



*Introducing New standard  
for Waste water Treatment*

## ***BPC “Technology Package”***

For ***EPC's & Business partners***

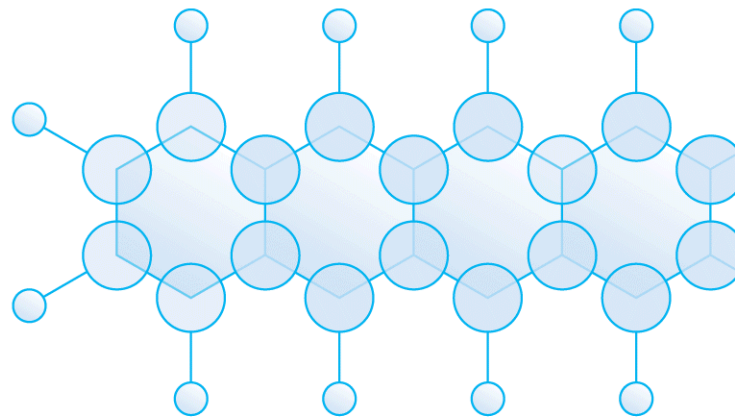
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### **Introduction:**

*This document is relevant for EPC companies with strong engineering & constructions abilities in certain geographies and has interest to successfully penetrate waste water treatment plant constructions.*

*With BPC technology package, the EPC will be empowered with the most innovative and cost effective solutions and positioned to with relevant tenders*

*The business model described below offers to combine “the best of both world” by letting the EPC company lead the most effective Waste water treatment solutions while getting the backup of the best technology and expertise from BPC at the back*

### **Background:**

*Establishing a professional Waste water treatment plant (“WWTP”) requires significant expertise, doing so in a cost effective manner is even more challenging*

*That’s why a perfect collaboration/synchronization between several parties (engineering design, technology providers, construction etc) is essential*

*BPC (BioPetroClean Ltd.) has design expertise as well as a proprietary **bioremediation technology** that was developed with complete automation to efficiently address the industrial WWT market demands.*

*In this document we will describe how an EPC firm can benefit from BPC technology and knowhow when it comes to **designing and implementing a most efficient WWTP***

*The combination of the powerful operational abilities of an EPC firm (in a given geography) with the process knowhow and the unique technology from BPC creates powerful and most profitable partnership*

*This method is successfully implemented in some geographies and BPC is seeking to spread it in other geographies such as China, Latin America and more*

*We are pleased to present this collaboration model and will be pleased to further discuss it with interested parties*

*Sincerely*

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## ***What does it take to construct a most efficient WWTP?***

*Establishing a professional and cost effective WWTP (Waste Water Treatment Plant), is a long process, and requires a professional & careful step by step process*

*The process can be divided to three phases:*

- 1. Design Phase**
- 2. Logistics phase**
- 3. Construction & Execution phase**

### ***Design Phase***

*This phase includes the exact setup definition, P&ID, detailed equipment specifications, detailed design specifications, for all the subcontractors and estimated costs), to achieve the above the following takes place*

- i. Study the requirements/objectives in detail – A professional study of the various stream that will feed into the WWTP (or in case of an upgrade, the available streams) and note all the consequences of the customer needs*
  - a. Type of streams*
  - b. Capacity (current and future) for each stream*
  - c. Desired treatment quality*
  - d. Site limitations/conditions (ground analysis, space, Budget constraints, manpower skills, regulations & restrictions, ambient & effluent temperature etc.)*
  - e. Critical demands (uptime, safety, control abilities etc)*
- ii. Take all necessary actions in order to complete the basic engineering design, where the process is defined as well as the modules, the equipment and the instruments are defined (though with basic characterizing criteria (not yet in full details)*
- iii. Share the basic design with the relevant parties in order to get relevant approvals*
- iv. Complete the detailed engineering design package (to get ready for purchasing and project execution)*

### ***Logistics Phase:***

*This is the first execution stage, according with the detailed design package, all purchase orders (PO) shall be executed including*

