

Broadband

Employment Growth from Given Level of Broadband Stimulus	£5 Billion Model	SME Jobs (13)
Total additional investment (per year) (1)	£5,000,000,000.00	
% Capitalized Labor in Telephone Plant (2)	28%	
% Capitalized Labor in Installing Fiber Optic Plant (3)	50%	
£ Amount of Labor Needed to Implement the Broadband Investment (4)	£2,225,000,000.00	
Average Loaded Wage of Telecom Industry Worker (5)	£35,824.73	
# Direct Telecommunications Jobs Created from Given BB Investment	62,108	
(Leakage of telecommunications jobs through outsourcing etc) (6)	(4,664)	
# U.K. Jobs Created Directly through telecommunications	57,444	11,144
Cost of Capital Equipment to Deploy Broadband at Given Investment Level	£2,775,000,000.00	
% Amount of Capital Equipment Expense that goes to Labor (Employee Compensation) (7)	34.9%	
\$ Amount towards Labor for Capital Equipment	£968,475,000.00	
Average Loaded Wage of Communications Equipment Mfg. Worker (8)	£39,027.21	
# Jobs Created Directly through Manufacturing of Required Capital Equipment	24,815	
(Leakage of Mfg. Jobs Through Imports of Capital Equipment) (9)	(5,807)	
# U.K. Jobs Created Directly through Manufacturing of Required Capital Equipment	19,009	11,271
Total Effect of Broadband Investment in Direct New Jobs	76,452	22,415
Employment Multiplier of Telecom Industry Jobs (10)	2.78	
Direct, Indirect and Induced Jobs Created by Direct Telecommunications Jobs Created	159,695	
Employment Multiplier of Electrics and Optical Industry Manufacturing Jobs (11)	2.70	
Direct, Indirect and Induced Jobs Created by Comm. Equip. Manufacturing Jobs Created	51,298	
Total direct jobs	76,452	22,415
indirect and induced	134,541	37,189
Total Direct, Indirect and Induced Created from Direct Jobs Created	210,993	
Network Multiplier Effect (12)	0.33	
Jobs Created Throughout the Economy by the Network Multiplier Effect	69,628	34,257
Total U.K. Jobs Created by Given Level of Broadband Investment	280,621	93,860

Notes:

(1) Assumes 75% of broadband investment is allocated to high-speed fiber optic deployment (e.g. FTTH - Fiber to the Home) and 25% of investment goes to phone- or cable-based DSL-level broadband. (Fiber generally has a more intensive labor component than broadband delivered through telephone networks because telephone and cable plant (lines) already exists for the most part and are retrofitted with equipment to provide broadband service.)

(2) "Telephone plant requirements consist of 28% capitalized labor." - Stephen B. Pociask, TeleNomic Research LLC, "Building a Nationwide Broadband Network: Speeding Job Growth" February 25, 2002, page 5.

(3) Corning Corporation (2008) <lv.pennnet.com/display_article/219598/13/ARTCL/none/none/1/Optimization-of-FTTH-passive-optical-networkscontinues>

(4) In this model, 55.5% of the cost of deploying broadband networks is in capital equipment, and 44.5% is in labor.

(5) UK Office of National Statistics (ONS), Annual Survey of Hours and Earnings (ASHE), Composition of workforce in the Telecom Industry (NAICS 517100, US) <www.statistics.gov.uk/about/methodology_by_theme/ashe.asp>

(6) (ONS, 2008) A certain number of jobs created through the increased demand for telecommunications and computer equipment needed to deliver broadband will leak out of the economy because they will be filled by computer manufacturing or assembly plants abroad. We estimate that this will be the case with 7.5% of the jobs, based on dividing the total imports of goods by the gross output of the telecom sector in 2006.

(7) Compensation to employees represents 34.9% of the aggregate cost of the "Computer and Electronic Parts" industries according to the Bureau of Economic Analysis in the US. We assume a similar labour cost in the UK for broadband build-out.

(8) (ONS, 2008) Annual Survey of Hours and Earnings <www.statistics.gov.uk/about/methodology_by_theme/ashe.asp>.

(9) (ONS, 2008) A certain number of jobs created through purchase of capital equipment needed to deliver broadband will leak out of the economy because they will be filled by computer manufacturing or assembly plants abroad. We estimate that this will be the case with 23.4% of the jobs, based on dividing the total imports of goods by the gross output of the Electrical and Optics manufacturing sector in 2006.

(10) The employment multiplier for jobs in Telecommunications is used and adapted from Scottish data from 2004. As with all other employment we have compensated for the larger network effects in the UK economy compared to Scotland.

(11) The employment multiplier for jobs in Manufacturing of Electrical and Optical Equipment is used and adapted from Scottish data from 2004.

