

USERGUIDE

Economic Impact Model for Electricity Supply **EIM-ES**

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Introducing the EIM-ES

OVERVIEW

The Economic Impact Model for Electricity Supply (EIM-ES) is a spreadsheet-based economic model to estimate the domestic employment and wider economic impacts of investments in the electricity supply sector within a country. The model can be set up to include up to 35 technologies to provide an assessment of employment creation, investment and value added across sectors under different future pathways for the development of the electricity sector. The tool can therefore be used to compare the magnitude of economic impacts under a range of scenarios with different technology mixes.

INPUTS

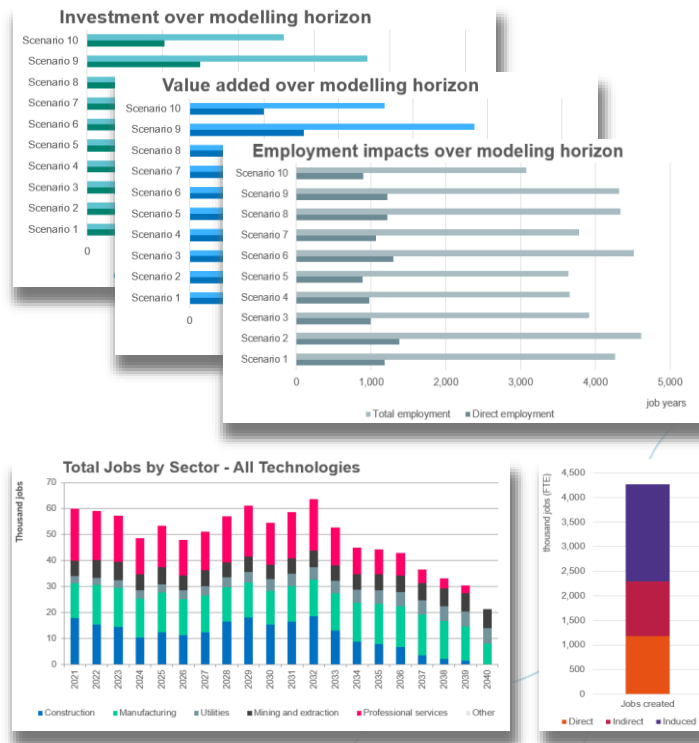
The analysis is based on:

- Investment cost data that is disaggregated, where possible, into its component parts;
- Assumptions on the share of investments that stay within the country;
- Salaries across different sectors;
- Input Output tables, which represent the economic relationships between sectors; and
- Future pathways for electricity supply, including capacity and generation.

RESULTS

A wide-range of results – broken down by technology, economic sector and type of cost - are shown in tabular and chart form for each scenario as well as headline comparisons between up to ten scenarios. Direct economic impacts are estimated for each year of the analysis period; and the wider indirect and induced impacts are estimated in aggregate over the full period selected by the user.

This document provides a step-by-step guide to setting up and using the model.



Model overview

Purpose and features of the main sections of the model

INPUTS >>

Setup scenarios, define technologies, input costs, salaries and scenario pathway data (capacity, retirements, generation)

IO_INPUT >>

Includes the most up-to-date Input Output table available for the country

Scenario_Loop >>

Sheets used to run through scenarios processing calculations (automated process using VBA)

RESULTS >>

Displays detailed results for each scenario as well as a comparison of the headline scenario results

CALCULATIONS >>

Where the calculations are performed for each technology as well as aggregated indirect and induced economic impacts

IMPORTANT NOTE: Yellow cells throughout the file are input cells where the user needs to include either text or data. Non-yellow shaded cells typically denote where formulas are used to perform calculations or link to other cells.

Opening the Excel file

The file opens on the cover sheet with a notice about calculations: read, click OK and start set up

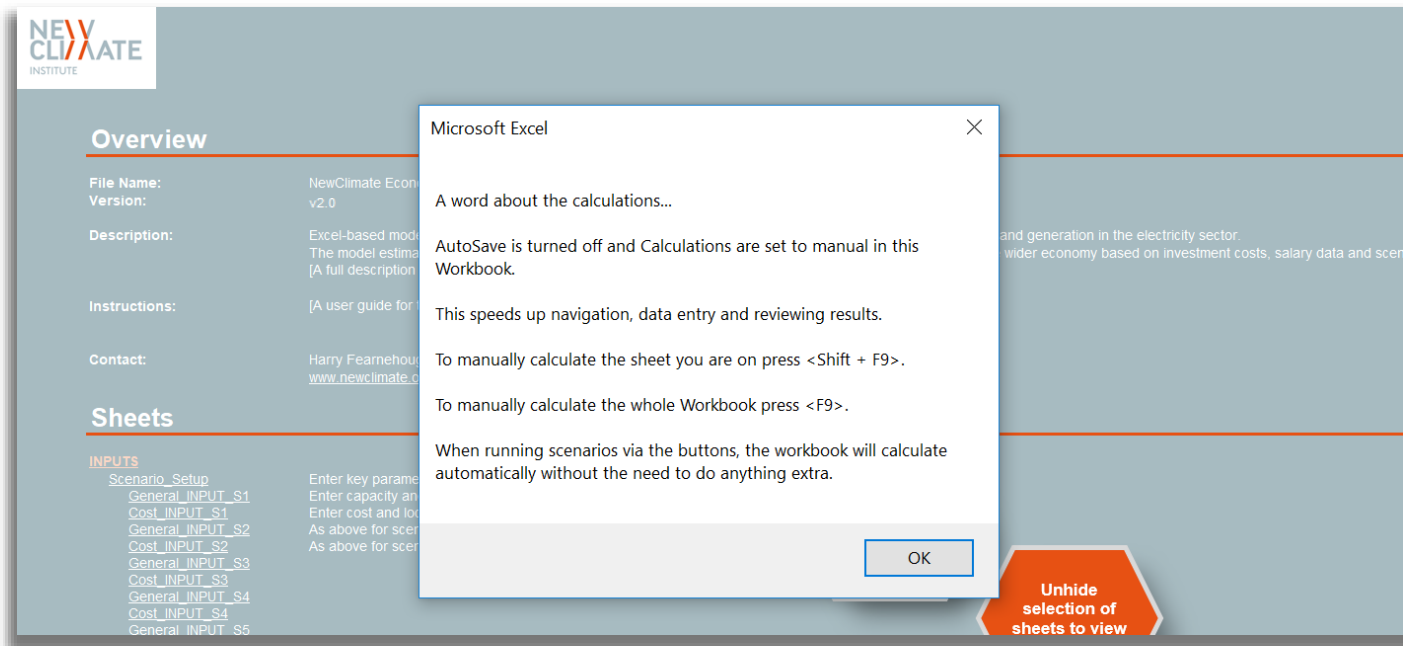
INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

CALCULATIONS >>



NEW CLIMATE INSTITUTE

Overview

File Name: NewClimate Econ
Version: v2.0

Description: Excel-based model...
The model estimates...
[A full description...]