- i. PO's to all equipment vendors*
- ii. PO's to construction vendors*

- iii. *PO's to technology providers & consulting agents*
- iv. *Other purchasing*
- v. *Administrations - Follow up equipment deliveries to site + payment & cash collection as applicable*

**Construction & Execution phase:**

*During this phase the construction subcontractors and the technology providers shall perform the site installations and integrations under supervisions by the professionals*

- i. *Perform constructions (concrete, piping, electricity, tanks etc)*
- ii. *Throughout the entire construction process phase there is a need for professional project construction management*
- iii. *Perform the installation / integration*
- iv. *During the last phase there is a need for the guidance and supervision of a process expert*
- v. *Commissioning / Operators training – supervised by process experts*
- vi. *Transfer the site to the customer or to the party that performs O&M (Operations & Maintenance)*
- vii. *Administrations - Throughout the entire phase*

**Examples for:**

- **Critical equipment categories:** *Control system (proprietary system that is delivered by BPC) Pumps, auto & manual valves, Blowers, Compressors, control panels, analytical instrumentation, pneumatic elements, and flow meters, level transmitters, tanks, mixers, chemicals etc.*
- **Critical construction subcontractors:** *RCC contractors, Metal constructions, piping, electricity supply, electrical & control wiring, O&M*
- **Technology providers & consulting professionals:** *Bioremediation technologies, filtration technologies, RO & ZLD technologies, process experts, project coordination & supervising experts etc.*

*An EPC firm may have tremendous advantages that enables efficient executions and yet fall short with the specific knowhow required to design and manage a waste water treatment plant*

*See paragraph in the next page to learn how BPC can complement the missing elements for an EPC company under an exclusive partnership agreement*

## **BPC ACT technology package**

*It is assumed that a respectable EPC active in a given territory will already have most of the required elements for execution of a WWTP*

*Yet, EPC may not have the specific expertise to design the most effective setup that guarantees the desired performance of the WWTP*

*Furthermore, many competing parties will use the “available technologies” to perform the treatment and that will result with a tight “Price competition” and smaller profit*

*BPC ACT Technology package offers a dual benefit*

- ✓ The most advanced **expertise** in WWTP (Design & integrations)
- ✓ The latest **bioremediation technology** that enables cost cutting and higher profit margins, this technology is only available to BPC business partners

*BPC packaged all the critical & valuable elements that an EPC may need to perform WWTP projects in the most effective & efficient way that will provide the competitive edge when competing on tenders or negotiating a cost effective solution*

*See Appendix 1 for more about BPC*

### **The Package**

*BPC ACT Technology package includes two main elements*

1. **The proprietary ACT control system** with the customized software and all the analytical devices that are delivered fully integrated and installed by BPC experts as part of the package
2. **BPC professional services** as detailed below

*Following is the content description of each element*

#### **1. ACT Control system**

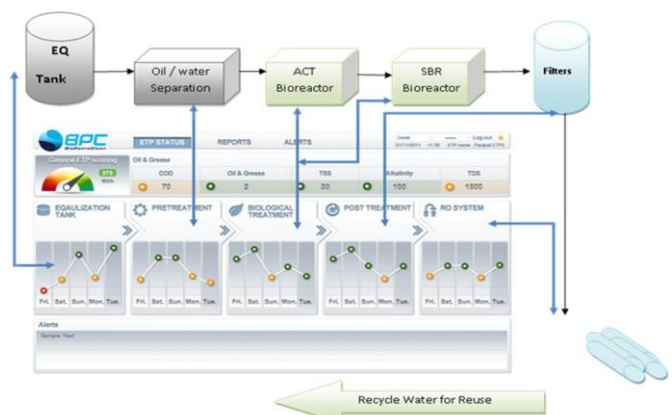
*This system will automatically control the entire process, Pre-treatment modules, Bioremediation process, and post treatment and sludge dewatering etc. to guarantee consistent high quality performance of the entire WWTP*

*It will also provide the ONLINE real time visibility over the process performance (see appendix)*

