WATERLEAU Group : water-air-waste-New.energy

LUCAS® ACTIVATED SLUDGE TECHNOLOGY

SAWEA Workshop 29-30 November 2005

Al-KHOBAR

WATERLEAU
GLOBAL WATER TECHNOLOGY

LUCAS : Leuven University Cyclic Activated sludge

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

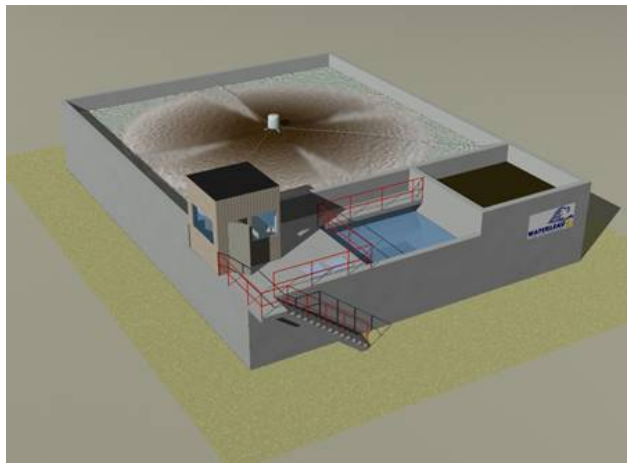
SBR system : advantages & disadvantages

Advantages of the cyclic operating SBR-systems :

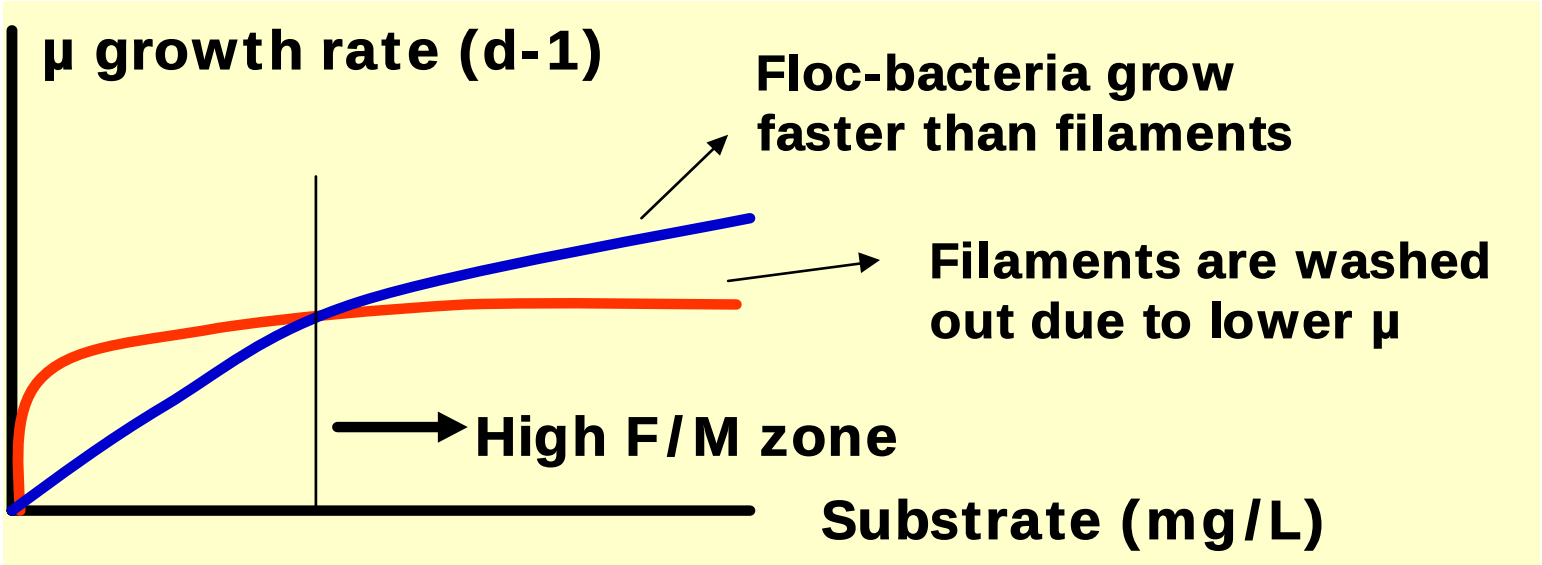
- Easy/compact construction
- Control in time flexibility that allows control of all specific phases
- Substrate gradients resulting in microbial selection of well settling sludge
- Quiscent settling conditions

Disadvantages of cyclic operating SBR-systems :

- Discontinuous influent feeding and effluent discharge
- The variable level and volume
- More complex moving equipment

