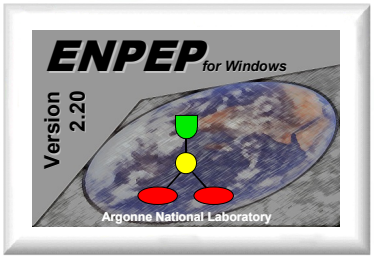
ENPEP-BALANCE: Expanded BALANCE Network with Refinery RESULTS FOR CASES 2-9

ENPEP-BALANCE Training Course
Singapore
December 5-9, 2011



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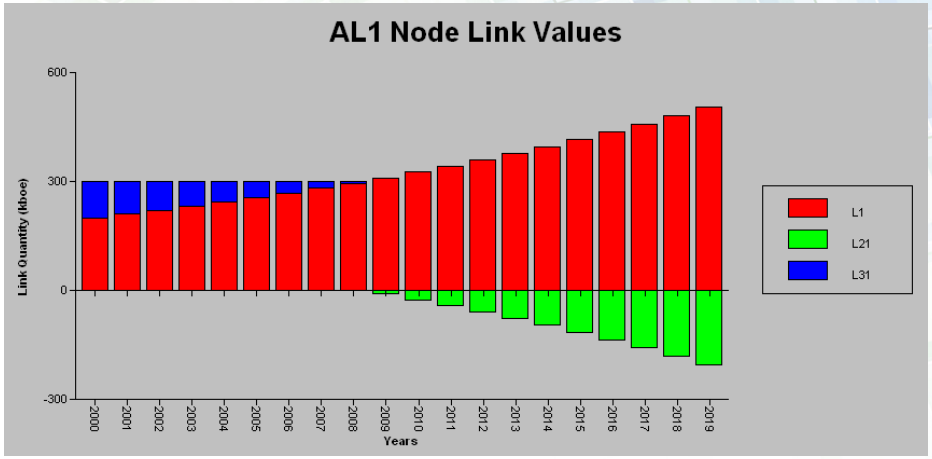
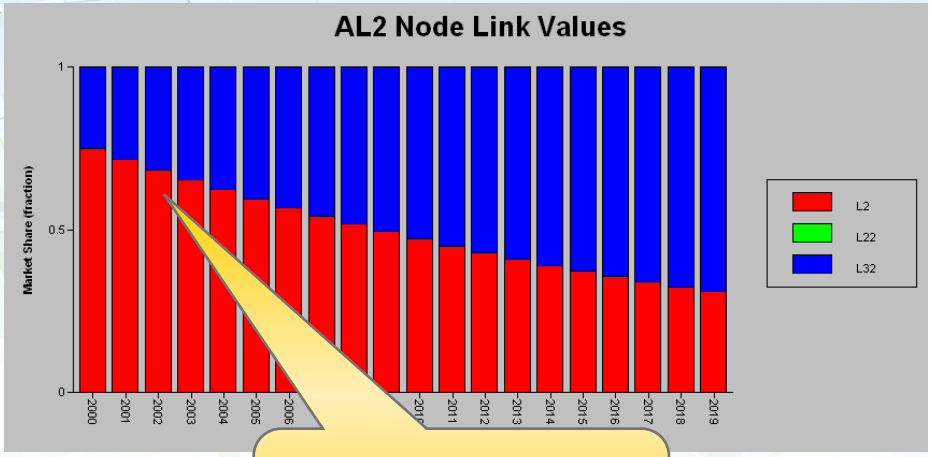
Exercises for Training: Total of 9 Cases (Base Case plus 8 Scenarios)

- Case 1: Design and run the refinery base case
- Case 2: Change price sensitivities from 2 to 10 at all decision nodes
- Case 3: Change the lag parameter from 1.0 to 0.5 at all decision nodes
- Case 4: Change refinery capacity to 1500 kboe (all plants capacity) in 2010
- Case 5: Change energy resource prices as follows
  - Price growth rates: 1%/yr each year for RS1, 6%/yr each year for RS2, no change on imported products
- Case 6: Change energy resource prices as follows
  - Supply curves: no change on imported products, RS1 linear slope = 0.01; RS2 quadratic = 0.00002
- Case 7: Introduce capacity constraint on imported crude oil (RS2): 1500 kBOE (2005); 1200 kBOE (2010); 1000 kBOE (2015)
- Case 8: Change the REFINERY output sizing link to residual oil (L1)
- Case 9: Change the growth rates for gasoline demand (DE3) to -5%/yr each year

Note: All variations are based on Case 1
Make a copy of Case 1, Open the Case, Close the Case, and Rename the Case to Case X. Then open the case, make the input changes, and run the case.

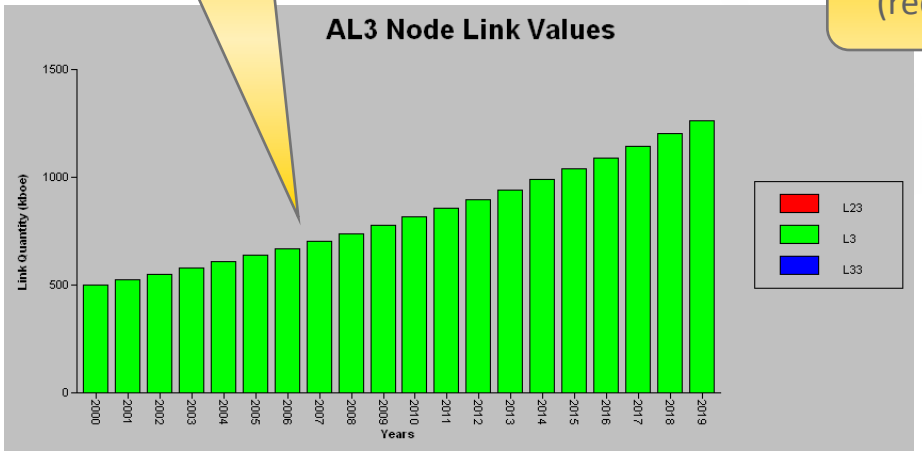
Case 2: Change of Price Sensitivities from 2 to 10



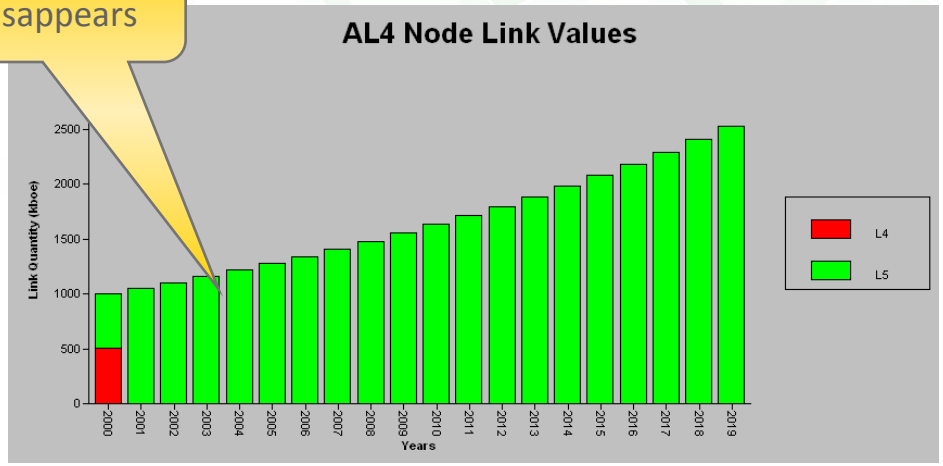


Why does this look slightly different than in the base case?

