2008 ASPO-USA Peak Oil Conference

Proceedings

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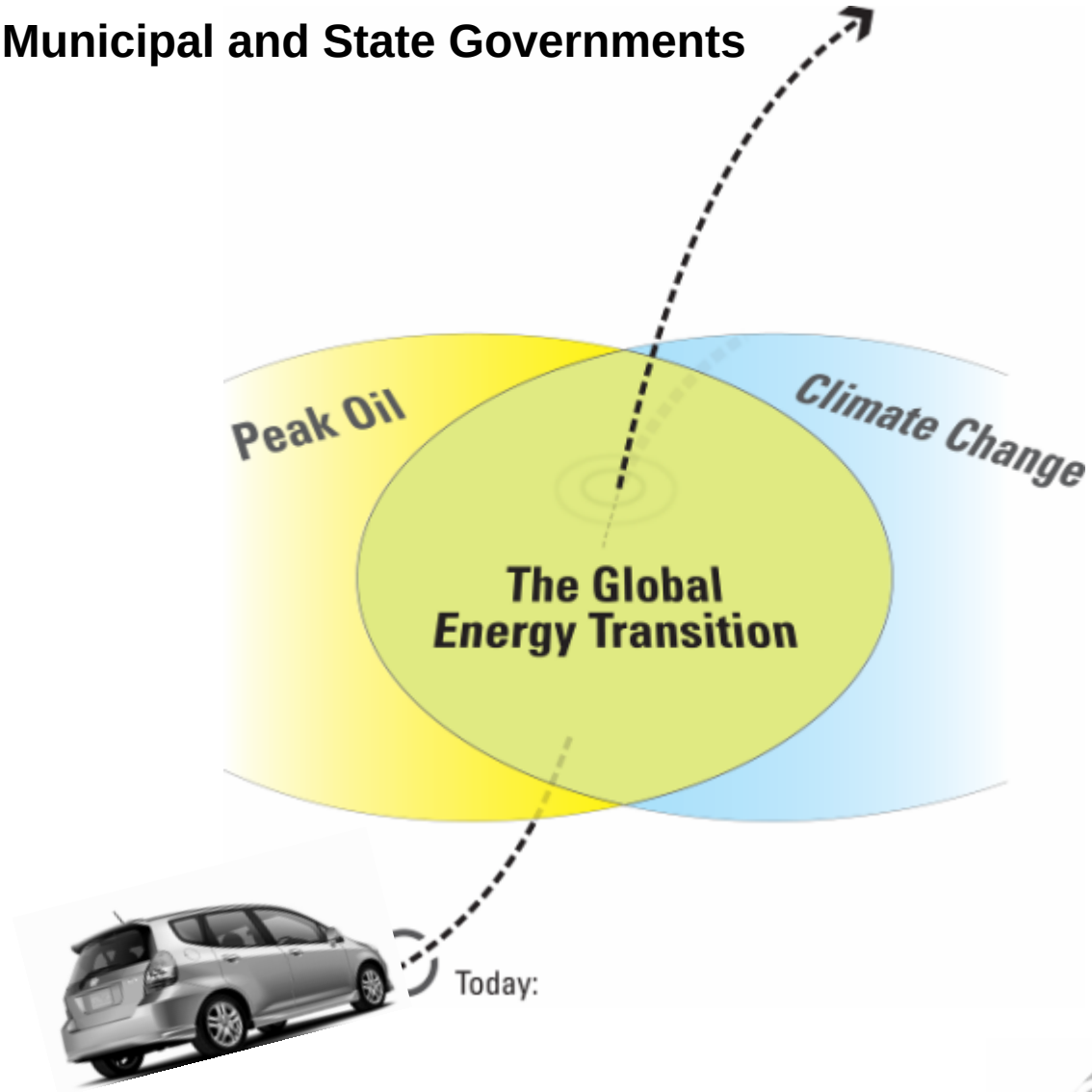
The Nexus of Peak Oil, Climate Change & Infrastructure

Scenario Planning for Municipal and State Governments

September 23, 2008

Bryn Davidson

Executive Director
Dynamic Cities Project
www.dynamiccities.org



The Nexus of Peak Oil, Climate Change & Infrastructure

Scenario Planning for Municipal and State Governments

1. Energy Transition = Peak Oil + Climate Change

2. Shocks and Tipping Points

3. Mapping Tipping Points

4. Scenarios: Thinking Outside the Extrapolation

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Peak Oil

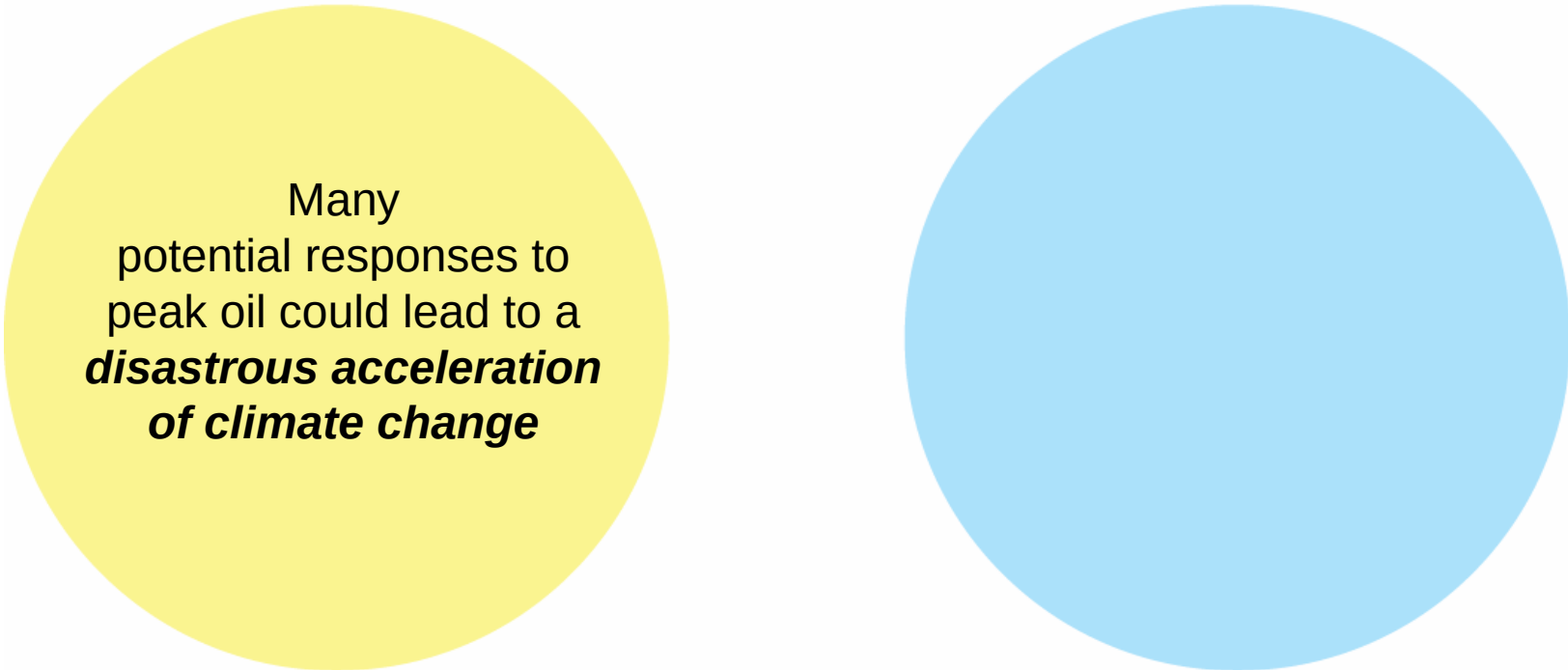
Vs.

Climate Change

Peak Oil

Vs.

Climate Change



Peak Oil

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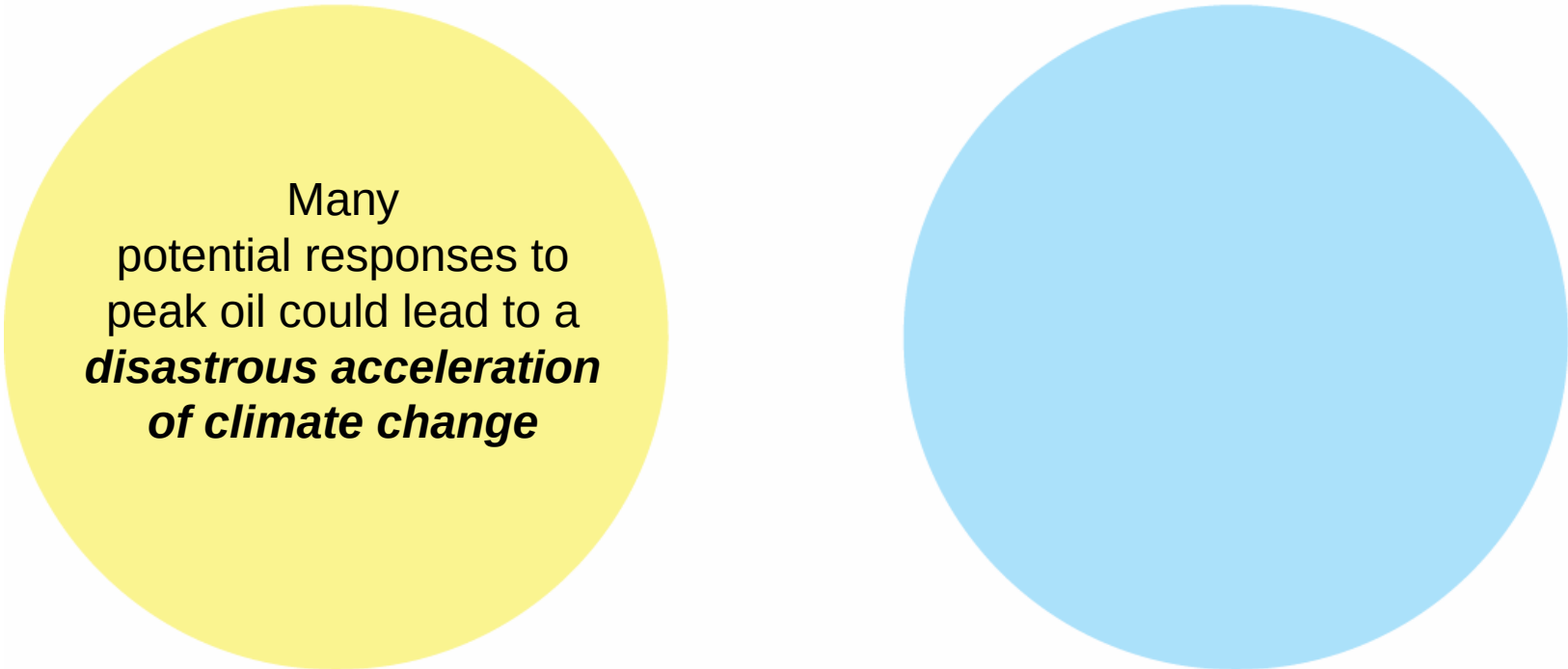

*** Gas to Coal Switching**
*** Coal to Liquids**
*** Tar Sands and Shale**
*** Forest Removal for Biofuels**

Peak Oil

Many
potential responses to
peak oil could lead to a
disastrous acceleration of climate change

* Gas to Coal Switching
* Coal to Liquids
* Tar Sands and Shale
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Climate Change

Many strategies
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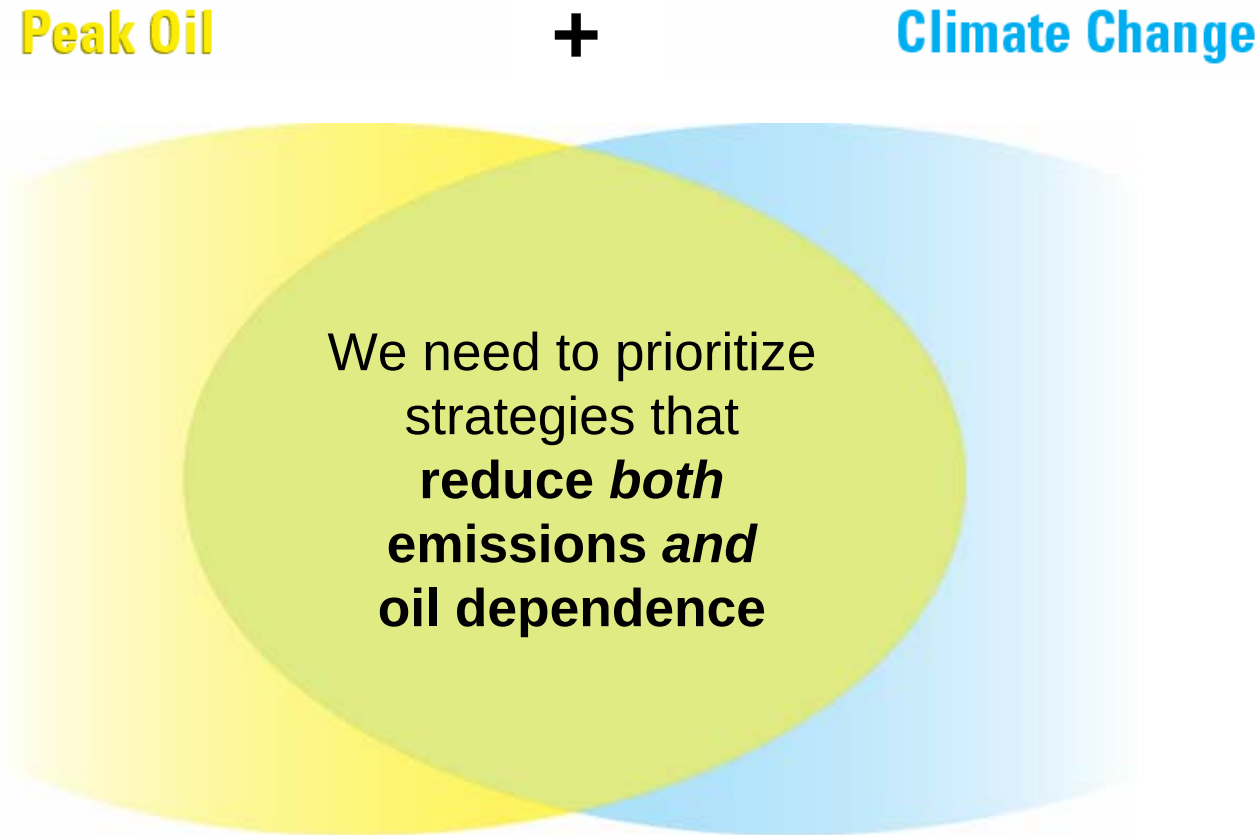
*** Emissions Trading**
*** Forestry Based Offsets**
*** Atmospheric Carbon Capture**



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Energy Transition Strategies

1. Energy Transition = Peak Oil + Climate Change

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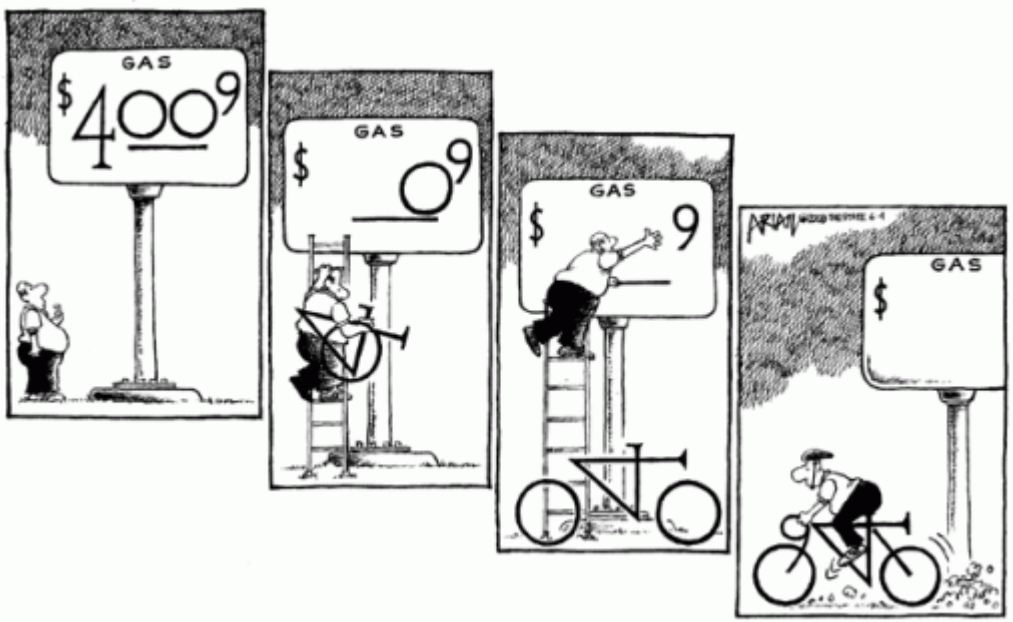
4. Scenarios: Thinking Outside the Extrapolation

For a long time now we've known how to create sustainable cities...
...but the motivation to scale-up these solutions has been lacking.

Credit: Press-Office City of Münster, Germany

For a long time now we've known how to create sustainable cities...
...but the motivation to scale-up these solutions has been lacking.



Peak oil and climate change will create tipping points
that will change ***what we're willing to do...***

Peak oil and climate change will create tipping points that will change ***what we're willing to do...***

autoblog
WE OBSESSIVELY COVER THE AUTO INDUSTRY

Desperate times: Ford will retool truck plants to build cars

Peak oil and climate change will create tipping points that will change ***what we're willing to do...***

How well we transition to a post-carbon future...

....will be determined by how well we react to unprecedented energy and climate tipping points.

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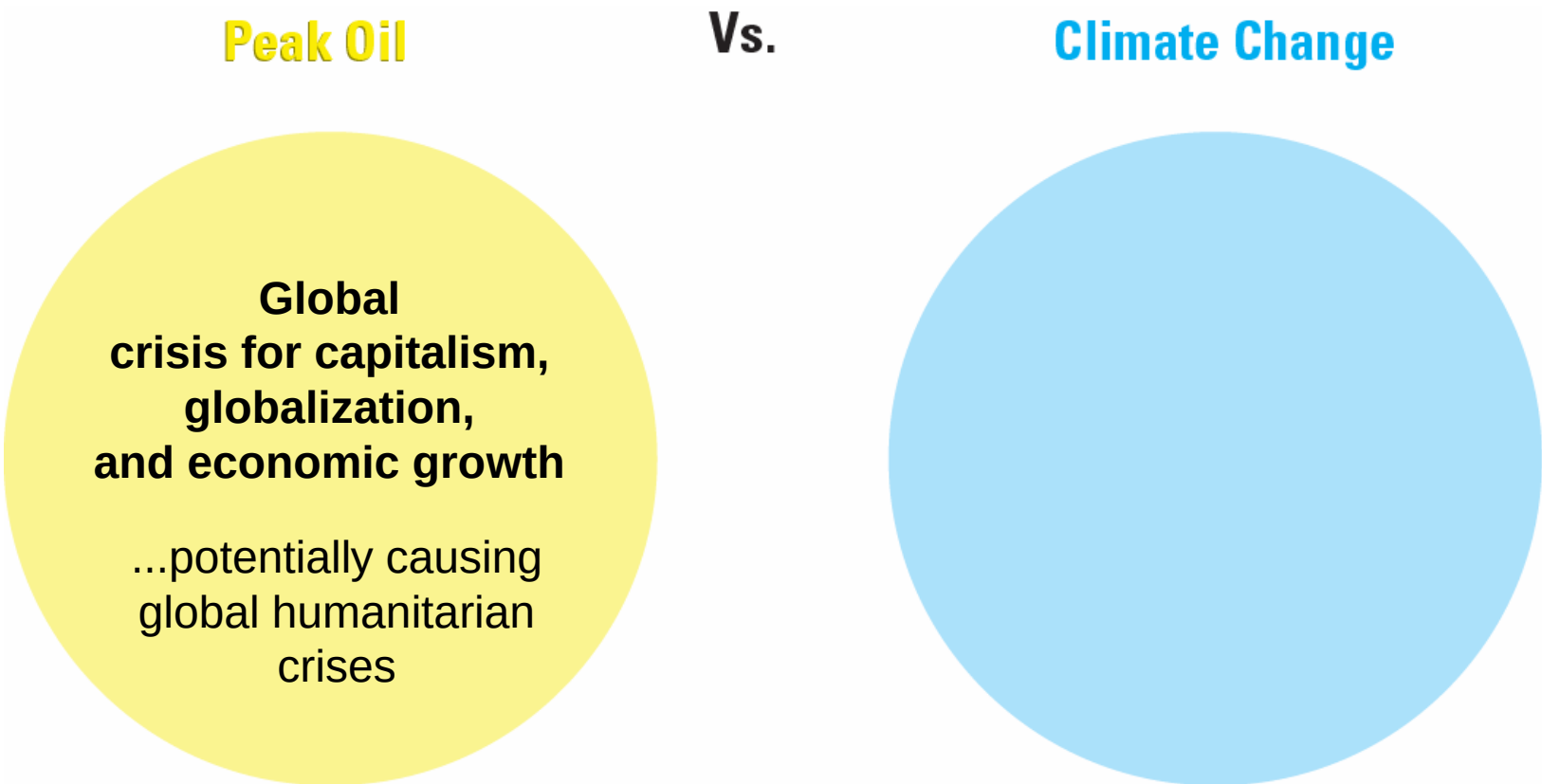
Peak Oil

Vs.

Climate Change



Peak Oil

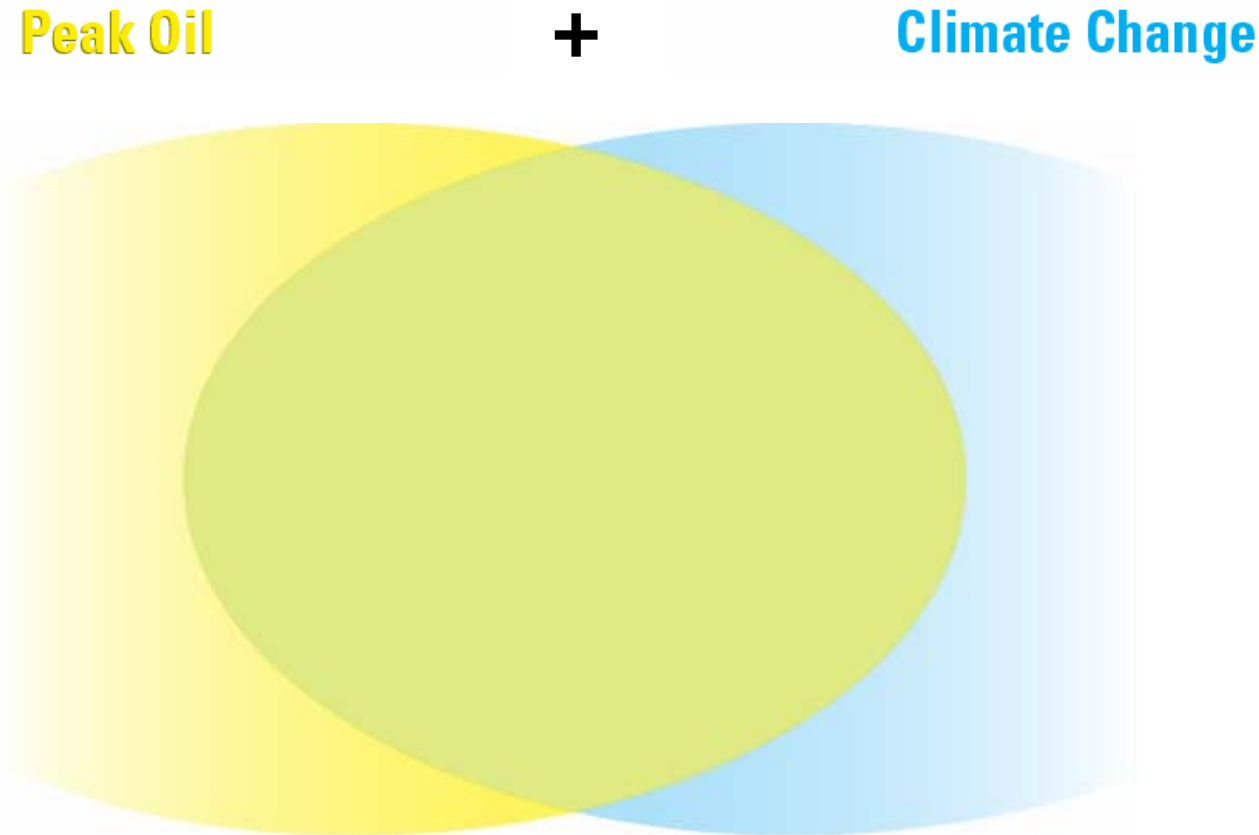
Vs.

Climate Change

Global ecological and humanitarian crisis

..potentially causing global economic crises

There are many potential impacts on cities that will be exacerbated by *both* peak oil *and* climate change.



