NUMBER	WITNESS	A/R	DATE	DESCRIPTION
SCH-__	**Samuel Hadaway**			PacifiCorp's response to WUTC Data Request No. 79 (6 pages)

UE-130043/PacifiCorp
February 28, 2013
WUTC Data Request 79

WUTC Data Request 79
Requestor: Ken Elgin

Referring to Exhibit No. __ (SCH-1T), page 24, lines 10-13 and 20-21, of Samuel C. Hadaway, please provide any analysis undertaken by the witness to evaluate any other readily available data supporting estimates of future long-term growth in GDP.

Response to WUTC Data Request 79

In its Annual Energy Outlook 2012, the U.S. Department of Energy, Energy Information Administration ("EIA"), forecasted real GDP growth for 2010-2035 to average 2.5 percent per year and for the GDP price deflator (inflation rate) to increase over this period by only 1.9 percent per year. In combination, these real GDP and inflation forecasts produce a long-term nominal GDP growth rate of only about 4.5 percent.

In contrast, in its Annual Report to Congress 1979, EIA projected the 1978-1995 average annual GDP inflation rate to be 6.9 percent. Along with an expected real GDP growth rate of 2.6 percent, this level of inflation produced a projected nominal GDP growth rate of approximately 10 percent.

Please see Attachment WUTC 79 for GDP forecast workpapers, specifically :
- www.EIA.gov/forecasts/AEO, 2012 forecast Table A20
- 1979 forecast, Vol. 3, p. 139

PREPARER: Samuel C. Hadaway

SPONSOR: Samuel C. Hadaway

WA UE-130043
WUTC 79

Annual Energy Outlook 2012

With Projections to 2035

June 2012

U.S. Energy Information Administration
Office of Integrated and International Energy Analysis
U.S. Department of Energy
Washington, DC 20585

This publication is on the WEB at:
www.eia.gov/forecasts/aeo

Exhibit No. ___ (SCH-__)
Docket UE-130043
Page 3
Attachment WUTC 79
Reference case

WA UE-130043
WUTC 79

Table A20. Macroeconomic indicators
(billion 2005 chain-weighted dollars, unless otherwise noted)

