

Scenario Analysis & Peak Oil

How to Plan for an Uncertain Future

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Uncertainty – Part of the Human Condition





Scenario:

"an internally consistent view of what the future might turn out to be – not a forecast, but one possible future outcome."

Scenario Planning:

A process using a range of possible futures that:

Define outer bounds of impacts from external factors





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Famous Examples from Military & Business RAND Corp's nuclear war scenarios (1950s)







Famous Examples from Military & Business Royal Dutch/Shell's "Arab Oil Embargo" scenarios (1970s)











Four Scenarios for the Future



Sacramento Area Council of Governments • Valley Vision



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Sacramento Region Blueprint

Scenarios	Single- Family: Multifamily Housing	% Housing Growth through Infill	% Trips by Auto	% Trips by Transit	% Trips by Walk/ Bike	Daily VMT per Household
A: Business as usual (trend)	75:25	27.0	93.7	0.8	5.5	47.2
B: Higher housing densities than A, with growth focused at the urban fringe	67:33	39.0	83.2	4.0	12.7	37.6
C: Higher housing densities than A, with growth focused on central infill sites	65:35	38.3	81.8	4.8	13.4	36.7
D: Higher housing and employment densities, with growth focused on central infill sites	64:36	44.0	79.9	4.8	15.3	35.7
Preferred Scenario	65:35	41.0	83.9	3.3	12.9	34.9





Sacramento Region Blueprint







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U.S. Land Use-Transportation Scenario Planning Projects

Source: Bartholomew & Ewing 2010





Scenario Inputs

- Transportation system elements: variable
- Land use/growth allocations (the D's): variable
- Growth levels: some variable/most constant
- Economic conditions (real estate markets & fuel prices): constant

Assessment Tools

- Land use allocation methods
- Travel demand modeling
- Other tools

Assessment Outputs

- Travel related
- Air quality & CO2
- Public costs
- Other





Scenario Inputs: Transportation System Elements

Road Lane Miles of Alternative Scenarios







Scenario Inputs: Land Use Elements

Density of Alternative Scenarios

percent difference in persons per developed acre compared to trend scenarios







Scenario Inputs: Land Use Elements

Households Near Transit

percent difference in percentage of total households within 1/4 mile of transit vs. trend scenario













Assessment Outputs

Vehicle Miles Traveled of Alternative Scenarios







Assessment Outputs

Vehicle Hours of Delay of Alternative Scenarios







Assessment Outputs

Agriculture Lands Consumed by Alternative Scenarios







Assessment Outputs

NO_x Emissions of Alternative Scenarios percent difference compared to trend scenarios







Assessment Outputs

Greenhouse Gas Emissions of Alternative Scenarios





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Assessment Outputs



Road Costs per Person: Alternative vs. Trend Scenarios









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M. King Hubbert



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Hubbert's Peak



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2007





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Source: EIA, 2000

























Source: Industry database, 2003 (IHS 2003) OGJ, 9 Feb 2004 (Jan-Nov 2003)













Probability Estimate	Ultimate Recovery BBbls	Annual Demand Growth, %	Peak Year	Peak Rate, MMBbls/yr	Peak Rate, MMBbls/day
Low (95%)	2,248	0.0	2045	24,580	67
	2,248	1.0	2033	34,820	95
	2,248	2.0	2026	42,794	117
	2,248	3.0	2021	48,511	133
Mean	3,003	0.0	2075	24,580	67
(expected	3,003	1.0	2050	41,238	113
value)	3,003	2.0	2037	53,209	146
	3,003	3.0	2030	63,296	173
High (5%)	3,896	0.0	2112	24,580	67
	3,896	1.0	2067	48,838	134
	3,896	2.0	2047	64,862	178
	3,896	3.0	2037	77,846	213

Source: Wood, Long & Morehouse, 2004



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Source: EIA, 2011









Source: Stover & Bae, 2011









Source: Maley & Weinberger, 2009



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Source: Lane, 2011





Housing Prices Declines Greatest at the Suburban Fringe Tampa MSA



Percent Change in House Prices: 4th Quarter 2006 to 4th Quarter 2007

Housing Prices Declines Greatest at the Suburban Fringe Portland-Vancouver MSA

Percent Change in House Prices: 4th Quarter 2006 to 4th Quarter 2007

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Source: Chakraborty, Kaza, Knaap & Deal, 2011

- Scenario analysis is an effective method for thinking about alternative futures, especially when there is significant uncertainty
- Regional transportation agencies are now well-practiced with the technique, but only with respect to internal variables
- Energy prices are volatile and the volatility is likely to increase, thereby increasing uncertainty
- It is now time to incorporate external variables into scenario analysis, especially those related to energy prices

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