Precision Scheduled Railroading

- What is it?
- Can you measure it?
- How do you forecast its future impact?

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  - Root cause gap analysis
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- Market and User Analysis
  - Pricing and yield management
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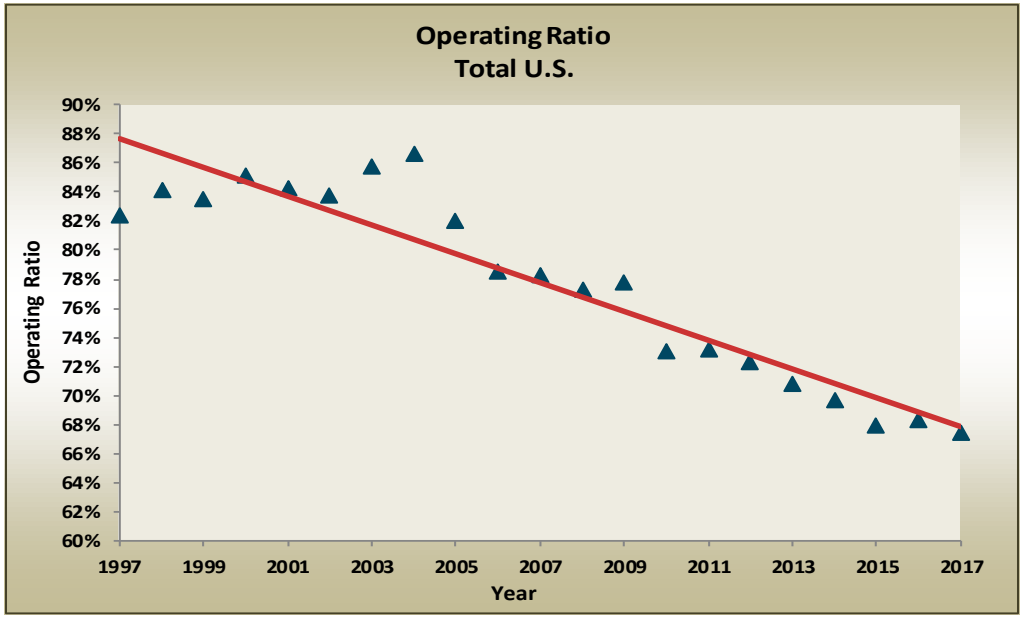
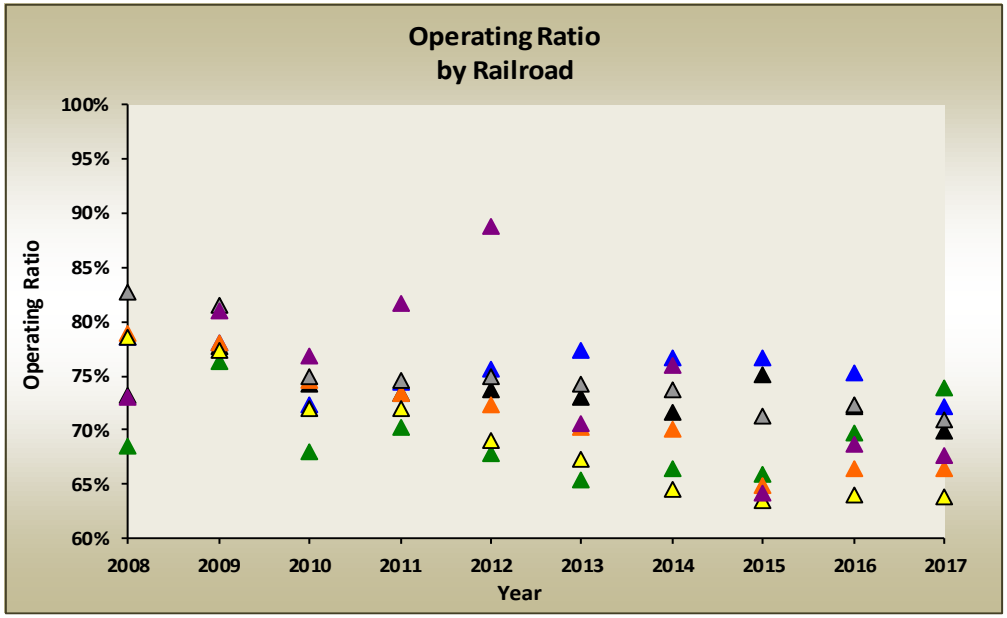
  - Fleet management
  - Competitor assessment

Railroads are reducing costs and increasing prices. Our work shows that a 55% Operating Ratio is quite achievable for all Class I railroads.

Operating Ratio = Total Cost / Total Revenue





NOTE:

-All presentation data are derived from the AAR Analysis of Class I Railroads reports

-Cost and revenue figures are stated in 2012 constant dollars

-Chart colors match each railroad's corporate color

- BNSF = Orange
- CP = Maroon
- NS = Black
- KCS = Gray
- CSX = Blue
- CN = Green
- UP = Yellow

Macro view of a railroad production function.

Cost $/GTM ==> Cost Efficiency

Revenue $/RTM ==> Price Efficiency

RTM / GTM ==> Network Efficiency

$$\frac{\text{Cost \$ / GTM}}{\text{Rev \$ / RTM}} \times \frac{\text{RTM}}{\text{GTM}} = \text{Operating Ratio}$$

Some key drivers impact all three performance metrics.

	Fuel Cost, Fuel Effic-iency	Labor Cost, Labor Prod	Track Maint. & Track Capital	Train & Car Velocity	Tons per Carload	Length of Haul	Traffic Mix	Truck Prices	STB Regu-lators
Cost $/ GTM	✓	✓	✓	✓	✓	✓	✓		
Rev $ / RTM				✓	✓	✓	✓	✓	✓
RTM / GTM					✓		✓		

Precision Scheduled Railroading (PSR) is a method for operating a railroad that expedites the delivery of shipments to maximize asset utilization while minimizing non-essential costs.

- Developed by Hunter Harrison, PSR is described by:

Hunter's Five Pillars of Precision Scheduled Railroading	• Provide Service: Do what you say you are going to do • Control Costs: Eliminate unnecessary costs • Optimize Assets: Use assets more efficiently and productively • Operate Safely: Safety is the top priority • Develop People: Cultivate the best team of railroaders
Hunter's Seven Service Design Principles	• Minimize car dwell time in yards • Minimize car classifications • Have more than one way to move cars to destination • Run general-purpose trains • Balance train movements by direction • Minimize power requirements • Strive for steady workflow load

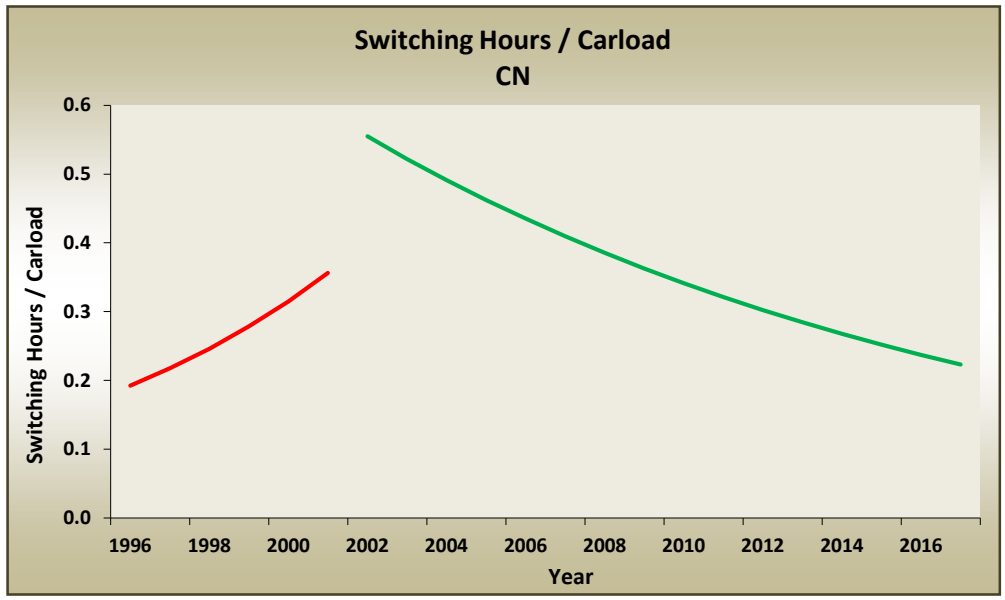
Implementing PSR requires railroads to pull certain operating levers.

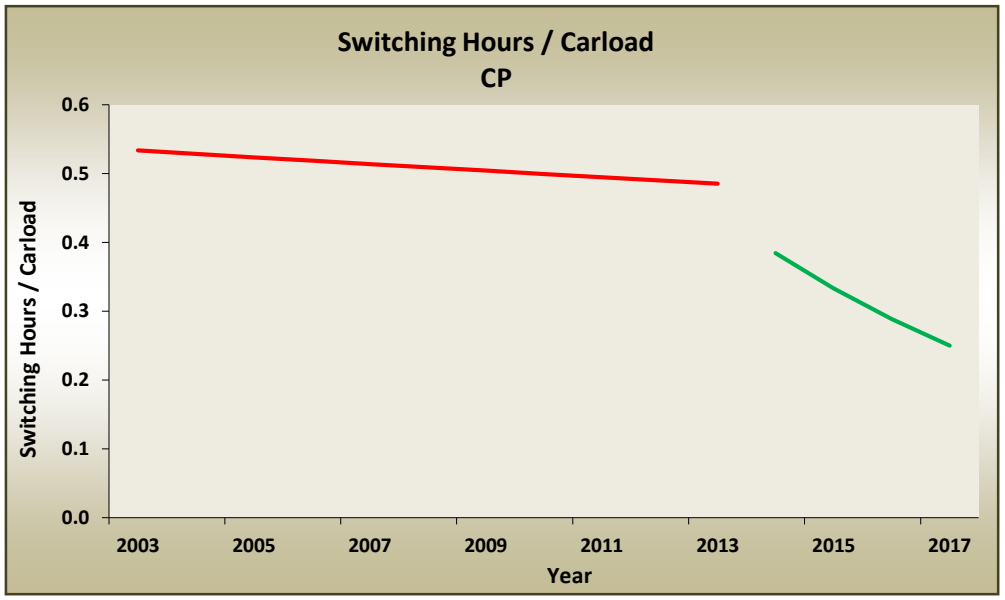
1	Reduce Yard / Local train starts, often to every other day to reduce costs & aggregate shipments
2	Spread Yard / Local train starts evenly across 3 shifts to reduce locos in Yard / Local service
3	Run every Road train 7 days per week to eliminate dead heads, away from home costs, delays
4	Run General Purpose trains to maximize train lengths & reduce train meets
5	Reduce average HP/ton on Road trains to save locomotives and reduce “hurry-up & wait”
6	Sell low density branch lines to reduce costs, focusing capital and management on the core
7	Convert hump yards to flat yards & close surplus yards to reduce costs and expedite handlings
8	Reduce head count in management and operations, focusing on “Must have” not “nice to have”
9	Bill and collect Accessorial charges to maximize revenue and change customers’ behavior
10	Charge price premium on peak days and in peak seasons to balance flows