Instructions: [A user guide for...]

Contact: Harry Fearnhouse
www.newclimate.org

Sheets

INPUTS

- Scenario_Setup
- General_INPUT_S1
- Cost_INPUT_S1
- General_INPUT_S2
- Cost_INPUT_S2
- General_INPUT_S3
- Cost_INPUT_S3
- General_INPUT_S4
- Cost_INPUT_S4
- General_INPUT_S5

Microsoft Excel

A word about the calculations..

AutoSave is turned off and Calculations are set to manual in this Workbook.

This speeds up navigation, data entry and reviewing results.

To manually calculate the sheet you are on press <Shift + F9>.

To manually calculate the whole Workbook press <F9>.

When running scenarios via the buttons, the workbook will calculate automatically without the need to do anything extra.

OK

Unhide selection of sheets to view

Cover INPUTS >> Scenario_Setup General_INPUT_S1 Cost_INPUT_S1 Fuel_Costs Learning_Curves IO_INPUT >> Scenario_Loop >> RESULTS >> ScenarioComparison RESULTS_S1 CALCULATIONS >> TECHNOLOGIES >> Sectoral_IMPACTS I_O_TABLE Lists Definitions

Setting up the scenarios and technologies

Setup scenarios, define technologies, input costs, salaries and scenario pathway data (capacity, retirements, generation)

INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

CALCULATIONS >>

Scenario_Setup

General
INPUT_S1/2/3...

Cost
INPUT_S1/2/3...

Fuel_Costs

Learning_Curves

DefaultComponent
Summary

- Enter country and define analysis period under **key parameters**
- Investment data and salaries entered in the model need to be expressed in **real terms in the same currency**
- List scenario names and add brief description for reference
- Up to 35 technologies can be included (applies to all scenarios)
- Corresponding information required includes load factor, construction period, lifetime, plant efficiency and fuel type (where relevant)
- Press F9 (calculate model) once the technology list is complete** to update the list across all sheets

Key parameters

Country selection: Argentina
Period start: 2017
Period end: 2040
Currency year: 2010
Currency unit: USD

Scenario definition

ID	Scenario name	Scenario description	Load factor	Construction duration	Lifetime	Average plant efficiency	Fuel type
01	Scenario 1	BASE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
02	Scenario 2	NCA	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
03	Scenario 3	CORFOGA	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
04	Scenario 4	ADGERA	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
05	Scenario 5	ADGERA	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
06	Scenario 6	CACHE	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
07	Scenario 7	CADER	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
08	Scenario 8	REP	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Technology list

Enter technology list up to a maximum of 35 different technologies and fill the columns of the table with information on the average plant of that technology. Fuel type and plant efficiency - for converting thermal energy into electrical energy - should be included for plants that use fuel as inputs (e.g. fossil fuels). For technologies with no fuel inputs, select "Not applicable" from the bottom of the drop-down list. Load factors can be used to estimate annual generation from installed capacity where modelled projections of generation does exist (where generation data are used to estimate a simplified LCOE of each technology based on the cost inputs included in the model). They are only used to sum the construction duration and average lifetime of new plants are used to apportion the capital and operational spending to the relevant years within the model.

Technol ID	Technology	Load factor	Efficiency	Construction duration	Lifetime	Average plant efficiency	Fuel type
Techn1	PCR Nuclear PWR	85%	33%	8	40	33%	uranium
Techn2	PCR CANDU commercial	85%	33%	8	40	33%	uranium
Techn3	PCR Biomethanol	85%	10%	2	30	40%	biomethane
Techn4	PCR Biogas methanol 1 MW	85%	10%	2	30	30%	not applicable
Techn5	PCR Biogas methanol 1 MW	85%	10%	2	30	20%	not applicable
Techn6	PCR Biogas methanol 1 MW	85%	10%	2	30	20%	not applicable
Techn7	PCR Biomethane methanol 1 MW	85%	10%	2	30	20%	not applicable
Techn8	PCR Biomethane methanol 1 MW	85%	10%	2	30	20%	not applicable
Techn9	PCR Biomethane methanol 1 MW	85%	10%	2	30	20%	not applicable
Techn10	PCR Biomethane methanol 1 MW	85%	10%	2	30	20%	not applicable
Techn11	PCR Ethanol	45%	10%	2	30	100%	not applicable
Techn12	PCR Ethanol 2	37%	10%	3	25	100%	not applicable
Techn13	PCR Ethanol 3	46%	10%	3	25	100%	not applicable
Techn14	PCR Ethanol 4	28%	10%	3	25	100%	not applicable
Techn15	PCR Ethanol 5	28%	10%	3	25	100%	not applicable
Techn16	PCR Methanol	25%	10%	2	40	100%	not applicable
Techn17	PCR Methanol	25%	10%	2	40	100%	not applicable
Techn18	PCR Solar Concentrated	35%	10%	2	25	100%	not applicable
Techn19	PCR Solar Photovoltaic A	23%	10%	1	25	100%	not applicable
Techn20	PCR Solar Photovoltaic B	23%	10%	1	25	100%	not applicable
Techn21	PCR Solar Photovoltaic C	18%	10%	1	25	100%	not applicable
Techn22	PCR PV 25% TRIPLEJUNCTION	18%	10%	1	25	100%	not applicable
Techn23	PCR ALBACORRIMENTO	85%	10%	1	25	100%	not applicable
Techn24	PCR Carbon (CC)	85%	10%	3	40	40%	Coal
Techn25	PCR Carbon (CC)	85%	10%	3	40	40%	Coal
Techn26	PCR CCS	85%	10%	2	40	40%	natural gas
Techn27	PCR CCS	85%	10%	2	40	40%	natural gas
Techn28	PCR CCS-GENERATION	90%	10%	2	40	40%	natural gas
Techn29	PCR CCS-GENERATION	90%	10%	2	40	40%	natural gas
Techn30	Proyecto Hidroeléctrica	50%	10%	5	40	80%	not applicable
Techn31	unassigned	1%	10%	1	25	not applicable	not applicable
Techn32	unassigned	1%	10%	1	25	not applicable	not applicable
Techn33	unassigned	1%	10%	1	25	not applicable	not applicable
Techn34	unassigned	1%	10%	1	25	not applicable	not applicable
Techn35	unassigned	1%	10%	1	25	not applicable	not applicable

