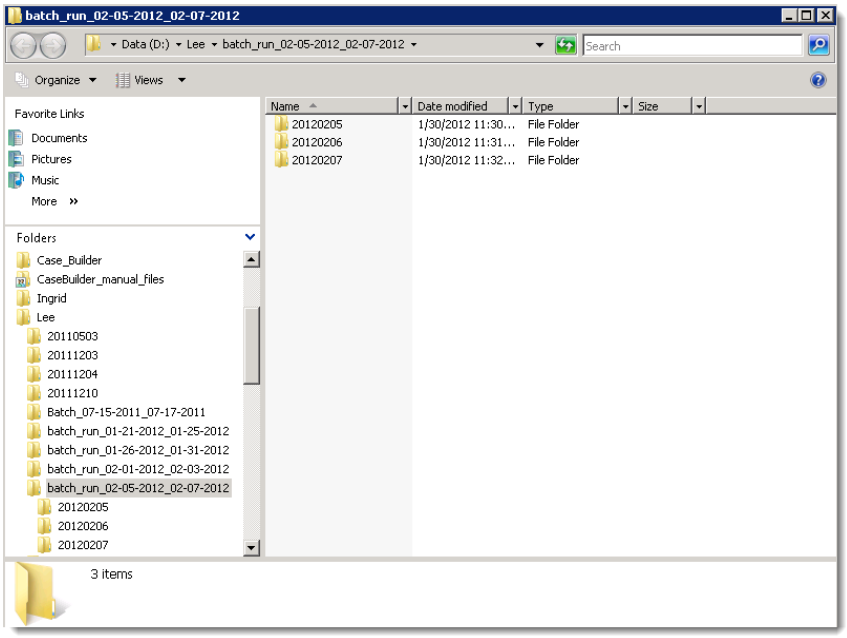


5. SELECT the appropriate Forecast data source.

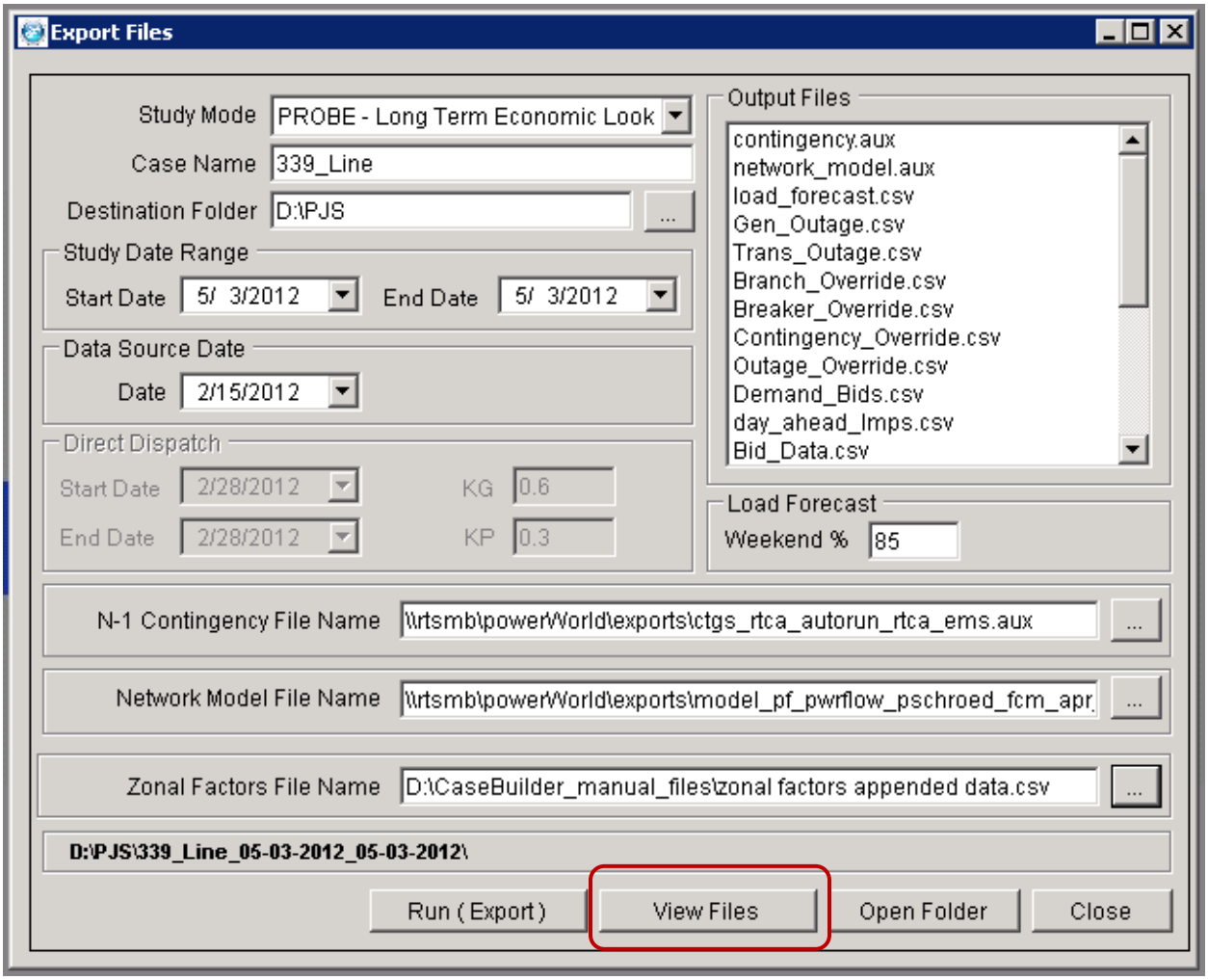


6. CLICK “Run (Export)”. A complete set of input files will be created for each day and a folder will be created for each study-day selected. Clicking “Open Folder” will open the folder.