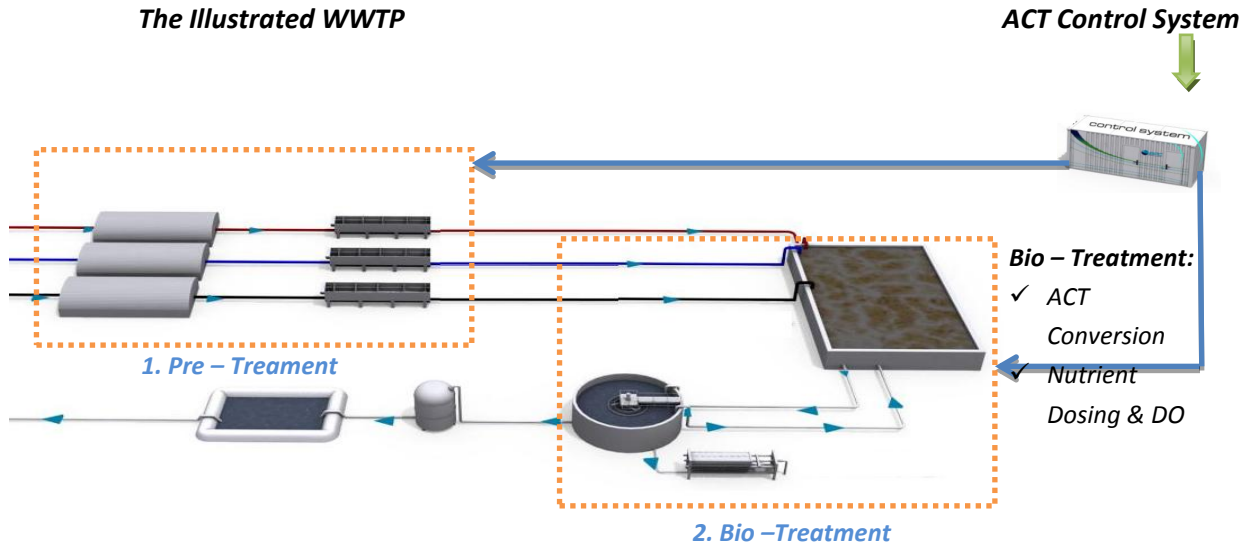
#### **Integrated Control system**



#### **Online Visibility of the entire WWTP**



## The Illustrated WWTP



See Appendix 2 for more details of the control system

### **BPC PROFESSIONAL services**

The following describes the variety of professional services that will allow any EPC company to construct the most efficient implementation of a WWTP

In fact these professional services are spread throughout the entire project life, from the initial **Design Phase**, thorough the **Logistics Phase** all the way to the **Construction and Execution Phase**

See details below

- **From Phase 1 – the design phase:**
  - BPC will perform **all the activities** related to this phase
  - BPC will deliver the **complete detailed engineering design** package (in English and with open format that allows quick translations or in the local language)
  - BPC will participate in **design reviews** to assist the **design approval** process
  - BPC will generate the equipment specification ready for the logistics purchasing
  - BPC will provide the detailed specifications (SOW) for each subcontractor ready for the EPC contract people to handle
  - BPC professionals will assist the EPC administrations, logistics and contract people as required for them to execute their part of the project
- **From Phase 2 - Logistics Phase**
  - The EPC is responsible to perform 100% of this phase with the relevant assistance from BPC

- *BPC will assist the administrations & logistics personal as may be required for them to perform their job (equipment purchasing, subcontractors agreements & deliveries according with scheduled time)*
- *BPC will assist with the critical element of VENDOR VALIDATION to assist validating the vendors for critical items*
- *BPC will also provide a recommended timetable (with optimized delivery time for each equipment or constriction job to synchronize the entire project)*
- ***From Phase 3 - Construction & Execution phase***
  - *BPC will provide all professional services that are associated with the integration of BPC technology (integrating the control system and link it to all applicable units, place the monitoring devices etc.)*
  - *BPC will ramp up the process and perform testing of each unit performance Vs. th specification and issue a “Gap analysis report” to point out all problematic items to vendors and subcontractors*
  - *BPC performs “bacteria optimization process” in its lab and have the culture ready*
  - *BPC will seed the biological culture (selected at the lab) and stabilize the bioprocess*
  - *BPC will operate the process during the plant commissioning and demonstrate the performance as specified for the bioprocess as well as for the entire plant*
  - *BPC will gather all the plant relevant documentation and provide the process documentation and operational manuals that will be generated and customized by BPC to fit the exact site*
  - *BPC will conduct the training in parallel*