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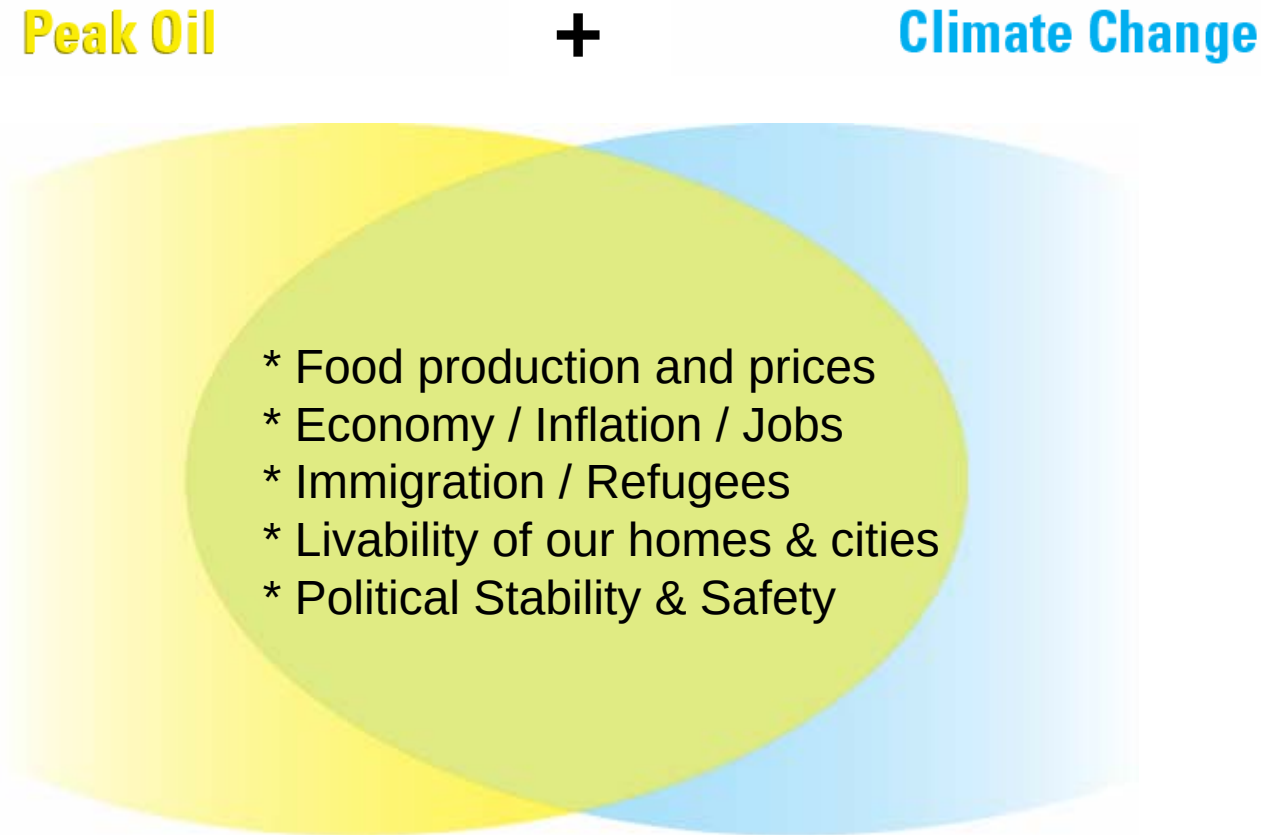
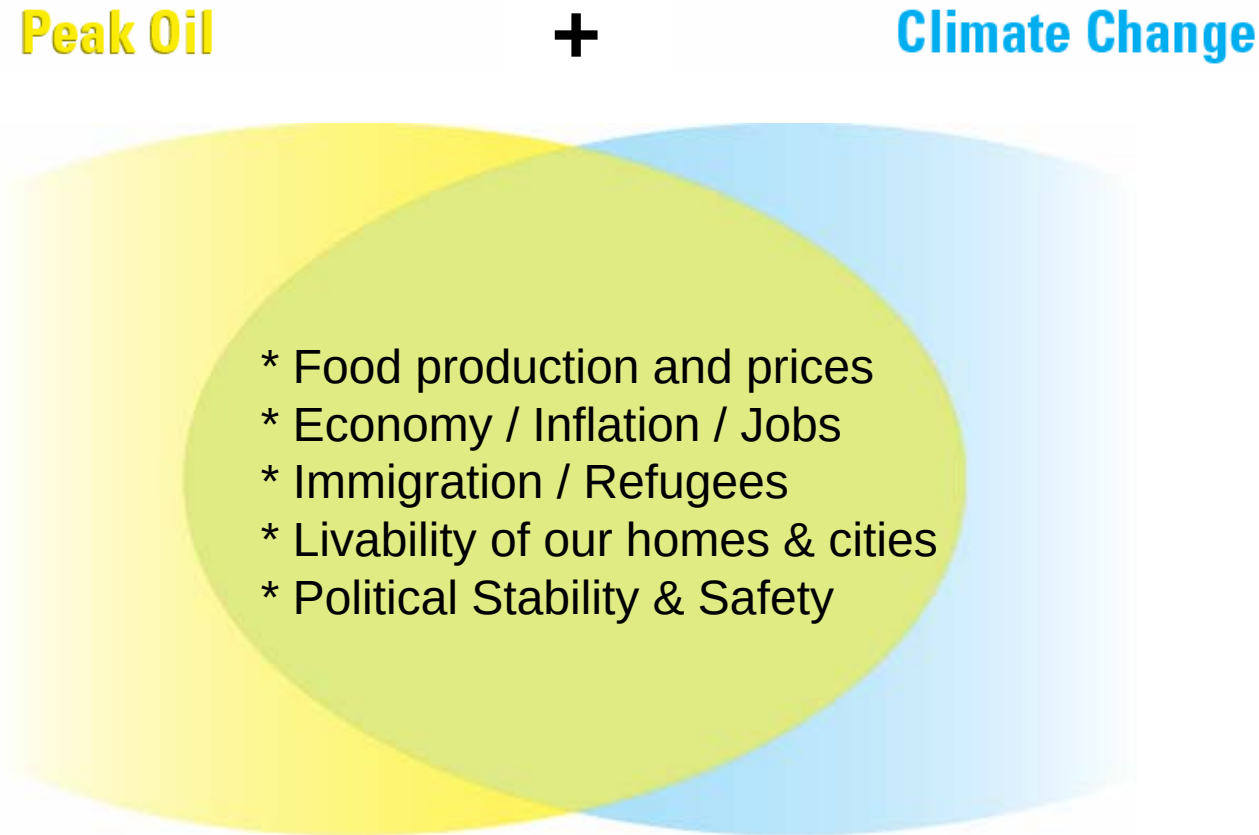
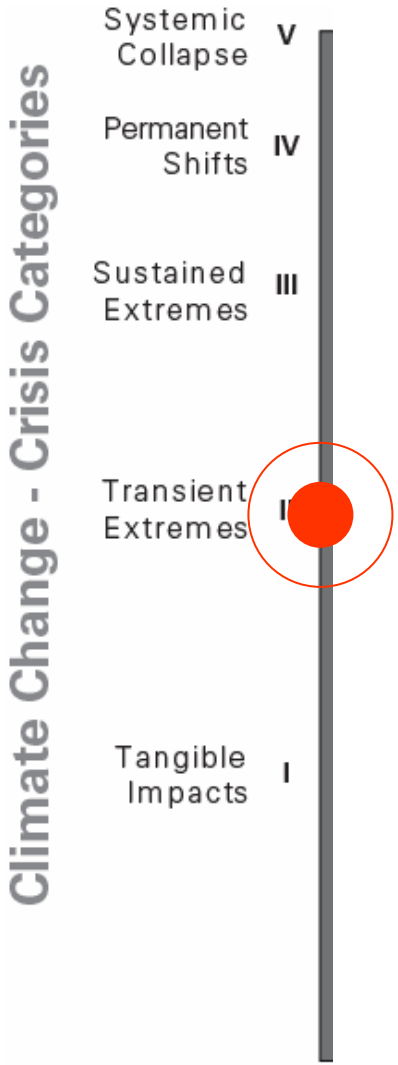




Scenarios help us to explore the ways that energy and climate shocks will change what we're willing to do...

Mapping Climate Shocks:
(similar to what's done for hurricanes)



Mapping Climate Shocks:
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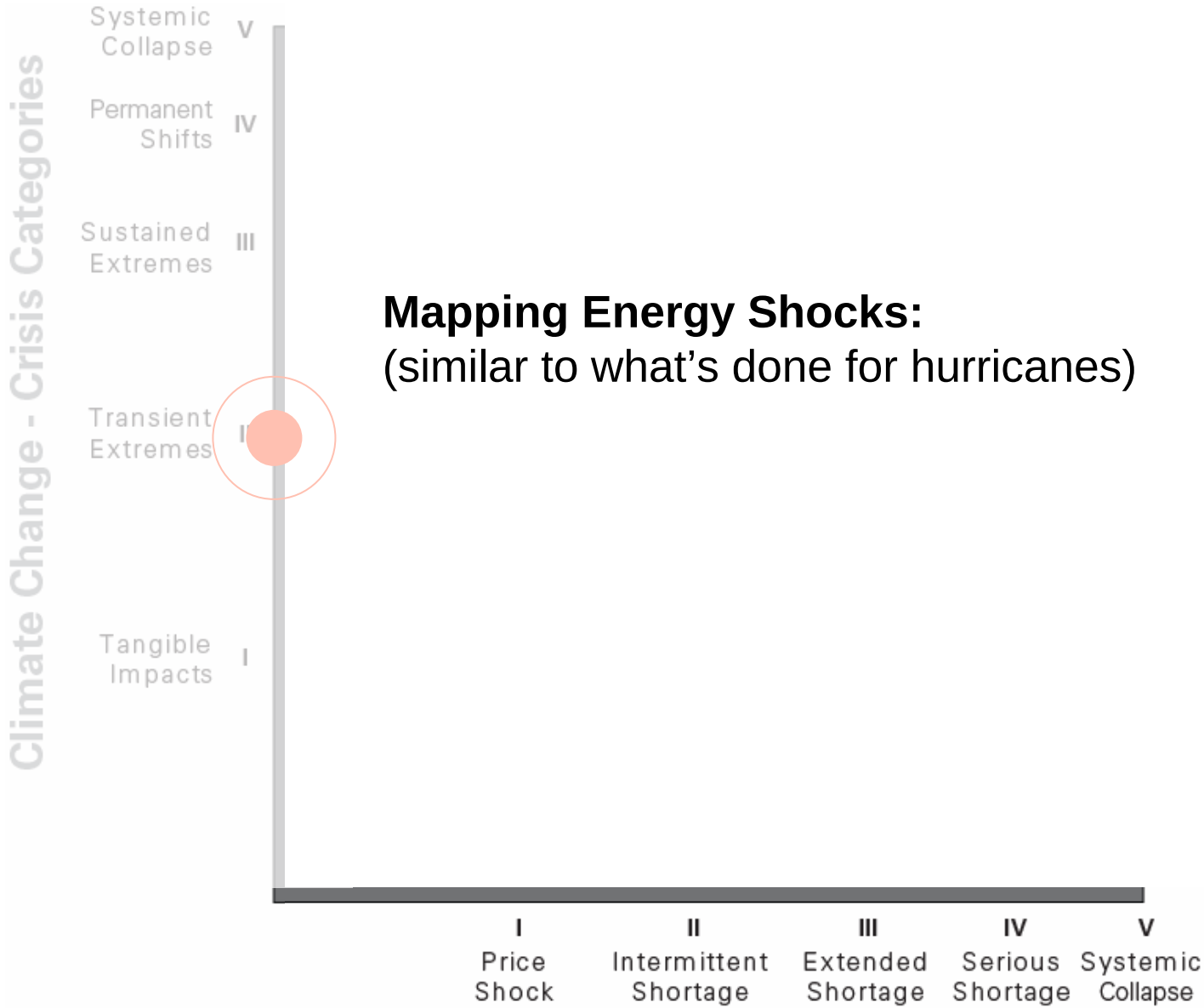
Example: Class II Climate Shock

An extreme drought reduces local food production.

To make up the difference food is imported (via truck).



Mapping Energy Shocks:
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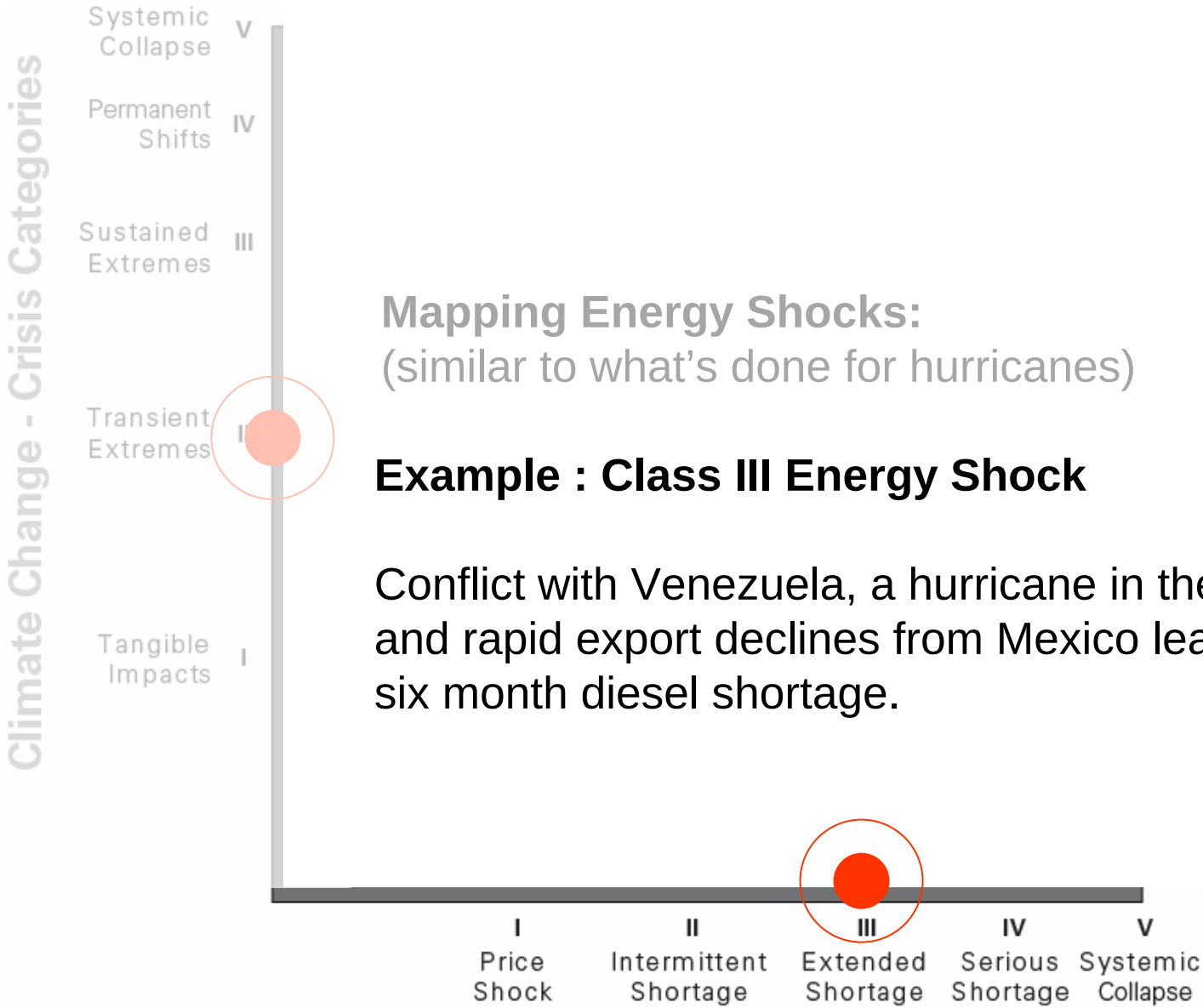
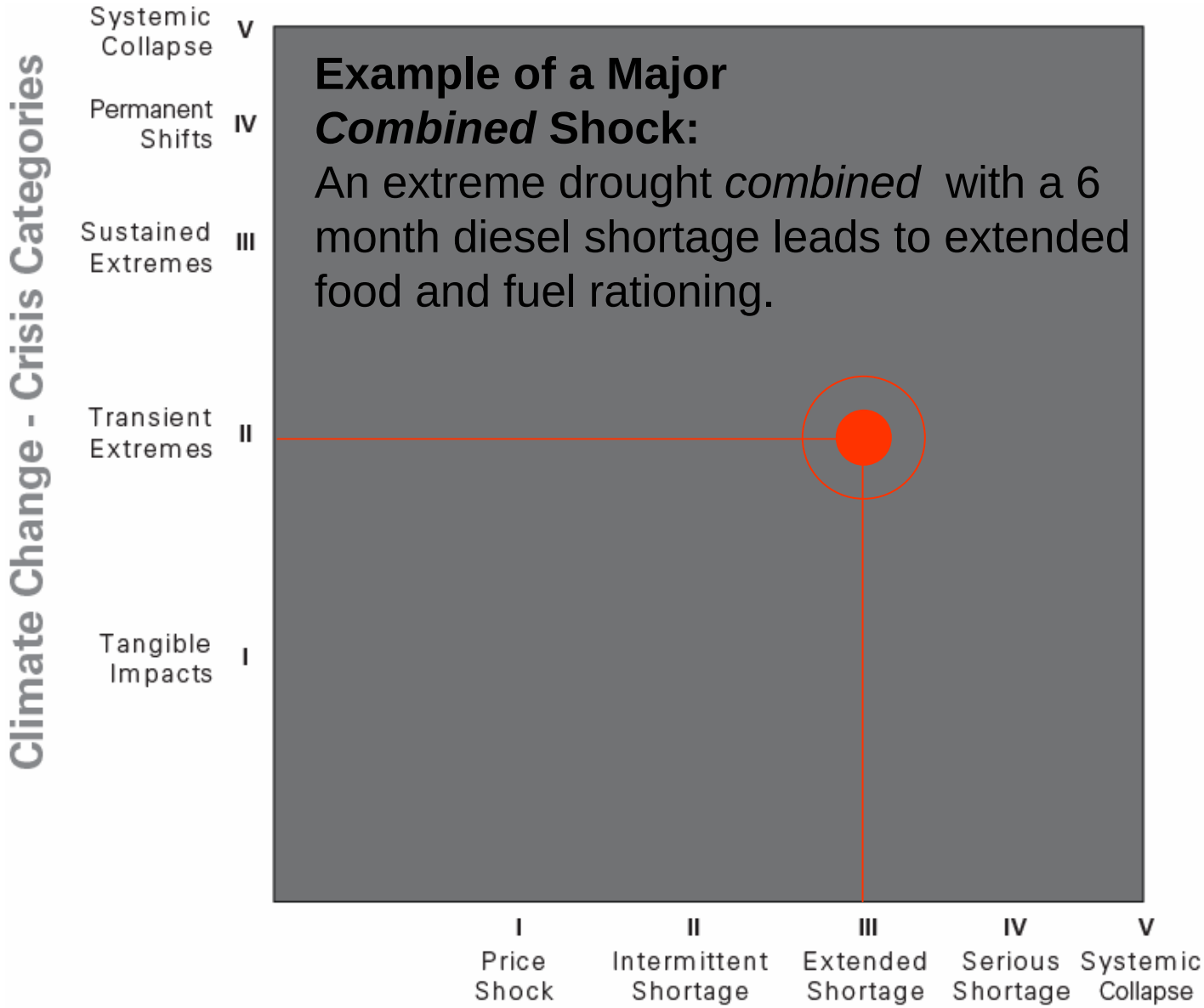
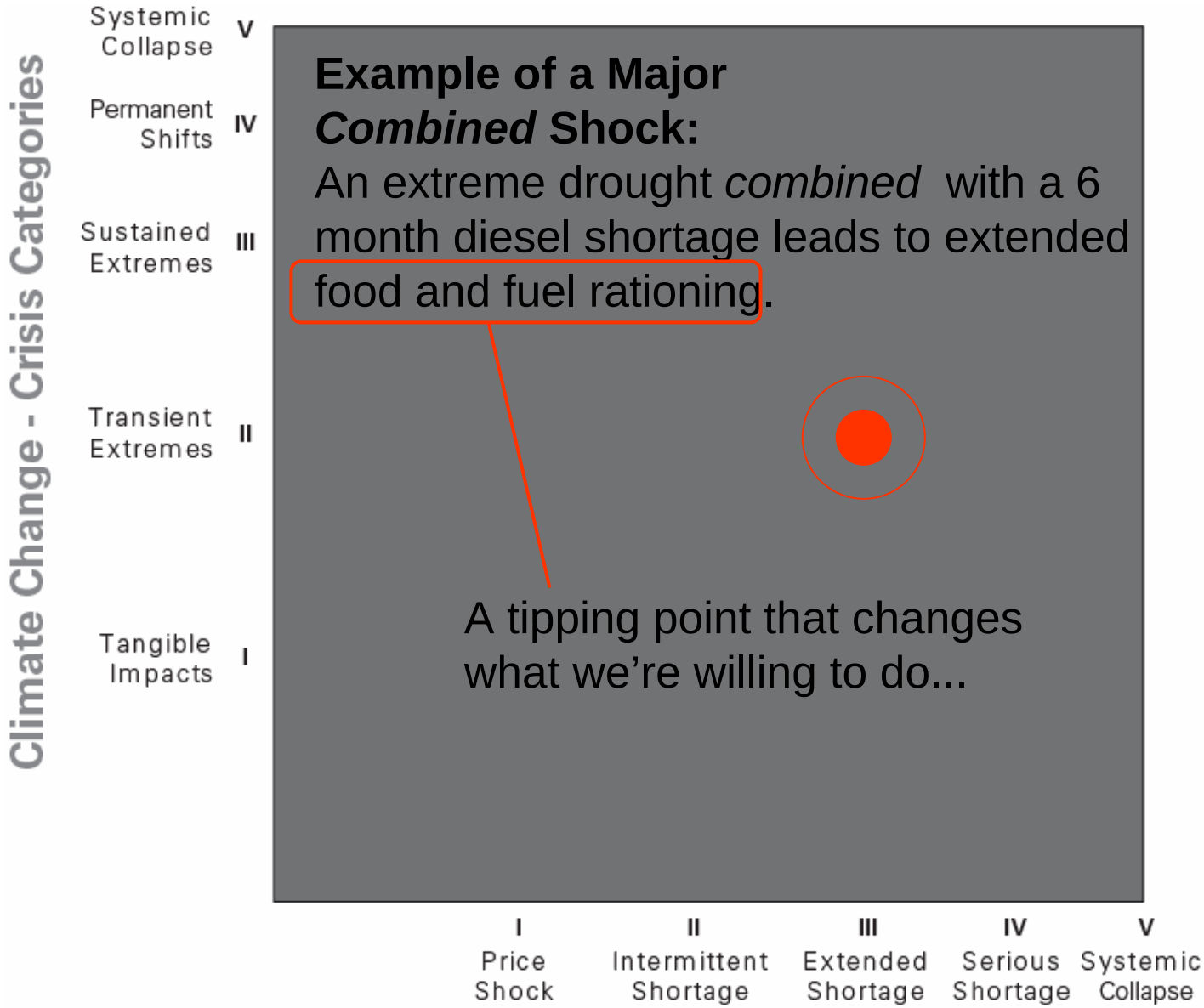


Mapping Energy Shocks:
(similar to what's done for hurricanes)

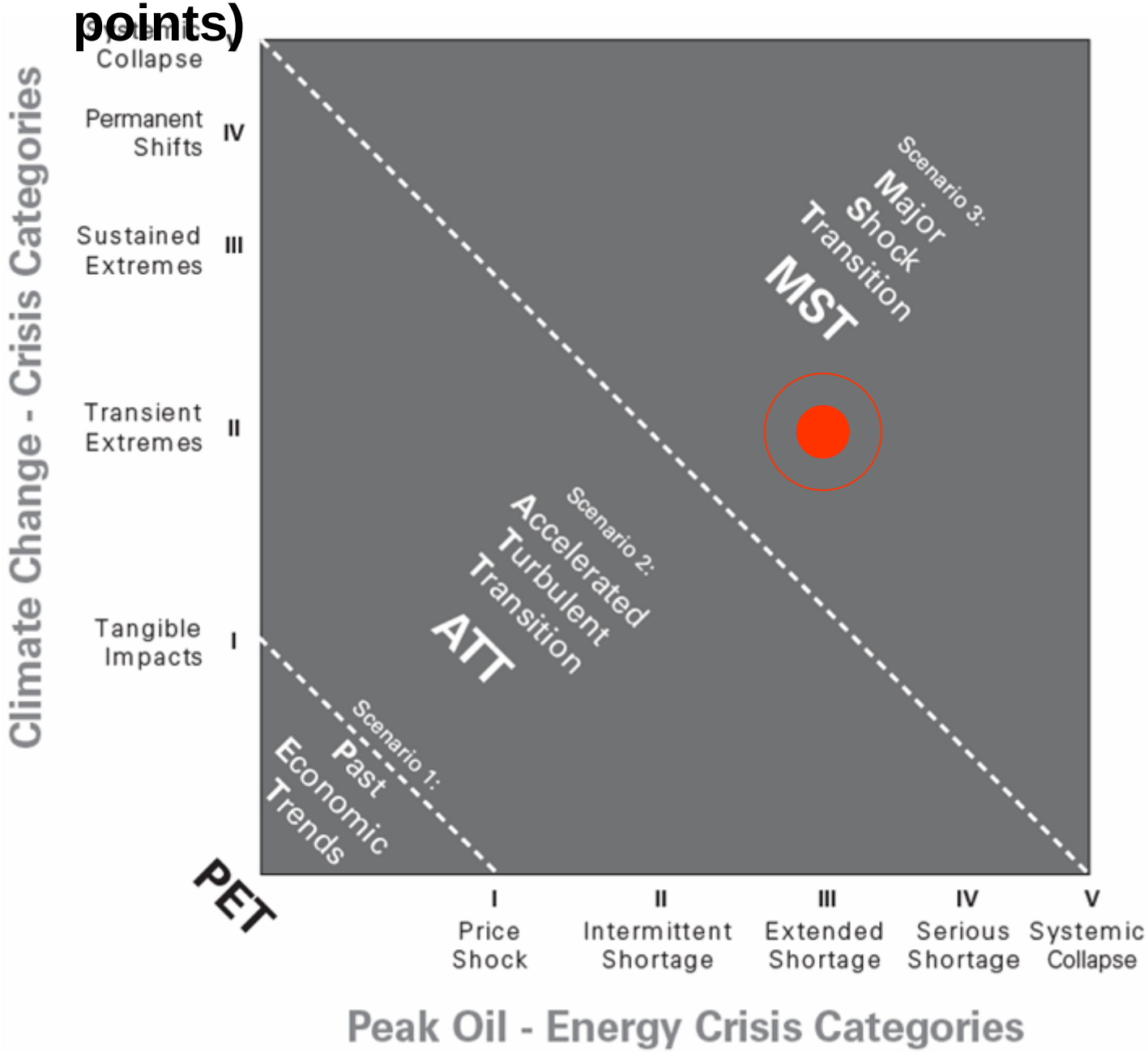
Example : Class III Energy Shock

Conflict with Venezuela, a hurricane in the gulf, and rapid export declines from Mexico lead to a six month diesel shortage.