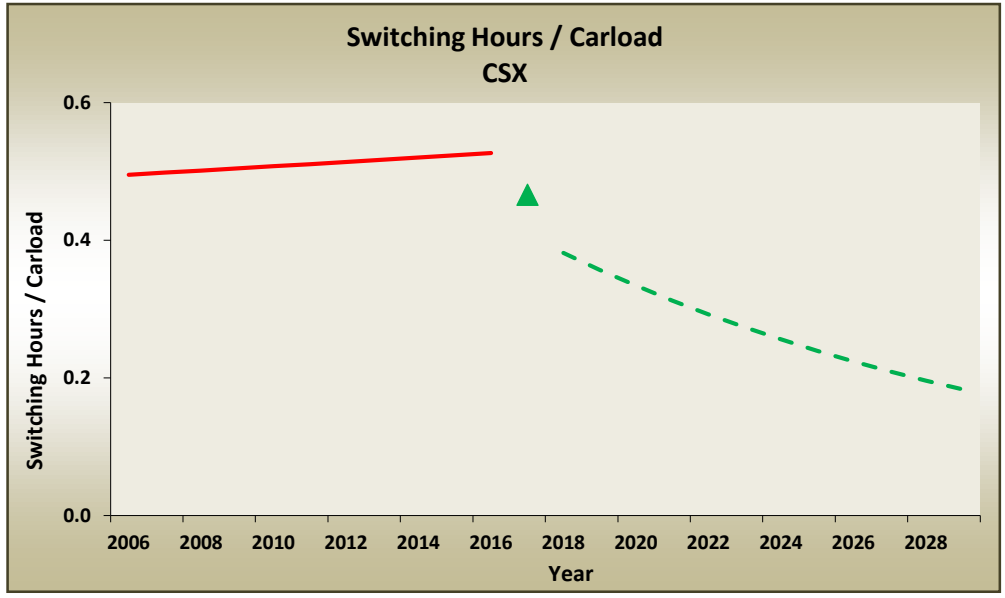
We used historical Class I data to measure and forecast the impact of PSR.

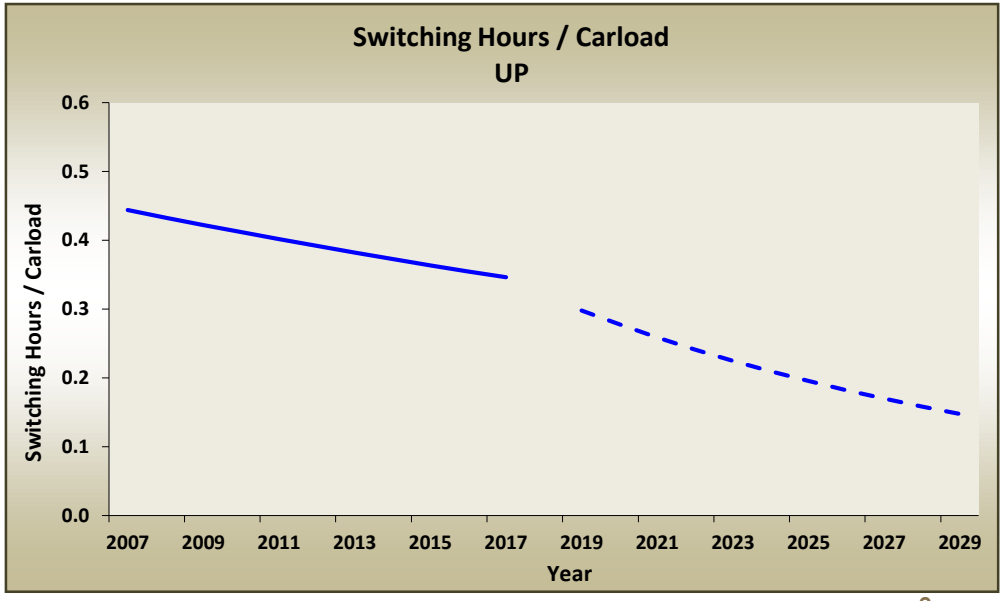
- We used publicly available data, the AAR Analysis of Class I Railroads, as our data source
- We chose a metric for each PSR operating lever to quantify that PSR element on rail performance
- We plotted historical data for the three Class I railroads that Hunter Harrison led
  - The red line represents the regression trend-line in the calculated metric pre-Hunter
  - The green line represents the regression trend-line in the metric post-Hunter
- We assumed PSR began on each railroad in the year Hunter arrived at that railroad:
  - CN -- 2002
  - CP -- 2014
  - CSX -- 2017
- We averaged the rate of post-PSR improvement of each metric across the three companies
- We used that historical improvement rate to forecast the likely impact of PSR on the UP & CSX

Reduce Yard / Local train starts, often to every other day, to reduce costs & aggregate shipments.

