

ANNEX 4

THE INPUT-OUTPUT APPROACH TECHNICAL NOTE

Mapping SIC03 classifications to Input-Output industry groups

The 128 Input-Output industries are constructed from groups of full 5 digit SIC03 industries. The marine environment component identified using SIC03 will therefore not always map directly to an Input-Output group. Where this occurs it has been necessary to apportion the economic contribution of the Input-Output group using the Office for National Statistics Annual Business Inquiry (ABI) full 5 digit SIC03 industry output information.

For example, SIC 45.24: Construction of water projects, will be included in Input-Output category Construction (SIC 45). Analysis of the ABI estimates 0.06% of the Construction industry output to be from companies in SIC 45.24. This proportion is then applied to the total economic value of the Construction group detailed in the Input-Output table.

Economic value – industry contribution to overall Scottish GDP

In order to estimate the economic value of industries, this analysis uses the latest Gross Value Added estimates as detailed in the Scottish Input-Output tables published by the Scottish Government in December 2007.

Gross Value Added is defined as GDP at basic prices (i.e. excludes taxes *less subsidies* on products) and is a measure of the contribution to GDP made by an individual producer, industry or sector. The GVA estimates relate to activity in 2004 and are in 2004 prices.

In the case of the core marine environment industries the GVA estimate is taken from Input-Output Industry by Industry table. Scottish employment figures are estimated full time equivalent employment figures taken from the Office for National Statistics Annual Business Inquiry (2004).

Note that these figures will include the GVA and employment associated with the final demand for the core industries' output as well as the GVA associated with the supply to other, non-core industries. As discussed, the GVA (or employment) created as a result of adding further value by other industries should not be considered marine related.

Core marine environment indirect economic activity

Although there are industries that are wholly marine environment (such as shipbuilding or fishing), and will therefore be picked up in the identification of the core industries, others will generate value (and employ people) by supplying these core industries. The value of this economic activity should be attributed to the marine environment because without the core industry demand, the economic value of these non-core industries would be affected.

Scotland's Seas: Towards Understanding their State - Annex 4

Since the Input-Output Supply and Use tables detail the flows of products between industries it is possible to identify the industries that supply the core marine environment industries and to construct the Input-Output analytical tables. The Input-Output type I Leontief inverse matrices have been used to estimate the indirect GVA and employment effects relating to the final demand for the core marine environment products.

Supported upstream economic activity

The core industry economic activity will include the GVA associated with the sale of products to other industries for further processing. Any further value added by these industries should not be considered to be marine related.

The Input-Output tables can be used to highlight the main buyers from the core industries. A very rough proxy estimate of the GVA generated by these industries as a result of these purchases has been provided. This estimate is arrived at by firstly calculating the value of these purchases as a proportion of total purchases (total intermediate demand including imports) by the purchasing industry, then applying this proportion to the purchasing industry total GVA.

It should be stressed again that this additional economic value is not considered in this report to be marine related.

Indirect and supported upstream double counting

Some of the indirect and supported upstream effects for each of the identified marine related industries will be within other industries identified as marine related. This activity cannot be included when looking at the marine sector as a whole since this is already taken account of in the core industry activity figure and would therefore be double counted. When summing the indirect and supported upstream effects to arrive at the all marine sector totals, any effects within any of the other identified marine related industries are excluded. As a result, the indirect and supported upstream totals for the all marine sector will always be lower than the sum of effects seen in the individual industry group analyses.

Scotland's Seas: Towards Understanding their State - Annex 4

THE CORE MARINE ENVIRONMENT INDUSTRIES, INDIRECT AND SUPPORTED UPSTREAM EFFECTS

IOC 3.1 Sea Fishing (SIC 05.01)			
INDIRECT EFFECTS	Rank	IOC description	Employment (FTE)
These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries	1	Banking	39
	2	Transport Services	53
	3	Shipbuilding and Repair	40
	4	Wholesale Distribution	25
	5	Retail Distribution	25
	6	Membership Organisations	19
	7	Other Business Services	26
	8	Other Land Transport	15
	9	Extraction - Oil and Gas	10
	10	Construction	9
		Others	96
Total upstream effects			357

Core marine related industry GVA and employment	GVA (£m)	Employment (FTE)
The Sea Fishing Industry	134.1	2,327
<i>upstream percentage</i>	<i>10%</i>	<i>13%</i>
TOTAL (includes upstream estimates)	149.5	2,684

