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Energy
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 _i /S _p	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	ε*(S _i /S _p)	0.0714	0.0000	0.0000	0.5274
	Group weight *real return	ε*(S _i /S _p)*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	η*(I _j /S _t)		-0.6108		
	Group weight *real return	η*(I _j /S _t)*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%			

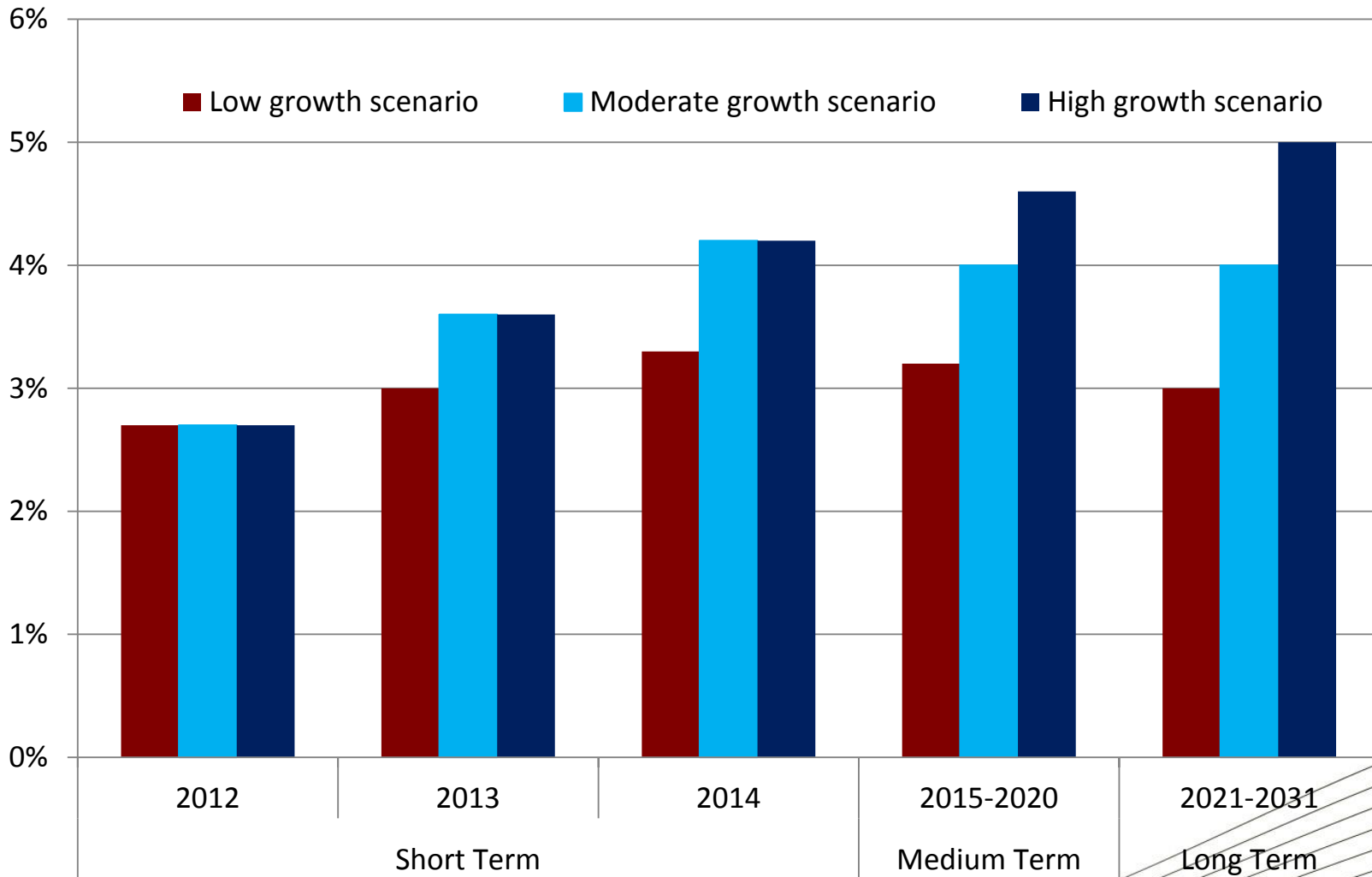
Note: need to determine whether foreign investment and **government investment** crowds-out private investment

ECONOMIC GROWTH



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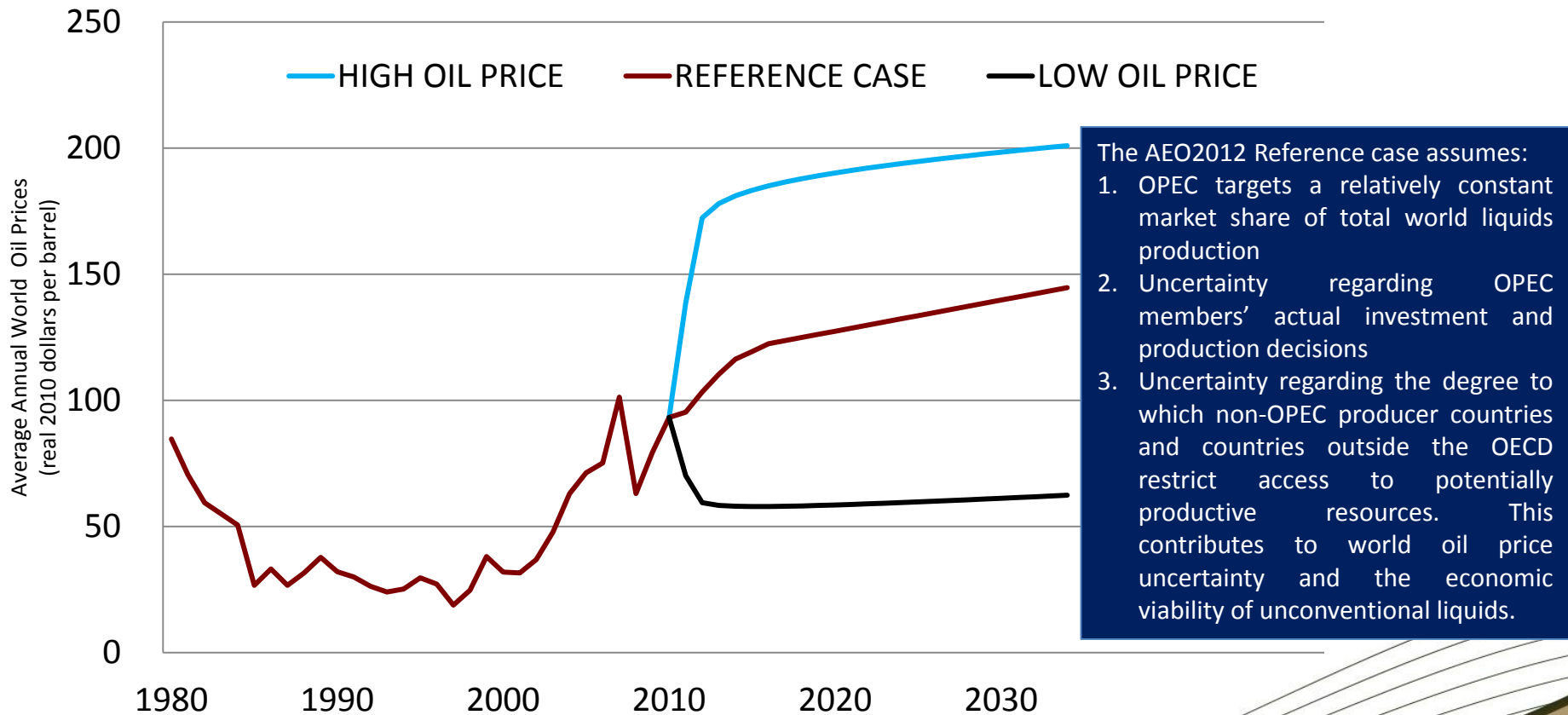
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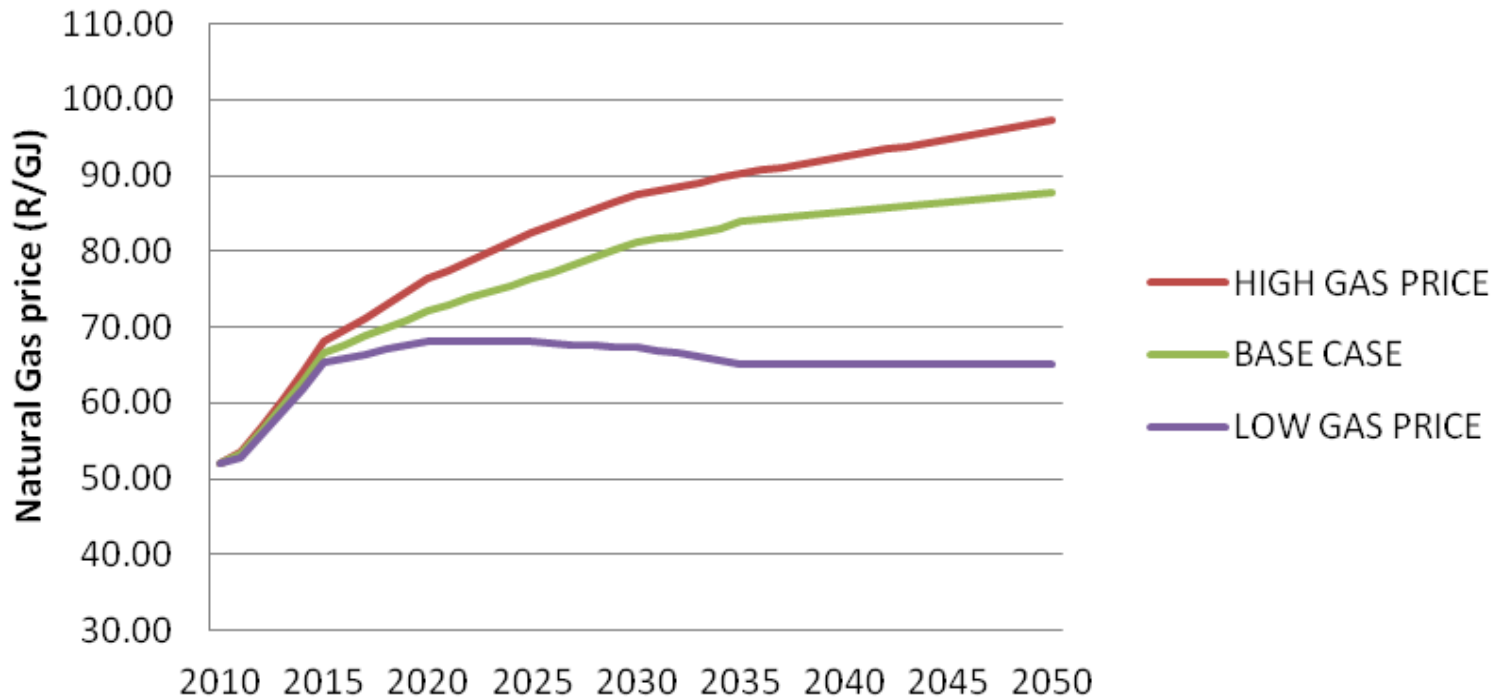


