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REPUBLIC OF SOUTH AFRICA

DRAFT INTEGRATED ENERGY PLANNING REPORT



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KEY MODELLING ASSUMPTIONS: MACROECONOMIC AND DEMOGRAPHIC

CONTENT



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- **MACROECONOMIC ASSUMPTIONS**
- **DEMAND MODEL OUTPUTS**



MACROECONOMIC ASSUMPTIONS

- Discount rate
- Aggregate economic growth
- Global oil prices
- Global natural gas prices

DISCOUNT RATE



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Simple function: Weighted Average = α SOC + (1- α)SRTP

EOCK

12.3%

assume $\alpha =$ 0.51

$$EOCK = f_1\gamma + f_2\pi$$

therefore

$$EOCK = \frac{\sum_i \varepsilon_i (S_i / S_p) \gamma_i - \sum_j \eta_j (I_j / S_p) \pi_j}{\sum_i \varepsilon_i (S_i / S_p) - \sum_j \eta_j (I_j / S_p)}$$

Discount rate: 11.3%

Economic Opportunity Cost of Capital (EOCK)

Ref	Description	Variables	Households	Business	Government	Foreign
1	Savers: Share	S/Sp	0.1429	0.5055	0.0000	0.3516
2	Nominal interest rate	i_r	0.1300		0.1156	0.0325
3	Tax rate	t	0.3100		0.0000	0.0000
4	Proportion of total borrowing responsive to foreign interest rate	k				0.4000
5	Return on savings/nominal MC of foreign borrowing	$ns = i^*(1-t)$	0.0897	0.0000	0.1156	0.0325
6	Inflation rate	p	0.0570	0.0570	0.0570	0.0260
7	Real return/real MC of foreign borrowing	$rs = (ns-p)/(1+p)$	0.0309	-0.0539	0.0555	0.0089
8	Elasticities	ε	0.5000	0.0000	0.0000	1.5000
	Group weight	$\varepsilon^*(S_i/Sp)$	0.0714	0.0000	0.0000	0.5274
	Group weight *real return	$\varepsilon^*(S_i/Sp)*rs$	0.0022			0.0047
	Sum of Group weights	A				0.5989
	Sum of Group weights * real return	B				0.00688
	Investors: Share	I_j/S_t		0.6108	0.1369	
	Nominal interest/earnings rate	i_r				
	Real return on investment	$rr = (i_r-p)/(1+p)$		0.2120	0.1563	
	Elasticity	η		-1.0000	0.0000	
	Group weight	$\eta^*(I_j/St)$		-0.6108		
	Group weight *real return	$\eta^*(I_j/St)*rr$		-0.1295		
	Sum of Group weights	C				-0.6108
	Sum of Group weights * real return	D				-0.1295
	EOCK	$EOCK = (B-D)/(A-C)$				
			11.3%			

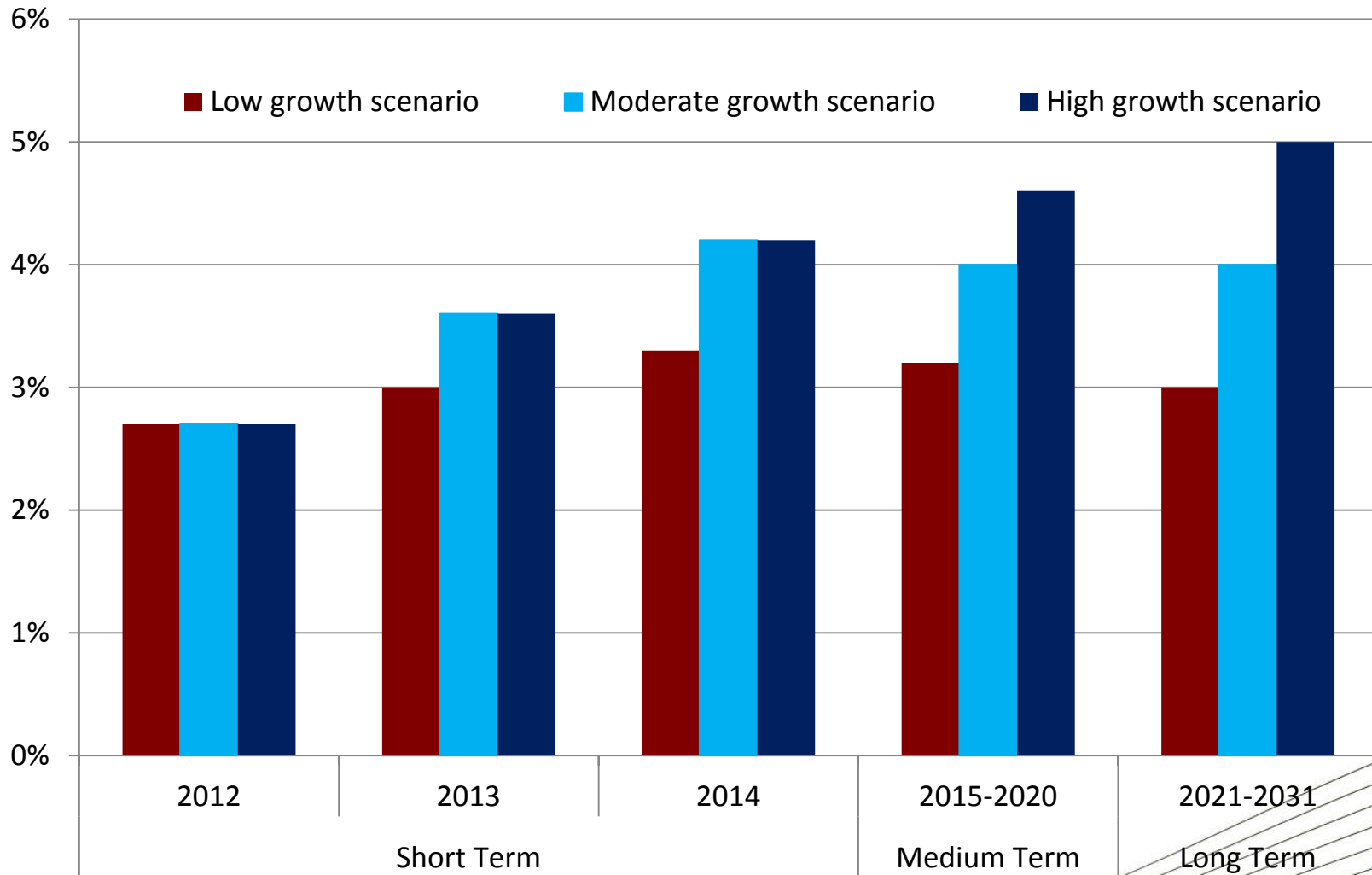
Note: need to determine whether foreign investment and **government investment** crowds-out private investment

ECONOMIC GROWTH



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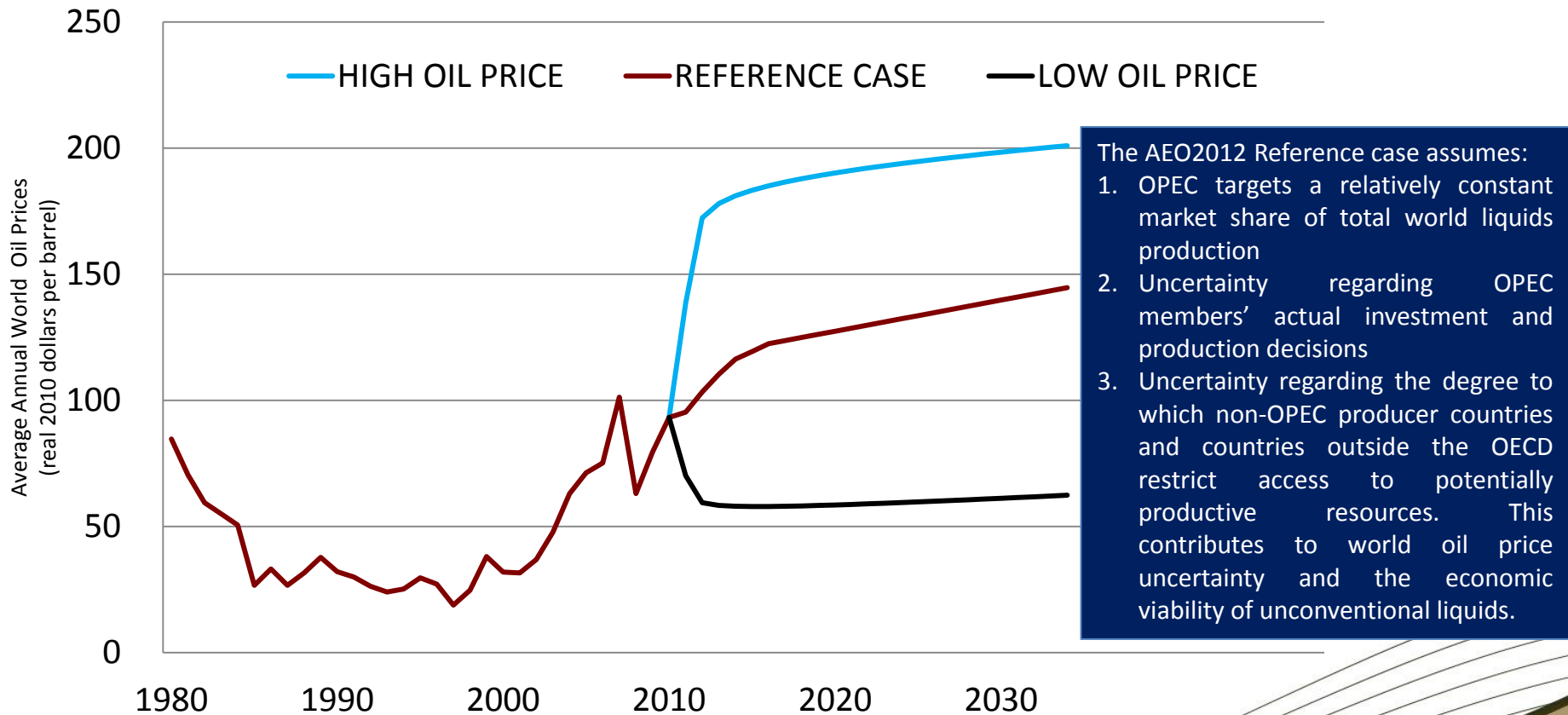
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GLOBAL OIL PRICES

