

# Energy Development Water Needs Assessment

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This report estimates the water demands needed to support the extraction and production of natural gas, coal, uranium, and oil shale in northwest Colorado.

The report was conducted in conformance with the legislative intent specified in House Bill 05-1177 and led by the Colorado and Yampa/White/Green River Roundtables.

These Roundtables are seeking to use data and information from this study, in conjunction with the Statewide Water Supply Initiative (SWSI) and other appropriate sources, to assist with the development of a basin-wide consumptive and nonconsumptive water supply needs assessment.

To access the entire report please visit:  
[www.crwcd.org/page\\_5](http://www.crwcd.org/page_5)

# Energy Water Needs Assessment Study Purpose

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**Comprehensive assessment of energy development water rights and water demands**

**Investigates direct and indirect water demands**

**Phase I – Nearly complete**

**Phase II - Modeling & Alternatives, 2009**

# Energy Water Needs Assessment

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**Estimate the water demands required for extraction and production**

- **natural gas**
- **coal**
- **uranium**
- **oil shale**
- **thermoelectric power**
- **indirect demands (population)**

# Demand Projection

## Oil Shale Example

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### **Unit demands**

**1.5 barrels of water per barrel of oil for in situ**

**2.9 barrels of water per barrel of oil for surface retort**

### **Assumed production levels**

**In situ: up to 1.5 million barrels/day**

**Retort: up to 50,000 barrels/day**

### **Simple math to calculate demands**

# Energy-Water Needs Assessment

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## **Demand Projections**

**Near-term: 2007-2017**

**Mid-term: 2018-2035**

**Long-term: 2036-2050**

## **Production Scenarios:**

**Low, medium, and high**

# Natural Gas (wells/year)

Planning Horizon	Production Scenarios		
	low	medium	high
Near-Term (2007 – 2017)	1,800	1,900	2,000
Mid-Term (2018 – 2035)	1,700	2,125	2,300 with 11,000 wells for oil shale
Long-Term (2036 – 2050)	Declines to 1,100	Declines to 1,500	Declines to 1,700

# Coal (million tons/year)

Planning Horizon	Production Scenarios		
	low	medium	high
Near-Term (2007 – 2017)	20.5 incl. Red Cliff Mine at 2.5 mtons/yr	20.5	20.5
Mid-Term (2018 – 2035)	20.5	26	26
Long-Term (2036 – 2050)	20.5	20.5	30 mtons/yr incl a coal gasification plant

mtons = million tons

# Uranium

Planning Horizon	Production Scenarios		
	low	medium	high
Near-Term (2007 – 2017)	none	none	1 underground mine
Mid-Term (2018 – 2035)	none	1 underground mine	1 underground mine
Long-Term (2036 – 2050)	none	1 underground mine	2 underground mines

# Oil Shale (barrels / day)

Planning Horizon	Production Scenarios		
	low	medium	high
Near-Term (2007 – 2017)	none	none	none
Mid-Term (2018 – 2035)	none	UM/SR 50,000 in situ 25,000	UM/SR 50,000 in situ 500,000
Long-Term (2036 – 2050)	none	UM/SR 50,000 in situ 150,000	UM/SR 50,000 in situ 1.5 MM