GLOBAL OIL PRICES

Average World Annual World Oil Price



PROJECTED NATURAL GAS PRICE

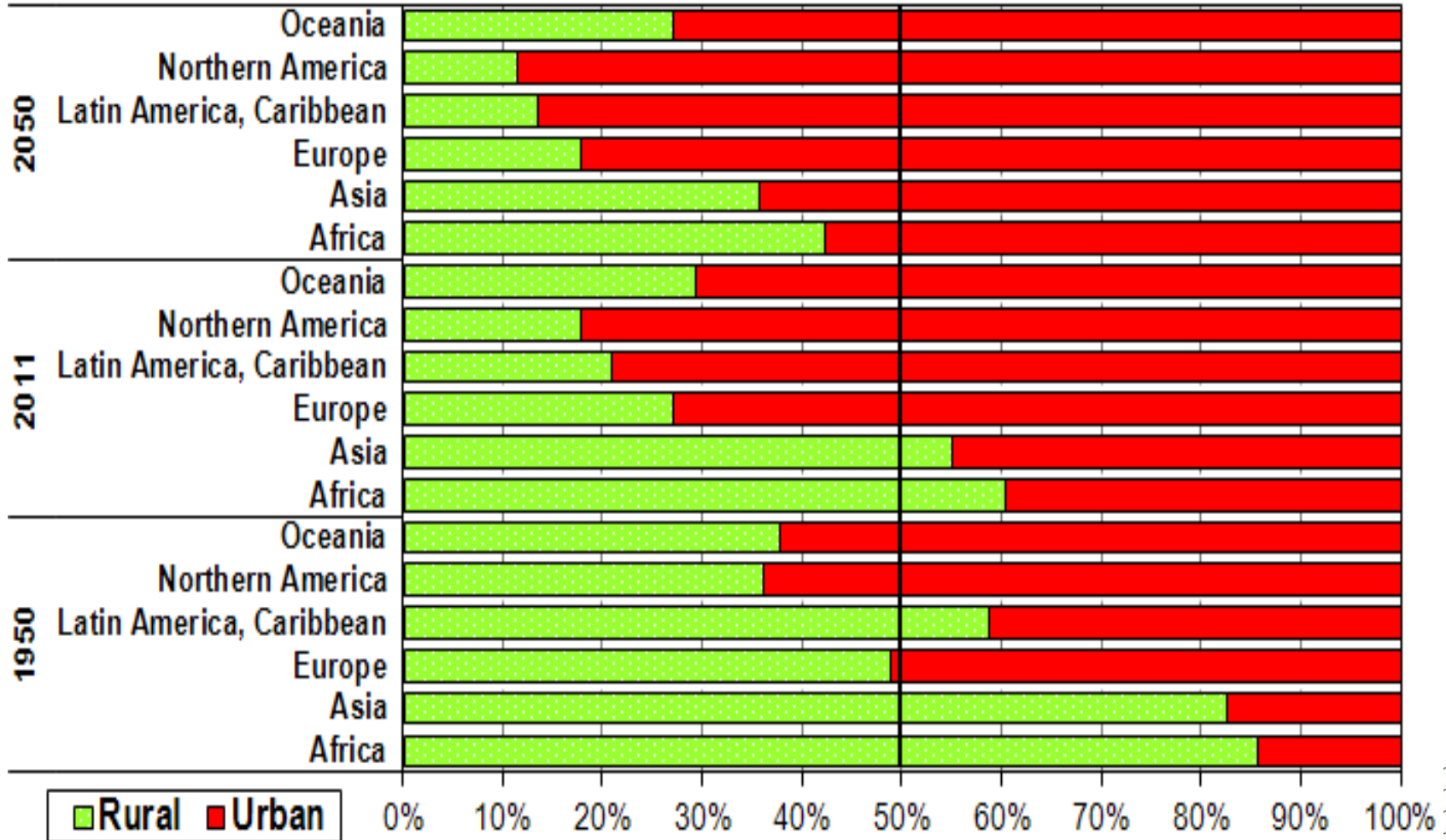


The **Base Case** natural gas price projections are based on the “**New Policies Scenario**” projections for **average gas import prices in Europe** in the 2011 World Energy Outlook

- 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’