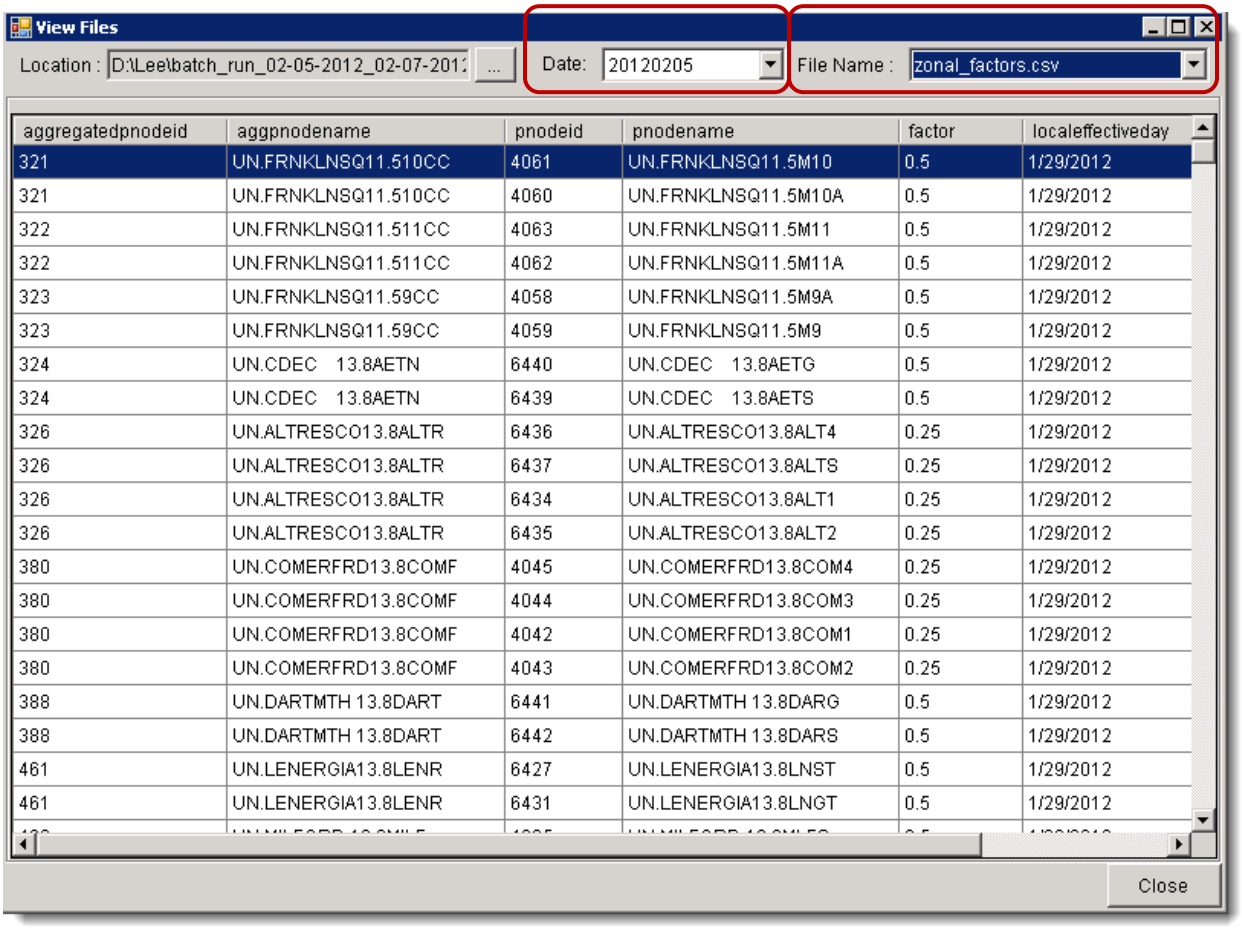


7. If desired, CLICK “View Files”.



8. SET “Date” (for multi-day batch runs) and the “File Name” to view each file.

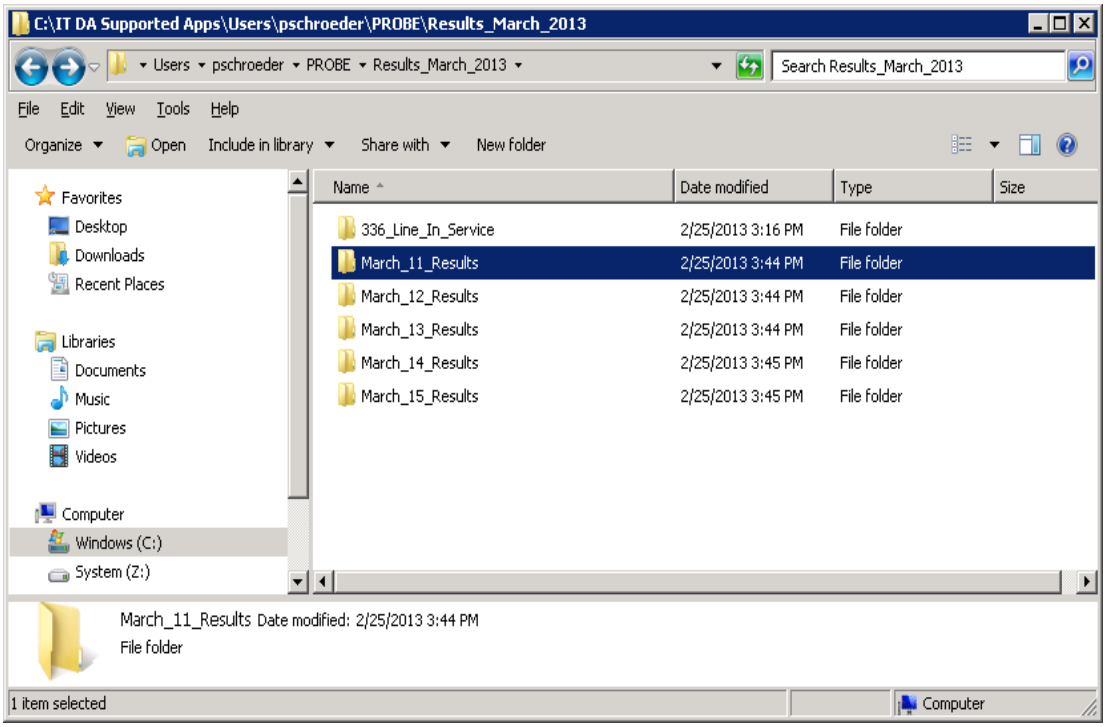



| aggregatedpnodeid | aggpnodename | pnodeid | pnodename | factor | localeffectiveday |
|---|---|---|---|---|---|
| 321 | UN.FRNKLNSQ11.510CC | 4061 | UN.FRNKLNSQ11.5M10 | 0.5 | 1/29/2012 |
| 321 | UN.FRNKLNSQ11.510CC | 4060 | UN.FRNKLNSQ11.5M10A | 0.5 | 1/29/2012 |
| 322 | UN.FRNKLNSQ11.511CC | 4063 | UN.FRNKLNSQ11.5M11 | 0.5 | 1/29/2012 |
| 322 | UN.FRNKLNSQ11.511CC | 4062 | UN.FRNKLNSQ11.5M11A | 0.5 | 1/29/2012 |
| 323 | UN.FRNKLNSQ11.59CC | 4058 | UN.FRNKLNSQ11.5M9A | 0.5 | 1/29/2012 |
| 323 | UN.FRNKLNSQ11.59CC | 4059 | UN.FRNKLNSQ11.5M9 | 0.5 | 1/29/2012 |
| 324 | UN.CDEC 13.8AETN | 6440 | UN.CDEC 13.8AETG | 0.5 | 1/29/2012 |
| 324 | UN.CDEC 13.8AETN | 6439 | UN.CDEC 13.8AETS | 0.5 | 1/29/2012 |
