



Picture credit top: WtE plant in Tampere, Finland, with kind permission of Steinmüller Babcock Environment GmbH.

Waste to Energy 2018/2019

Technologies, plants, projects, players and backgrounds of the global thermal waste treatment business

Extract

11th edition, 2018

Waste to Energy 2018/2019

The industry's leading standard reference in the WtE sector. On around **1,100 pages** the **updated 11th edition** includes:

- the analysis of the different treatment technologies as well as the description and market shares of all important operators and technology providers
- data on more than 2,430 waste treatment plants with more than 4,500 incineration units worldwide
- the description and analysis of more than 1,000 projects throughout the world
- the explanation of backgrounds, planning requirements and operating modes of thermal waste treatment
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Price: **from 2,900.- EUR plus VAT**. Please see the order form at the end of this extract for details.
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Background

The market for thermal treatment and energetic recovery of residual and other types of solid waste is growing continuously. Increasing waste amounts, shrinking landfill spaces in agglomerations and higher ecological standards stimulate this growth throughout the world.

Today, more than 2,430 WtE plants are active worldwide. They have a disposal capacity of around 360 million tons of waste per year. Only in 2017, more than 80 new thermal treatment plants had been installed with a total treatment capacity of 25 million tpy. We estimate more than 2,700 plants with a capacity of about 530 million annual tons to be operational by 2027.

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Japan	281	Finland	660
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Singapore	514	Hungary	759
South Korea	520	Ireland	764
Taiwan	547	Italy	771
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Vietnam	571	Lithuania	796
Rest of Asia	579	Luxembourg	801
6.3 <i>Australia & Pacific</i>	584	Malta	804
Australia	585	Netherlands	807
Rest of Australia & Pacific	594	Norway	820
		Poland	831
		Portugal	846
		Romania	853

Russia	858	6.5	<i>North America</i>	968
Serbia	865		Canada	969
Slovakia	869		USA	980
Slovenia	873		Rest of North America	1014
Spain	877	6.6	<i>South & Central America</i>	1019
Sweden	886		Argentina	1020
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United Arab Emirates

Last update: 07-2018

Inhabitants [million]	9.3	Number of waste incineration plants	-
Municipal solid waste [1,000 t]	6,335	Incineration capacity [1,000 Mg/a]	-
of which thermally treated [1,000 t]	-	Average age of incineration lines	-
Electricity from waste 2015 [GWh]	-	Share of total electricity production 2015 [%]	-
Heat from waste 2015 [TJ]	-	Share of total heat production 2015 [%]	-

Management summary

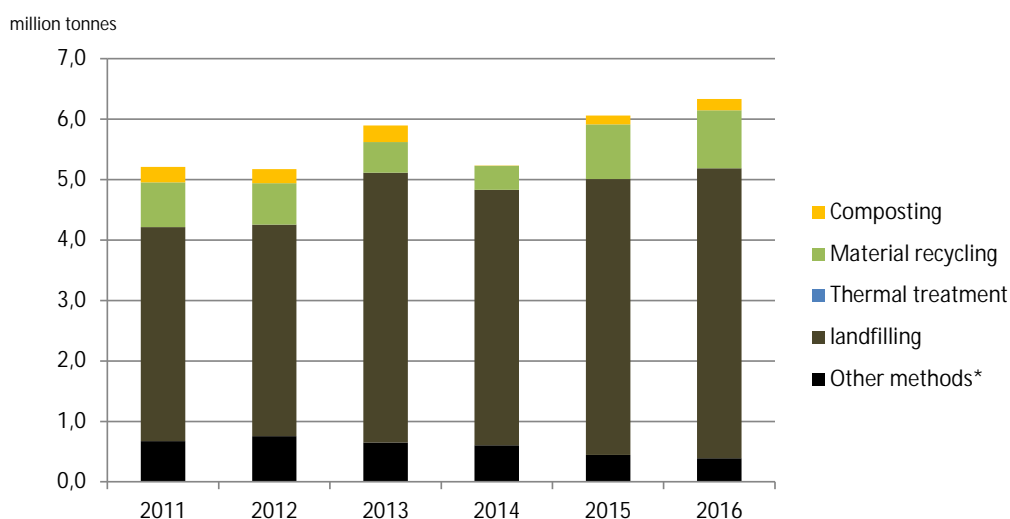
One of the two projects in Sharjah was commissioned in 2018. The other one is likely to be realised in the years to come. As further capacities are lacking, projects are being planned in the emirates of Abu Dhabi and Dubai. Altogether, the waste market of the UAE can be considered as dynamic.

