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現地調査面談者リスト

参考資料-1 現地調査面談者リスト

Air Pollution Sector

Ministry of Water & Environment (MoWE)

No	Name	Department	Position
1	Mr. Mugabi Stephen David	Environment Sector Support Services	Commissioner
2	Mr. Mafumbo Julius	Environment Sector Support Services	Assistant Commissioner
3	Mr. Mununuzi Nathan	Environment Sector Support Services	Senior Environment Officer
4	Mr. Ndibirema Dadinoh	Environment Sector Support Services	Environment Officer
5	Ms. Queen Cathevine Kavabo	Environment Sector Support Services	Environment Officer
6	Mr. Ituka Gilbert	Environment Sector Support Services	Environment Officer
7	Mr. Mugabe Motram	Environment Sector Support Services	Environment Officer
8	Mr. Richard Matua	Urban Water & Sewerage	Acting Commissioner
9	Eng. Joshua Senengo	Urban Water & Sewerage	Principal Engineer

Kampala Capital City Authority (KCCA)

No	**Name**	**DEPARTMENT**	**POSITION**
1	Mr. Jude Byansi Zziwa	Waste and Sanitation	Manager
2	Ms. Namanda Clare	Environment Management	Supervisor
3	Mr. Richard Mutabazi	Water and Sanitation	Supervisor
4	Mr. Ronald Mubiru	Sports, Recreation and Tourism	Manager
5	Mr.Alex Ndayabakira	Directorate of Public Health	Epidemiologist
6	Ms. Furtunate Bis	Directorate of Traffic	Engineer

National Environmental Management Authority (NEMA)

NO	**NAME**	**DEPARTMENT**	**POSITION**
1	Mr. Waiswa Ayazika	Environmental Monitoring & Compliance	Director
2	Mr. John Okatch	Environmental Monitoring & Compliance	Environment Assessment Officer
3	Ms. Monica Angom	Environmental Monitoring & Compliance	Senior Environment Inspector
4	Ms. Nancy Allimadi	Environmental Monitoring & Compliance	Senior Environment Inspector
5	Ms. Kutesakwe Jennifer	Environmental Monitoring & Compliance	Senior Environment Inspector
6	Ms. Nsereko Patience	Environmental Monitoring & Compliance	Principal Environment Inspector

AirQo Project

NO	**NAME**	**DEPARTMENT**	**POSITION**
1	Mr. Deo Okure	-	Air Quality Scientist and Programme Manager
2	Ms. Priscah Adrine	-	Digital Communications Executive

Ministry of Works and Transport （MoWT）

NO	**NAME**	**DEPARTMENT**	**POSITION**
1	Mr. Charles Mutemo	Environment Liaison Unit	Principal Environment Officer
2	Ms. Atino Juliet	Environment Liaison Unit	Senior Environment Officer

Ministry of Health (MoH)

NO	**NAME**	**DEPARTMENT**	**POSITION**
1	Mr. Bob Omoda Amodan	Department of Environmental Health	Environmental Health Officer

Urban Water Supply Sector

National Water and Sewerage Corporation (NWSC)

No	Name	Department	Position
1	Dr. Rose C. Kaggwa	IREC	Director, Business and Scientific Services
2	Dr. Irene Nansubuga	IREC, Water Quality Department	Manager
3	Dr. Mohammed Babu	IREC, Water Quality Department	Manager
4	Dr. Allan Kaford	IREC, External Service	Principal Engineer
5	Mr. Ekanya Emmanuel	IREC	Senior Manager Operations
6	Mr. Julius Kato Karuma	IREC	Principal Engineer
7	Eng. Amayo Johnson	HQ	Deputy Managing Director, Technical Services
8	Eng. Alex Gisagara	HQ	Director, Engineering Services
9	Eng. Joe Kamanyi	HQ, Infrastructure Planning and Development	Senior Manager
10	Mr. Samson Kamugisha	HQ	Senior Economist
11	Eng. Angelo Kwitonda	Sewerage Service Department	Principal Engineer
12	Eng. Jackson Nimusiima	HQ, Infrastructure Planning Project Management	Senior Manager
13	Eng. Hellen Izama	HQ, Infrastructure Planning and	Manager
14	Mr. Geoffrey Kujju	HQ, Treasury and Accounts	Manager
15	Mr. Denis Agea	HQ, Planning and Capital Development	Project Engineer
16	Mr. Martin Orwiny	HQ, Planning and Capital Development	Engineer
17	Ms. Atukunda Agrace	HQ, Projects & External Services	Principal Accounts Officer
18	Mr. Jonathan Omolo	HQ, Corporate Strategy and Investment Financing	Economist
19	Mr. Joseph Tweheyo	HQ	Project Manager
20	Ms.Freda Bugenyi	HQ	Principal Engineer
21	Ms. Sarah Manuella Amoit	HQ, Corporate Strategy and Investment Financing	Economist
22	Eng. Mahmood Lutaaya	NWSC Kampala Water	General Manager
23	Eng. Process Ahabwe	NWSC Kampala Water	Principal Engineer
24	Eng. Tom Buyi	NWSC Kampala Water	Monitoring and Evaluation Manager
25	Ms. Evas Tumuheirwe	NWSC Kampala Water, GIS/Block Mapping	Manager
26	Ms. Emily Atusasive	NWSC Kampala Water, GIS/Block Mapping	Senior GIS Officer
27	Dr. Martin Kalibbala	NWSC Kampala Water, Asset Management	Manager
28	Mr. Bernard Mwaka	NWSC Kampala Water, GIS - Asset Management (Kampala region)	Senior Officer
29	Mr. Godfrey Arinaitwe	NWSC Kampala Water, Non-Revenue Water Management	Senior Manager
30	Mr. Gilbert Muhwezi	NWSC Kampala Water, Potential Loss Capacity & Infrastructure	Principal Engineer
31	Mr. Samuel Kiwanuka	Hydraulic Model - Asset Management	Engineer
32	Dr. Frank Kizito	NWSC Kampala Water, Asset Management	Senior Manager
33	Mr. Enos Malambala	NWSC Kampala Water	Principal Quality Control Officer
34	Mr. Ronald Kitakufe	NWSC Kampala Water, Urban Pro Poor Kisenyi Branch	Branch Manager
35	Mr. Otteran	NWSC Kampala Water, Prepaid Meters (in Kampala Water old Office)	Manager
36	Mr. Pius Nyanzi	NWSC Kampala Water, Projects Implementation Unit	Engineer
37	Eng. Andrew Muhwezi	NWSC Kampala Water, Water Production	Senior Manager
38	Mr. Bryan Wabujje	NWSC Kampala Water, Water Production (in Gaba WTP)	IT Officer
39	Mr. Osigire Emmanuel	NWSC Kampala Water, Gaba I WTP	GI Shift Overseer
40	Mr. Tom Mbaziira	NWSC Hoima	Area Manager
41	Mr. Nsabimana Nelson	NWSC Hoima	Area Engineer
42	Mr. Okello Moses	NWSC Hoima	Shift Overseer
43	Mr. Mukwaya Sadik	NWSC Hoima	Quality Control Officer
44	Mr. Alex Nahabwe	NWSC Mubende	Area Manager
45	Mr. Waiswa Siraj	NWSC Mubende	Technical Supervisor
46	Mr. Olobo David	NWSC Mubende	Shift Overseer
47	Mr. Edward Murinde	NWSC Mubende	Quality Control Officer
48	Eng. Charles Sseku	NWSC Mityana	Area Manager

49	Mr. Nelson Otai	NWSC Soroti	Area Manager
50	Mr. Martin Odeke	NWSC Soroti	Area Engineer
51	Mr. Lokoru Mariano	NWSC Soroti	Human Resource Officer
52	Mr. Fred Busingye	NWSC Tororo	Area Manager
53	Mr. Charles Epeet	NWSC Tororo	Area Engineer
54	Mr. Arima Zubairisa	NWSC Tororo	Branch Manager
55	Ms. Nakanjako Juliet	NWSC Tororo	Senior Quality Control Officer
56	Mr. Mike Gonahasa	NWSC Tororo	Quality Control Officer

African Development Bank (AfDB)

NO	NAME	DEPARTMENT	POSITION
1	Mr. Mbiro Andrew	Uganda Office, Water and Sanitation	Senior Water and Sanitation Officer

World Bank (WB)

NO	NAME	DEPARTMENT	POSITION
1	Ms. Harriet Nattabi	Uganda Office, Water Resources	Water Resources Specialist

Agence Frangaise de Developpement (AFD)

NO	NAME	DEPARTMENT	POSITION
1	Ms. Abaliwano Juliet	Uganda Office, Water and Environment	Programme Officer
2	Mr. Frederick Mugisa	Uganda Office, Urban Development	Urban Development Specialist

UNICEF

NO	NAME	DEPARTMENT	POSITION
1	Mr. Wiberforce Kimezere	Uganda Office, Water Supply, Sanitation, Hygiene Department	Water Supply, Sanitation, Hygiene Specialist

Kreditanstalt für Wiederaufbau (KfW)

NO	NAME	DEPARTMENT	POSITION
1	Mr. Fred Othieno	Uganda Office, Water, Sanitation & Refugees	Project Coordinator

参考資料-2
NWSC 外部サービス（ES）の業務実績

参考資料-2 NWSC 外部サービス（ES）の業務実績

期間	プロジェクト名	客先	国名	資金源	受注金額 **(USD)**	受注金額 **(EURO)**
Dec 2019 - Mar 2021	Services for the Development of Customer Relations Management Software and its Integration to GIS and BIQ Systems for the City of Bulawayo (Ongoing)	Bulawayo	Zimbabwe	City of Bulawayo	156,460	-
Oct 2019 - Jun 2021	Implementation of WOP for BSWSC (Ongoing)	BSWSC	Nigeria	World Bank	324,700	-
Jan 2018 - Dec 2021	Utility Support to Capacity Development for Sustainable Water Services within Uganda (CaDeSWaS) - *Value Addition Project (Ongoing)*	VEI, The Netherlands	Uganda	Royal Netherlands Government	-	3.9 Million
Jan 2015 - Jun 2021	Alternative Approaches and Tools for Improved Water Supply and Sanitation for Towns in Northern Uganda (ATWATSAN) - *Value Addition Project (Ongoing)*	NWSC	Uganda	FDW, The Netherlands	-	4.5 Million
Aug 2018 - Apr 2020	Institutional Development Support for Sierra Leone Water Company (SALWACO)	SALWACO	Sierra Leone	AfDB	761,883	-
Nov 2017 - Apr 2019	Technical Assistance and Third Party Training support for implementation of Project for Management Capacity Enhancement for South Sudan Urban Water Corporate (Sub contracts with TECI)	TECI	Uganda	JICA	117,995	-
Jun 2015 - Mar 2019	Chittagong Water Supply Improvement & Sanitation Project	Chittagong WASA	Bangladesh	Gov. of Bangladesh/World Bank	2.5 Million	-
Feb - Dec 2018	Institutional Strengthening for Bauchi State Water and Sewerage Corporation (BSWSC)	BSWSC	Nigeria	World Bank	181,635	-
Sep - Oct 2018	Training in Water treatment Plant Operations, Non Revenue Water Management, and Financial Management for Water Corporation of Oyo State (Sub contract with 2ML)	2ML	Nigeria	Oyo State Government	145,700	-
Oct 2016 - Jul 2017	Management Commercialization and Institutional Support to Kaduna State Water Board (Sub contract with 2ML)	2ML	Nigeria	Kaduna State Government	191,170	-
Apr 2017 - Aug 2017	Training in Water treatment Plant Operations, Non Revenue Water Management, and Financial Management for Lagos Water Corporation (LWC) - (Sub contract with 2ML)	2ML	Nigeria	Lagos State Government	51,500	-

期間	プロジェクト名	客先	国名	資金源	受注金額 **(USD)**	受注金額 **(EURO)**
Sep 2015 - Apr 2016	On job training and Staff attachments for Sierra Leone Water Company (SALWACO)	SALWACO	Sierra Leone	AfDB	601,727	-
Feb 2015 - Oct 2015	Technical Assistance for Identification and Evaluation of Options for a Decentralized Zonal Management Model for Dhaka Water Supply and Sewerage Authority, Bangladesh - Review of the Organization Structure	Castalia	Bangladesh	World Bank	141, 600	-
Oct 2014 - Oct 2015	Performance Contracts for Lusaka Water and Sewerage Company	World Bank	Zambia	World Bank	49,750	-
Jun 2014 - Apr 2015	Water Operator Partnership for Nairobi City, Harari Region Water and Sanitation Authority (Ethiopia) and Ghana Water Company Ltd-Cooperation Agreement with UN HABITAT	UN HABITAT/GWOPA	Ghana, Kenya, Ethiopia	GWOPA	166,768	-
Jan 2014 - Apr 2014	Preparation of outline specifications for Utility Systems, Procedures and Equipment for Karnataka Urban Water Supply Modernization Project	World Bank	India	World Bank	27,676	-
Jan 2014 - Dec 2014	Water Operator Partnership Africa – Plateau State Water Board	WOP Africa	Nigeria	AWF - AfDB	57,941	44,570
Dec 2013 - Dec 2015	Sub Consultancy services with Consulaqua for capacity development of Water Supply and Sanitation Authorities (WSSAs) in Tanzania	GIZ	Tanzania	GIZ	105,274	80,980
May 2012 - Nov 2014	Consultancy Services For Improvement in Operational and Financial Performance, of Tanzania Electric Supply Company Limited - Roll out of PDP to Zones, Generation & Transmission Unit + Assessment of ICT Systems	TANESCO	Tanzania	TANESCO	321,404	-
Mar 2012 - Feb 2017	Capacity Development for Performance Improvement of Water Utilities in Secondary Urban Centers in East Africa (Dar Es Salaam Water & Sewerage Company (Tanzania) & Rift Valley Water Services Board Kenya)	UNESCO IHE, The Netherlands	Kenya Tanzania Uganda	ACP EU Water Facility	282,528	217,329
Jul 2012 - Apr 2016	Water Asset Management for Small Towns in Uganda with emphasis on Post-Conflict Northern Region”	VEI, The Netherlands	Uganda	ACP EU Water Facility	231,790	178,300
Aug 2013 to Feb 2013	Technical Support to South Sudan Urban Water Corporation and Board of Directors - Development of Corporate Plan & Performance Contracts for South Sudan Urban Water Corporation	TetraTech ARD	South Sudan	USAID	77,106	-

期間	プロジェクト名	客先	国名	資金源	受注金額 **(USD)**	受注金額 **(EURO)**
Apr 2012 - Dec 2016	Implementation of the English Speaking Pan African Track of the International Executive Masters Programme of Water for all AgroParistTech	AgroParisTech	France	ADB, DBSA, APT	94,896	72,997
Sept 2013 - Jun 2013	Capacity Building for Wau and Maridi water utilities and water quality monitoring for Maridi water supply system	TetraTech ARD	South Sudan	USAID	148,600	-
Apr 2013 - Mar 2014	Water Operator Partnership Africa – Thika Water and Sewerage Company	WOP Africa	Kenya	AWF - AfDB	36,930	28,408
Apr 2013 - Mar 2014	Water Operator Partnership Africa – Ogun State Water and Sewerage Company	WOP Africa	Nigeria	AWF - ADB	38,388	29,529
Apr 2012 - May 2012	Subcontract Agreement for the provision of Block Mapping Services for Wau Distribution Network	Louis Berger Inc. USA	South Sudan	USAID	61,000	-
Feb 2012 - Nov 2013	Provision of Consultancy Services to Prepare a Performance Improvement Plan	WASA, T&T	Trinidad & Tobago	WASA	112,320	-
Nov 2011 - Oct 2012	Development of a Six months Performance Improvement Programme and Monitoring and Evaluation framework for Battery Plus	Battery Plus, Uganda	Uganda	Battery Plus, Uganda	4,536	-
Jun 2011 - Dec 2013	Benchmarking for Improved Water Utility Performance – Development of a Short course	UNESCO IHE, The Netherlands	India Uganda Brazil	Dutch Government	17,063	13,125
May 2011 - Sept 2011	Implementation of Institutional Support of Harari Water and Sanitation Project in association with UNESCO IHE, Delft	Ministry of Water & Energy, Ethiopia	Ethiopia	AfDB	359,694	-
May 2011 - Jul 2011	Consultancy Services for the Information Technology Procedures Management Manual (ITPMM)	EWSA	Rwanda	EWSA	96,663	-
May 2011 - Jul 2011	Training in Community Development for Lusaka Water and Sewerage Company	WSUP, UK	Zambia	WSUP, UK	11,260	-
Mar 2011 - Jun 2011	Subcontract Agreement for the provision of On job training for Wau Urban Water Treatment Plant	Louis Berger Inc. USA	South Sudan	USAID	24,530	-

期間	プロジェクト名	客先	国名	資金源	受注金額 **(USD)**	受注金額 **(EURO)**
Mar 2011 - Jun 2011	Situational Analysis for Wau and Malakal Urban Water Corporation	Louis Berger Inc. USA	South Sudan	USAID	33,475	-
Feb 2011 - Aug 2011	Financing Agreement for the RUWASS Project: Assessment of the ability/Capacity of water authorities in selected towns to meet O&M Costs	DWD	Uganda	GIZ	33,376	25,674
Feb 2011 - May 2011	Professionalization of Urban Poor Services	World Bank	India	World Bank	62,802	-
Feb 2011	Proposal preparation for upcoming Water Operator Partnership	WOP Africa	Nigeria	Water Facility AfDB	5,360	-
Jun 2010 - May 2011	Consultancy Services For Improvement in Operational and Financial Performance, of Tanzania Electric Supply Company Limited (TANESCO)	TANESCO	Tanzania	TANESCO	241481	-
Jan 2010 - Nov 2010	Water Operator's Partnership – Design of Annual Performance Improvement Plan and development of Non Revenue Water Reduction Strategy for Kisumu Water and Sewerage Company (KIWASCO) - Under Water Operator Partnerships	WOP Africa	Kenya	WOP-Africa	25548	-
Jun 2008- May 2011	Technical Support for Northern Uganda Water and Supply Services – Sub contract with ARD, Inc. USA - On going	TetraTech ARD, USA	Uganda	USAID	469031	-
Oct 2010 - Jan 2011	Water Tariff Review Study	EWSA	Rwanda	EWSA	114000	-
Oct 2010	Training of Lusaka water Staff and Sewerage Company staff in Monitoring and Evaluation/ Business Planning	World Bank	Zambia	World Bank	17079.78	-
Nov 2010	Development of Course Materials for Commercial and Financial Management under the LVWATSAN II	UNESCO IHE	Kenya Tanzania Uganda	UNHABITAT	7500	-
Jun 2010 - Aug 2010	Capacity Development for Wau Urban Water Corporation - Situational and Gap Analysis	Louis Berger Inc. USA	Sudan	USAID	8563	-

期間	プロジェクト名	客先	国名	資金源	受注金額 **(USD)**	受注金額 **(EURO)**
May 2010 - Jul 2010	Development of Strategic Improvement Plan for the South Sudan Urban Water Corporation (SSUWC)	ABRI, DAI Inc. USA	South Sudan	USAID	23152	-
Mar 2010 - Jul 2010	Institutional Support: Assessment and Audit of Block Mapping, GIS and update of Billing Systems for Dar es Salaam Water & Sewerage Company (DAWASCO)	DAWASCO	Tanzania	World Bank	57250	-
Nov 2009 - Jul 2010	Support for sustainable water and sanitation project - Letter of Authorization Sustainable Water and Sanitation Africa	ARD	Africa region	USAID	22,500	-
Mar 2009 - May 2010	Capacity building for Private Water Operators and Local Government Officials in Northern Uganda	DWD	Uganda	GTZ	42,000	-
May 2009 - Jun 2010	Fast Track Capacity Building Programme for Utilities around Lake Victoria and Technical Assistance in developing a Strategic Business Plan & Training for Harar Water & Sewerage Authority, Ethiopia	UN HABITAT	Uganda, Kenya, Tanzania & Ethiopia	UN-HABITAT/ AfDB	411,400	-
Sept 2009 - Dec, 2010	Support for Development of Internally Delegated Performance Contract (IDPCs) for Ogun State Water Corporation	Ogun State Water Corporation	Nigeria	World Bank	135,900	-
Jun 2007 - Nov. 2009	Consultancy Services For Institutional Support to Nakuru Water & Sanitation Services Company Ltd (NAWASCO), Kenya, in association with DHV BV, Netherlands	DHV, SNV	Kenya	AfDB	63,000	-
Jun 2007- Nov. 2010	Consultancy Services For Institutional Support to Nakuru Water & Sanitation Services Company Ltd (NAWASCO), Kenya, in association with DHV BV, Netherlands	DHV, SNV	Kenya	AfDB	63,000	-
Oct. 2008 - Nov. 2008	Development of Billing and Revenue Collection Systems for Empresa Moçambicana de Águas (a water company) for the town of Barirro of Leberdade, Mozambique	WSUP, UK	Mozambique	World Bank	12,500	-
Oct. 2008 - Oct. 2008	Advisory Services in respect to the Implementation of the Incentive and Bonus Scheme for Nairobi City Water and Sewerage Company Ltd., (NCWSC) Kenya	NCWSC	Kenya	NCWSC	9,450	-
Jun 2008 - Jul 2008	Audit and investigation of the billing systems to ensure sound controls, address risks and un earth any fraud/losses for Nairobi City Water and Sewerage Company Ltd.	NCWSC	Kenya	NCWSC	18,725	-
Feb, 2007 - Oct. 2008	Consultancy Services on Customer Management System – Implementation of Quality Assurance for Nairobi City Water and Sewerage Company Ltd., Kenya	NCWSC	Kenya	NCWSC	32,000	-

期間	プロジェクト名	客先	国名	資金源	受注金額 **(USD)**	受注金額 **(EURO)**
Jul 2007-Jul 2008	Institutional development/strengthening billing/IT systems and other key support services	DAWASCO	Tanzania	World Bank	99,700	-
Jun 2007 - Aug. 2008	Fast Track Capacity Building Programme for Utilities in association with UN HABITAT, Kenya, Tanzania and Uganda	UN HABITAT	Uganda, Kenya & Tanzania	UN-HABITAT, AfDB	464,001	-
Jan. 2008 - Feb. 2008.	Provision of Consultancy Services to Dar Es Salaam Water and Sewerage Company (DAWASCO) to establish a Social Connection Fund (Development of Policy manual), Tanzania	DAWASCO	Tanzania	World Bank	29,100	-
Feb 2008 - Feb 2009	Provision of specialist water operations assistance to WSUP Project – for Naivasha Water and Sewerage Company, Kenya	WSUP, UK	Kenya	WSUP, UK	6,400	-
2008	Development of a Performance Improvement plan for Nkana Water and Sewerage Company, Zamiba	NKANA Water	Zambia	NKANA water	16,200	-
Jul 2007 - Jul 2008	Performance Improvement Plan & Decentralization for Dar Es Salaam Water and Sewerage Company (DAWASCO)	DAWASCO	Tanzania	World Bank	11,000	-
Feb 2007 - Apr 2008	Review of the Management of Revenue collection of the Kampala City Council (KCC)	KCC	Uganda	KCC	18,800	-
Jan 2007 - Sept.2007	Capacity building for Private Water Operators, Local Government Officials & DWD staff in Utility Infrastructure and Systems Management & Regulation	DWD	Uganda	GTZ	81,200	55,000
Jan 2006 - Jan 2007	Turning point Programme for Dar es Salaam Water and Sewerage Company (DAWASCO), Tanzania	DAWASCO	Tanzania	World Bank	99,450	-
2007	Capacity building training of Nkana Water and Sewerage Company staff and management in customer care and strategic business planning	NKANA Water	Zambia	NKANA water	19,650	-
2007	Feasibility Study for Incentive based performance for Northern and East Uganda	PAG Inc. USA	Uganda	USAID	25,028	-
Jun 2007	Operational Rescue Plan for Dar es Salaam Water and Sewerage Company (DAWASCO), Tanzania	DAWASCO	Tanzania	World Bank	10,000	-
Jul 2006 - Sept. 2006	Consultancy Services on Incentive & Bonus Scheme for Nairobi City Water and Sewerage Company, Kenya	NCWSC	Kenya	NCWSC	24,500	-

期間	プロジェクト名	客先	国名	資金源	受注金額 **(USD)**	受注金額 **(EURO)**
Jan 2006 - Apr 2006	100 days Stretch-Out Programme for Nkana Water, Zambia	NKANA Water	Zambia	World Bank	35,000	-
Jan 2006 - Apr 2006	Review of Performance Agreement for Lusaka Water, Zambia	Lusaka Water	Zambia	World Bank	44,780	-
2005 - 2006	Support to Implementation of the 200 days programme and revision of the Performance Agreements between Nkana Water & Sewerage Company	NKANA Water	Zambia	NKANA water	15,850	-
2006	Training in Customer Care, Biling, Revenue Collection and Accounting of private water operators in Hoima and Masindi	DWD	Uganda	DWD	11,000	-
2006	Developing and implementing organizational behaviour and change management programmes in Steel rolling Mills, Jinja	Alam Group	Uganda	Alam Group	6,453	-
Nov 2005 - Jan 2006	Improvement Programmes for the Nzoia Cluster, Phase 1, Step 1&2 Accompanying Measures Western Kenya	Guaff	Kenya	KfW	139, 546	-
Jul 2005 - Sept 2006	Improvement of Billing and IT systems and Support Processes for Nairobi City Water and Sewerage Company (NCWSC) Limited	NCWSC	Kenya	NCWSC	103,700	-
Jun 2005 - Dec 2005	Development of Operational Rescue Plan for Dar Es Salaam Water and Sewerage Company (DAWASCO)	DAWASCO	Tanzania	World Bank	114,550	-
2005	Review of computerization of the Ministry of Lands Office	Ministry of Lands	Uganda	GIZ	16,700	-

参考資料-3
本邦企業アンケート回答詳細

参考資料-3 本邦企業アンケート回答詳細

（1） ワークショップ、セミナーへの関心と協力可否

各社からのアンケート回答やヒアリングで確認したワークショップ、セミナー（アイデアソン）への関心について下表にまとめた。アンケートに協力した全 12 社が聴講のみを含め関心あり、8 社がオンライン含めビジネスマッチングワークショップでのプレゼン可、うち 2 社が現地への派遣も前向き、アイデアソンには 6 社が参加可となっている。

各ヒアリング先企業のワークショップ・セミナーへの関心（水道分野）

No.	企業名	技術分野	関心	プレゼン	アイデアソン	現地派遣
1	愛知時計電機	水道メータ	あり	可	参加可	なし
2	石垣	汚泥脱水機	あり	不可	関心なし	なし
3	クボタ	ポンプ	あり	可	参加可	なし
4	前澤工業	バルブ	あり	可	参加可	可
5	メータウォーター	セラミック膜ろ過	あり	可	参加可	なし
6	横河ソリューションサービス	SCADA 漏水管理システム 計測機器	あり	可	聴講	なし
7	JFE エンジニアリング	浄水場 EPC	あり	不可	聴講	なし
8	OKAMURA	塩素滅菌装置	あり	可	不明	可
9	東芝インフラシステムズ	オゾン発生装置	あり	不可	聴講	なし
10	兼工業	PSV システム（持圧弁）	あり	可	聴講	なし
11	グッドマン	漏水探知器	あり	可	参加可	なし
12	三菱ケミカルアクア・ソリューションズ	遠隔監視システム	あり	可	参加可	なし
合計			12	8	5	2

出典：調査団

（２）　自由回答設問に対する回答

a) 今後のアフリカ地域での営業活動

- ケニアを中心に、安全で清潔な水へのニーズがある地域へ展開していく予定。
- 現時点での予定はない。（本件でのオンラインワークショップのように現地渡航をしないでビジネスチャンスを模索）
- 独自の営業活動は現在のところ未定
- ODA 案件を中心に資機材の販売を展開していきたい。
- 他国の現地法人を活用した公共上下水道、民間排水処理案件への元請/下請（プロセス設計および M&E 部分の設計・調達）参画
- 民間向け及び ODA の STEP 案件があれば注力したい。
- 日本の ODA 上下水事業の受注を目指して現在活動中。アフリカ地域の同事業案件についても、同様に受注を目指して営業活動中。
- 上下水道 EPC に関心があり、案件内容によっては取組意欲がある。
- JICA の援助がつく上下水道、灌漑、農業案件に注力し積極的に活動する方針
- JICA 案件あるいは現地での入札案件への参加、また日本各地の事業体との協力

b) アフリカ地域での営業・販売体制（営業拠点、生産拠点、現地代理店等）

- ケニアに現地代理店あり（1 社）
- 印僑コネクション、エージェントを活用、あるいは既に現地進出しているゼネコン等からのオファーによる案件ベースの取り組み。現地子会社、ケニア支店
- アフリカ地域の統括営業・サービス拠点として、バーレーンに子会社を設立。その傘下として、アンゴラ、エジプト、ナイジェリア、南アフリカに直轄拠点を設置
- 営業拠点は JICA 案件中心のため日本、生産拠点：日本、アフターはドバイから対応。
- 日本の商社、官公庁による分科会・プラットフォームを活用し、営業活動を実施予定。（アフリカ現地に拠点は無し）
- 現地代理店について発掘中。

c) アフリカでの営業、受注、製造、納入等の活動における問題点、不安要素

- 現地政府・省庁への PR の機会が少ない。
- 廉価品を扱う企業（特に中国企業）との競争時は良い技術・品質を提案してもなかなか受注に辿り着けない。提案方式の差別化が必要。
- 競合他社（特に中国メーカー品）市場流通状況、市場価格帯

- 現地事情（政治、治安、法制、商慣習等々）
- 情報が少ない現地の開発課題、ニーズが把握できていない。また、遠隔地であり自社単独での情報収集に限界がある。
- 現地で競合する製品の情報が無く自社の販売戦略が立案できていない。
- 現地法規制、税制、拠点設立要否等の情報が不足しており、リスク判断が困難であること。
- 現地土木・建築パートナー（ゼネコン）の開拓が困難であり、技術・財務両面の与信判断についても難航が予測されること。
- 現地工事（土建、機電）パートナー知見不足
- 代理店網の未整備
- 情報の少なさから信頼すべき代理店の構築に難しさを感じる。
- カウンターパートについても一定のリスク（契約、財政面（支払い遅延等)、許認可手続き（施工中の協議難航等)）が想定されること。
- 支払い関係。納入後のメンテナンスをどうするかが課題になる。
- 既に営業体制を構築し、ビジネスを展開しているので、問題点・不安要素等はない。

d) ウガンダ、またはアフリカ地域での展開に当たっての日本政府（外務省、JICA 等）への要望

- 具体的案件情報
- 現地の開発課題、ニーズを共有して欲しい。
- プロジェクト組成による資金供与（財務面のリスク低減）
- 他国の競合製品を排除するためにぜひ無償または STEP 案件として頂きたい。
- 本邦製品の採用 : 円借款では、本邦製品縛りで日本の受注確度を向上させる策をとってもらえるケースが増えているが、無償案件では、日本タイドの為、本邦機器採用縛りが乏しいケースが散見される為、無償案件こそ、本邦製品の採用を後押し頂きたい。
- 現状、十分に日本製品が採用される案件にも関わらず、安易な判断で他国製が使用されていると感じており、JICA 事業においては可能な限り日本製品が採用されることを強く希望。
- パートナー企業とのマッチング機会の創出（パートナーとなり得る現地企業および現地に進出済みの海外籍企業）
- 今後も、オンラインを含めた海外要人の訪日ミッションを継続開催して頂きたい。
- 浄化サービス契約（初期費用不要の売水契約）の実証をしたいが、客先与信が不透明

なため一企業では投資に踏み切れない。例えば政府予算を活用して、浄化装置を製作し、エンドユーザーへ 5－10 年のサービス契約を締結して、浄化水量（使用水量）に応じて料金回収するスキームを実証したい。（長期契約になるため、政府予算を活用したプロジェクトでは通りにくいと思われるが)。実証が成功すれば、後続案件の導入障壁は下がる。価格では勝てない市場では契約スキームで差別化したい考え。

参考資料-4
ワークショップ・アイデアソン
出席者リスト

参考資料4.1 都市給水ワークショップ出席者リスト

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: Uganda-Japan Business Matching Workshop (Urban Water Supply Sector)

Venue: Golden Tulip Canaan Hotel Luweero Conference Room Date: 30th Sep 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
1	Dr. Allan Kaford	NWSC External Services	Business and Scientific Services	Principal Engineer	Coordinator
2	Mr. Julius Kato Karuma	NWSC HQ	Operations Department	Principal Engineer	Group 3 Leader
3	Dr. Martin Kalibbala	NWSC Kampala Water	Asset Management Kampala Water	Manager	Facilatator
4	Ms. Bugenyi Freda	NWSC Kampala Water	-	Principal Engineer	
5	Mr. Godfrey Arinaitwe	NWSC Kampala Water	Non-Revenue Water Management	Senior Manager	Group 1 Leader
6	Mr. Joseph Tweheyo	NWSC Kampala Water	Katosi Water Treatment Plant	Project Manager	Group 2 Leader
7	Mr. Process Ahabwe	NWSC Kampala Water	Project Implementation Unit	Principal Engineer	
8	Mr. Mahmood Lutaaya	NWSC Kampala Water	Kampala Water Management	General Manager	
9	Dr. Frank Kizito	NWSC Kampala Water	Asset Management	Senior Manager	
10	Dr. Rose C. Kaggwa	NWSC IREC	Business and Scientific Services	Director	Online
11	Mr. Edison Muzahura	NWSC IREC	Training & Capacity Development	Manager	NWSC IREC
12	Dr. Irene Nansubuga	NWSC	Water Quality Department	Water Quality Manager	NWSC IREC
13	Dr. Mohammed Babu	NWSC	Water Quality Department	Manager	NWSC IREC
	Mr. Alex Gisagara	NWSC HQ	Engineering Services	Director	Absent
14	Ms. Hellen Izama	NWSC HQ	Infrastructure Planning and Development	Manager	NWSC IREC
15	Mr. Jackson Nimusiima	NWSC HQ	Infrastructure Planning Project Management	Senior Manager	NWSC IREC
16	Mr. Angelo Kwitonda	NWSC HQ	Sewerage Service	Principal Engineer	NWSC IREC
17	Mr. Samson Kamugisha	NWSC HQ	Corporate Planning	Senior Economist	NWSC IREC
18	Mr. Emmanuel Ekanya	NWSC HQ	Operations Eastern Region	Senior Manager	NWSC IREC
19	Ms. Evas Tumuheirwe	NWSC Kampala Water	GIS/Block Mapping	Manager	NWSC IREC
20	Ms. Emily Atusasive	NWSC Kampala Water	GIS/Block Mapping	-	NWSC IREC
21	Mr. Tom Buyi	NWSC Kampala Water	Monitoring and Evaluation	Manager	NWSC IREC
22	Ms. Jacqueline Bagonza	NWSC Kampala Water	(NRW)	Senior Engineer	NWSC IREC
23	Mr. Otteran Tayebwa	NWSC Kampala Water	Prepaid Meters	-	NWSC IREC
24	Mr. Andrew Muhwezi	NWSC Kampala Water	Kampala Water Water Production	Senior Manager	NWSC IREC
25	Mr. Enos Malambala	NWSC Kampala Water	Water Quality Department	Principal Quality Control Officer	NWSC IREC
26	Mr. Ronald Kitakufe	NWSC Kampala Water	Urban Pro Poor Kisenyi Branch	Branch Manager	NWSC IREC
27	Mr.Tom Mbaziira	NWSC Hoima	-	Area Manager	Online
28	Mr. Alex Nahabwe	NWSC Mubende	-	Area Manager	Online

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: Uganda-Japan Business Matching Workshop (Urban Water Supply Sector)
Venue: Golden Tulip Canaan Hotel Luweero Conference Room Date: 30th Sep 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
29	Eng. Charles Sseku	NWSC Mityana	-	Area Manager	Online
30	Mr. Fred Businge	NWSC Tororo	-	Area Manager	Online
31	Mr. Otai Nelson	NWSC Soroti	-	Area Manager	Online
32	Mr. Richard Matua	MoWE	Urban Water & Sewerage	Acting Commissioner	Online
33	Mr Martin Nijsse	VEI	-	Coordinator	Online
34	Ms. Susan Kasemire	Water Mission (NGO)	-	WASH Engineer	Online
35	Mr. Ichiro Fukuhara	JICA Uganda Office	-	Senior Representative	
36	Ms. Kaweesa Mariam	JICA Uganda Office	-	Assistant Program Officer	
37	Mr. Shohei Yamamoto	JICA Survey Team	-	Team Leader/Urban Water Supply	
38	Mr. Masahide Hanabusa	JICA Survey Team	-	Private Sector Technology/Business Matching	
39	Mr. Cavan Goh Wei Yung	JICA Survey Team	-	Urban Water Supply 2	
40	Ms. Margaret Namagera	JICA Survey Team	-	Local Engineer (Urban Water Supply)	
41	Mr. Kuniaki Taguchi	Yokogawa Solution Service (SCADA, Water Leakage Monitoring)	Global Sales Section Environmental Systems Division	Chief	Online
42	Mr. Kazuo Maruyama	KANE Kogyo Co., Ltd. (Pressure Sustaining Valve)	Production Engineering Department	Manager	Online
43	Mr. Masaru Ochiai		-	Vice President	Online
44	Mr. Hiroyuki Tokutake	Maezawa Industries, Inc. (Flow Control Valves)	International Department	Deputy General Manager	Online
45	Ms. Aya Yagi		International Department	Staff	Online
46	Ms. Yoshiko Iwase	Goodman (Leakage Detection Equipment)	International Division	Assistant	Online
47	Mr. Kenichi Watanabe		-	President	Online
48	Mr. Tadashi Sato	Fujitecom (Leakage Detection Equipment)	Overseas Sales Department	-	Online
49	Mr. Takuro Nishimura	Nagaoka International Corp. (Chemiles)	Sales and Development Group, Environmental Business Div.Water Business Headquarters	Acting Group Manager	Online
50	Ms. Naoko Mori	Mitsubishi Chemical Aqua Solutions (Remote Monitoring System)	Overseas Business Support Department	-	Online
51	Mr. Suguru Kudo		Technology Management Department	-	Online
52	Mr. Naoki Yasuda		Overseas Business Support Department	Senior Manager	Online
53	Mr. Kazuki Matsui	Metawater (Mobile Ceramic Membrane Water Supply)	International Sales & Marketing Dept., International Business Division	-	Online
54	Mr. Taku Asano		International Sales & Marketing Dept., International Business Division	Chief	Online
55	Mr. Yasuyuki Shinotsuka		International Sales & Marketing Dept., International Business Division	Manager	Online
56	Mr. Shuntaro Sakai	Tokyo Keiki (Electromagnetic Flow Meter)	Measurement System Company Sales	-	Online
57	Mr. Takayuki Shirakawa		Measurement System Company Sales	Assistant Manager	Online

参考資料4.1 都市給水ワークショップ出席者リスト

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: Uganda-Japan Business Matching Workshop (Urban Water Supply Sector)

Venue: Golden Tulip Canaan Hotel Luweero Conference Room Date: 30th Sep 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
58	Mr. Kazuki Akashi	Toshiba Infrastructure Systems & Solutions Corporation (EPC, Ozone generator)	Social System Div. Water & Enviromental Oversea Sales Group	Specialist	Online

参考資料4.2 都市給水アイデアソン出席者リスト

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: "Japan×Uganda, Private×Public, Jointly Creating Uganda's Urban Environment"
(Urban Water Supply Sector)

Venue: Golden Tulip Canaan Hotel Luweero Conference Room Date: 1st Oct 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
1	Dr. Allan Kaford	NWSC External Services	External Service	Principal Engineer	Coordinator
2	Mr. Julius Kato Karuma	NWSC HQ	Operations Department	Principal Engineer	Group 3 Leader
3	Dr. Martin Kalibbala	NWSC Kampala Water	Asset Management Kampala Water	Manager	Facilatator
4	Ms. Bugenyi Freda	NWSC Kampala Water	-	Principal Engineer	
5	Mr. Godfrey Arinaitwe	NWSC Kampala Water	Non-Revenue Water Management	Senior Manager	Group 1 Presentator
6	Mr. Gilbert Muhwezi	NWSC Kampala Water	Physical Loss Control & Instrumentation	Principal Engineer	Group 1 Leader
7	Mr. Joseph Tweheyo	NWSC Kampala Water	Katosi Water Treatment Plant	Project Manager	Group 2 Leader
8	Mr. Process Ahabwe	NWSC Kampala Water	Project Implementation Unit	Principal Engineer	
9	Mr. Mahmood Lutaaya	NWSC Kampala Water	Kampala Water	General Manager	
10	Dr. Frank Kizito	NWSC Kampala Water	Asset Management	Senior Manager	
11	Dr. Rose C. Kaggwa	NWSC IREC	Business and Scientific Services	Director	Online
12	Mr. Edison Muzahura	NWSC IREC	Training & Capacity Development	Manager	NWSC IREC
13	Dr. Irene Nansubuga	NWSC	Water Quality Department	Water Quality Manager	NWSC IREC
14	Dr. Mohammed Babu	NWSC	Water Quality Department	Manager	NWSC IREC
	Mr. Alex Gisagara	NWSC HQ	Engineering Services	Director	Absent
15	Ms. Hellen Izama	NWSC HQ	Infrastructure Planning and Development	Manager	NWSC IREC
16	Mr. Jackson Nimusiima	NWSC HQ	Infrastructure Planning Project Management	Senior Manager	NWSC IREC
17	Mr. Angelo Kwitonda	NWSC HQ	Sewerage Service	Principal Engineer	NWSC IREC
18	Mr. Samson Kamugisha	NWSC HQ	Corporate Planning	Senior Economist	NWSC IREC
19	Mr. Emmanuel Ekanya	NWSC HQ	Operations Eastern Region	Senior Manager	NWSC IREC
20	Ms. Evas Tumuheirwe	NWSC Kampala Water	GIS/Block Mapping	Manager	NWSC IREC
21	Ms. Emily Atusasive	NWSC Kampala Water	GIS/Block Mapping	-	NWSC IREC
22	Mr. Tom Buyi	NWSC Kampala Water	Monitoring and Evaluation	Manager	NWSC IREC
23	Ms. Jacqueline Bagonza	NWSC Kampala Water	-	Senior Engineer	NWSC IREC
24	Mr. Otteran Tayebwa	NWSC Kampala Water	Prepaid Meters	-	NWSC IREC
25	Mr. Andrew Muhwezi	NWSC Kampala Water	Kampala Water Water Production	Senior Manager	NWSC IREC
26	Mr. Enos Malambala	NWSC Kampala Water	-	Principal Quality Control Officer	NWSC IREC
27	Mr. Ronald Kitakufe	NWSC Kampala Water	Urban Pro Poor Kisenyi Branch	Branch Manager	NWSC IREC

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: "Japan×Uganda, Private×Public, Jointly Creating Uganda's Urban Environment"
(Urban Water Supply Sector)

Venue: Golden Tulip Canaan Hotel Luweero Conference Room Date: 1st Oct 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
28	Mr.Tom Mbaziira	NWSC Hoima	-	Area Manager	Online
29	Mr. Alex Nahabwe	NWSC Mubende	-	Area Manager	Online
30	Eng. Charles Sseku	NWSC Mityana	-	Area Manager	Online
31	Mr. Fred Businge	NWSC Tororo	-	Area Manager	Online
32	Mr. Otai Nelson	NWSC Soroti	-	Area Manager	Online
33	Mr. Richard Matua	MoWE	Urban Water & Sewerage	Acting Commissioner	Online
34	Ms. Kaweesa Mariam	JICA Uganda Office	-	Assistant Program Officer	
35	Mr. Shohei Yamamoto	JICA Survey Team	-	Team Leader/Urban Water Supply	
36	Mr. Masahide Hanabusa	JICA Survey Team	-	Private Sector Technology/Business Matching	
37	Mr. Cavan Goh Wei Yung	JICA Survey Team	-	Urban Water Supply 2	
38	Ms. Margaret Namagera	JICA Survey Team	-	Local Engineer (Urban Water Supply)	
39	Mr. Kazuo Maruyama	KANE Kogyo Co., Ltd. (Pressure Sustaining Valve)	Production Engineering Department	Manager	Online (discussion)
40	Mr. Masaru Ochiai		-	Vice President	Online (viewer)
41	Ms. Aya Yagi	Maezawa Industries, Inc. (Flow Control Valves)	International Department	Staff	Online (viewer)
42	Ms. Yoshiko Iwase	Goodman (Leakage Detection Equipment)	International Division	Assistant	Online (discussion)
43	Mr. Kenichi Watanabe		-	President	Online (discussion)
44	Mr. Mbiro Andrew	African Development Bank (AfDB)	-	Senior Water and Sanitation Officer	Online
45	Ms. Alexander V. Danilenko	World Bank (WB)	-	-	Online
46	Ms. Susan Kasemire	Water Mission (NGO)	-	WASH Engineer	Online