| 326 | UN.ALTRESCO13.8ALTR | 6436 | UN.ALTRESCO13.8ALT4 | 0.25 | 1/29/2012 |
| 326 | UN.ALTRESCO13.8ALTR | 6437 | UN.ALTRESCO13.8ALTS | 0.25 | 1/29/2012 |
| 326 | UN.ALTRESCO13.8ALTR | 6434 | UN.ALTRESCO13.8ALT1 | 0.25 | 1/29/2012 |
| 326 | UN.ALTRESCO13.8ALTR | 6435 | UN.ALTRESCO13.8ALT2 | 0.25 | 1/29/2012 |
| 380 | UN.COMERFRD13.8COMF | 4045 | UN.COMERFRD13.8COM4 | 0.25 | 1/29/2012 |
| 380 | UN.COMERFRD13.8COMF | 4044 | UN.COMERFRD13.8COM3 | 0.25 | 1/29/2012 |
| 380 | UN.COMERFRD13.8COMF | 4042 | UN.COMERFRD13.8COM1 | 0.25 | 1/29/2012 |
| 380 | UN.COMERFRD13.8COMF | 4043 | UN.COMERFRD13.8COM2 | 0.25 | 1/29/2012 |
| 388 | UN.DARTMTH 13.8DART | 6441 | UN.DARTMTH 13.8DARG | 0.5 | 1/29/2012 |
| 388 | UN.DARTMTH 13.8DART | 6442 | UN.DARTMTH 13.8DARS | 0.5 | 1/29/2012 |
| 461 | UN.LENERGIA13.8LENR | 6427 | UN.LENERGIA13.8LNST | 0.5 | 1/29/2012 |
| 461 | UN.LENERGIA13.8LENR | 6431 | UN.LENERGIA13.8LNGT | 0.5 | 1/29/2012 |

