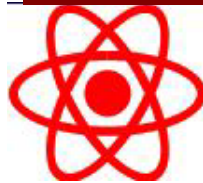


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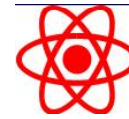
WITH THE CONTRIBUTION OF



Dott. Chim. ENZO TARQUINI

VIA E. MONTALE, 3 – 63833 MONTEGIORGIO (ITALY)

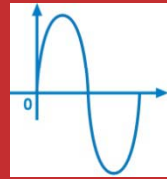
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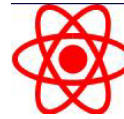
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**AN ALTERNATIVE SOLUTION FOR THE
TREATMENT OF WASTE WATER AND
ORGANIC WASTE FROM DOMESTIC
AND/OR FOOD INDUSTRY AND FARM
ACTIVITIES.**



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WHAT DO WE MEAN BY WASTE WATER AND ORGANIC WASTES?

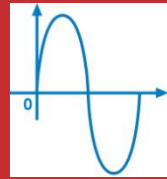
SOME EXAMPLES:

DOMESTIC ACTIVITIES :

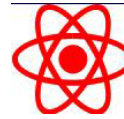
- WASTE WATER FROM FOOD PREPARATION AND FOOD WASTE, LAUNDRY, TOILET AND SUCH LIKE
- ORGANIC WASTE FROM FOOD PREPARATION AND FOOD, FROM GARDENING ACTIVITIES, GREEN AREAS AND THE LIKE (I.E. EASILY BIODEGRADABLE MATERIALS)

FOOD INDUSTRY AND FARM ACTIVITIES.

- PROCESS WASTE WATER WITH BIODEGRADABLE ORGANIC LOAD AND TOILET WASTE WATER
- NATURAL ORGANIC WASTE AND PRODUCTION WASTE THAT ARE EASILY BIODEGRADABLE



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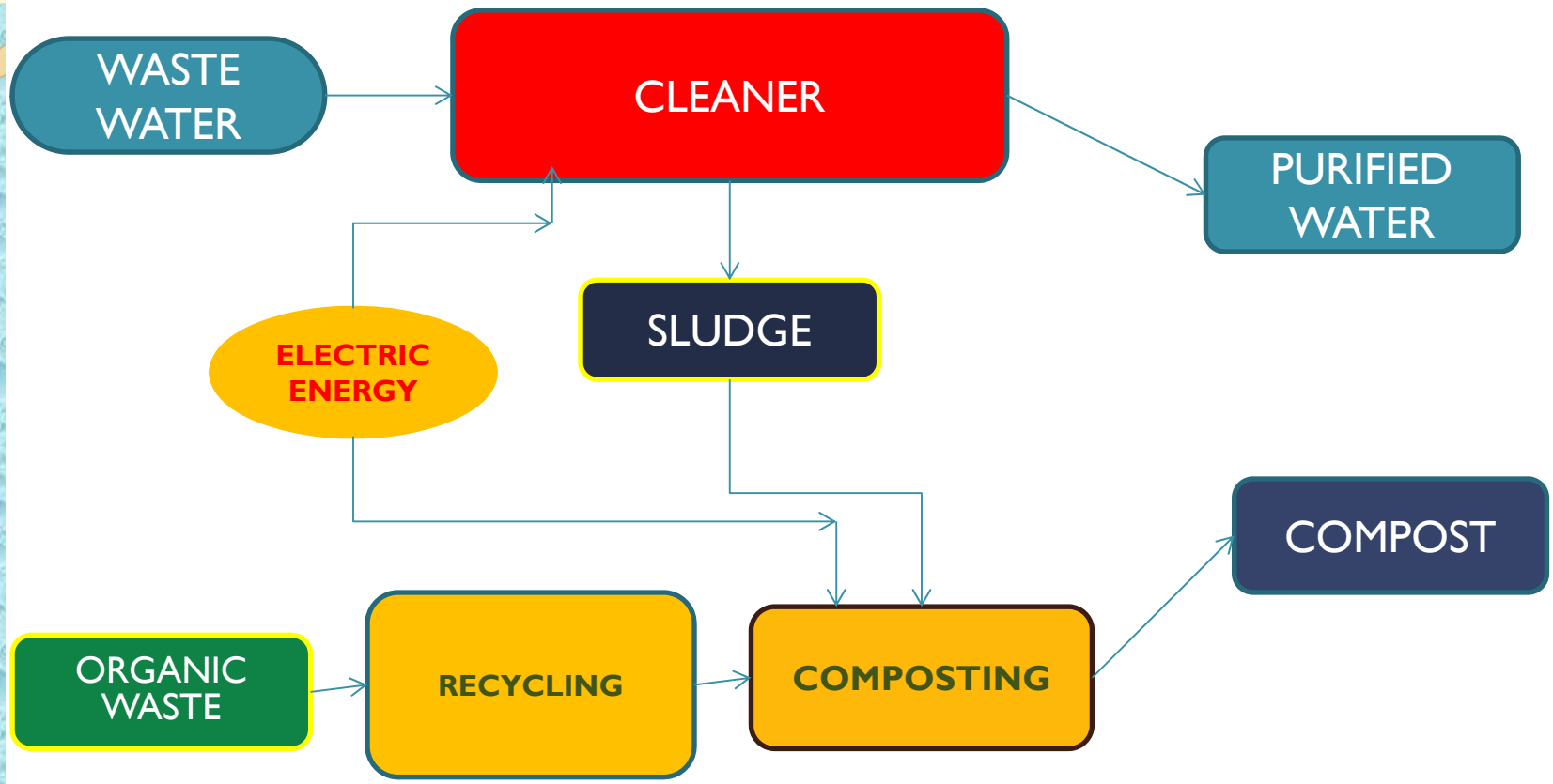


