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Waste to Energy 2019/2020

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

Extract

12th edition, 2019

Waste to Energy 2019/2020

The leading **standard reference in the WtE industry**. On around **1,100 pages** the **12th edition** includes up-to-date information and analysis:

- more than 2,430 waste treatment plants with more than 4,800 incineration units worldwide, including details on capacity, start of operation, technology, flue gas treatment, manufacturer and operator
- more than 1,100 WtE projects throughout the world
- treatment technologies and market shares of important operators and technology providers
- market factors, planning requirements and operating modes of thermal waste treatment
- investment and operational costs and revenues with exemplary calculations
- a forecast of the global WtE market until 2028, by country, including new plants and capacities, shutdowns and investment volumes per year, explained in a comprehensible and detailed way

In addition to the study, all customers will receive the following products for one year:

- **ecoprogram WtE Monitor:** update on international construction and modernisation projects (emailed every two weeks)
- **ecoprogram WtE Project Tracker:** complete list of all known projects worldwide (MS Excel file), including status, capacity and commissioning (emailed every three months)
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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, around 2,450 thermal waste treatment plants are active worldwide. They have a disposal capacity of around 368 million tons of waste per year. Only in 2018, more than 60 new plants had been installed with a total treatment capacity of more than 14 million tpy. We estimate nearly 2,700 plants with a capacity of more than 530 million tpy to be operational by 2028.

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Indonesia	283	Finland	685
Iran	291	France	694
Japan	298	Germany	737
Malaysia	507	Greece	775
Pakistan	514	Hungary	780
Philippines	518	Ireland	785
Singapore	527	Italy	791
South Korea	534	Latvia	813
Taiwan	573	Lithuania	816
Thailand	587	Luxembourg	820
Vietnam	600	Malta	822
Rest of Asia	608	Netherlands	825
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Australia	614	Poland	846
Rest of Australia & Pacific	622	Portugal	860
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		Russia	870
		Serbia	879
		Slovakia	882

Slovenia	886	USA	992
Spain	890	Rest of North America & Caribbean	1024
Sweden	899		
Switzerland	914	6.6 <i>South & Central America</i>	1027
Turkey	929	Argentina	1028
Ukraine	934	Brazil	1032
United Kingdom	940	Chile	1037
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Switzerland

Last update: 09-2019

Inhabitants [million]	8.54	Number of waste incineration plants	30
Municipal solid waste [1,000 t]	6,060	Incineration capacity [1,000 Mg/a]	4,016
of which thermally treated [1,000 t]	2,880	Average age of incineration lines	22
Electricity from waste 2016 [GWh]	2,422	Share of total electricity production 2015 [%]	3.6
Heat from waste 2016 [TJ]	13,654	Share of total heat production 2015 [%]	62.2

