



SEPTEMBER 2014

2014 IRP Draft Analysis Results*

Detailed Candidate Resource Plan Results

* These are indicative results from a high level planning perspective. Can only be used to provide guidance and direction. This is not a prescriptive solution.

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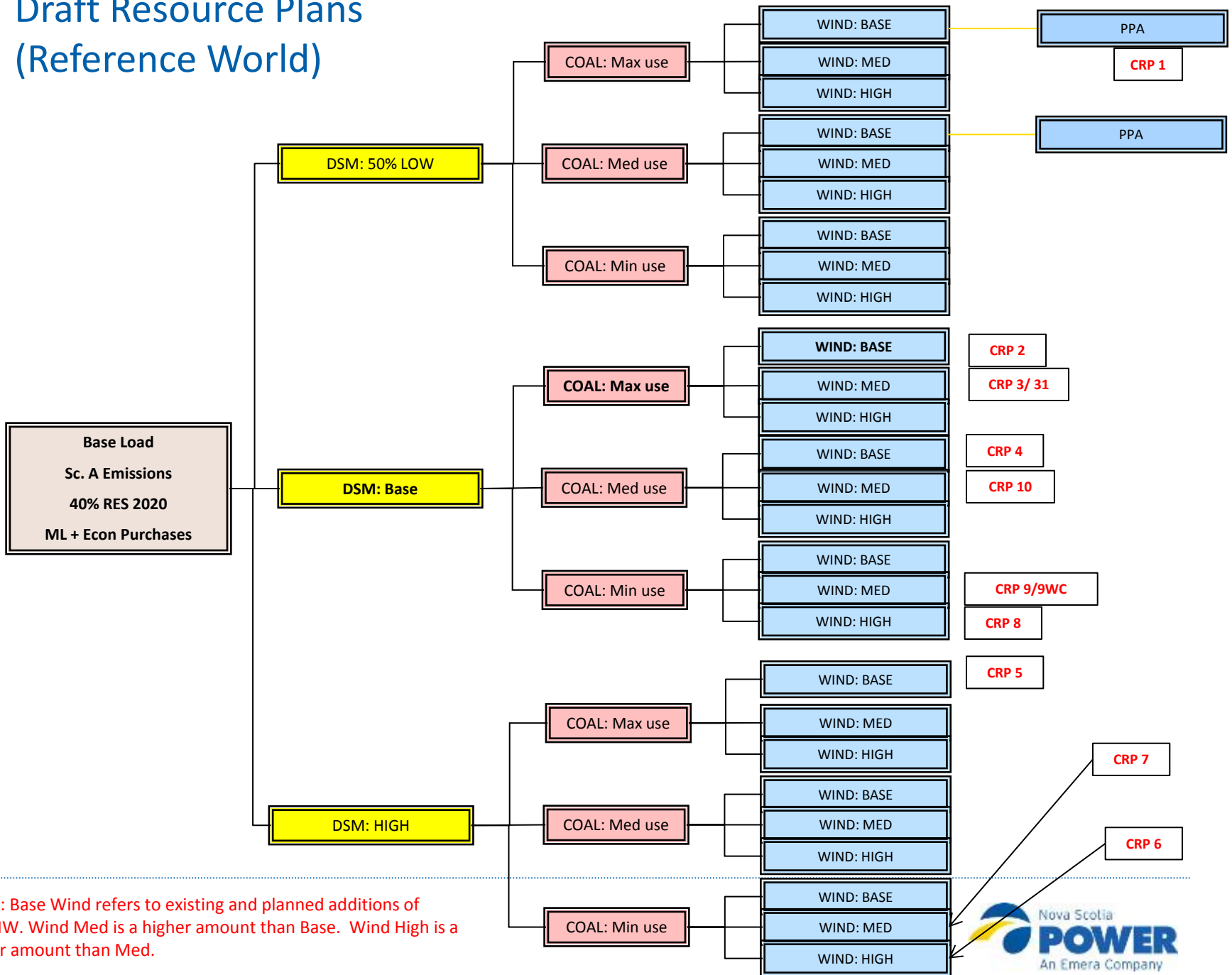
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Note to Reviewers

Please note the following in the review of this draft deck:

- The NPV cost results are the from the Strategist modeling.
- The adders to represent sustaining capital investments have not been included in the NPV costs for the CRPs.
- Study period NPV's can only be compared within the same unit retirement strategies (e.g. all maximum coal).
 - For existing units that are not retired in the planning period and are assumed to run indefinitely, the cost to keep those units running have not been included in the study period costs. For CRPs with the same retirement strategy these costs are common across all plans and do not affect the ranking of the plans in the study period. For CRPs with different retirement strategies the costs vary and could affect ranking in the study period.
- The costs for Hg abatement shown in the Hg emissions graphs have been included in the candidate resource plan NPVs.

Draft Resource Plans (Reference World)



NOTE: Base Wind refers to existing and planned additions of 582MW. Wind Med is a higher amount than Base. Wind High is a higher amount than Med.

Candidate Resource Plans – Description Table

CRP	DSM	WIND	COAL
World 1 - REFERENCE			
CRP 1	50% of LOW	BASE	MAX
CRP 2	BASE	BASE	MAX
CRP 3	BASE	MED	MAX
CRP 4	BASE	BASE	MED
CRP 5	HIGH	BASE	MAX
CRP 6	HIGH	HIGH	MIN
CRP 7	HIGH	MED	MIN
CRP 8	BASE	HIGH	MIN
CRP 9	BASE	MED	MIN
CRP 9WC	BASE	MED (Optimistic Capacity Credit)	MIN
CRP 10	BASE	MED	MED
CRP 31	BASE - 50% Peak 100% Energy	MED	MAX
World 2- HIGH LOAD			
CRP 21	BASE	MED (Optimize)	MAX
CRP 32	BASE -50% Peak 100% Energy	MED (Optimize)	MAX

	Max Retirement Strategy
	Med Retirement Strategy
	Min Retirement Strategy
	Max Retirement Strategy - High Load



CRP1 Preliminary Results

CRP1 Input Assumptions

Candidate Resource Plan 1 (CRP1):

- Base Load Forecast
- Half Low DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Maximum Coal Use
- PPA fixed in the plan in 2023 for RES
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP1 Preliminary Results

	CRP01-01-FGD-R01	CRP01-01-R01
	Least cost study period	Least cost study period (without FGD)
2015		
2016		DR Water Heaters
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019	Mersey Phase 1	Mersey Phase 1
2020		
2021		
2022		
2023	Mersey Phase 2 PPA 100MW Firm	Mersey Phase 2 PPA 100MW Firm
2024		
2025	TUC 1 Retire FGD (Lin 3/4 300 MW)	TUC 1 Retire
2026	2 x CT 34MW	
2027		
2028		
2029		
2030		
2031	CT 50MW	
2032	TUC 2 Retire CT 50MW	TUC 2 Retire CT 50MW & CT 34MW
2033		
2034		
2035	Tre 5 Retire CC 145MW	Tre 5 Retire CC 145MW
2036	CT 50MW	CT 50MW
2037		
2038	CT 50 MW	CT 50 MW
2039	PHBM 51.7 MW Firm CT 50 MW	PHBM 51.7 MW Firm CT 50 MW
	Lin 1 Retire	Lin 1 Retire
Planning PV \$M	12,125	12,143
Study PV \$M	19,450	19,647

	Half LowDSM Program Adm Cost \$M	Half LowDSM Customer Cost \$M
2015	24.2	23.6
2016	23.8	24.1
2017	23.2	24.5
2018	21.6	25.0
2019	21.2	22.9
2020	21.7	22.9
2021	22.6	23.1
2022	23.8	23.4
2023	24.2	24.2
2024	25.1	24.1
2025	25.9	25.2
2026	27.2	27.4
2027	28.8	29.2
2028	31.0	32.3
2029	32.3	29.5
2030	34.7	33.0
2031	36.3	36.2
2032	37.2	37.3
2033	37.4	38.3
2034	37.1	38.9
2035	36.5	39.2
2036	36.0	40.1
2037	35.4	40.0
2038	34.9	40.6
2039	34.6	41.3
NPV	352.5	363.2



CRP1-1 (FGD) Preliminary Results

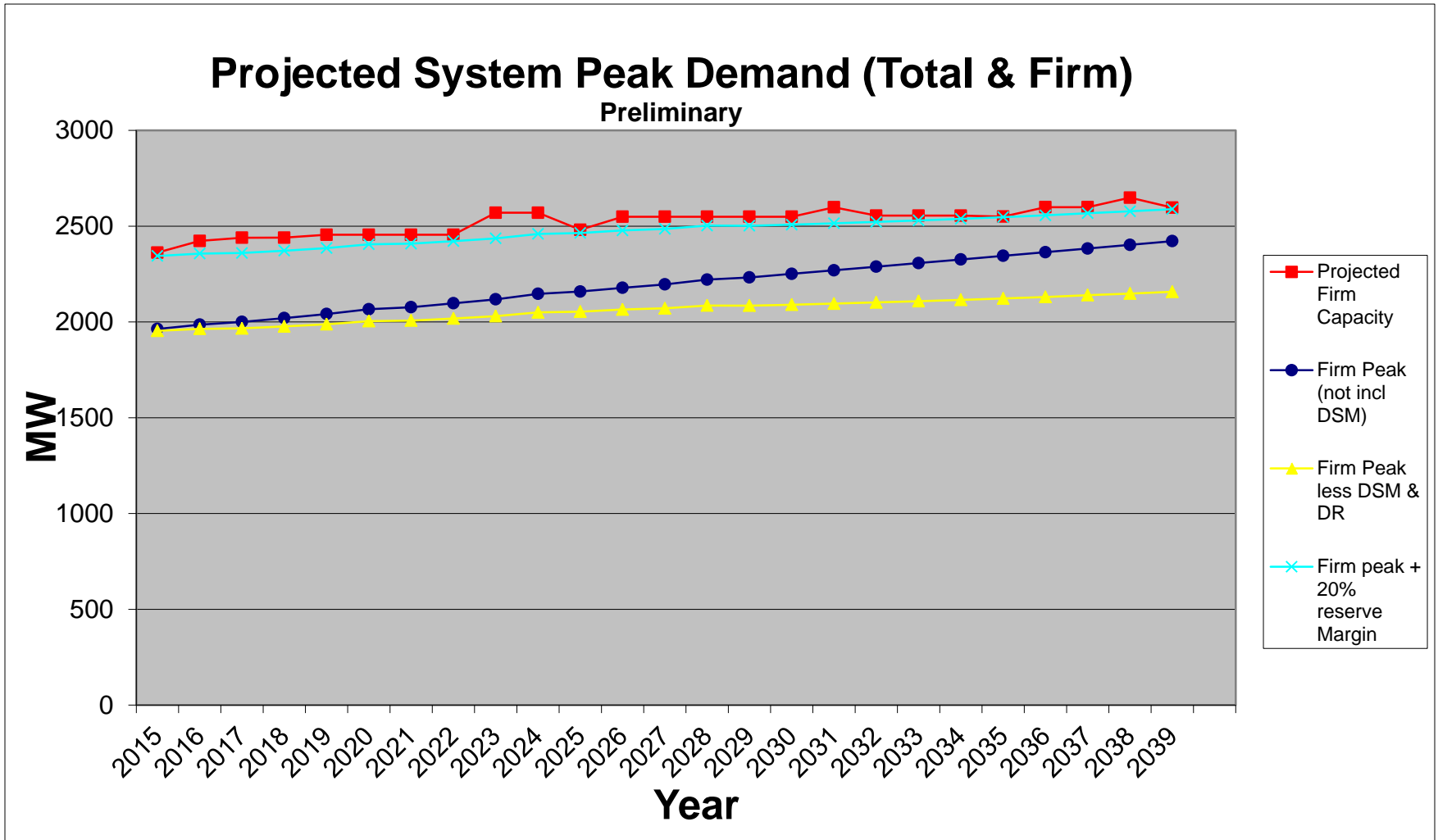
CRP1-1 (FGD)

Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	9	22	34	44	53	62	70	79	88	97	105	161	223	234	244	255	264
Firm Peak Less DSM	1,954	1,964	1,967	1,977	1,988	2,005	2,007	2,018	2,030	2,050	2,054	2,090	2,123	2,130	2,140	2,148	2,157
DRWH Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DRCM Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Firm Peak Less DR	1,954	1,964	1,967	1,977	1,988	2,005	2,007	2,018	2,030	2,050	2054	2090	2123	2,130	2,140	2,148	2,157
RM Required	391	393	393	395	398	401	401	404	406	410	411	418	424.5	426	428	430	431
Required MWs	2,345	2,357	2,360	2,372	2,386	2,406	2,409	2,422	2,436	2,460	2464	2508	2547	2,556	2,568	2,578	2,589
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass																	51.7
PPA									100								
Assumed Unit Retirement				-153							-89		-150				-153
Natural Gas Unit													145.0	49.4		49.4	49.4
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	0.0	0.0	0.0	115.0	0.0	-89.0	0.0	-5.0	49.4	0.0	49.4	-51.9
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	113.7	113.7	113.7	228.7	228.7	139.7	207.7	208.5	257.9	257.9	307.3	255.4
Total Firm Capacity	2362	2423	2440	2440	2455	2455	2455	2455	2570	2570	2481	2549	2550	2599	2599	2649	2597
Surplus (Deficit) MWs above RM	17	66	80	68	70	50	46	33	134	110	17	41	3	43	31	71	8
Reserve Margin %	20.9%	23.4%	24.1%	23.4%	23.5%	22.5%	22.3%	21.6%	26.6%	25.4%	20.8%	22.0%	20.1%	22.0%	21.5%	23.3%	20.4%

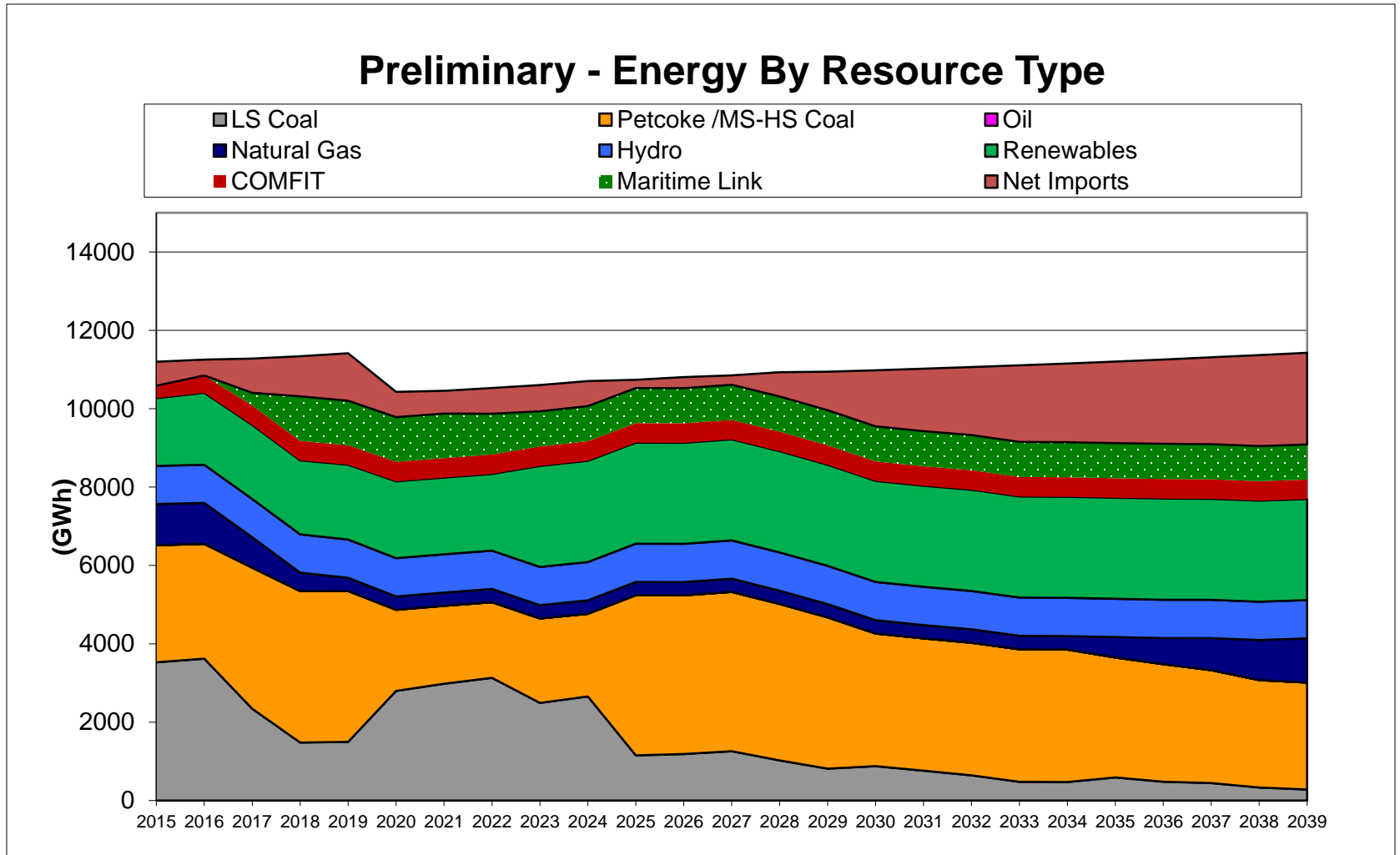
CRP1-1 (FGD)

Preliminary Demand and DSM



CRP1-1 (FGD)

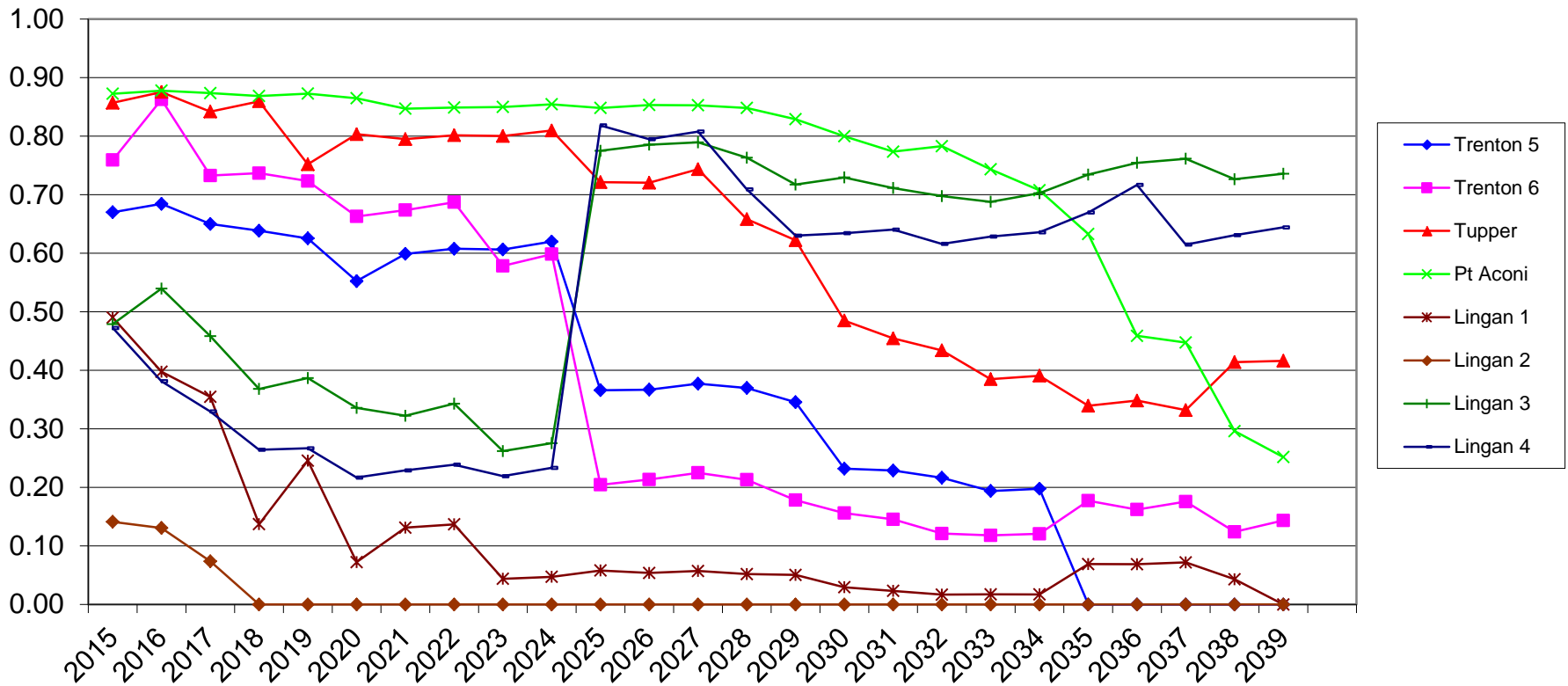
Preliminary Energy by Resource Type



CRP1-1 (FGD)

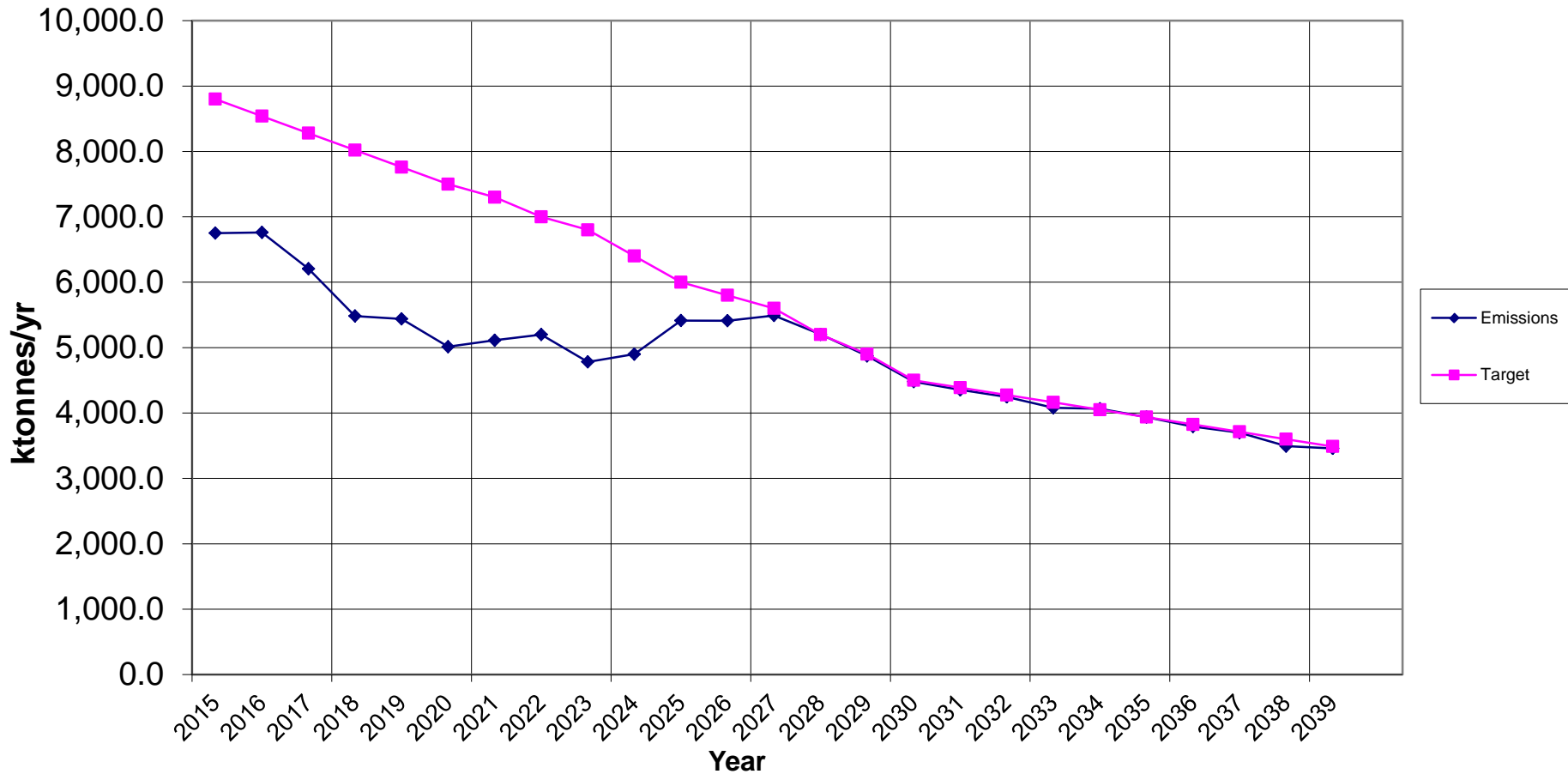
Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



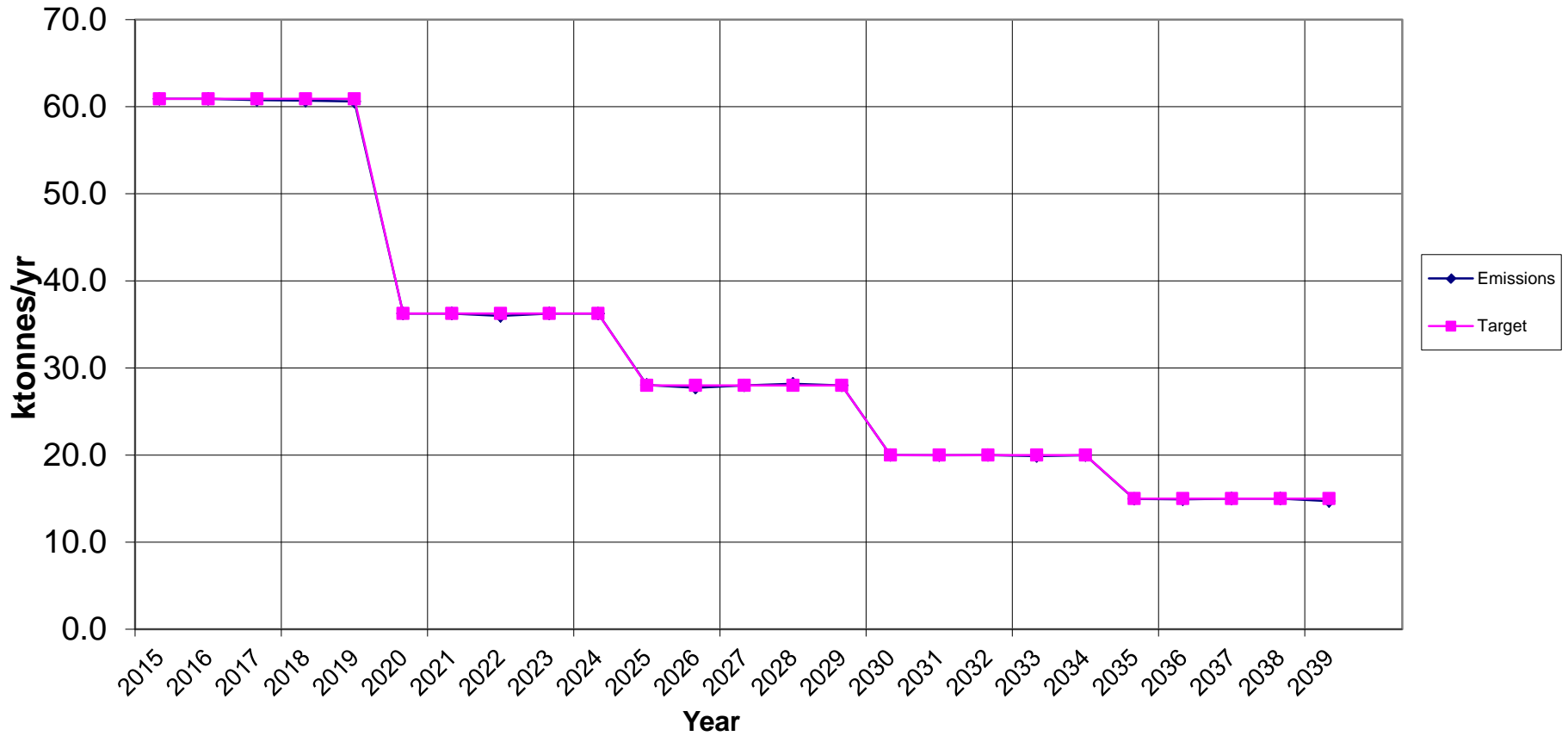
CRP1-1 (FGD) Preliminary CO₂ Emissions

Projected CO₂ Emissions



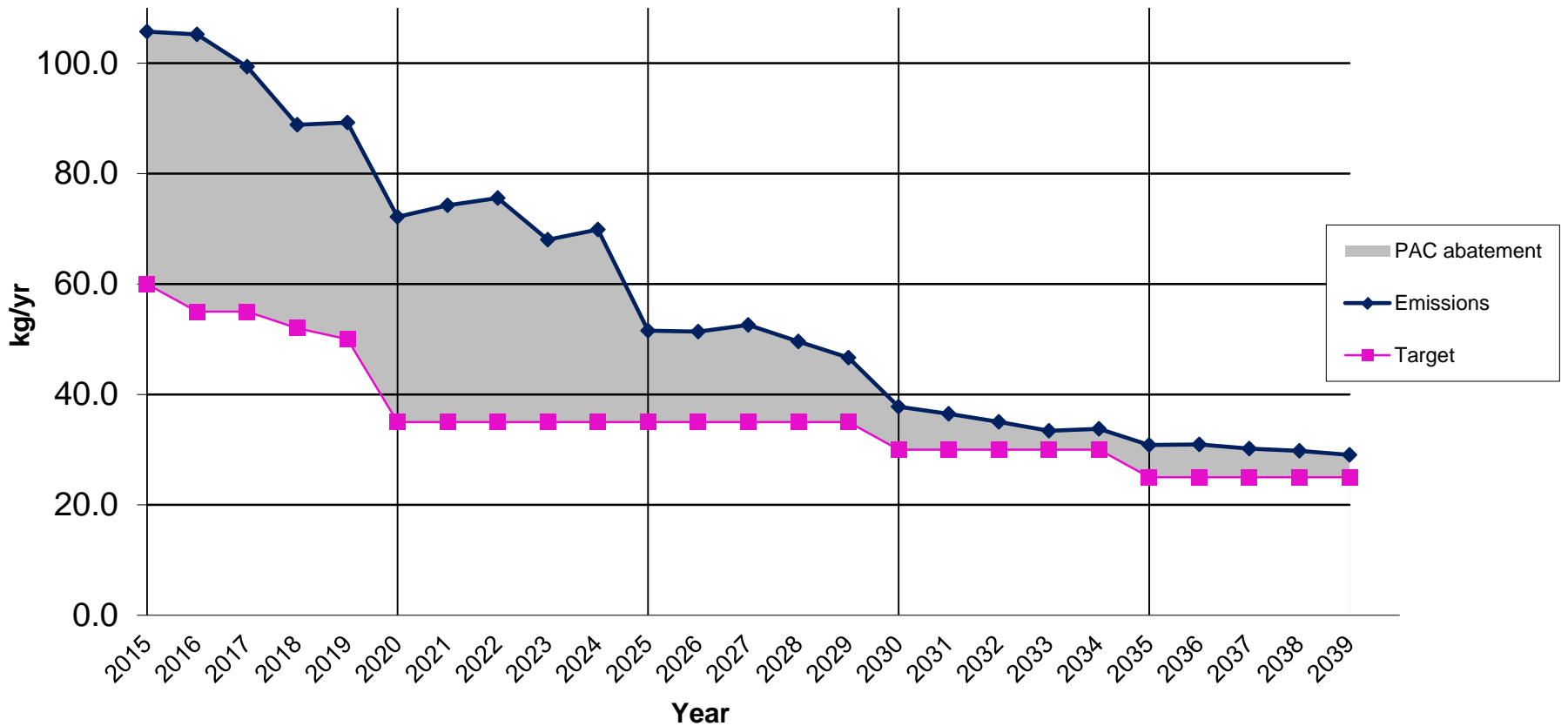
CRP1-1 (FGD) Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP1-1 (FGD) Preliminary Hg Emissions

Projected Mercury Emissions



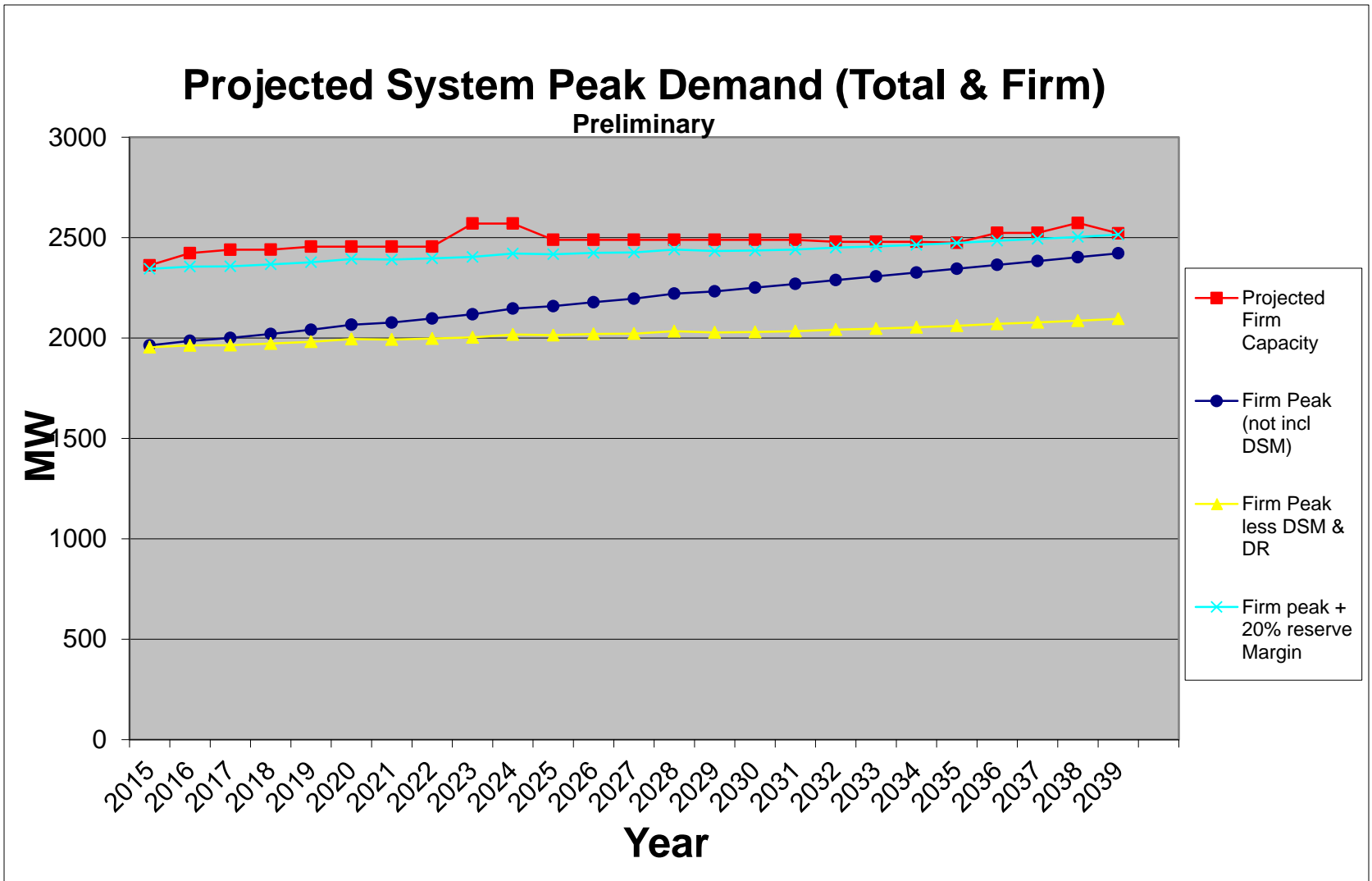


CRP1-1 Preliminary Results

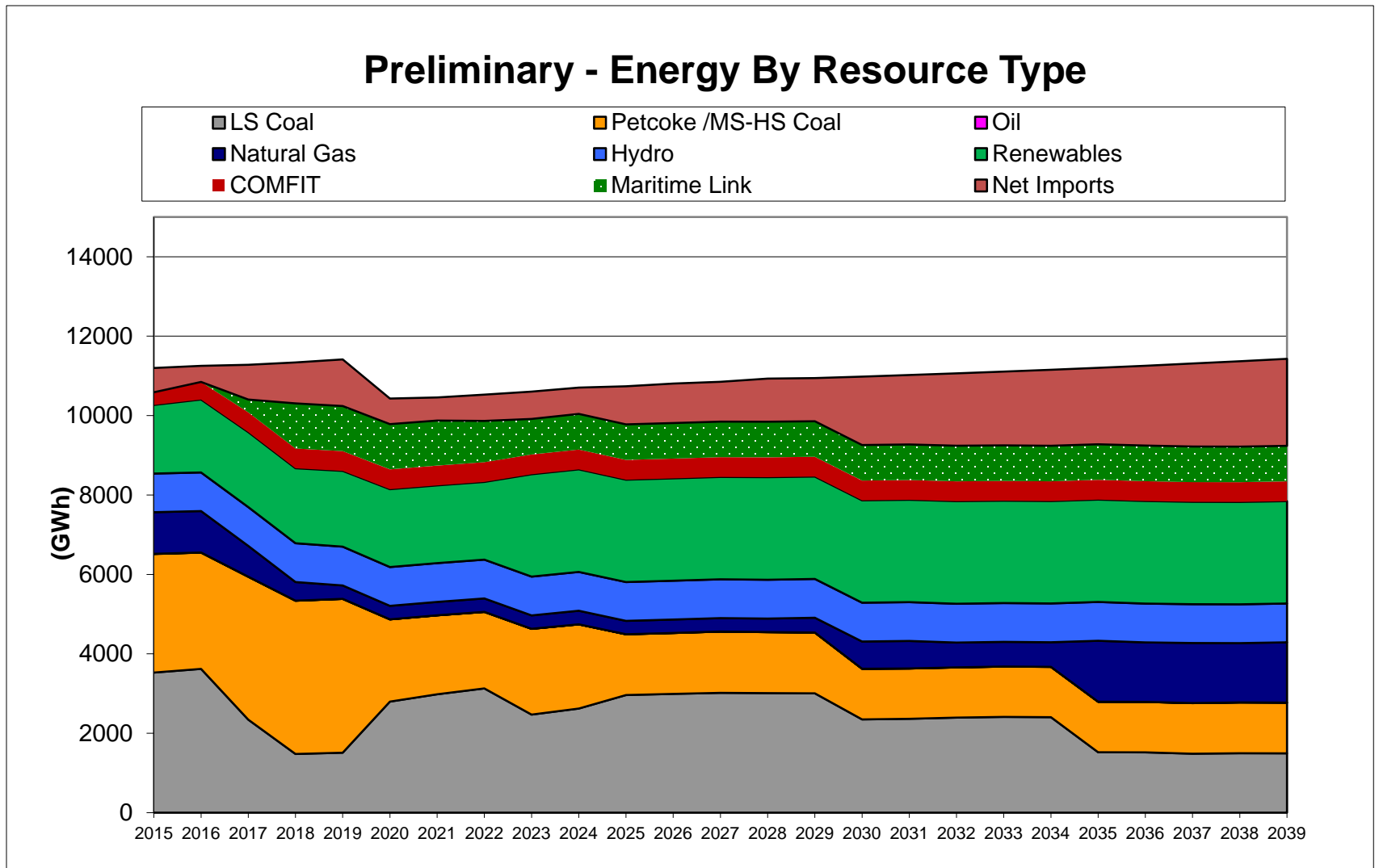
CRP1-1 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	9	22	34	44	53	62	70	79	88	97	105	161	223	234	244	255	264
Firm Peak Less DSM	1,954	1,964	1,967	1,977	1,988	2,005	2,007	2,018	2,030	2,050	2,054	2,090	2,123	2,130	2,140	2,148	2,157
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Firm Peak Less DR	1,954	1,963	1,964	1,972	1,981	1,995	1,992	1,997	2,003	2,017	2014	2030	2061	2,070	2,078	2,086	2,096
RM Required	391	393	393	394	396	399	398	399	401	403	403	406	412.2	414	416	417	419
Required MWs	2,345	2,356	2,357	2,367	2,377	2,394	2,391	2,397	2,404	2,421	2417	2436	2473	2,485	2,494	2,504	2,515
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass																	51.7
PPA									100								
Assumed Unit Retirement																	
Natural Gas Unit				-153							-81		-150	49.4		49.4	49.4
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	0.0	0.0	0.0	115.0	0.0	-81.0	0.0	-5.0	49.4	0.0	49.4	-51.9
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	113.7	113.7	113.7	228.7	228.7	147.7	147.7	133.1	182.5	182.5	231.9	180.0
Total Firm Capacity	2362	2423	2440	2440	2455	2455	2455	2455	2570	2570	2489	2489	2475	2524	2524	2573	2521
Surplus (Deficit) MWs above RM	17	67	83	73	78	61	64	58	166	149	72	53	1	39	30	70	7
Reserve Margin %	20.9%	23.4%	24.2%	23.7%	23.9%	23.1%	23.2%	22.9%	28.3%	27.4%	23.6%	22.6%	20.1%	21.9%	21.4%	23.3%	20.3%