参考資料4.3 大気汚染ワークショップ出席者リスト

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: Uganda-Japan Business Matching Workshop（Air Pollution Sector)
Venue: Golden Tulip Canaan Hotel Asmara Conference Room Date: 30th Sep 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
1	Mr. Mafumbo Julius	MoWE	Environment Sector Support Services	Assistant Commissioner	Closing speech
2	Mr. Mununuzi Nathan			Senior Environment Officer	Presentator
3	Mr. Ndibirema Dadinoh			Environment Officer	
4	Mr. John Okatch	NEMA	Environmental Monitoring & Compliance	Environment Assessment Officer	
5	Ms. Kutesakwe Jennifer			Senior Environment Inspector	Presentator
6	Ms. Nsereko Patience			Principal Environment Inspector	
7	Mr. Moses Kabangi Mwigo	MoH	Department of Environmental Health	Commissioner	
8	Mr. Fred Mulabya			Principal Environmental Health Officer	Presentator
9	Mr. Dickson Wandera			Environmental Health Officer	
10	Mr. Bob Omoda Amodan			Environmental Health Officer	
11	Ms. Atino Juliet	MoWT	Environment Liaison Unit	Senior Environment Officer	
12	Ms. Winifred Anna Adoch Gena			Social Environment Officer	
13	Mr. Birimumaso David C.E.A	MoEMD	Energy Efficiency Conservation	Senior Energy Officer	Presentator
14	Mr.Alex Ndayabakira	KCCA	Directorate of Public Health	Epidemiologist	Presentator
15	Mr. Deo Okure	AirQo Project	-	Air Quality Scientist and Programme Manager	Presentator
16	Ms. Priscah Adrine		-	Digital Communications Executive	
17	Mr. Kyalimpa Joseph	UMA	-	Representative	
18	Mr. Jakob Hornbach	Bodawerk International Ltd.	-	CEO	Presentator
19	Mr. Janos Bisasso		-	COO	
20	Mr. Ben Lokeris Koriang		-	CCO	
21	Mr. Yuki Inoue	JICA Uganda Office	-	Representative	Opening Speech
22	Mr. Shunichi Okahisa	JICA Survey Team	-	Air Pollution Management	Chairperson
23	Ms. Ruth Mubeezi Neebye		-	Survey Assistant/Coordinator	Chairperson
24	Mr. Mahad Muhammad	Makerere University	School of Public Health	Student	Assistant
25	Mr. Senkubuge Shafik			Student	Assistant
26	Mr. Masaaki Yoshikawa	Osaka Gas Co., Ltd.	Energy Technology Laboratories	Manager	Online, Presentator
27	Mr. Kenichi Tanaka	HORIBA, Ltd.	International Sales Dept.	Manager	Online
28	Mr. Leo Yasukawa			Staff	Online, Presentator
29	Mr. Susumu Hayashi		R and D Planning Center	Manager	Online

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: Uganda-Japan Business Matching Workshop（Air Pollution Sector)

Venue: Golden Tulip Canaan Hotel Asmara Conference Room Date: 30th Sep 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
30	Mr. Mikael Mcheik	HORIBA FRANCE S.A.S.	-	-	Online
31	Mr. Hidenori Takada	Toyota Tsusho Corporation / Mobility 54	-	Representative	Online
32	Mr. Satoshi Miyaichi	JICA Survey Team	-	Air Pollution Management	Online
33	Ms. Junko Masaki	Nippon Koei Co., Ltd	International Environment Dept.	Manager	Online

Attendant List

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Meeting Title: "Japan×Uganda, Private×Public, Jointly Creating Uganda's Urban Environment" (Air Pollution Sector)
Venue: Golden Tulip Canaan Hotel Asmara Conference Room Date: 1st Oct 2021 Time: 10:00 - 16:00

SN	Name	Organization	Department	Title	Remarks
1	Mr. Ndibirema Dadinoh	MoWE	Environment Sector Support Services	Environment Officer	Group 2
2	Mr. John Okatch	NEMA	Environmental Monitoring & Compliance	Environment Assessment Officer	Group 3
3	Ms. Nsereko Patience			Principal Environment Inspector	Group 2
4	Mr. Moses Kabangi Mwigo	MoH	Department of Environmental Health	Commissioner	Group 2
5	Mr. Fred Mulabya			Principal Environmental Health Officer	Group 3
6	Mr. Dickson Wandera			Environmental Health Officer	Group 1
7	Mr. Bob Omoda Amodan			Environmental Health Officer	Group 1
8	Ms. Atino Juliet	MoWT	Environment Liaison Unit	Senior Environment Officer	Group 3
9	Ms. Winifred Anna Adoch Gena			Social Environment Officer	Group 1
10	Mr.Alex Ndayabakira	KCCA	Directorate of Public Health	Epidemiologist	Group 2
11	Ms. Fortunate Bis		Directorate of Traffic	Engineer	Group 1
12	Ms. Priscah Adrine	AirQo Project	-	Digital Communications Executive	Group 1
13	Mr. Kyalimpa Joseph	UMA	-	Representative	Group 3
14	Mr. Jakob Hornbach	Bodawerk International Ltd.	-	CEO	Group 1
15	Mr. Janos Bisasso		-	COO	Group 3
16	Mr. Yuki Inoue	JICA Uganda Office	-	Representative	Opening and Closing Speech
17	Mr. Shunichi Okahisa	JICA Survey Team	-	Air Pollution Management	Chairperson
18	Ms. Ruth Mubeezi Neebye		-	Survey Assistant/Coordinator	Chairperson
19	Mr. Mahad Muhammad	Makerere University	School of Public Health	Student	Group 3
20	Mr. Senkubuge Shafik			Student	Group 2
21	Mr. Masaaki Yoshikawa	Osaka Gas Co., Ltd.	Energy Technology Laboratories	Manager	Online, Group 1
22	Mr. Satoshi Miyaichi	JICA Survey Team	International Environment Dept.	Air Pollution Management	Online, Group 3
23	Mr. Birimumaso David C.E.A	MoEMD	Energy Efficiency Conservation	Senior Energy Officer	Online, Group 3
24	Mr. Deo Okure	AirQo Project	-	Air Quality Scientist and Programme Manager	Online, Group 2
25					

参考資料-5.1
都市給水ワークショップ・
アイデアソンプレゼン資料

NWSC EXPECTATIONS OF JAPAN SUPPORT & ADVANCED TECHNOLOGIES

29th SEPTEMBER 2021

ALLAN KAFORD, PRINCIPAL ENGINEER, NWSC

PRESENTATION OUTLINE

- Introduction
- Strategic Anchorage
- Strategic Initiatives to Enhance Service Coverage
- Key Challenges
- Expectations of Japan & Advanced Technologies

INTRODUCTION

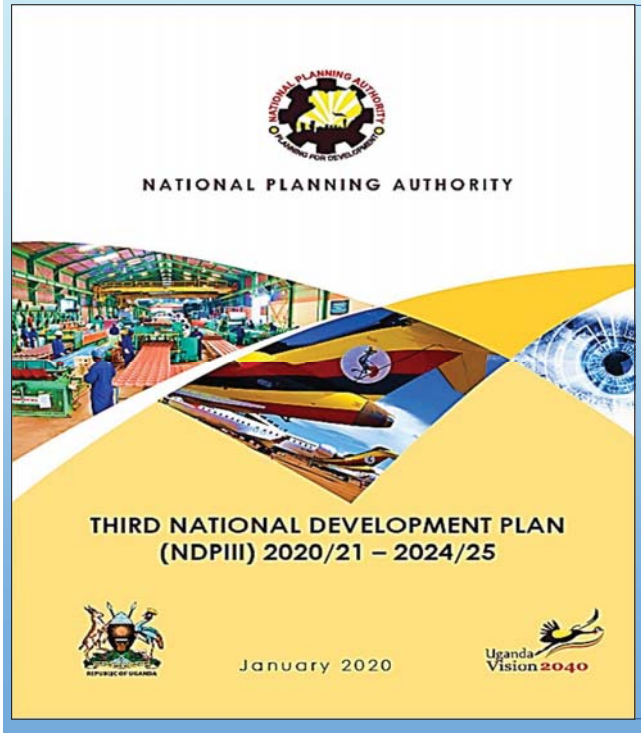
Mandate: provide water and sewerage services in Urban Areas on commercial and financially viable basis.

NWSC operates in **258 towns/urban centers in** Uganda

Vision: The Leading Customer Service Oriented Utility in the World.

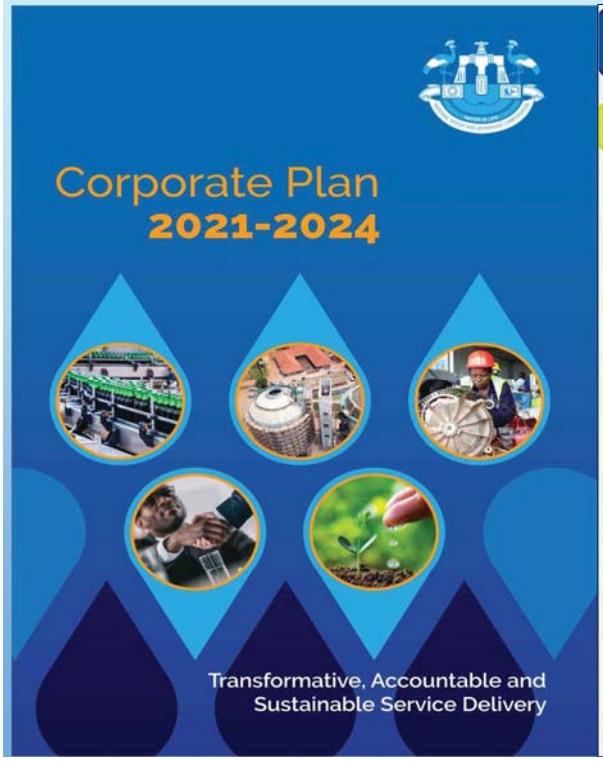
Mission: To Sustainably and Equitably provide Cost Effective, Quality Water and Sewerage Services to the Delight of All Stakeholders, while Conserving the Environment and enhancing stakeholder trust.

STRATEGIC ANCHORAGE



- **Sustainable Development Goals 2030**
- **Vision 2040 and NDP III (2020 - 2030)**
- **Government Manifesto (NRM) 2021 - 2026**
- **Water and Environment Strategic Investment Plan (SIP 2018-2030)**
- **GoU Performance Contract 2021 - 2024**
- **NWSC Corporate Plan 2021 - 2024**

STRATEGIC ANCHORAGE



THEME (2021-2024) ▶ TRANSFORMATIVE, ACCOUNTABLE,AND SUSTAINABLE SERVICE DELIVERY

STRATEGIC PRIORITY AREAS (SPAS)	STRATEGIC RESULTS (SR)
INDUSTRIALIZATION	Well serviced Industrial Parks and Industries
INFRASTRUCTURE DEVELOPMENT	Increased access to Water and Sewerage services
SKILLING AND WORKFORCE DEVELOPMENT	Skilled and Productive workforce
PRIVATE SECTOR INVOLVEMENT	Increased Private sector involvement
ORGANIZATION HEALTH AND SUSTAINABILITY	A healthy organization with delighted customers

PERFORMANCE OVERVIEW 2015 - 2021

Region	FY 2015/16	FY 2016/17	FY 2017/18	FY 2018/19	FY 2019/20	FY 2020/21
Geographical Growth (No. of Towns)	170	218	236	253	256	258
Water Production Capacity (million m3)	106	121	126	135	140	144
Volume of Water Supplied(million m3)	103	116	120	128	132	137
Volume of Water Sold (million m3)	74	80	83	91	88	87
Non-Revenue Water (NRW) (%)	28	30.9	31	29.2	33.5	34.6
Water Pipe Network (Km)	9 ,960	12,113	14,466	17,556	18,410	20,495
Sewer Pipe Network (Km)	557	580	604	663	693	715
Water Connections (No.)	472,193	524,657	587,863	659,157	724,006	775,794
Pro-poor Connections (No.)	9,260	10,424	12,305	17,186	21,600	24,867
Sewer Connections (No.)	20,355	21,072	21,616	22,606	23,914	24,026
Billing (UGX.Billion) - (VAT Incl.)	292	345	390	437	424	419
Collections (UGX.Billion) - (VAT Incl.)	284	323	385	437	391	446
Annual Turnover (UGX.Billion)	276	321	388	442	463	464
Operating Profit (UGX.Billion)	34	38	92	96	103	109
Staff Numbers	2,860	3,131	3,443	3,778	4,126	4,045

Strategic Initiatives to Enhance Service Coverage

- **Key Strategic Interventions: Building Capacities At All Levels**
  - Staff Capacity Development Programmes Including
    - ✓ Establishment Of The Vocational Training Facility at Gabba
    - ✓ The International Resource Centre (IREC)/Training Facility For NWSC And External Clients
    - ✓ The Western Regions Resource Training Center in Bushenyi (WESREC)
    - ✓ Planned Vocational Skills Training Facility in Katchung, Lira

Strategic Initiatives to Enhance Service Coverage

- **Key Strategic Interventions: Implementation of Capital Projects (Completed Projects)**
  - **SCAP 100**- Aims At 100% Service Coverage In All Areas (Achieved: Annual **Average 2500 Km, 58,000 New Connections, 3,000 PSPs And Several** Water Supply Stabilisation Plans (WSSP))
  - Kampala Water-lake Victoria WATSAN Project (KW – LVWATSAN)
  - Fort Portal Water Production Improvements
  - Water Management And Development Project (WMDP): Arua
  - Water Management And Development Project (WMDP): Bushenyi
  - Water Management And Development Project (WMDP) - Gulu Water Supply project
  - Kapchorwa Water Supply Project
  - Water Supply Extension to Kasese Industrial Park
  - Upgrade of Lira Water Supply System

PICTORIAL VIEW OF COMPLETED PROJECTS

Sembabule Intake and Water Treatment Plant

H.E the President at the Commissioning of Gulu Water Treatment Plant under the WMDP Project

Key Strategic Interventions

Key Strategic Interventions: Implementation of Capital Projects (Ongoing Projects)

1. Scap 100
2. Kampala Water-lake Victoria Watsan Píoject (KW – LVWATSAN)
3. Kampala Sanitation Project (LVPII) -Construction of Nakivubo Waste Water Treatment Plant at Bugolobi.
4. Upgrading Of Kapeeka Water Supply System
5. Sembabule Wateí Supply Improvement Píoject
6. Hoima Wateí Supply Impíovement Píoject
7. Development Of Water And Sanitation Infrastructure For The Isingiro, Mbarara – Masaka Areas (South Western Cluster)
8. Bushenyi Water Supply Augmentation Project
9. Kiruddu Waste Water Treatment Plant: 10.Parombo Water Supply Project 11.Lyantonde Water Supply Project
10. Integrated Water Management And
11. Development Project (IWMDP)

Key Challenges

- Inadequate infrastructure that cannot cope with the Population growth/ Urbanisation growth rate
- Limited Financial resources to match Watsan growth with the ever increasing demand for services
- Climate change and valiability affecting reliability of water sources
- High NRW Especially in Kampala Water
- NWSC efforts to accelerate service provision have slowed down due to the negative impacts of covid19 Pandemic

Expectations for Japan & Advanced Technologies

- Financial Support Towards Development And Implementation Of Critical / Priority Watsan Infrastructure Development
- Collaborative Partnership in the Area of technology development such as Prepaid meters
- Technical Support to Vocational Skills Training Facility and Regionalisation
- Support in enhancing NWSC Capacity to manage water supply infrastructure in the Area of NRW
  - ✓ Establishment of DMAs in KW
  - ✓ Equipping the meter workshop
  - ✓ Establish a training yard for Leak detection for dissemination to other NWSC areas
  - ✓ Telemetry (SCADA systems) for flows, pressures and reservoir levels
  - ✓ Network fixtures for Pressure Management

Thank You For Listening

Data Collection Survey for Urban Environment (Urban Water Sector)

Uganda-Japan Business Matching Workshop

Explanation of Result of Survey

September 30, 2021

JICA Survey Team

Contents

1. Activities for the JICA Survey Team
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3. NWSC Basic Information past 5 Years
4. Target Area for Survey
5. Baseline Information of 10 Target Areas
6. Survey Result of Kampala Water
7. Survey Result of Hoima, Mubende, Mityana, Tororo and Soroti
8. Proposed Aid Policy
9. Proposed Project in Urban Water Sector (Draft)
10. Donor Information
11. Collaboration with Private Sector and Other Donors
12. Business Matching Workshop and Ideathon

1 Urban Water Sector
Activities for JICA Survey Team

- Data collection through website and local staff in Japan
- Data collection through MoWE, NWSC H/Q, IREC, VSDF, Kampala Water, Hoima, Mubende, Mityana, Soroti and Tororo at Site
- Confirmation of current situation of NWSC
- Confirmation of Aid policy for JICA
- Business Matching Workshop and Ideathon

2 Urban Water Sector
3-Year NWSC Corporate Plan (2021-2024)

Vision — **The Leading Customer Service Oriented Utility In The World**

Period — **2021 - 2024 (3 Years)**

Strategic Priority Area (SPA)

SPA 1. Industrialization
- Increase water and sewerage service coverage for industrial development and growth

SPA 2. Infrastructure Development
- Increase service coverage
- Ensure compliance to water and wastewater quality standards

SPA 3. Skilling and Workforce Development
- Have a highly competent, skilled, ethical and productive workforce
- Contribute to the capacity development of the water sector

SPA 4. Private Sector Involvement
- Strengthen the private sector involvement

SPA 5. Organizational Health & Sustainability
- Increase revenue, operating surplus
- Environmental and ecological sustainability
- Enhance Corporate Citizenship
- Improve liquidity, operational efficiency, water supply reliability, customer services, employee motivation and commitment

Source: NWSC Corporate Plan 2021-2024

2 Urban Water Sector
5-Year NWSC Target

Targets (5 Years)

Mission (Medium to Long-Term)	Indicators	Kampala Metropolitan Area 2021 ⇒ 2026		Other Regions/ Towns 2021 ⇒ 2026	
Water Production	Water Production (million m^3)	124.8	142	56.7	77.7
	NRW (%)	42.2	39.2	23 - 25 (24)	19 – 21.5 (20.5)
Customer Services	Total Connections (no.)	400,349	525,468	446,781	582,423
	Total PSPs/Kiosks (no.)	8,025	12,767	21,173	31,931
Compliance	Water Quality (%)	98	98	98	98
Financial	Billings (million Ushs)	339	432	184.9	245.9
	Collection Efficiency (%)	100	101	91 - 110 (102.5)	97 – 105 (101)
	Average Debt Age (Months)	1.2	0.5	3.8～5.7 (4.5)	0.9～5.5 (2.9)

Source: NWSC Corporate Plan 2021-2024

2 Urban Water Sector
Source of NWSC Financing (2021/22-2025/26)

Financial Forecast (Project Expenditure): 5,380 Billion (1.5 billion)

NWSC Financial Sources: 57%

GoU Financial Source: 8%

Donor Financial Sources: 35% (AFD, KfW, EIB, EU-ITF, WB, AfDB and others)

Sources of Financing (Inflows) (Ushs Million)

Cash Flow Item	2021/22	2022/23	2023/24	2024/25	2025/26	Total	USD	%
Collections (Water and Sewerage)	523,439	564,591	602,494	642,486	684,674	3,017,684	845	56%
Collections from other income	4,915	5,137	5,369	5,632	5,907	26,960	8	1%
Sub-Total (Internal Sources)	528,354	569,728	607,863	648,118	690,582	3,044,644	853	57%
External Sources								
GoU Releases	89,213	89,213	89,213	89,213	89,213	446,064	125	8%
Donor Releases	322,822	582,066	450,279	346,568	187,500	1,889,235	529	35%
Sub-Total (External Sources)	412,035	671,279	539,492	435,781	276,713	2,335,299	654	43%
Total Inflows	940,389	1,241,006	1,147,355	1,083,898	967,295	5,379,943	1,506	100%

Source: NWSC Corporate Plan 2021-2024

3 Urban Water Sector
NWSC Basic Information past 5 Years

☐ Key Performance Indicator for Water Supply

- Water production is increased to 1.3 while water connection and PSP are increased to 1.5 and 2.0 respectively.

Key Performance Indicator	2015/16 (1)	2016/17	2017/18	2018/19	2019/20 (2)	(2)/(1)
Number of Towns (Nos.)	170	218	236	253	258	1.5
Water Service Coverage (%)	78	78.2	83.7	83.7	84	1.1
Water Production (Million m^3)	106	120.7	126.2	134.9	140	1.3
Water Supply (Million m^3)	102.7	116.2	120.1	127.8	132	1.3
Water Sales (Million m^3)	73.9	80.2	82.9	90.5	87	1.2
Non-Revenue Water (NRW, %)	28	30.9	31	29	34	1.2
Total Water Connections (Nos.)	472,193	529,709	582,863	659,157	724,006	1.5
Total Public Stand Pipes (Nos.)	10,841	10,424	12,305	17,186	21,600	2.0
Total water pipe network (km)	9,960	12,113	14,466	17,556	19,974	2.0

Source: NWSC Integrated Annual Report 2019/20

3 Urban Water Sector
NWSC Basic Information past 5 Years

☐ Financial Performance

- Turnover is increased by 1.7, About 60 % of turnover comes from Kampala Water.
- Collection Efficiency is excellent even affected by COVID-19 (Including arrears).
- EBITDA is continuously increasing.

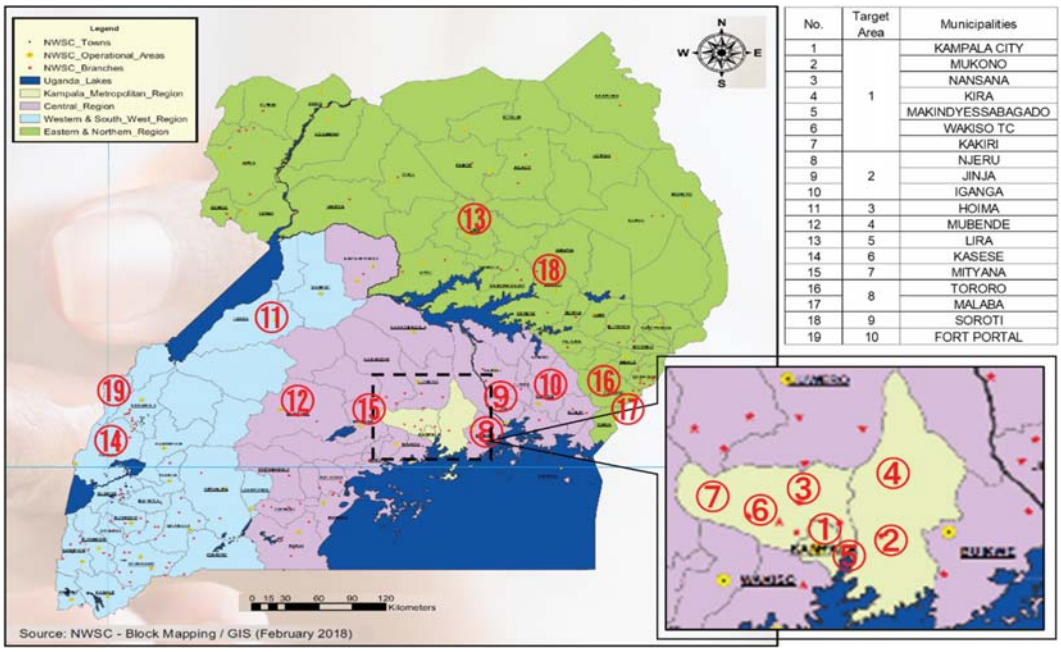
Key Performance Indicator	2015/16 (1)	2016/17	2017/18	2018/19	2019/20 (2)	(2)/(1)
Turnover (Billion Ushs) Net VAT	276	321	388	442	463	1.7
Billing (Billion Ushs) VAT Inc.	292	347	390	437	424	1.5
Collections (Billion Ushs) VAT Inc.	284	323	385	437	391	1.4
Collection Efficiency (%)	97	93	99	100	92	0.9
Debt Age (Months)	2.6	3	2.9	2.3	3.6	1.4
EBITDA (Billion Ushs)	34	38	92	96	103	3.0
Staff Number (Nos.)	2,860	3,131	3,443	3,778	4,082	1.4
Staff Productivity (Nos.)	6	6	6	6	6	1.0

Source: NWSC Integrated Annual Report 2019/20

4 Urban Water Sector

Target Area for Survey

- Collection of Basic Information of 10 target areas
- Site Survey for 6 areas (Kampala Water, Hoima, Mubende, Mityana, Tororo and Soroti)



No.	Target Area	Municipalities
1	1	KAMPALA CITY
2		MUKONO
3		NANSANA
4		KIRA
5		MAKINDYESSABAGADO
6		WAKISO TC
7		KAKIRI
8	2	NJERU
9		JINJA
10		IGANGA
11	3	HOIMA
12	4	MUBENDE
13	5	LIRA
14	6	KASESE
15	7	MITYANA
16	8	TORORO
17		MALABA
18	9	SOROTI
19	10	FORT PORTAL

Source：JST

5 Uban Water Sector

Baseline Information of 10 Target Areas

Target Area	Kampala	Jinja	Hoima	Mubende	Lira	Kasese	Mityana	Tororo	Soroti	Fort Portal
Region	Kampala	Central	Western & South West	Central	Eastern & Northern	Western & South West	Central	Eastern & Northern	Eastern & Northern	Western & South West
Year of Transfer to NWSC	1972	1972	2006	2006	1990	1990	2013	1980	2008	1990
Target Population to be Served (2020)	6,761,636	929,697	253,978	288,146	440,882	366,317	241,174	760,712	383,644	484,378
Supply Population (2020)	6,242,420	737,706	120,568	104,899	394,215	186,781	123,344	520,657	243,546	242,617
Water Service Coverage (%)	92	76	47	36	89	51	51	57	62	50
Capacity Utilization (%)	97	67	64	72	71	96	40	35	103	67
Average Water Supply (hours)	15～20	15～20	8～12	18	15～20	24	20～24	16	16	20～24
Water Production (m^3/year)	85,134,735	7,483,183	770,395	598,116	2,300,565	1,303,030	708,741	1,682,653	1,787,353	1,335,755
Water Sold (m^3/year)	49,160,464	4,831,230	420,169	511,063	1,495,996	1,004,773	413,618	1,388,270	1,162,969	1,057,633
Billing Efficiency (%)	60	79	71	89	72	81	61	83	72	85
NRW (%)	40	21	29	11	28	19	39	17	28	15
Billing (Ushs '000)	245,247,870	25,552,587	1,967,866	2,170,619	6,361,796	3,980,479	1,562,179	6,242,257	5,144,790	4,981,130
Collection (Ushs '000)	238,705,506	24,089,215	1,849,005	1,941,736	5,668,522	3,502,556	1,455,838	4,813,520	4,482,647	4,320,708
Collection Efficiency (%)	97	94	94	89	89	88	93	77	87	87
Unit Cost of Water Production (Ushs/m^3)	2,132	6,746	3,589	8,386	3,205	1,717	5,078	4,052	4,720	3,668
Staff Productivity (nos.)	4	4	4	5	5	5	5	4	5	4
Total Connection (nos.)	356,272	32,158	6,212	5,923	14,768	10,501	6,241	17,516	10,059	14,138
Total Length of Water Distribution Network (km)	3,186 (2020)	488 (2019)	261 (2021)	117 (2019)	134 (2016)	91 (2017)	231 (2021)	220 (2018)	102 (2019)	258 (2017)

Note：Target population to be served and Supply Population (2020) is calculated by NWSC's own formula. Number of connection is including the disconnection number. Source：NWSC and interview survey to NWSC staff.

6 Urban Water Supply
Survey Result of Kampala Water

☐ Outline of Water Supply Facility

Item	Specifications
Water Source	Lake Victoria
Water Production Capacity	• Ggaba I, II, III WTP: 230,000 m^3/day • Katosi WTP: 160,000m^3/day (expandable to 240,000 m^3/day) Total: 390,000 m^3/day (expandable to 470,000 m^3/day)
Treatment Method	Ggaba I, II, and III: Conventional Water Treatment Katosi WTP: Conventional Water Treatment with using technology for Dissolved Air Flotation
Water Quality Test	• Water quality test has been conducted based on the water quality testing schedule and test items. • The treated water meets the water quality standards.
Treatment Conditions	• WTPs are operating according to manual and schedule. • Inefficiency water WTP operation due to deterioration of raw water. • Overloaded operation by 30,000 m^3/day (80,000 m^3/day to 110,000 m^3/day) for Ggaba III WTP due to high water demand.
Distribution Facilities	Total Reservoir Volume: 118,490m^3 including Ggaba and Katosi WTP Clear Water Tank, Total Length of Distribution Pipe: 3,186km, HDPE: 47%, PVC: 30%, ST: 21%, GI and DI 2%.

Source: Compiled by JST based on interviews with NWSC and collected data

6 Urban Water Supply
Survey Result of Kampala Water

Water Supply Hours (Not included Katosi Supply Volume)

- ☐ Center of Kampala 24 hours supply
- ☐ Surrounding areas of Kampala center12 to 18 hours
- ☐ Supply hour tends to be shorter in areas far from the center of Kampala

Source : NWSC

6 Urban Water Sector

Survey Result of Kampala Water

☐ Non-Revenue Water

FY	2015/16	2016/17	2017/18	2018/19	2019/20
NRW	31.8%	37.1%	36.2%	34.6%	39.5%

System Input Volume 7,204,513 (m^3/month)	Authorized Consumption 4,515,323	Billed Authorized Consumption 4,295,088	Billing System (Including prepaid water sales) 4,294,534	Revenue Water 4,295,088 59.6%
			Water Theft (Culprits charged) 554	
		Unbilled Authorized Consumption 220,235 3.1%	Unbilled Metered Consumption 4,100	NRW 2,909,425 **40.4%**
			Unbilled Unmetered Consumption 216,135	
	Water Losses Unaccounted-For-Water (UFW) 2,689,198	Commercial Loss 1,365,355 19.0%	Unauthorised Use 607,496	
			Metering Inaccuracies 757,859	
		Physical Loss 1,323,835 18.4%	Leaks 397,873	
			Reservoir Leaks and Overflows 0	
			Bursts 925,962	

NWSC NRW Water Balance (May 2021)

6 Urban Water Sector

Survey Result of Kampala Water

☐ **Issue on Development of Water Supply Facility**

- Updating of the Master Plan for systematic development planning to meet the future water demand.
- Rehabilitation of distribution networks and establishment of DMA in all supply area with pressure control system.
- Establishment of Dedicated Non-Revenue Water Department for comprehensive NRW reduction activity including capacity development especially for the NRW reduction.

7 Urban Water Sector
Survey Result of Hoima, Mubende, Mityana, Tororo and Soroti

☐ Water Source and Water Treatment Plan

Item	Hoima	Mubende	Mityana	Tororo	Soroti
Water Source	8 boreholes	2 dams, 5 boreholes	Swamp, 4 boreholes	River	River
Production Capacity	3,000 m^3/day	1,920 m^3/day	4,800 m^3/day	7,800 m^3/day	8,500 m^3/day
Actual Production Capacity	2,150 m^3/day due to power outage and borehole broken	1,560 m^3/day	1,936 m^3/day	4,500 m^3/day due to power outage	5,500 m^3/day due to power outage.
Water Demand (2030)	11,040 m^3/day	11,891 m^3/day	9,660 m^3/day	32,130 m^3/day	21,980 m^3/day
Treatment Method	Rapid sand filtration w/o sedimentation	Conventional WTP	Conventional WTP	Conventional WTP	Conventional WTP
Treatment Condition	Meet with water quality standard	Meet with water quality standard	Meet with water quality standard	Meet with water quality standard	Meet with water quality standard
Facility Condition	・Aged facilities ・Lack of essential equipment (dosing pump etc.)	•Lack of essential equipment (dosing pump etc.)	Lack of essential equipment (mixer, no spare of dosing pump etc.)	To be confirmed	To be confirmed
Raw Water Quality	High iron, algae	High iron High TCU (Color)	High iron High TCU (color) High humic substances	High turbidity during the rainy season	High turbidity during the rainy season

Source : NWSC

7 Urban Water Sector
Survey Result of Hoima, Mubende, Mityana, Tororo and Soroti

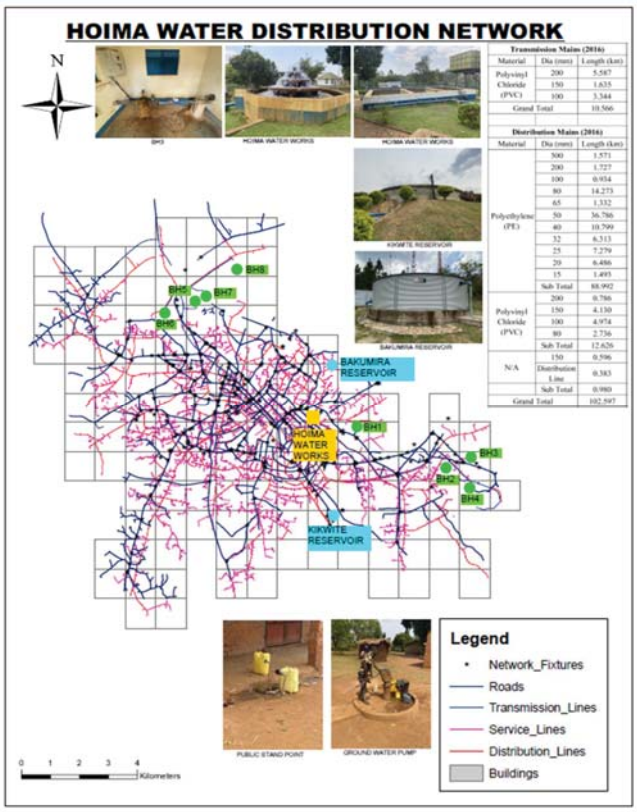
☐ Reservoir and Distribution Pipe

Item	Hoima	Mubende	Mityana	Tororo	Soroti
Total Volume of Reservoir	3,324 m^3	1,750m^3	1,062m^3	5,140 m^3	8,087 m^3
Pipe Length	261 km (2021)	117 km (2019)	231 km (2021)	220 km (2018)	102 km (2019)
Diameter	Up to 300 mm	Up to 200 mm	Up to 200 mm	Up to 300 mm	Up to 300 mm
Main Pipe Materials	HDPE, PVC	HDPE, PVC	HDPE, PVC	HDPE, PVC, GI, AC	HDPE, PVC, ST
Connection 1) Domestic 2) PSP 3) Commercial and industrial 4) Institutional and Gov.	1) 74% 2) 2.3% 3) 21% 4) 2.7%	1) 74% 2) 4% 3) 19% 4) 3%	1) 78% 2) 5% 3) 13% 4) 4%	1) 81% 2) 8% 3) 8% 4) 3%	1) 64% 2) 4% 3) 25% 4) 6%

Source : NWSC

7 Urban Water Sector

HOIMA (YEAR 2016 DATA)

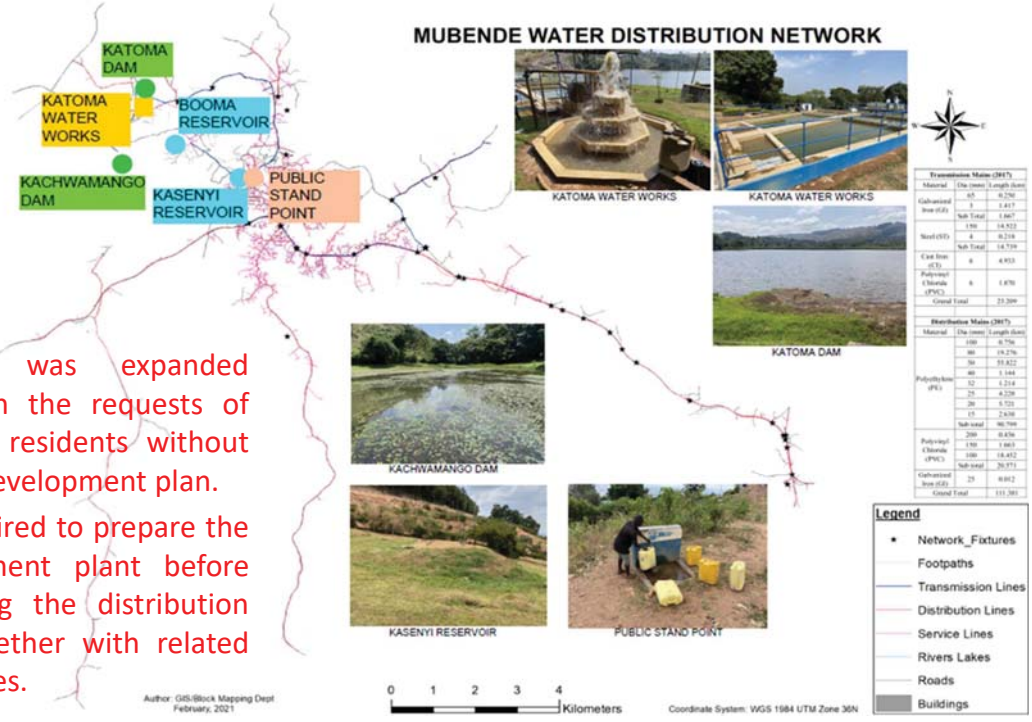


Source: NWSC GIS Unit

7 Urban Water Sector

MUBENDE (YEAR 2017 DATA)

☐ Mubende Distribution Network

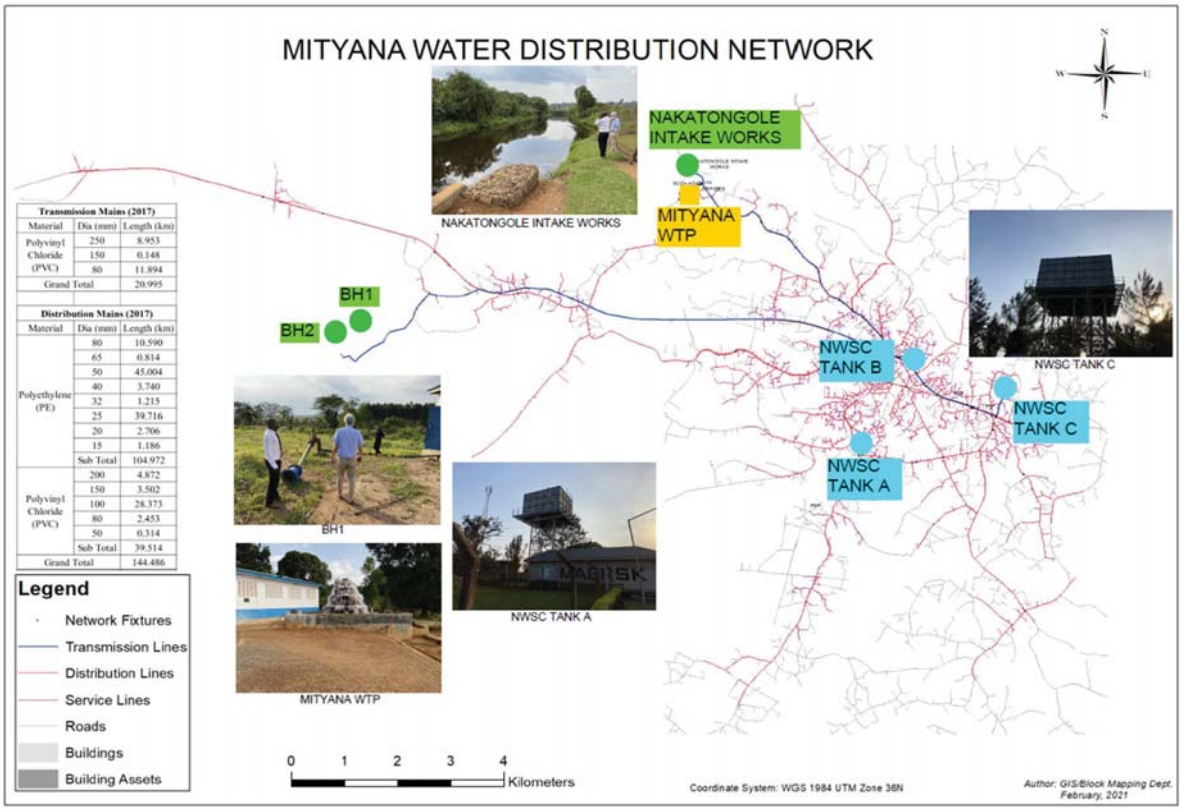


- Pipeline was expanded based on the requests of city and residents without proper development plan.
- It is required to prepare the development plant before expanding the distribution area together with related authorities.

Source: NWSC GIS Unit

7 Urban Water Sector

MITYANA （YEAR 2017 DATA）



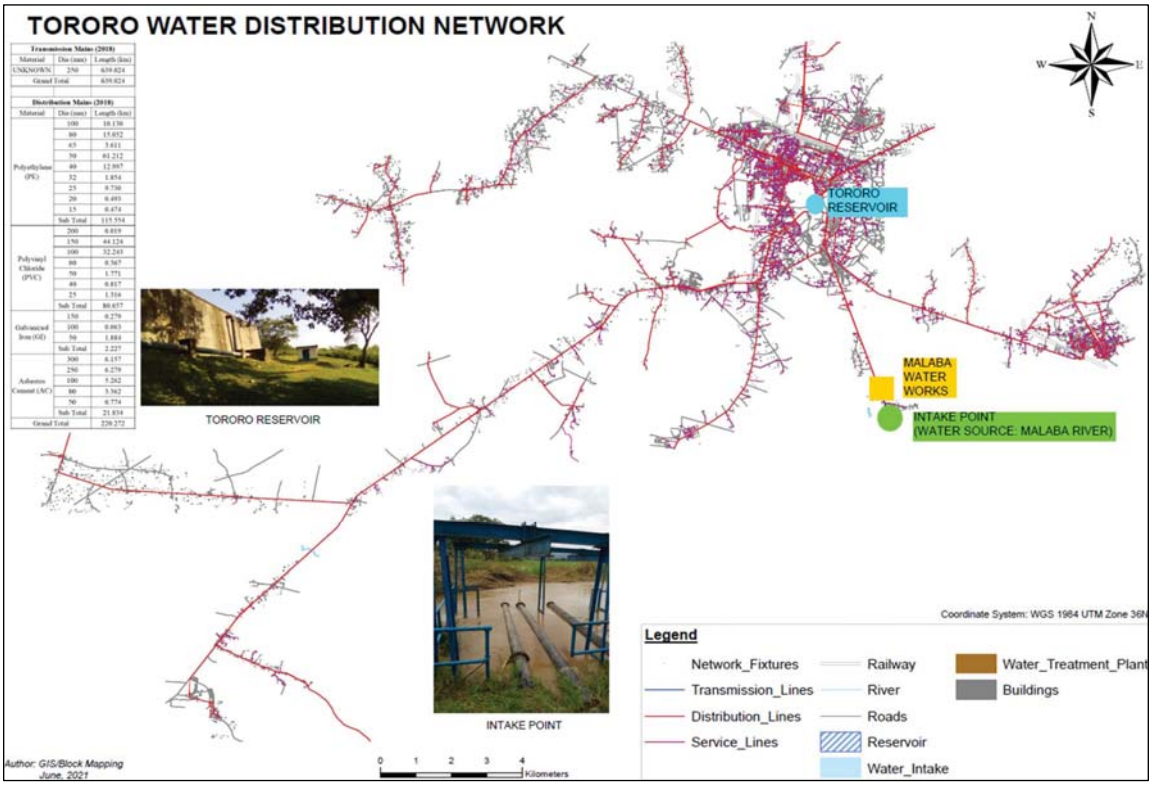
Transmission Mains (2017)		
Material	Dia (mm)	Length (km)
Polyvinyl Chloride (PVC)	250	8.953
	150	0.148
	80	11.894
Grand Total		20.995

Distribution Mains (2017)		
Material	Dia (mm)	Length (km)
Polyethylene (PE)	80	10.590
	65	0.814
	50	45.004
	40	3.740
	32	1.215
	25	39.716
	20	2.706
	15	1.186
	Sub Total	104.972
Polyvinyl Chloride (PVC)	200	4.872
	150	3.502
	100	28.373
	80	2.453
	50	0.314
	Sub Total	39.514
Grand Total		144.486

Source: NWSC GIS Unit

7 Urban Water Sector

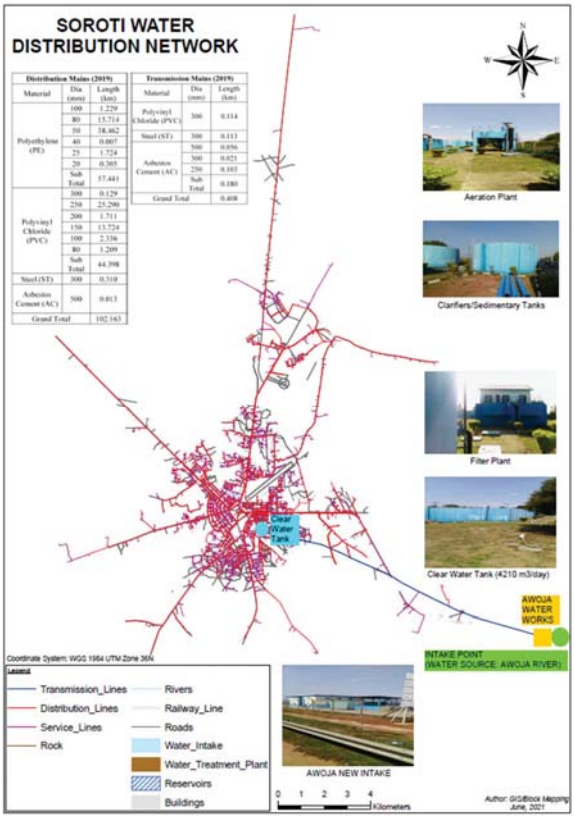
TORORO (YEAR 2018 DATA）



Source: NWSC GIS Unit

7 Urban Water Sector

SOROTI (YEAR 2019 DATA)



Source: NWSC GIS Unit

7 Urban Water Sector

Survey Result of Hoima, Mubende, Mityana, Tororo and Soroti

☐ Non-Revenue Water

- Commercial Loss : Meter inaccuracy, Illegal connection, etc.
- Physical Loss : Leakage and burst from old pipes and/or high pressure, pipe damaged by construction, etc.
- Countermeasure: line patrolling, replacement of aged pipe and faulty water meter, but active measure such as detection of underground water are not being carried out.

