Supplementary Table S1: Comparison of different selected *efe* ethylene production systems constructed in *Synechococcus elongatus* PCC 7942 and *Synechocystis* sp. PCC 6803 in regards to reported efficiency and stability. The listed productivities are the highest reported values under the different cultivation conditions tested.

ID	Host and other genetic modifications	*efe* gene and modifications	Expression plasmid/ integration site (number of *efe* genes)	Promoter	Max. reported productivity ($\mu L*L^{-1}*h^{-1}*OD^{-1}$)	Stability	Phenotype	Reference
1	*Synechococcus* R2-SPc ΔpUH25	original	pUC303-EFE03	P_{efe}	25	N.R.	N.R.	(Fukuda 1994)
2	*Synechococcus* R2-SPc ΔpUH24	original	pUC303-EFE03	P_{efe}	52,9	+	blue-green	(Sakai et al. 1997)
3	*Synechococcus* R2-SPc ΔpUH24	original	pUC303-EFE10	P_{lacZ}	17,6	+	blue-green	(Sakai et al. 1997)
4	*Synechococcus* R2-SPc ΔpUH24	original	pUC303-EFE30	P_{lacZ}	11,1	+	blue-green	(Sakai et al. 1997)
5	*Synechococcus* R2-SPc ΔpUH24	original	pUC303-pEXE3-I	P_{psbA1}	15,9	-	green	(Sakai et al. 1997)
6	*Synechococcus* R2-SPc ΔpUH24	original	pUC303-pEXE3 Δ1-Δ8 [P_{psbA1} variations]	P_{psbA1}	130-323	-	yellow-green	(Sakai et al. 1997)
7	*Synechococcus* R2-SPc ΔpUH24	original	pUC303-pEXEΔ9	P_{psbA1} shrunken	15	+	blue-green	(Sakai et al. 1997)
9	*Synechococcus* R2-SPc	original	*psbAI* (1**efe*)	P_{psbA1}	7	N.R.	N.R.	(Wang et al. 2000)
10	*Synechococcus*	original	*psbAI* (1**efe*)	P_{psbA1}	451	-	yellow-green	(Takahama et al. 2003)
11	*Synechococcus*	original	*NSI* (1**efe*)	P_{trc}	140	+	blue-green	This work
12	*Synechococcus*	optimized [(b)] with His-tag	*NSI* (1**efe*)	P_{trc}	140	+	blue-green	This work

ID	Host and other genetic modifications	*efe* gene and modifications	Expression plasmid/ integration site	Promoter	Max. reported productivity ($\mu L*L^{-1}*h^{-1}*OD^{-1}$)	Stability	Phenotype	Reference
13	*Synechocystis*	optimized [a] 3X-FLAG tag	*slr0168* (1**efe*)	P_{psbA}	≈370	+	blue-green	(Ungerer et al. 2012)
14	*Synechocystis* Δ*psbAII*	optimized [a] 3X-FLAG tag	*slr0427, slr0168* (2**efe*)	P_{psbA}	≈570	+	blue-green	(Ungerer et al. 2012)
15	*Synechocystis*	optimized [b] His-tag	pDF-trc-EFEh	P_{trc}	≈170	+	N.R	(Guerrero et al. 2012)
16	*Synechocystis*	optimized [b] His-tag	pDF-lac-EFEh	$P_{A1lacO-1}$	≈170	N.R	N.R	(Guerrero et al. 2012)
17	*Synechocystis*	optimized [b] His-tag	pDF-pet-EFEh	P_{petE}	≈28	N.R	N.R	(Guerrero et al. 2012)
18	*Synechocystis*	optimized [b] His-tag	pDF-coa-EFEh	P_{coa}	≈48	N.R	N.R	(Guerrero et al. 2012)
19	*Synechocystis*	optimized [b] His-tag	pDF-smt-EFEh	P_{smt}	≈2	N.R	N.R	(Guerrero et al. 2012)
20	*Synechocystis* Δ*ogdc*/ Δ*ssadh kgtP* (Δ*phaAB*)	optimized [c] His-tag	*slr0168, sll1981, slr0370* (3**efe*)	P_{cpcB}	858	+	N.R	(Zhu et al. 2015)
21	*Synechocystis* Δ*ogdc*/ Δ*ssadh*	optimized [c] His-tag	*slr0168, sll1981, slr0370* (3**efe*)	P_{cpcB}	≈360	N.R	N.R	(Zhu et al. 2015)
22	*Synechocystis* Δ*ogdc*	optimized [c] His-tag	*slr0168 , sll1981* (2**efe*)	P_{cpcB}	≈220	N.R	N.R	(Zhu et al. 2015)
23	*Synechocystis* Δ*ogdc*	optimized [c] His-tag	*sll1981* (1**efe*)	P_{cpcB}	≈130	N.R	blue-green	(Zhu et al. 2015)

24	*Synechocystis* Δ*ssadh*	optimized [c] His-tag	*slr0370* (1**efe*)	P_{cpcB}	≈90	N.R	blue-green	(Zhu et al. 2015)
25	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	P_{cpcB}	774	N.R	N.R	(Zhu et al. 2015)
26	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	$P_{psbA2(6803)\ modified}$	518	+	N.R	(Zhu et al. 2015)
27	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	$P_{psbA2(6803)}$	≈520	N.R	N.R	(Zhu et al. 2015)
28	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	$P_{psbA2(7942)}$	≈350	N.R	N.R	(Zhu et al. 2015)
29	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	P_{rbc}	≈650	N.R	N.R	(Zhu et al. 2015)
30	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	P_{psbD}	≈450	N.R	N.R	(Zhu et al. 2015)
31	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	P_{psbA1}	≈420	N.R	N.R	(Zhu et al. 2015)
32	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	P_{groESL}	≈300	N.R	N.R	(Zhu et al. 2015)
33	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	P_{glnA}	≈340	N.R	N.R	(Zhu et al. 2015)
34	*Synechocystis*	optimized [c] His-tag	*slr0168* (1**efe*)	P_{cI}	≈390	N.R	N.R	(Zhu et al. 2015)
35	*Synechocystis*	optimized [a] 3X-FLAG tag T7 TT, rbsV4	*slr0168* (1**efe*)	P_{psbA}	718	N.R	N.R	(Xiong et al. 2015)
36	*Synechocystis* Δ*psbAII*	optimized [a] 3X-FLAG tag	*slr0427*, *slr0168* (3**efe*)	P_{psbA}	≈550	N.R	N.R	(Xiong et al. 2015)