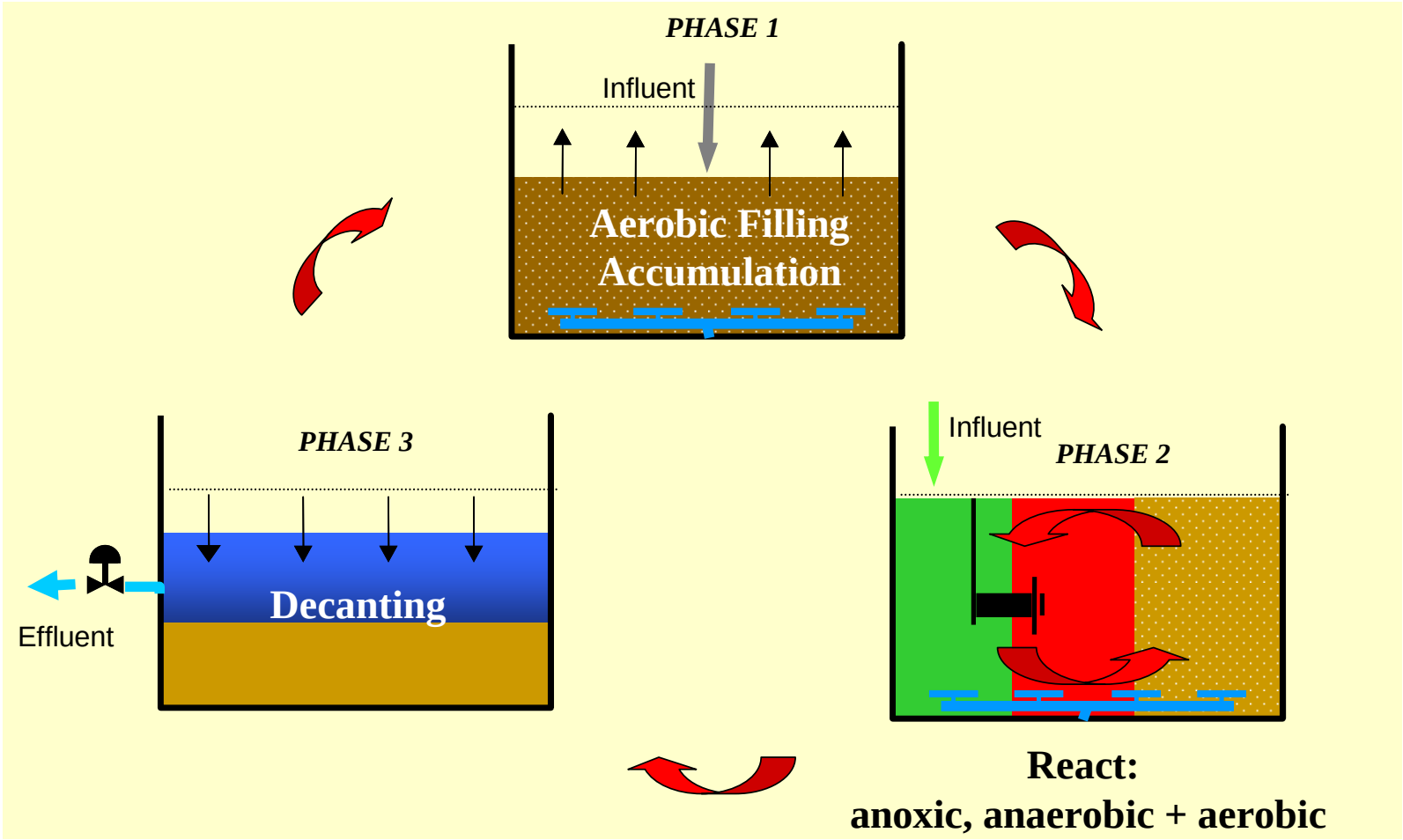


SBR system : settling advantages



- Substrate gradients resulting in selection of well settling sludge
- Quiscent (undisturbed) settling

SBR system : time control advantages

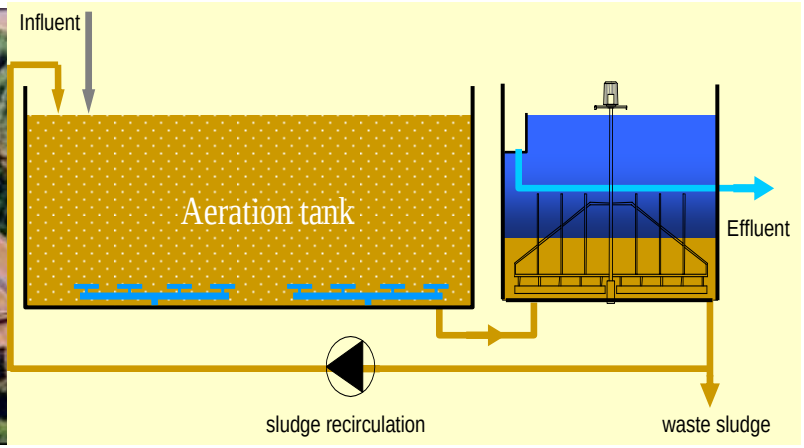


Time & alternation of ‘react’ phases is adapted to obtain optimal nutrient removal

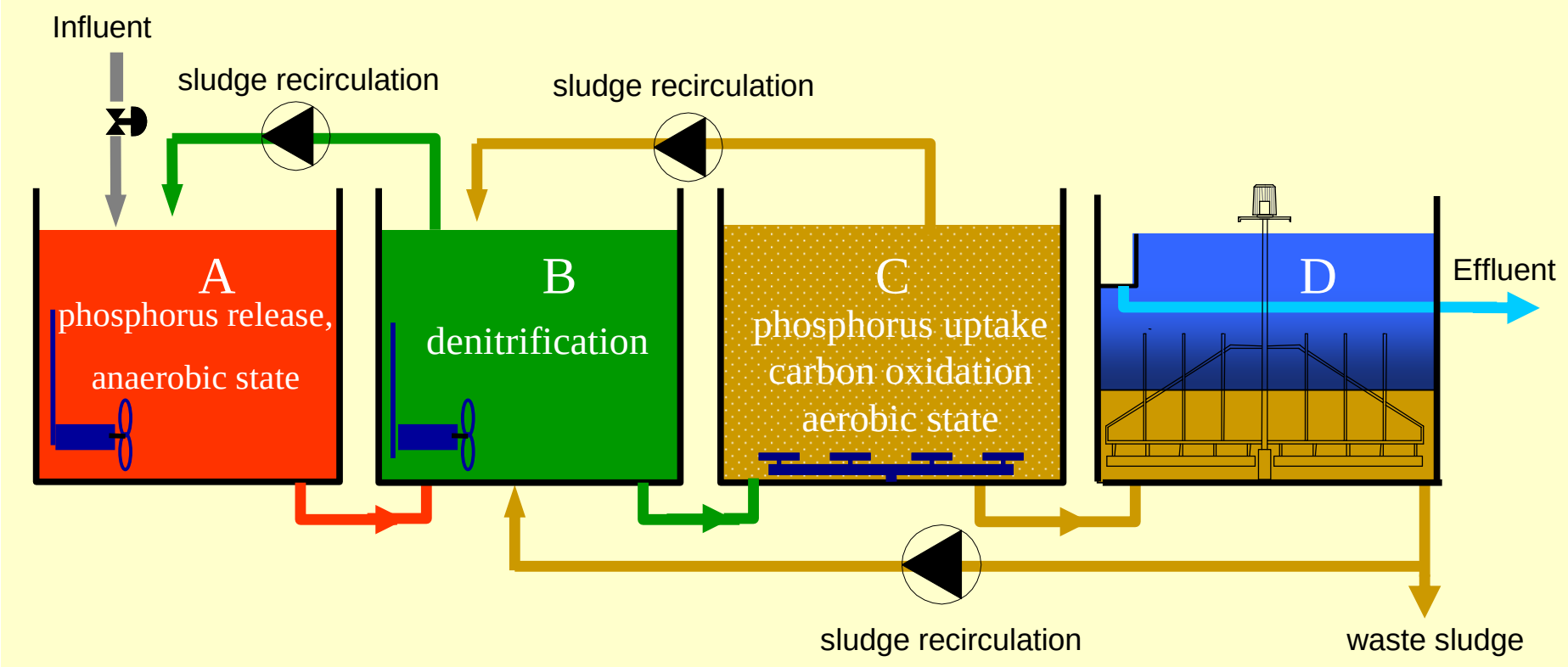
Conventional system : advantages & disadvantages