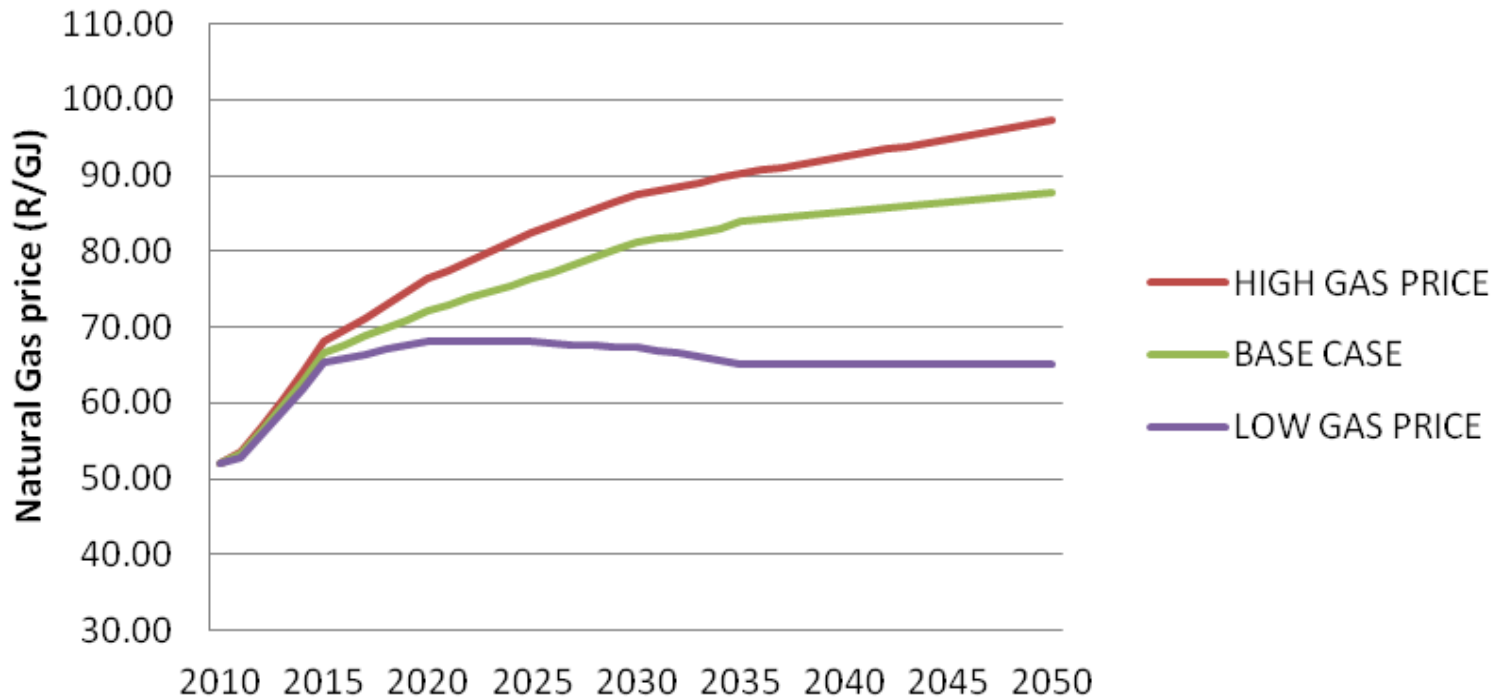
Average World Annual World Oil Price



The AEO2012 Reference case assumes:

1. OPEC targets a relatively constant market share of total world liquids production
2. Uncertainty regarding OPEC members' actual investment and production decisions
3. Uncertainty regarding the degree to which non-OPEC producer countries and countries outside the OECD restrict access to potentially productive resources. This contributes to world oil price uncertainty and the economic viability of unconventional liquids.

PROJECTED NATURAL GAS PRICE

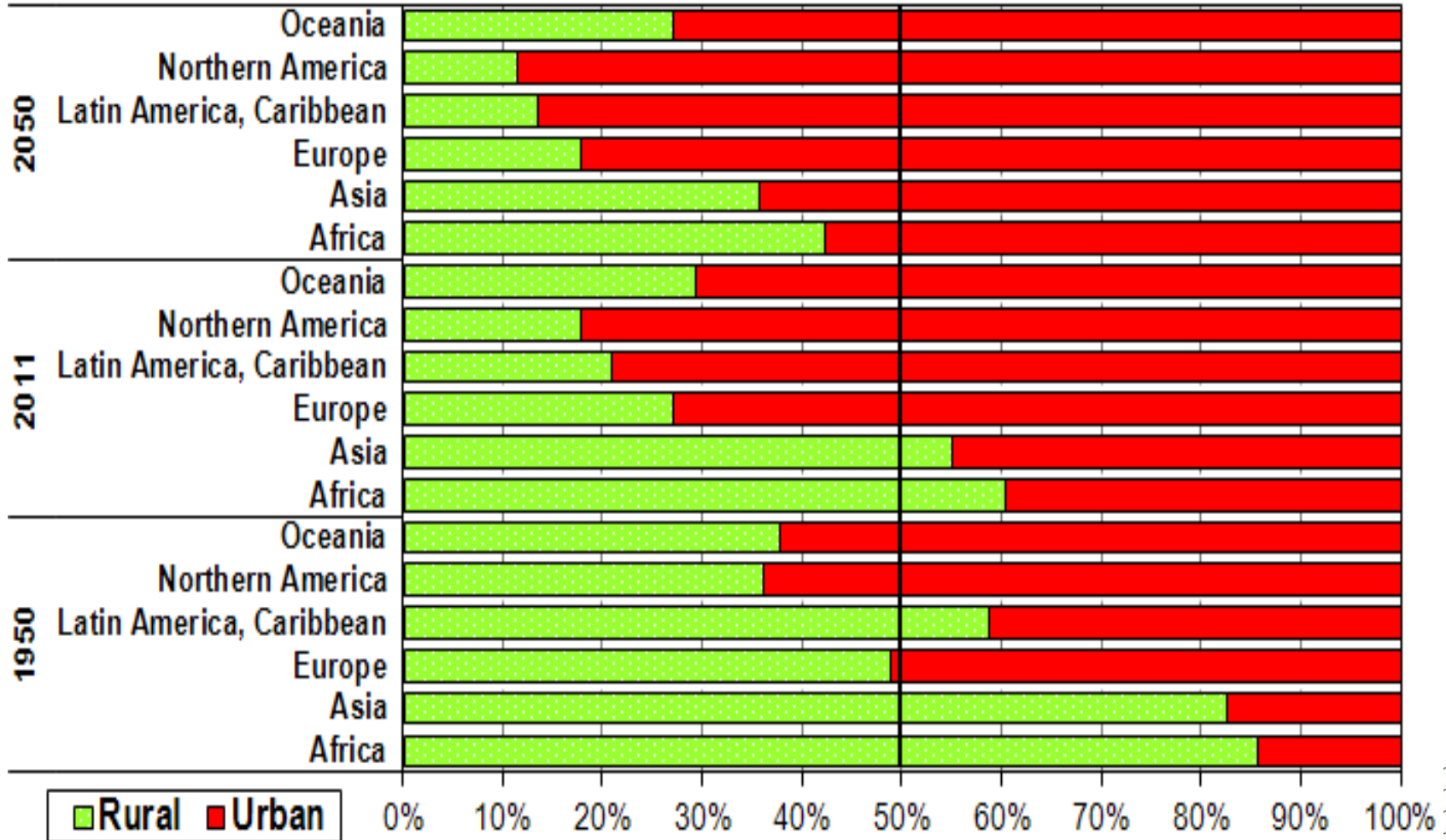


The **Base Case** natural gas price projections are based on the “**New Policies Scenario**” projections for **average gas import prices in Europe** in the 2011 World Energy Outlook

