Supplementary Table 3: Energy cost parameters. Parameters that deviate from these values are listed in the corresponding figure/table captions

Category	Eukaryotes	Bacteria	Units
cell division time t	variable	variable	s
Total transcripts per cell $N_{tot,r}$	variable	variable	copies
Average transcript degradation rate δ_r	variable	variable	copies/s
Total proteins per cell $N_{tot,p}$	variable	variable	copies
Average protein degradation rate δ_p	variable	variable	copies/s
amino acid X	23.55 [4]	23.55 [4]	P
amino acid A	10 [4]	10 [4]	P
amino acid R	23 [4]	23 [4]	P
amino acid N	13 [4]	13 [4]	P
amino acid D	11 [4]	11 [4]	P
amino acid C	23 [4]	23 [4]	P
amino acid Q	11 [4]	11 [4]	P
amino acid E	12 [4]	12 [4]	P
amino acid G	10 [4]	10 [4]	P
amino acid H	33 [4]	33 [4]	P
amino acid I	29 [4]	29 [4]	P
amino acid L	22 [4]	22 [4]	P
amino acid K	27 [4]	27 [4]	P
amino acid M	31 [4]	31 [4]	P
amino acid F	46 [4]	46 [4]	P
amino acid P	16 [4]	16 [4]	P
amino acid S	10 [4]	10 [4]	P
amino acid T	17 [4]	17 [4]	P
amino acid W	63 [4]	63 [4]	P
amino acid Y	44 [4]	44 [4]	P
amino acid V	20 [4]	20 [4]	P
rATP	49.7 [4]	49.7 [4]	P
rCTP	46.7 [4]	46.7 [4]	P
rGTP	50.7 [4]	50.7 [4]	P
rUTP	45.7 [4]	45.7 [4]	P
dATP	51.7 [4]	51.7 [4]	P
dCTP	48.7 [4]	48.7 [4]	P
dGTP	52.7 [4]	52.7 [4]	P
dTTP	47.7 [4]	47.7 [4]	P
Replication helicase per bp [196, 197]	1	1	ATP
Translation elongation per AA	4	4	P
Translation mRNA remodeling	20	5	ATP
Translation rounds per mRNA remodeling	1	1	
Translation degradation per AA [101]	1	1	ATP

Supplementary Table 3 – *Continued from previous page*

Category	Eukaryotes	Bacteria	Units
Translation initiation	10	3	ATP
Translation termination	1	1	P
Okazaki fragment cost	$3L_g$ [22, 23]	$0.3L_g$ [14]	ATP
DNA repair per bp	0	0	P
Transcription activation	10	5	ATP
Transcription initiation	50 [40, 41]	1 [39]	ATP
Abortive transcripts	100	100	ATP
mRNA capping	4 [198]	0	ATP
Initiations per transcription cycle	1	1	
Transcription elongation	1	1	ATP
Transcription histone modifications	30	0	P/nucleosome
CTD phosphorylation cost	100	0	P
Splicing cost	10 [64, 65]	0	ATP
Initial poly(A) length	250 [77–79]	0	nt
Final poly(A) length	100 [75, 76]	0	nt
Transcription readthrough length	200	100	nt
mRNA export	10	0	ATP
Nucleosome length	147	0	nt
Linker length	variable	0	nt
H1	variable	0	P
H2A	variable	0	P
H2B	variable	0	P
H3	variable	0	P
H4	variable	0	P