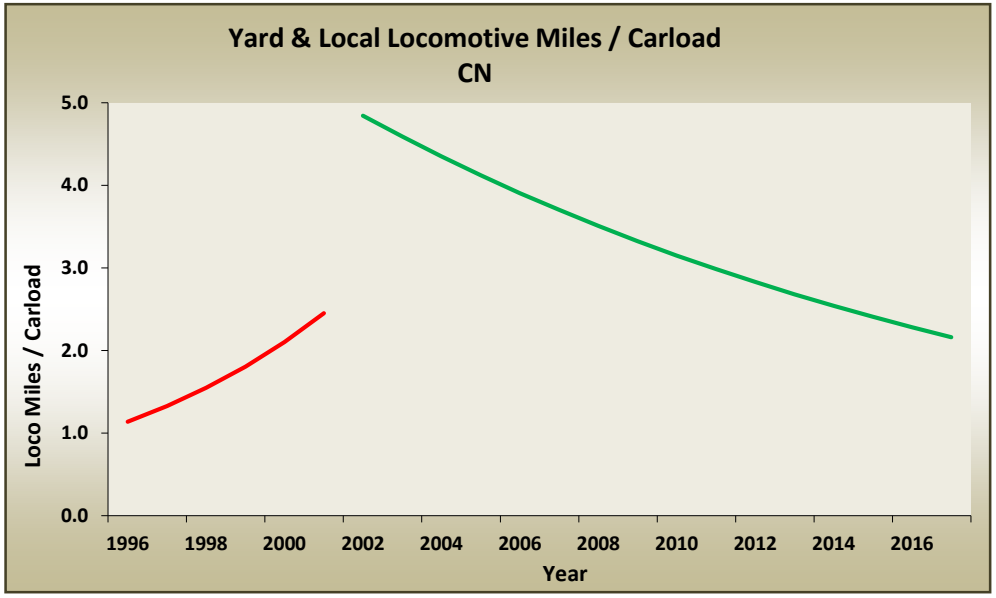


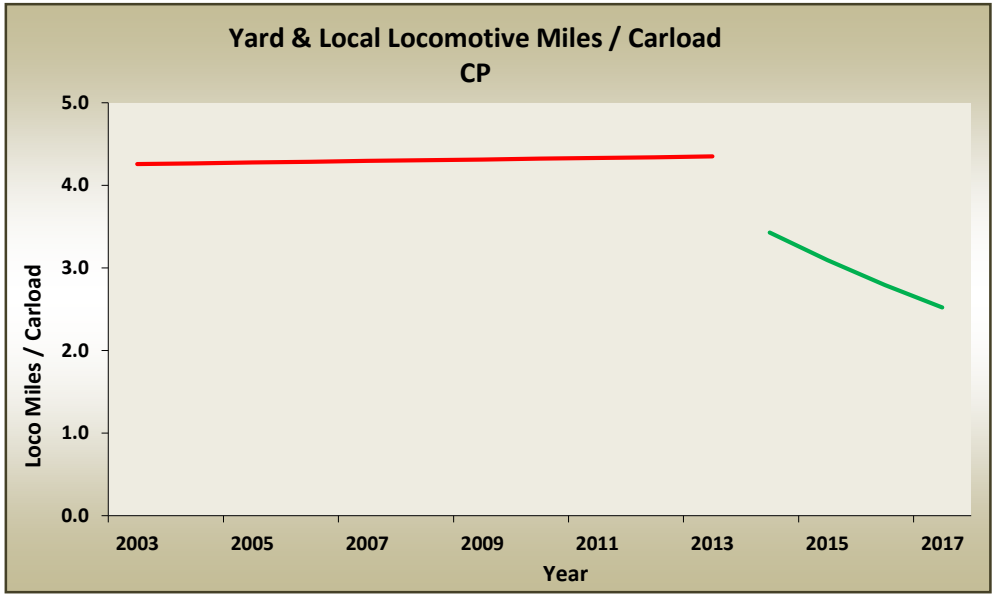


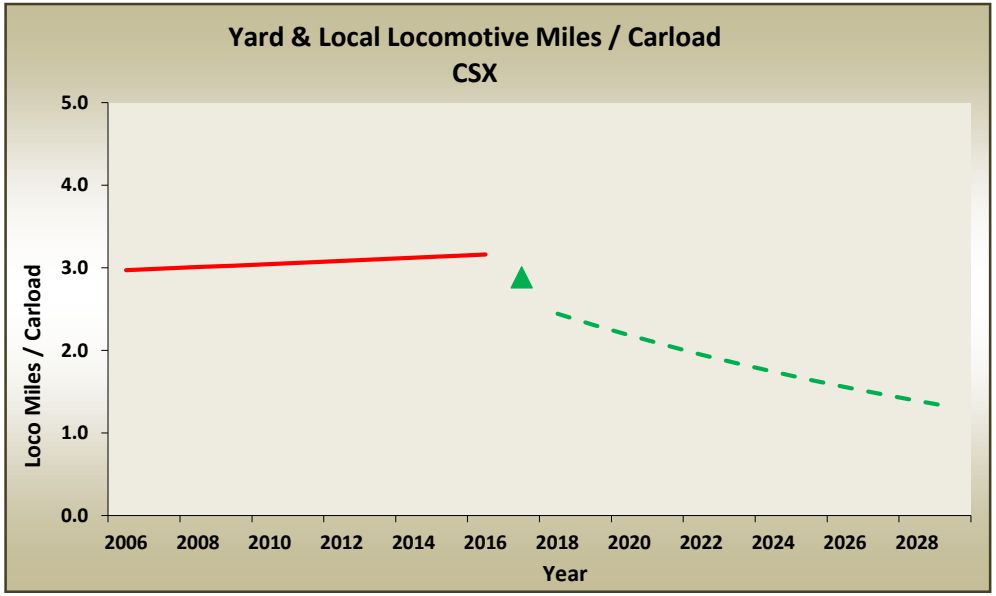


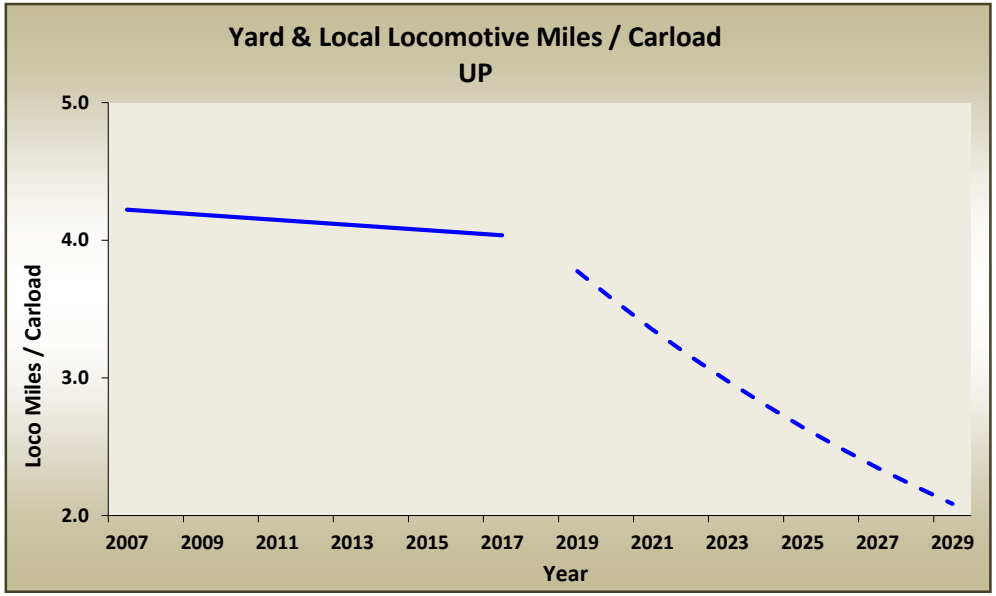


Spread Yard / Local train starts evenly across 3 shifts to reduce locos in Yard / Local service.

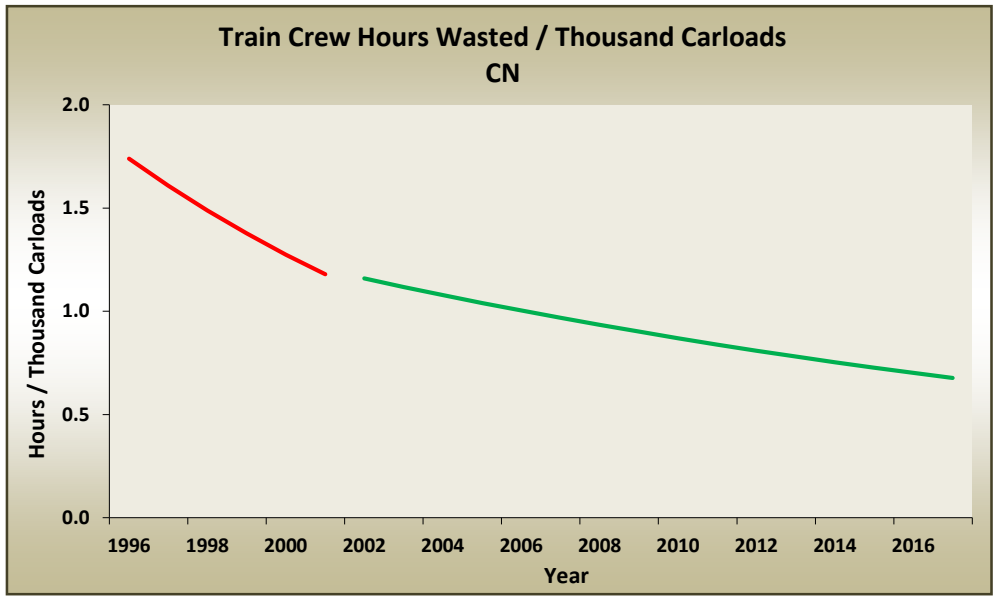


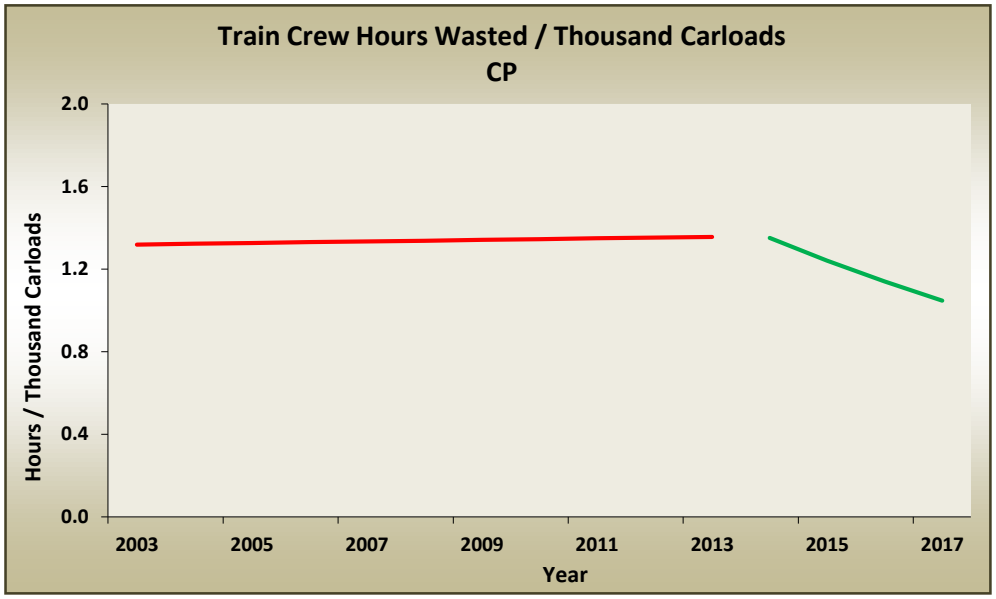


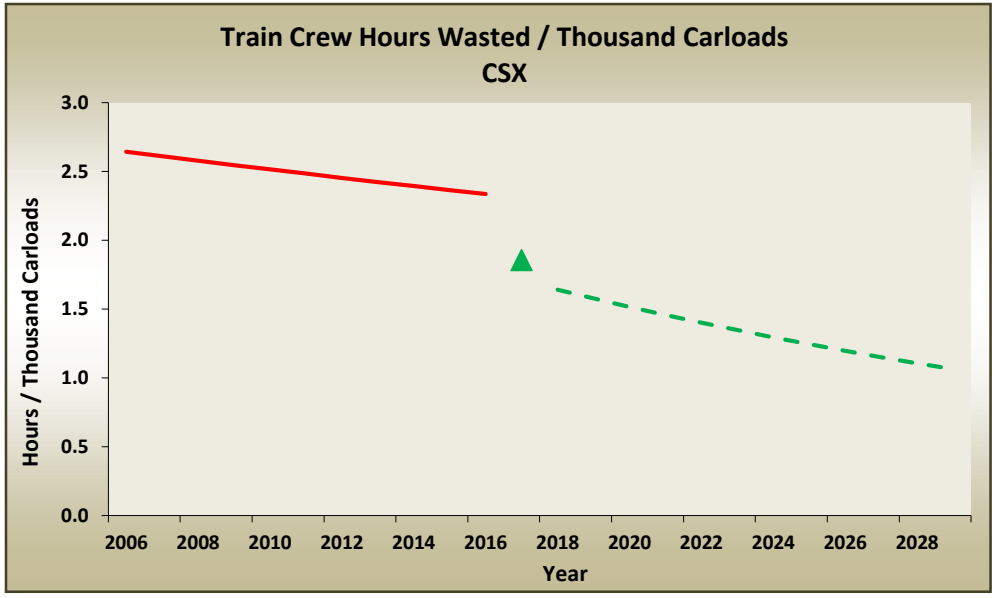


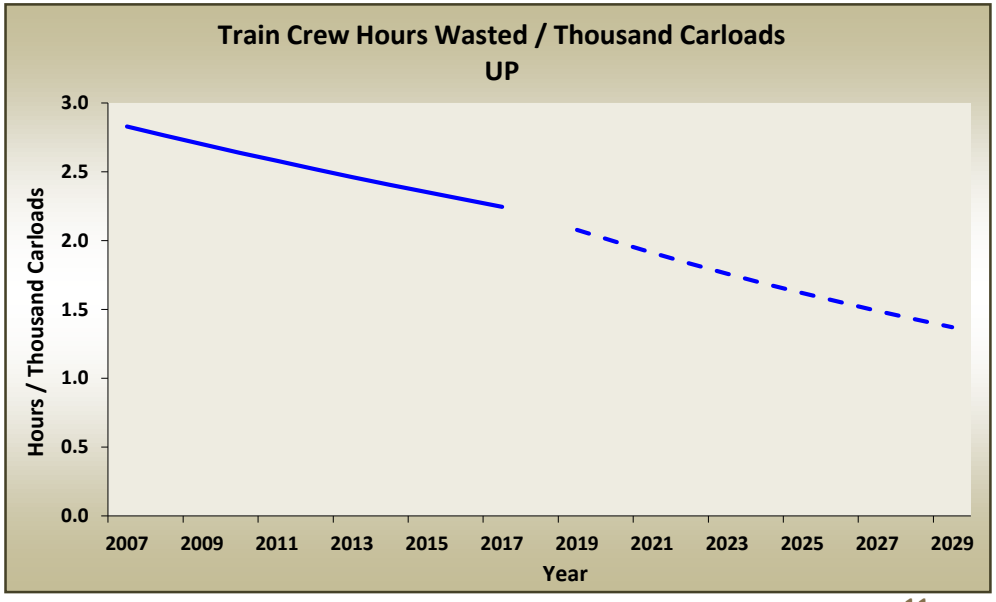


Run road trains seven days per week to eliminate dead heads, away-from-home crew costs, and shipment delays at terminals.

