

## Appendix A Supplementary material

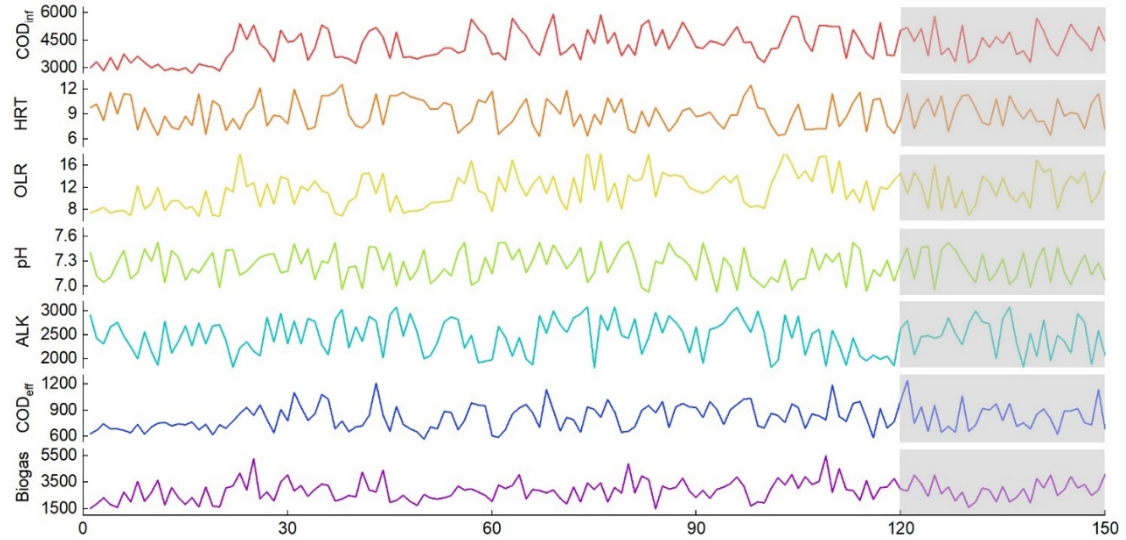


Fig. S1 The dataset. The white area is training data and the grey area is test data. The features include inflow chemical oxygen demand ( $\text{COD}_{\text{inf}}$ , mg/L), pH, alkalinity (ALK, mg/L), organic loading rate [OLR,  $\text{kgCOD}/(\text{m}^3 \cdot \text{d})$ ], hydraulic retention time (HRT, h). The labels include effluent chemical oxygen demand ( $\text{COD}_{\text{eff}}$ , mg/L) and biogas yield ( $\text{m}^3/\text{d}$ ).

Table S1 Study environment.

Study environment	Configuration
Operation system	Windows 10 64-bit
Programming language	Python 3.6
Deep learning platform	TensorFlow 2.1
CPU	Intel Core i5-7200U
GPU	NVIDIA GeForce 940MX
Memory	8GB

Table S2 Search space set in TPE.

Hyperparameter	Search space
Cell size of hidden layer	[10, 80]
Dropout rate	[0.005, 0.5]
Learning rate	[0.0001, 0.01]
Iteration	[800, 1500]
Batch size	[10, 20]