FY	2015/16	2016/17	2017/18	2018/19	2019/20
Hoima	31.6%	19.9%	31.3%	19.0%	29.0%
Mubende	9.6%	6.5%	8.1%	7.0%	11.0%
Nityana	22.0%	16.9%	29.9%	31.0%	39.0%
Troro	14.6%	8.6%	10.5%	14.1%	17%
Soroti	13.7%	14.9%	12.1%	11.7%	28%

Source: NWSC

7 Urban Water Sector
Hoima, Mubende, Mityana, Tororo and Soroti

☐ Issues to be Addressed

- Most of the water sources are getting deteriorating.
- There is no future rehabilitation and development plan in consideration of water demand forecast.
- Most of water treatment facilities are aged.
- Pipeline and equipment are aged and deteriorating.
- In Tororo and other towns, AC pipe is still utilizing.
- Power outage is causing disruption of the water production and distribution.
- All survey areas are increasing NRW.

Source: Compiled by JST based on interviews with NWSC and collected data

7 Urban Water Sector
Hoima, Mubende, Mityana, Tororo and Soroti

☐ Requirement of Future Action

- Evaluation of the current water supply situation and preparation of comprehensive development plan based on the water demand forecast and environment.
- Preparation of rehabilitation and augmentation plan, which including
  - ✓ The future expansion area
  - ✓ Development of reliable water source
  - ✓ Rehabilitation or construction of WTP
  - ✓ Rehabilitation and expansion of water distribution system
  - ✓ Introducing the appropriate technology such as pressure management, chemical reducing WTP, etc.
- Establishment of Non-Revenue Water Department (clustering some branches for efficiency activities)

8 Urban Water Sector
Proposed Aid Policy

☐ Analysis of Current Situation and Needs for Cooperation

Due to following reason, NWSC is not at the stage for (2) "Support for improvement of basic services"

- Water supply for Kampala city: 24 hours
- Water meter installation: 100%
- Revenue collection efficiency: 92% despite water tariffs Ushs 3,516/m^3 (¥110/m^3) being more expensive than surrounding countries such as Tanzania Ushs 984/m^3, Ethiopia Ushs 222 /m^3, Kenya Ushs 2,308/m^3
- Meeting with water quality standard: 98%
- Cost Recovery: Kampala WA income is significantly higher than the operation and maintenance costs

Source: Compiled by JST based on interviews with NWSC and collected data

8 Urban Water Sector
Proposed Aid Policy

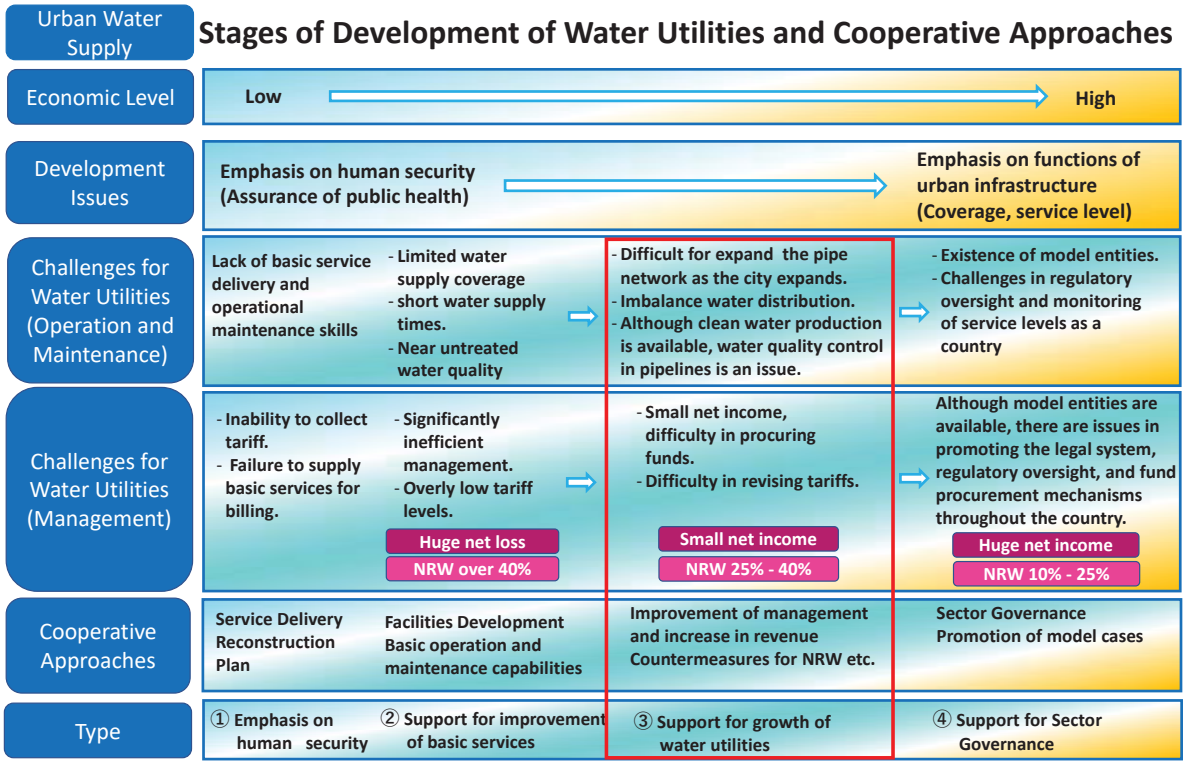
☐ Based on the following circumstances, support for improvement of management and increase in revenue through "(3) Support for growth of water utilities "

- Not catching up the expansion of water supply facilities due to population growth in surrounding of urban area (such as Kampala MA)
- Although main projects are currently funded by grant from GoU and donors, it is essential to borrow from financial institutions to finance the huge capital investment in the future, however, there is not enough borrowing capacity at present.
- There is room for improvement in income as NRW for the entire service region, including the Kampala Metropolitan Area, FY 2019/20 is 34%.
- While NWSC as a whole remains profitable, about 50% of NWSC regional branches FY 2018/19 and 80% in FY 2019/20 could not recover the O&M cost by water revenue. So internal subsidy from the benefit of Kampara water is being made to such branches.

Source: Compiled by JST based on interviews with NWSC and collected data

8 Urban Water Sector
Proposed Aid Policy

☐ Level of Water Utilities and Type of Support



Source: JICA

8 Urban Water Sector
Proposed Aid Policy

☐ Analysis of the Challenges, Risk and Strengths of NWSC

1) Effort to Resolve Challenges and Risk for NWSC

The following are the major challenges and risks that need to be overcome in the technical and operational aspects of NWSC:

- Insufficient water production and distribution capacity caused by increased in water demand due to population growth
- Change in treatment method and increase in treatment costs due to deterioration of raw water quality
- High and increasing NRW
- Inefficient O&M of water supply facilities due to insufficient asset management systems
- Insufficiency of NWSC's own capital investment capacity observed from the current financial condition
- Inadequate resources and capacity to cope with water service expansion

The following initiatives are needed to solve these issues and reduce the risks.

- ➢ Rehabilitation/expansion of large-scale water supply facilities
- ➢ Further improvement of water service level
- ➢ Strengthening of operational and financial management

Source: Compiled by JST based on interviews with NWSC and collected data

8 Urban Water Sector
Proposed Aid Policy

2) Strength of NWSC and Initiatives to leverage Those Strengths

The key strengths that will serve as the foundation for further growth of NWSC are as follows.

- Relatively high water tariffs and high willingness to pay in Africa
- Sufficient income generation in Kampala urban areas
- Capacity and structure of staff capable of providing basic services
- NWSC has an excellent External Services Department (ES)
- Strong relationship with African Water Association
- Financial and technical assistance from GoU and development partners

In addition, the following initiatives are necessary to further utilize those strengths.

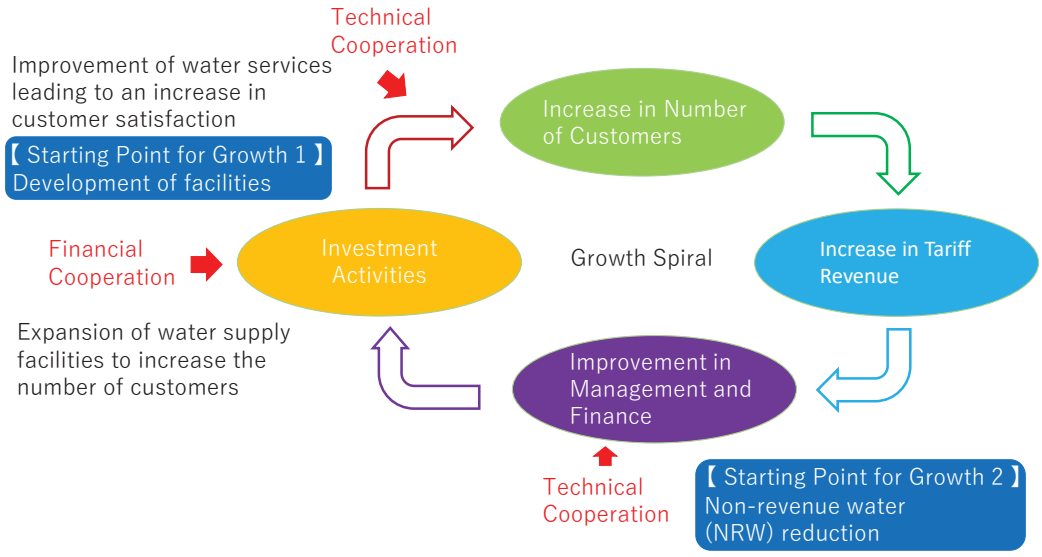
- Further strengthening of organizational and business management
- Strengthening of NWSC's financial independence and profitability
- Expansion of NWSC's activities to neighboring countries

Source: Compiled by JST based on interviews with NWSC and collected data

8 都市給水分野
Proposed Aid Policy

☐ NWSC Growth Scenarios

Sustainable running of the growth spiral, effectively and timely financial and technical cooperation is important.



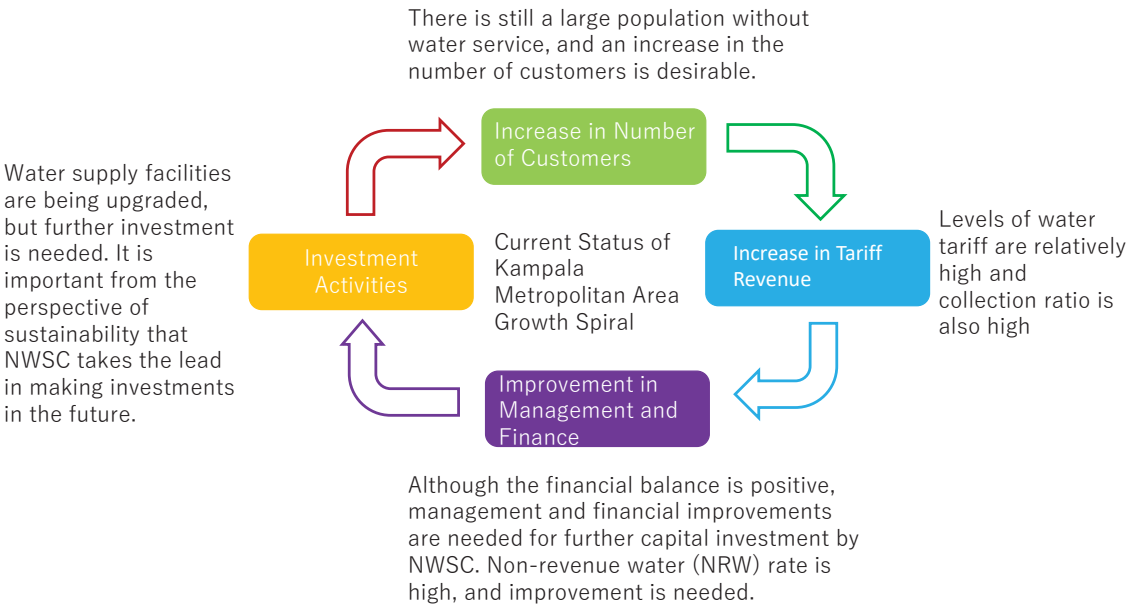
Source: JST

8 Urban Water Sector

Proposed Aid Policy

☐ Scenarios of Kampala Water

- Basic water services have been achieved and the growth spiral is beginning to revolve.
- Further investment for accelerating the growth spiral is required.



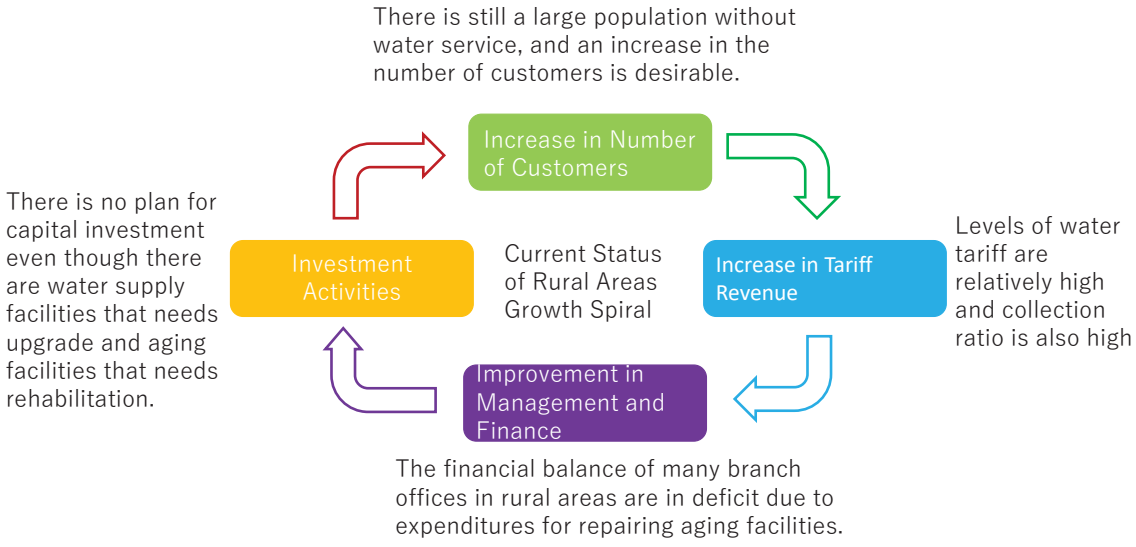
Source: JST

8 Urban Water Sector

Proposed Aid Policy

☐ Scenario other than Kampala Water

- Under the current infrastructure condition such as aged WTP and pipe, it will be difficult to achieve a growth spiral.
- It is firstly upgrading and expand the aging facilities to achieve future growth with internally generated fund, grant from GoU and doners.



Source: JST

9 Urban Water Sector
Proposed Future Project

☐ Proposed Project in Urban Water Sector (Draft)

No.	Name of Proposed Project	Form of Aid
Short-Term Plan		
1.	Dispatch of JICA Expert (data collection, relationship building) to MoWE	Dispatch of individual experts
2.	NWSC Management Infrastructure Strengthening Project	Technical Cooperation
3.	Regional Cities Water Supply Development Project	Grant aid
Medium to Long-Term Plan		
4.	Kampala Metropolitan Area Transmission Mains Replacement Project	Loan Aid
5.	Regional Cities Water Supply Expansion Project	Loan Aid
6.	Strengthening of African Water and Sanitation Academy and Regional Collaboration Project ((Establishment will be supported by individual experts and subsequent continuous strengthening will be supported by third country training program and Knowledge Co-Creation Program)	Third Country Training Program and Knowledge Co-Creation Program

Source: JST

10 Urban Water Supply Sector
Donor Information

☐ Interviews to Various Donors and the Results

Name	Area	Scope	Donor	Status
Kampala Water Lake Victoria Water and Sanitation (WATSAN) Project (Phase I – III)	Kampala Region	• Estimated project cost: €372 million • Rehabilitation and upgrading of Ggaba I & II water treatment plant (230,000 m^3/day) • Construction of the Katosi Water Treatment Plant (Phase 1: 160,000, Phase 2: 240,000 m^3/day), construction of the Katosi transmission main and distribution system (54 km) • Institutional Support/Capacity Building and Program Management	・EIB（Loan） ・AFD（Loan） ・EU-ITF（Grant） ・KfW（Grant）	Completion: 2023
Adjumani - Integrated Water Management and Development Project	Eastern & Northern Region	• Improvement of water supply system	IDA-WB（Loan）	・Procurement of consultant ・Completion: December 2024
Mbale - Integrated Water Management and Development Project	Eastern & Northern Region	• Construction of new water system • Rehabilitation of existing systems	IDA-WB（Loan）	・Procurement of consultant ・Completion: December 2024

Source: Compiled by JST based on interviews with various donors and collected data

10 Urban Water Supply Sector
Donor Information

☐ Interviews to Various Donors and the Results

Name	Area	Scope	Donor	Status
Development of WATSAN Infrastructure for the Mbarara, Masaka and Isingiro Areas, South Western Cluster	Western & South Western Region	・Estimated project cost: €126 million ・Construction of new water intake and water treatment plant（Mbarara、Isingiro） ・Rehabilitation of existing water systems	AFD（Loan）	・Ongoing ・Completion: June 2024
Integrated Program to Improve Living Conditions in Gulu (Phase Ⅱ Nile Option)	Eastern & Northern Region	・Construction of water treatment plant and bulk transfer, distribution system	・KfW（Grant） ・WB（Loan）	Completion: June 2025
Wakiso West WatSan Project (WWWSP)	Central Region	・Development of the water supply system	IDA-DANIDA（Loan）	Completion: April 2023

Source: Compiled by JST based on interviews with various donors and collected data

10 Urban Water Supply Sector
Donor Information

☐ Interviews to Various Donors and the Results

Item	World Bank (WB)	AfDB	AFD	KfW
1. Importance of Uganda among all the target countries in Africa	WB has been in Uganda for 50 years and there is no talk of exit. SSCD is under review.	An important country among all the target countries in Africa.	AFD had an office established in Uganda in 2009 and Uganda remains a priority in the East African region	Uganda remains a very important partner for the German government.
2. High priority sectors	WB is interested in projects under the water supply sector in both the urban and rural areas. Refugee areas assistance as well.	Roads, agriculture, and water supply & sanitation both in urban and rural areas of Uganda.	50% of the investment from AFD in the last 5 years is in the water and energy sector	Water supply, road & bridge, agriculture, air, renewable energy
3. Future collaboration with JICA on urban water supply sector	WB is open for collaboration with JICA if there is a possibility in water supply sector.	It is welcome if there is any good project.	For any collaborations with other donors, it is discussed during the development sector meeting groups.	Flexible for cooperation with other donors.

Source: Compiled by JST based on interviews with various donors and collected data

10 Urban Water Supply Sector
Donor Information

☐ Interviews to Various Donors and the Results

Item	World Bank (WB)	AfDB	AFD	KfW
4. Water Project 【Finance】	① IWMDP(Gulu, Adjumani, and Mbale) (Loan) ② IPILC in Gulu (Phase Ⅱ Nile Option) (Loan)	① The Lake Victoria Protection II Project (LVP II) (Loan) ② Strategic Towns Water Supply and Sanitation Project (STWSSP)(Loan)	① KW WATSAN Project (Loan) ② Development of WATSAN Infrastructure Project (Loan)	① KW WATSAN Project （Grant） ② IWMDP (Gulu) (Grant） ③ IPILC in Gulu (Phase Ⅱ Nile Option) （Grant）
5. Technical issues in projects	Restudy and change of water source due to low quality of F/S etc. Change of water source.	-	The WATSAN Project applies a special treatment method due to the deterioration of water quality in Lake Victoria. Land acquisition problem.	Under confirmation
6. NRW, Prepaid water meter （PPWM）, Capacity Building	NRW reduction：Low interest PPWM：No interest Capacity building：organization improvement and capacity building in UWA	NRW reduction：Rehabilitation and expansion of distribution network in UWA PPWM：No interest at present Capacity building: Under implementation of capacity development program in water sector	NRW reduction: WATSAN Project plans to implement NRW measures, management of water transmission and distribution pipes, DMA, etc.	Under confirmation

Source: Compiled by JST based on interviews with various donors and collected data

11 Urban Water Supply Sector
Collaboration with Private Sector and Other Donors

☐ Private Technologies and Companies which can be expected for Collaboration（Water Supply Sector）

No.	Technology	Company	Local Issue
1	Leakage Management System with SCADA System	Yokogawa Solution Service	Water leakage and pressure management
2	Pressure Reduction Valve	Foreign Companies	Pressure control（reduction）
3	Pressure Sustaining Valve (PSV)	Kane Kogyo	Pressure control（sustaining）
4	Leak Detection Devices	Goodman Fujitecom	Leak detection
5	Water Supply Ledger System, GeoSpatial Analysis	Foreign companies (VEI etc.)	GIS Mapping, Investment plan
6	Ultra High-Speed Chemical-Free Water Treatment System "Chemiles"	Nagaoka	High iron concentration in groundwater (Mityana etc.)
7	Remote Monitoring System	Mitsubishi Chemical Aqua Solutions	Monitoring of water quality, flow, level, rainy/dry seasons

Source: JST

11 Urban Water Supply Sector
Collaboration with Private Sector and Other Donors

☐ Potential Collaboration with Other Donors

*** Only possibility at present**

(1) Water Supply Project in Local Urban Cities (Financial Cooperation)

Option 1: Water Supply Project in Soroti and/or Tororo City

Scope (Tentative):

① Construction of a new water treatment plant using river water as a water source and development of transmission and distribution networks

② Introduction of SCADA system to reduce non-revenue water (especially in Soroti)

Recommended Japanese technology: Depending on the water quality of the water source (under confirmation), SCADA, remote monitoring system

Possibility of collaboration with other donor: World Bank, AfDB, KfW (* No other donor is implementing/planning project in Eastern Region)

⇒NWSC's expectations are very high in a high-growth city.

11 Urban Water Supply Sector
Collaboration with Private Sector and Other Donors

☐ Potential Collaboration with Other Donors

* Only possibility at present

(1) Water Supply Project in Local Urban Cities (Financial Cooperation)

Option 2: Water Supply Project with Chemical Free Groundwater Treatment Technology in Mityana

Scope (Tentative):

①New construction / expansion of a water treatment plant that uses groundwater with a high iron content as a water source (reduction of O&M cost)

②Introduced SCADA system and upfront investment for non-revenue water

Recommended Japanese technology:

Ultra-high-speed chemical-free water injection treatment device "Chemiles", water intake technology, SCADA system, water leakage management software

Possibility of collaboration with other donor: World Bank, AfDB, KfW

⇒ Good conditions for applying Japanese technology, but low growth among candidate cities is an issue.

11 Urban Water Supply Sector
Collaboration with Private Sector and Other Donors

☐ Potential Collaboration with Other Donors

*** Only possibility at present**

(2) Non-revenue Water Reduction Project in Kampala (Technical Cooperation)

Scope (Tentative):

①Provision of necessary equipment (new/additional) such as leak detection equipment and portable pressure gauge, and necessary training of technical staff

②Support for strengthening of facility inventory data and preparation of facility renewal plans, etc. for improvement of asset management

Recommended Japanese technology:

Leakage detector, metal pipe detector, non-metal pipe detector, knowhows of efficient facility inventory management / facility renewal planning

Possibility of collaboration with other donor: AFD, VEI

1) Coordination with NRW reduction activities to be implemented in the WATSAN project

2) Strengthening of aging pipe inventory information and cooperation to future pipe replacement works by NWSC and other donors (**AFD** etc.)

3) Collaboration on supports for asset management with **VEI** that has already supported the GIS mapping system

11 Urban Water Supply Sector
Collaboration with Private Sector and Other Donors

☐ Potential of External Funding from PPP

*Discussion in Ideathon for future possibility

【PPP Contract Patterns (Example)】

Full Privatization, Concession Method, Lease-Afermage Method,

Management Contract, Co-owned company, etc.

【Advantages of implementing private sector cooperation】

- Efficient services that utilize the technological and financial capabilities of the private sector can be expected.
- The private sector attempts to provide efficient and effective services in pursuit of profits.

【Issues in implementing private sector cooperation】

- A mechanism is needed to appropriately regulate and supervise the level of services and tariffs provided by the private sector.
- Water tariffs may increase as the private sector pursues profits. In addition, there is a possibility that unfairness may occur between regions.
- A risk that services to low-income groups who cannot pay water tariffs will be reduced.
- If the private sector lacks the track record and knowledge of operating a water supply business, the service may temporarily decline.

12 Urban Water Supply Sector
Business Matching Workshop and Ideathon

☐ Workshop Overview

Title: Uganda-Japan Business Matching Workshop (Webinar Style) Date and Time: September 30 2021 10:00 - 16:00 (JPT 16:00-22:00) Host: JICA (Tokyo, Uganda Office), Co-Host: NWSC Location: Golden Tulip Kanaan Kampala, Luweero Conference Room
Program: 10:00 - 13:00 (Morning Session) * program after this presentation • Presentations by 6 Japanese companies regarding water supply business 14:00 - 16:00 (Afternoon Session) • Presentations by 2 Japanese companies regarding water supply business • Business matching between public (including NWSC) and Japanese companies at each booth through live streaming • Closing speech by NWSC
Participants MoWE, NWSC, NGO, JICA Uganda Office, JICA Survey Team Online: NWSC IREC, Japanese companies, JICA H/Q

12 Urban Water Supply Sector
Business Matching Workshop and Ideathon

☐ Seminar (Ideathon) Overview

Title: “Japan × Uganda, Private × Public, Jointly Creating Uganda's Urban Environment” (Webinar Style) Date and Time: October 1 2021 10:00 - 16:00 (JPT 16:00-22:00) Host: JICA (Tokyo, Uganda Office), Co-Host: NWSC Location: Golden Tulip Kanaan Kampala, Luweero Conference Room
Program: 10:00 - 13:00 (Morning Session) • Introductions by NWSC (Kampala Water, NRW, Reginal Areas) • Group discussions (Group 1 NRW, Group 2 Kampala, Group 3 Regional) 14:00 - 16:00 (Afternoon Session) • Preparation of Action Plans by each Group • Presentation of Action Plans by each Group • Closing speech by NWSC
Participants MoWE, NWSC, NGO, JICA Uganda Office, JICA Survey Team Online: NWSC IREC, World Bank, AfDB, Japanese companies, JICA H/Q

Uganda-Japan Business Matching Workshop

Yokogawa SCADA System & Water Loss Management System

Kuniaki TAGUCHI
Yokogawa Solution Service Corporation
Global Promotion Section
Environmental Systems Division

30th Sep. 2021

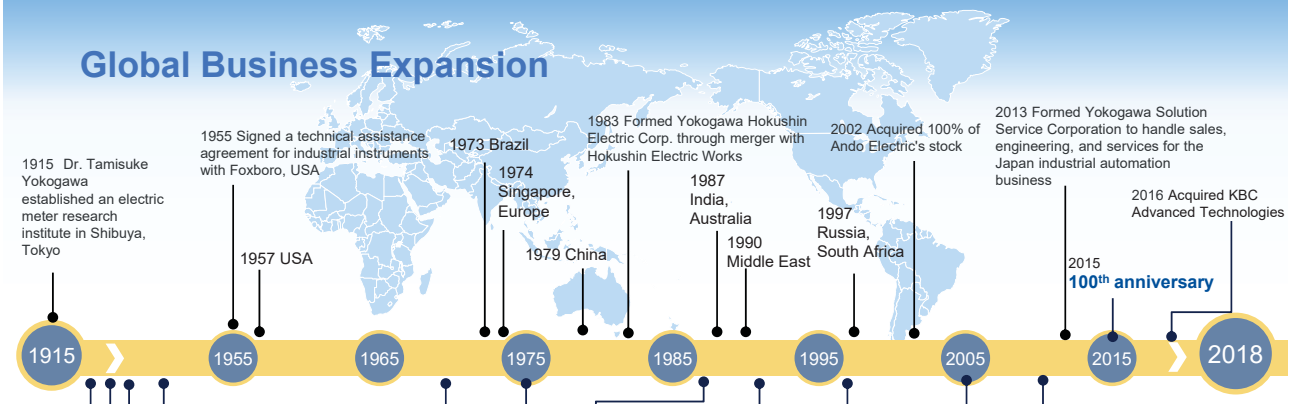
Agenda

1. About Our Company
2. About Our Water Loss Management System (WLMS)
3. One of the biggest reference

1．About Our Company

Global Business Expansion and Innovation

Global Business Expansion



Innovation

Product Profile for Industrial Automation

Yokogawa Field Proven Solutions – YOKOGAWA's Lineup –

Production Management MES*

Production Control System
Production control systems

Field Instruments
Field instruments, sensors, measuring instruments, analyzers and other equipment

* MES = Manufacturing Execution System

- APC & AOA (Advanced Process Control & Advance Operation Assistance): Exapilot, Exasmoc, Exarqe, Exaplog; CAMS for HIS
- Asset Management: PRM
- Leakage Management
- Integrated Production Control System: CENTUM VP
- Network Based Control System: STARDOM
- SCADA Server Software: Supervisory Systems FAST/TOOLS
- Differential Pressure Transmitter: EJA/ EJX
- Magnetic Flowmeter: AFX
- Digital Vortex Flowmeter: DYF
- Zirconia Oxygen Analyzer: Z R
- Ultrasonic Flowmeter: US300
- Process Gas Chromatograph: GC100 0MKII
- Advanced Valve Positioner: YVP
- Temperature Transmitter: YTA50/ 70, YTA100/300

Co-innovating tomorrow™

| August 2018 |
Integrated Communications Center

YOKOGAWA

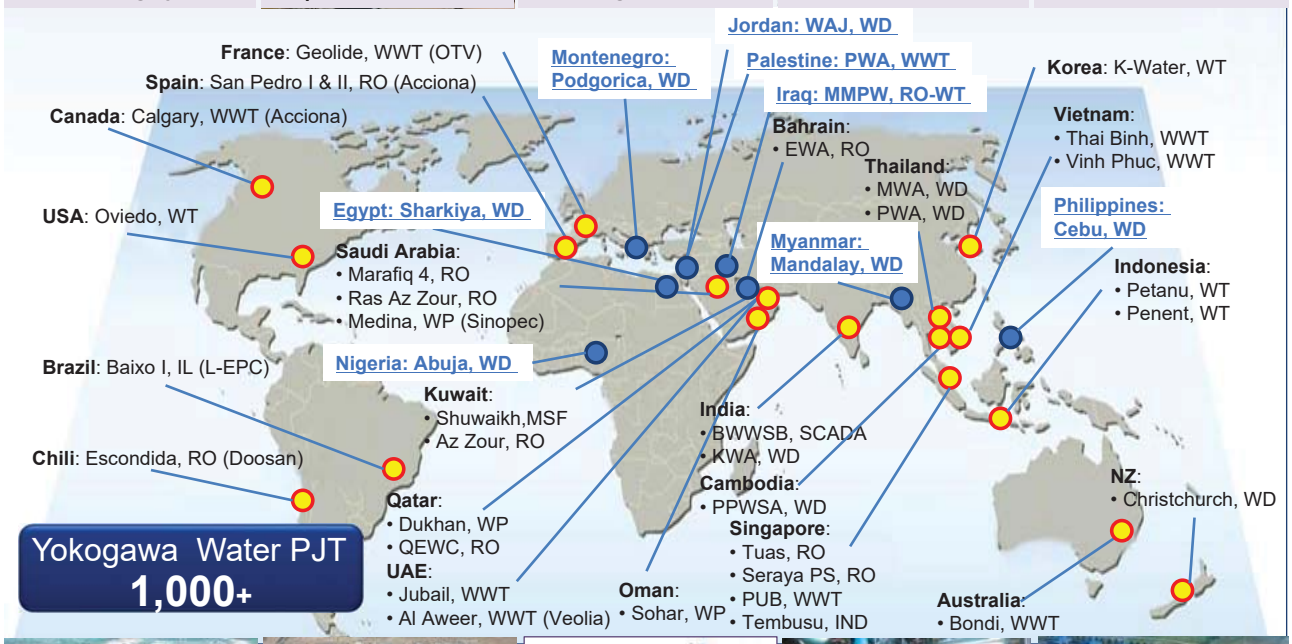

Canada/Calgary WWT


Spain/San Pedro RO


Montenegro/Podgorica WD


Thailand/MWA WLM


Indonesia/Petanu WT




Brazil/Baxio Iligation


UAE/Al Aweer WWT

KSA/Medina WP


S'pore/Seraya RO


S'pore/TMUC Multi Uty

Project reference

No.	Country	Year	Project Type	Kind of ODA	Type of Contract	Status
1	Montenegro	2010	Water distribution	G/A	Subcontract	Complete
2	Jordan	2011	Water distribution	G/A	Subcontract	Complete
3	Egypt	2012	Water distribution	TC	Subcontract	Complete
4	Palestine	2013	Wastewater Treatment Plant	G/A	Subcontract	Complete
5	Philippines	2015	Water distribution	G/A	JV	Complete
6	Iraq	2015	Desalination Plant	L/A	Subcontract	Ongoing
7	Nigeria	2016	Water distribution	TC	Subcontract	Complete
8	Bangladesh	2017	Water distribution	L/A	Prime Contract	Ongoing
9	Myanmar	2017	Water distribution	G/A	Subcontract	Complete
10	Malaysia	2017	Water distribution	TC	JV	Ongoing
11	Myanmar	2018	Water Treatment Plant	L/A	Subcontract	Ongoing
12	Bangladesh	2019	Water Treatment Plant	L/A	Subcontract	Ongoing
13	Morocco	2019	Desalination Plant	Private Finance	Subcontract	Ongoing

L/A: Loan Agreement
G/A: Grant Agreement

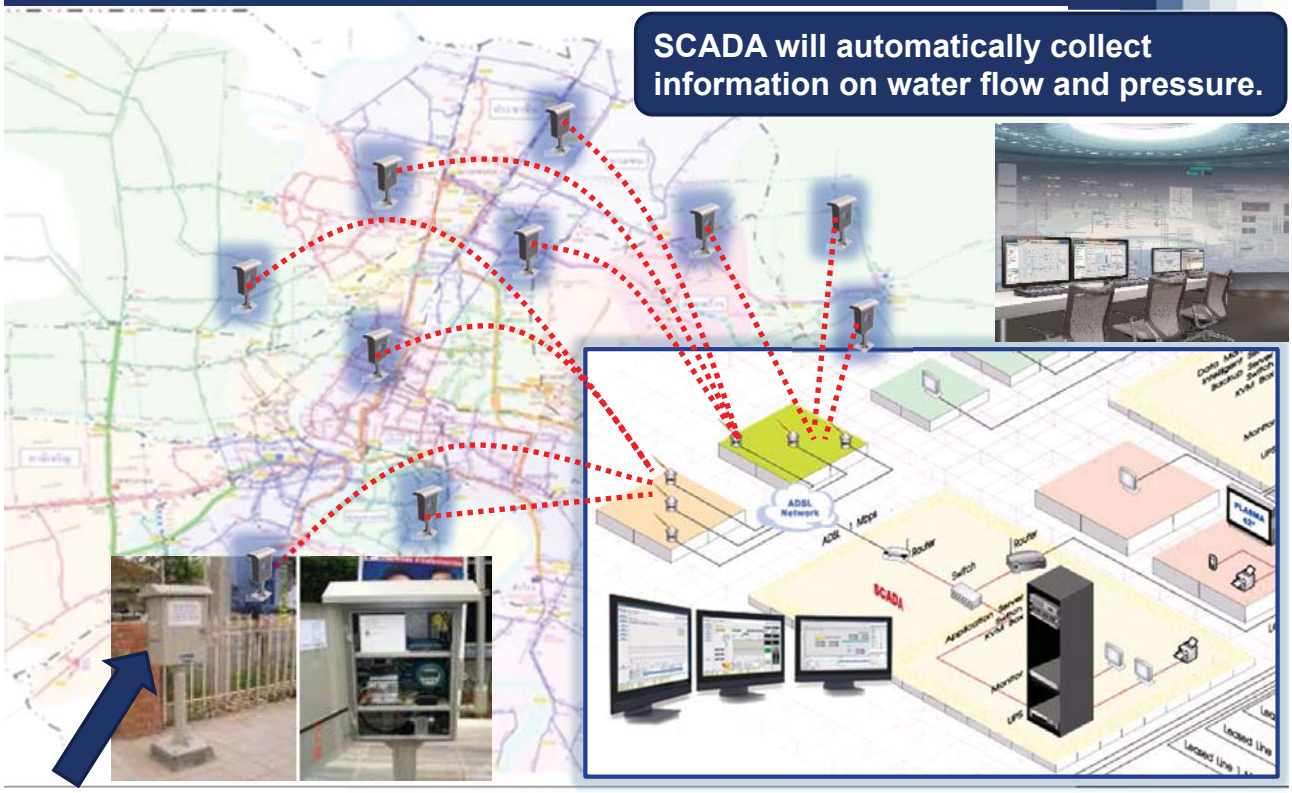
Services Anywhere - global reach, local delivery

■ Regional Response Centers

(As of April 1, 2018)

2． About Our Water Loss Management System (WLMS)

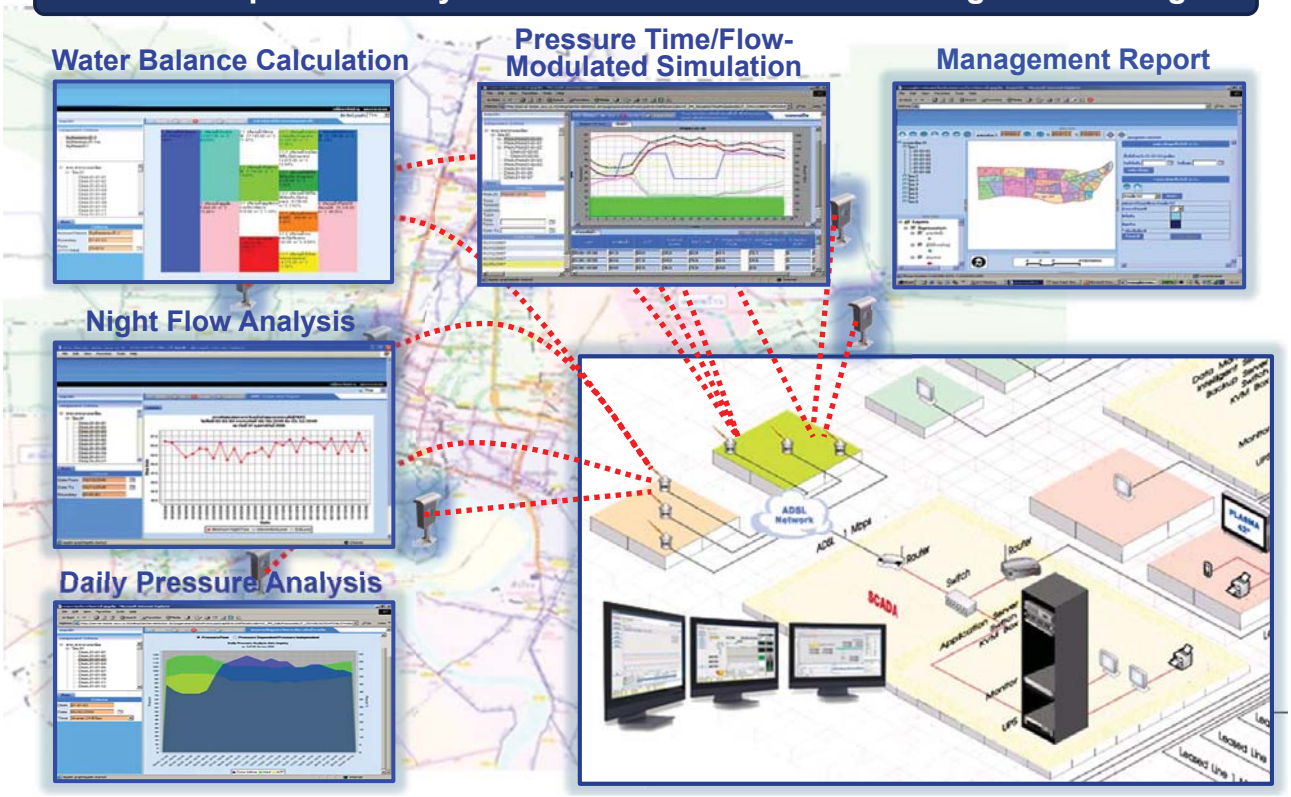
Image of data gathering



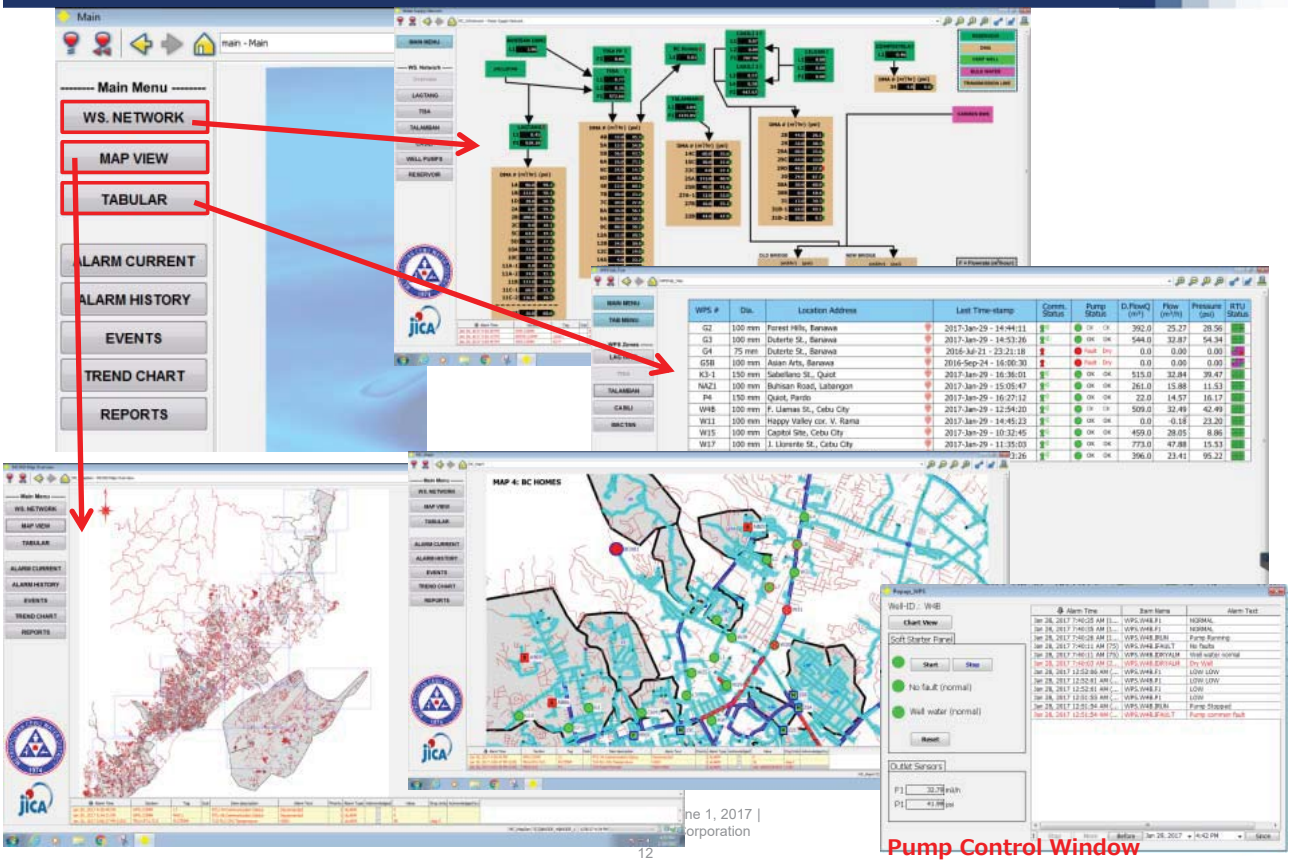
RTU
(Remote Terminal Unit)

Water Loss Management System(WLMS)

WLMS can provide analysis information useful for reducing water leakage.



