TABLE I: PROCEDURE OF THE PROPOSED FRAMEWORK

1- Determine the transaction power by energy segments.
2- Encoding the transaction data by AES at each hour:
3- Cipher (byte in [4*Nb], byte out [4*Nb], word w[Nb*(Nr+1)]).
4- Begin
5- *Byte state [4, Nb].*
6- *State = in*
7- *Addroundkey (state, w[0, Nb-1])*
8- *For round =1 step 1 to Nr-1*
9- *Sub Bytes (state)*
10- *Shift Rows (state)*
11- *Mix Columns (state)*
12- *Addroundkey (state, w[round*Nb, (round+1)*Nb-1])*
13- *End for*
14- *Sub Bytes (state)*
15- *Shift Rows (state)*
16- *AddroundKey (state, w [Nr*Nb, (Nr+1)*Nb-1])*
17- *Out= state*
18- *End*
19- Block chaining the secured data.
20- Broadcast block through IoT.
21- execute cloud computing based on PSO algorithm.
22- *For agent: 1 to n*
23- *Compute optimal transaction power.*
25- *Execute lines 4 to 19.*
26- *self-energy management for each agent in smart city.*
27- *Stopping conditions.*
27- *End*

TABLE II: THE COMPARATIVE RESULTS OF THE COST ANALYSIS

Cases	Total (Hub.sys, Microgrid.sys, and Transportation.sys Plus Grid)
Proposed Energy Cost (¢)	111994279374.642
General Energy Cost (¢)	111994441785.181
Error (%)	2.2%

TABLE II: THE COMPARATIVE RESULTS OF THE DATA MANAGEMENT

	Dataset												
	Hub.sys			Transportation.sys			Microgrid.sys			Grid.sys			
Cases	**Load Data Rate (MB)**	**Power Generation Data Rate (MB)**	**Power Transaction Data Rate (MB)**	**Load Data Rate (MB)**	**Power Generation Data Rate (MB)**	**Power Transaction Data Rate (MB)**	**Load Data Rate (MB)**	**Power Generation Data Rate (MB)**	**Power Transaction Data Rate (MB)**	**Load Data Rate (MB)**	**Power Generation Data Rate (MB)**	**Power Transaction Data Rate (MB)**	**Total Rate (MB)**
Proposed Method	-	-	**6.144**	-	-	**18.4٣**	-	-	**6.144**	-	-	**24.٠١**	**55.292**
General Method	**12**	**١٥**	**6.144**	**١٨**	**٥٤**	**18.4٣**	**٣**	**١٥**	**6.144**	**٣**	**٣٠**	**24.٠١**	**٢٠٤,٧٢**
Error (%)	**81.3%**			**79.61%**			**74.5%**			**57.88%**			**72.99%**