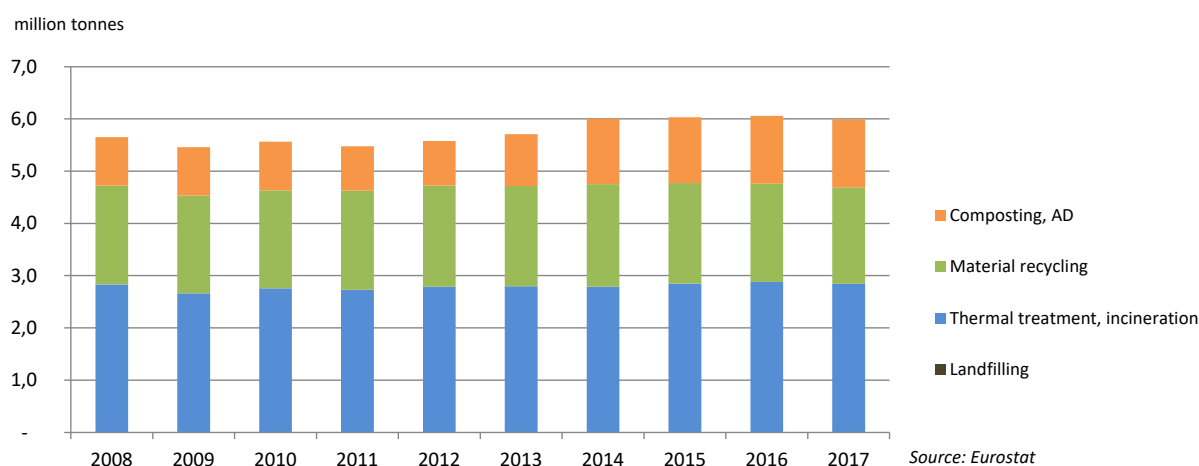
Management summary

The market for the construction of new waste incineration plants in Switzerland is saturated. Individual lines can be expected to be modernised in the years to come, for instance in Emmenspitz and Cheneviers. In total, the incineration capacities will not increase in Switzerland.

Background / market factors / legal framework

Switzerland is one of the countries that were significantly involved in developing modern waste incineration. The main reason for this is the fact that there is a shortage of suitable land for landfill sites because of the topography of the alpine country.

Figure 230: Shares of incineration, recycling and landfilling of municipal solid waste in Switzerland



Even though Switzerland is not an EU member country, it has been complying with the EU specifications for several years, because the country is lacking space for landfilling. This holds true for both the regulations of the Landfill Directive on landfilling biodegradable waste and the specifications of the EU Waste Framework Directive for a 50% recycling share by 2020.

(...)

(...)

A National Action Plan on Green Growth for the years between 2014 and 2020 was published in 2014. The plan does not only require the development of policies to increase recycling rates, but also to promote energy from renewable sources such as waste, biogas and biomass.

As a result, in mid-2014, Vietnam introduced a feed-in tariff for power produced by energy recovery of waste, amounting to 2.114 VND/kWh (~ 8.60 EURct/kWh). This is 25% higher than the tariff for wind power plants.

As it is a promising future market, WtE is also an issue in bilateral negotiations between Vietnam and other countries, mainly Japan and South Korea. These negotiations have also resulted in financial incentives. Furthermore, Vietnam's Deputy Prime Minister announced to strengthen the cooperation with Australia in terms of expanding the WtE capacities. Amongst others, Australian energy firm Trisun Energy has announced to invest in Vietnam.

Figure 97: Legislation and waste management plans in Vietnam

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Legislation	in force							likely to be in force				
	likely to be in force							implementation status unclear				
	implementation status unclear							likely to be in force				
Waste Management			National Action Plan on Green Growth 2014-2020									
Feed-in Tariff			2,114 VND/kWh (~ 0.086 EUR/kWh)						likely to be in force			

in force
 likely to be in force
 implementation status unclear

Plants

In 2018, the first modern WtE plant in Vietnam went online in the city of Can Tho, the fourth largest city in Vietnam. The project was developed by China Everbright.

According to information of the German public development cooperation agency GIZ, even before 30 small-scale incinerators for solid waste installed in rural areas of Vietnam were operational. Nevertheless, it remains uncertain which waste streams are incinerated at the facilities. We do not have any information on plants that treat MSW thermally. Due to their low capacities, we assume these facilities to be solid biomass incinerators.

In 2017, Hanoi's municipal utility URENCO and Japanese manufacturer Hitachi Zosen put their 30,000 tpy commercial and hazardous waste plant in Hanoi into operation. However, due to the input of hazardous waste, we do not classify this as a WtE plant according to the definition of this report.

(...)

(...)

plant asset was constructed. The vast majority of them use grate incineration technology, while the biomass plants are usually equipped with fluidised bed technology.

