

# High speed rail: America's energy and climate insurance policy

Anthony Perl

Simon Fraser University Vancouver

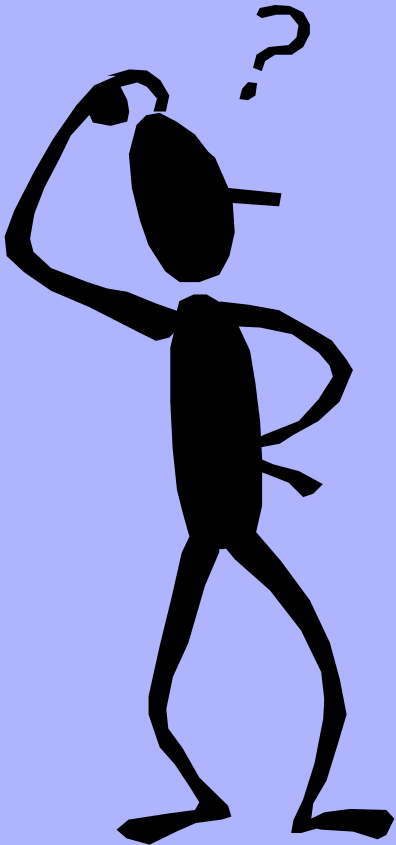


[aperl@sfu.ca](mailto:aperl@sfu.ca)

# Why will we see a major redesign of U.S. transport systems within 10 years ?

---

---



# Because we have reached the end of the 'Beverly Hillbillies' oil story



Conventional oil was the ideal  
fuel for the 20<sup>th</sup> century American Dream.

Conventional wisdom: the mid-point of the world's petroleum endowment gives plenty of time to plan adjustments

---

---



*What, Me Worry?*



Geological reality: the second half of the earth's oil endowment is *physically different*

## **Athabasca** Oil Sands Project

Currently one of the largest construction projects on the planet, the Athabasca Oil Sands Project is the first new fully integrated oil sands project in 25 years.





# The world's most plentiful oil reserves are in remote and fragile places

---

---



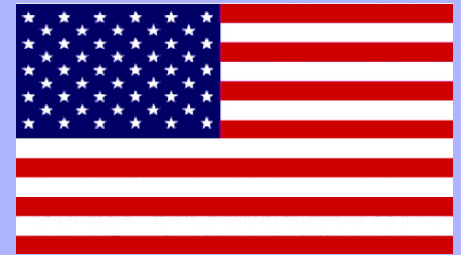
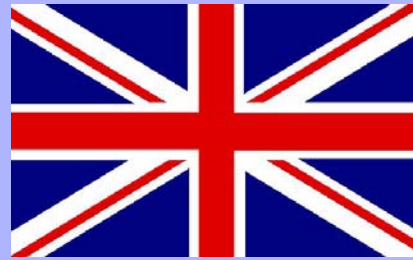
Producing this 'extreme oil' involves much higher risks, costs and conflict than the oil we have already burned through

---

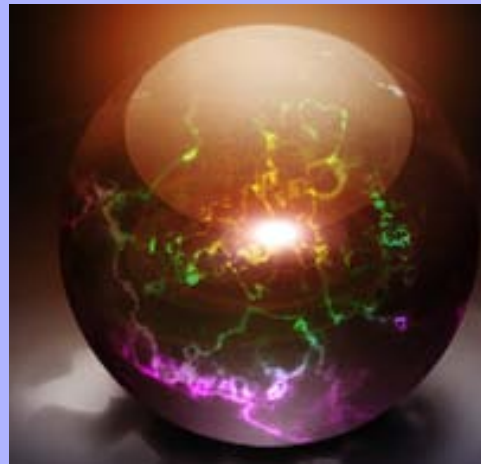
---



# Best guess: Global oil exports peak in 2012



Sooner ?



Later ?

When should we expect an end to growing oil supplies?



Can the  
U.S.  
survive  
this  
coming  
mother of  
all energy  
crises?