- 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

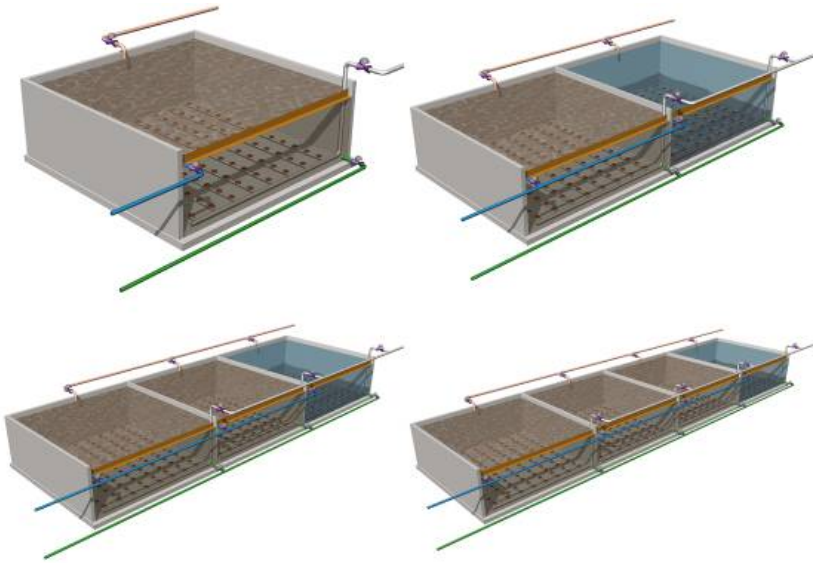


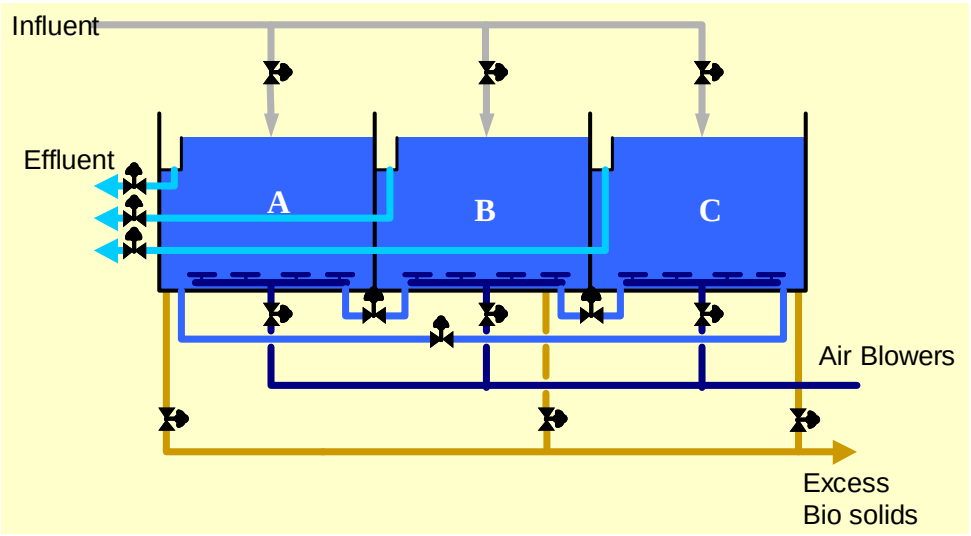
Conventional system : advantages & disadvantages



Introduction of nutrient removal in control in place ; more tanks ands recirculation

LUCAS hydraulic scheme

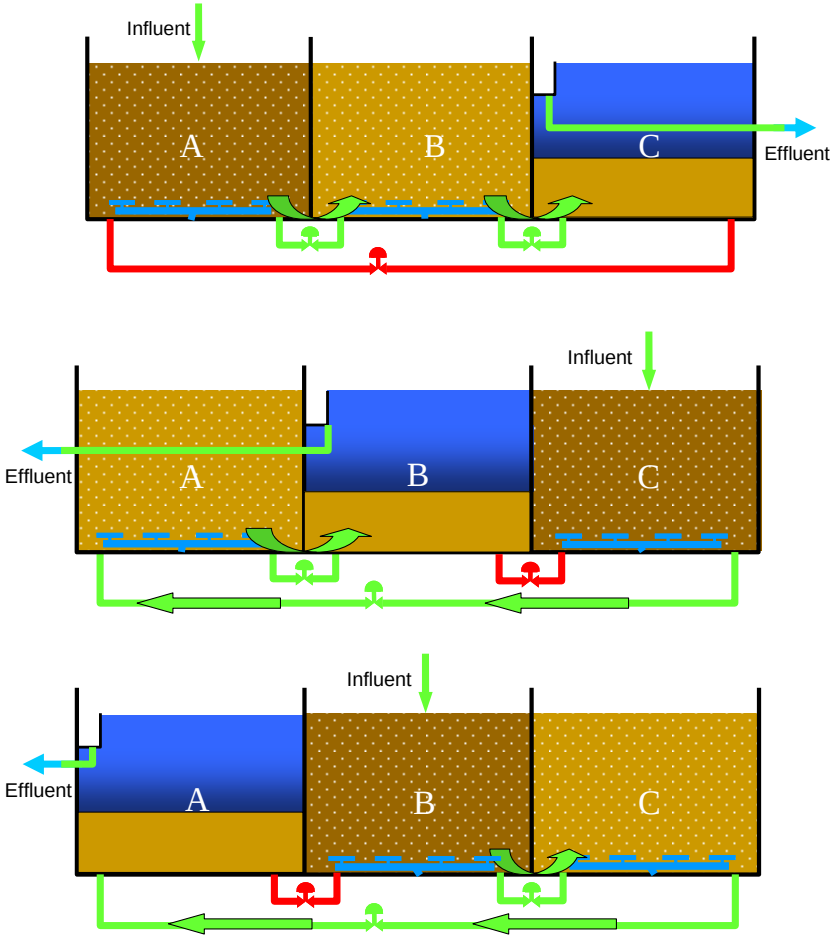




-The system can be described as a **multiple unit tank**

- The units within the tank are hydraulically connected (one system)

LUCAS sludge distribution (‘recirculation’) by gravity’

