Scenario A (Base Case): Modified Ludzak Ettinger (MLE) **Effluent** Infuent Step 2. Step 1. Clarifier Denitrification Nitrification Supplemental COD Nitrate (if needed) Recycle Loop Biogas for Anaerobic Sludge to Energy O_2 Digester Landfill Recovery **Digester Centrate** Scenario B: Complete Autotrophic Nitrogen Removal over Nitrite (CANON) Effluent Step 1. High Rate Infuent Activated Sludge Clarifier Step 2. Anammox CANON Reactor (HRAS) Biogas for Anaerobic Sludge to Energy Digester Landfill Recovery **Digester Centrate** Biogas for Energy 4 Scenario C: Anammox-n-damo Recovery Effluent Step 1. High Rate Infuent Step 2. Step 3. Anammox & Activated Sludge Clarifier Nitrification N-damo Archaea (HRAS) Methane Gas 02 O_2 for n-damo Anaerobic Sludge to 50% of flow directly to Digester Landfill anaerobic reactor **Digester Centrate** Scenario D: Anammox-n-damo-AnMBR Supplemental Methane for n-damo (if needed) CH4 from external source Methane Effluent saturated Step 3. Step 1. Anaerobic Infuent flow Step 2. Anammox & Membrane Clarifier Nitrification N-damo Reactor (AnMBR) Archaea $\mathsf{T}_{\mathsf{Biogas}}$ for Sludge to Energy Landfill

50% of flow directly to anaerobic reactor

▼ Recovery