| Indicators	Reference case							Annual growth 2010-2035 (percent)
	2009	2010	2015	2020	2025	2030	2035	
Real gross domestic product	12703	13088	14803	16740	19185	21725	24539	2.5%
Components of real gross domestic product								
Real consumption	9037	9221	10218	11250	12697	14359	16220	2.3%
Real investment	1454	1715	2457	2888	3472	4063	4836	4.2%
Real government spending	2540	2557	2355	2407	2525	2667	2818	0.4%
Real exports	1494	1663	2289	3096	4235	5484	6953	5.9%
Real imports	1853	2085	2463	2800	3516	4461	5690	4.1%
Energy intensity								
(thousand Btu per 2005 dollar of GDP)								
Delivered energy	5.42	5.45	4.84	4.33	3.85	3.48	3.17	-2.1%
Total energy	7.46	7.50	6.58	5.93	5.32	4.80	4.36	-2.1%
Price indices								
GDP chain-type price index (2005=1.000)	1.097	1.110	1.196	1.304	1.424	1.580	1.758	1.9%
Consumer price index (1982-4=1.00)								
All-urban	2.15	2.18	2.42	2.67	2.95	3.30	3.72	2.2%
Energy commodities and services	1.93	2.12	2.62	2.94	3.36	3.86	4.37	2.9%
Wholesale price index (1982=1.00)								
All commodities	1.73	1.85	2.10	2.23	2.39	2.58	2.81	1.7%
Fuel and power	1.59	1.86	2.29	2.57	3.01	3.50	4.12	3.2%
Metals and metal products	1.87	2.08	2.43	2.50	2.57	2.61	2.64	1.0%
Industrial commodities excluding energy	1.76	1.83	2.04	2.13	2.22	2.32	2.43	1.1%
Interest rates (percent, nominal)								
Federal funds rate	0.16	0.18	3.26	4.07	4.29	4.52	4.30	- -
10-year treasury note	3.26	3.21	4.67	5.10	5.06	5.26	5.18	- -
AA utility bond rate	5.75	5.24	6.74	7.41	7.17	7.48	7.56	- -
Value of shipments (billion 2005 dollars)								
Service sectors	19996	20602	22469	24967	28029	30911	33430	2.0%
Total industrial	5667	5838	6730	7363	7973	8328	8692	1.6%
Nonmanufacturing	1615	1578	1873	2103	2228	2305	2407	1.7%
Manufacturing	4052	4260	4857	5260	5745	6023	6285	1.6%
Energy-intensive	1509	1595	1664	1786	1901	1973	2034	1.0%
Non-energy-intensive	2543	2664	3194	3474	3844	4050	4251	1.9%
Total shipments	25664	26440	29199	32329	36002	39239	42122	1.9%
Population and employment (millions)								
Population, with armed forces overseas	307.8	310.8	326.2	342.0	358.1	374.1	390.1	0.9%
Population, aged 16 and over	241.8	244.3	256.5	269.4	282.6	296.2	309.6	1.0%
Population, over age 65	39.7	40.4	47.1	55.1	64.2	72.3	77.7	2.6%
Employment, nonfarm	130.7	129.8	139.4	147.3	154.2	162.0	166.8	1.0%
Employment, manufacturing	11.8	11.5	12.1	11.9	11.4	10.3	9.2	-0.9%
Key labor indicators								
Labor force (millions)	154.2	153.9	158.0	163.6	168.6	174.5	181.7	0.7%
Nonfarm labor productivity (1992=1.00)	1.06	1.10	1.16	1.26	1.42	1.57	1.75	1.9%
Unemployment rate (percent)	9.28	9.63	7.51	6.47	5.54	5.40	5.54	- -
Key indicators for energy demand								
Real disposable personal income	9883	10062	11035	12472	14286	16268	18217	2.4%
Housing starts (millions)	0.60	0.63	1.75	1.92	1.96	1.90	1.89	4.5%
Commercial floorspace (billion square feet)	80.3	81.1	84.1	89.1	93.9	98.2	103.0	1.0%
Unit sales of light-duty vehicles (millions)	10.40	11.55	16.16	16.40	17.79	18.11	18.64	1.9%

GDP = Gross domestic product.
Btu = British thermal unit.
- - = Not applicable.
Sources: 2009 and 2010: IHS Global Insight, Global Insight Industry and Employment models, August 2011. Projections: U.S. Energy Information Administration, AEO2012 National Energy Modeling System run REF2012.D020112C.

Rodekohr
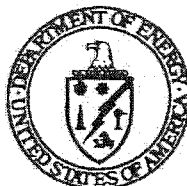
Annual Report to Congress

1979

Volume Three: Projections

U.S. Department of Energy
Energy Information Administration

Exhibit No. ___ (SCH-__)
Docket UE-130043
Page 5

WA UE-130043
WUTC 79

Attachment WUTC 79

imported goods and depends on the amount of energy used to produce these goods. Moreover, ripple effects from an initial price shock can persist in causing greater, or less, inflation even after the prices of all goods have been adjusted to reflect higher energy costs. The economy has certain built-in mechanisms, such as the tendency of wages, social security payments, and Government transfer payments to follow prices upward, that serve to transmit the initial shocks to later periods.

The depressing effect that higher prices have on aggregate demand leads to a lower growth rate for the economy. This effect is accentuated if total payments to foreign energy producers increase and the nominal trade balance deteriorates. These events, in turn, reduce both the purchasing power of the dollar and the total domestic production that is available for domestic consumption after foreign demand is satisfied. Conversely, if oil import payments decline as oil prices increase, the trade balance is positively affected and the purchasing power of the dollar increases.