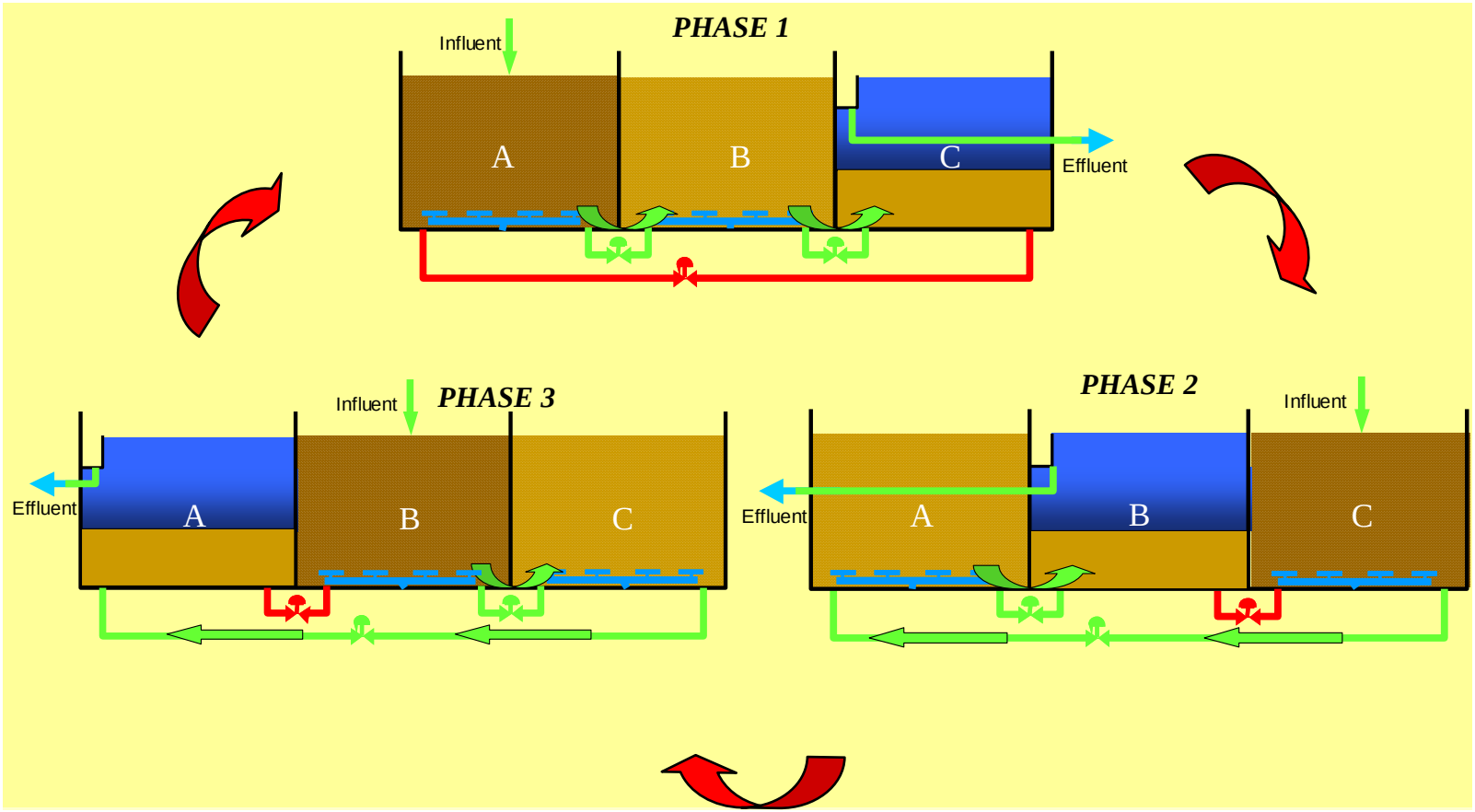


PHASE 1;
unit A, MLSS decrease
unit B, MLSS constant
unit C, MLSS increase

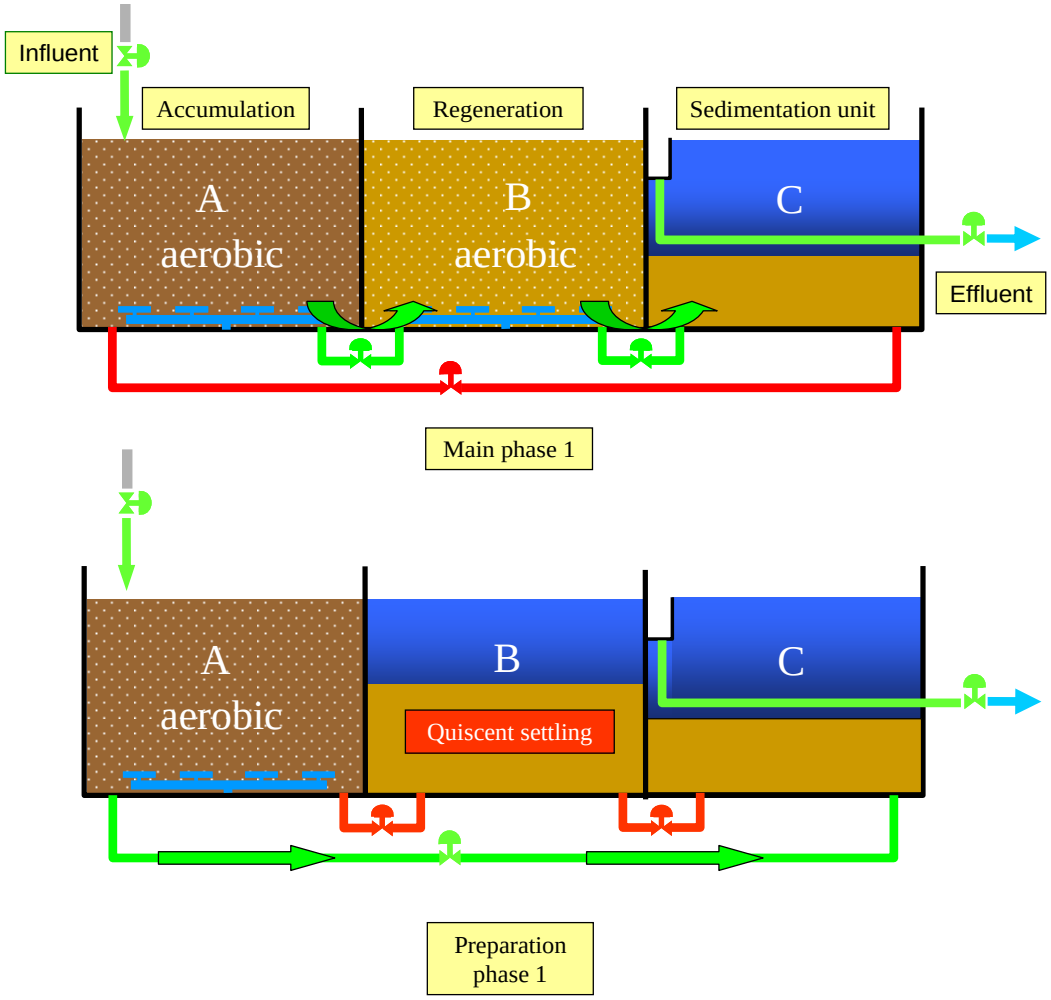
PHASE 2;
unit A, MLSS constant
unit B, MLSS increase
unit C, MLSS decrease