Entering investment costs, local share and sectors



Setup scenarios, define technologies, input costs, salaries and scenario pathway data (capacity, retirements, generation)

INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

CALCULATIONS >>

Scenario_Setup

General
INPUT_S1/2/3...

Cost
INPUT_S1/2/3...

Fuel_Costs

Learning_Curves

DefaultComponent
Summary

For each technology...

- Enter **capex, fixed opex and variable opex** in top 3 rows
- To use default cost components select the **corresponding default technology from the drop down list and recalculate the worksheet (Shift + F9)**. This will automatically populate the cost item, cost category, share input and sector columns. These data can be manually overridden where better information exists (note capex, fixed opex and variable opex should each add to 100%)
- Enter **local share of investment** for each cost component, including fuel where relevant, or use sector level local shares from IO data (set in the box above the first technology)

Cost Category	Value	Rate	Unit	In-country share	Local share	Sector
Capex	1.500	100%	USD/kWp	100%	100%	Utility
Fixed Opex	0.200	100%	USD/kWp/yr	100%	100%	Utility
Variable Opex	0.000	100%	USD/kWh	100%	100%	Utility

Manual Bases the In-country share on manual entries in column L
Sector Bases the In-country share on sectoral level data contain
Mx Bases the In-country share on manual entries in column L

Default technology

Investment

Local share

Tech3

Solar PV (Utility)

Technology	Cost Item	Cost Category	Value Input	Share Input	Value	Unit	In-country Share Manual	Sector In-country Share	In-country Spend	Sector	Labour Share of Spend	Labour Share Override	In-country Labour Spend
Total capex and opex input fields - leave blank if using detailed cost item inputs													
Tech3	Total	Capex	1,100			USDk/MW							
Tech3	Total	OpexFixed	26			USDk/MW/yr							
Tech3	Total	OpexVariable	-			USD/MWh							
Detailed cost item input fields - if using total capex and opex costs, data in the value input column will not be used													
1	Solar PV	Tech3 PV module		34%	375	USDk/MW	70%	82%	252	D27: Electrical equipment	19%	na	50
2	Solar PV	Tech3 Inverter		6%	66	USDk/MW	100%	82%	68	D27: Electrical equipment	19%	na	12
3	Solar PV	Tech3 Racking/Mounting		9%	102	USDk/MW	0%	77%	-	D25: Fabricated metal products	24%	na	-
4	Solar PV	Tech3 Installation		12%	136	USDk/MW	70%	87%	95	D41T43: Construction	26%	na	24
5	Solar PV	Tech3 BOS, grid connection		17%	189	USDk/MW	50%	82%	94	D27: Electrical equipment	19%	na	18
6	Solar PV	Tech3 Developer cost		12%	133	USDk/MW	90%	89%	119	D69T75: Professional, scientific and technical ac	51%	na	61
7	Solar PV	Tech3 Land		0%	3	USDk/MW	20%	87%	1	D68: Real estate activities	7%	na	0
8	Solar PV	Tech3 Fees and contingencies		9%	97	USDk/MW	20%	85%	19	D64T86: Financial and insurance activities	18%	na	4
9	Solar PV	Tech3 Maintenance		45%	12	USDk/MW/yr	50%	82%	6	D27: Electrical equipment	19%	na	1
10	Solar PV	Tech3 Operation		55%	14	USDk/MW/yr	50%	93%	7	D35: Electricity, gas, steam and air conditioning	14%	na	1
11	Solar PV	Tech3			-		50%	0%	-		na	na	
12	Solar PV	Tech3			-			0%	-		na	na	
13	Solar PV	Tech3			-			0%	-		na	na	
14	Solar PV	Tech3			-			0%	-		na	na	
15	Solar PV	Tech3			-			0%	-		na	na	

Technology	Fuel	Cost Category	Average plant efficiency	Sector In-country Share	Total Spend	Sector	Labour Share of Spend	Labour Share Override	In-country Labour Spend
Tech3	Not applicable	Fuel	100%	100%	0%	-		na	
Summary of costs									
Tech3	Capex			Summary	60%	657			169
Tech3	OpexFixed			Summary	50%	13			2
Tech3	OpexVariable			Summary	0%	-			-
Tech3	Fuel			Summary	0%	-			-
Tech3	Load factor		28%						
Tech3	Lifetime		25						
Tech3	Discount rate		10%						
Tech3	Capital recovery factor		0.11						
Tech3	LCOE		60.01						

Sector

Entering investment costs, local share and sectors

Setup scenarios, define technologies, input costs, salaries and scenario pathway data (capacity, retirements, generation)

INPUTS >>

Scenario_Setup

IO_INPUT >>

General
INPUT_S1/2/3...

Scenario_Loop >>

Cost
INPUT_S1/2/3...

RESULTS >>

Fuel_Costs

CALCULATIONS >>

Learning_Curves

DefaultComponent
Summary

- Buttons at the top of the Cost_INPUT_S1 sheet can be used to copy the populated data for all technologies to all other scenarios, or individual scenarios automatically **if using the same cost and local share assumptions for all scenarios**

Copy cost input data from S1 (here) to other scenario sheets.