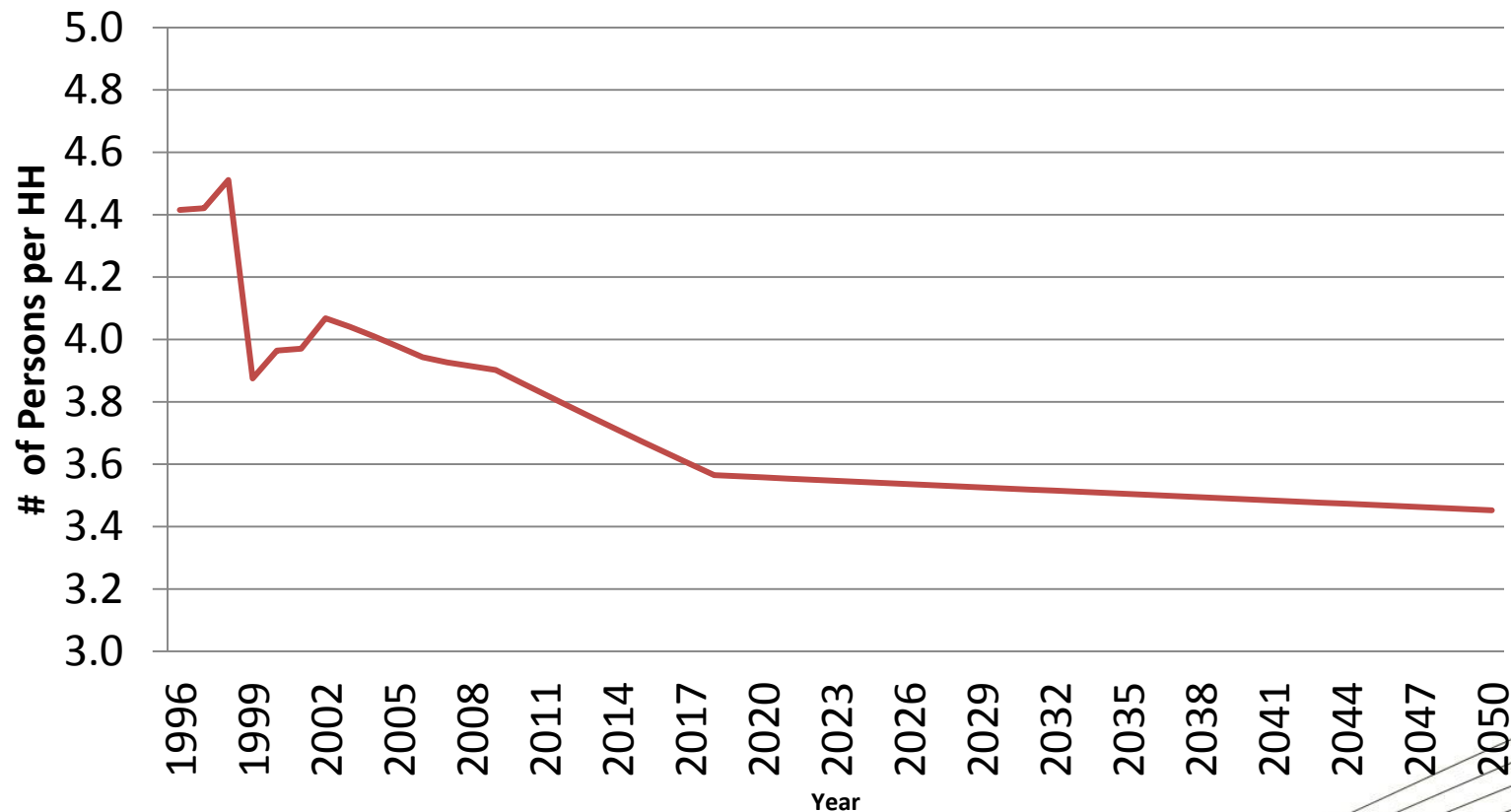
DEMOGRAPHIC ASSUMPTIONS





DEMOGRAPHIC (2)

Number of persons per household

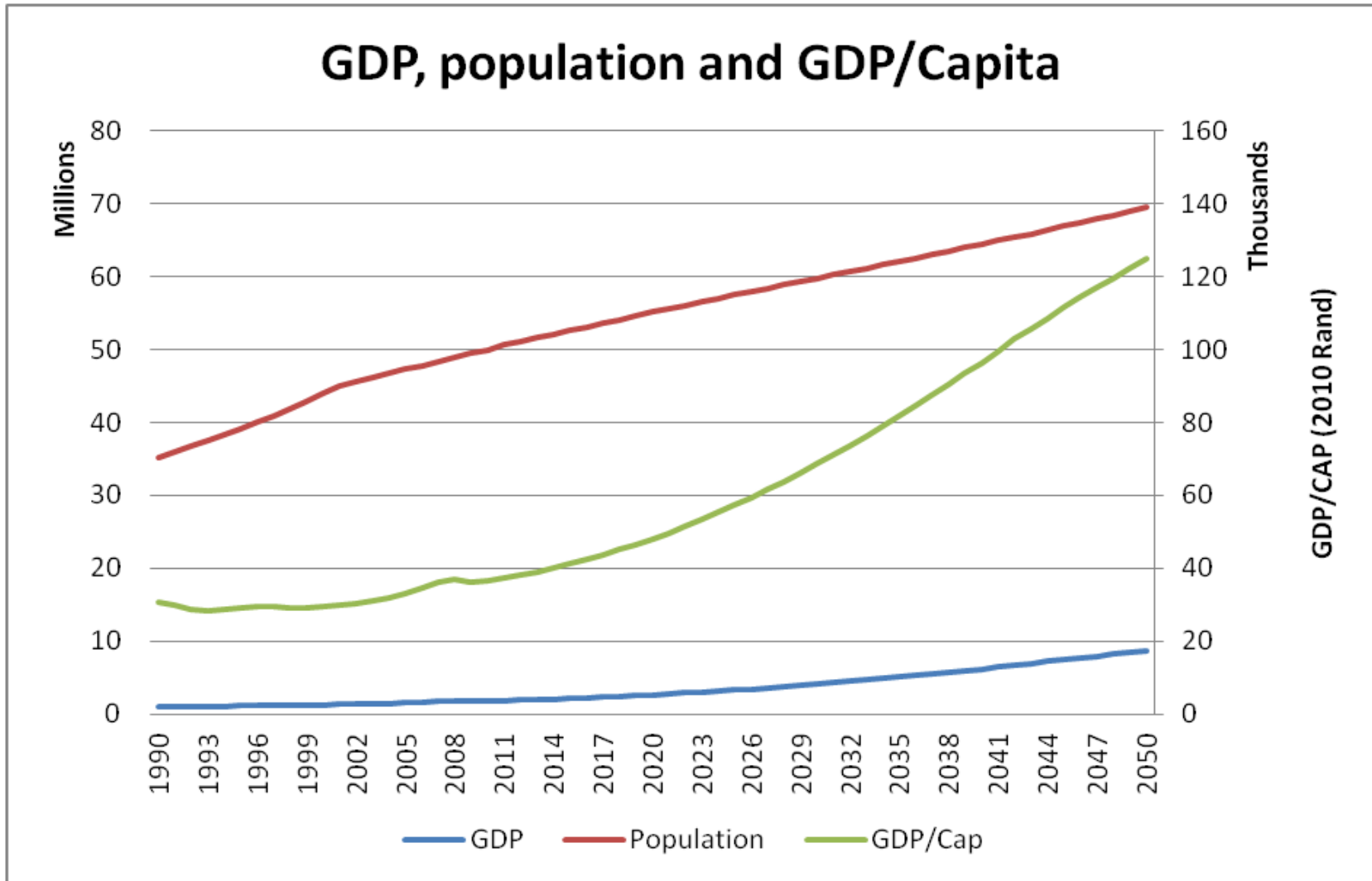


DEMOGRAPHIC (3)



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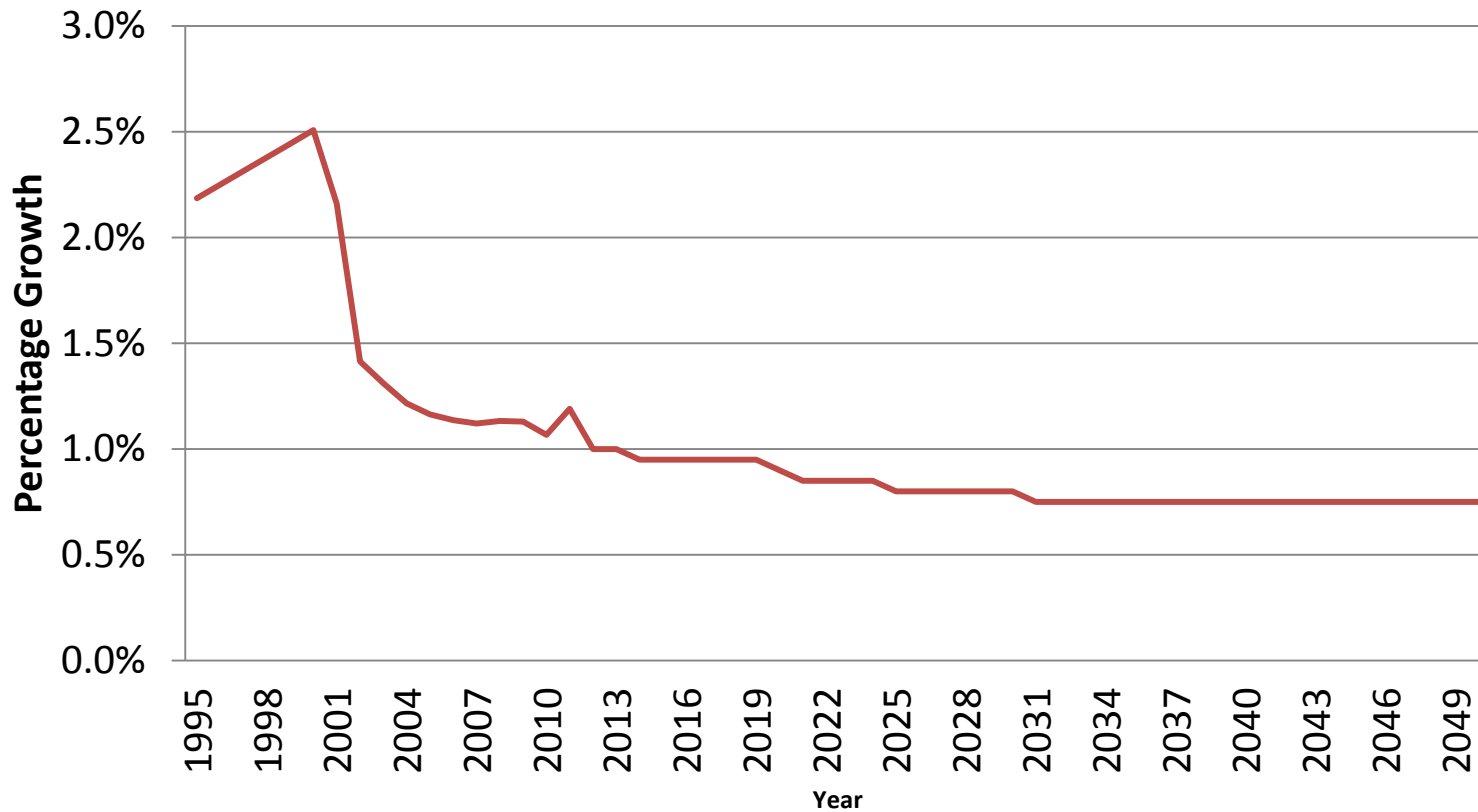
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DEMOGRAPHIC (4)