## Who Does What ?

The table below defines the highlighted SOW (Scope Of Work) split between the EPC and BPC

Price Item		BPC SOW	EPC SOW
<b>Professional Services</b>			
Basic Engineering Process - BEP	P&ID, Flow diagram, equipment list with detailed specifications, concrete layout, piping definition	X	
Detailed engineering	According with local standards TBD by local engineering	X	X
Project management		X	X
Treatment Process Management	including pretreatment, Bioremediation and post treatment	X	
Logistics	Purchasing on time	X	X
System integrations		X	X
Plant commissioning	Run the site for one month fluently	X	X
Bioremediation process optimization	Lab process (Bacteria culture selection)	X	
Training & documentation	Train Operators during commissioning	X	
<b>Equipment</b>			
Analytical instruments Power distribution & Control panel	PLC, Pneumatic, Panel, control I/O and customized S/W etc	X	
Analytical instruments	Online analyzers and meters (TOC, TN, TP, DO, OUR, pH, Temperature, Turbidity,	x	
ACT monitoring & Control System	Completely integrated unit	X	
Site Power distribution panel	feeding all the equipment installed		X
Level transmitters / switches	In tanks, sludge, chemicals Etc		X
Chemical room <b>Equipment</b>	Tanks, Mixers, Pumps, pipes, Power, etc		X
Sludge Handling Equipment	Tanks, certrifuge, piping, valves etc		X
Heat Exchange system	For inlet temperature if applicable		X
Pretreatment Instruments	As designed in BEP		X
Post treatment instruments	As designed in BEP		X
Effluent transport equipment	Pumps, Auto & Manual valves, Flow meters, etc.		X
Air System	Blowers, diffusers, piping		X
<b>Civil construction</b>			
Concrete construction	site foundations, Concrete basins for: Equalization tank, Reactors, clarifier, + Chemical room & control room		X
Piping construction	For Water, Air, Chemicals		X
Electrical wiring	Power & Control lines		X
Miscellaneous		X	X

### ***BPC Technology Package – Pricing***

*BPC ACT solutions are applicable to a variety of waste water application specifications, where “Specifications” includes: The inlet contamination compounds/level, effluent flow rate, desired quality performance of the treated effluent*

*ACT technology package is priced according to the application and to the flow rate*

<i>Application Complexity</i>	<i>Flow rate</i>	<i>Package Price</i>
<i>Petrochemical factories</i>	<i>TBD</i>	<i>TBD</i>
<i>Textile factories</i>	<i>TBD</i>	<i>TBD</i>
<i>Oil &amp; Gas Production</i>	<i>TBD</i>	<i>TBD</i>

### ***BPC ACT technology Package - Payment terms***

*As indicated above, BPC is involved from the very beginning of the cycle, already with the first efforts to define the needs of the client with all the relevant details*

*The payment milestones are:*

- 1. 10% down Payment upon issuing the PO for the package*
- 2. 10% upon delivery of the detailed design (end of first phase & ready for logistics phase)*
- 3. 60% upon delivery of BPC ACT control system to the plant*
- 4. 10% upon completion of installation of ACT control system and wiring all control lines*
- 5. 10% upon completion of the commissioning & training and delivering the plant to the client*

### ***Wrap-up***

- BPC tailored the above package so that EPC partners may have significant competitive edge when competing on deals / Tenders.*
- The combination of ACT technology package and the EPC capabilities enables a smooth, professional and most cost effective delivery of WWTP to a variety of market segments*
- Exclusive partnership can be relevant under certain conditions*
- The same exact concept is applicable for a WWTP Retrofit. This is the case where an existing treatment plant has a need for a retrofit that will: Improve quality, or Increase capacity or reduce cost etc. For this purpose, BPC developed the expertise and technology to offer a retrofit (see appendix 3)*