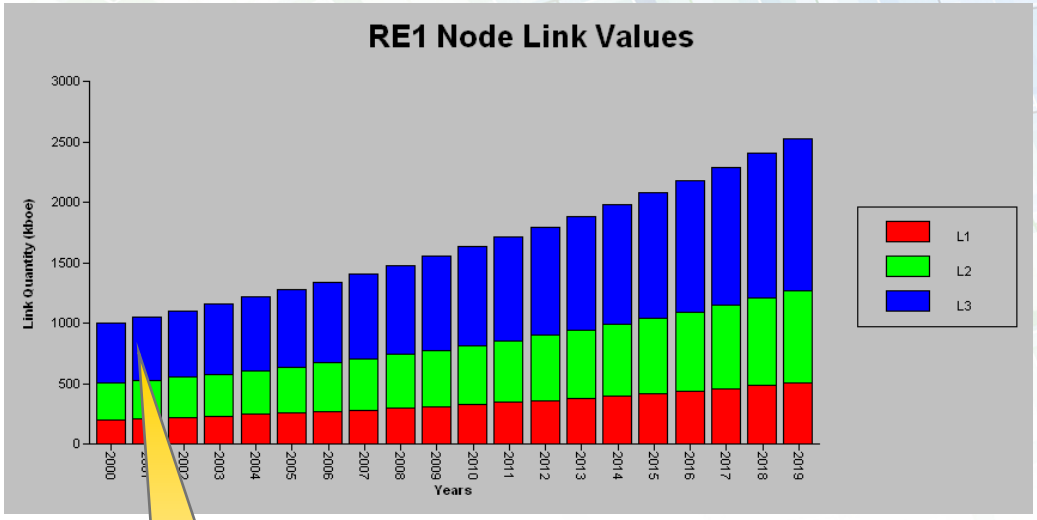
Import gasoline is not used



Domestic crude (red) disappears

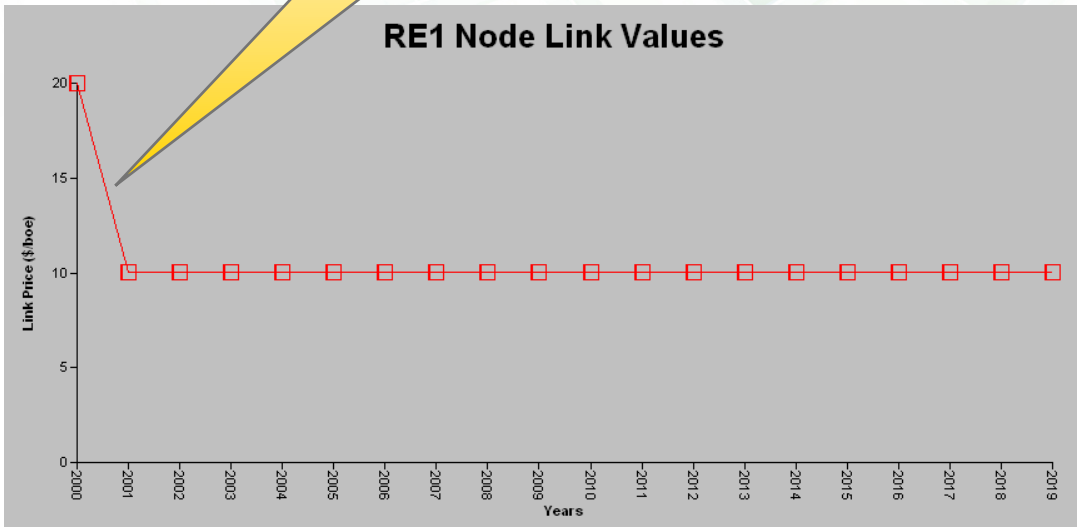


Case 2: Change of Price Sensitivities from 2 to 10

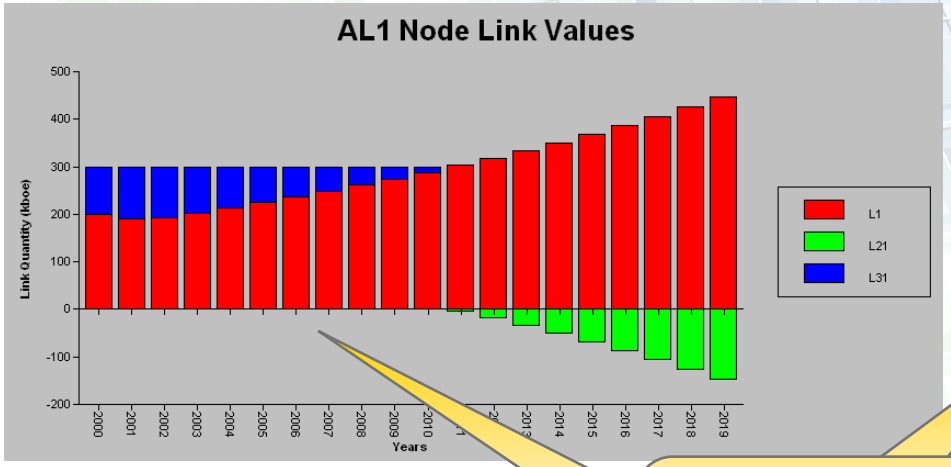


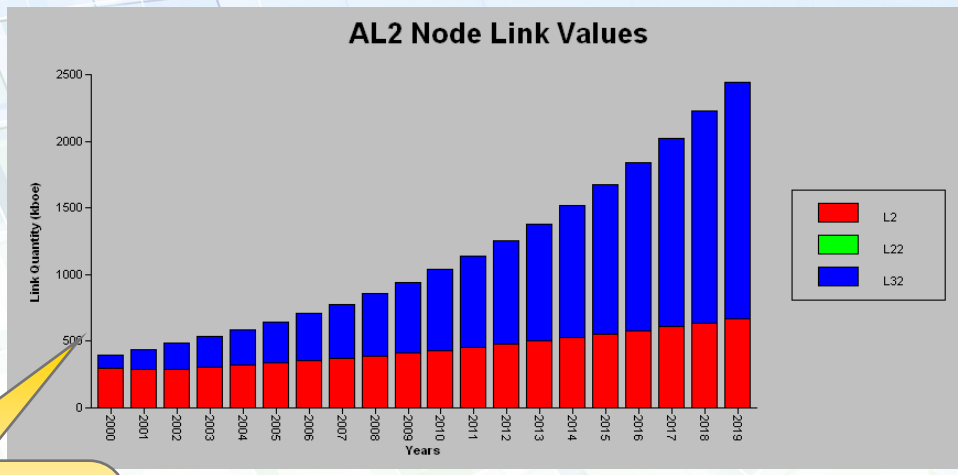
Why is there no drop in refinery output as in the base case (slide 24)?