CRP1-1 Preliminary Demand and DSM

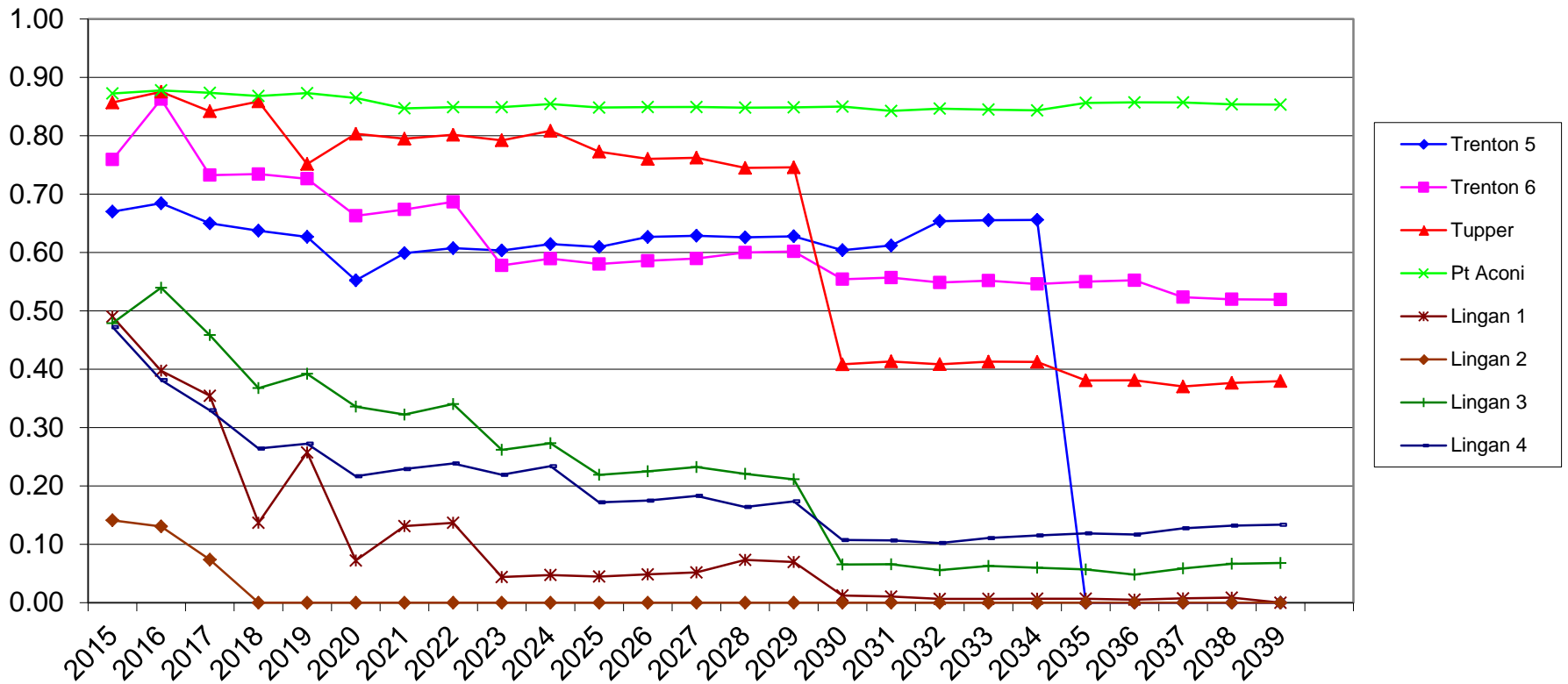


CRP1-1 Preliminary Energy by Resource Type



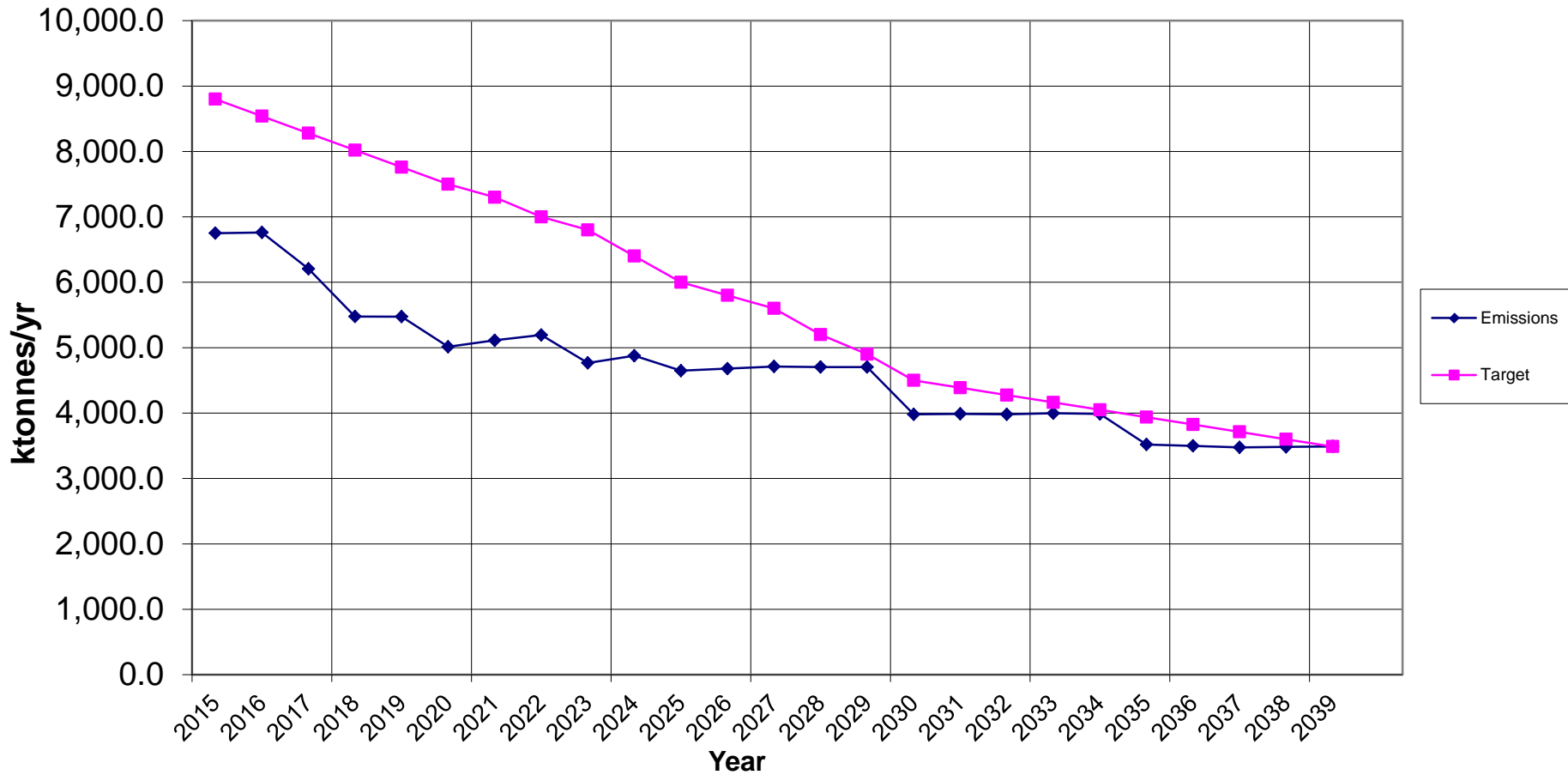
CRP1-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



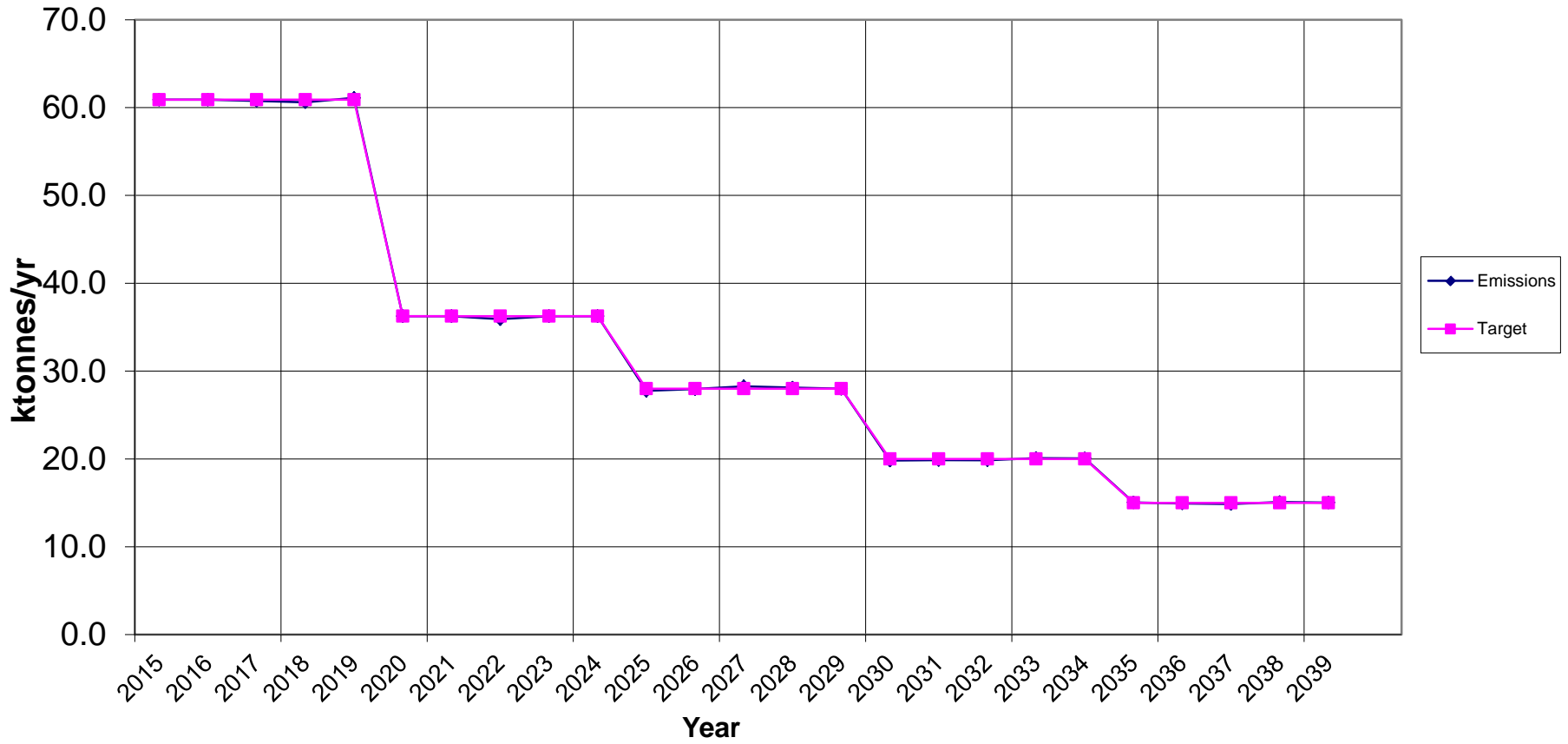
CRP1-1 Preliminary CO₂ Emissions

Projected CO₂ Emissions



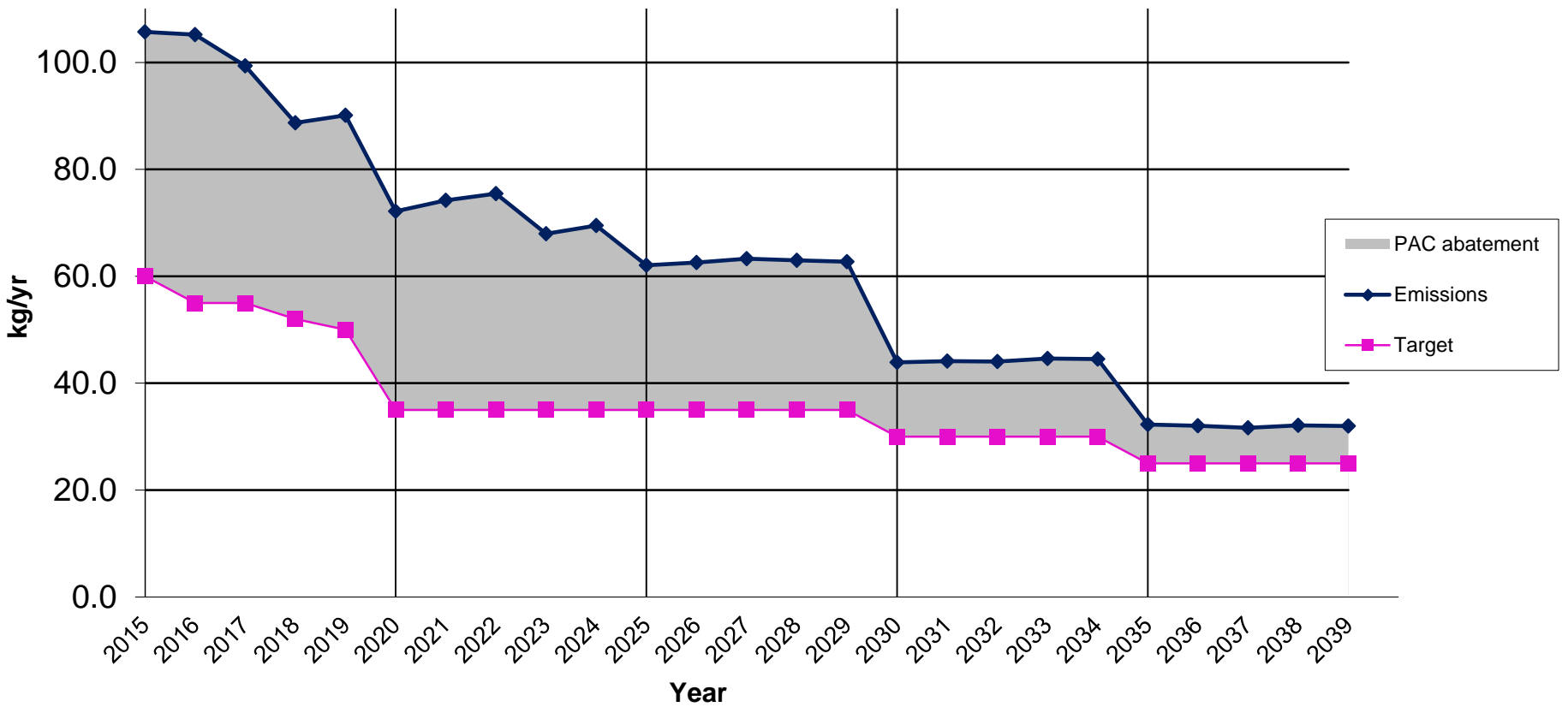
CRP1-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP1-1 Preliminary Hg Emissions

Projected Mercury Emissions





CRP2 Preliminary Results

CRP2 Input Assumptions

Candidate Resource Plan 2 (CRP2):

- Base Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Maximum Coal Use
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP2 Preliminary Results

	CRP02-01-R03	CRP02-17-R03 (FGD)
	Least cost study period	Least cost Planning period
2015		
2016		
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025	TUC 1 Retire	TUC 1 Retire FGD (Lin 3/4 300 MW)
2026		
2027		
2028		
2029		
2030		
2031		
2032	TUC 2 Retire	TUC 2 Retire
2033		
2034		
2035	CT 50MW Tre 5 Retire	CT 50MW Tre 5 Retire
2036		
2037		
2038		
2039	CT 50 MW PHBM 51.7MW firm Lin 1 Retire	CT 100MW PHBM 51.7MW firm Lin 1 Retire
Planning PV \$M	11,235	11,206
Study PV \$M	16,794	16,876

	Base DSM	Base DSM
	Program Adm Cost	Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9



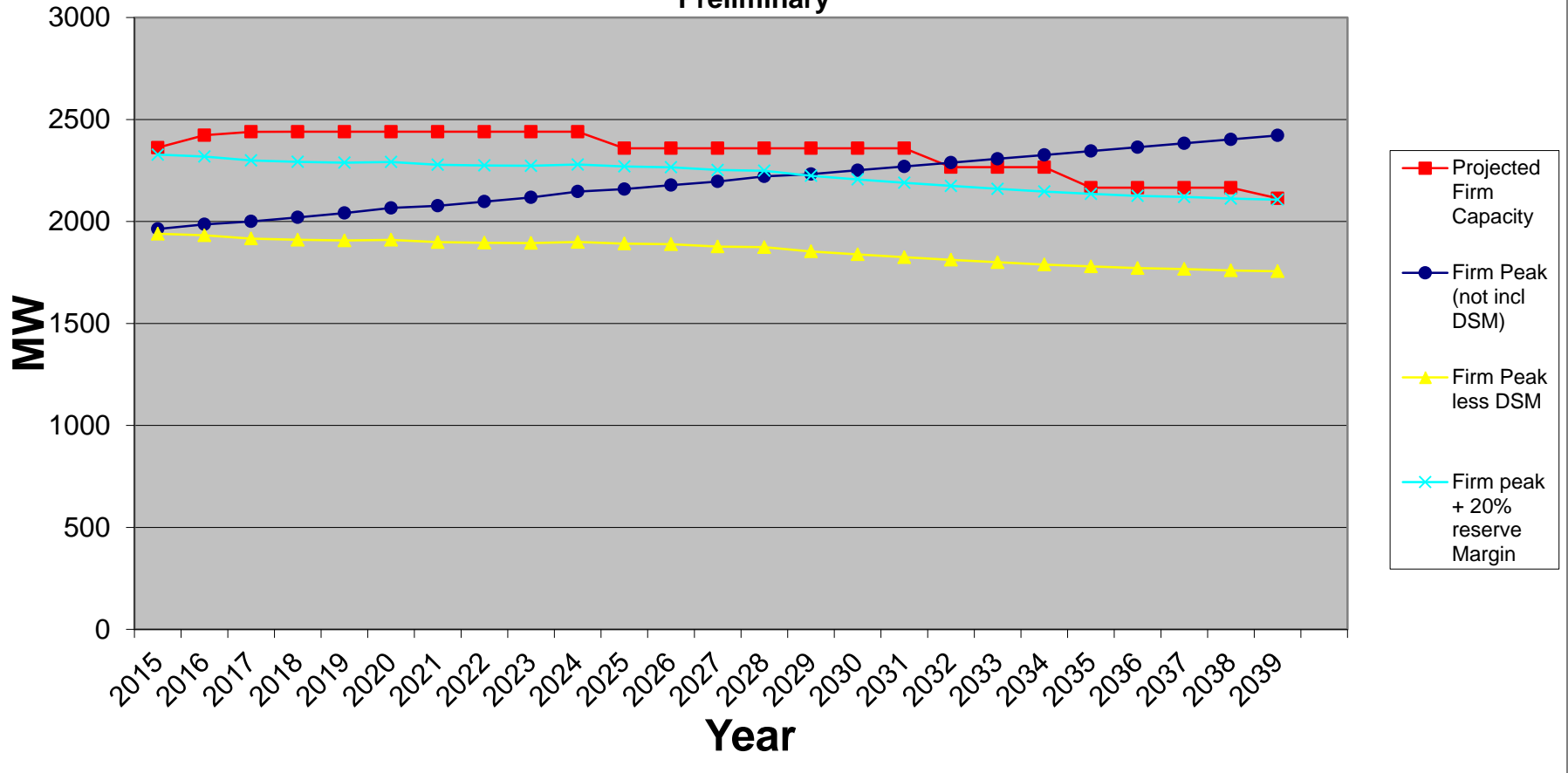
CRP2-1 Preliminary Results

CRP2-1 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
RM Required	388	386	383	382	381	382	380	379	379	380	378	368	356	354	353	352	351
Required MWs	2,328	2,319	2,299	2,293	2,288	2,292	2,278	2,275	2,273	2,279	2,270	2,206	2,136	2,126	2,120	2,112	2,107
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass																	51.7
Additional Wind																	
Assumed Unit Retirement				-153							-81		-150				-153
Natural Gas Unit													49.4				49.4
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-81.0	0.0	-100.6	0.0	0.0	0.0	-51.9
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	98.7	98.7	98.7	98.7	98.7	17.7	17.7	-175.9	-175.9	-175.9	-175.9	-227.8
Total Firm Capacity	2362	2423	2440	2440	2440	2440	2440	2440	2440	2440	2359	2359	2166	2166	2166	2166	2114
Surplus (Deficit) MWs above RM	34	104	141	148	152	148	162	165	167	161	89	153	30	40	45	53	7
Reserve Margin %	21.8%	25.4%	27.3%	27.7%	28.0%	27.8%	28.5%	28.7%	28.8%	28.5%	24.7%	28.3%	21.7%	22.2%	22.6%	23.0%	20.4%

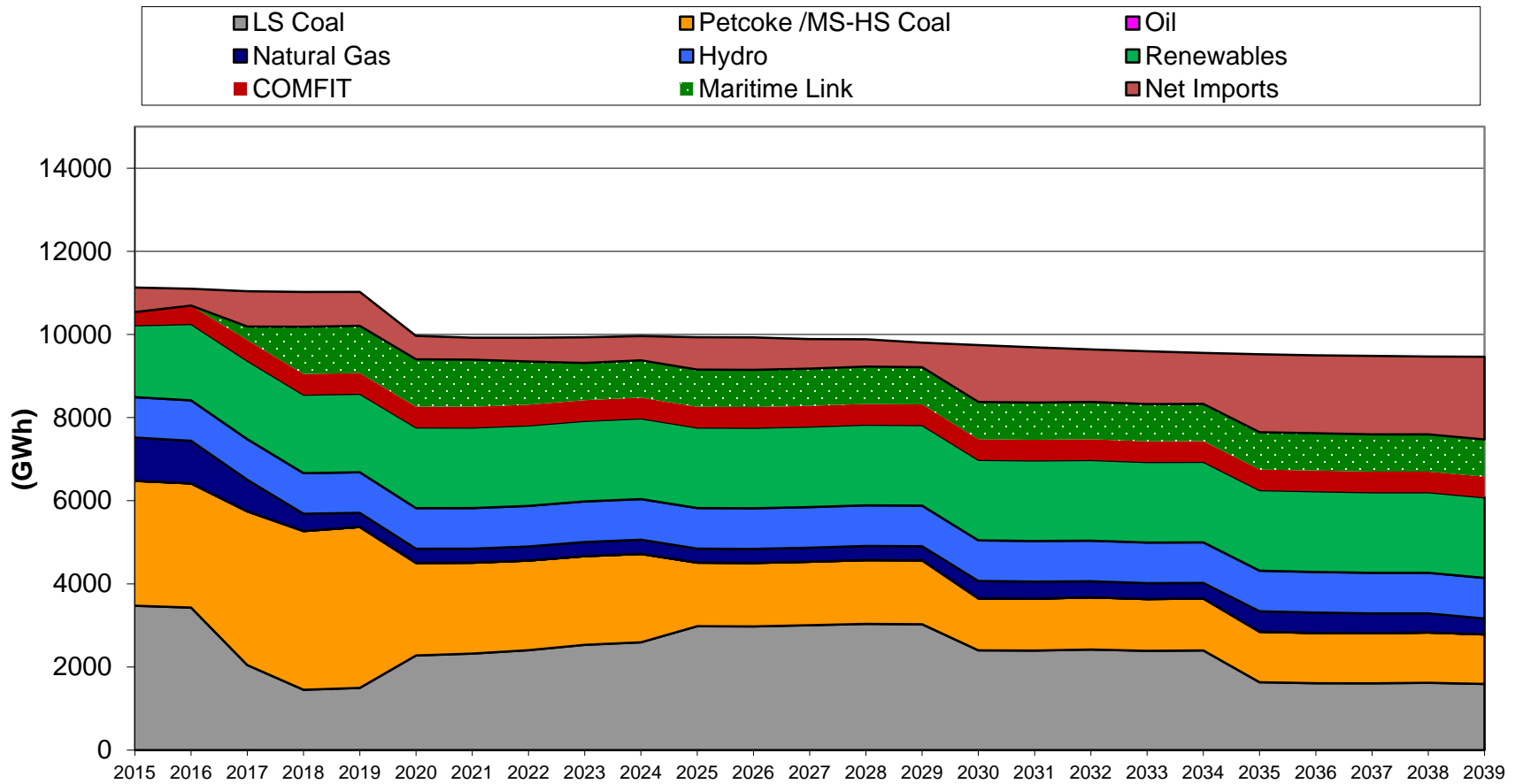
CRP2-1 Preliminary Demand and DSM

Projected System Peak Demand (Total & Firm) Preliminary



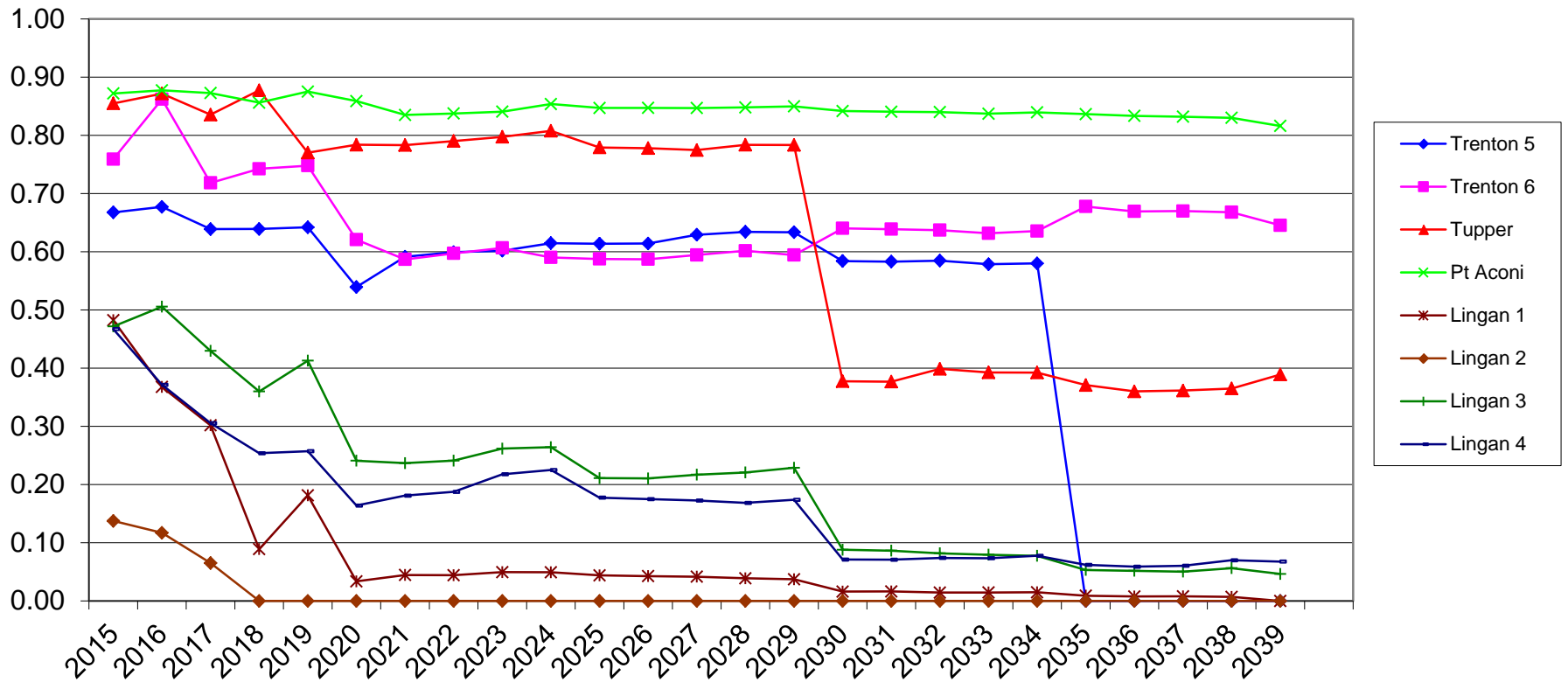
CRP2-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



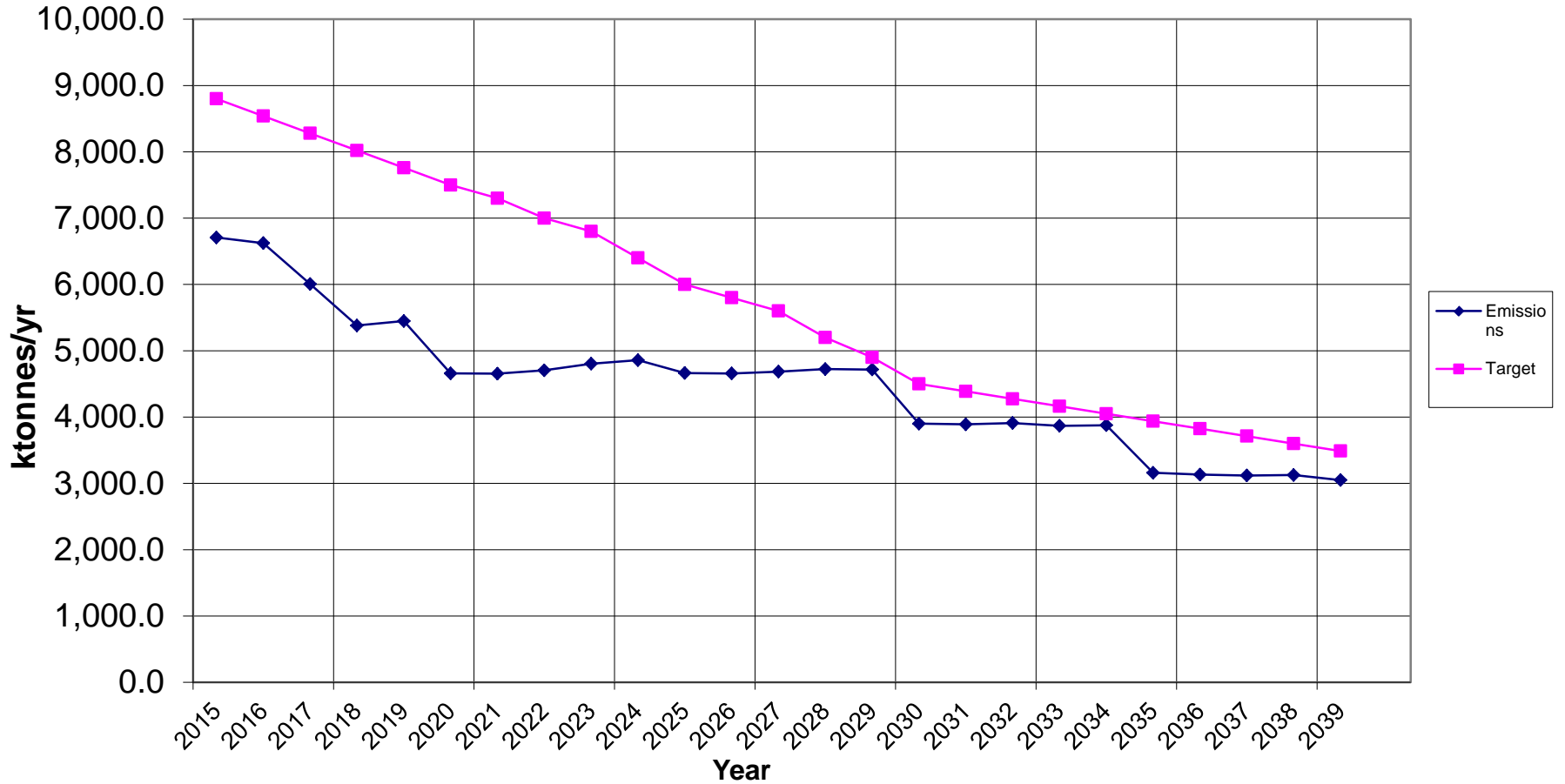
CRP2-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



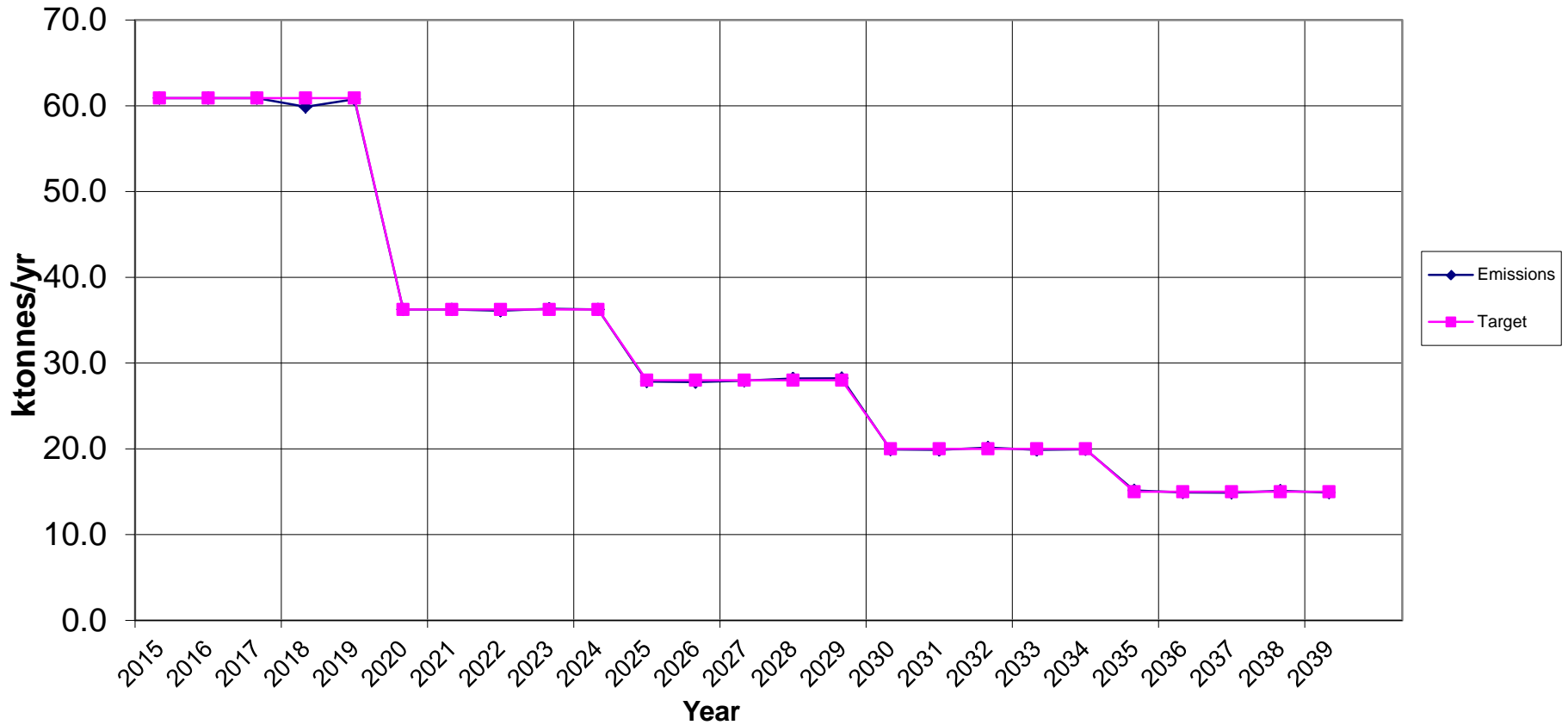
CRP2-1 Preliminary CO₂ Emissions

Projected CO2 Emissions



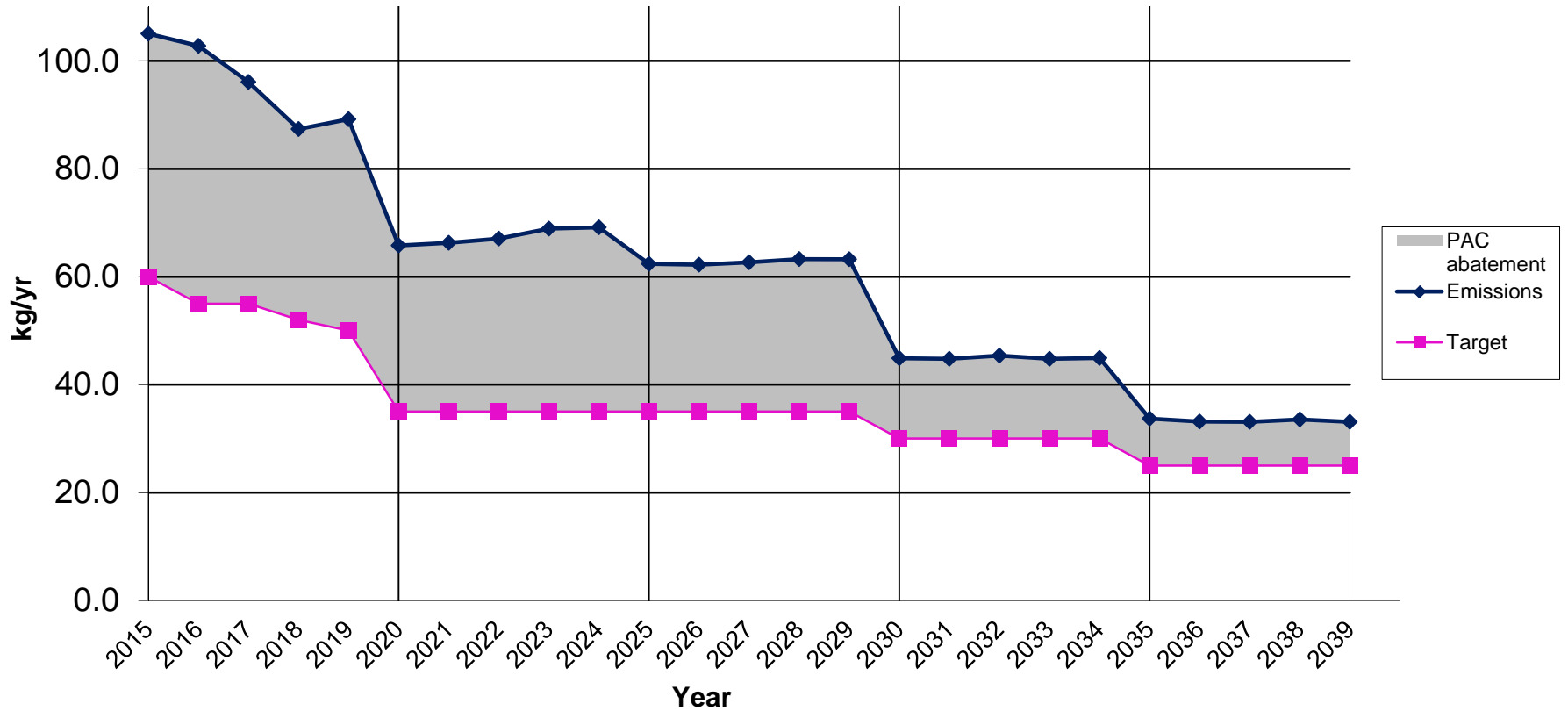
CRP2-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP2-1 Preliminary Hg Emissions

Projected Mercury Emissions





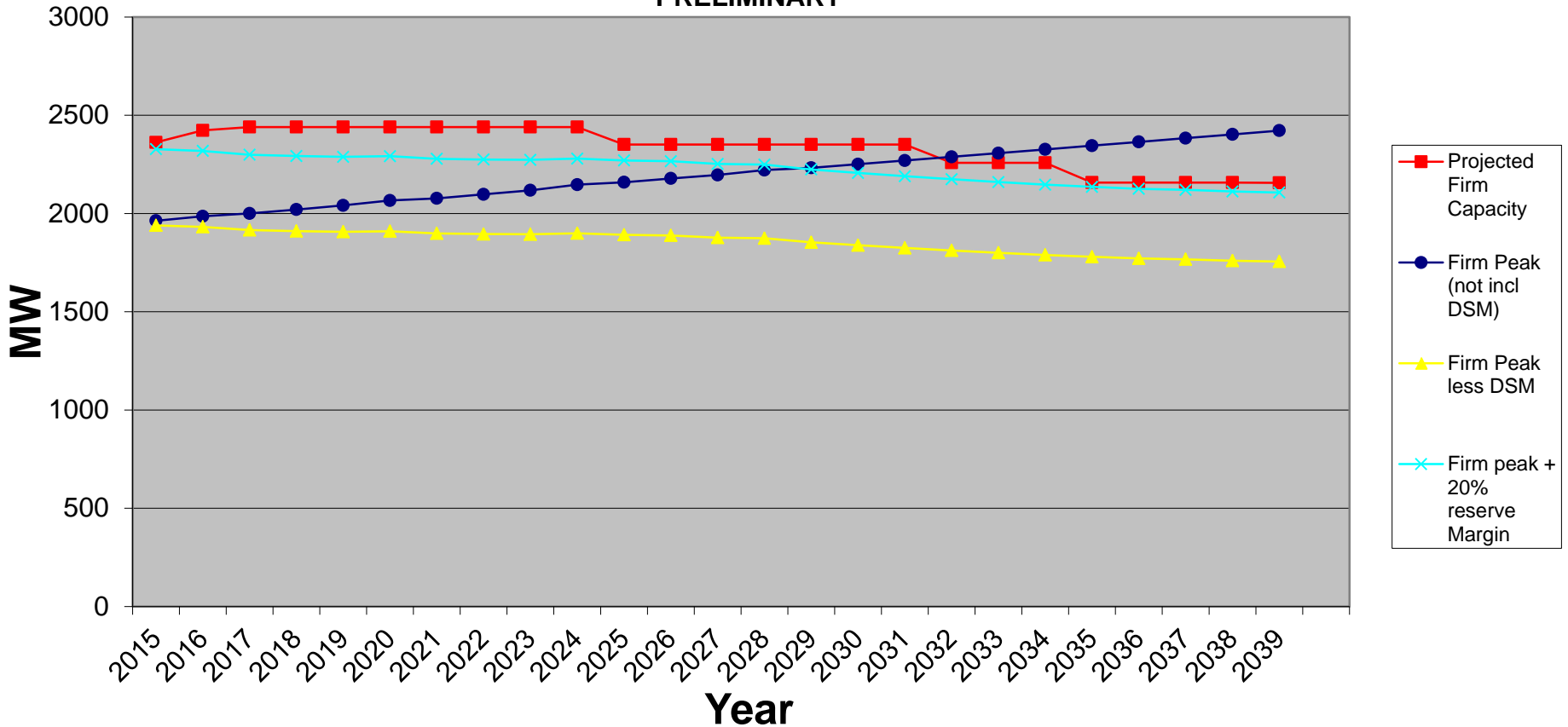
CRP2-17 Preliminary Results

CRP2-17 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
RM Required	388	386	383	382	381	382	380	379	379	380	378	368	356	354	353	352	351
Required MWs	2,328	2,319	2,299	2,293	2,288	2,292	2,278	2,275	2,273	2,279	2,270	2,206	2,136	2,126	2,120	2,112	2,107
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153													
Small Biomass PPA			10														
Hydro			1.8														
FGD parasitic power											-8.0						
PH Biomass																	51.7
Assumed Unit Retirement				-153							-81		-150				-153
Natural Gas Unit													49.4				100
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-89.0	0.0	-100.6	0.0	0.0	0.0	-1.3
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	98.7	98.7	98.7	98.7	98.7	9.7	9.7	-183.9	-183.9	-183.9	-183.9	-185.2
Total Firm Capacity	2362	2423	2440	2440	2440	2440	2440	2440	2440	2440	2351	2351	2158	2158	2158	2158	2156
Surplus (Deficit) MWs above RM	34	104	141	148	152	148	162	165	167	161	81	145	22	32	37	45	49
Reserve Margin %	21.8%	25.4%	27.3%	27.7%	28.0%	27.8%	28.5%	28.7%	28.8%	28.5%	24.3%	27.9%	21.2%	21.8%	22.1%	22.6%	22.8%