Only if we  
fast track  
mobility  
systems  
that can  
perform  
without oil

Moving people and freight without oil will necessitate **transport revolutions**

---

---



This is **not** a transport revolution

# What is a transport revolution?

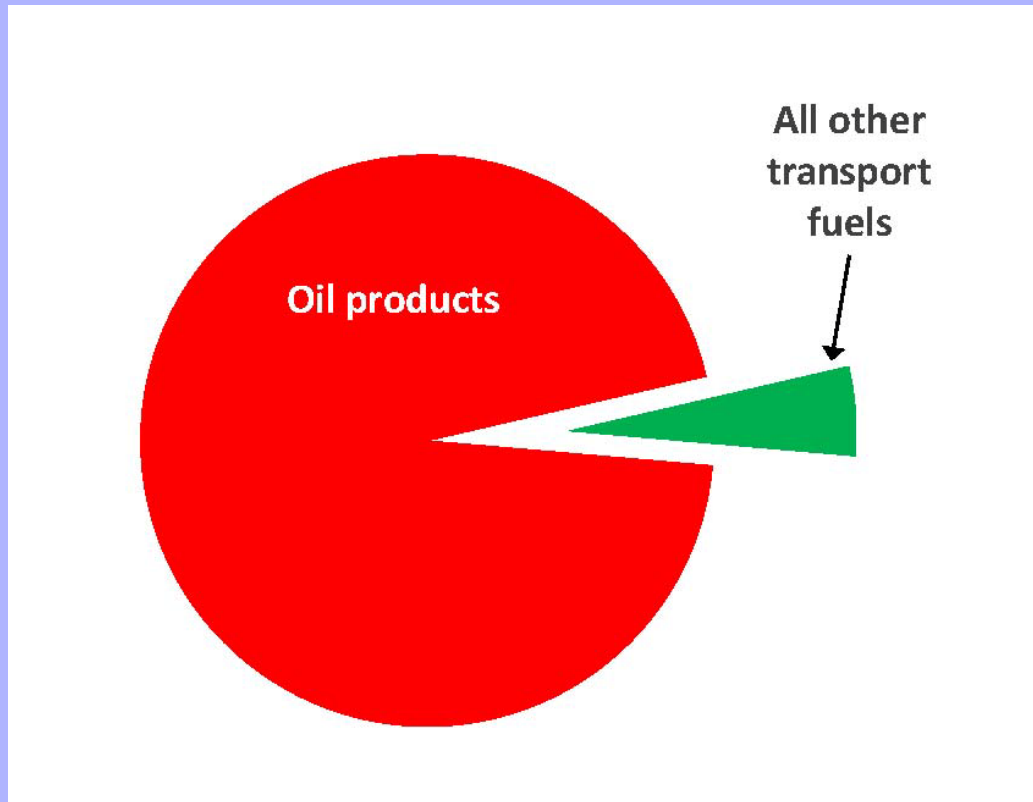
---

---



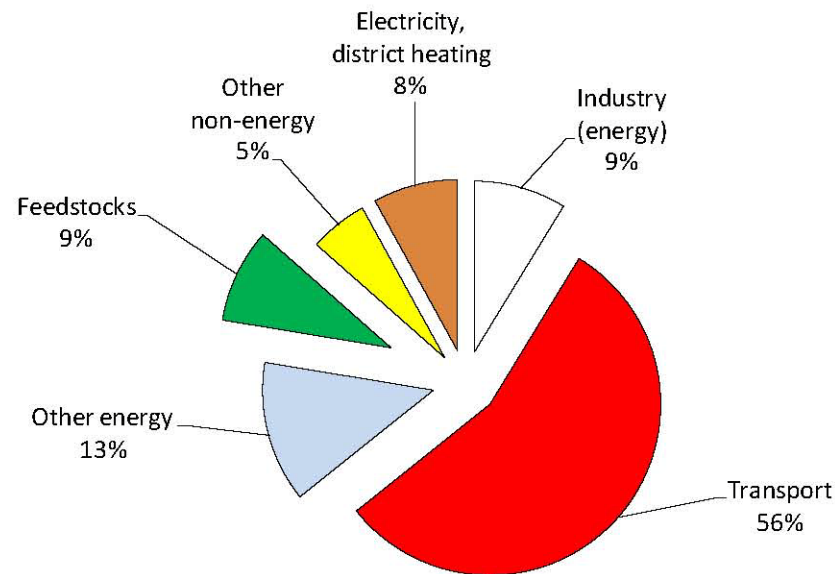
- A **substantial change** in a society's transport *activity* —moving people or moving freight, or both — that occurs in **less than 25 years**.
- Substantial change means a **50% increase or decrease** in transport activity or use of a new means of transport becomes part of the lives of 10% of the society's population.

# Transport revolutions will lead, not lag, our energy transition because:



Oil products power ~95% of global mobility

# Breaking the world's oil addiction can only occur by reducing its flow through internal combustion engines



Data are for the world for 2005, from International Energy Agency, *Energy Balances of Non-OECD Countries, 2004-2005*, IEA, Paris, France, 2007. Canadian data show a similar share for transportation. (US data show a much higher share for transportation.)