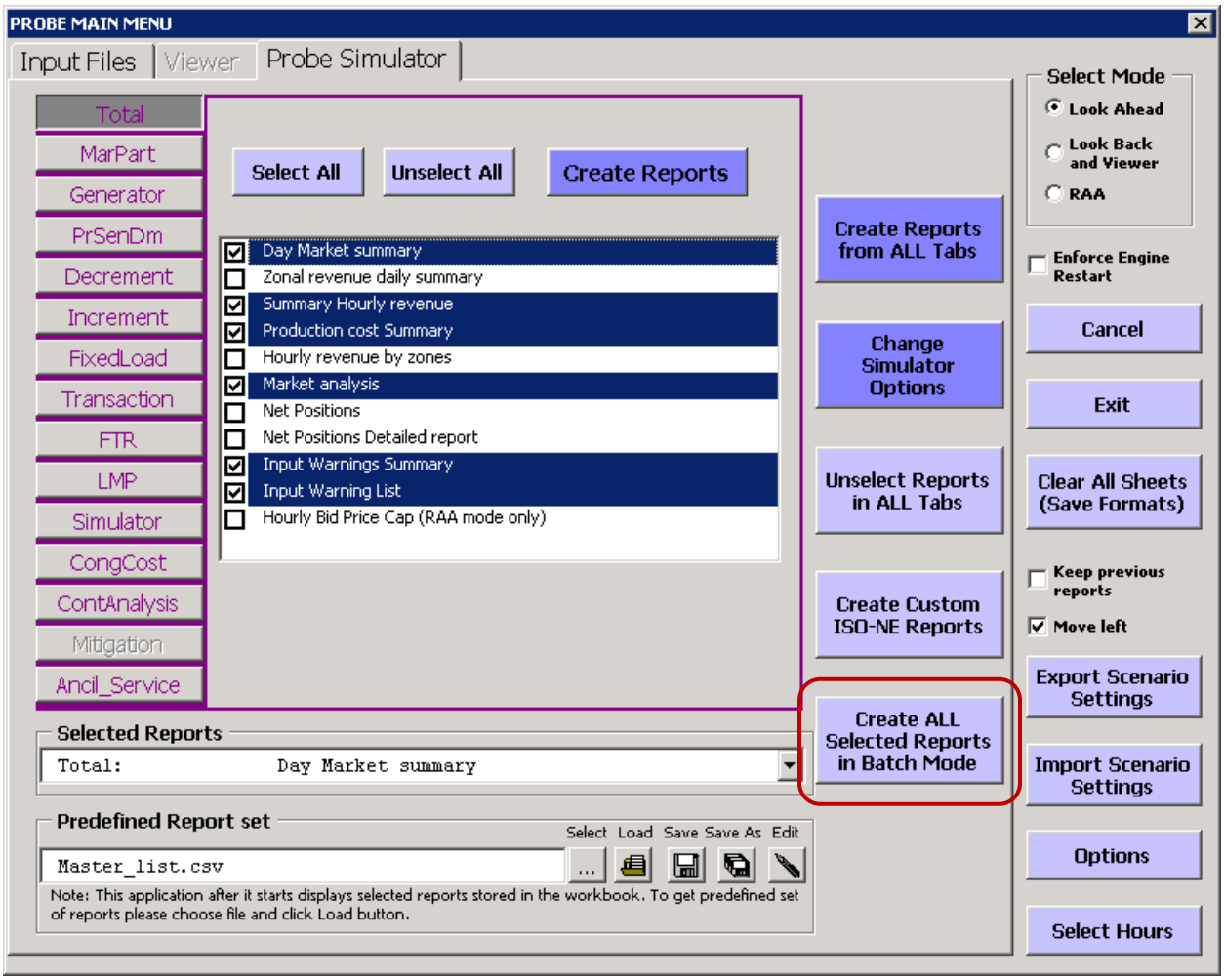
## Attachment D - PROBE Batch Mode Set-up and Operation

The following screens and steps describe Multi-Day, Batch Mode operation for PROBE Look-Ahead Studies:

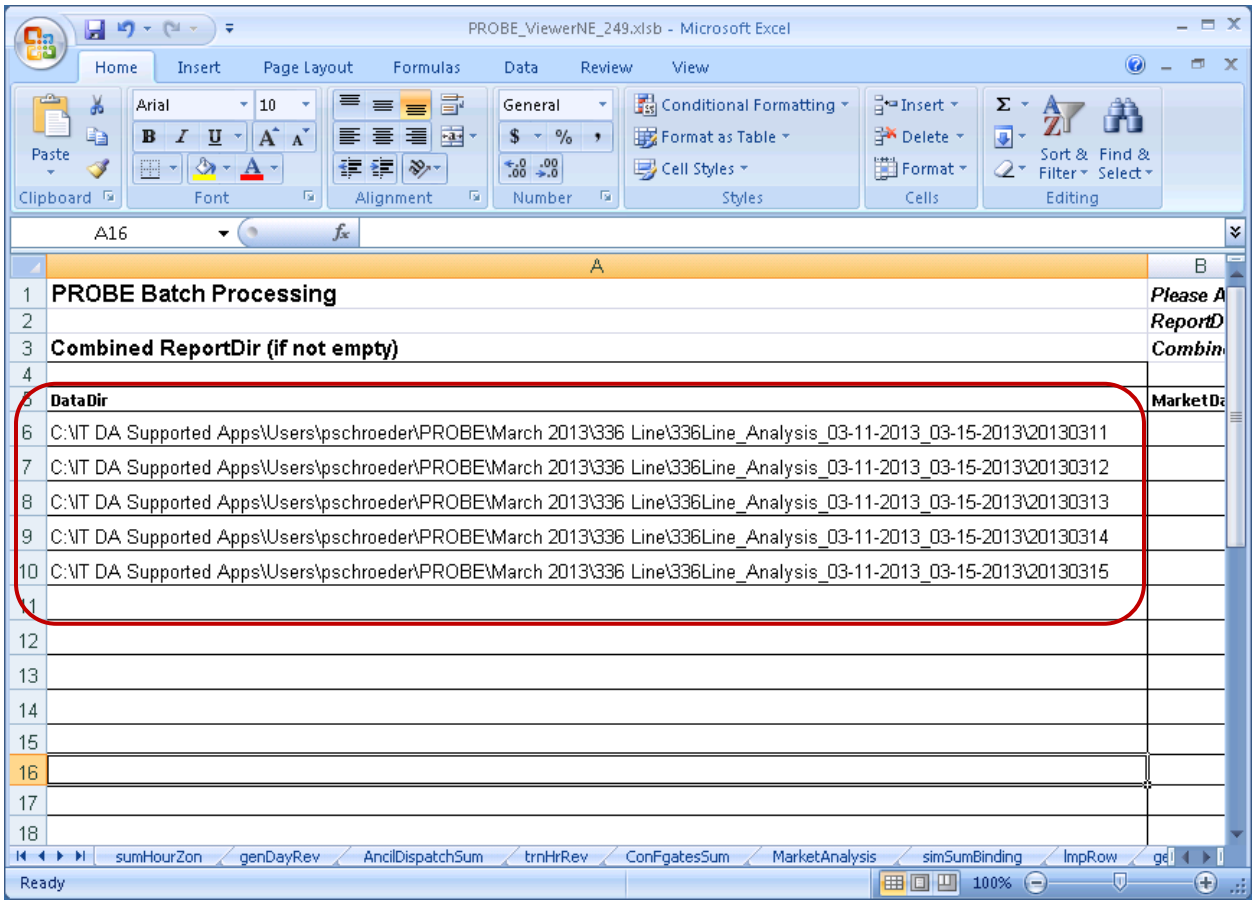
1. CREATE separate folders for each day's results as shown below. Results **cannot** be grouped into the same folder, otherwise, PROBE will post the same results for the first day to all folders.