Population Growth





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DEMAND MODEL OUTPUTS

Dr. Rebecca Maserumule
Demand Modelling Specialist

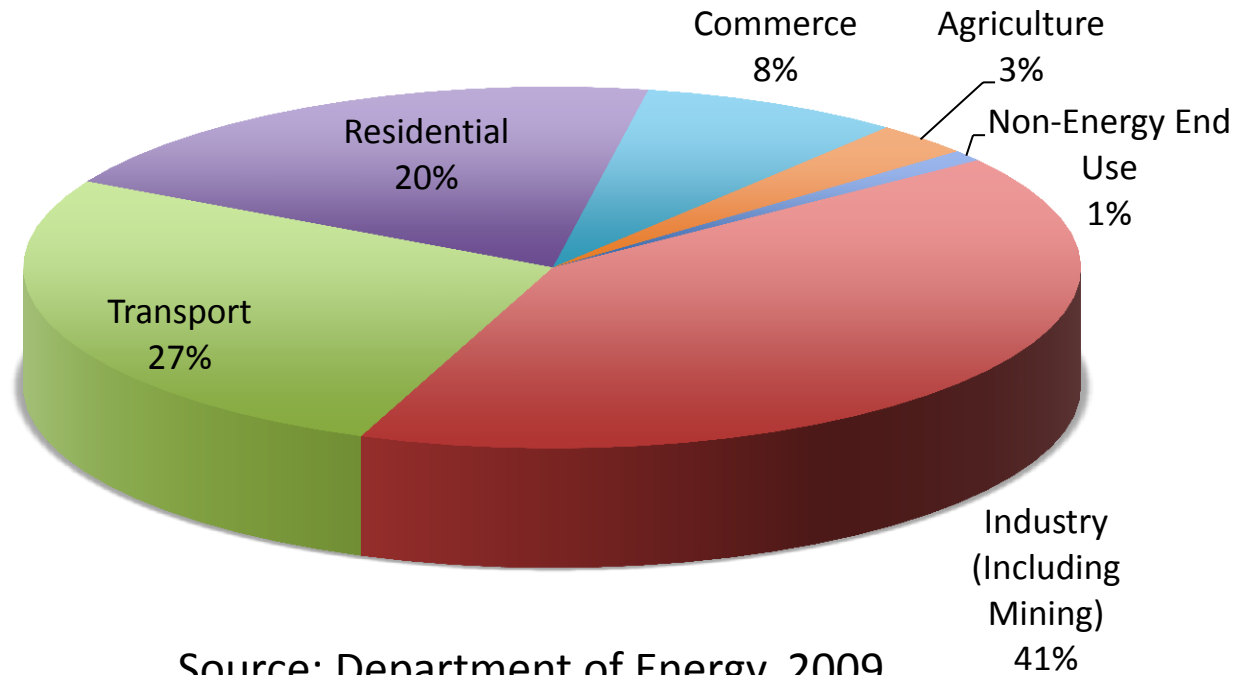


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- MACROECONOMIC ASSUMPTIONS
- **DEMAND MODEL OUTPUTS**



FINAL ENERGY CONSUMPTION



Source: Department of Energy, 2009

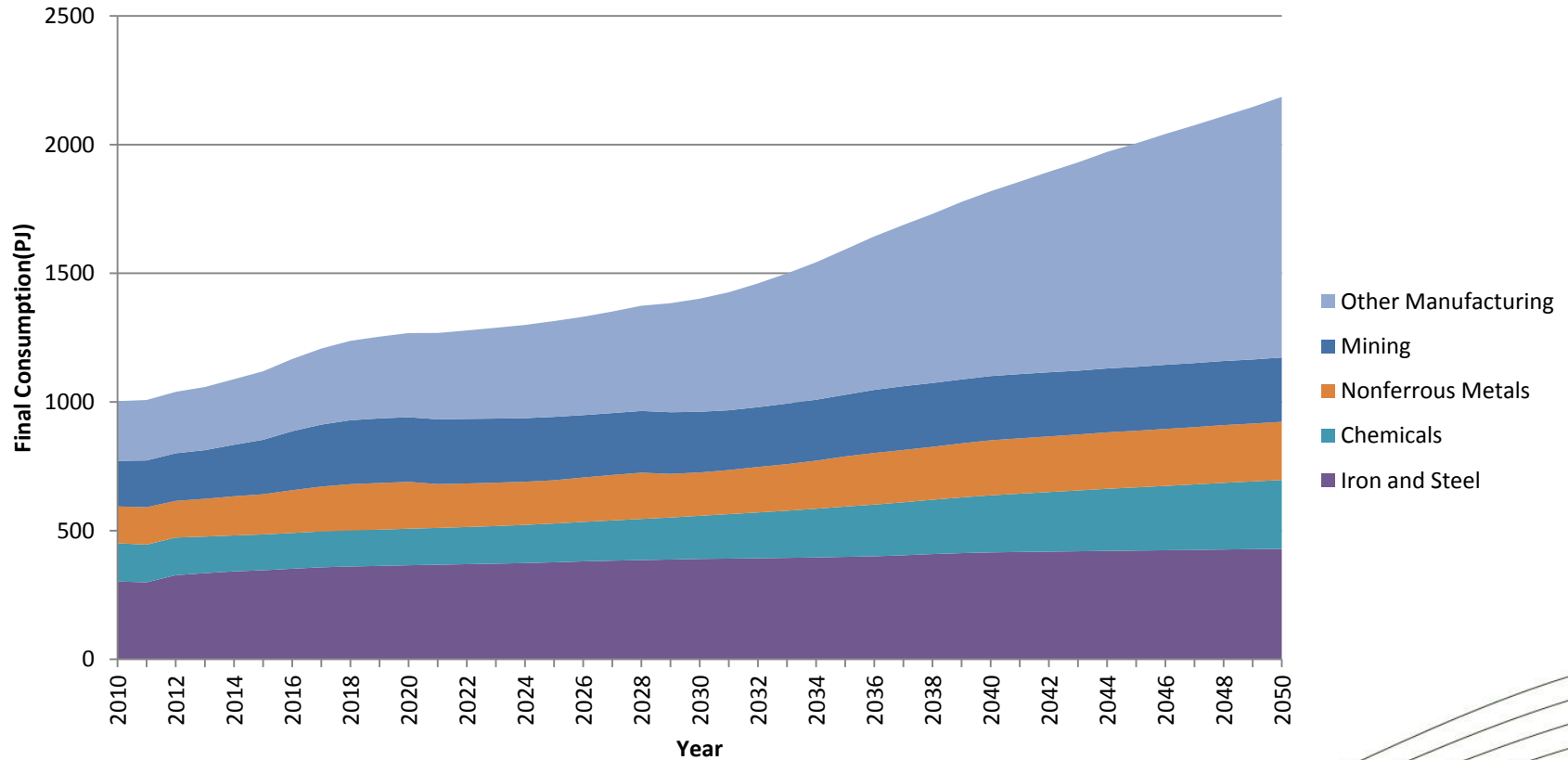
INDUSTRIAL SECTOR



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Total Energy Demand

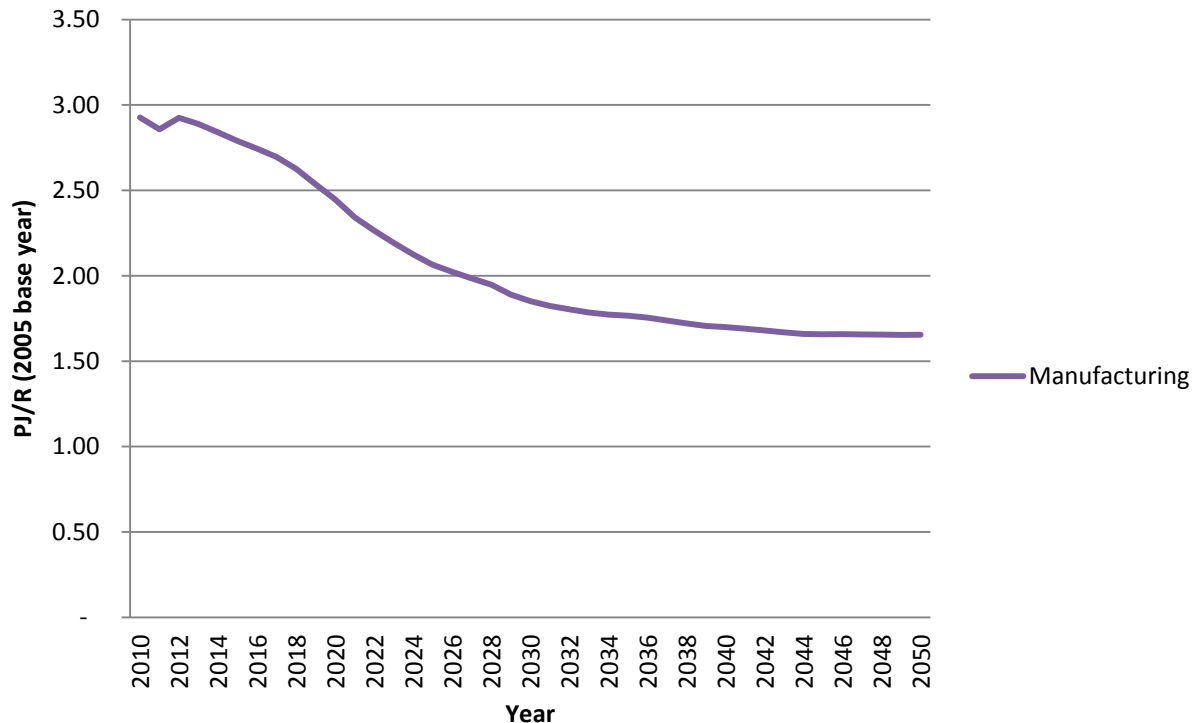


Source: Model Output



MANUFACTURING SECTOR INTENSITY

Manufacturing Energy Consumption/Gross Value Added)