Electric mobility is the key to energy transition because it can blend multiple renewable sources ...

---

---

---



# To incrementally replace nonrenewable energy sources

---

---



# High-speed rail already has revolutionized intercity travel in Japan and W. Europe

---

---



HSR is mature technology, up and running since 1964 with ZERO fatalities in Japan!

# China's high-speed rail revolution is a game changer

---

---



In 5 years, China will have doubled the world's  
HSR capacity.



# China's HSR manufacturing capacity will cut bullet train costs by 50% or more.





# Electric railways also offer proven technology for moving freight inland



# Mobility modes that cannot run at scale without oil will see more radical changes

---

---





# Being unprepared exposes the U.S. to considerable risk



# How can the U.S. gear up for post carbon transport?

---

---



- ✓ New priorities
- ✓ New skills
- ✓ New policy

Step 1: We have to set aside outdated plans for a future that will never arrive

---

---

---



Will Rogers once advised America that to get out of a hole, the first thing one has to do is:

**STOP DIGGING !**



# Why is this so hard to do?

---

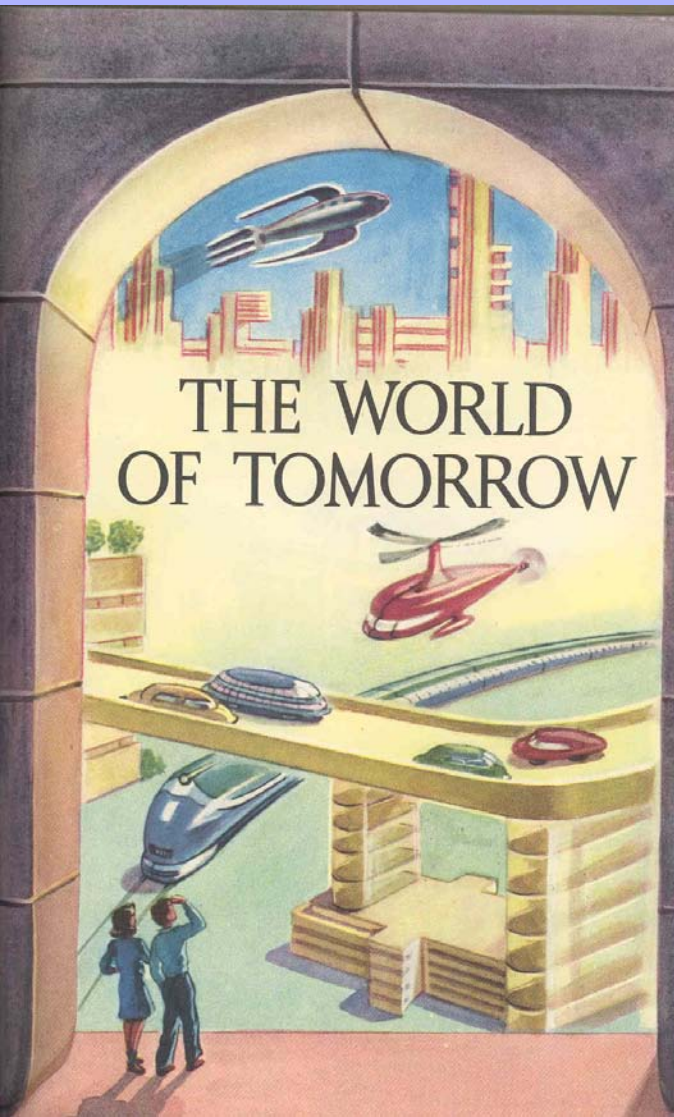
---

---



For every 10,000 engineers who can design highways and airports, there might be one who can develop an electric railroad

This imbalance yields a skewed vision – such as seeking new fuels to be used in the same vehicles and on the same infrastructure



# While ignoring proven ways to move people between cities without oil

---

---



# Step 2: Launch a Transportation Redevelopment Agency to guide major change

---

---

1. Set the key parameter - how much to reduce liquid petroleum fuel use in transport between start and end of the plan.
2. Estimate current transport activity and energy use.
3. Anticipate future available modes and energy use.
4. Develop a plausible strategy for deploying future modes that meet desired activity and energy use.
5. Continually refine and improve energy use estimates and proposals for transport activity.