Why does the crude purchase price for the refinery drop to $10 instead of $12 as in the base case (slide 28)?



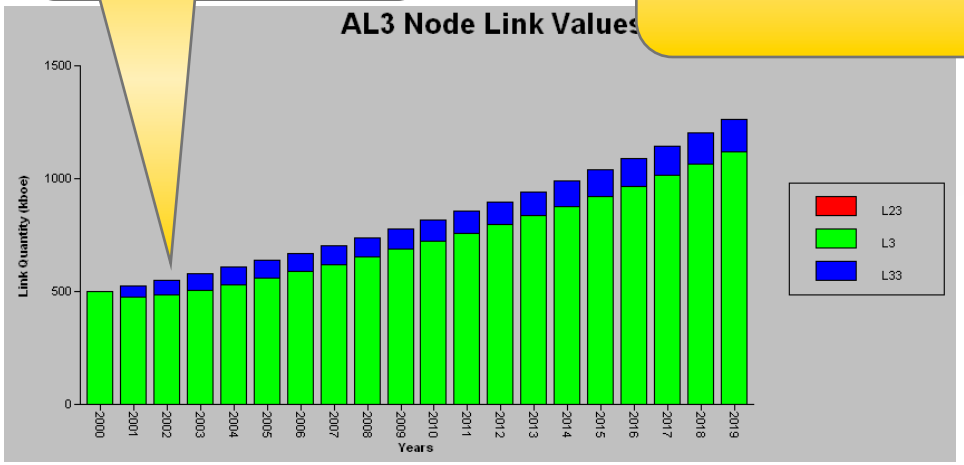
Case 3: Change of Lag Parameter from 1.0 to 0.5

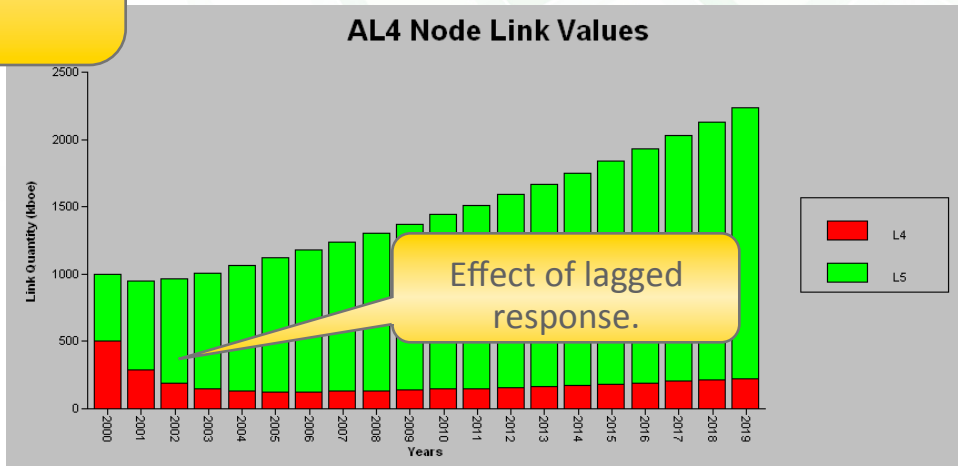




Why are these 2 graphs essentially the same as for the base case?

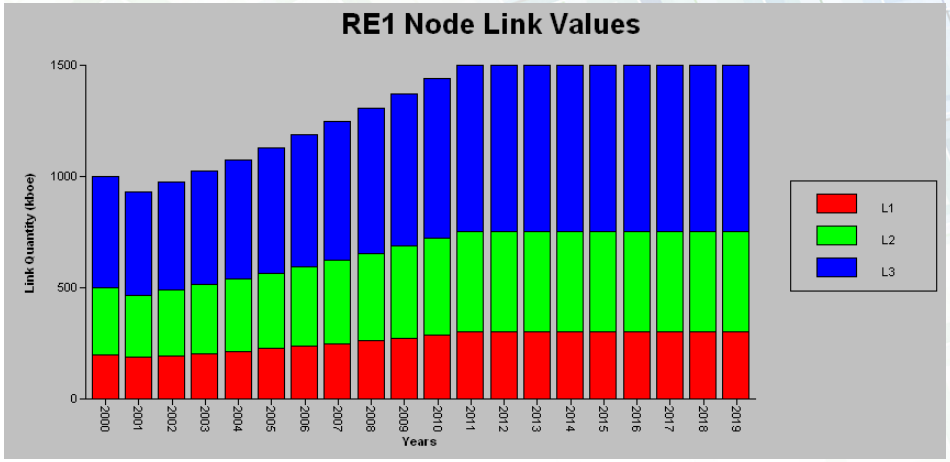
Is this the same as in the base case?