- Historically natural gas prices in the OECD have been closely correlated to oil prices through indexation clauses in long-term supply contracts and also as a result of competition between gas and oil products in power generation and end-use markets. However different pricing mechanisms in different parts of the world lead to differences in the actual level of prices.
- When oil prices are high, oil-indexed gas prices also tend to be high (with a certain lag period).
- However gas prices which are driven by competition and supply/demand dynamics tend to be lower than oil-indexed prices as has been seen in Europe and the US.
- The ‘New Policies Scenario’ assumes that at a global level, existing policies are maintained and that recently announced commitments and plans, including those yet to be formally adopted, are implemented in a cautious manner
- The High Gas Price projections are based in the ‘Current Policies Scenario’
- The Low Gas Price projections are based on the ‘450 Scenario’



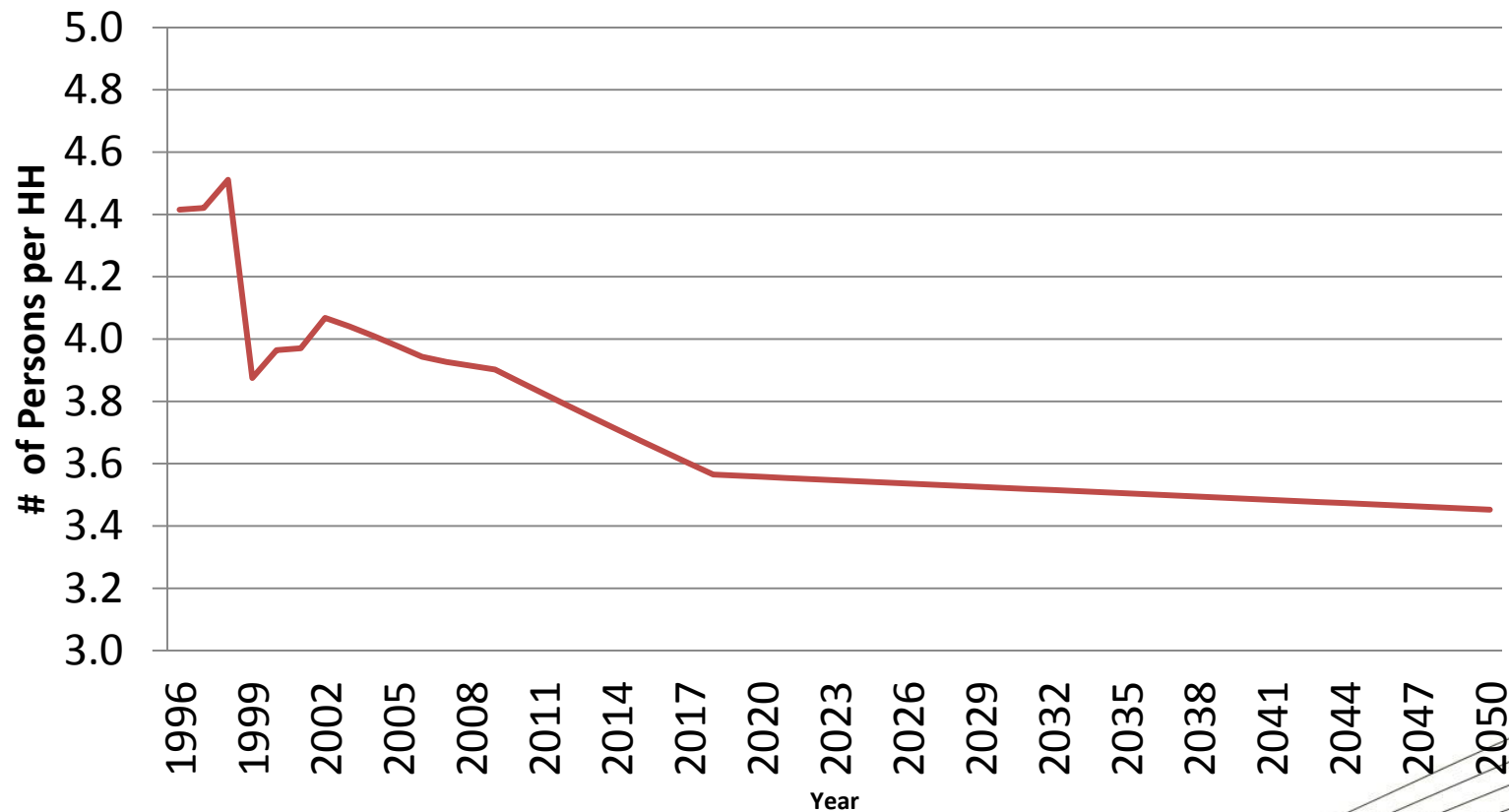
DEMOGRAPHIC ASSUMPTIONS





DEMOGRAPHIC (2)

Number of persons per household

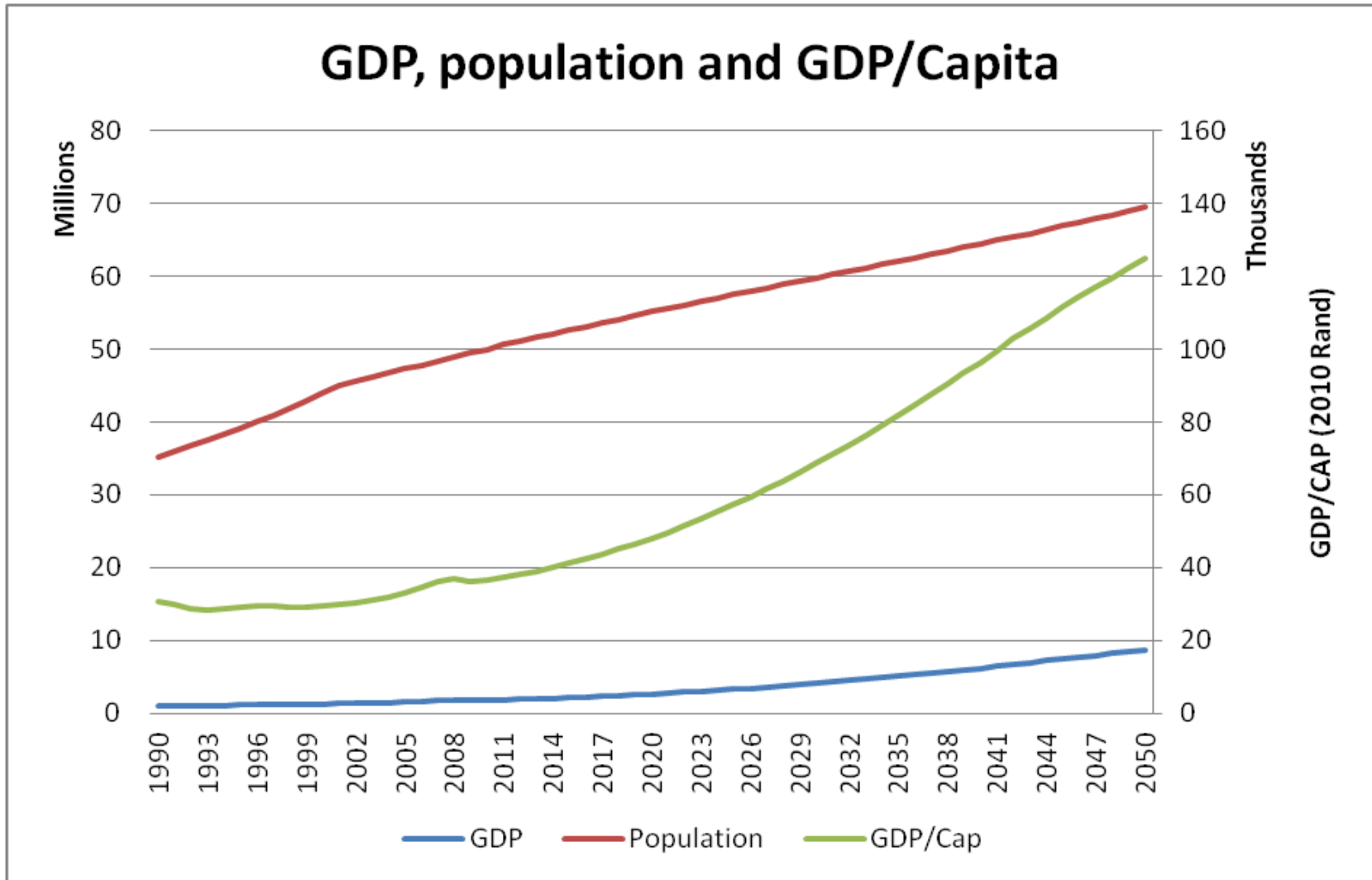


DEMOGRAPHIC (3)



