

# West Coast Collaborative - Can We Have It All?

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# Minimize Emissions, Reduce Petroleum Consumption or Ensure Technical Feasibility- Can We Have It All?

**What are various market mechanisms to reduce petroleum consumption while ensuring low-emission fuels and technologies? How can government programs accelerate such?**

**. . . basic approach to various market mechanisms (Moyer, GMERP, DERA, TERP, etc,) is the same as that used to evaluate testing and deployment of new technology . . . .**

# **UPRR's General Approach – A Comprehensive & Aggressive Program**

- **Identification - look for/consider potential technologies**
- **Evaluation - test to objectively determine pros and cons**
- **Development - adapt to UPRR operational reqt's/needs**
- **Acquisition – obtain the equipment or technology**
- **Deployment - dedicate to use for continued evaluation**
- **Optimization – continued tweaks for maximum benefit**
- **AND FINALLY, Utilization – ensure full time usage and continued improved capability**

# **Step #1 : Identification – Look For/Consider Potential Technologies**

- **Existing/In Use – new/remanufactured Tier 0, 0+, 1+ and Tier 2 road/switch locomotives, ULEL Green Goat and Genset switchers, shutdown devices, repowered road locomotives w/ SCR after treatment, distributed power**
- **Prior Evaluations – shut down devices, DOC and DPF retrofits on older locomotives, scrubber for locomotive exhaust, LNG road locomotives**
- **Potential Future – road hybrids, in cylinder/engine enhancements, fuels, turbines, operational improvements, on-board energy storage (batteries, flywheels, ultra capacitors), aerodynamics, after treatment, fuel cells**

## **Step #2: Evaluation – Test To Objectively Determine Pros/Cons**

- **Safety and compliance with regulations**
- **Operational Considerations – parts compatibility, training requirements, consumables, maintenance, horsepower, range, tractive effort, and physical limitations (infrastructure, height, width, and length)**
- **Financial Aspects – fueling and track infrastructure, capital and O&M costs, cost effectiveness, equipment life span, ROIC**
- **Emissions Impacts – oxides of nitrogen, ROG, particulate matter, GHG's, and sulfates**

# Step #2: Evaluation – Test To Objectively Determine Pros/Cons

## Federal Regulation of Freight Railroads

Surface Transportation Board (STB)	<b>Financial Standards:</b> Rates, Mergers, Safety, Environment
US Environmental Protection Agency (US EPA)	<b>Environmental Standards:</b> Locomotive Emissions Standards, Water Quality, Toxics & Waste Regulation
Customs and Border Protection	<b>Security Standards:</b> Transportation over Northern and Southern borders
Transportation Security Administration (TSA)	<b>Security Standards:</b> Transportation Security
Federal Railroad Administration (FRA)	<b>Safety Standards:</b> Maintenance of Track and Equipment, Grade Crossing Warning Devices, Noise (from rail operations including locomotive horns), Operations, Employee Safety
Pipelines and Hazardous Materials Safety Administration	<b>Safety Standards:</b> Transportation of Hazardous Materials
Department of Agriculture and Food Safety	<b>Safety Standards:</b> Inspections for Agricultural Pests, Inspections at the Borders
Occupational Safety and Health Administration (OSHA)	<b>Safety Standards:</b> Working Conditions in Railroad Shops