WLMS Graphic

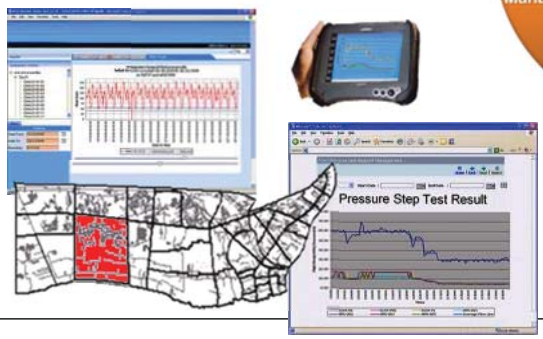


The Benefits from installing WLMS

Save time & production cost

SCADA/RTU

WLM System



Increase sales & Increase benefits

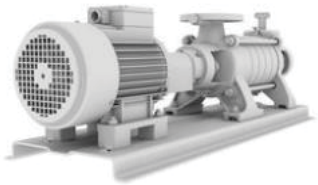
3． One of the biggest reference

The project for the Improvement of Water Supply System in Metropolitan Cebu Water District

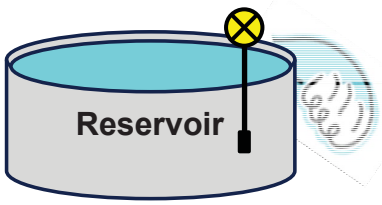
Project overview

Project	The project for the Improvement of Water Supply System in Metropolitan Cebu Water District
Country and area	Philippines / Metro Cebu
Construction period	From March 2015 to September 2016 (18 month)
Customer	Metropolitan Cebu Water District's (MCWD)
Purpose of Project	Monitoring 143 spots by SCADA system

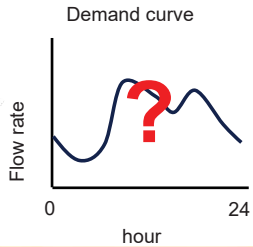
Before Project situation



No signal,
No remote operation



Sensor malfunction cause overflow



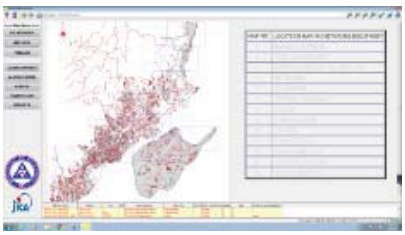
No hourly / daily data

Low water pressure

No remote operation

Water burst & leakage

SCADA System for this project

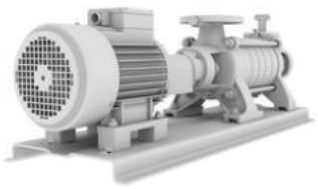

SCADA System

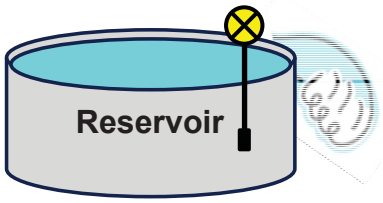
Water Loss Management system

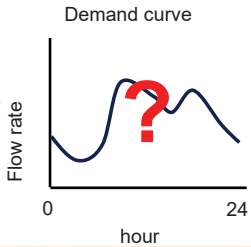
Data gathering from 143 spots

Reservoir	Reservoir	Reservoir	Well Pump	DMA	DMA	DMA
FLOW	FLOW	FLOW	FLOW	FLOW	FLOW	FLOW
LEVEL	LEVEL	LEVEL	PRESSURE	PRESSURE	PRESSURE	PRESSURE

Before Project situation







No signal,
No remote operation

Sensor malfunction cause overflow

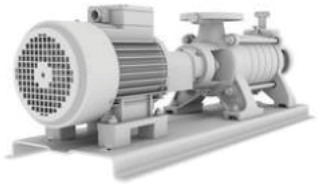
No hourly / daily data

Low water pressure

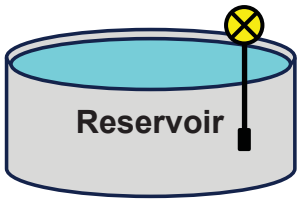
No remote operation

Water burst & leakage

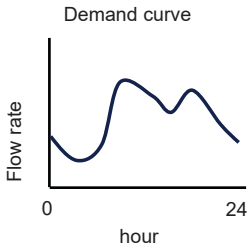
After Project situation



Remote operation from SCADA room



Sensor replaced, No more overflow



Gathering lots data efficiently

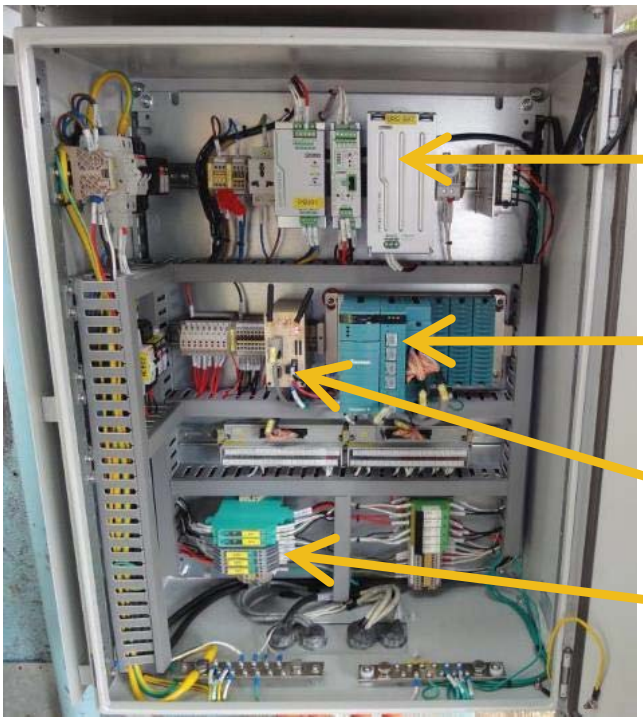
Enough water pressure everywhere

Remote operation

Early detection of Water burst & leakage

Well Pump Station

Well Pump Station Panel Inside



DMA Panel and Inside

DMA

Flow meter at DMA

SCADA ROOM

Training

- Difficult to understand with one lecture
- Repetitive training is necessary to master SCADA


Co-innovating tomorrow™
Let's build a sustainable water together
for our Future Generation!
Thank you for your attention.

Fair Water Distribution

PSV system

Pressure Sustaining Valve System

WELCOME

JICA SDGs Business Verification Survey Team　KANE KOGYO CO., LTD.

The outline of this presentation

- About our Company and products.
- Introduction photos of JICA feasibility survey of PSV in Sri Lanka.
- PSV system evaluation test result at NWSB T.T.C.
- What is & where to use the PSV System?
- What is the merit of the PSV system?
- What is the size variation of the PSV?
- About learning program.
- The GPS integrated datalogger with programable timer controller.

Company

Established In 1930

Kane Kogyo Co., Ltd. Office: Sapporo, Sendai, Tokyo, Nagoya, Osaka, Hiroshima, Fukuoka and Taipei, Singapore.

Qingdao Kane Kogyo Machinery Co., Ltd. Factory.

Kane International Technology Ltd. JAPAN — Marketing, R&D.

Kane International Technology Co., Ltd. TAIWAN — Exclusive Distributor.

Kane International Technology Pte., Ltd. SINGAPORE — Marketing.

Kane Kogyo Co., Ltd.

Qingdao Kane Kogyo Machinery Co., Ltd.

KANE

KANE KOGYO CO., LTD.

PRODUCT LINE of KANE

*Automatic control valves
- Water hammer Eliminator
- Pressure reducing valves
- Solenoid valves

*Digital differential pressure measurement unit for backflow preventer

*Digital water flow controller for irrigation, water distribution.

*CNC tube cutting machine for the production line of MOTOR Industry

*Super high-pressure fittings for common rail injection system

*Ultrasonic cleaning machine

SOLUTION MANUFACTURER

KANE

Fair Water Distribution **PSV system** JAPAN

JICA Feasibility Survey of PSV System in Sri Lanka

Presentation and Demonstration

May 2017 – April 2018

PSV
Pressure
Sustaining
Valve

Site Visit and Data Collection

JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution **PSV system** JAPAN

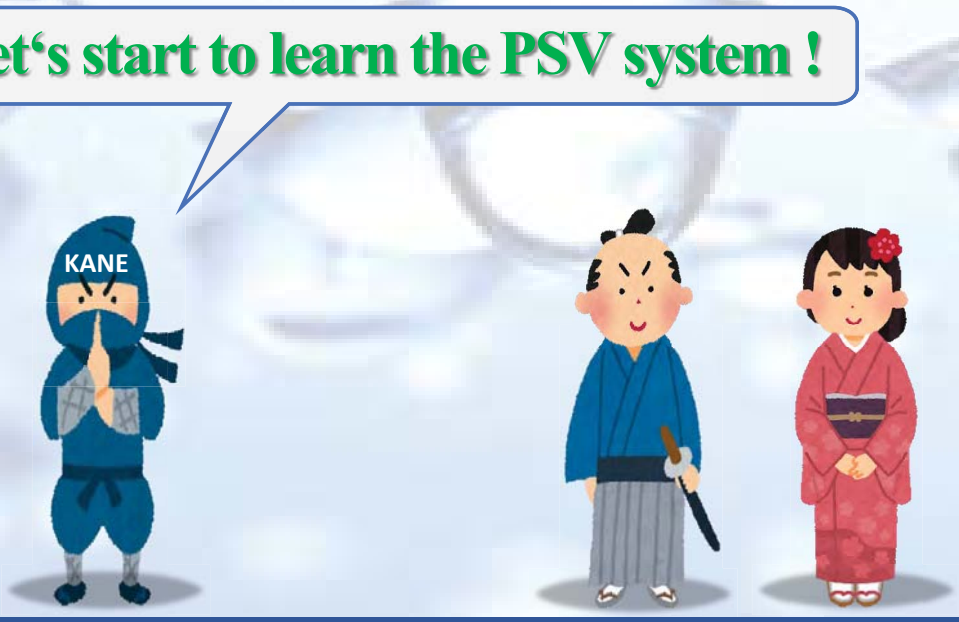
One day of PSV Workshop: Member from 10 Regional Service Center

S

PSV
Pressure
Sustaining
Valve

JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution **PSV system** JAPAN

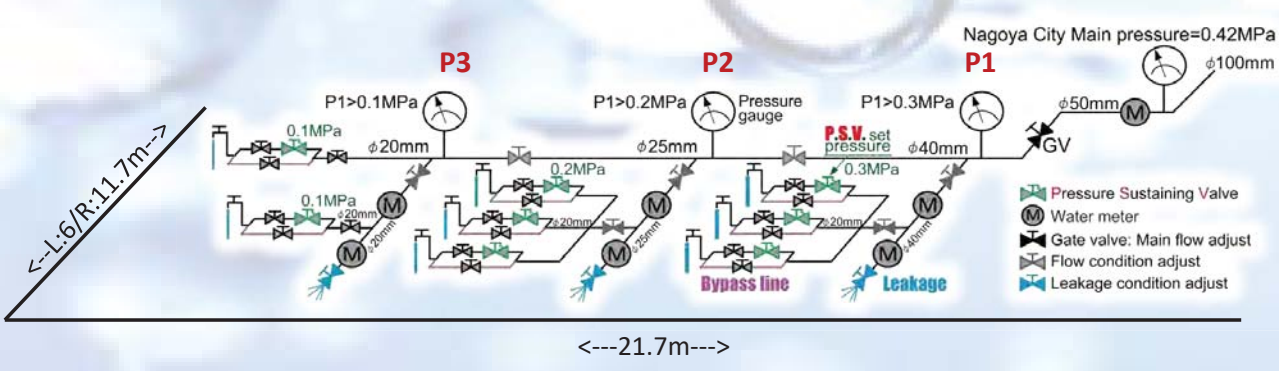


JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution **PSV system** JAPAN

PRESSURE SUSTAINING VALVE EVALUATION TEST SYSTEM DIAGRAM

Nagoya-city Waterworks & Sewage Bureau Technical Training Center



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Fair Water Distribution **PSV system** JAPAN

P.S.V. EVALUATION TEST RECORD AT NWSB T.T.C.*

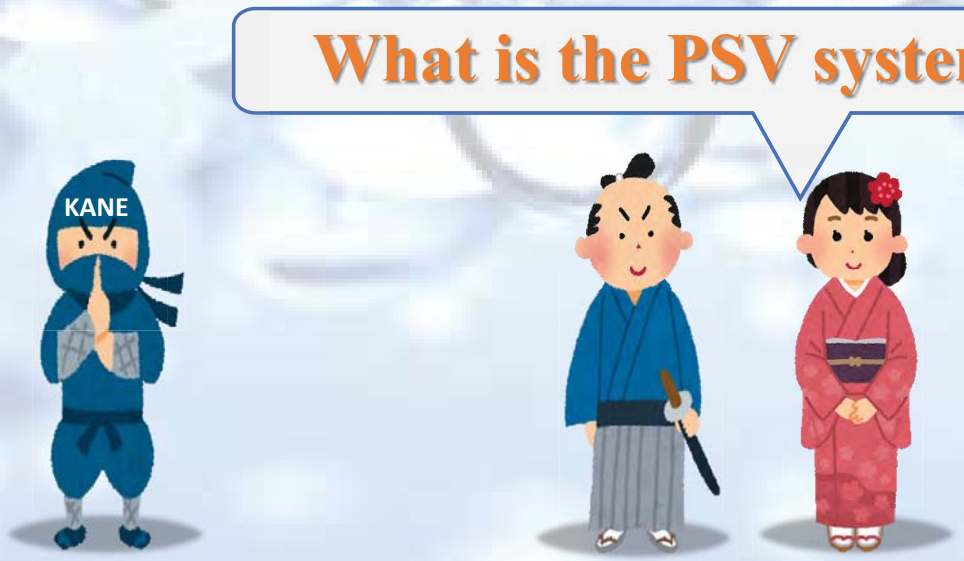
Test condition with ongoing water leakage 30 %

Pressure distribution efficiency to the terminal supply line.
Result: +14.3%

Distribution flow volume. (Energy saving of pump)
Result : -7.0%

*Nagoya-city Waterworks & Sewage Bureau Technical Training Center

Fair Water Distribution **PSV system** JAPAN



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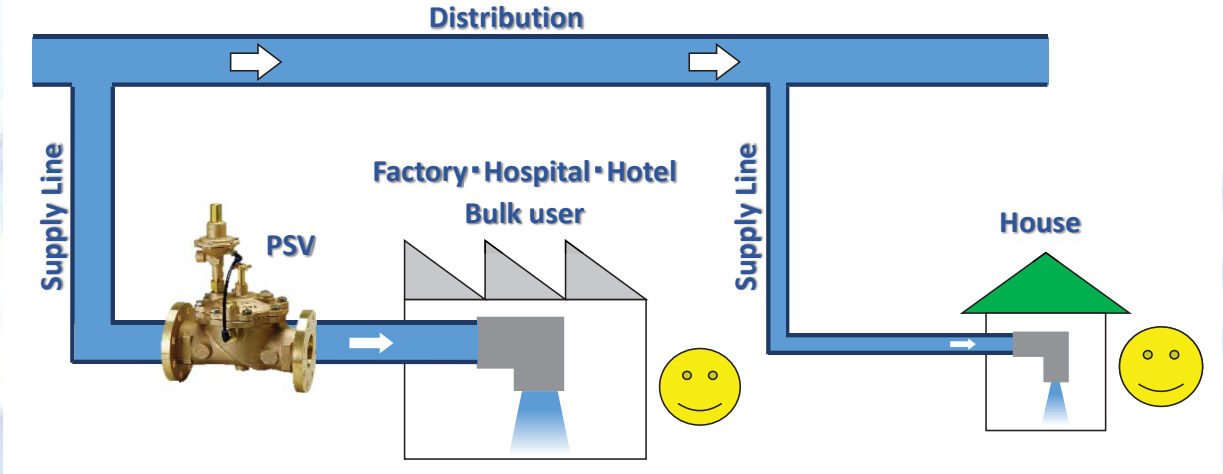
Fair Water Distribution PSV system JAPAN

The PSV system is generally configured with a primary pressure control valve, which is called a sustaining pressure control valve or a back pressure regulating valve.

Here, it is called a Pressure Sustaining Valve.

The function is to keep-hold the primary-side water distribution pressure by reducing the volume of the water flow to the secondary side when the primary side water pressure dropped less than the desired pressure.

Fair Water Distribution PSV system JAPAN

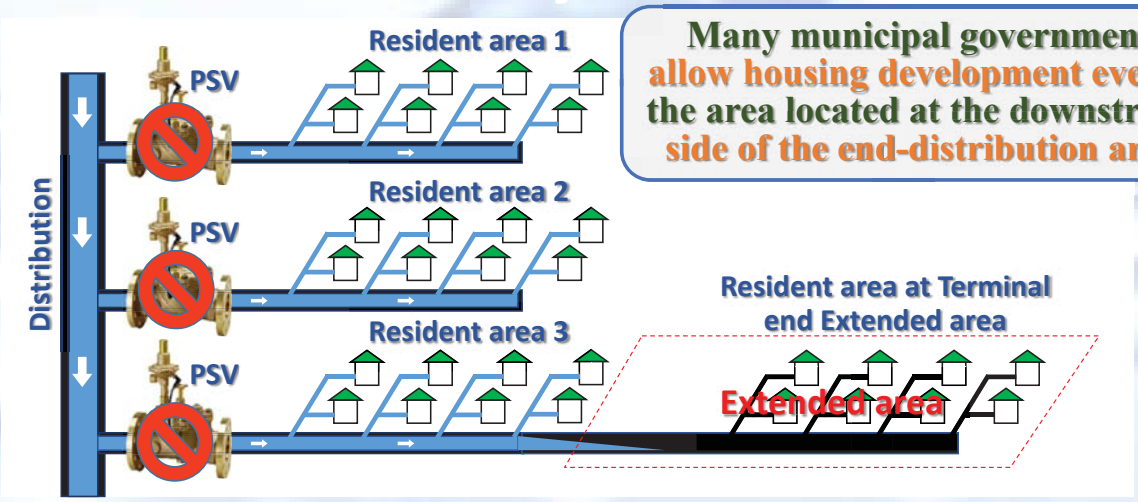


It is an automatic flow volume balancing system of water distribution network, as we call PSV system.
And that enables energy-saving and low-cost operation of the growing water distribution network by utilizing the 30-year experienced PSV know-how.

Fair Water Distribution PSV system JAPAN

JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution PSV system JAPAN



Many municipal governments allow housing development even in the area located at the downstream side of the end-distribution area.

Because there is a market voice and the water demand occurred by the life-level grown-up speed is quicker than the initially planned rehabilitation end-timing of the water distribution network.

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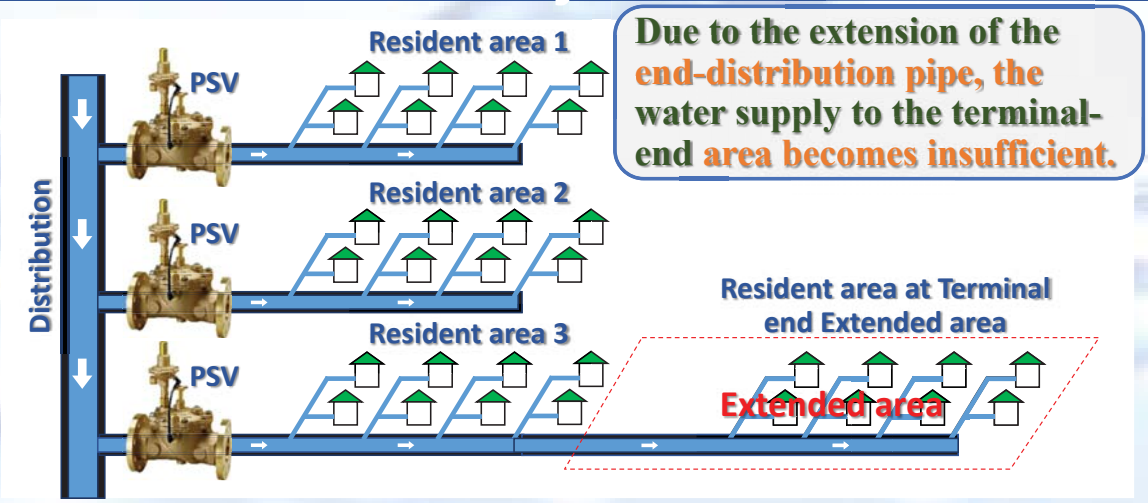
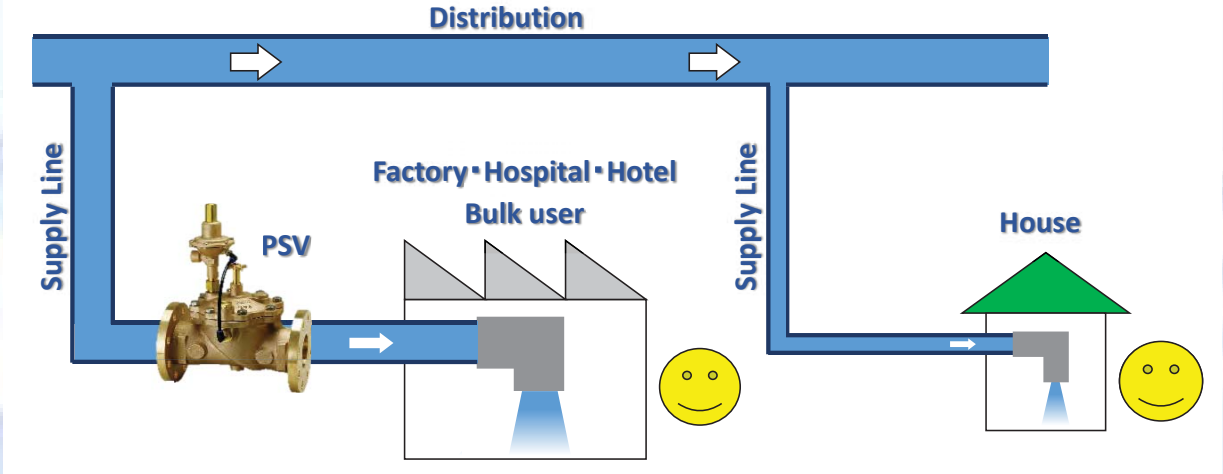
Fair Water Distribution PSV system JAPAN



Due to the extension of the end-distribution pipe, the water supply to the terminal-end area becomes insufficient.

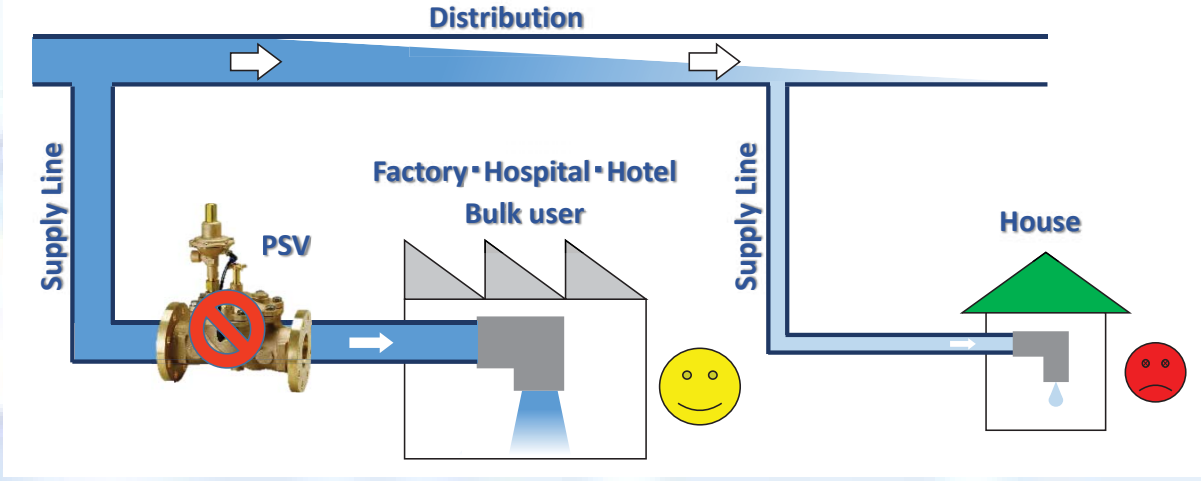
However, after installing the PSV system, people can get enough water supply even in the extended area during peak time.

Fair Water Distribution PSV system JAPAN



It is strongly recommended to use PSV where stable water supply is required during peak time at residential areas downstream from Bulk User.

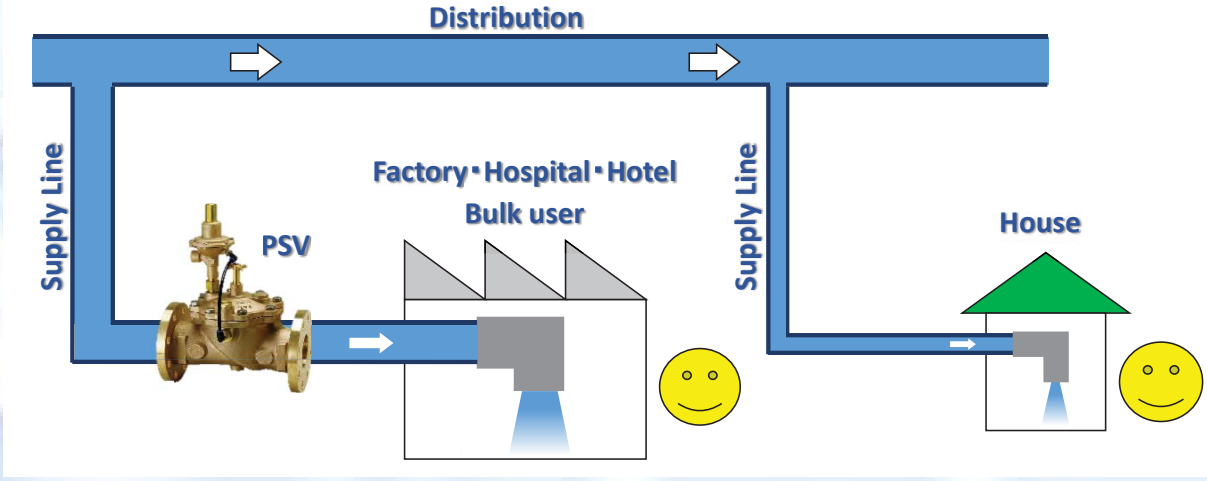
Fair Water Distribution PSV system JAPAN



Without installing PSV, house holders living in the residential areas at a downstream side of Bulk User cannot get stable water supply during a peak time.

JICA SDGs Business Verification Survey Team KANE

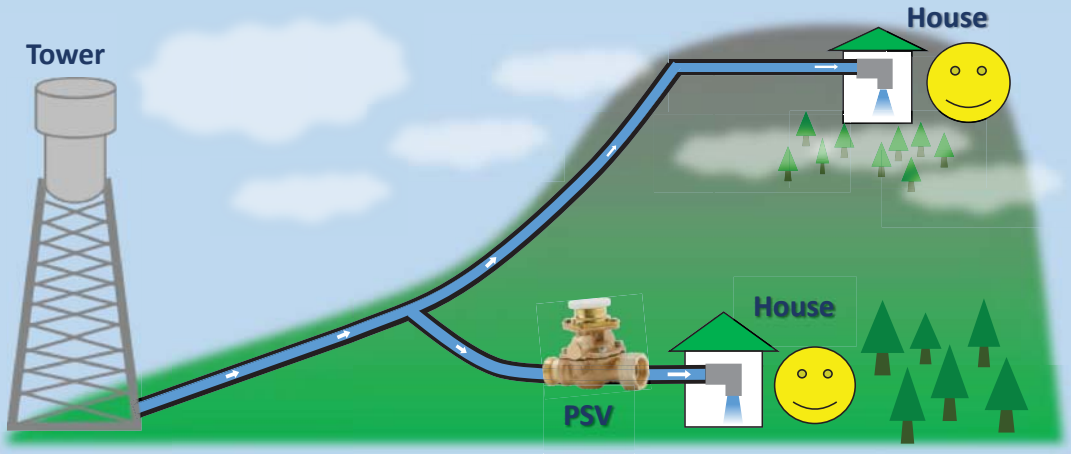
Fair Water Distribution PSV system JAPAN



After installing PSV, no more complains won't come from residential areas, to the water board's office during a peak-time.

JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution PSV system JAPAN



It is recommended to install PSV after the branch-out point at low elevation area, it enables to distribute water with enough pressure during peak time even at higher elevated area.

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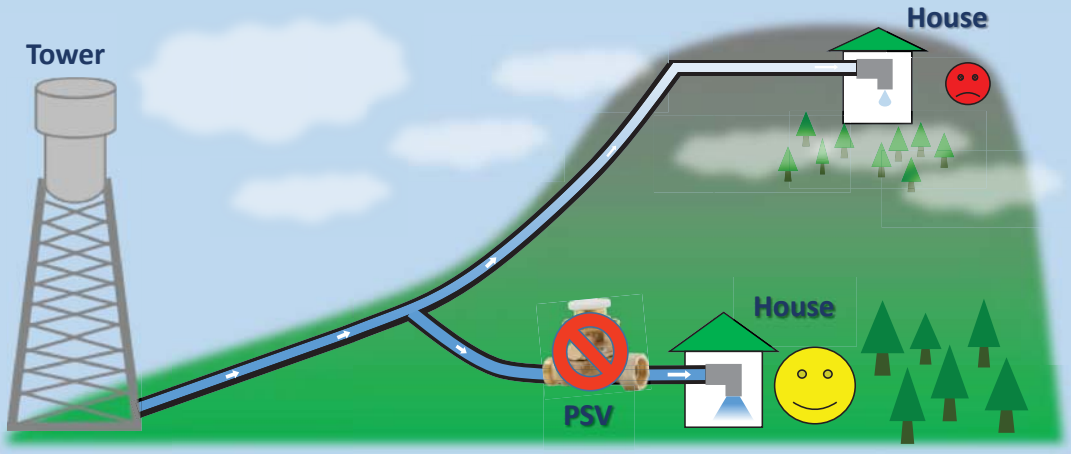
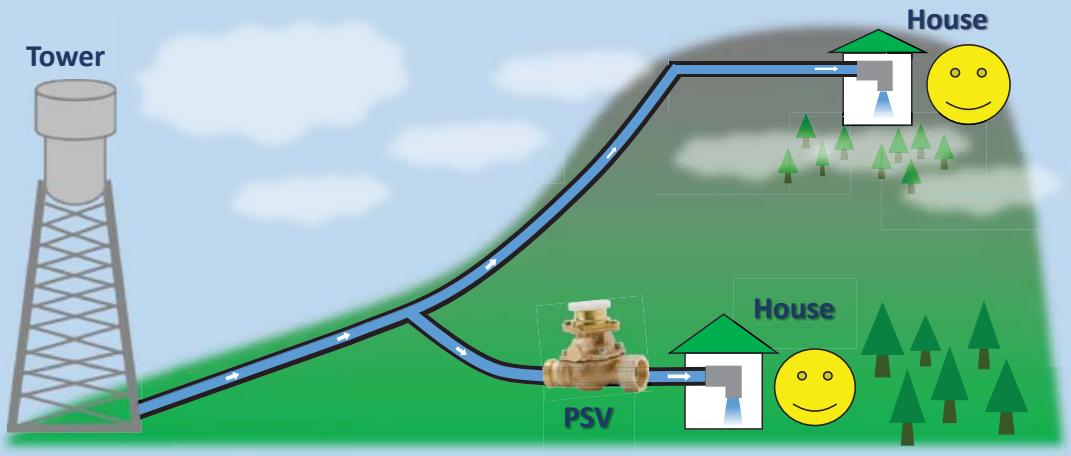
Fair Water Distribution PSV system JAPAN



Without PSV,
higher elevated area cannot get enough pressure or water distribution during a peak-time.

JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution PSV system JAPAN



After installing PSV at each houses of low elevation area, the house holder at higher area can get sufficient pressure and water volume even during a peak-time.

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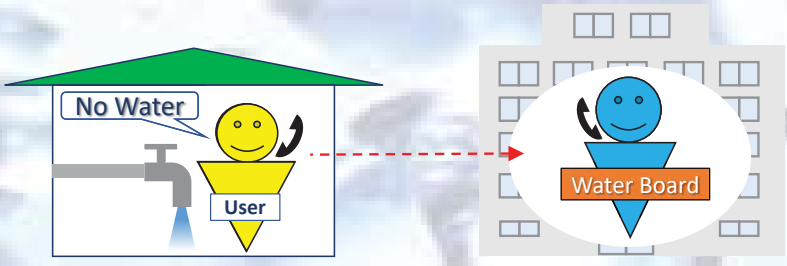
Fair Water Distribution PSV system JAPAN

What is the merit of using PSV system ?

JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution PSV system JAPAN



PSV system can solve the unstable water supply condition of certain areas of the water scheme in a short period at a low cost. And it enables to support the water distribution to a wide range of areas and populations.

Therefore, both suppliers and consumers can be relieved from concerns about water supply and demand.

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Fair Water Distribution PSV system JAPAN

What is the difference between to adopt PSV system, or conventional rehabilitation methods against water distribution network?

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Fair Water Distribution PSV system JAPAN

Fair Water Distribution PSV system JAPAN

The water tower construction and the enhancement of the pump station are not necessary. The Manpower for manual valve control and large-scale pipe-laying work are no longer required to solve the small area or district insufficient water distribution during peak time. Even during the black-out, this cooperative individual distributed control system is working. There is no need for long-term rehabilitation at a high cost.

Fair Water Distribution **PSV system** JAPAN

MERIT FOR BOARD, WORKER & CONSUMER

It is possible to reduce the human resources
to regulate the water flow volume by opening/closing the gate valves
to redistribute to the unable water supply area.

Queuing for the water truck will not be necessary
for a newly developed water supply area.

After the extensive rehabilitation,
PSV can be removed to re-use at the other targeted district/area.

It becomes much easier to find out the leakage point.
The redistributed supply pressure increases the leakage noise
significantly furthermore, the leakage water comes out on the ground surface.

Fair Water Distribution **PSV system** JAPAN

SUSTAINABLE DEVELOPMENTS GOALS

Furthermore, the PSV system
can contribute to SDGs.

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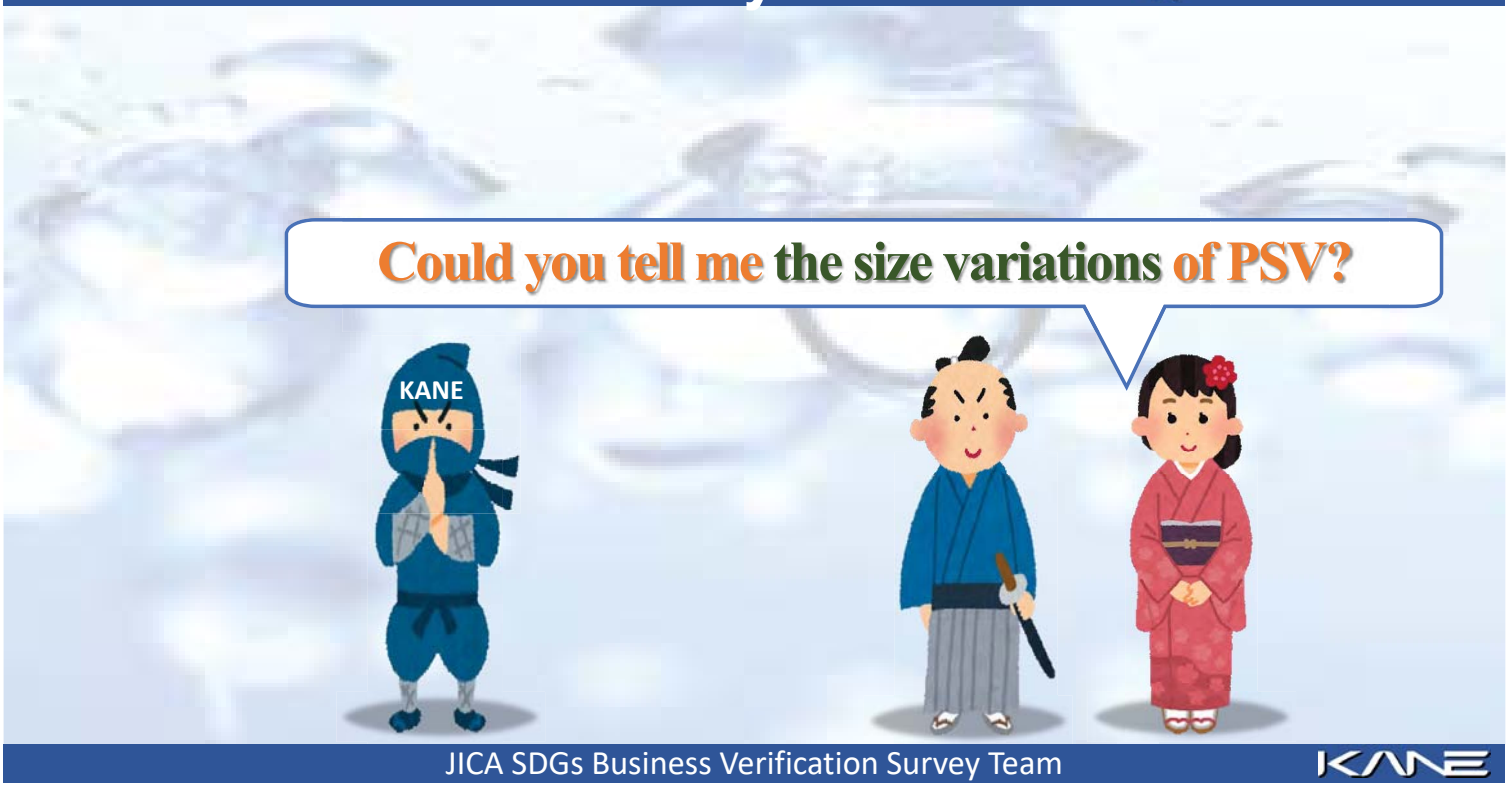
Fair Water Distribution **PSV system** JAPAN



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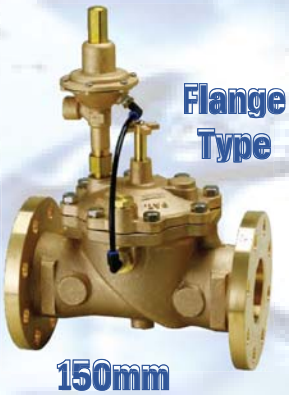
Fair Water Distribution **PSV system** JAPAN

Threaded Type

20mm

Flange Type



150mm

<<UNDER UPGREADING>>
<optional item>
<System controller>
・GPS & Pressure sensor
・Calendar & timer
・Wireless & USB port
・IP68
<Included valve function>
・Manual operation
(same as a gate valve)
・Bypass function
<<Introduce latterly>>

Size variations of the standard line-up are
15 to 200mm, and 300mm(with reduced-bore).
The connection from 15 to 75mm is a threaded type.
And 100 to 300mm is a flange type.

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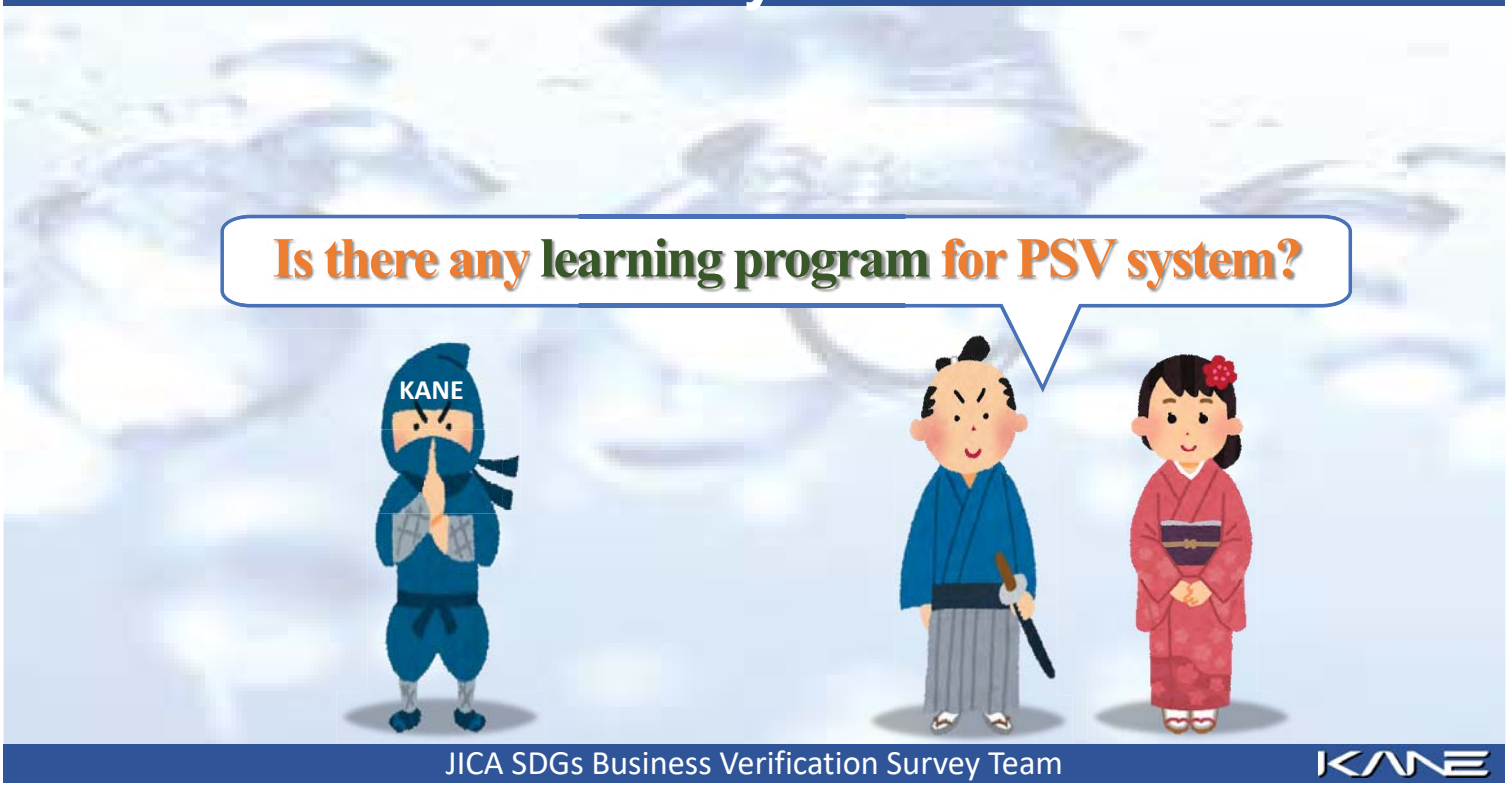
Fair Water Distribution PSV system JAPAN



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Fire Water Distribution PSV system JAPAN

JICA SDGs Business Verification Survey Team KANE

Fair Water Distribution **PSV system** JAPAN

REVIEW

PSV system is …

- Energy-saving with low-cost and more than 10 years of free maintenance record.
- It enables water distribution sufficiently to the bulk user areas, areas with elevation gaps, and terminal end areas.
- As an improving way of the water distribution, there are significant advantages compared against the improving by the additional infrastructural development or rehabilitation.
- The biggest advantage is that both suppliers and consumers can be relieved from concerns about water supply & demand.