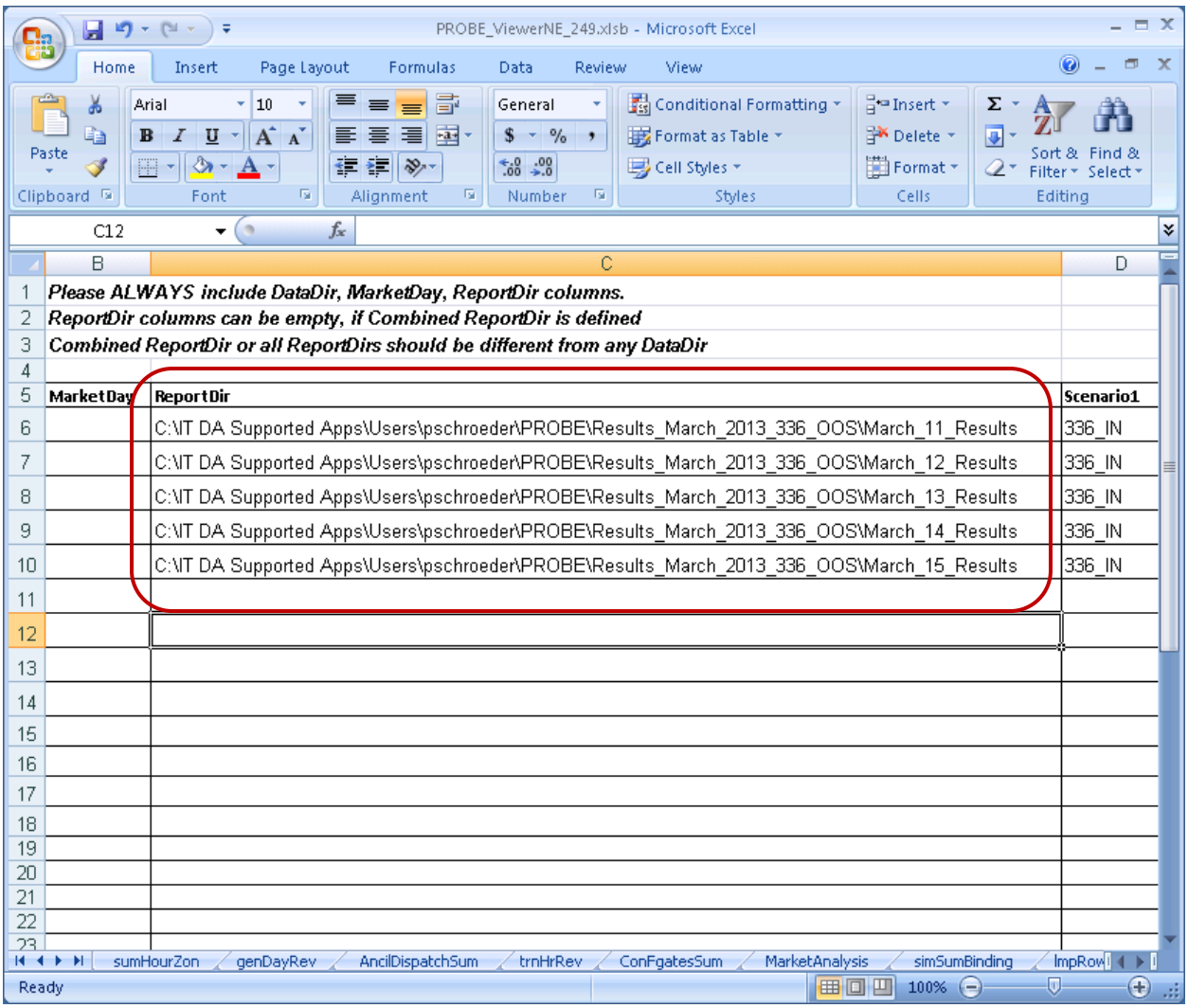
2. NAVIGATE to the “PROBE Simulator” tab in the PROBE Excel spreadsheet and SELECT “Create ALL Selected Reports in Batch Mode”.