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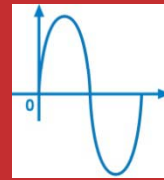
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THE BEST KNOWN AND MOST USED METHOD FOR THE TREATMENT OF ALL THESE TYPES OF WASTE WILL BE CALLED "CLASSIC" FOR SHORTNESS'. THIS METHOD CONSISTS IN:

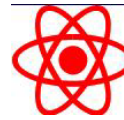
- DOMESTIC AND SIMILAR INDUSTRIAL WASTE:
BIOLOGICAL SEWAGE TREATMENT BY ACTIVATED SLUDGE (CLEANER) AND DISCHARGE OF PURIFIED WATER INTO SURFACE WATER.
- ORGANIC WASTE :
RECYCLING AND TREATMENT IN COMPOSTING PLANTS WITH THE USE OF COMPOST IN ENVIRONMENTAL RECOVERY



SIMPLIFIED "CLASSIC " METHOD



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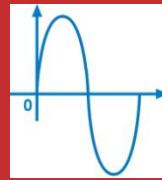


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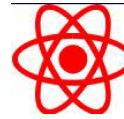
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TWO LIMITS OF "CLASSIC" METHOD":

- USE OF HIGH POWER AND HIGH ELECTRICITY CONSUMPTION FOR THE TREATMENT OF ORGANIC (CLEANER) AND COMPOSTING.
- HIGHER COST FOR RECYCLING AND COMPOSTING.



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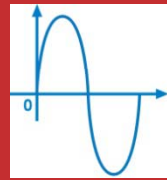


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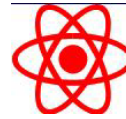
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“THE PROPOSAL CONTAINED IN THIS STUDY PROVIDES A DIFFERENT APPROACH FOR THE TREATMENT OF WASTE WATER AND ORGANIC WASTE.
FOR SHORTNESS THIS WILL BE CALLED "ALTERNATIVE METHOD"

-
- BIODIGESTION AND COGENERATION PLANT WITH THE PRODUCTION OF ELECTRICITY AND HEAT
 - SOLID DIGESTATE WILL BE USED AS SOIL IMPROVER IN GARDENS, FIELDS AND OASES
 - LIQUID DIGESTATE WILL BE USED IN HYDROPONIC GARDENS AND OASES, OR TREATED IN PHYTOREMEDIATION PLANTS WITH NATURAL CIRCULATION

