TIMES China Model 34 Regions (TCM34R)

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Partners

IEA: International Energy Agency

ETSAP: Energy Technology Systems Analysis Programme

POLITO: Politecnico di Torino – Energy Department

KanORS

NDRC: Energy Leading Group of National Development Reform Committee

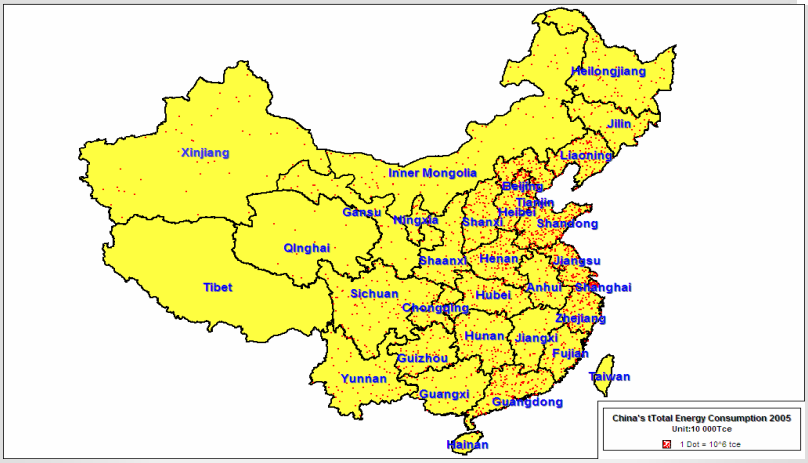
ERI: Energy Research Institute

BJUT: Beijing University of Technology

China's Economic and Social Data on year 2006

Region	Including Provinces		Area		Population		GDP	
	Number	Share%	10^4 Sq.m	Share%	10^8 Person	Share%	10^8 yuan	Share%
East	10	32.2	91	9.5	4.69	36.3	127535.3	55.6
Center	6	19.4	103	10.7	3.53	27.1	42961.6	18.7
West	12	38.7	686	71.5	3.62	28.0	39301.3	17.1
North	3	9.7	80	8.3	1.08	8.36	19723.1	8.6
Total	31	100	960	100	12.92	100	209406.8	100

Data from the above table show that in 2006, eastern regions with its area of less 10% of the total, population more than 36%, contribute more than half of the nation's GDP by consuming around 70% of China's total energy.



The total energy Consumption of China in 2005 is 2144.79 Million Tce. Among which coal consumption is 2167.2251 million tons, oil 325.35 million tons ,and natural gas 46763 million cu.m.

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Modelling features

Multi-regional TIMES model:

- 34 regions (administrative Chinese regions)

- 7 sectors with different details

- 12 timeslices (4 seasons, day-night-peak)

- Base year 2005

- Time horizon 2050 (15 periods)

Data collection

A lot of data are available for the TCM34R but:

- often there isn't coherence between the National and Regional balance;
- in some sectors (e.g. Industry) the is a different structure and detail between national and regional balance;
  The National industry sector is really disaggregated but the regional one describe only the total industry consumption, without sub-sectors;
- this require some assumptions to disaggregate the national data into the regional one, with problem of consistency!
- not always the balance are consistent; the local production not match the resource availability!!

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Data collection

- Population
  - regional urban population
  - regional rural population
- GDP
  - for sector
  - for region and industrial sub-sector
- Workers for industrial sub-sector (almost regions)

Some of the previous data are used as drivers for the demand projection

The most important sources

China Statistic Yearbook

China Energy Statistic Yearbook

China Regional Statistic Yearbook

China Electricity & Coal Industry Committee

IEA publications
- Tracking Industrial Energy Efficiency and CO2 Emissions

Focus of activity

Description of objectives and assumption

Focus of modelling on power sector and industry

No description of demand technologies for: residential, commercial, agriculture and transport sectors.