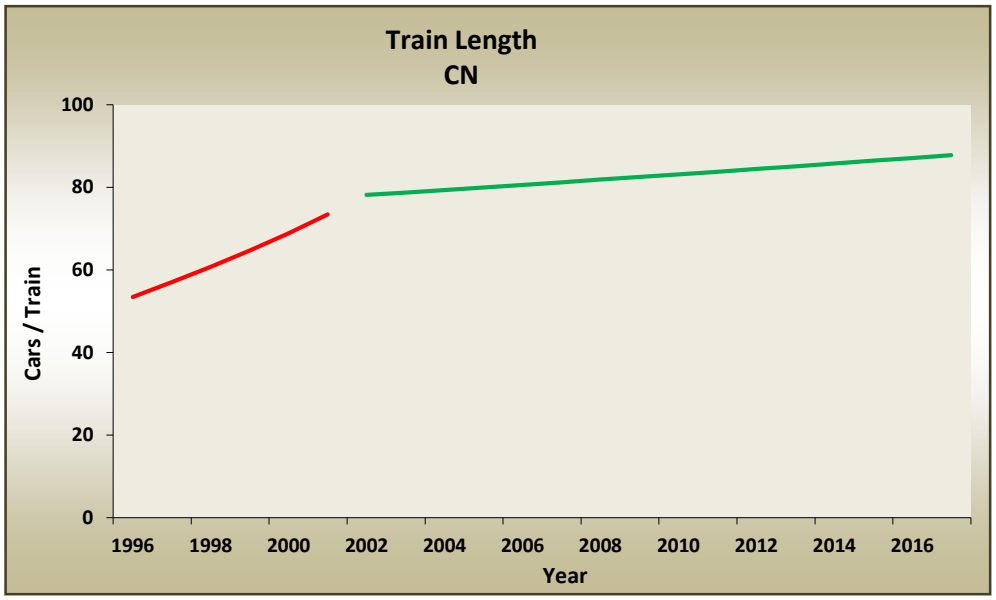


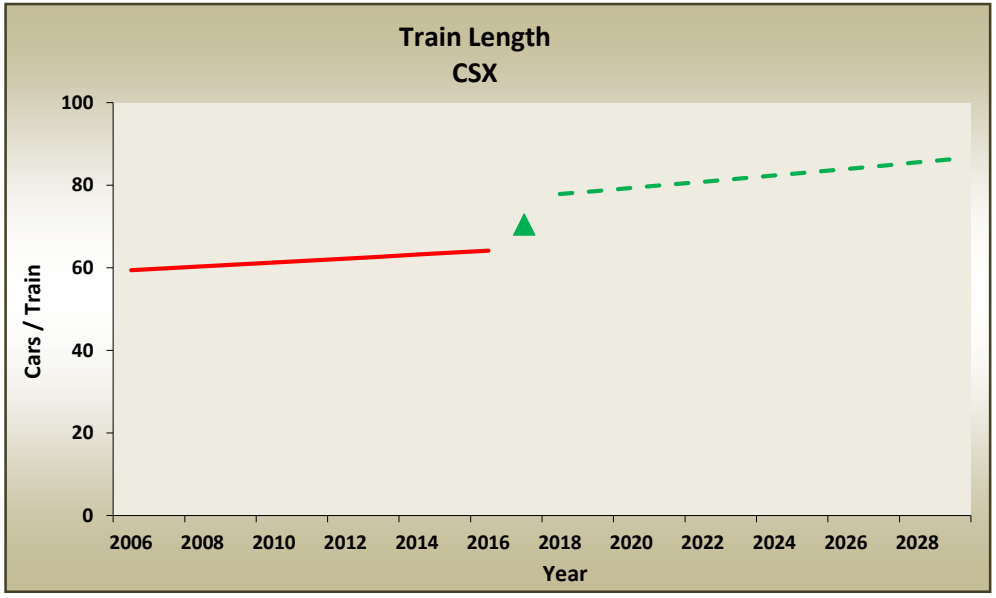


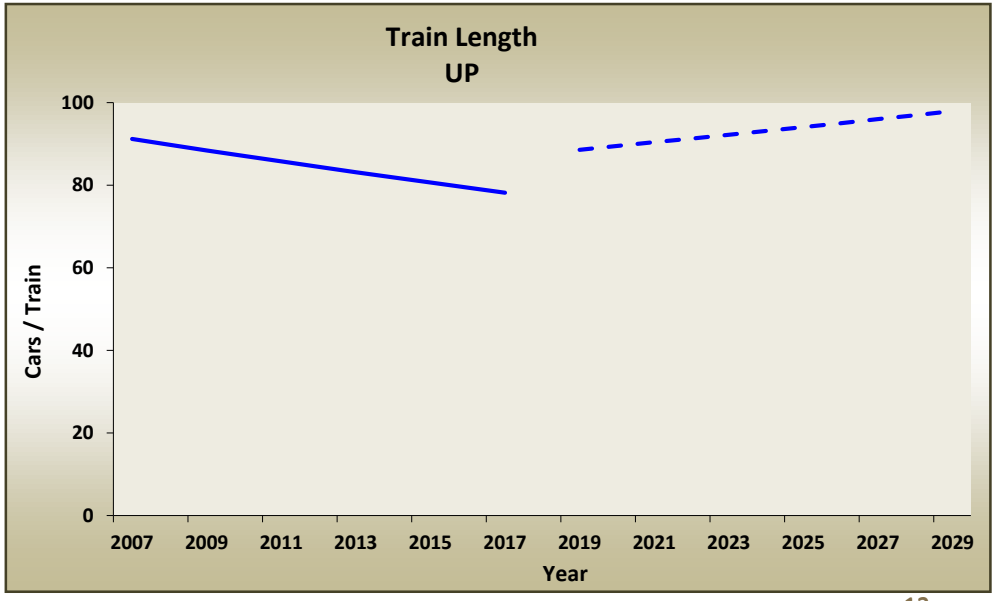




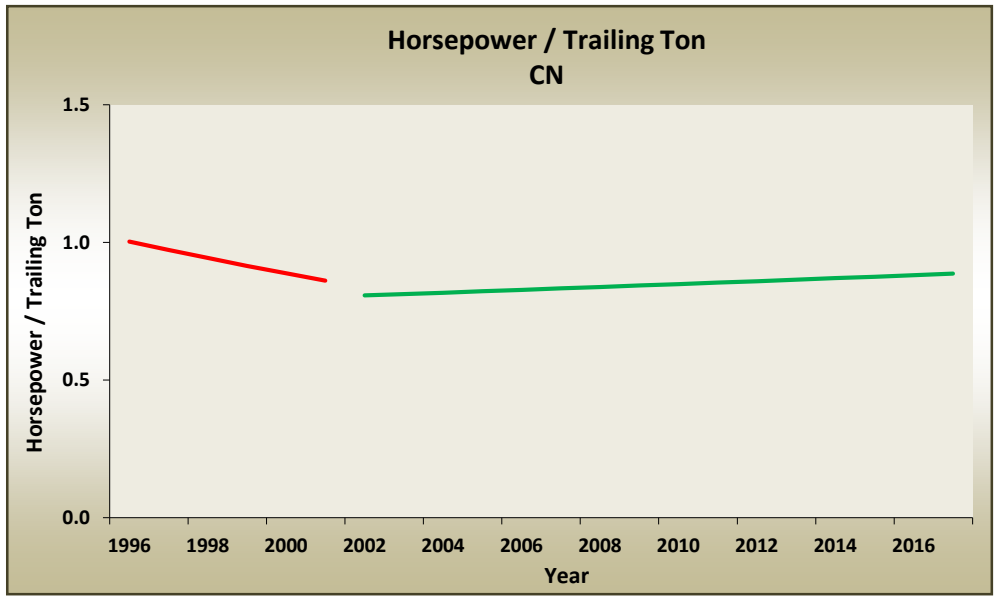
Run General Purpose trains to maximize train lengths.