PHASE 3;
unit A, MLSS increase
unit B, MLSS decrease
unit C, MLSS constant

LUCAS Cyclic Operation

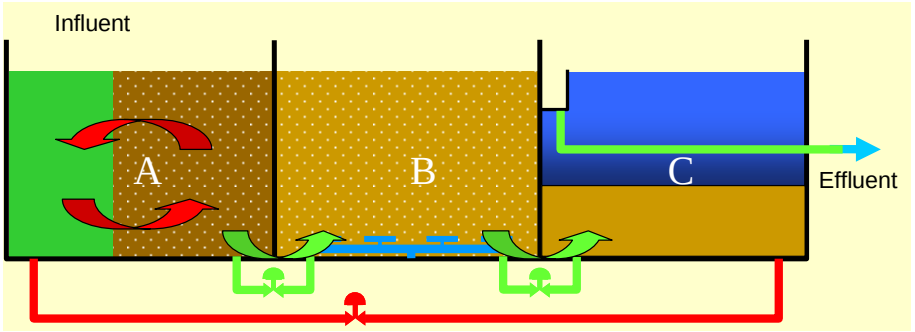


LUCAS Cyclic Operation

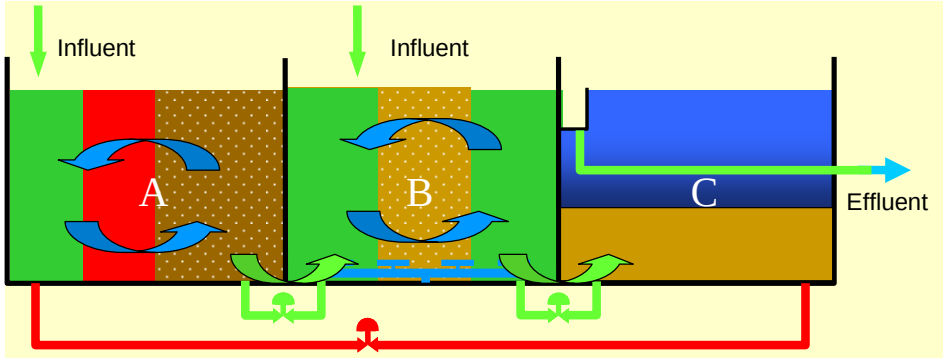


- Regenerated unit becomes next clarifier
- No short circuiting of influent to clarifier

LUCAS advanced nutrient removal

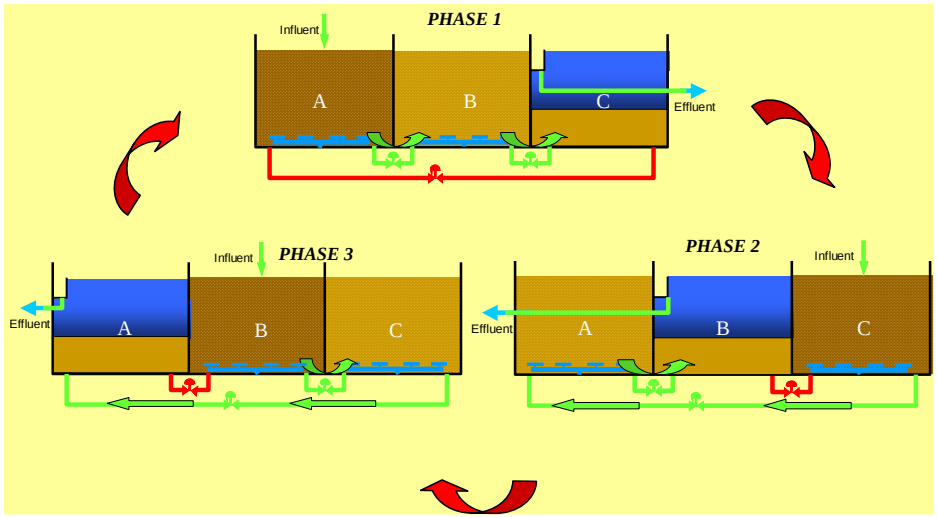


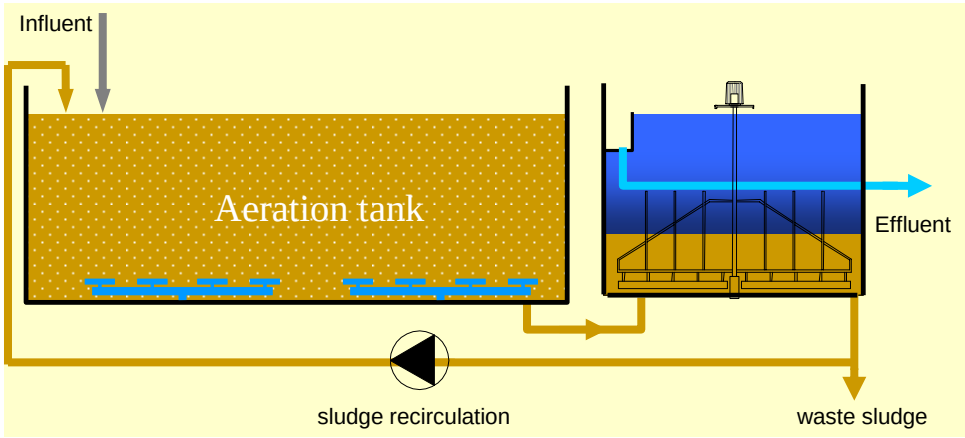
LUCAS-3 Nremoval **(moderate N)**
A: Anoxic / aerobic
B : Aerobic



LUCAS-3 NPremoval **(high NP)**
A: Anoxic / anaerobic/aerobic
B : Anoxic/aerobic/anoxic

