Development of Solar-Powered Groundwater Desalination & Purification System

AGC Asahi Glass & Jain Irrigation Systems Limited

8 June 2018

AGC Asahi Glass



AGC

As of December 2017

Name	AGC ASAHI GLASS	
Head Office	Tokyo, JAPAN	[
Founded	September 8, 1907 (As the first sheet-glass p	producer in Japan)
Consolidated Subsidiaries	210 including 172 compa	nies overseas
Employees	53,224	AGC Global Operation
Employees Conglomerate	53,224 Mitsubishi Group Company	AGC Global Operation The Americas Sales : 168.4 bn yen (12%) Employees : 4,400 Employees : 17,400 AGC Global Operation Japan / Asia Sales : 1,007.2 bn yen (65 Employees : 31,400

Business Overview

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"AGC, An Everyday Essential Part of Our World" AGC



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Overseas Business Development

Year	Europe/EMEA	Year	ASIA/Japan	Year	Americas
2016	[Morocco] Automotive Glass Production Base established in Morocco.	2014	[Vietnam] AGC acquire a Vietnamese polyvinyl chloride (PVC) company, Phu My	2013	[Mexico] AGC Automotive Mexico S. DE R.L. DE C.V. established.
2015	[Poland] AGC acquires NordGlass, automotive replacement glass company in Poland.		Saudi Arabia AGC and Obeikan Glass agreed to set up a JV for architectural glass.	2011	[Brazil] AGC Glass Brazil, Inc. established. First entry into the Brazilian
2012	[Germany] Strategic partnership with Interpane in Germany (Became a consolidated subsidiary)	2003	[Korea]At Hanwook Techno Glass Co., Ltd., production of PDP glass substrates begins in Korea.	1985	market. [USA] AP Technoglass Co. (Automotive
2004	[Hungary] AGC Automotive Hungary Ltd. established. Production of automotive glass begins in Hungary.	2000	[Taiwan]Asahi Glass Fine Techno Taiwan Co., Ltd. (AGC Display Glass Taiwan Co., Ltd.) established. Production of LCD glass substrates begins in Taiwan		America, Inc.) established. Production of automotive glass begins in the USA.
1999	[UK] Imperial Chemical Industries PLC's (AGC Chemicals Europe, Ltd.) fluoropolymers business acquired.	1992	[China] Dalian Asahi Float Glass Co., Ltd. (now AGC Flat Glass (Dalian) Co., Ltd.) established in China. Production of flat glass		
	Production of fluorochemicals begins in Europe	1972	[Indonesia] P.T. Asahimas Flat Glass Co.,		
1997	[Russia] Capital participation made in Bor Glassworks (OJSC AGC Bor Glassworks). First entry into the Russian market.	1964	the Indonesian market. [Thailand]Thai Asahi Glass Public Co., Ltd. (AGC Flat Glass (Thailand) Public Co., Ltd.) established		
1981	【Belgium】 Asahi Glass acquires Glaverbel S.A., (AGC Glass Europe S.A.) a glass company in Belgium. First	1956	[India]Glass production begins in India. AGC becomes one of the first Japanese private companies to enter the Indian market.		
	entry into Europe.	1907	[Japan]1907 Asahi Glass Company founded.		

*This list shows AGC's first entry into the region.





Jain Irrigation – A snapshot

1963

Started our trading business in agricultural inputs and equipment

Company has **32** manufacturing plants



5.2 Mn+ Farmer lives have been touched



1 BN+ Aggregate revenues as on 31st March, 2017

12,000+ Associates globally



Incorporated in 1978



11,000+ Dealers and distributors base globally



USD 1 BN+ Market capitalisation as on 16th September, 2016

120+ countries reached through our products & Services





Microirrigation company in India



Microirrigation company globally



Manufacturer of plastic pipes in India



In mango processing globally



In tissue culture production of banana and pomegranate globally



In onion and vegetable dehydration globally



In Solar Agriculture Pump



Completing the Agricultural Value Chain





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Close to customers with widespread geographic footprint

State	Plants	Offices	Depots	Dealers
Maharashtra	5	18	9	1,556
Madhya Pradesh	-	1	3	173
Karnataka	-	5	2	234
Gujarat	2	5	2	242
Tamil Nadu	1	6	3	104
Rajasthan	1	3	4	90
Telangana	1	8	1	180
Andhra Pradesh	2	13	3	150
Other States	_	22	12	342
Total	12	81	39	3,071



Close to customers with widespread geographic footprint



How Widespread is Groundwater Salinity?





(F. Weert, 2009) and (Central Ground Water Board, India, Annual Report, 2009-2010)





HOW FAR RURAL INDIA TRAVELS EVERY DAY TO FETCH DRINKING WATER ?

INDIAN AVERAGE %



WITHIN PREMISES

42.9%

TRAVEL UPTO 0.5 KM



0.5 KM



TRAVEL MORE THAN 0.5 KM



MORE THAN 0.5 KM

TOP 10 STATES WITH LEAST ACCESSIBILTY

#1 MANIPUR 40.7%
#2 TRIPURA 39.6%
#3 ODISHA 38.5%
#4 MEGHALAYA 37.9%
#5 JHARKHAND 36.4%
#6 MADHYA PRADESH 36.1%
#7 MIZORAM 32.1%
#8 RAJASTHAN 31.9%
#9 WEST BENGAL 31.5%
#10 NAGALAND 31.4%

Source : Answer to Unstarred question 1757 in the Lok Sabha

#1 CHANDIGARH 85.4% #2 PUNJAB 81.7%

Outline

- Feasibility study ongoing since September 2017
- Aim to provide **safe drinking water** in a stable manner
- Firstly target in **rural areas in Maharashtra State** where:
 - Frequent droughts (40% of the land is drought-prone)
 - Increased demand for groundwater for irrigation (5 times more from 1970 to 2010)
 - Groundwater with high salinity level
 - Some rural areas off-grid, climate vulnerable population
- Explore a business development of a solar-powered groundwater desalination & purification system



Purification of Groundwater for Drinking Water AGC



Electrodialysis with Ion Exchange Membranes AGC

Advantages

*Reverse Osmosis

- High water efficiency
 Water reuse ratio: ≥90% (cf. RO* method: ca.50%)
- High energy efficiency

No high pressure pump required (cf. RO method: high pressure pump required)

→ Good combination with solar power

Disadvantage

High initial cost

High quality electrodialyzer needed (4-5 times more expensive than RO method)

 \rightarrow Challenge is to lower the initial cost by localization



Example of electrodialyzer



Ion-exchange membrane

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Energy Consumption & Membrane area comparison ED vs RO



Relative cost of desalination technologies





Supply Chain under Consideration



AGC	Supply Ion Exchange Membranes and provide overall technical advice
Jain	 Manufacture all components of electrodialysis other than membranes, and solar PV system Assemble and install a water purification system Engage in sales & maintenance of the system
End-users	Purchase the water purification system



- Develop a prototype electrodialyzer with new improved AGC's ion exchange membranes installed.
- Conduct a **pilot study in several sample sites** in Maharashtra State to evaluate the prototype.
- Collaborate on joint research to develop a **most efficient system.**
- Identify and tackle issues for **low-cost production**.
- Study potential needs in other parts of India as well as other countries.
- Explore possibility to take advantage of **public financial schemes** (e.g., GCF)

Thank

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