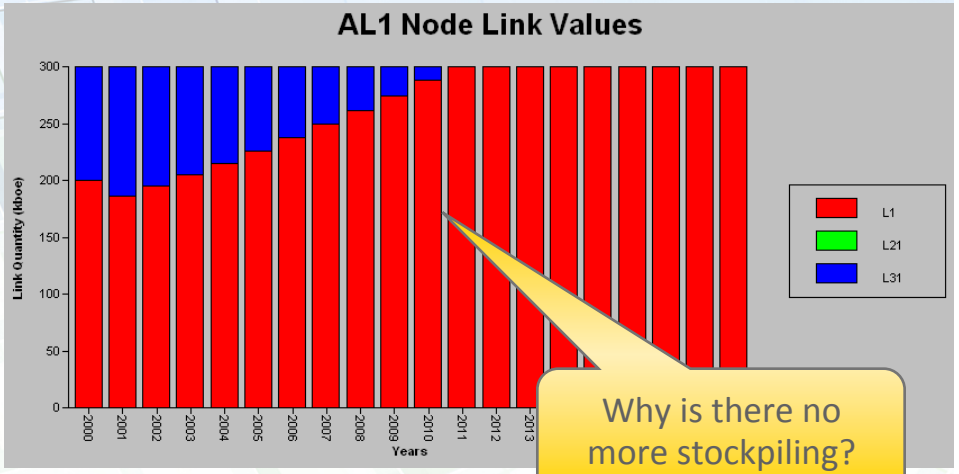


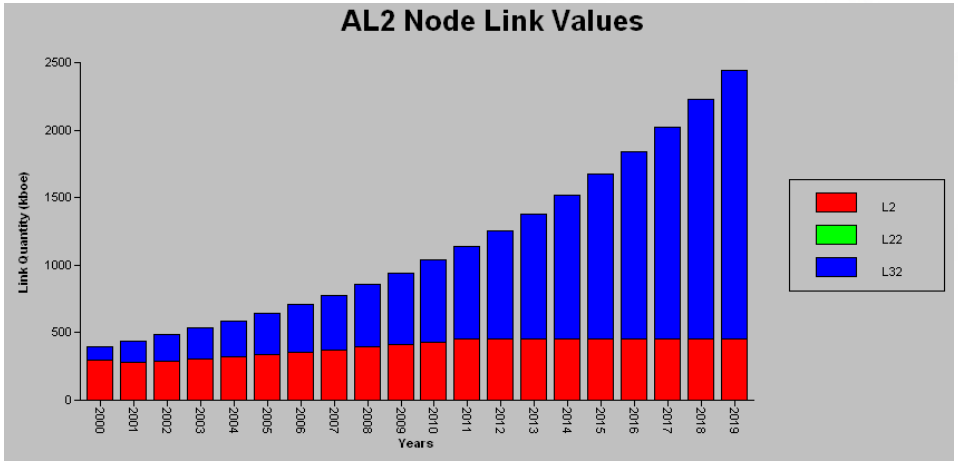


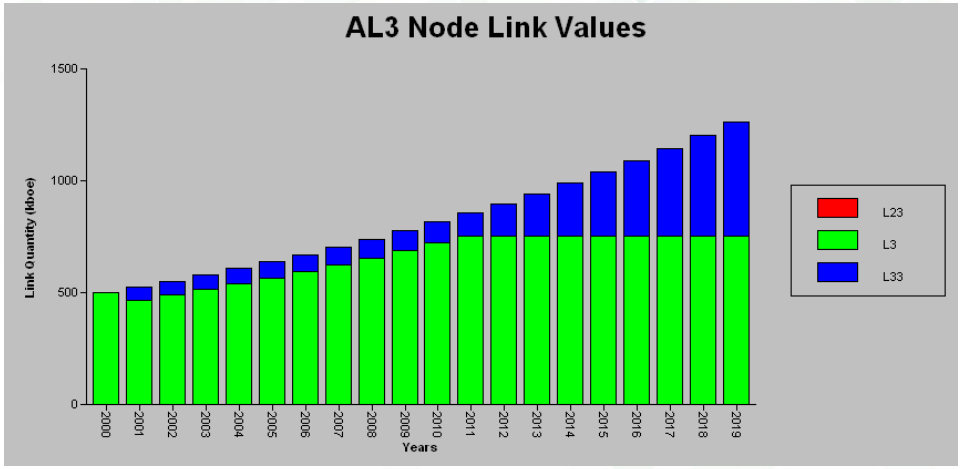
Effect of lagged response.