SUPPORTED UPSTREAM EFFECTS	Rank	IOC description	Value of purchases from Sea Fishing (£m)	Proxy GVA	Proxy FTE
These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.	1	Hotels, Catering, Pubs, etc	23.5	61.5	2,647
	2	Fish and Fruit Processing	168.6	59.2	2,290
	3	Retail Distribution	0.4	0.7	27
	4	Public Administration	0.4	0.3	8
	5	Recreational Services	0.4	0.2	6
	6	Water Transport	0.1	0.2	3
	7	Extraction - Oil and Gas	0.4	0.1	2
	8	Construction	0.1	0.1	2
	9	Wholesale Distribution	0.0	0.1	1
	10	Education	0.0	0.1	2
		Others	1.3	0.7	14
Total downstream effect			195.3	123.1	5,001

IOC 3.2 Fish farming (SIC 05.02)			
INDIRECT EFFECTS	Rank	IOC description	Employment (FTE)
These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries	1	Animal Feeding Stuffs	102
	2	Wholesale Distribution	147
	3	Banking	102
	4	Other Land Transport	102
	5	Owning and Dealing in Real Estate	13
	6	Retail Distribution	110
	7	Insurance and Pension Funds	30
	8	Shipbuilding and Repair	40
	9	Health and Veterinary Services	41
	10	Pharmaceuticals	26
		Others	264
Total upstream effects			976

Core marine related industry GVA and employment	GVA (£m)	Employment (FTE)
The Fish Farming Industry	72.3	1,492
<i>upstream percentage</i>	<i>41%</i>	<i>40%</i>
TOTAL (includes upstream estimates)	121.7	2,468

SUPPORTED UPSTREAM EFFECTS	Rank	IOC description	Value of purchases from Fish Farming (£m)	Proxy GVA	Proxy FTE
These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.	1	Fish and Fruit Processing	10.6	3.7	144
	2	Hotels, Catering, Pubs, etc	0.2	0.6	25
	3	Retail Distribution	0.2	0.3	11
	4	Recreational Services	0.4	0.2	6
	5	Public Administration	0.2	0.2	5
	6	Education	0.0	0.1	3
	7	Extraction - Oil and Gas	0.3	0.1	2
	8	Construction	0.1	0.1	2
	9	Health and Veterinary Services	0.0	0.1	2
	10	Banking	0.0	0.1	1
		Others	0.5	0.6	14
Total downstream effect			12.7	6.0	213

Note: Partial Input-Output category core employment figures are based upon estimated output share applied to employment figures for the whole Input-Output category. Indirect and supported upstream figures are estimated using the Input-Output model.

Source: Input-Output tables for Scotland 2004

Scotland's Seas: Towards Understanding their State - Annex 4

IOC 5 Service activities incidental to oil and gas extraction (SIC 11.2 & 12)			
INDIRECT EFFECTS	Rank IOC description	GVA (£m)	Employment (FTE)
These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries	1	Renting of Machinery	66.1 1,289
	2	Banking	51.2 819
	3	Construction	37.4 877
	4	Architectural Activities and Tech' Consultancy	37.4 820
	5	Accountancy Services	15.3 346
	6	Water Transport	14.3 246
	7	Electricity Production and Distribution	12.3 90
	8	Telecommunications	11.2 97
	9	Railways	10.3 173
	10	Insurance and Pension Funds	9.8 119
		Others	154.0 3,854
	Total upstream effects	419.3	8,733

Core marine related industry GVA and employment	GVA (£m)	Employment (FTE)
The Services incidental to oil and gas extraction Industry	592.3	10,928
<i>upstream percentage</i>	<i>41%</i>	<i>44%</i>
TOTAL (includes upstream estimates)	1,011.6	19,661

SUPPORTED UPSTREAM EFFECTS	Rank IOC description	Value of purchases from Services incidental to oil and gas extraction (£m)	Proxy GVA	Proxy FTE
These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.	1	Oil Process, Nuclear Fuel	1,021.2	47.3 1,102
	2	Electricity Production and Distribution	86.2	22.4 165
	3	Gas Distribution	10.4	19.8 86
	4	Health and Veterinary Services	1.4	4.2 126
	5	Wholesale Distribution	3.1	4.0 85
	6	Letting of Dwellings	1.3	3.9 9
	7	Construction	4.7	3.6 84
	8	Education	1.1	3.2 100
	9	Retail Distribution	2.1	3.2 129
	10	Architectural etc Activities	3.0	2.5 56
		Others	24.0	24.3 585
	Total downstream effect	1,158.4	138.5	2,528

IOC 9 (part) Processing and preserving of fish and fish products (SIC 15.2)			
INDIRECT EFFECTS	Rank IOC description	GVA (£m)	Employment (FTE)
These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries	1	Sea Fishing	60.0 1,042
	2	Agriculture	54.6 1,390
	3	Wholesale Distribution	30.8 648
	4	Banking	28.6 457
	5	Other Land Transport	9.0 235
	6	Transport Services	4.6 117
	7	Other Financial Institutions	4.0 39
	8	Distribution and Motor Repair, etc	3.6 107
	9	Legal Activities	3.3 83
	10	Electricity Production and Distribution	3.2 23
		Others	51.8 1,149
	Total upstream effects	253.4	5,291