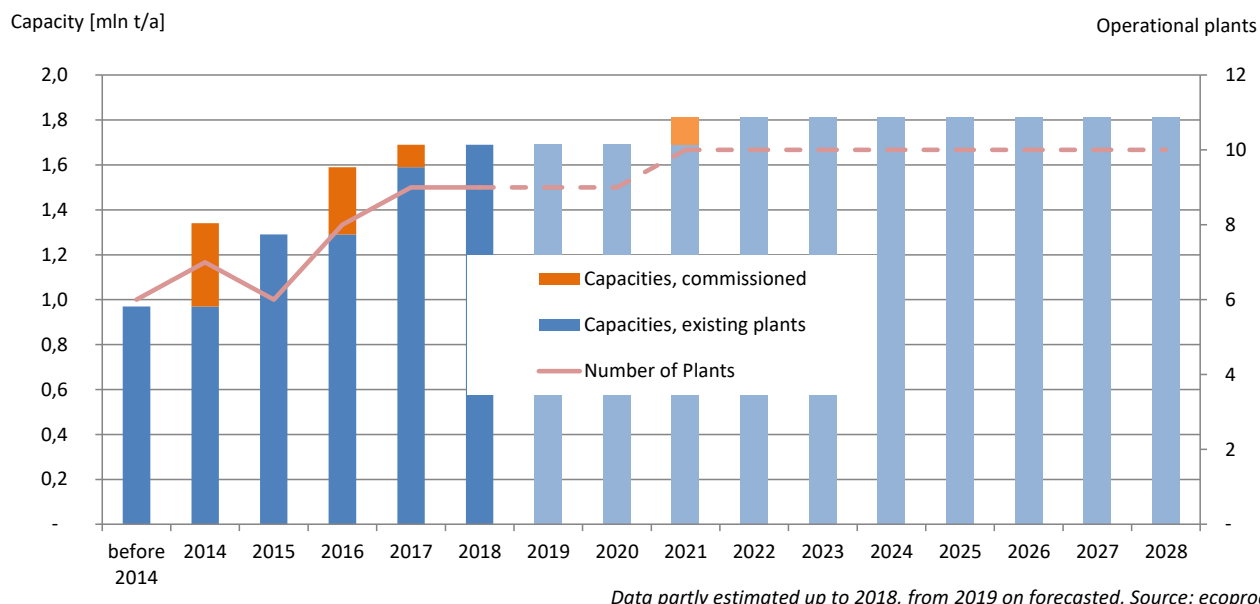
For the biomass plant in Hämeenkyrö, it was announced that co-incineration of RDF from C&I waste sources should start in early 2017. However, this waste will also mainly consist of wooden material. This facility does therefore not stand for a trend towards a general comeback of waste co-incineration in biomass plants. Until mid-2018, there have not been any news that co-incineration started.

Market development

Basically, the construction of WtE capacities in Finland has come to an end. The existing WtE asset is already larger than initially planned. The plant in Leppävirta already represents the closure of a gap in a more rural region.

A similar project is underway in the city of Salo. It has been delayed for several years for legal issues regarding the awarding of the waste amounts to Ekokem in 2014. However, in 2017, the Supreme Court decided in favour of Ekokem. After the legal issue was settled, a new waste management firm named Lounavoima Oy was founded to finally develop the WtE facility. German based company Steinmüller Babcock Environment GmbH has been chosen to deliver, install and commission the extended boiler. The single-line plant should be able to process around 120,000 t/a of municipal and commercial waste from the cities of Turku and Salo and should be operational by the end of 2020.