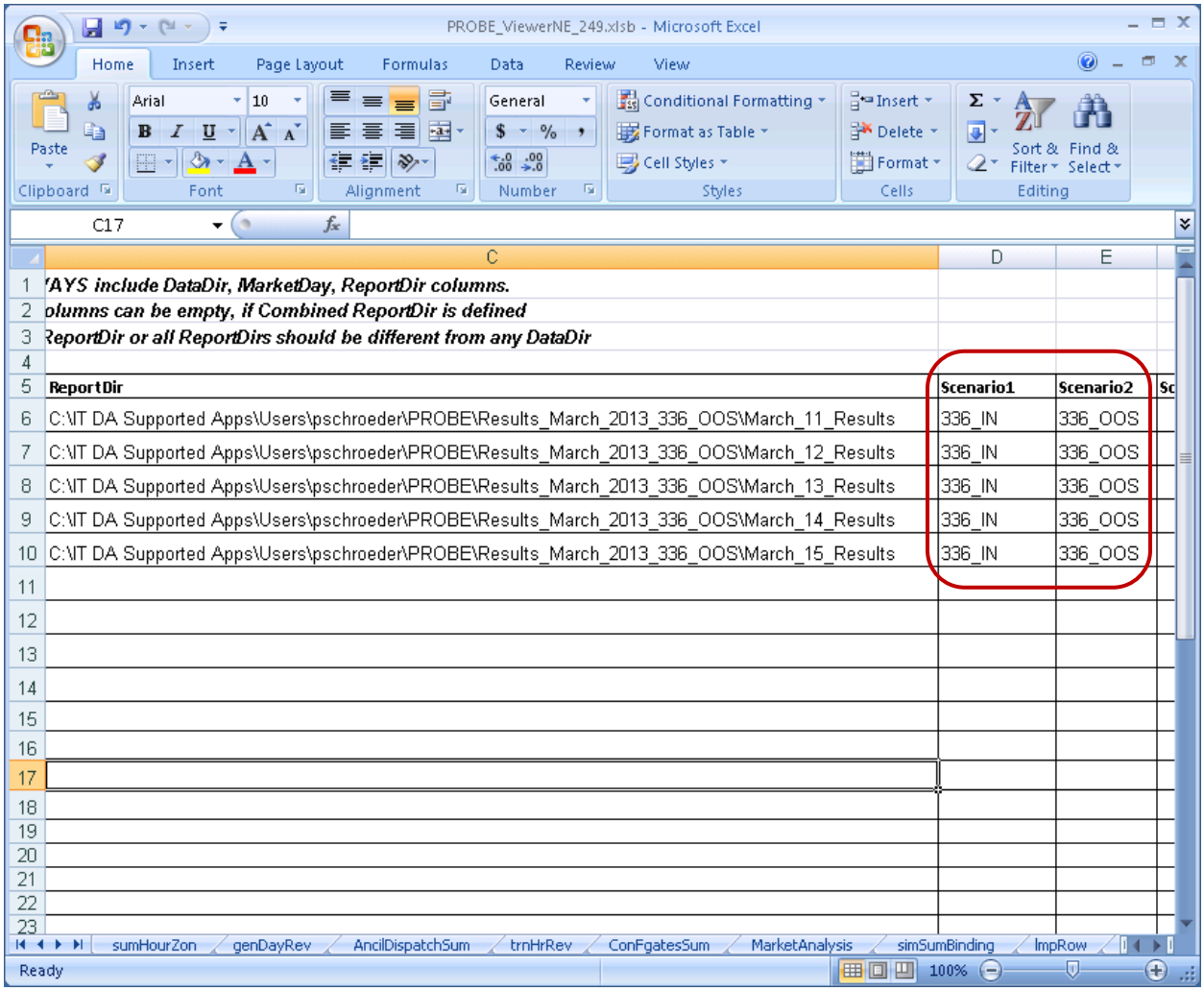
3. SET the “DataDir” paths to where the input data resides for each corresponding day.



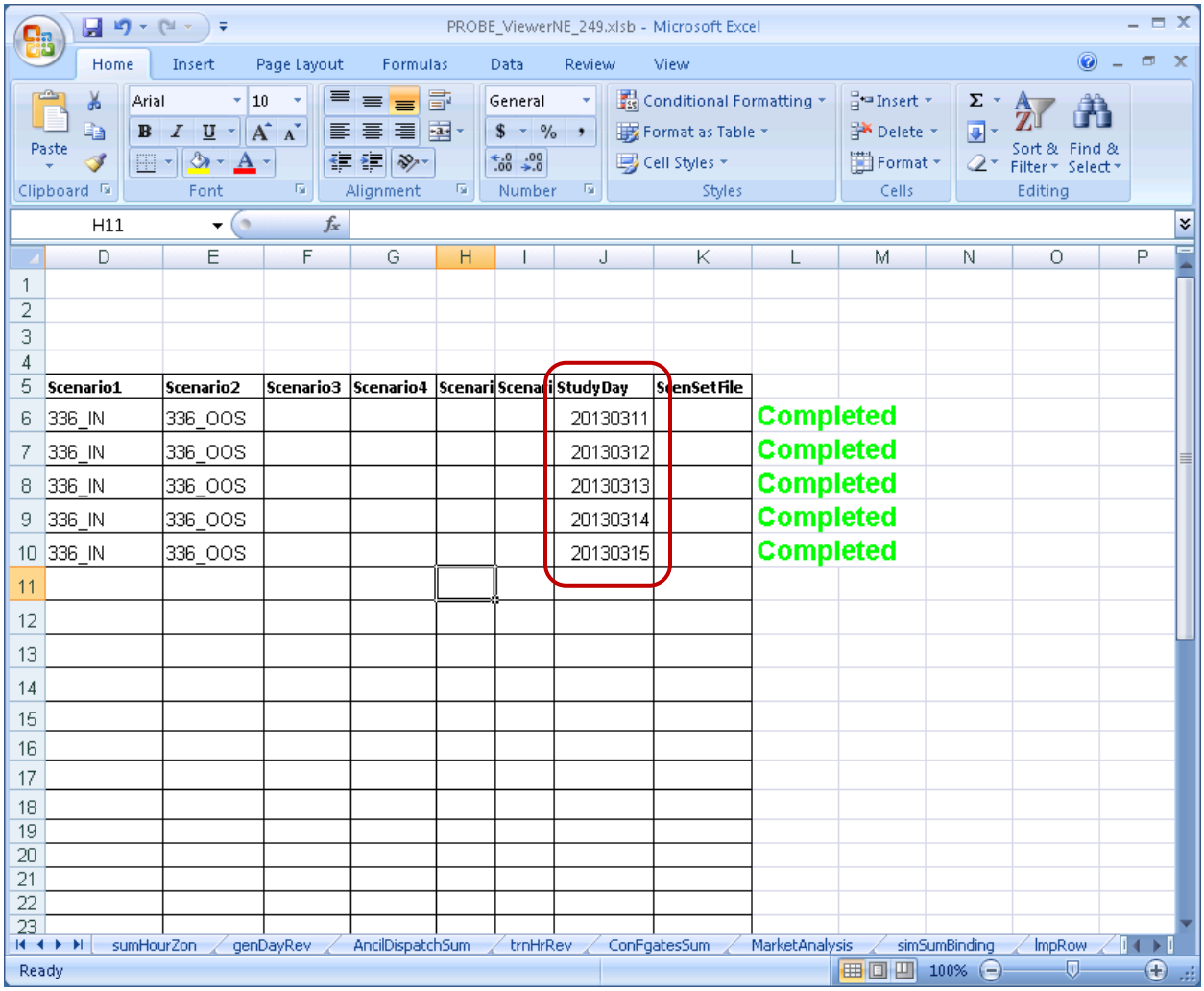
4. SET the folder paths where the reports are to be written in the “ReportDir” column. The “MarketDay” column is **not** normally used.