Case 4: Reduced Refining Capacity of 1500 kBOE in 2010

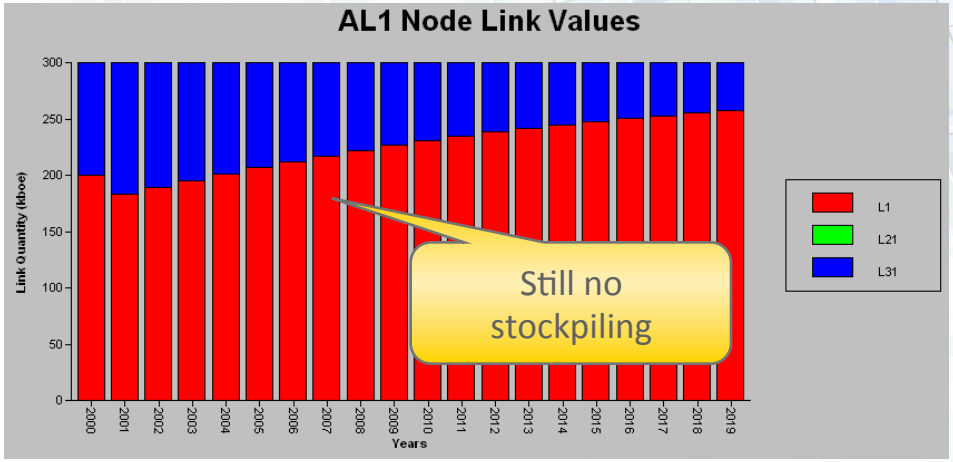


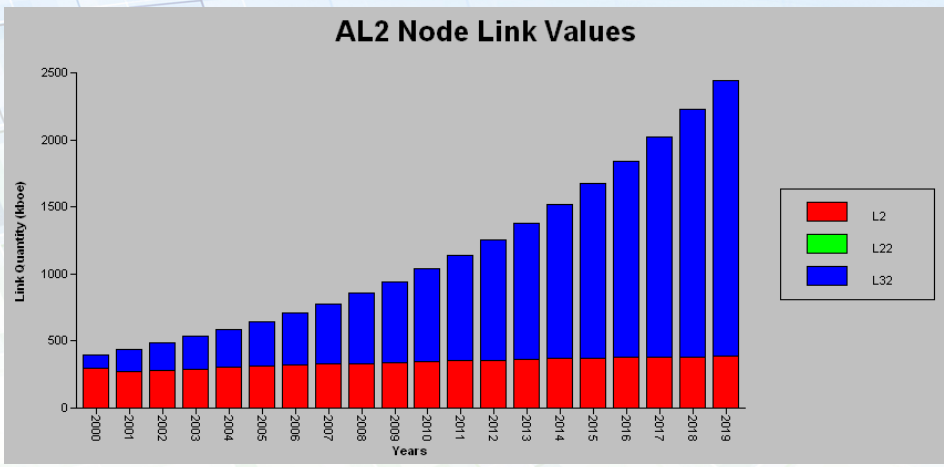


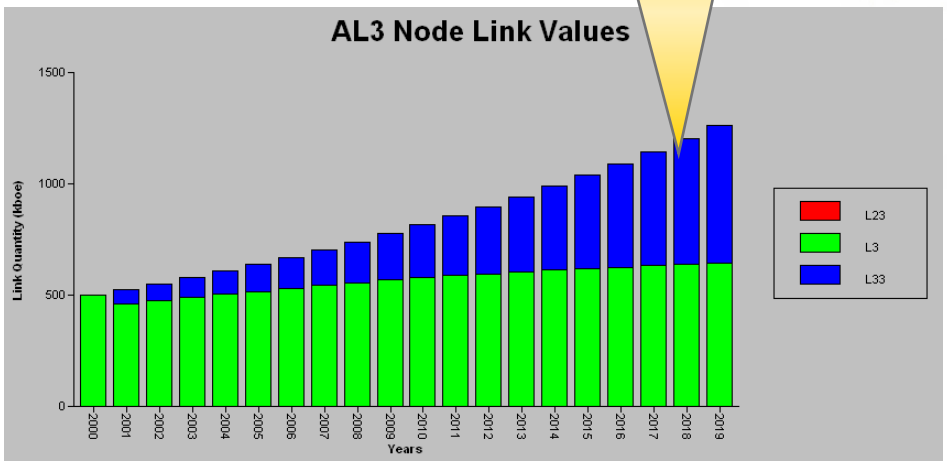


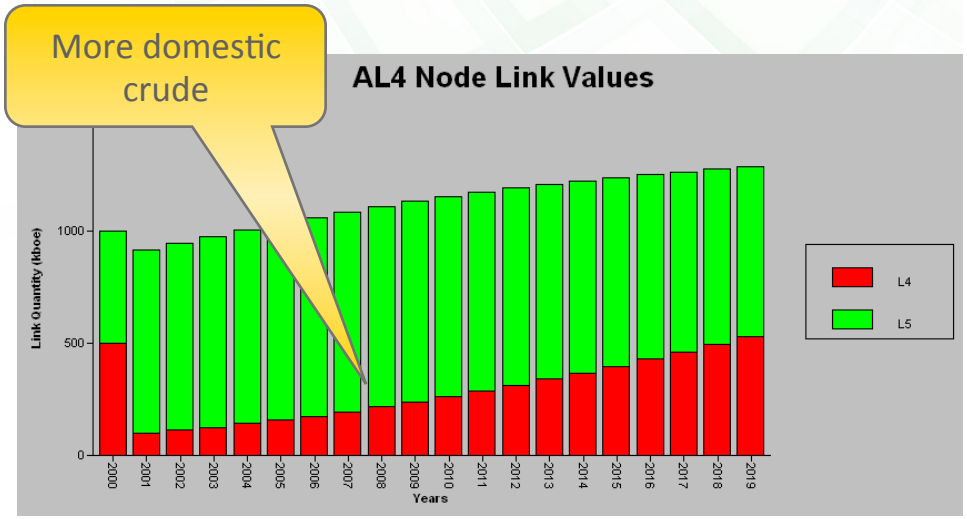


Case 5: Change in Crude Prices; RS1 = 1%, RS2 = 6%

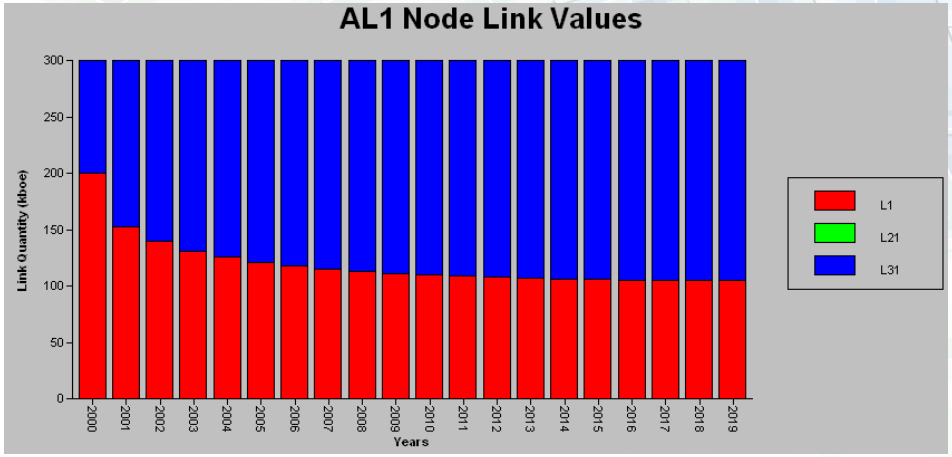


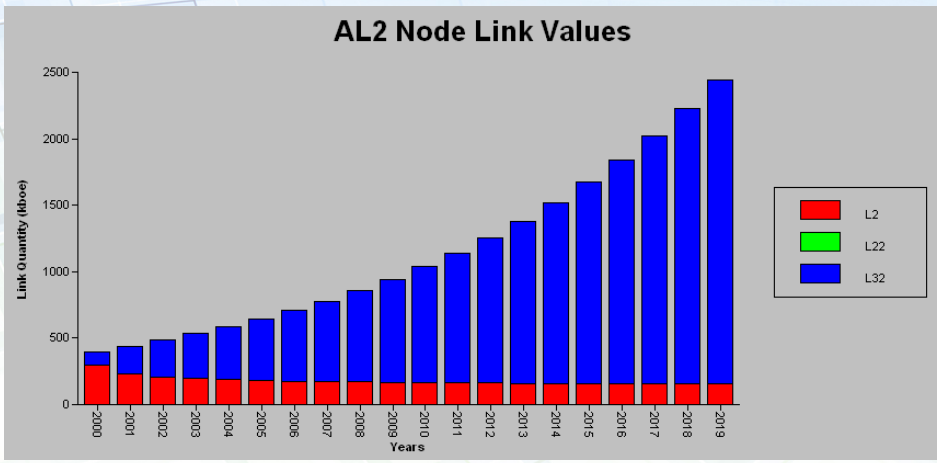




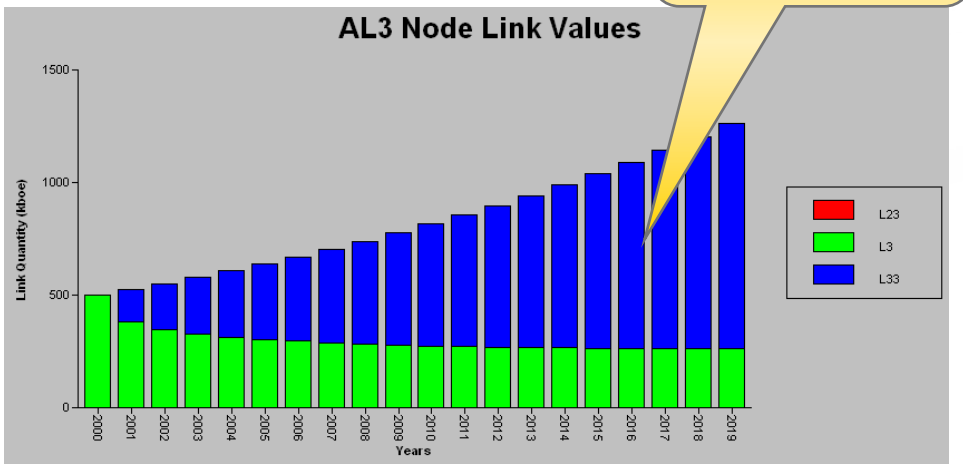


Case 6: Change in Crude Prices; RS1 Linear Slope = 0.01; RS2 Quadratic = 0.00002

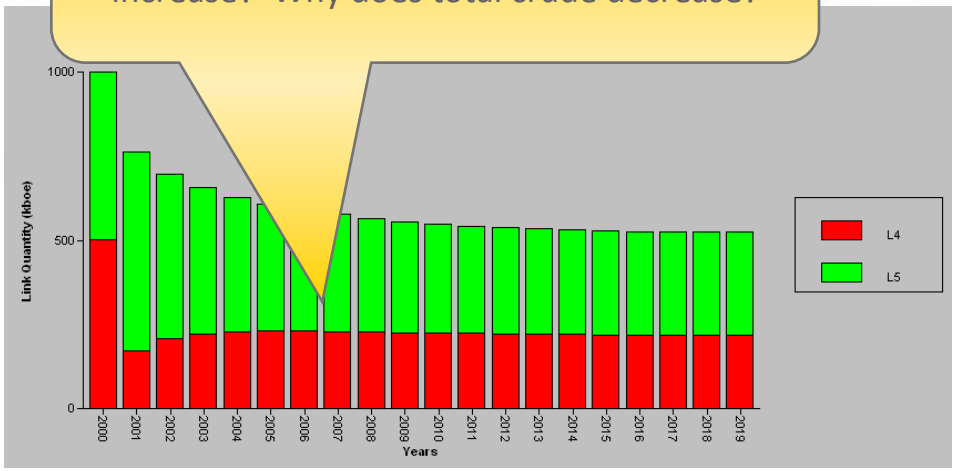




Significant shift to import gasoline (blue)



Can you explain this trend? Why does domestic crude (red) first drop and then increase? Why does total crude decrease?