## Appendix 1 – About BPC

### **BioPetroClean Mission**

*BPC delivers turnkey solutions for industrial waste water treatment plants (new or existing ones)*

*BioPetroClean transforms the treatment of industrial wastewater into an efficient, economical and ecologically-friendly process. BioPetroClean's modular and easy to integrate ACT - Automatic Chemostat Treatment - provides a novel solution to challenges presented by pollution, environmental regulations and operational cost pressures.*

### **BPC Offering**

*BPC's clean technology and expertise simplifies and streamlines the bioremediation process resulting in significant cost savings. The company offers water purification market solutions that combine a full engineering process with BPC's unique bioremediation know-how. BPC's process is tailored to the site's specific physical characteristic and environmental challenges. Ongoing support ensures that the performance of the system is maintained at a steady state.*

*BPC offers turnkey solutions applicable for any required capacity and be delivered as:*

- **ADD ON** to an existing treatment site (utilizing the existing infrastructure) in order to allow quality improvements, treated water re-use, capacity increase and reduction of operational cost.
- **Green Field** – delivery of a complete treatment system in a new factory or in places where no system was in use.

**Unique Technology:** *BPC's offering is based on two innovations: A unique, highly effective bacteria cocktail which eliminates the need to recycle biological sludge and prevents dangerous by-products, and a unique process control system that simplifies the treatment of oil-polluted soil and water under a wide range of environmental conditions.*

**Flexible, Scalable and Modular Delivery:** *BPC's system is completely modular, enabling customized solutions that are tailored to clients' specific needs and site conditions. The system's flexibility makes it applicable to numerous sites including oil refineries, oil storage farms, drilling sites, marine ports, contaminated reservoirs and storage tanks.*

**Automatic Control & Remote Monitoring:** *BPC's fully automated system is comprised of a variety of on-line sensors which monitor and react to parameters such as: TPH, nitrogen, dissolved oxygen, TOC and temperature. Remote access to the control unit is available via computer and mobile devices.*

### **Intellectual Property Rights**

*The company has filed two patents in the area bioremediation as discussed below, and is currently in the process of filing two additional patents relating to the cost-effective treatment of wastewater.*

**Innovative technology for gas free cleaning of oil storage tanks** - *This patent claims certain bacteria that produce bio-emulsifiers which can be used in removing oil from surfaces. The patent further*

describes a novel procedure for using these bio-emulsifiers to clean the cargo compartments of oil tankers.

**Innovative bioremediation water purification process** - This patent claims a novel procedure for cleaning oil refinery wastewater using a controlled bioreactor operating as a modified chemostat.

### Marketing and Sales

BPC is positioned as the microbiological solution provider of choice for any sizeable polluted water requirement. The company is aggressively pursuing revenue growth, with the objective of being the vendor of choice for all waste water treatment plants RETROFITS. The company's unique technology enables it to target high and low capacity facilities in both mature and emerging markets. BPC seeks collaborations and partnership agreements to penetrate new geographies

**Emerging Markets:** BPC currently has achieved significant traction in India, South Africa and Israel. Other markets such as Europe, the Americas, and China are ideal targets for BPC marketing and sales as demand for water purification solutions is increasing alongside the growth in the Oil & Gas industry

**Distribution Strategy:** BPC will market its offering with distribution and business partners, BPC targets major industries such as oil & gas, Petrochemical factories, Pulp & Paper, textile factories, steel factories and other industries with waste water challenges

#### Who can benefit from a BPC UPGRADE?

Refineries and petrochemical factories, pulp & paper factories and other industrial firms who happen to generate significant amounts of waste water and have a need for one of the following improvements:

- Dramatic **quality** improvements
- Quality performance **Stability** – guarantee no UPSETS (that currently may disturb the treatment plant several times a year)
- **Problematic stream** – Effective treatment of high COD streams and other especially problematic streams
- **Capacity increase** and release of current production bottlenecks
- **Lower OPEX** - Reduction of cost when **Recycling** the treated waste water

With its new process and sophisticated control system BPC tailors the most effective (and cost effective) solution to any industrial waste water challenge.

