

# Yield Management in the Railroad Industry Supporting Supply Chain Partnerships

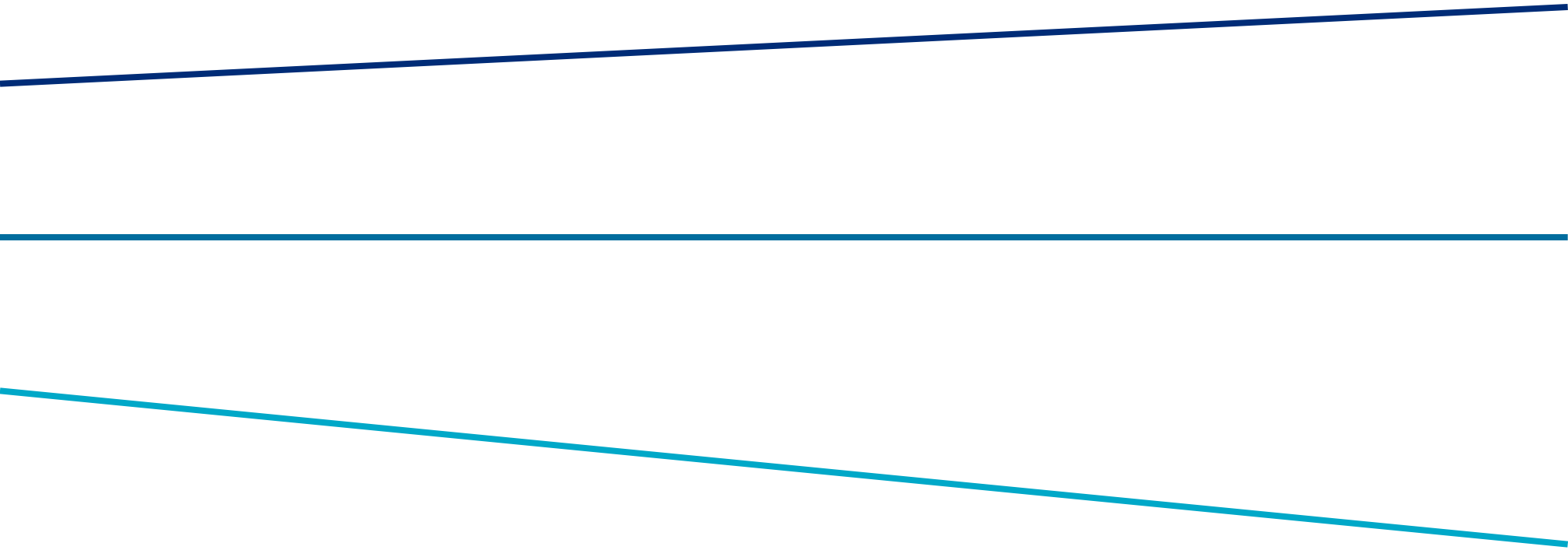
November 14, 2011

**Jason Kuehn**  
Associate Partner

INFORMS Conference, Charlotte, NC

Section 1

# CAPITAL ALLOCATION BUSINESS PORTFOLIO MANAGEMENT



## Classical yield management of maximizing profits generated by constrained assets is an obvious, but challenging, application of yield management in the railroad business

- Big data challenges – matching commercial and operating data can be complex and produces very large data sets
- Complexity of simultaneously optimizing multiple resources with different substitutability:

Resource	Fungible Across Customers	Fungible Across Business Units	Fungible Across Geography
Locomotives	✓	✓	✓
Cars	✓	✗	✓
Crews	✓	✓	✗
Track Capacity	✓	✓	✗
Terminal Capacity	✓	✗	✗

