
Sustainable Water Treatment
And Reuse
SHUBHAM
EQUIPMENTS
ROTHWELL
WATER

Company Origin & History

Origin of Rothwell

Rothwell Water was cofounded in December 2012 by Peter L. Timpany, CSBR inventor, and Mr. Keonho Lee, with the goal of conducting a global water business based on CSBR process engineering experience applied to more than 30 wastewater /sewage treatment plants worldwide.
The Anyang Bakdal Underground Sewage Treatment Plant, implemented by Rothwell and which won the International Water Association's (IWA) No.1 Award for Resource Recovery has become a cornerstone event to successfully achieve Rothwell's goal of entering the global Water Market.
The Package CSBR Sewage Treatment System developed for Wastewater Treatment projects in Bolivia is an innovative eco-friendly technology that overcomes the Not In My Backyard (NIMBY) phenomenon, highlighting Rothwell's importance in the water business.
Our technology portfolio is applied to domestic and international markets, fulfilling our vision of being a global water company.

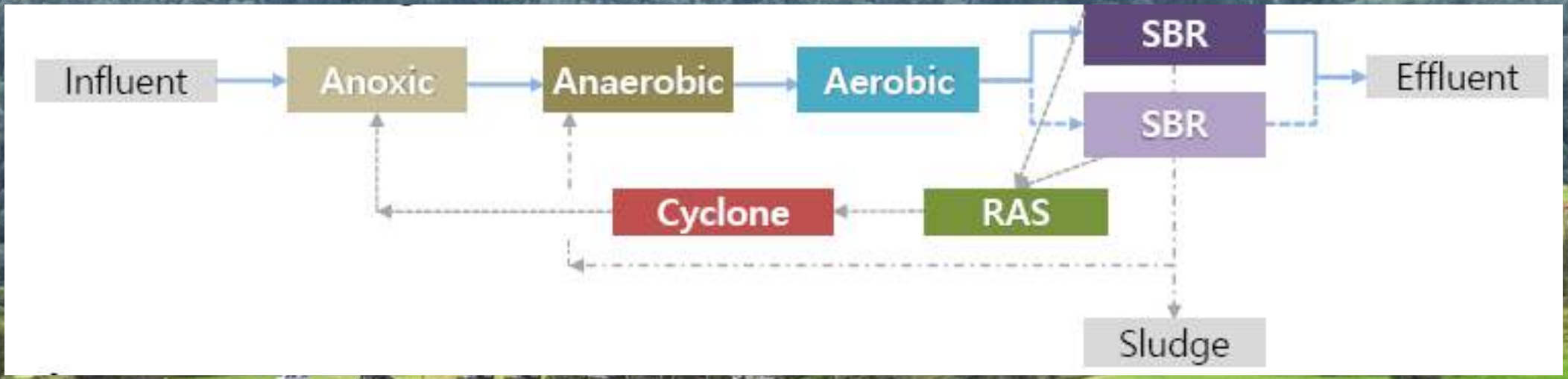
Chairman of Rothwell Associates
CTO of Rothwell Water
Peter L.Timpany

CEO of Rothwell Water
Keonho Lee

History

- 2012.12 Established Rothwell Watertech Glocal, Inc.
- 2014.03 Certification of Venture Company / R&D Institute
- 2014.12 Awarded 'Excellent Environment Venture Company' (Korea Environmental Industry & Technology Institute; KEITI)
  Registered patent for CMBR Processing System (Patent No. 10-1472421)
- 2015.04 Registered patent for Small Package CSBR Process System (Patent No. 10-1510405)
- 2015.11 Received 'The Citation of Excellent Small and Medium Business' (Minister of Industry and Commerce)
- 2016.08 Changed company name to Rothwell Water Co., Ltd.
- 2017.05 Registered patent for Advanced Treatment Process with Activated Sludge Purification System (Patent: No. 10-1744451)
- 2017.12 Registered license for Engineering and Construction of Domestic Water Facilities

Process Flow



Technology Introduction - CSBR

Competencies

CSBR™ is a water treatment process that achieves continuous flow by improving batch operation flow of conventional SBR (Sequencing Batch Reactor) process.