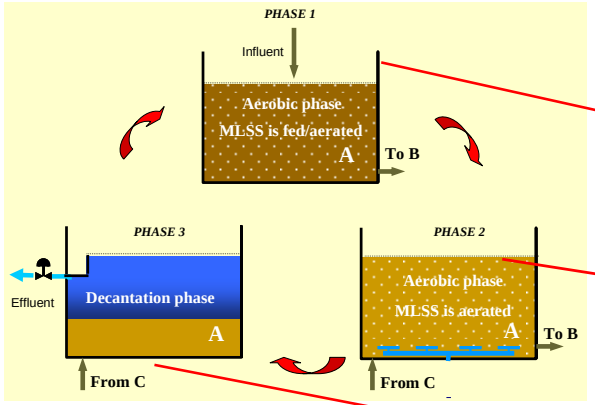
LUCAS overlap with conventional system

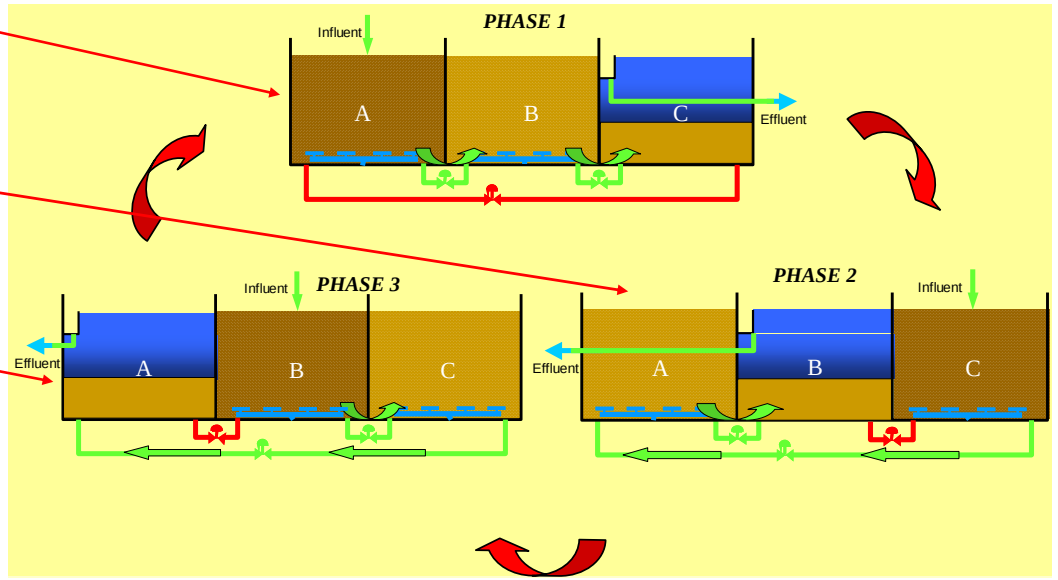




Seen over each partial time phase the combination of the individual units (the overall tank) resembles a continuous conventional activated sludge system, however without the sludge recirculation

LUCAS overlap with SBR system





Seen over the complete cycle each unit has a SBR-cyclic operation, however without level changes

LUCAS Advantages

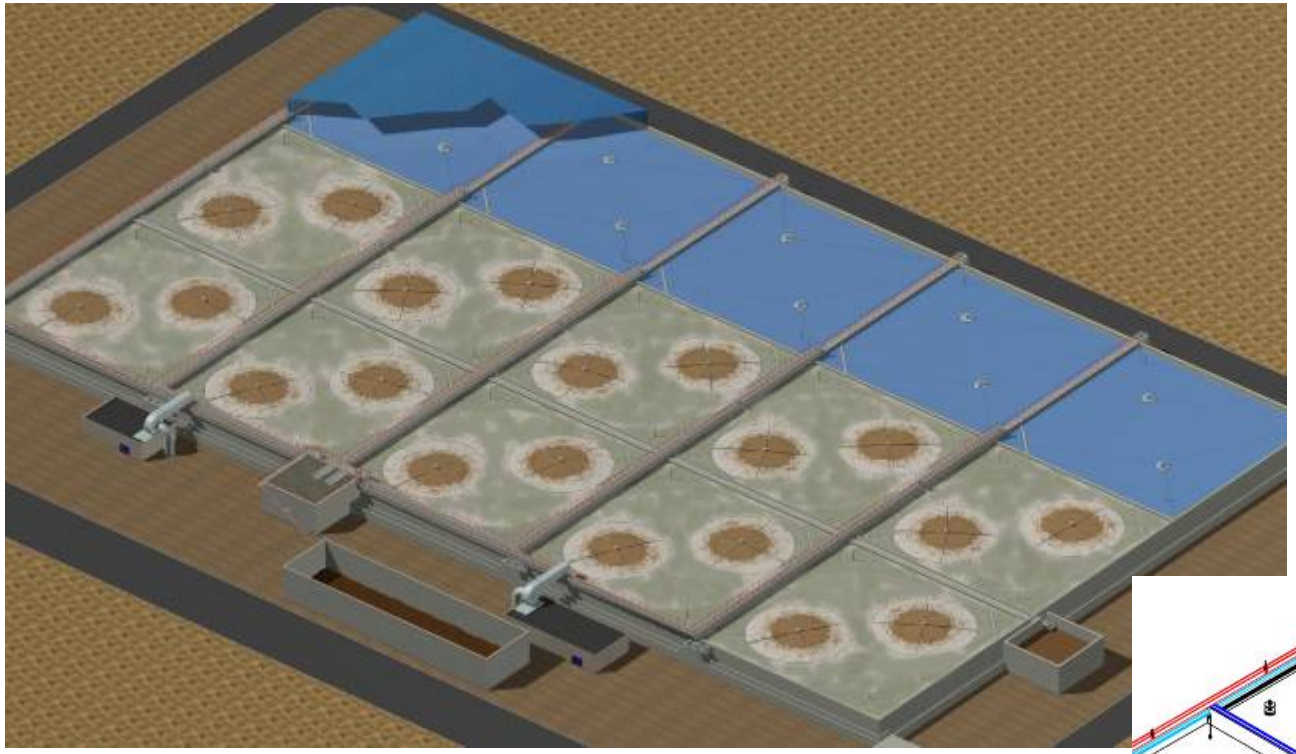
The LUCAS system combines the advantages and disregards the disadvantages of the conventional WWTP and the variable volume Sequencing Batch Reactor WWTP

