

Template for I/A Tech Comparison

Category	KleanTu Submission 12-01-21
Size: Single Family Residence (330 permitted gpd, 165 gpd flow for cost effectiveness calculations)	
Influent: Assume septic tank discharges at 65 mg/L TN and drainfield takes out another 25%, so 50 mg/L TN is reasonable baseline for comparisons.	
Basics	
Manufacturer / Parent Company	KleanTu® LLC (Edgartown, MA; Pittsburgh, PA)
Model / Technology Name	NITROE® Wastewater Treatment System Models: 2KS, 2KM, 10KM, SSD
Background	
Patent Year	Pending
Years in production	Five (5) years
Approach	
Category (Media filter, ATU, Membrane, sequencing batch reactors, drainfield, etc.)	Biological nitrification / denitrification in a media system
Positioning	
Ideal applications	Applicable to single residences, apartments, townhouses, clusters of residences and commercial establishments
Capacity Range	100 gpd to 1 million gpd or more (gpd = gallons per day)
Performance	
TN concentration output range category (<5 / <10 / <15 / <19 mg/L)	Less than 10 mg/L
TP concentration output range category (<0.5 / <1.0 mg/L)	Phosphorus removal an added feature if needed to reduce phosphorus concentrations in the effluent
kg N removed/year beyond Ref'd 50 mg/L	73 lb/yr (33 kg/yr) based on Case History below
Approvals	
Residential Permits: MA	A number of Towns in Massachusetts
General / Provisional (<50) / Pilot (<10)	Provisional Permit
Other States	
Commercial Permits	MA DEP and Towns in Massachusetts
Testing	
Internal performance testing data - how many years / data points / sampling frequency?	Five (5) years as of Nov 2021
Internal performance testing data - Range, mean, median BOD/TSS/TN values	Five (5) years as of Nov 2021
3rd party testing data - how many years / data points / sampling frequency?	Three (3) years as of Nov 2021
3rd party testing data - Range, mean, median BOD/TSS/TN values	Case History - Single Family Residence 2KS Model (Average of 19 Months Sampling): Flow Rate 352 gallons per day Nitrogen In 73 mg/L Nitrogen Out 5 mg/L BOD ₅ Out 5 mg/L TSS Out 16 mg/L Nitrogen Removed 73 lb/yr
3rd party testing source/organization (s)	Massachusetts Alternative Septic System Test Center (MASSTC) Buzzard's Bay Coalition Envirotech Lab Barnstable County Health Lab
Cost	
NEW SFR Construction (design+permit+equipment supply+install)	Average of multiple installations as of January 2020, \$33,000 including septic tank and leach field excluding unusual site conditions and landscaping
Monthly operating costs (electricity etc.)	Single Family Residence 2KS Model: If not on solar panel, <u>electricity cost</u> is approximately \$19 per month at \$0.22 per kWh; adjust for other costs per kWh
Yearly O&M requirements	
Yearly O&M costs (without sampling)	Single Family Residence 2KS Model: Approximately \$595 per year in 2021 dollars including electricity, remote sensing and periodic repairs with replacement of parts and materials averaged over 20 years
Yearly O&M costs (with sampling)	For sampling add \$275 per sampling event as required by locality (2021 dollars)
Expected system lifespan (range)	
Total Cost of system over over 20 years (design + install + operation + maintenance + repairs)	Single Family Residence 2KS Model Retrofit: Approximate present value of \$36,000 discounted at 5% over 20 years
Beyond 20 years	
Cost Effectiveness	
Cost per kg N removed beyond ref'd 50mg/L - 20 year	Approximately \$25 per pound (\$11 per kg) removed across NitROE 2KS based on Case History above at a single family residence for removal across NitROE tank
Beyond 20 years	
Retrofits	
Ability to use tech in retrofit applications	Can be retrofitted to existing septic systems
Expected capital cost of a retrofit for SFR	Around \$25,000 (2021 dollars) for equipment and installation excluding unusual site conditions and landscaping
Phosphorus Removal	
Commentary	Phosphorus removal can be added to any of the NitROE models for a modest increase in installation cost; phosphorus removal will add to operational costs in proportion to the amount of phosphorus to be removed and required effluent concentrations; disinfection can also be added to any of the NitROE models.
Pitch	
Unique aspects/advantages	High-quality treated wastewater Simplicity (gravity flow, single air pump) Retrofit existing septic systems Out of sight integrated with landscaping; quiet without odors Remote sensing for real time monitoring of operation Green aspects Phosphorus removal and disinfection options Affordable
Why us?	High-quality treated wastewater with aesthetically-pleasing, simple system at affordable cost
Clusters	
Cluster potential?	Models are available for treatment of clusters of single family residences
Range (gal/day)	Up to 1 million gallons per day or more
Contact Point	
Local Representatives MA & RI	info@kleanTu.com and (800)303-4787