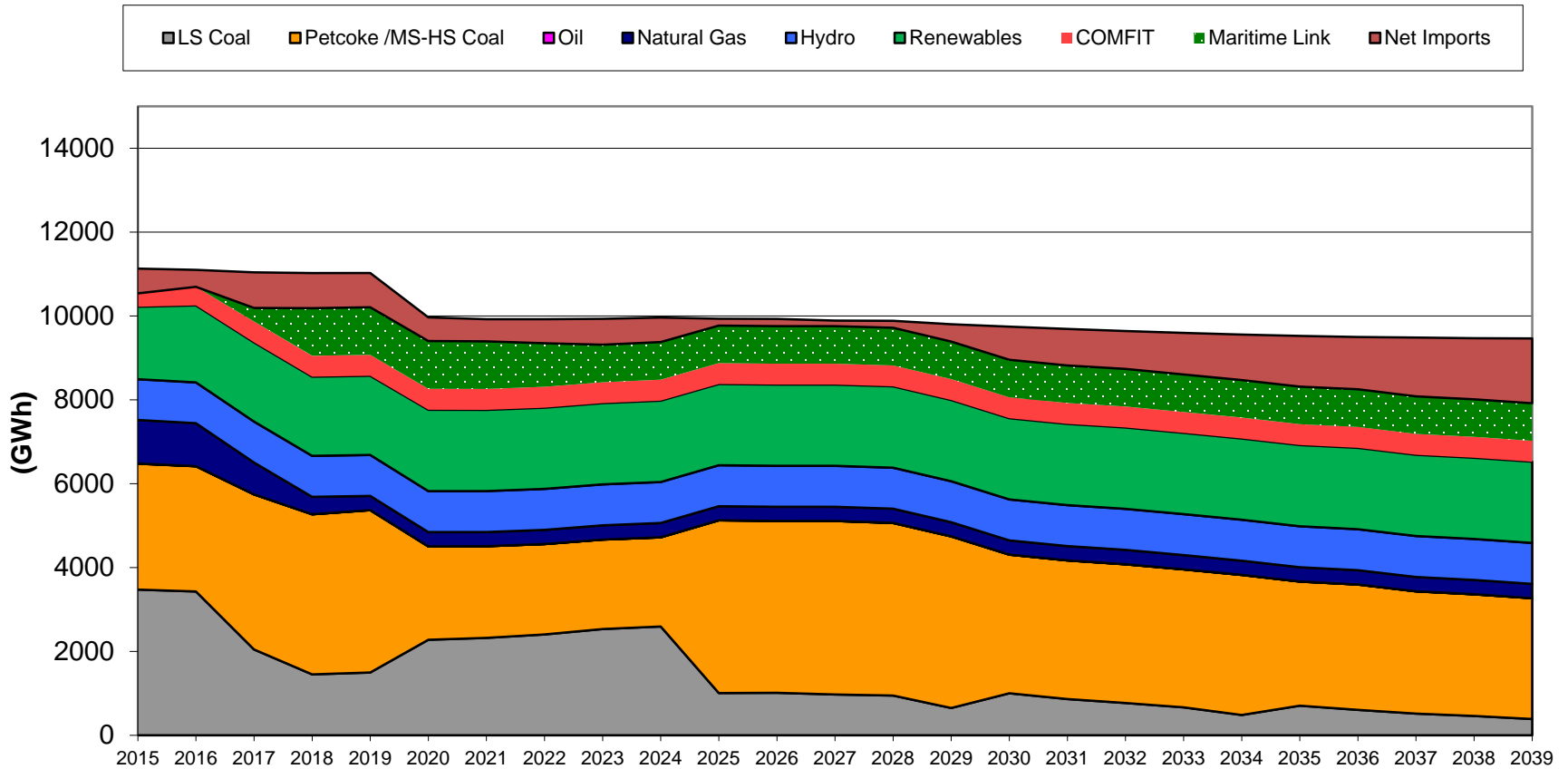
CRP2-17 Preliminary Demand and DSM

Projected System Peak Demand (Total & Firm)
PRELIMINARY



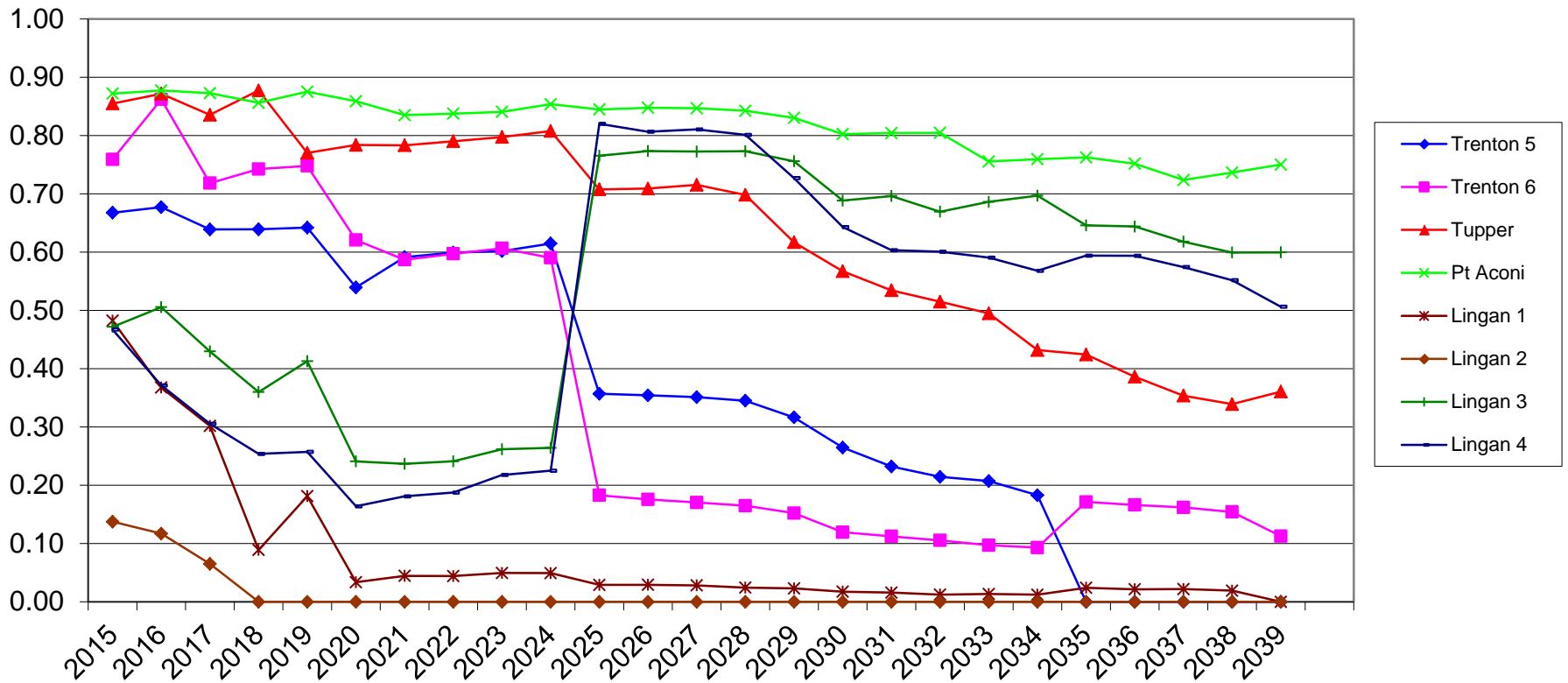
CRP2-17 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



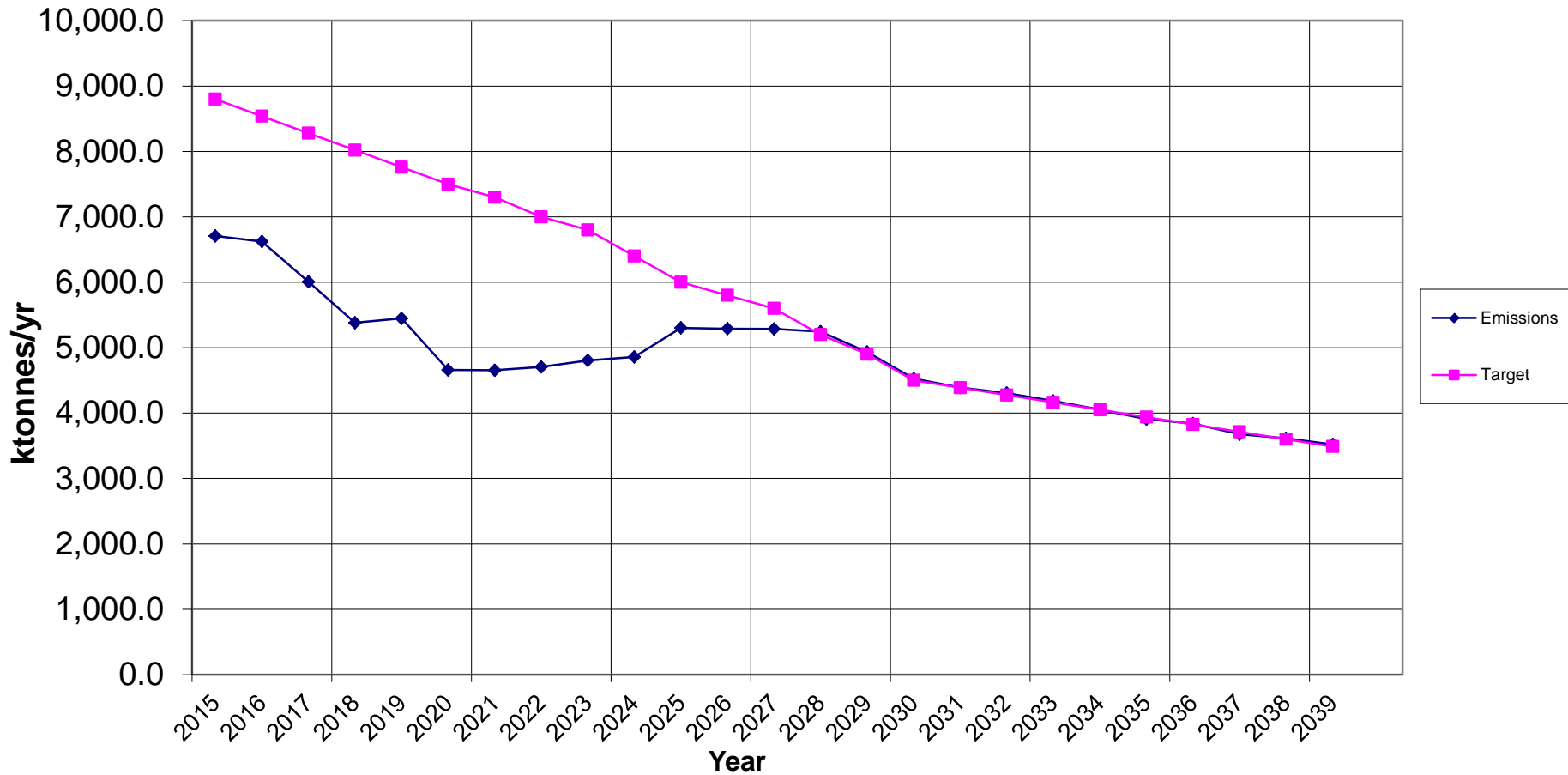
CRP2-17 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



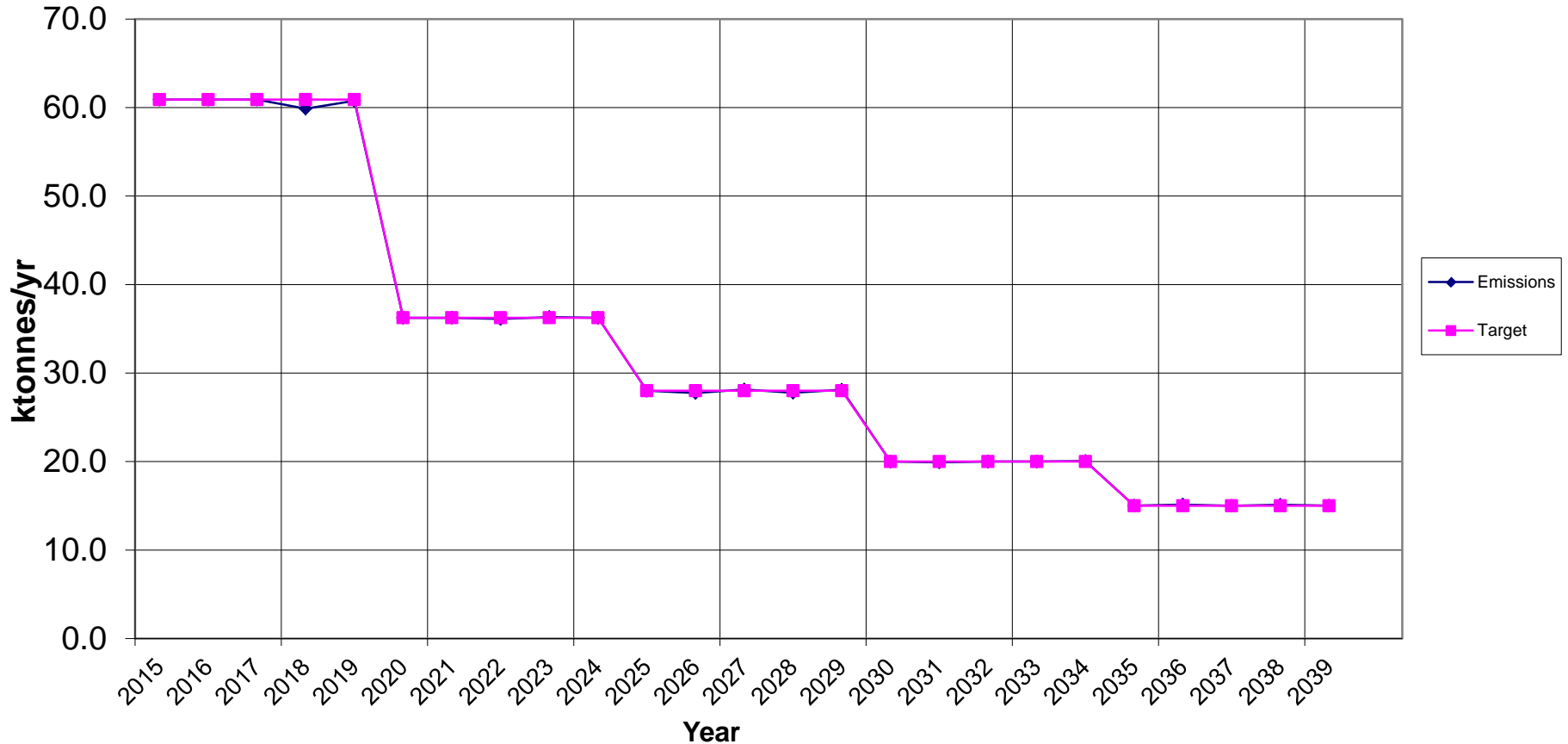
CRP2-17 Preliminary CO₂ Emissions

Projected CO2 Emissions



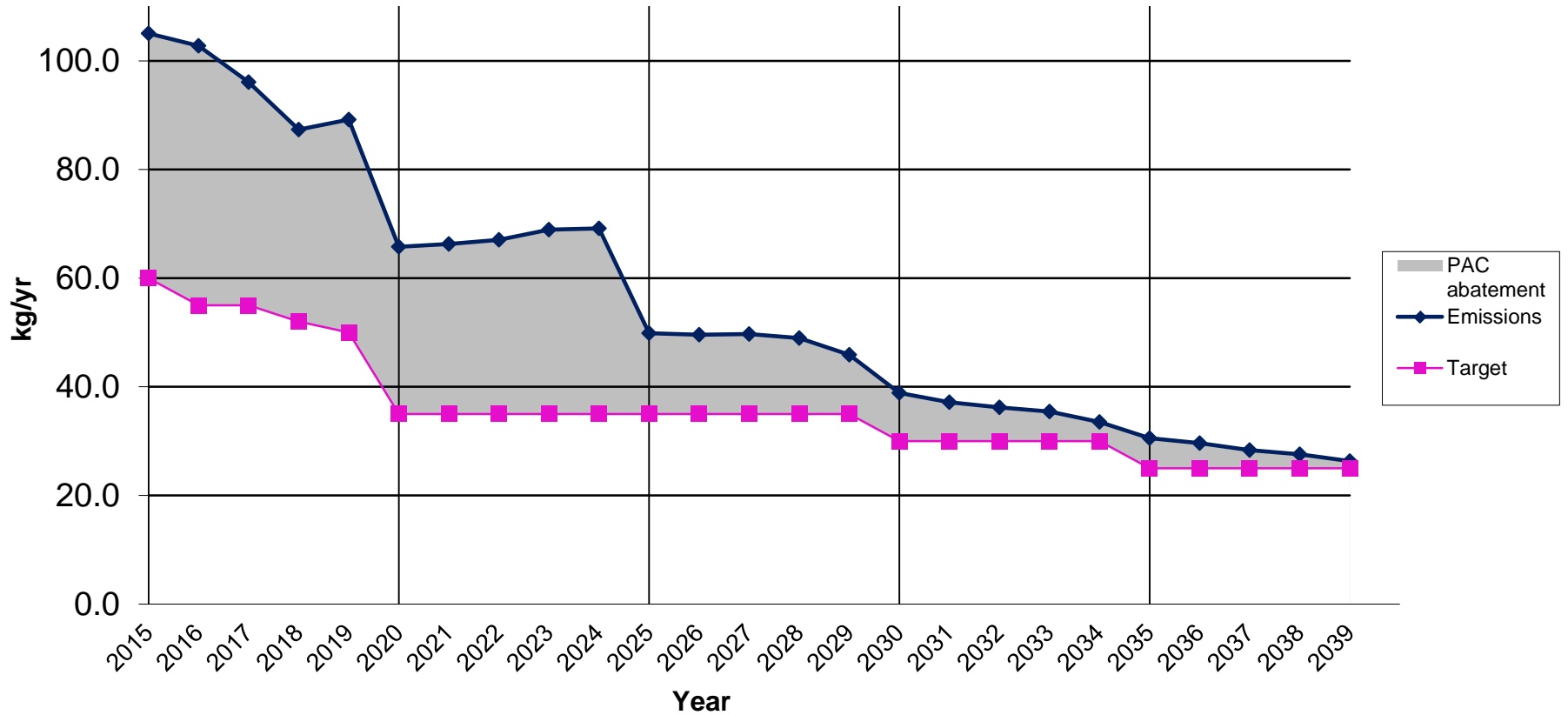
CRP2-17 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP2-17 Preliminary Hg Emissions

Projected Mercury Emissions





CRP3 Preliminary Results

CRP3 Input Assumptions

Candidate Resource Plan 3 (CRP3):

- Base Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Maximum Coal Use
- Medium Wind (Wind integration: 2 x CT 50 MW and \$200M for reliability tie and transmission upgrades)
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP3 Preliminary Results

	CRP3-01-R01	CRP3-05-R01
	Least cost study period	Least cost planning period
2015		
2016		
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019		
2020		
2021		
2022		
2023	Wind Block 150MW 2 x CT 50 MW (for wind integration)	Wind Block 150MW 2 x CT 50 MW (for wind integration)
2024		
2025	TUC 1 Retire	TUC 1 Retire FGD (Lin 3/4 300MW)
2026		
2027		
2028		
2029		
2030		
2031		
2032	TUC 2 Retire	TUC 2 Retire
2033		
2034		
2035	Tre 5 Retire	Tre 5 Retire
2036		
2037		
2038		
2039	PHBM 51.7 MW Firm Lin 1 Retire	PHBM 51.7 MW Firm Lin 1 Retire
Planning PV \$M	11,516	11,493
Study PV \$M	17,110	17,181

	Base DSM Program Adm Cost	Base DSM Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9

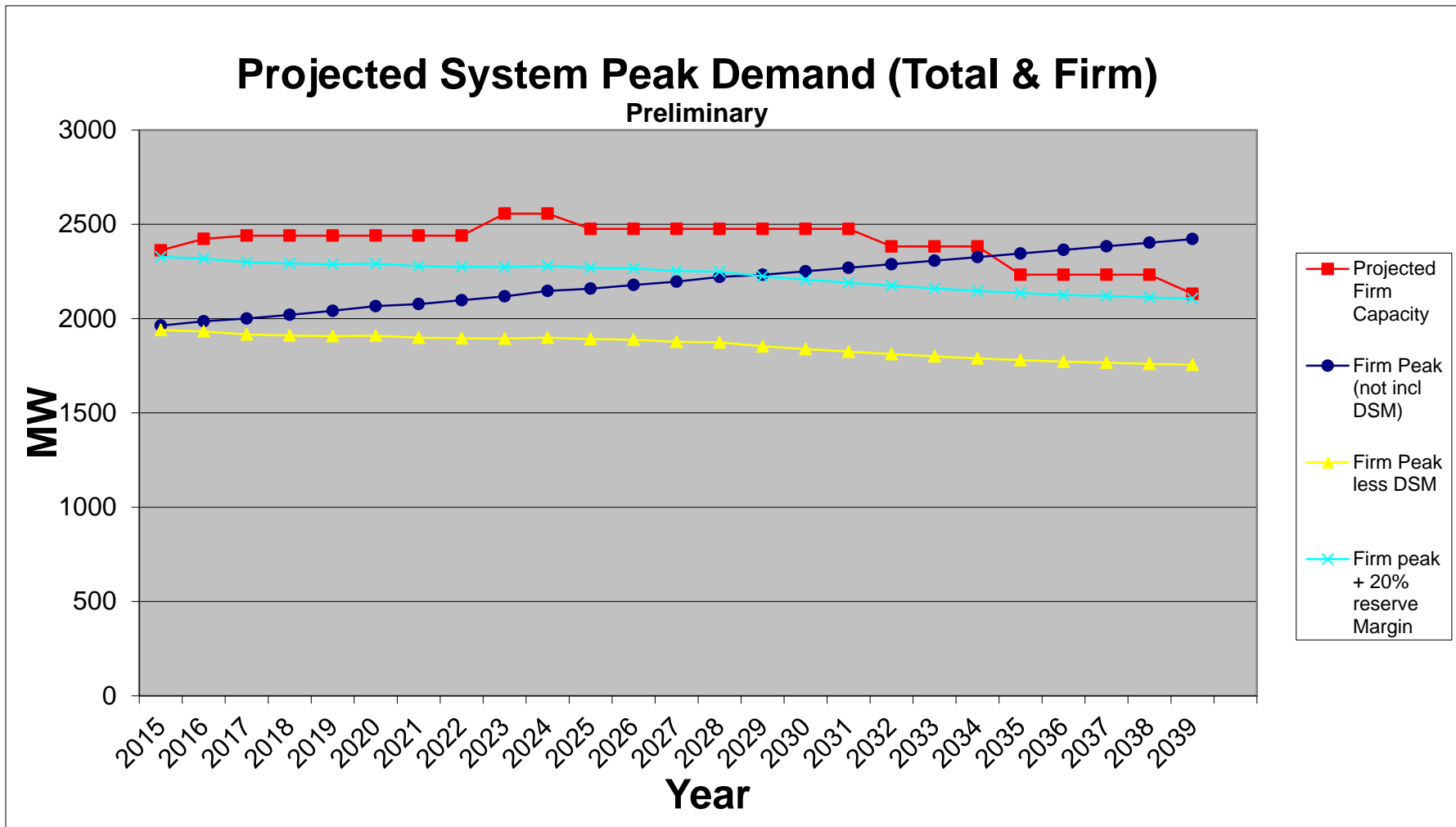


CRP3-1 Preliminary Results

CRP3-1 Preliminary Load and Resources

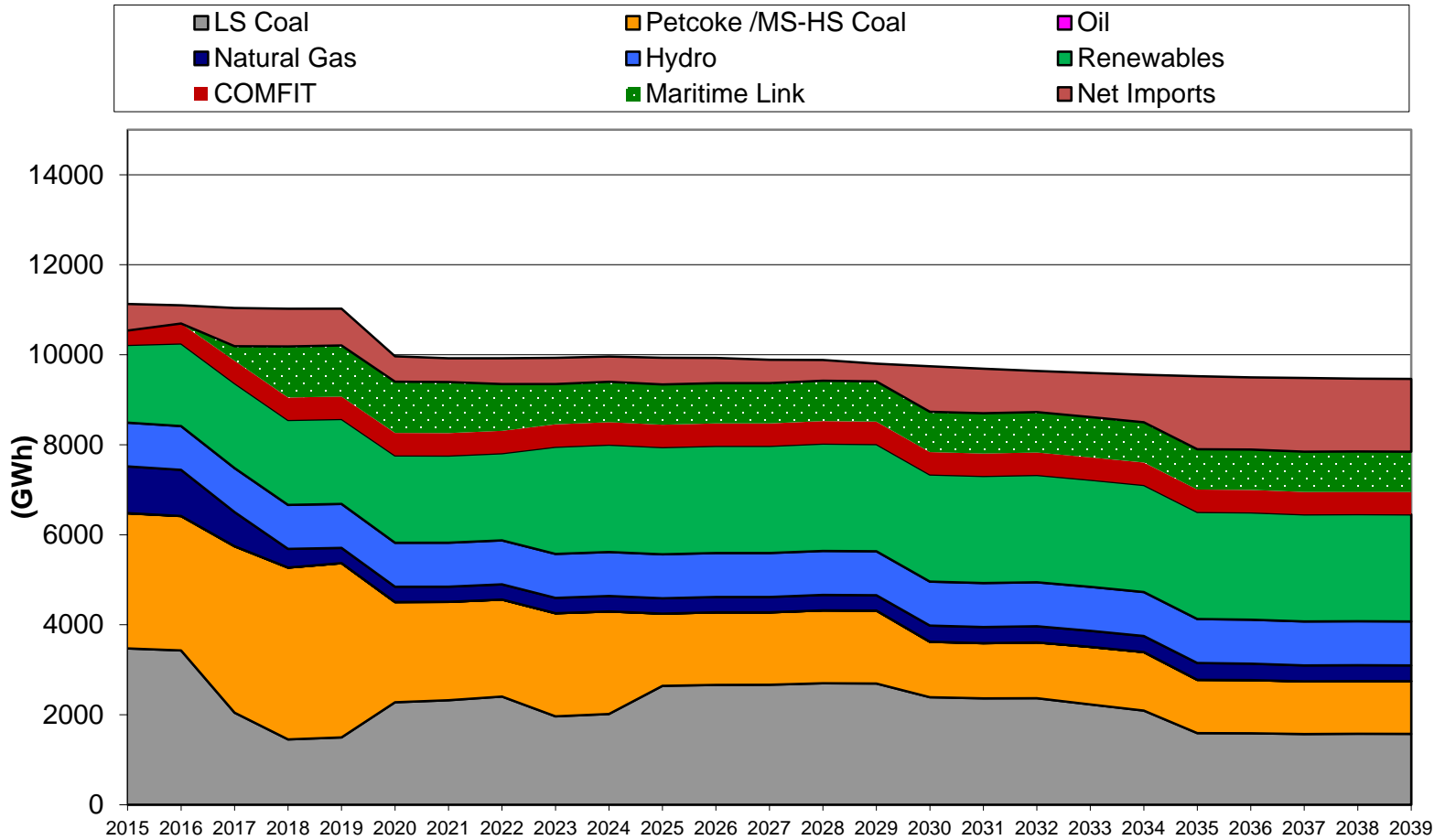
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
RM Required	388	386	383	382	381	382	380	379	379	380	378	368	356	354	353	352	351
Required MWs	2,328	2,319	2,299	2,293	2,288	2,292	2,278	2,275	2,273	2,279	2,270	2,206	2,136	2,126	2,120	2,112	2,107
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass																	51.7
Additional Wind									18								
Assumed Unit Retirement				-153							-81		-150				-153
Natural Gas Unit									98.6								
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	0.0	0.0	0.0	116.6	0.0	-81.0	0.0	-150.0	0.0	0.0	0.0	-101.3
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	98.7	98.7	98.7	215.3	215.3	134.3	134.3	-108.7	-108.7	-108.7	-108.7	-210.0
Total Firm Capacity	2362	2423	2440	2440	2440	2440	2440	2440	2557	2557	2476	2476	2233	2233	2233	2233	2131
Surplus (Deficit) MWs above RM	34	104	141	148	152	148	162	165	284	277	206	269	97	107	112	121	24
Reserve Margin %	21.8%	25.4%	27.3%	27.7%	28.0%	27.8%	28.5%	28.7%	35.0%	34.6%	30.9%	34.6%	25.5%	26.0%	26.4%	26.9%	21.4%

CRP3-1 Preliminary Demand and DSM



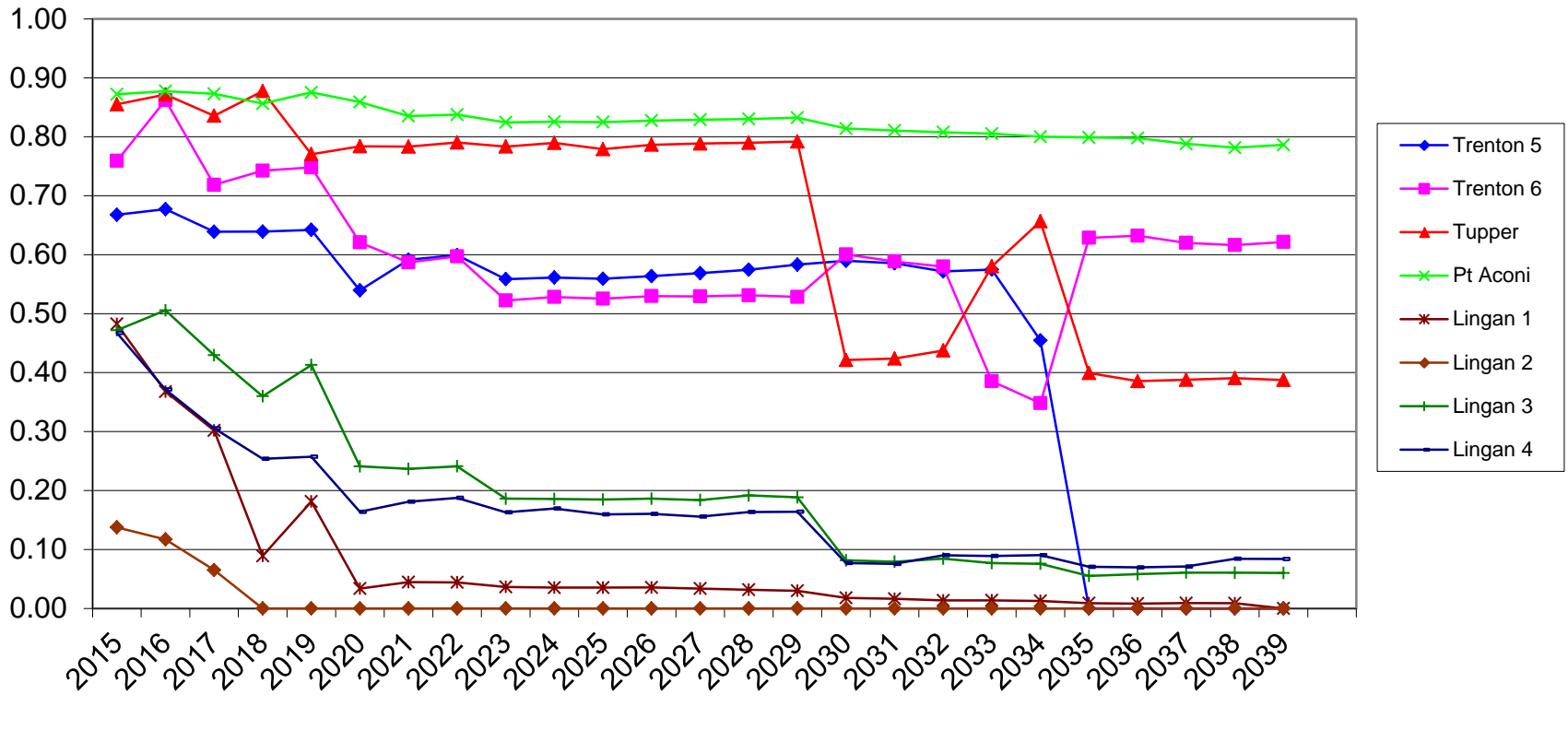
CRP3-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



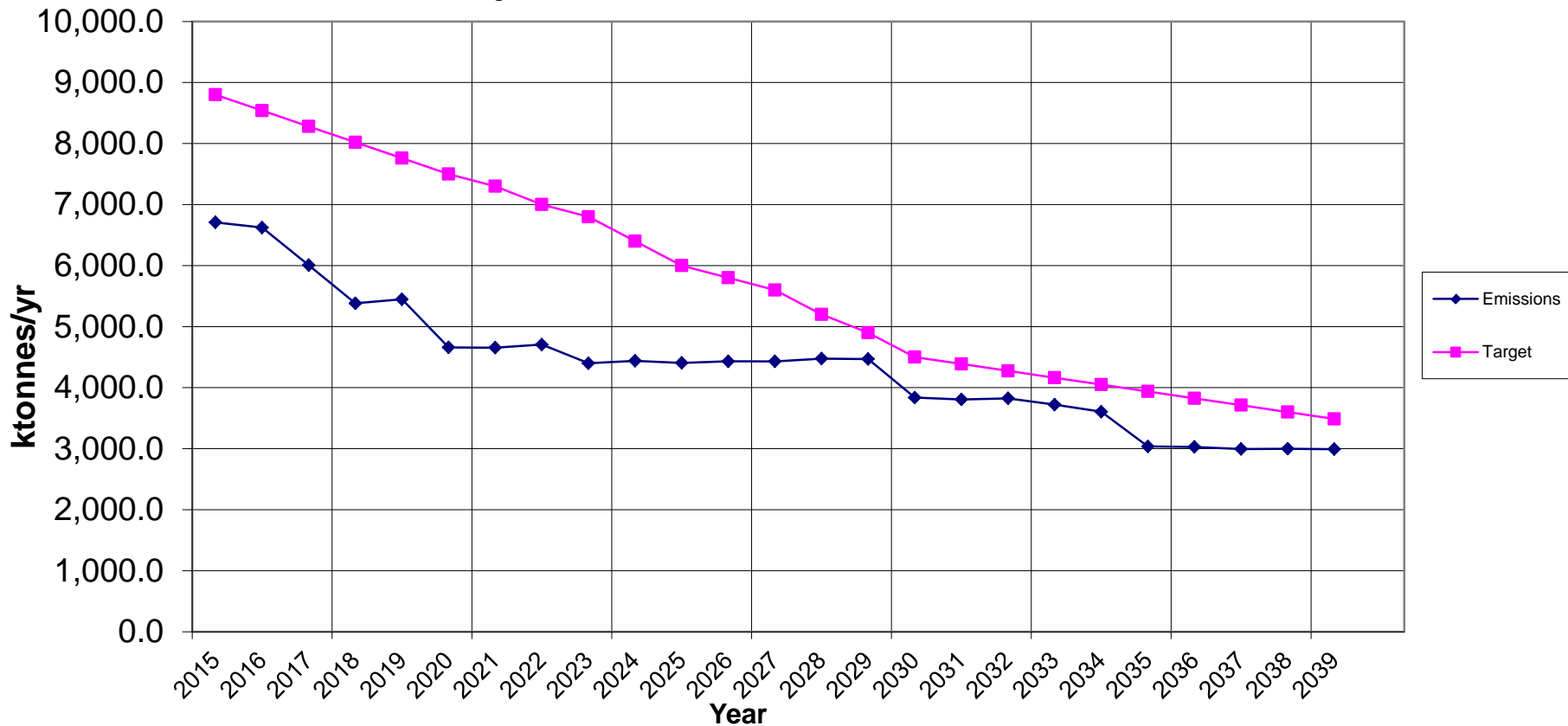
CRP3-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units