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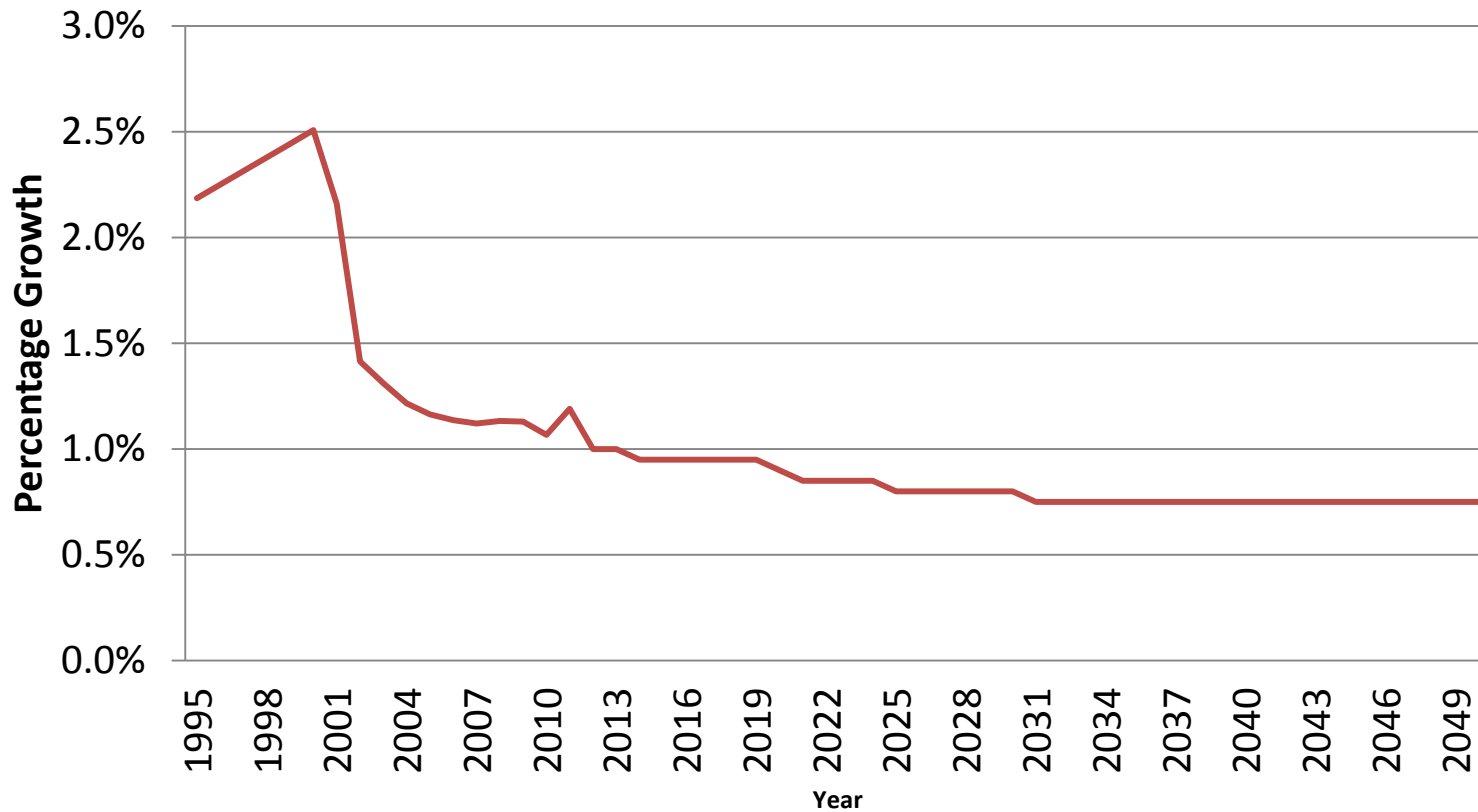
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DEMOGRAPHIC (4)