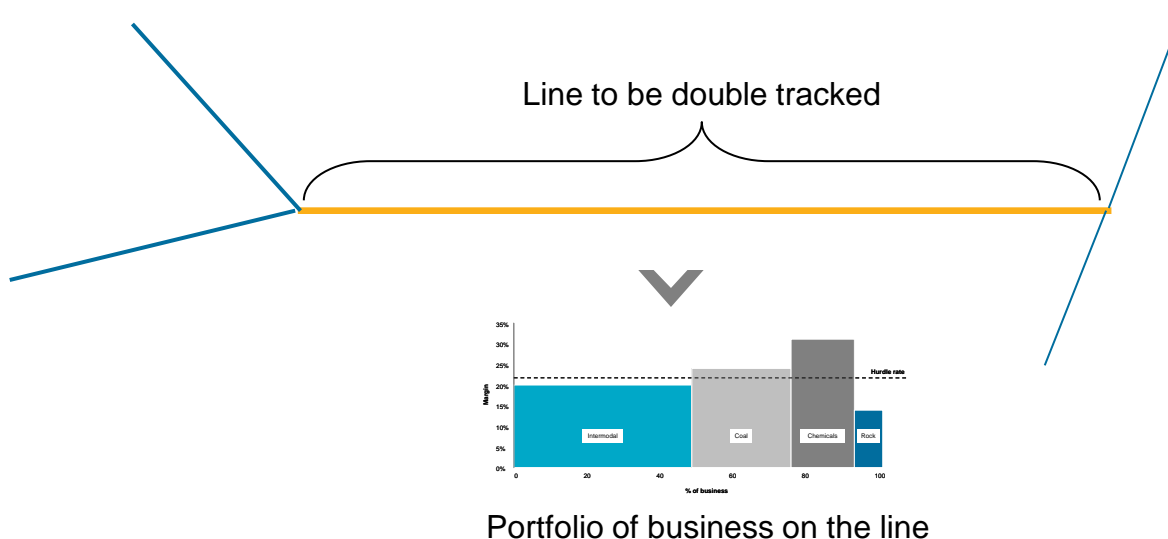
- Actually determining track and terminal capacity can be difficult
- Multiple business units and customers sharing train resources



- **Rather than launching a system to maximize the profitability of the entire network, application can begin with focused analyses around key identified bottlenecks**

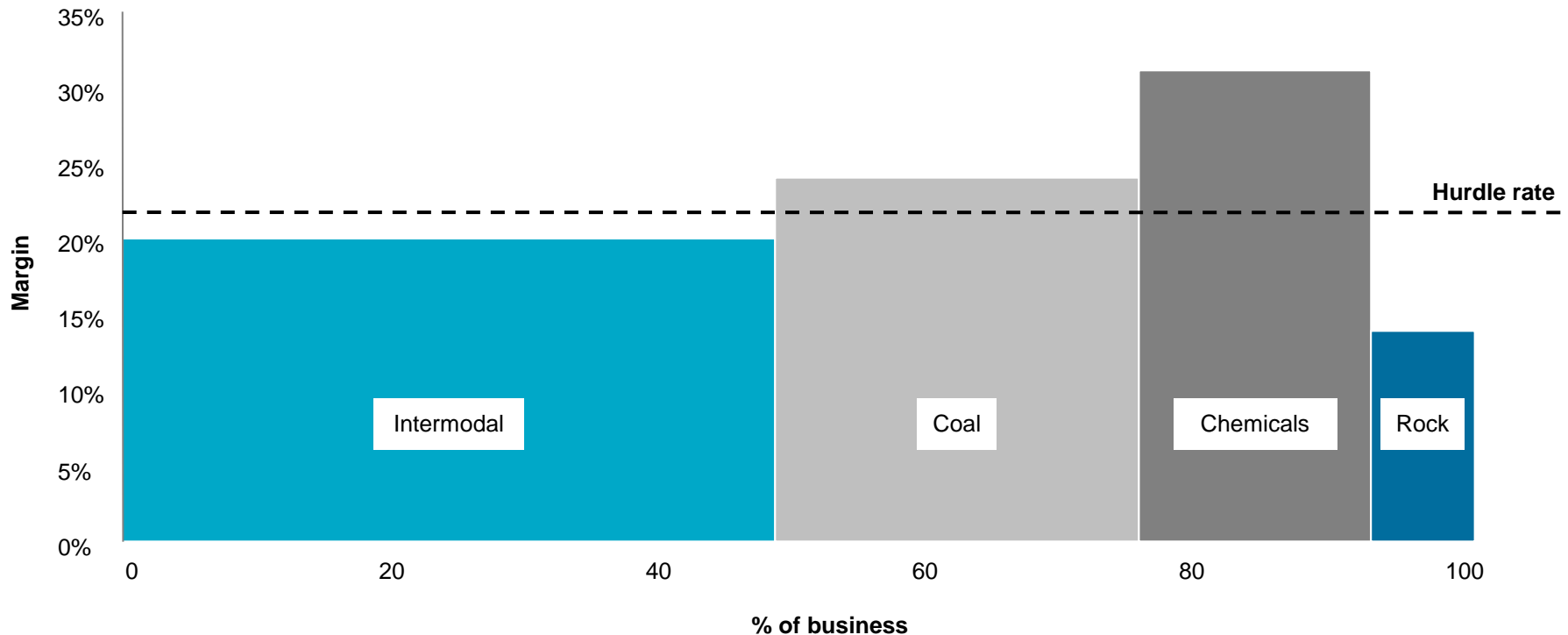
## Specific capital project to resolve a resource constraint