## Appendix 2 – Monitoring & Control System

WWTP (Waste Water Treatment Plants) have a growing need for accurate and reliable monitoring of effluent parameters, before & after treatment.

**BPC provides a reliable & cost effective analytical & control system for all ETP's**

- Monitoring effluent streams in **three locations** simultaneously (Inlet, process & Treated effluent)
- The system consists of three main elements:
  - a. **Automated Sampling System** designed to meet specific effluent streams
  - b. **On line analyzers** that measure a variety of parameters (Flow, pH, Temp., TOC, DO, OUR, TN, TP, Turbidity, Alkalinity, TDS, Sulfides and more...)
  - c. **Closed Loop Control:** BPC system Closes the loop via PLC automating the process including:
    1. pH adjustment
    2. Chemical dosing at multiple process points
    3. DO (Dissolved Oxygen) control for bioreactors
    4. Online OUR (Oxygen Uptake Ratio) in bioreactors & chemical oxidation
    5. Flow control (as applicable)
- **Visibility:** Process performance is clearly displayed in multiple locations
- **Central control:** all data and statuses are synchronized with the plant main control unit

Fig. 1: sampling, online analyzing & control system

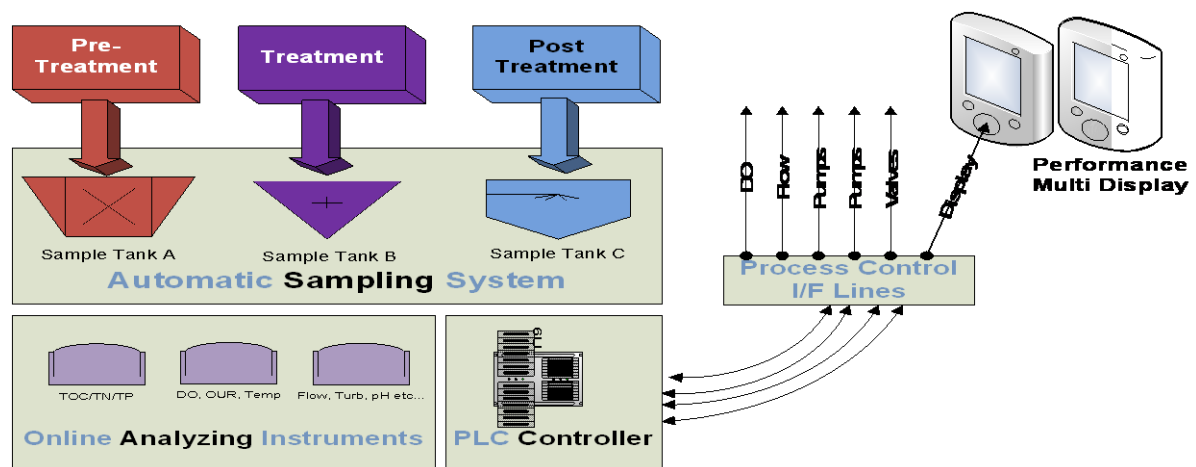


Fig. 2: BPC Monitoring & Control System



## Available configurations:

Three different configurations are available:

1. **Basic Module**
2. **Advanced Control Module**
3. **Optional I/F**

**Note:** customers can start with basic module and gradually expand to the maximum capabilities

## Detailed description:

**Basic Module;** consists of three main elements:

1. Three channel sampling system, each sampling is customized to meet
  - a. The effluent stream characteristics (inlet, In-Process, or treated)
  - b. The desired sampling mode (online, accumulating, average or other)
2. An array of Analyzers (TOC, COD, DO, TN, TP, Temp, pH, Alkalinity, & more)
3. *Local & Remote Display monitors*

## Customized solutions:

BPC's monitoring & Control system is designed in a modular way that enables specific customizations for each individual ETP, according to its needs & setup.