NOTE: clicking on the scenario buttons will replace any existing data and can NOT be UNDONE!



Adding fuel costs over time and learning curves

Setup scenarios, define technologies, input costs, salaries and scenario pathway data (capacity, retirements, generation)

INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

CALCULATIONS >>

Scenario_Setup

General
INPUT_S1/2/3...

Cost
INPUT_S1/2/3...

Fuel_Costs

Learning_Curves

DefaultComponent
Summary

- Where available, **fuel cost projections** can be added for all relevant fuels
- All values need to be converted into USD/MWh-thermal prior to entering into the model
- Technology cost (learning) curves** can be included for capex, fixed and variable opex as an index
- The year the main cost data is based on should be set to one and cost changes entered relative to this value, i.e. if the technology costs are from 2016 then that should be the base year where the index = 1

Fuel cost input

Fuel costs can be added in the top table of this sheet for all years. Costs should be converted from their original unit (e.g. MMBtu, tonne, bbl) into USD/MWh of thermal energy (MWh). The costs here are then converted to costs expressed in USD/MWh of electrical energy in the Cost_INPUT_S1/S2.

FuelCostInputs_T						
Fuel_Type_List.xls/CostInputs_Tbl						
Fuel type	Unit	2017	2018	2019	2020	2021
Natural gas	USD/MWh-thermal	20.1	20.1	21.3	22.4	23.4
Coal	USD/MWh-thermal	14.4	14.9	15.0	15.4	15.8
Uranium	USD/MWh-thermal	3.0	3.0	3.0	3.0	3.0
Solid biomass	USD/MWh-thermal	11.2	11.5	11.8	12.1	12.4
Biogas	USD/MWh-thermal	34.1	34.1	34.1	34.1	34.1
Biodiesel	USD/MWh-thermal	82.9	84.7	86.0	87.1	87.5
Fuel oil	USD/MWh-thermal	26.5	26.8	34.9	37.4	39.0
Gas Oil	USD/MWh-thermal	43.4	43.9	55.9	59.5	61.9
unassigned	USD/MWh-thermal					
unassigned	USD/MWh-thermal					
Not applicable	USD/MWh-thermal	-	-	-	-	-

Capex

Insert capex learning curve information (cost reduction over time) to the table for each technology relative to

Curve_Capex_L LearningCurve_Capex_Tbl

OpexFixed

Insert fixed opex learning curve information (cost reduction over time) to the table for each technology relative to

OpexFixed_L LearningCurve_OpexFixed_Tbl

Tech Ref	Technology	2015	2016	2017	2018	2019	2020	2021
Tech1	PCR Nuclear PWR	1.00	1.00	1.00	1.00	0.99	0.99	0.9
Tech2	PCR CAREM commercial	1.00	1.00	1.00	1.00	0.99	0.99	0.9

OpexVariable

Insert variable opex learning curve information (cost reduction over time, excluding fuel costs) to the table for each

OpexVariable_L LearningCurve_OpexVariable_Tbl

Tech Ref	Technology	2015	2016	2017	2018	2019	2020	2021
Tech9	PCR Nuclear PWR	1.00	1.00	1.00	0.99	0.99	0.99	0.9
Tech11	PCR CAREM commercial	1.00	1.00	1.00	0.99	0.99	0.99	0.9
Tech12	PCR Biocombustibles	1.00	1.00	1.00	1.00	0.99	0.99	0.9
Tech13	PCR Biogas menos 1 MW	1.00	1.00	0.99	0.99	0.99	0.99	0.9
Tech14	PCR Biogas mas 1 MW	1.00	1.00	0.99	0.99	0.99	0.99	0.9
Tech15	PCR Biogas RSU	1.00	1.00	0.99	0.99	0.99	0.99	0.9
Tech16	PCR Biomasa menos 5 y 15	1.00	1.00	0.99	0.99	0.99	0.99	0.9
Tech17	PCR Biomasa entre 5 y 15	1.00	1.00	0.99	0.99	0.99	0.99	0.9
Tech18	PCR Biomasa mas de 15 M	1.00	1.00	0.99	0.99	0.99	0.99	0.9
Tech19	PCR Residuos	1.00	1.00	0.99	0.99	0.99	0.99	0.9
Tech20	PCR Eolico 1	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tech21	PCR Eolico 2	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tech22	PCR Eolico 3	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tech23	PCR Eolico 4	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Tech24	PCR Eolico 5	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Default breakdown of technology costs

Setup scenarios, define technologies, input costs, salaries and scenario pathway data (capacity, retirements, generation)

INPUTS >>

Scenario_Setup

IO_INPUT >>

General
INPUT_S1/2/3...

Scenario_Loop >>

Cost
INPUT_S1/2/3...

RESULTS >>

Fuel_Costs

CALCULATIONS >>

Learning_Curves

DefaultComponent
Summary

- Provides a **default breakdown of capex and opex** investments by component part for a selection of technologies
- Also includes sector mapping to ISIC rev4 sectors
- Sheet acts as an interface to a separate database that analyses publicly available technology cost breakdowns from literature