Figure 146: Development of plants and capacities in Finland

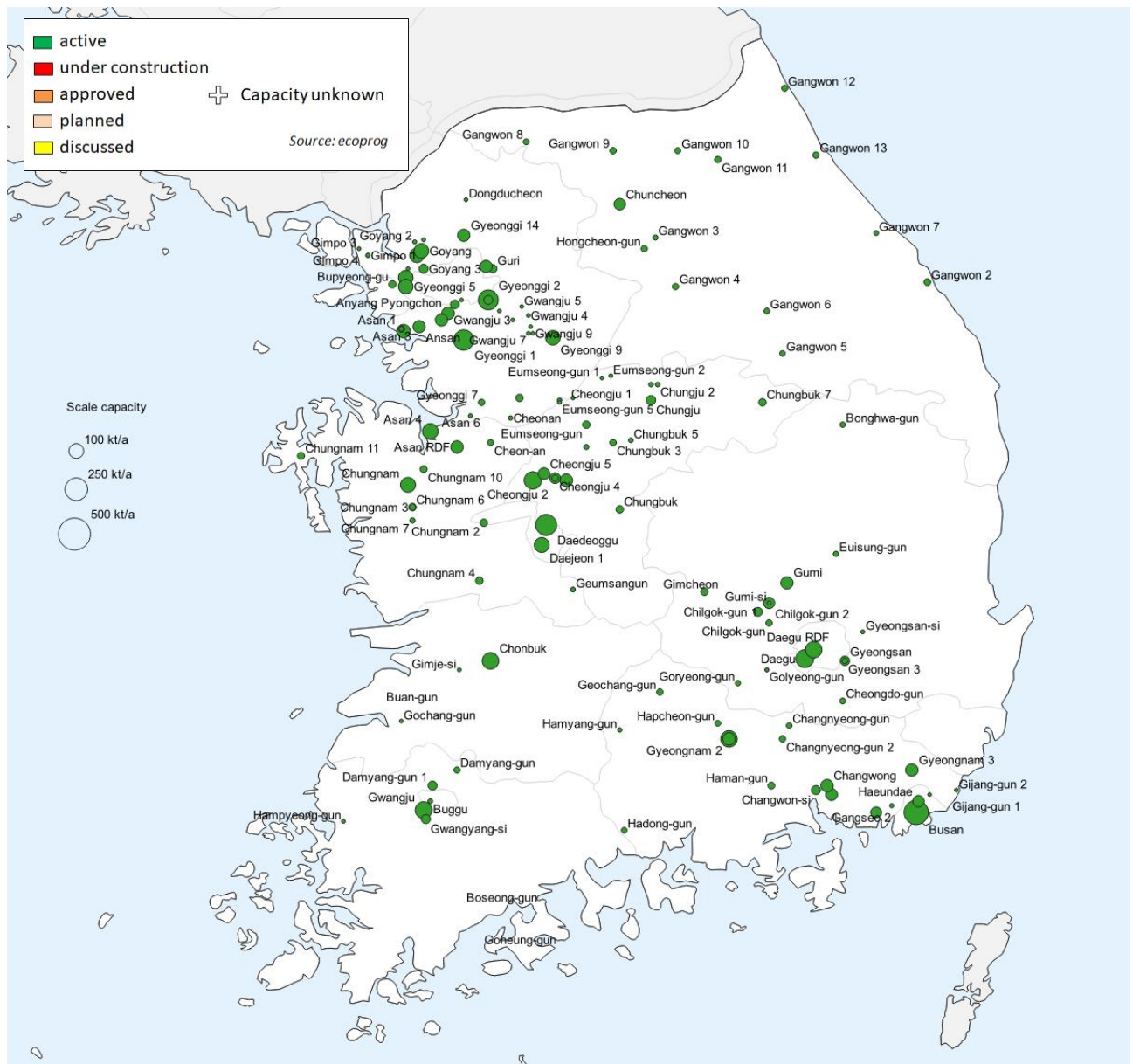


(...)

(...)

The younger RDF plants use fluidised bed technology. This also changes the competitive landscape among the technology providers. The RDF plant in Daegu was equipped by Foster Wheeler and started operations in 2014. The project in Pohang should be equipped with a bubbling fluidised bed boiler supplied by Andritz.

Figure 85: Locations of plants and projects in South Korea



Apart from the project in Pohang, South Korean energy provider Posco Energy was involved in the realisation of the latest RDF project in Busan and subcontracted AE&E Group, another European manufacturer from Austria, for delivering technology.

