## Scenario A (Base Case): Modified Ludzak Ettinger (MLE) Effluent Clarifier Biogas for Step 1. Step 2. Energy Infuent-Denitrification Nitrification | Recovery AD N-Rich Sludge to Supplemental CODT Nitrate Centrate $O_2$ Landfill Recycle Loop (if needed) Scenario B: HRAS/CANON Anammox Abbreviations: ► Effluent Clarifier AD - Anaerobic Sludge Digester HRAS - High Rate Activated Sludge Biogas for AOB - Ammonium Oxidizing Step 1 Step 2. Energy Infuent AOB/Anammox Bacteria **HRAS** Recovery **Anammox - An**aerobic **Amm**onia AD N-Rich Sludge to Oxidizing Bacteria Centrate Landfill AnMBR - Anaerobic Membrane $O_2$ **Bioreactor Digester** N-damo - Nitrate-driven Scenario C: AnMBR/Anammox denitrifying anaerobic methane oxidizing archaea Clarifier | Effluent Biogas for Step 1. Step 2. Infuent Energy AOB/Anammox AnMBR Recovery AD N-Rich $O_2$ Sludge to Centrate Landfill Biogas for Scenario D: HRAS/Anammox/n-damo Energy Recovery **►** Effluent Step 3. Clarifier Anammox & Step 1. Step 2. Infuent HRAS Nitrification N-damo Archaea Methane rich $O_2$ biogas Sludge to Landfill AD N-rich Centrate Scenario E: AnMBR/Anammox/n-damo Supplemental Methane for n-damo (if needed) ► Effluent Step 3. Clarifier Step 1. Step 2. Anammox AnMBR Nitrification & N-damo

## Infuent · Archaea $O_2$ Methane rich biogas for n-damo 50% of methane saturated AD flow to n-damo reactor Digester Sludge to Centrate Landfill Biogas for Energy Recovery