Background / market factors / legal framework

The UAE is a federation of 7 emirates that are named after the capital of each emirate. The emirates of Dubai, Abu Dhabi and Sharjah account for nearly two thirds of the country's population.

The standard of waste management and waste treatment differs per emirate. In general, considering waste management as an important public issue is relatively young and only began after 2005. Sharjah, for instance, already reached a recycling rate of more than 50% in 2012. Abu Dhabi adopted a general strategy for waste management in 2013.

Figure 36: Shares of incineration, recycling and landfilling of municipal solid waste in the UAE



* Includes gathering for recovery

Source: UAE Statistics

(...)

(...)

According to a report from UNIDO, about 80% of the MSW is directly disposed of at Iran’s 3,000 landfills, buried or burned. As most of the landfills are informal ones, only 2.5% is landfilled at sanitary landfills. In the coming years, the number of landfills should be reduced to 600. In 2015, 500 landfills were shut down already.

According to UNIDO information, 20% of the MSW is treated (7% sorting and 13% recycling). For the treatment of waste there are 2 MBT plants in Isfahan and Arad Khou. The MBT plant in Arad Khou generates 2,000 tpd of RDF with a comparatively low calorific value of 8,500 KJ/kg.

Figure 58: Legislation and waste management plans in Iran

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Legislation												
Waste Management		integrated national waste management plan										
						National 5-year municipal waste management plan						
							5-year development plan					
						National Strategic Plan of Developing Waste to Energy and Incineration in Iran						
Feed-in Tariff						0.08 EUR/kWh						

in force
 likely to be in force
 implementation status unclear

According to the Ministry of Energy, Renewable Energy and Energy Efficiency Organization (SATBA), formerly Renewable Energy Organization of Iran (SUNA), the feed-in tariff for waste incineration amounts to 0.08 EUR/kWh (3,700 IRR/kWh) since 2016. In the second half of 2016, the SUNA was meant to discuss an increase of the tariff to 0.25 EUR/kWh. However, as of 2018, there is no information on such an increase. Although granted for 20 years, after 10 years the tariff will be multiplied by 0.7, resulting in prices of 0.05 EUR/kWh (2,590 IRR/kWh).

Plants

In Iran, a waste incinerator in Tehran was officially inaugurated in February 2015, close to the landfill site in Arad Khou, formerly known as the Kahrizak landfill. It is supposed to have a capacity of 64,000 tpy. The waste complex also includes an MBT plant and several composting sites.

The co-incineration of waste in cement plants is not common yet but has a great potential as there are more than 40 cement plants in the country. However, up to now, these facilities do not have the technology to co-incinerate waste. An additional obstacle for the co-incineration of RDF is its currently low calorific value.

(...)

(...)

Market development

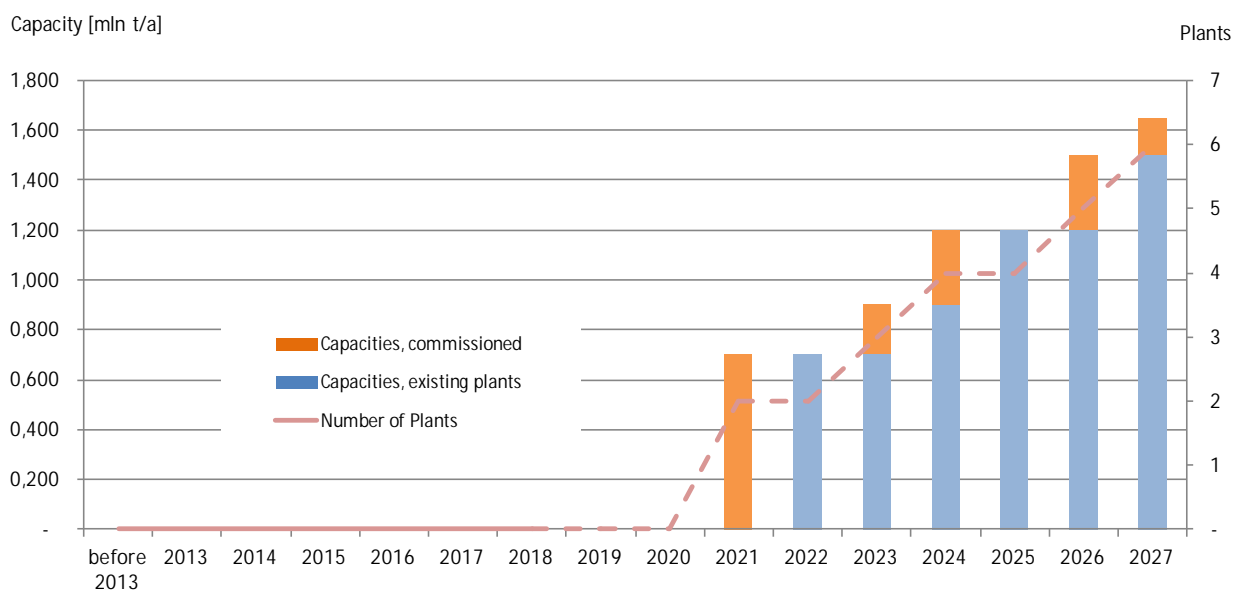
Especially the landfill taxes in the different states triggered an increasing interest in WtE solutions, which has resulted in a WtE planning boom in the past years. As of June 2018, we knew of 20 projects in different planning stages.