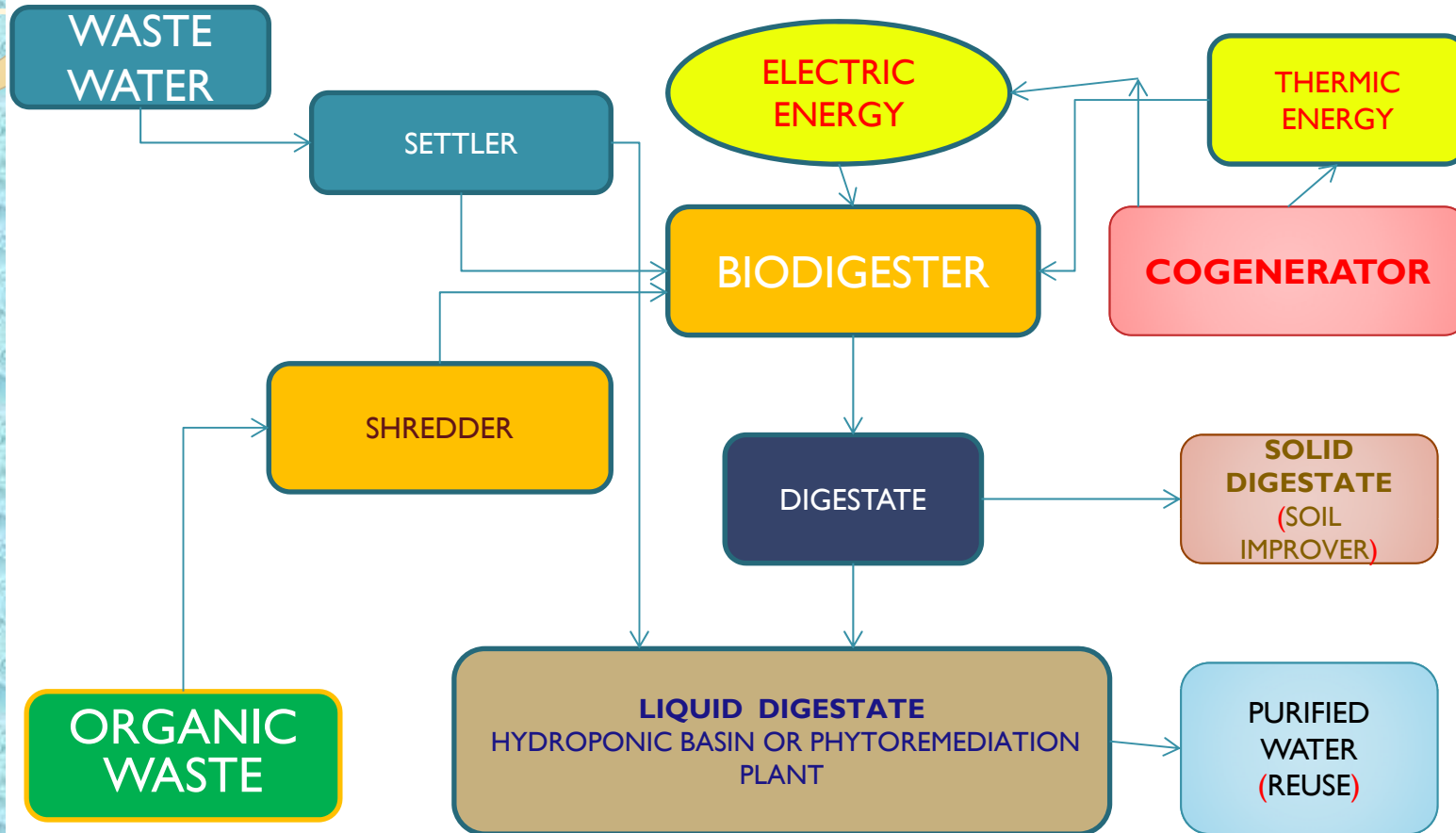


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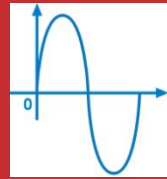


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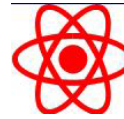
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PLANT SCHEME OF "ALTERNATIVE METHOD"



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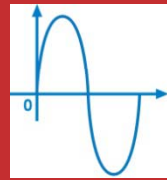
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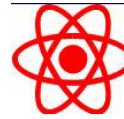
ALTERNATIVE METHOD: WHAT EXPECTATIONS AND BENEFITS?

BETTER EXPLOITATION OF WATER WASTE AND ORGANIC WASTE:

- PRODUCING ELECTRICITY AND HEAT BY PLANT BIODIGESTION AND CHP
- CUTTING THE COST OF TREATMENT SERVICES
- USING THE SOLID DIGESTATE AS SOIL IMPROVER AND LIQUID DIGESTATE IN HYDROPONIC GARDENS, OASES, FIELDS OR IN PHYTOREMEDIATION PLANTS WITH NATURAL CIRCULATION