Population Growth





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THANK YOU



DEMAND MODEL OUTPUTS

Dr. Rebecca Maserumule
Demand Modelling Specialist

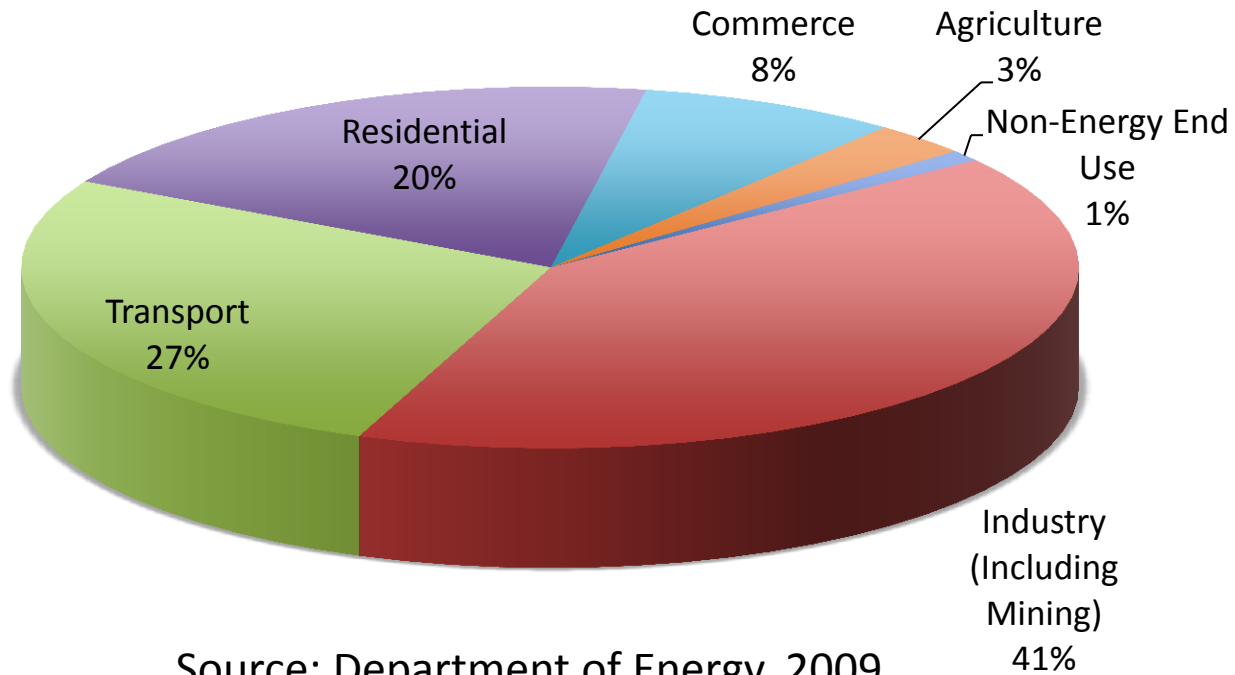


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- MACROECONOMIC ASSUMPTIONS
- **DEMAND MODEL OUTPUTS**



FINAL ENERGY CONSUMPTION



Source: Department of Energy, 2009

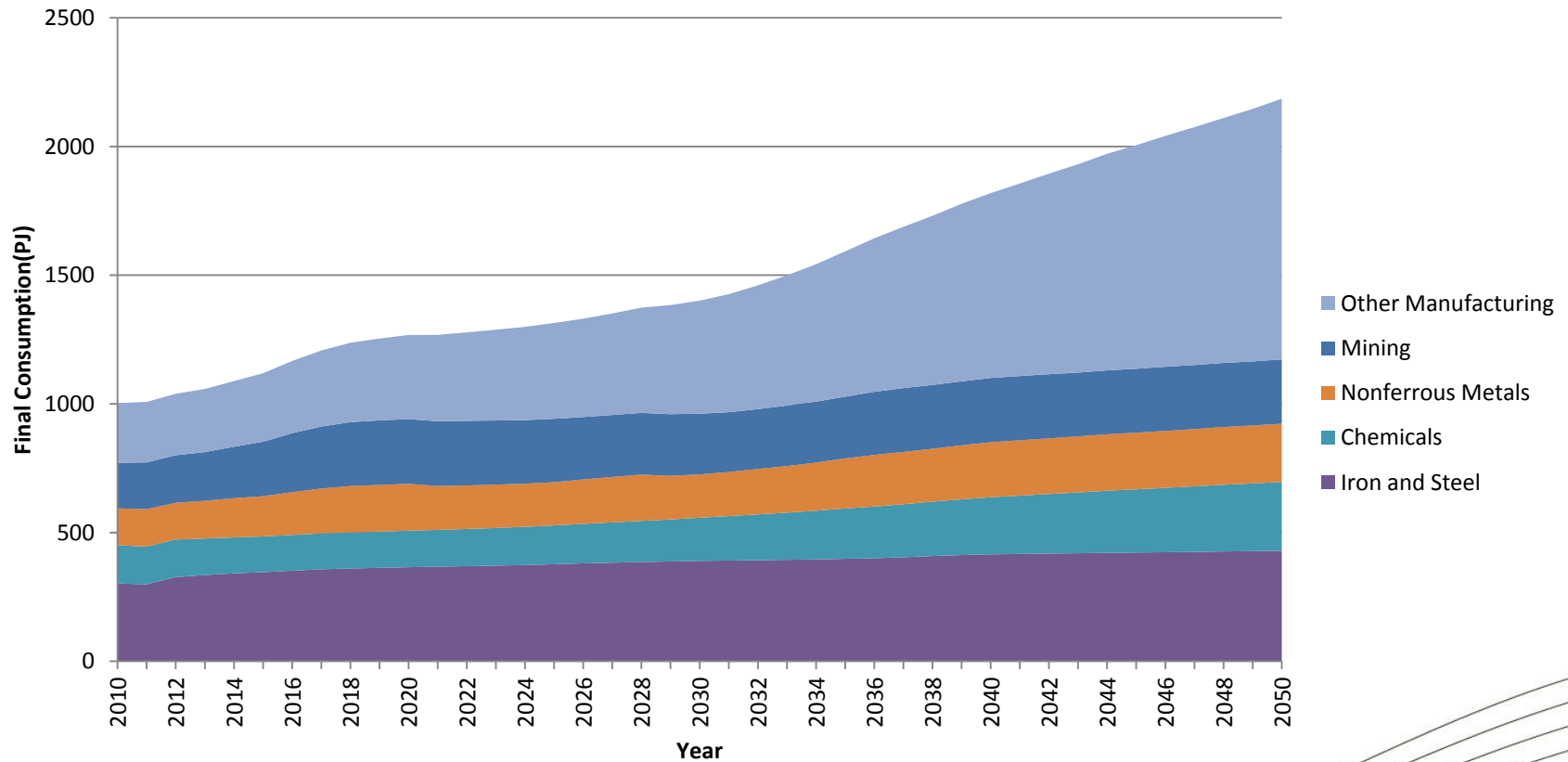
INDUSTRIAL SECTOR



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Total Energy Demand

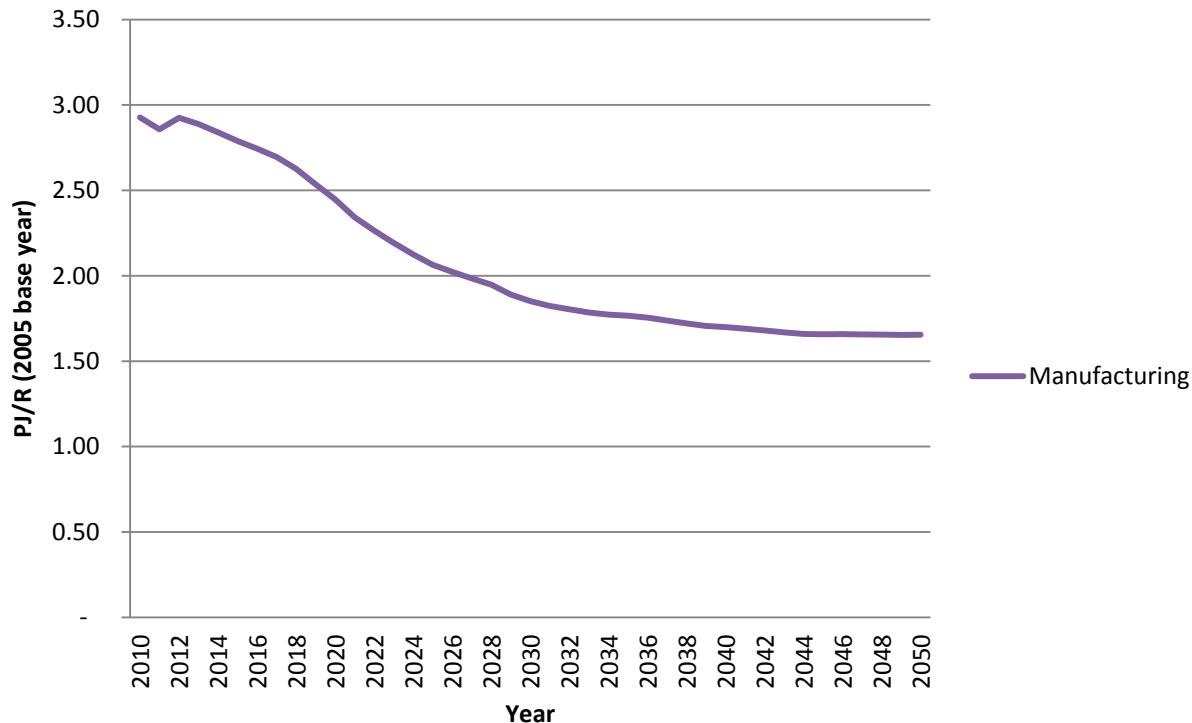


Source: Model Output



MANUFACTURING SECTOR INTENSITY

Manufacturing Energy Consumption/Gross Value Added)