As in most young WtE markets, however, the status of many projects remains uncertain. Plans are often initiated by players lacking experience and know-how. Certain projects intend to use advanced technologies by suppliers that do not have any commercial experience so far.

The most advanced project is located in Kwinana, near Perth. After main construction company Posco had issued a notice of termination, project developer Phoenix Energy nominated BGC Contracting as the new preferred EPD contractor. Despite the delay, preliminary groundworks have begun in early 2018. Operational start is planned for 2021. When completed, the facility will process 400,000 tpy, which equals about 50% of the MSW collected in the Perth metro area.

In September 2017, Hitachi Zosen Inova (HZI) and Tribe Infrastructure Group were selected to build the plant in East Rockingham, which is located next to Kwinana. According to HZI, construction works will begin in the third quarter of 2018.

Figure 109: Development of plants and capacities in Australia



Data partly estimated up to 2017, from 2018 on forecasted, Source: ecoprolog

In the end, some of the early plannings from our project outlook might fail. In the long term, however, there is no doubt that numerous WtE projects are possible in Australia – if landfill taxes continue to increase as planned and China and other countries tighten their waste import policy.

(...)

(...)

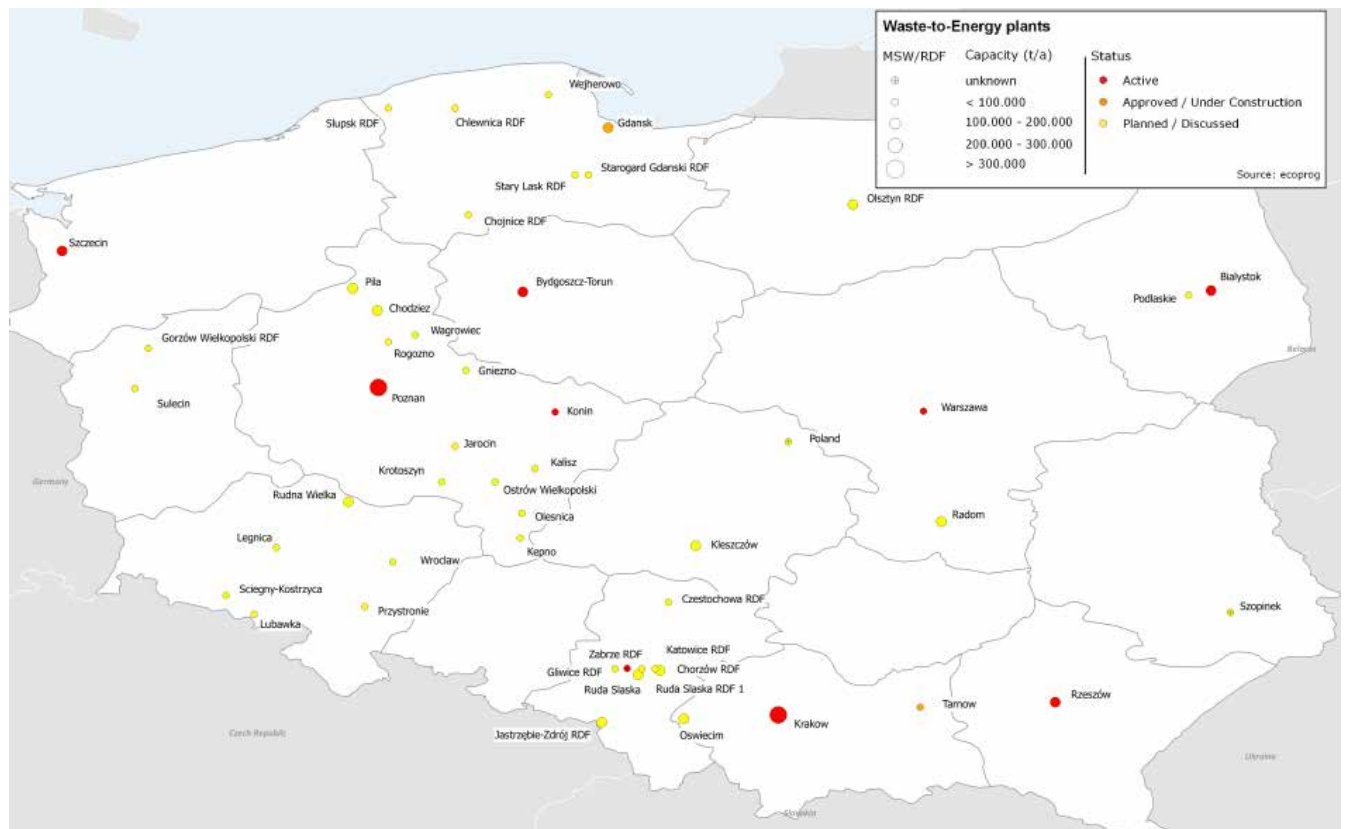
The Gdańsk project is also planned as a PPP. After the contract was initially awarded to German EEW a review resulted in a reawarding, which was won by Italy-based Astaldi and Termomeccanica Ecologia along with French operator Tiru.

The consortium of Astaldi and Termomeccanica Ecologia together with Atzwanger also made an offer for the project in Warszawa. However, Chinese general contractor Shanghai Electric Power Construction, subsidiary of Power China, was awarded for the modernisation of the plant.