- A2O activated sludge process with continuous process flow is arranged in the first stage
- Two series of SBR system, maintaining a fixed water level, are arranged at the end of A2O process

Process Flow

- CFR (Continuos Flow Reactor) Cell is part of A2O process that maintains continuous flow with anoxic, anaerobic and aerobic zone in the first stage, and two SBR reactors in a row alternatively in the second stage.
- The influent undergoes anaerobic/aerobic reaction from organic decomposition process and flows into the lower water level SBR tanks - in which sedimentation and supernatant discharge occurs.
- The influent is mixed with sludge and undergoes SBR reaction with aerobic, anaerobic and sedimentation processes - therefore biodegradation is once again performed.
- The microbial sludge is discharged to the outside through the thickened return activated sludge (TRAS) system on the bottom of SBR tank, where sedimentation occurs.
- The remaining sludge is mixed with the influent of the previous stage and the process is repeated in bioreactors.

PKG CSBR

Rothwell's Package CSBR Processing System (PKG CSBR) has been developed as a part of the Bolivian Government's Wastewater Treatment project to solve the eutrophication problem of Lake Titicaca, the largest lake in South America, by applying CSBR's proven design techniques using Steel Corrugated Pipes. The success of PKG CSBR technology has been proven by an outstanding operation performance in Guri City's Pilot Plant in South Korea.

Reactor equip. installation
(Diuser/pump/pump/discharge device)

Package modularization
(50m3/d HxWxL = 4x4x8m)

(50m3/d, 100KWh/d) PKG CSBR Interior
(BOD5<10, TN<20, TP<1.0 mg/l)