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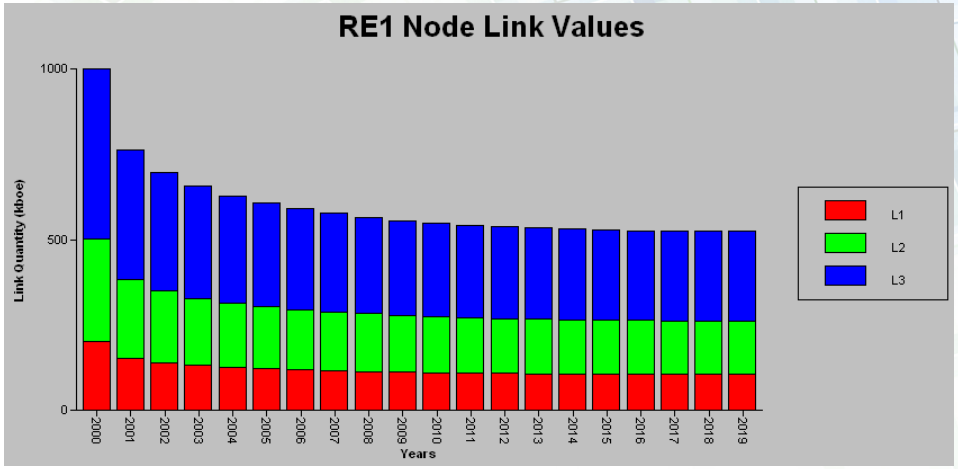
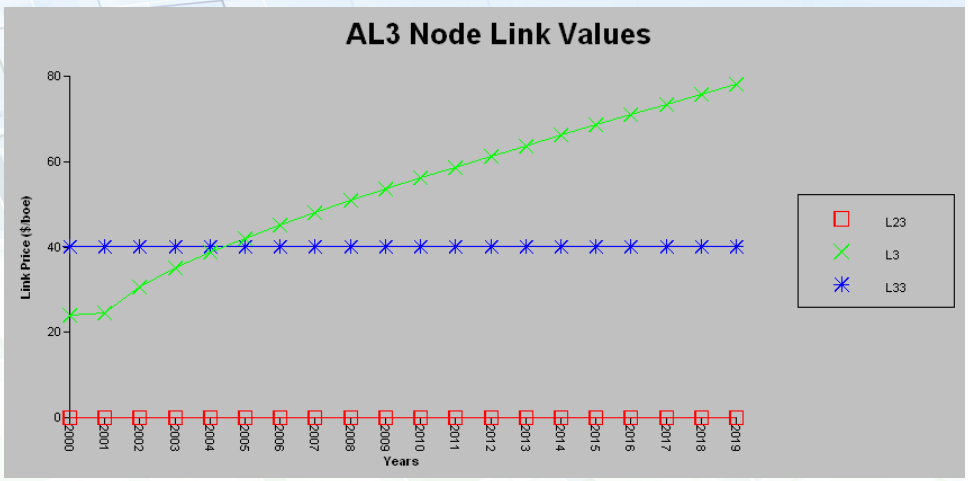
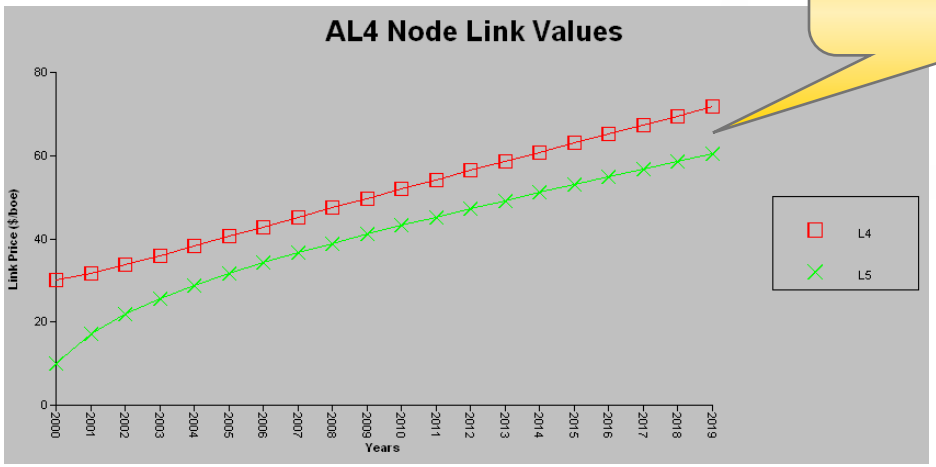
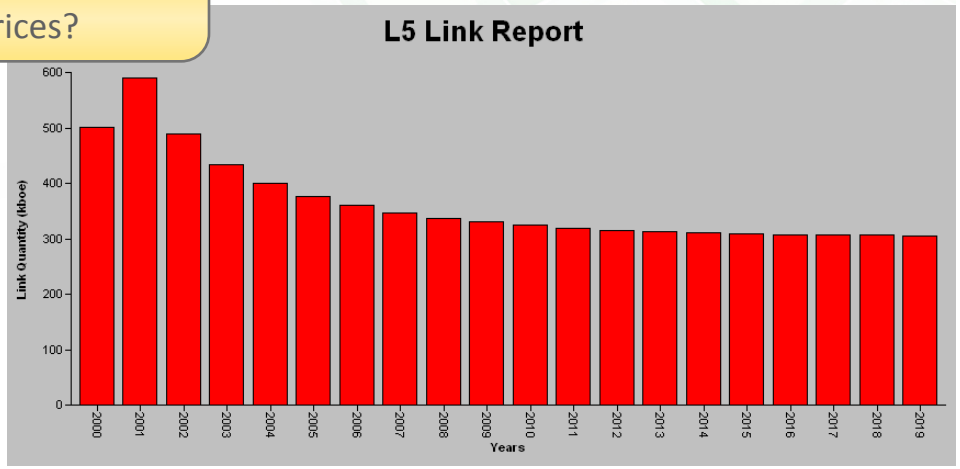