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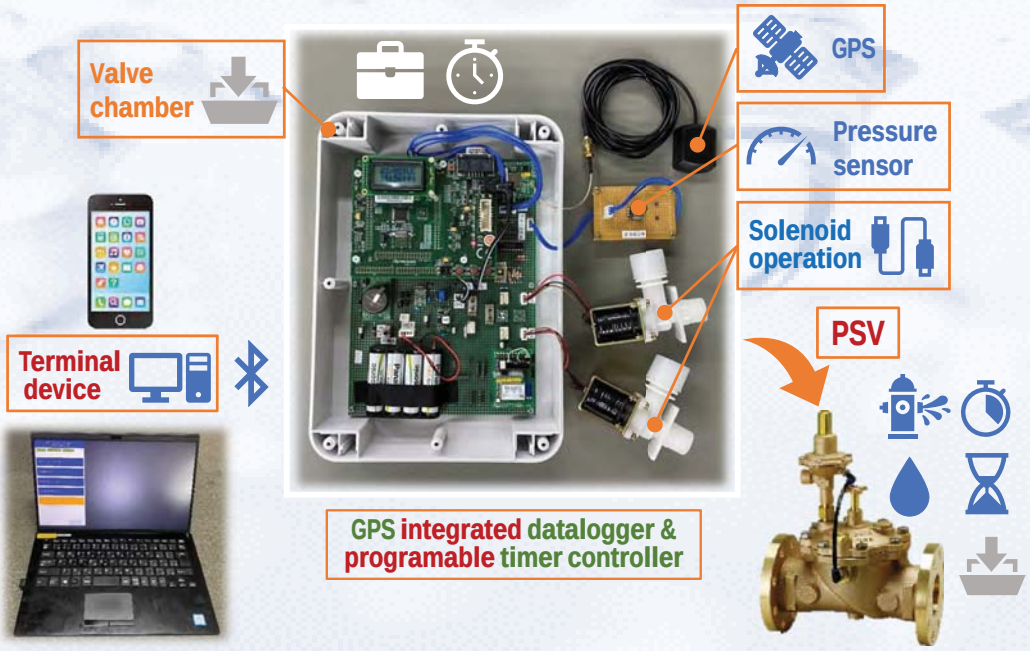
CONFIGURATION OF CONTROLLER & EACH DEVICE



PSV SYSTEM CONTROLLER

WHAT IS THE FUNCTION OF THIS?

Data Logger: Hand-carry data logger with a dual data backup system.

GPS: Location identification and time synchronizing with other controllers by GPS clock.

Bluetooth: Updated program data, Sensor signal record, Communication history with smartphone or PC.

Sensors: A Pressure sensor is mounted as a standard item.

Program timer: In the case of set emergency mode, on/ off control is priority operated with the sensor/ wireless signal than the written timer program by the installed solenoid valve.

MAIN COMMUNICATION BETWEEN

CONTROLLER AND TERMINAL DEVICES

Terminal device

Timer program Upload

Datalogger/ Sensor setting Up & Download

PSV Manual ON/OFF

Operation record Download

Sensor/Note record DL

GPS Location/ Clock data DL

Prior Command by Sensor signal

Time sharing with GPS clock

PSV timer control

GPS integrated datalogger & programable timer controller

PSV SYSTEM CONTROLLER

PURPOSE OF EACH FUNCTION

Hand-carry data logger: Collect records of the on-time/real distribution conditions to improve the distribution volume balance.

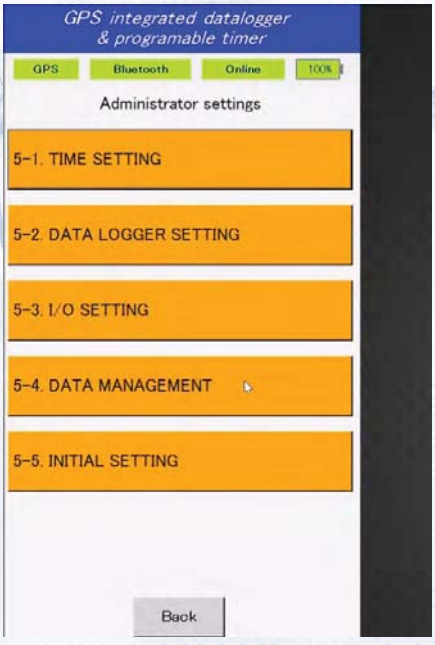
GPS: Enables the time-sharing control of the actual condition at a certain area covered by the controllers with synchronized timing.

Bluetooth: Upload/download programs, data records, on-site note record.

Sensors: Normally, pressure sensor is more than enough, but there might be the other factor is important, such as humidity, temperature or seismic intensity sensor.

Program timer: If the distributed water amount for the total amount against several targeted areas is uncontrollably a shortage, this controller shall be installed to control on/off and switching the distribution area/direction by timing control (distribution time sharing). (No more manual gate valve control by workers is necessary.)

HOW TO SETUP/ USE?



Fair Water Distribution **PSV system** JAPAN

Thank you for your attention!

JICA SDGs Business Verification Survey Team KANE KOGYO CO., LTD.

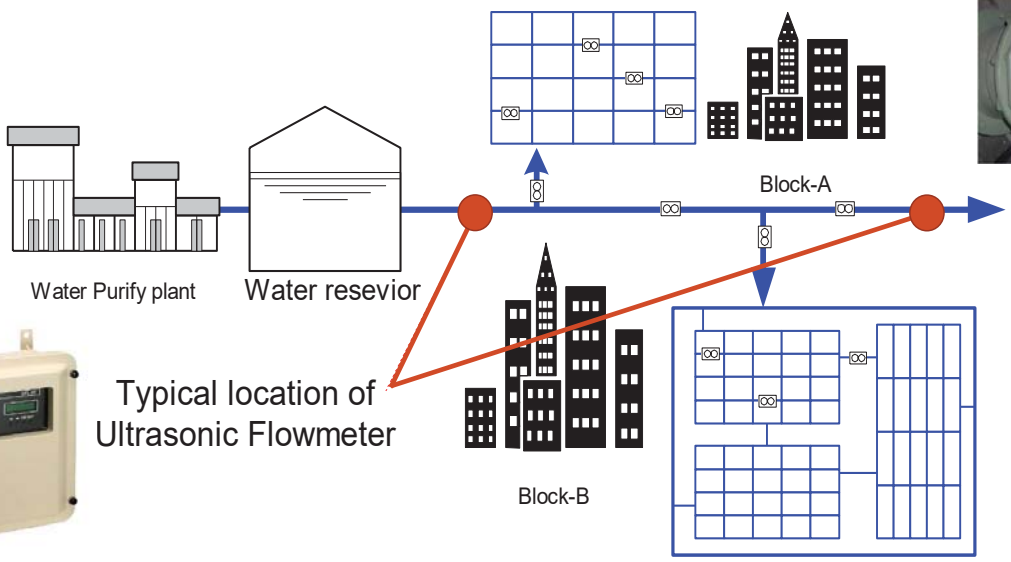
UTILIZATION OF ULTRASONIC FLOWMETER FOR NON-REVENUE WATER

Introduction of TOKYO KEIKI's Products

TOKYO KEIKI

THE CONTRIBUTION OF OUR ULTRASONIC FLOWMETER

- Contribution for SDGs no.6
- The collected data will be utilized for water leak detection
- For example, measuring before and after a network then compare the data.



TOKYO KEIKI

SPECIFICATIONS-ULTRASONIC FLOWMETER

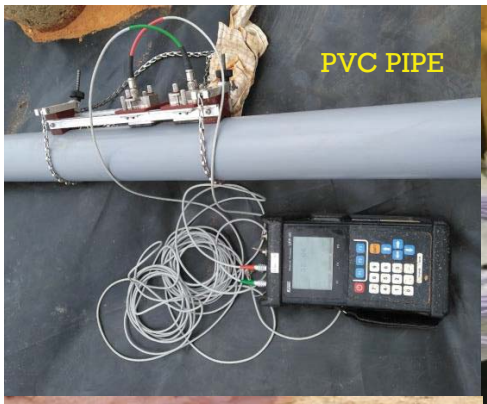
- Portable Ultrasonic Flowmeter UFP-20

Diameter range : DN13 to DN5000mm
Accuracy : ±1.0%MAX
IP Class : IP65
Battery
Dual path, Dual channel
Thickness meter function (Option)

- Stationary Ultrasonic Flowmeter UFL-30

Diameter range : DN25 to DN6000mm
Accuracy : ±1.0%MAX
IP Class : IP67, 68
Four path function

TOKYO KEIKI



TOKYO KEIKI

TOKYO KEIKI

CALIBRATION FACILITY

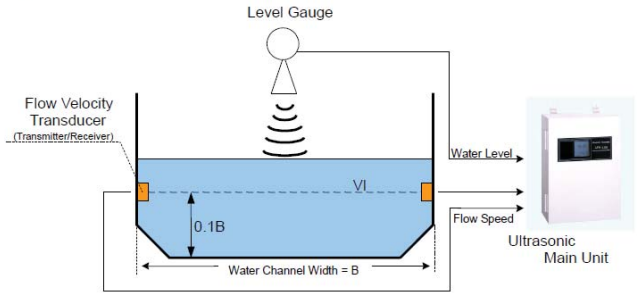
Uncertainty : 0.07 %
Applicable pipe diameter : DN50 ～DN600
Maximum Flowrate : 2000m3/h max
Over head height : 25m
Applicable Certificate : JCSS / ISO 17025

TOKYO KEIKI

OPEN CHANNEL ULTRASONIC FLOWMETER

UFH-100

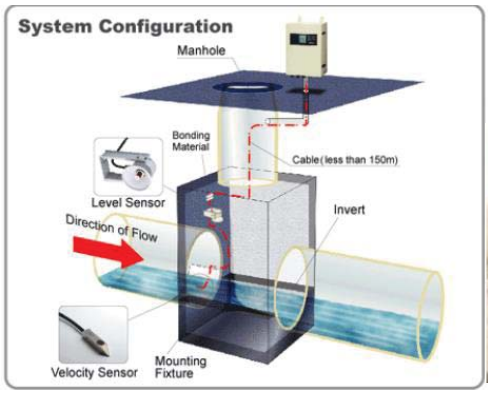
Measurement Method



Water channel width : 0.3～20m
Application : Agricultural water, River water

Level gauge is included

UVH-2000



Water channel width : 0.25～5m
Application : Sewage, Waster water, Industrial effluents, Other fluids with suspended matters or small bubbles which reflect ultrasonic

Level gauge is included

TOKYO KEIKI

SPECIFICATIONS-RADAR LEVEL GAUGE

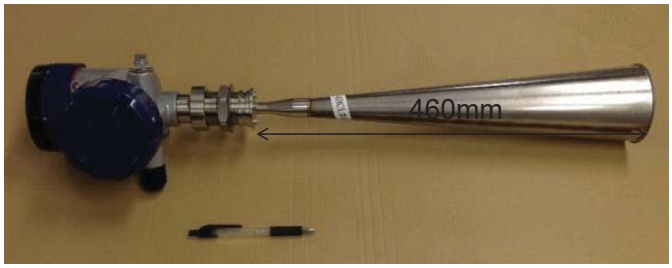
- Non-contact Radar Level Gauge KRG-10

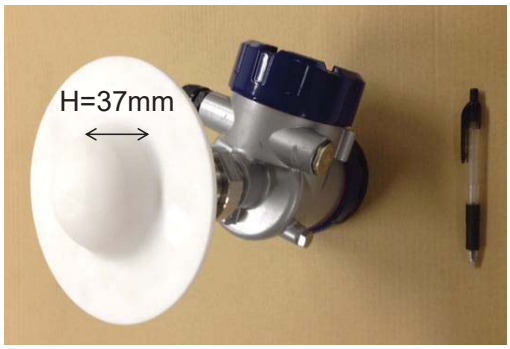
Measurement range : 30m MAX
Accuracy : ±2㎜MAX
Output : 4-20mADC and HART
Rapid tracking : track up to 2m / sec
Antenna : cone, process seal, clamp
selectable variety

- Microwave Level Gauge MD-10

Measurement range : 20m MAX
Accuracy : ±10㎜MAX
Output : RS-485
Antenna : 8 inch cone
Rapid activation

TOKYO KEIKI


460mm


H=37mm

MONITORING SYSTEM

Display on PC or Smart phone

Popular browser (Google Chrome, Firefox)

Pilot test

Mapping

PERSON IN CHARGE

- **TOKYO KEIKI INC.**
- Measurement System Company
  Overseas Sales Sect. Sales Dept.
- **Shuntaro Sakai** (Mr.)
- Tel: +81-3-3737-8664
- Fax: +81-3-3737-8665
- Mobile: +81-80-9537-3938
- Email: s-sakai@Tokyo-keiki.co.jp

Hydro-Tracer
Water Leakage detector

The easiest way to find leakage for everyone with success.

GOODMAN INC.
YOKOHAMA JAPAN

What is Tracer Gas Method?

It is a method of detecting leaks by filling the pipe with exploration gas and detecting holes and cracks that cause leaks.

◯Tracer gas method

1.Injecting tracer gas

2.Tracing above buried pipe line with detector.

3.Detecting tracing gas

4. Leakage is found

Advantage of tracing gas method

1. Resin pipes such as vinyl chloride pipes and polyethylene pipes, or even very small amounts of water leakage can also be found with high accuracy.
2. Easy to use, detecting with accuracy without complicated settings or experience
3. Unlike acoustic detectors, it is effective even in noisy environment anytime anywhere!

High Accuracy

Easy

Reliable

Equipment of tracing gas method

HT55

Variotec460

Snooper 4

Advantage of HYDRO-TRACER

1. Producing gas continuously for long time if purified water and electricity are available
2. No need to prepare multiple heavy cylinders!
3. The weight is only 23kg! Easy to deliver compared to gas cylinders.
4. The maximum gas generating rate is 700 liters/min by type.

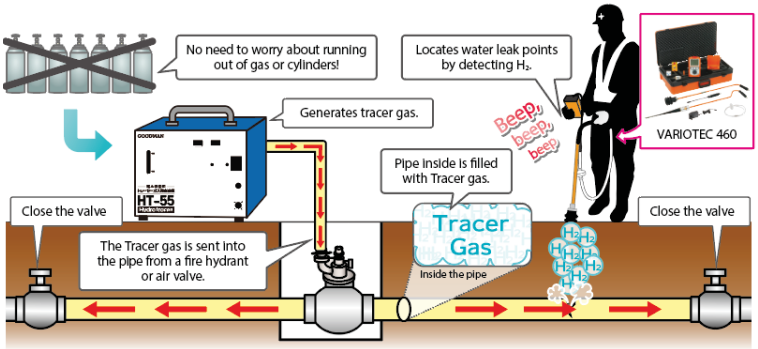
HT-55
Max60ℓ/min

HT-100
Max.200ℓ/min

HT-200
Max700ℓ/min

Advantage of Valiotec460
Tracer gas detector

1. Accurate detection with two sensors and built-in pumps
2. Plenty of attachments make it available to detect in environment from road surface to perforation inspection.
3. The gas density is displayed numerically on a large-screen LCD with backlighting



Advantage of Snooper4
Tracing gas detector

1. The palm-sized body uses large numerical displays and sound and light to clearly convey gas detection.
2. A small pump for gas suction is installed on the main body, so you can use outdoors or on the road.
3. Both hand and bell probes are included as standard

Case Studies

HT55

Valiotec460

Snooper 4

CASE STUDY 1

Date: August 2018

Place: Mountain forest area in Northern Kanto in Japan

Pipes: VP pipe Φ25 mm

Survey distance: 400m

There was a leakage underground about 0.6t litter/h in the water supply pipe which was buried on the slope of bank, and it was very difficult to find the leakage with acoustic leak detector under such circumstance.

Therefore, in order to investigate by tracing gas methods, we cut off water supply for 11 households, then injected hydrogen mixed gas into the pipe with Hydro-Tracer and located leaks with Valiotec460 for about half a day, and finally pinpointed the suspected leakage site.

We excavated the area and found the water leakage successfully.

CASE STUDY2

The max. value detected in valve box of fire hydrant

After digging the area, water leakage was identified.

Date: December 2019
Place: Hyogo prefecture in Japan
Pipes: VP pipe Φ100 mm
Survey distance: 250m
We found leakage with Valiotec460 gas detector in about 1 hour after gas injection by HT55 Hydro-tracer.

CASE STUDY 3




Date: March 2019
Place: BEKASI Training Center, Palembang, Indonesia
Pipes: PVC 50mmΦ
Survey Distance：100m

After our training seminar to PDAM TRTAMUSI members, they surveyed water pipeline in Palembang city and found 11 points where water leakage is suspected.

Coming Soon!

COCODA

Hydro Sensor

1. Ultra sensitive built-in sensor with suction pump
2. Rechargeable battery with charger
3. LED indicators and controllable detecting sound
4. Silicon rubber protector with belt suspender
5. Useful both inside house and ground
6. Long lasting durable sensor, no need to calibrate
7. low price and easy to use for everyone

GOODMAN
D305

PVC pipe-leakage Detector D305

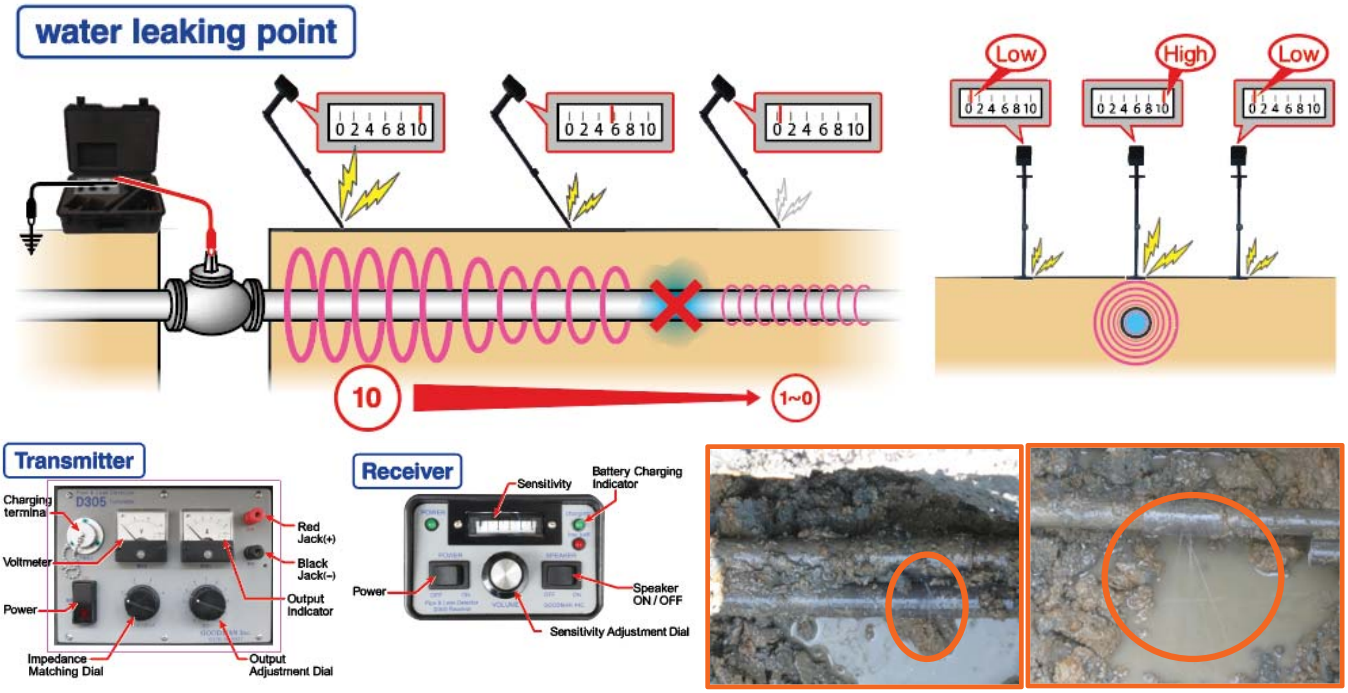
The only detector that can pinpoint water leaks and locate non-metallic pipes!

Features:

- Pinpoint water leak and pipe location
- Easy operation and quick result
- Water resistant and robust carrying case
- Built-in rechargeable batteries

PAT.P.
GOODMAN INC.

PVC pipe-leakage Detector D305



NEW! Are you satisfied with your listening stick?!

Smart listening device for water leak detection!

Amplifier for listening rod

KIKUZO

Making your listening rod more effective!!

made in Japan
PAT.P

- You can concentrate on leakage sound with earphones.
- Economical - 40hours continuous use with USB charger!
- Durable and insulated silicon housing.
- Easy to handle with volume switch.
- Temporary cut off power switch installed.

With earphones

spec	[Power]AA battery NiMH ×2 [Operating time]40 hours/nominal [Size/Weight] ϕ75×55㎜ /180g

PVC pipe leak stopper
Water leakage stop tape
TOMEZO

Feature

1. Most inexpensive tape stopping leakage
2. Can be applied on wet pipe
3. Slipless adhesive feature
4. No need to cut and replace pipe
5. Upto 200mm diameter on any pipe material
6. Durable material prevent leak long time

PVC pipe leak stopper
Water leakage stop tape
TOMEZO

❶ After taking backpaper,apply tension to Tomezo, cover the leak spot.

❷ Wrap at least 3 layers or more to ensure stop leaks depending upon internal water pressure.

❸ Apply tie band to prevent back rush.

Thank you!

GOODMAN INC.

2-3-3 MUTSUURA HIGASHI, KANAZAWA,
YOKOHAMA, KANAGAWA, 236-0037 JAPAN
TEL +81-45701-5680
E-mail: yiwase@goodman-inc.co.jp

WATER ENERGY

Creating a better tomorrow through technological innovation and development – uncovering a future for the finite resources of water and energy.

NAGAOKA INTERNATIONAL CORP.

Groundwater Intake & Treatment

CORPORATE PROFILE

Domestic Operations

NAGAOKA INTERNATIONAL CORPORATION

- **Established** : October,1934 (Renowned: November, 2004)
- **Employees** : 96 (184:Whole Nagaoka Group)
- **Headquarter Office** : Osaka, Japan
- **Sales Office** : Tokyo, Japan
- **Factory** : Tokyo & Hyogo, Japan

Overseas Network

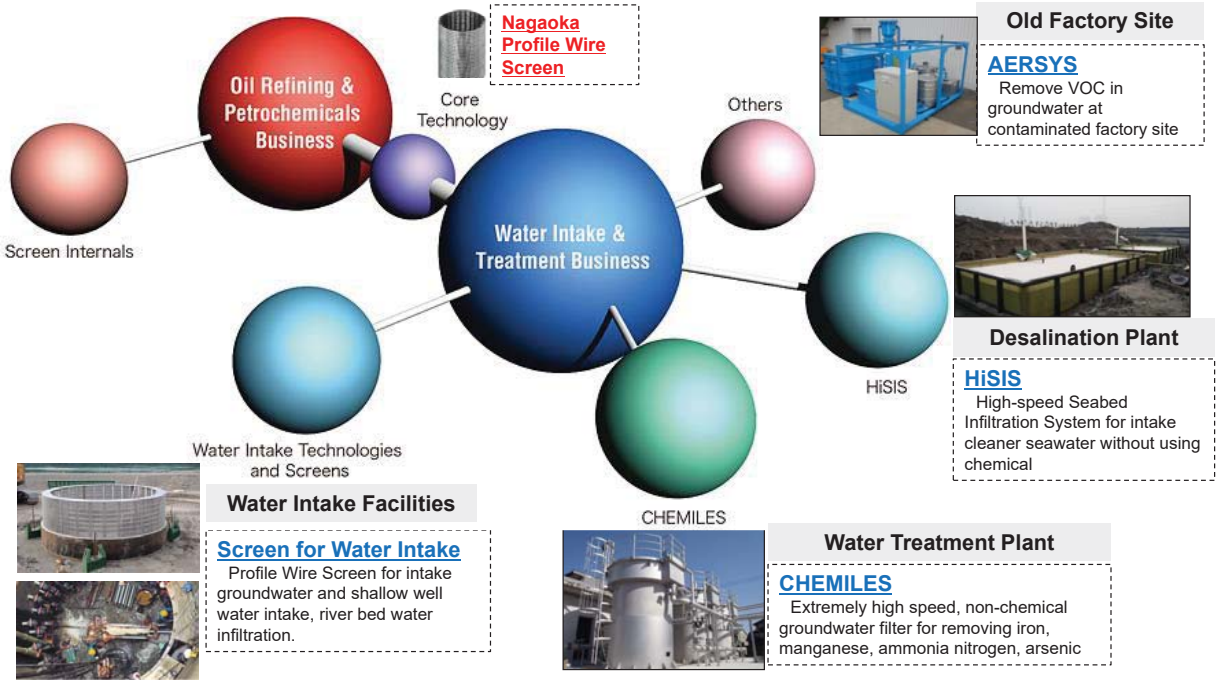
China : Nagaoka Equipment (Dalian) Co., Ltd
Vietnam : NAGAOKA VIETNAM CO.,LTD.

NAGAOKA BUSINESS FILEDS

NAGAOKA technologies assist and contribute to the production of “Water” and “Energy”

Petrochemical Plant

Screen Internal
Nagaoka Screen Internals are used in the heart of oil refining, petrochemical and chemical fertilizer complex



Old Factory Site

AERSYS
Remove VOC in groundwater at contaminated factory site

Desalination Plant

HiSIS
High-speed Seabed Infiltration System for intake cleaner seawater without using chemical

Water Intake Facilities

Screen for Water Intake
Profile Wire Screen for intake groundwater and shallow well water intake, river bed water infiltration.

Water Treatment Plant

CHEMILES
Extremely high speed, non-chemical groundwater filter for removing iron, manganese, ammonia nitrogen, arsenic

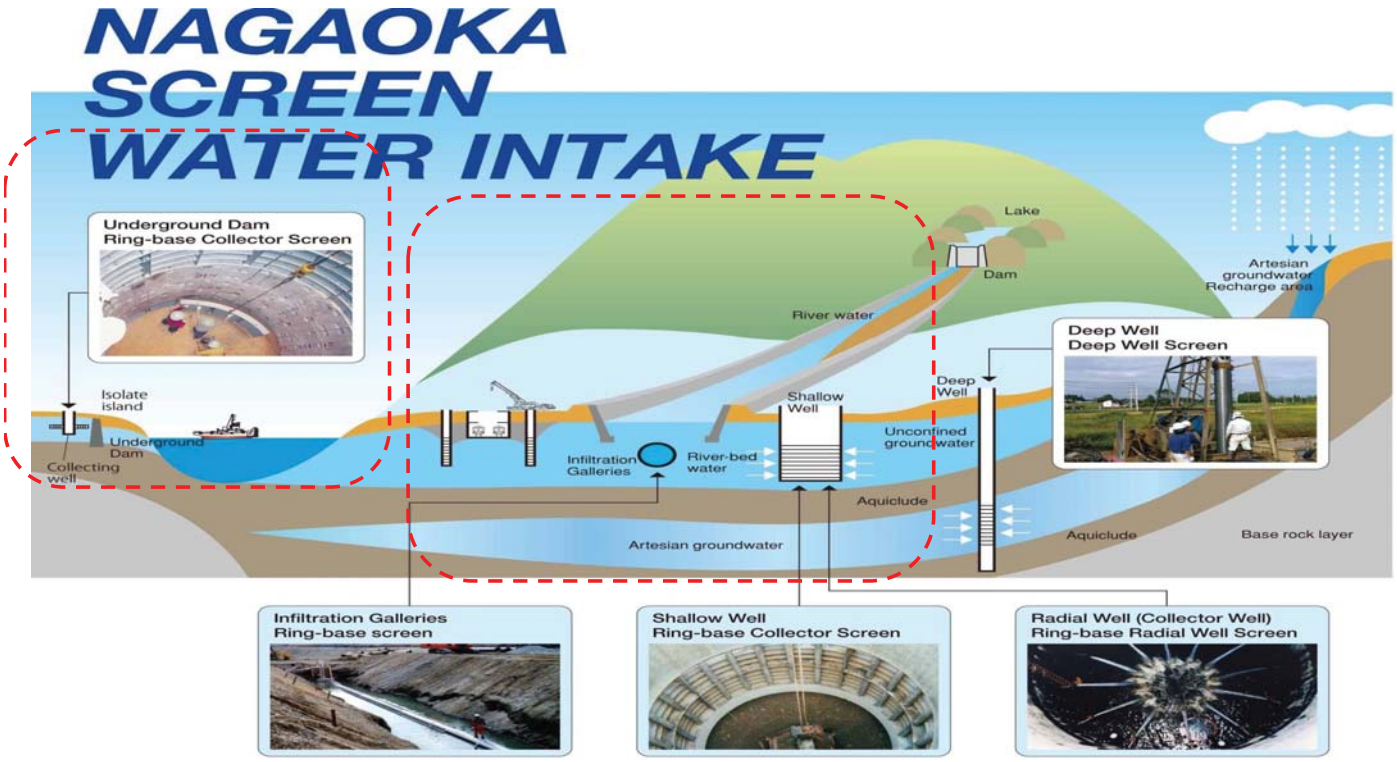
Internationally Recognized NAGAOKA Technologies by International Water Association(IWA)

2010 : Global Honor – East Asia Winner
The Development and Application of Innovative High Speed Biological Groundwater Treatment Technology “CHEMILES”

2012: Global Honor – East Asia Winner
Optimum Solution for Water Shortage by use of effective Screens Water Intake, Lingyuan, China

2014: East Asia Winner, Global Winner and Superior Achievement
“ENERLES” Innovative Water Treatment System without energy nor chemicals by Nagaoka International Corp. in China

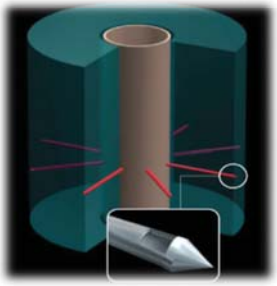
NAGAOKA Screen Water Intake Method



NAGAOKA Screen Water Intake Method

1. COLLECTOR WELL

2. RADIAL WELL



3. INFILTRATION GALLERY

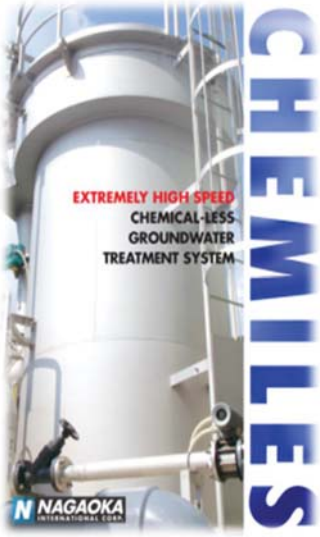
System	1. COLLECTOR WELL	2. RADIAL WELL	3. INFILTRATION GALLERY
Feature	Nagaoka invented side intake system. Collector can intake water from surrounded aquifer effectively. With Collector and Radial Screens superiority, large amount of water can be taken.	Screens (approx. ϕ100 x 30m) are multiply installed. Comparing to the conventional design, Nagaoka can ensure the accuracy of installation and intake efficiency. In addition, Screens are reinforced which Nagaoka can only provide. Depending on the site condition, the combination of Collector and Radial Screens can be achieved.	Infiltration Gallery is installed under the riverbed or seabed so that it can collect large amount of water.
Supply Records	247 PROJECTS	235 PROJECTS	263 PROJECTS
Maximum Capacity (1well)	12,000㎥/day	19,000㎥/day	200,000㎥/day

NAGAOKA Groundwater Treatment System

CHEMILES – Extremely High Speed Chemical less Groundwater Treatment System

*Highly effective, multiple scales, self-managing, no-filter media replacement, chemical free treatment-**Minimize LCC***

Iron, Manganese, Ammonia, Arsenic … Removable in one filter !



Medium scale municipal water supply (16,000 m³/day)

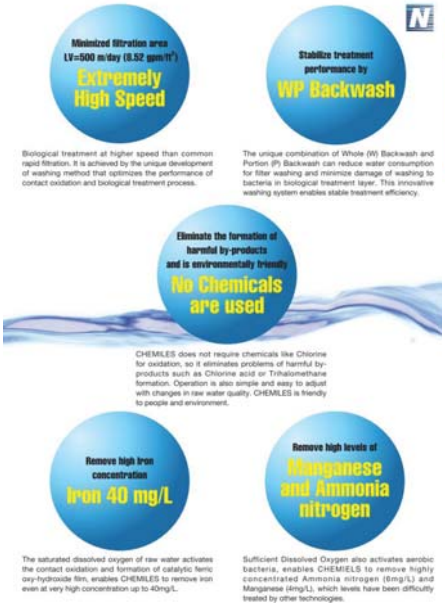
Large scale municipal water supply (40,000 m³/day)

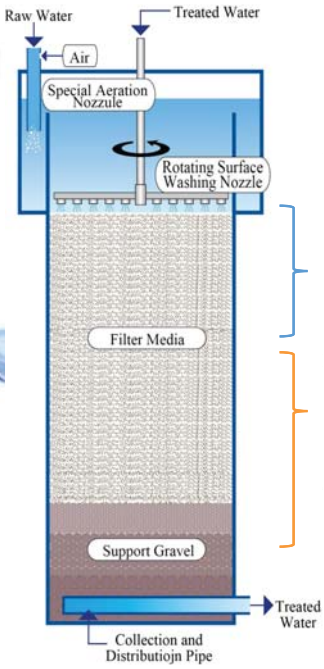
Compact design for municipal water supply system, medium scale (4,500 m3/day)

Stand-alone industrial water system (food processing, linen, paper mill) systems - various scales

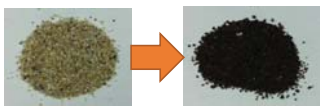
Supply Record: >50 projects in Japan & >10 project in Asia (50m³～50,000m³/day)

CHEMILES： Chemical-Less water treatment technology





Dissolved oxygen activate Raw Water	**Special Oxidation Nozzle increase DO of Raw Water to almost saturated level.**
Contact Oxidation（Fe Removal）	● Soluble ferrous ion（Fe^{2+}）in raw water is oxidized by this dissolved oxygen and form ferric oxy-hydroxide catalyst film on the surface of media. $2Fe^{2+} + 1/2O_2 + 4OH^- + H_2O \rightarrow 2FeOOH \cdot H_2O\downarrow$ $2Fe^{2+} + 1/2O_2 + 4OH^- + H_2O + FeOOH \cdot H2O \rightarrow 3FeOOH \cdot H_2O\downarrow$ ● The film act as catalysts to facilitate the oxidation of soluble ferrous ions and the forming of insoluble ferric hydroxide, and also to enhance ferrous ion removal rate and removal efficiency. $2Fe^{2+} + 1/O_2 + 4OH^- + H_2O \rightarrow 2Fe(OH)_3\downarrow$ ● Formed ferric hydroxide will attach on the surface of media.
Bio-treatment/ Contact Oxidation（Mn Removal）	● The removal of manganese occurs continuously due to the repetition of self-catalytic contact oxidation reaction. In addition, if iron bacteria exist in water, manganese deposition process may be occurred by these bacteria. $2Mn^{2+} + MnO_2 \cdot H_2O + H_2O \rightarrow MnO_2 \cdot MnO \cdot H_2O + 2H^+$（contact reaction） $MnO_2 \cdot MnO \cdot H_2O + 1/2O_2 + H_2O \rightarrow 2MnO_2 \cdot H_2O\downarrow$（oxidation reaction） Self-catalytic oxidation reaction
Bio-treatment/ (whole layer) （NH_4^+-N Removal）	● Nitrifying bacteria perform nitrification reaction on ammonia nitrogen through nitrate nitrogen. $NH_4^+ + 3/2O_2 \rightarrow NO_2^- + H_2O + 2H^+$ $NO_2^- + 1/2O_2 \rightarrow NO_3^-$



Only typical silica sand
（No Special Filter Media）
⇒ **SEMI-PERMANENTLY usable**

Business Records in Malaysia: Intake and Water Treatment

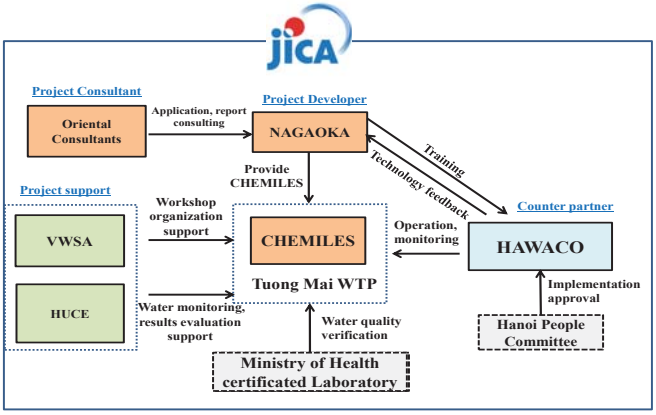
Product	Radial Well (10,000m^3/D×2 wells) + CHEMILES Groundwater treatment
Capacity	20,000m^3/D (4 filters made of reinforced concrete basin)
End User	Kelantan Water Authority
Water Resource	Groundwater
Water Quality (mg/L)	Raw Water Fe:4.0, Mn:0.2, NH_3:0.3⇒ Treated Water Fe:≦0.3, Mn:≦0.05, NH_3:≦0.1
Completion Year	2020

Radial Well Construction

CHEMILES Treatment System

Business Records in Vietnam: JICA Project for public waterworks

Product	CHEMILES Groundwater treatment
Capacity	2,500m^3/D
Local Counterpart	Hanoi Water Limited Company 【JICA Project: Verification for Disseminating CHEMILES for groundwater treatment】
Water Resource	Groundwater (High Ammonia 4.25mg/L)
Water Quality (mg/L)	Raw Water Fe:5.8, Mn:0.24, NH_3:4.25⇒ Treated Water Fe:≦0.3, Mn:≦0.1, NH_3:≦0.1
Completion Year	2016



Business Records in Vietnam: Water Utility

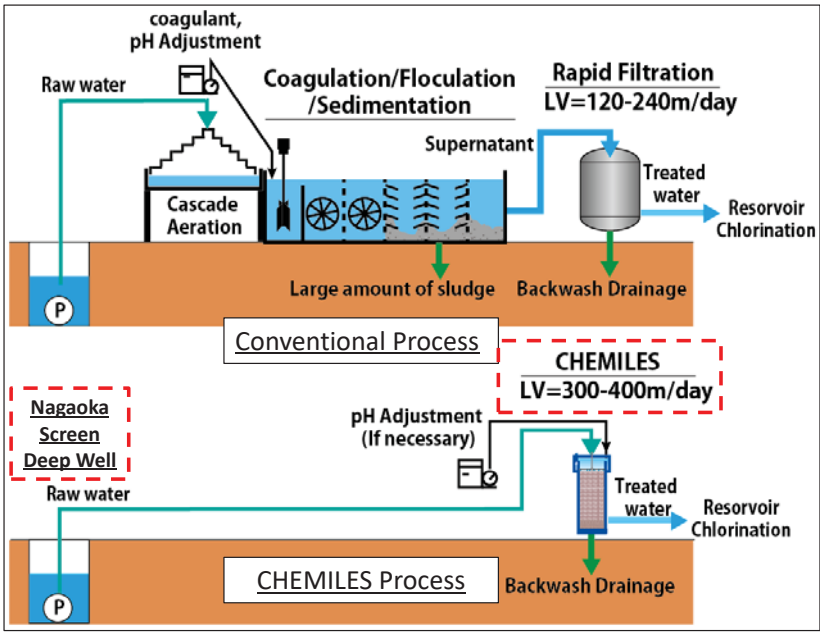
Product	CHEMILES Groundwater treatment
Capacity	10,000m^3/D (8 filters made of reinforced concrete basin)
End User	Son Ha International Corporation
Water Resource	Groundwater (High Ammonia 4.5mg/L)
Water Quality (mg/L)	Raw Water Fe:9.46, Mn:0.42, NH_3:4.5⇒ Treated Water Fe:≦0.3, Mn:≦0.1, NH_3:≦0.3
Completion Year	2020

Case Study of Mityana city, Uganda

As a case study, we propose ①Nagaoka Screen Deep Well & ②CHEMILES for water treatment plant expansion project at Mityana city as below condition.
A case study of 4,300m^3/day is an additional water treatment plant with the current water treatment plant.
A case study of 9,100m^3/day is a renewal water treatment plant instead of the current water treatment plant.

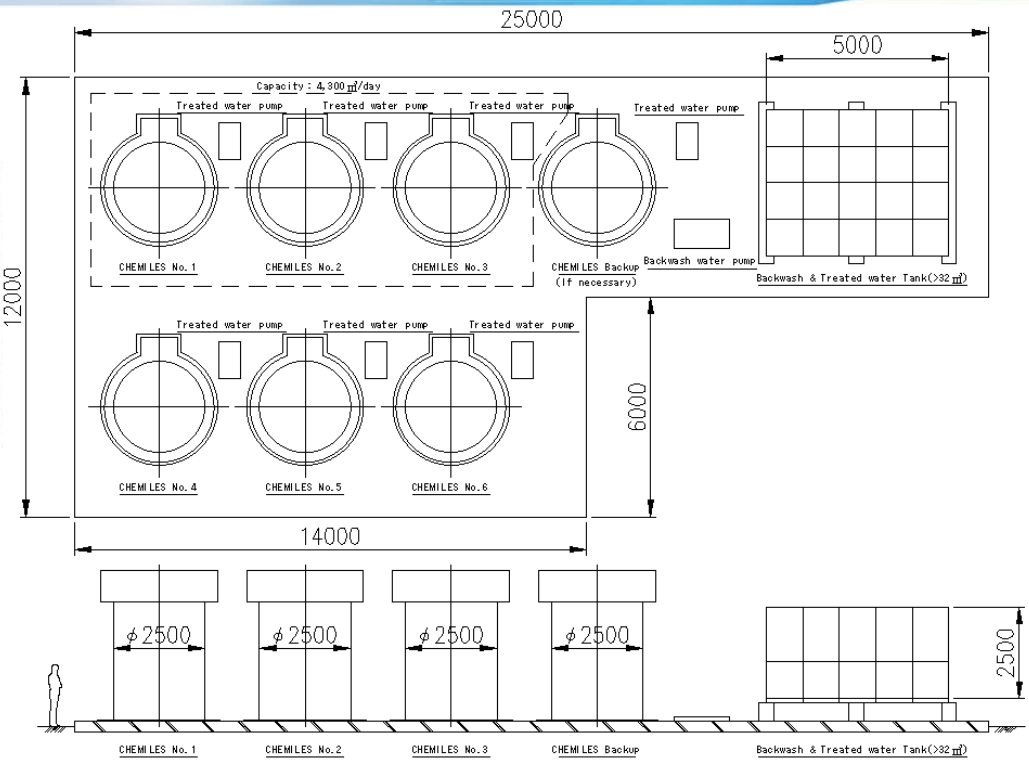
	Name	Raw water	Treated water	Memo
Raw Water Quality	Iron(mg/L)	4.3	<0.3	
	pH	6.0	-	
	M-Alkalinity (pH:4.8)	22	-	Since the M-alkalinity (pH: 4.8) is low at 22mg/L, injection of alkaline agent may be necessary as in the current process. (Pilot Study may be necessary.)
Assumption Condition	Manganese (mg/L)	<0.5	-	
	Ammonia (mg/L)	<0.5	-	
	ATU-BOD (mg/L)	<1.0	-	

	Item	Case 1	Case 2	Memo
Design Condition	Method	Steel Tank Method	RC Tank Method	
	Capacity	4,300㎥/Day 9,100㎥/Day	4,300㎥/Day 9,100㎥/Day	Operation Hour: 24hours/Day



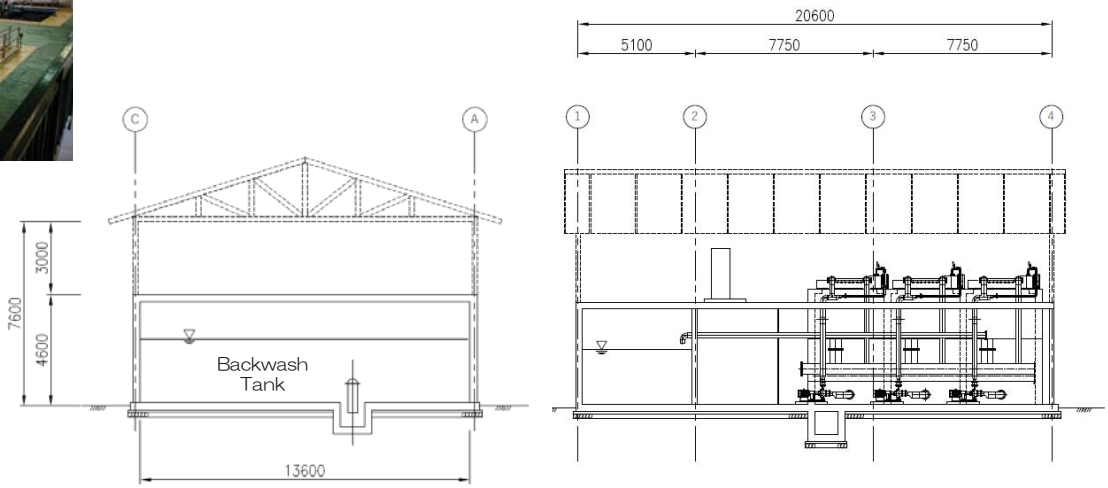
Proposal Case 1（Steel Tank Method）

1 Tank：1,400-1,600㎥/Day
Capacity：4,300㎥/Day　3 Tank
Capacity：9,100㎥/Day　6 Tank
（No-Backup）
Capacity：9,100㎥/Day　7 Tank
（1 Tank Backup）



Proposal Case 2（RC Tank Method）

1 Tank：4,300-5,000㎥/Day
Capacity：4,300㎥/Day　1 Tank
Capacity：9,100㎥/Day　2 Tank
（No-Backup）
Capacity：9,100㎥/Day　3 Tank
（1 Tank Backup）



Creating a better tomorrow through technological innovation and development – uncovering a future for the finite resources of water and energy.

www.nagaokajapan.co.jp

MITSUBISHI CHEMICAL

Introduction of Mitsubishi Chemical Aqua Solutions

- Water Treatment & Remote Monitoring For Urban Water Supply in Uganda -

Ver.1/ September 2021

KAITEKI Value for Tomorrow
Mitsubishi Chemical Holdings Group

Confidential

MITSUBISHI CHEMICAL AQUA SOLUTIONS CO.,LTD.