CSBR Operation Stages

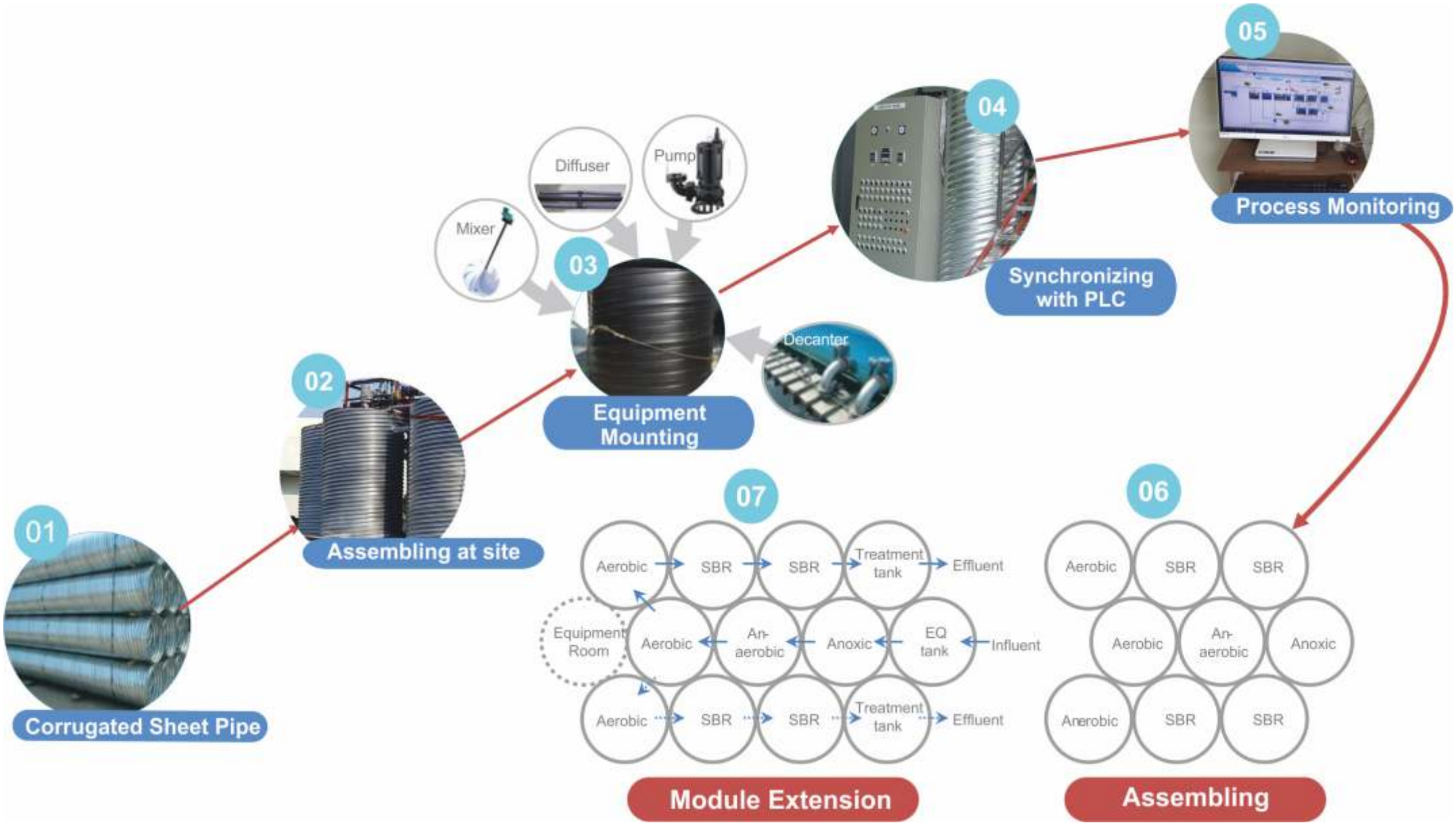
Reactor Operation Stage

Aerobic/Settling Tank Operation Mode

Water Quality

Parameter	Influent (max/min)	Treated Water Quality	
		BNR	CSBR
BOD_5	270/100	15	≤10
COD_{cr}	685/200	≤ 55	≤ 40
TSS	287/100	≤ 15	≤ 15
NH_3-N	20/15	≤ 2	≤ 2
TKN	30/20	≤ 8	≤ 5
PO_4-P	6.0/3.0	≤ 1.0	≤ 1.0

Packaged CSBR Procedure



Reference - 50m³/day Guri City Pilot plant in Republic of Korea

Performance Index		Design	Operation Result	Performance level
Treated wastewater flow (/day)		50	60	120%
Waste sledge (/day)		0.67	0.5	80%
Consumed electricity(kWh/day)		185.6	140	80%
Effluent quality	BOD_5 (mg/l)	10	5.2	Excellent
	COD (mg/l)	40(Chrome)	7.8(Manganese)	Excellent
	TSS (mg/l)	15	4.4	Excellent
	T-N (mg/l)	20	8.3	Excellent
	T-P (mg/l)	1.0	0.21	Excellent

1. Suwon Phase-1 WWTP (220,000m³/d)
2. Kumi WWTP (330,000m³/d)
3. Kunjang Industrial WWTP (30,000 m³/d)
4. Wonnung WWTP (80,000 m³/d)
5. Gaeun WWTP (2,000 m³/d)
6. Uijeongbu WWTP (200,000 m³/d)
7. Jeonju WWTP (100,000 m³/d)
8. Byukje WWTP (30,000 m³/d)
9. Bakdal WWTP (250,000 m³/d)
10. Daegu Technopolice Industrial WWTP (4,500 m³/d)
11. Pyeongchang WWTP (18,000 m³/d)
12. Byeolrae WWTP (27,000 m³/d)
13. Minrak WWTP (16,000 m³/d)
14. Samsong WWTP (16,000 m³/d)
15. Sanming WWTP (80,000 m³/d)
16. Beijing Qinghe WWTP (120,000 m³/d)
17. Huai'an Municipal WWTP (20,000 m³/d)
18. Okotoks WWTP (3,000 m³/d)
19. Juangriego WWTP (10,000 m³/d)