UM/SR = underground mine/surface retort

bpd = barrels / day

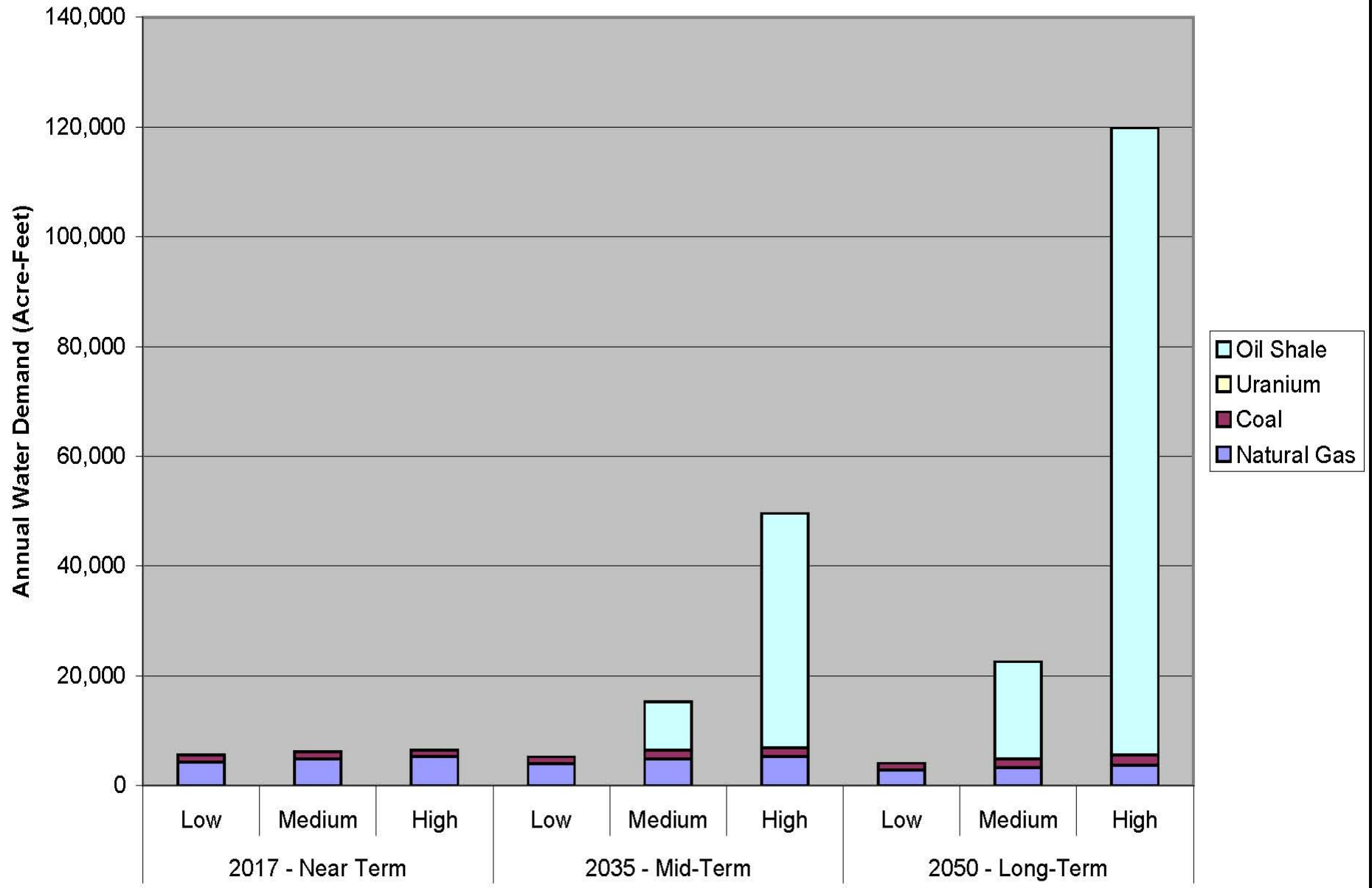
# Electrical Generation capacity for Oil shale (MW)

Planning Horizon	Production Scenarios		
	low	medium	high
Near-Term (2007 – 2017)	none	none	none
Mid-Term (2018 – 2035)	none	469	6,406
Long-Term (2036 – 2050)	none	2,031	18,900