3 Scenarios for Planning (defined by tipping points)



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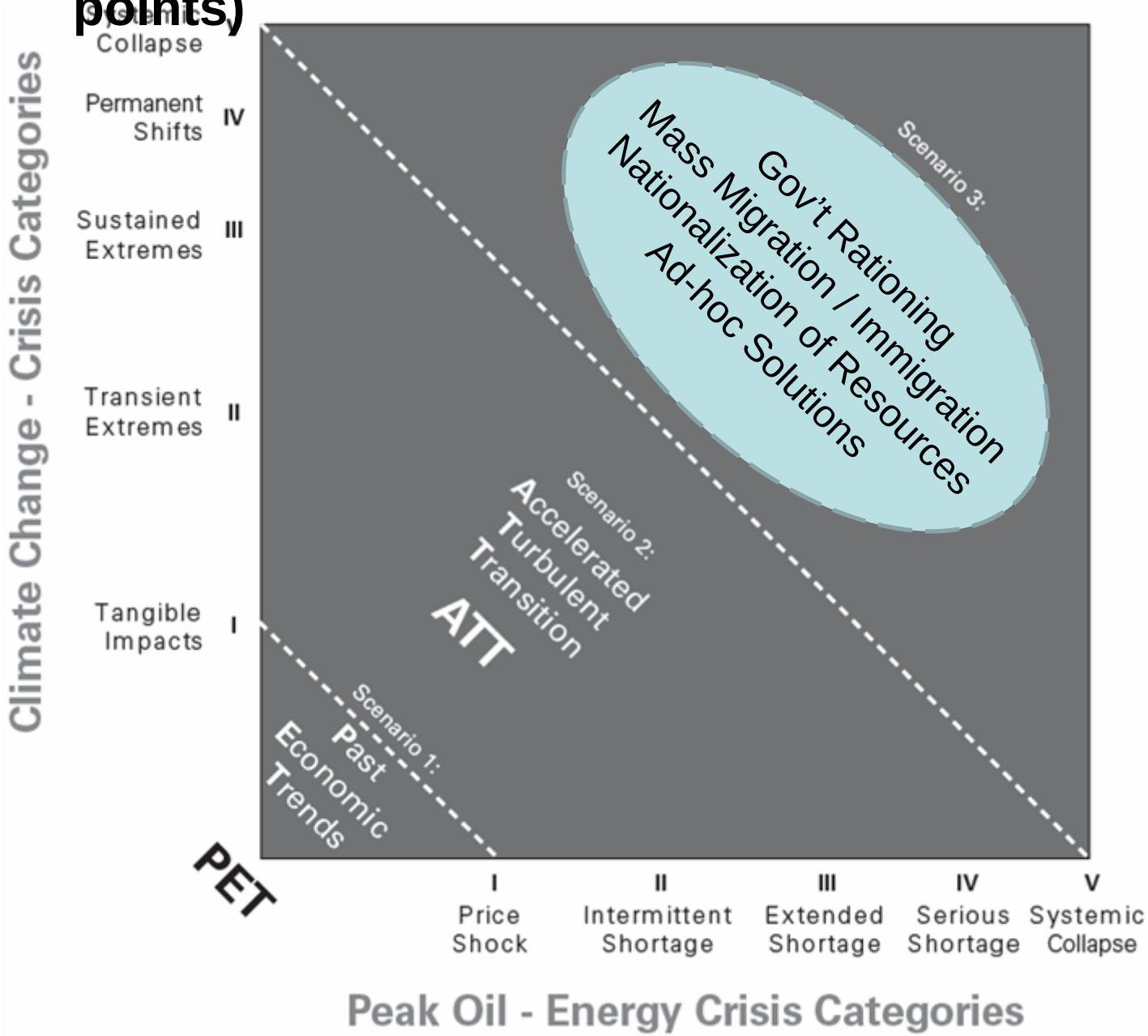

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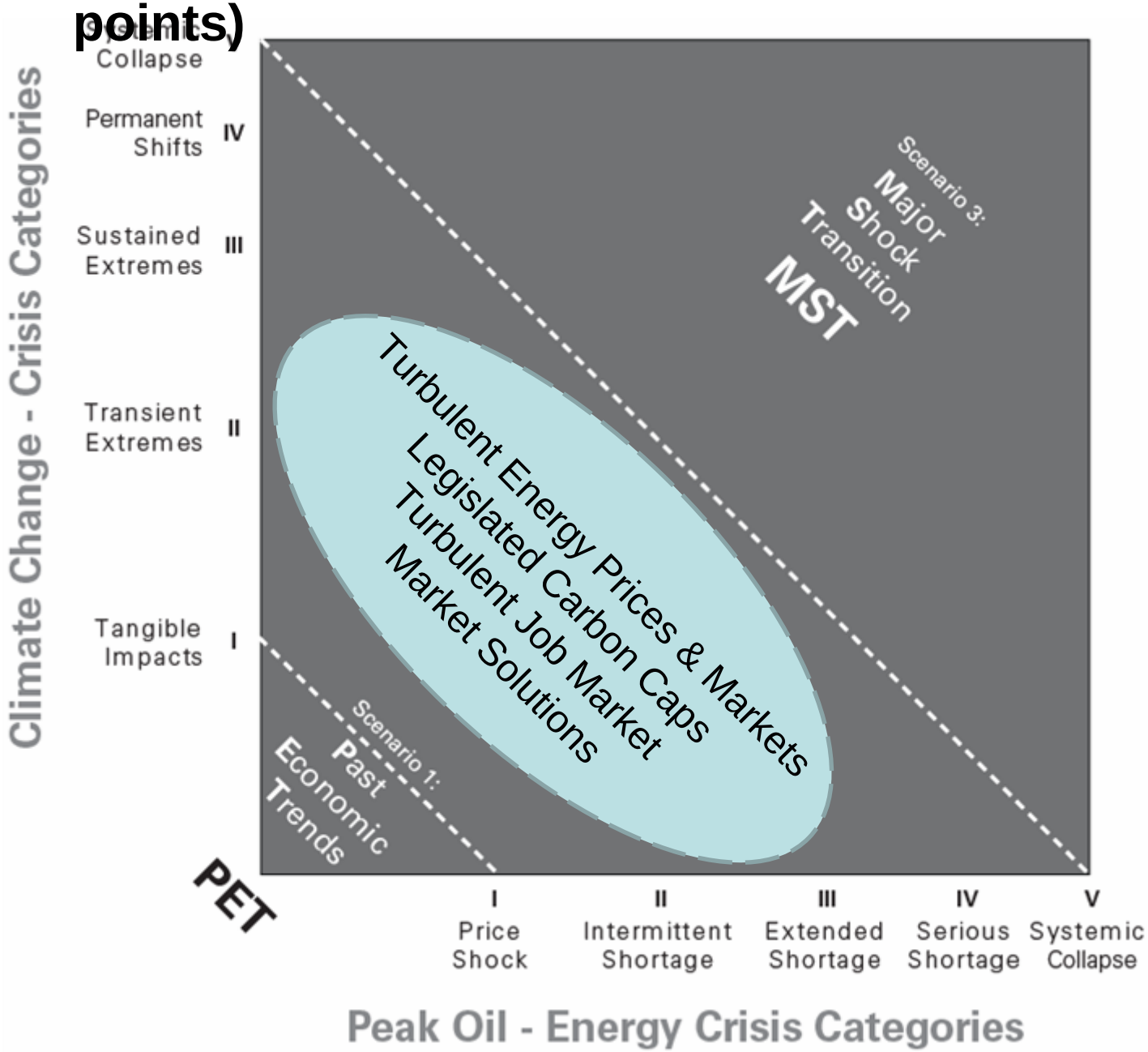

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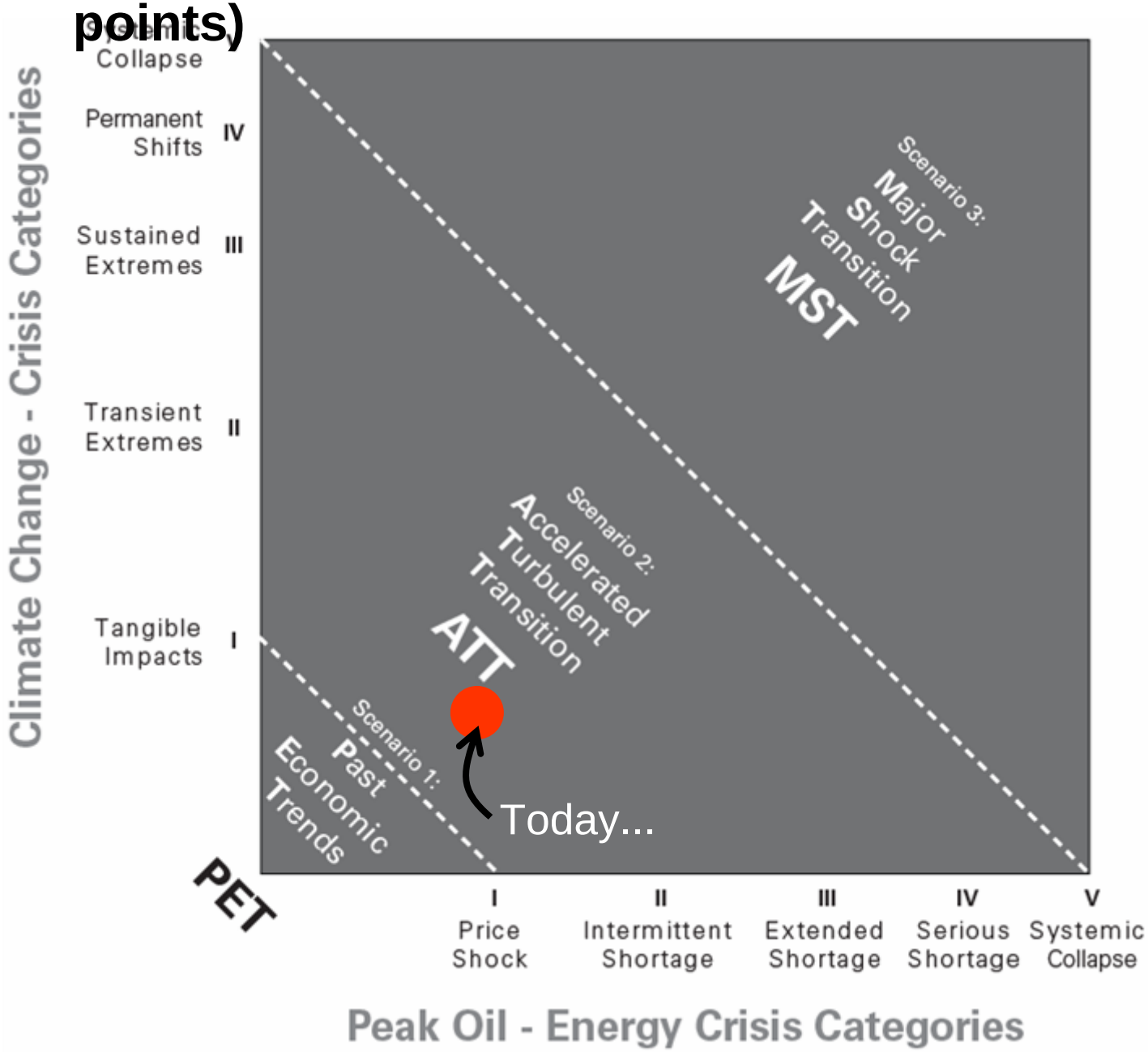

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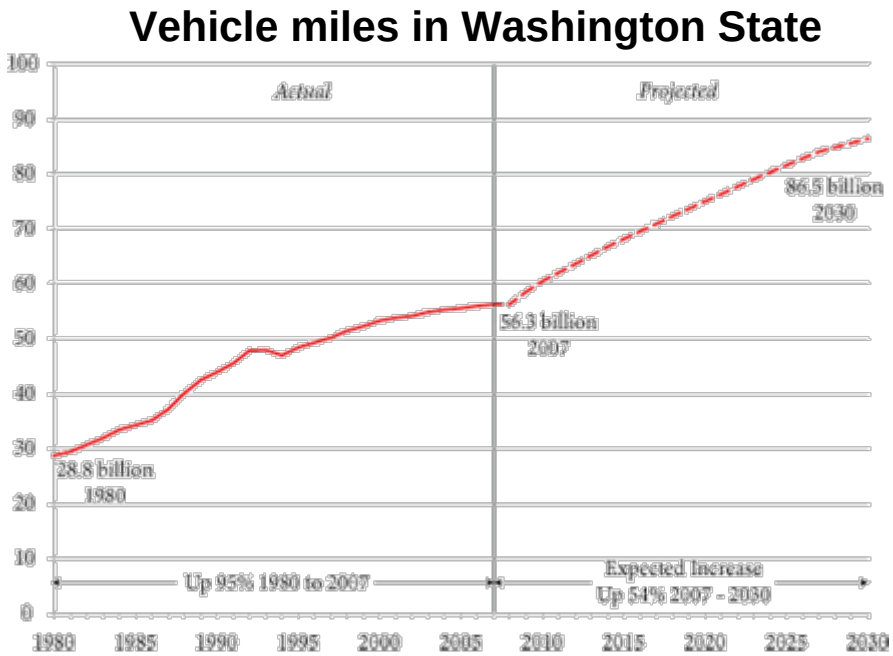
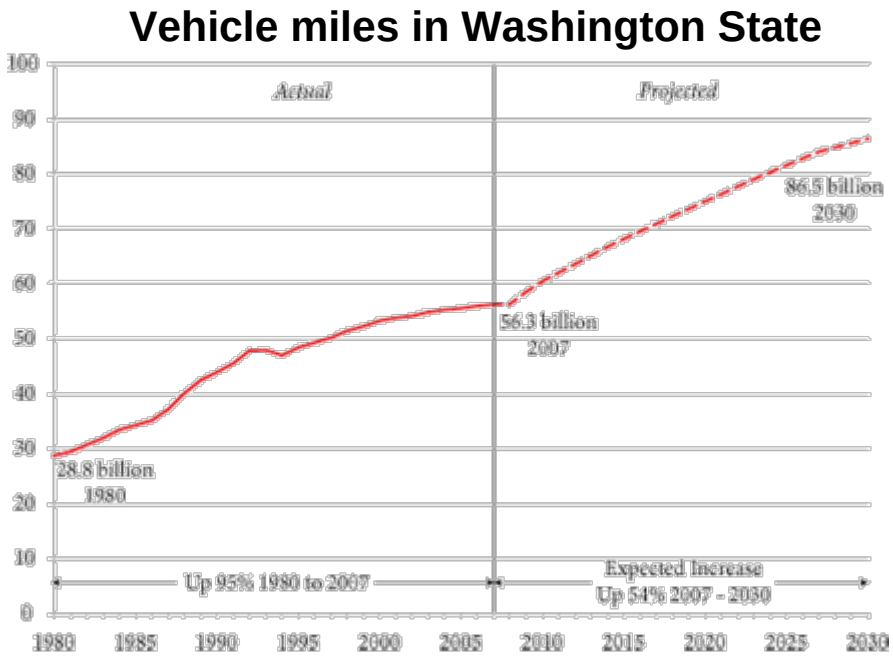


Buried within every infrastructure planning organization are charts like this one....

chart source = sightline.org

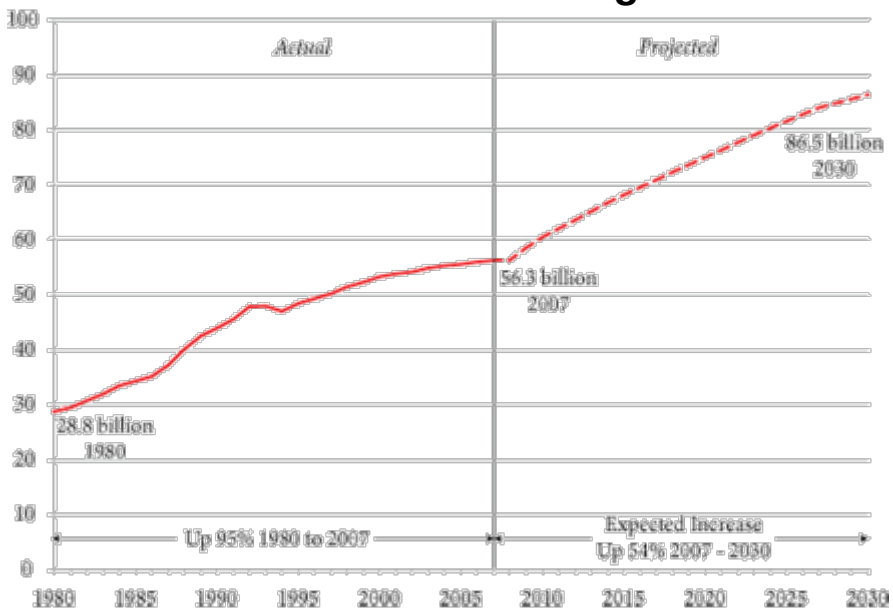


Buried within every infrastructure planning organization are charts like this one....

...they are developed by economists to predict the future demand for infrastructure such as highways.

chart source = sightline.org

Vehicle miles in Washington State



The Past - 1980 to 2007:

Up 95%

The Future - 2007 to 2030:

Up 54%

These projections are typically *extrapolations* of past trends...

chart source = sightline.org

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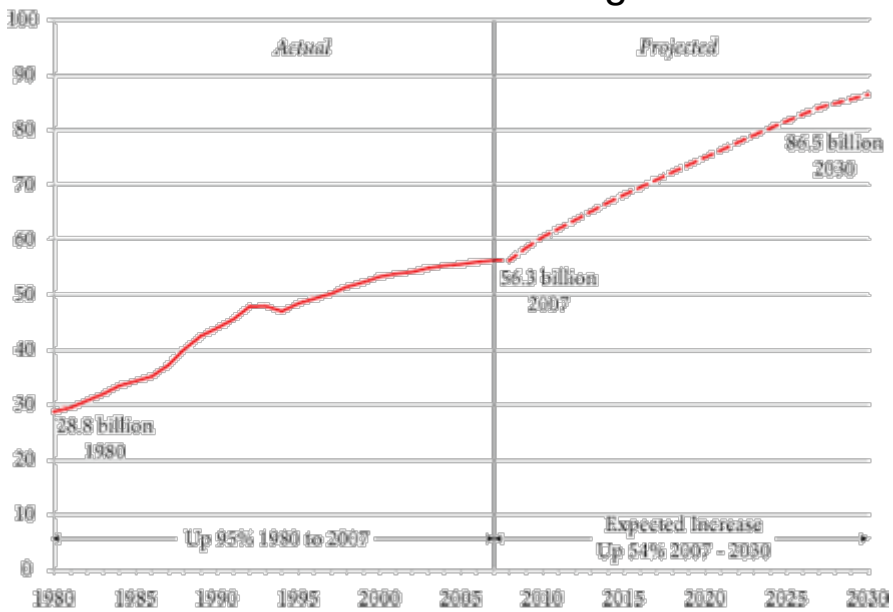

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These projections are typically *extrapolations* of past trends...

...and typically lead to 'more of the same'

chart source = sightline.org

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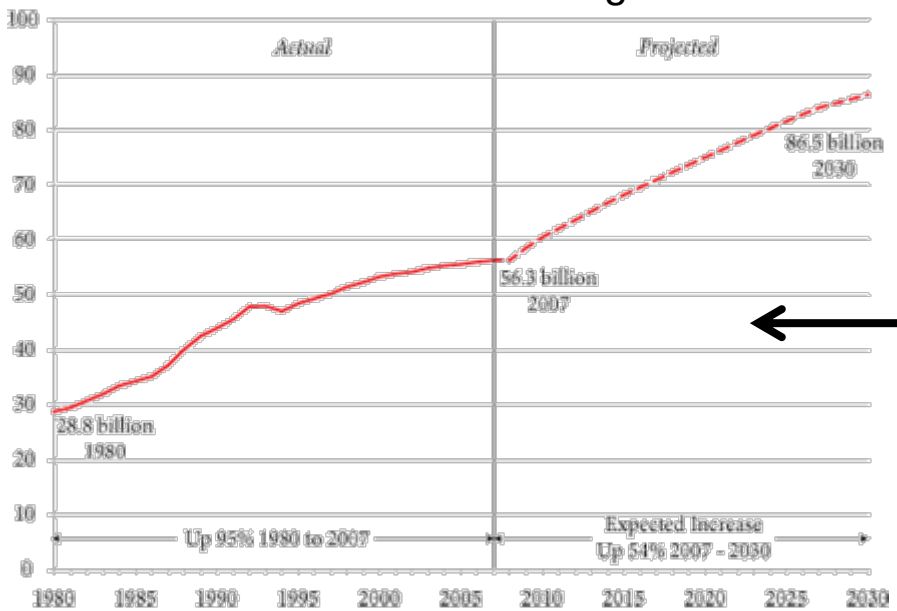


Posted by Stacey W-H
04/22/2008 04:14 PM

"This model was used in Olympia when locals tried to convert a section of Old 99 from 4 lanes to 2, adding a center turn lane, bike lanes and pedestrian amenities.

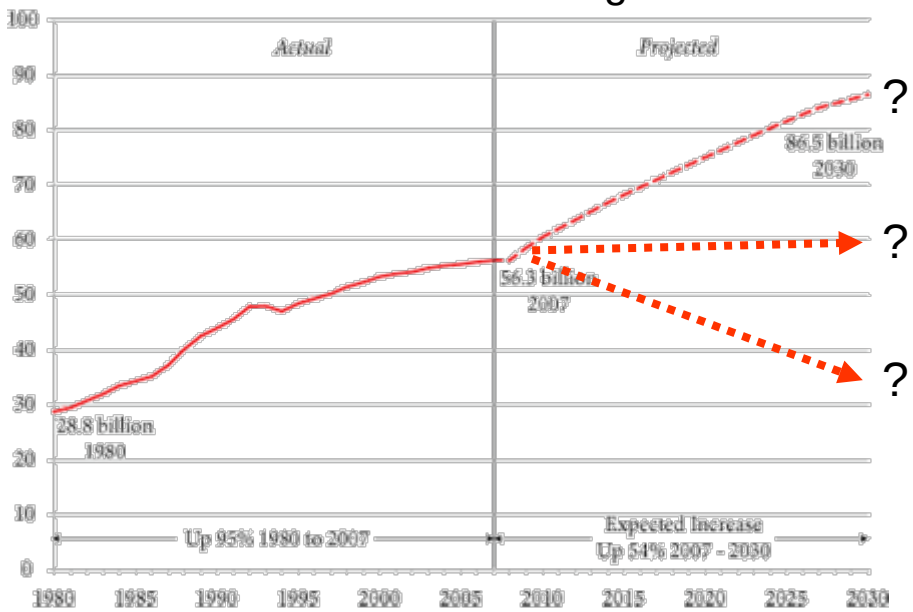
... the traffic engineers rejected the plan because the projections showed the road would eventually exceed capacity."

These projections are typically *extrapolations* of past trends...

...and are
***very difficult* to question**

chart source = sightline.org

Vehicle miles in Washington State



What if the future is different than the past?

chart source = sightline.org

PLANETIZEN
THE PLANNING & DEVELOPMENT NETWORK

Airlines Desert Small Towns, Despite Costly Investments in Infrastructure

If you build it, will they come? Not in Hagerstown, Maryland, where airlines have left town despite a brand new runway.

"Earlier this decade, city officials in Hagerstown, Md., started making the case to build a longer runway at their airport to lure service by regional jets, instead of the turboprop planes that provided its only flights.

Several years and $61.4 million later, the city opened its concrete welcome mat, a new 7,000 foot runway, last November — two months after the airport lost scheduled air service altogether.

Despite its costly investment, a dogged marketing effort by local officials and even help from Congress, the airport has had no luck attracting a new carrier, as the industry struggles under soaring fuel prices.