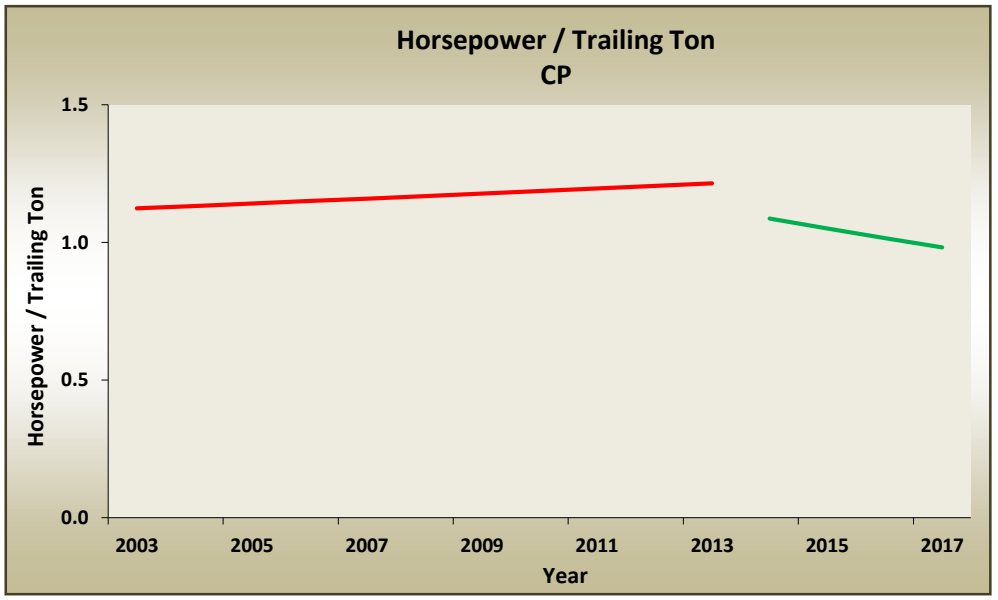


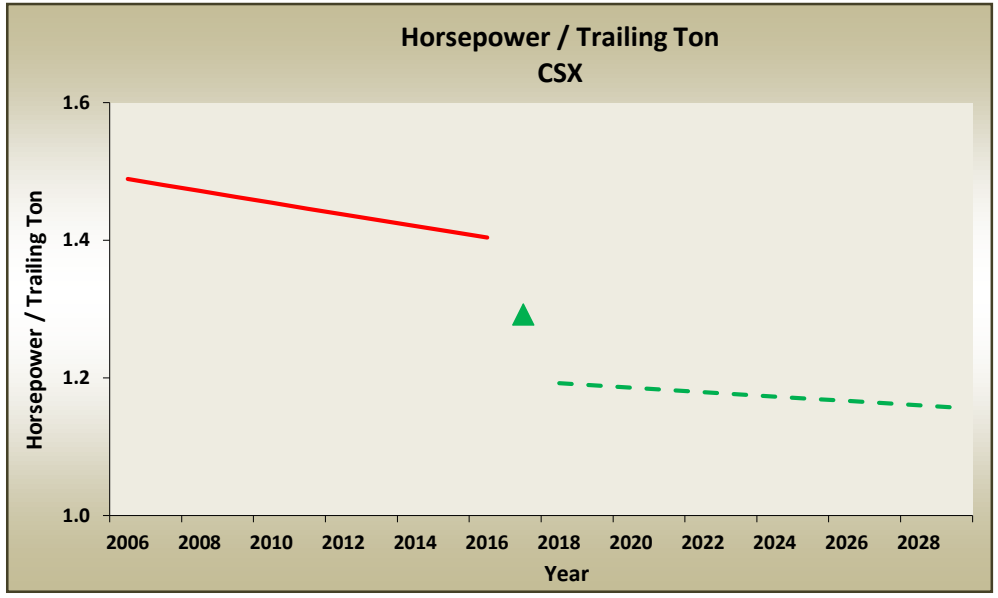


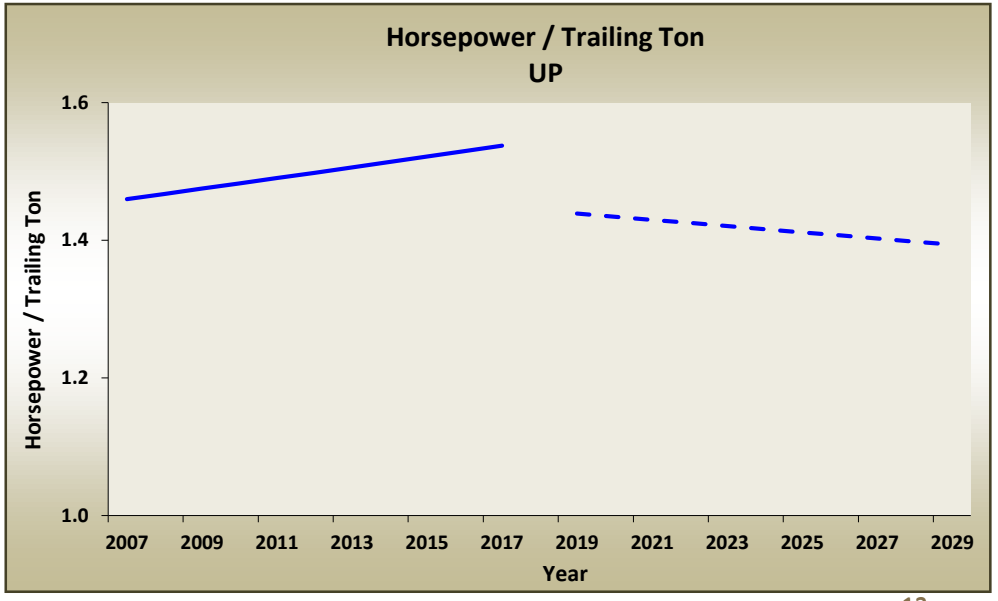


Reduce average HP/ton on Road trains to save locomotives and reduce “hurry-up & wait”.

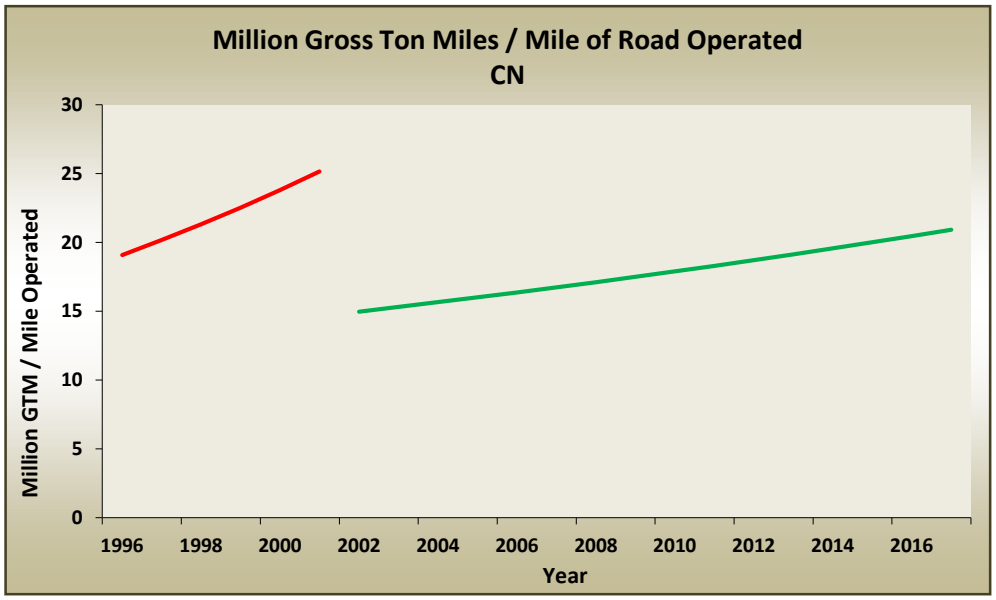


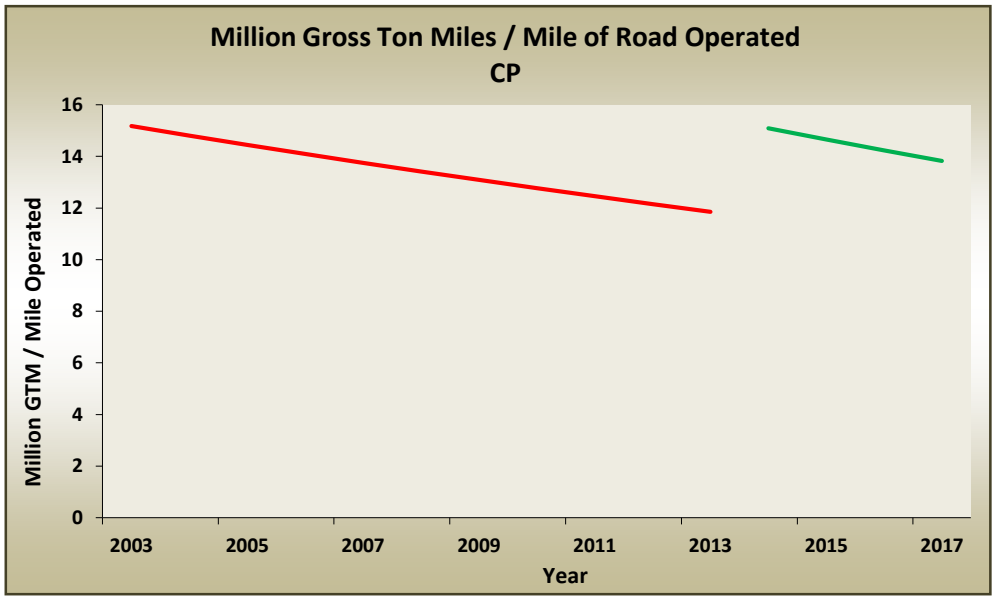


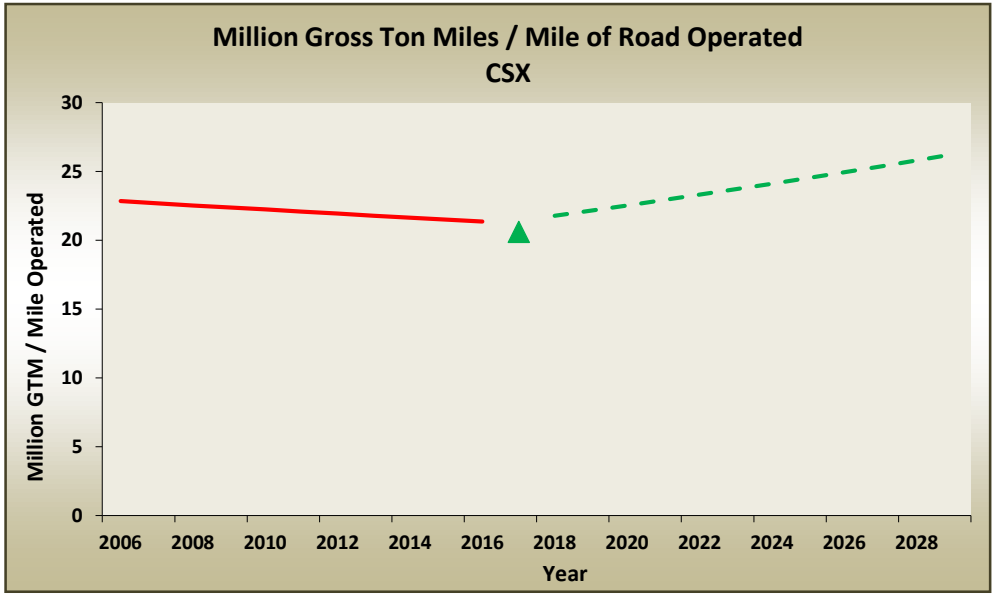


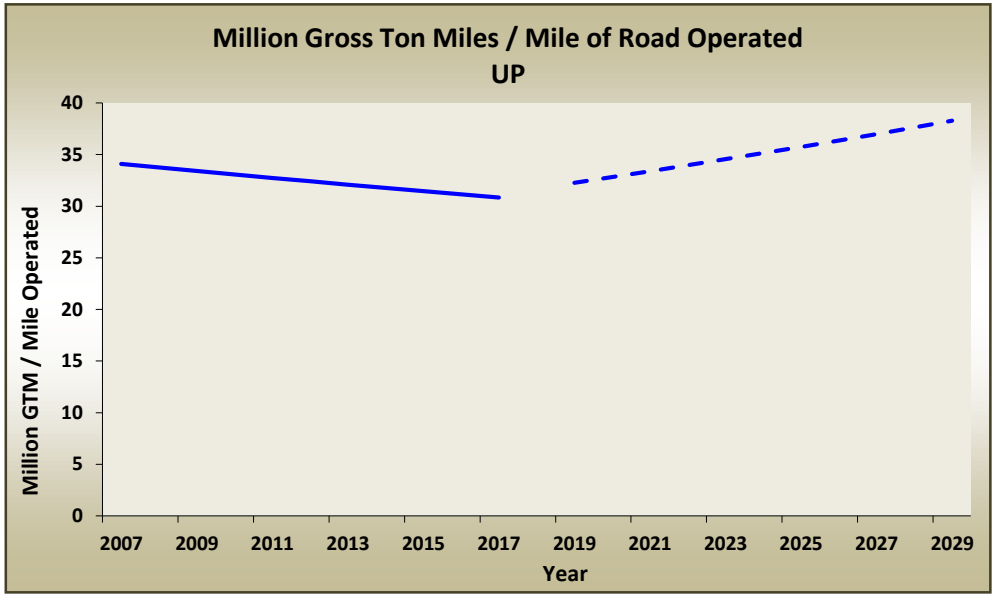


Sell low density branch lines to reduce costs and focus capital and management on core.