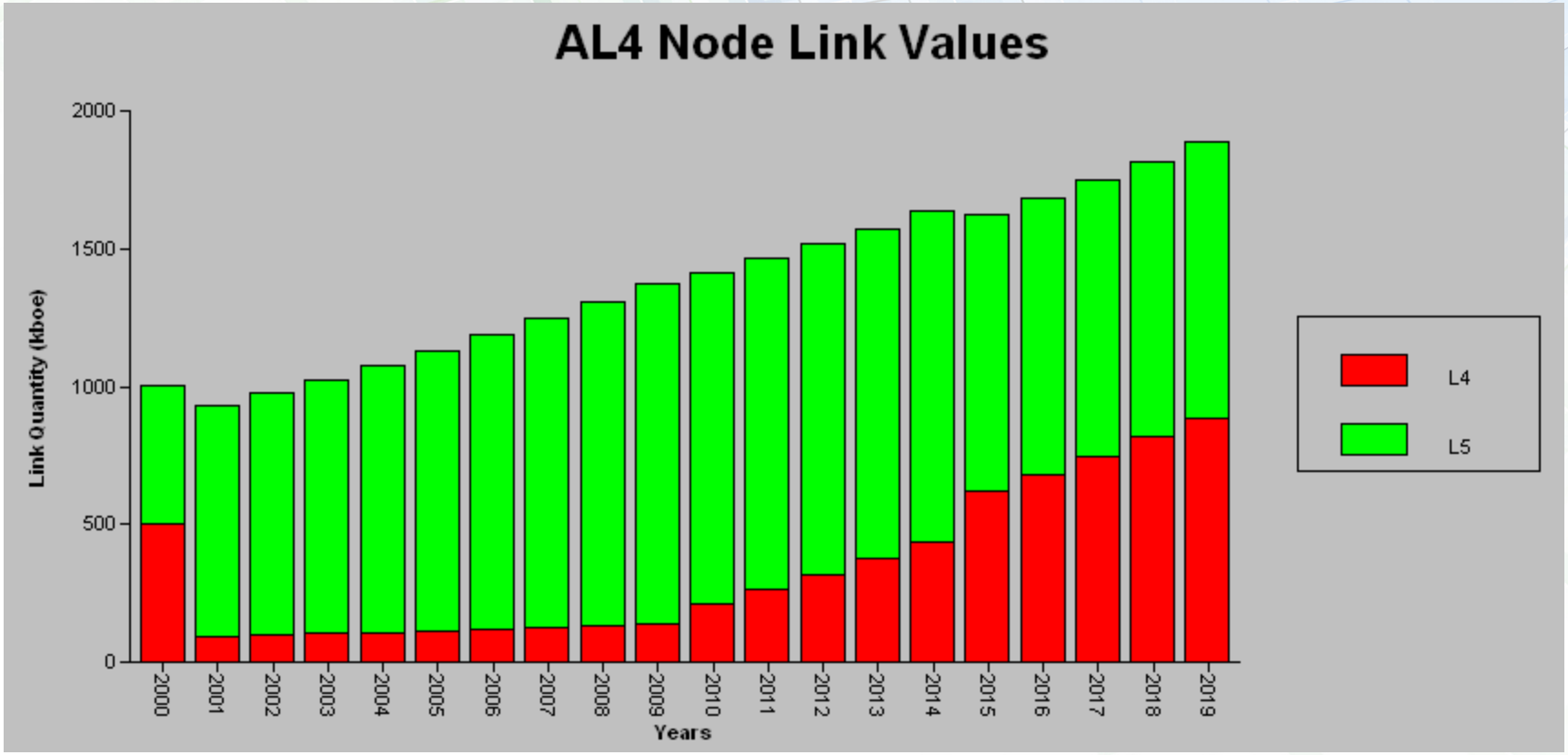


Can you explain the observed resource prices?

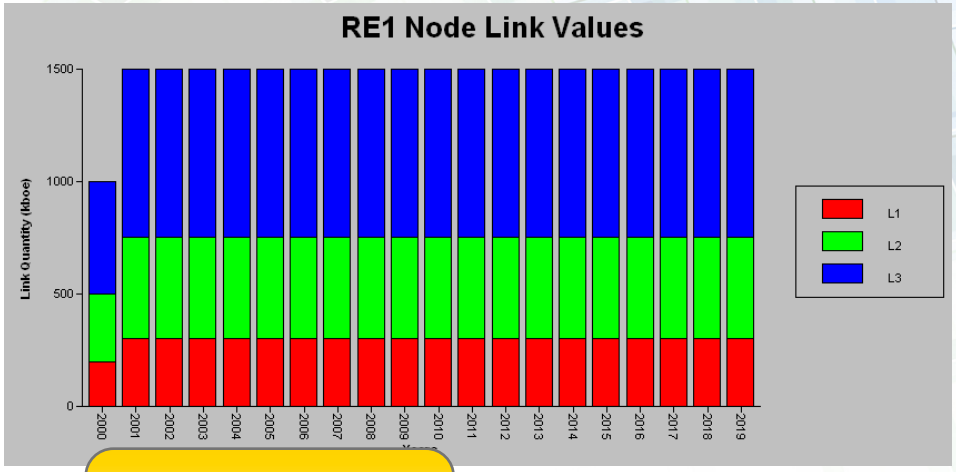


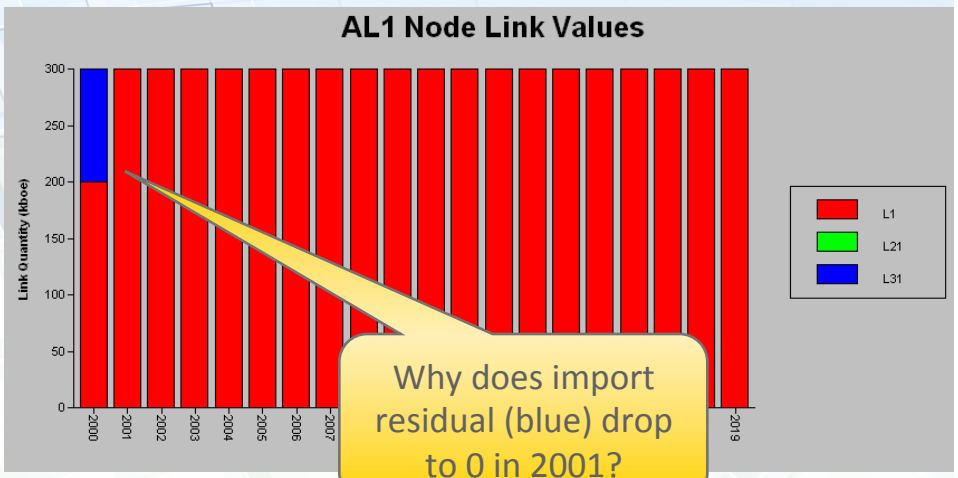


Case 7: Introduce Constraint on Imported Crude Oil (RS2) 1500 (2005); 1200 (2010); 1000 (2015)