"Could we pick a worse time to go out and get commercial service? Probably not,"

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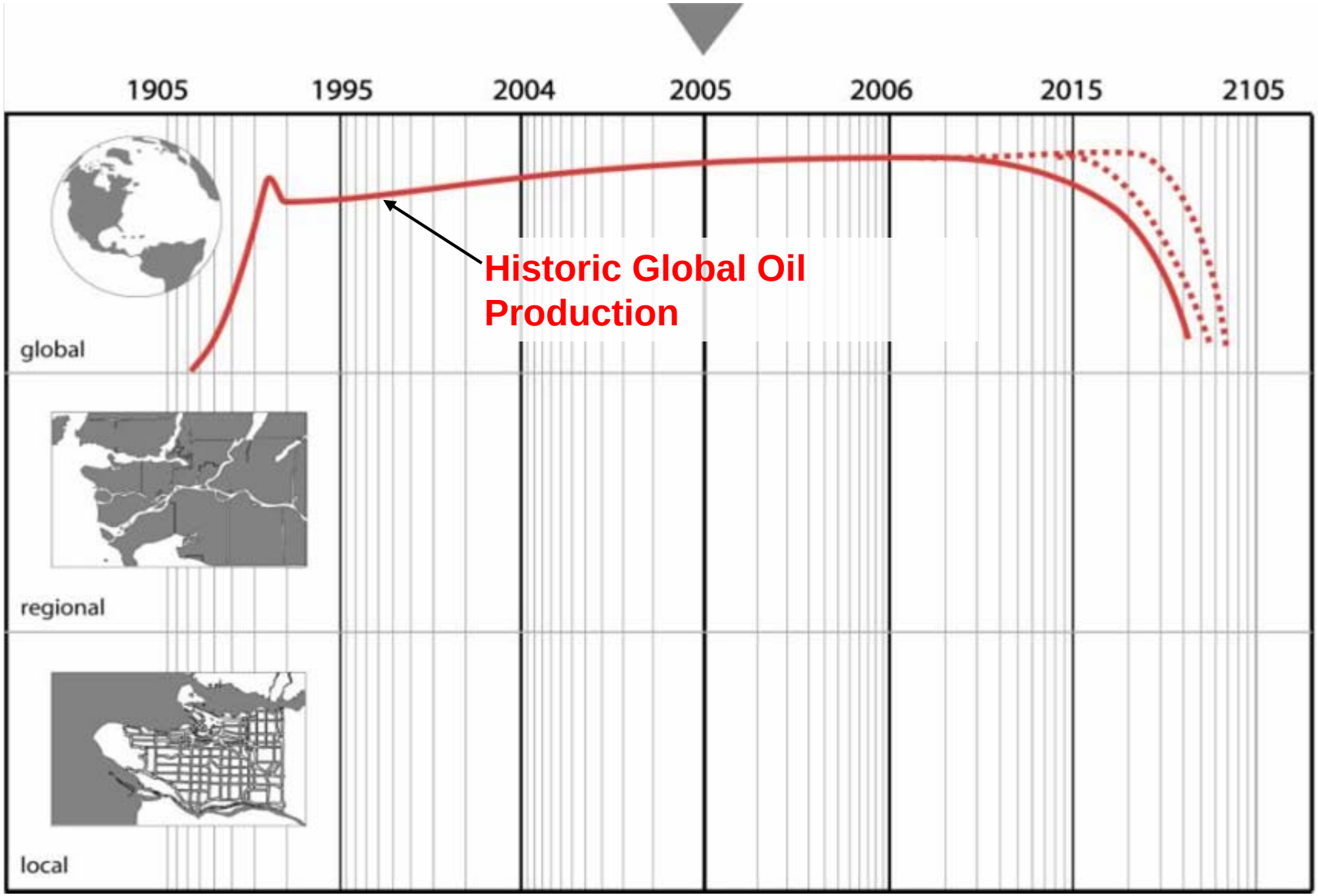
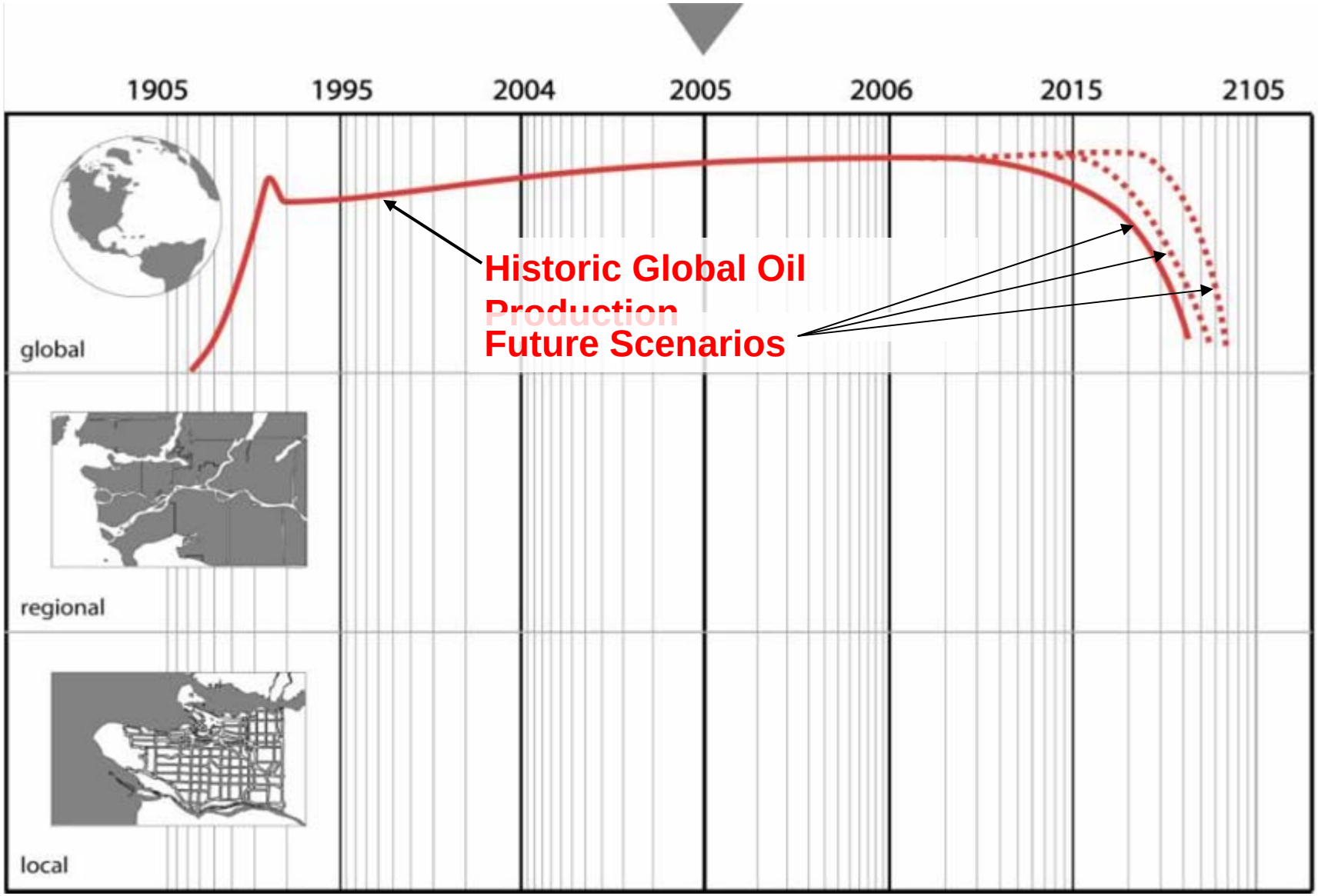
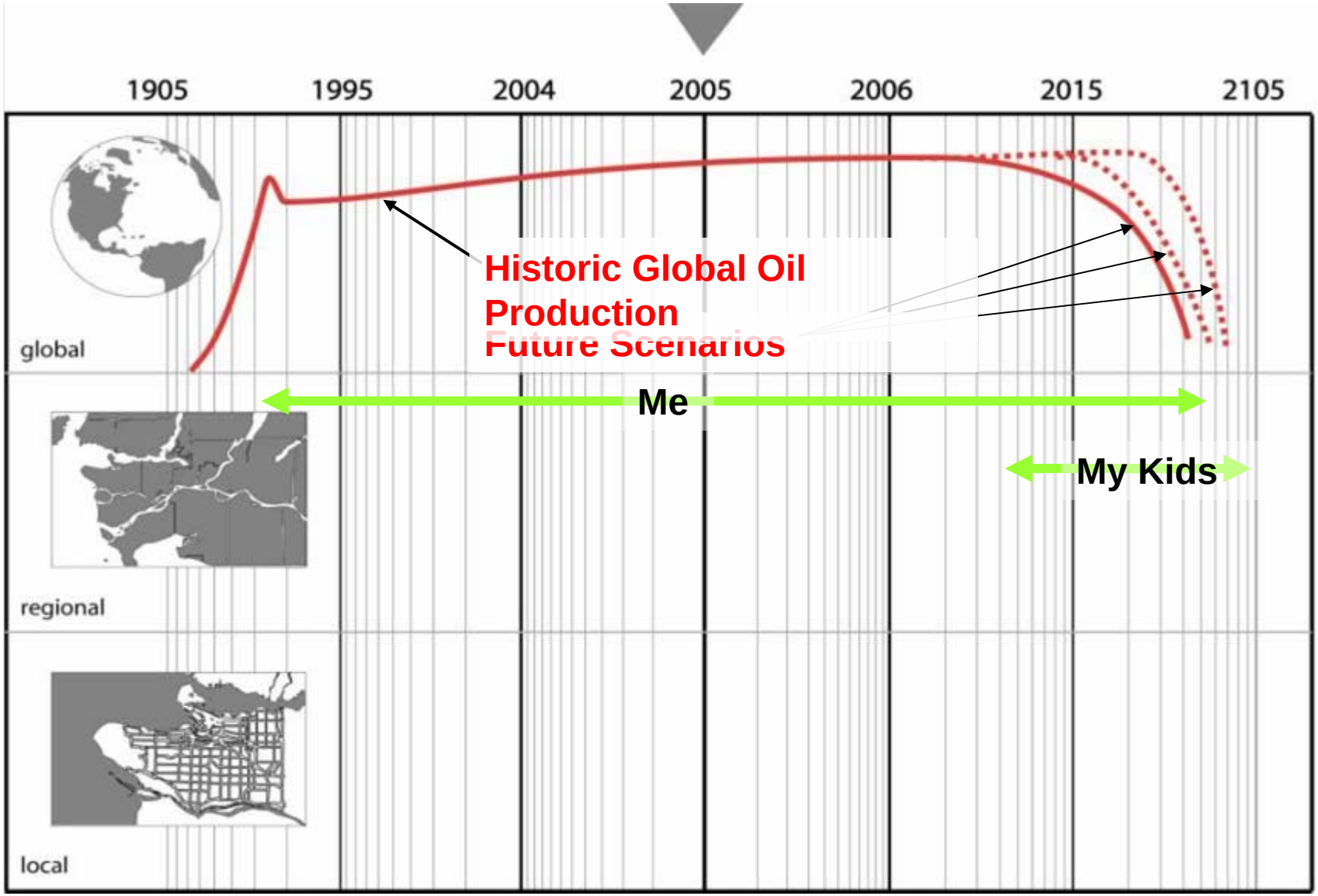
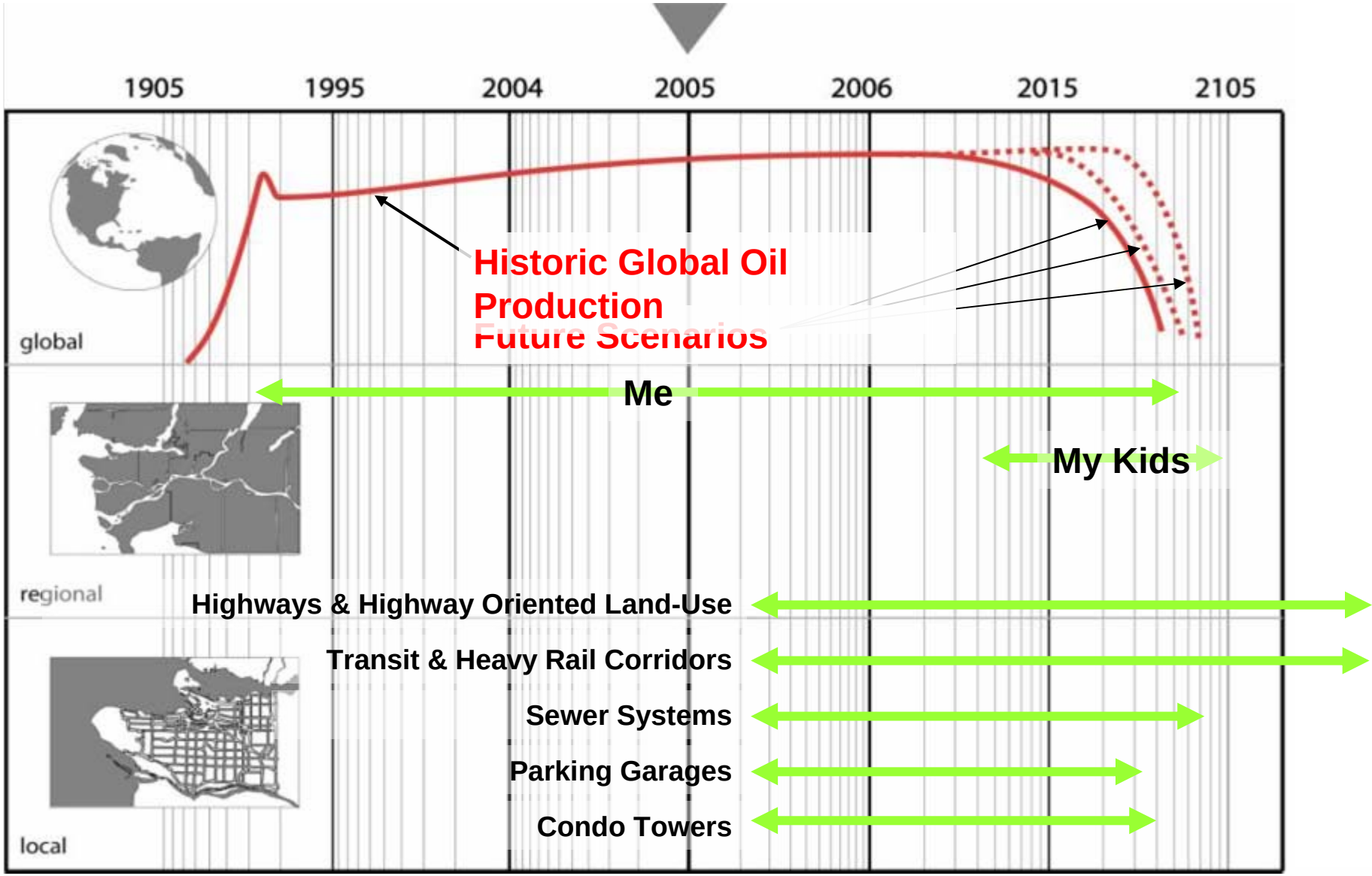
"Could we pick a worse time to go out and get commercial service? Probably not,"

This city spent $61m on a *stranded asset.*



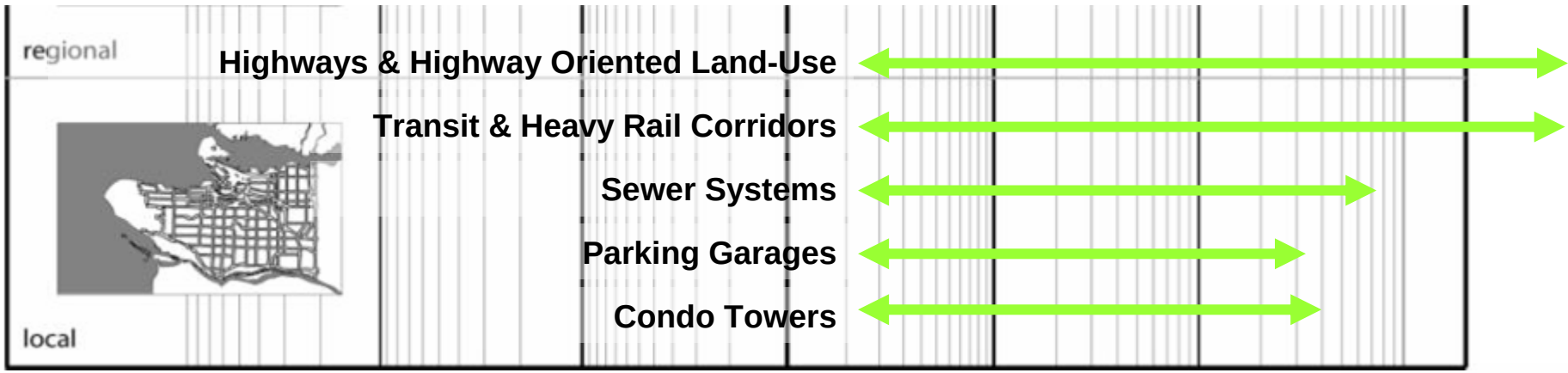




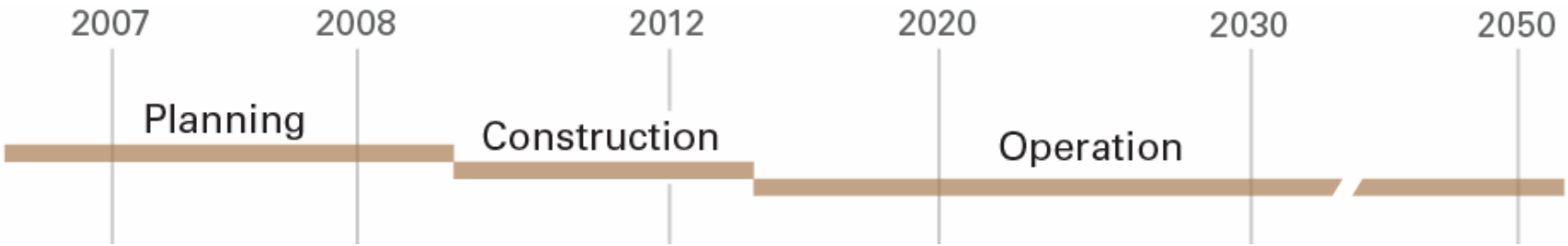


The infrastructure we're building today will be serving us in a post-oil, climate constrained future.

We need to use scenarios to test the value of our infrastructure investments
(and avoid building *stranded assets)*



Example: **Testing an Investment in Highway Expansion**



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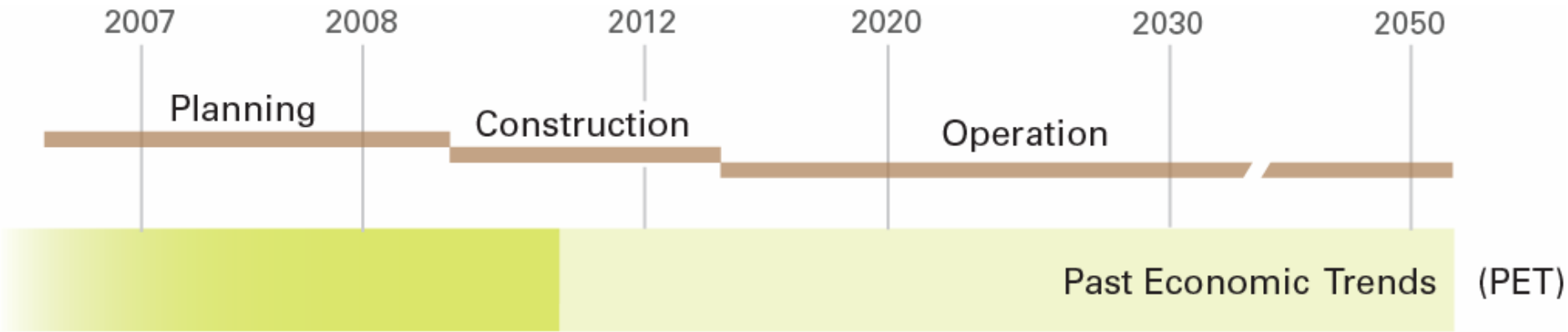


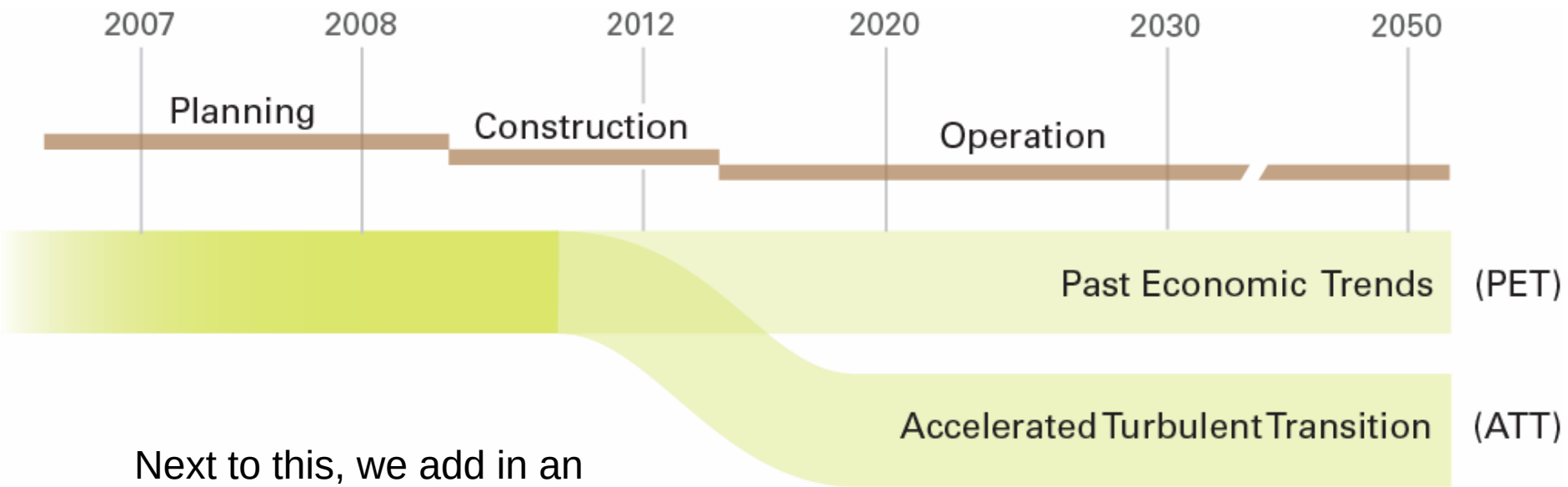
This economic projection is being used as a justification for a major highway expansion project in British Columbia.

We'll label this the PET scenario. →

Fast Fact The BC Trucking Association estimates trucks are stopped or slowed in the Lower Mainland 75% of the time – and truck traffic is expected to rise by 50% by 2021

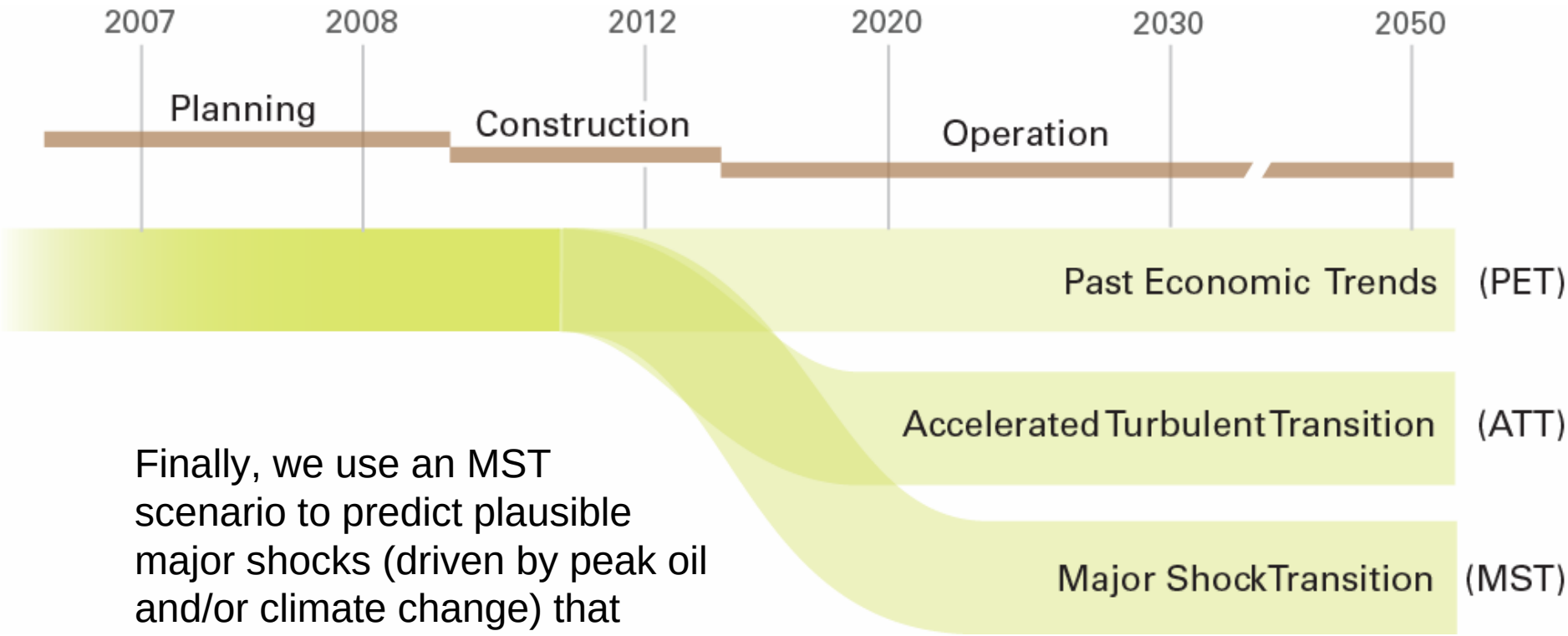
www.th.gov.bc.ca/gateway

Example: **Testing an Investment in Highway Expansion**



Next to this, we add in an ATT scenario which accounts for the impacts of rising energy prices and future climate legislation.