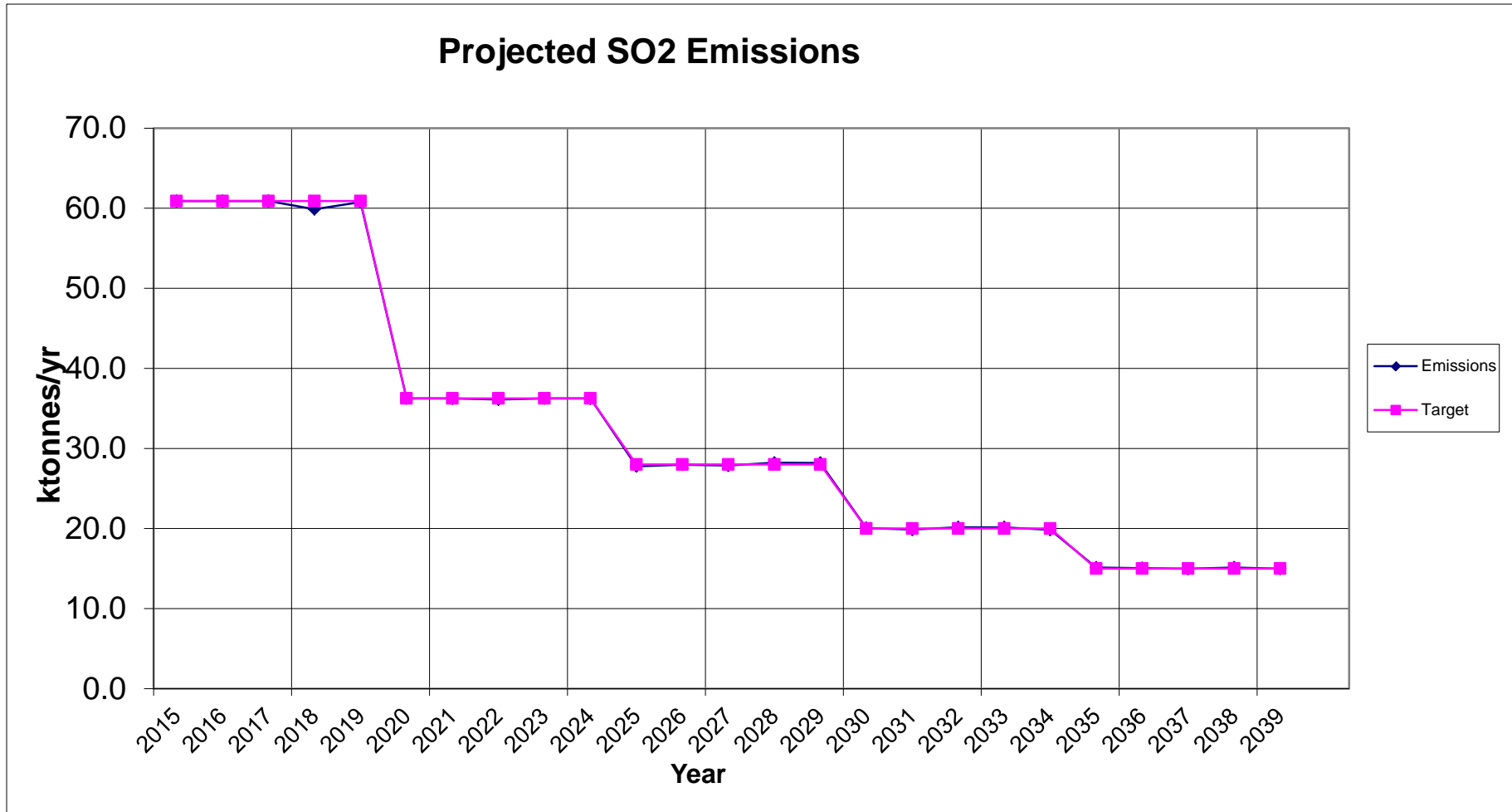


CRP3-1 Preliminary CO₂ Emissions

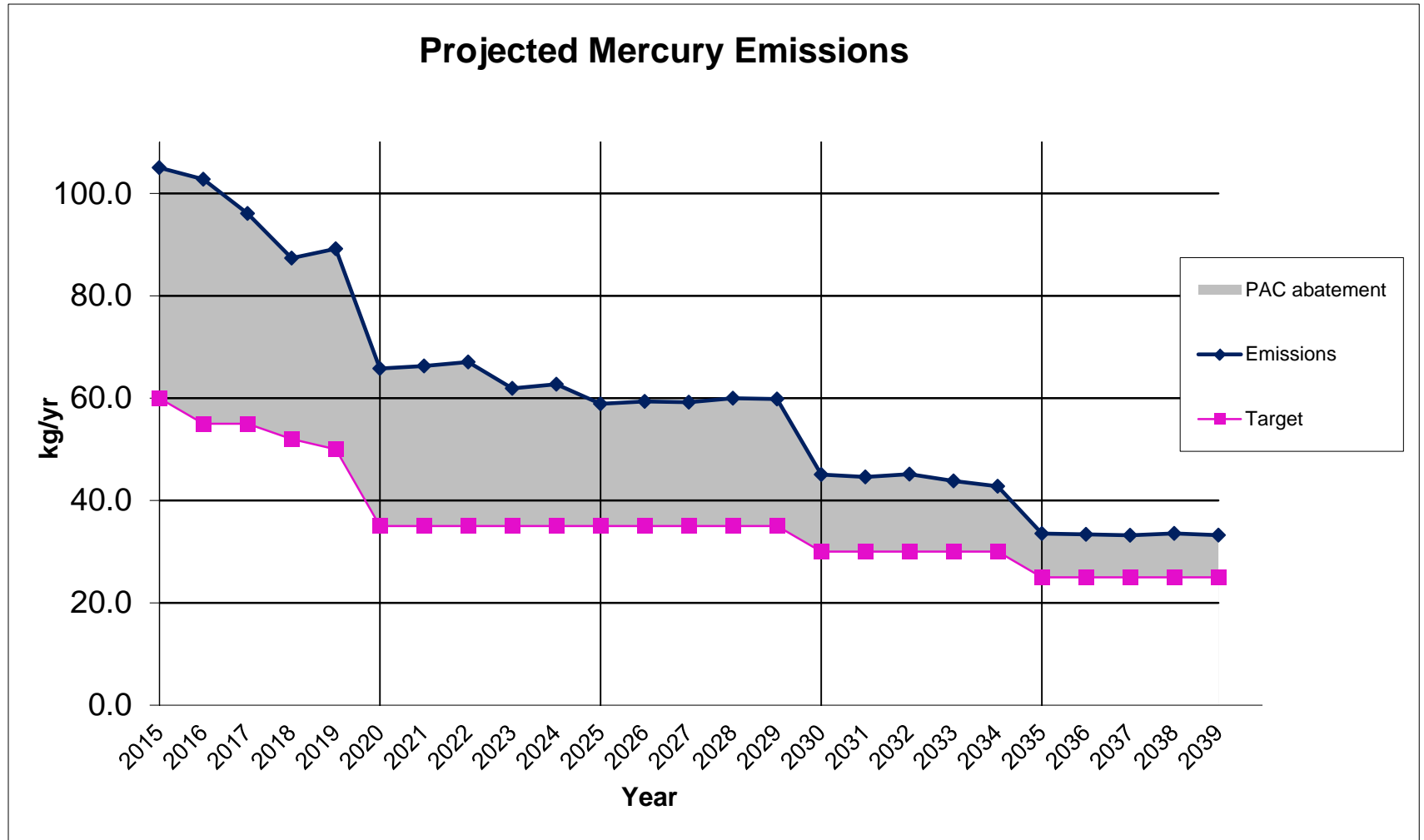
Projected CO₂ Emissions



CRP3-1 Preliminary SO₂ Emissions



CRP3-1 Preliminary Mercury Emissions



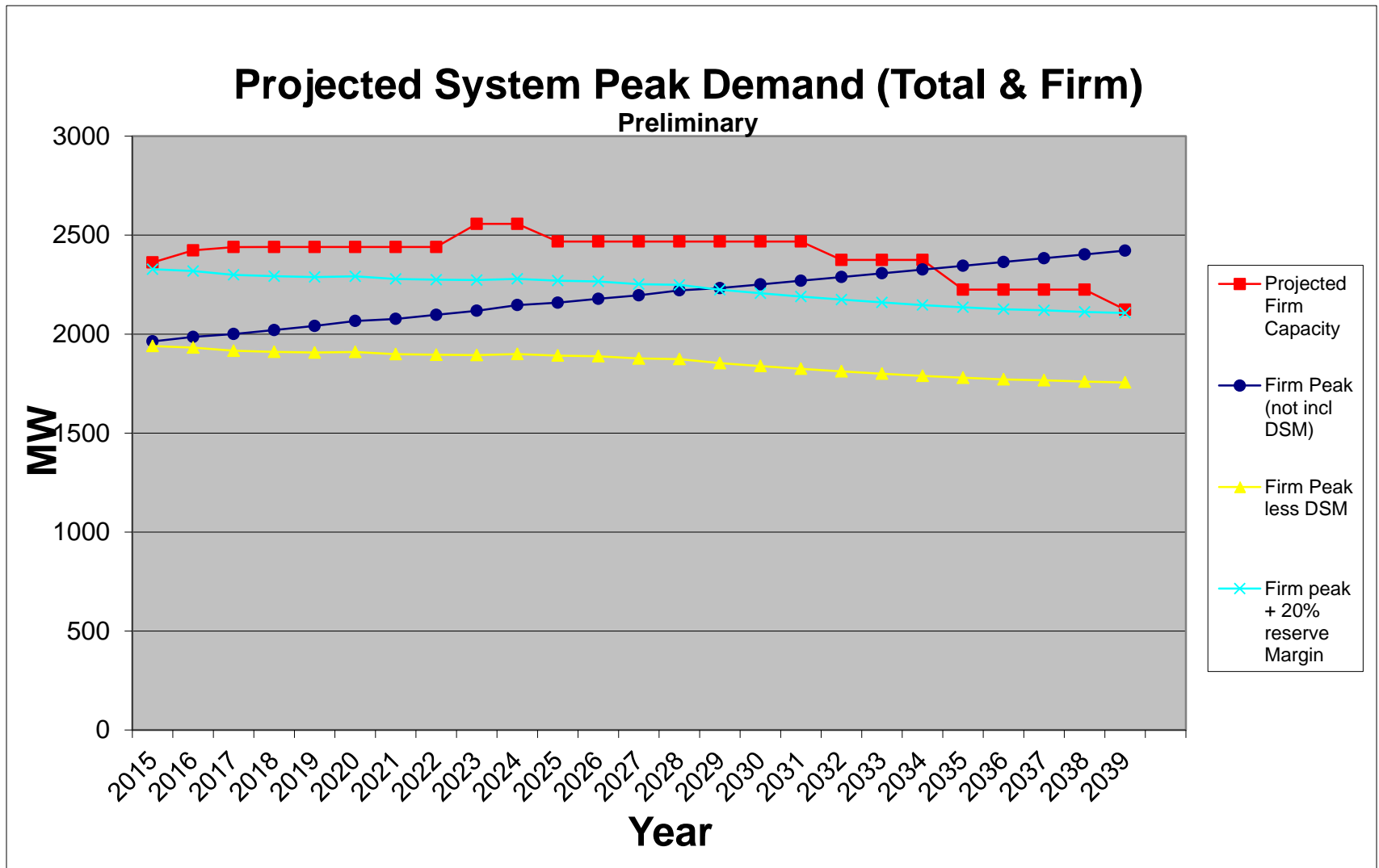


CRP3-5 Preliminary Results

CRP3-5 Preliminary Load and Resources

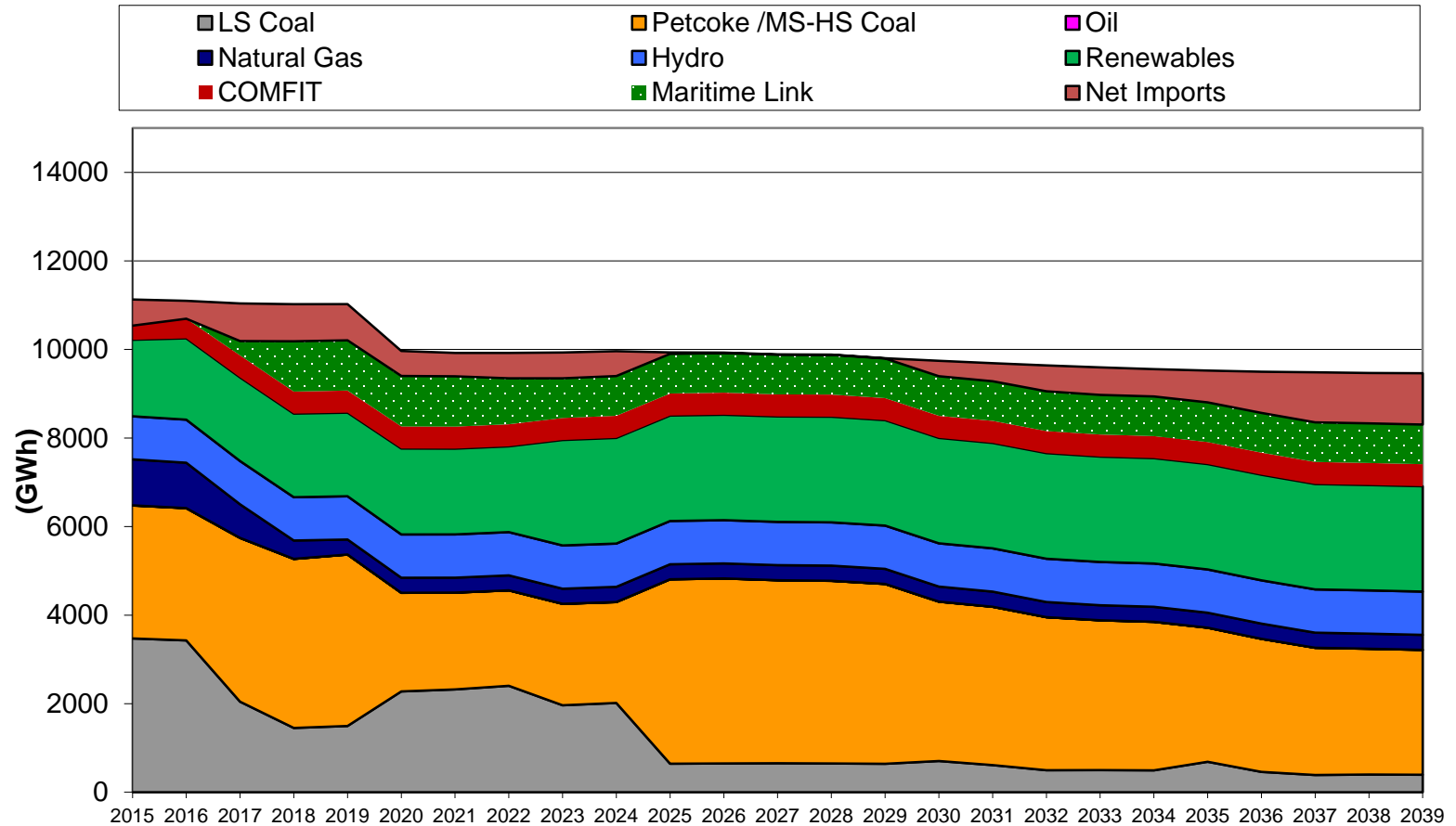
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
RM Required	388	386	383	382	381	382	380	379	379	380	378	368	356	354	353	352	351
Required MWs	2,328	2,319	2,299	2,293	2,288	2,292	2,278	2,275	2,273	2,279	2,270	2,206	2,136	2,126	2,120	2,112	2,107
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass																	51.7
FGD Parasitic power											-8.0						
Additional Wind									18								
Assumed Unit Retirement				-153							-81		-150				-153
Natural Gas Unit									98.6								
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	0.0	0.0	0.0	116.6	0.0	-89.0	0.0	-150.0	0.0	0.0	0.0	-101.3
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	98.7	98.7	98.7	215.3	215.3	126.3	126.3	-116.7	-116.7	-116.7	-116.7	-218.0
Total Firm Capacity	2362	2423	2440	2440	2440	2440	2440	2440	2557	2557	2468	2468	2225	2225	2225	2225	2123
Surplus (Deficit) MWs above RM	34	104	141	148	152	148	162	165	284	277	198	261	89	99	104	113	16
Reserve Margin %	21.8%	25.4%	27.3%	27.7%	28.0%	27.8%	28.5%	28.7%	35.0%	34.6%	30.5%	34.2%	25.0%	25.6%	25.9%	26.4%	20.9%

CRP3-5 Preliminary Demand and DSM



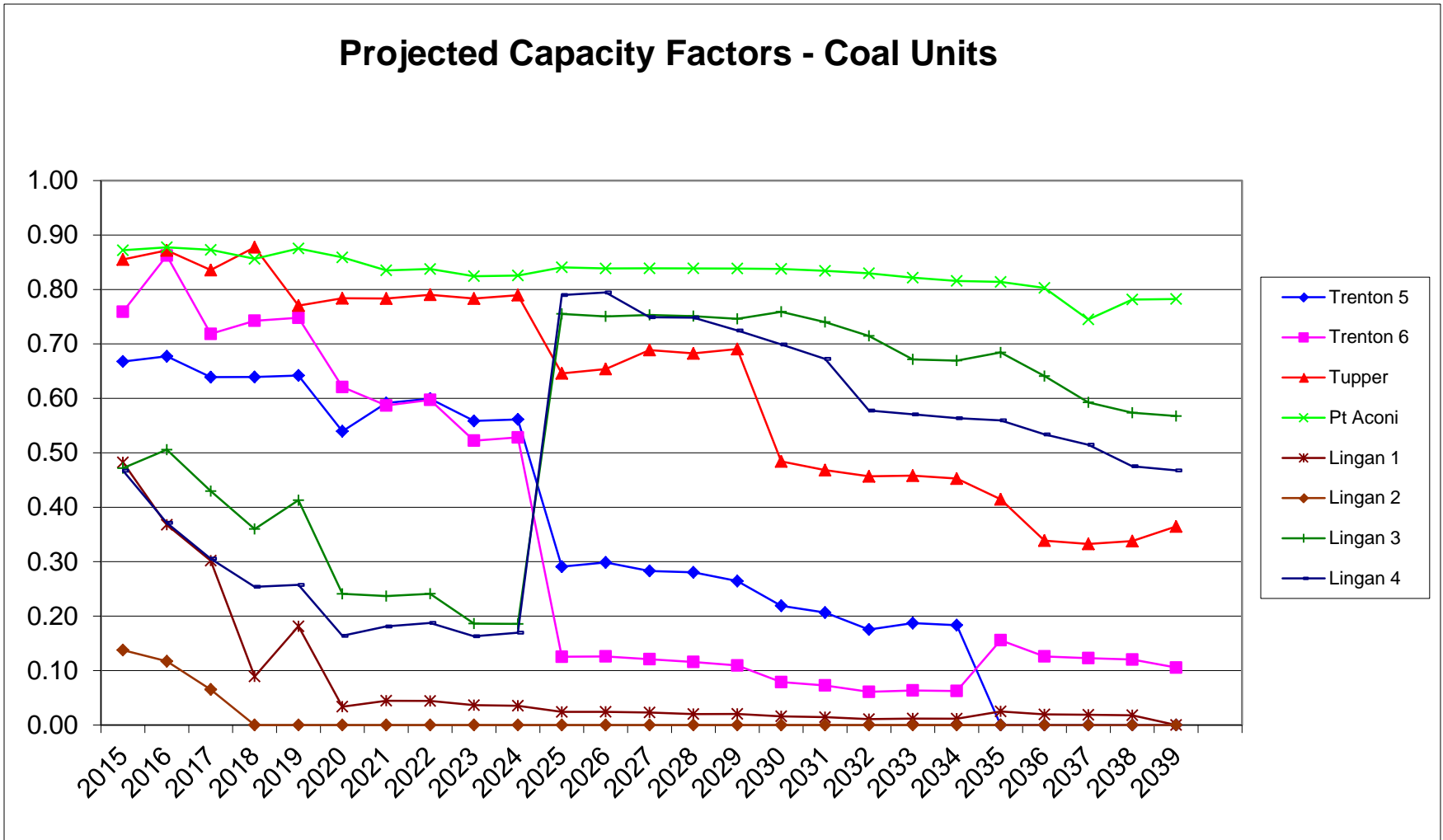
CRP3-5 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type

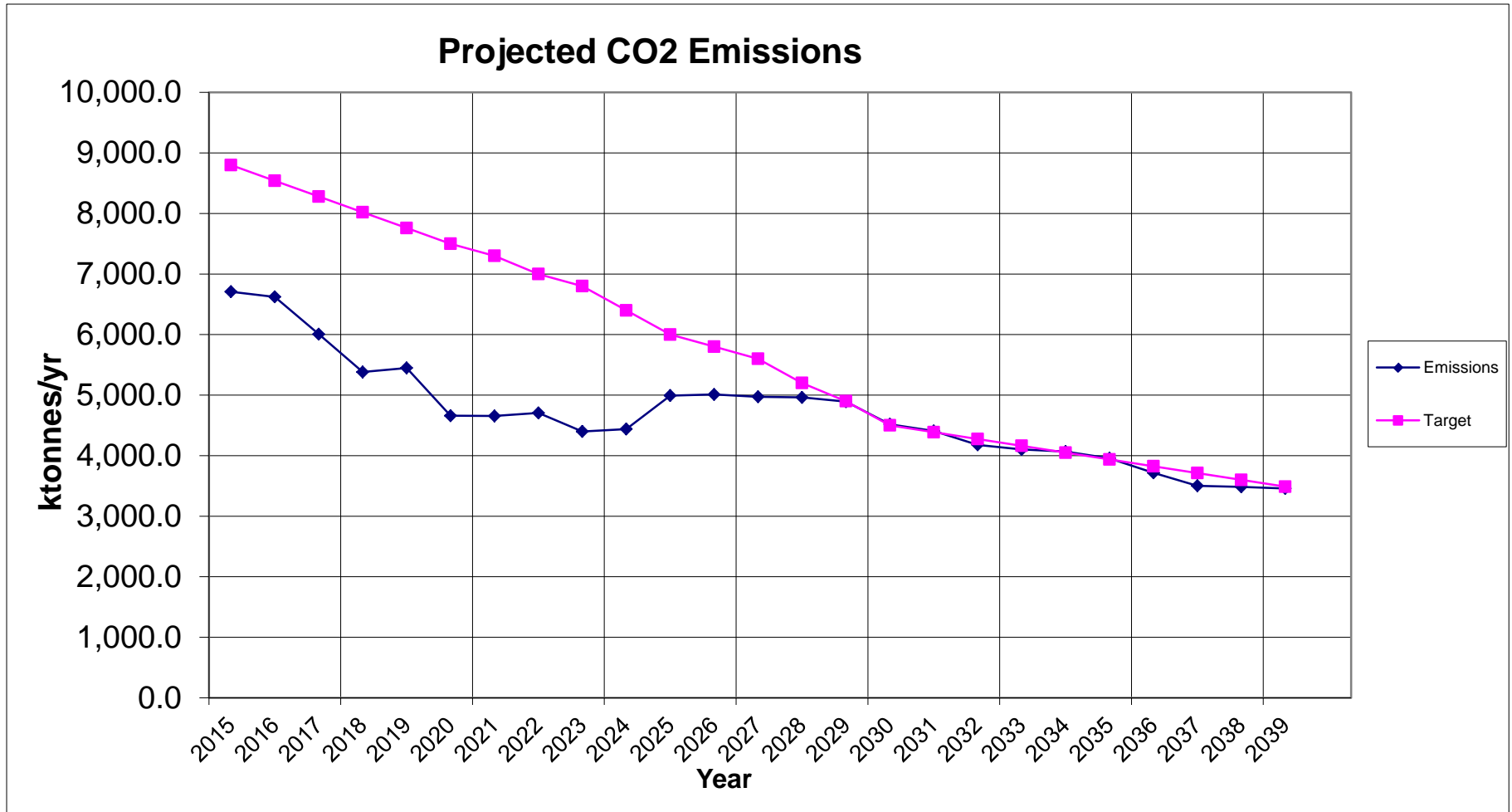


CRP3-5 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units

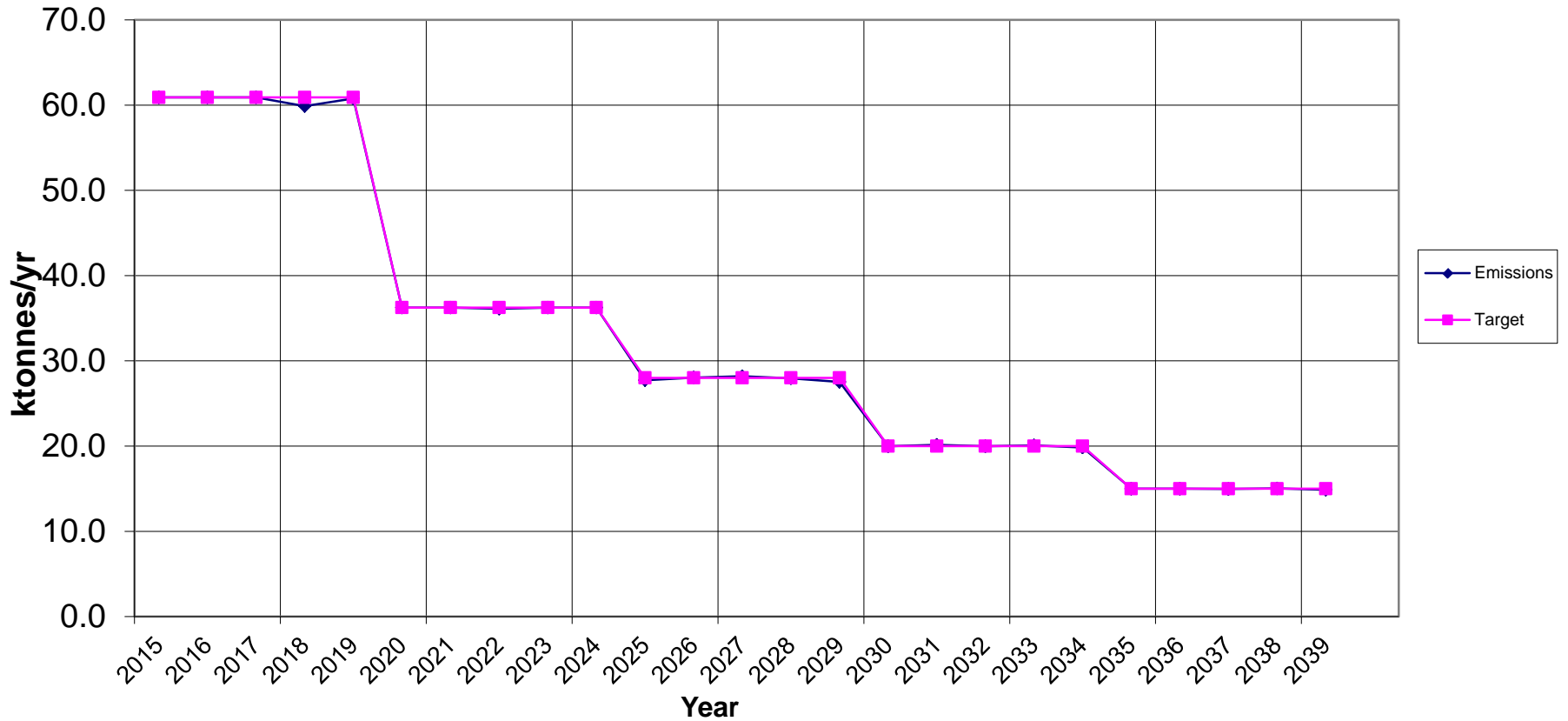


CRP3-5 Preliminary CO₂ Emissions



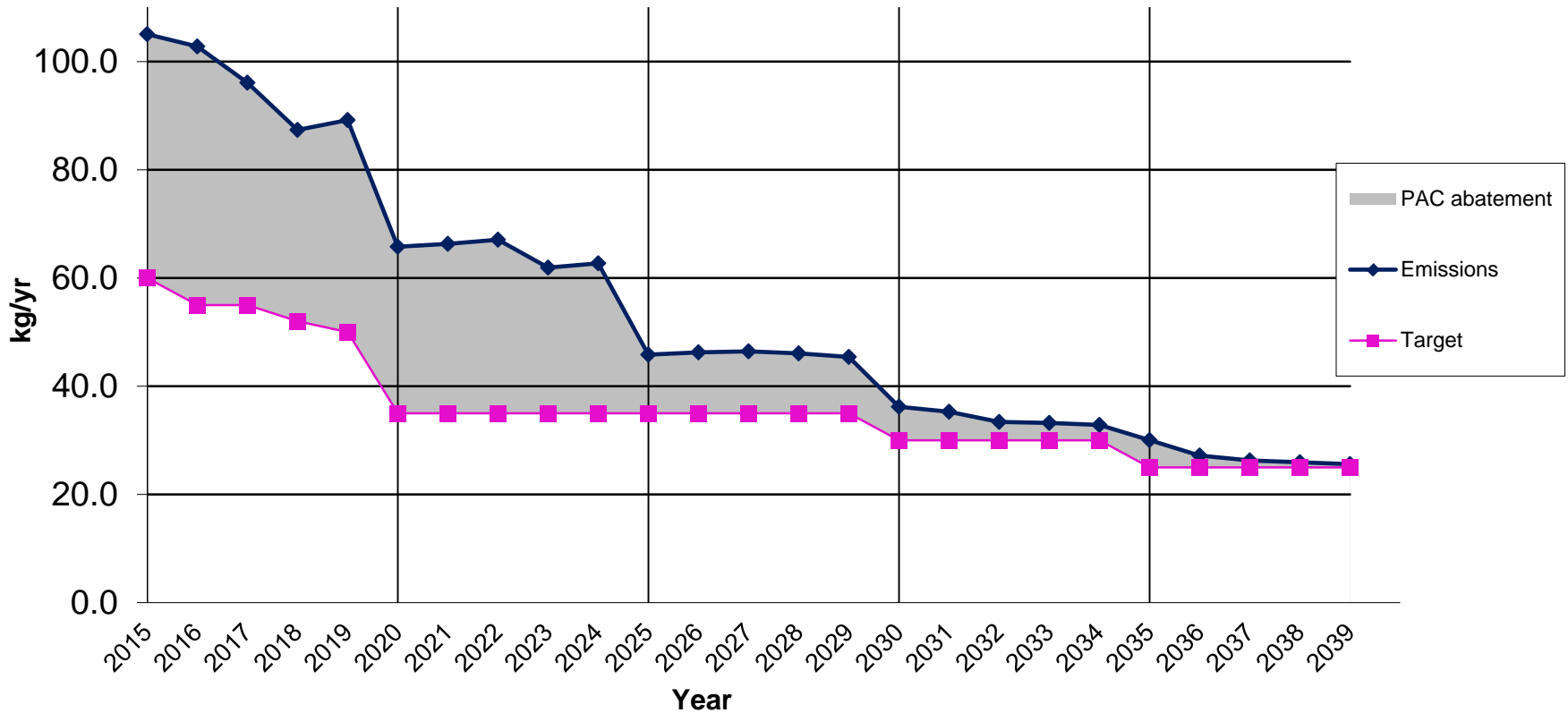
CRP3-5 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP3-5 Preliminary Mercury Emissions

Projected Mercury Emissions





CRP4 Preliminary Results

CRP4 Input Assumptions

Candidate Resource Plan 4 (CRP4):

- Base Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Medium Coal Use
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP4 Preliminary Results

	CRP4-1-R01	CRP4-1-FGD-R01
	Least cost study period	Least cost study period (w FGD)
2015		
2016	DR Water H & DR Comm	DR Water H & DR Comm
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019		
2020	TUC 1 Retire	TUC 1 Retire
2021		
2022		
2023		
2024		
2025		FGD (Lin3/4 300 MW)
2026		
2027	TUC 2 Retire	TUC 2 Retire
2028		
2029		
2030	CT 34MW Tre 5 Retire	Tre 5 Retire
2031	CT 50MW & CT 34MW TUC 3 Retire	CC 145MW TUC 3 Retire
2032		
2033		CT 50MW
2034	CC 145MW Lin 1 Retire	CT 50MW Lin 1 Retire
2035		
2036		
2037		
2038	2 x CT 50MW Lin 3 Retire	
2039	CC 145MW Lin 4 Retire	
Planning PV \$M	11,419	11,372
Study PV \$M	17,326	17,149 *
		* Study PV needs to be adjusted for retirements

	Base DSM Program Adm Cost	Base DSM Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9

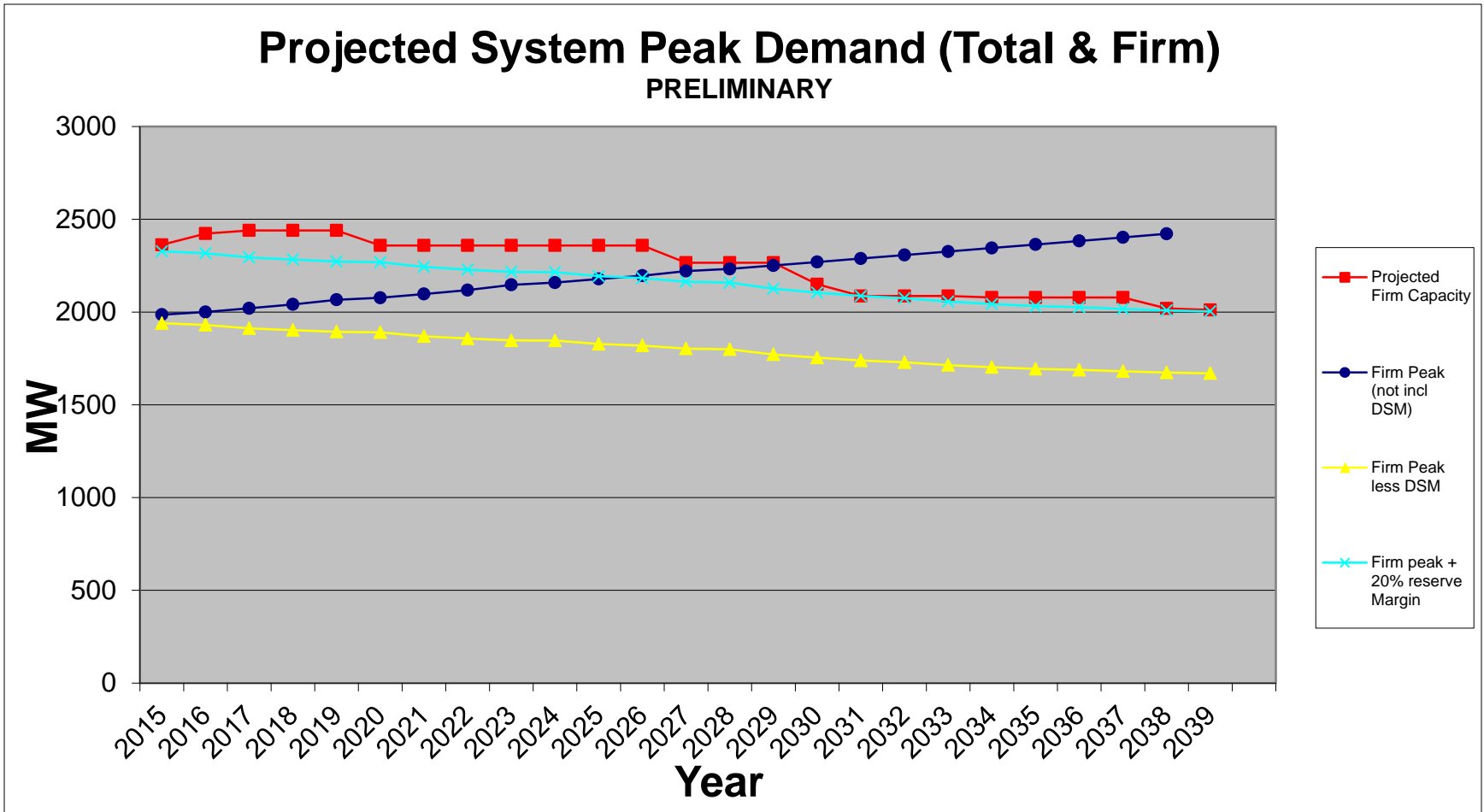


CRP4-1 Preliminary Results

CRP4-1 Preliminary Load and Resources

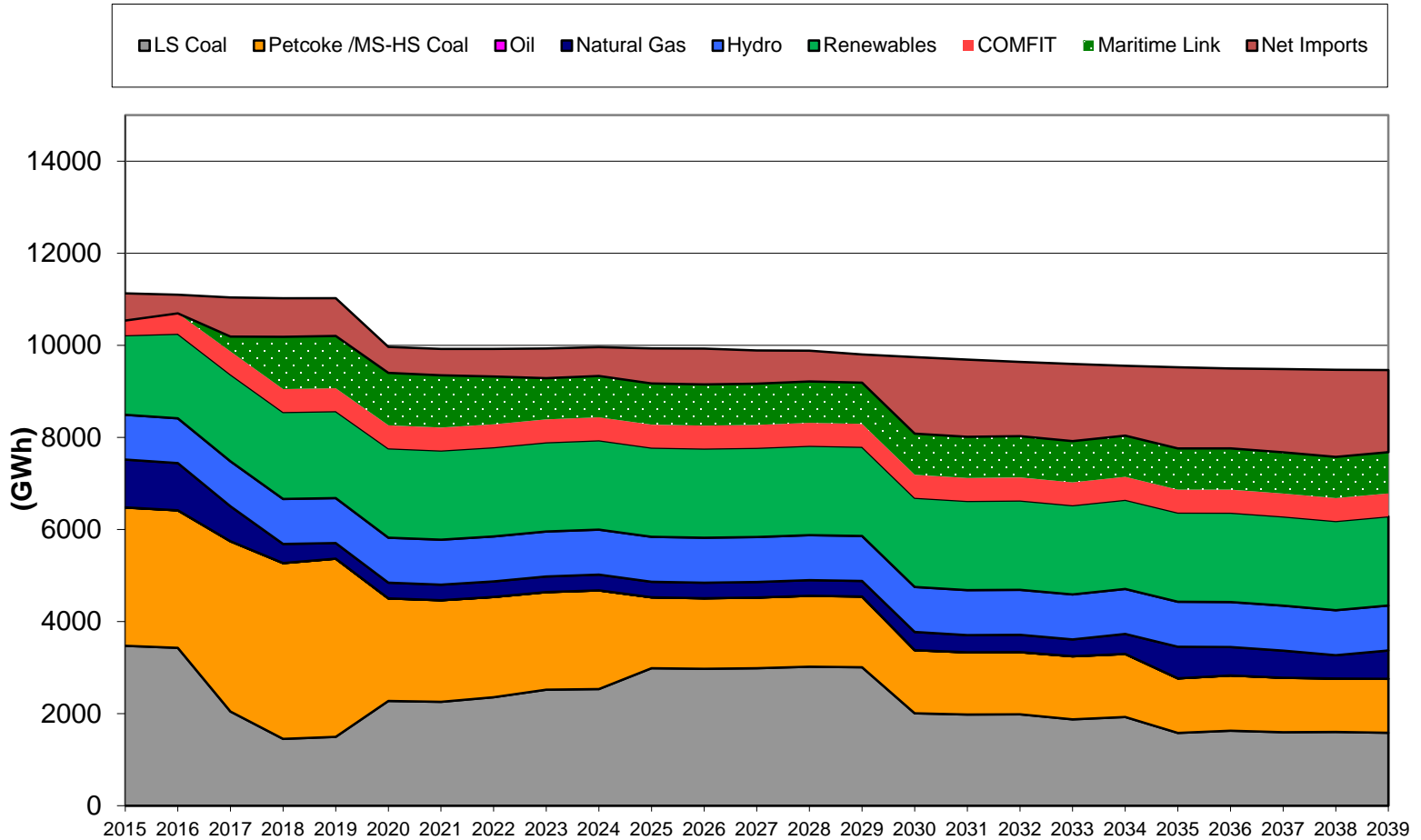
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	1	4	7	10	14	18	20	21	24	24	24	23	24	24	24
Firm Peak Less DR	1,940	1,931	1,912	1,903	1,894	1,890	1,870	1,857	1,847	1,846	1,828	1,754	1,693	1,689	1,681	1,674	1,670
RM Required	388	386	382	381	379	378	374	371	369	369	366	351	339	338	336	335	334
Required MWs	2,328	2,317	2,295	2,283	2,272	2,269	2,244	2,229	2,216	2,215	2,194	2,105	2,032	2,026	2,017	2,009	2,004
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.25													
Small Biomass PPA			10														
Hydro			1.8														
FGD parasitic power																	
Additional Wind																	
Assumed Unit Retirement				-153		-81						-150				-158	-153
Natural Gas Unit												34				98.8	145
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	-81.0	0.0	0.0	0.0	0.0	0.0	-116.0	0.0	0.0	0.0	-59.2	-8.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	17.7	17.7	17.7	17.7	17.7	17.7	-191.3	-262.9	-262.9	-262.9	-322.1	-330.1
Total Firm Capacity	2362	2423	2440	2440	2440	2359	2359	2359	2359	2359	2359	2150	2079	2079	2079	2019	2011
Surplus (Deficit) MWs above RM	34	106	145	157	168	91	116	131	143	144	166	45	46	52	62	11	8
Reserve Margin %	21.8%	25.5%	27.6%	28.3%	28.9%	24.8%	26.2%	27.0%	27.7%	27.8%	29.1%	22.6%	22.7%	23.1%	23.7%	20.6%	20.5%

CRP4-1 Preliminary Demand and DSM



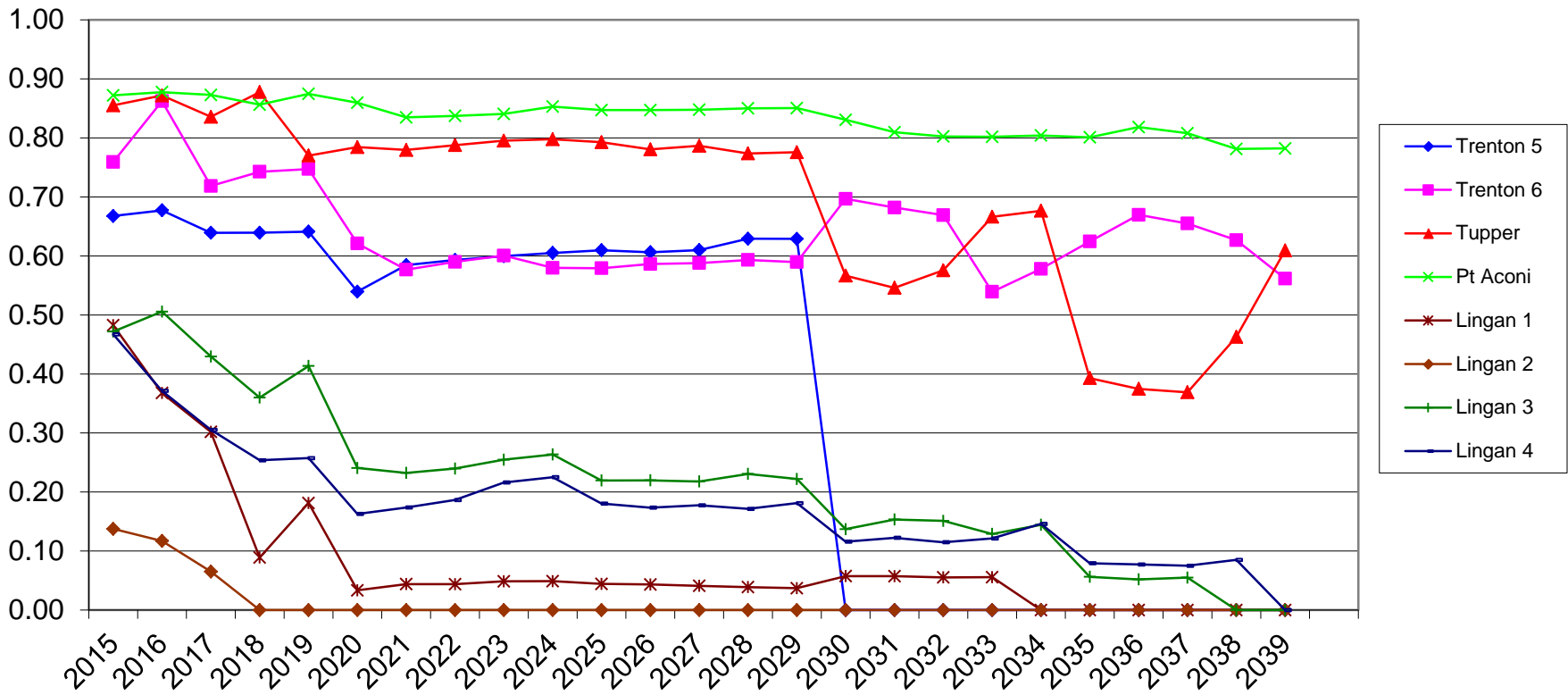
CRP4-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



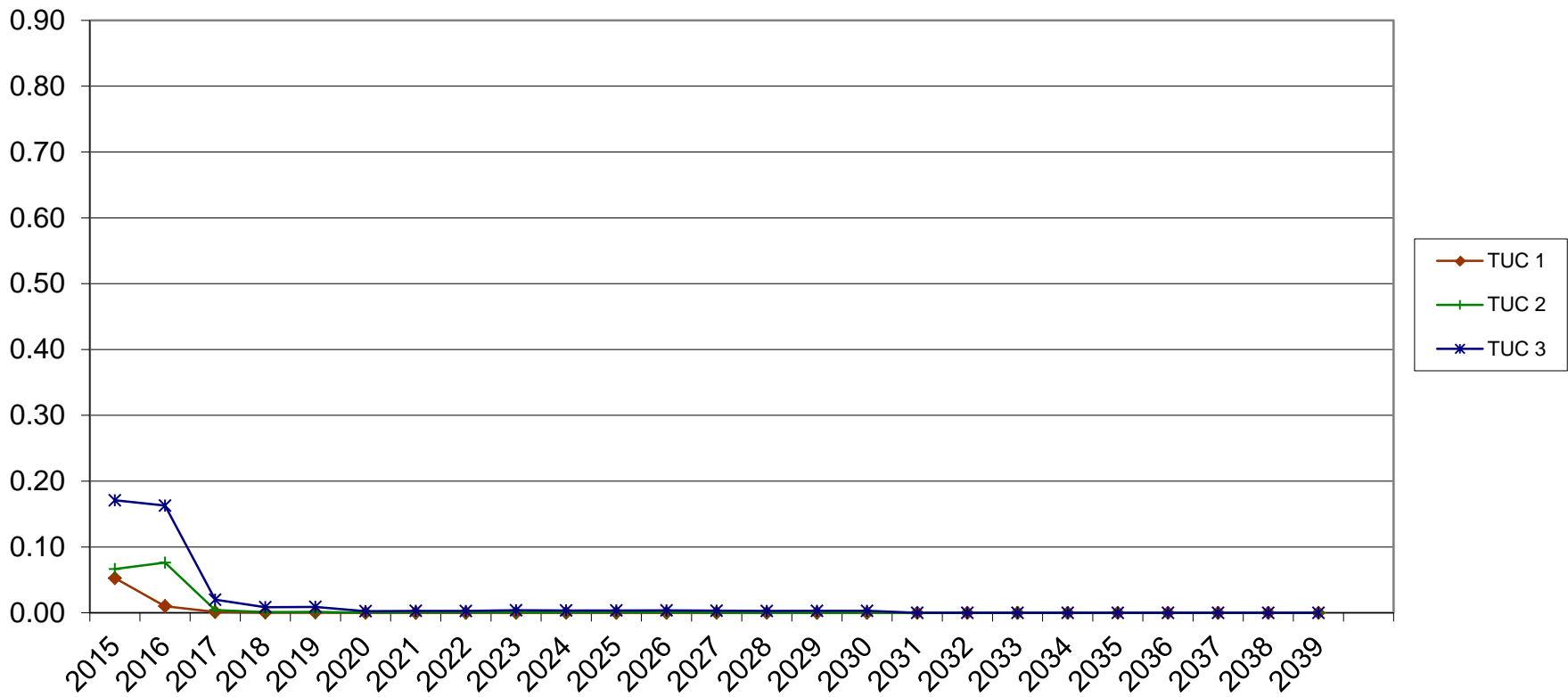
CRP4-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



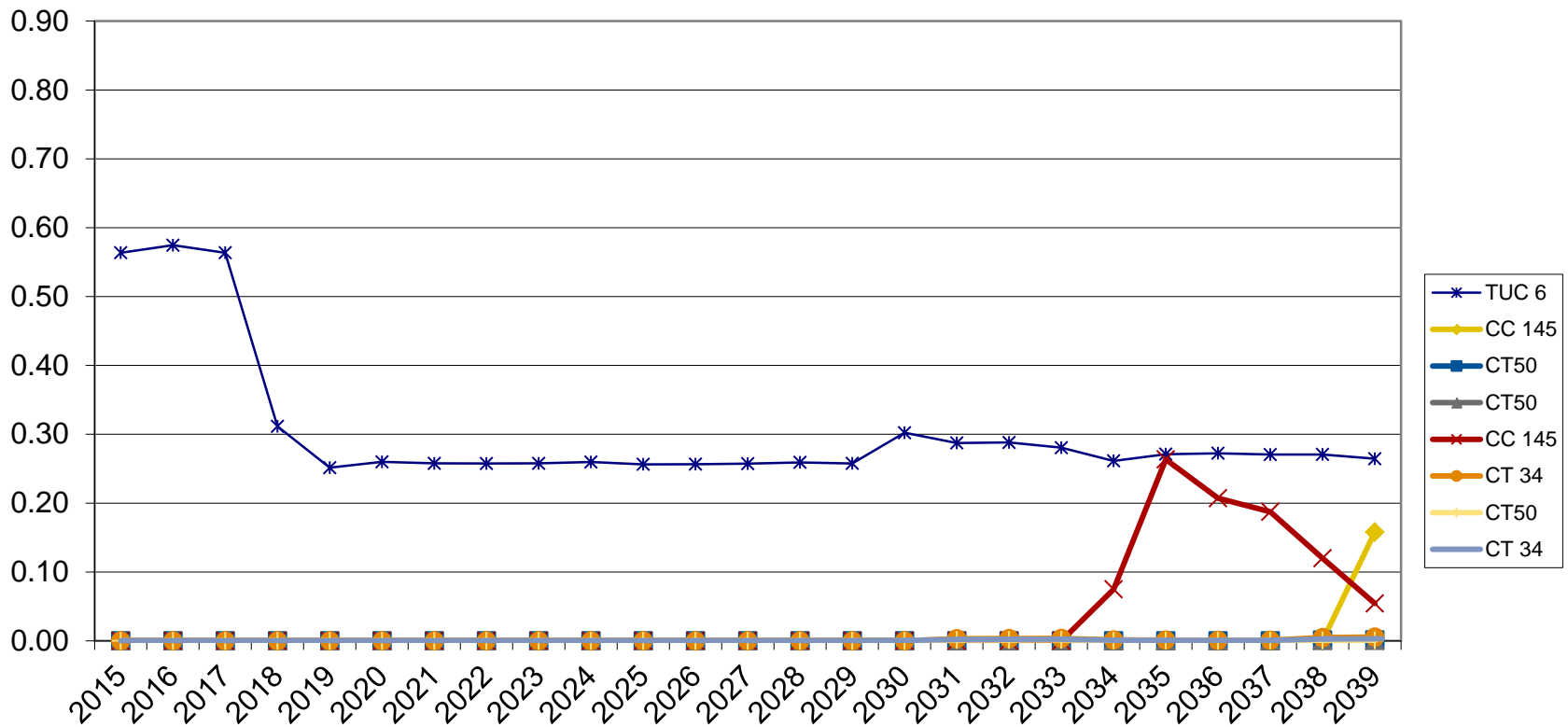
CRP4-1 Preliminary TUC Capacity Factors

Projected Capacity Factors - TUC 123



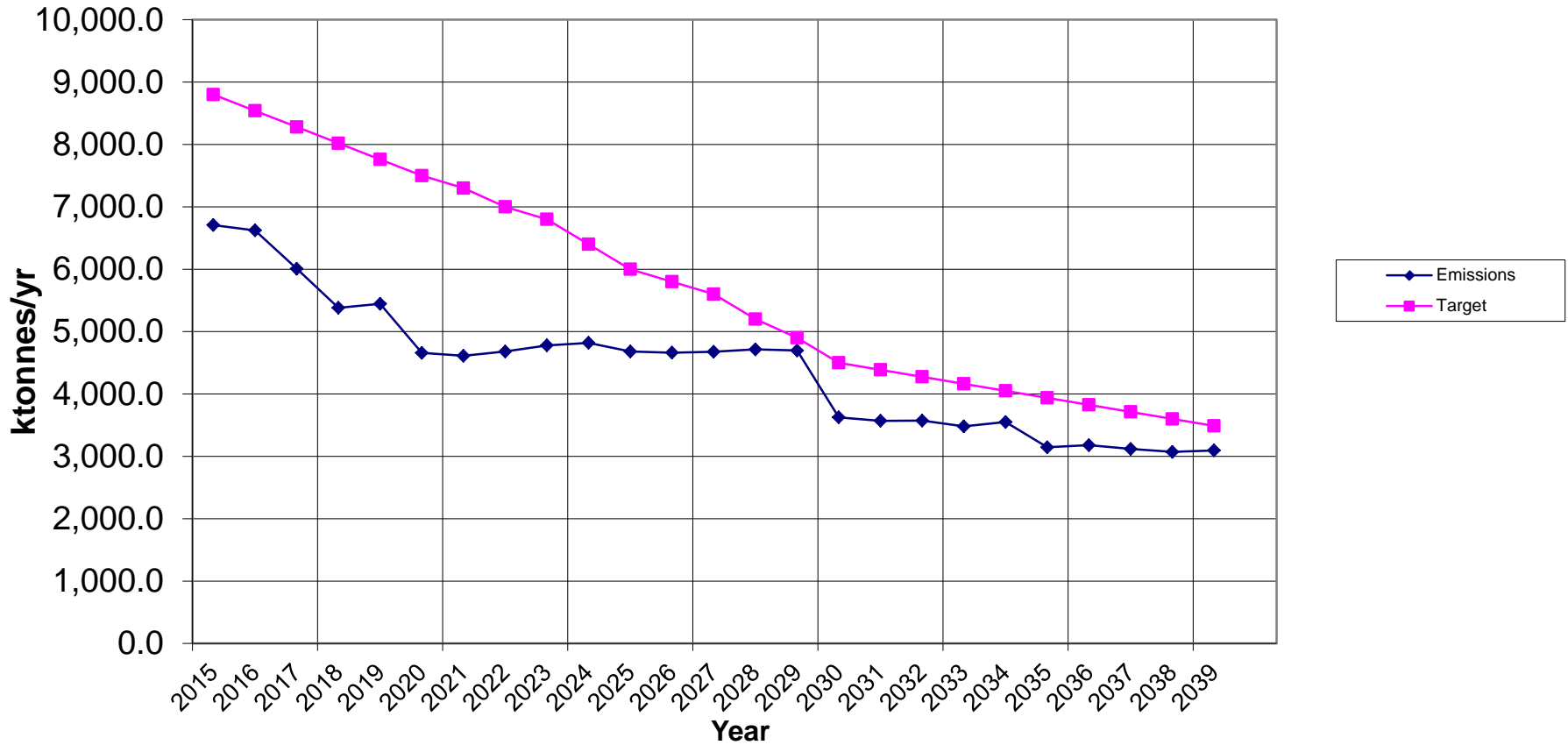
CRP4-1 Preliminary CT/CC Capacity Factors