The 40 planned projects have different municipal and private stakeholders. Among them are waste management companies, experienced WtE operators (such as Finnish Fortum) or industrial stakeholders that would also serve as energy customers (such as chemical company Synthos in Oświęcim).

Regarding the technology suppliers, it has to be said that all projects are international tenders and highly competitive (due to the EU funding). As a result, many different technology suppliers are active on the Polish market. Keppel Seghers delivers the incineration technology to the plant in Białystok, Martin to the one in Konin, Doosan Lentjes to the Kraków plant and Hitachi Zosen Inova to the Poznań facility. However, Italian Termomeccanica is the strongest competitor in Poland. It equipped the plant in Bydgoszcz and Szczecin that was originally awarded to MH Power Systems Europe. Furthermore, Termomeccanica also won the projects in Rzeszów and Gdańsk.

Figure 209: Locations of plants and projects in Poland



(...)

Flue gas cleaning: Dry Scrubbing absorber with Bag House. Activated carbon.

Manufacturer furnace: CNIM

Manufacturer flue gas cleaning: Defisa

Remarks: Last revamping from 1997-1999

La Coruña

Sogama

Morzós, 10 bajos

15187 San Román - Encrovas. Cerceda, A Coruña

Tel.: 0034 981 698500

Fax: 0034 981 586064

palcazar@sogama.es

Status: active

Capacity (t/a): 550.000

Real throughput (t/a): 533.742

Power production capacity (MW): 49,0

Heat production capacity (MW): 75,0

Remarks: In 01/2017, plant operator SOGAMA announced a collaboration with Spanish construction company Valtalia to double the site's current capacity. The contract worth EUR 275 million does not only apply to the WtE plant, but also to an adjacent material recycling and RDF production facility.

Unit: 1

Start of operation: 2002

Capacity (t/h): 23,7

Incineration mode: Fluidized Bed

Flue gas cleaning: Semi-dry scrubbing absorber with bag house. Activated carbon. SNCR.