BPC customized monitoring & Control system is delivered after factory integration& testing

Fig. 3: sampling, online analyzing & control system



**Advanced control Module;** The closed loop control & automated dosing:

Analyzed parameters are fed to a PLC utilizing BPC proprietary algorithms to produce the control lines for:

- ✓ Chemical dosing automation required for: pH adjustment, Nutrients accurate injection bioreactors& Chemicals in the pretreatment or post treatment (DAF or clarifier)
- ✓ Balance the DO (Dissolved Oxygen) level in bioreactors (Blower control)
- ✓ Adjust the Flow control
- ✓ Optimize chemical consumption (dosing adjusted according with flow & contamination characteristics)
- ✓ Provide process performance management reports– consumption etc.

**Optional - Interface to the plant control system**

BPC offers an optional interface module that will synchronize all data and control lines to& from the main plant control system. For uniform operations of the plant under one control

## Appendix 3 – BPC ACT retrofit

### Improve Effluent Treatment (ETP) Quality & Stability with BPC ACT

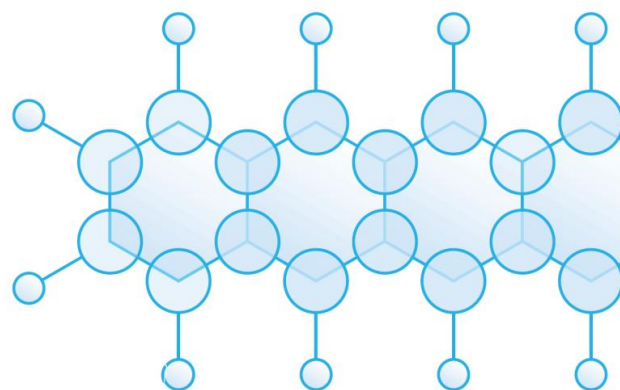


**BPC ACT (Automated Chemostat Treatment)** – is the latest bioremediation technology development for waste water treatments. It is available for "greenfield" installation as well as for existing WWTP retrofits.

**BPC ACT retrofit** – is applicable to any effluent treatment plant (ETP), it will boost the plants' performance, remove bottlenecks, thus reducing Operational expenses.

#### Implementing BPC ACT retrofit involves:

- Site study – design a tailored solution to each site
- Engineer a bacterial cocktail tailored form the process effluent.
- Transform the existing bioreactor to low MLSS ACT Bioreactor
- Addition of the control system and application of closed loop automation for:
  - ✓ Flow Control
  - ✓ pH adjustments
  - ✓ Pre/Post treatment - Chemical dosing
  - ✓ Bioreactor - Nutrient dosing & DO Control