Core marine related industry GVA and employment	GVA (£m)	Employment (FTE)
The Fish processing Industry	228.0	8,813
<i>upstream percentage</i>	<i>53%</i>	<i>38%</i>
TOTAL (includes upstream estimates)	481.4	14,104

SUPPORTED UPSTREAM EFFECTS	Rank IOC description	Value of purchases from Fish processing (£m)	Proxy GVA	Proxy FTE
These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.	1	Hotels, Catering, Pubs, etc	2.2	5.8 248
	2	Retail Distribution	3.2	4.9 196
	3	Bread, Biscuits, etc	3.7	2.4 75
	4	Other Business Services	0.9	1.5 67
	5	Health and Veterinary Services	0.5	1.4 42
	6	Education	0.4	1.2 36
	7	Public Administration	1.3	1.0 24
	8	Recreational Services	1.6	0.9 21
	9	Wholesale Distribution	0.4	0.5 11
	10	Other Financial Institutions	0.4	0.5 5
		Others	6.6	5.0 117
	Total downstream effect	21.0	25.1	842

Note: Partial Input-Output category core employment figures are based upon estimated output share applied to employment figures for the whole Input-Output category. Indirect and supported upstream figures are estimated using the Input-Output model.

Source: Input-Output tables for Scotland 2004

Scotland's Seas: Towards Understanding their State - Annex 4

IOC 78 Building and repairing of ships and boats (SIC 35.1)			
INDIRECT EFFECTS	Rank IOC description	GVA (£m)	Employment (FTE)
<p>These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries</p>	1	Wholesale Distribution	11.4 240
	2	Banking	7.5 120
	3	Construction	4.7 111
	4	Computing Services	3.2 53
	5	Electricity Production and Distribution	3.0 22
	6	Electric Motors and Generators	2.2 34
	7	Owning and Dealing in Real Estate	2.2 8
	8	Architectural Activities and Tech' Consultancy	2.1 46
	9	Insurance and Pension Funds	2.0 24
	10	Other Land Transport	1.6 43
		Others	28.1 665
	Total upstream effects	68.1	1,367

	GVA (£m)	Employment (FTE)
Core marine related industry GVA and employment		
The Shipbuilding and repair Industry	244.7	5,849
<i>upstream percentage</i>	22%	19%
TOTAL (includes upstream estimates)	312.9	7,216

SUPPORTED UPSTREAM EFFECTS	Rank IOC description	Value of purchases from Shipbuilding and repair (£m)	Proxy GVA	Proxy FTE
<p>These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.</p>	1	Public Administration	42.8	810
	2	Sea Fishing	11.2	166
	3	Fish Farming	4.2	27
	4	Construction	1.4	24
	5	Extraction - Oil and Gas	2.2	11
	6	Water Transport	0.4	10
	7	Transport Services	0.6	7
	8	Other Business Services	0.1	7
	9	Auxiliary to Insurance	0.1	2
	10	Distribution and Motor Repair, etc	0.0	2
		Others	0.3	6
	Total downstream effect	63.4	47.9	1,073

IOC 88 (part) Construction of water projects (SIC 45.24)			
INDIRECT EFFECTS	Rank IOC description	GVA (£m)	Employment (FTE)
<p>These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries</p>	1	Construction	0.4 10
	2	Banking	0.1 2
	3	Owning and Dealing in Real Estate	0.1 0
	4	Renting of Machinery	0.1 1
	5	Architectural Activities and Tech' Consultancy	0.0 1
	6	Wholesale Distribution	0.0 1
	7	Articles of Concrete etc	0.0 1
	8	Other Mining and Quarrying	0.0 0
	9	Other Land Transport	0.0 1
	10	Structural Metal Products	0.0 1
		Others	0.3 6
	Total upstream effects	1.2	24

	GVA (£m)	Employment (FTE)
Core marine related industry GVA and employment		
The Construction of water projects Industry	3.0	70
<i>upstream percentage</i>	28%	26%
TOTAL (includes upstream estimates)	4.2	94

SUPPORTED UPSTREAM EFFECTS	Rank IOC description	Value of purchases from Construction of water projects (£m)	Proxy GVA	Proxy FTE
<p>These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.</p>	1	Letting of Dwellings	0.5	4
	2	Education	0.1	11
	3	Public Administration	0.3	5
	4	Owning and Dealing in Real Estate	0.1	0
	5	Retail Distribution	0.0	2
	6	Banking	0.0	1
	7	Insurance and Pension Funds	0.1	0
	8	Health and Veterinary Services	0.0	1
	9	Water Supply	0.0	0
	10	Other Financial Institutions	0.0	0
		Others	0.4	5
	Total downstream effect	1.5	2.7	30

Note: Partial Input-Output category core employment figures are based upon estimated output share applied to employment figures for the whole Input-Output category. Indirect and supported upstream figures are estimated using the Input-Output model.