(12) Crandall, Jackson, and Singer in their study "The Effects of Ubiquitous Broadband Adoption on Investment, Jobs, and the U.S. Economy" find a broadband network effect of 1.17. While network effects do decline with the build out of networks and technology over time, nevertheless, given the fact that 40% of UK households still do not have broadband internet (and many of those that do have slow speeds), we still see significant opportunities for network effects from broadband to be realized. We have chosen a conservative multiplier of 0.33

(13) The share of small and medium enterprises (SME) is calculated with data from Department of Business Enterprise and Reform (BERR) <stats.berr.gov.uk/ed/sme/>

Intelligent Transportation Systems

Additional Investment Amount (per year)	£5,000,000,000			
Spending Breakdown Public Transport and Road Systems		Hardware	Software	Services
% Invested (1)		16.7%	41.7%	41.7%
£ Invested	£5,000,000,000	£833,333,333	£2,083,333,333	£2,083,333,333
Direct Labor Projections				
% Amount of Expense to Labor (2)		23.5%	32.7%	71.2%
£ Amount of Expense to Labor	2,360,416,667	£195,833,333	£681,250,000	£1,483,333,333
Total Cost of Labor (Wages + Benefits) (3)		£39,027	£38,000	£35,825
# Direct Jobs Created		5,018	17,928	41,405
Leakage Due to Imports (4)	(2,036)	(1,174)	(862)	0
Net Direct Jobs	62,314	3,844	17,065	41,405
Weighted Type II Employment Multiplier (Direct+Indirect+Induced)	2.27	2.78	2.60	2.08
Total = Direct+Indirect+Induced	141,222	10,686	44,385	86,152
Indirect + Induced Jobs	78,908	6,842	27,319	44,747
SME jobs, direct (5)	43,910	2,279	12,151	29,481
SME jobs, indirect and induced	52,753	3,827	19,449	29,477
Network Effect Multiplier	0.33			
# Jobs from Network Effect	47,074			
(SME jobs from Network Effect)	23,160			
Total SME jobs including network effects	119,823			
% SME jobs	63.6%			
Total Additional Jobs Created	188,296			

Notes:

- (1) We assume a mix of ITS investments with hardware costs as the minority component and the rest of the costs divided between software and installation/services.
- (2) Hardware and Software labour costs according to Annual Business Inquiry (ONS, 2008). Services approximated to same as US Healthcare IT share
- (3) (ONS, 2008) Annual Survey of Hours and Earnings. Average labour costs are multiplied with 1.25 for construction, 1.30 for manufacturing, and 1.35 for software to reach industry total cost of labour. www.statistics.gov.uk/articles/economic_trends/ET627_Chesson.pdf
- (4) (ONS, 2008) A certain number of jobs created through the increased demand for telecommunications and computer equipment needed to deliver broadband will leak out of the economy because they will be filled by computer manufacturing or assembly plants abroad. We estimate that this will be the case with 23.4% of the jobs in Electrical and Optical manufacturing, 4.8% in software production, and that all services are domestic, based on dividing the total imports of goods by the gross output of respective industry sector in 2006.
- (5) Data on SME jobs from "Enterprise Directorate: Small and Medium Enterprise Statistics for the UK and Regions," Department for Business Enterprise & Regulatory Reform, 2007 <stats.berr.gov.uk/ed/sme/>.

Smart Grid

Additional Investment Amount (per year) £5,000,000,000

Spending Breakdown		Construction	Hardware	Software	Services	Telecom
£ Invested (1)		£125,000,000	£963,509,317	£947,981,366	£825,310,559	£388,198,758
Direct Labor Projections						
% Amount of Expense to Labor (3)		18.5%	23.5%	32.7%	71.2%	23.20%
£ Amount of Expense to Labor		£125,000,000	£322,049,689	£394,114,907	£695,621,118	£90,062,112
Avg. Annual Wages		£25,716	£39,027	£38,000	£35,825	£35,825
# Direct Jobs Created		4,861	8,252	10,371	19,417	2,514
Leakage Due to Imports (3)	(2,618)	0	(1,931)	(499)	0	(189)
Net Direct Jobs	42,797	4,861	6,321	9,873	19,417	2,325
Direct SME jobs (4)	26,293	1,240	3,748	7,029	13,825	451
Weighted Type II Employment Multiplier (5)	4.04	2.79	2.70	2.60	5.68	2.78
Total = Direct+Indirect+Induced	173,109	13,560	17,058	25,677	110,348	6,465
Indirect + Induced Jobs	130,312	8,700	10,737	15,805	90,931	4,139
SME jobs from indirect + induced	90,886	6,980	6,006	11,252	64,735	1,914
Network Effect Multiplier	0.33					
# Jobs from Network Effect	57,703					
SME jobs from network effect	28390					
Total Additional Jobs Created	230,812					
Total SME jobs	145,568					

Notes:

(1) Based on an implementation of the Department of Energy and Climate Change, policy option 2a <www.berr.gov.uk/files/file45794.pdf> (Mandated 10-year rollout of smart meters) and an analysis by KEMA Ltd of a smart grid roll-out by Duke Energy in the USA. They found labour costs to be approximately 30% of total spending. <www.gridwise.org/pdf/SmartGridMASTER.pdf>

(2) See UK Office of National Statistics, 2008 Annual Business Inquiry

(3) Using 2005 UK data of import to industry over gross turnover.

(4) Data on SME jobs from "Enterprise Directorate: Small and Medium Enterprise Statistics for the UK and Regions," Department for Business Enterprise & Regulatory Reform, 2007 <stats.berr.gov.uk/ed/sme/>.

(5) Employment multipliers are adapted from Type II Employment Multipliers from Scotland Statistics and adjusted for the larger UK economy and overall economic output growth between 2004 and 2008. <www.scotland.gov.uk/Topics/Statistics/Browse/Economy/Input-Output/Multipliers>