(...)

(...)

Fosston

Polk County
Fosston Industrial Park, 708 8th Street NW
MN 56542 Fosston
Tel.: 001-218 435-6501
Status: active
Capacity (t/a): 26,112

Remarks: As of 06/2017, the facility is currently undergoing an upgrade and expansion process. Polk County Environmental Services received a USD 9.25 million funding for phase 2. Moreover, an organic compost site is going to be constructed at the site. The facility provides steam to three local food processing businesses.

Unit: 1

Start of operation: 1988
Capacity (t/h): 1.7
Incineration mode: moving grate
Flue gas cleaning: Duct Sorbent Dry Injection (Sodium Bicarbonate) / Electrostatic Precipitator / Activated Carbon Injection

Unit: 2

Start of operation: 1988
Capacity (t/h): 1.7
Incineration mode: moving grate
Flue gas cleaning: Duct Sorbent Dry Injection (Sodium Bicarbonate) / Electrostatic Precipitator / Activated Carbon Injection

Franklin County

Status: discussed

Remarks: As of 08/2019, most of Franklin County's waste is being landfilled, but the site is close to capacity. The County is currently deciding on the scale of the plant. According the director of Solid Waste Management, the facility would also accept waste from other counties.

French Island

Xcel Energy
200 S. Bainbridge St., La Crosse
WI 54603 French Island
Tel.: 001 (715) 839-2565
Status: active
Capacity (t/a): 127,488
Power production capacity (MW): 32,0

Remarks: In 01/2017, Xcel Energy's contract with La Crosse County, Wisconsin, was prolonged until 2030. Under the amended deal, La Crosse is required to deliver 70,000 tpy of waste to the facility until 2030. In 2016, it supplied 76,000 tpy.

Unit: 1

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Start of operation: 1987
Capacity (t/h): 8.3
Incineration mode: RDF-Spreader Stoker, Water Wall furnace
Flue gas cleaning: Duct Sorbent Dry Injection / Fabric Filter / Selective Non Catalytic Reduction
Manufacturer furnace: Energy Products of Idaho

Unit: 2

Start of operation: 1987
Capacity (t/h): 8.3
Incineration mode: RDF-Spreader Stoker, Water Wall furnace
Flue gas cleaning: Duct Sorbent Dry Injection / Fabric Filter / Selective Non Catalytic Reduction
Manufacturer furnace: Energy Products of Idaho

Ft. Lauderdale

Wheelabrator South Broward, Inc.
4400 South State Road 7
FL 33314 Ft. Lauderdale
Tel.: 954-581-6606
Status: active
Capacity (t/a): 720,000
Power production capacity (MW): 66.0

Unit: 1

Start of operation: 1991
Capacity (t/h): 31.3
Incineration mode: Mass Burn, Water Wall furnace
Flue gas cleaning: Spray Dryer Absorber/Scrubber / Fabric Filter / Selective Non Catalytic Reduction / Activated Carbon Injection
Manufacturer furnace: Von Roll

Unit: 2

Start of operation: 1991
Capacity (t/h): 31.3
Incineration mode: Mass Burn, Water Wall furnace
Flue gas cleaning: Spray Dryer Absorber/Scrubber / Fabric Filter / Selective Non Catalytic Reduction / Activated Carbon Injection
Manufacturer furnace: Von Roll

Unit: 3

Start of operation: 1991
Capacity (t/h): 31.3
Incineration mode: Mass Burn, Water Wall furnace
Flue gas cleaning: Spray Dryer Absorber/Scrubber / Fabric Filter / Selective Non Catalytic Reduction / Activated Carbon Injection
Manufacturer furnace: Von Roll

Fulton

(...)

(...)

