

Snapshot of - AIM-Hub

Archive of AIM-Hub, version: V2.2

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Reference card - AIM-Hub

The reference card is a clearly defined description of model features. The numerous options have been organized into a limited amount of default and model specific (non default) options. In addition some features are described by a short clarifying text.

Legend:

not implemented

- implemented
- implemented (not default option)

About

Name and version	AIM-Hub V2.2
Model link	https://www-iam.nies.go.jp/aim/about_us/index.html
Institution	National Institute for Environmental Studies (NIES), Japan, https://www.nies.go.jp/index-e.html , Kyoto-University (Kyoto-University), Japan, https://www.kyoto-u.ac.jp/en .
Documentation	AIM-Hub documentation consists of a referencecard and <u>detailed model documentation</u>
Process state	published

Model scope and methods

Model documentation: [Model scope and methods - AIM-Hub](#)

Model type	<input type="checkbox"/> Integrated assessment model <input type="checkbox"/> Energy system model	<input checked="" type="checkbox"/> CGE <input type="checkbox"/> CBA-integrated assessment model
Geographical scope	<input checked="" type="checkbox"/> Global	<input type="checkbox"/> Regional
Objective	To understand, economy, energy and land-use interaction particularly related to climate policy	
Solution concept	<input type="checkbox"/> Partial equilibrium (price elastic demand) <input type="checkbox"/> Partial equilibrium (fixed	demand) <input checked="" type="checkbox"/> General equilibrium (closed economy)
Solution horizon	<input checked="" type="checkbox"/> Recursive dynamic (myopic)	<input type="checkbox"/> Intertemporal optimization (foresight)
Solution method	<input checked="" type="checkbox"/> Simulation	<input type="checkbox"/> Optimization

Temporal dimension

Base year:2005, time steps:Annual, horizon: 2100

Note: 2005- 2015 is used for calibration and parameters are adjusted to be close to the IEA energy balance table

Spatial dimension Number of regions:17

- | | |
|------------------------|--------------------------------------|
| 1. Japan | 10. Brazil |
| 2. China | 11. Rest of South America |
| 3. India | 12. Middle East |
| 4. Rest of Asia | 13. North Africa |
| 5. Rest of Europe | 14. Rest of Africa |
| 6. Former Soviet Union | 15. Rest of East and South East Asia |
| 7. Turkey | 16. EU |
| 8. Canada | 17. New Zealand and Australia |
| 9. United States | |

Time discounting type

- | | |
|--|---|
| <input type="checkbox"/> Discount rate exogenous | <input type="checkbox"/> Discount rate endogenous |
|--|---|

Policies

- | | |
|--|---|
| <input checked="" type="checkbox"/> Emission tax | <input checked="" type="checkbox"/> Emission standards |
| <input checked="" type="checkbox"/> Emission pricing | <input checked="" type="checkbox"/> Energy efficiency standards |
| <input checked="" type="checkbox"/> Cap and trade | <input checked="" type="checkbox"/> Agricultural producer subsidies |
| <input checked="" type="checkbox"/> Fuel taxes | <input checked="" type="checkbox"/> Agricultural consumer subsidies |
| <input checked="" type="checkbox"/> Fuel subsidies | <input checked="" type="checkbox"/> Land protection |
| <input type="checkbox"/> Feed-in-tariff | <input checked="" type="checkbox"/> Pricing carbon stocks |
| <input checked="" type="checkbox"/> Portfolio standard | |
| <input checked="" type="checkbox"/> Capacity targets | |

Socio-economic drivers

Model documentation: [Socio-economic drivers - AIM-Hub](#)

Population

- | | |
|---|---|
| <input checked="" type="checkbox"/> Yes (exogenous) | <input type="checkbox"/> Yes (endogenous) |
|---|---|

Population structure

- | | |
|--|---|
| <input type="checkbox"/> Yes (exogenous) | <input type="checkbox"/> Yes (endogenous) |
|--|---|

Education level

- | | |
|--|---|
| <input type="checkbox"/> Yes (exogenous) | <input type="checkbox"/> Yes (endogenous) |
|--|---|

Urbanization rate	<input type="checkbox"/> Yes (exogenous)	<input type="checkbox"/> Yes (endogenous)
GDP	<input checked="" type="checkbox"/> Yes (exogenous)	<input type="checkbox"/> Yes (endogenous)
Income distribution	<input type="checkbox"/> Yes (exogenous)	<input type="checkbox"/> Yes (endogenous)
Employment rate	<input checked="" type="checkbox"/> Yes (exogenous)	<input type="checkbox"/> Yes (endogenous)
Labor productivity	<input checked="" type="checkbox"/> Yes (exogenous)	<input type="checkbox"/> Yes (endogenous)
Total factor productivity	<input type="checkbox"/> Yes (exogenous)	<input checked="" type="checkbox"/> Yes (endogenous)
Autonomous energy efficiency improvements	<input type="checkbox"/> Yes (exogenous)	<input checked="" type="checkbox"/> Yes (endogenous)