Today's Contents

MITSUBISHI CHEMICAL

1. Introduction

2. "On-site" Water Treatment System

3. WeLLDAS™ - Remote Monitoring System -

4. Reference (Company Profile)

Today's Contents

1. Introduction
2. "On-site" Water Treatment System
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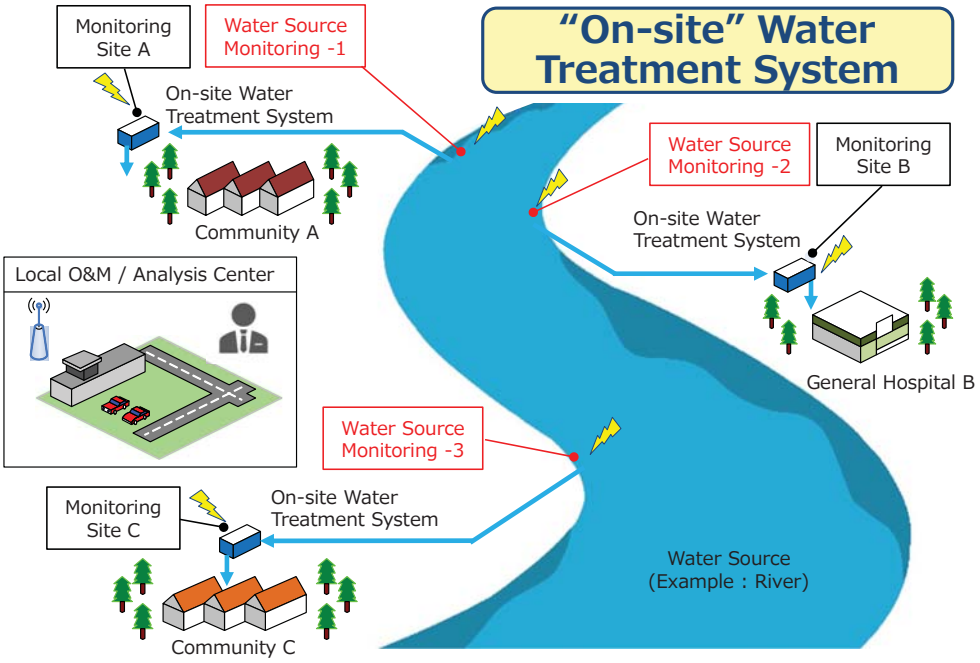
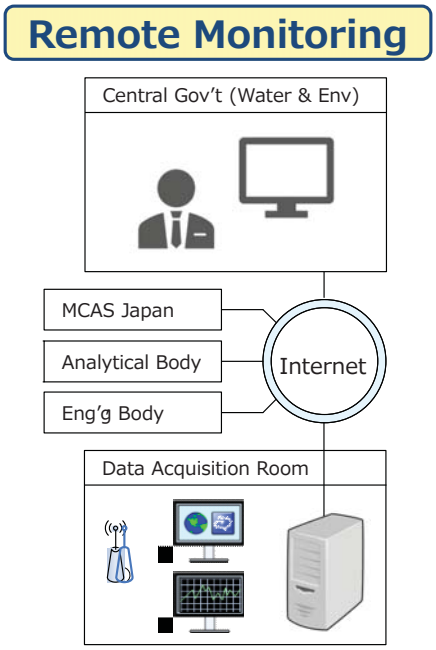
Introduction

Mitsubishi Chemical Aqua Solutions Co., Ltd. (MCAS)

- What We Do:
  - Engineering, Procurement & Construction (EPC) of water treatment system using membrane filtration
- Business in Africa:
  - Has been working in Kenya since 2012 (JICA projects, etc.)
  - Has local partners in Kenya and Zambia

Concept of Our Business





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“On-site” Water Treatment System

MITSUBISHI CHEMICAL

A system that supplies water that meets client’s requirements

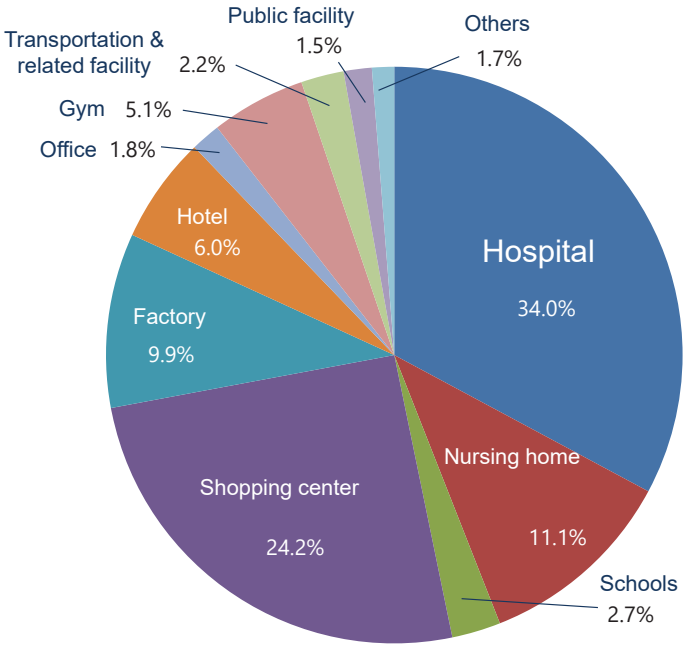
Any water source is acceptable :
City water, groundwater & surface water

Custom-designed system :
To produce drinking water at stable quality

Safe and stable water supply :
By using remote monitoring system etc.

Achievements in Japan

MITSUBISHI CHEMICAL



- ✓ “MCAS” is the pioneer in the groundwater treatment industry and holding over 50% share of the market in Japan.
- ✓ Total number of installed systems in Japan is more than 1,300.

As of the end of February, 2021

MITSUBISHI CHEMICAL AQUA SOLUTIONS CO.,LTD.

Membrane Filtration Technology

MITSUBISHI CHEMICAL

- Today's theme: Ultrafiltration (UF) membrane




Several types depending on purposes

Source: Website of Mitsubishi Chemical Aqua Solutions
(https://www.m-chemical.co.jp/sterapore/en/hollow_fiber_product.html)

How Does It Work?

MITSUBISHI CHEMICAL

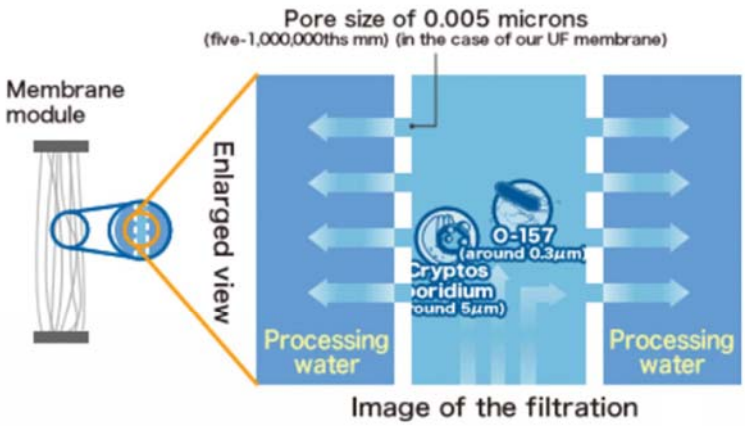


Image of the filtration

Enlarged cross section of hollow fiber membrane

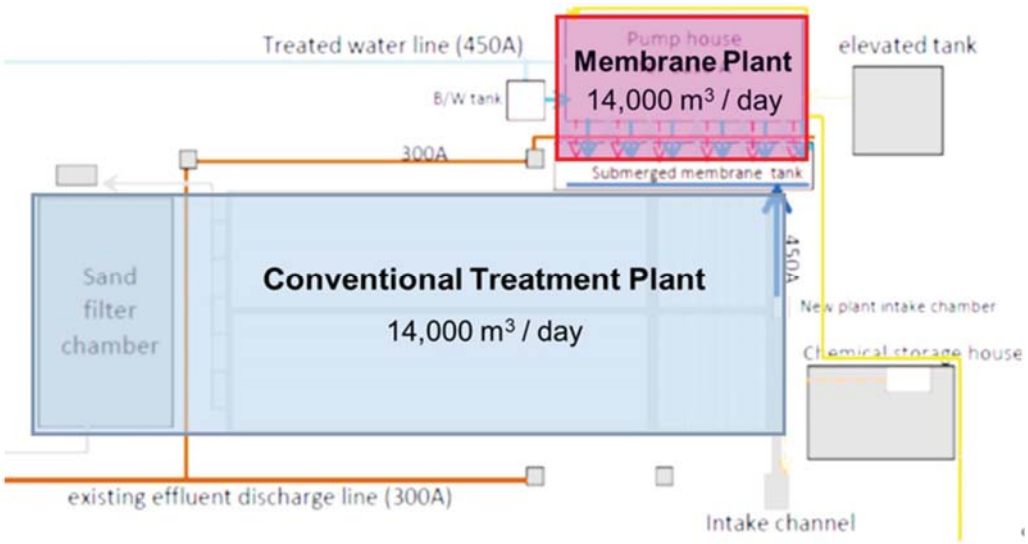
Source: Website of Mitsubishi Chemical Aqua Solutions
(https://www.mcas.co.jp/en/business/water/)

Membrane VS Conventional at a glance

	Membrane	Conventional (In Kenya's case)
Structure	 or 	
Turbidity limit	Approximately 50 ~ 3,000 NTU ✓ **Turbidity tolerant**	Approximately 10 NTU
Pre-treatment	Injection of chlorine and coagulant (+sand filtration) ✓ **Less chemical**	Injection of chlorine and coagulant, flocculation and sedimentation
Water loss	Approximately 2 ~ 3% during backwash ✓ **Minimal loss**	Approximately 8 ~ 10% during backwash
Space requirements	Approx. 30% of conventional type (see next slide) ✓ **Less space & Low installation cost**	Large space is required for installation
Remarks	Stable and effective for treating turbid water Easy to up-scale	Suitable for treating low turbidity water Unstable treatment for high turbidity

How smaller than the Conventional?

<Example>



Some 70% of the installation space can be saved

Ref. 1) Kenya/ High turbidity

- Client : JICA*
- Site Location : A satellite town of Nairobi
- Target Pop. : Approx. 1,000 people (400HH)
- Raw Water : Surface water
- Purpose : Drinking water

- Topics
  1) Highly turbid river water (Esp. in rainy season)
  2) Safe water supply by membrane (100 m^3/D)
  3) Remote monitoring & assistance from Japan
- Process Flow : Oxidation → SFx2 → AC → UF
- Start Supplying : From June 2015

*JICA project
Pilot Survey for Disseminating SME's Technologies for Community-based Water Treatment & Supply System Using Solar Energy (Oct. 2013 ~ Sep. 2016)

About JICA
https://www.jica.go.jp/english/index.html

River Water to Municipal Water

Water Quality (Abstract)

Raw Water (June 2015 to May 2016)

S/N	Parameter	Unit	KS459/1996	17-Jun	31-Jul	31-Aug	30-Sep	9-Nov	8-Dec	2-Feb	15-Mar	28-Apr	30-May
1	E.Coli	pcs/100mL	Nil.	Detected	Detected	Detected	Detected	Nil.	Detected	Nil.	Detected	Detected	Detected
2	Color	TCU	< 15	200	31	20	22	79	102	50	70	420	74
3	Turbidity	NTU	< 5	48.2	7.3	3.1	3.0	42.7	41.7	24.7	28.8	281.0	32.4
4	Iron	mg/L	< 0.3	0.6	1.2	0.5	0.5	3.1	2.2	1.6	1.5	7.9	1.6
5	Manganese	mg/L	< 0.1 (0.5)	0.100	0.180	0.110	0.150	0.360	0.440	0.230	0.390	1.500	0.260
6	Aluminum	mg/L	< 0.1	0.012	1.400	0.170	0.180	4.300	1.600	1.400	0.990	5.600	0.970

Beyond standard value

Treated Water (June 2015 to May 2016)

S/N	Parameter	Unit	KS459/1996	17-Jun	31-Jul	31-Aug	30-Sep	9-Nov	8-Dec	2-Feb	15-Mar	28-Apr	30-May
1	E.Coli	pcs/100mL	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.	Nil.
2	Color	TCU	< 15	< 5	1	1	1	2	3	4	6	2	2
3	Turbidity	NTU	< 5	0.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	0.2	0.1	< 0.1
4	Iron	mg/L	< 0.3	< 0.01	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
5	Manganese	mg/L	< 0.1 (0.5)	< 0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
6	Aluminum	mg/L	< 0.1	0.01	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02

Below the Standard for all parameters after membrane treatment!

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3. WeLLDAS™ - Remote Monitoring System -
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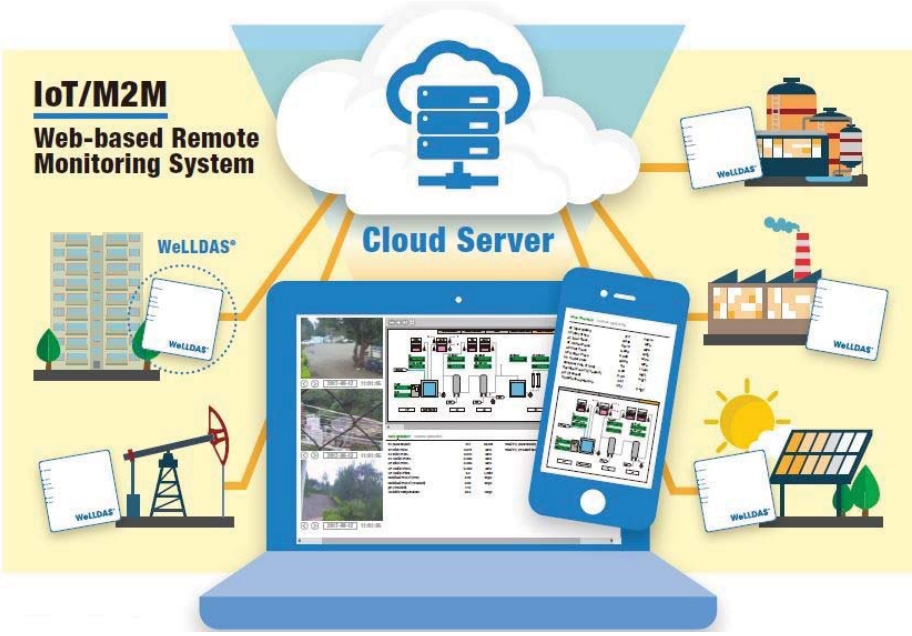
Remote Monitoring "WeLLDAS™"



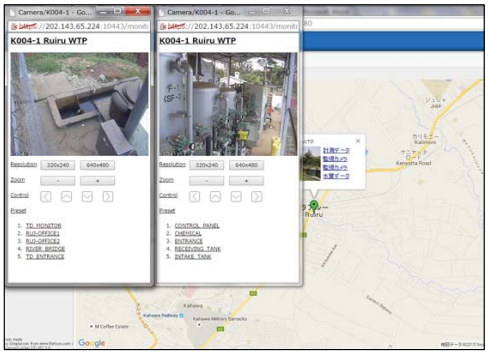
Overview of “WeLLDAS™”

Main Features

- Easily installed in conventional water treatment plants
- Easy access from PC and smartphone etc.
- No need to develop hardware system by client
- Real-time monitoring of data and video image
- Cheaper operation cost with local SIMs
- Standardized specs. for global operation in different countries
- Maintenance activities can be optimized by WeLLDAS™

Operation Image

Image1:
Real-time Video Monitor



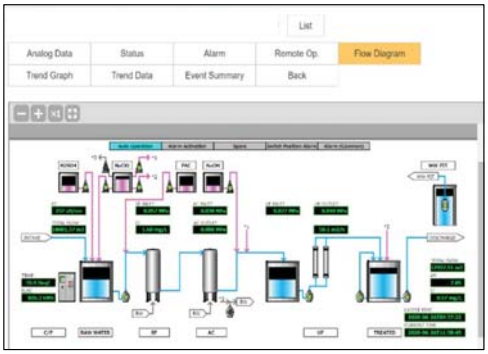


Image-2 :
Real-time Flow Diagram

Image-3 :
Operational Trend Display

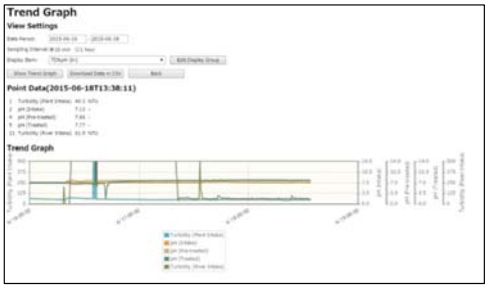
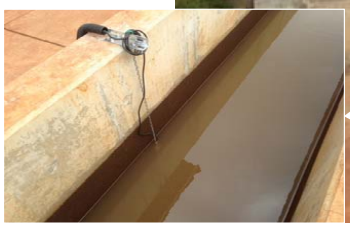


Image-4 :
Water Level Monitor (Area Wise)

Ref. 1) Monitoring Turbidity (raw water)

Display

Control panel



Sensor

Ref. 2) Existing water treatment plant

Image1
Map of monitoring site

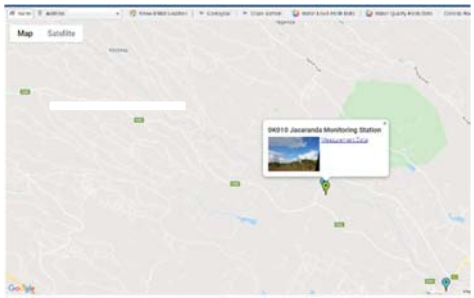


Photo1
Inside Monitoring Station

Image2
Monitoring parameters

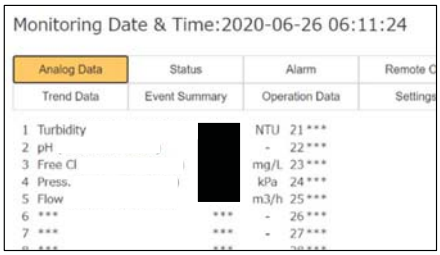


Image3
Trend graph

WeLLDAS™ has been employed in an existing WTP in Kenya since 2015, contributing to stable operation and safe water supply

Ref. 3) Groundwater Monitoring

- Monitoring a well in Myanmar, where salinity intrusion is occurring.
- Installed WeLLDAS and sensors to check water level and electrical conductivity of the well.

Real-time Monitoring of "Salinity Intrusion" and " Water Scarcity" of a Well

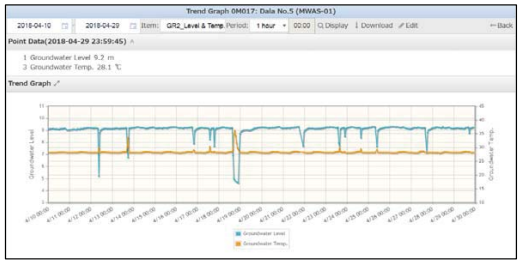


Image-1 : Groundwater Level and Groundwater Temp

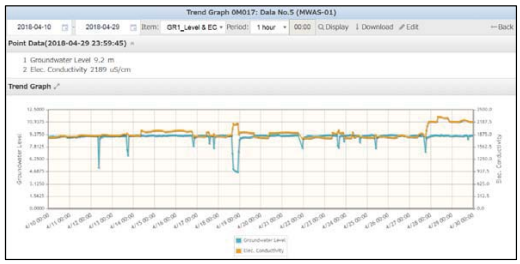
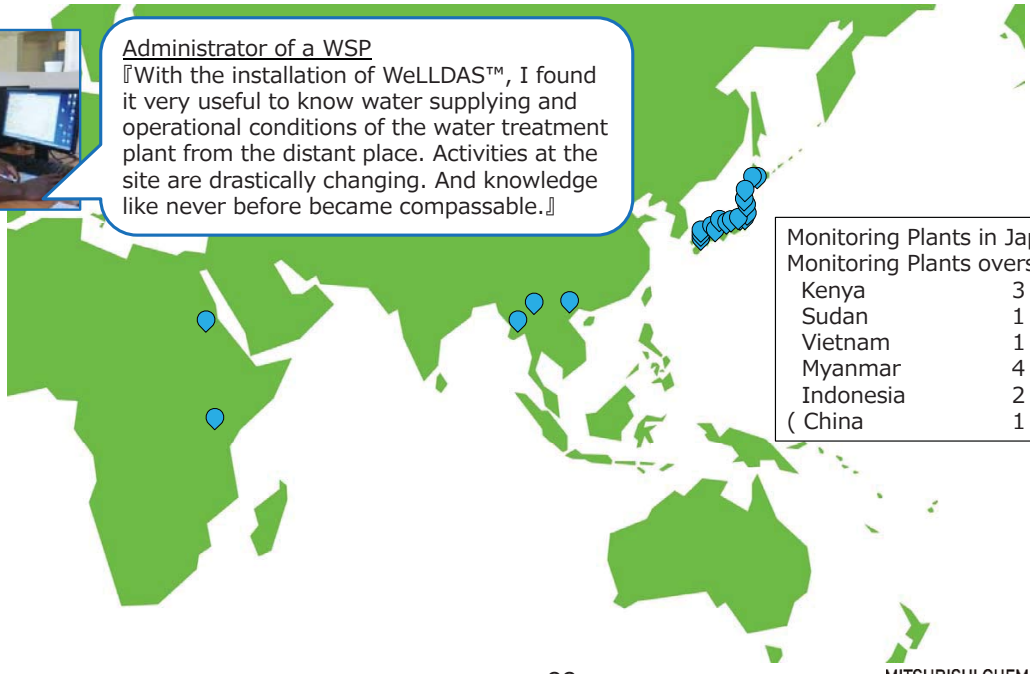


Image-2 : Groundwater Level and Elec. Conductivity

WeLLDAS™ Operation World-wide

Administrator of a WSP
『With the installation of WeLLDAS™, I found it very useful to know water supplying and operational conditions of the water treatment plant from the distant place. Activities at the site are drastically changing. And knowledge like never before became compassable.』



Monitoring Plants in Japan	400 systems
Monitoring Plants overseas	11 systems
Kenya	3 systems
Sudan	1 system
Vietnam	1 system
Myanmar	4 systems
Indonesia	2 systems
(China	1 system)

Today's Contents

1. Introduction

2. "On-site" Water Treatment System

3. WeLLDAS™ - Remote Monitoring System -

4. Reference (Company Profile)

Company Profile

Name	Mitsubishi Chemical Aqua Solutions Co., Ltd. ("MCAS")
Headquarters	1-2-2, Nihonbashihongoku-cho, Chuo-ku, Tokyo, Japan
Establishment	November 1985
Capital	JPY 373.5 million ≒ USD 3.4 million
Workforce	472
Scope of Business	✓ EPC and O&M of - Water treatment, wastewater treatment, separation & specialty process - On-site water treatment ✓ Material supply related to water treatment business ✓ Hydroponics system for leafy vegetables/ High-performance seedling production system ✓ Water quality analysis and R&D

As of August 1, 2021

Naoko Mori (Ms.)
Overseas Business Division
Mitsubishi Chemical Aqua Solutions Co., Ltd.
mori.naoko.ma@m-chemical.co.jp

Introduction of METAWATER

September 30th, 2021

1. Company Profile of METAWATER

METAWATER's Origins

NGK INSULATORS, LTD.

Fuji Electric


Sludge treatment equipment

NGK Water Environment System

(Mechanical technology)

+

Fuji Electric Water Environment Systems

(Electrical technology)


Ozone generation system


Water treatment equipment

METAWATER

Established April 2008


Power receiving and transforming equipment

A comprehensive engineering company in the water and environment business fields


Sewage treatment equipment


Monitoring & control equipment

3

Company Profile of METAWATER

METAWATER is the leading engineering company, based in Japan, with unique products and wide range of experiences from product supply, EPC up to O&M service incl. PFI projects.

Capital	JPY 11.9 Bil. (ca. US$ 100 Mil.)
Stock Market	First Section of Tokyo Stock Exchange, Code:9551
Net Sales	JPY 129 Bil. (ca. US$ 1.25 Bil.)
Employees	3,082 (consolidated)
Location (JPN)	Tokyo (Head Office), Hino Office, Nagoya Office
(Intl.)	Vietnam, Cambodia, Singapore, Netherlands, USA


Ceramic Membrane

More than 40% of share in MF/UF DWTP in Japan


Ozone Generator

Top supplier more than 170 installations


Sludge Incineration

More than 25% of share in Japan **more than 45%** in large scale

PTF System

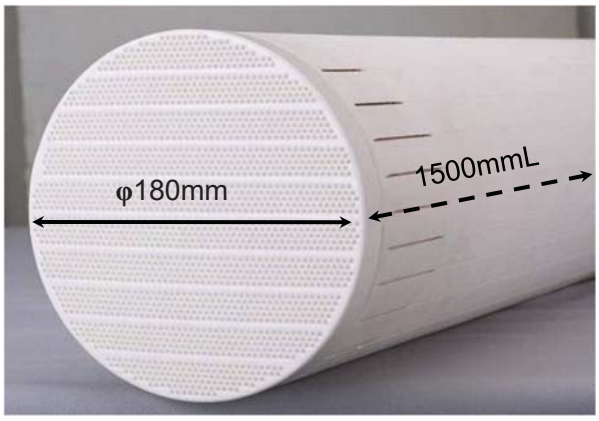
Newly developed product

4

2. Ceramic Membrane

5

Ceramic Membrane Filtration System

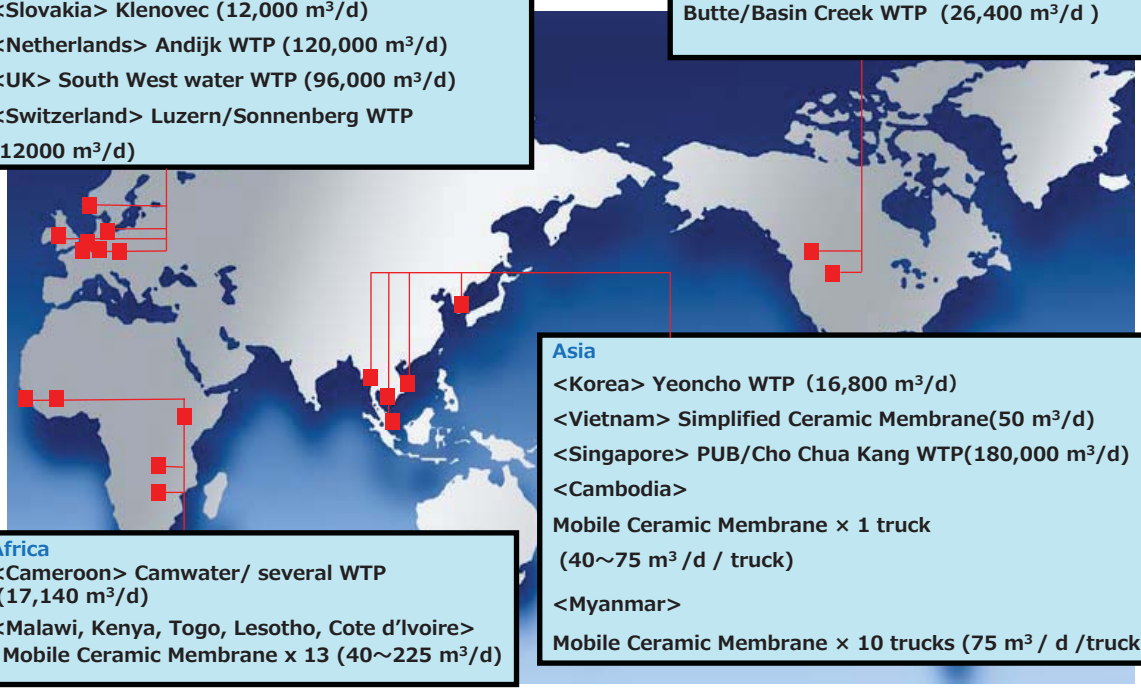


Dimension	Φ180mm×1,500mmL
Pore size	0.1μm
Filtration area	25m^2
No. of channels	2,000
Channel dia.	Φ2.5mm

- ✔High mechanical strength
- ✔Long lifespan
- ✔High water quality
- ✔High water recovery
- ✔Simply and reliably operation
- ✔Low running cost

6

Installation map (Overseas)



Europe
<Norway> Vanvikan (900 m³/d)
<Slovakia> Klenovec (12,000 m³/d)
<Netherlands> Andijk WTP (120,000 m³/d)
<UK> South West water WTP (96,000 m³/d)
<Switzerland> Luzern/Sonnenberg WTP (12000 m³/d)

USA
<Colorado State> Parker WTP(37,900 m³/d)
<Montana State>
Butte/Basin Creek WTP (26,400 m³/d)

Asia
<Korea> Yeoncho WTP (16,800 m³/d)
<Vietnam> Simplified Ceramic Membrane(50 m³/d)
<Singapore> PUB/Cho Chua Kang WTP(180,000 m³/d)
<Cambodia>
Mobile Ceramic Membrane × 1 truck (40～75 m³ /d / truck)
<Myanmar>
Mobile Ceramic Membrane × 10 trucks (75 m³ / d /truck)

Africa
<Cameroon> Camwater/ several WTP (17,140 m³/d)
<Malawi, Kenya, Togo, Lesotho, Cote d'Ivoire>
Mobile Ceramic Membrane x 13 (40～225 m³/d)

7

3. Mobile Ceramic Membrane Filtration Equipment

8

Mobile Ceramic Membrane Filtration Equipment

9

General descriptions of Mobile Unit

◆Concept of Mobile Ceramic Membrane Filtration Equipment

MCM is suitable for

✓ Rural areas with difficulty in the pipe distribution of drinking water or O&M of conventional water treatment plants

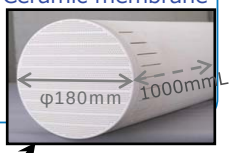
✓ Emergency drinking water production at disasters

10

Characteristics of MCM

- ✓ Easy operation even for high turbidity water
- ✓ Easy access to various water sources
- ✓ Clean and safe drinking water quality can be secured
- ✓ High recovery rate
- ✓ Ceramic membrane can be stored in the dry condition
  -> long-term storage & quick start-up are possible

Ceramic membrane



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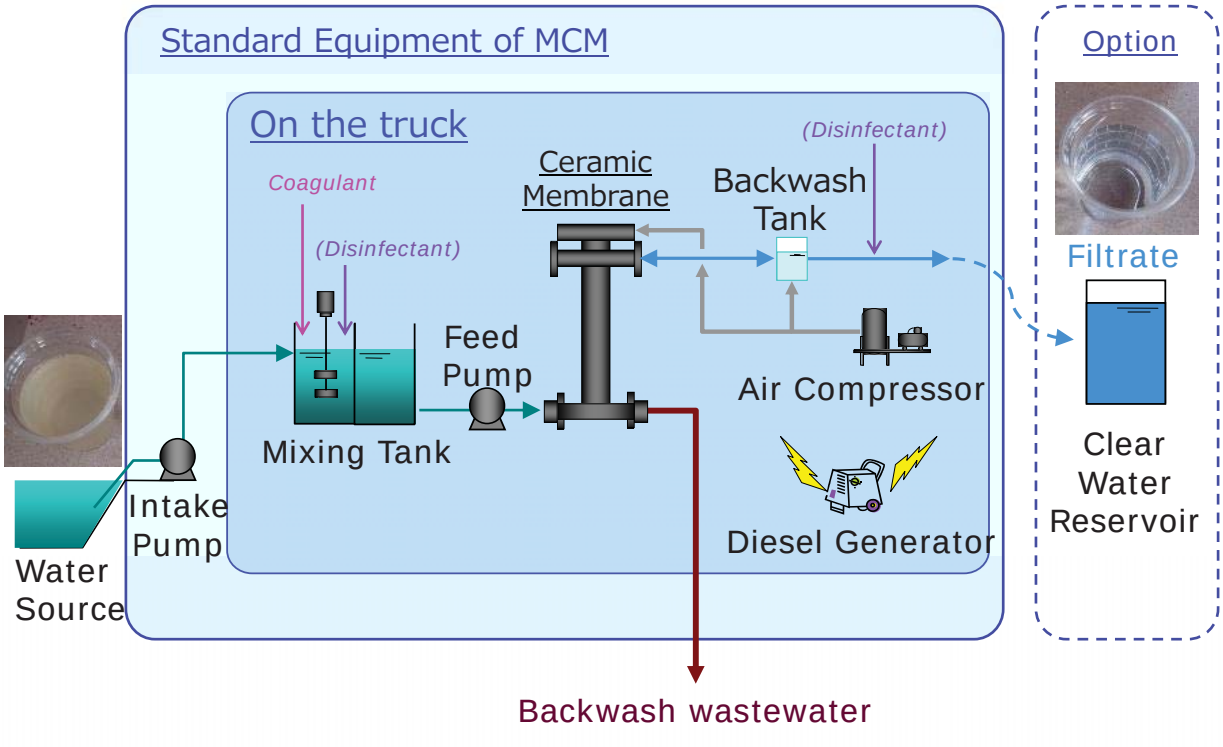
Process Flow Diagram



12

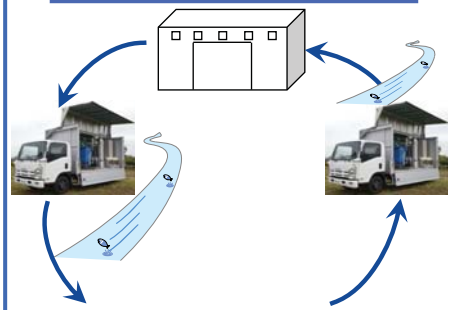
An Example of Application

METAWATER

Water Treatment

Water Distribution

Water Treatment Technology



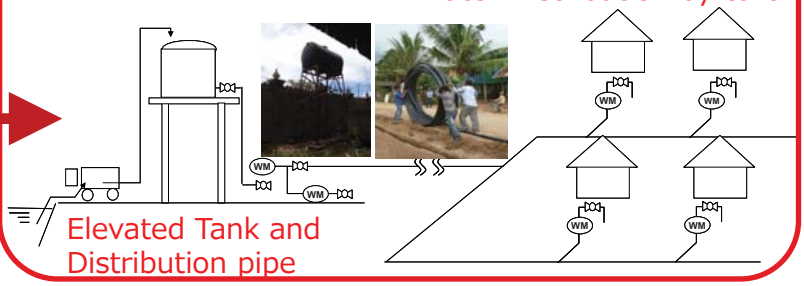
Intake Water and treatment

Water Distribution

Storage Tank

Water Distribution directly

Water Distribution by cart



Elevated Tank and Distribution pipe

13

Supply Record

METAWATER

Country	Malawi	Kenia	Cambodia	Togo	Lesotho	Cote dIvoire	Myanmar	Madagascar
Purpose of Usage	For water supply to rural area	For disaster countermeasure	For water supply to rural area			For disaster countermeasure		
Quantity	3 trucks	2 trucks	1 truck	3 trucks	4 trucks	1 truck	10 trucks	1 truck
Capacity (per truck)	75m3/day	50m3/day	75m3/day	50m3/day	200m3/day	40m3/day	75m3/day	75m3/day
NTU of raw water	520	520	500	520	500	500	Unknown	Unknown
Starting Operation	Jan. 2013	May 2013	Apr. 2014	Apr. 2014	Jun. 2014	Jan. 2015	Nov. 2017	Sep.2021

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Activity in Africa

Intaking Site (in Keyna)

Raw water with 300NTU (in Keyna)

Training session (in Malawi)

Supplying treated water (in Malawi)

15

Activity in Myanmar

Sales starting ceremony (in Yangon)

Water supplying demonstration (near Yangon)

Water supplying demonstration (near Mandalay)

Treated water for the people (near Yangon)

16

Project in Malawi

17

Thank you for your attention

Please feel free to contact us at:
matsui-kazuki@metawater.co.jp

Water Leak Detection Devices
FUJI TECOM INC.

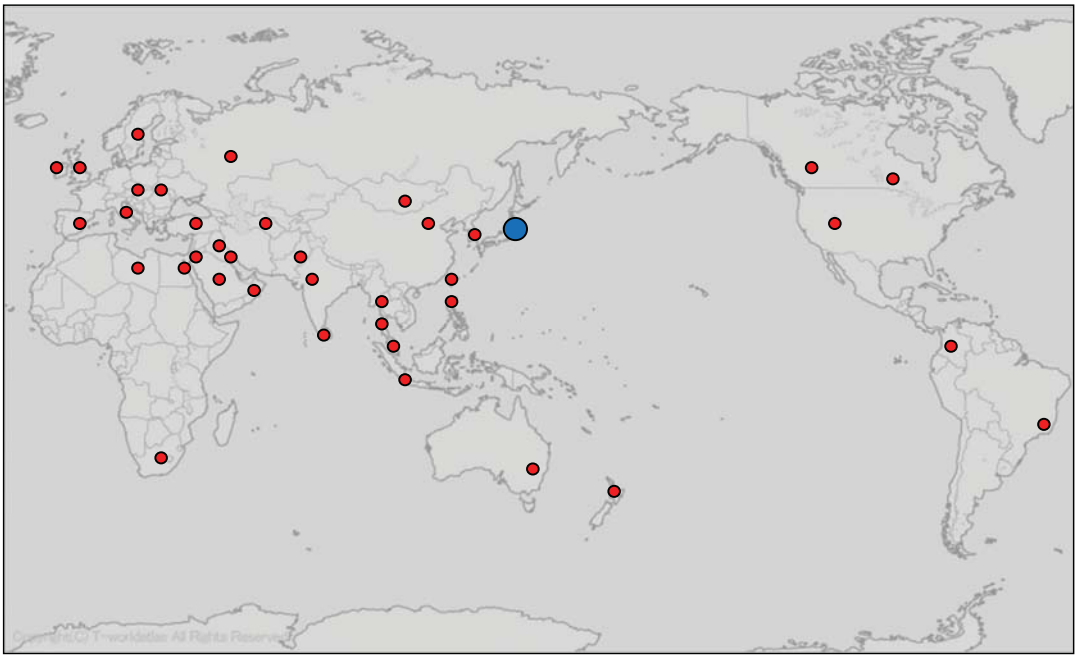
FUJI TECOM INC.

Domestic Offices and Service Network

- Headquarter & Overseas Sales Group: Chiyoda-ku, Tokyo
- Technical Development & Training Center: Niiza, Saitama
- 8 Regional Sales Offices

Worldwide Sales and Service Network

More than 40 distributors all over the world



FUJI TECOM INC.

Training Program

Training site

Buried Pipe Materials:
CIP/GP/LP/PVC/PE

1. Pipeline Operation / Maintenance and Leak detection
2. Introduction of survey equipment
3. Technical instruction of survey instruments
4. Comparison of various leak types & site conditions

Outline of leak investigation procedure

Setting and Survey of 'Area'

(Grasp priority area)

Which area?

Survey of 'Line'

(Sort out defective pipelines)

Which pipeline?

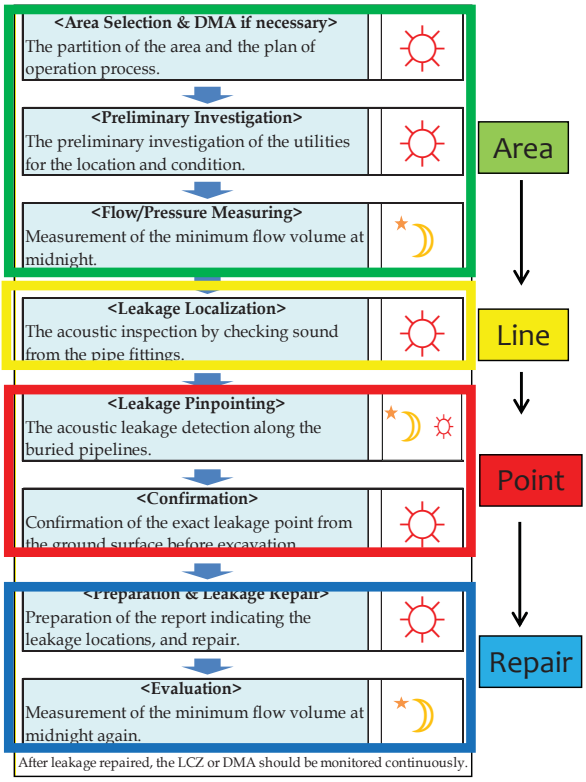
Survey of 'Point'

(Pinpoint leaking point)

Leaking point

FUJI TECOM INC.

Overview of water leak investigation



'Area' phase
- Pipeline locating
- Flow / Pressure measuring

'Line' phase
- Specifying leakage pipeline

'Point' phase
- Pinpointing leaking point
- Investigation before excavation

FUJI TECOM INC.

Devices for ‘Pipeline locating’

Metal locator F-90M

Used to detect buried boxes, fire hydrants, etc. The buzzer and meter help investigation from auditory and visually aspects.

Pipeline & cable locator PL-G

The receiver detects the magnetic field generated in the pipe and identifies the position and depth of the pipe. The buzzer, vibrator, and LED will inform you the position of the pipe.

Non-metallic pipe locator NPL-100

The transmitter sends signal sound from a fire hydrant etc. Signal sound waves are detected on the surface by receiving unit to locate buried non-metal pipes.

FUJI TECOM INC.

Devices for ‘Flow / Pressure measuring’

Pressure and flow data logger DLS-HS

You can measure and save water pressure data.
By attached software, you can make table or graph of the data.
In addition, by using multiple units, it is possible to check the pipe network by simultaneously measuring of the water pressure at multiple points.

Portable ultrasonic flow meter UFP-20

A flow meter to measure the flow rate inside a pipe using ultrasonic waves. (Product of Tokyo Keiki)

FUJI TECOM INC.

Devices for ‘Specifying leakage pipeline’

Leak Noise Logger System LNL-1

Install loggers on a valve, etc., and the minimum sound pressure value propagating in the pipeline is measured based on a fixed measurement interval. Graphing etc. is possible with attached software.

Digital Sound Detector FSB-8D Noise Level Analyzer FSJ-1

An electronic listening stick that captures a weak leak sound and discovers the leak by comparing the sound with the numerical value. By installing a analyzing unit, automatic judgment and recording of judgment results are possible.

Listening Stick LSP Series

It is used to check for abnormal noise propagating in the pipeline. Check the sound of water leaks and the wetness in the ground by touching the valve or inserting it into the hole drilled with a boring bar (described later).

FUJI TECOM INC.

Devices for ‘Pinpointing leaking point’

Digital Quatro Correlator LC-5000

Using 4 preamplifiers, in addition to the conventional "2-point correlation", simultaneous correlation of up to 6 routes can be performed. In addition, it is also equipped with a logger function, so it is possible to check for water leaks after collecting the equipment at a later date.

Digital Noise Reduction Water Leak Detector DNR-18

Equipped with a noise reduction digital filter, leak detection can be performed regardless of the noise that interferes. Leakage sound level values at 250 points can be recorded and graphed with attached software.

Water Leak Detector LDR-20

A leak detector with significantly improved sensitivity. The small and light design reduce the work load for a long time. By adopting universal design, pick-up sensor can be connected to either left or right. Data display and report output are possible with an attached application.

FUJI TECOM INC.

Devices for ‘Investigation before excavation’

Boring Bar
BB-1.0

Drive up to the close point of the pipeline and make a hole for the listening stick.

Listening Stick
LSP Series

Apply it to a valve plug or insert it into a hole drilled with a boring bar, and check for water leakage and wetness in the ground.

FUJI TECOM INC.

Thank you for your attention!

Contact

Mail: overseas_sales@fujitecom.co.jp
Web: https://www.fujitecom.com/

Themes of Ideathon

1st October, 2021
JICA Survey Team

Group Discussion Program
AM
(1) Self introduction of attendants in each group

(2) Decision of final presenters and secretaries for record and action plan (hopefully more than 2, not only JICA Survey Team)

(3) Check and revise the discussion theme if any group theme is too many (for 2 hours discussion: less than 30 minutes for current issue, remaining time for future)

(4) Question and Discussion (use white board as required)

PM
(5) Preparation of Action Plan

(6) Presentation by each group and discussion

Group 1: NRW reduction and improvement of O&M and implementation regime

1. Understanding and Organization of Current Situation
   1) What is current accurate NRW rate, which is bigger between physical loss and commercial loss?
   2) How is old pipe situation and deterioration in area wise
   3) What is current situation of water leakage due to high pressure, valve control

2. Best practice by technical countermeasures to reach to such as 15% of NRW rate as target and General
   1) Any good practice in European countries or neighboring countries in Africa
   2) Good practices in Japan and by JICA technical cooperation
   3) Any activity started in Uganda
   4) What is realistic target of NRW rate (in how many years) and goals?

