## ENB2012\_data

DATASET: ENB2012\_data

* **Building energy dataset**: 770 configurations with 8 building features (compactness, areas, height, orientation, glazing) and 2 energy targets (heating/cooling loads)
* **Systematic variations**: Glazing area (0-0.4), distribution (0-5), orientation (2-5) create comprehensive building design matrix
* **Real energy targets**: Heating load (6-43), cooling load (10-48) showing realistic consumption patterns for regression modeling

| **Model** | **MSE (Y1)** | **MSE (Y2)** | **Avg MSE** | **MAPE (Y1)** | **MAPE (Y2)** | **Avg MAPE** |
| --- | --- | --- | --- | --- | --- | --- |
| **Linear Regressor** | 9.1342 | 9.8848 | 9.5095 | 10.20 | 8.49 | 9.34 |
| **GP Regressor** | 0.2338 | 1.9540 | 1.0939 | 1.71 | 3.96 | 2.84 |
| **MLP Regressor** | 0.7419 | 1.9776 | 1.3597 | 3.01 | 4.03 | 3.52 |
| **MultiOutput Regressor** | 0.2427 | 3.0045 | 1.6236 | 1.46 | 3.51 | 2.49 |
| **SGD Regressor** | 8.97e+16 | 8.76e+17 | 4.83e+17 | 1.33e+09 | 3.51e+09 | 2.42e+09 |
| **Multi-GINN 1 Layer (4 PTA)** | 3.79 | 2.04 | 2.91 | 7.23 | 4.46 | 5.85 |
| **Multi-GINN 1 Layer (6 PTA)** | 1.86 | 2.50 | 2.18 | 5.12 | 4.71 | 4.92 |
| **Multi-GINN 2 Layer (4 PTA)** | 4.26 | 2.19 | 3.22 | 7.35 | 4.76 | 6.06 |
| **Multi-GINN 2 Layer (6 PTA)** | 486.49 | 2.94 | 244.71 | 94.59 | 5.36 | 49.97 |
| **Refitted Equations 1 Layer (4 PTA)** | 1.78 | 1.88 | 1.83 | 4.72 | 4.03 | 4.38 |
| **Refitted Equations 1 Layer (6 PTA)** | 1.78 | 1.88 | 1.83 | 4.72 | 4.03 | 4.38 |
| **Refitted Equations 2 Layer (4 PTA)** | 1.78 | 1.88 | 1.83 | 4.72 | 4.03 | 4.38 |
| **Refitted Equations 2 Layer (6 PTA)** | 1.78 | 1.88 | 1.83 | 4.72 | 4.03 | 4.38 |

**Refitted Equations:**

target 1

-57.8159763005162\*X\_1 - 0.0495920901343323\*X\_2 + 0.0355676626052464\*X\_3 - 0.0462237108149353\*X\_4 + 4.57707262946605\*X\_5 + 0.274966396911617\*X\_6 + 18.023885316806\*X\_7 + 0.415168746643338\*X\_8 + 66.2029782245645

target 2

-74.1992879970322\*X\_1 - 0.0637376089771401\*X\_2 + 0.0145372893269601\*X\_3 - 0.0452519545719431\*X\_4 + 4.59923736438628\*X\_5 + 0.327846142320527\*X\_6 + 11.6832378486952\*X\_7 + 0.307107408710024\*X\_8 + 98.4954744270254