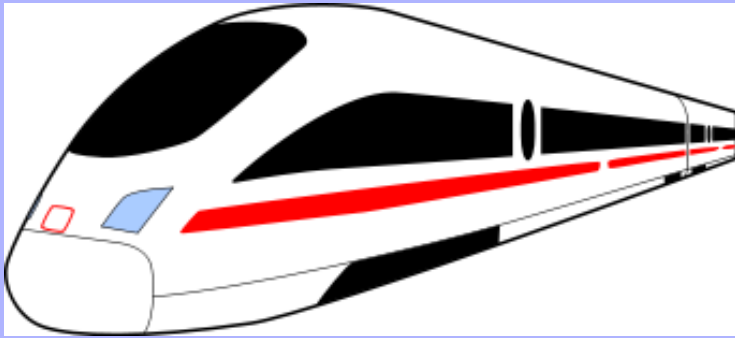
# Example: 40% Less Oil Used To Move Americans by 2025

Values and totals in this table are rounded to aid comprehension  Mode	2007				2025						
	pkm in billions (except per capita)	Fuel use per pkm, in MJ	Total liquid fuel use in EJ (GJ for per capita)	Total electric ity use in EJ (GJ for per capita)	Local pkm in billions (except per capita)	Non-local pkm in billions (except per capita)	Fuel use per pkm in MJ	Total liquid fuel use in EJ (GJ for per capita)	Total electric ity use in EJ (GJ for per capita)	Liquid fuel powere d pkm	Electrically powere d pkm
Personal vehicle (ICE)	7,700	2.6	20.4		2,300	2,000	2.1	9.0		4,300	
<i>Personal vehicle (electric)</i>					1,000		1.0		1.0		1,000
<i>Future transport</i>					200		0.5		0.1		200
Local public transport (ICE)	50	2.8	0.1		100		2.0	0.2		100	
<i>Local public transport (electric)</i>	40	0.6		0.0	400		0.5		0.2		400
Bus (inter-city, ICE)	200	0.7	0.1			500	0.5	0.3		500	
<i>Bus (inter-city, electric)</i>						500	0.4		0.2		500
Rail (inter-city, ICE)	6	0.9	0.0			100	0.6	0.1		100	
<i>Rail (inter-city, electric)</i>	3	0.3		0.0		400	0.2		0.1		400
Aircraft (domestic)	950	2.0	1.9			600	1.8	1.1		600	
Aircraft (international)	330	2.3	0.8			400	2.1	0.8		400	
Airship (dom. and int.)						100	1.2	0.1		100	
Marine (dom. and int.)						100	0.7	0.1		100	
Totals	9,300		23.4	0.0	4,000	4,700		11.7	1.6	6,200	2,500
Per capita	30,500		76.5	0.1	24,500			32.8	4.5		

# U.S. Rail Renaissance Cost Estimate

---

---



- \$1 trillion would buy a 15,500 mile HSR network
- \$1 trillion more needed to electrify conventional lines.
- \$280 billion per year to arrive at post-carbon intercity mobility
- 2% of GDP for 15 years

# Step 3: Deploy **and use** the policy tools for implementing post-carbon mobility

---

---



- Introduce fiscal options that move beyond 'road socialism'
- Enable public-private partnerships through infrastructure condominiums
- Encourage carbon sunsets through acquiring and repurposing 'stranded assets'

# Pricing road use opens the vault to fund post-carbon infrastructure



Time of day	Tax
00:00 – 06:29	0 SEK
06:30 – 06:59	10 SEK
07:00 – 07:29	15 SEK
07:30 – 08:29	20 SEK
08:30 – 08:59	15 SEK
09:00 – 15:29	10 SEK
15:30 – 15:59	15 SEK
16:00 – 17:29	20 SEK
17:30 – 17:59	15 SEK
18:00 – 18:29	10 SEK
18:30 – 23:59	0 SEK





# A Divide Needs to be Bridged Between Public Roads and Private Rails



# New Electric Mobility Corridors Will Require an 'Infrastructure Condominium'





# What about stranded assets?



Large airports are connected to cities and surrounding regions mainly by road

# Lyon St. Exupery is not an airport; it is a Travelport

---

---



Many European airports are prepared to shift  
from air to rail



# Transport revolutions will arrive – whether we are ready or not

---

---



High-speed rail will be a litmus test of America's prospects for creating a happy ending out of the coming changes.

To find out more:



For further information on post-carbon mobility, visit:

[www.transportrevolutions.info](http://www.transportrevolutions.info)