- Rising fuel and construction costs
- Intermittent fuel and power shortages
- Rapidly Expanding ‘Green Collar’ Sector
- Turbulent Stock Market
- Weird Weather



Finally, we use an MST scenario to predict plausible major shocks (driven by peak oil and/or climate change) that could significantly impact *what we're willing to do...*

- Carbon / Fuel Rationing
- Massive Refugee Influx
- Undulating Recessions
- Aging Infrastructure Breakdown

Truck Miles in 2021

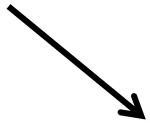
(PET) **+50%**

Fast Fact The BC Trucking Association estimates trucks are stopped or slowed in the Lower Mainland 75% of the time – and truck traffic is expected to rise by 50% by 2021

Now we can put these 3 projections side-by-side to test the resilience of our investment.

www.th.gov.bc.ca/gateway

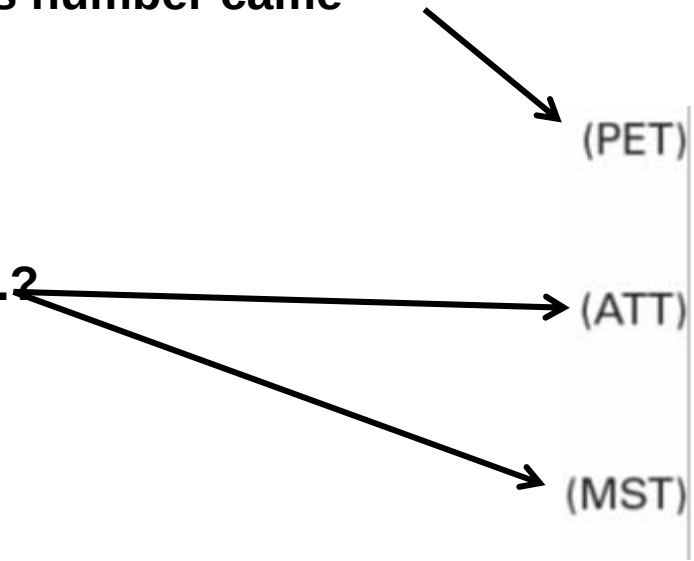
We know where this number came from...



	Truck Miles in 2021
(PET)	+50%
(ATT)	-10%
(MST)	-30%

We know where this number came from...

What about these ...?



Truck Miles in 2021

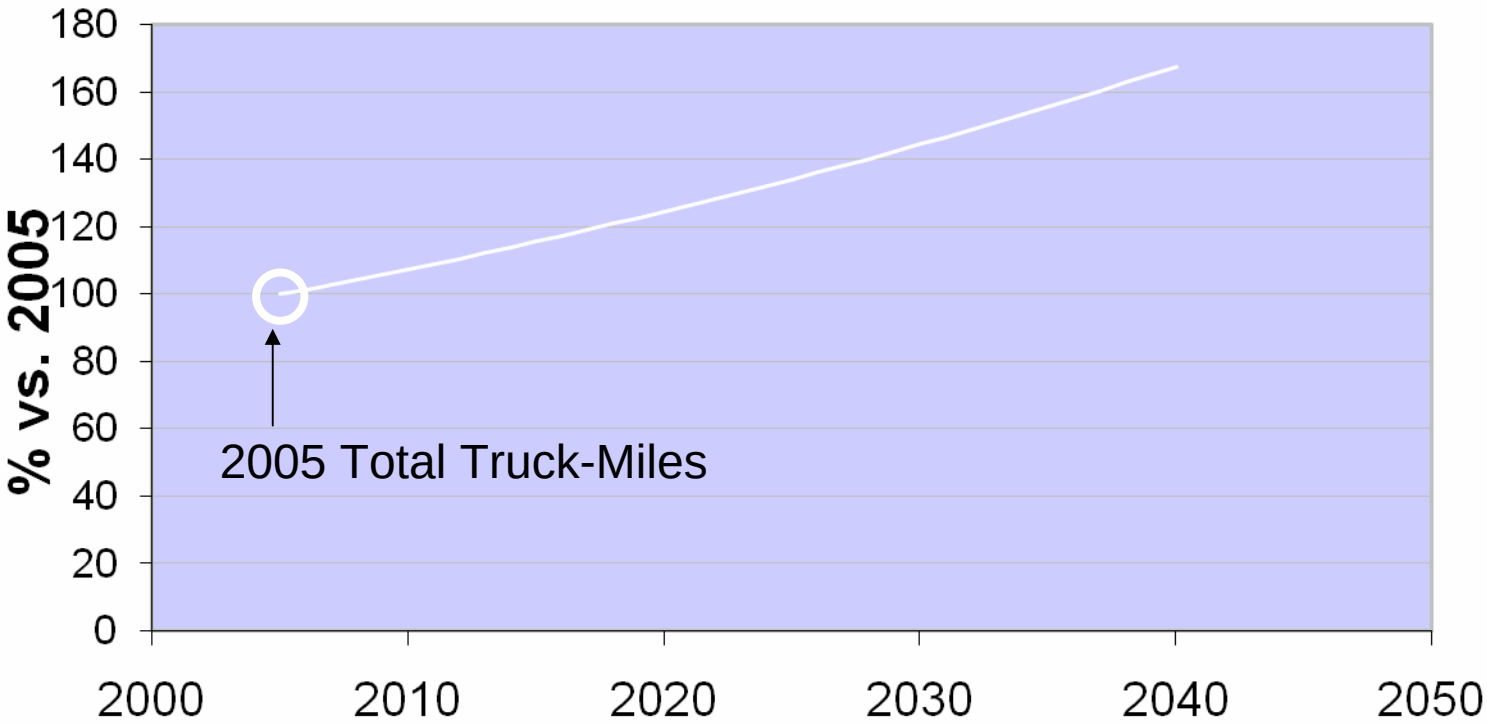
+50%

-10%

-30%

US & Canada:

ATT Scenario for Total Truck Miles



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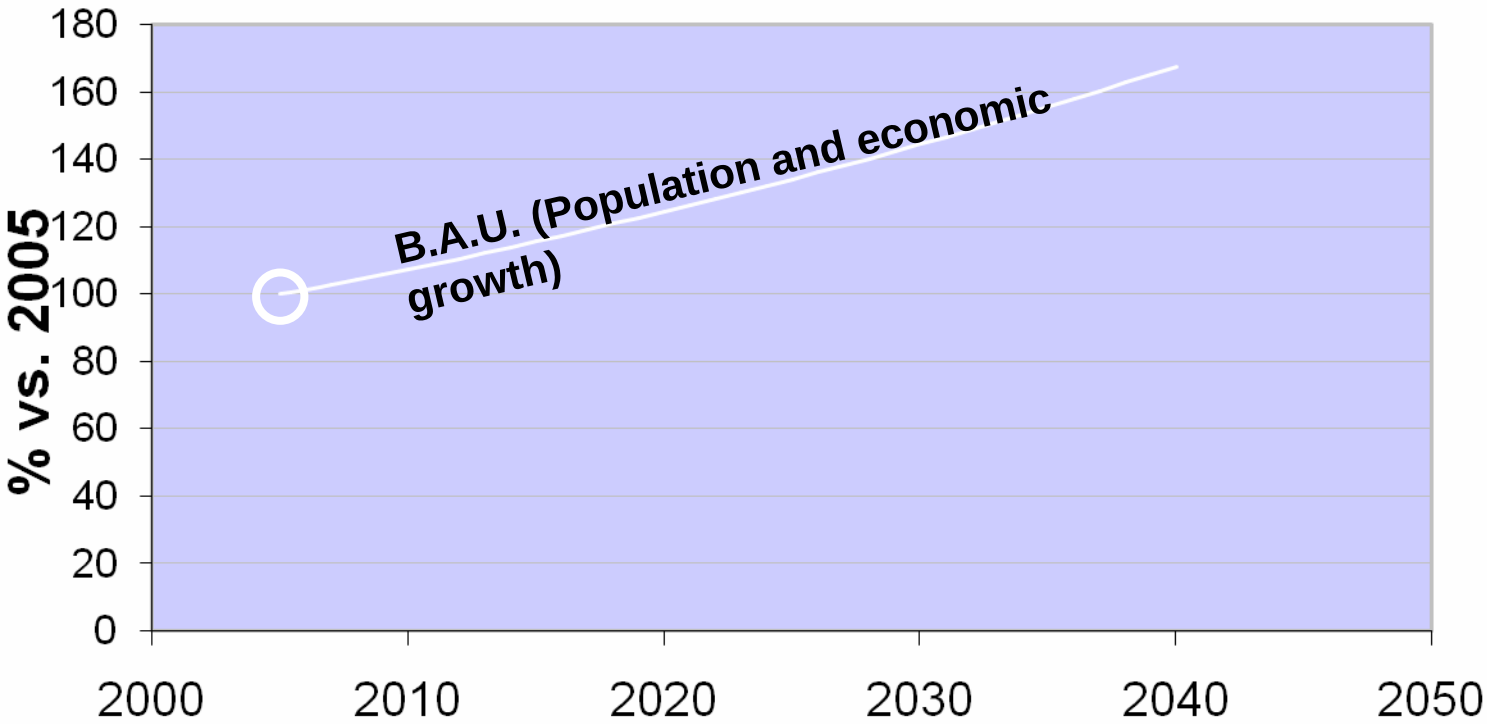

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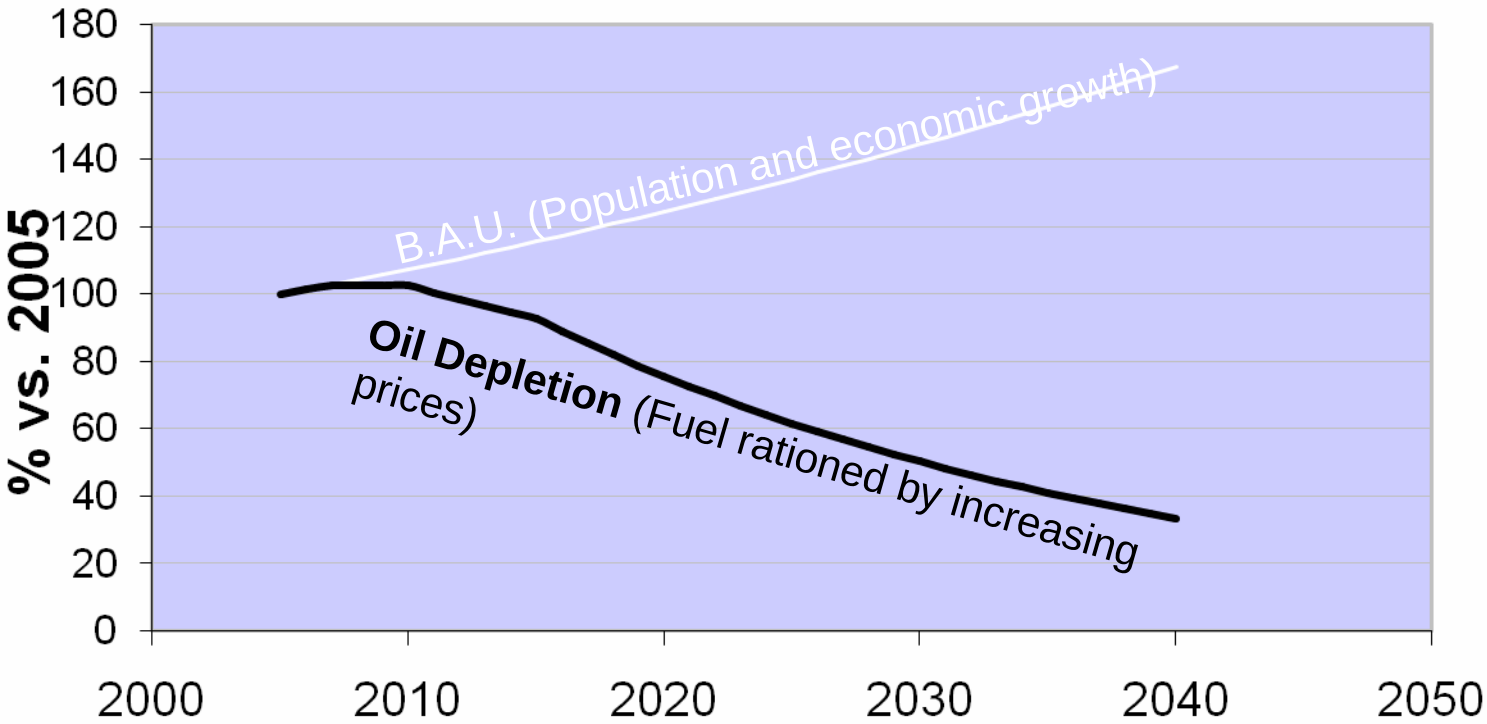

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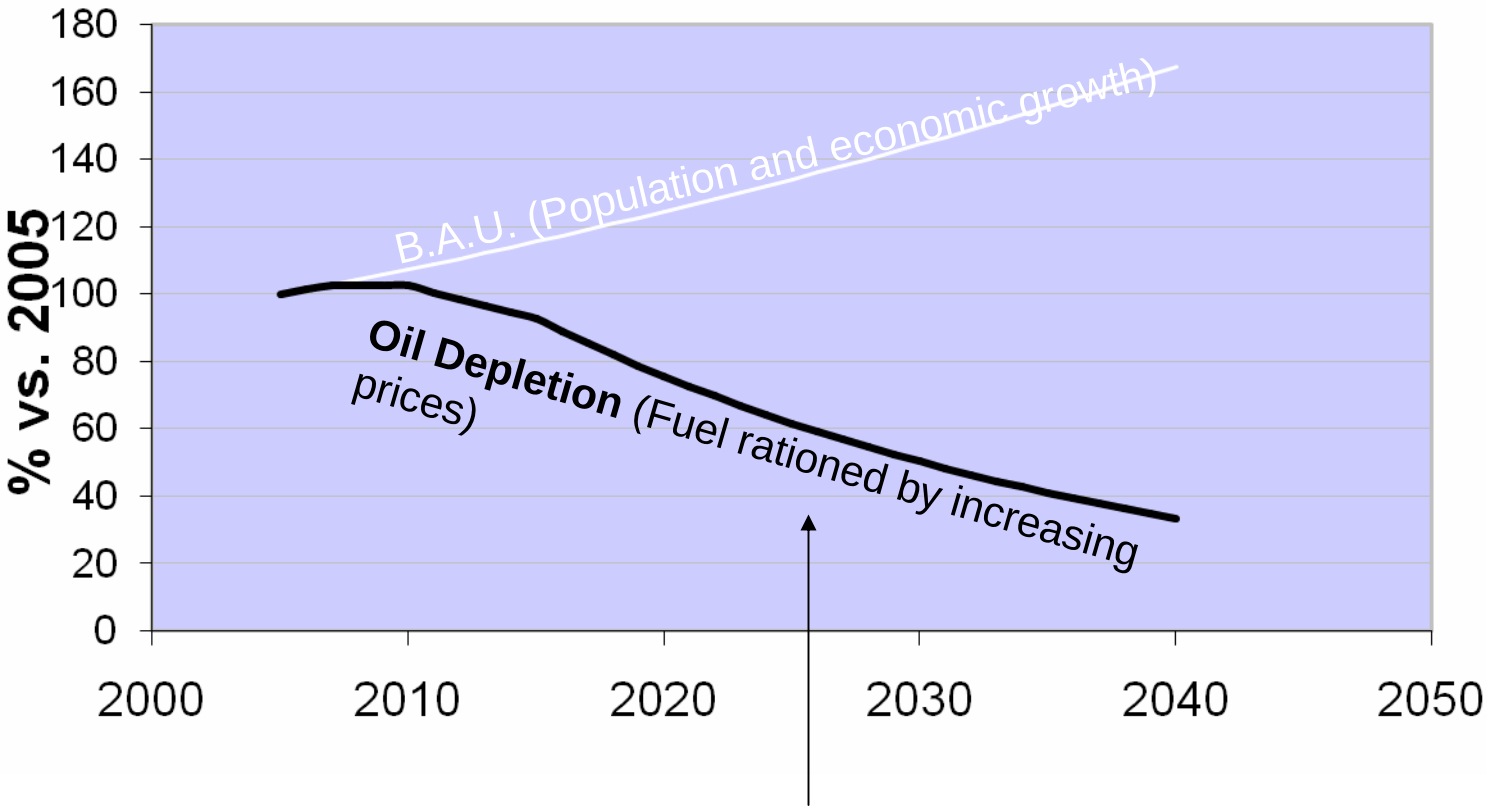
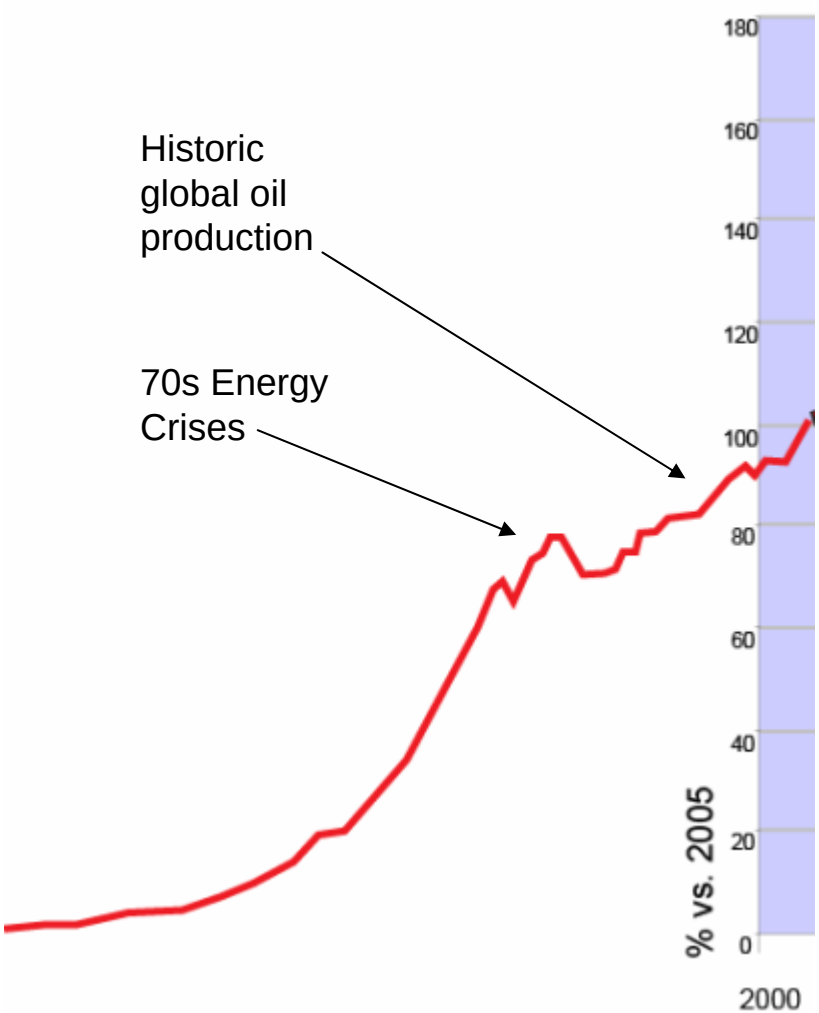


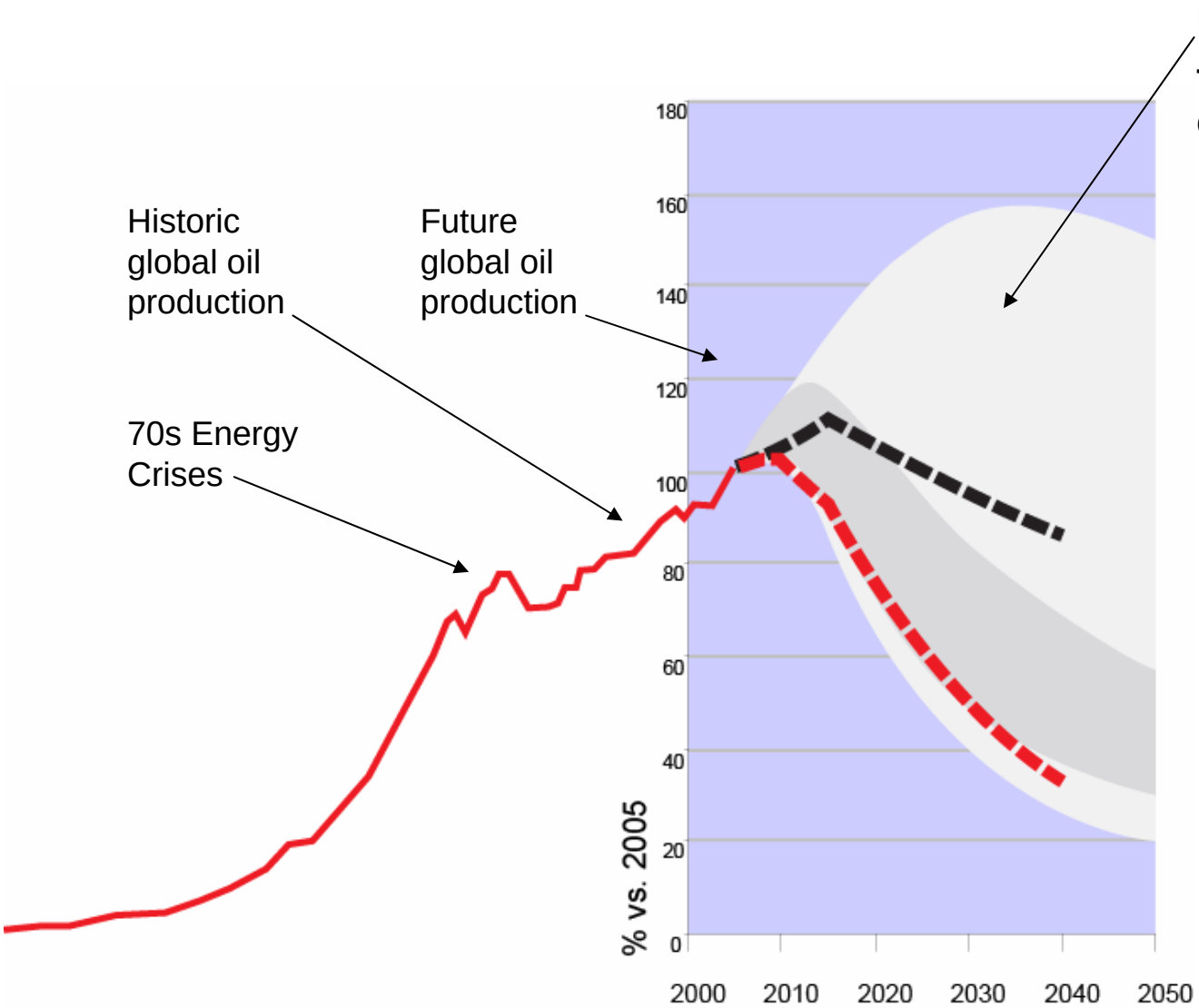
Where does this depletion curve come from?