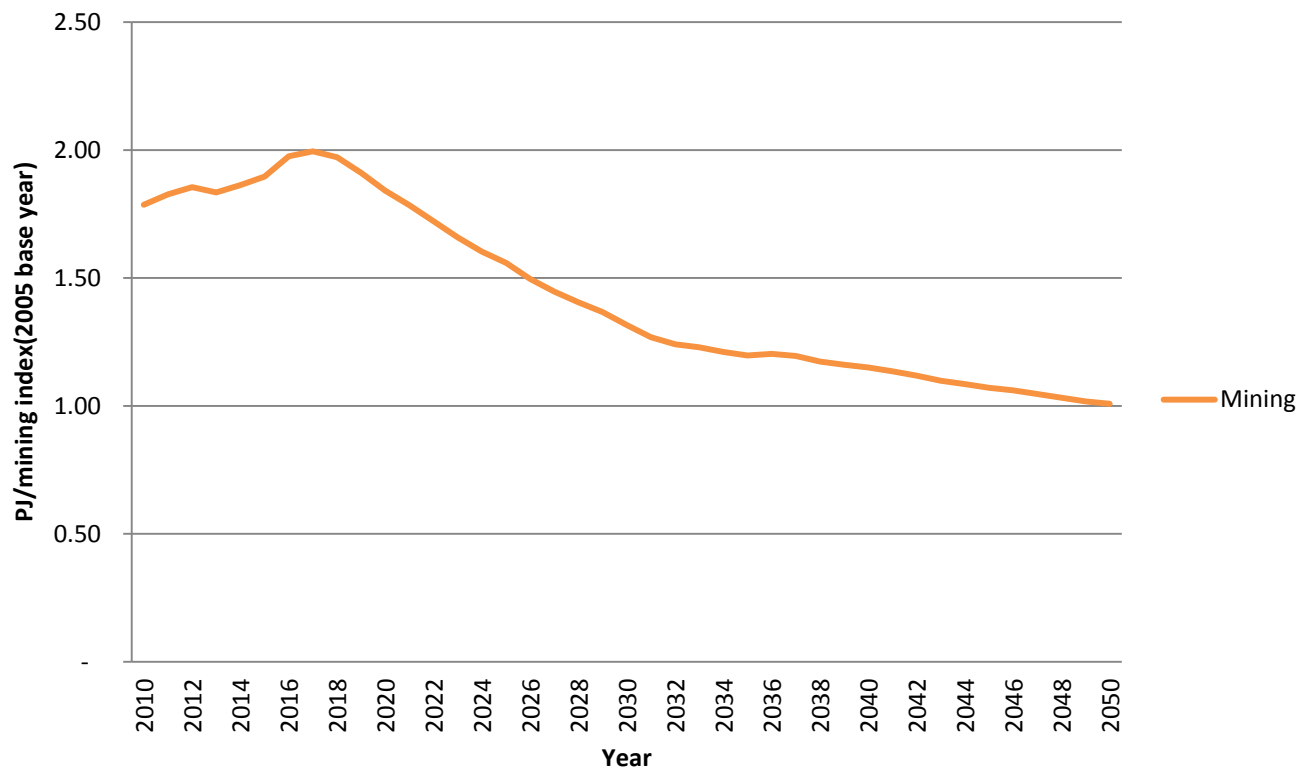


Source: DoE Analysis



MINING SECTOR INTENSITY

Mining Sector Energy Consumption/per Mining index

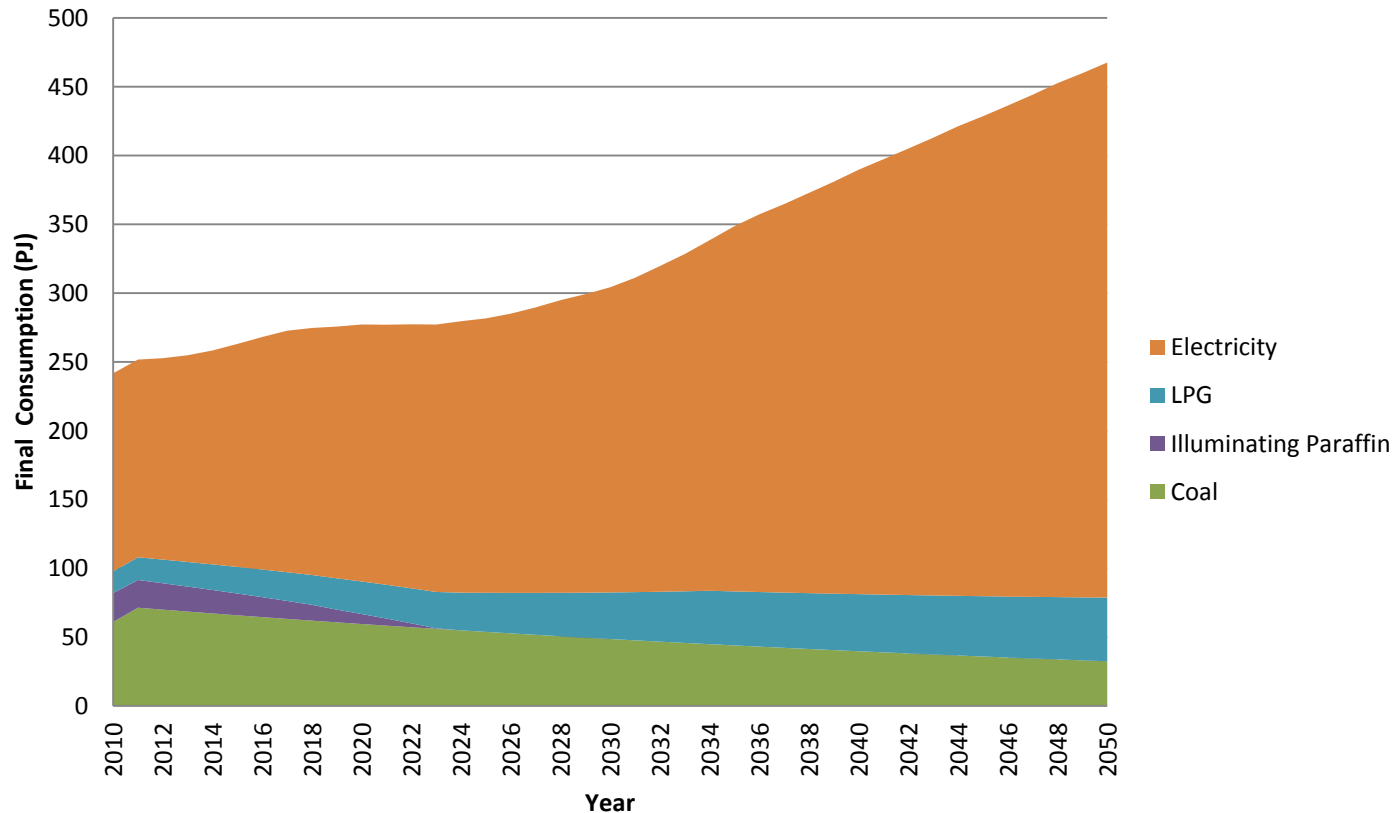


Source: DoE Analysis



RESIDENTIAL SECTOR

Total Energy Demand

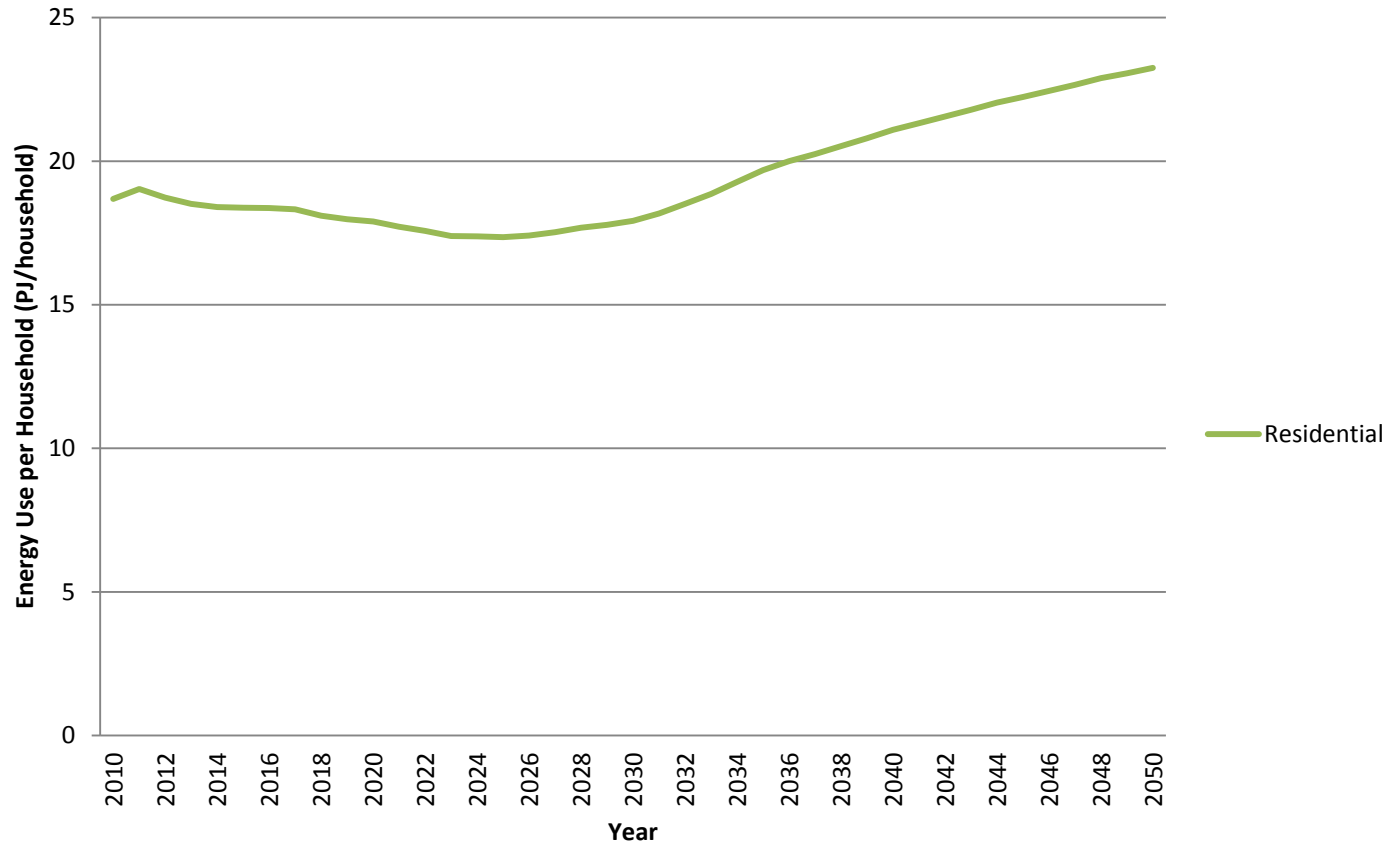


Source: Model Output