In addition to depressing aggregate demand, higher world oil prices also reduce the effective stock of capital and, thus, affect the total productive capacity of the Nation; this latter occurrence in turn can lead to a permanently lower rate of growth in potential output.

Key Macroeconomic Variables in the Middle World Oil Price Case

In the middle world oil price case, real GNP grows 2.6 percent annually from 1978 to 1995 or at approximately the same rate as between 1973 and 1978. (See Table 4.29.) Projected growth in real disposable income is comparable to that in real GNP. Between 1978 and 1995, industrial production increases at a higher rate (3.6 percent annually) than it did between 1973 and 1978 (2.5 percent annually); however, industrial production does not regain the strength that it exhibited between 1965 and 1973 when it grew at an annual rate of 4.7 percent.

Prices, as measured by the implicit price deflator for GNP, increase 6.9 percent annually from 1978 to 1995. The annual average unemployment rate projected for the 1978–95 period falls from a peak of 7.6 percent in 1981 to below 6.5 percent in 1986 and thereafter. Foreign and domestic new car sales average 12 million per year during 1985–95.

Macroeconomic Interactions with Energy in the Three Projection Series

Throughout the midterm, world oil prices moderately affect income, output, and the general inflation rate and significantly affect the unemployment level.

Price Effects

The growth rate of the producer price index for fuels and related products and power (the Bureau of Labor Statistics index of nominal energy prices at the wholesale level) varies between 1978 and 1995 from 15.4 percent in the high price case to 11.9 percent yearly in the low price case. This variation, which is most prevalent during the early years of the forecast, is reflected in the different values for producer prices, consumer prices, and the implicit GNP deflator shown in the table below:

Energy Price Effects on General Prices, 1978-95 World Oil Price

World Oil Price	Producer Price Index for Fuels and Related Products and Power	Producer Price Index	Consumer Price Index (CPI)	Implicit Price Deflator for GNP
(Annual Rates of Change)				
High	15.4	8.4	7.7	7.0
Medium	13.8	7.9	7.5	6.9
Low	11.9	7.4	7.4	6.8
(Inflation Rate Difference)				
Low to Medium	1.9	0.5	0.1	0.1
Low to High	3.5	1.0	0.3	0.2

Higher inflation rates are also accompanied by depressing effects on output and employment. Moreover, Government policies designed to neutralize employment effects of oil price changes would most likely accentuate the differences among the inflation rates for the three scenarios. That is, with a rapid rise in the world oil price, an attempt to maintain employment could add to the inflationary impetus from higher oil prices and in turn lead to higher price effects than those shown, for example, in the "High World Oil Price" case.

Exhibit No. ___ (SCH-__)
Docket UE-130043
Page 6

WA UE-130043
WUTC 79

Attachment WUTC 79

Table 5.5 Summary of Energy Prices: Projection Series Low, Middle, High
(1979 Dollars)