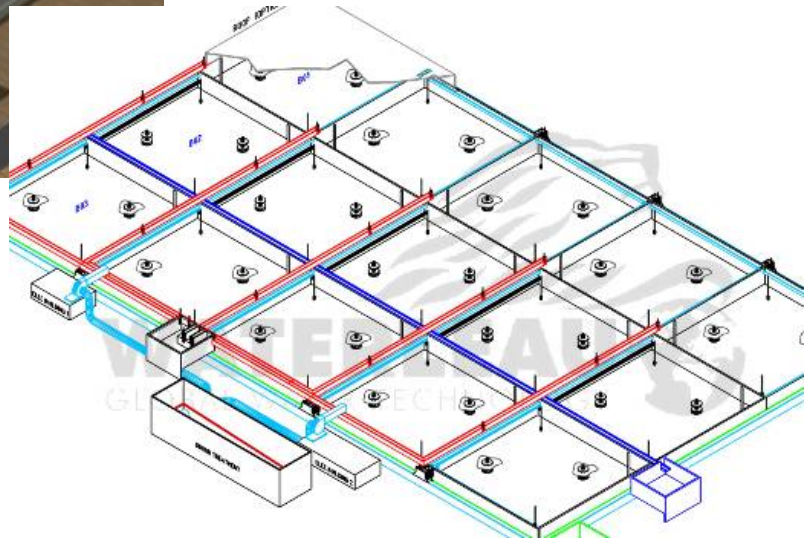
Main advantages are the compact and redundant contruction combined with a high and reliable treatment capacity and process flexibility