Projected Capacity Factors - TUC 6/ New Nat Gas Units



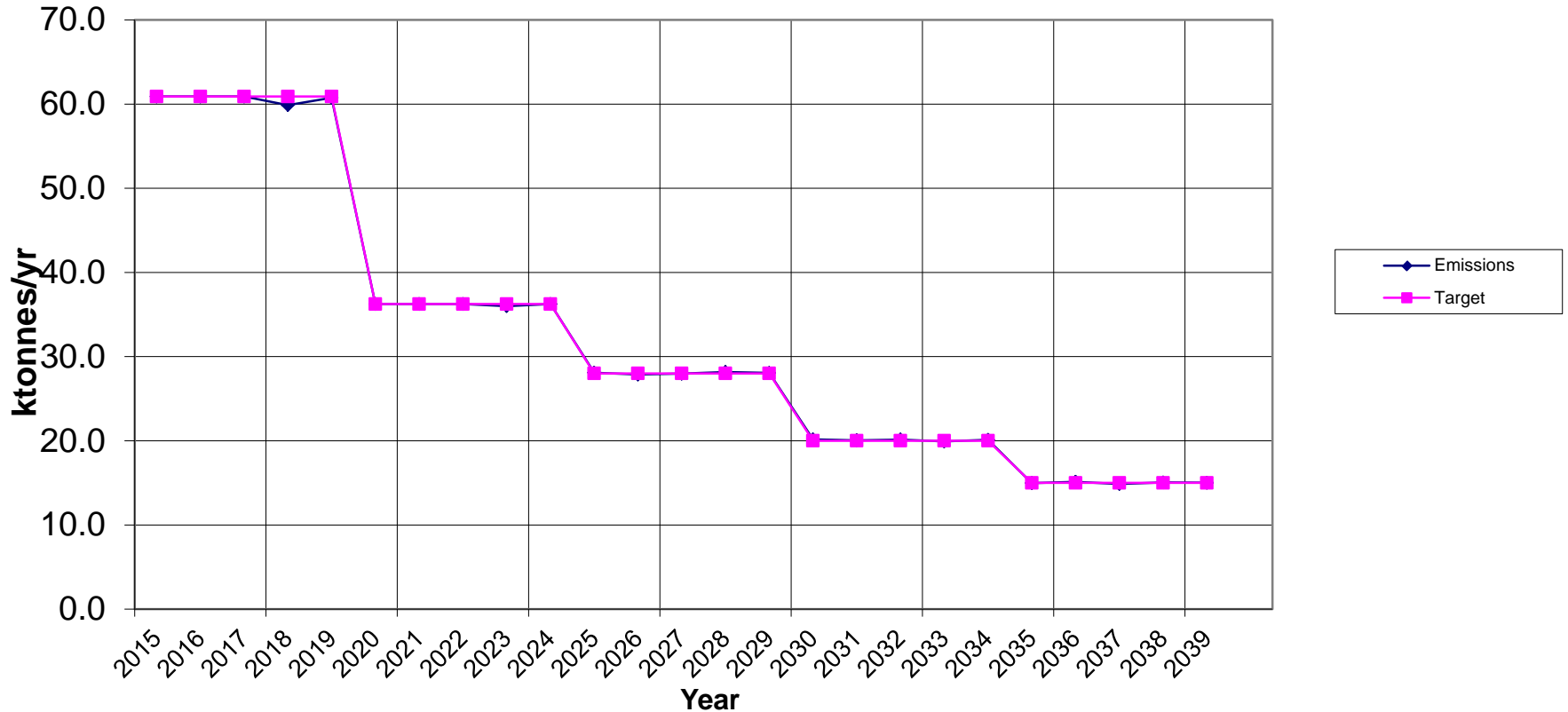
CRP4-1 Preliminary CO₂ Emissions

Projected CO2 Emissions

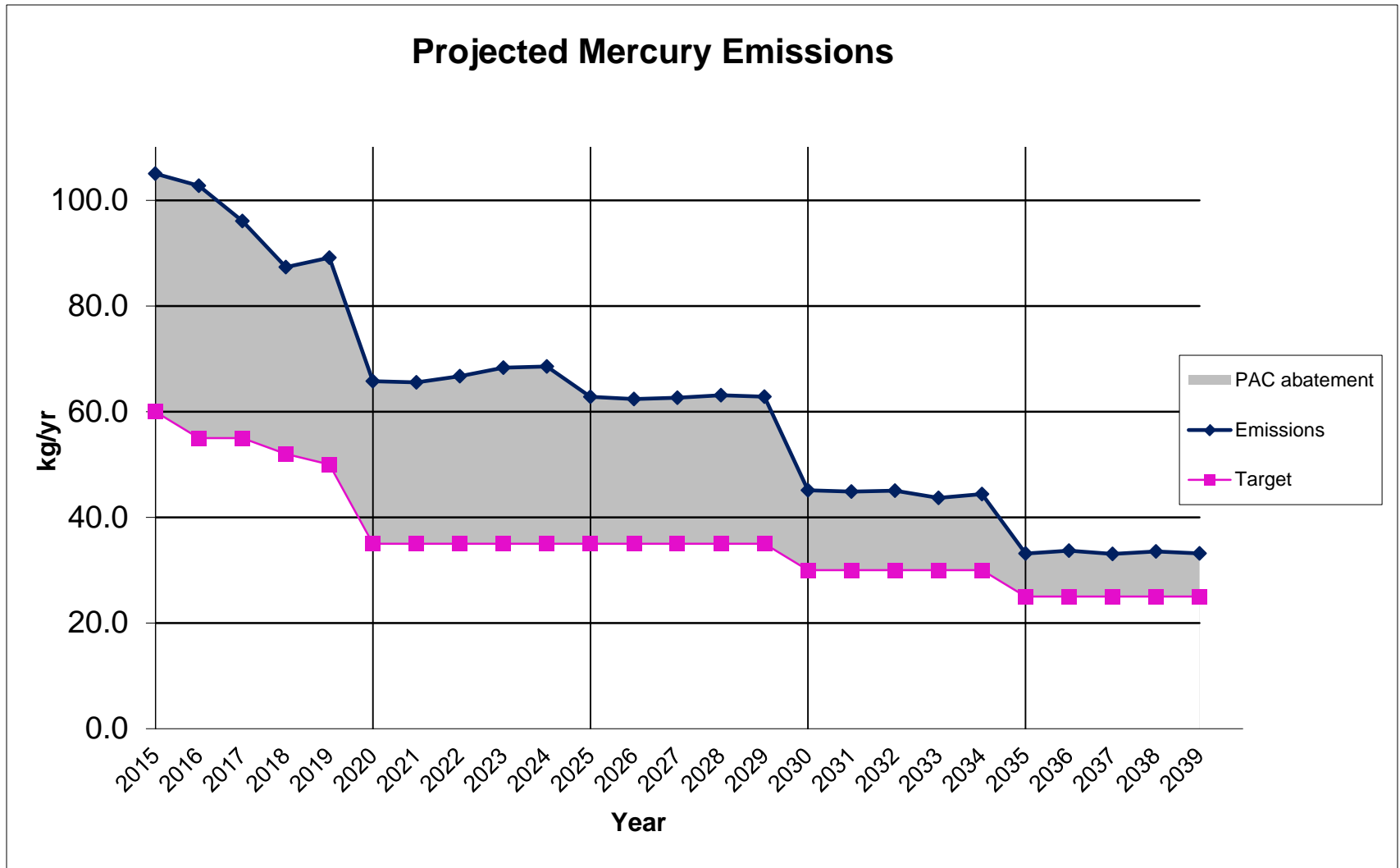


CRP4-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP4-1 Preliminary Mercury Emissions



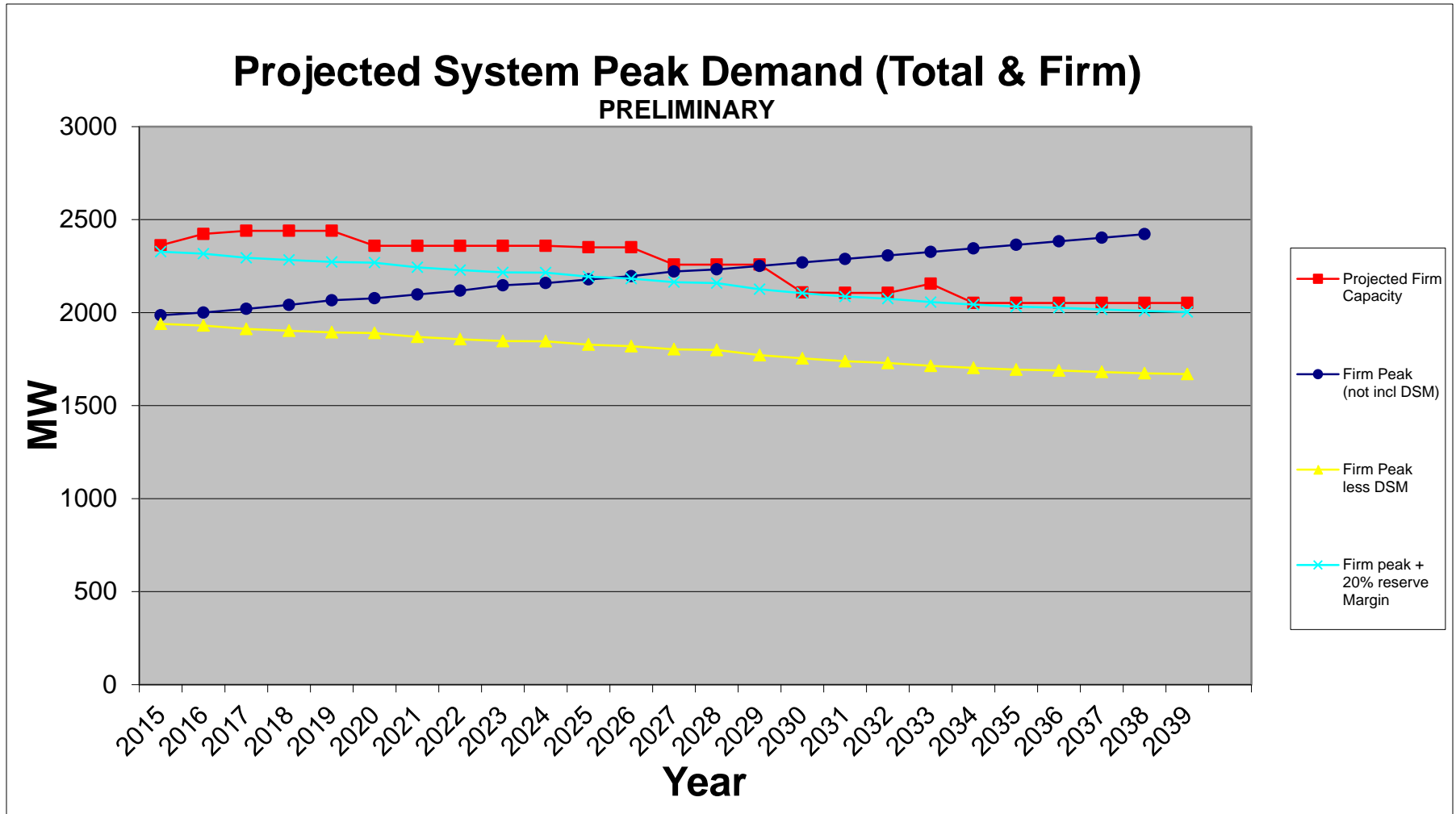


CRP4-1-FGD Preliminary Results

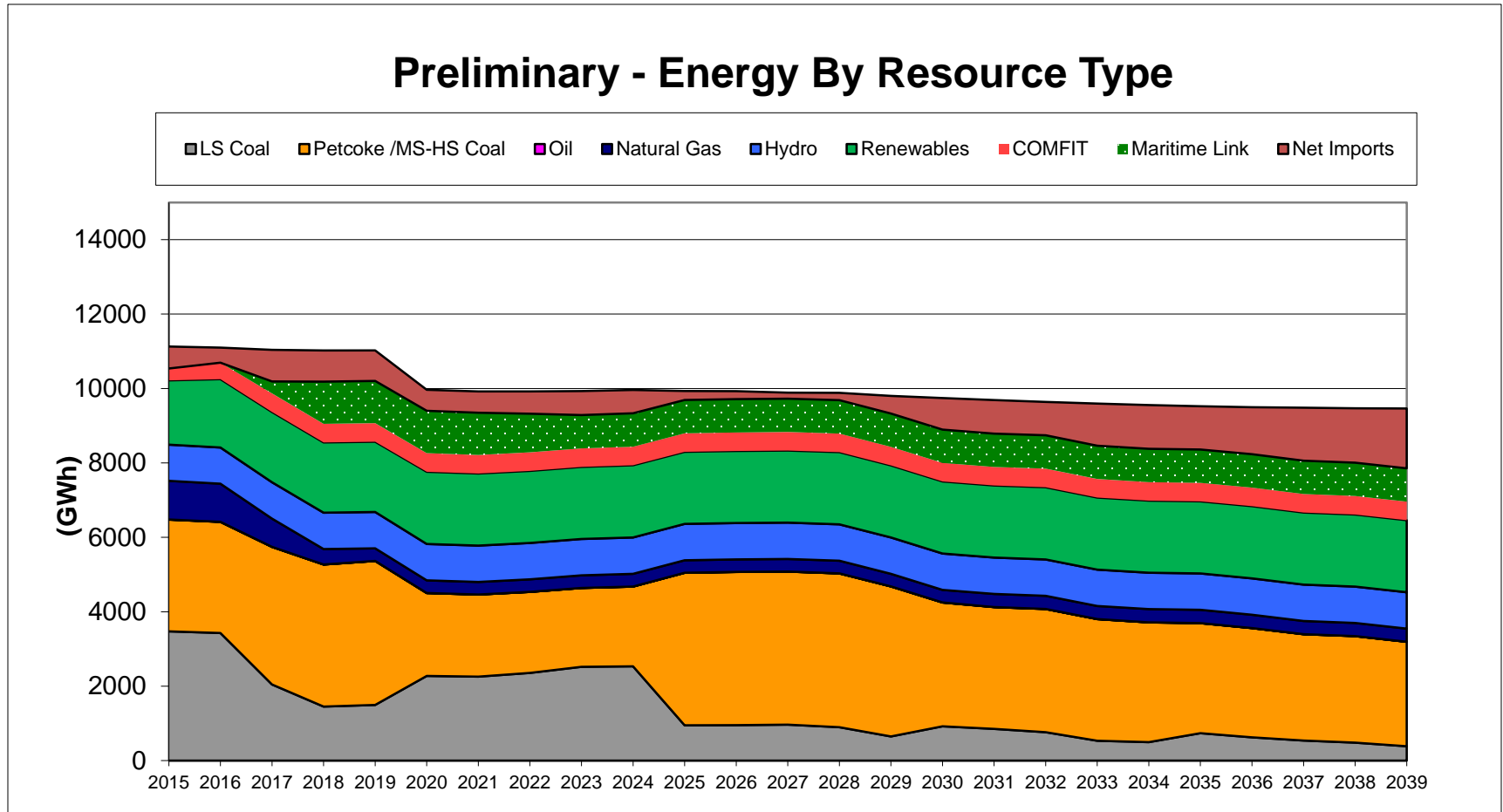
CRP4-1-FGD Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,892	1,839	1,780	1,771	1,767	1,760	1,756
DRWH Reduction	0	1	2	4	7	10	39	60	62	60	62	62	62
DRCM Reduction	0	0	1	4	7	10	24	24	24	23	24	24	24
Firm Peak Less DR	1,940	1,931	1,912	1,903	1,894	1,890	1,828	1,754	1,693	1,689	1,681	1,674	1,670
RM Required	388	386	382	381	379	378	366	351	339	338	336	335	334
Required MWs	2,328	2,317	2,295	2,283	2,272	2,269	2,194	2,105	2,032	2,026	2,017	2,009	2,004
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):													
Burnside #4		33											
COMFIT - Biomass	4.2	6											
COMFIT - Wind	14.14	4.56	5.1										
REA Wind	2.35	17.34											
Maritime Link				153									
Small Biomass PPA			10										
Hydro			1.8										
FGD parasitic power							-8.0						
Additional Wind													
Assumed Unit Retirement				-153		-81		-150					
Natural Gas Unit													
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	-81.0	-8.0	-150.0	0.0	0.0	0.0	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	17.7	9.7	-233.3	-289.5	-289.5	-289.5	-289.5	-289.5
Total Firm Capacity	2362	2423	2440	2440	2440	2359	2351	2108	2052	2052	2052	2052	2052
Surplus (Deficit) MWs above RM	34	106	145	157	168	91	158	3	20	26	35	43	48
Reserve Margin %	21.8%	25.5%	27.6%	28.3%	28.9%	24.8%	28.6%	20.2%	21.2%	21.5%	22.1%	22.6%	22.9%

CRP4-1-FGD Preliminary Demand and DSM

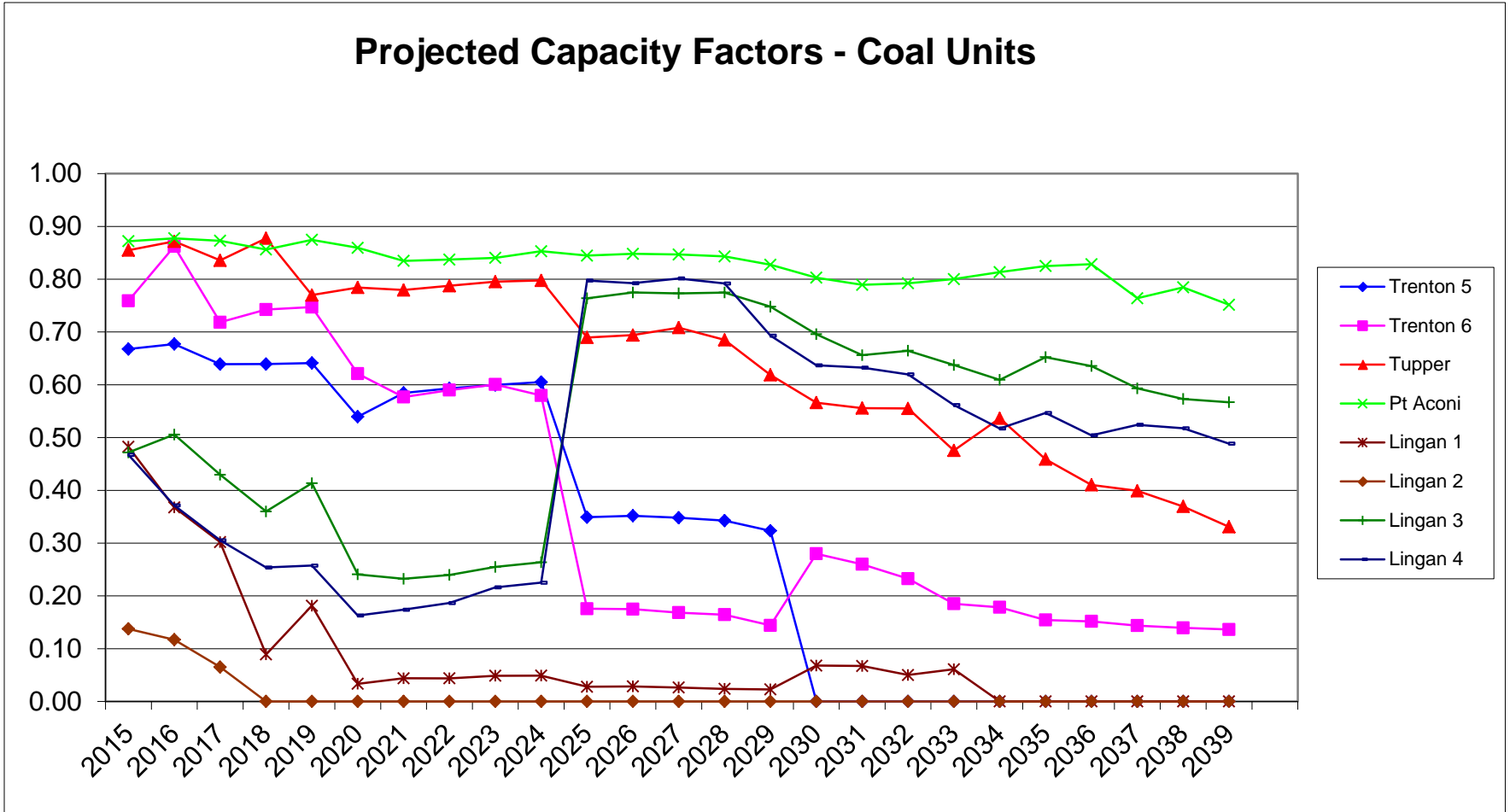


CRP4-1-FGD Preliminary Energy by Resource Type



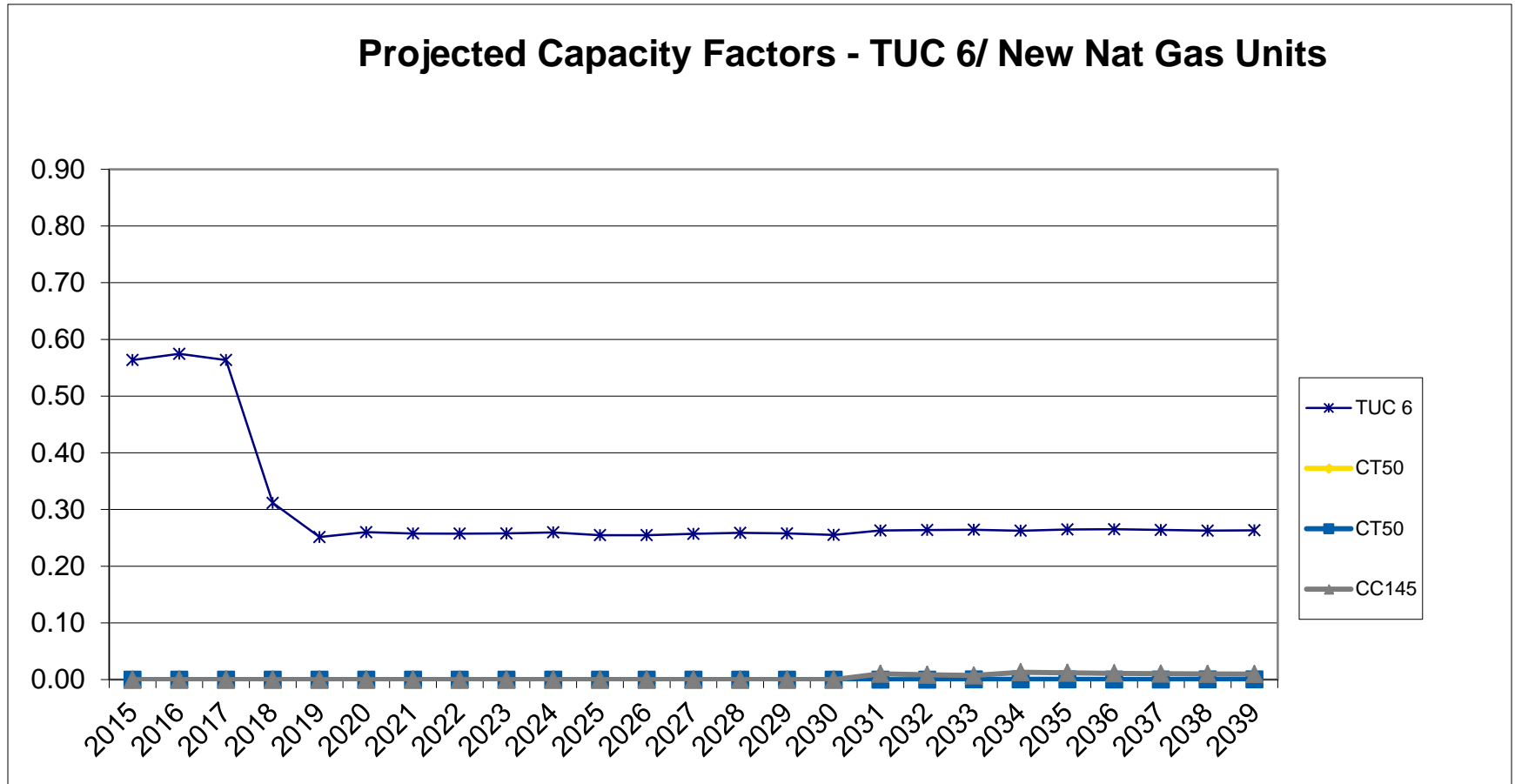
CRP4-1-FGD Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



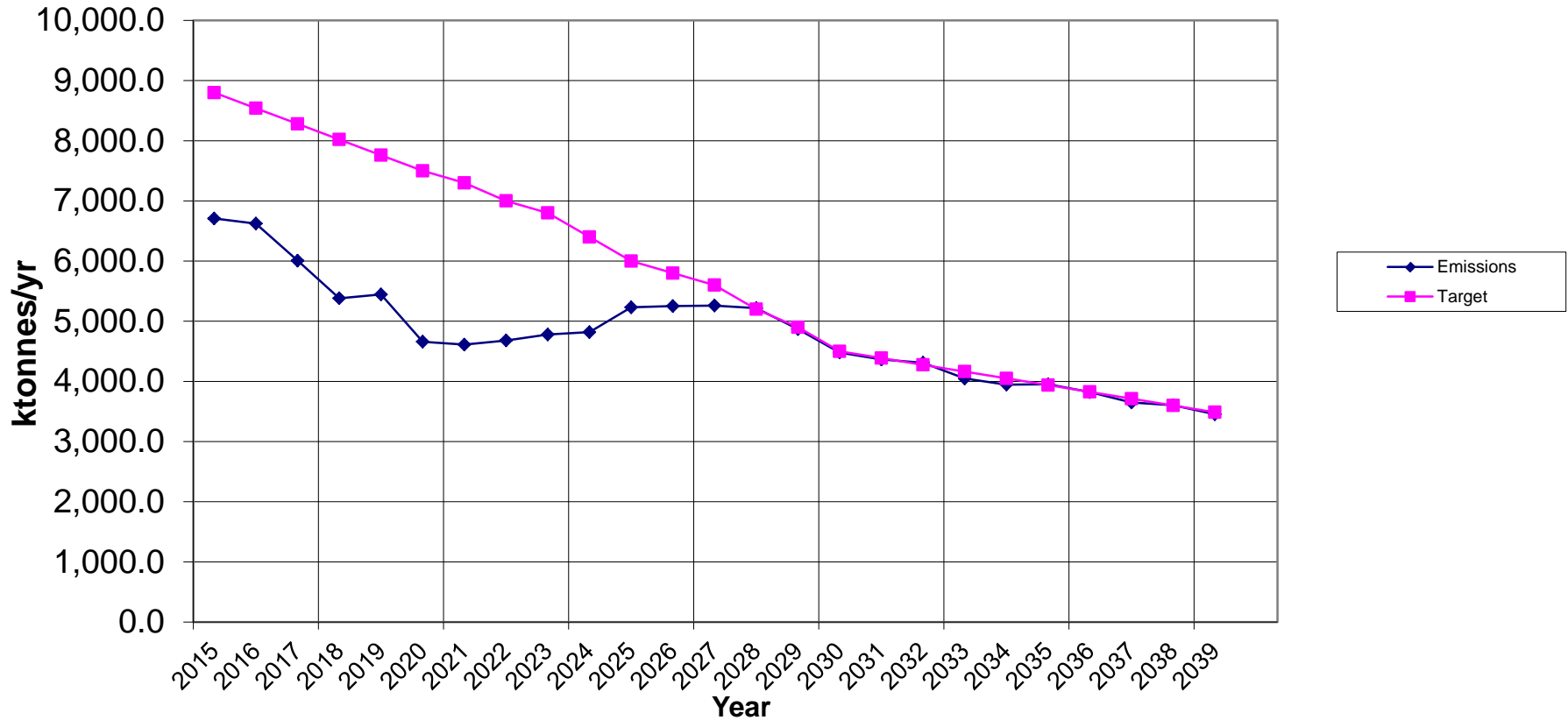
CRP4-1-FGD Preliminary CT/CC Capacity Factors

Projected Capacity Factors - TUC 6/ New Nat Gas Units

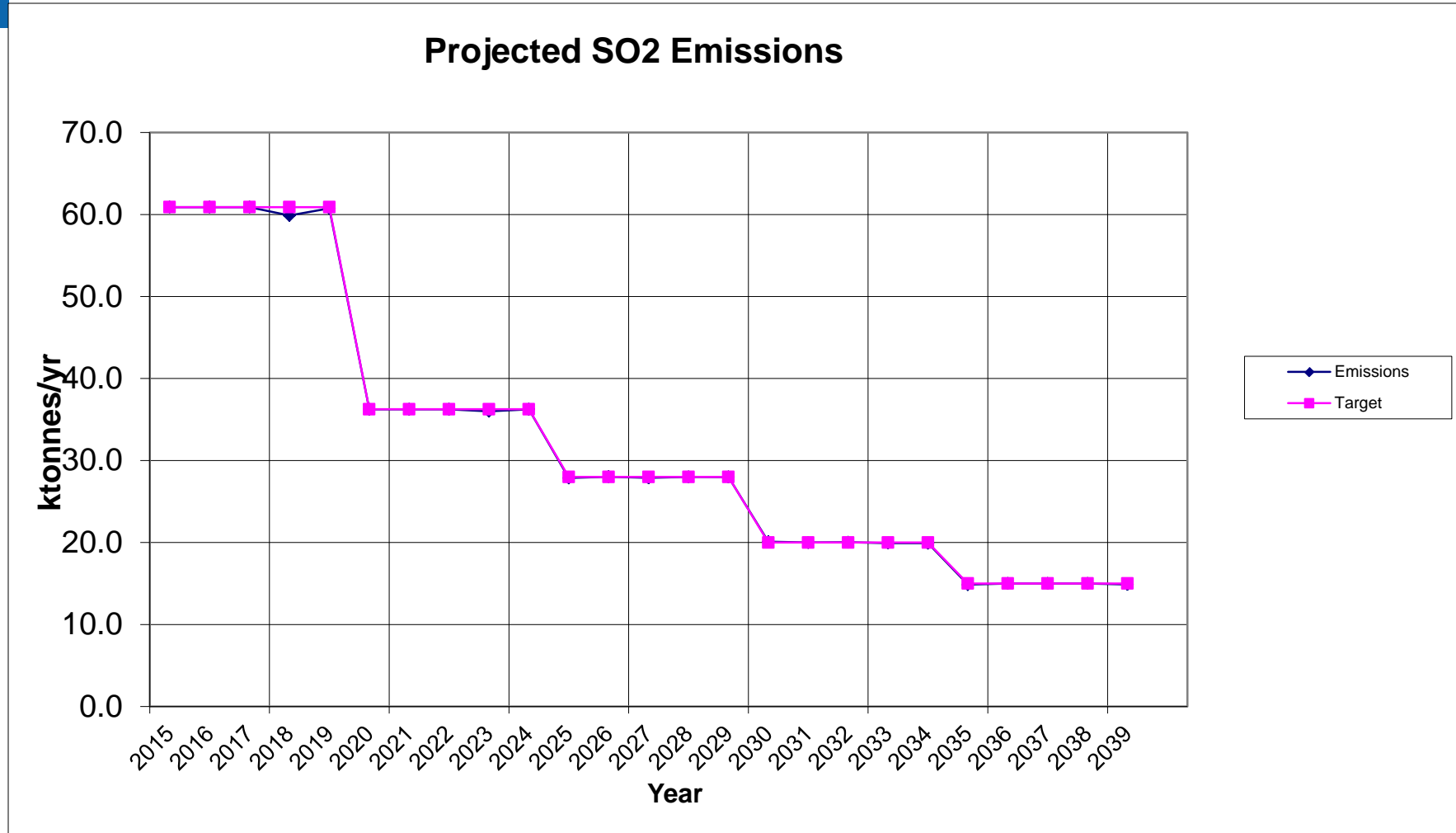


CRP4-1-FGD Preliminary CO₂ Emissions

Projected CO2 Emissions

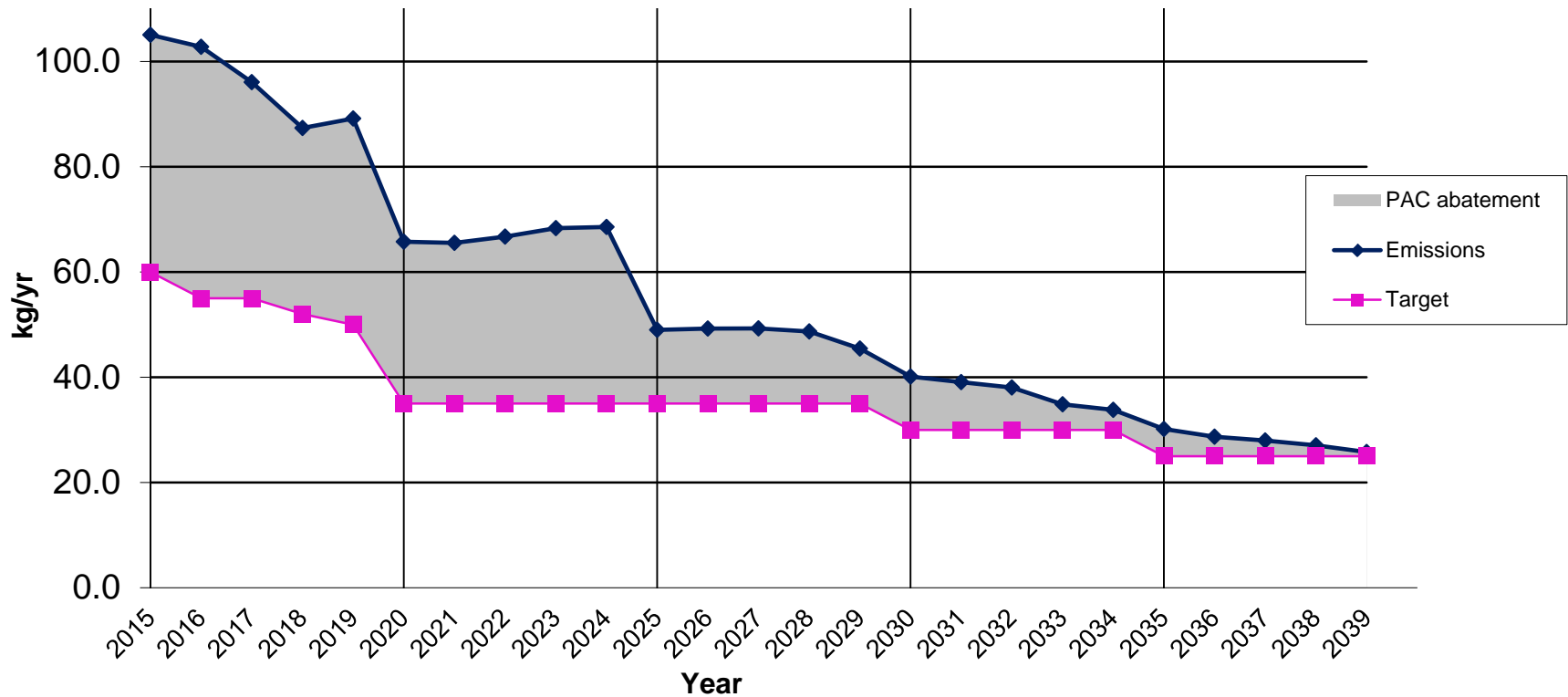


CRP4-1-FGD Preliminary SO₂ Emissions



CRP4-1-FGD Preliminary Mercury Emissions

Projected Mercury Emissions





CRP5 Preliminary Results

A large, solid blue decorative wave shape that curves upwards from the bottom left and extends across the bottom of the slide.