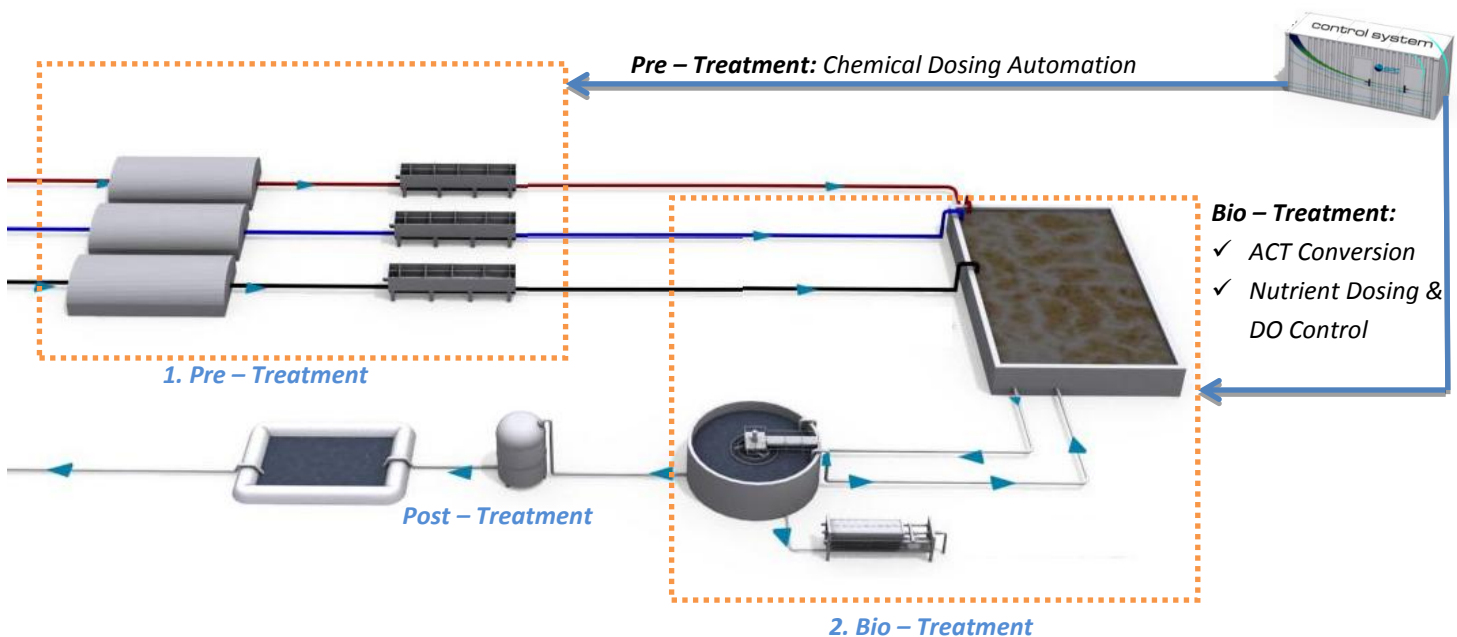


**BPC ACT is available for all ETP industrial or municipal**



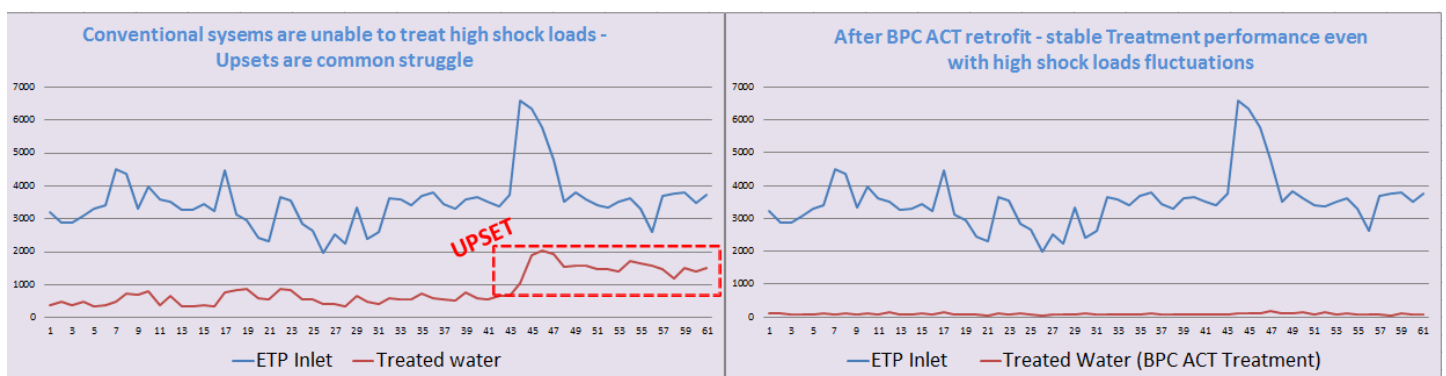
The retrofit is performed on two elements:

1. Pre- treatment, 2. Bio – Treatment



### The value you gain from BPC ACT retrofit

- Quality Improvements
- Stable performance, complete prevention from upsets
- Increase in Flow/Capacity of the plant.
- Closed loop automation for chemical dosing, nutrient dosing & DO Control
- Reduction in chemical usage
- Reduction in sludge volume by at least 35%
- Reduce OPEX (by 25%)



**BPC ACT Retrofits provide rapid Return on Investment**