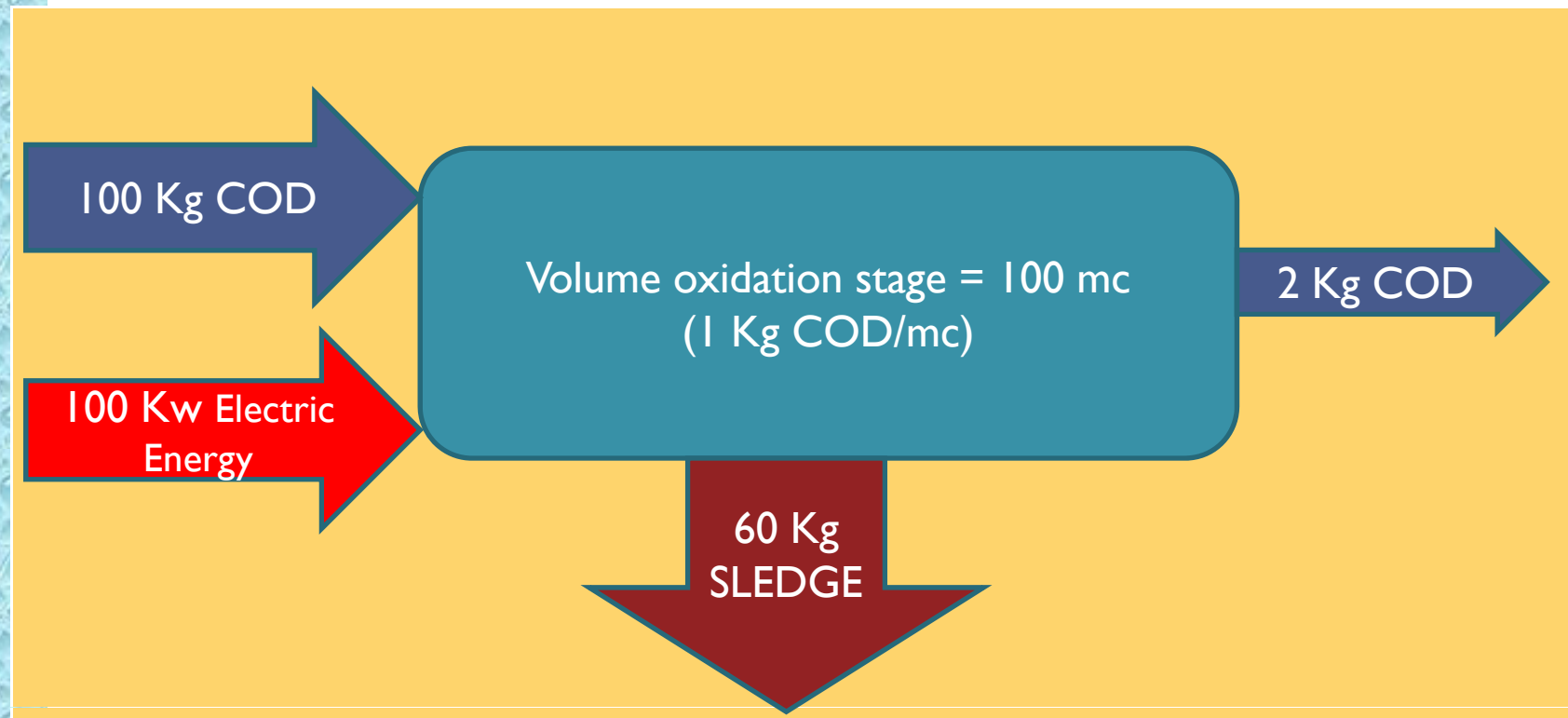
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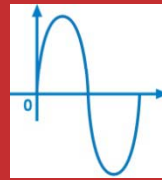
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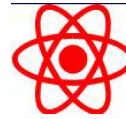
TO THIS PURPOSE, AS A FIRST STEP, A COMPARISON OF THE MATTER AND ENERGY BALANCE IN A BIOLOGICAL TREATMENT (CLEANER)...



COD = Chemical Oxygen Demand



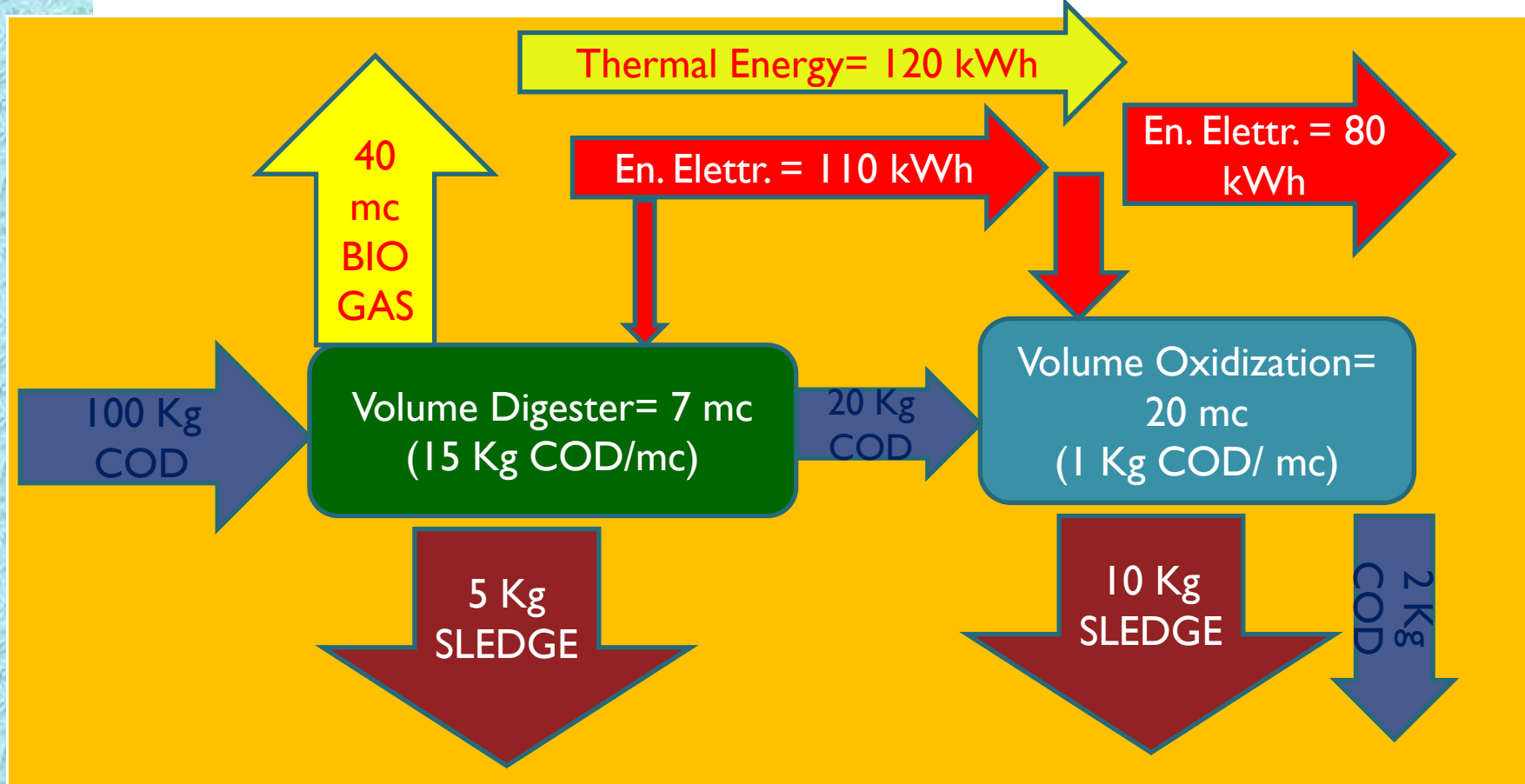
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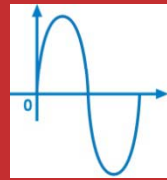