- Determine the constrained resource
- Identify the portfolio of traffic using the constrained resource
  - Requires the ability to examine commercial and operational data together
- Manage the portfolio of business to bring the margin of all business on the line up to the corporate hurdle rate
  - Ensures that all traffic on the line covers the cost of reinvesting in the business



## Double Tracking Project

Until all the capacity is utilized, business at margins below the corporate hurdle rate generate a positive contribution



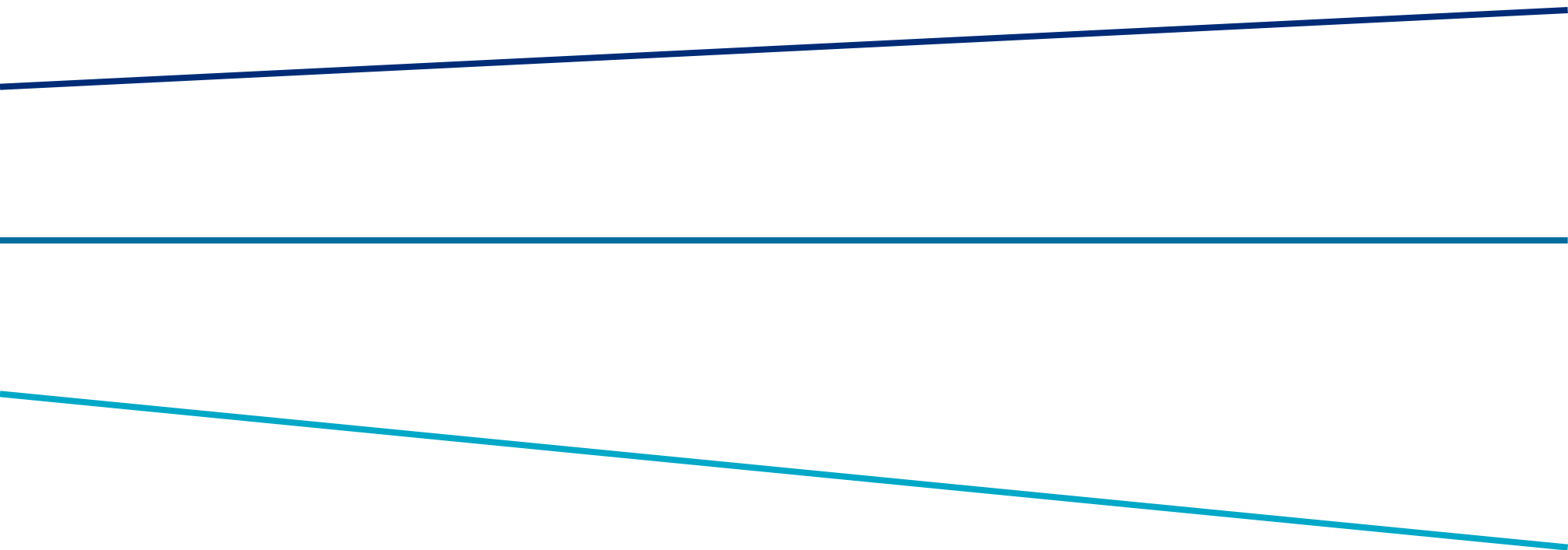
Once the capacity is fully utilized it is necessary to manage the portfolio of business on the line to meet or exceed the corporate hurdle rate by:

1. Improving the profitability of low yield traffic, and/or
2. Replacing low yield traffic with growth in high yield traffic

Section 2

# PRICING

## UNDERSTANDING AND MANAGING SUPPLY CHAIN VARIABILITY



# The travel industry is a leading user of 'transactional' yield management systems to maximize revenue and manage capacity

- Is it a partnership when:
  - you can't get a seat on the right flight, or a room at a convenient hotel or a car rental when you have an important meeting?
  - On a long-term job, your room availability and negotiated rate is not protected when capacity is tight, the relationship does not feel like a partnership?
- Preferred customer programs can be used to mitigate these issues
- Transactional approaches to yield management do not work well in a supply chain partnership context
  - Capacity management is too rigid
    - Availability is not guaranteed
  - Pricing is highly variable



- **Shutting down a key client's plant, missing a vessel connection at a port, or creating an inventory stock out because of tight capacity is not a stable supply chain partnership from the shipper's perspective**
- **Volatile pricing also does not create a dependable supply chain**



# Comparison of 'transactional' approach to yield management with supply chain partnership approach

## Transaction Yield Management



- Maximize capacity utilization
  - Booking system
  
- Price variability to manage demand and maximize revenue
  - React to customer behaviors
  
- Supplier focused



## Supply Chain Partnership

- Capacity Allocation
  - Understand and predict real capacity requirements
    - Demand forecast
    - Analysis of demand volatility
    - Customer needs analysis
  
- Price stability
  - Anticipate and influence customer behavior
    - Incentives for managing volatility
  - Build expectations of unused capacity into pricing
  
- Customer focused
  - Understand full supply chain
    - Sub-optimizing railroad's portion may be required to optimize overall chain
    - Extract full value for service provided

# Like the travel industry railroads are currently focused on new tools to improve capacity utilization

<b>System Type</b>	<b>Supply Chain Issues</b>
<p data-bbox="108 529 586 561"><b>Reservation / Booking systems</b></p> <ul data-bbox="108 589 620 729" style="list-style-type: none"><li>• Major focus of European railways</li><li>• Rigid capacity allocation<ul data-bbox="143 696 405 729" style="list-style-type: none"><li>– Routing options</li></ul></li></ul> 	<ul data-bbox="1024 589 1856 729" style="list-style-type: none"><li>• Capacity not always available when needed</li><li>• Transit time variance based on routing<ul data-bbox="1058 696 1856 729" style="list-style-type: none"><li>– Shipper is aware of trip plan when shipment is booked</li></ul></li></ul>
<p data-bbox="108 858 485 889"><b>Dynamic Car Scheduling</b></p> <ul data-bbox="108 918 560 1100" style="list-style-type: none"><li>• Major focus in North America</li><li>• Capacity based routing<ul data-bbox="143 1025 379 1100" style="list-style-type: none"><li>– Yard capacity</li><li>– Train capacity</li></ul></li></ul> 	<ul data-bbox="1024 918 1876 1153" style="list-style-type: none"><li>• No specific capacity limits</li><li>• Transit time variance based on routing<ul data-bbox="1058 1025 1876 1100" style="list-style-type: none"><li>– Shipper may not be aware of ultimate transit time when shipment is tendered</li></ul></li><li>• Tool can also be used for recovery from incidents</li></ul>