Capacity (t/h): 5,0
Incineration mode: horizontal grate
Flue gas cleaning: Dry Scrubbing
Manufacturer furnace: Noell
Manufacturer flue gas cleaning: ABB, Fläkt

Karlstad

Karlstads Energi AB
Hedenverket
651 84 Karlstad
Tel.: +46 54 540 7110
johan.thelander@karlstad.se
Status: active
Capacity (t/a): 107,520
Real throughput (t/a): 48,040
Power production capacity (MW): 17.0
Heat production capacity (MW): 20.4

Unit: 1

Start of operation: 1986
Capacity (t/h): 7,0
Incineration mode: horizontal grate
Flue gas cleaning: Fabric Filter / Wet Scrubbing
Manufacturer furnace: Noell
Manufacturer flue gas cleaning: ABB, Fläkt

Unit: 2

Start of operation: 1986
Capacity (t/h): 7.0
Incineration mode: moving grate
Flue gas cleaning: Fabric Filter / Flue Gas
Condensation
Manufacturer furnace: B&W Vølund
Manufacturer flue gas cleaning: ABB Fläkt, Götaverken
Miljö

Kiruna

Kiruna Värmeverk AB
Värmeverksvägen 12
98185 Kiruna
Tel.: +46 0980 70723
Jan.Fjordell@tvab.kiruna.se
Status: active
Capacity (t/a): 32,256
Real throughput (t/a): 60,800
Power production capacity (MW): 3.1
Heat production capacity (MW): 17.7

Unit: 1

Start of operation: 1985
Capacity (t/h): 2.1
Incineration mode: VS Grate, air-cooled
Flue gas cleaning: Wet Scrubbing
Manufacturer furnace: Vølund
Manufacturer flue gas cleaning: Götaverken Miljö

Unit: 2

Start of operation: 1985
Capacity (t/h): 2.1
Incineration mode: VS Grate, air-cooled
Flue gas cleaning: Wet Scrubbing
Manufacturer furnace: Vølund
Manufacturer flue gas cleaning: Götaverken Miljö

Köping

Vafab Miljö AB
Norsavägen 13
731 98 Köping
Tel.: +46 22129491
sture.pettersson@vafabmiljo.se
Status: active
Capacity (t/a): 38,400
Real throughput (t/a): 29,380
Power production capacity (MW): 12.0
Heat production capacity (MW): 9.9

Unit: 1

Start of operation: 1972
Capacity (t/h): 5.0
Incineration mode: moving grate
Flue gas cleaning: Fabric Filter
Manufacturer furnace: Kockum
Manufacturer flue gas cleaning: Fläkt

Lidköping

Lidköpings Värmeverk AB
Sjöhagsvägen 8
531 88 Lidköping
Tel.: +46 510 - 770 290
jan-eric.isaksson@lidkoping.se
Status: active
Capacity (t/a): 163,584
Real throughput (t/a): 90,480
Power production capacity (MW): 4.0
Heat production capacity (MW): 38.1

Remarks: As of 04/2019, the company Westco Miljø will supply 33,000 tons of RDF to the plants in Borås and Lidköping in 2019. In fall 2012 Babcock & Wilcox Vølund AB supplied a semi-dry flue gas cleaning system to the plant. The customer took over the installation in March 2013.

Unit: 1

Start of operation: 2013
Capacity (t/h): 9.3
Incineration mode: water-cooled DynaGrate
Manufacturer furnace: BW Vølund

Unit: 2

Start of operation: 1984
Capacity (t/h): 6.0
Incineration mode: fluidised bed
Flue gas cleaning: Dry Scrubbing

(...)