37	*Synechocystis* Δ*psbAII xylAB* (Δ*slr0168*)	optimized [a] 3X-FLAG tag	*slr0427* (1**efe*)	P_{psbA}	≈177	N.R	N.R	(Lee et al. 2015)
38	*Synechocystis*	original	pDF-trc-o-*efe*	P_{trc}	≈230	+	N.R	(Carbonell et al. 2016)
39	*Synechocystis*	optimized [b]	pDF-trc-sy-*efe*	P_{trc}	≈170	+	N.R	(Carbonell et al. 2016)
40	*Synechocystis* (motile)	optimized [d] lambda *oop* TT	pVZ325-P_{tac}-efe	P_{tac}	500	N.R	blue-green	(Kuchmina et al. 2017)
41	*Synechocystis* Δ*ogdc*/Δ*ssadh* Δ*ntcA* (unsegregated)	optimized [c] His-tag	*slr0168, sll1981, slr0370, sll1423* (4**efe*)	P_{cpcB}	2463	N.R	N.R	(Mo et al. 2017)
42	*Synechocystis* Δ*ogdc*/Δ*ssadh* Δ*ntcA* (unsegregated)	optimized [c] His-tag	*slr0168, sll1981, slr0370* (3**efe*)	P_{cpcB}	≈1750	N.R	N.R	(Mo et al. 2017)
43	*Synechocystis* Δ*ntcA* (unsegregated)	optimized [c] His-tag	*slr0168* (1**efe*)	P_{cpcB}	1572	N.R	N.R	(Mo et al. 2017)
44	*Synechocystis* NtcA OE (Δ*phaAB*)	optimized [c] His-tag	*slr0168* (1**efe*)	P_{cpcB}	≈800	N.R	N.R	(Mo et al. 2017)
45	*Synechocystis*	optimized [e] RBS-0 (SD), TT BB0014	*slr0168* (1**efe*)	P_{trc}	103	N.R	N.R	(Veetil et al. 2017)
46	*Synechocystis*	optimized [e] RBS-34, TT BB0014	*slr0168* (1**efe*)	P_{trc}	≈135	N.R	N.R	(Veetil et al. 2017)
47	*Synechocystis*	optimized [e] RBS-30, TT BB0014	*slr0168* (1**efe*)	P_{trc}	195	N.R	N.R	(Veetil et al. 2017)
48	*Synechocystis*	optimized [e] RBS-H, TT BB0014	*slr0168* (1**efe*)	P_{trc}	≈30	N.R	N.R	(Veetil et al. 2017)
49	*Synechocystis*	optimized [e] RBS-C9, TT BB0014	*slr0168* (1**efe*)	P_{trc}	≈10	N.R	N.R	(Veetil et al. 2017)

50	*Synechocystis*	optimized [(e)] RBS-C10, TT BB0014	*slr0168* (1**efe*)	P_{trc}	≈10	N.R	N.R	(Veetil et al. 2017)
51	*Synechocystis*	optimized [(e)] RBS-C11, TT BB0014	*slr0168* (1**efe*)	P_{trc}	≈10	N.R	N.R	(Veetil et al. 2017)
52	*Synechocystis*	optimized [(e)] RBS-30, TT BB0014	*slr0168* (1**efe*)	3*P_{trc}	≈175	N.R	N.R	(Veetil et al. 2017)
53	*Synechocystis*	optimized [(e)] RBS-30, TT BB0014	*slr0168* (1**efe*)	5*P_{trc}	≈175	N.R	N.R	(Veetil et al. 2017)
54	*Synechocystis*	optimized [(e)] RBS-30, TT BB0014	pVZ321-P_{trc}-Rbs30-efe	P_{trc}	≈90	N.R	N.R	(Veetil et al. 2017)
55	*Synechocystis* Δ*glgC*	optimized [(e)] RBS-30, TT BB0014	*slr0168* (1**efe*)	P_{trc}	≈120	N.R	N.R	(Veetil et al. 2017)
56	*Synechocystis* Δ*glgC*	optimized [(e)] RBS-30, TT BB0014	pVZ321-P_{trc}-Rbs30-efe	P_{trc}	≈105	N.R	N.R	(Veetil et al. 2017)

efe: ethylene forming enzyme; +: Stable; -: Unstable; N.R: Not Reported; TT: Transcription terminator; OE: over-expression; SD: Shine Dalgarno; (a): Optimized sequence from *P. syringae* pv. *Phaseolicola* as done in (Ungerer et al. 2012); (b): Optimized sequence from *P. syringae* pv. *phaseolicola* as done in (Guerrero et al. 2012); (c): Optimized sequence from *P. syringae* pv. *sesami* as done in (Zhu et al. 2015); (d) Optimized sequence from *P. syringae* pv. *phaseolicola* PK2 as done in (Kuchmina et al. 2017) (e) Optimized sequence from *P. syringae* pv. *phaseolicola* as done in (Veetil et al. 2017).