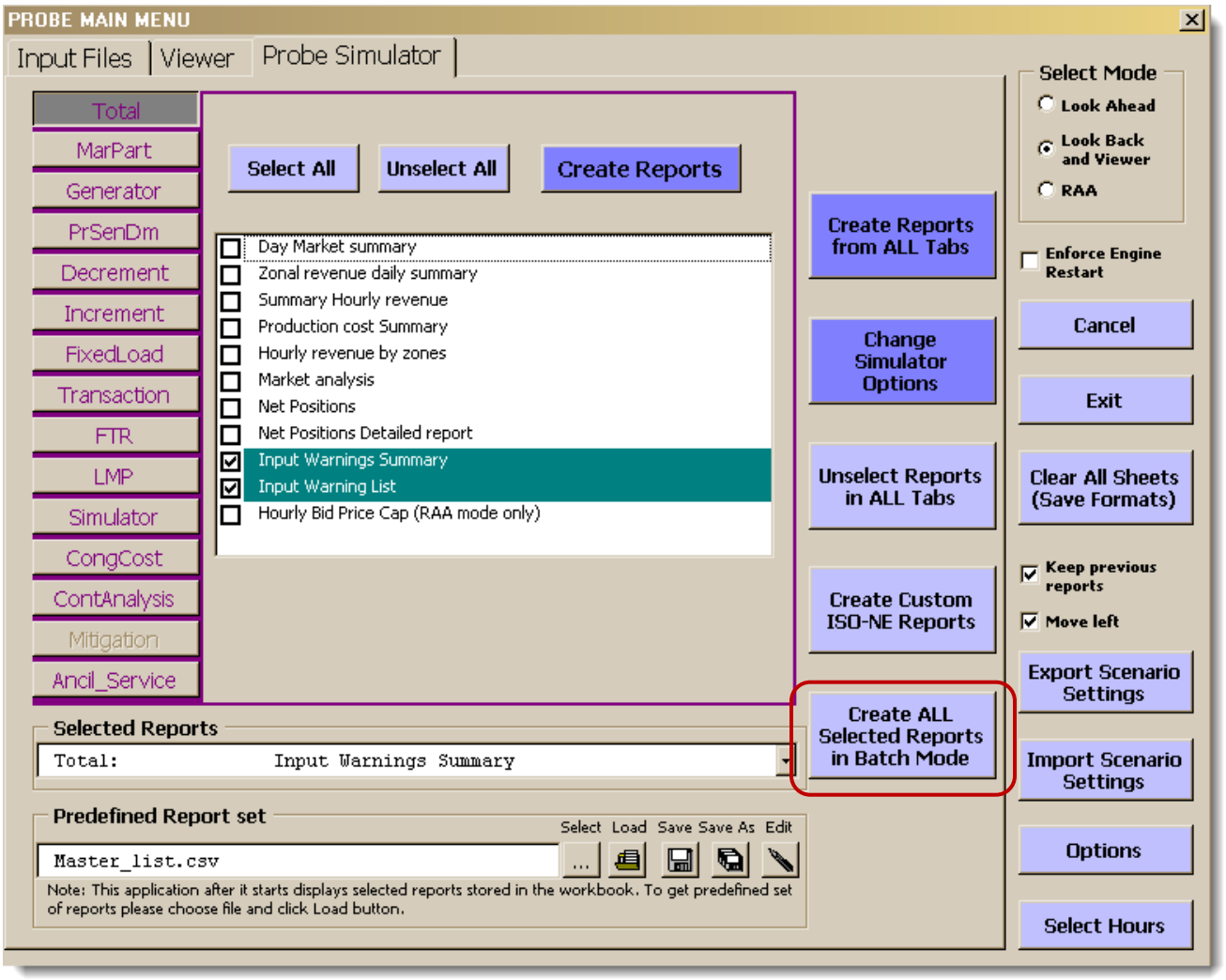
5. IDENTIFY the Scenario1, Scenario2….Scenario6 names as desired.