Macro-economy

Model documentation: Macro-economy - AIM-Hub

Economic sector

Industry	<input type="checkbox"/> Yes (physical) <input checked="" type="checkbox"/> Yes (economic)	<input type="checkbox"/> Yes (physical & economic)
Energy	<input type="checkbox"/> Yes (physical) <input type="checkbox"/> Yes (economic)	<input checked="" type="checkbox"/> Yes (physical & economic)
Transportation	<input type="checkbox"/> Yes (physical) <input type="checkbox"/> Yes (economic)	<input type="checkbox"/> Yes (physical & economic)
Residential and commercial	<input type="checkbox"/> Yes (physical) <input checked="" type="checkbox"/> Yes (economic)	<input type="checkbox"/> Yes (physical & economic)
Agriculture	<input type="checkbox"/> Yes (physical) <input type="checkbox"/> Yes (economic)	<input checked="" type="checkbox"/> Yes (physical & economic)
Forestry	<input type="checkbox"/> Yes (physical) <input type="checkbox"/> Yes (economic)	<input type="checkbox"/> Yes (physical & economic)

Other economic sector **Services - Yes (Economic)****Macro-economy****Trade** **Coal** **Oil** **Gas** Uranium **Electricity** Bioenergy crops **Food crops** Capital **Emissions permits** **Non-energy goods****Cost measures** **GDP loss** **Welfare loss** **Consumption loss** Area under MAC Energy system cost mark-up **Equivalent Variation****Categorization by group** **Income** Urban - rural Technology adoption Age Gender Education level Household size**Institutional and political factors** Early retirement of capital allowed Interest rates differentiated by country/region Regional risk factors included Technology costs

differentiated by country/region

 Technological change

differentiated by country/region

 Behavioural change

differentiated by country/region

 Constraints on cross country financial transfers**Resource use****Coal** Yes (fixed) **Yes (supply curve)** Yes (process model)**Conventional Oil** Yes (fixed) **Yes (supply curve)** Yes (process model)**Unconventional Oil** Yes (fixed) **Yes (supply curve)** Yes (process model)**Conventional Gas** Yes (fixed) **Yes (supply curve)** Yes (process model)**Unconventional Gas** Yes (fixed) **Yes (supply curve)** Yes (process model)

Uranium	<input type="checkbox"/> Yes (fixed)	<input type="checkbox"/> Yes (process model)
	<input type="checkbox"/> Yes (supply curve)	
Bioenergy	<input type="checkbox"/> Yes (fixed)	<input type="checkbox"/> Yes (process model)
	<input checked="" type="checkbox"/> Yes (supply curve)	
Water	<input type="checkbox"/> Yes (fixed)	<input type="checkbox"/> Yes (process model)
	<input type="checkbox"/> Yes (supply curve)	
Raw Materials	<input type="checkbox"/> Yes (fixed)	<input type="checkbox"/> Yes (process model)
	<input type="checkbox"/> Yes (supply curve)	
Land	<input type="checkbox"/> Yes (fixed)	<input type="checkbox"/> Yes (process model)
	<input type="checkbox"/> Yes (supply curve)	
Other resource use	<i>Note: Bioenergy linked with AIM/PLUM</i>	

Technological change

Energy conversion technologies	<input type="checkbox"/> No technological change	change
	<input checked="" type="checkbox"/> Exogenous technological	<input type="checkbox"/> Endogenous technological change
Energy End-use	<input type="checkbox"/> No technological change	change
	<input checked="" type="checkbox"/> Exogenous technological	<input type="checkbox"/> Endogenous technological change
Material Use	<input type="checkbox"/> No technological change	change
	<input checked="" type="checkbox"/> Exogenous technological	<input type="checkbox"/> Endogenous technological change
Agriculture (tc)	<input type="checkbox"/> No technological change	change
	<input checked="" type="checkbox"/> Exogenous technological	<input type="checkbox"/> Endogenous technological change

Energy

Model documentation: [Energy - AIM-Hub](#)

Energy technology substitution

Energy technology choice

- No discrete technology choices
- Logit choice model
- Production function
- Linear choice (lowest cost)
- Lowest cost with adjustment penalties

Energy technology substitutability

- Mostly high substitutability
- Mostly low substitutability
- Mixed high and low substitutability
- Mostly high substitutability in some sectors and mostly low substitutability in other sectors**

Energy technology deployment

- Expansion and decline constraints
- System integration constraints

Energy**Electricity technologies**

- Coal w/o CCS**
- Coal w/ CCS**
- Gas w/o CCS**
- Gas w/ CCS**
- Oil w/o CCS**
- Oil w/ CCS
- Bioenergy w/o CCS**
- Bioenergy w/ CCS**
- Geothermal power**
- Nuclear power**
- Solar power**
- Solar power-central PV
- Solar power-distributed PV
- Solar power-CSP
- Wind power**
- Wind power-onshore**
- Wind power-offshore**
- Hydroelectric power**
- Ocean power

Hydrogen production

- Coal to hydrogen w/o CCS
- Coal to hydrogen w/ CCS
- Natural gas to hydrogen w/o CCS
- Natural gas to hydrogen w/ CCS
- Oil to hydrogen w/o CCS
- Oil to hydrogen w/ CCS
- Biomass to hydrogen w/o CCS
- Biomass to hydrogen w/ CCS
- Nuclear thermochemical hydrogen
- Solar thermochemical hydrogen
- Electrolysis