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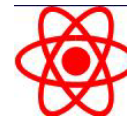
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...WITH A BIODIGESTION FOLLOWED BY ORGANIC OXIDIZATION TREATMENT WILL BE OFFERED





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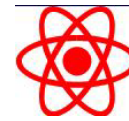
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NOTICE HOW EQUAL AMOUNTS 'OF COD IN (100 Kg) E OUT (2Kg) ...

PARAMETER	BIOLOGICAL	BIODIGESTION + BIOLOGICAL
ELECTRIC ENERGY	- 100 kWh	+ 110 kWh
THERMAL ENERGY	-----	+ 120 kWh
VOLUMES REQUIRED	100 mc	7+20 = 27 mc
PRODUCTION SLUDGE	60 Kg	5+10 = 15 Kg

... THE COMBINED SOLUTION (BIODIGESTION + BIOLOGICAL TREATMENT) COMPARED TO BIOLOGICAL TREATMENT GIVES

1. A THERMIC POWER (± 290 kWh) PARTIALLY CONVERTIBLE IN ELECTRICITY (± 110 kWh) AGAINST A CONSUMPTION OF 100 kWh WITH A POSITIVE BALANCE OF ABOUT 200 kWh
2. VOLUMES OF EQUIPMENT REDUCED: 27 VS 100 mc;
3. VOLUMES OF SLUDGE REDUCED BY 75% : 15 VS 60 Kg



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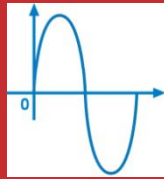
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SECOND STEP

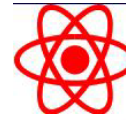
LET'S MAKE AN EXAMPLE USING BIODIGESTION TREATMENT:
FROM A UNIT LOAD OF 210 g/d of ORGANIC SUBSTANCE (S. O.)
and 690 l/d of WASTE WATER WHAT DO WE HAVE TO EXPECT?

SOME RELEVANT DATA IN THE FOLLOWING TABLE

PARAMETER	Un.tà Measurement	Quantity	AVERAGE VALUE
BIOGAS UNITS FOR 'MASS	mc/Kg SS*g	0,300-0,400	0,35
BIOGAS PER UNIT	mc/A.E.*g	0,285-0,380	0,33
TOTAL ENERGY(VOL. BIOGAS * P.C.I. BIO)	Kcal/A.E.*g		1.665
TOTAL ENERGY (VOL. BIOGAS * P.C.I. BIO/860,421)	kWh/A.E.*g		1,935
ELECTRIC ENERGY (27% di En.Tot.)	kWh/A.E.*g		0,50
THERMIC ENERGY(66% di En.Tot	kWh/A.E.*g		1,27
THERMIC ENERGY (66% di En.Tot.)	Kcal/A.E.*g		1.093



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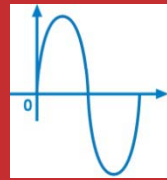


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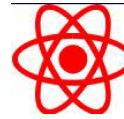
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NOW LET'S EXAMINE THE CASE OF TWO SOLUTION PLANTS FOR A SMALL COMMUNITY '(AE 10), FOLLOWING THE TWO SCHEMES "CLASSIC" and "ALTERNATIVE"

WE ARE AT YOUR DISPOSAL ON REQUEST TO PROPOSE TECHNICAL AND ECONOMIC FEASIBILITY STUDIES RELATED TO INDUSTRIAL ACTIVITIES: IN THIS CASE SPECIFIC DATA ON THE QUALITATIVE AND QUANTITATIVE WASTEWATER AND ORGANIC WASTE CHARACTERISTICS SHOULD BE PROVIDED.