3. Actions on Infrastructural development to cope with physical loss
   1) Water leakage detection (device, regime)
   2) Pipe replacement and upgrading,
   3) Repair of pipe
   4) Water pressure management
   5) GIS mapping system
   6) Deteriorated pipe analysis
   7) Training of contractor for pipe repair etc.
   8) Any requirement of training yard for leak detection etc., improvement of on the job training

4. Actions for Commercial loss
   1) How to reduce the metering inaccuracy (selection of meter, calibration of meter, replacement)
   2) How to monitor the supplied flow
   3) How to reduce the stealing water
   4) How to cooperate/coordinate between technical dept. and commercial dept.

5. Economic/Financial, organizational aspect
   1) Asset management system,
   customer ledger system
   2) Investment plan for pipe replacement etc.
   3) Strengthening of NRW department
   4) Capacity development for staff

Group 2: Improvement of Kampala Water Supply (WTP, PPP)

1. Historical and Current Situation and Issue of Kampala Water region

Treatment

1) lake Victoria water quality

2) treatment quality (Gaba, Katosi)

Distribution (Area wise)

1) Central Kampala

2) Surrounding Area

3) Most suburb area

Distribution (Issue wise)

1) Consumption per capita, supply hour

2) water pressure

3) water quality

Skill and training

1) any insufficient skill of staff

2) any insufficient skill or problem of contractors

2. Improvement of Management, Operation and Maintenance of Facilities

1) Improve operation and maintenance for facilities (WTPs. Pipes)

2) Zoning and management, regional office

3) Possibility of PPP (management contract etc., history of PPP incl. regional area)

3. Investment requirement for new expansion, upgrade, replacement

1) How big expansion is required for future

2) requirement of upgrading facilities

3) replacement of old equipment (flow meter, valve etc.)

4) how to secure budget

4. Capacity Development

1) How to increase the staff

2) How to train the staff

3) Vocational training center

5. Commercial Revenue

1) Prepaid meters for Kampala (institutional, commercial)

2) Public stand pipe for pro-poor community

Group 3: Urban Water Supply in Local Areas outside Kampala

1. General Situation

Technical

1) water treatment capacity
2) water quality
3) water supply, pressure, NRW (stealing, water pressure by high pressure, etc.)
4) GIS mapping, asset management, customer service (ledger)

Financial

5) Financial situation in each region
6) understanding on future investment (grant fund) trend by central government

2. Best Practice for regional area development

1) Any specific activity by donor, NGO (infrastructure, PPP, village etc.)
2) low cost treatment or network development
3) Financial flow (internal subsidy) from capital city, government

3. Infrastructure Development

1) Finding reliable water source
2) optimization of distribution (e.g. pumping to high land area)
3) How to construct the low cost facility
4) How to serve for remote area
5) Public standpipe (ordinal, prepaid)
6) Any possibility of introducing PPP

4. How to reduce NRW in small towns

1) countermeasure for stealing water
2) reduction of alias (water tariff setting appropriate?)

5. Investment requirement

1) new water source
2) Expansion of facilities (WTP, network)
3) New technologies

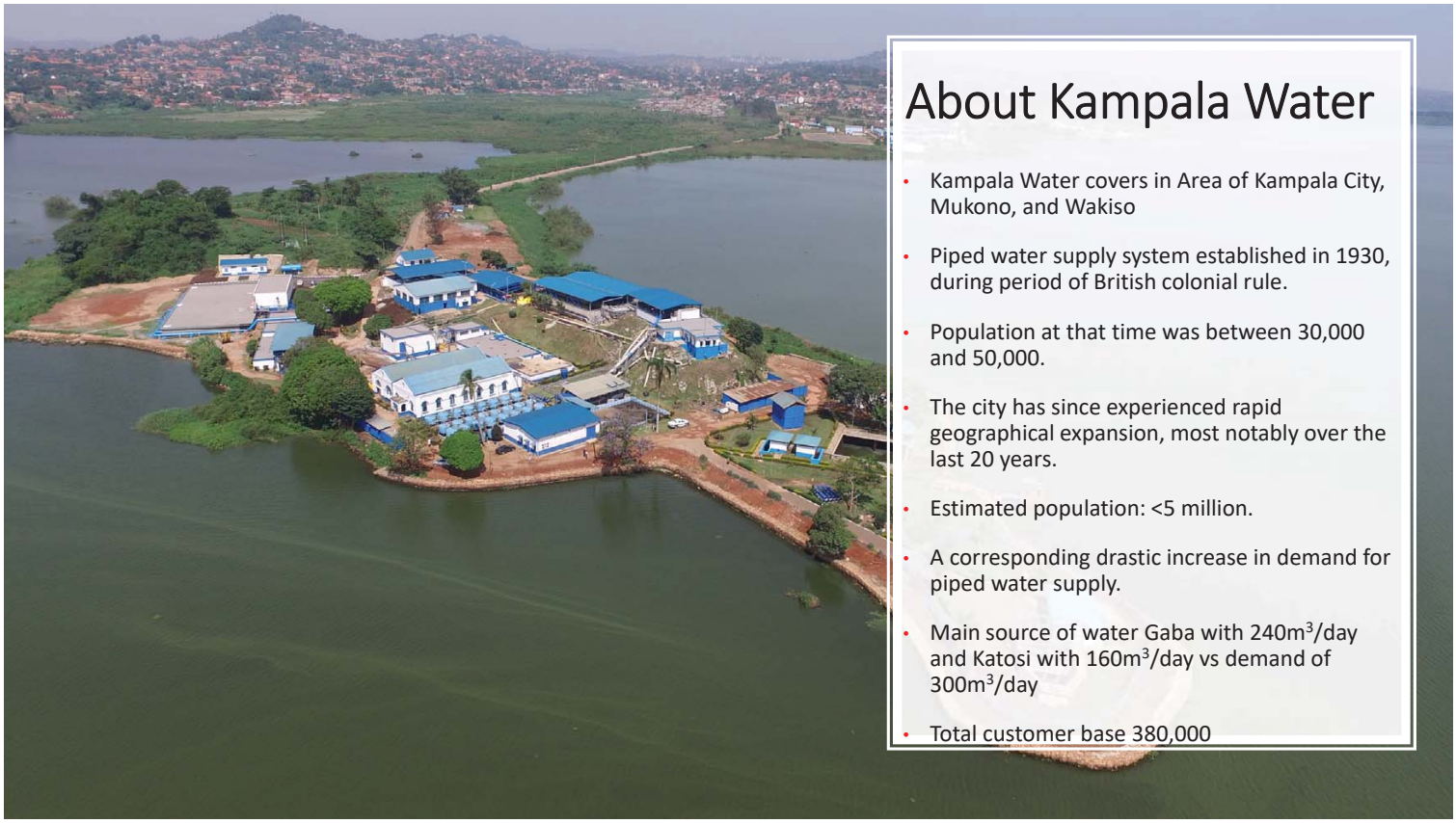
6. Capacity Building

1) how to increase new staff for rapidly expanding area
2) how to train the new staff (vocational training center etc.)

Kampala Water and Sewerage Services: highlights, Challenges and Opportunities

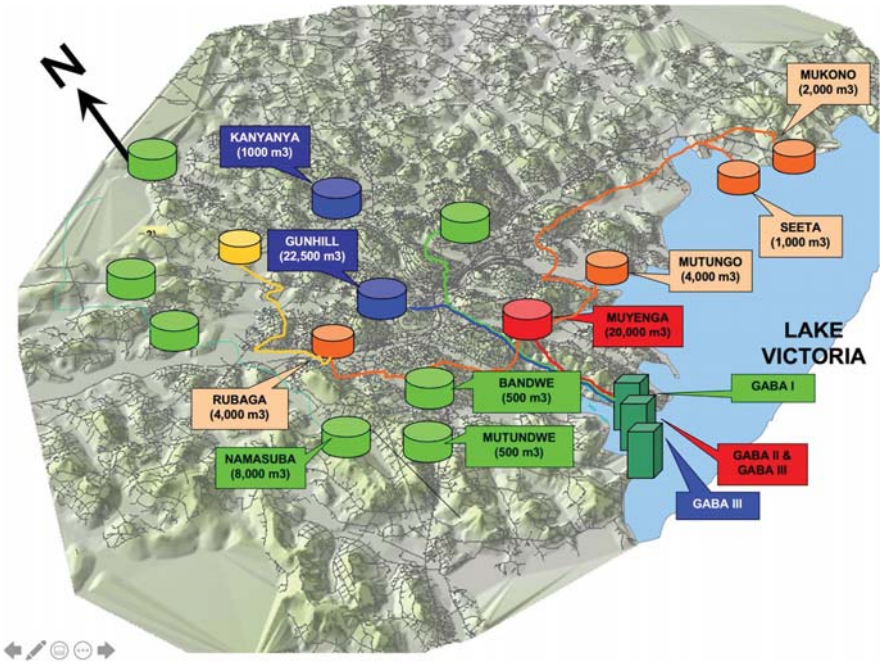
Mahmood Lutaaya
General Manager – NWSC Kampala

Presented to Uganda – Japan Business Matching Workshop on 1st October 2021

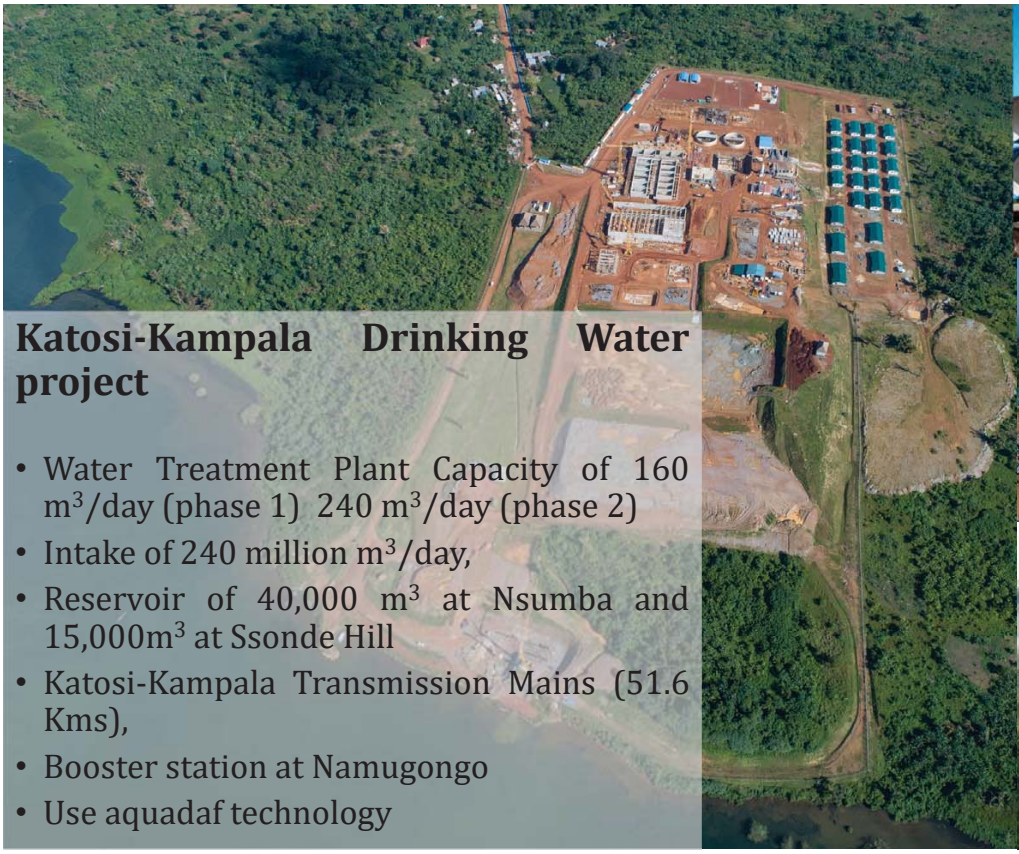


About Kampala Water

- Kampala Water covers in Area of Kampala City, Mukono, and Wakiso
- Piped water supply system established in 1930, during period of British colonial rule.
- Population at that time was between 30,000 and 50,000.
- The city has since experienced rapid geographical expansion, most notably over the last 20 years.
- Estimated population: <5 million.
- A corresponding drastic increase in demand for piped water supply.
- Main source of water Gaba with 240m^3/day and Katosi with 160m^3/day vs demand of 300m^3/day
- Total customer base 380,000

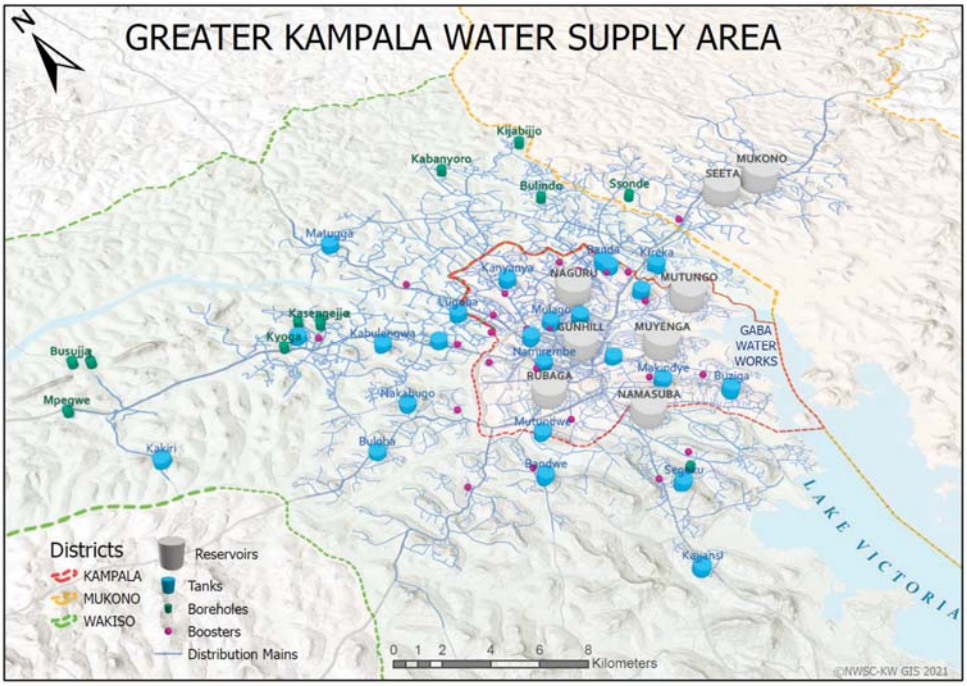


- **Production: Gaba I (1929), II (1992), & III (2007)**
  - Gaba I - 70K m^3/d, Gaba II -80K m^3/d, Gaba -100K m^3/d
  - Conventional treatment process (coagulation, sedimentation, filtration & disinfection)
  - 14 boreholes
- **Transmission and storage**
  - Reservoirs (70,000m^3): primary – 4No, secondary – 8No, balancing tanks – 9No.
- **Distribution network**
  - pipe network – 3,000km ≥ DN50mm , includes the attendant fixtures – 3,600No., and booster stations – 43No.



Katosi-Kampala Drinking Water project

- Water Treatment Plant Capacity of 160 m^3/day (phase 1) 240 m^3/day (phase 2)
- Intake of 240 million m^3/day,
- Reservoir of 40,000 m^3 at Nsumba and 15,000m^3 at Ssonde Hill
- Katosi-Kampala Transmission Mains (51.6 Kms),
- Booster station at Namugongo
- Use aquadaf technology


GREATER KAMPALA WATER SUPPLY AREA
N
Kijabijo
Kabanyoro
Bulindo
Ssonde
MUKONO
SEETA
Matugga
Banda
Kireka
Kanyanya
NAGURU
MUTUNDO
Lugoba
Mulago
SUNHILL
MUYENGA
GABA WATER WORKS
Kasangejje
Kyoga
Kabulengwa
Busujja
Namirembe
RUBAGA
Makindye
Buziga
Mpegwe
Nakabugo
NAMASUBA
Mutundwe
Kakiri
Bulobe
Bandwe
Seguku
LAKE VICTORIA
Kajjansi
Districts
KAMPALA
MUKONO
WAKISO
Reservoirs
Tanks
Boreholes
Boosters
Distribution Mains
0 1 2 4 6 8
Kilometers
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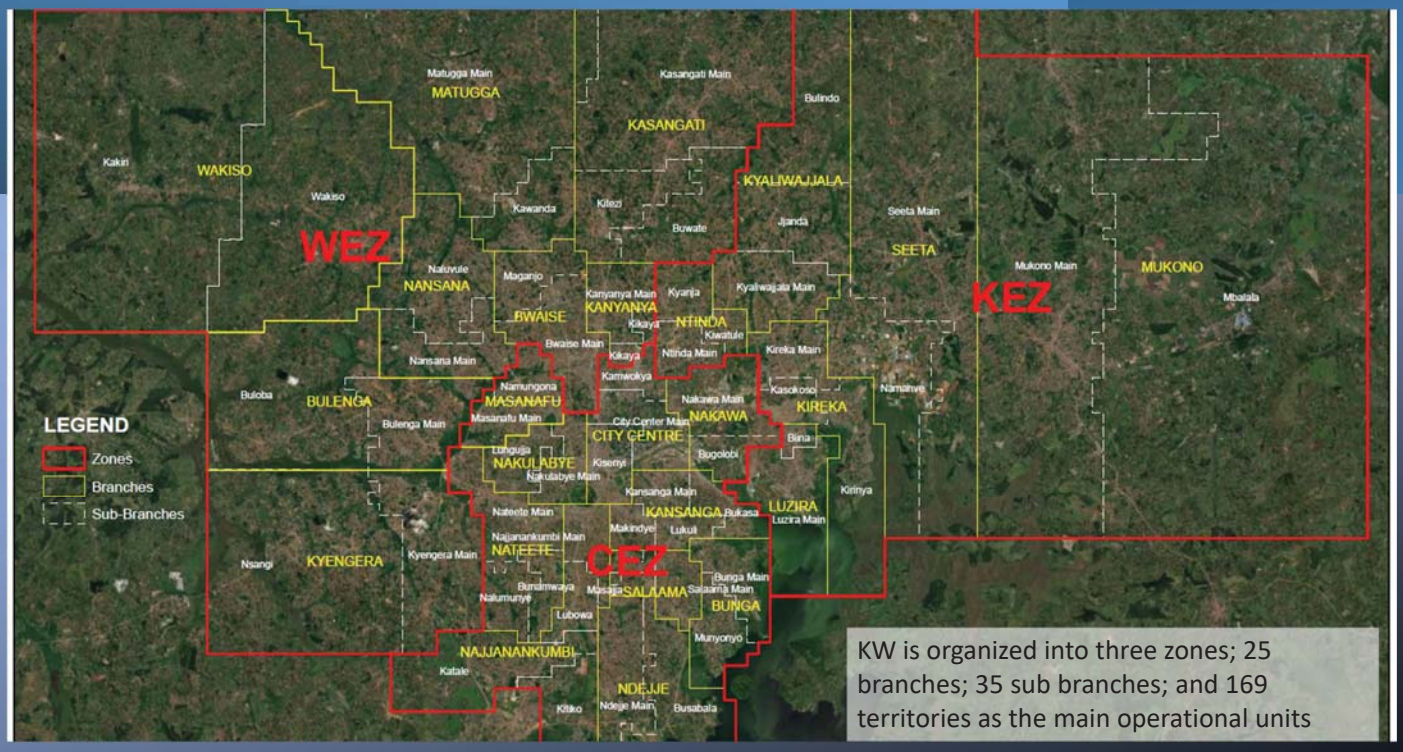
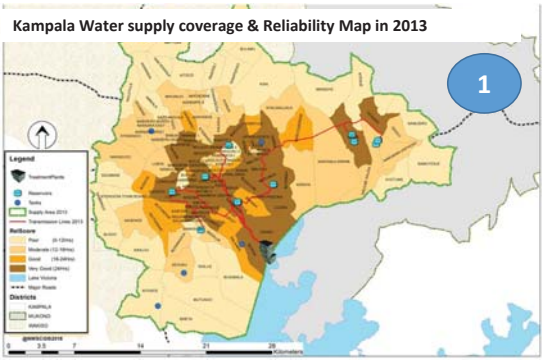
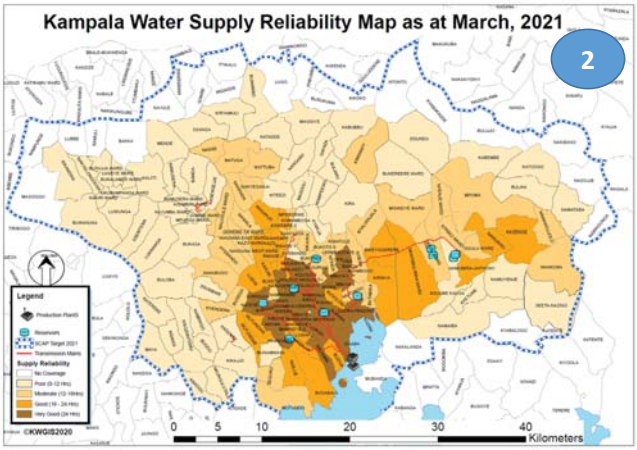
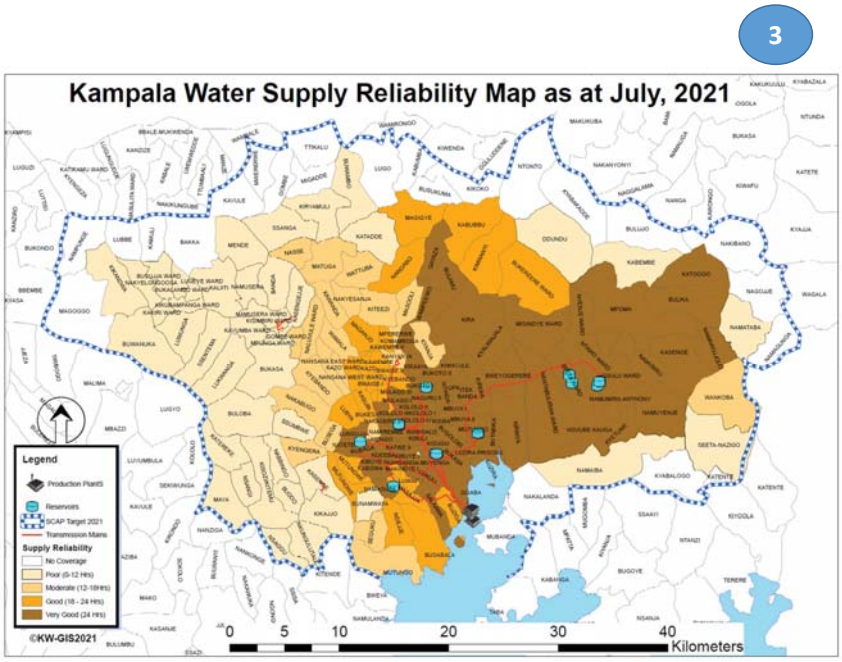
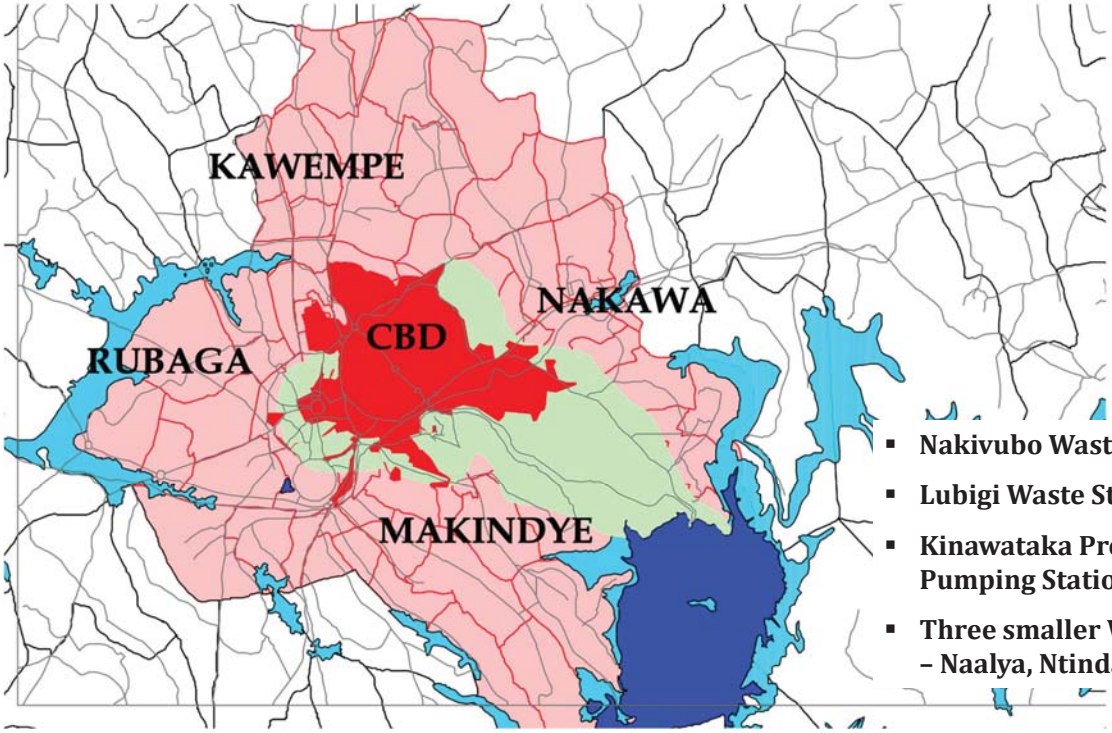

Matugga Main
MATUGGA
Kasangati Main
KASANGATI
Bulindo
Kakiri
WAKISO
KYALIWAJJALA
Wakiso
Kawanda
Kitezi
Buwate
Jjanda
Seeta Main
WEZ
SEETA
Nakuvule
NANSANA
Maganjo
Kanyanya Main
KANYANYA
Kyanja
Kyaliwajjala Main
KEZ
Mukono Main
MUKONO
Mbalala
BWAISE
NTINDA
Kikaya
Kiwaatule
Bwaise Main
Kireka Main
Nansana Main
Kamwokya
Buloba
BULENGA
Namungona
MASANAFU
Nakawa Main
Kasokoso
Namanve
KIREKA
Masanafu Main
City Center Main
NAKAWA
Bulenga Main
CITY CENTRE
Bina
Bugolobi
NAKULABYE
Kisenyi
Nakulabye Main
Kansanga Main
Kirinya
LEGEND
Zones
Branches
Sub-Branches
Nateete Main
KANSANGA
Bukasa
LUZIRA
Luzira Main
Najjanankumbi Main
Makindye
Lukuli
Nsangi
KYENGERA
Kyengera Main
NATEETE
CEZ
Bunga Main
Bundmwaya
Masaja
SALAAMA
Salaama Main
Nakumunye
BUNGA
Lubowa
Munyonyo
NAJJANANKUMBI
Katale
NDEJJE
Kitiko
Ndejje Main
Busabala
KW is organized into three zones; 25 branches; 35 sub branches; and 169 territories as the main operational units



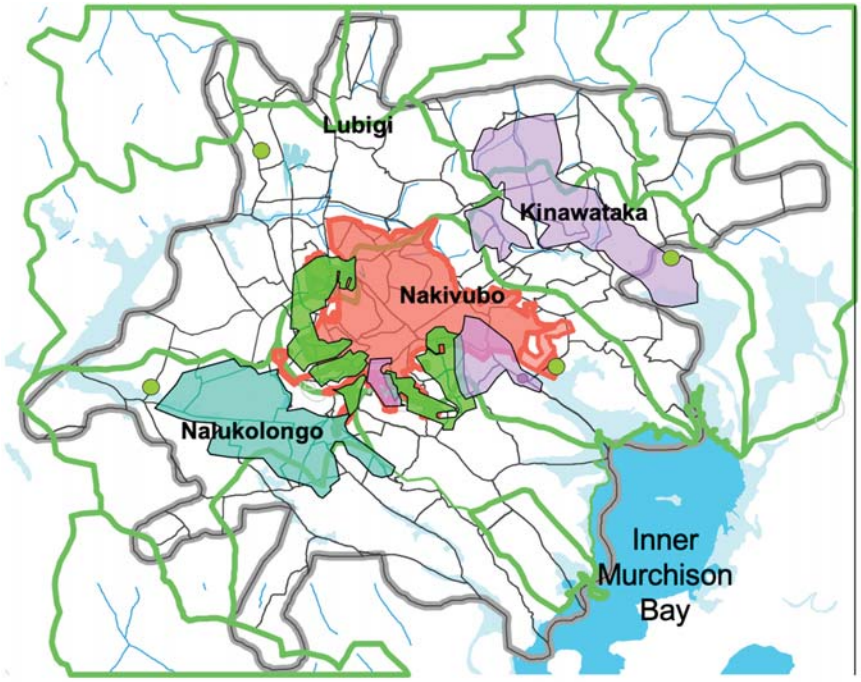




Kampala Water Sewage Services Coverage



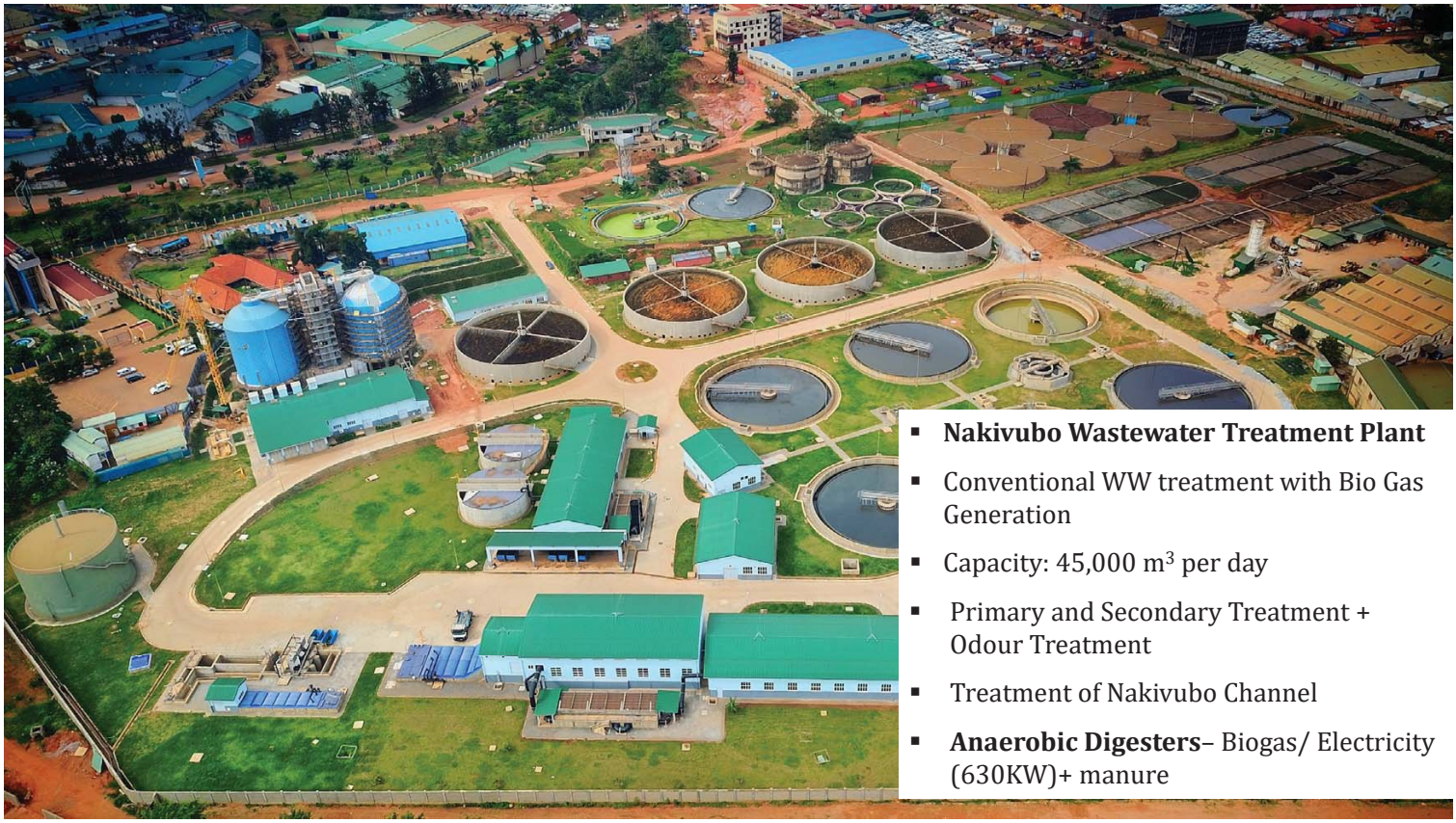
- Nakivubo Wastewater Treatment Plant
- Lubigi Waste Stabilisation Ponds
- Kinawataka Pre-Treatment and Pumping Station
- Three smaller WSPs – Housing Estates – Naalya, Ntinda and Bugolobi



- Nakivubo extensions (2019)
- Kinawataka catchment (2019)
- Lubigi catchment (2014)
- Nalukolongo catchment (2023)

2021	2033
15%	30%

- **Lubigi Waste Stabilisation Ponds**
- Capacity 5,400 m^3/ day
- Briquettes made from Lubigi sludge in partnership with 'Water for People"
- Manure production



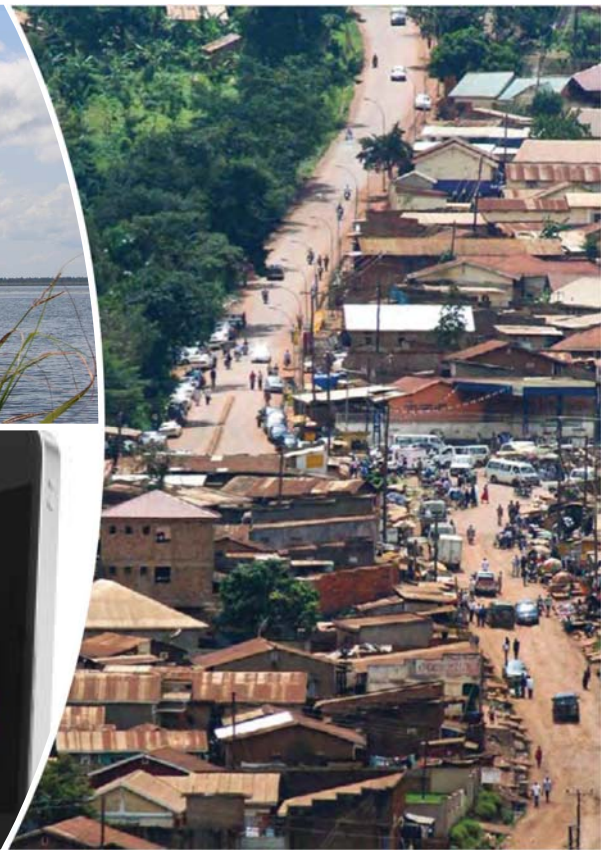
- **Nakivubo Wastewater Treatment Plant**
- Conventional WW treatment with Bio Gas Generation
- Capacity: 45,000 m^3 per day
- Primary and Secondary Treatment + Odour Treatment
- Treatment of Nakivubo Channel
- **Anaerobic Digesters**– Biogas/ Electricity (630KW)+ manure

Ongoing and Planned Interventions

1. Kampala Water-Lake Victoria WATSAN Project (KW – LVWATSAN)
   - Network Restructuring & Rehabilitation.
   - Water Supply and Sanitation Services in Informal Settlements.
   - Construction of Primary Network Pipelines in Greater Kampala Metropolitan Area (GKMA)
2. **Bulk water evacuation projects from Naguru, Sonde and Mukono reservoirs. 40km of pipework.**
3. **Gaba 1 works:** Construction of a clarifier and sludge handling facility to minimize impact on the environment by clarifier sludge
4. **Wakiso West Water Supply Project – 62,500 m^3/day**

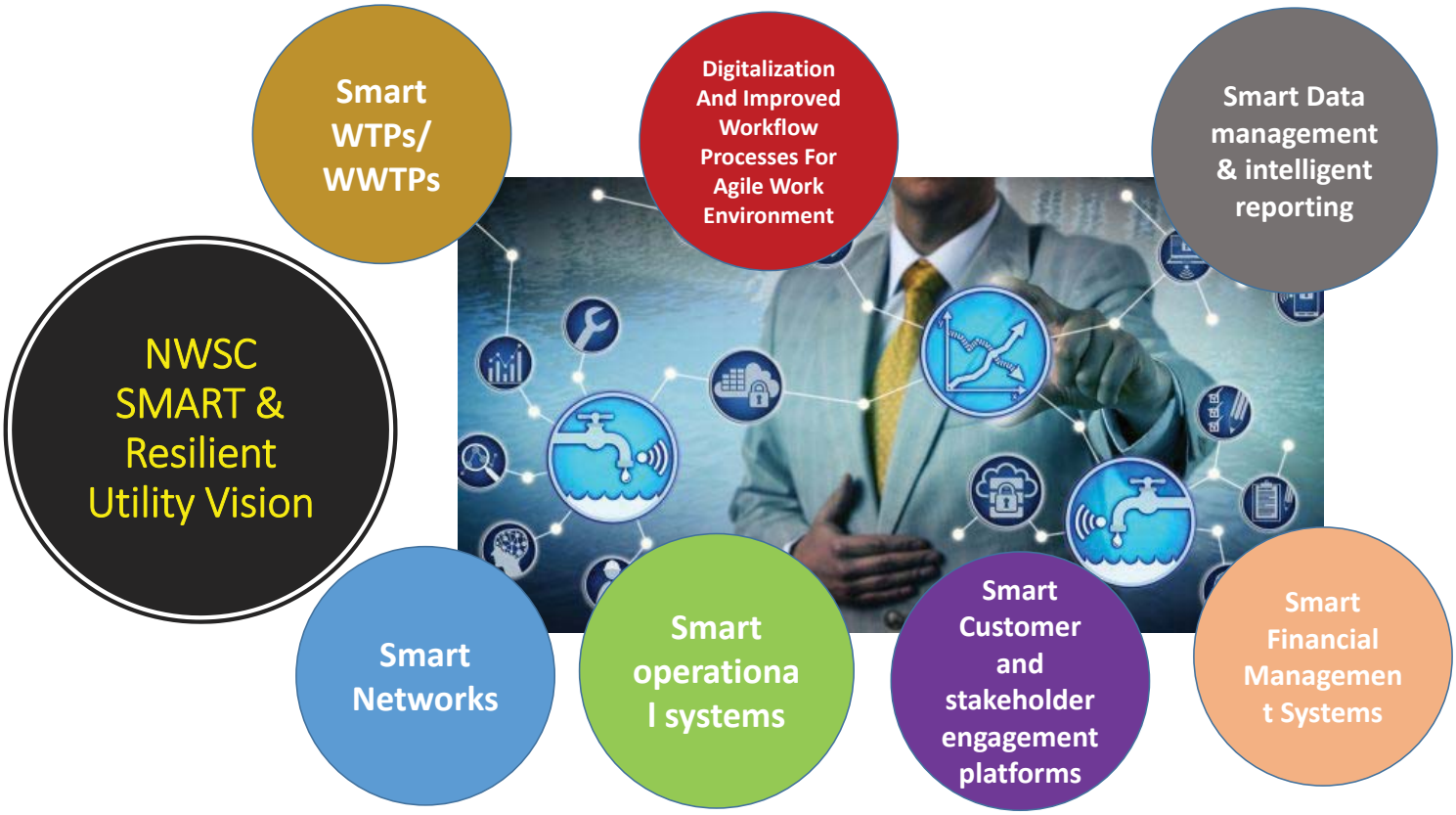
What are the challenges or Opportunities

- **Demographic Change**
  - High rate or urbanization – Increasing population – target population is a moving target
  - Increasing Demands - Focus on infrastructure development for the unserved areas
  - Uneven Development - More customers in vulnerable circumstances (pro-poor service provision challenge)
- **Climate Change - Environment/source Protection**
  - Too much water/Not enough water
  - Increased pollution
  - Environmental degradation
- **Technological** Change
  - Digital transformation - Speed of new technologies
  - Explosion of data
  - Protection and security concerned - cyber security
  - Smart Utility Vision and holistic customer digital experience
- **Change in customer expectations**
  - Increased awareness
  - Less tolerance of service outages.
  - Desire for a more personalized service
  - Expect experiences and interactions with greater choice, personalization, simplicity and ease



What are the challenges or Opportunities

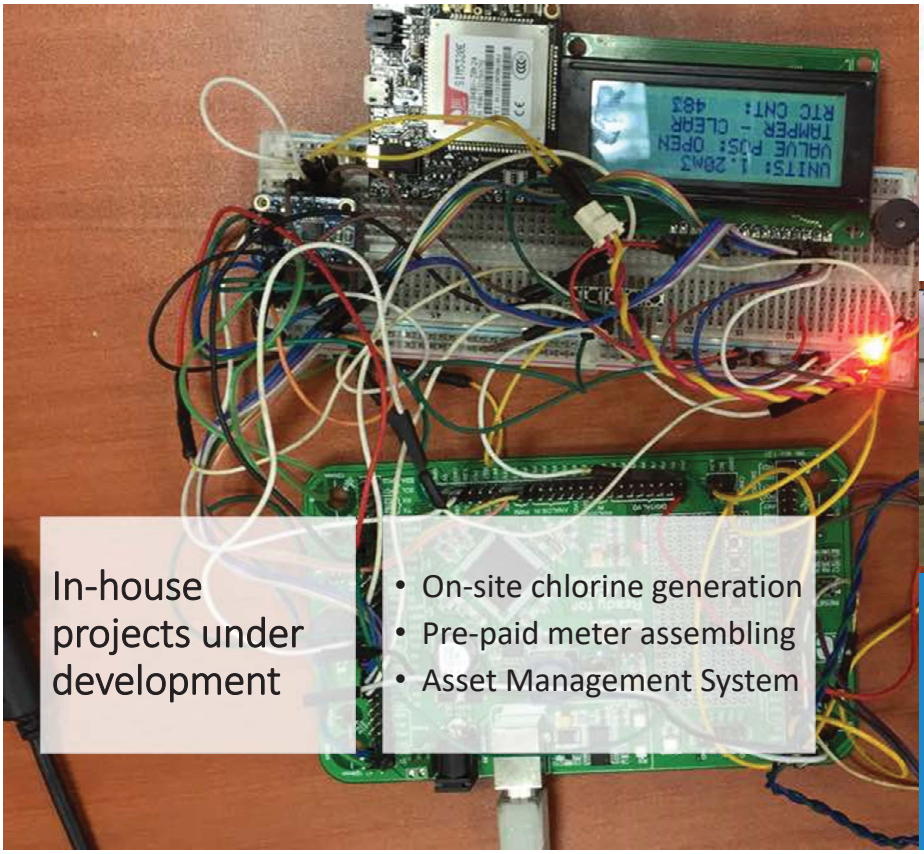
- **Relatively High NRW – NRW Strategy**
- **Intermittent Water Supply**
- **Infrastructure & Financing Gap**
  - Aged infrastructure
  - Huge infrastructure gap to meet the unserved population
  - Financing Gap – Inadequate funds to finance investments/ Non-full cost recovery tariff
- **Operational and Caps**
  - High Energy and chemical Costs - Green Energy Options and process optimization
  - Highly manual Data collection and non mechanized operations
  - Inadequate documentation of infrastructure assets – pipes, fixtures etc.
  - Inadequate remote monitoring
- **Staff Capacity Gaps**


Smart WTPs/ WWTPs
Digitalization And Improved Workflow Processes For Agile Work Environment
Smart Data management & intelligent reporting
NWSC SMART & Resilient Utility Vision
Smart Networks
Smart operational systems
Smart Customer and stakeholder engagement platforms
Smart Financial Management Systems


IN-HOUSE VS
OUTSOURCED
SOFTWARE DEVELOPMENT
In-House Solution/software development
START

Adopting a holistic customer Digital Experience

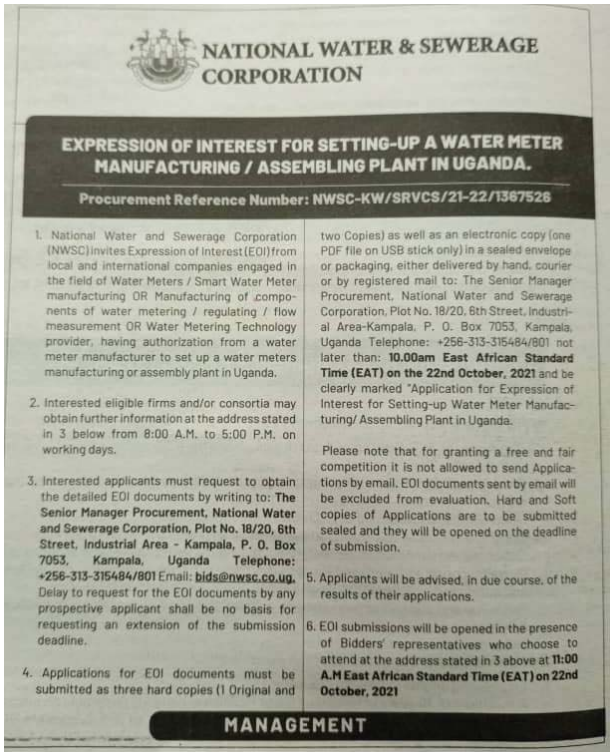
- **One stop customer interaction center**
- **Interactive website**
- **Mobile app**
- **E-payment options**
- **Social media platforms**



In-house projects under development

- On-site chlorine generation
- Pre-paid meter assembling
- Asset Management System

Modern Meter Laboratory and Meter Assembly Plant



NATIONAL WATER & SEWERAGE CORPORATION

EXPRESSION OF INTEREST FOR SETTING-UP A WATER METER MANUFACTURING / ASSEMBLING PLANT IN UGANDA.