# Step #3: Development – Adapt to Operational Requirements & Needs

## 60-Day Movement of *One Class 1 Line-haul Locomotive*

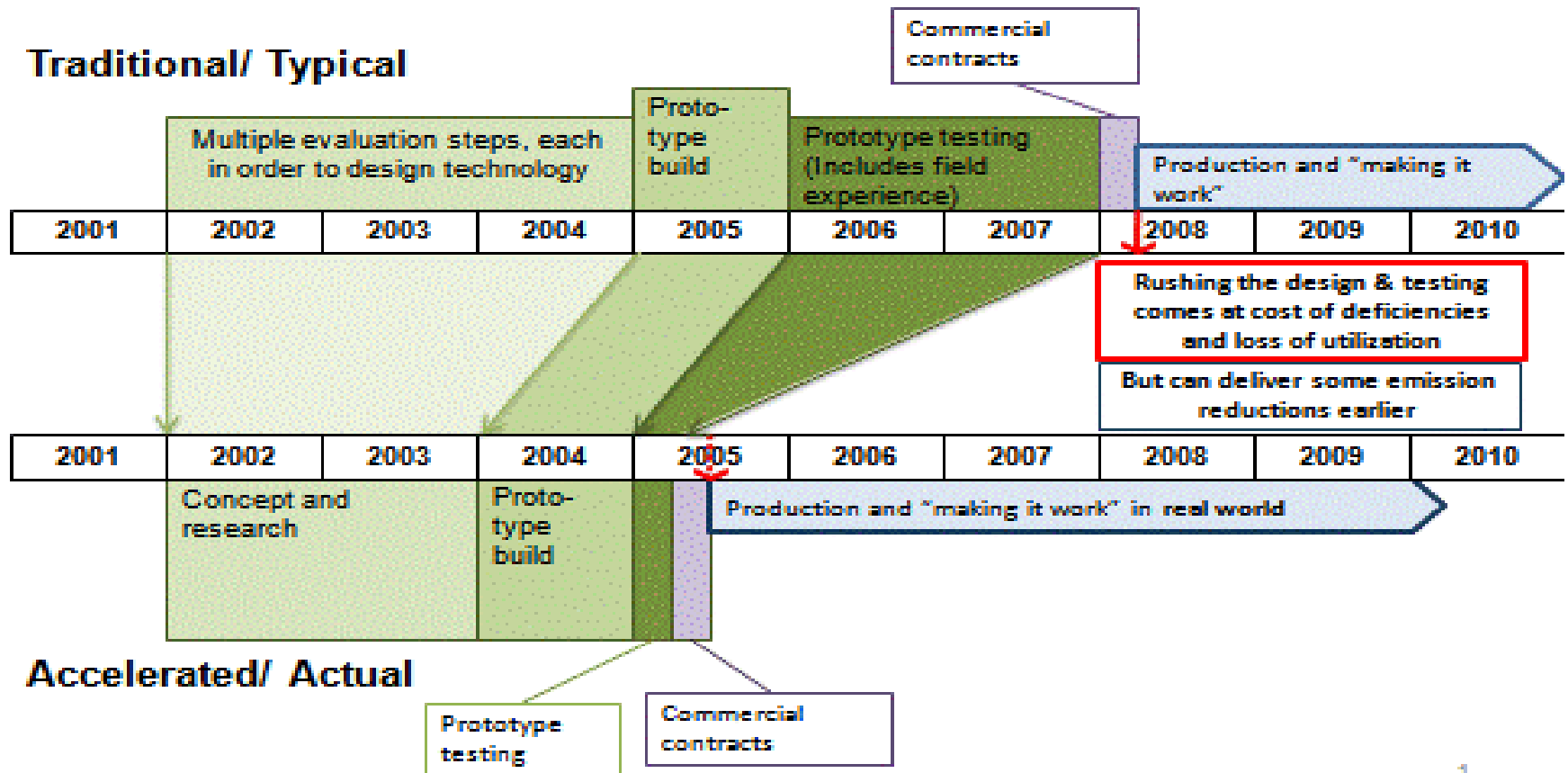


## **Step #4: Acquisition – Obtain the Equipment or Technology**

- **Non Disclosure Agreements – utilized to protect new technology not yet patented**
- **R & D Programs – provide incentive funding for new/enhanced equipment (i.e. - GMERP, TERP, etc.)**
- **Emissions Reductions Programs – incentive funds to acquire and utilize new, lower emitting machinery (i.e. – CMP, DERA, TERP, etc.)**
- **Business Needs – capacity/growth, efficiency, enhanced technology**

# Step #5: Deployment – Dedicate to Use for Continued Evaluation

## Lessons Learned in Genset Development



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# Step #6: Optimization – Continued Tweaks for Maximum Benefit