World Oil Price (dollars per barrel)	1978	2000 Low 27.00	2000 Mid 43.00	2000 High 60.00	2010 Low 27.00	2010 Mid 43.00	2010 High 60.00	2020 Low 27.00	2020 Mid 43.00	2020 High 60.00
Energy Prices by Sector										
Residential										
Electricity (dollars per million Btu)	12.69	16.23	16.37	16.42	15.84	15.97	15.97	15.99	16.25	16.28
(cents per kilowatt-hour)	4.33	5.54	5.59	5.60	5.40	5.45	5.45	5.46	5.54	5.55
Light Oil (dollars per million Btu)	3.82	5.93	8.61	11.18	6.04	8.49	10.32	6.21	8.29	9.23
Natural Gas (dollars per million Btu)	2.68	4.46	4.67	4.72	4.92	5.23	5.22	5.46	5.90	5.90
Commercial										
Electricity (dollars per million Btu)	12.84	16.56	16.71	16.76	16.18	16.31	16.31	16.33	16.59	16.62
(cents per kilowatt-hour)	4.38	5.65	5.70	5.72	5.52	5.56	5.56	5.57	5.66	5.67
Light Oil (dollars per million Btu)	3.63	5.56	8.24	10.81	5.67	8.13	9.95	5.84	7.93	8.86
Heavy Fuel Oil (dollars per million Btu)	2.46	4.42	7.08	9.53	4.56	7.03	8.77	4.75	6.87	7.70
Natural Gas (dollars per million Btu)	2.31	4.50	4.71	4.76	4.96	5.27	5.26	5.50	5.94	5.94
Industrial										
Electricity (dollars per million Btu)	8.34	12.67	12.82	12.86	12.29	12.41	12.42	12.43	12.69	12.72
(cents per kilowatt-hour)	2.85	4.32	4.38	4.39	4.19	4.23	4.24	4.24	4.33	4.34
Light Oil (dollars per million Btu)	3.60	5.63	8.31	10.88	5.74	8.19	10.02	5.91	7.99	8.93
Heavy Fuel Oil (dollars per million Btu)	2.49	4.49	7.15	9.59	4.62	7.09	8.84	4.82	6.93	7.76
Coal* (dollars per million Btu)	1.34	2.40	2.43	2.44	2.53	2.58	2.59	2.79	2.94	2.98
(dollars per ton)	30.15	54.00	54.68	54.90	56.93	58.05	58.28	62.78	66.15	67.05
Natural Gas (dollars per million Btu)	1.56	4.75	4.96	5.01	5.21	5.52	5.51	5.74	6.16	6.19
Transportation										
Light Oil (dollars per million Btu)	5.14	9.57	12.25	14.82	9.68	12.14	13.96	9.85	11.94	12.87
Heavy Fuel Oil (dollars per million Btu)	2.33	4.42	7.08	9.53	4.56	7.03	8.77	4.75	6.87	7.70

*Excludes metallurgical coal.

thus, the price of electricity changes only slightly with world oil price changes.

The short-term midprice forecast, given in Chapter 3, for the transportation sector shows the estimated price for gasoline in 1980 to be $1.33 per gallon, in 1980 dollars. (See Table 3.3.) In 2000, the price per gallon of gasoline is forecasted for the midprice case to be $1.53 in 1979 dollars and $5.59 in 2000 dollars, the latter assuming an average annual inflation rate of 6.3 percent from 1980 to 2000.[2] (For the high case in 2000, the price per gallon of gasoline is $6.76 in 2000 dollars.)

As drastic as these figures may seem, the impact of these prices on an individual budget are not that extreme. Assuming an average annual salary of $15,000 (1980 dollars), an average of 10,000 vehicle-miles driven per year, and an average fleet efficiency of 15 miles per gallon, gasoline expenditures account for 6 percent of the average annual income in 1980. A $15,000 salary in 1980

becomes approximately $50,000 in 2000, under the above inflation rate assumptions. With the above assumptions, but using an average fleet efficiency of 25 miles per gallon, the midprice case shows gasoline expenditures to be 4 percent of average annual income in 2000. Growth in annual income above the inflation rate would further reduce the share of gasoline expenditures. (This example assumes no conservation, that is, no fewer miles driven per vehicle in response to higher gasoline prices.)

This trend in rising energy costs may be less rapid after 2000 if the United States becomes more energy-sufficient and, by that period, is well into synthetic liquids production. The relatively inexpensive price of coal can relieve the pressure of high oil prices on the U.S. economy. However, this assumes an average annual growth in the coal industry of 3.2 percent for the middle case and 3.5 percent for the high case, over a 2.5-percent growth rate in the low case where there is a heavy reliance on imports to satisfy liquids demand.

Comparisons of the low, middle, and high cases will be given throughout this chapter. In summary, high world oil prices do encourage conservation in all sectors and some fuel switching, principally in

[2] The long-term forecast only represents light oil in the transportation sector. The gasoline price should actually be higher by approximately 7 percent. Conversion factors used are 5.248 million Btu per barrel and 42 gallons per barrel.