CRP5 Input Assumptions

Candidate Resource Plan 5 (CRP5):

- Base Load Forecast
- High DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Maximum Coal Use
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP5 Preliminary Results

	CRP5-01-R01	CRP5-08-R01
	Least cost study period	Least cost Planning period
2015		
2016		
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019		
2020		
2021		
2022		
2023		
2024		
2025	TUC 1 Retire	TUC 1 Retire
2026		
2027		
2028		
2029		
2030		FGD (LIN 3/4 300MW)
2031		
2032	TUC 2 Retire	TUC 2 Retire
2033		
2034		
2035	Tre 5 Retire	Tre 5 Retire
2036		
2037		
2038		
2039	PHBM 51.7 MW Firm Lin 1 Retire	PHBM 51.7 MW Firm Lin 1 Retire
Planning PV \$M	11,816	11,810
Study PV \$M	16,767	16,855

	High DSM Program Adm Cost \$M	High DSM Customer Cost \$M
2015	76.3	68.0
2016	92.0	85.6
2017	104.6	98.6
2018	107.4	96.8
2019	112.8	82.2
2020	119.3	79.8
2021	106.9	75.1
2022	102.2	72.6
2023	99.0	72.7
2024	104.0	77.6
2025	110.9	86.2
2026	118.6	97.0
2027	121.1	99.5
2028	120.4	100.7
2029	114.5	83.0
2030	106.5	78.7
2031	94.6	73.6
2032	85.9	68.0
2033	65.8	64.8
2034	61.1	61.8
2035	56.6	59.6
2036	52.4	57.8
2037	49.6	56.8
2038	44.2	57.0
2039	43.4	56.7
NPV	1,260.6	1,037.2

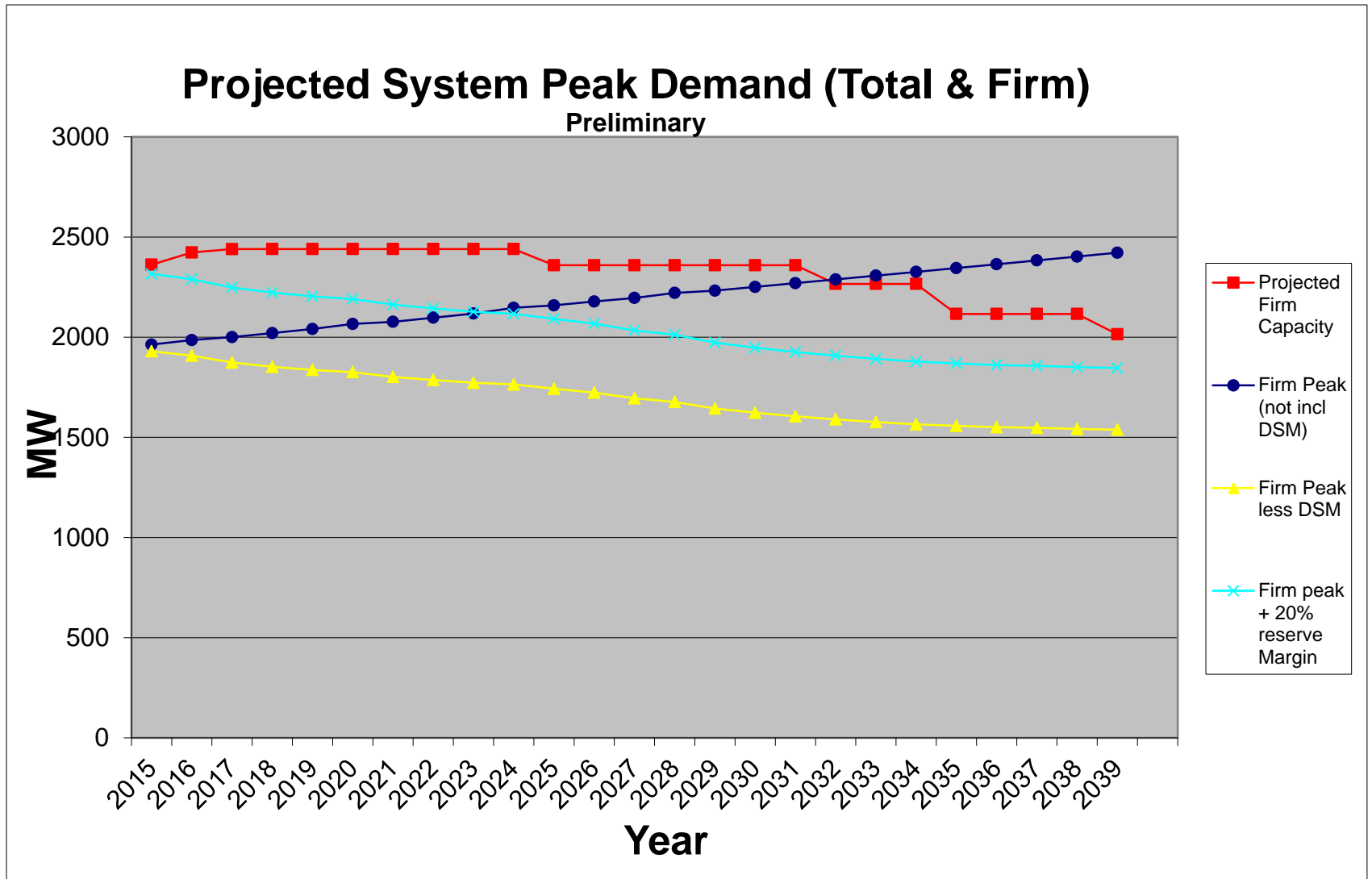


CRP5-1 Preliminary Results

CRP5-1 Preliminary Load and Resources

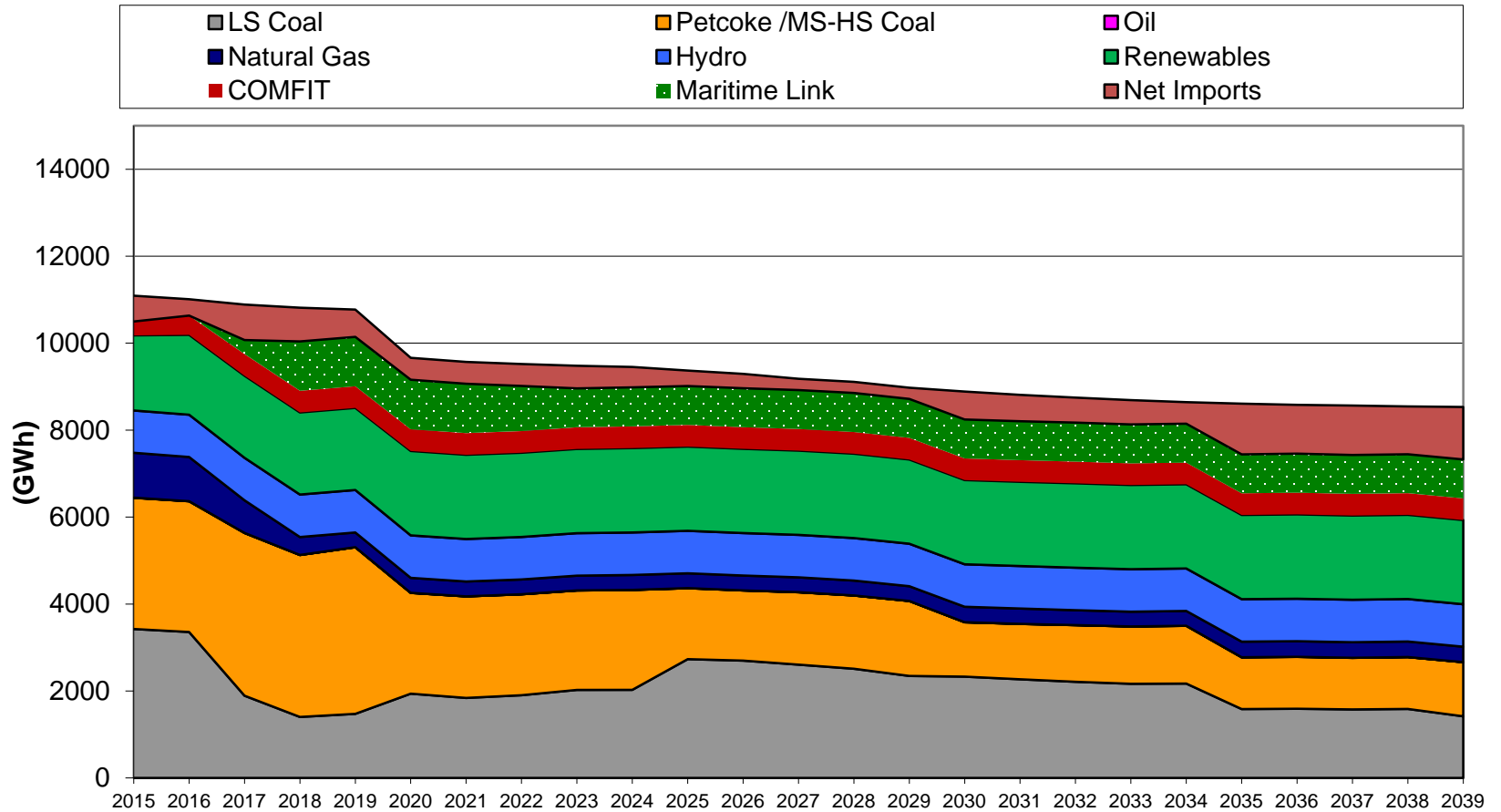
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	33	78	127	168	205	241	275	311	345	383	416	628	788	813	836	861	884
Firm Peak Less DSM	1,930	1,908	1,874	1,852	1,836	1,826	1,802	1,786	1,773	1,764	1,743	1,623	1,557	1,551	1,548	1,542	1,538
RM Required	386	382	375	370	367	365	360	357	355	353	349	325	311	310	310	308	308
Required MWs	2,316	2,289	2,248	2,223	2,204	2,191	2,162	2,144	2,127	2,117	2,091	1,948	1,869	1,861	1,857	1,850	1,846
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														51.7
Hydro			1.8														
Additional Wind																	
Assumed Unit Retirement				-153							-81		-150				-153
Natural Gas Unit																	
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-81.0	0.0	-150.0	0.0	0.0	0.0	-101.3
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	98.7	98.7	98.7	98.7	98.7	17.7	17.7	-225.3	-225.3	-225.3	-225.3	-326.6
Total Firm Capacity	2362	2423	2440	2440	2440	2440	2440	2440	2440	2440	2359	2359	2116	2116	2116	2116	2015
Surplus (Deficit) MWs above RM	46	134	192	217	236	249	278	296	313	323	268	411	247	255	259	266	169
Reserve Margin %	22.4%	27.0%	30.2%	31.7%	32.9%	33.6%	35.4%	36.6%	37.7%	38.3%	35.4%	45.3%	35.9%	36.4%	36.7%	37.2%	31.0%

CRP5-1 Preliminary Demand and DSM



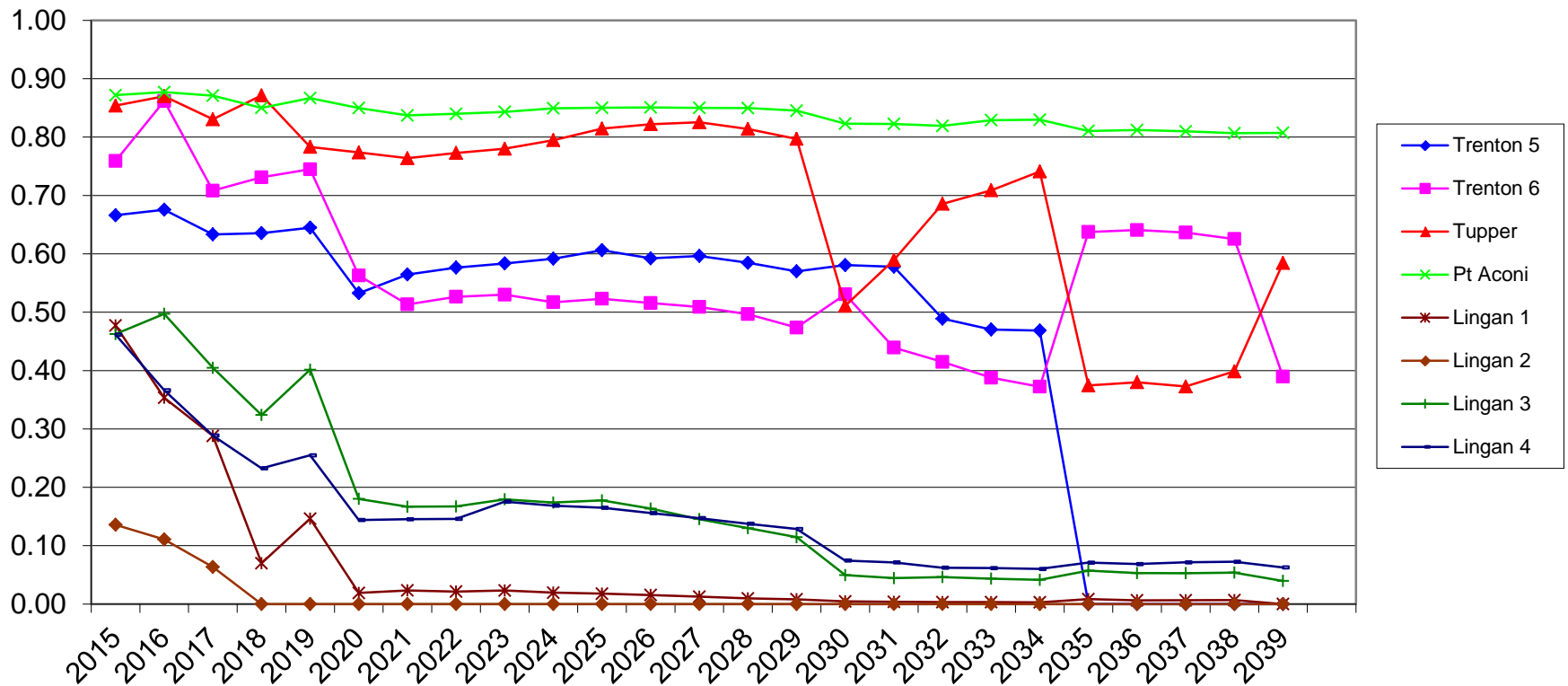
CRP5-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



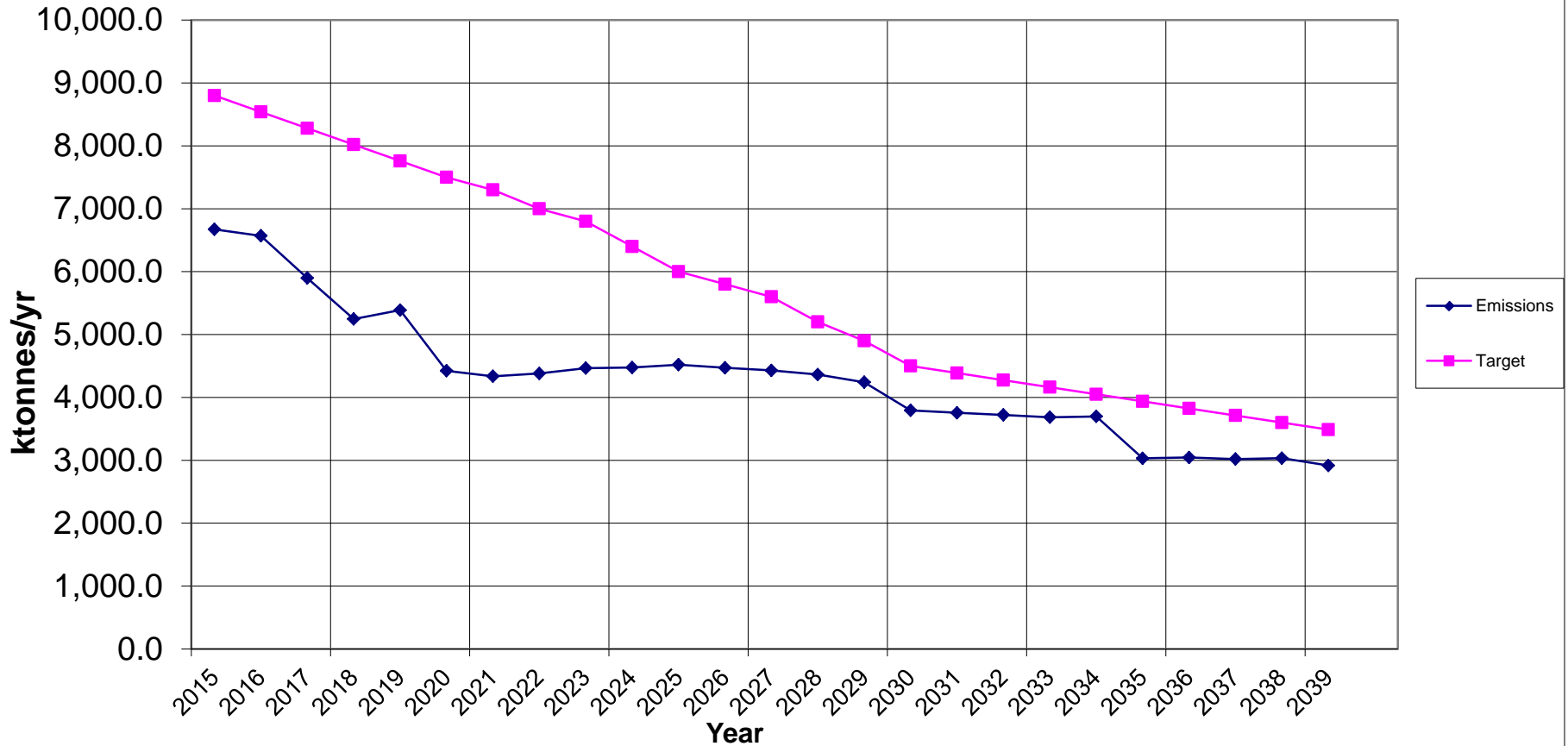
CRP5-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



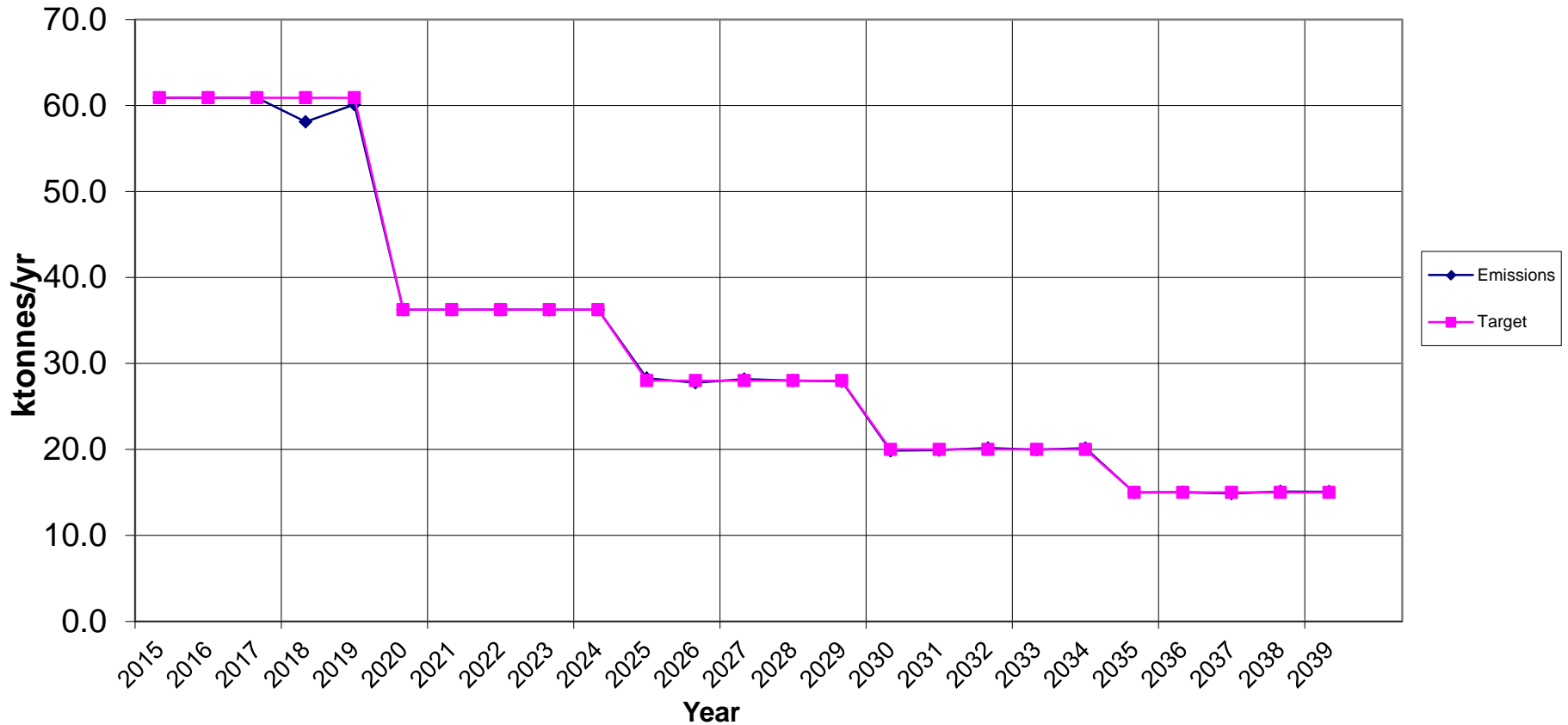
CRP5-1 Preliminary CO₂ Emissions

Projected CO₂ Emissions



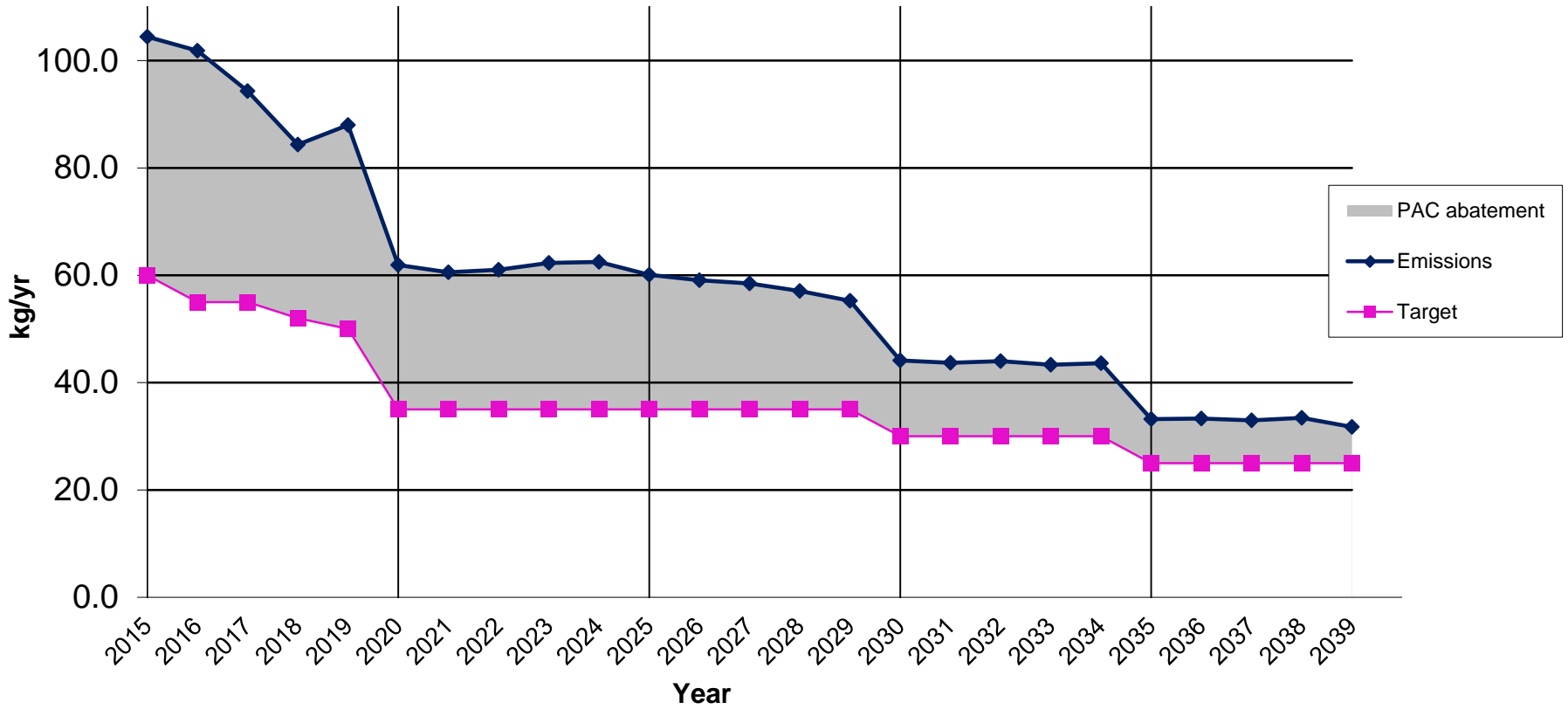
CRP5-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP5-1 Preliminary Mercury Emissions

Projected Mercury Emissions



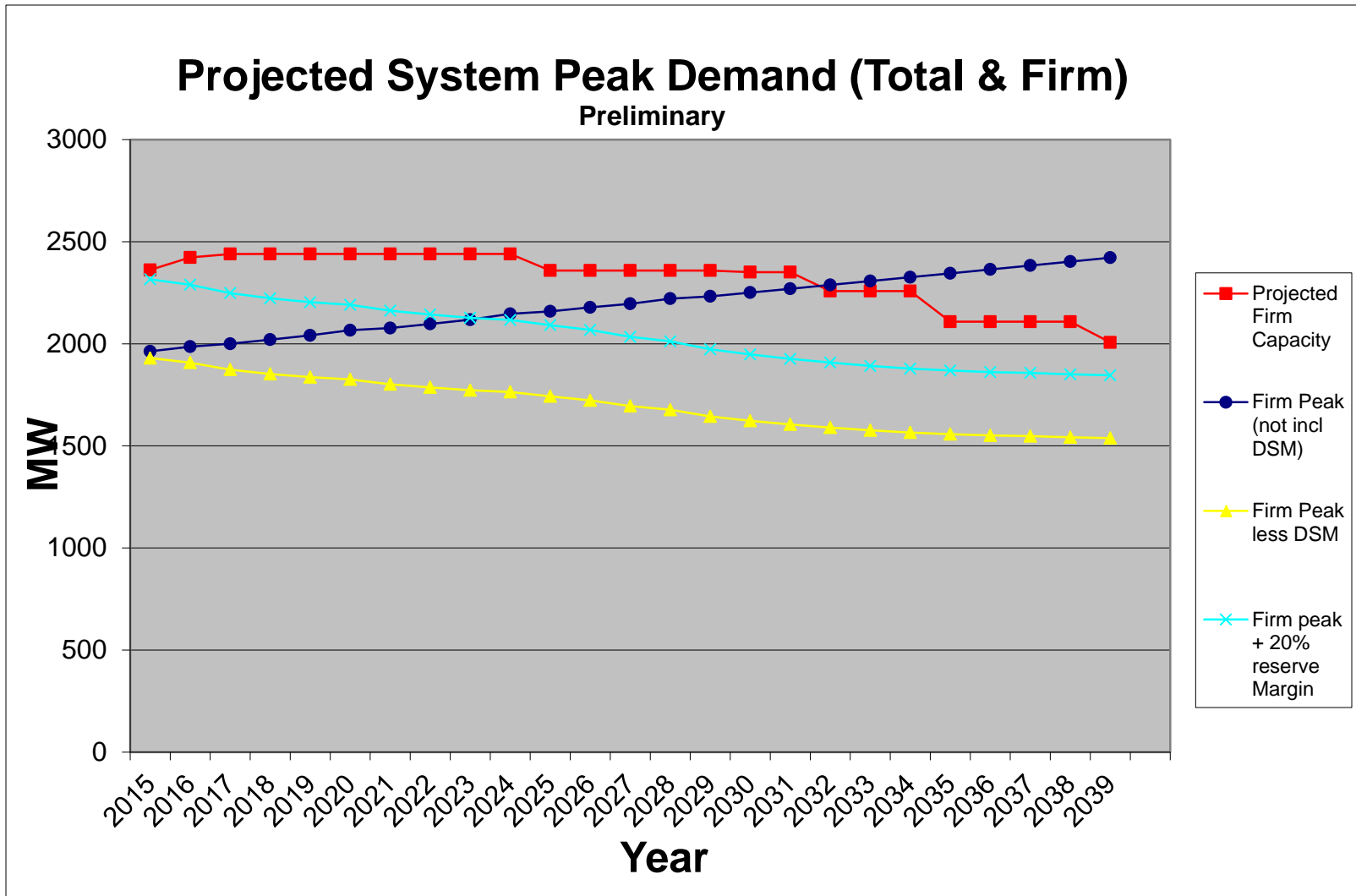


CRP5-8 Preliminary Results

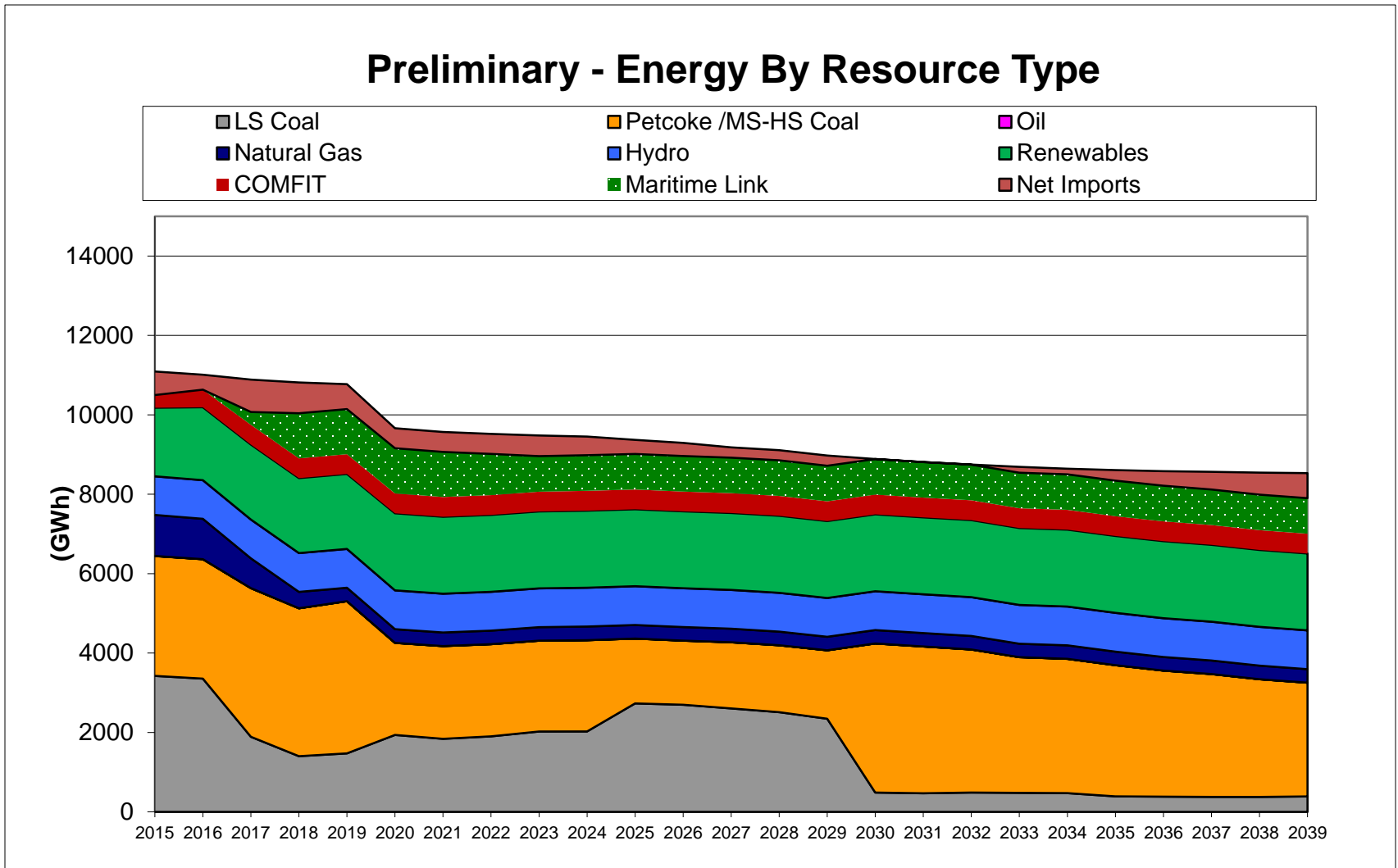
CRP5-8 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	33	78	127	168	205	241	275	311	345	383	416	628	788	813	836	861	884
Firm Peak Less DSM	1,930	1,908	1,874	1,852	1,836	1,826	1,802	1,786	1,773	1,764	1,743	1,623	1,557	1,551	1,548	1,542	1,538
RM Required	386	382	375	370	367	365	360	357	355	353	349	325	311	310	310	308	308
Required MWs	2,316	2,289	2,248	2,223	2,204	2,191	2,162	2,144	2,127	2,117	2,091	1,948	1,869	1,861	1,857	1,850	1,846
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														51.7
Hydro			1.8														
FGD Parasitic Power												-8					
Additional Wind																	
Assumed Unit Retirement				-153							-81		-150				-153
Natural Gas Unit																	
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	0.0	0.0	0.0	0.0	0.0	-81.0	-8.0	-150.0	0.0	0.0	0.0	-101.3
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	98.7	98.7	98.7	98.7	98.7	17.7	9.7	-233.3	-233.3	-233.3	-233.3	-334.6
Total Firm Capacity	2362	2423	2440	2440	2440	2440	2440	2440	2440	2440	2359	2351	2108	2108	2108	2108	2007
Surplus (Deficit) MWs above RM	46	134	192	217	236	249	278	296	313	323	268	403	239	247	251	258	161
Reserve Margin %	22.4%	27.0%	30.2%	31.7%	32.9%	33.6%	35.4%	36.6%	37.7%	38.3%	35.4%	44.9%	35.4%	35.9%	36.2%	36.7%	30.5%

CRP5-8 Preliminary Demand and DSM

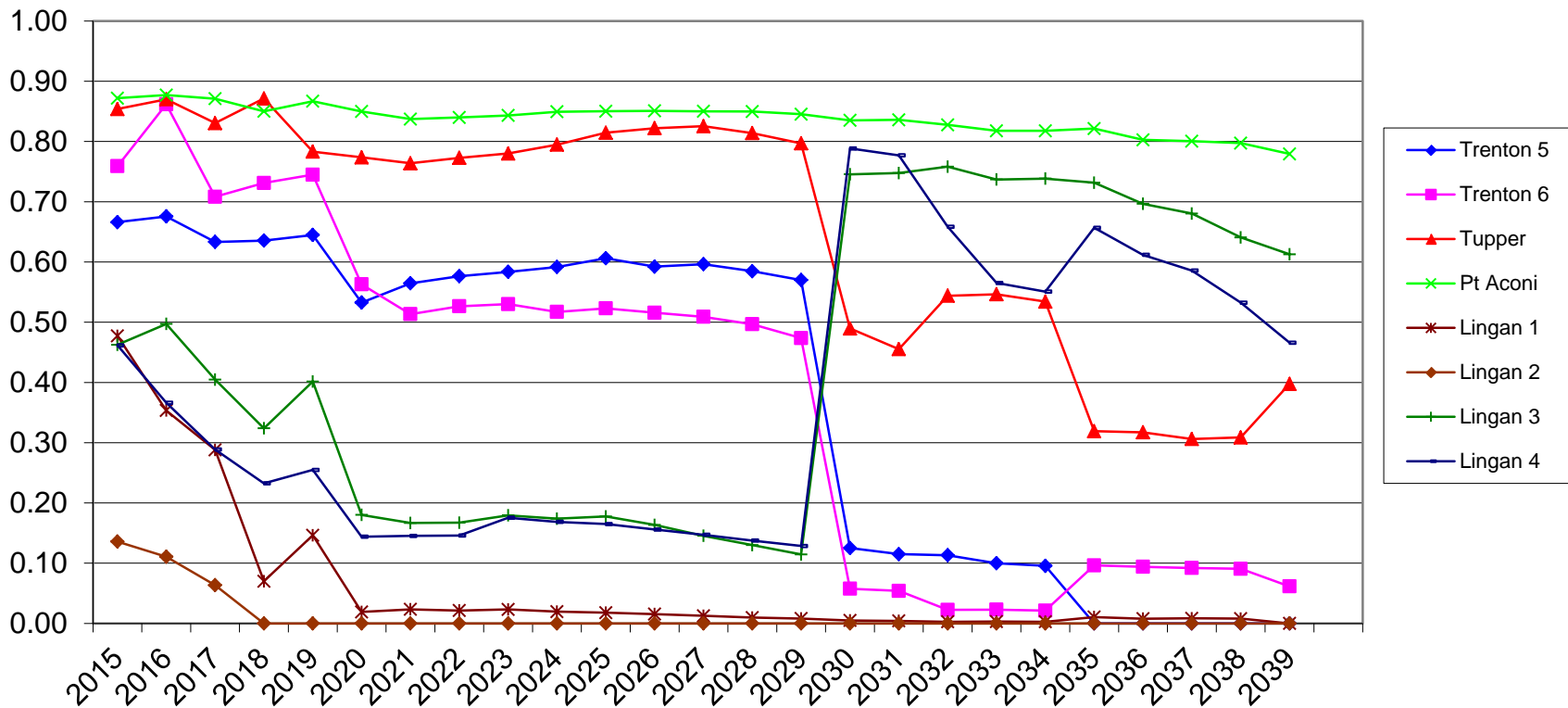


CRP5-8 Preliminary Energy by Resource Type



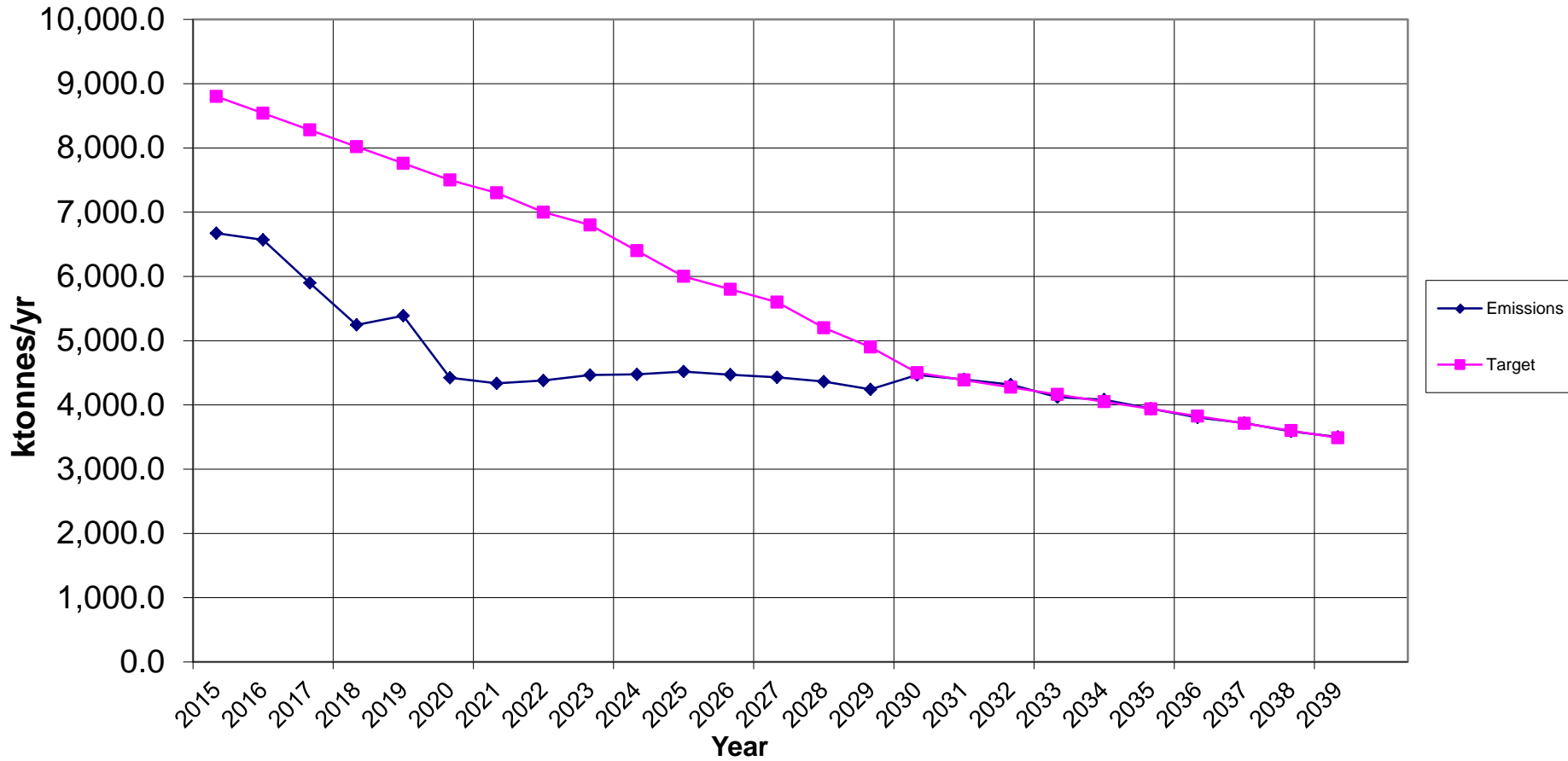
CRP5-8 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



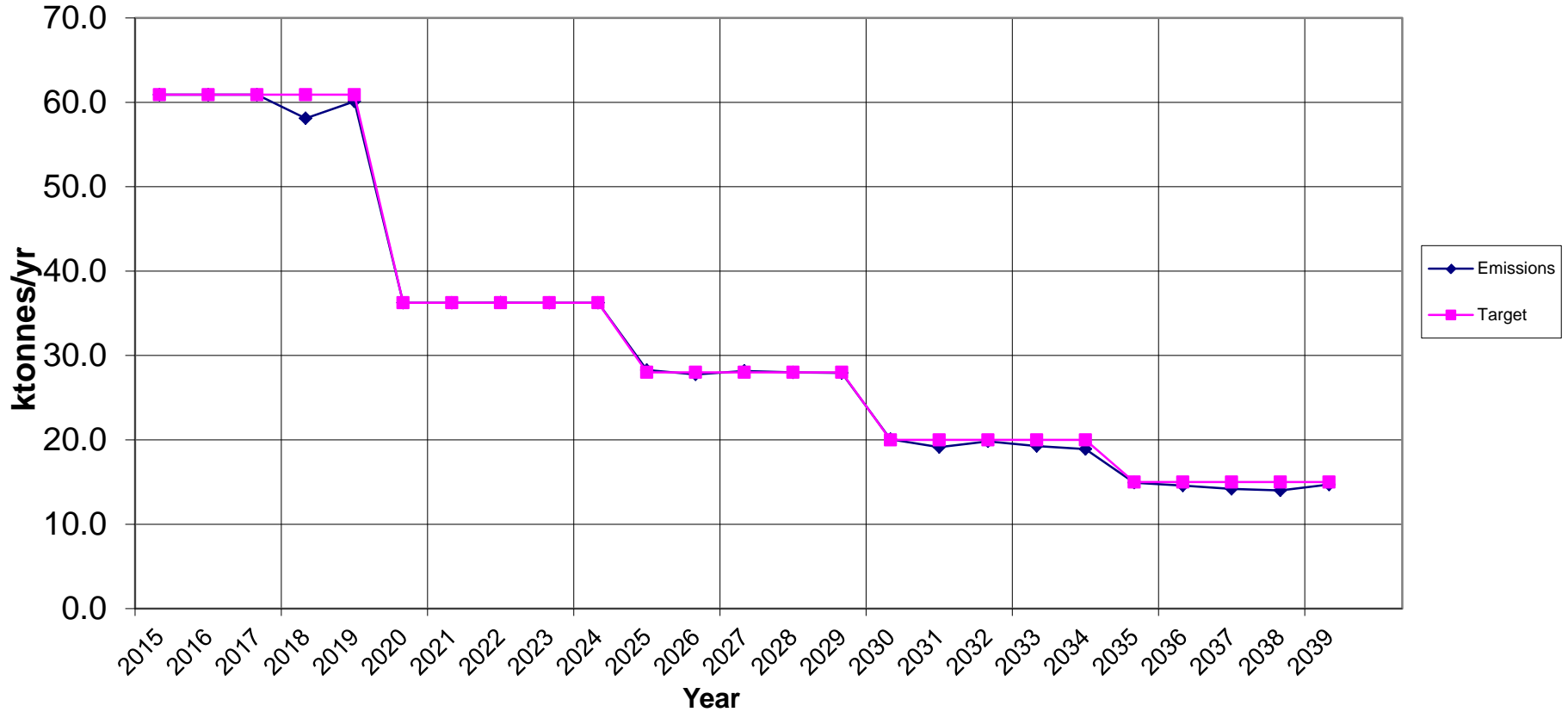
CRP5-8 Preliminary CO₂ Emissions

Projected CO2 Emissions

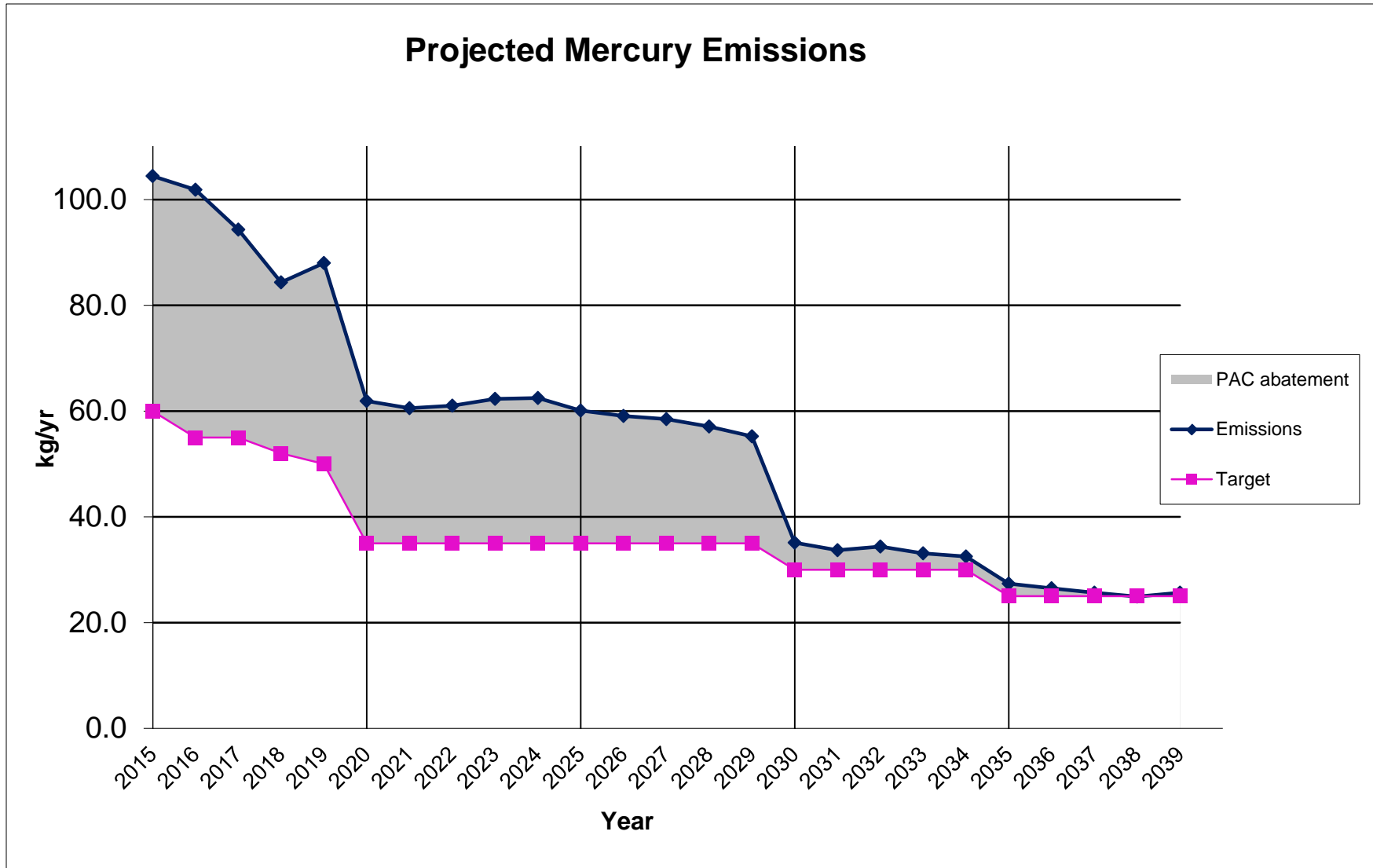


CRP5-8 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP5-8 Preliminary Mercury Emissions