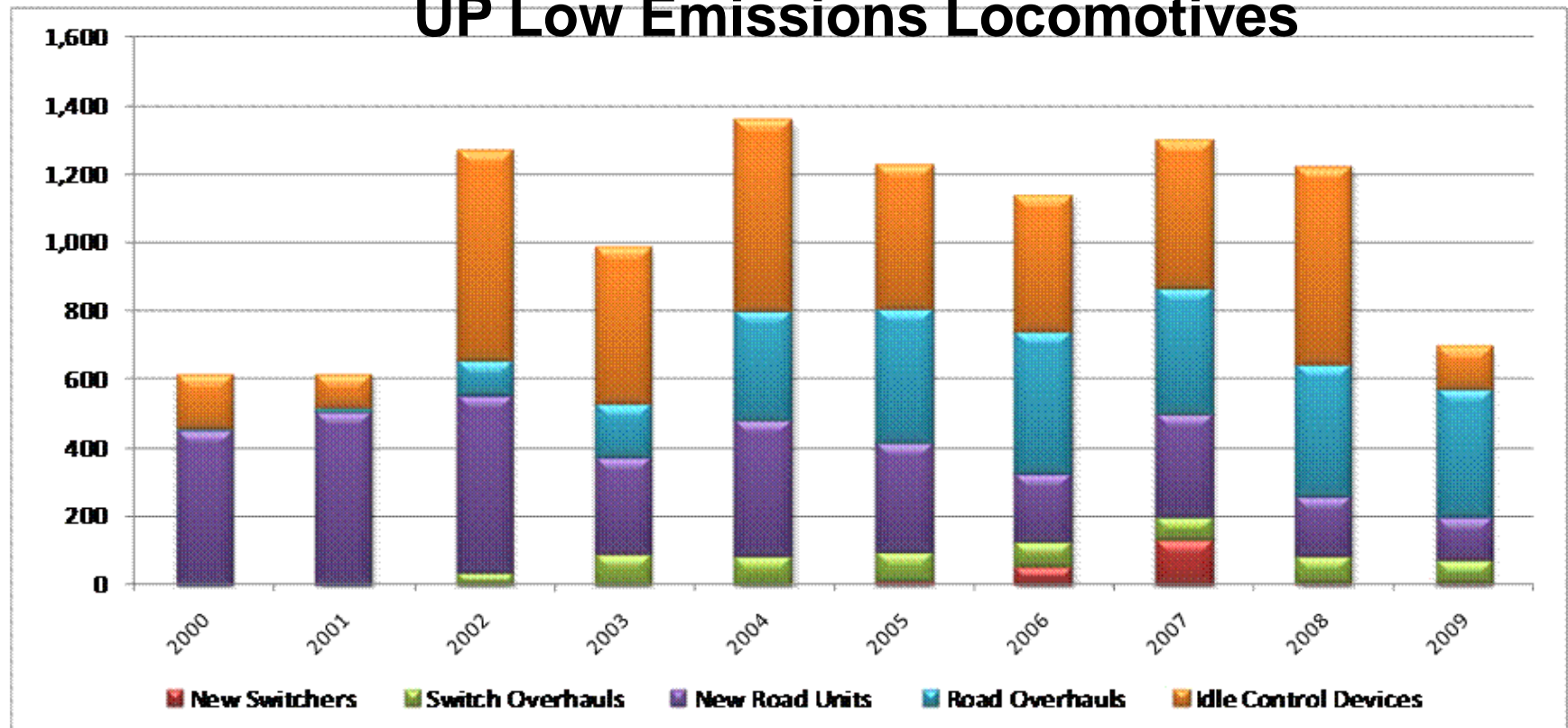
- **Safety Enhancements (i.e. - TIR's, DP controls, etc.)**
- **Remedy Deficiencies - battery fires, turbo's, electrical controls, traction motors, hardware/software for computers**
- **Train Control - distributed power, data access**
- **Emissions Benefits – potential after treatment equipment**

# Step #7: Utilization – Ensure Full Time Usage & Improvements

Loco	Model Nbr	Utilized?(y/n/?)	Reported?	Latest Mech Status
<a href="#">UPY 2607</a>	RP20GE	Y	Y	RW
<a href="#">UPY 2608</a>	RP20GE	?	N	IS
<a href="#">UPY 2609</a>	RP20GE	Y	Y	WK
<a href="#">UPY 2610</a>	RP20GE	?	N	WK
<a href="#">UPY 2657</a>	RP20GE	Y	Y	WK

# RESULT – Excellent Knowledge of Technology & Cleanest Locomotive Fleet in North America

## UP Low Emissions Locomotives



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
New Switchers						11	51	130	4	2	198
Switch Overhauls			35	90	81	84	73	65	80	67	575
New Road Units	451	500	516	279	398	318	200	300	175	125	3,262
Road Overhauls	6	13	104	159	320	390	412	370	385	375	2,534
Idle Control Devices	156	98	612	459	561	422	400	434	575	127	3,844
<b>TOTALS</b>	<b>613</b>	<b>611</b>	<b>1,267</b>	<b>987</b>	<b>1,360</b>	<b>1,225</b>	<b>1,136</b>	<b>1,299</b>	<b>1,219</b>	<b>696</b>	<b>10,413</b>

# Can We Have It All?

## Reducing Emissions through Technology

- **Achieves (or exceeds) environmental goals**

- **Uses “real world” technology**
  - Realistic trade-offs between expectations & achievables

- **Technology & infrastructure are matched**
  - A technology is of little use if it cannot be supported (ex: fuels)

- **Meaningful balance between benefits & risks**
  - Avoiding “tyranny of the perfect”
  - Accumulating results vs. waiting for “moon shots”

# Discussion



UNION PACIFIC  
ENVIRONMENTAL  
MANAGEMENT