Default cost component breakdown by technology

Technology number	Technology name	Technology source	Default investment	Default operational costs	Default operational costs	Default operational costs	Default	Share in cost
							Component type	Value total
1	Technology 1	Chatham, Wind	1	None	027: Electrical equipment	Capex	Capex	100%
2	Technology 2	Chatham, Wind	2	None	027: Electrical equipment	Capex	Capex	100%
3	Technology 3	Chatham, Wind	3	None	027: Electrical equipment	Capex	Capex	100%
4	Technology 4	Chatham, Wind	4	None	027: Electrical equipment	Capex	Capex	100%
5	Technology 5	Chatham, Wind	5	None	027: Electrical equipment	Capex	Capex	100%
6	Technology 6	Chatham, Wind	6	None	027: Electrical equipment	Capex	Capex	100%
7	Technology 7	Chatham, Wind	7	None	027: Electrical equipment	Capex	Capex	100%
8	Technology 8	Chatham, Wind	8	None	027: Electrical equipment	Capex	Capex	100%
9	Technology 9	Chatham, Wind	9	None	027: Electrical equipment	Capex	Capex	100%
10	Technology 10	Chatham, Wind	10	None	027: Electrical equipment	Capex	Capex	100%
11	Technology 11	Chatham, Wind	11	None	027: Electrical equipment	Capex	Capex	100%
12	Technology 12	Chatham, Wind	12	None	027: Electrical equipment	Capex	Capex	100%
13	Technology 13	Chatham, Wind	13	None	027: Electrical equipment	Capex	Capex	100%
14	Technology 14	Chatham, Wind	14	None	027: Electrical equipment	Capex	Capex	100%
15	Technology 15	Chatham, Wind	15	None	027: Electrical equipment	Capex	Capex	100%
16	Technology 16	Chatham, Wind	16	None	027: Electrical equipment	Capex	Capex	100%
17	Technology 17	Chatham, Wind	17	None	027: Electrical equipment	Capex	Capex	100%
18	Technology 18	Chatham, Wind	18	None	027: Electrical equipment	Capex	Capex	100%
19	Technology 19	Chatham, Wind	19	None	027: Electrical equipment	Capex	Capex	100%
20	Technology 20	Chatham, Wind	20	None	027: Electrical equipment	Capex	Capex	100%

Technology number	Technology name	Technology source	Default investment	Default operational costs	Default operational costs	Default operational costs	Default	Share in cost
							Component type	Value total
1	Technology 1	Chatham, Wind	1	None	027: Electrical equipment	Capex	Capex	100%
2	Technology 2	Chatham, Wind	2	None	027: Electrical equipment	Capex	Capex	100%
3	Technology 3	Chatham, Wind	3	None	027: Electrical equipment	Capex	Capex	100%
4	Technology 4	Chatham, Wind	4	None	027: Electrical equipment	Capex	Capex	100%
5	Technology 5	Chatham, Wind	5	None	027: Electrical equipment	Capex	Capex	100%
6	Technology 6	Chatham, Wind	6	None	027: Electrical equipment	Capex	Capex	100%
7	Technology 7	Chatham, Wind	7	None	027: Electrical equipment	Capex	Capex	100%
8	Technology 8	Chatham, Wind	8	None	027: Electrical equipment	Capex	Capex	100%
9	Technology 9	Chatham, Wind	9	None	027: Electrical equipment	Capex	Capex	100%
10	Technology 10	Chatham, Wind	10	None	027: Electrical equipment	Capex	Capex	100%
11	Technology 11	Chatham, Wind	11	None	027: Electrical equipment	Capex	Capex	100%
12	Technology 12	Chatham, Wind	12	None	027: Electrical equipment	Capex	Capex	100%
13	Technology 13	Chatham, Wind	13	None	027: Electrical equipment	Capex	Capex	100%
14	Technology 14	Chatham, Wind	14	None	027: Electrical equipment	Capex	Capex	100%
15	Technology 15	Chatham, Wind	15	None	027: Electrical equipment	Capex	Capex	100%
16	Technology 16	Chatham, Wind	16	None	027: Electrical equipment	Capex	Capex	100%
17	Technology 17	Chatham, Wind	17	None	027: Electrical equipment	Capex	Capex	100%
18	Technology 18	Chatham, Wind	18	None	027: Electrical equipment	Capex	Capex	100%
19	Technology 19	Chatham, Wind	19	None	027: Electrical equipment	Capex	Capex	100%
20	Technology 20	Chatham, Wind	20	None	027: Electrical equipment	Capex	Capex	100%

Model is set up for OECD input output database

Include the most recent Input Output table for the country

INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

CALCULATIONS >>

- Standard version of the model is set up to work with the 45 sectors included in **OECD data tables** (2021 version)
- Excel file downloaded from OECD and data input directly as values
- A limitation of the analysis using Input Output tables is that the energy sector is represented at a relatively aggregated level
- The model can be configured to accommodate **alternative sources of Input Output tables** with different sector configurations



OECD.Stat

Input-Output Tables (IO Ts) 2021 ed.

Country: AUS: Australia

Year: 2021

Use US Data: Millions	D01102	D03	D03106	D03108	D06	D06102	D11101	D16	D16101	D16	D20	D21
sector	Agriculture, hunting and forestry	Mining and quarrying, energy producing products	Mining and quarrying, non-energy producing products	Mining and quarrying, service activities and tobacco	Food and beverages	Textiles and leather and fur	Wood and cork	Paper and printing products	Chemical and allied products	Non-metallic mineral products	Chemical and allied products	Other
From industry												
sector												
TTL_01102: Agriculture, hunting and forestry	9 832.7	1 807.5	54.5	139.4	4.5	21 823.1	791.9	1 229.4	9.1	11.3	83.6	15
TTL_03106: Mining and quarrying, energy producing products	530.6	136.2	14.7	14.6	1.8	2 202.7	52.2	0.6	1.7	1.8	3.4	5
TTL_03108: Mining and quarrying, non-energy producing products	191.7	13.3	2 739.5	1 896.6	33.9	858.9	18.6	140.8	394.7	6 842.2	2 739.6	10
TTL_06102: Mining and quarrying, service activities and tobacco	102.9	12.8	341.3	7 443.5	51.7	195.2	7.8	23.6	36.6	21.2	284.6	16

https://stats.oecd.org/Index.aspx?DataSetCode=IOTS_2021

Run scenarios in the model

INPUTS >>

Scenario_Setup

IO_INPUT >>

General
INPUT_S1/2/3...

Scenario_Loop >>

Cost
INPUT_S1/2/3...

RESULTS >>

Fuel_Costs

CALCULATIONS >>

Learning_Curves

DefaultComponent
Summary

- When all input data is entered into the model return to the [Scenario_Setup](#) sheet
- All scenarios **where a scenario name is entered** can be run using the large turquoise button labelled [Run all scenarios](#)
- **Individual scenarios** can be run using the blue buttons

Note: Depending on the processing speed of the computer, each scenario can take approximately a minute to run. It is advisable to **save and close any other Excel files that are open** prior to executing the scenario runs.