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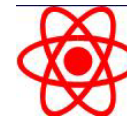


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SOLUTION COMPARISON: POTENTIAL ' 10 C.E. (CAPITA EQUIVALENT)

CLASSIC SCHEME		ALTERNATIVE SCHEME
BATH Equalization Cap. 1.000 lt		BATH IMHOFF (reduced) Cap. 1.500 lt
Grease Cap. 500 lt		BIODIGESTER (VOL. 9 mc)
BIOLOGICAL CLEANER 10 C.E.		HYDROPONIC SYSTEM (200 mq)
N° 2 PUMPS pot. 0,5 kW * 6 hours/d		N° 2 PUMPS pot. 0,5 kW * 6 hours/d
n° 2 blowers pot. 0,75 kw * 8 hours/d		N° 1 Mixer pot. 0,5 kW * 8 hours/d
		N° 1 shredder pot. 1.5 kW * 1 hours/d
Estimated Electricity Consumption Daily (kWh/d)	18,0	11,5 - 6.5 Kwh/d



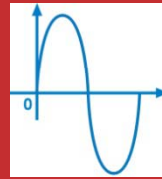
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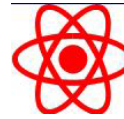
COST ANALYSIS FOR PLANTS (excluding sewerage as common to the two possible solutions)

CLASSIC SCHEME		ALTERNATIVE SCHEME	
BATH Equalization	1.000,00 €	BATH IMHOFF	450,00 €
Grease	800,00 €	BIODIGESTER	6.000,00 €
BIOLOGICAL CLEANER	5.500,00 €	SYSTEM HYDROPONIC	2.500,00 €
TOTAL	7.300,00 €	TOTAL	8.950,00 €
		DIFFERENCE	+ 1.650,00

THE ALTERNATIVE SOLUTION HAS A GREATER INVESTMENT COST ESTIMATED AT € **1,650.00** WHICH DOES NOT TAKE INTO ACCOUNT THE COSTS OF RECYCLING



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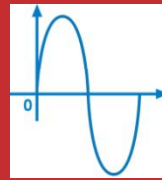
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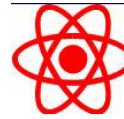
ESTIMATED MANAGEMENT YEARLY COSTS COMPARISON

DESCRIPTION	CLASSIC SCHEME	ALTERNATIVE SCHEME
Electricity mains	1.642,50 €	1.049,38
Electricity produced(5 kWh/d)		- 456,25
Inspections and advice	400,00 €	400,00
Maintenance	300,00 €	300,00
Analysis and sludge disposal	200,00 €	-----
Totale	2.542,50 €	1.293,13 €
DIFFERENCE	+ 1.249,37 €	

THE ALTERNATIVE SCHEME HAS A LOWER YEARLY OPERATING COSTS WHICH ARE ESTIMATED AT APPROXIMATELY 1,250.00 €



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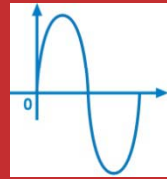
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FRAMEWORK SUMMARY

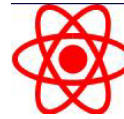
Description Costs	CLASSIC SCHEME	ALTERNATIVE SCHEME	Difference +/-
PLANT	7.300,00 €	8.950,00 €	+ 1.650,00 €
YEARLY MANAGEMENT COSTS	2.542,50 €	1.293,13 €	-1.249,17€
			+ 400,83 €

CONCLUSION: IN A LITTLE MORE THAN A YEAR THE HIGHER PURCHASE PLANT COSTS ARE COMPENSATED BY MANAGEMENT SAVINGS.

DURING NEXT PERIOD OF PLANT LIFE YOU WILL TAKE ADVANTAGE OF ALL THE BENEFITS THAT ALTERNATIVE SCHEME LEADS.



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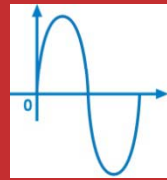


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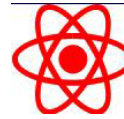
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SUMMARY OF THE ADVANTAGES OF THE ALTERNATIVE SCHEME.