6. ENTER the appropriate study-day dates into the “Study Day” column.



7. CLICK “Create All Selected Reports in Batch Mode” to get back into the “Batch Mode Process” display.

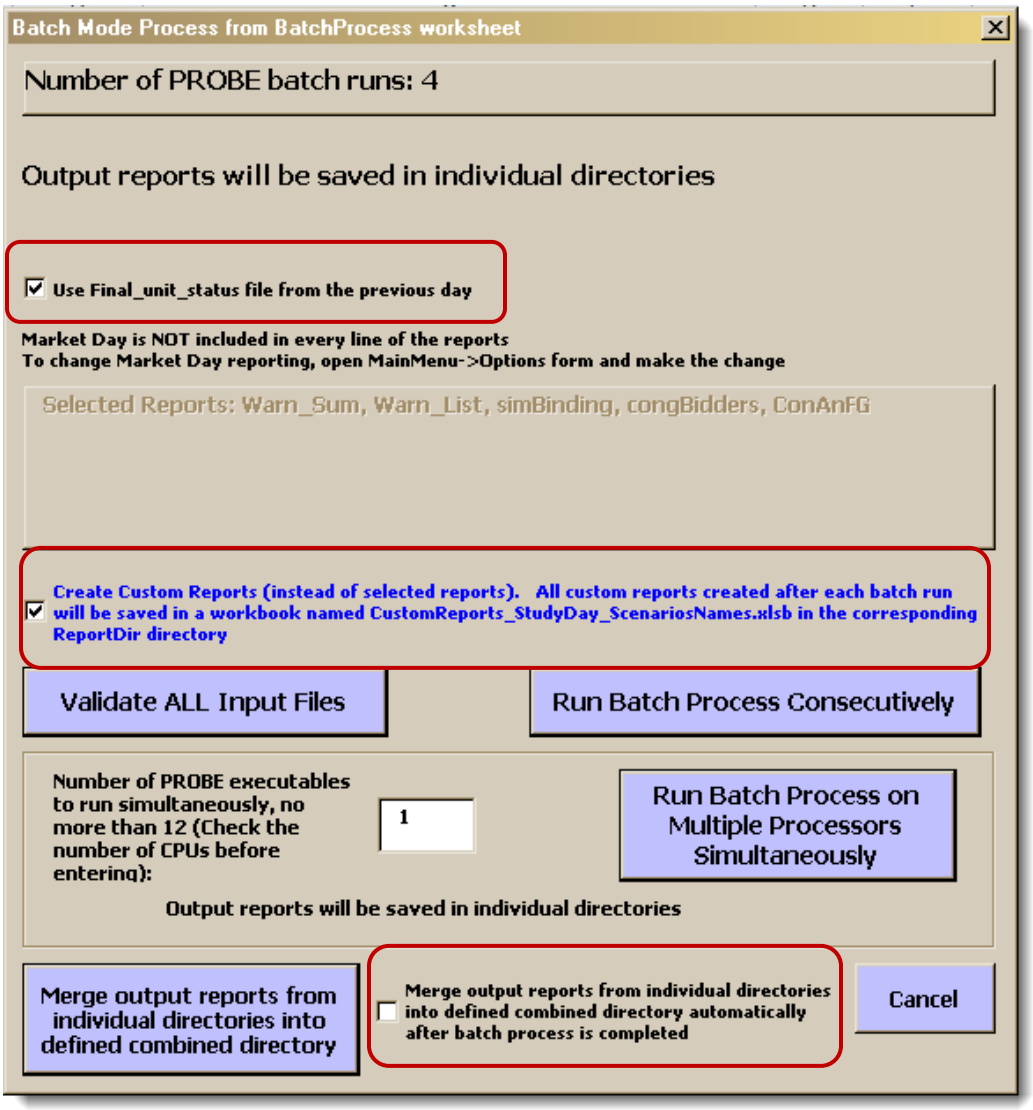


8. CLICK the "Validate All Input Files" and verify that all the files in the input folders are included and that the filepaths on the BatchProcess spreadsheet are correct.

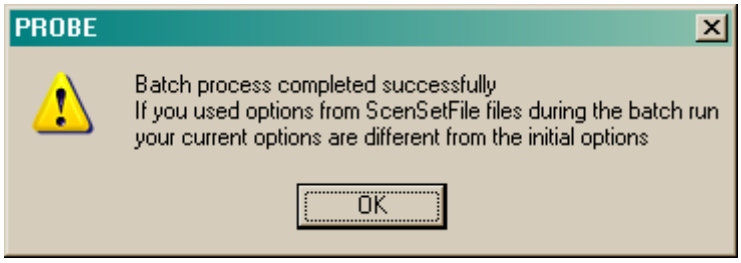
   a. CHECK the "Use Final_unit_status…day" box to enable PROBE to pass the unit run histories from one (1) day to the next.

   b. CHECK the "Create Custom Reports…" box to create the ISONE custom reports in the results path. If the box is **not** checked, all the reports selected in the PROBE Simulator tab will be created for each day.

   c. The "Merge output reports from individual directories…." box is normally unchecked as this does **not** work with the ISONE custom reports.



9. CLICK the “Run Batch Process Consecutively” to run PROBE on one (1) CPU processor core OR SPECIFY the number of CPU processor cores (up to twelve (12)) and CLICK the “Run Batch Process on Multiple Processors Simultaneously”. Selecting multiple processor cores speeds up the PROBE solution process significantly. When PROBE has successfully solved each day, the following success message will be displayed:




Also, “Completed” will appear in Green to the right of the “ScenSetFile” column. The daily reports will be available in each specified results folder.