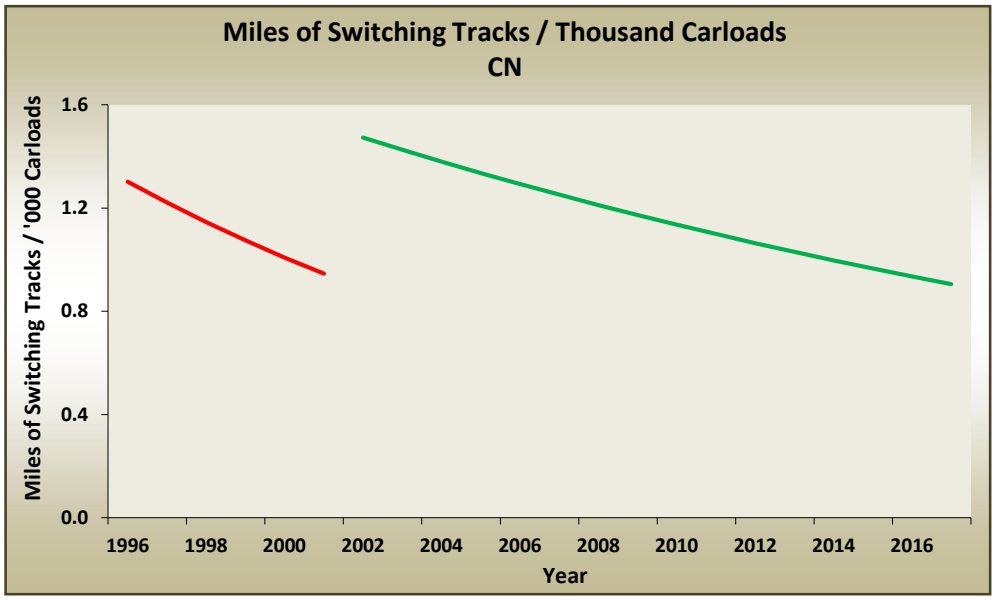


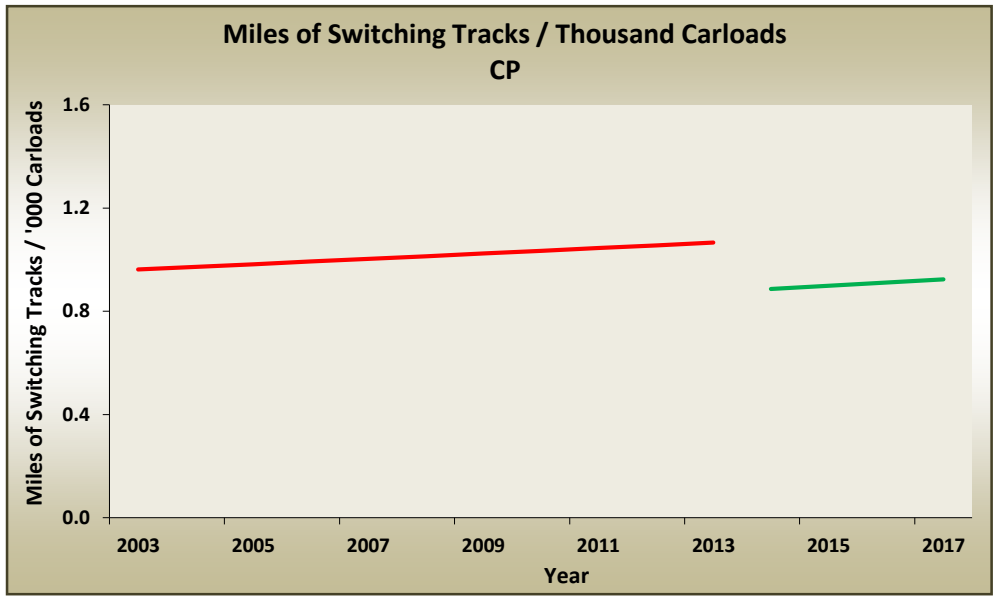


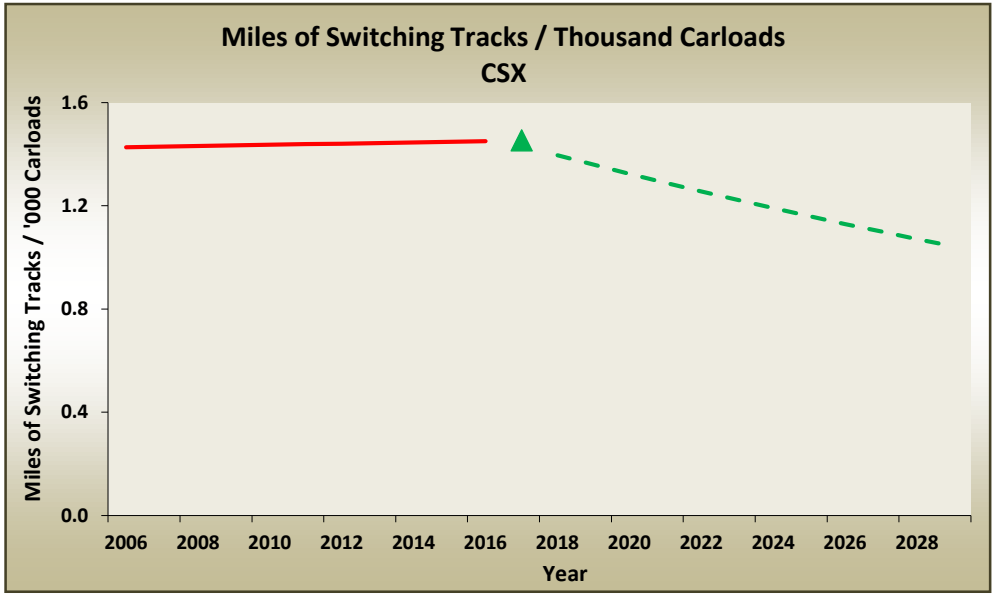


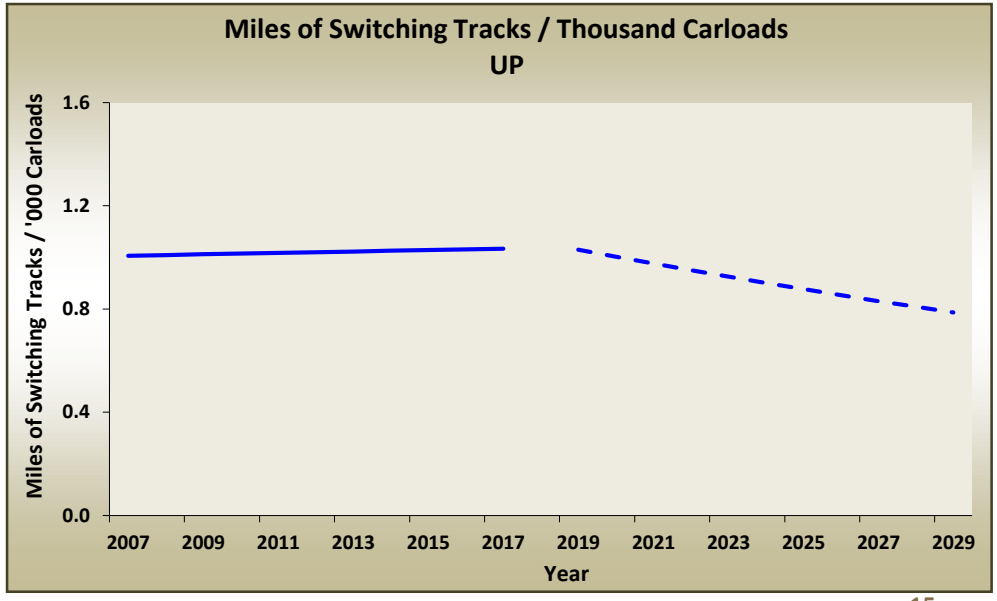


Convert hump yards to flat yards and close surplus yards to reduce costs and expedite handlings.