Manufacturer furnace: Kvaerner (Metso)

Manufacturer flue gas cleaning: ABB

Unit: 2

Start of operation: 2002

Capacity (t/h): 23,7

Incineration mode: Fluidized Bed

Flue gas cleaning: Semi-dry scrubbing absorber with bag house. Activated carbon. SNCR.

Manufacturer furnace: Kvaerner (Metso)

Manufacturer flue gas cleaning: ABB

Unit: 3

Start of operation: 2002

Capacity (t/h): 23,7

Madrid

Tirmadrid, S.A.

Cañada Real De Merinas s/n

28051 Madrid

Tel.: +34 913 324 131

Fax: +34 913 322 780

tirmadrid@tirmadrid.es

Status: active

Capacity (t/a): 211.968

Real throughput (t/a): 296.650

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ã ecoprolog GmbH, www.ecoprolog.com

Power production capacity (MW): 29,8

Remarks: Plant owner: Tirmadrid S.A.

Unit: 1

Start of operation: 1997

Capacity (t/h): 9,2

Incineration mode: Fluidized Bed

Flue gas cleaning: Semi-dry scrubbing with bag house.

Activated carbon. SCR.

Manufacturer furnace: EBARA, Lurgi

Manufacturer flue gas cleaning: H-ABT

Unit: 2

Start of operation: 1997

Capacity (t/h): 9,2

Incineration mode: Fluidized Bed

Flue gas cleaning: Semi-dry scrubbing with bag house.

Activated carbon. SCR.

Manufacturer furnace: EBARA

Manufacturer flue gas cleaning: H-ABT

Unit: 3

Start of operation: 1997

Capacity (t/h): 9,2

Incineration mode: Fluidized Bed

Flue gas cleaning: Semi-dry scrubbing with bag house.

Activated carbon. SCR.

Manufacturer furnace: EBARA

Manufacturer flue gas cleaning: H-ABT

Mataró

TEM-UTE CONSTRUCTRUORA / Veolia

Environmental Services

C/ de la Teixidora, 83 Pol. Ind. Les Hortes del Camí Ral

8302 Mataró

Tel.: +34 937 411 030

Fax: +34 937 411 265

trm@trm.es

Status: active

Capacity (t/a): 153.600

Real throughput (t/a): 162.000

Power production capacity (MW): 14,6

Remarks: As announced in June 2017, in order to improve the materials selection section of their facility, Veolia has put investments of around EUR 2.8 million into the refurbishment of the plant. Major update of the combustion system in 2010/2011. Since 2010, the new operator is TEM-UTE, a consortium of SUFI SU (38%), VEOLIA PROPERTE (38%), CORA TIERRA (19%), and Germany-based BKW Biokraftwerke Fürstenwalde GmbH (5%).

(...)

Plants and projects

Brampton

Emerald Energy From Waste Inc.
7656 Bramalea Road
L6T 5M5 Brampton
Tel.: 905-791-2777
info@emeraldefw.com
Status: active
Capacity (t/a): 145.536
Real throughput (t/a): 174.000
Power production capacity (MW): 7,7

Remarks: In 03/2016, it was stated that the plant operator was looking for a long-term waste treatment agreement with Peel Region, which would include a plant expansion to at least 250,000 tpy.

Unit: 1

Start of operation: 1992
Capacity (t/h): 3,8
Incineration mode: controlled air incinerator (2-stage modular Consumat units)
Flue gas cleaning: spray humidifier, dry lime injection and fabric filter & HG sorbent (activated carbon), selective catalytic reduction control
Manufacturer furnace: Consutech Systems, LLC
Remarks: Waste is first ignited by an auxiliary burner and then undergoes a gasification / pyrolysis process.

Unit: 2

Start of operation: 1992
Capacity (t/h): 3,8
Incineration mode: controlled air incinerator (2-stage modular Consumat units)
Flue gas cleaning: spray humidifier, dry lime injection and fabric filter & HG sorbent (activated carbon), selective catalytic reduction control
Manufacturer furnace: Consutech Systems, LLC
Remarks: Waste is first ignited by an auxiliary burner and then undergoes a gasification / pyrolysis process.