- LOWER MANAGEMENT COSTS AGAINST HIGHER INVESTMENT COSTS WHICH ARE COMPENSATED IN LESS THAN 2 YEARS
- POSSIBILITY OF EXPLOITING BIOGAS DIRECTLY OR TO MAKE ELECTRIC AND THERMIC ENERGY
- ELIMINATION OF THE RECYCLING COSTS
- POSSIBILITY OF USING SOLID AND LIQUID DIGESTATE FOR GREENHOUSES AND / OR HYDROPONIC GARDENS, CROPS BIOLOGICAL AND SIMILAR

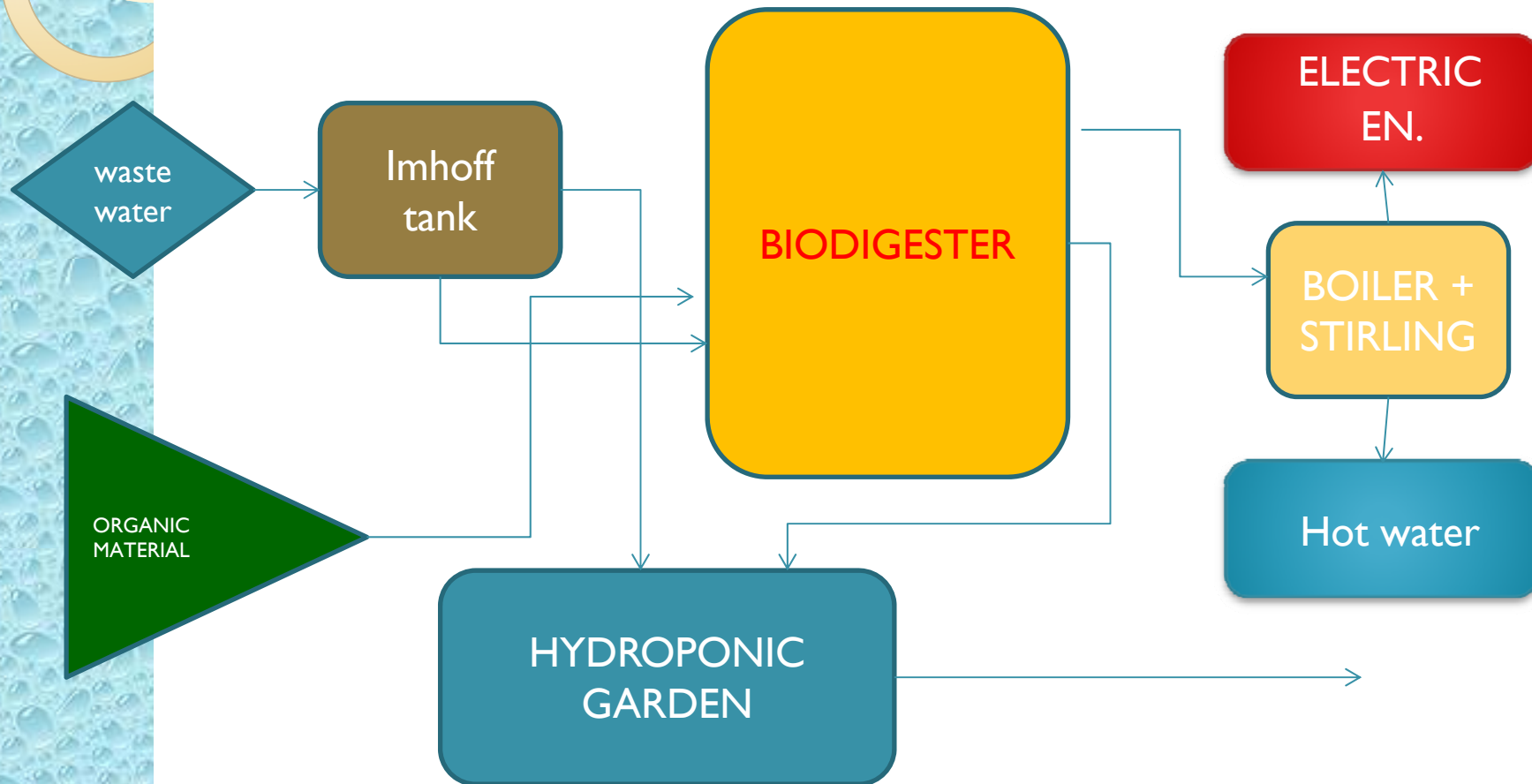


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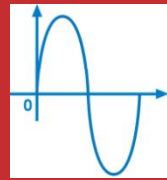


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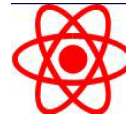
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ALTERNATIVE SOLUTION: simplified scheme for small communities