Run all
scenarios

(where scenario name
added)



Key parameters

Country selection	Argentina
Period start	2017 From period start and year, e.g. '2017'
Period end	2040 The period start and end years define the period over which the model and included job creation is calculated, using the 10 years. They are also used to define the analysis period for the scenario.
Current year	2016 All scenario data is defined in 2016 USD
Currency unit	USD Input should be interpreted in the same unit (unless noted, otherwise prior to entering into the model)

Scenario definition

Enter scenario names and descriptions for all scenarios that you would like to run. Enter scenario name separately from 'Run this scenario'.

ID#	Scenario Name	Scenario Description			
01	Scenario 1	BASE	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario
02	Scenario 2	NCA	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario
03	Scenario 3	CORONEL	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario
04	Scenario 4	ADBERA	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario
05	Scenario 5	ADBERAL	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario
06	Scenario 6	CAUSE	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario
07	Scenario 7	CADER	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario
08	Scenario 8	YEP	Scenario not used (hide sheets)	Use scenario (hide sheets)	Run this scenario

Automatically looping through scenarios

Sheets used to run through scenarios using buttons (automated process using VBA)

INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

CALCULATIONS >>

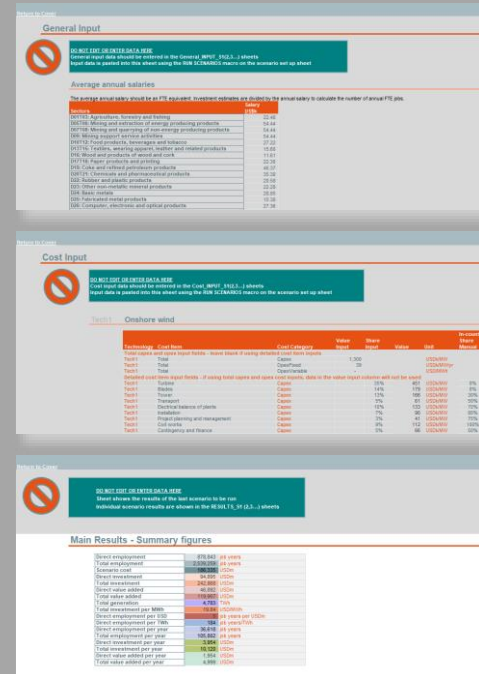
General_INPUT

Cost_INPUT

ScenarioRESULTS

- Sheets are used to facilitate the automation of scenario runs
- The sheets should **not be edited and can be left hidden** for ease of navigating the model. Their structure needs to remain aligned to the scenario input and results sheets
- The following steps are performed automatically when running a scenario (via buttons):
 1. Copies the data from the [General...](#) and [Cost...](#) INPUT_S1/2/3 sheets
 2. Pastes the data as values into the [General...](#) and [Cost...](#) INPUT sheets
 3. Calculates the model generated results in the [ScenarioRESULTS](#) sheet
 4. Copies the results to the respective [RESULTS_S1/2/3](#) sheets as values

Steps 1-4 are repeated for all scenarios that are selected to run



The image shows three screenshots of an Excel spreadsheet. The first screenshot is the 'General Input' sheet, which contains a table of average annual salaries for various categories. The second screenshot is the 'Cost Input' sheet, which contains a table of onshore wind costs for different turbine models. The third screenshot is the 'Main Results - Summary figures' sheet, which contains a table of key financial metrics.

Category	Salary
001212 Agriculture, livestock and fishing	19.40
001213 Mining and extraction of energy producing products	19.40
001214 Mining and extraction of non-energy producing products	19.40
001215 Other project services activities	19.40
001216 Transport, storage, information and communication	22.00
001217 Wholesale and retail trade and repair of motor vehicles	19.40
001218 Food and drink	19.40
001219 Repair, maintenance and installation	22.00
001220 Other non-metallic mineral products	19.40
001221 Other non-metallic mineral products	19.40
001222 Other non-metallic mineral products	19.40
001223 Other non-metallic mineral products	19.40
001224 Other non-metallic mineral products	19.40
001225 Other non-metallic mineral products	19.40
001226 Other non-metallic mineral products	19.40
001227 Other non-metallic mineral products	19.40
001228 Other non-metallic mineral products	19.40
001229 Other non-metallic mineral products	19.40
001230 Other non-metallic mineral products	19.40

Category	Cost
001212 Agriculture, livestock and fishing	19.40
001213 Mining and extraction of energy producing products	19.40
001214 Mining and extraction of non-energy producing products	19.40
001215 Other project services activities	19.40
001216 Transport, storage, information and communication	22.00
001217 Wholesale and retail trade and repair of motor vehicles	19.40
001218 Food and drink	19.40
001219 Repair, maintenance and installation	22.00
001220 Other non-metallic mineral products	19.40
001221 Other non-metallic mineral products	19.40
001222 Other non-metallic mineral products	19.40
001223 Other non-metallic mineral products	19.40
001224 Other non-metallic mineral products	19.40
001225 Other non-metallic mineral products	19.40
001226 Other non-metallic mineral products	19.40
001227 Other non-metallic mineral products	19.40
001228 Other non-metallic mineral products	19.40
001229 Other non-metallic mineral products	19.40
001230 Other non-metallic mineral products	19.40

Metric	Value
Total employment	170,045 jobs
Total investment	2,000,000 USD
Total revenue	10,000,000 USD
Total value added	1,000,000 USD
Total jobs added	1,000 jobs
Total jobs added per year	1,000 jobs
Total value added per year	1,000,000 USD

Reviewing the scenario results

Displays the results for each scenario as well as a comparison of the headline scenario results

INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

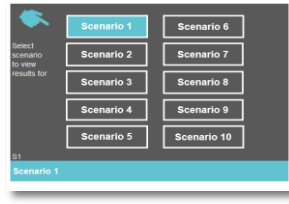
Scenario Comparison

CALCULATIONS >>

RESULTS_Charts

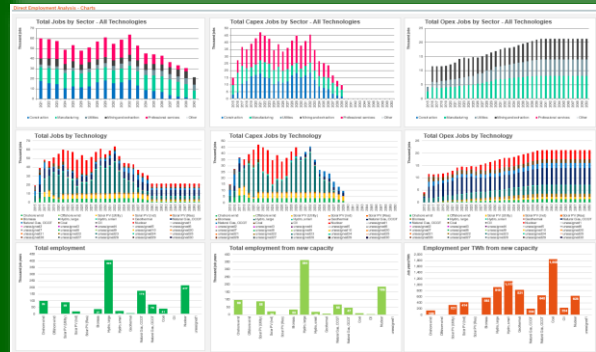
RESULTS_S1/2/3...