Rothwell Main Technology References

CSBR™

Name of Project	Flow (m³/day)	Country	Status	Process
Bakdal WWTP (Underground)	250,000	South Korea	Commissioned 2017	CSBR
Nongso WWTP (Underground)	100,000	South Korea	Commissioned 2016	MSBR
Sosabeol WWTP (Underground)	22,000	South Korea	Commissioned 2015	MSBR
Daegu Techno Police Industrial WWTP (Underground)	4,500	South Korea	Commissioned 2014	CSBR
Samsong WWTP (Underground)	16,000	South Korea	Commissioned 2013	CSBR
Jumunjin WWTP	4,800	South Korea	Commissioning 2013	CSBR
Byeolrae WWTP (Underground)	27,000	South Korea	Commissioned 2013	CSBR
Minrak WWTP (Underground)	16,000	South Korea	Commissioned 2013	CSBR
Gulhwa WWTP (Underground)	47,000	South Korea	Commissioned 2012	MSBR
JinKun-II WWTP (Underground)	20,000	South Korea	Commissioned 2010	CSBR
Wonnung WWTP	80,000	South Korea	Commissioned 2008	CSBR
Byukje WWTP	30,000	South Korea	Commissioned 2007	CSBR
Kunjang Industrial Park WWTP	30,000	South Korea	Commissioned 2006	CSBR
Jeonju WWTP	100,000	South Korea	Commissioned 2005	CSBR
Yeosu WWTP	110,000	South Korea	Commissioned 2004	CSBR
Jinkun WWTP	80,000	South Korea	Commissioned 2004	CSBR
Gwangyang WWTP	24,000	South Korea	Commissioned 2002	MSBR
Incheon International Airport High Strength WWRP	20,000	South Korea	Commissioned 2000	MSBR
CAP CANA	110,000	Dominican Republic	In operation	MSBR
D'Clase Industrial/Zona Franca Gurabo WWTP	1,700	Dominican Republic	In operation	MSBR
Charoen Pokhand Poultry Processing WWTP	6,600	U.S.A	Commissioned 1998	MSBR
Marys Ville WWTP	40,000	U.S.A	In operation	MSBR
Cumana East WWTP	25,000	Venezuela	Commissioned 1999	MSBR
Juangriego WWTP	10,000	Venezuela	Commissioned 1990	MSBR
Mariposa WWTP	207,360	Venezuela	Commissioned 1999	MSBR
Punta Gorda WWTP	80,000	Venezuela	Commissioned 1996	MSBR
Huai'an Municipal WWTP	20,000	China	Commissioned 2007	CSBR
Jiaozhou Textile Industrial Park 100% WWTP	20,000	China	Commissioned 2006	CSBR
Sanming Municipal WWTP	80,000	China	Commissioned 2004	CSBR
Shenzhen Municipal WWTP	120,000	China	Commissioned 2001	MSBR
Songjiang East Municipal WWTP	30,000	China	Commissioned 2004	MSBR
Wuxi Municipal WWTP	30,000	China	Commissioned 2003	MSBR
Taiyuan Iron and Steel Industry. WWTP	50,000	China	In operation	MSBR
Kunming Puz haoWWTP	100,000	China	Commissioned 2015	MSBR
Estevan WWTP	6,000	Canada	Commissioned 1995	MSBR
Okotoks WWTP	3,000	Canada	Commissioned 1998	MSBR

BioMedia Kaldnesmedia ™

Industrial	5000m ^{3}orabove		
NameofPlant	Flowm ^{3}day	Country	Year
AOKondopoga	14000	Russia	20002004
ArkhangelskPulpandPaper	17400	Russia	2007
BahiaSul	15000	Brazil	2007
Bhadrachalam	6400	India	2007
BillerudGruvönMill	6000	Sweden	2006
CMPCInforsa	6000	Chile	2006
CMPCLaja	7700	Chile	2005
CMPCPacico	5500	Chile	2009
CMPCPuenteAlto	5500	Chile	2006
CMPCSantaFe	9000	Chile	2006
FraserPapersMaine	6000	USA	2002
NorskeSkogFollum	8000	Japan	2007
PapeleraSniace	10690	Spain	2010
QuesnelRiverPulp	6000	Canada	2005
RottnerosUtansjö	7350	Sweden	2005
SCAGraphicOrtviken	10000	Sweden	2004
SCAPackagingMunksund	11200	Sweden	2009
StendalMill	6100	Germany	2004
StoraEnsoAnjalankoski	8000	Finland	2005

Municipal	2000m ^{3}orabove		
NameofPlant	Flowm ^{3}day	Country	Year
BroomeldColorado	4697	USA	2002
CorbySTW	4000	England	1998
EDARGavàViladecans	12000	Spain	2010
EDARVilareal	4908	Portugal	2010
FieldsPointRI	34200	USA	2010
Gardermoen	5790	Norway	1998
LilleMarquette	14630	France	2012
Lillehammer	3840	Norway	1994
Nyköping	3660	Sweden	1998
Pyewipe	3960	England	1998
RA2	19000	Norway	2002
Röti	8349	Switzerland	2004
Sjölunda	6230	Sweden	1998
TEDAWestPhase1	4200	China	2006
TroisFrontièresCC3F	8000	France	2008
Uddebo	2700	Sweden	2008
Visby	5800	Sweden	2007
WildcatHillFlagstaAZ	6600	USA	2008
Yucaipa	4037	USA	2007

SHUBHAM EQUIPMENTS

SHUBHAM EQUIPMENTS PVT. LTD.