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

LUCAS NP : Sewage-WWTP parallel lanes





300.000 P.E.
160 m by 100 m = 1600 m²
Surface aerators, 4 m depth

LUCAS NP : Sewage-WWTP 3 parallel lanes

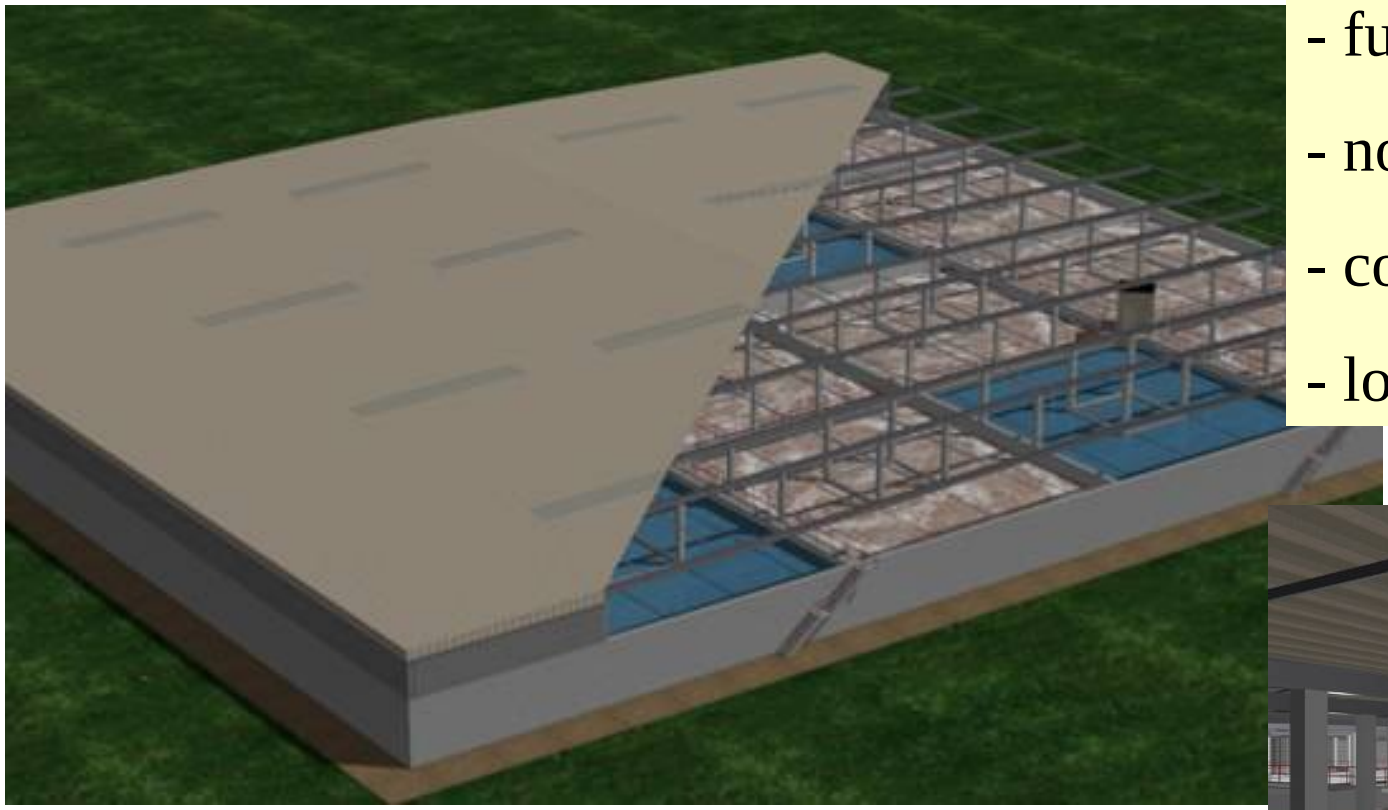
100.000 P.E.
City of Antwerp North

LUCAS NP : Sewage-WWTP 7 parallel lanes

400.000 PE, 60.000 m3/day, Loujiang-China

LUCAS Undercover-zero emission

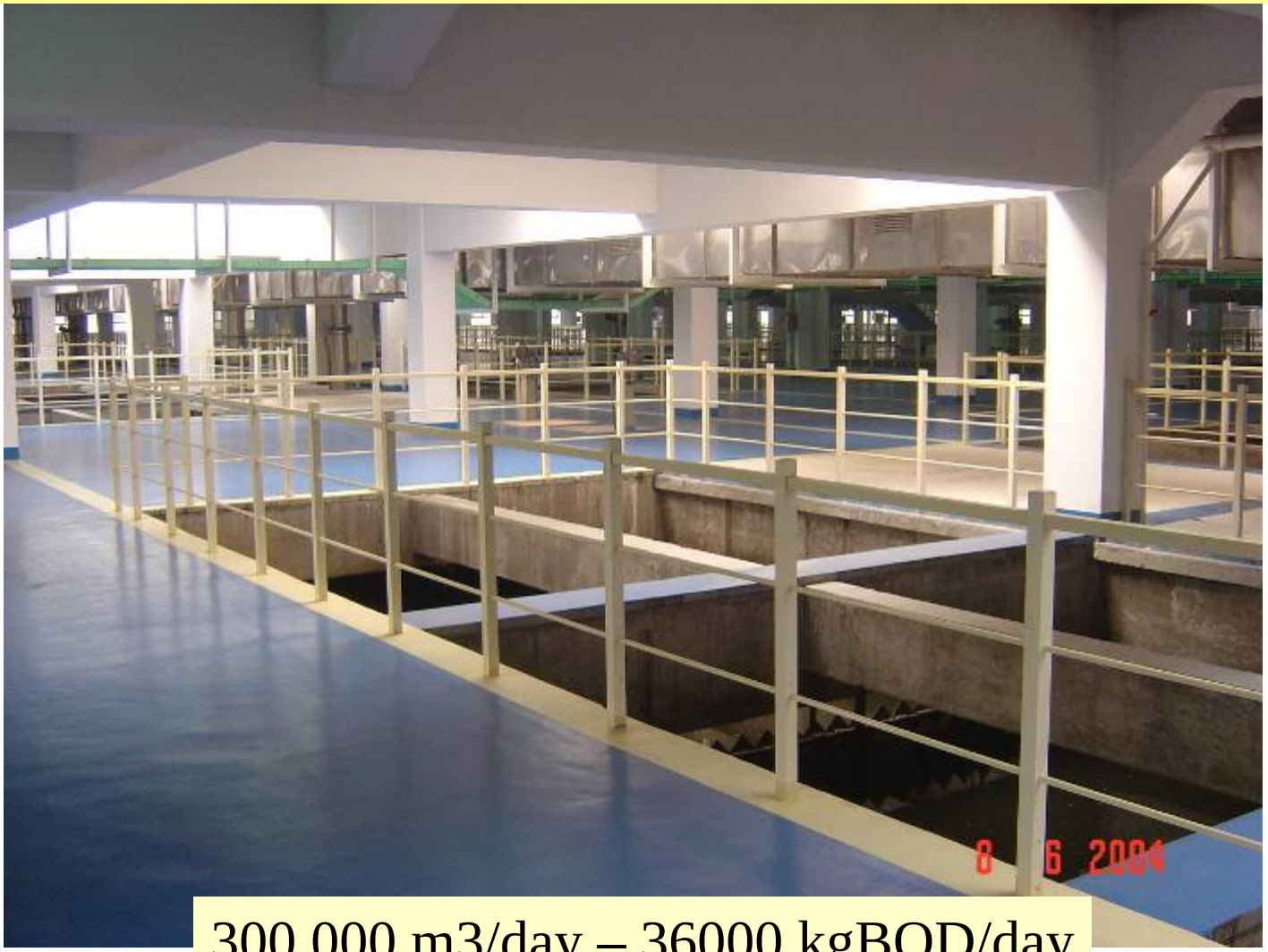
- completeley covered
- full odour control
- noise control
- compact
- low visual impact



LUCAS NP : Sewage-WWTP 3 parallel lanes

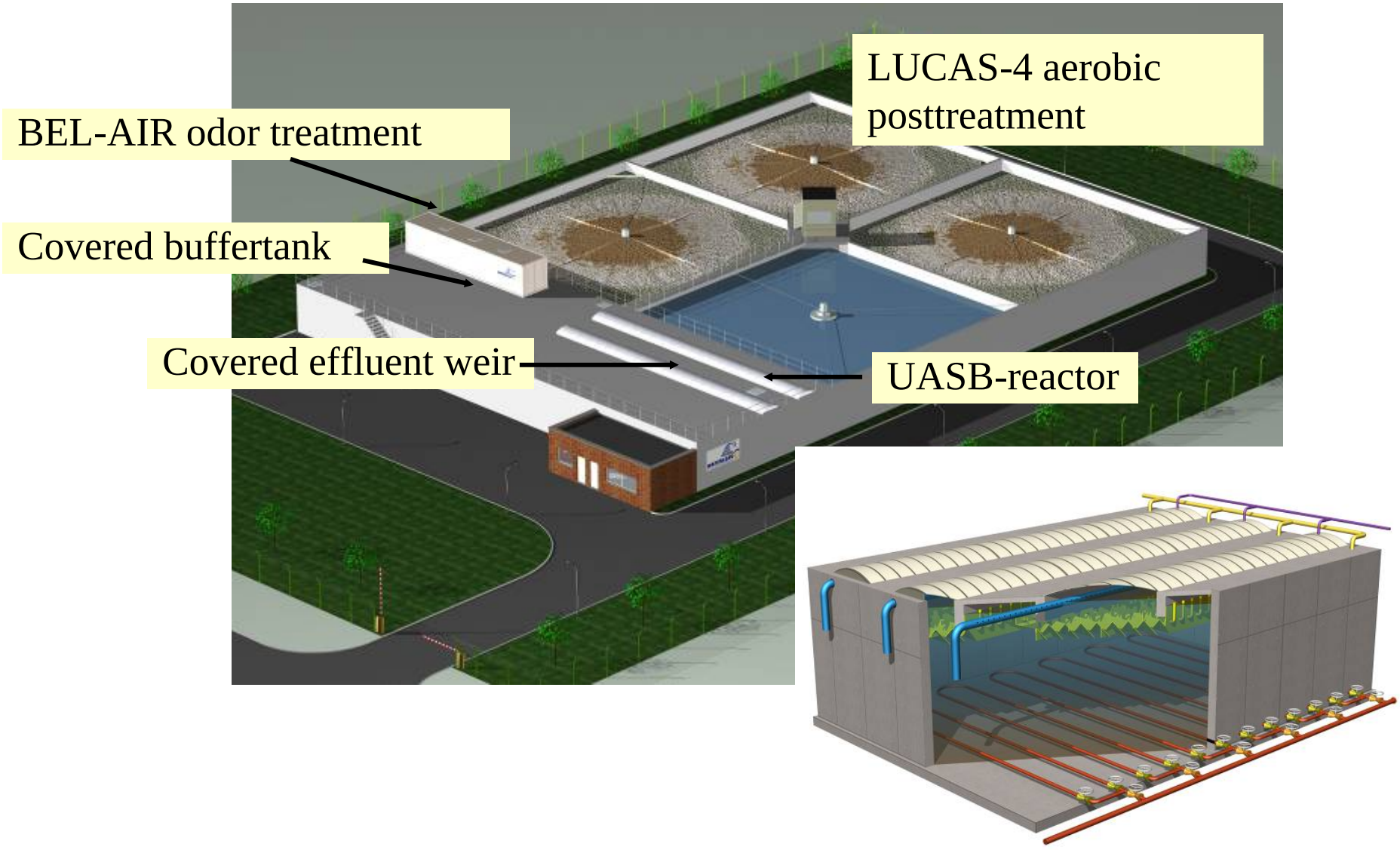
300.000 PE, Taipa – Macau

LUCAS NP : Sewage-WWTP 12 parallel lanes



300.000 m3/day – 36000 kgBOD/day
Nanjing China

LUCAS anaerobic-aerobic



LUCAS anaerobic-aerobic

Heineken Breweries:
Nigeria, Vietnam, Netherlands

LUCAS : zero environmental impact

completeley covered

full odour control

noise control

+ unobtrusive :

- can be built underground

- camouflated

+ no visual impact

+ no environmental impact