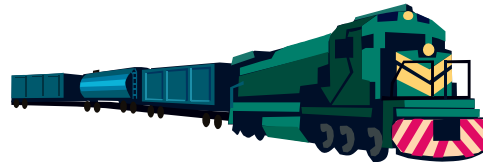
## Supply chains have inherent variability

Variability increases supply chain costs, and therefore should be measured and incorporated into pricing



### Production variability

- Production failures
- Material shortages
- Labor disruptions



### Transport variability

- Interchanges with other carriers
  - Shortlines
  - Class One's
- Lack of resources (crews, locomotives, cars)
- Disruptions from accidents, weather, maintenance windows
- Supply chain 'lumpiness'
  - Larger units (e.g. ocean vessels) feeding smaller units such as trains



### Distribution variability

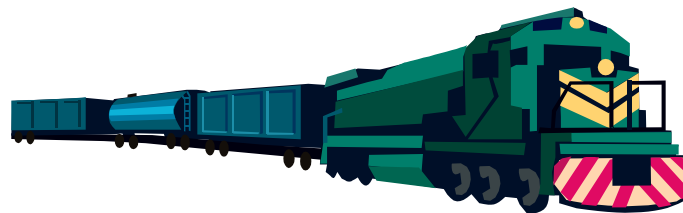
- Market variance
- Excessive inventory
- Breakdowns of unloading equipment



- **Accommodating supply chain variability adds value to a partnership**
- **Consistent service often leads to more consistent shipment volumes**

## Business to business relationships are not based on managing individual transactions but creating mutually beneficial long-term partnerships

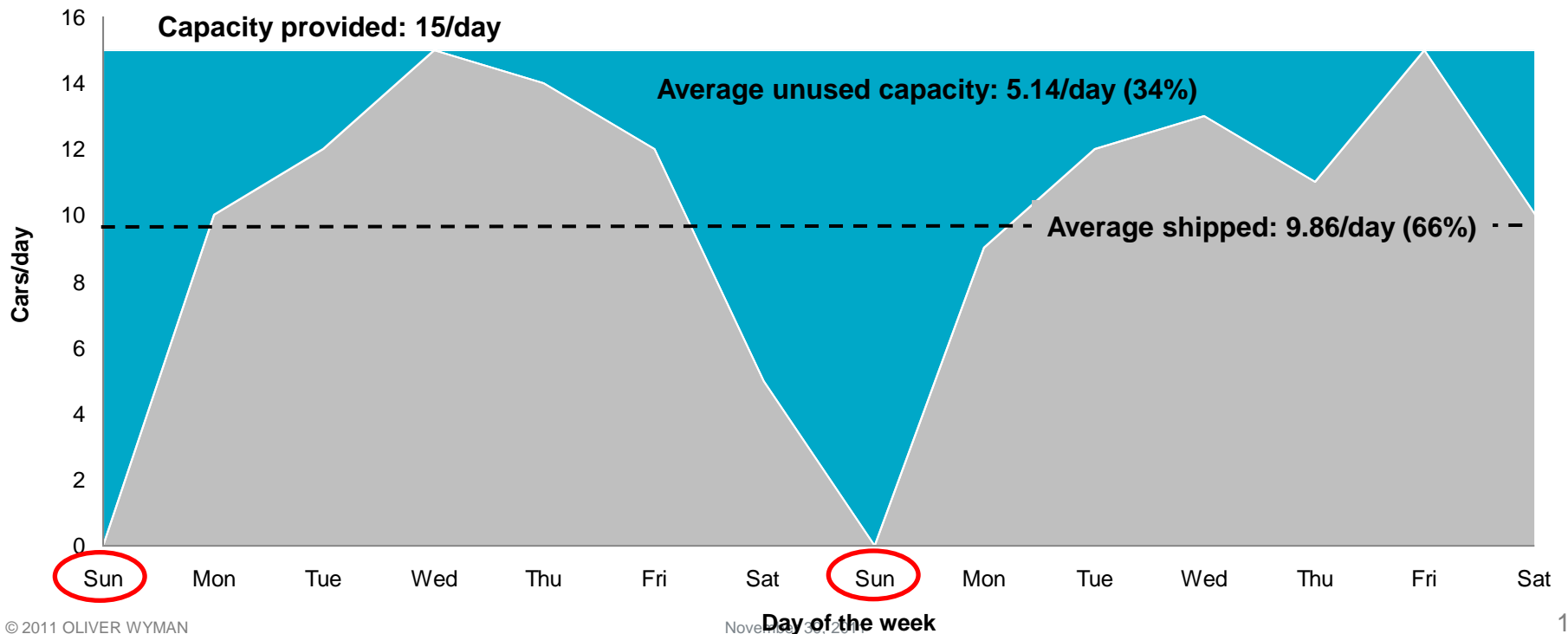
- Railroads need to be increasingly focused on understanding the entire supply chain of which they are a part and creating partnerships with all parties in the supply chain to:
  - Minimize supply chain variability
  - Create contingency plans for supply chain interruptions
  - Optimize the entire supply chain (not just the railroad portion of it)
- Being a stable, reliable supply chain provider includes:
  - Stable predictable prices
  - Ability to accommodate reasonable volume variance



