

DATA: from 1381

	<u>Power Peak in year (MW)</u>		<u>Total Energy in year (<math>\times 10^6</math> kWh)</u>
1	→ 27494	→	135177
2	→ 26216	→	146988
3	→ 27600	→	160030
4	→ 30694	→	173600
5	→ 32997	→	183981
6	→ 34583	→	198586
7	→ 34270	→	208439
8	→ 37580	→	213818
9	→ 39242	→	225226
10	→ 42367	→	230228
11	→ 43459	→	242677
12	→ 46474	→	255642
13	→ 48937	→	268209
14	→ 50321	→	279248
15	→ 52693	→	282716
16	→ 55442	→	299727
17	→ 57098	→	304215
18	→ 57681	→	322146
19	→ 64043	→	343108
20	→ 67805	→	359421
21	→ 69457	→	

$$K_{11} = n = 21, \quad K_{12} = \sum_i x_i = 231, \quad K_{13} = \sum_i (x_i)^2 = 3311, \quad K_{14} = \sum_i (x_i)^3 = 53361$$

$$K_{21} = K_{12} = 231, \quad K_{22} = K_{13} = 3311, \quad K_{23} = K_{14} = 53361, \quad K_{24} = \sum_i (x_i)^4 = 917147$$

$$K_{31} = K_{22} = 3311, \quad K_{32} = K_{23} = 53361, \quad K_{33} = K_{24} = 917147, \quad K_{34} = \sum_i (x_i)^5 = 16417401$$

$$K_{41} = K_{32} = 53361, \quad K_{42} = K_{33} = 917147, \quad K_{43} = K_{34} = 164174276, \quad K_{44} = \sum_i (x_i)^6 = 302221931$$

$$C_1 = \sum_i y_i = 942553, \quad C_2 = 12059980, \quad C_3 = 186449294, \quad C_4 = 3.1428 \times 10^9$$

$f(x)$ : linear:

$$\begin{bmatrix} 21 & 231 \\ 231 & 3311 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} = \begin{bmatrix} 942 & 553 \\ 12 & 0.59980 \end{bmatrix}$$

$$\begin{bmatrix} a_1 \\ a_2 \end{bmatrix} = \begin{bmatrix} 0.2048 & -0.00143 \\ -0.0143 & 0.0013 \end{bmatrix} \begin{bmatrix} C_1 \\ C_2 \end{bmatrix} \Rightarrow \begin{matrix} a_1 = 2.0714 \times 10^4 = 20714 \\ a_2 = 0.2197 \times 10^4 = 2197 \end{matrix}$$

$$\Rightarrow f(x) = 20714 + 2197x \quad \rightarrow \quad f(x)|_{x=22} = 69048 \text{ MW}$$

$f(x)$ : 2nd order:  $S_1 = \sum_{i=1}^{21} R_i^2 = \sum_{i=1}^{21} (y_i - (20714 + 2197x_i))^2 = 37,812,154$

$$\begin{bmatrix} 21 & 231 & 3311 \\ 231 & 3311 & 53361 \\ 3311 & 53361 & 917147 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} = \begin{bmatrix} 942553 \\ 12059980 \\ 186449294 \end{bmatrix} \Rightarrow \begin{matrix} a_1 = 23038 \\ a_2 = 1591 \\ a_3 = 28 \end{matrix}$$

$$\Rightarrow f(x) = 28x^2 + 1591x + 23038 \quad \rightarrow \quad f(x)|_{x=22} = 71592 \text{ MW}$$

$f(x)$ : 3rd order:  $S_2 = \sum_{i=1}^{21} R_i^2 = \sum_{i=1}^{21} (y_i - (23038 + 1591x_i + 28x_i^2))^2 = 20,946,818$

$$\begin{bmatrix} 21 & 231 & 3311 & 53361 \\ 231 & 3311 & 53361 & 917147 \\ 3311 & 53361 & 917147 & 16417401 \\ 53361 & 917147 & 16417401 & 302221931 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix} = \begin{bmatrix} 942553 \\ 12059980 \\ 186449294 \\ 3.1428 \times 10^9 \end{bmatrix} \Rightarrow \begin{matrix} a_1 = 21205 \\ a_2 = 2488 \\ a_3 = -72 \\ a_4 = 3 \end{matrix}$$

$$\Rightarrow f(x) = 3x^3 - 72x^2 + 2488x + 21205 \quad \rightarrow \quad f(x)|_{x=22} = 73037 \text{ MW}$$

$$S_3 = \sum_{i=1}^{21} R_i^2 = \sum_{i=1}^{21} (y_i - f(x_i))^2 = 15,380,277$$

$S_3 < S_2 < S_1 \rightarrow$  3rd order ✓

$$\begin{bmatrix} 20 & 210 & 2870 & 44110 \\ 210 & 2070 & 44110 & 722666 \\ 2870 & 44110 & 722666 & 12333300 \\ 44110 & 722666 & 12333300 & 216455810 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \end{bmatrix} = \begin{bmatrix} 4828182 \\ 57991462 \\ 847374922 \\ 7.3549 \times 10^9 \end{bmatrix} \Rightarrow \begin{aligned} a_1 &= 131620 \\ a_2 &= 9510 \\ a_3 &= 70 \\ a_4 &= 0 \end{aligned}$$

$$\Rightarrow f(x) = 70x^2 + 9510x + 131620$$

$\xrightarrow{14.02} f(x) \Big|_{x=22} = 374720 \times 10^6 \text{ kWh}$   
 $\xrightarrow{14.01} f(x) \Big|_{x=21} = 362200 \times 10^6 \text{ kWh}$

$$\text{peak Load} \times T = \frac{\text{Total annual Energy}}{\text{Load Factor}}$$

$$\Rightarrow \text{peak} = \frac{374720 \times 10^9}{8760 \times 0.68} = 62.9063 \times 10^9 = 62906.3 \text{ MW}$$