DCP Oil Depletion Models



Peak Oil Analysis Papers:
http://dynamiccities.squarespace.com/files-documents/peak-oil-papers/

DCP Oil Depletion Models



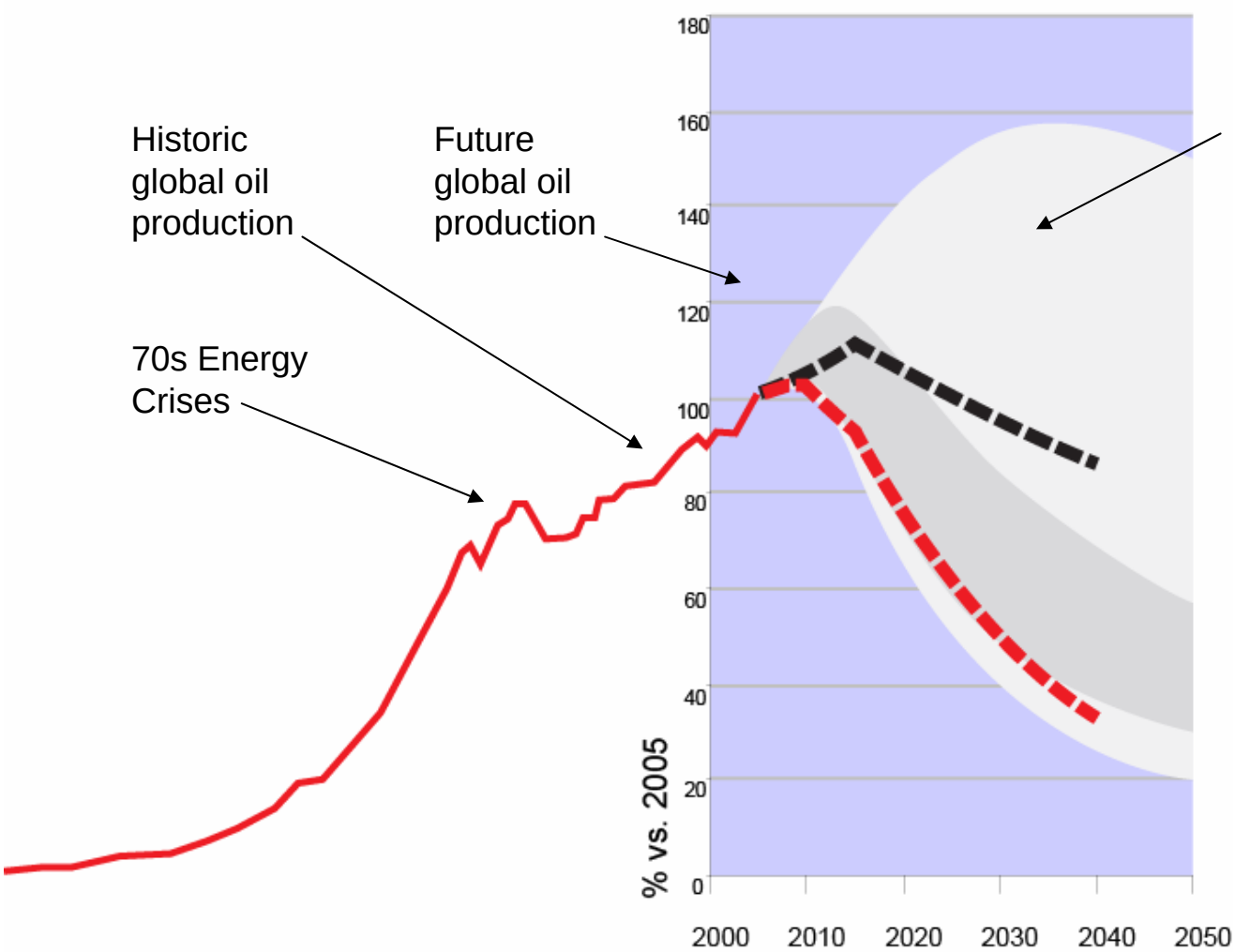
Peak Oil Analysis Papers:
http://dynamiccities.squarespace.com/files-documents/peak-oil-papers/

DCP Oil Depletion Models

Light Gray:

The wide range of depletion models.

Some are questionable...



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DCP Oil Depletion Models

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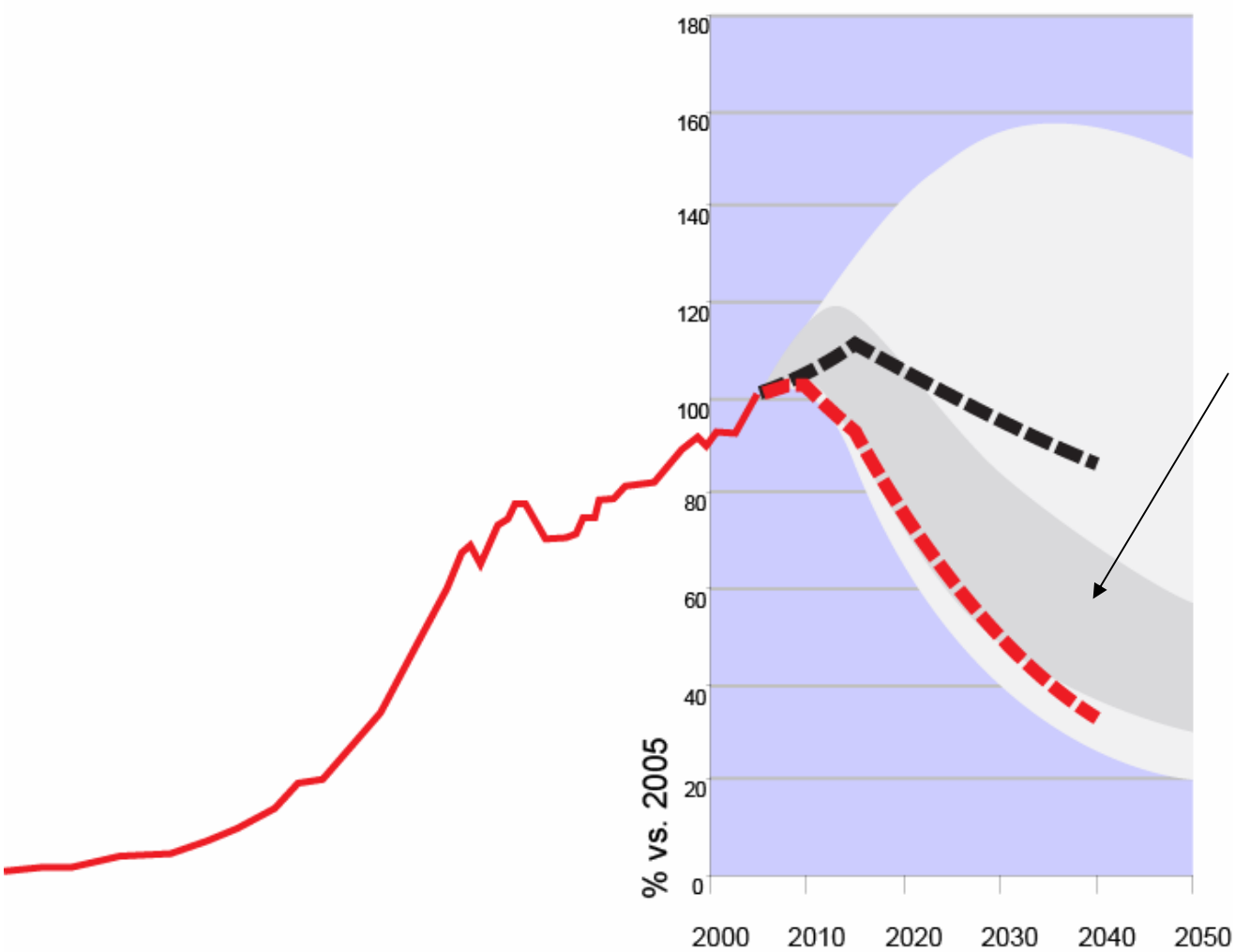


Darker Gray:

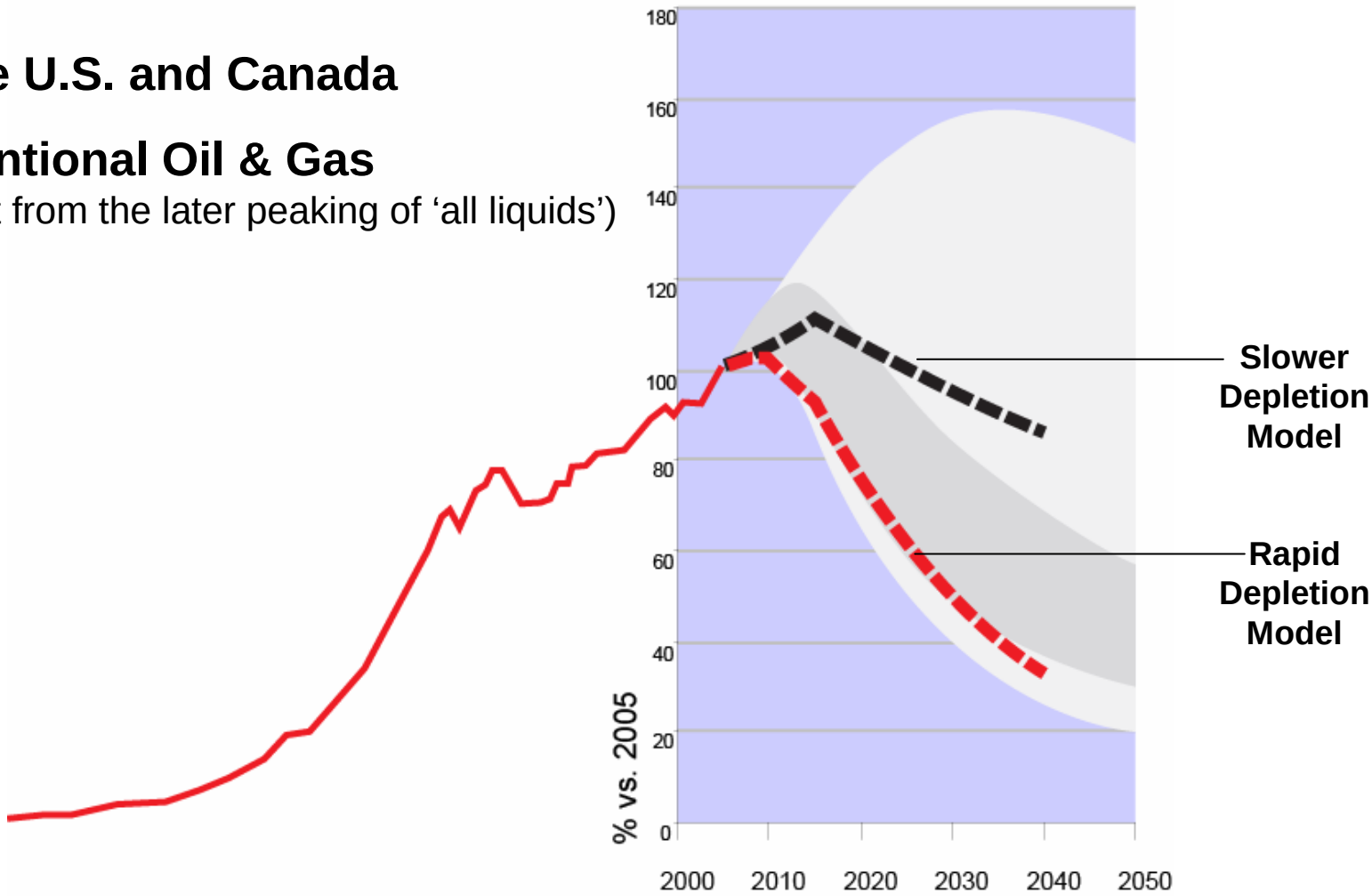
Depletion scenarios per peer reviewed peaking study (Robelius)

"Giant Oilfields and Future Production"
(3.3M) [2007] Frederik Robelius. phD Thesis, University of Uppsala.
http://dynamiccities.squarespace.com/files-documents/peak-oil-papers/GiantOilfields_and_Future_Production.pdf

DCP Oil Depletion Models

- **For the U.S. and Canada**
- **Conventional Oil & Gas**

(as distinct from the later peaking of 'all liquids')



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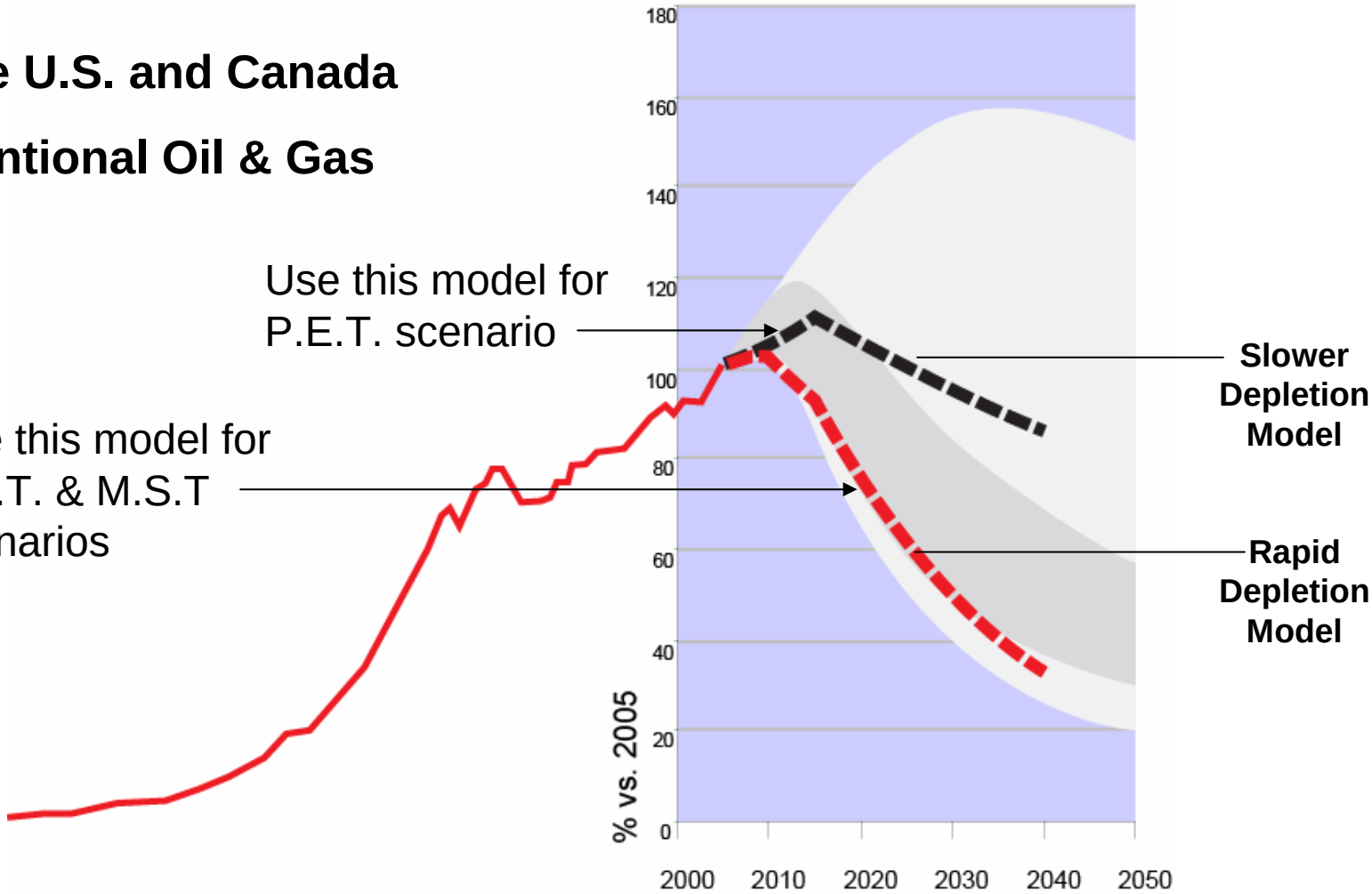

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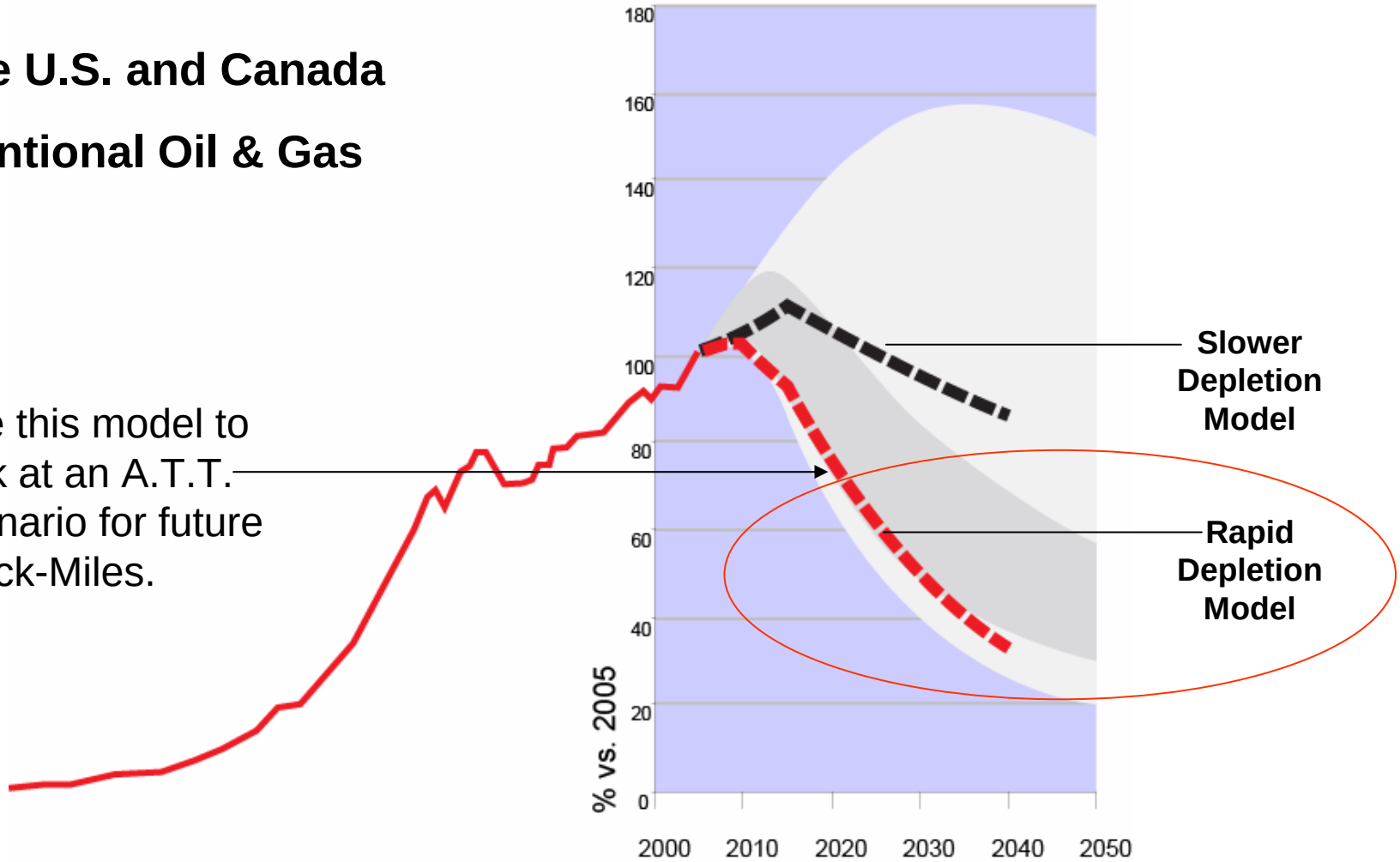
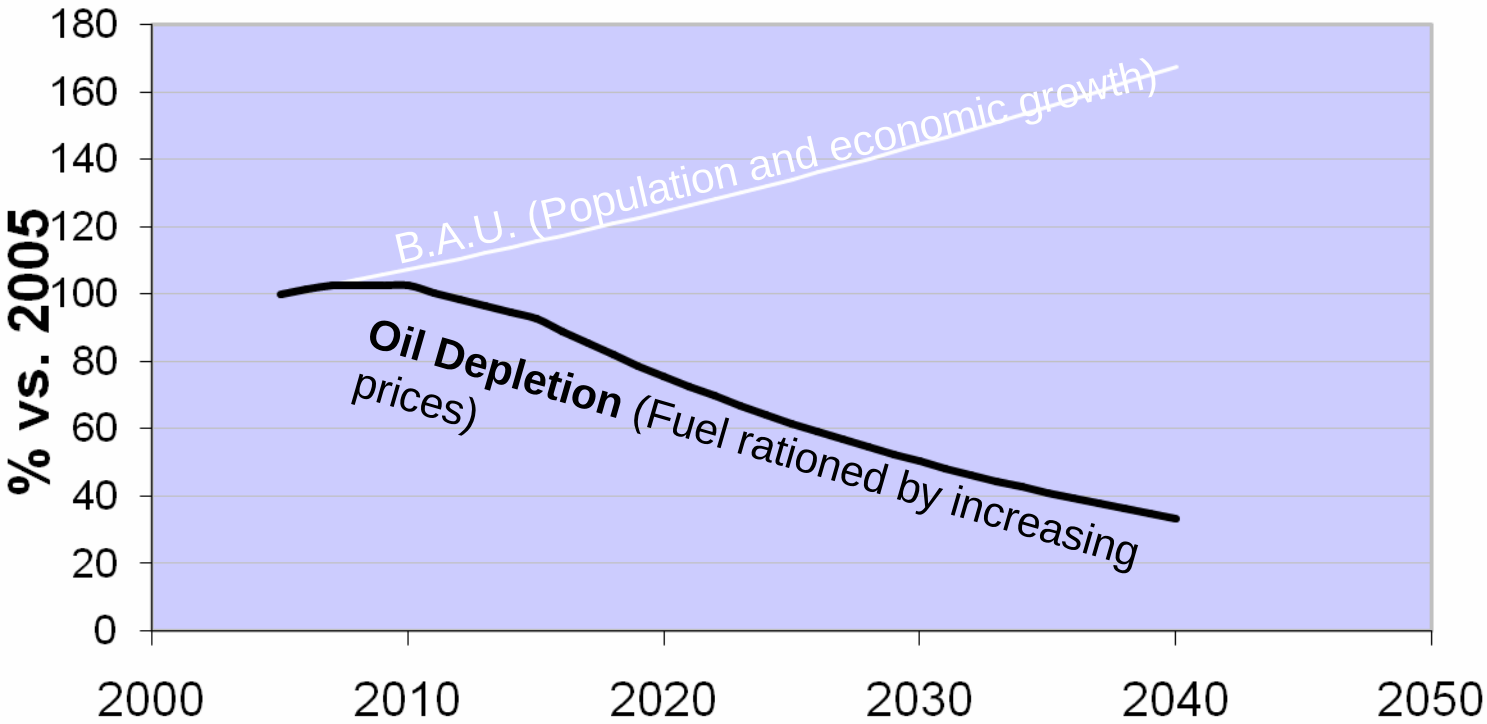


US & Canada:

ATT Scenario for Total Truck Miles



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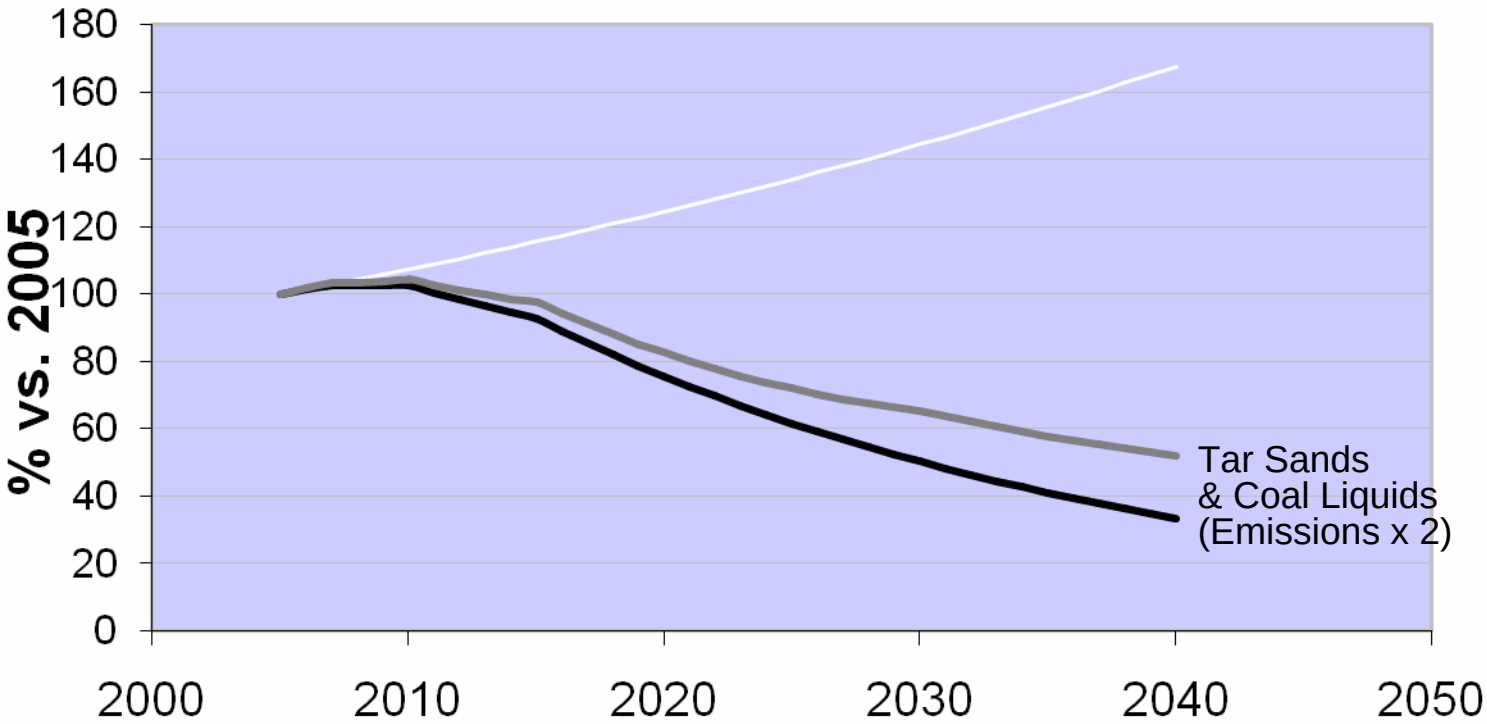

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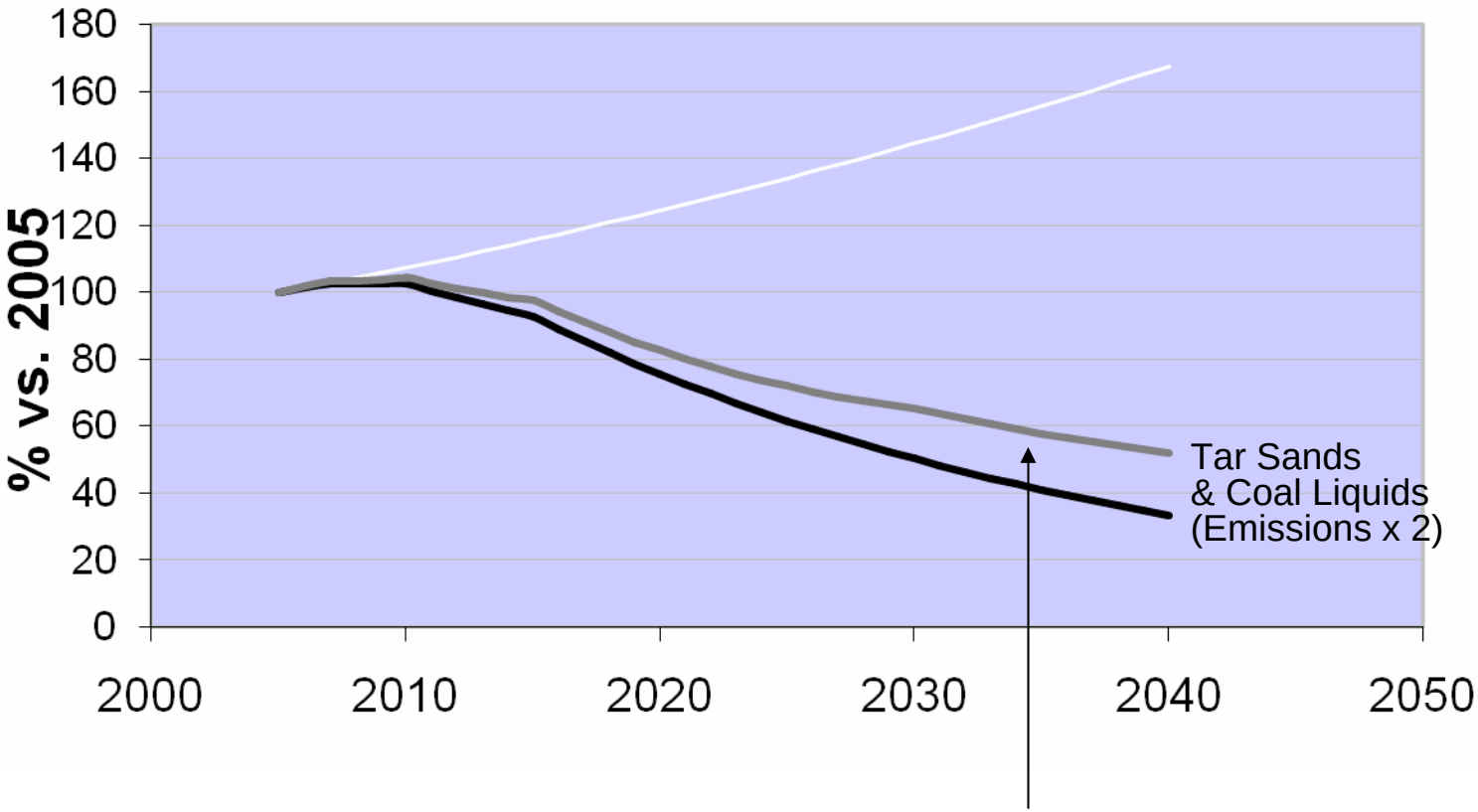

This is a mitigation ‘wedge’ showing how quickly a strategy or technology can scale-up.