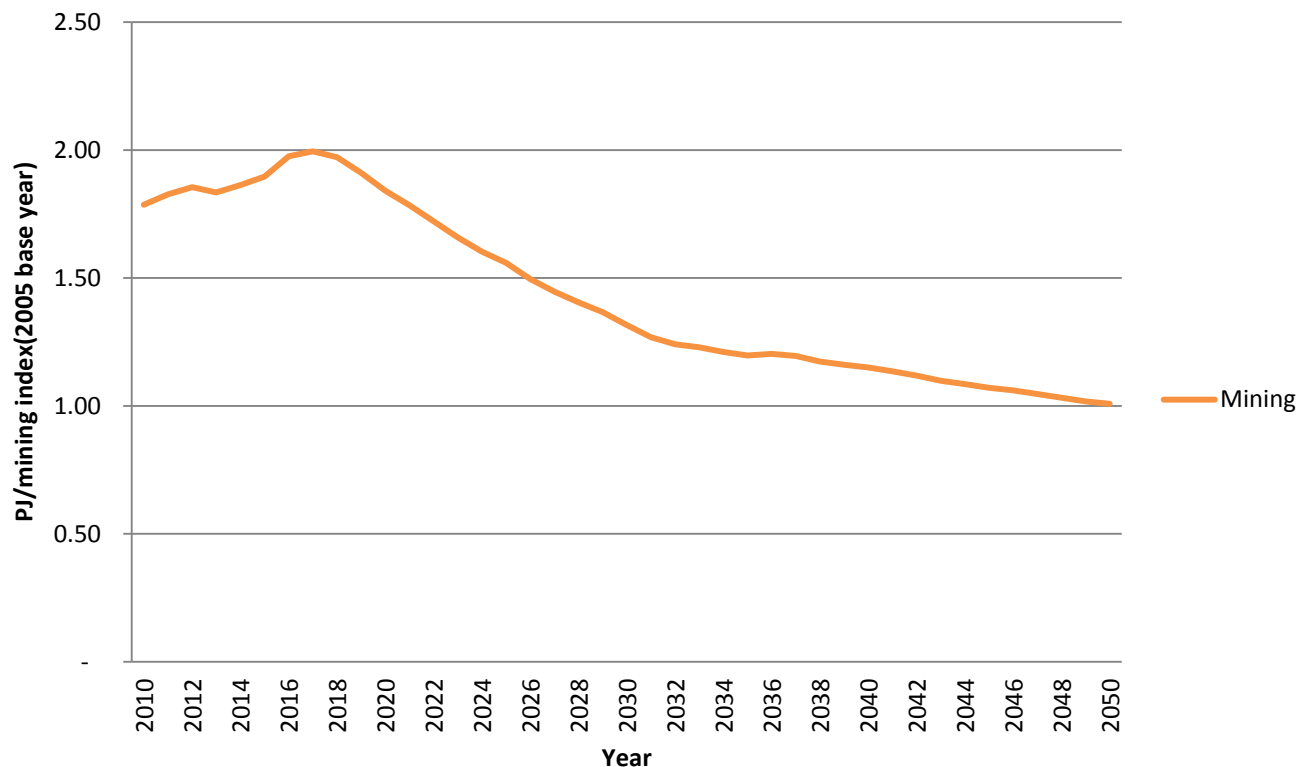


Source: DoE Analysis



MINING SECTOR INTENSITY

Mining Sector Energy Consumption/per Mining index

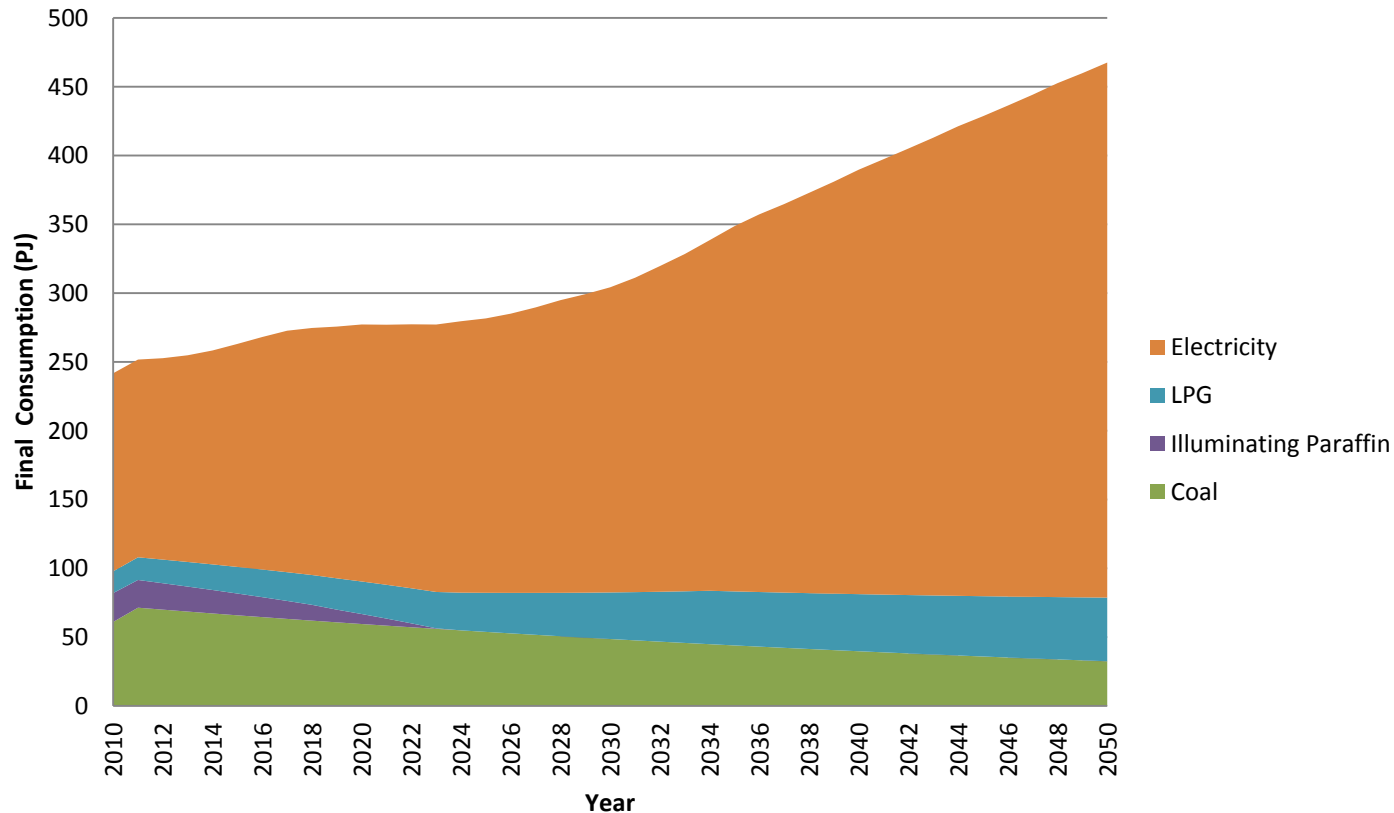


Source: DoE Analysis



RESIDENTIAL SECTOR

Total Energy Demand

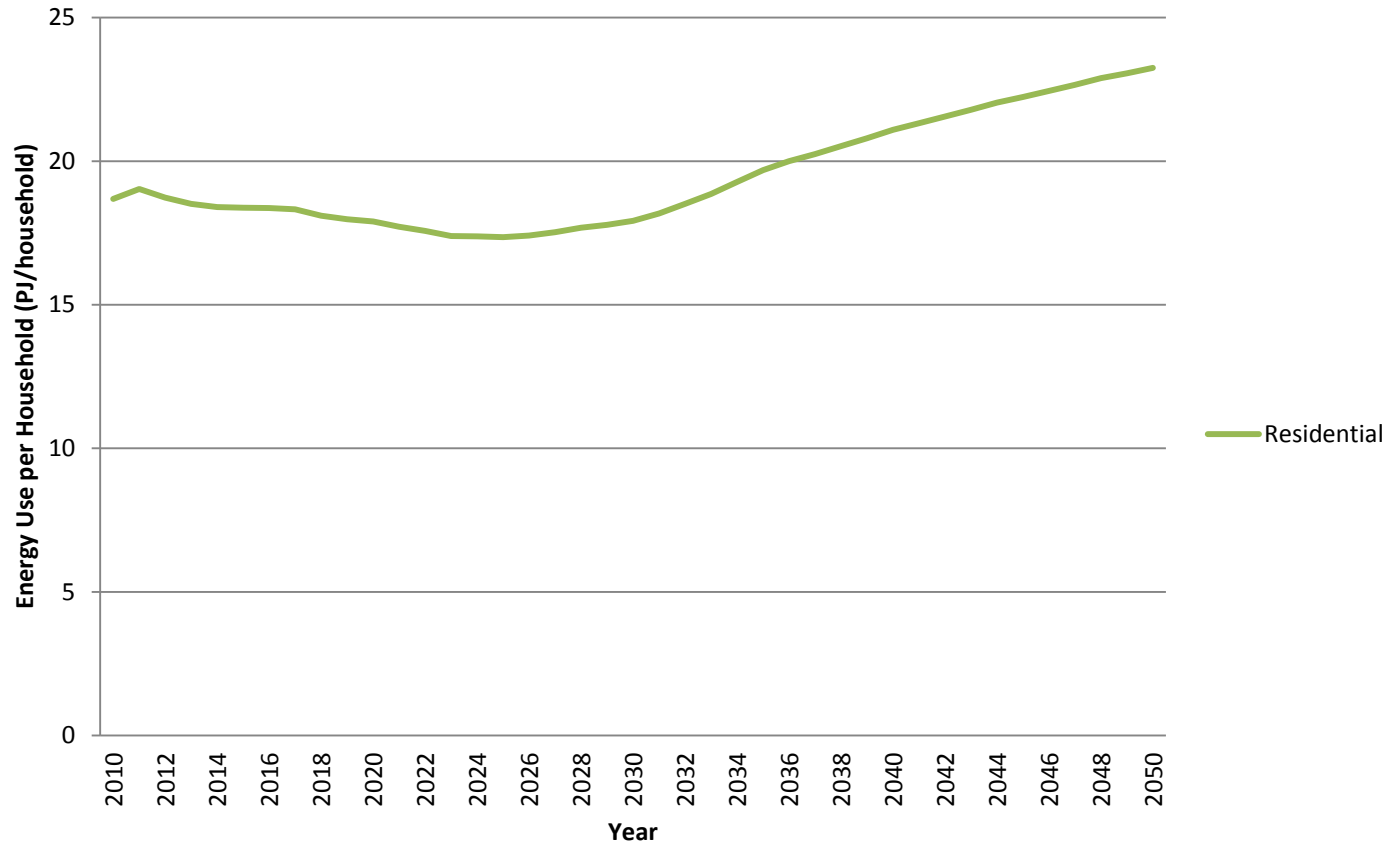


Source: Model Output