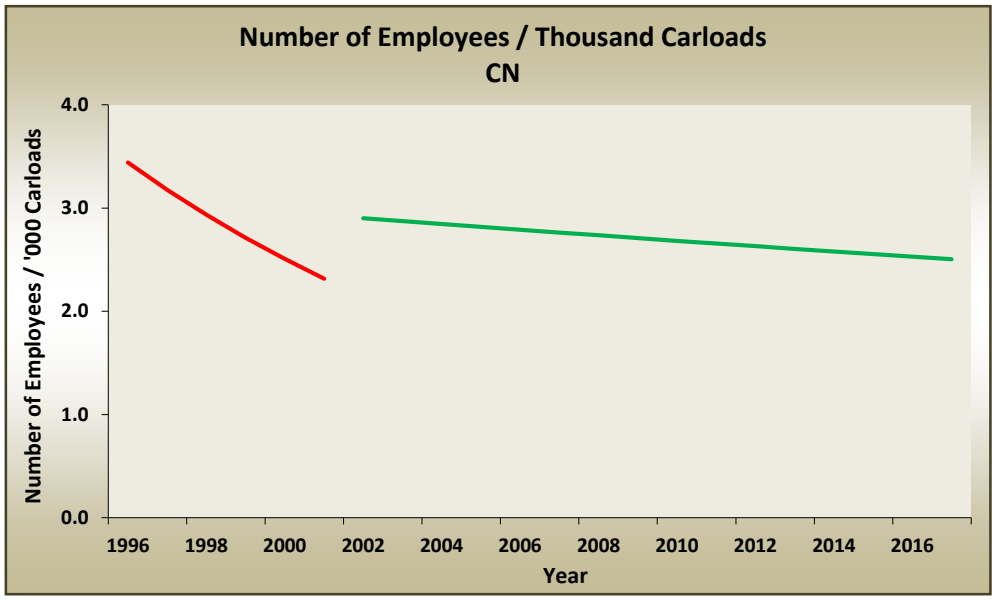


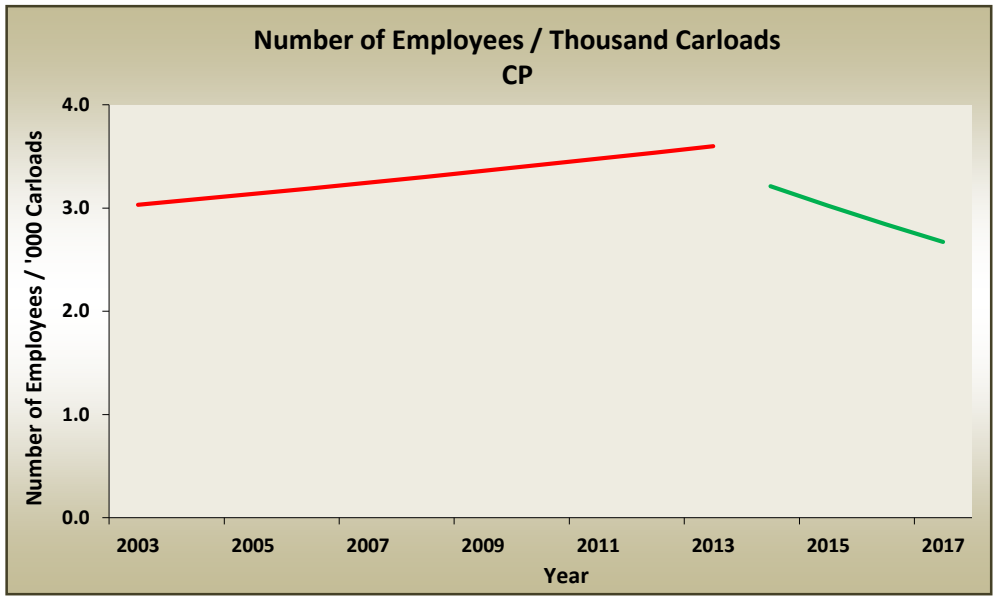


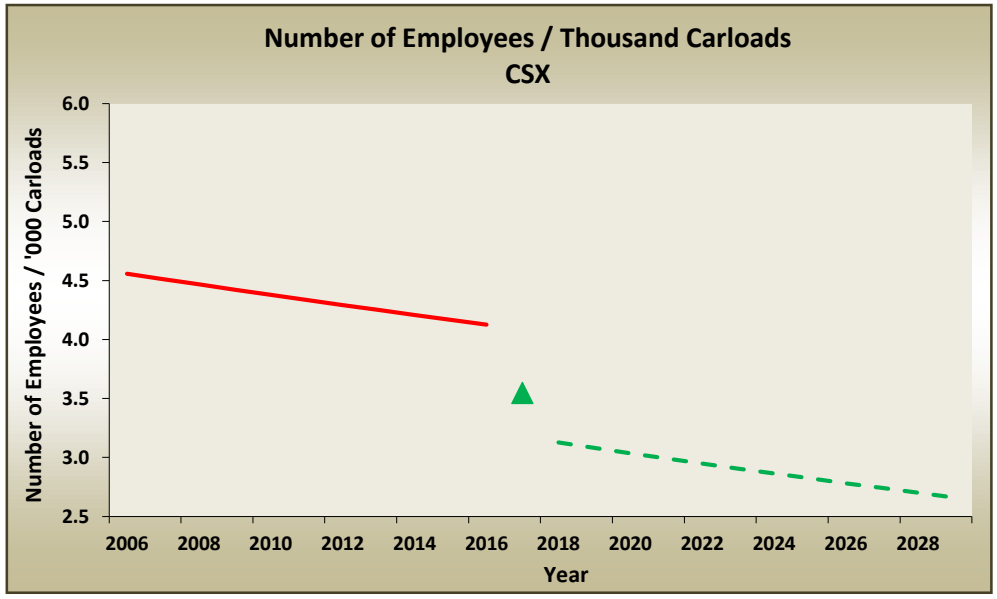


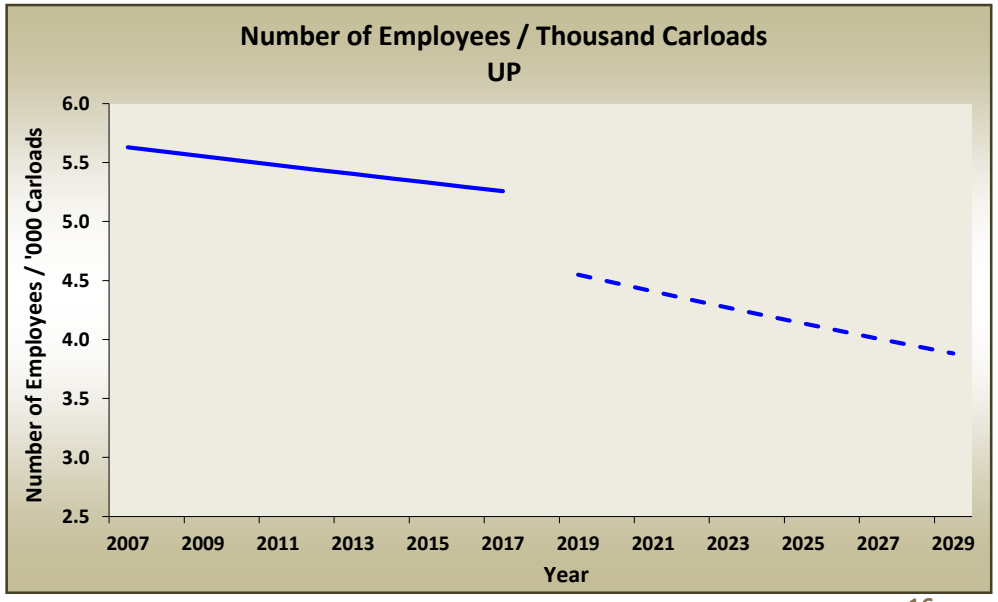


Reduce head count in management and operations, focusing on “Must have” not “Nice to have”.