US & Canada:

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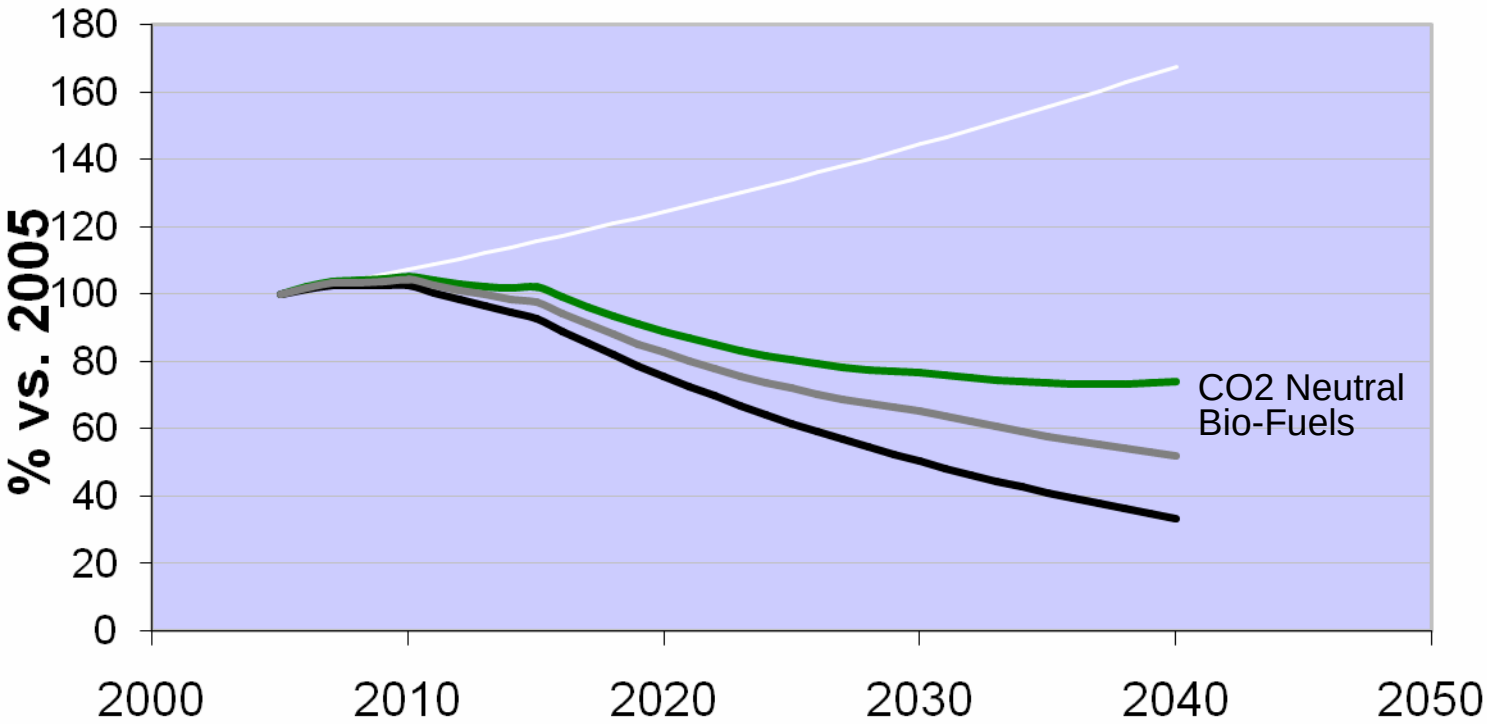

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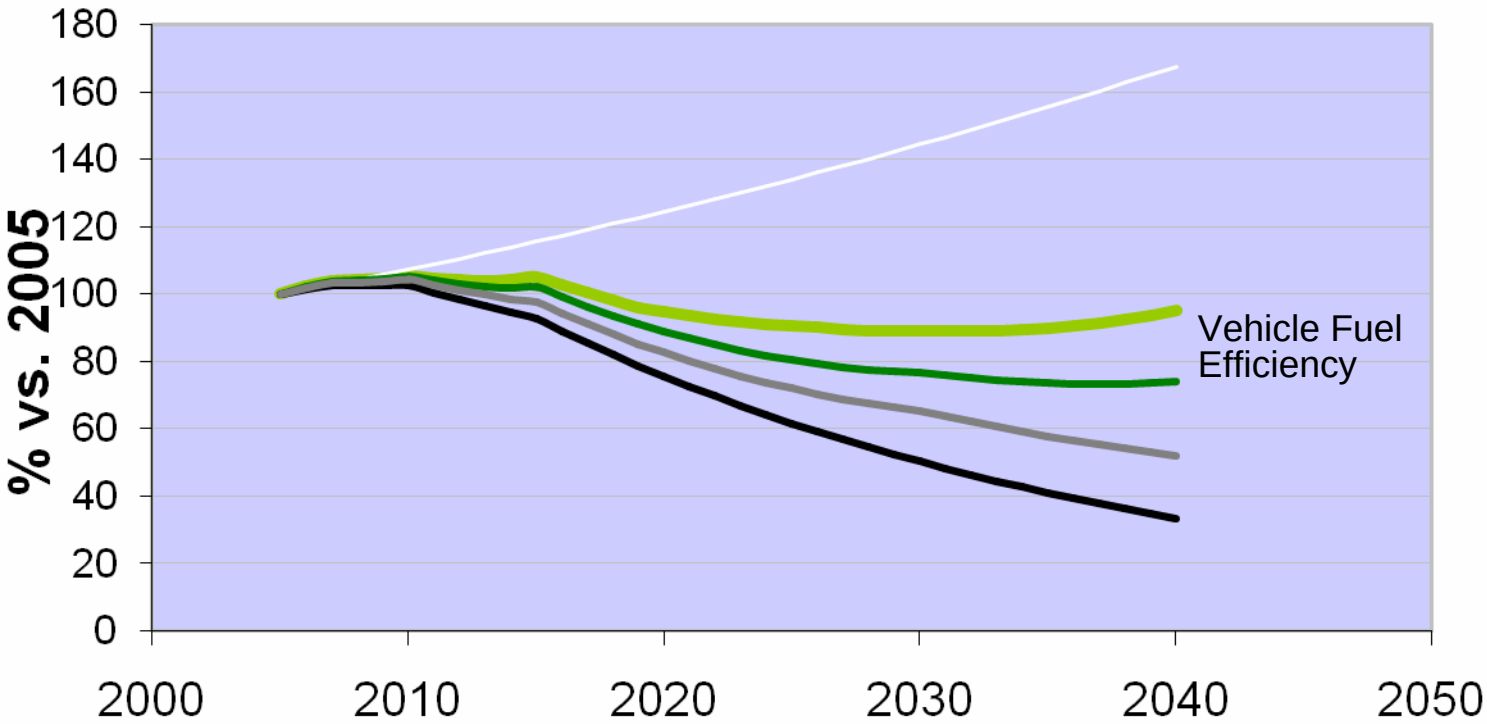

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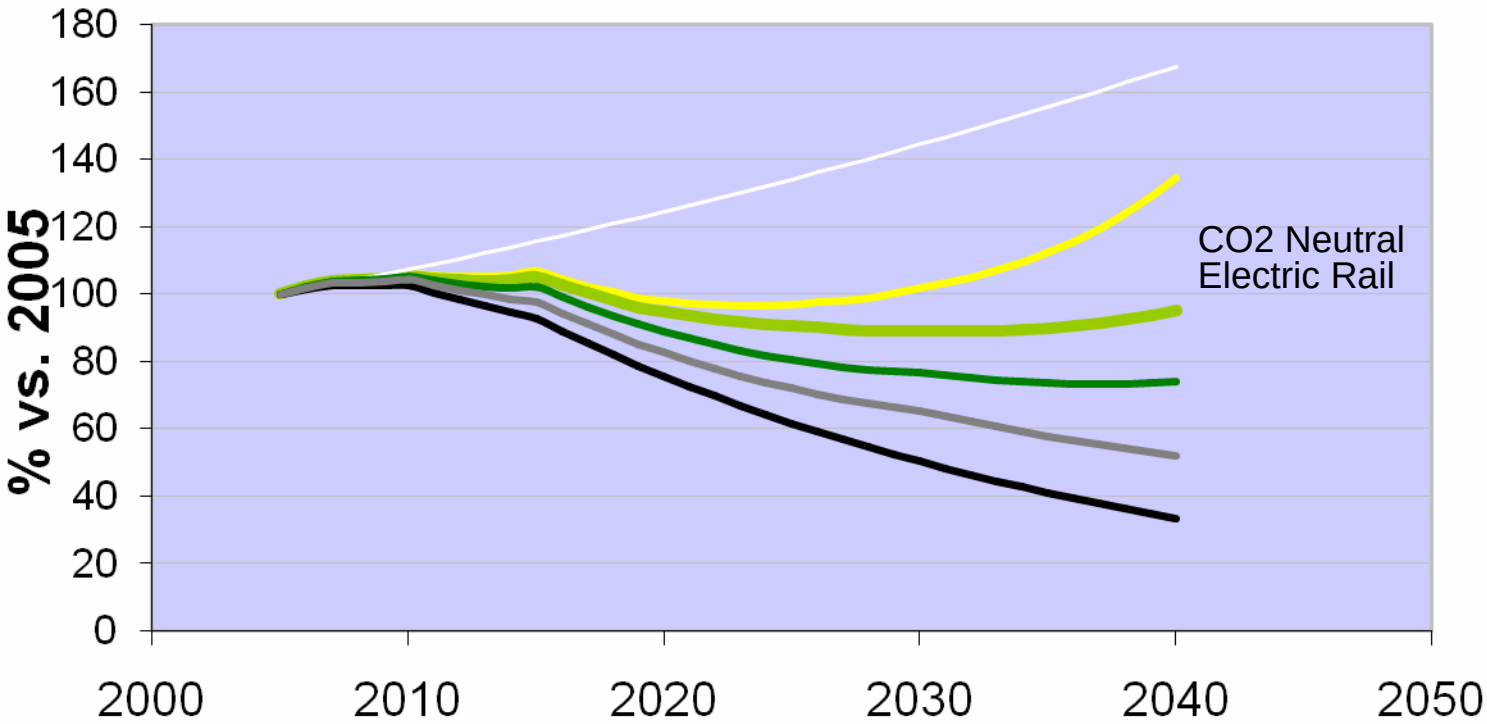

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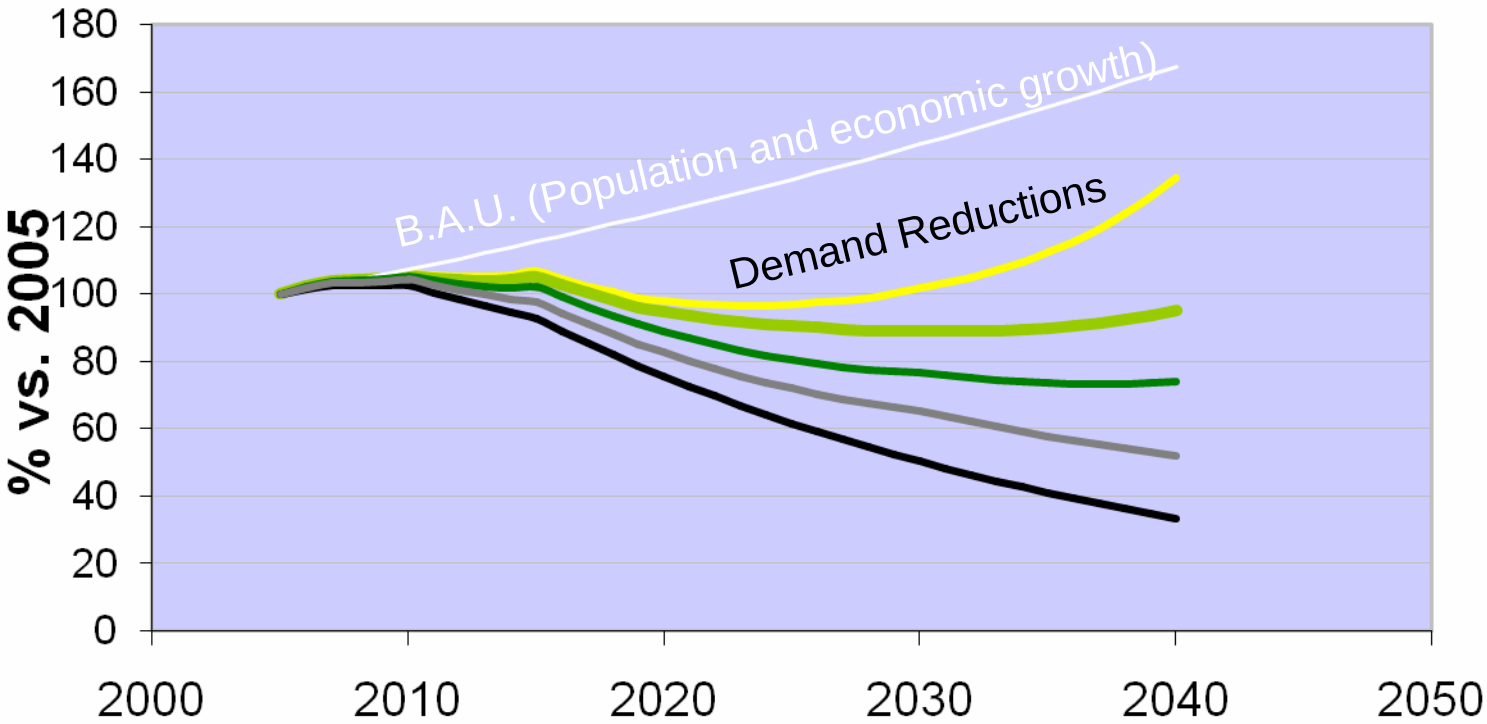

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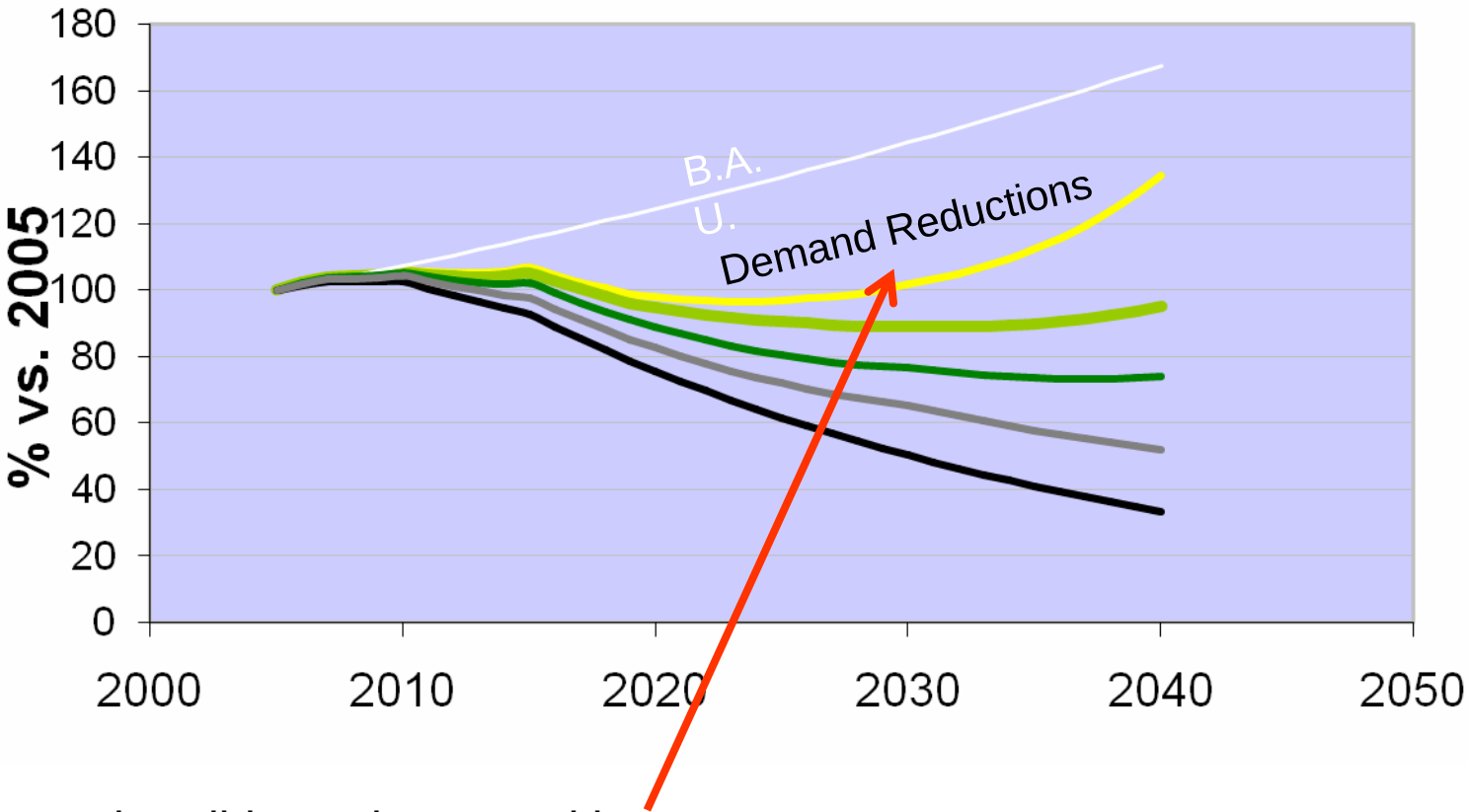

Buy Local, Build Local or Do Without...

US & Canada:
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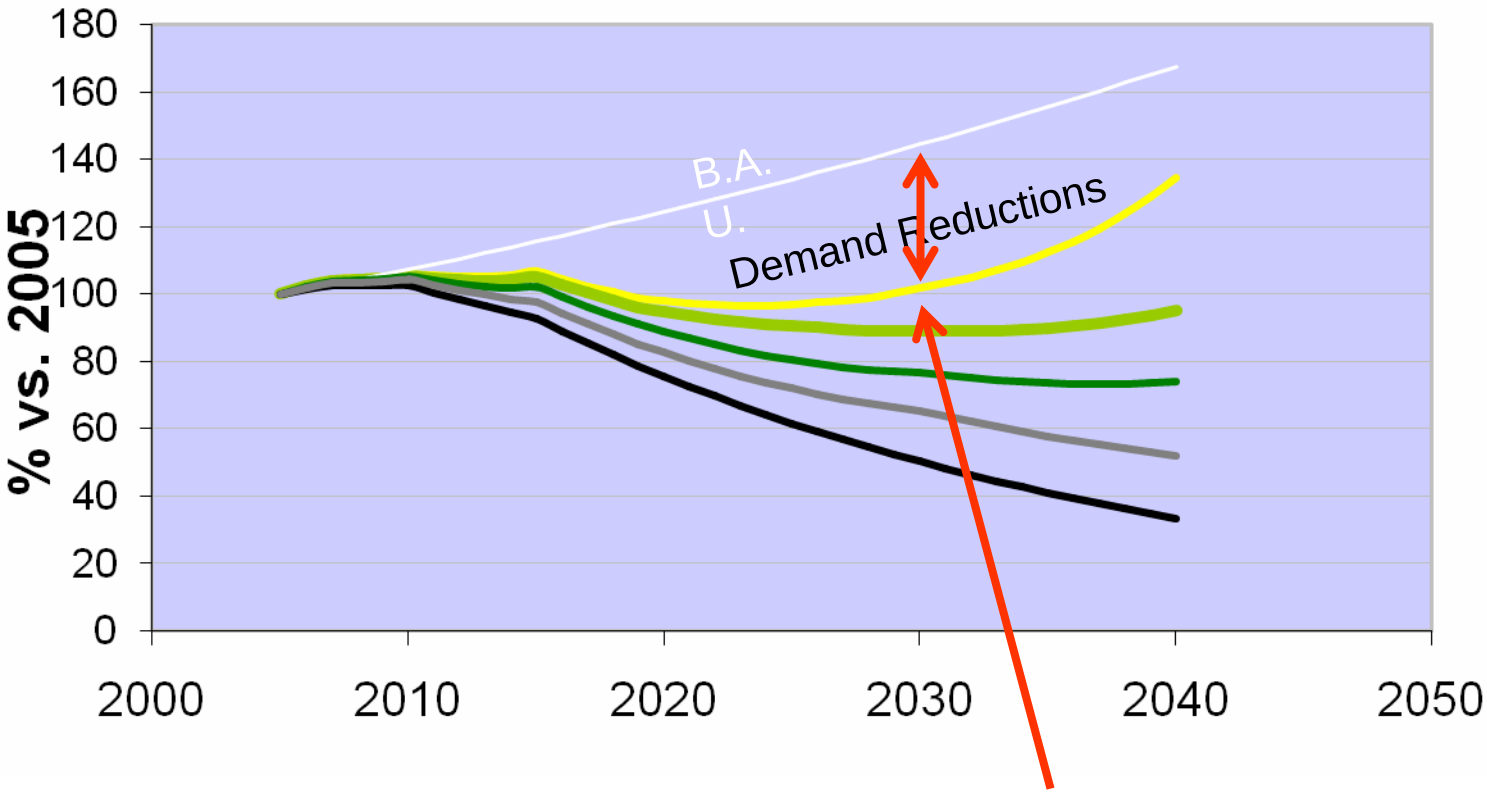

Buy Local, Build Local or Do Without...

2020-2030 = 'peak local'
local food, products etc...