RESIDENTIAL SECTOR INTENSITY

Residential Energy Use Per Household

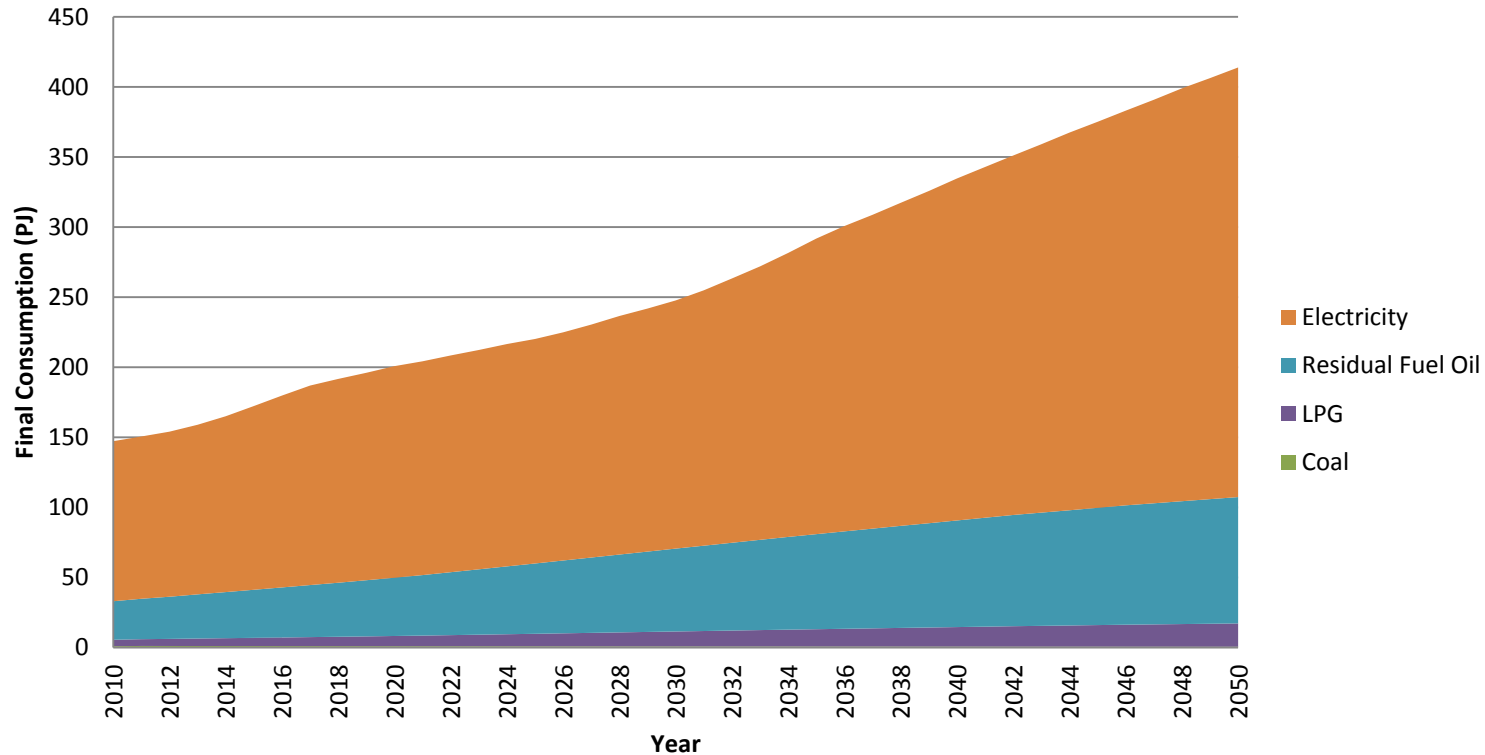


Source: DoE Analysis



COMMERCIAL SECTOR

Total Energy Demand

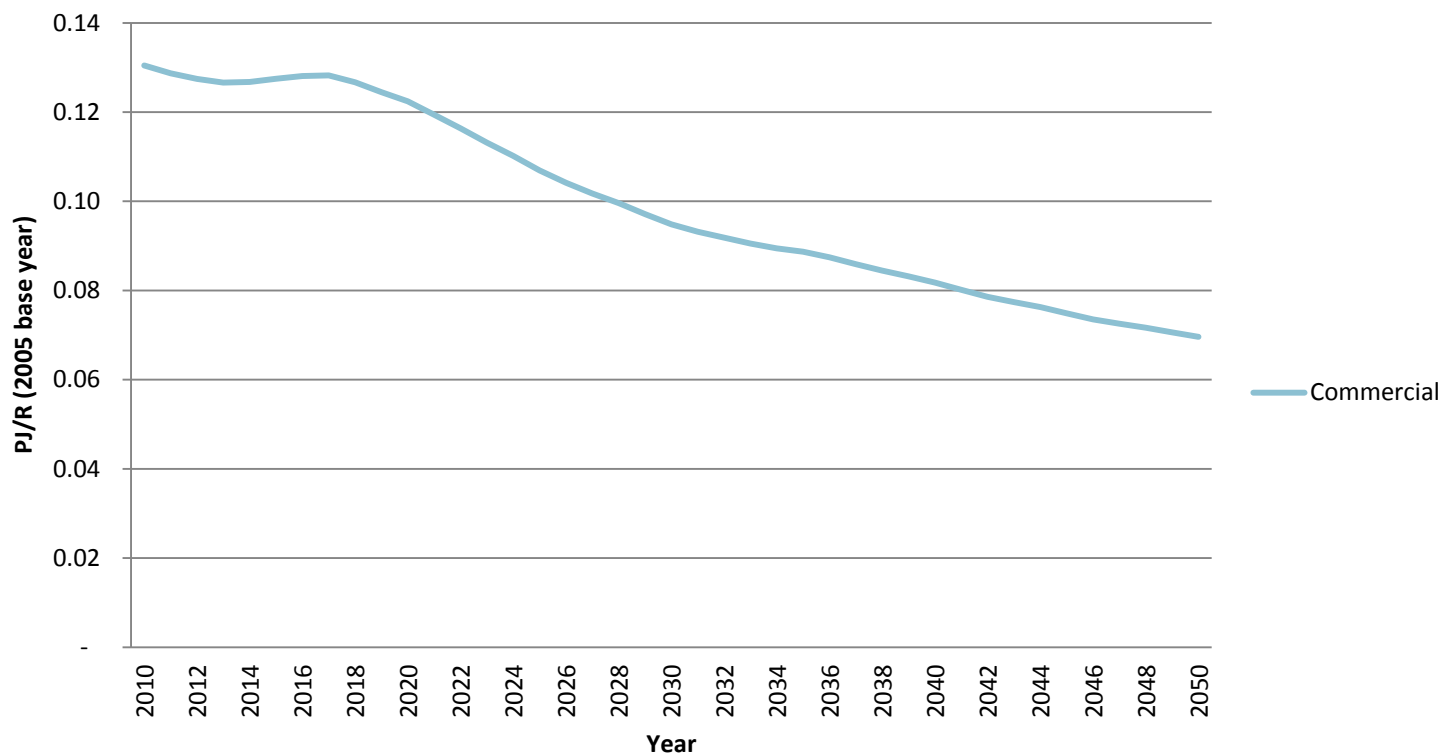


Source: Model Output



COMMERCIAL SECTOR INTENSITY

Commercial Sector Energy Consumption/per Gross Value Added)