CRP6 Preliminary Results

CRP6 Input Assumptions

Candidate Resource Plan 6 (CRP6):

- Base Load Forecast
- High DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Minimum Coal Use
- High Wind (Wind integration: 5 x CT 50 MW and \$238M for reliability tie and transmission upgrades.
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP6 Preliminary Results

	CRP6-01-R01
	Least cost planning & study period
2015	
2016	
2017	ML Oct 2017 Lingan 2 Retire
2018	
2019	
2020	Lingan 1 Retire PHBM 51.7 MW Firm
2021	TUC 1 Retire
2022	Wind Block 150 MW 2 x 50 MW CT (wind integration)
2023	Lingan 3 Retire
2024	Lingan 4 Retire Wind Block 150 MW 3 x 50 MW CT (wind integration)
2025	
2026	
2027	
2028	TUC 2 Retire
2029	
2030	Trenton 5 Retire
2031	
2032	
2033	
2034	
2035	Tupper 2 Retire CT 50MW
2036	
2037	
2038	
2039	
Planning PV \$M	12,334
Study PV \$M	17,525

	High DSM Program Adm Cost	High DSM Customer Cost
	\$M	\$M
2015	76.3	68.0
2016	92.0	85.6
2017	104.6	98.6
2018	107.4	96.8
2019	112.8	82.2
2020	119.3	79.8
2021	106.9	75.1
2022	102.2	72.6
2023	99.0	72.7
2024	104.0	77.6
2025	110.9	86.2
2026	118.6	97.0
2027	121.1	99.5
2028	120.4	100.7
2029	114.5	83.0
2030	106.5	78.7
2031	94.6	73.6
2032	85.9	68.0
2033	65.8	64.8
2034	61.1	61.8
2035	56.6	59.6
2036	52.4	57.8
2037	49.6	56.8
2038	44.2	57.0
2039	43.4	56.7
NPV	1,260.6	1,037.2



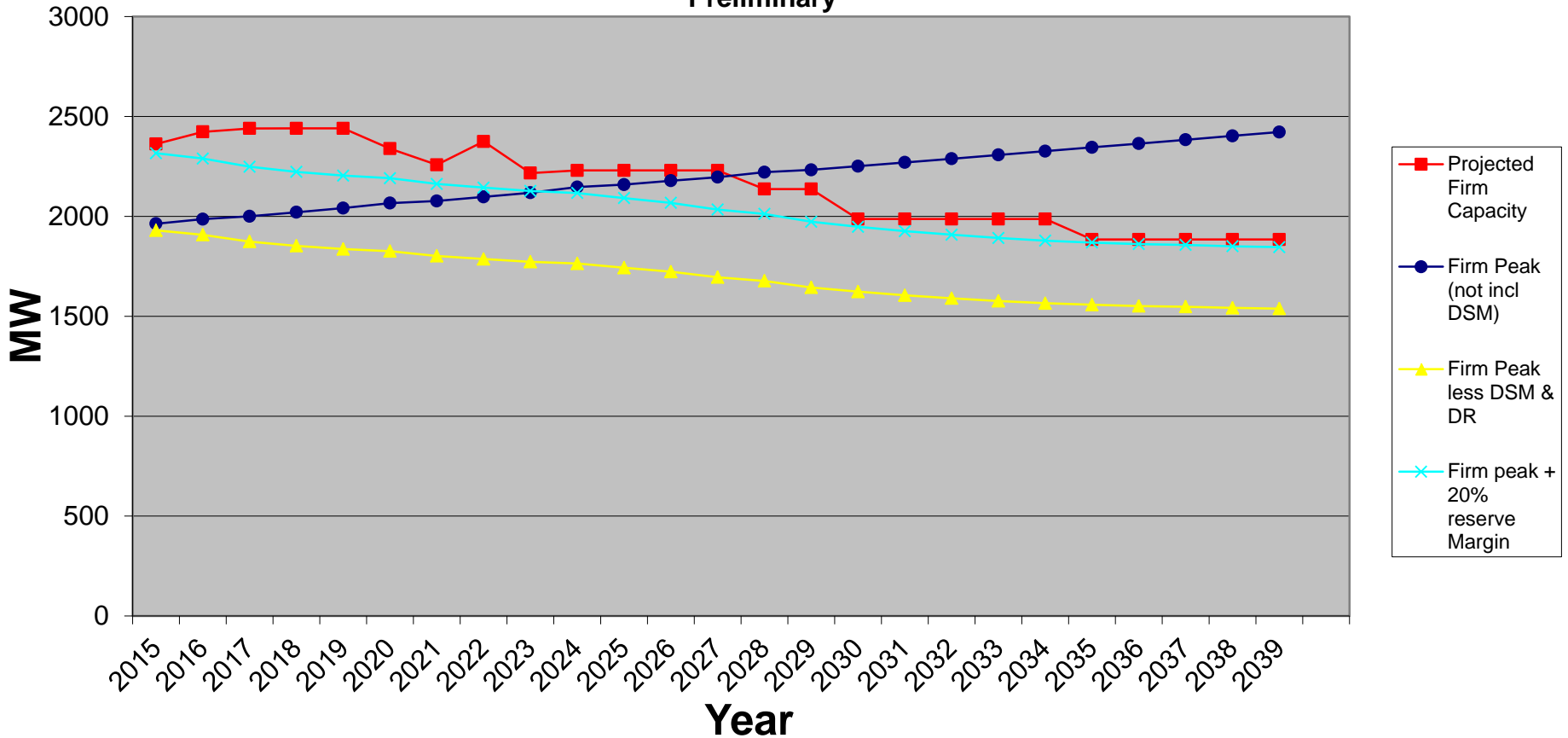
CRP6-1 Preliminary Results

CRP6-1 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	33	78	127	168	205	241	275	311	345	383	416	628	788	813	836	861	884
Firm Peak Less DSM	1,930	1,908	1,874	1,852	1,836	1,826	1,802	1,786	1,773	1,764	1,743	1,623	1,557	1,551	1,548	1,542	1,538
DRWH Reduction																	
DRCM Reduction																	
Firm Peak Less DR	1,930	1,908	1,874	1,852	1,836	1,826	1,802	1,786	1,773	1,764	1743	1623	1557	1,551	1,548	1,542	1,538
RM Required	386	382	375	370	367	365	360	357	355	353	349	324.6	311.5	310	310	308	308
Required MWs	2,316	2,289	2,248	2,223	2,204	2,191	2,162	2,144	2,127	2,117	2091	1948	1869	1,861	1,857	1,850	1,846
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass						51.7											
Additional Wind								18		18							
Assumed Unit Retirement				-153		-153	-81		-158	-153		-150	-152				
Natural Gas Unit								98.8		148.1			49.4				
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	-101.3	-81.0	116.8	-158.0	13.1	0.0	-150.0	-102.6	0.0	0.0	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	-2.6	-83.6	33.2	-124.8	-111.7	-111.7	-354.7	-457.3	-457.3	-457.3	-457.3	-457.3
Total Firm Capacity	2362	2423	2440	2440	2440	2339	2258	2375	2217	2230	2230	1987	1884	1884	1884	1884	1884
Surplus (Deficit) MWs above RM	46	134	192	217	236	148	96	231	89	113	138	39	15	23	27	34	38
Reserve Margin %	22.4%	27.0%	30.2%	31.7%	32.9%	28.1%	25.3%	32.9%	25.0%	26.4%	27.9%	22.4%	21.0%	21.5%	21.7%	22.2%	22.5%

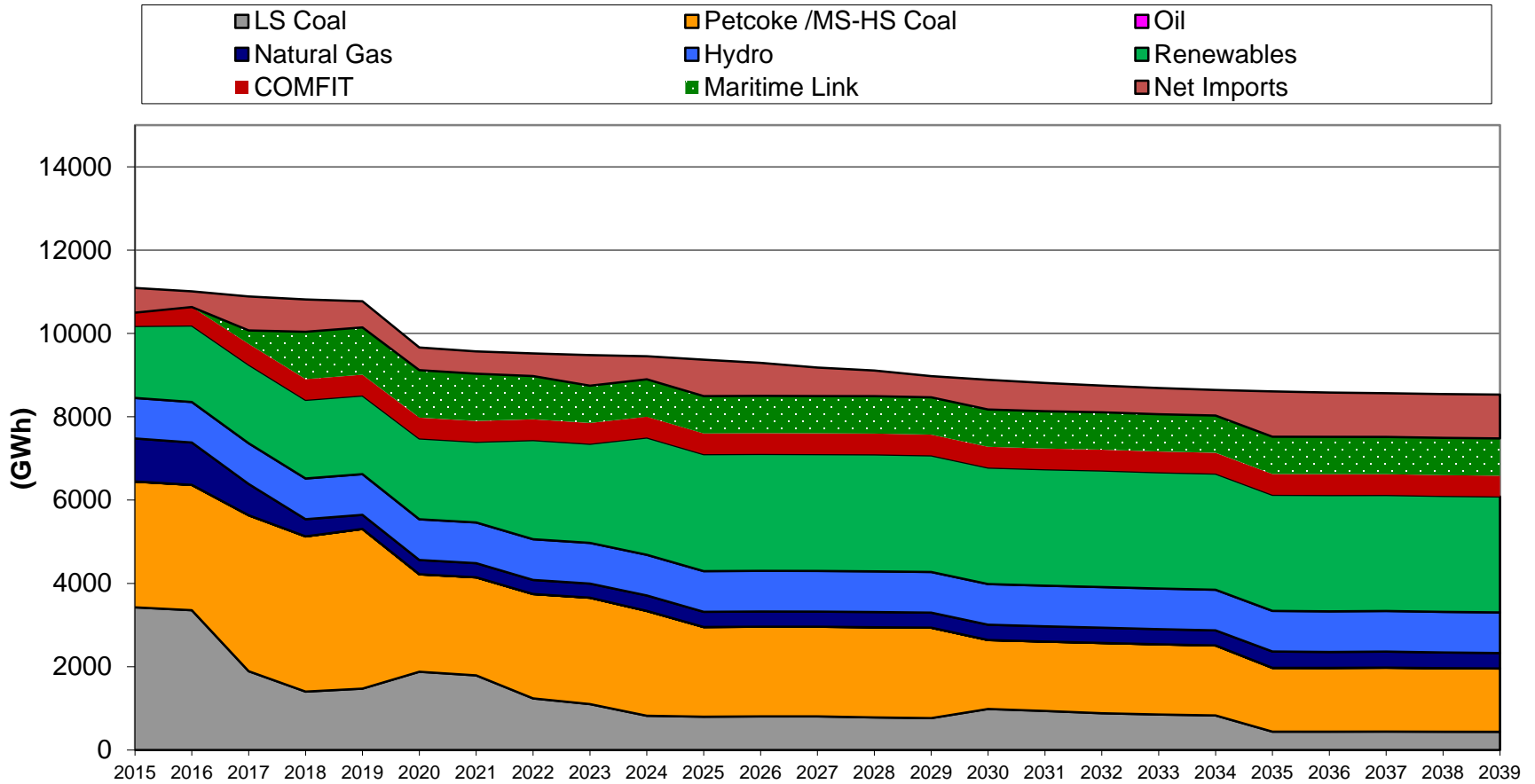
CRP6-1 Preliminary Demand and DSM

Projected System Peak Demand (Total & Firm) Preliminary



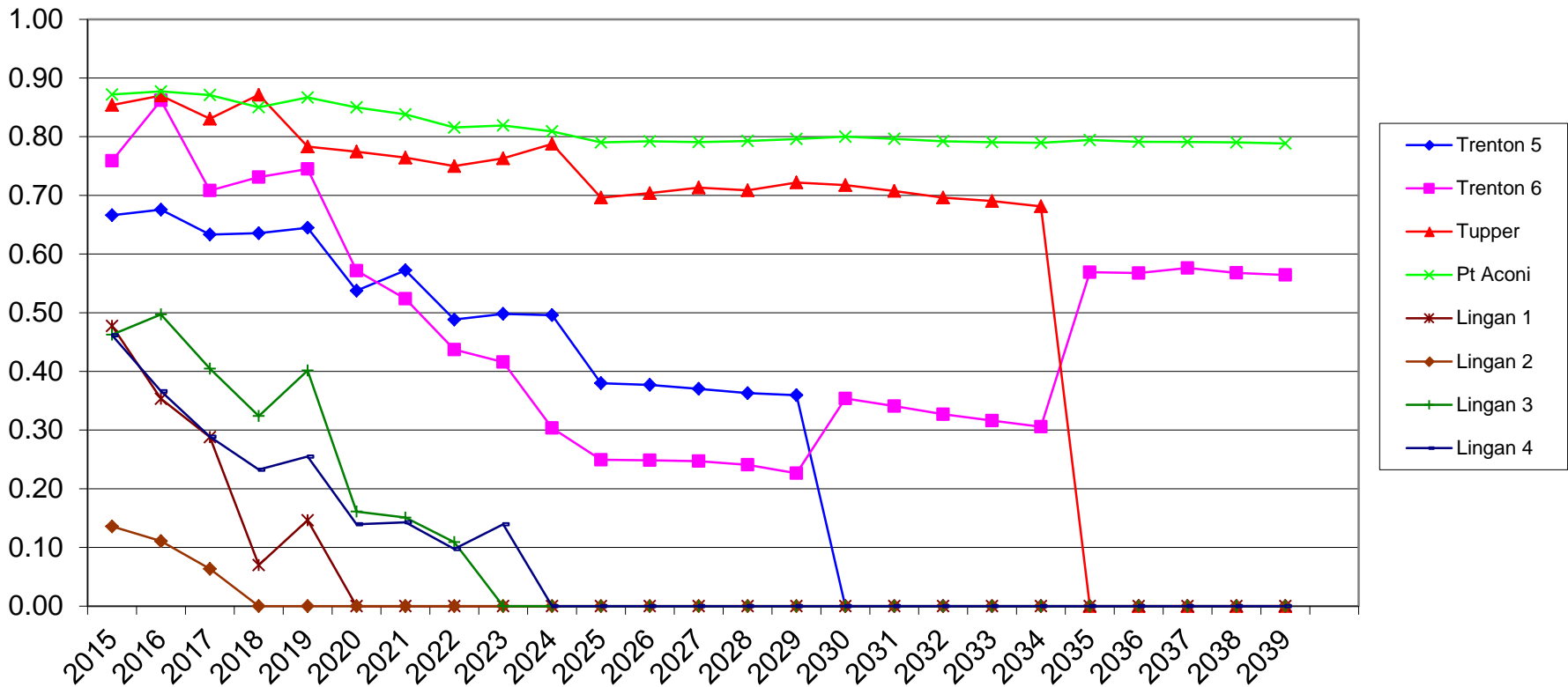
CRP6-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



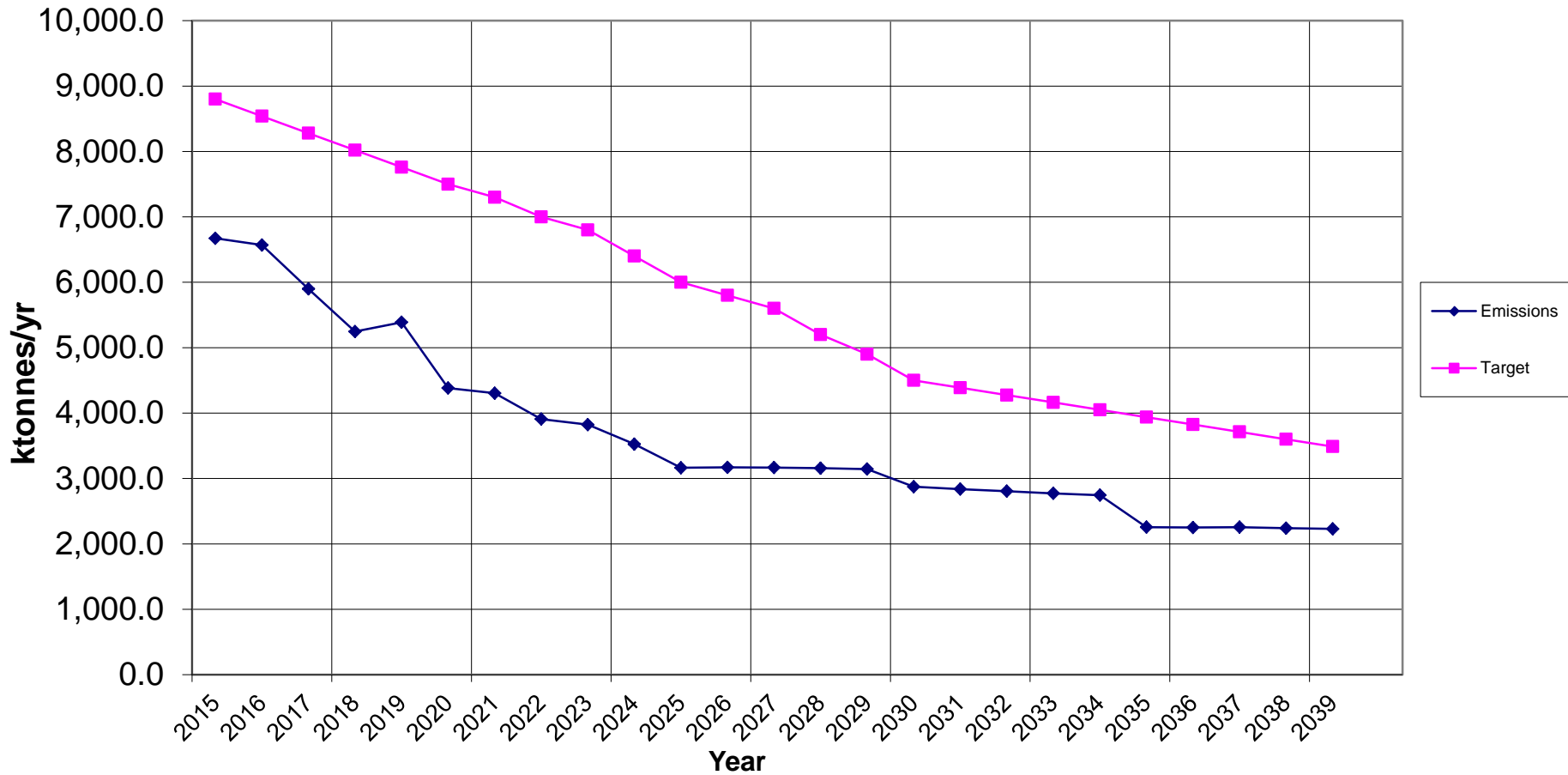
CRP6-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



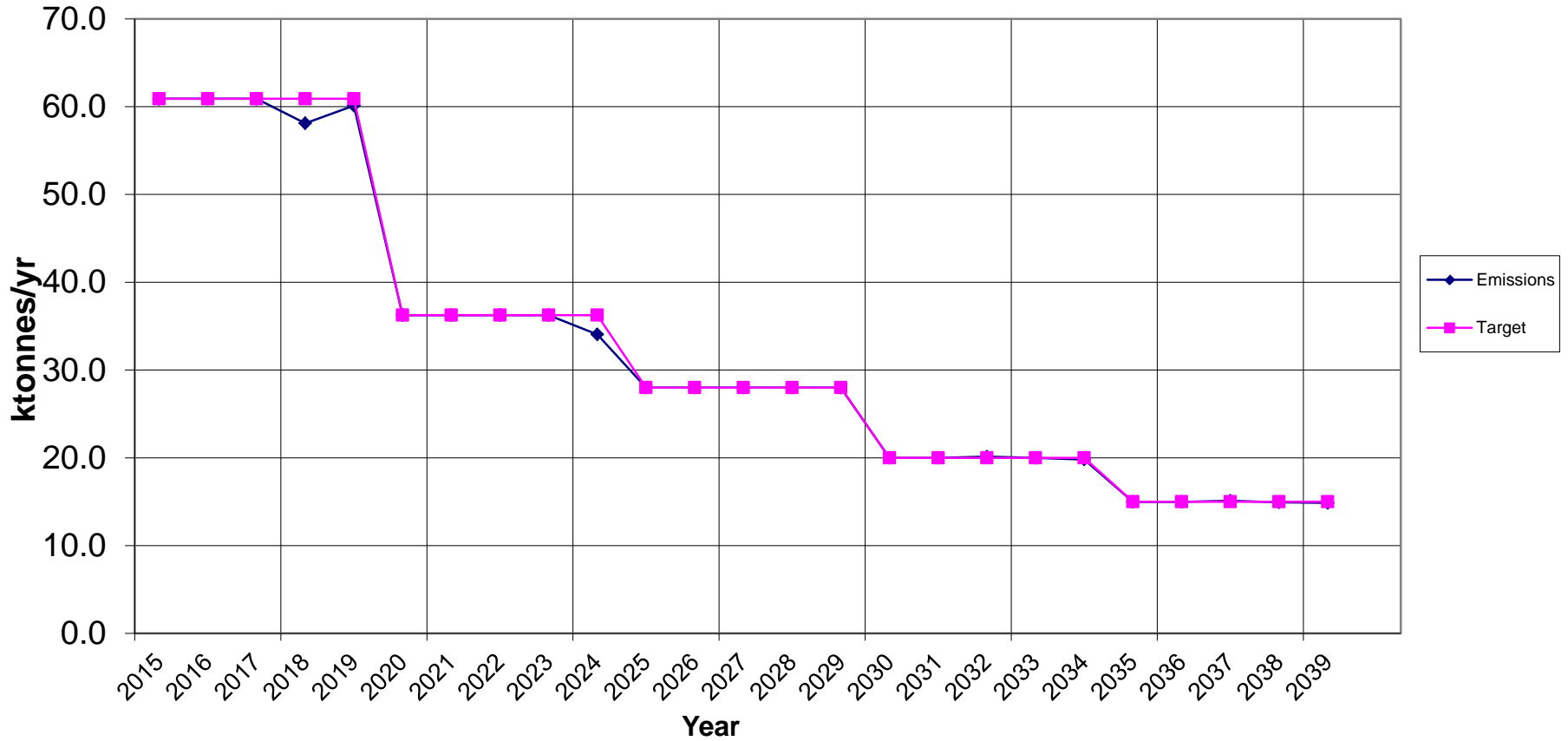
CRP6-1 Preliminary CO₂ Emissions

Projected CO₂ Emissions



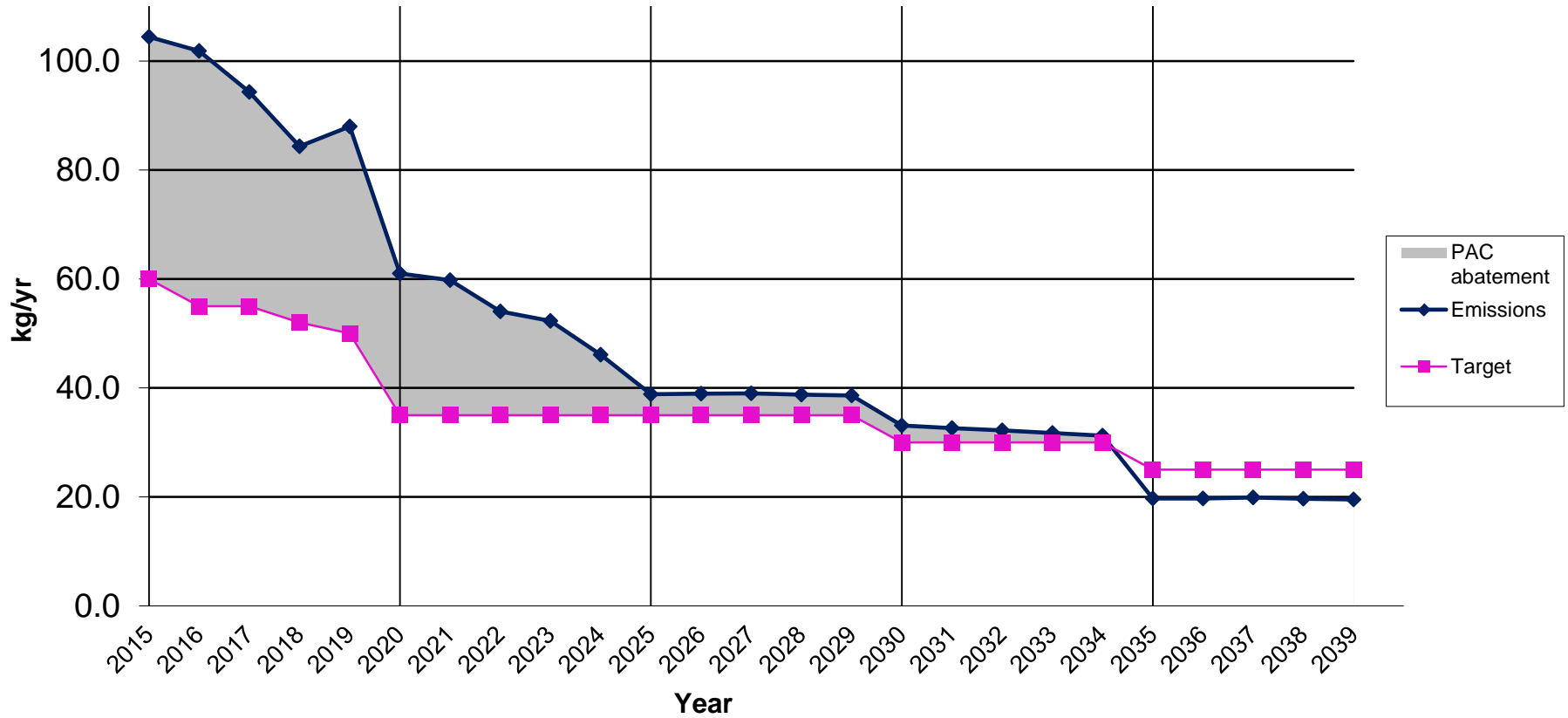
CRP6-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP6-1 Preliminary Mercury Emissions

Projected Mercury Emissions





CRP7 Preliminary Results

CRP7 Input Assumptions

Candidate Resource Plan 7 (CRP7):

- Base Load Forecast
- High DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Minimum Coal Use
- Medium Wind (Wind integration: 2 x CT 50 MW and \$200M for reliability tie and transmission upgrades)
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP7 Preliminary Results

	CRP7-01-R01	CRP7-05-R01
	Least cost study period	Least cost Planning period
2015		
2016	Demand Response - Water Heater and Comm	Demand Response - Commercial
2017	ML Oct 2017 Lingan 2 Retire	ML Oct 2017 Lingan 2 Retire
2018		
2019		
2020	Lingan 1 Retire PHBM 51.7 MW Firm	Lingan 1 Retire PHBM 51.7 MW Firm
2021	TUC 1 Retire	TUC 1 Retire
2022		
2023	Lingan 3 Retire Wind Block 150 MW 2 x 50 MW CT (wind integration)	Lingan 3 Retire Wind Block 150 MW 2 x 50 MW CT (wind integration)
2024	Lingan 4 Retire	Lingan 4 Retire CT 50MW
2025		
2026		
2027		
2028	TUC 2 Retire	TUC 2 Retire
2029		
2030	Trenton 5 Retire CT 50MW	Trenton 5 Retire CT 50MW
2031		
2032		
2033		
2034		
2035	Tupper 2 Retire CT 50MW	Tupper 2 Retire CT 50MW & CT 34 MW
2036		
2037		
2038		
2039		
Planning PV \$M	12,208	12,202
Study PV \$M	17,362	17,388

	High DSM Program Adm Cost \$M	High DSM Customer Cost \$M
2015	76.3	68.0
2016	92.0	85.6
2017	104.6	98.6
2018	107.4	96.8
2019	112.8	82.2
2020	119.3	79.8
2021	106.9	75.1
2022	102.2	72.6
2023	99.0	72.7
2024	104.0	77.6
2025	110.9	86.2
2026	118.6	97.0
2027	121.1	99.5
2028	120.4	100.7
2029	114.5	83.0
2030	106.5	78.7
2031	94.6	73.6
2032	85.9	68.0
2033	65.8	64.8
2034	61.1	61.8
2035	56.6	59.6
2036	52.4	57.8
2037	49.6	56.8
2038	44.2	57.0
2039	43.4	56.7
NPV	1,260.6	1,037.2

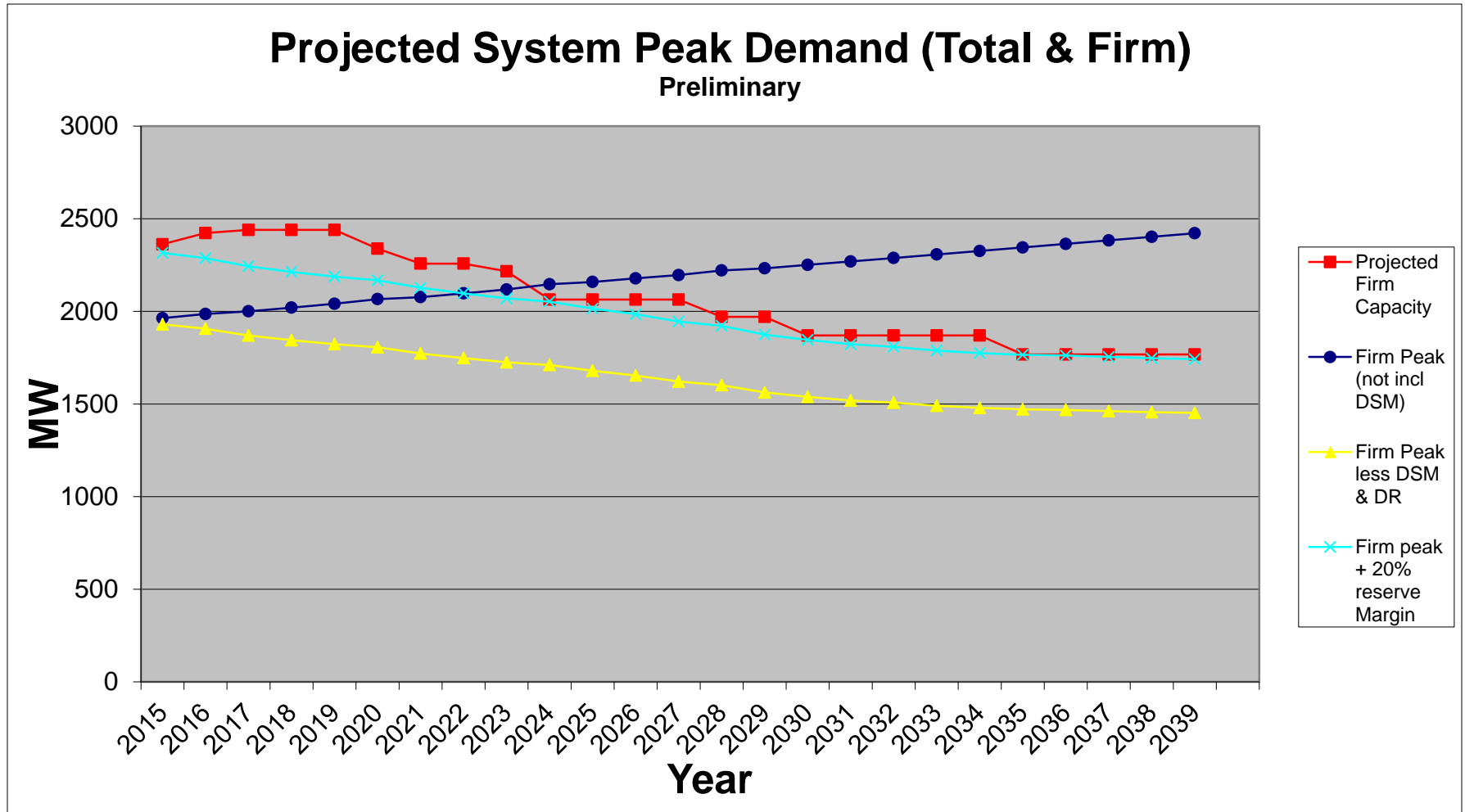


CRP7-1 Preliminary Results

CRP7-1 Preliminary Load and Resources

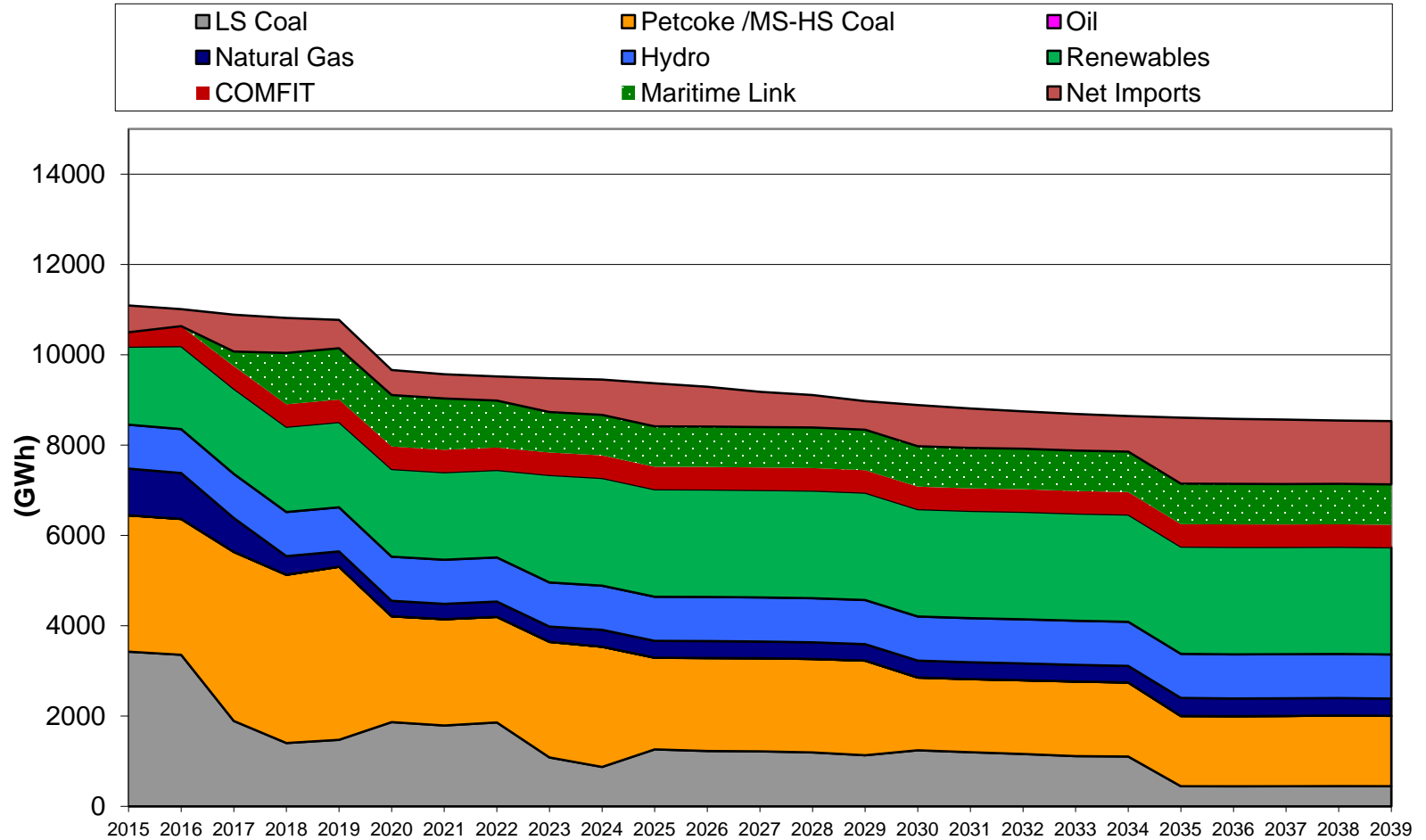
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	33	78	127	168	205	241	275	311	345	383	416	628	788	813	836	861	884
Firm Peak Less DSM	1,930	1,908	1,874	1,852	1,836	1,826	1,802	1,786	1,773	1,764	1,743	1,623	1,557	1,551	1,548	1,542	1,538
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	1	4	7	10	14	18	20	21	24	24	24	23	24	24	24
Firm Peak Less DR	1,930	1,906	1,870	1,844	1,823	1,806	1,773	1,748	1,725	1,711	1,679	1,538	1,471	1,468	1,462	1,456	1,452
RM Required	386	381	374	369	365	361	355	350	345	342	336	307.7	294.3	294	292	291	290
Required MWs	2,316	2,288	2,244	2,213	2,188	2,168	2,127	2,097	2,070	2,053	2015	1846	1766	1,762	1,754	1,747	1,743
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass						51.7											
Additional Wind									18								
Assumed Unit Retirement				-153		-153	-81		-158	-153		-150	-152				
Natural Gas Unit									98.8			49.4	49.4				
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	-101.3	-81.0	0.0	-41.2	-153.0	0.0	-100.6	-102.6	0.0	0.0	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	-2.6	-83.6	-83.6	-124.8	-277.8	-277.8	-471.4	-574.0	-574.0	-574.0	-574.0	-574.0
Total Firm Capacity	2362	2423	2440	2440	2440	2339	2258	2258	2217	2064	2064	1870	1767	1767	1767	1767	1767
Surplus (Deficit) MWs above RM	46	135	196	227	252	171	131	160	146	11	48	24	2	6	13	20	25
Reserve Margin %	22.4%	27.1%	30.5%	32.3%	33.8%	29.5%	27.4%	29.2%	28.5%	20.6%	22.9%	21.5%	20.1%	20.4%	20.9%	21.4%	21.7%

CRP7-1 Preliminary Demand and DSM



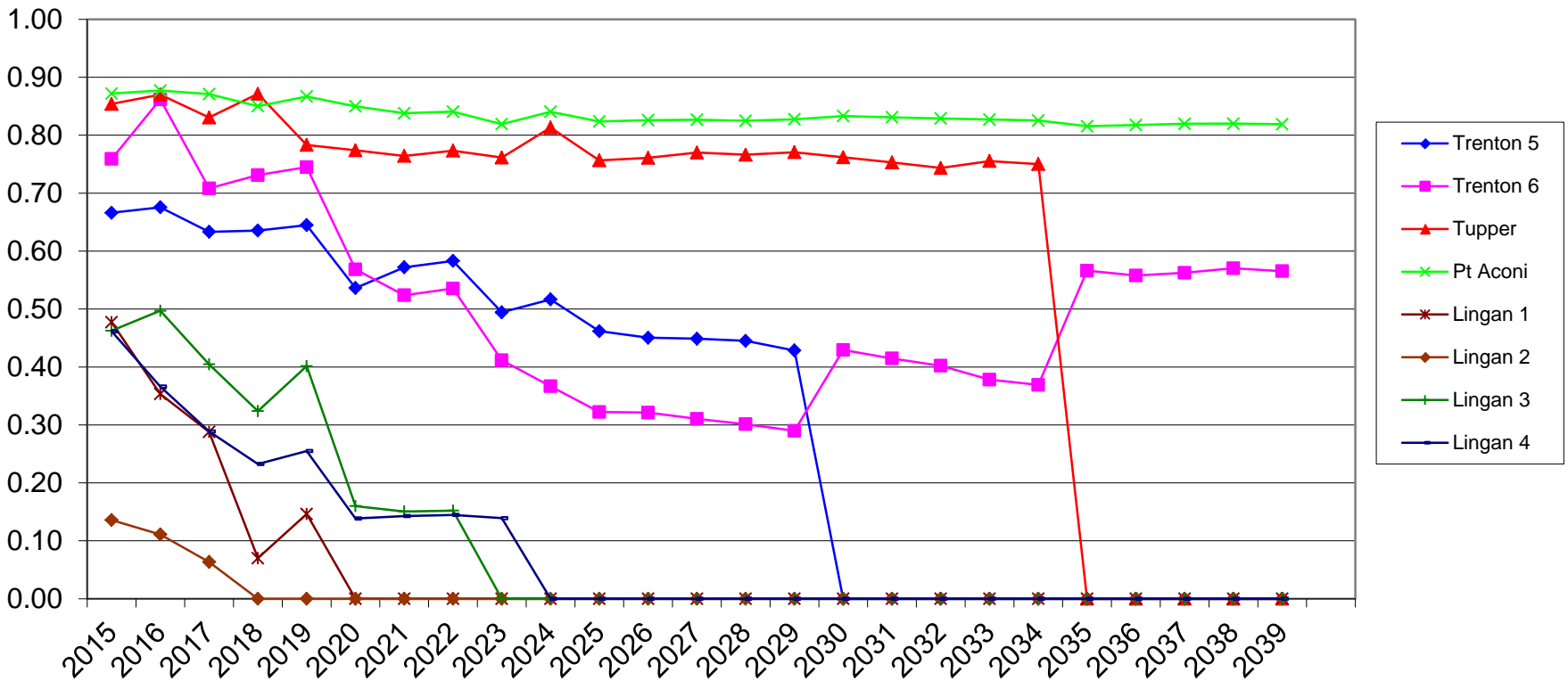
CRP7-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



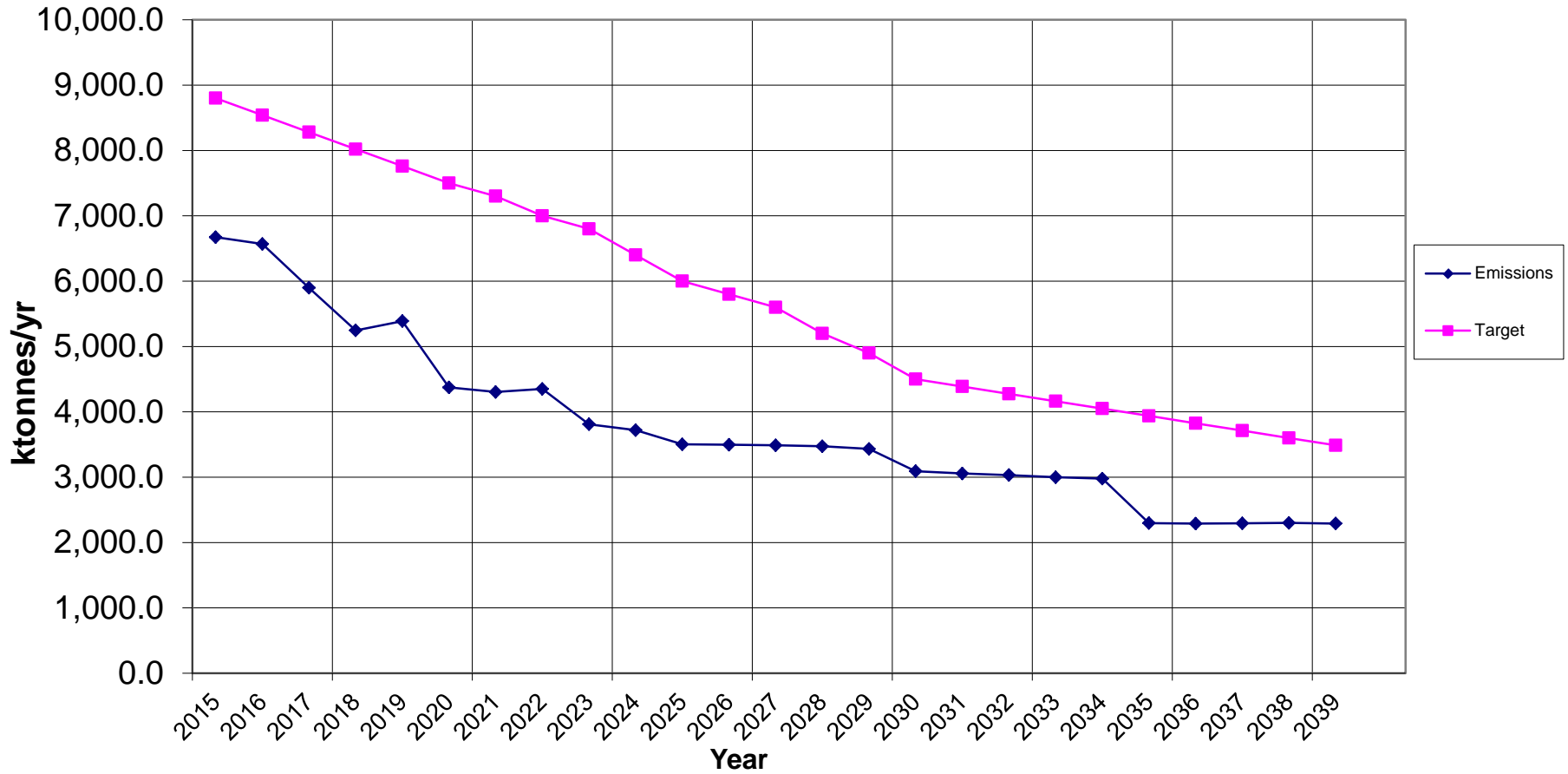
CRP7-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units