RESIDENTIAL SECTOR INTENSITY

Residential Energy Use Per Household

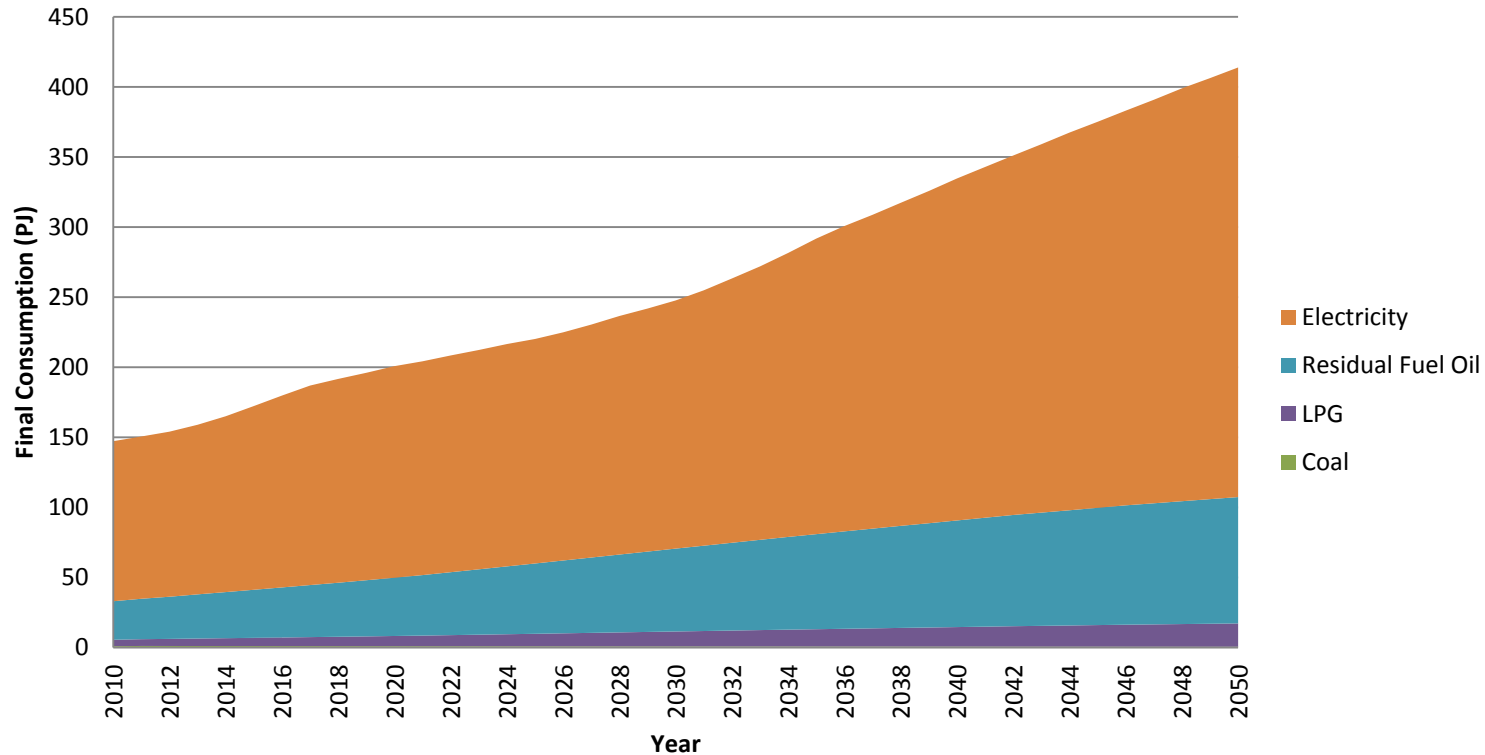


Source: DoE Analysis



COMMERCIAL SECTOR

Total Energy Demand

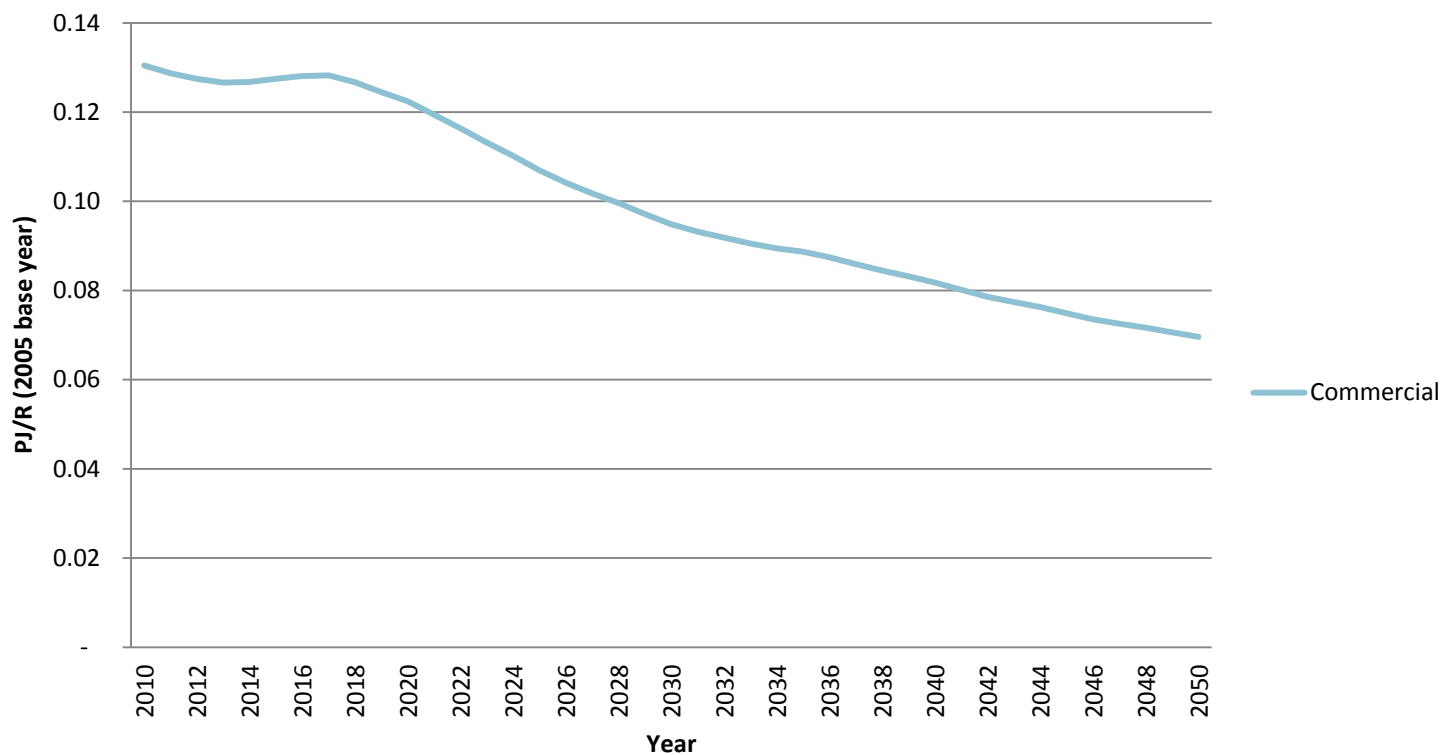


Source: Model Output



COMMERCIAL SECTOR INTENSITY

Commercial Sector Energy Consumption/per Gross Value Added)