- **Scenario Comparison** sheet provides a **high level summary and comparison of the employment and wider economic impacts** across the different scenarios
- **RESULTS_Charts** sheet allows the user to select a scenario at the top (click the box for the desired scenario) and view a dashboard of result charts, including technology specific visualisations.
- Individual scenario results sheets include **detailed tables of results** broken down by:
 - Technology
 - Economic sector
 - Year of analysis
 - Direct, indirect, induced
 - Capex, opex
 - Etc.



Comparison of scenario results

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
Total employment	4,100,000	3,950,000	3,800,000	3,650,000	3,500,000	3,350,000	3,200,000	3,050,000	2,900,000	2,750,000
Total employment per year	4,100,000	3,950,000	3,800,000	3,650,000	3,500,000	3,350,000	3,200,000	3,050,000	2,900,000	2,750,000
Total investment in capacity	120,000	115,000	110,000	105,000	100,000	95,000	90,000	85,000	80,000	75,000
Total value added	10,000	9,500	9,000	8,500	8,000	7,500	7,000	6,500	6,000	5,500
Total electricity generation	4,000	3,900	3,800	3,700	3,600	3,500	3,400	3,300	3,200	3,100
Total investment per year	120,000	115,000	110,000	105,000	100,000	95,000	90,000	85,000	80,000	75,000
Total employment per USD in capacity	34	33	32	31	30	29	28	27	26	25
Total employment per year	4,100,000	3,950,000	3,800,000	3,650,000	3,500,000	3,350,000	3,200,000	3,050,000	2,900,000	2,750,000
Total investment per scenario	120,000	115,000	110,000	105,000	100,000	95,000	90,000	85,000	80,000	75,000
Total value added per year	10,000	9,500	9,000	8,500	8,000	7,500	7,000	6,500	6,000	5,500
Total value added per USD	83	80	77	74	71	68	65	62	59	56



Calculation sheets for each of the technologies

Where the calculations are performed for each technology as well as aggregated indirect and induced economic impacts

INPUTS >>

IO_INPUT >>

Scenario_Loop >>

RESULTS >>

CALCULATIONS >>

Tech 1,2,3...

Sectoral_IMPACTS

I_O_TABLE

- There is a **Calculation** sheet for each of the 35 potential technologies
- Calculates the **direct** investment in each year for capex and opex as well as the **direct** investment in the labour market
- These sheets **should not be edited and can be left hidden** for ease of navigating the model (button in **TECHNOLOGIES >>** sheet)
- Data in the sheets will always reflect the last scenario to run in the model
- Results sheets summarise the estimates of **direct employment and investment** in each of these technology sheets

Tech1 Onshore wind

Capacity and Generation

Tech1	Onshore wind	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Onshore wind	GW	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capacity added in year	GW	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative capacity additions from Period Start	GW	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Generation from all capacity	GWh	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Generation from new capacity	GWh	2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Learning curve implementation	Capex	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Opex cost	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Over/variable	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Full	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Not applicable	Not applicable												
Full estimate													