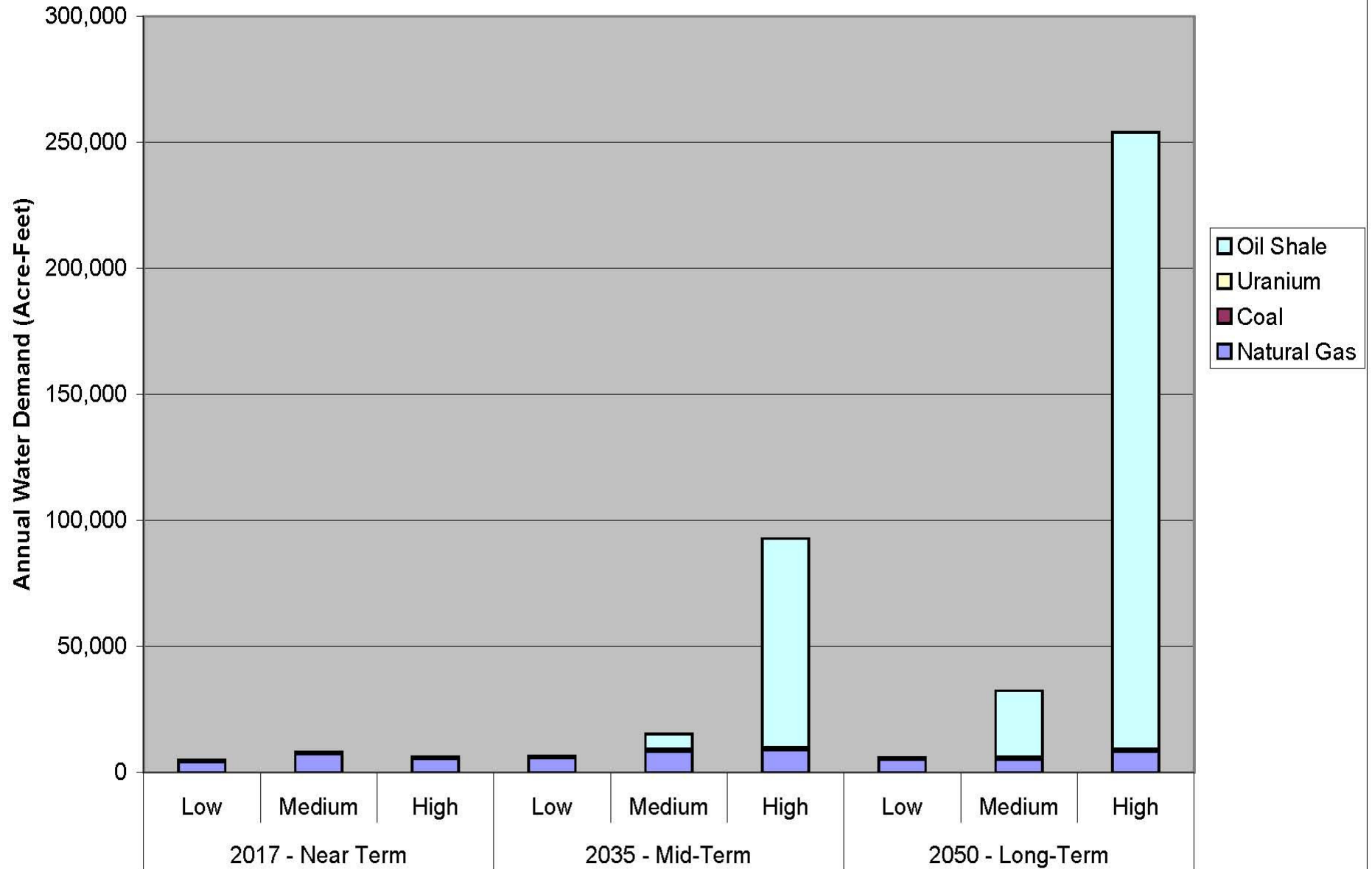
# Population Increase

	Near Term (2007-2017)			Mid- Term (2018-2035)			Long-Term (2036-2050)		
	low	med	high	low	med	high	low	med	high
<b>Natural gas</b>	42,000	46,000	48,000	42,000	48,000	51,000	36,000	46,000	50,000
<b>Coal</b>	5,100	6,500	6,500	5,100	6,500	6,500	5,100	6,500	10,500
<b>Uranium</b>	0	0	0	0	0	0	0	0	0
<b>Oil shale</b>	3,000	3,000	3,000	3,000	6,000	37,000	3,000	16,000	83,000
<b>TOTAL</b>	50,100	55,500	57,500	50,100	60,500	94,500	44,100	68,500	143,500