Understand the supply chain > Understand the value provided to the shipper

## Linking commercial and operational data is key to analyzing the cost of variability Requires new tools to handle big data problems

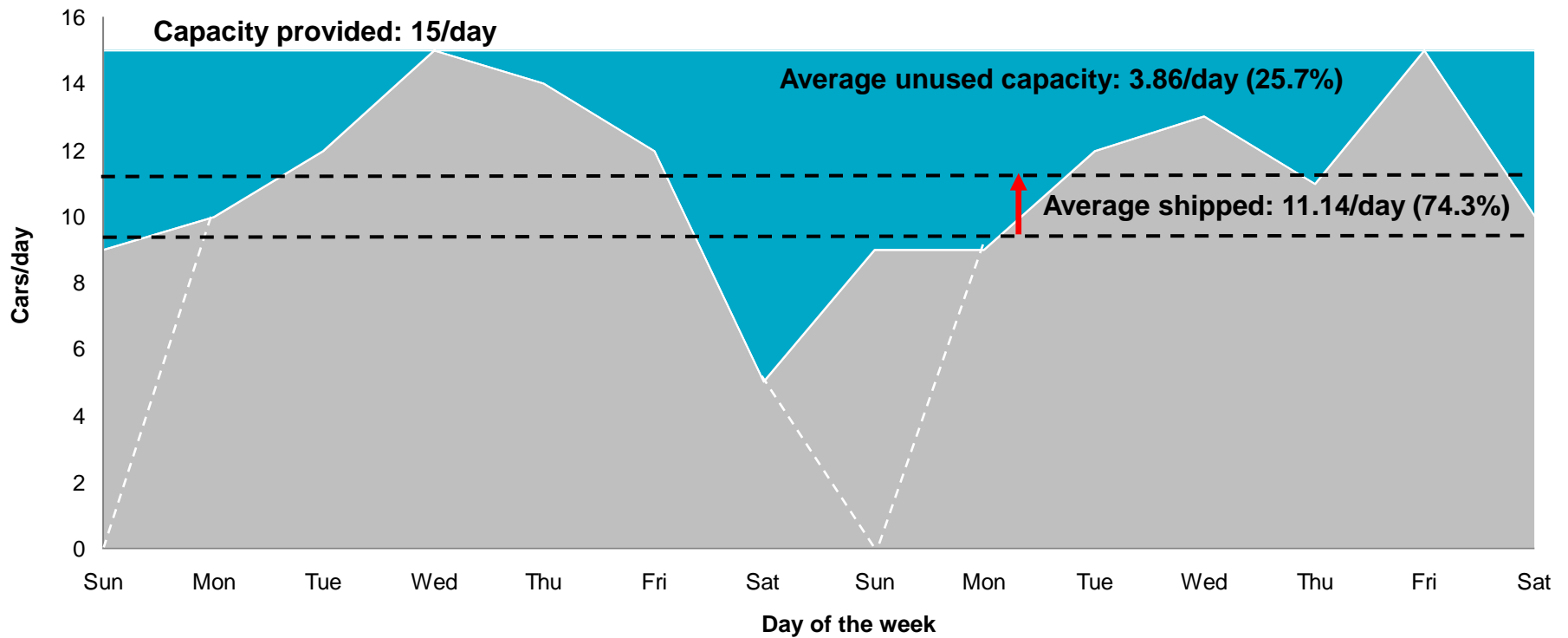
- Capacity provided to handle 100% of traffic is 15 units per day
  - Average utilization is 66% (9.86 units per day)
- Volume shipped varies from 0 to 15 units per day
- Cost of unutilized capacity (34% or 5.14 units per day) should be included in pricing
  - Nothing is shipped on Sundays – are resources idle on that day?