US & Canada:

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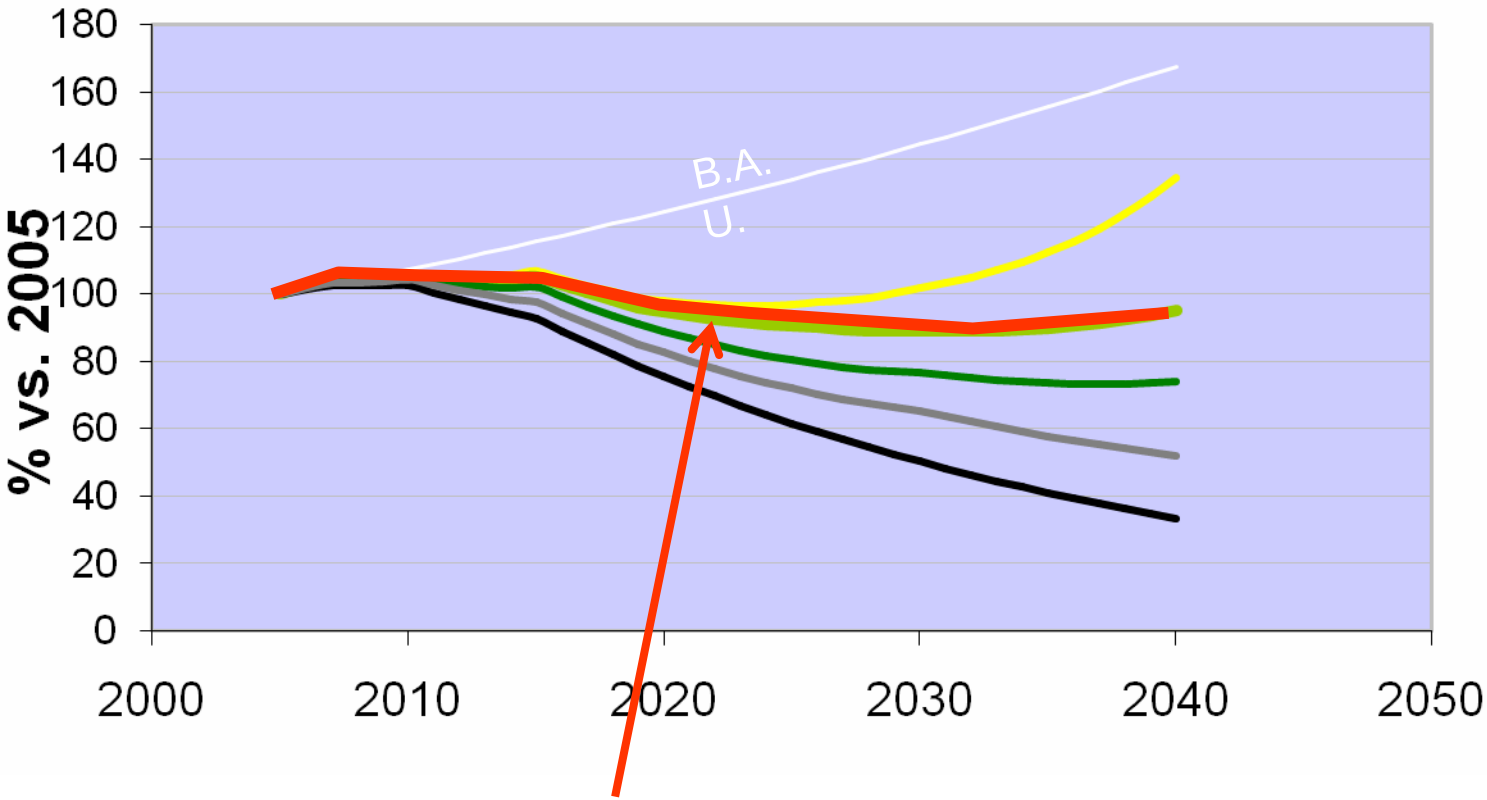

Road Capacity Required for Trucks:

US & Canada:

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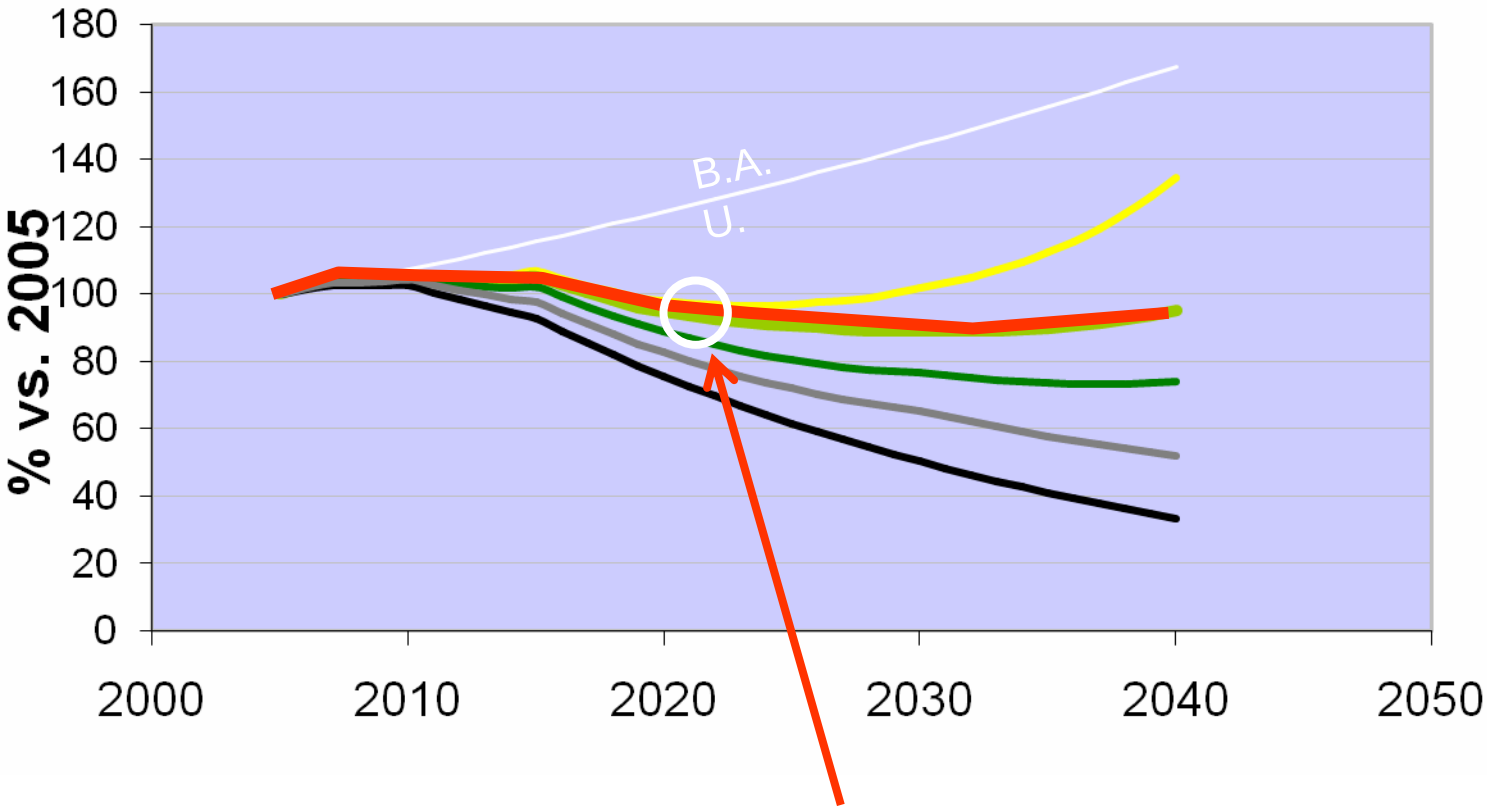
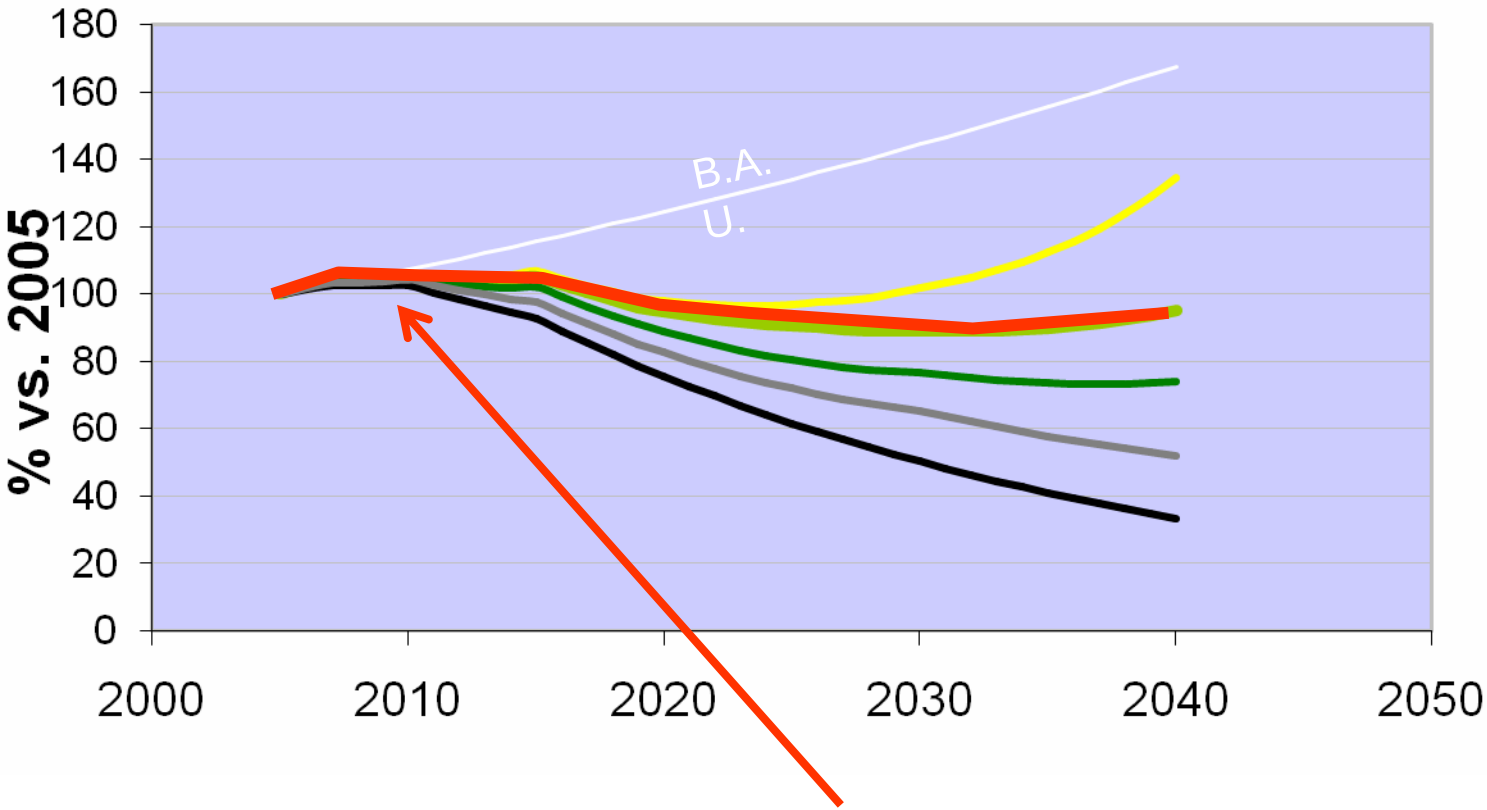
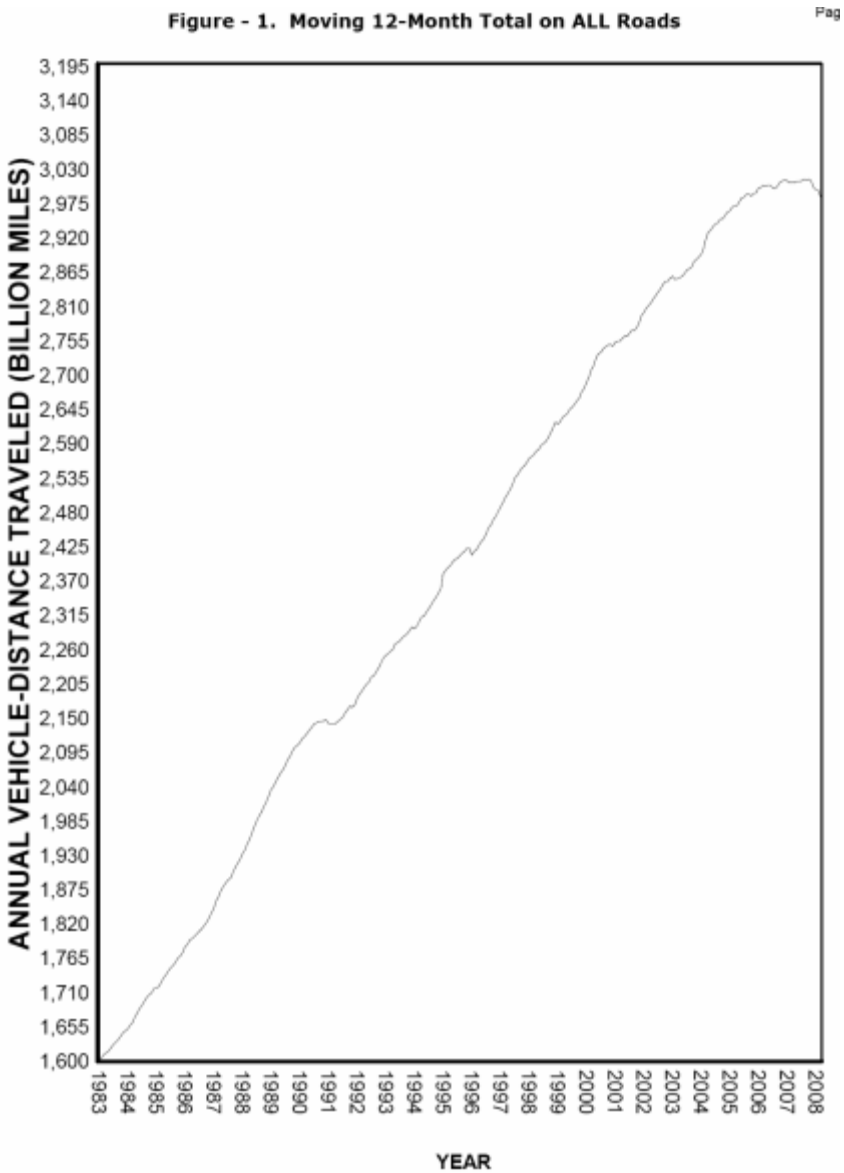


Road Capacity Required for Trucks: -10% in 2021

US & Canada:
ATT Scenario for Total Truck Miles



Road Capacity Required for Trucks: Are we nearing 'Peak Roads'?



TRAFFIC VOLUME TRENDS

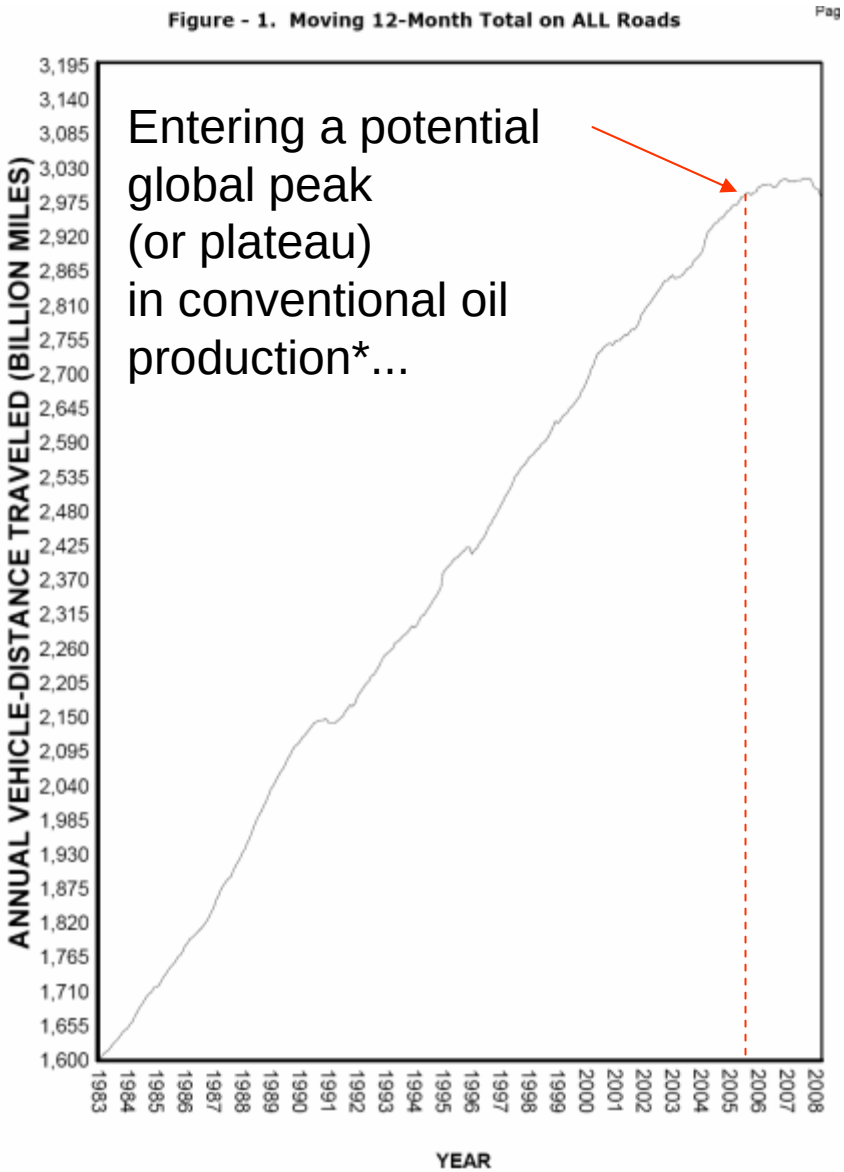
March 2008

U. S. Department
of Transportation

Federal Highway Administration

Office of Highway
Policy Information

Road Capacity Required for Trucks: Are we nearing 'Peak Roads'?



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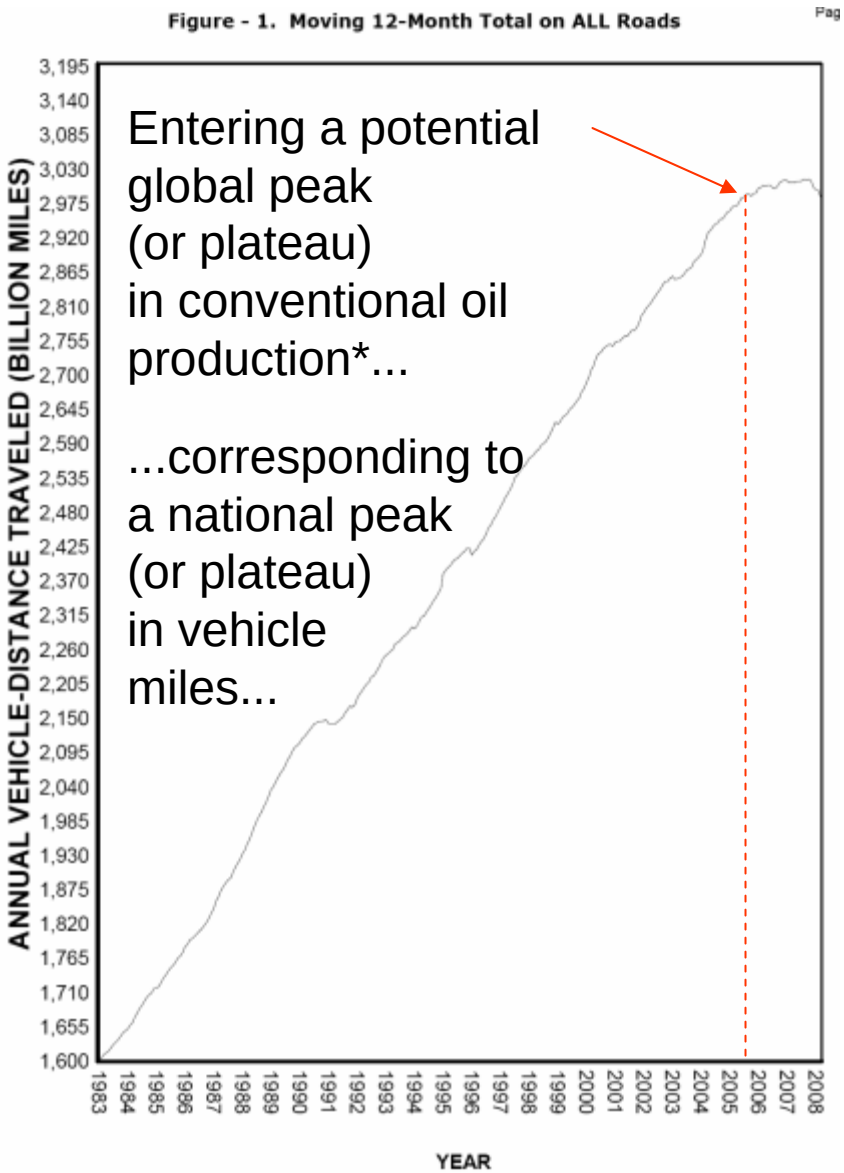

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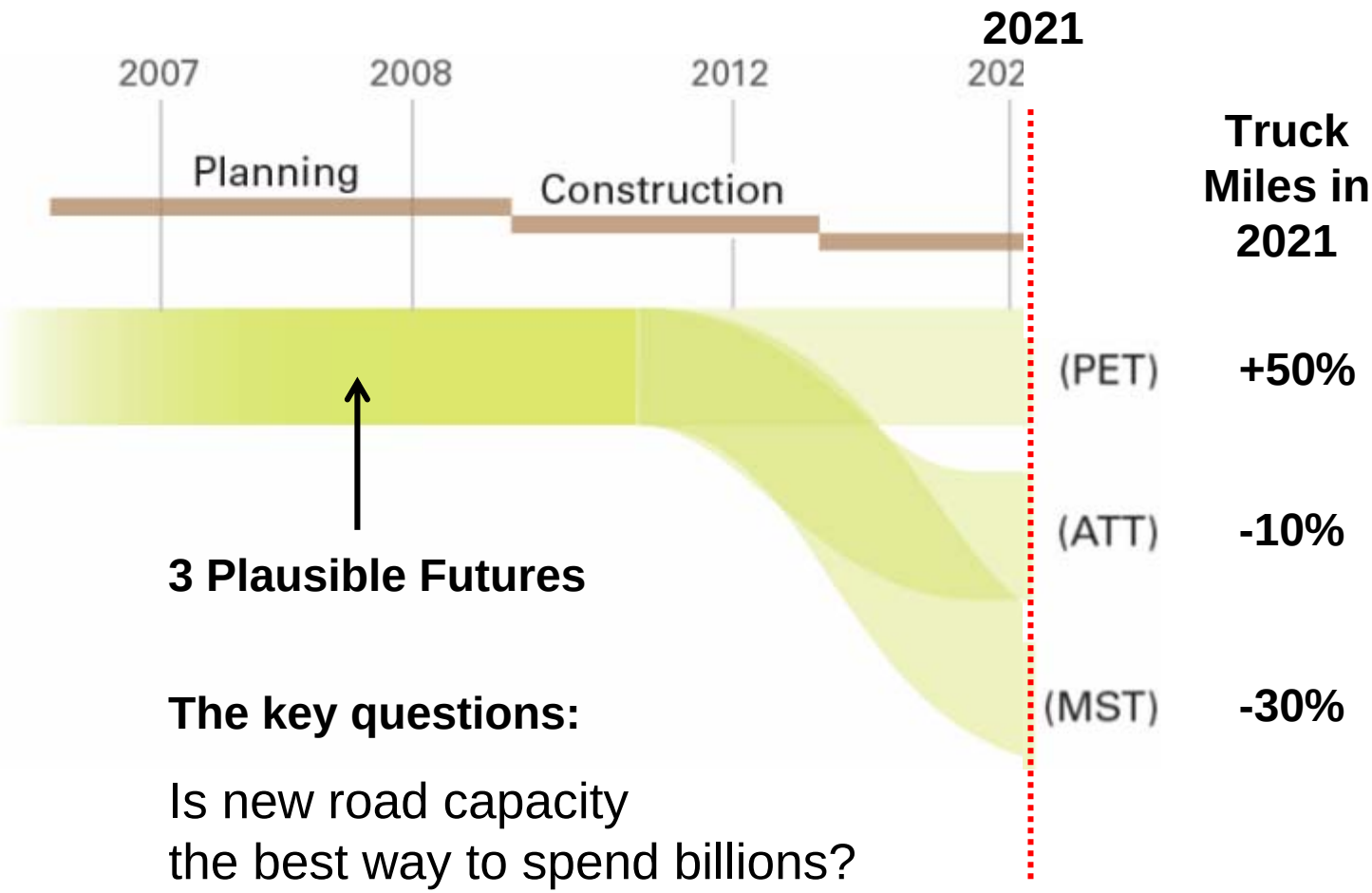

Truck Miles in 2021

+50%

-10%

-30%

3 Plausible Futures

The key questions:

Is new road capacity
the best way to spend billions?

(probably not!)

The Nexus of Peak Oil, Climate Change & Infrastructure

Scenario Planning for Municipal and State Governments

Dynamic Cities' Wish List :

- Fully integrate peak oil and climate change dialogues
  Prioritize strategies to reduce *both* emissions *and* oil dependence

- ASPO North America Depletion Model (& Wedges)
  Scenarios for 'available' oil and gas products

- Scenario-based planning for every investment serving us past 2012
  We badly need to rethink our past growth based forecasts

- Min. 10 Year moratorium on new highway / airport expansion
  Its highly likely there are more resilient investments to be made

Peak Oil, Climate Change & Transportation

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bryn@dynamiccities.org

604.728.0606