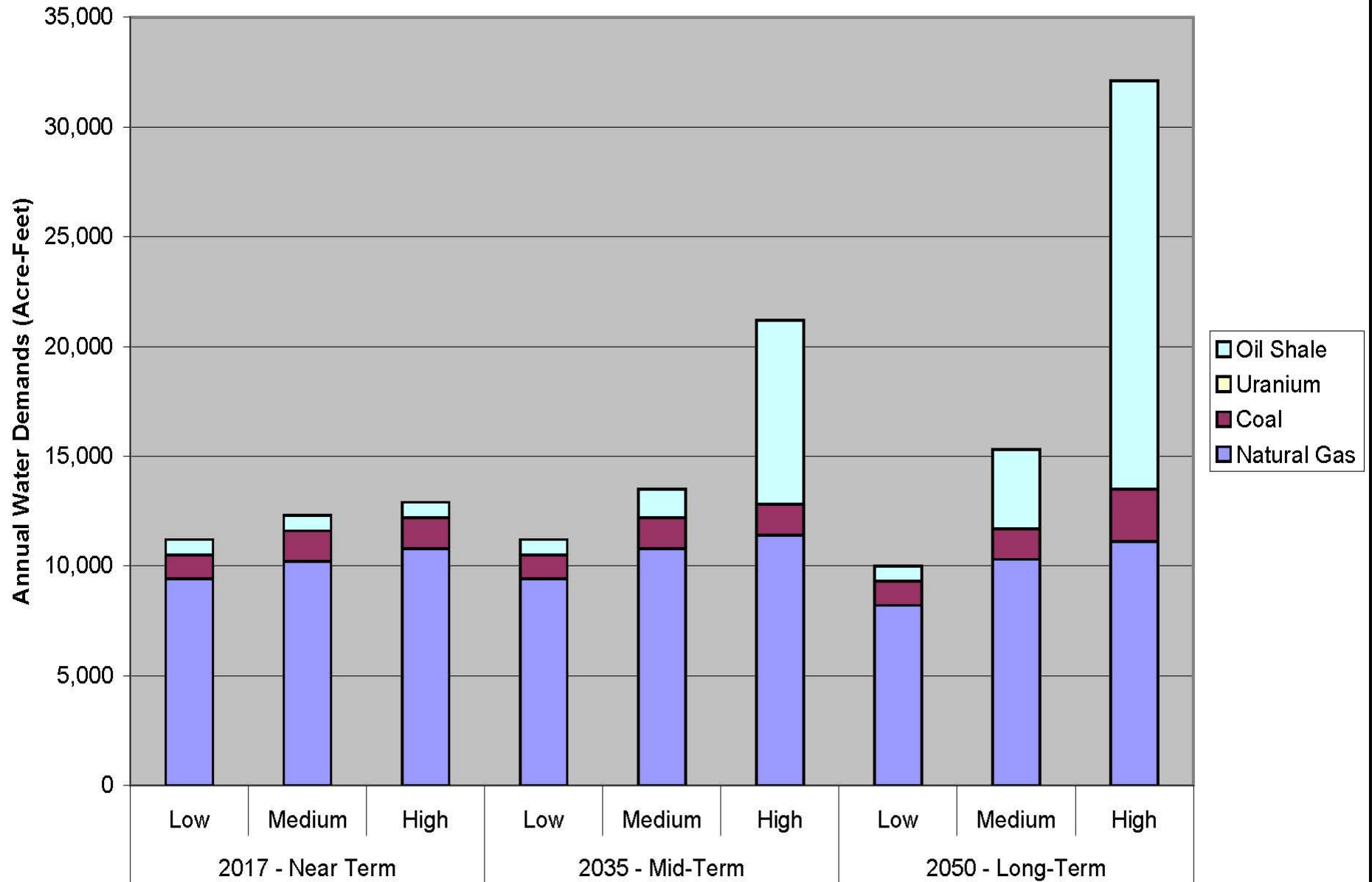
# Direct Water Demands



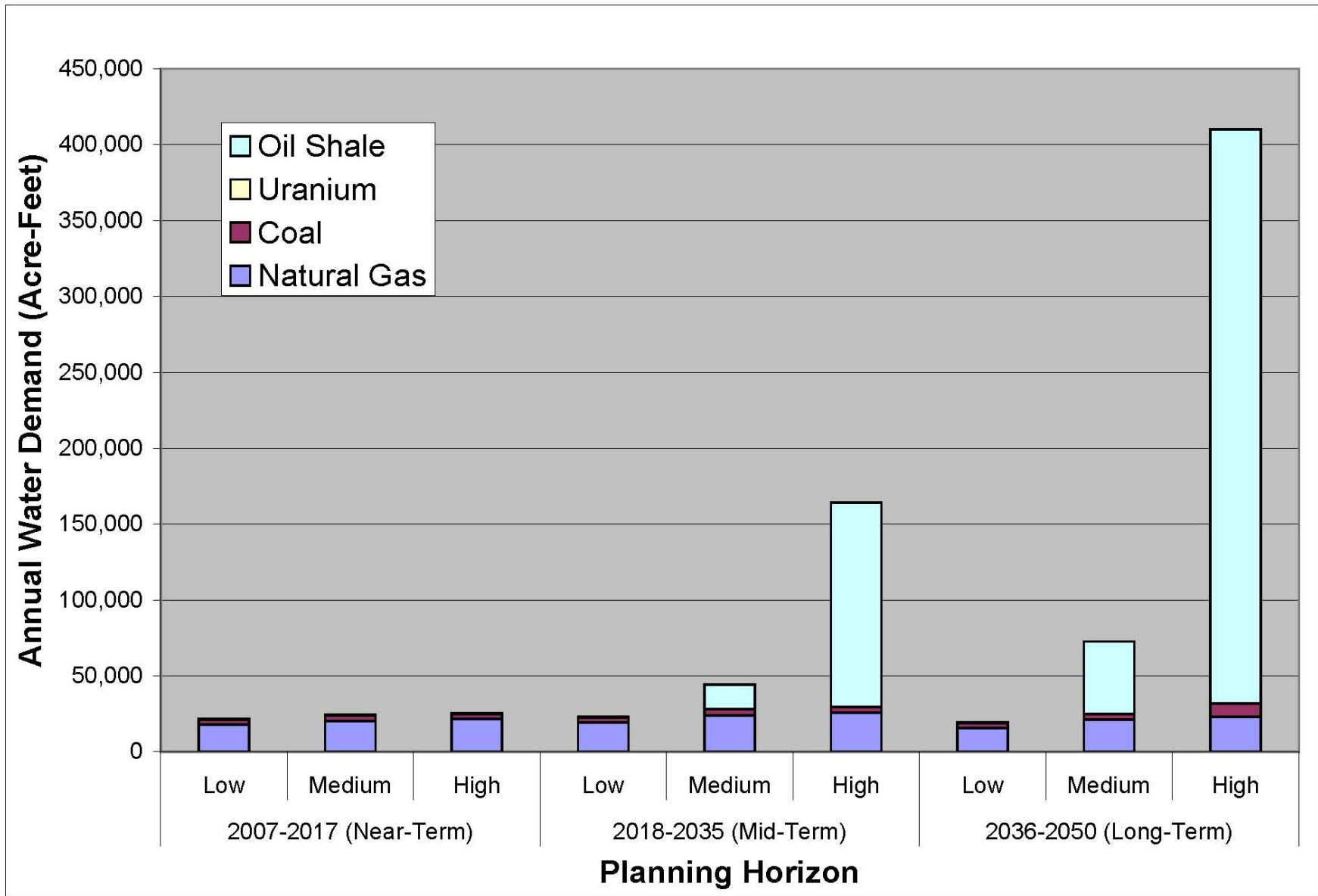
# Thermoelectric Water Demands



# Indirect Water Demands



# Total Water Demands



# Conditional Water Rights

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**Energy interests have extensive portfolio of conditional and absolute water rights**

**Many of the conditional water rights are senior to significant absolute water rights**

# Study Conclusions for Oil Shale Development

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**Greatest uncertainty and greatest challenge if a commercial industry emerges**

**Potential power-water demand high if electric heating derived from in-state coal fired plants is used**

**Potential power-water demands could be much lower if other heating methods are used**

**On high end (1.5 Million Bbd), oil shale water demands could exceed available compact water**

**Non-compact sources of water to be investigated in Phase II of study**

# Study Conclusions of Other Energy Demands

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**Water needs from other sectors, including population growth, could be significant but not expected to exceed compact availability**

# Some More to Think About

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**Mid-range demands should be considered for water planning to provide protection and enhancement for agricultural, environmental, recreational, industrial and domestic uses**

**High-range demands should be considered within statewide planning for use of Colorado River water  
(HB 05-1177, SB 07-122)**

# Next Steps

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**Roundtables to take action on report**

**Want to keep report as a final draft and circulate broadly**

**Phase II – modeling of demands and examining alternatives - 2009**