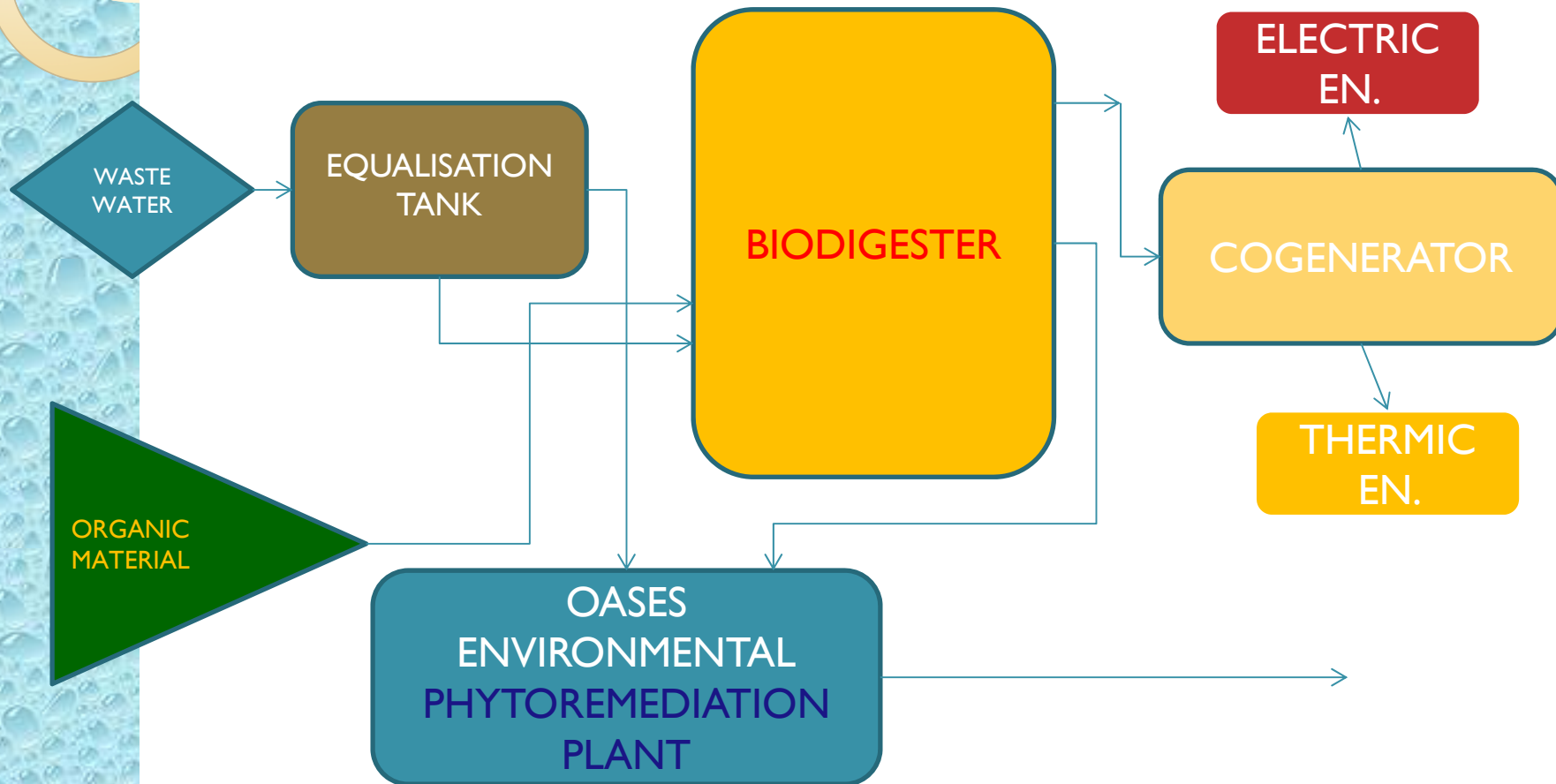


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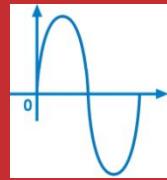


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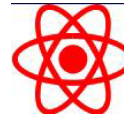
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ALTERNATIVE SCHEME A more simplified scheme for small communities



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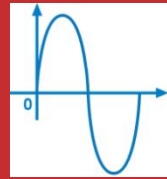
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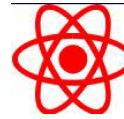
ALTERNATIVE SOLUTION: ADDITIONAL CONSIDERATIONS

THIS SOLUTION IS:

- MOST FIT IN VIEW OF A TEMPERATURE RANGE OF 33-35 °C, TYPICAL OF HOT CLIMATES;
- EASIER TO MANAGE;
- MORE ECONOMICALLY AFFORDABLE IN A LIFE COURSE SYSTEM;
- MORE ENVIRONMENTAL PROFITABLE CONSIDERING THE RECYCLING OF DIGESTATES.



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WE ARE AVAILABLE:

- FOR FURTHER EXPLANATION
- FOR ANY TECHNICAL AND ECONOMIC FEASIBILITY STUDIES

THANKS FOR YOUR ATTENTION