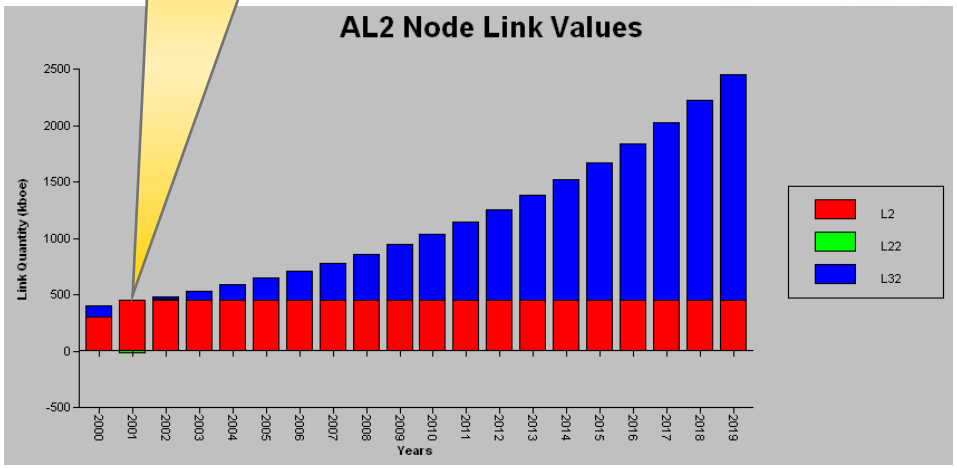


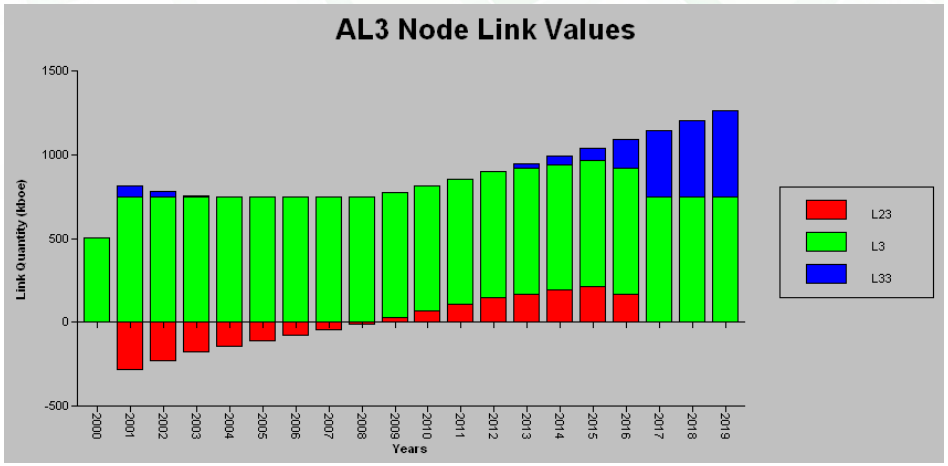
Case 8: Change the Output Sizing Link to Residual Oil (Link L1)





Why is diesel stockpiled in 2001?





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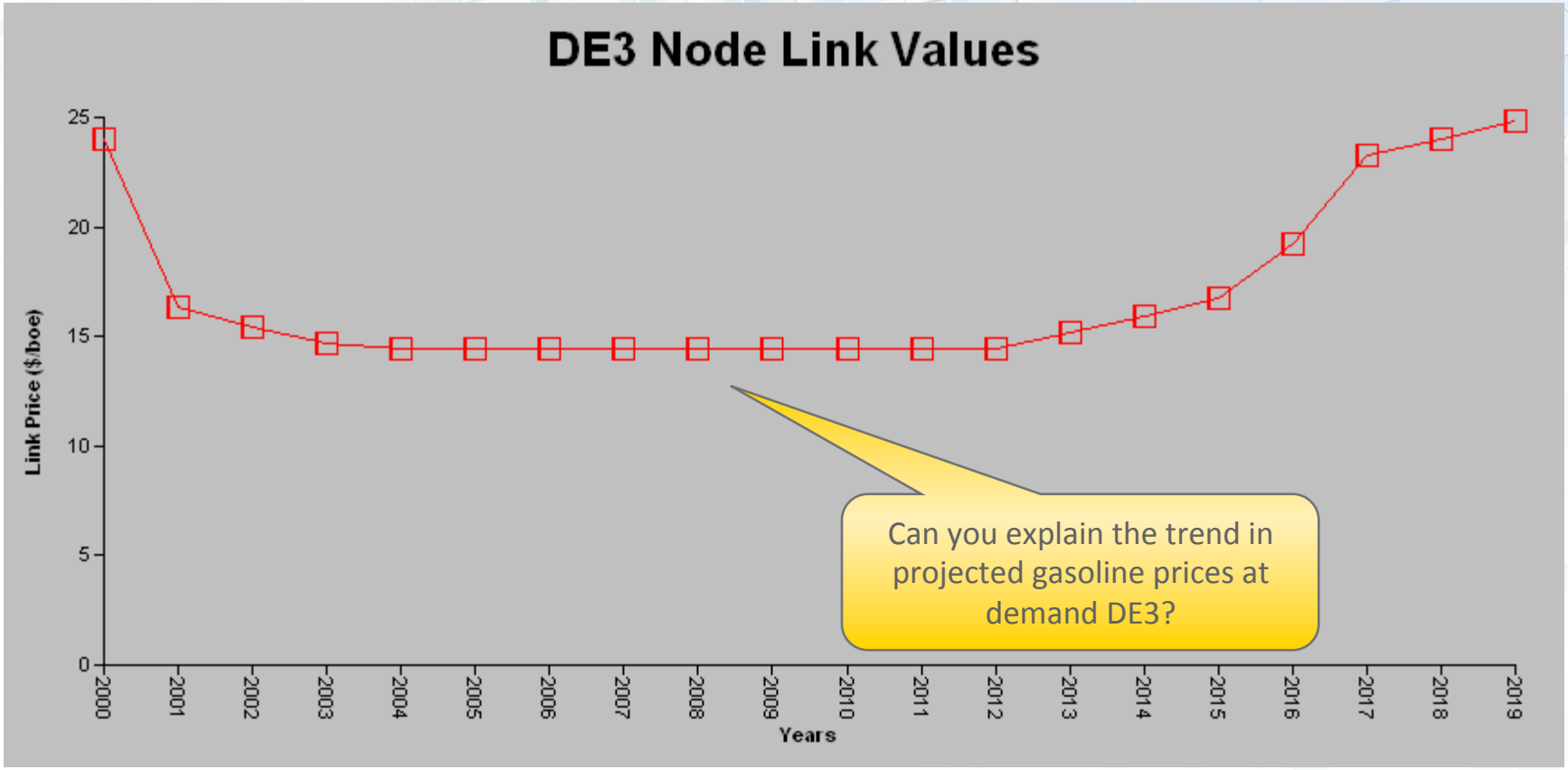

Case 9: Gasoline Demand Declines by 5% per Year