(Manufactured in India under Technical Collaboration with Rothwell Water, South Korea)

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ROTHWELL
WATER TECH
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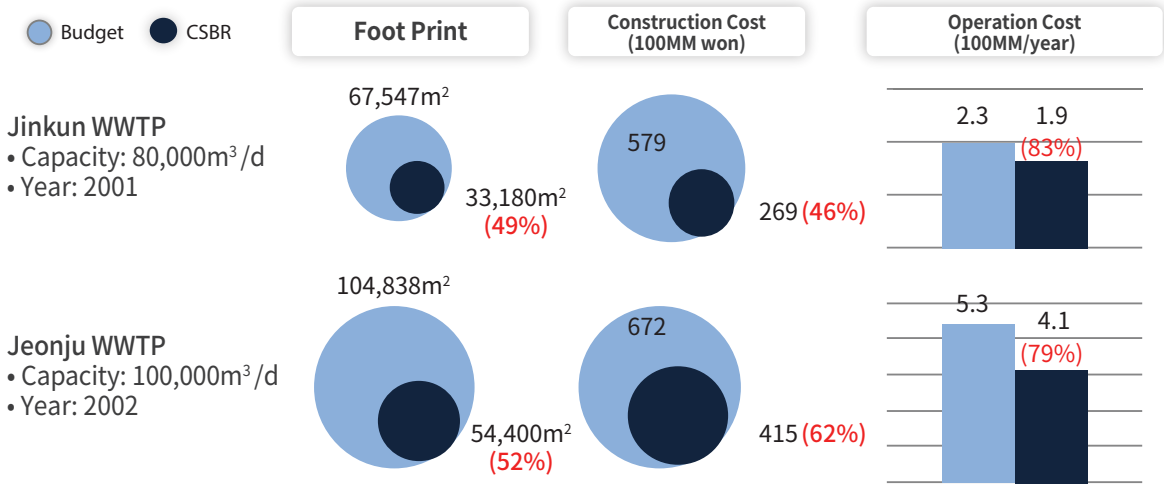
Constant Level and Continuous Flow Sequencing Batch Reactor

Economic Value

	BNR	CSBR
Construction Cost	100%	70%
Operation Cost	100%	85%
Foot Print	100%	70%

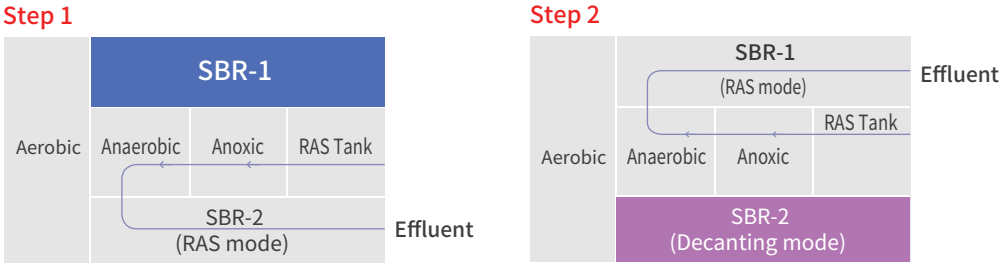
* BNR : Biological Nutrient Remoral

Practical Case

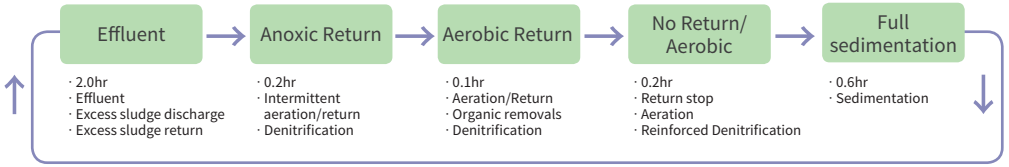


Technology Introduction - CSBR

Reactor Operation Stage



Aerobic/Settling Tank Operation Mode



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