Source: Input-Output tables for Scotland 2004

Scotland's Seas: Towards Understanding their State - Annex 4

IOC 95 (part) Sea and coastal water transport (SIC 61.1)			
INDIRECT EFFECTS	Rank IOC description	GVA (£m)	Employment (FTE)
These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries	1	Transport Services	12.0 310
	2	Banking	3.3 53
	3	Owning and Dealing in Real Estate	1.0 4
	4	Renting of Machinery	0.8 16
	5	Construction	0.7 16
	6	Architectural Activities and Tech' Consultancy	0.6 12
	7	Computing Services	0.5 9
	8	Other Business Services	0.5 23
	9	Other Financial Institutions	0.5 5
	10	Telecommunications	0.5 4
		Others	5.4 132
	Total upstream effects	25.9	584

Core marine related industry GVA and employment	GVA (£m)	Employment (FTE)
The Sea and coastal water transport Industry	134.7	2,312
<i>upstream percentage</i>	16%	20%
TOTAL (includes upstream estimates)	160.6	2,896

SUPPORTED UPSTREAM EFFECTS	Rank IOC description	Value of purchases from Sea and coastal water transport (£m)	Proxy GVA	Proxy FTE
These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.	1	Extraction - Oil and Gas	44.1	231
	2	Printing and Publishing	2.7	60
	3	Education	0.6	60
	4	Wholesale Distribution	1.4	38
	5	Transport Services	3.3	35
	6	Postal Services	0.7	43
	7	Distribution and Motor Repair, etc	0.6	32
	8	Hotels, Catering, Pubs, etc	0.4	44
	9	Public Administration	1.1	21
	10	Banking	0.5	13
		Others	11.2	191
	Total downstream effect	66.7	34.2	769

All CORE MARINE ENVIRONMENT INDUSTRIES			
INDIRECT EFFECTS	Rank IOC description	GVA (£m)	Employment (FTE)
These figures represent the GVA and employment created in all Scottish industries as a result of supplying products to the identified core marine related industries	1	Banking	99.6 1,592
	2	Renting of Machinery	70.2 1,371
	3	Wholesale Distribution	59.8 1,259
	4	Agriculture	55.9 1,423
	5	Construction	46.7 1,096
	6	Architectural Activities and Tech' Consultancy	42.5 932
	7	Transport Services	28.6 737
	8	Other Land Transport	22.3 583
	9	Electricity Production and Distribution	19.4 143
	10	Accountancy Services	18.7 423
		Others	283.2 6,234
	Total upstream effects	746.9	15,793

Core marine related industry GVA and employment	GVA (£m)	Employment (FTE)
The all marine related sector Industry	1,409.0	31,790
<i>upstream percentage</i>	35%	33%
TOTAL (includes upstream estimates)	2,155.9	47,583

SUPPORTED UPSTREAM EFFECTS	Rank IOC description	Value of purchases from All CORE MARINE ENVIRONMENT INDUSTRIES (£m)	Proxy GVA	Proxy FTE
These figures represent proxy estimates of the GVA and employment generated by other industries with the purchases from the marine related industry. They should not be included in the overall economic value for the marine related industry.	1	Hotels, Catering, Pubs, etc	26.7	3,008
	2	Oil Process, Nuclear Fuel	1,022.6	1,104
	3	Public Administration	48.0	908
	4	Electricity Production and Distribution	86.7	166
	5	Gas Distribution	10.5	86
	6	Retail Distribution	6.2	379
	7	Education	2.3	213
	8	Wholesale Distribution	4.9	137
	9	Health and Veterinary Services	2.1	188
	10	Letting of Dwellings	1.9	14
		Others	57.6	1,238
	Total downstream effect	1,269.5	284.1	7,441

Note: Partial Input-Output category core employment figures are based upon estimated output share applied to employment figures for the whole Input-Output category. Indirect and supported upstream figures are estimated using the Input-Output model. Each of the identified marine industries indirect and supported upstream effects will include activity between other marine industries. To prevent double counting, this activity is not included for the marine sector as a whole. As a result, the all marine sector totals will always be lower than the sum of the identified industries.

Source: Input-Output tables for Scotland 2004