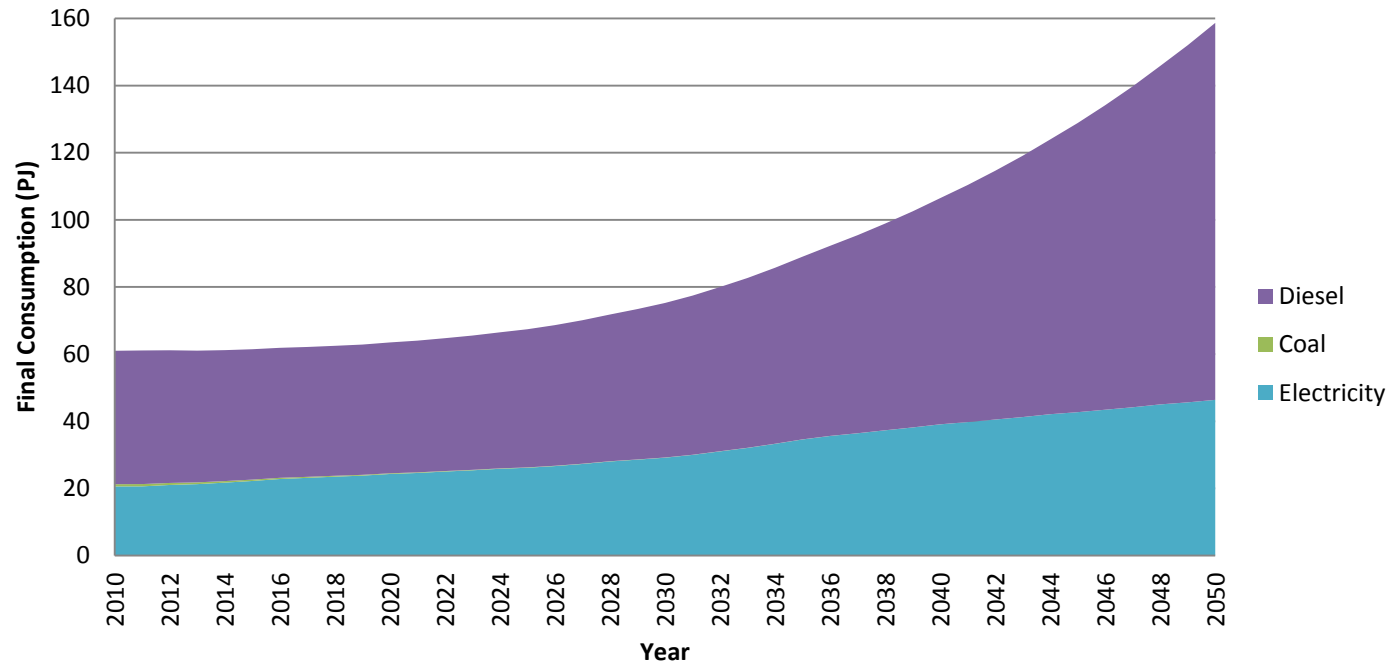


Source: DoE Analysis



AGRICULTURAL SECTOR

Total Demand

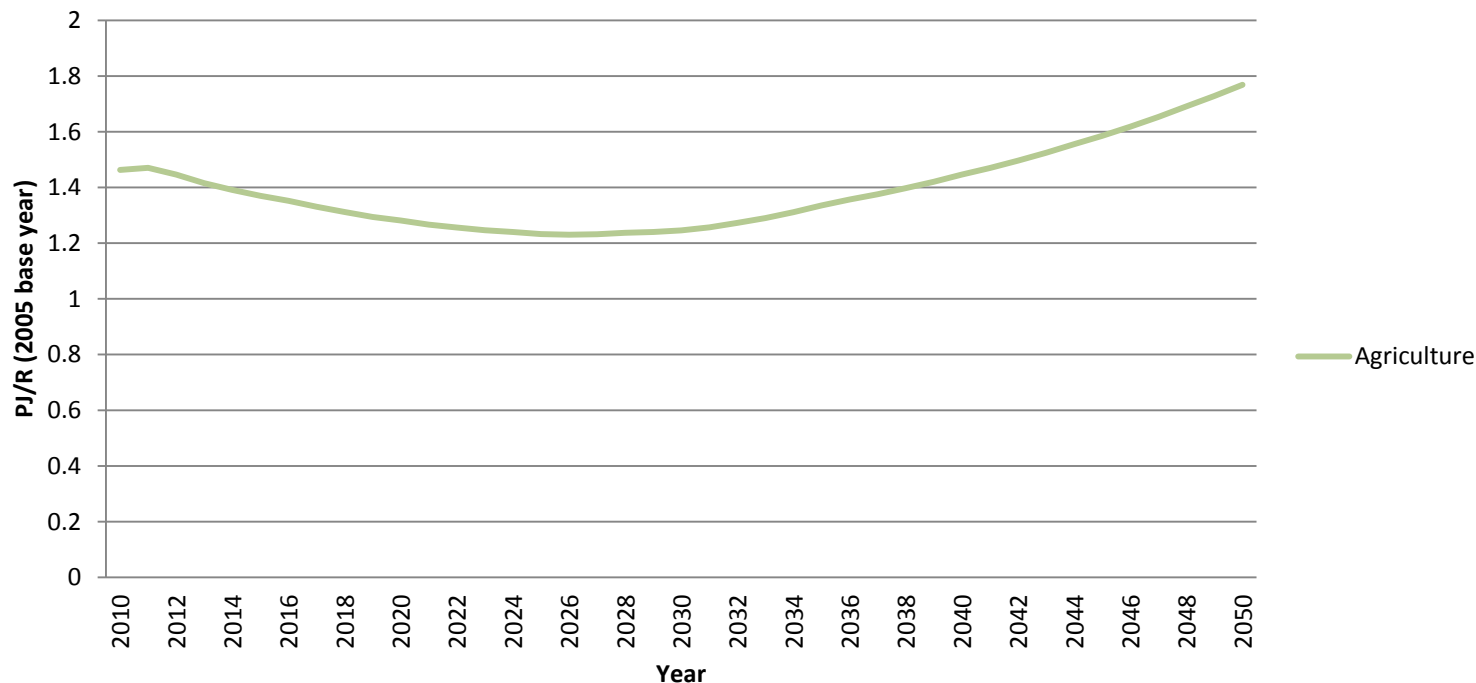


Source: Model Output



AGRICULTURAL SECTOR INTENSITY

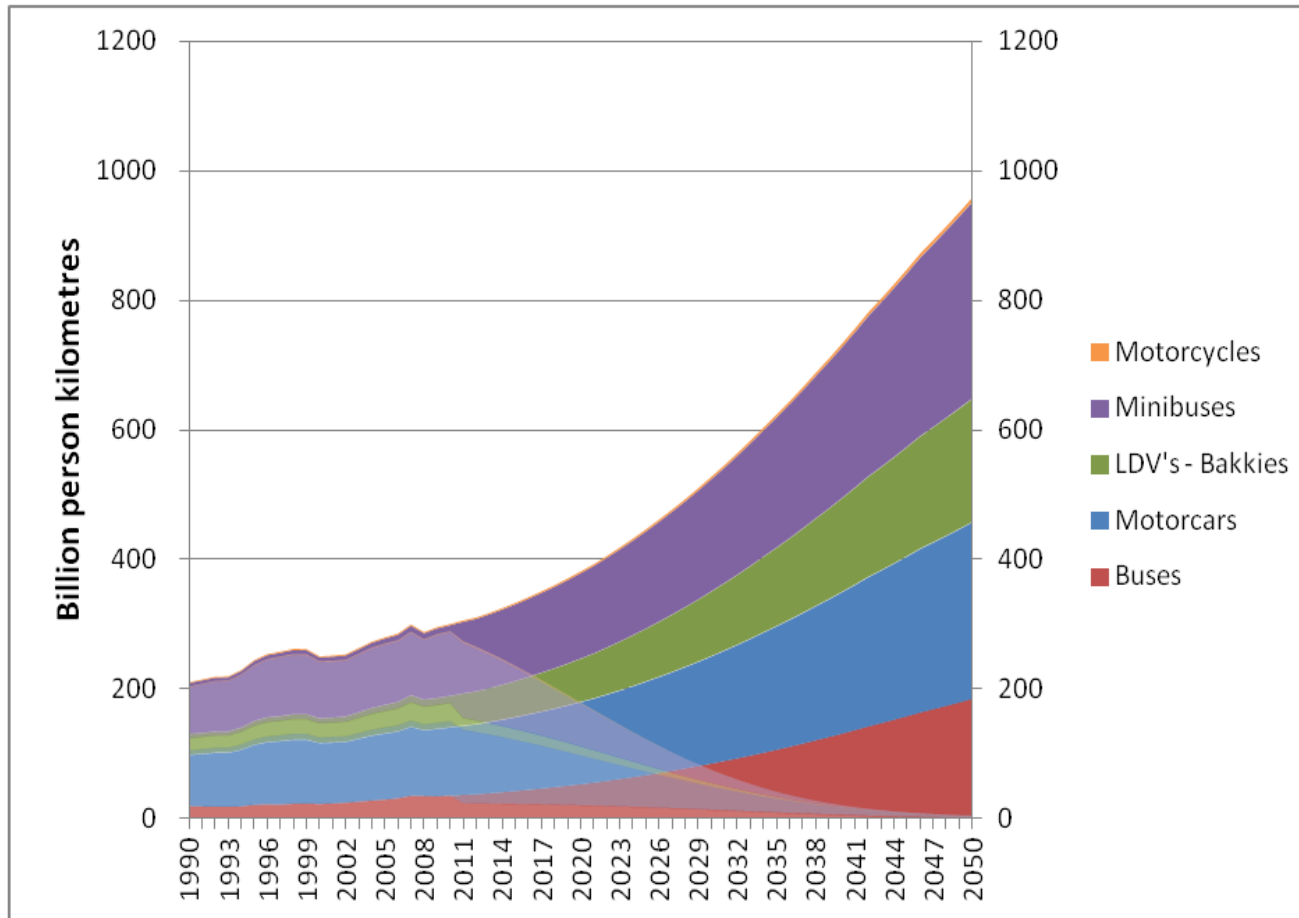