Unit: 3

Start of operation: 1992
Capacity (t/h): 3,8
Incineration mode: 2-stage modular Consumat units
Flue gas cleaning: spray humidifier, dry lime injection and fabric filter & HG sorbent (activated carbon), selective catalytic reduction control
Manufacturer furnace: Consutech Systems, LLC
Remarks: Waste is first ignited by an auxiliary burner and then undergoes a gasification / pyrolysis process.

Unit: 4

Start of operation: 1992
Capacity (t/h): 3,8
Incineration mode: controlled air incinerator (2-stage modular Consumat units)

Flue gas cleaning: spray humidifier, dry lime injection and fabric filter & HG sorbent (activated carbon), selective catalytic reduction control
Manufacturer furnace: Consutech Systems, LLC
Remarks: Waste is first ignited by an auxiliary burner and then undergoes a gasification / pyrolysis process.

Unit: 5

Start of operation: 1992
Capacity (t/h): 3,8
Incineration mode: controlled air incinerator (2-stage modular Consumat units)
Flue gas cleaning: spray humidifier, dry lime injection and fabric filter & HG sorbent (activated carbon), selective catalytic reduction control
Manufacturer furnace: Consutech Systems, LLC
Remarks: Waste is first ignited by an auxiliary burner and then undergoes a gasification / pyrolysis process.

Burnaby

Covanta Burnaby Renewable Energy Inc.
5150 Riverbend Dr.
V3N 4V3 Burnaby
Tel.: (604) 521-1025
Status: active
Capacity (t/a): 253.440
Real throughput (t/a): 256.000
Power production capacity (MW): 18,2
Heat production capacity (MW): 122,4

Remarks: The plant's emission control system was upgraded in 2014 for CAD 7 million. As first reported in mid-2015, CAD 6 million (EUR 4.3 million) will be spent on technology to recover non-ferrous metals from incineration ashes. Moreover, CAD 1.6 million (EUR 1.15 million) will be spent for new natural gas burners at the site. For the future, also a capacity increase to 370,000 tpa is planned.

Unit: 1

Start of operation: 1988
Capacity (t/h): 11,0
Incineration mode: Reverse Acting Grate
Flue gas cleaning: spray humidifier, dry lime injection and fabric filter & HG sorbent (activated carbon), and SNCR (ammonia injection)
Manufacturer furnace: CNIM
Remarks: System upgrade in 2006

Unit: 2

Start of operation: 1988
Capacity (t/h): 11,0
Incineration mode: Reverse Acting Grate

(...)

(...)		Askar	79	Balkh Province WtE projects	581
Anshun	106	Aso	297	Ballarat	591
Antibes	676	Asukamura	297	Baltimore	989
Antwerpen 1	618	Atami City	297	Bamberg	722
Anyang	106	Atlantic County	988	Ban Lat District	566
Anyang City	106	Atsugi	297	Bandipora	251
Anyang Pyongchon	526	Auburn	988	Bando City	299
Aomori	294	Augsburg	721	Bangalore 2	251
Aomori 2	294	Aurangabad	250	Bangalore WtE proposals	251
APP BioSNG plant	939	Avesta	892	Bangkok 2	566
Årdal	826	Awa City	297	Bangkok 3	566
Ardèche	676	Awaji	297	Bangkok Nong Khaem 1	566
Ardley	939	Awara City	298	Bangkok Nong Khaem 2	566
Arecibo	1017	Awashimaura	298	Baoding	107
Arezzo	777	Awka	82	Baoji	107
Argenteuil	676	Ayabe City	298	Baoquanling	107
Århus	646	Ayutthaya	566	Baoshan City 1	107
Aridagawa, Arida District	295	Azuma East	298	Baoshan City 2	107
Arita, Nishimatsuura District	295	Azuma West	298	Baotou	107
Arnoldstein	608	Azumino	298	Baotou 2	108
Arques	676	Babylon	988	Baramulla	251
Arrabloy	677	Bacolod	511	Bareilly	251
Arundel	940	Baddesley	940	Barueri	1026
Asago	295	Bagalur	251	Basak	511
Asahi City	295	Baguio	511	Basel	908
Asahi Town	295	Bahamas Stellar Energy	1016	Batam	272
Asahikawa	296	Baicheng	106	(...)	
Asaka	296	Baicheng 4	106		
Asan RDF	526	Bainbridge	988		
Ashikaga	296	Bairia	251		
Ashikita	296	Baiyin	107		
Ashiya City	296	Balakhani	582		
		Bali	553		

Price and product information

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