Refined liquids

- Coal to liquids w/o CCS
- Coal to liquids w/ CCS
- Gas to liquids w/o CCS
- Gas to liquids w/ CCS
- Bioliqids w/o CCS**
- Bioliqids w/ CCS**
- Oil refining

Refined gases

- Coal to gas w/o CCS
- Coal to gas w/ CCS
- Oil to gas w/o CCS
- Oil to gas w/ CCS

Biomass to gas w/o CCS Biomass to gas w/ CCS**Heat generation** Coal heat Natural gas heat Oil heat Biomass heat Geothermal heat Solarthermal heat CHP (coupled heat and power)**Grid Infra Structure****Electricity** Yes (aggregate) Yes (spatially explicit)**Gas** Yes (aggregate) Yes (spatially explicit)**Heat** Yes (aggregate) Yes (spatially explicit)**CO₂** Yes (aggregate) Yes (spatially explicit)**Hydrogen** Yes (aggregate) Yes (spatially explicit)**Energy end-use technologies****Passenger transportation** Passenger trains Buses Light Duty Vehicles (LDVs) Electric LDVs Hydrogen LDVs Hybrid LDVs Gasoline LDVs Diesel LDVs Passenger aircrafts**Freight transportation** Freight trains Heavy duty vehicles Freight aircrafts Freight ships**Industry** Steel production Aluminium production Cement production Petrochemical production Paper production Plastics production Pulp production**Residential and commercial** Space heating Space cooling Cooking Refrigeration Washing Lighting**Land-use**

Model documentation: Land-use - AIM-Hub**Land cover**

- Cropland**
- Cropland irrigated
- Cropland food crops
- Cropland feed crops
- Cropland energy crops**
- Forest**
- Managed forest**
- Natural forest**
- Pasture**
- Shrubland**
- Built-up area

Agriculture and forestry demands

- Agriculture food**
- Agriculture food crops**
- Agriculture food livestock**
- Agriculture feed**
- Agriculture feed crops**
- Agriculture feed livestock**
- Agriculture non-food**
- Agriculture non-food crops**
- Agriculture non-food livestock**
- Agriculture bioenergy**
- Agriculture residues
- Forest industrial roundwood
- Forest fuelwood
- Forest residues

Agricultural commodities

- Wheat**
- Rice**
- Other coarse grains**
- Oilseeds**
- Sugar crops**
- Ruminant meat**
- Non-ruminant meat and eggs**
- Dairy products**

Emission, climate and impacts

Model documentation: Emissions - AIM-Hub, Climate - AIM-Hub, Non-climate sustainability dimension - AIM-Hub

Greenhouse gases

- CO2 fossil fuels**
- CO2 cement**
- CO2 land use**
- CH4 energy**
- CH4 land use**
- CH4 other**
- N2O energy**
- N2O land use**
- N2O other**
- CFCs**
- HFCs**
- SF6**
- PFCs

Pollutants

- CO energy**
- CO land use**
- CO other**
- NOx energy**
- NOx land use**
- NOx other**
- VOC energy**
- VOC land use**
- VOC other**
- SO2 energy**
- SO2 land use**
- SO2 other**

- BC energy
- BC land use
- BC other
- OC energy
- OC land use

- OC other
- NH3 energy
- NH3 land use
- NH3 other

Climate indicators

- Concentration: CO2
- Concentration: CH4
- Concentration: N2O
- Concentration: Kyoto gases
- Radiative forcing: CO2
- Radiative forcing: CH4
- Radiative forcing: N2O
- Radiative forcing: F-gases

- Radiative forcing: Kyoto gases
- Radiative forcing: aerosols
- Radiative forcing: land albedo
- Radiative forcing: AN3A
- Radiative forcing: total
- Temperature change
- Sea level rise
- Ocean acidification

Carbon dioxide removal

- Bioenergy with CCS
- Reforestation
- Afforestation

- Soil carbon enhancement
- Direct air capture
- Enhanced weathering

Climate change impacts

- Agriculture
- Energy supply
- Energy demand

- Economic output
- Built capital
- Inequality

Co-Linkages

- Energy security: Fossil fuel imports & exports (region)
- Energy access: Household energy consumption
- Air pollution & health: Source-based aerosol

emissions

- Air pollution & health: Health impacts of air Pollution
- Food access
- Water availability
- Biodiversity

Model Documentation - AIM-Hub

Introduction

The AIM is an integrated assessment model framework which consists of 4 models. The core of the model is AIM/CGE. The whole economic activities are represented in the AIM/CGE, but energy, agriculture and land use are relatively disaggregated than other sectors. AIM/PLUM deals with spatial explicit land use downscaling and also provides bioenergy supply curve. AIM/Dynamic provides

global total emissions constraints for AIM/CGE incorporating MAC (Marginal Abatement Cost Curve) and non-CO₂ information from AIM/CGE. The climate outcomes are made by MAGICC. This wiki page mostly explains about AIM/CGE.

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- **Agricultural demand**
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References

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