Agricultural Sector Energy Consumption/per Gross Value Added



Source: DoE Analysis



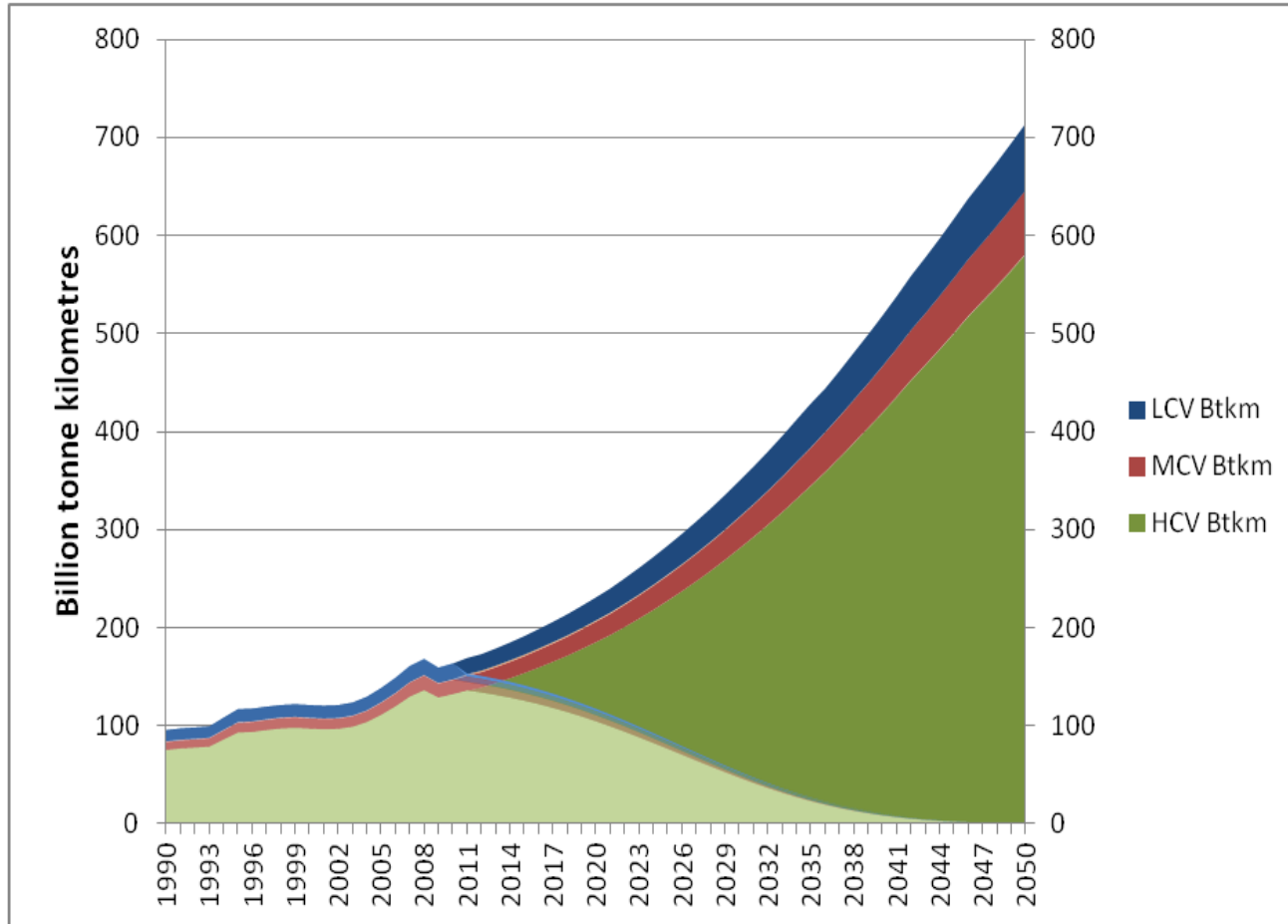
TRANSPORT - PASSENGER



Source: Model Output



TRANSPORT - FREIGHT



Source: Model Output



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THANK YOU