(...)		Alexandria, USA	998	APP BioSNG plant, United Kingdom	950
		Alexandria (Virginia), USA	999	Årdal, Norway	841
Aalborg, Denmark	671	Alkmaar, Netherlands	830	Ardèche, France	700
Aars, Denmark	671	Allington, United Kingdom	950	Ardley, United Kingdom	950
Aberdeen, United Kingdom	950	Almena, USA	999	Arecibo, Puerto Rico	1026
Abiko, Japan	304	Altay Prefecture, China	105	Arezzo, Italy	798
Abiko 2, Japan	304	Ama, Japan	308	Argenteuil, France	700
Abilene, USA	998	Amagasaki, Japan	308	Århus, Denmark	671
Abu Dhabi TAQA, United Arab Emirates	71	Amagasaki City, Japan	309	Aridagawa, Arida District, Japan	311
Accra 2, Ghana	75	Amagi, Japan	309	Arita, Nishimatsuura District, Japan	311
Acerra RDF, Italy	797	Amakusa, Japan	309	Arnoldstein, Austria	635
Addis Ababa, Ethiopia	978	Amakusa 2, Japan	309	Arques, France	700
Addu, Maldives	611	Amakusa 3, Japan	309	Arrabloy, France	701
Adelaide, Australia	619	Amakusa City, Japan	309	Arua, Uganda	79
Agano, Japan	304	Ambala, India	267	Arundel, United Kingdom	951
Agawam, USA	998	Ami Town, Inashiki District, Japan	310	Asago, Japan	311
Ageo City, Japan	305	Amilly, France	700	Asahi City, Japan	311
Agra, India	267	Amman, Jordan	76	Asahi Town, Japan	312
Aguni, Japan	305	Amol, Iran	295	Asahikawa, Japan	312
Ahmedabad 1, India	267	Åmotfors, Sweden	905	Asaka, Japan	312
Ahmedabad 2, India	267	Amphill, United Kingdom	950	Asan 1, South Korea	541
Ahmedabad 3, India	267	Amritsar, India	267	Asan 2, South Korea	541
Ahwaz, Iran	295	Amsdorf RDF, Germany	742	Asan 4, South Korea	541
Aibetsu Town, Kamikawa district, Japan	305	Amsterdam, Netherlands	830	Asan 5, South Korea	541
Aikawa Town, Japan	305	Anantapur, India	267	Asan 6, South Korea	541
Ainan, Minamiuwa District, Japan	305	Anantnag, India	268	Asan RDF, South Korea	541
Aioi, Japan	306	Andernach RDF, Germany	742	Ashikaga, Japan	312
Aira, Japan	306	Ando, Japan	310	Ashikita, Japan	312
Aizumi, Japan	306	Andorra la Vella, Andorra	978	Ashiya City, Japan	313
Aizuwakamatsu, Japan	306	Anji, China	105	Askar, Bahrain	74
Akaiwa, Japan	306	Anjo City, Japan	310	Aso, Japan	313
Akashi, Japan	307	Annaka City, Japan	310	Asukamura, Japan	313
Akawa, Japan	307	Anqing, China	105	Atami City, Japan	313
Aki, Japan	307	Anqing 2, China	105	Atsugi, Japan	313
Aki City, Japan	307	Anqing 3, China	106	Auburn, USA	999
Akishima City, Japan	307	Ansan, South Korea	541	Augsburg, Germany	743
Akita, Japan	308	Anshun, China	106	Aurangabad, India	268
Akkeshi, Akkeshi District,, Japan	308	Antibes, France	700	Avesta, Sweden	905
Ako, Japan	308	Antwerpen 1, Belgium	644	Awa City, Japan	313
Aksu East, China	105	Antwerpen 3, Belgium	644	Awaji, Japan	314
Aksu West, China	105	Anyang, China	106	Awara City, Japan	314
Akune City, Japan	308	Anyang Hua, China	106	Awashimaura, Japan	314
Ål, Norway	841	Anyang Longan, China	106	Awka, Nigeria	77
Alaer, China	105	Anyang Pyongchon, South Korea	541	Ayabe City, Japan	314
Albano Laziale RDF, Italy	797	Aomori, Japan	310	Ayutthaya, Thailand	594
Ålesund, Norway	841	Aomori 2, Japan	311	(...)	

Price and product information

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