Capex for Capacity Added in Year

By capacity type, capacity in MW

Technology	Cost Category	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Tech1	Capex	DB1: Agriculture, hunting, forestry											
Tech1	Capex	DB2: Fishing and aquaculture											
Tech1	Capex	DB3: Mining and quarrying, energy producing products											
Tech1	Capex	DB4: Mining and quarrying, non-energy producing products											
Tech1	Capex	DB5: Manufacturing, construction, energy supply											
Tech1	Capex	DB6: Wholesale, retail trade, accommodation, food and beverage services											
Tech1	Capex	DB7: Transport, storage, information and communication											
Tech1	Capex	DB8: Health and social work activities											
Tech1	Capex	DB9: Education and research											
Tech1	Capex	DB10: Information and communication											
Tech1	Capex	DB11: Chemical and allied products											
Tech1	Capex	DB12: Chemical and allied products											
Tech1	Capex	DB13: Chemical and allied products											
Tech1	Capex	DB14: Chemical and allied products											
Tech1	Capex	DB15: Chemical and allied products											
Tech1	Capex	DB16: Chemical and allied products											
Tech1	Capex	DB17: Chemical and allied products											
Tech1	Capex	DB18: Chemical and allied products											
Tech1	Capex	DB19: Chemical and allied products											
Tech1	Capex	DB20: Chemical and allied products											
Tech1	Capex	DB21: Chemical and allied products											
Tech1	Capex	DB22: Chemical and allied products											
Tech1	Capex	DB23: Chemical and allied products											
Tech1	Capex	DB24: Chemical and allied products											
Tech1	Capex	DB25: Chemical and allied products											
Tech1	Capex	DB26: Chemical and allied products											
Tech1	Capex	DB27: Chemical and allied products											
Tech1	Capex	DB28: Chemical and allied products											
Tech1	Capex	DB29: Chemical and allied products											
Tech1	Capex	DB30: Chemical and allied products											
Tech1	Capex	DB31: Chemical and allied products											
Tech1	Capex	DB32: Chemical and allied products											
Tech1	Capex	DB33: Chemical and allied products											
Tech1	Capex	DB34: Chemical and allied products											
Tech1	Capex	DB35: Chemical and allied products											
Tech1	Capex	DB36: Chemical and allied products											
Tech1	Capex	DB37: Chemical and allied products											
Tech1	Capex	DB38: Chemical and allied products											
Tech1	Capex	DB39: Chemical and allied products											
Tech1	Capex	DB40: Chemical and allied products											
Tech1	Capex	DB41: Chemical and allied products											
Tech1	Capex	DB42: Chemical and allied products											
Tech1	Capex	DB43: Chemical and allied products											
Tech1	Capex	DB44: Chemical and allied products											
Tech1	Capex	DB45: Chemical and allied products											
Tech1	Capex	DB46: Chemical and allied products											
Tech1	Capex	DB47: Chemical and allied products											
Tech1	Capex	DB48: Chemical and allied products											
Tech1	Capex	DB49: Chemical and allied products											
Tech1	Capex	DB50: Chemical and allied products											
Tech1	Capex	DB51: Chemical and allied products											
Tech1	Capex	DB52: Chemical and allied products											
Tech1	Capex	DB53: Chemical and allied products											
Tech1	Capex	DB54: Chemical and allied products											
Tech1	Capex	DB55: Chemical and allied products											
Tech1	Capex	DB56: Chemical and allied products											
Tech1	Capex	DB57: Chemical and allied products											
Tech1	Capex	DB58: Chemical and allied products											
Tech1	Capex	DB59: Chemical and allied products											
Tech1	Capex	DB60: Chemical and allied products											
Tech1	Capex	DB61: Chemical and allied products											
Tech1	Capex	DB62: Chemical and allied products											
Tech1	Capex	DB63: Chemical and allied products											
Tech1	Capex	DB64: Chemical and allied products											
Tech1	Capex	DB65: Chemical and allied products											
Tech1	Capex	DB66: Chemical and allied products											
Tech1	Capex	DB67: Chemical and allied products											
Tech1	Capex	DB68: Chemical and allied products											
Tech1	Capex	DB69: Chemical and allied products											
Tech1	Capex	DB70: Chemical and allied products											
Tech1	Capex	DB71: Chemical and allied products											
Tech1	Capex	DB72: Chemical and allied products											
Tech1	Capex	DB73: Chemical and allied products											
Tech1	Capex	DB74: Chemical and allied products											
Tech1	Capex	DB75: Chemical and allied products											
Tech1	Capex	DB76: Chemical and allied products											
Tech1	Capex	DB77: Chemical and allied products											
Tech1	Capex	DB78: Chemical and allied products											
Tech1	Capex	DB79: Chemical and allied products											
Tech1	Capex	DB80: Chemical and allied products											
Tech1	Capex	DB81: Chemical and allied products											
Tech1	Capex	DB82: Chemical and allied products											
Tech1	Capex	DB83: Chemical and allied products											
Tech1	Capex	DB84: Chemical and allied products											
Tech1	Capex	DB85: Chemical and allied products											
Tech1	Capex	DB86: Chemical and allied products											
Tech1	Capex	DB87: Chemical and allied products											
Tech1	Capex	DB88: Chemical and allied products											
Tech1	Capex	DB89: Chemical and allied products											
Tech1	Capex	DB90: Chemical and allied products											
Tech1	Capex	DB91: Chemical and allied products											
Tech1	Capex	DB92: Chemical and allied products											
Tech1	Capex	DB93: Chemical and allied products											
Tech1	Capex	DB94: Chemical and allied products											
Tech1	Capex	DB95: Chemical and allied products											
Tech1	Capex	DB96: Chemical and allied products											
Tech1	Capex	DB97: Chemical and allied products											
Tech1	Capex	DB98: Chemical and allied products											
Tech1	Capex	DB99: Chemical and allied products											
Tech1	Capex	DB100: Chemical and allied products											

Calculation sheets to derive indirect and induced effects

Where the calculations are performed for each technology as well as aggregated indirect and induced economic impacts

- INPUTS >>
- IO_INPUT >>
- Scenario_Loop >>
- RESULTS >>
- CALCULATIONS >>

- Tech 1,2,3...
- Sectoral_IMPACTS
- I_O_TABLE

- Direct, indirect and induced economic and employment impacts are calculated in the **Sectoral_IMPACTS** sheet
- Calculations take the aggregate investment over the period defined in the **Scenario_Setup** sheet
- Calculations are carried out at the economic sector level
- Type 1 and Type 2 multipliers are derived from the IO table in the **I_O_TABLE** sheet and used to estimate indirect and induced impacts of investments, respectively
- Sectoral level local share estimates are also derived from the IO table data

Sectoral Impacts by Technology

This sheet feeds the estimates of total direct capital and operational expenditures over the period of interest (defined in the Scenario_SETUP sheet) into columns F and G and calculates the corresponding value added, total labour earnings and employment. The first column of columns F to H calculates the direct impacts, the second and third (G to H) calculate the indirect impacts and the last part (I to H) calculates the induced impacts.

Tech1	Onshore wind	Technology	Direct		Indirect		Induced		Total	Employment	Employment
			Value Added	Value Added	Value Added	Value Added	Value Added	Value Added			
1	1	021702 Agriculture, hunting, forestry	-	-	-	-	-	-	-	-	-
1	1	0201 Fishing and aquaculture	-	-	-	-	-	-	-	-	-
1	1	0202 Mining and quarrying	-	-	-	-	-	-	-	-	-
1	1	0203 Manufacturing	-	-	-	-	-	-	-	-	-
1	1	0204 Wholesale and retail trade, repair of motor vehicles	-	-	-	-	-	-	-	-	-
1	1	0205 Accommodation and food service activities	-	-	-	-	-	-	-	-	-
1	1	0206 Information and communication	-	-	-	-	-	-	-	-	-
1	1	0207 Health and social work activities	-	-	-	-	-	-	-	-	-
1	1	0208 Public administration and defence, compulsory social security	-	-	-	-	-	-	-	-	-
1	1	0209 Other service activities	-	-	-	-	-	-	-	-	-
1	1	0300 Total	2,785,449	1,243,415	887,908	45,423	-	-	-	-	-

IO Table

Technology	021702	0201	0202	0203	0204	0205	0206	0207	0208	0209	0300
021702	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
0201	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
0202	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
0203	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
0204	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
0205	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000	0.000000
0206	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000	0.000000
0207	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000	0.000000
0208	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000	0.000000
0209	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000	0.000000
0300	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	1.000000

QUESTIONS / COMMENTS / FEEDBACK

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