## Understanding and managing volatility

Utilizing Sunday to same level as other days would increase volume and revenue nearly 13%

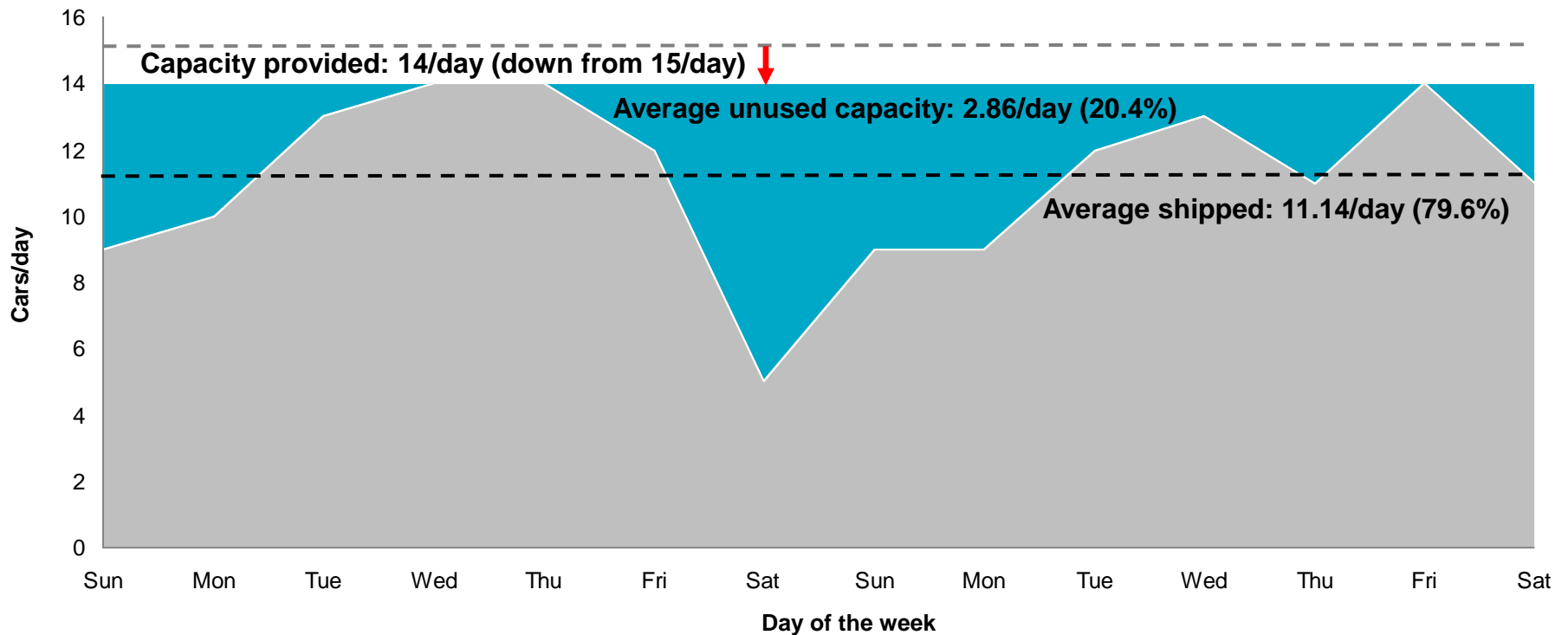
- Average volume shipped increases from 9.86 per day to 11.14 per day