But the TCM34R includes projections of energy demands for all the sectors in an aggregated processes by service.

Focus of activity

Residential and Commercial sector

- described by demand segment:
  - space heating;
  - lighting
  - cooling
  - other appliances (only electricity appliances for residential sector)

- for each demand segment:
  - a dummy technology with an energy intensity input
  - a projection with different drivers

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Focus of activity

Demands of the Residential and Commercial sector

COML	Commercial Lighting Demad	MSqM
COMH	Commercial Heating Demand	MSqM
COMC	Commercial Cooling Demand	MSqM
COMO	Commercial Other Demand	MSqM
RULI	Residential Urban Lighting Demand	POPU
RUHE	Residential Urban Space Heating Demand	POPU
RUCK	Residential Urban Cooking Demand	POPU
RUOT	Residential Urban Other elect. Appliances Demand	POPU
RUCO	Residential Urban Cooling Demand	POPU
RRLI	Residential Urban Lighting Demand	POPR
RRHE	Residential Rural Space Heating Demand	POPR
RRCK	Residential Rural Cooking Demand	POPR
RRCO	Residential Rural Cooling Demand	POPR
RROT	Residential Rural Other elect. Appliances Demand	POPR

Focus of activity

Agriculture, Construction and Other Sector

- described by total sector demand:
  - with a dummy technology - energy intensity input
  - a projection using sector GDP

AGRI	Agriculture demand	100MY
CONS	Construction demand	100MY
OTHE	Other demand	10000Tce

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Focus of activity

Electricity sector

- Power plants (coal technologies, CO_2 capture, wind potential and nuclear potential)
- Grids: modelling the existing and planned grids
- Modelling the electricity load curve
- Modelling demand side efficiency measures for electricity in a simple way

Focus of activity

Electricity sector by region

- Base year power plants are elaborated by size and by fuel

		China statistical data					
		Power Plant Capacity [MW]	Power Plant Fuel Share [%]	Coal Technology Share [%] - split among the coal power plant	Electricity Production [10^4 Tce]	Availability Factor	Power Plant Efficiency
Existing Coal fired: Less than 100MW	ECOA_LT100_00	738.8	0.970	0.219	55	0.069	0.37
Existing Coal fired: 100 to 200 MW	ECOA_100-200_00	1630.0		0.484	121	0.069	0.36
Existing Coal fired: 200 to 300 MW	ECOA_200-300_00	1000.0		0.297	74	0.069	0.35
Existing Coal fired: 300 to 600 MW	ECOA_300-600_00	0.0		0.000	0	0.000	0.34
Existing Coal fired: Greater than 600 MW	ECOA_600_00	0.0		0.000	0	0.000	0.33
Existing Gas fired Power Plants	EGAS_00	1.9	0.01		1.32	0.650	0.40
Existing Fuel Oil fired Power Plants	EOIL_00	9.2	0.03		6.47	0.650	0.35
Existing Nuclear Power Plants	ENUC_00	0.0			0.0	0.000	0.33
Existing Hydro Power Plants	EHYD_00	1053.4			0.0	0.000	0.33
Existing Wind Power Plants	EWIN_00	17.5			5.7	0.300	0.33
Existing Biomass Power Plants	EBIO_00	0.0			0.0	0.000	0.25

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Focus of activity

Electricity sector

- Future power plants are described by techs:
  - Coal fired power
    - supercritical steam cycles;
    - ultra-supercritical steam cycles;
    - integrated gasification combined cycle;
  - Coal + CO2 capture
  - Co-firing biomass in coal power plants
  - Coal for CHP
  - Hydro power plants expansion potential
  - Wind
  - Nuclear expansion potentials

Focus of activity

Industrial sector

- Iron and steel
- Cement
- Glass
- Chemicals and petrochemicals
- Non-ferrous metal
- Pulp and paper

This sector is described with processes and end-use technologies.

Not yet decided if with or without materials flow