LUCAS® ACTIVATED SLUDGE TECHNOLOGY
LUCAS combines advantages and disregards disadvantages of the conventional system and the variable volume SBR system.

Like in the conventional system, the reactor volume and the level in the tanks are always constant and there is a continuous inflow-outflow.

Like in the SBR system, the reactor operates according to the control in time principle.
Advantages of the cyclic operating SBR-systems:
- Easy/compact construction
- Control in time flexibility that allows control of all specific phases
- Substrate gradients resulting in microbial selection of well settling sludge
- Quiscent settling conditions

Disadvantages of cyclic operating SBR-systems:
- Discontinuous influent feeding and effluent discharge
- The variable level and volume
- More complex moving equipment
SBR system: settling advantages

- Substrate gradients resulting in selection of well settling sludge
- Quiscent (undisturbed) settling
SBR system: time control advantages

PHASE 1
Influent
Aerobic Filling Accumulation

PHASE 2
Influent
React:
anoxic, anaerobic + aerobic

PHASE 3
Decanting
Effluent

Time & alternation of ‘react’ phases is adapted to obtain optimal nutrient removal
Conventional system: advantages & disadvantages

- **Main advantages**
  - continuous influent and effluent flow rate
  - constant water level

- **Main disadvantages**
  - limited flexibility,
  - devices for sludge raking
  - devices for re-circulation flow
  - circular configuration of sedimentation tanks
  - high footprint
Conventional system: advantages & disadvantages

Introduction of nutrient removal in control in place; more tanks and recirculation.
- The system can be described as a **multiple unit tank**

- The units within the tank are hydraulically connected (one system)
LUCAS sludge distribution (‘recirculation’) by gravity

**PHASE 1:**
- Unit A, MLSS decrease
- Unit B, MLSS constant
- Unit C, MLSS increase

**PHASE 2:**
- Unit A, MLSS constant
- Unit B, MLSS increase
- Unit C, MLSS decrease

**PHASE 3:**
- Unit A, MLSS increase
- Unit B, MLSS decrease
- Unit C, MLSS constant
LUCAS Cyclic Operation

PHASE 1

PHASE 2

PHASE 3
- Regenerated unit becomes next clarifier
- No short circuiting of influent to clarifier
LUCAS advanced nutrient removal

LUCAS-3 N removal (moderate N)
A: Anoxic / aerobic
B: Aerobic

LUCAS-3 N P removal (high NP)
A: Anoxic / anaerobic/aerobic
B: Anoxic/aerobic/anoxic
Seen over each partial time phase the combination of the individual units (the overall tank) resembles a continuous conventional activated sludge system, however without the sludge recirculation.
Effluent

Decantation phase

Aerobic phase: MLSS is aerated

Influent

Aerobic phase: MLSS is aerated

To B

From C

PHASE 1

PHASE 2

PHASE 3

LUCAS overlap with SBR system

Seen over the complete cycle each unit has a SBR-cyclic operation, however without level changes
The LUCAS system combines the advantages and disregards the disadvantages of the conventional WWTP and the variable volume Sequencing Batch Reactor WWTP.

Main advantages are the **compact** and **redundant** construction combined with a **high** and **reliable** treatment capacity and process **flexibility**.

The hearth of the LUCAS concept is its **Cyclic Activated Sludge Technology**.

The advantage are proven by the many references in industrial and municipal projects.
300,000 P.E.
160 m by 100 m = 1600 m²
Surface aerators, 4 m depth
LUCAS NP : Sewage-WWTP 3 parallel lanes

100,000 P.E.
City of Antwerp North
LUCAS NP: Sewage WWTP 7 parallel lanes

400,000 PE, 60,000 m³/day, Loujiang-China
LUCAS Undercover - zero emission

- completely covered
- full odour control
- noise control
- compact
- low visual impact
LUCAS NP: Sewage-WWTP 3 parallel lanes

300,000 PE, Taipa – Macau
LUCAS NP : Sewage-WWTP 12 parallel lanes

300,000 m³/day – 36,000 kgBOD/day
Nanjing China
LUCAS anaerobic-aerobic

- BEL-AIR odor treatment
- Covered buffertank
- Covered effluent weir
- UASB-reactor
- LUCAS-4 aerobic posttreatment
Heineken Breweries:
Nigeria, Vietnam, Netherlands
LUCAS: zero environmental impact

- completely covered
- full odour control
- noise control
- unobtrusive:
  - can be built underground
  - camouflaged
- no visual impact
- no environmental impact