Procurement Reference Number: NWSC-KW/SRVCS/21-22/1367526

1. National Water and Sewerage Corporation (NWSC) invites Expression of Interest (EOI) from local and international companies engaged in the field of Water Meters / Smart Water Meter manufacturing OR Manufacturing of components of water metering / regulating / flow measurement OR Water Metering Technology provider, having authorization from a water meter manufacturer to set up a water meters manufacturing or assembly plant in Uganda.

2. Interested eligible firms and/or consortia may obtain further information at the address stated in 3 below from 8:00 A.M. to 5:00 P.M. on working days.

3. Interested applicants must request to obtain the detailed EOI documents by writing to: **The Senior Manager Procurement, National Water and Sewerage Corporation, Plot No. 18/20, 6th Street, Industrial Area - Kampala, P. O. Box 7053, Kampala, Uganda Telephone: +256-313-315484/801** Email: **bids@nwsc.co.ug.** Delay to request for the EOI documents by any prospective applicant shall be no basis for requesting an extension of the submission deadline.

4. Applications for EOI documents must be submitted as three hard copies (1 Original and two Copies) as well as an electronic copy (one PDF file on USB stick only) in a sealed envelope or packaging, either delivered by hand, courier or by registered mail to: The Senior Manager Procurement, National Water and Sewerage Corporation, Plot No. 18/20, 6th Street, Industrial Area-Kampala, P. O. Box 7053, Kampala, Uganda Telephone: +256-313-315484/801 not later than: **10.00am East African Standard Time (EAT) on the 22nd October, 2021** and be clearly marked "Application for Expression of Interest for Setting-up Water Meter Manufacturing/ Assembling Plant in Uganda.

Please note that for granting a free and fair competition it is not allowed to send Applications by email. EOI documents sent by email will be excluded from evaluation. Hard and Soft copies of Applications are to be submitted sealed and they will be opened on the deadline of submission.

5. Applicants will be advised, in due course, of the results of their applications.

6. EOI submissions will be opened in the presence of Bidders' representatives who choose to attend at the address stated in 3 above at **11:00 A.M East African Standard Time (EAT) on 22nd October, 2021**

MANAGEMENT

UGANDA – JAPAN BUSINESS MATCHING WORKSHOP

PRESENTATION ON THE NRW AND ASSET MANAGEMENT SITUATION IN NWSC-KW

Godfrey Sentume Arinaitwe
SM- NRWM
1st October 2021

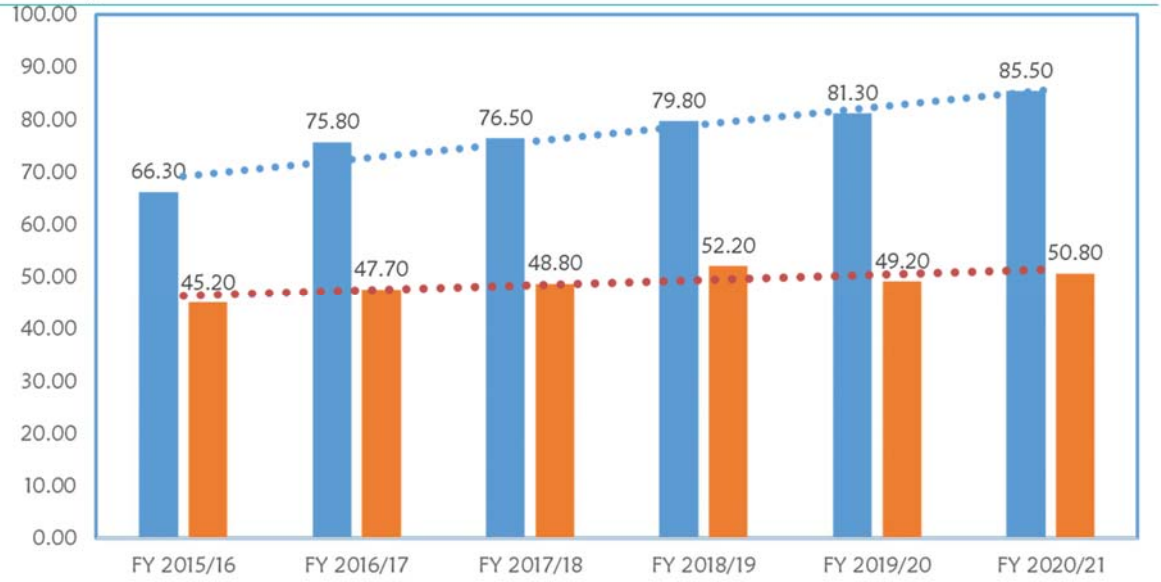
BRIEF BACKROUND

Non-Revenue Water (NRW) has remained one of the biggest challenges in National Water and Sewerage Corporation (NWSC) and Kampala Water (KW) has the biggest contribution. Despite the numerous interventions carried in the previous years to reduce NRW, Kampala Water's NRW has remained relatively high ranging between 32% - 44%.

NRW <33%

WATER SUPPLY AND SALES TRENDS

FY	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
System Input Volume (million m^3)	66.3	75.8	76.5	79.8	81.3	85.5
Water Sales (million m^3)	45.2	47.7	48.8	52.2	49.2	50.8
NRW (%)	31.8	37.1	36.2	34.6	39.5	40.6



System Volume input improvement – 29%, Water Sales improvement 12% over the last 5 years

NRW TRENDS

FY	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21
System Input Volume (million m^3)	66.3	75.8	76.5	79.8	81.3	85.5
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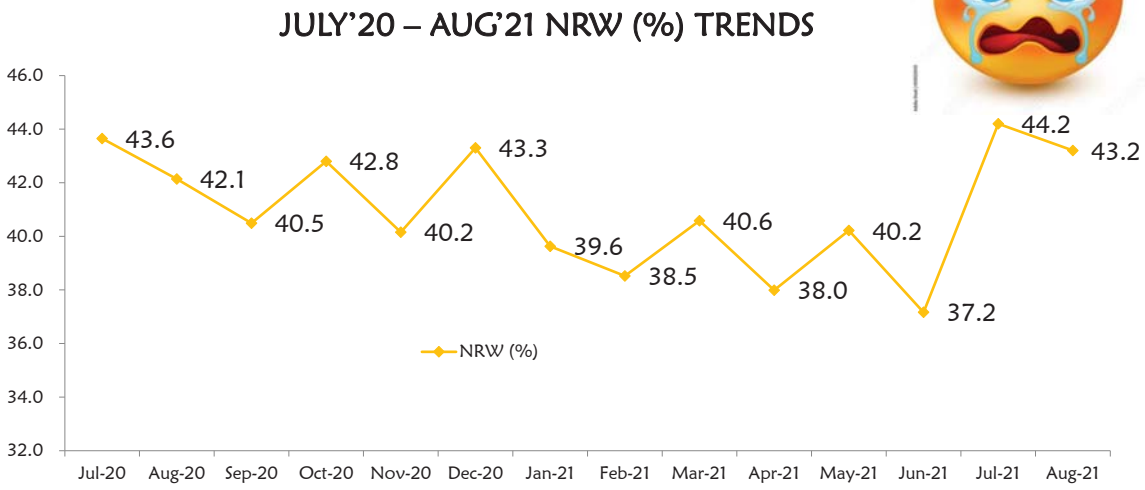


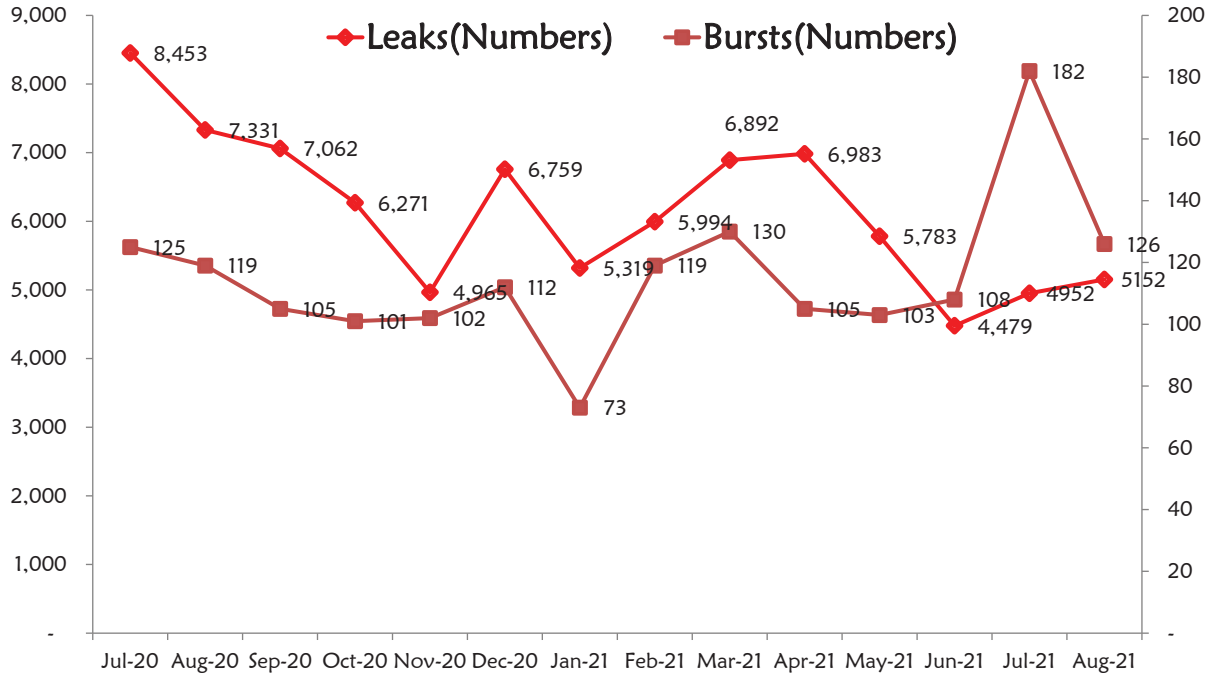
CHALLENGES AND GAPS

Physical Losses

- Bursts and Leakages are on the rise….
- Aged pipe network sections that keep failing and require renewal/replacement.
- Limited number of leak detection equipment of which some are aged and require replacement.
- A large number of critical network fixtures that are not mapped.

CHALLENGES AND GAPS

No. of Leaks and Bursts _ July'20 – Aug'21



CHALLENGES AND GAPS

Metering Issues

- There are quite a number of customer meters that are aged beyond the recommended age/meter dial. This compromises the metering efficiency and the corporation ends up losing.
- There are vandalized and some defective meters in the field …..Some are actually repairable but we lack spare parts.
- Lack of Robust Meter Management System
- The large consumer meters are currently monitored manually with at least one reading picked per week, which does not assist in proper consumption analysis.

CHALLENGES AND GAPS

Water Theft / Illegal Use

- Illegal use is on the rise…….
- Theft of fixtures such as Valves and Straight Connectors causing loss of Water

CHALLENGES AND GAPS

Institutional Challenges

- Kampala water is currently operated as one system with no hydraulically controlled zones.
- There are limited bulk meters that can assist in measurement of flows to various parts of the primary water supply network.
- Currently, KW Network Operates as one pressure-managed area much as we experience excessive pressures in some parts of the network. Customers on raised Areas experience low pressures during peak hours

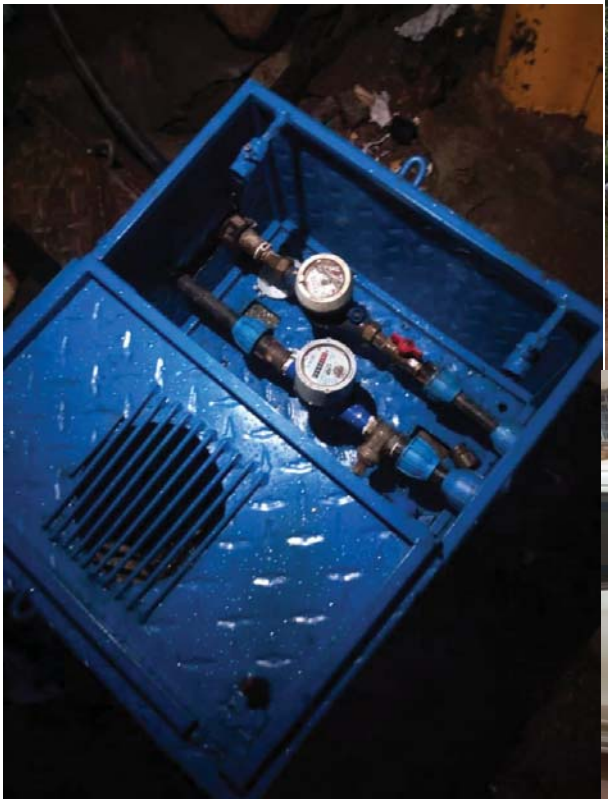
ONGOING INTERVENTIONS

NRW STRATEGY

- Development of a NRW Management Module that is web based to help in data capture and management of field anomalies.
- Mapping and tracking all unregistered Properties and Premises
- Strengthening Local Communities leadership in Combatting NRW
- Enhanced Meter Management (Replacement of Aged Meters, Repair of Defective Meters, Servicing of Meters, procurement and upgrade of Meter Laboratory. ***Meter Management System****
- Strengthening Water Loss Prevention Unit (WALOPU) to deal with Water Theft / Illegal use. Including partnering with _The Army, Police and Judiciary.
- SWALOP Programme to deepen surface Pipes
- Targeted Network Control Improvement focusing on Restoring Network fixtures to full functionality and accessibility
- Operation House to House (H2H) Audit for field anomalies (Identification and Remedy)

ONGOING INTERVENTIONS

NRW STRATEGY



ONGOING INTERVENTIONS

ASSET MANAGEMENT

Introduction of MapKit, which has facilitated the following:

- Enhanced survey, mapping, condition assessment and maintenance scheduling for critical network fixtures.
- Improved capture and analysis of location information for all reported and handled incidents and anomalies (leaks, bursts, defective meters etc.)

Revamped Hydraulic Modelling Unit, resulting in:

- Improved network planning and rationalization of network operations.
- Support for implementation of Kampala Water Masterplan, in collaboration with the design consultants of KW LVWatsan Package 2b.

Ongoing pilot project (with support from Altereo France), targeting the following:

- Predictive mains failure analysis and modelling.
- Identification and prioritization of critical mains for targeted pipe renewal and replacement campaigns.

FOCUSED ON INTERVENTIONS

- Creation of District Metered Areas that can assist in monitoring the impact of activities related to reduction of NRW.
- Prioritized replacement of aged and Vandalized/defective customer meters to accurately measure the billed consumption.
- Procurement of leak detection equipment to improve on our active leakage control activities.
- Creation and monitoring of pressure-managed areas in places that are faced with excessive pressures, as a means of reducing occurrence of network failures. Installation of PCVs
- Introduction of telemetric systems for flow and pressure controls within the distribution network.
- Reinstatement of Automated Meter Reading (AMR) system for better monitoring of large consumer accounts.
- Prioritized network renewal and replacement campaign for aged pipe sections that have experienced frequent failures.
- Renewal and reinstatement of critical network fixtures.

WATER SUPPLY SITUATION OF NWSC LOCAL AREAS (TORORO AND SOROTI)

PRESENTATION BY: Julius Kato Kavuma
NWSC

TORORO AREA OVERVIEW.

- Tororo Area was handed over to NWSC on 1st February 1988.
- The Area has seven (7) branches of Tororo, Busia, Malaba, Nagongera, Magodesi, & Nabuyoga.

WATER SUPPLY SOURCES

- Comprise mainly; River Malaba & motorized boreholes. (No. 11)

STATISTICAL DATA

- Current total average monthly water production 129,782m^3 and water sales of 105,143m^3 per month. (NRW 19%)
- Current demand is 203,102m^3 per month
- Future demand is 410,000m^3 per month
- Total population currently served of about 366,543 out of 601,481 people.
- Water Mains Distribution Network is about 440km and 10km of sewerage mains.
- Water Supply System having about 14,741 water

CURRENT INFRASTRACTURE

- Water treatment plant at Malaba
- Nine (9) boreholes at Busia – Average 8.5m^3/hr
- Two (2) boreholes at Nagongera – average 11m^3/hr
  Two (2) boreholes at Nabuyoga – average 5m^3/hr
- Four (4) Reservoirs
- 2 Booster Stations. (Not functional)

PROBLEM STATEMENT

- SCAP100 currently serves only 50,000 people vs 601,481
- Only half (366,543) of the 601,481 is served
- 702 Public Stand Pipes (PSPs) across 228 km length not adequate to serve the Tororo population
- Tororo Reservoir remains a crucial issue to go beyond 52.85km including neighboring areas to meet the future demand 410,000m^3
- Undefined sum of Villages to be served creates a gap to bridge

CHALLENGES AND WAYFORWARD

- Inadequate Water Treatment Plant hence need to upgrade plant from current design capacity of 5,100m^3/day to 10,000m^3/day
- Old Transmission System hence the need to upgrade the entire system from DN 300 DI pipes to DN 450 uPVC pipes.
- Frequent breakdown of pumps due to old age hence the need install new 2No.raw water submersible pumps, and construction of debris sieve along the river.

CHALLENGES AND WAYFORWARD

- Inadequate Supply to meet the required demand for water hence need to upgrade and extend the water distribution network system.
- Poor quality of the raw water from river Malaba due to silt accumulation during rain season and construction of debris sieve along the river.
- Low yields from motorized boreholes.

SOROTI AREA OVERVIEW.

- Soroti Area was handed over to NWSC in 2002
- The Area has seven (4) branches of Soroti, Serere, Kaberemaido, & Amuria.

WATER SUPPLY SOURCES

- Comprise mainly; River Awoja & motorized boreholes. (No. 04)

STATISTICAL DATA

- Current total monthly water production 135,845m^3 and water sales of 104,600m^3 per month. (NRW 23%)
- Current demand is 210,000m^3 per month
- Future demand is 420,000m^3 per month
- Total population currently served of about 201,150 out of 700,300 people.
- Water Mains Distribution Network is about 634km and 22km of sewerage mains.
- Water Supply System having about 10,358 water connections and 528 sewerage connections

CURRENT INFRASTRACTURE

- A conventional Water treatment plant at Awoja
- One (1) borehole at Amuria – 8m^3/hr
- One (1) borehole at Kaberemaido - 8m^3/hr
- Two (2) boreholes at Serere – 8m^3/hr @ with more two to be commissioned.
- Eleven (11) Reservoirs
- One (1) Booster Station.

PROBLEM STATEMENT

- SCAP100 planned to serve only 49 Villages as of FY 2019/20 (290 villages out of 339) are left out
- Pending water extension of 30km to cover over more new connections and 162 PSPs.
- The need to meet the future water demand of 420,000m^3, key investment options are required
- Places like Amuria, Kaberemaido, and Serere each has 1 borehole (8m^3/hr) creating the need for more
- There is only one booster station serving 11 water reservoirs insufficient to serve the 700,300 population

CHALLENGES AND WAYFORWARD

- Inadequate plant capacity hence the need to upgrade from 8,000m^3/day to 16,000m^3/day
- 31km of Old Transmission System hence the need to upgrade the entire system.
- Low capacity Amuria reservoir hence need to upgraded from 160m^3 to 300m^3
- DN 150 AC pipes in the distribution network of about 35km hence the need to replace with DN 300 uPVC pipes.

CHALLENGES AND WAYFORWARD

- Low sewerage coverage hence the need to expand it more out of town.
- Few booster stations hence the need to install more booster stations to pump water to the hilly areas like Tubur, Acuna and Orung.

THANK YOU FOR LISTENING

参考資料-5.2
大気汚染ワークショップ・
アイデアソンプレゼン資料

Data Collection Survey for Urban Environmental Sector (Urban Water Supply and Air Pollution)

Business Matching Workshop (Air Pollution)

JICA Survey Team

30th September, 2021

Japan International Cooperation Agency

NIPPON KOEI
INTERNATIONAL CONSULTING ENGINEERS

Table of Contents

1. Outline of the Survey

2. Survey Method in Uganda

3. Main Issues to be Solved

4. Identifying of Priority Issues

5. Public-Private Partnership

1. Outline of the Survey (1)

(1) Survey Period:

From December 2020 to November 2021

(2) Survey Schedule and Team Members:

	Position	Name	2020	2021										Man-Month	
			12	1	2	3	4	5	6	7	8	9	10	11	Total: Uganda	Total: Japan
Work in Uganda	1) Team Leader / Urban Water Supply	Shohei Yamamoto			■	■			■			■	■		2.17	
	2) Air Pollution Management	Satoshi Miyaichi/ Shunichi Okahisa							■			■	■		1.33	
	3) Private Sector Technology /Business Matching	Masahide Hanabusa							■			■	■		1.33	
	4) Urban Water Supply (2)	Cavan Goh Wei Yung			■	■			■			■	■		0.73	
															Sub-total 5.56	

Legend ■ : Work in Uganda

+

Local Engineer Ms. Ruth Mubeezi	Responsible for collecting and organizing information of air pollution sector and coordinating meetings with related organization in Uganda

1. Outline of the Survey (2)

(3) Purpose:

To collect necessary information and data to consider the possibility of technical assistance for improving air pollution in Uganda (or Kampala) in the future.

(4) Contacted Ministries and Organizations:

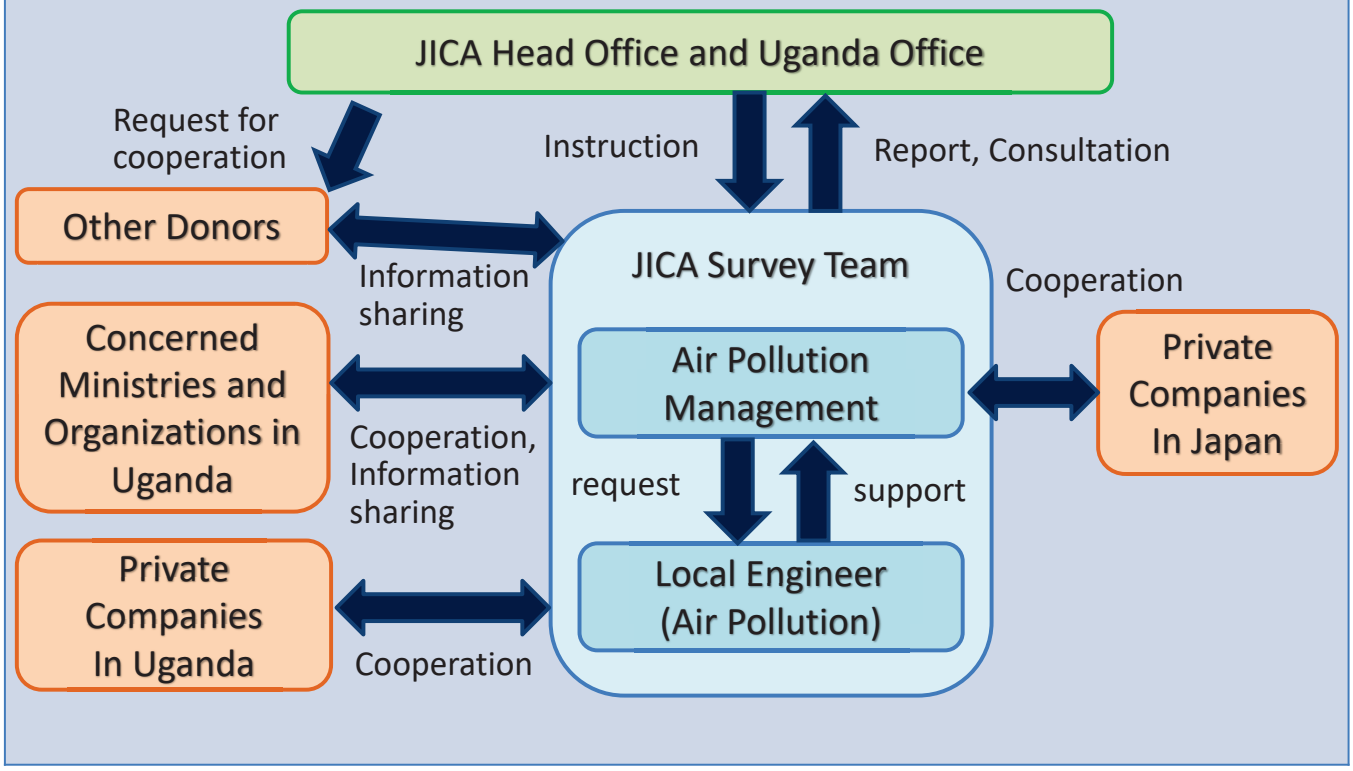
- MoWE: Ministry of Water and Environment
- NEMA: National Environmental Management Authority
- MoH: Ministry of Health
- MoWT: Ministry of Works and Transport
- KCCA: Kampala Capital City Authority
- AirQo Project
- Private Companies in Kampala
- Other Donors

(5) Main Activities:

- Information collection through the Internet
- Interviews with ministries and organizations related to air pollution
- Summarizing the issues and their needs
- Holding and preparing the workshop and Ideathon
- Preparation of reports

1. Outline of the Survey (3)

(6) Survey Structure:

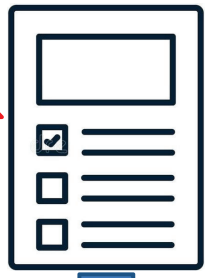


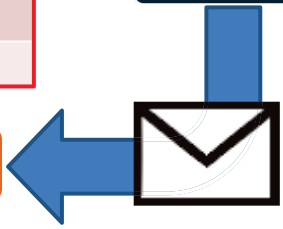
2. Survey Method in Uganda

Preparation of Questionnaire and Interview Survey

#	Category
1	Organization Structure and Budget
2	Policies and Regulations
3	Environmental / emission standards related to air pollution
4	Air quality and emission gases monitoring
5	Air pollution control (vehicle and fixed source)
6	Current issues and future plans
7	Basic information
8	Support status by other donors

Questionnaire





MoWE, NEMA, MoH, MoWT, KCCA, AirQo Project

Interview

3. Main Issues to be Solved (1)

(1) Organizational Structure
(Human Resources and Budget)

(2) Environmental Policy
(Laws, Regulations, Standards)

(3) Monitoring
(Ambient Air and Emission Gas)

(4) Air Pollution Control
(Vehicle and Fixed Source)

3. Main Issues to be Solved (2)

(1) Organizational Structure
Insufficient securing and training of human resources for considering and implementing air pollution measures
Air pollution duties between organizations are not clearly defined.

(2) Environmental Policy
Environmental / emission standards for air pollution have not been finalized.
Official measurement method for air pollutants measurement has been established.
Regulations or specific policies regarding fixed sources have not been established.
The vehicle inspection system is almost non-functional.

3. Main Issues to be Solved (3)

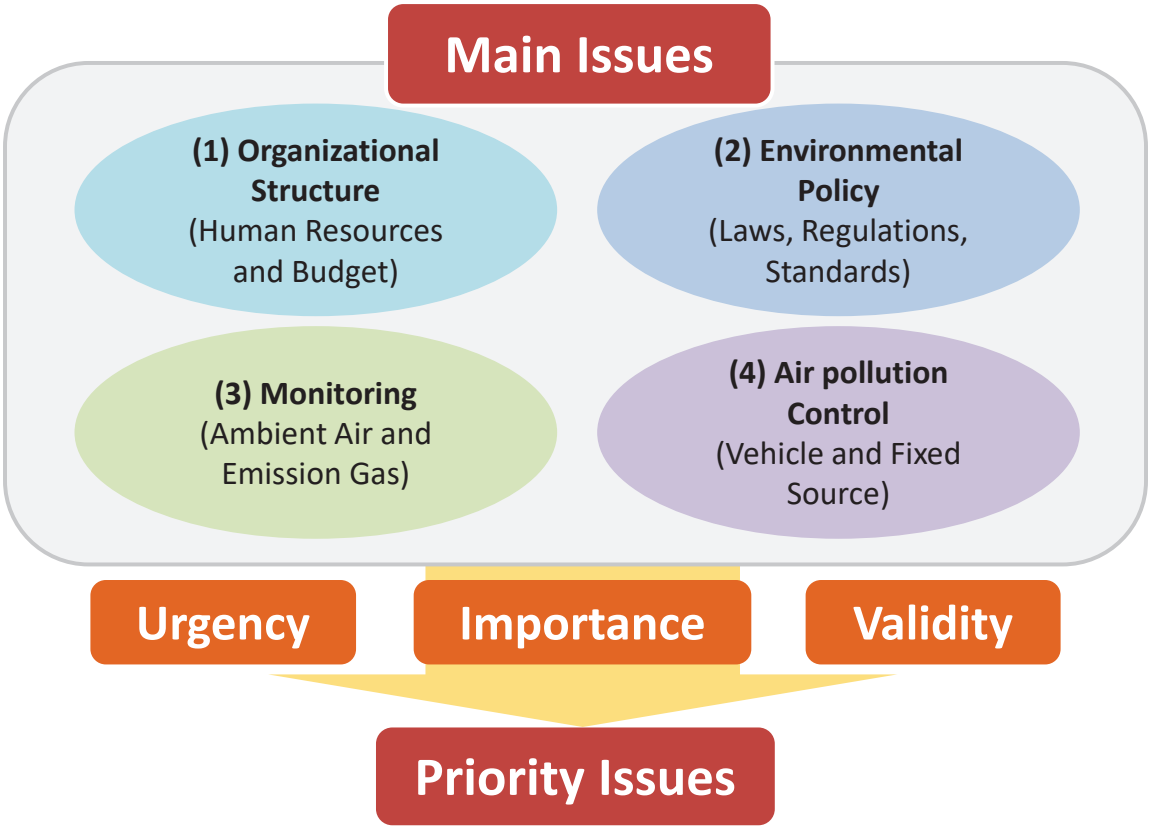
(3) Monitoring	
Ambient Air	Due to budgetary constraints, the future expansion of the air quality monitoring system may be limited.
	It is difficult to maintain and evaluate the accuracy of air quality sensors properly .
	Measurement of gaseous substances (SO_2, O_3, CO) have not been carried out. NO_2 measurement is also limited.
	No air quality monitoring station (AQMS) is installed. There is a possibility of introducing AQMS of Japanese companies, but cost for transportation, installation, and maintenance needs to be considered.
	High-precision PM component analysis equipment has not been installed, and there are no analysis methods and laboratories.
Emission Gas	Emission source monitoring has not been carried out and emission inventory has not been updated.
	Since the existing emission inventory is old (ICF International, 2009) and the source contribution ratio is unknown, it is difficult to extract measure items that should be prioritized.

3. Main Issues to be Solved (4)

(4) Air pollution Control	
Vehicle Source	Some ministries have prioritized measures against vehicle sources, but traffic jam in Kampala has not been sufficiently improved.
	Even if private companies sell electric motorcycles, it is not profitable enough. Also currently, not many Ugandans can afford electric motorcycles.
Fixed Source	Implementation of fixed source measures for major factories has not been confirmed. It is important to introduce desulfurization, denitration, dust collection technologies, etc. and GHG emission reduction measures.
	Since gas pipelines are not laid in Kampala and gas cylinders are expensive, it is not easy to switch from biomass fuel.

4. Identifying of Priority Issues

Efforts to Identify Priority Issues by Ugandan side



5. Public-Private Partnership

In order to solve the priority issues…

It is necessary for Ugandan ministries and organization to consider the possibility of cooperation with private companies.

This workshop will be a good opportunity;

(1) To connect and discuss with Ugandan and Japanese private companies.

(2) To know the products, technologies and services that contribute to air pollution control provided by companies.

We believe that this workshop will promote collaboration between Uganda and Japan in air pollution sector in the future!

Thank you for your attention.

Ministry of Water and Environment

Status of air pollution in Kampala and expectations to Japanese companies

Presented by Mununuzi Nathan

Senior Environment Officer

Introduction

- The Ministry of Water and Environment is mandated with initiating legislation, policy formulation, setting standards, inspections, monitoring, coordination and back up technical support in relation to water and environment sectors.
- This mandate therefore extends to issues relating to air pollution.

Status of air pollution in Kampala

- The Ministry does not collect data on the status of air pollution
- Instead the ministry undertakes inspections and compliance monitoring of especially industries on general pollution.
- Through the Climate Change Department, the ministry compiles data on Green House Gas emissions.
- Reports indicate that Kampala is one of the most polluted cities in Africa

Major sources

- Vehicle emissions due to heavy traffic and old fleet
- Industrial establishments some of which are obsolete
- Biomass fuel (more than 90% of households rely on charcoal and firewood as source of energy)
- Refuse/waste burning due to open burning
- Road dust due to unpaved roads

Expectations for Japanese companies

- Support the establishment of air quality monitoring system
- Promote the supply of less polluting technologies
- Participate in air quality monitoring
- Support the improvement of transport systems
- Support proper waste disposal and management systems
- Support the formulation and implementation of policies, laws, guidelines and standards
- Promote green energy transformation

Thank you

PRESENTATION ON THE PROGRESS OF DEVELOPING THE AIR QUALITY STANDARDS AND REGULATIONS FOR UGANDA

30th September 2021

Contents

(1) NEMA's mandate in relation to air pollution control

(2) Current status of the development process for Air quality standards and regulations

(3) Future activities and initiatives related to air pollution control

(4) Technical assistance needed for air pollution control

Mandate

- The National Environment Management Authority (NEMA), is the principal government agency in Uganda responsible for the **monitoring, coordinating, supervising** and **regulating** all activities relating to the environment.
- NEMA advises the government of Uganda and spearheads the development of environmental policies, regulations, laws, guidelines and standards.

Mandate

- In line with Section 103 of the National Environment Act No.5 of 2019, NEMA is mandated to;
  - Establish the criteria and procedure for the measurement of air quality;
  - Prescribe ambient air quality standards and other air quality standards;
  - Prescribe emission standards for various sources; and,
  - Establish the criteria and issue guidelines for air pollution control for mobile, stationary and other sources.
- The Authority is also required to take measures to control air pollution in liaison with other Lead Agencies.

Air Quality Regulations and Standards

- Currently, NEMA is in the final stages of developing the Air Quality Standards in liaison with the relevant Lead Agencies, other stakeholders and development partners such as;
- KCCA,
- Makerere University- (Departments of Chemistry and Computer Sciences),
- NGOs - Clean Air Initiatives,
- Ministry of Works and Transport

Air Quality Regulations and Standards

- Uganda National Bureau of Standards (UNBS),
- Ministry of Gender and Social Development,
- Ministry of Water and Environment ,
- Petroleum Authority of Uganda,
- the American Embassy, among others. These partners have been very instrumental in providing input into the development of the air quality standards.

Air Quality Regulations and Standards

- **The Draft Regulations**

Key provisions in the Regulations include;

- Regulation of emission sources
- Indoor air quality
- Occupational air quality
- Air quality monitoring and management plans

among others

Air Quality Regulations and Standards

- **The Regulations provide the following categories of standards/limits;**
  - Ambient Air Quality
  - Source Emissions
  - Vehicle Emissions
  - Occupational Health and Safety

Example of limits provided in the standards

	Ambient Air Quality Standards			
No.	**Pollutant**	Time-weighted Average	**Standard For Ambient Air**	**WHO Standards 22/9/2021**
1	Carbon monoxide (CO)	8 hours	9 mg/m^3	
		1 hour	35 mg/m^3	
2	Hydrogen Sulphide (H_2S)	1 hour	42 µg/m^3	
3	Ozone (O_3)	1 hour	235 µg/m^3	
		8 hour (instant Peak)	120 µg/m^3	60µg/m3
4	$PM_{2.5}$	Annual average	25 µg/m^3	5µg/m3
		24 hours	35 µg/m^3	15 µg/m3
5	PM_{10}	Annual average	40 µg/m^3	15µg/m3
		24 hours	60 µg/m^3	45µg/m3
6	Sulphur dioxide (SO_2)	1 hour	75 µg/m^3	
		24 hours	20 µg/m^3	
7	Nitrogen dioxide (NO_2)	Annual average	40 µg/m^3	10µg/m3
		1 hour	200 µg/m^3	
8	Total Volatile Organic Compounds (VOCs)	24 hours	600 µg/m^3	

Roadmap for Air Quality Management in Uganda

- Finalize the Air quality regulations by Dec 2021
- Develop source emission standards for the Oil and gas sector. These were not provided for in the draft regulations as the sector requires more benchmarking.

Future activities for air quality control and management in Uganda

- Implementation of the air quality regulations and standards, in particular, the Authority and Lead Agencies will be required to;
  - Undertake routine monitoring and reporting of emissions generated from facilities and other emission sources
  - Monitor the ambient air quality
  - Establish air quality zones (zoning) so that special programs (air quality management plans) are designed to ensure that targets are set by the responsible players to work towards meeting the ambient air quality standards.

Future activities for air quality control and management in Uganda

The Authority and Lead Agencies will be required to;

- Establish Air quality monitoring stations
- Identify air pollution hotspots by modelling air quality data

NEMA will be required to;

- Report on the State of the environment report once every two years.
- Corroborate with key players and development partners to enable NEMA realize her mandate

Technical Support required for implementation of Air Quality Management Road Map

- Air Quality monitoring equipment – real time and mobile monitoring stations
- Technical capacity building in;
  - Use of the equipment and
  - Air quality modelling, source apportionment and other related issues in detail
  - Understanding standards for the oil and gas sector

THANK YOU FOR LISTENING

For God and my country

MINISTRY OF HEALTH

Health effects from air pollution in Uganda

By: Fred Mulabya,

For Commissioner-EHD

AIR POLLUTION OVERVIEW

- Air pollution is the presence of solid particles or gases in the atmosphere that are harmful to:
  - ✓humans and other living beings,
  - ✓cause damage to the climate or to materials.

EFFECTS OF AIR POLLUTION

- Varies depending on:
  - ✓ Type of pollutant
  - ✓Length and level of exposure
  - ✓Individual health risk

WHAT CAN SMOG AND SOOT DO?

- Smog and soot are generated generally from combustion of fuels
  - Smog can irritate the eyes and throat and also damage the lungs, especially those of children, senior citizens(elderly persons), and people who work or exercise outdoors.
  - Can intensify symptoms and trigger asthma attacks, loss of sight

SOOT CAN CAUSE HEART ATTACKS

- The tiniest airborne particles in soot, whether gaseous or solid, penetrate the lungs and bloodstream and worsen bronchitis,
- **Leading to heart attacks, and even hasten death.**

WHAT CAN BENZENE DO?

- Benzene is emitted during combustion of gasoline.
- Classified as carcinogen by EPA-USA, and can cause:
  - Eye, skin, and lung irritation in the short term,
  - And blood disorders- Like leukaemia in the long term

WHAT CAN DIOXINS DO?

- More typically found in food but also present in small amounts in the air.
- Can affect the liver in the short term
- Harm the immune, nervous, and endocrine systems as well as reproductive functions

WHAT CAN POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) DO?

- Polycyclic aromatic hydrocarbons (PAHs) are by-products of traffic exhaust and wildfire smoke
- In large amounts they have been linked to eye and lung irritation, blood and liver issues, and even cancer

WHAT CAN CARBONMONOXIDE DO?

- As a result of incomplete combustion
- In large amounts they can cause eye and lung irritation, and death by suffocation

SEVEN MILLION DIE, ANNUALLY

- Air pollution is now the world's fourth-largest risk factor for early death;
  - 4.5 million deaths were linked to outdoor air pollution exposures
  - And another 2.2 million deaths were caused by indoor air pollution

PUBLIC HEALTH ACTIONS - GUIDELINES

- Develop an indoor air quality policy and guideline;
  - Initiate and strengthen the service being part of the minimum health care package

PUBLIC HEALTH ACTIONS- AIR-QUALITY RELATED DISEASE SURVEILLANCE

- Improve our detection, documentation and reporting of air pollution related conditions needs
- Health workers need to be trained to raise the suspicion index
- Improve data capture tools

PUBLIC HEALTH ACTIONS-AWARENESS CREATION

- Increase community awareness on air quality
- Scaleup monitoring

Thank you

ACTIVITIES AND EFFORTS FOR AIR POLLUTION

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INTRODUCTION

- Sources of air pollution in an airshed can be natural and anthropogenic (human produced).
- Today, burning of fossil fuels contributes significantly to air pollution
- Collectively, ICEs and conventional fuels are the dominant contributor to transport-related air pollution.
  - Road traffic – a key source of air pollution in urban areas.
- The main air pollution indicators that need to be monitored include:
  - Sulphur dioxide (SO_2)
  - Nitrogen oxides (NO_x)
  - Particulate matter (PM_{10}, $PM_{2.5}$)
  - Ozone (O_3)
  - Carbon monoxide (CO)
  - Volatile organic compounds (VOCs)
  - Several toxic metals, such as **lead**, arsenic, cadmium, nickel or **mercury** (“quicksilver”).

INTRODUCTION CONT'D

- In Uganda, road transport accounts for:
  - 95% of passenger traffic and
  - 96.5% of the freight cargo.
- Major transportation modes include
  - cars and private taxis,
  - mini-bus taxis,
  - Buses,
  - Trucks, and
  - Motorcycles.
- Public transport is dominated by 14-seater mini-buses (matatus) and motorcycle taxis (boda-bodas),
  - Typically imported second- or third- hand,
- Total number of registered vehicles range between 1.4 and 2 million (including motorcycles).

All these vehicles use ICEs, powered by fossil fuels

INTRODUCTION CONT'D

- Combined with population growth and rapid urbanization, rise in motorization in Uganda is leading to many negative challenges
  - Road Traffic Congestion;
  - High Transport-Based Carbon Emission;
  - Low Fuel Efficiency;
  - Climate Change effects;
  - Inadequate Transport Infrastructure; and Unsafe Transport Modes.

INTRODUCTION CONT'D

- Some figures
  - Uganda emits 4.9 million tons (or 0.2 tons per capita) of carbon dioxide per year.
  - Transport and agriculture sectors represent 62% of national emissions in 2000
    - projected to represent 70% by 2030 under a 'business as usual' scenario.
  - 70% of the population depends on agriculture - a climate-sensitive sector.
  - Electricity generation potential 1,276 MW (740 MW peak demand), 90.9% RE
    - This provides potential for EV promotion as a PuE avenue.

We need to find alternative energy to replace burning of fossil fuels in ICEs

EXISTING POLICIES TO REDUCE/CONTROL AIR POLLUTION

- Enforcement of the use of un-leaded fuel (MEMD)
- A differential Environment tax based on age is in place (URA)
- Ban on the importation of motor vehicles which are over 15 years old from the date of manufacture (URA)
- Use of Non-Motorized Transport (NMT) (KCCA)
- Inspection of all vehicles and motorcycles for road worthiness (MoWT)
- Infrastructure development (Widen roads, Install traffic lights, ring-roads, and flyovers)

SOME PROPOSALS (AS PER THE REVISED DRAFT ENERGY POLICY 2021)

- Pre-inspection (before importation) and post-inspection (those on the roads) of vehicles (to include testing for fuel economy ratios and carbon emission);
- Introduction of carbon- tax in line with the “polluter pay principle” to deter heavy polluters;
- Switch to cleaner fuels (blended fuels) in line with the Biofuels Act;
- Introduction of Fuel Economy Labelling;
- Introduction of Mass Transport System in cities;
- Introduction of Electric Mobility.

ON-GOING ACTIVITIES

- Development of policy framework for Clean mobility;
- Automotive fuel economy baseline survey;
- Awareness creation (fuel campaign, clean mobility);
- Promotion of Electric Mobility;
- Fuel Marking and Quality Monitoring Program.

MINISTRY OF ENERGY
AND MINERAL DEVELOPMENT

The End

energy
For Sustainable Development