## Understanding and managing volatility

Reducing peak volume to 14/day increases utilization to nearly 80% and reduces cost by nearly 7%

- Assumes newly available 1 unit of capacity per day can be utilized by another shipper
- Average volume shipped remains the same, peak volume is reduced



# Customer incentives to manage volume variability

# 1

## 'Take or Pay' contracts

- Expensive and usually only acceptable to very service sensitive customers
  - Usually offset by high performance penalties paid by railroad for missing service commitments

# 2

## Capacity protection charge

- Charge an incremental rate covering out-of-pocket costs to protect capacity for key client
  - Especially effective if lower revenue filler traffic can be used to fill excess capacity released by key client

# 3

## Volume incentive rates with cap on daily volume

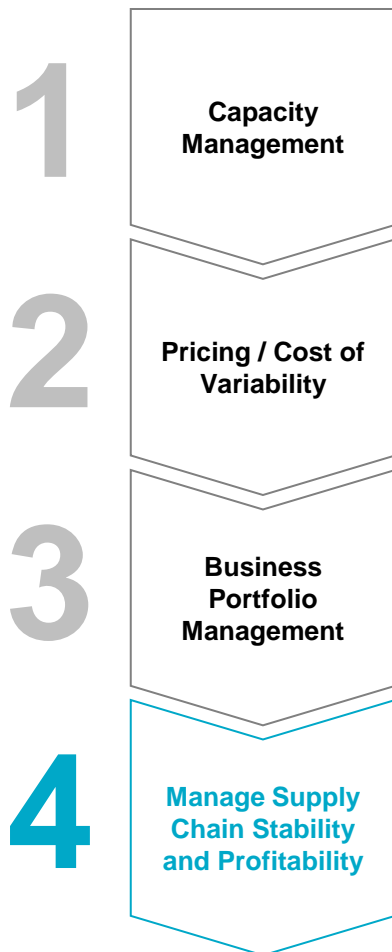
- Incentive for price sensitive shipper to grow volume to fill capacity
  - Induce market share growth
  - Cover inventory costs of holding inventory closer to market
  - Cover costs of loading rail cars on weekends

- Railroad must provide reliable service including reliable car supply needed to generate loadings



**Making cost of volume variance transparent allows it to be managed between the railroad and the shipper**

# Creating a framework for understanding and managing supply chain variability



- Use variability analysis to create capacity plans
  - Determine train capacity for key customers and markets
  - Allocate resources (car and locomotive) across businesses
  - Manage terminal and corridor capacity across market segments
- Include analysis of railroad operating variance to allow for recovery to plan
- Factor customer shipment variability into pricing decisions for contracts
  - Day of week and seasonal variability
  - Variability due to too little buffer in supply chain
- Work with supply chain stake holders to optimize supply chain cost of variability using incentive/penalty structures around volume variance
- Analyze profitability of contracts (including cost of variability)
  - Manage existing contracts and relationships to match new opportunities
  - Replace low profitability business with new opportunities at higher profit levels
- Create a framework with which to engage the customer in managing the supply chain
- Supply chain variability impacts capacity allocation and utilization
  - Constraining railroad profitability
  - Creating operational challenges in accommodating volume variability
- Understand, manage, and capture the full value of your supply chain relationships



**Focus on understanding and managing variability from a supply (value) chain perspective, not from a capacity utilization perspective**



Don't just  
accommodate supply  
chain variability.

Understand it,  
Manage it,  
Charge for it!