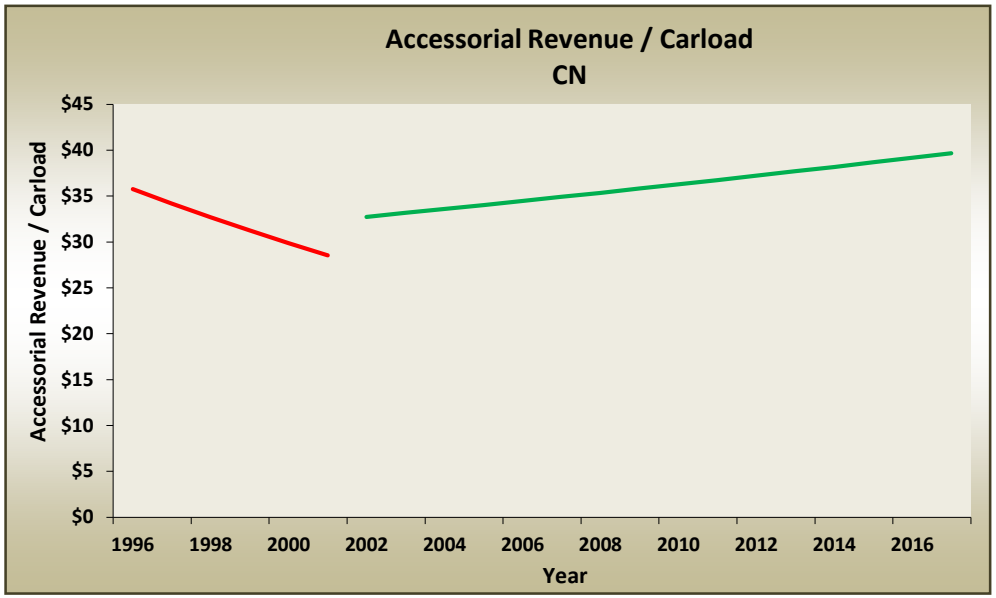


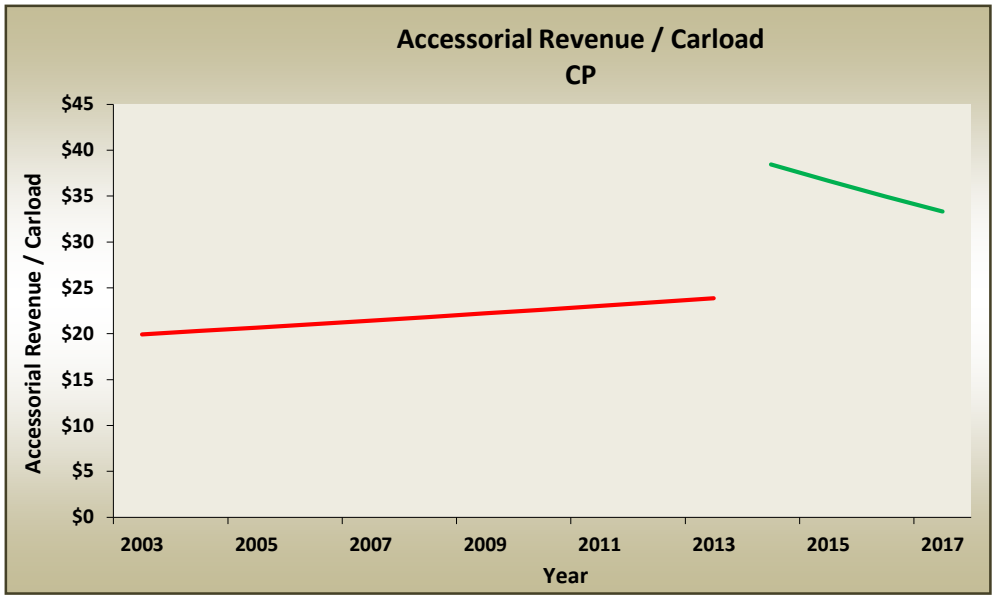


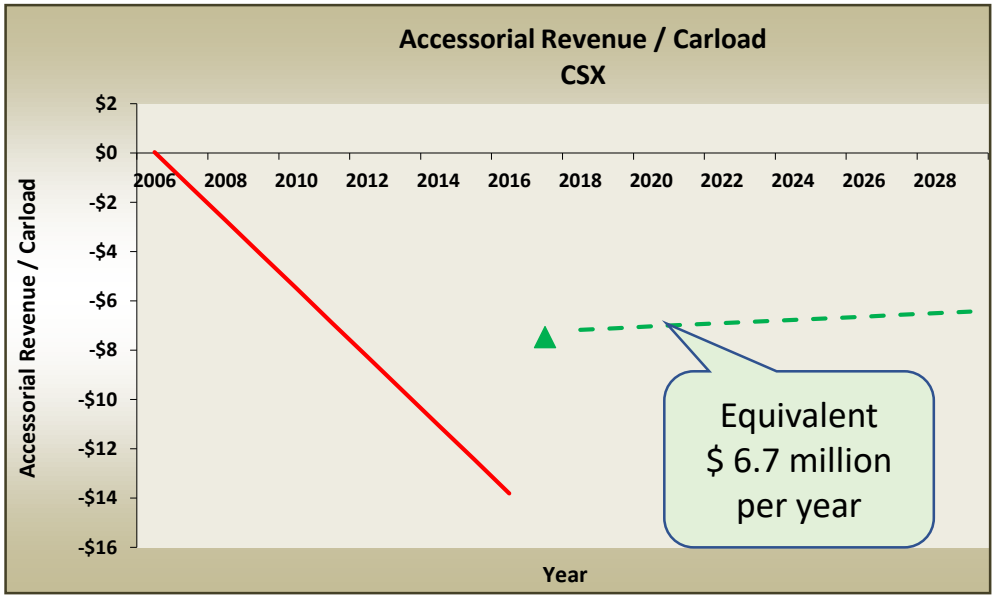


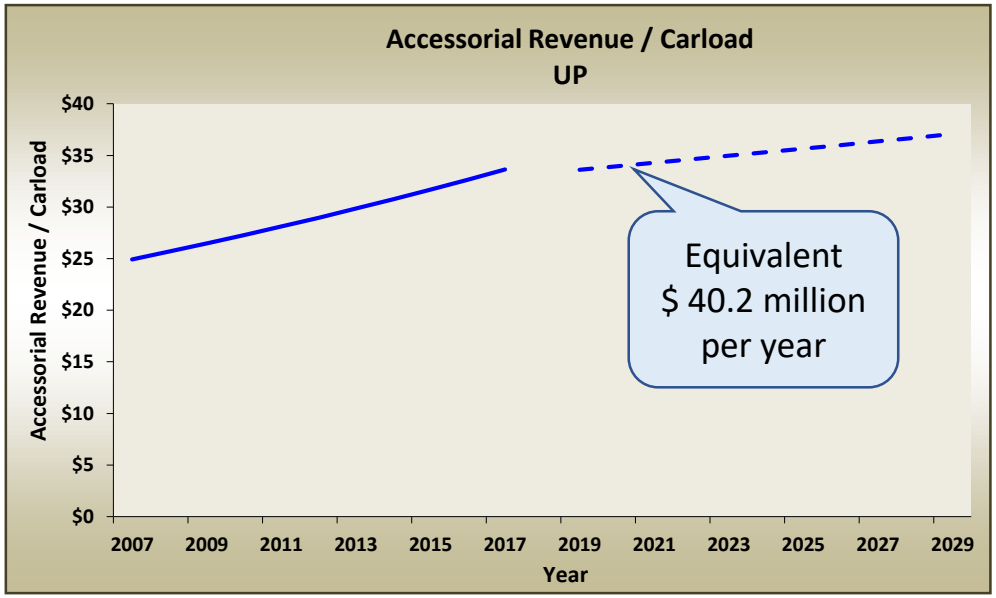


Bill and collect Accessorial charges to maximize revenue and change customers' behavior.

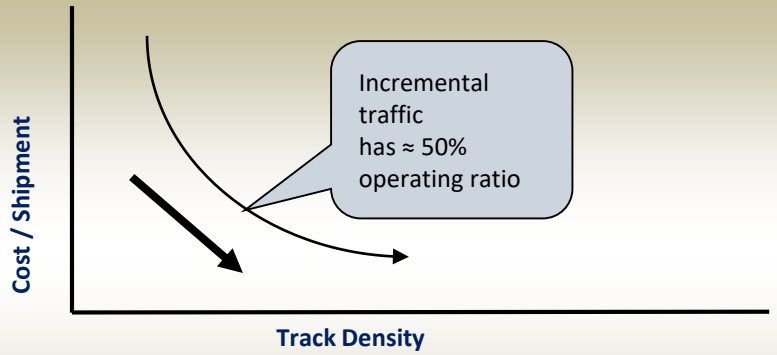




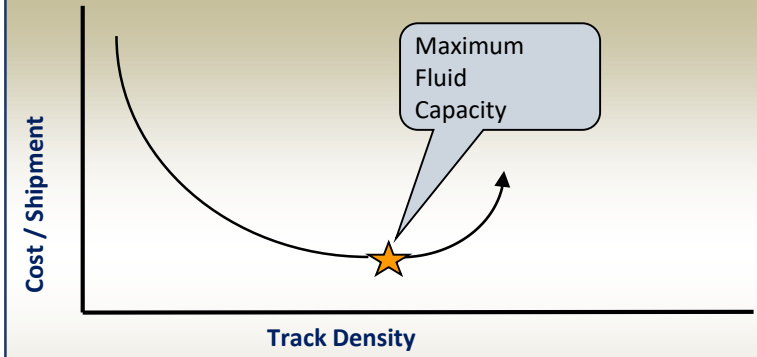




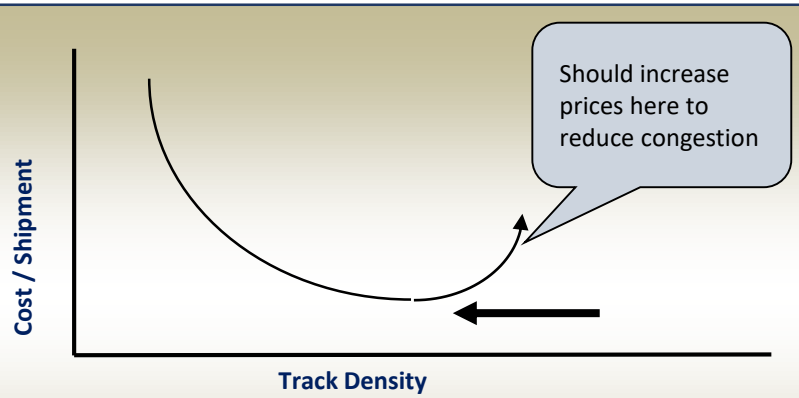
Charge price premium on peak days and in peak seasons to balance flows.



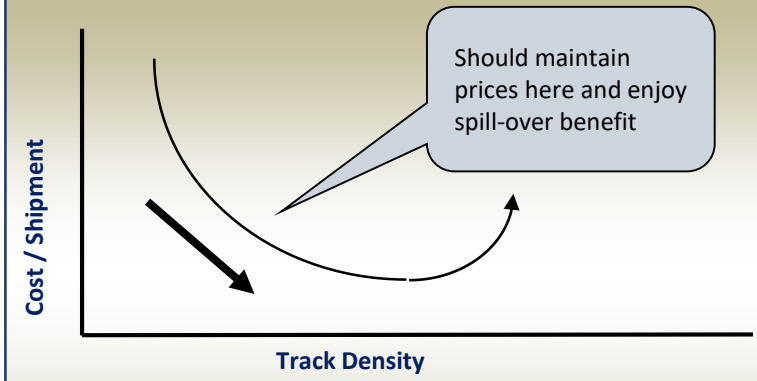
(1) In the railroad business, increasing volumes reduces averages cost per unit by spreading the high fixed costs over more and more shipments.



(2) Too much traffic causes congestion, bogs down operations and erodes service quality. Slower train velocity further reduces track capacity and increases crew & locomotive costs.



(3) Sophisticated managers will NOT raise prices across the board (driving traffic to trucks) but only on congested corridors, during busy seasons, and on peak days of week.



(4) The market will respond by shifting many traffic flows from the congested corridors and days to the lower volume corridors and days as sourcing patterns change to a new network equilibrium.

SUMMARY

- Precision Scheduled Railroading focuses on the key drivers of the business
- Using publicly available data, we can see the impact of PSR on specific operating metrics
- Assuming CSX, UP, and other railroads should be able to replicate the PSR success, we can forecast expected improvements and track their progress
- Analysts can look beyond Operating Ratio to determine if railroad managers are pulling the right levers and making the fundamental changes necessary to implement PSR

Please call us to discuss any of these topics and/or other railroad issues you may be facing.

Forecasted Cost Reductions for each Railroad

- Our analytical model translates the forecasted improvement in each of the PSR operating metrics into forecasted cost reductions in each of the future years for each railroad
- Analysts can track detailed operating metrics to see if PSR is actually getting implemented at the pace necessary to yield the financial impacts that were observed at CN and CP

Forecasted Volume and Price Increases for each Railroad

- Our revenue forecasting model estimates pricing headroom by commodity, for each railroad
  - Calculate the future truck equivalent cost for each commodity-railroad combination
  - Estimate the regulatory limit for each commodity-railroad combination
  - Choose the lower of “truck” or “regulator” as the constraint for a price ceiling
  - Assume railroads can raise prices up to that calculated indifference level

Forecasted Operating Ratio and Operating Income for each Railroad

- We combine our forecasts of volume, costs, and price to predict annual financial performance

Sensitivity analyses and “what if” scenarios around many key assumptions:

- Fuel Price, Truck Driver Wages, Recession Volumes, M&A Synergies, etc.