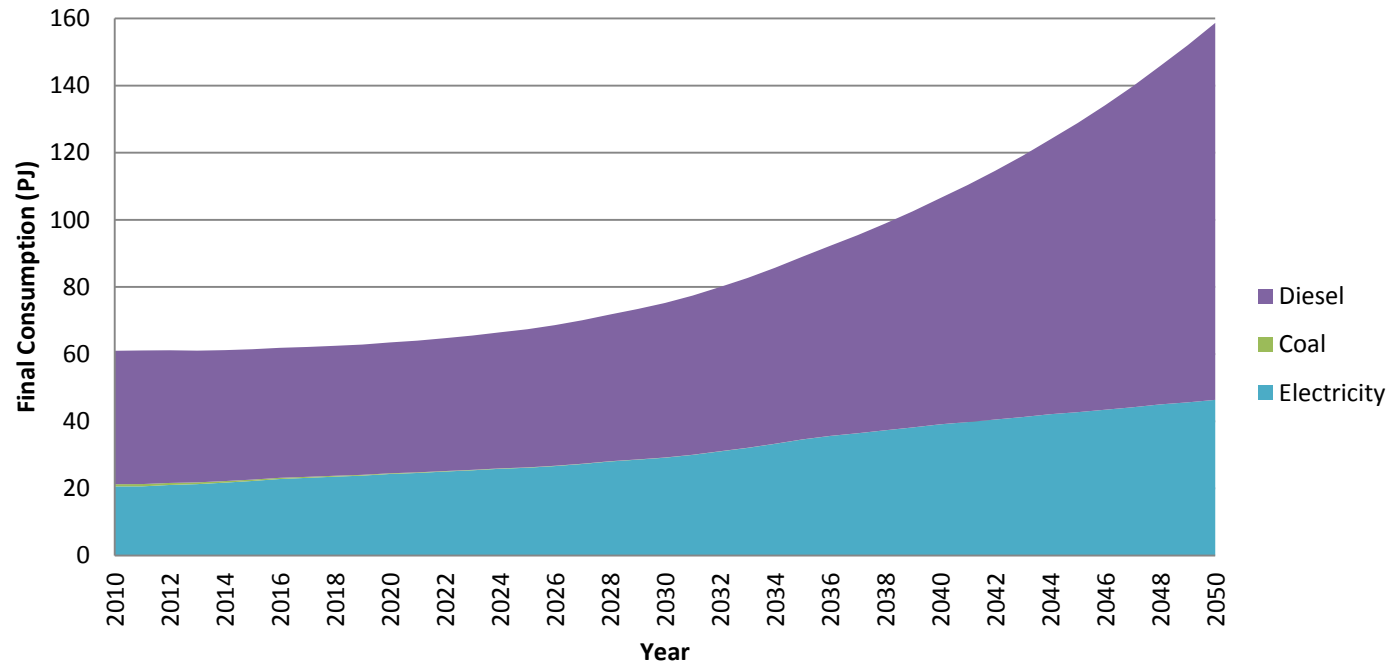


Source: DoE Analysis



AGRICULTURAL SECTOR

Total Demand

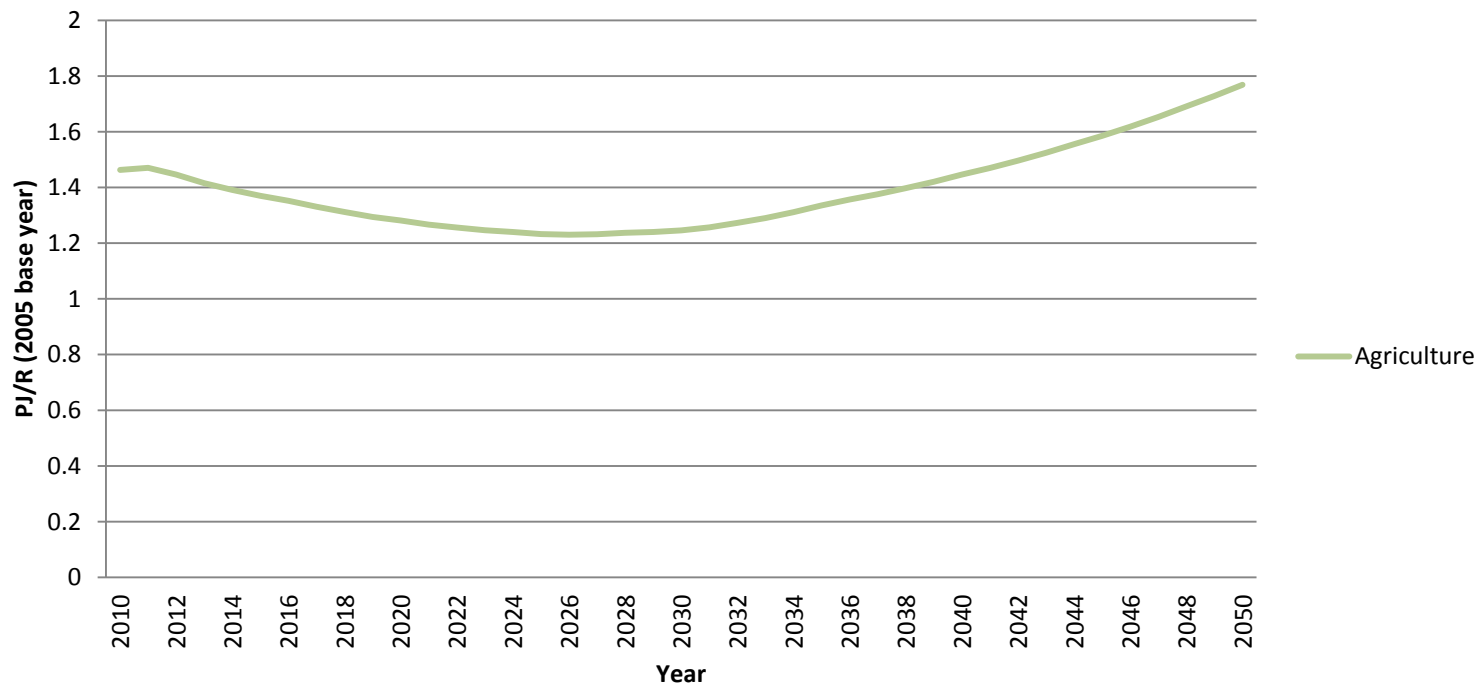


Source: Model Output



AGRICULTURAL SECTOR INTENSITY

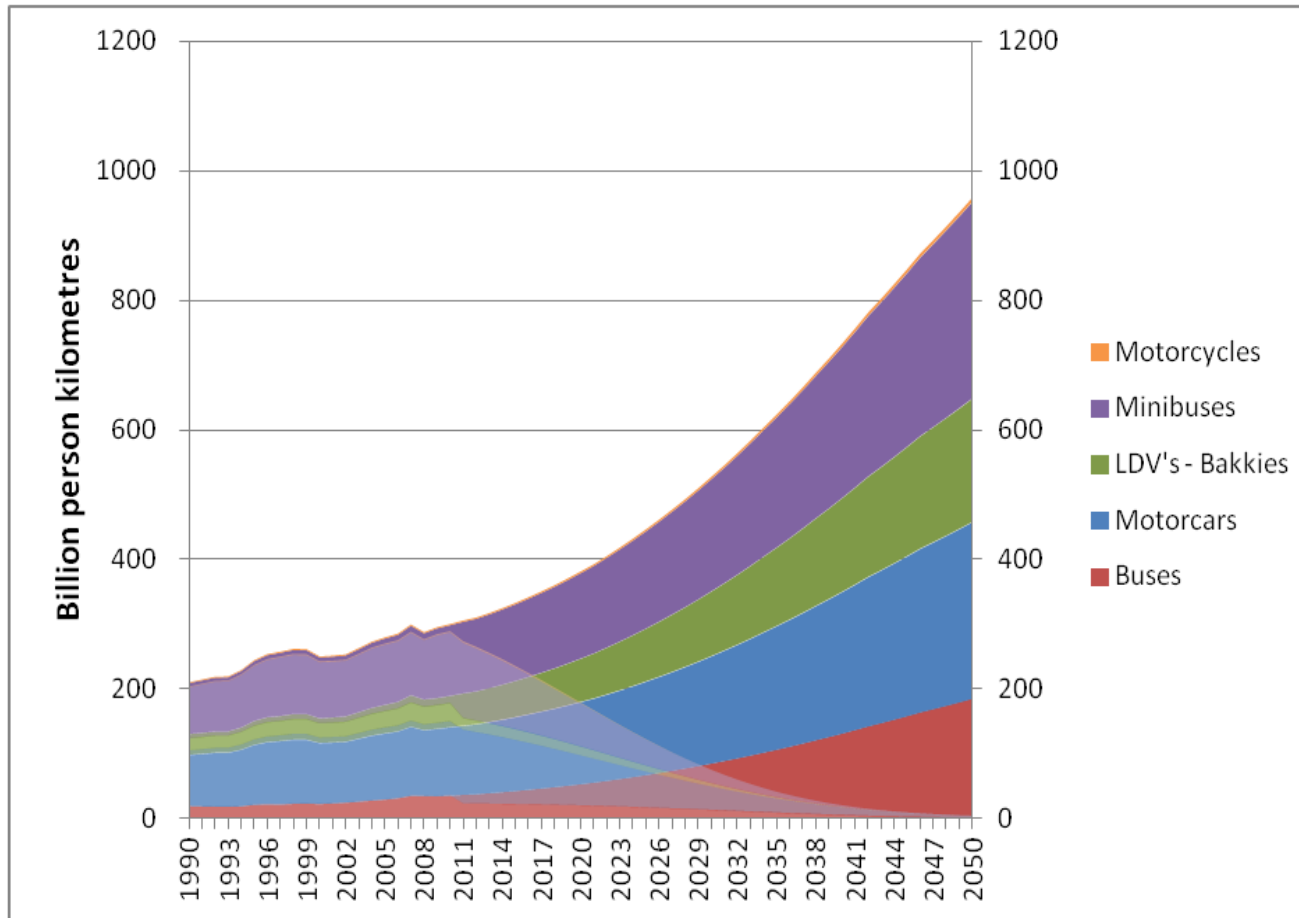
Agricultural Sector Energy Consumption/per Gross Value Added



Source: DoE Analysis



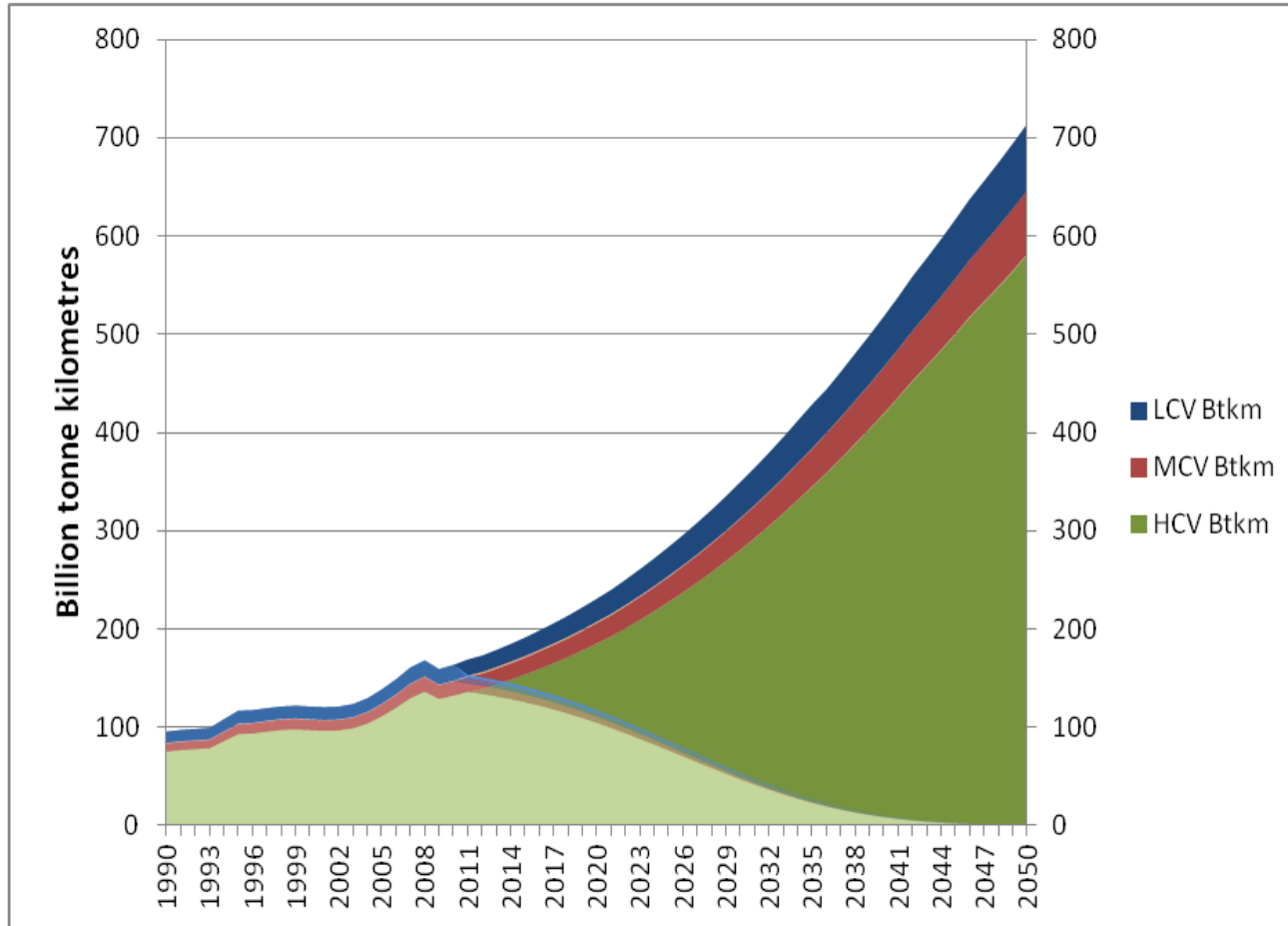
TRANSPORT - PASSENGER



Source: Model Output



TRANSPORT - FREIGHT



Source: Model Output



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THANK YOU