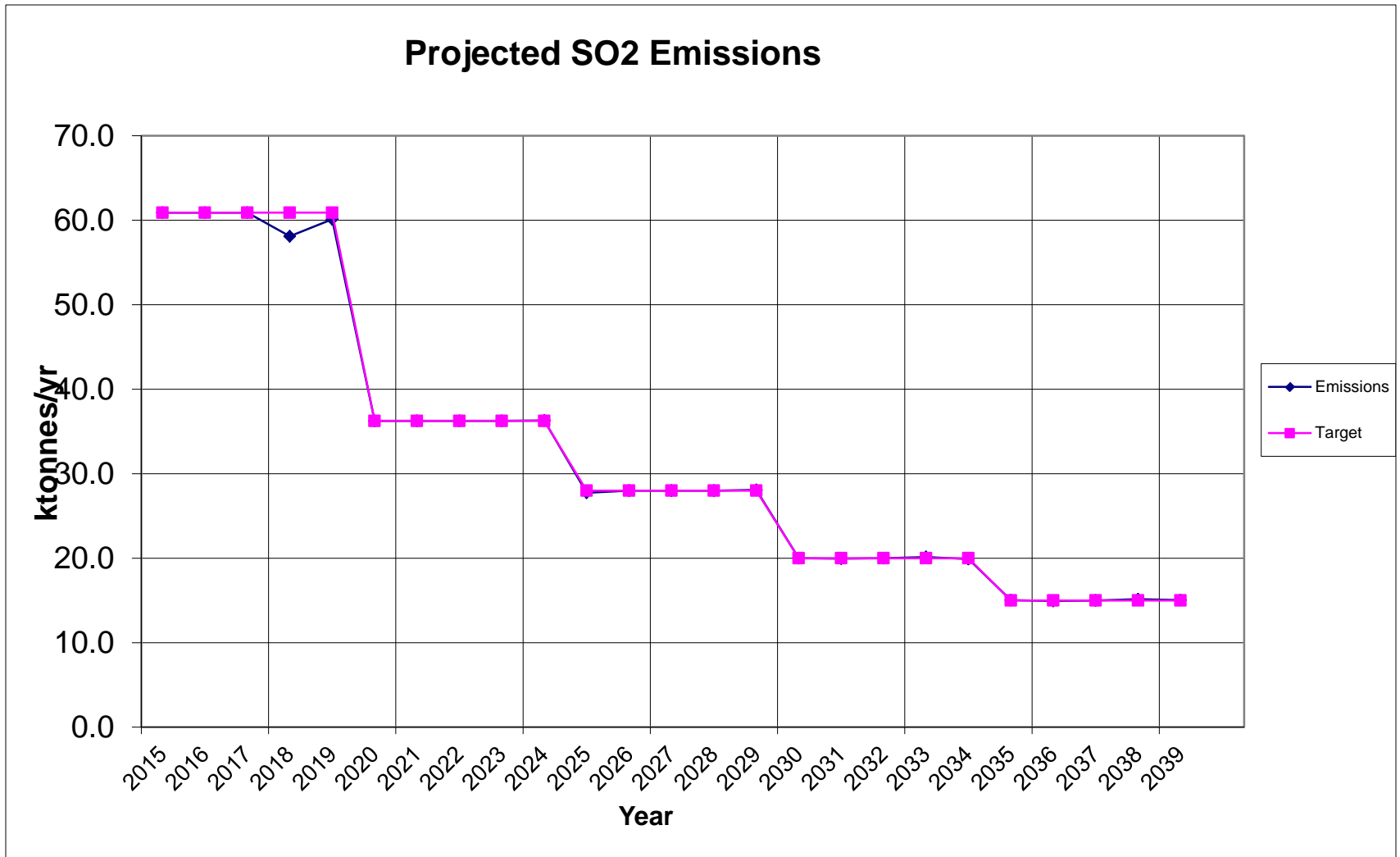


CRP7-1 Preliminary CO₂ Emissions

Projected CO₂ Emissions

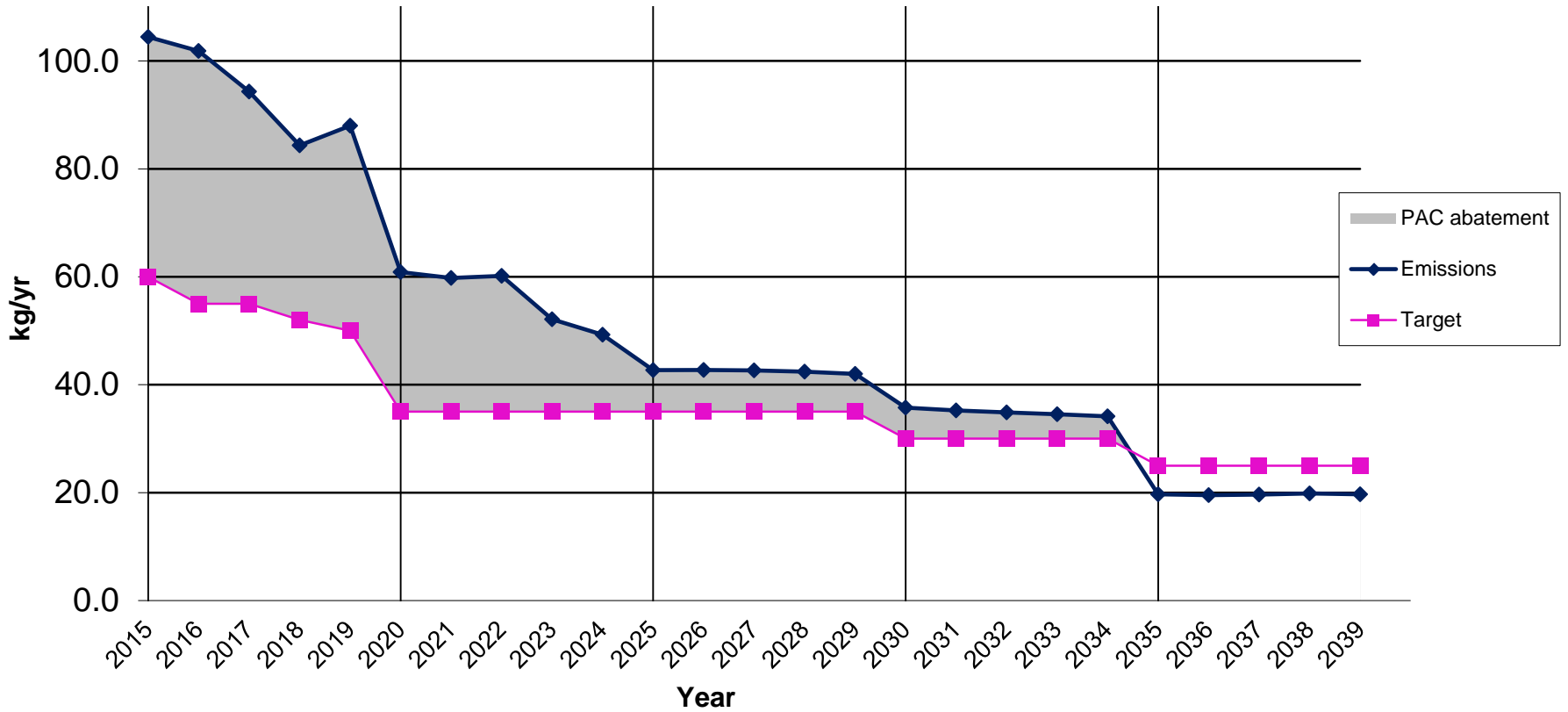


CRP7-1 Preliminary SO₂ Emissions



CRP7-1 Preliminary Mercury Emissions

Projected Mercury Emissions



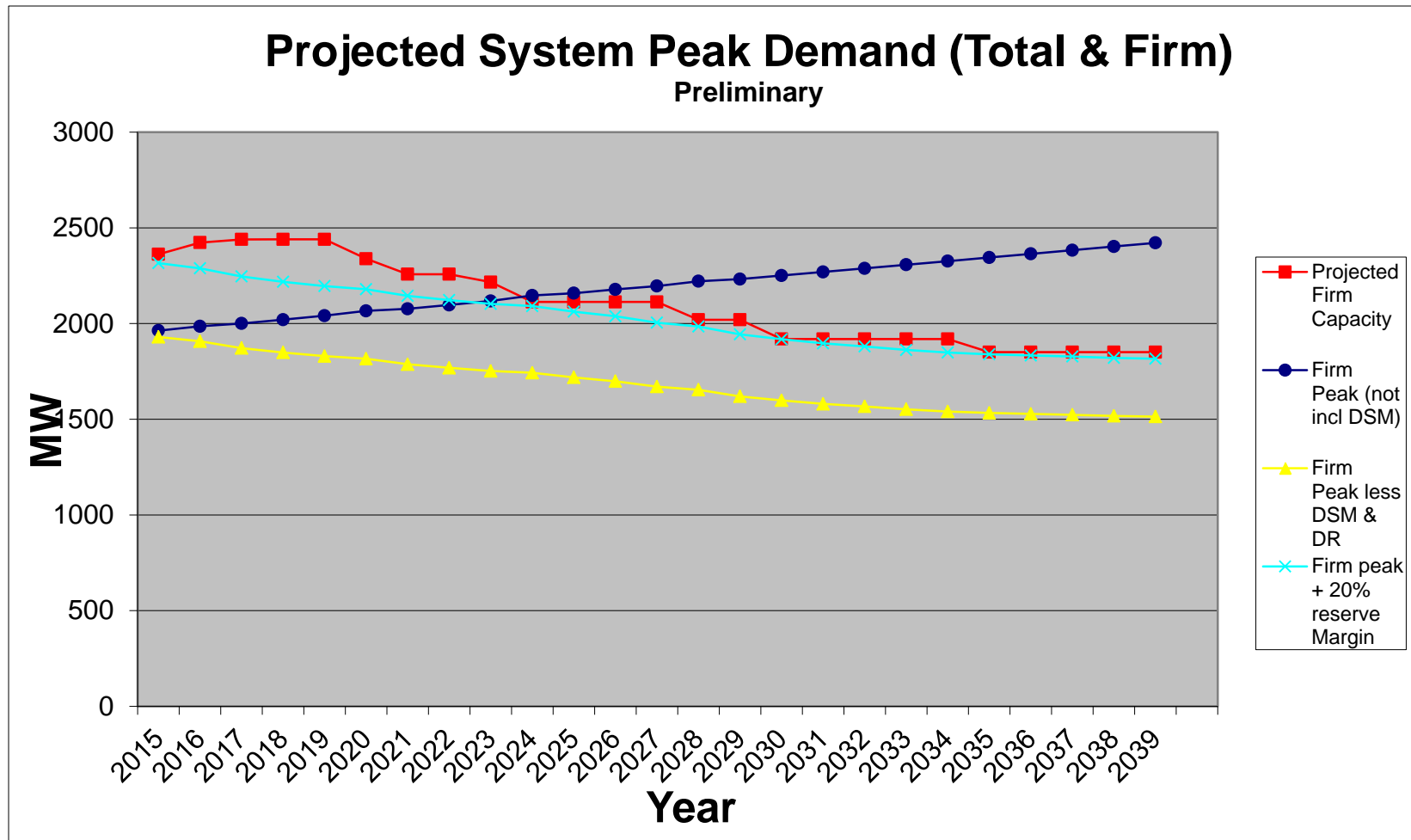


CRP7-5 Preliminary Results

CRP7-5 Preliminary Load and Resources

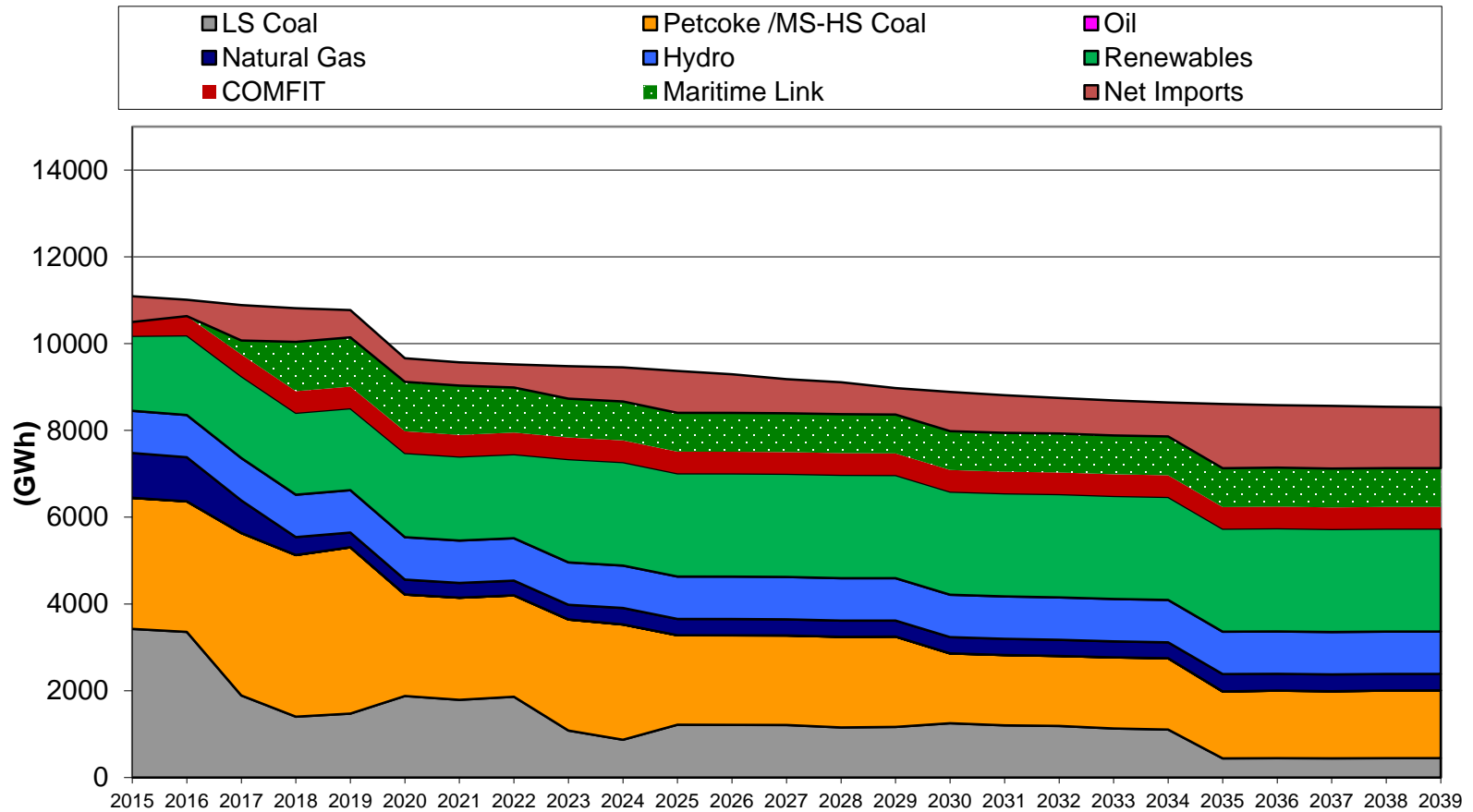
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	33	78	127	168	205	241	275	311	345	383	416	628	788	813	836	861	884
Firm Peak Less DSM	1,930	1,908	1,874	1,852	1,836	1,826	1,802	1,786	1,773	1,764	1,743	1,623	1,557	1,551	1,548	1,542	1,538
DRWH Reduction																	
DRCM Reduction	0	0	1	4	7	10	14	18	20	21	24	24	24	23	24	24	24
Firm Peak Less DR	1,930	1,907	1,872	1,849	1,830	1,816	1,788	1,769	1,752	1,743	1719	1599	1533	1,528	1,523	1,518	1,514
RM Required	386	381	374	370	366	363	358	354	350	349	344	319.7	306.6	306	305	304	303
Required MWs	2,316	2,289	2,246	2,218	2,196	2,180	2,145	2,123	2,103	2,092	2062	1918	1840	1,834	1,828	1,821	1,817
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass						51.7											
Additional Wind									18								
Assumed Unit Retirement				-153		-153	-81		-158	-153		-150	-152				
Natural Gas Unit									98.8	49.4		49.4	83.4				
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	-101.3	-81.0	0.0	-41.2	-103.6	0.0	-100.6	-68.6	0.0	0.0	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	-2.6	-83.6	-83.6	-124.8	-228.4	-228.4	-422.0	-490.6	-490.6	-490.6	-490.6	-490.6
Total Firm Capacity	2362	2423	2440	2440	2440	2339	2258	2258	2217	2113	2113	1919	1851	1851	1851	1851	1851
Surplus (Deficit) MWs above RM	46	134	193	222	244	159	113	135	114	21	51	1	11	17	23	30	34
Reserve Margin %	22.4%	27.0%	30.3%	32.0%	33.3%	28.8%	26.3%	27.6%	26.5%	21.2%	22.9%	20.1%	20.7%	21.1%	21.5%	22.0%	22.3%

CRP7-5 Preliminary Demand and DSM



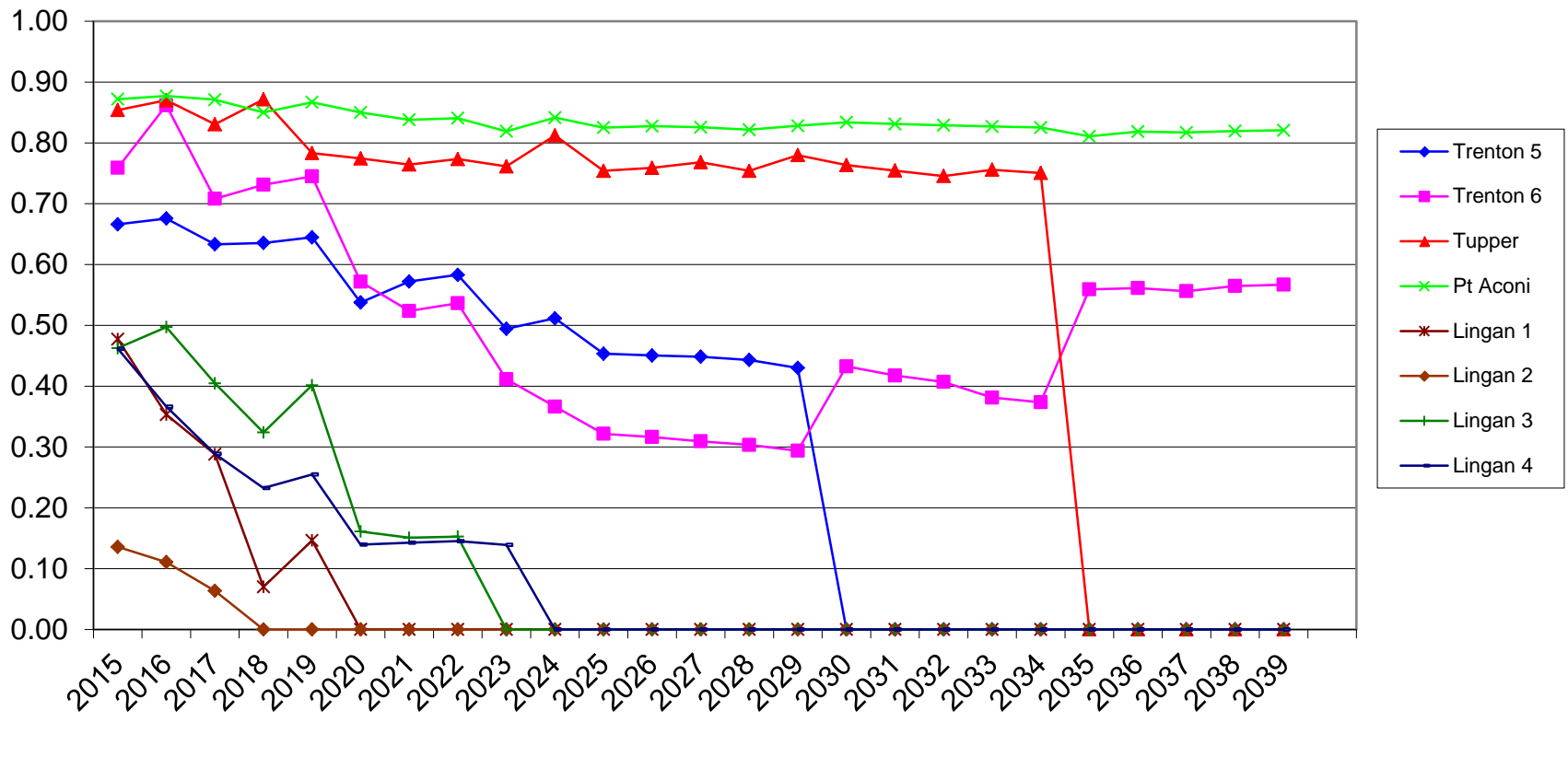
CRP7-5 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



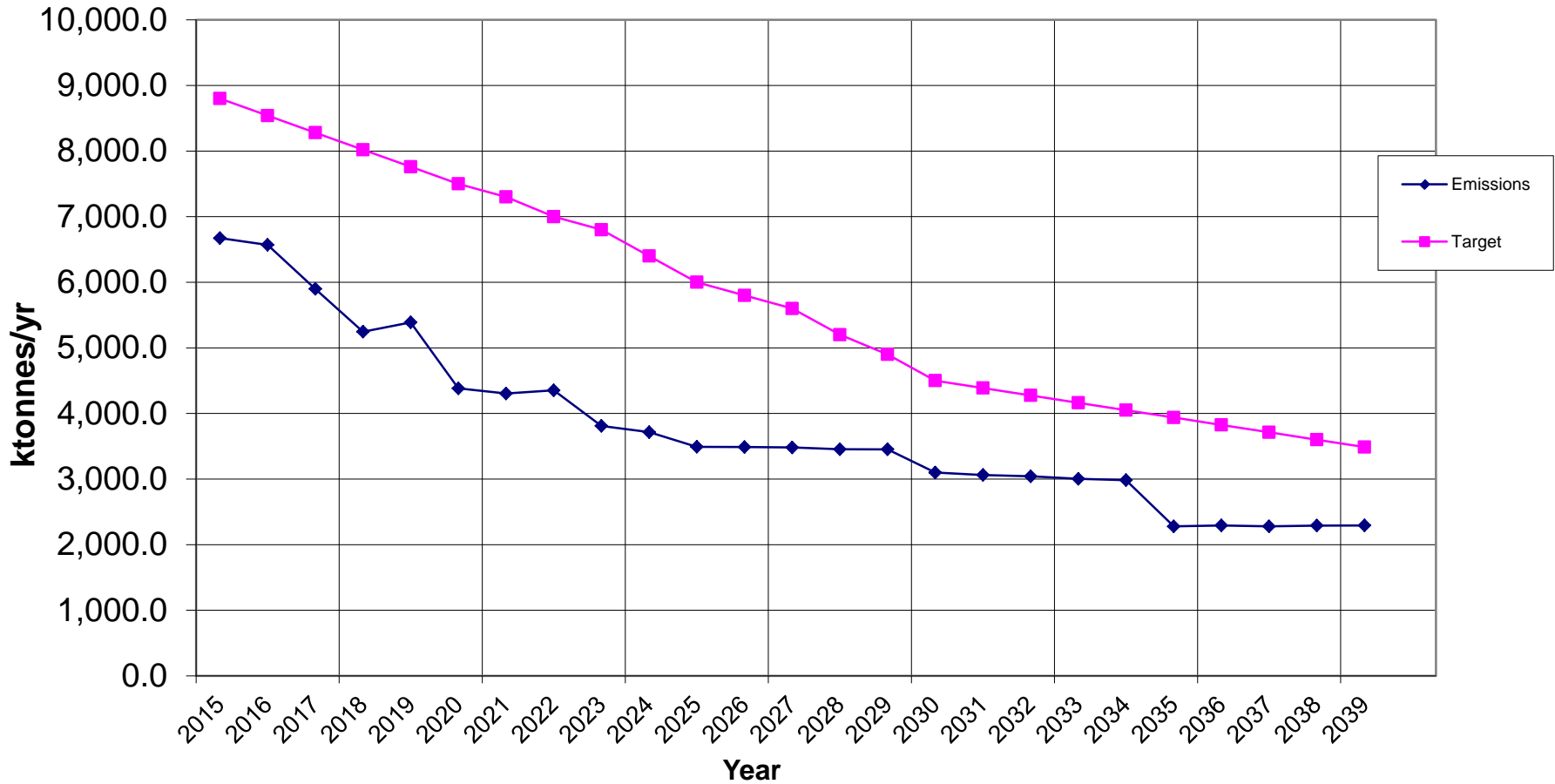
CRP7-5 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



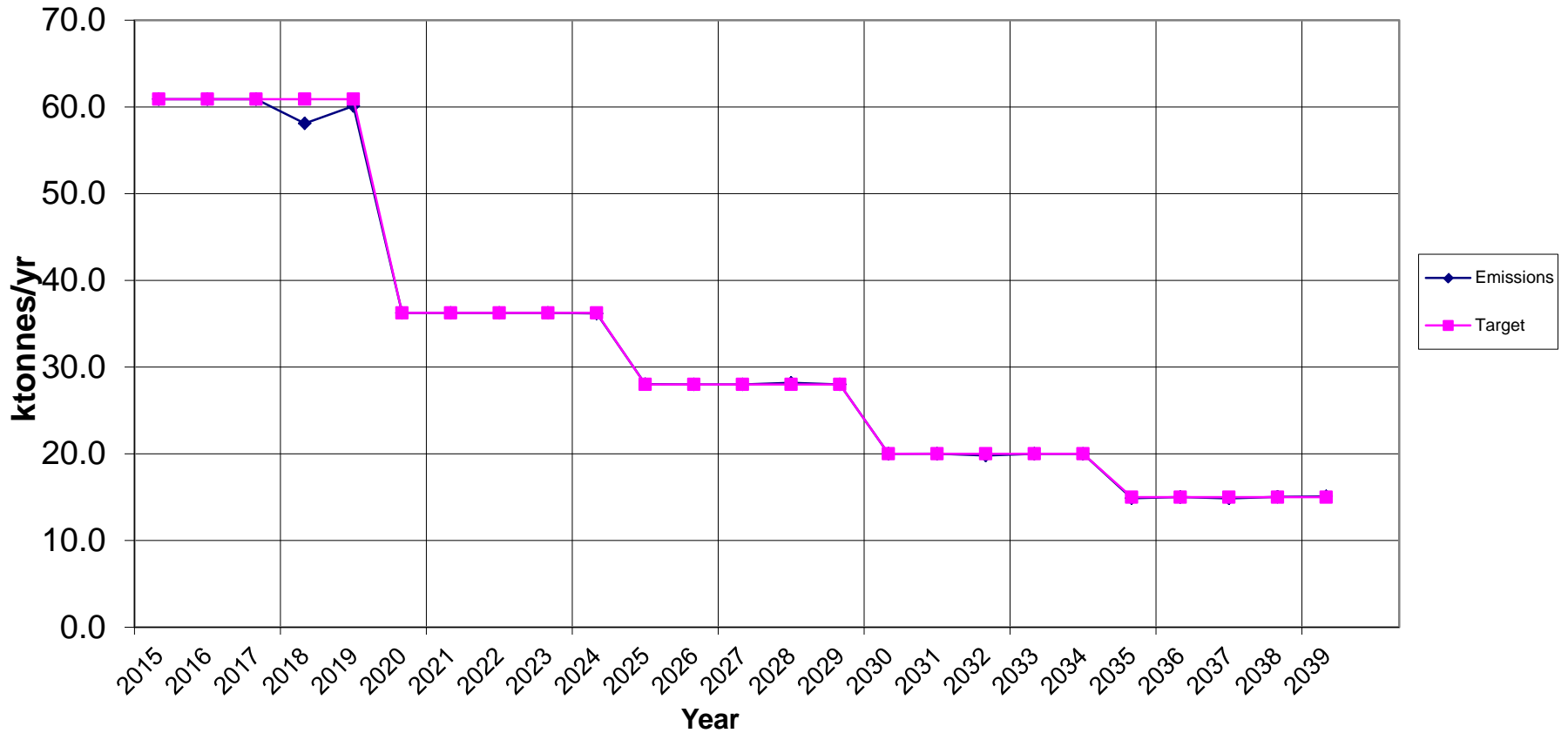
CRP7-5 Preliminary CO₂ Emissions

Projected CO2 Emissions



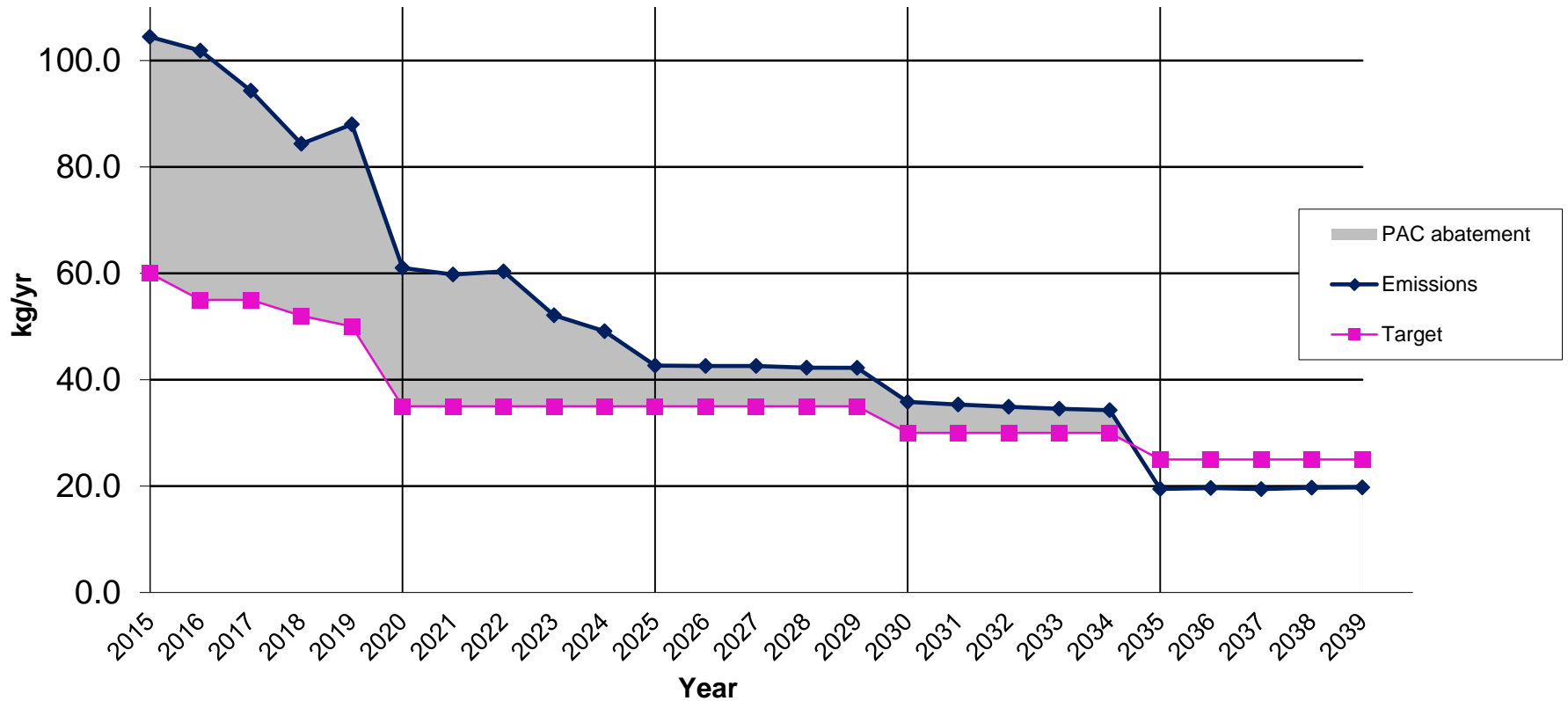
CRP7-5 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP7-5 Preliminary Mercury Emissions

Projected Mercury Emissions





CRP8 Preliminary Results

CRP8 Input Assumptions

Candidate Resource Plan 8 (CRP8):

- Base Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Minimum Coal Use
- High Wind (Wind integration: 5 x CT 50 MW and \$238M for reliability tie and transmission upgrades)
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP8 Preliminary Results

	CRP8-01-R01
	Least cost study period
2015	
2016	Demand Response - Water Heater
2017	ML Oct 2017 Lingan 2 Retire
2018	
2019	Mersey Phase 1
2020	Lingan 1 Retire PHBM 51.7 MW Firm
2021	TUC 1 Retire
2022	Wind Block 150 MW 2 x 50 MW CT (wind integration)
2023	Lingan 3 Retire Mersey Phase 2
2024	Lingan 4 Retire Wind Block 150 MW 3 x 50 MW CT (wind integration)
2025	
2026	
2027	
2028	TUC 2 Retire CT 50MW
2029	CT 50MW
2030	Trenton 5 Retire CT 50MW
2031	
2032	
2033	
2034	
2035	Tupper 2 Retire CT 50MW
2036	
2037	
2038	
2039	
Planning PV \$M	11,936
Study PV \$M	17,791

	Base DSM Program Adm Cost	Base DSM Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9



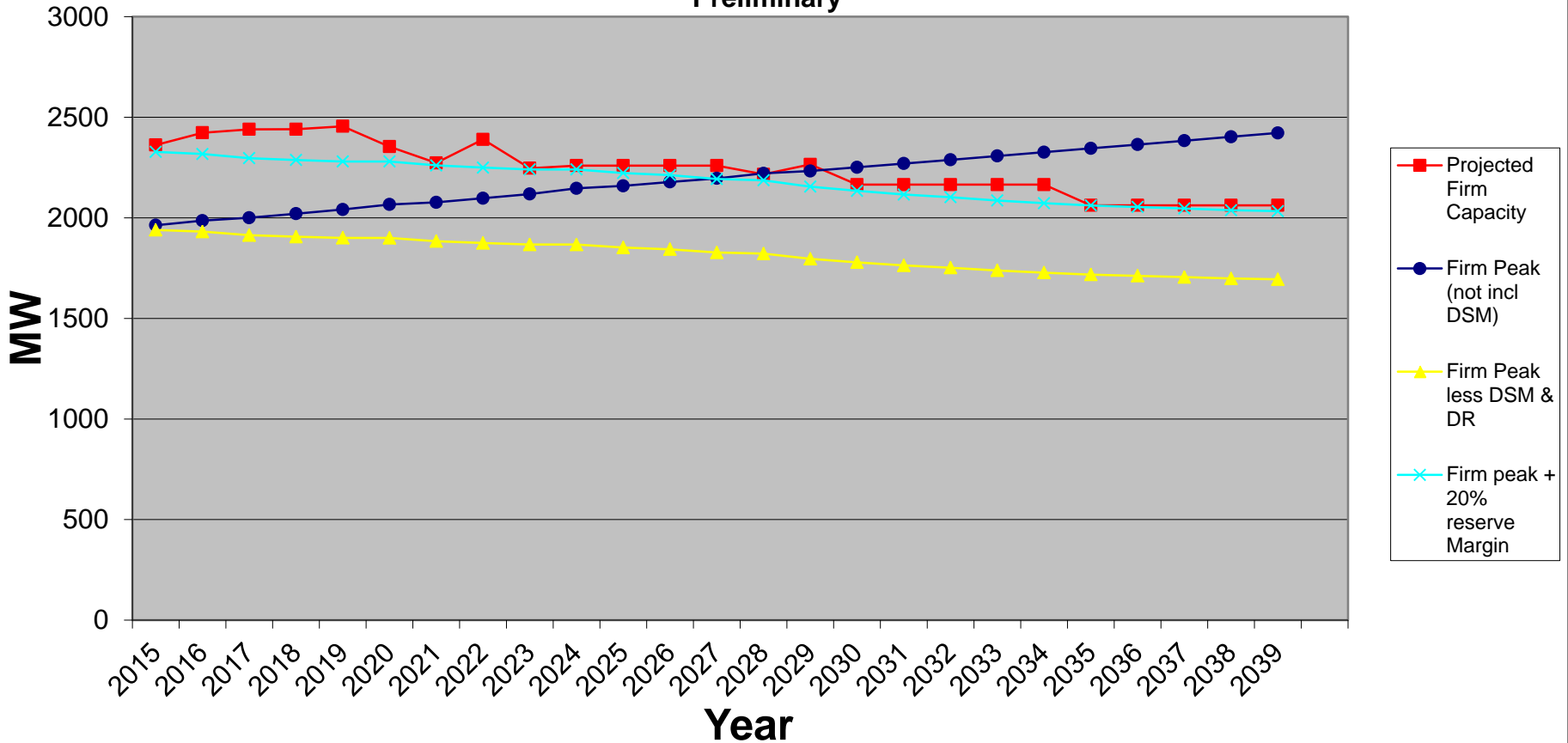
CRP8-1 Preliminary Results

CRP8-1 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction																	
Firm Peak Less DR	1,940	1,931	1,914	1,906	1,900	1,900	1,884	1,875	1,867	1,867	1,852	1,779	1,718	1,712	1,705	1,698	1,694
RM Required	388	386	383	381	380	380	377	375	373	373	370	355.7	343.6	342	341	340	339
Required MWs	2,328	2,317	2,296	2,287	2,280	2,280	2,261	2,250	2,241	2,241	2,223	2,134	2,062	2,054	2,046	2,038	2,033
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass						51.7											
Additional Wind								18		18							
Assumed Unit Retirement				-153		-153	-81		-158	-153		-150	-152				
Natural Gas Unit								98.8		148.1		49.4	49.4				
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	-101.3	-81.0	116.8	-143.0	13.1	0.0	-100.6	-102.6	0.0	0.0	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	12.4	-68.6	48.2	-94.8	-81.7	-81.7	-176.5	-279.1	-279.1	-279.1	-279.1	-279.1
Total Firm Capacity	2362	2423	2440	2440	2455	2354	2273	2390	2247	2260	2260	2165	2062	2062	2062	2062	2062
Surplus (Deficit) MWs above RM	34	106	143	153	175	74	12	140	6	19	37	31	1	8	16	24	29
Reserve Margin %	21.8%	25.5%	27.5%	28.0%	29.2%	23.9%	20.6%	27.5%	20.3%	21.0%	22.0%	21.7%	20.0%	20.5%	20.9%	21.4%	21.7%

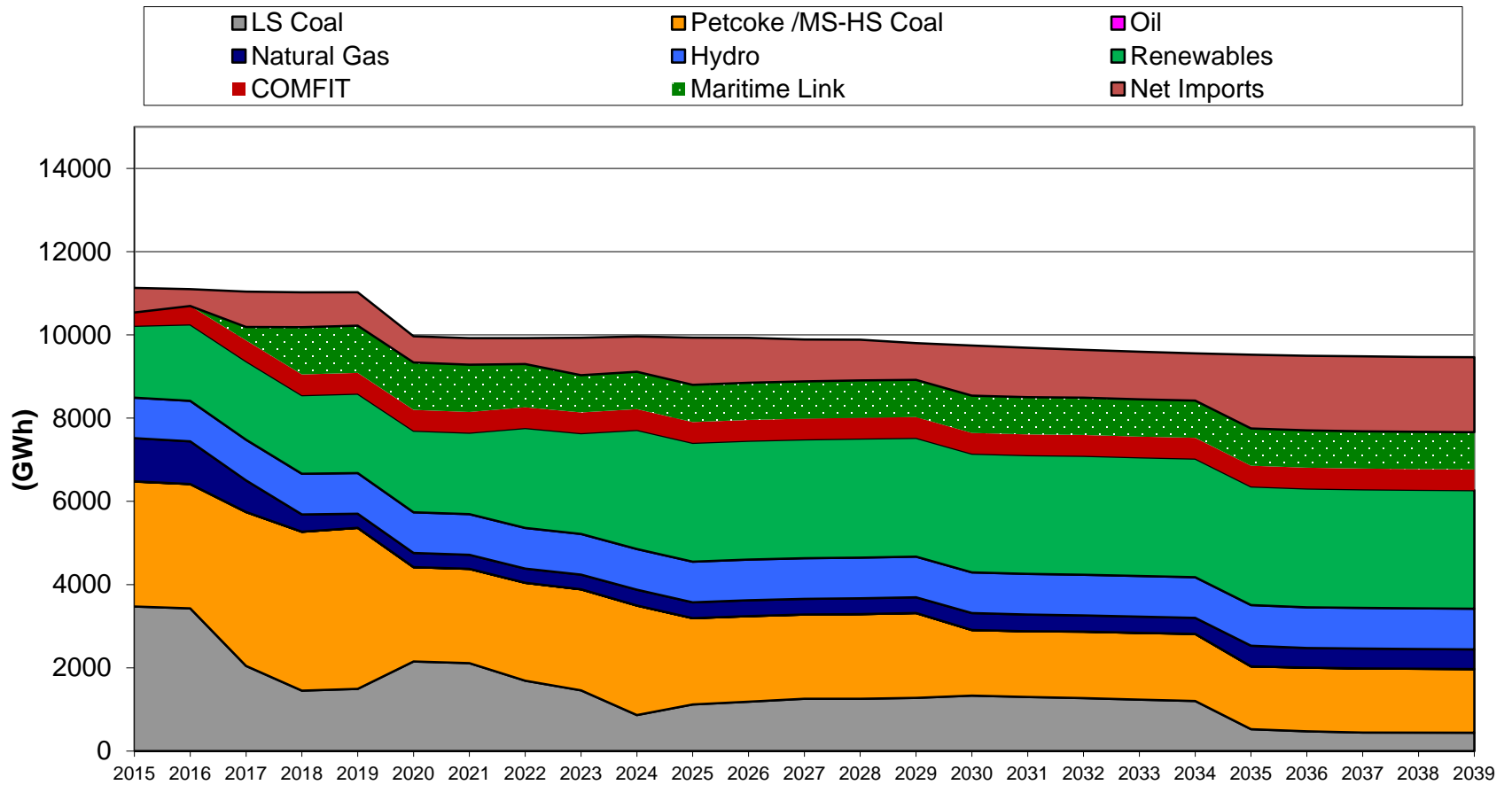
CRP8-1 Preliminary Demand and DSM

Projected System Peak Demand (Total & Firm) Preliminary



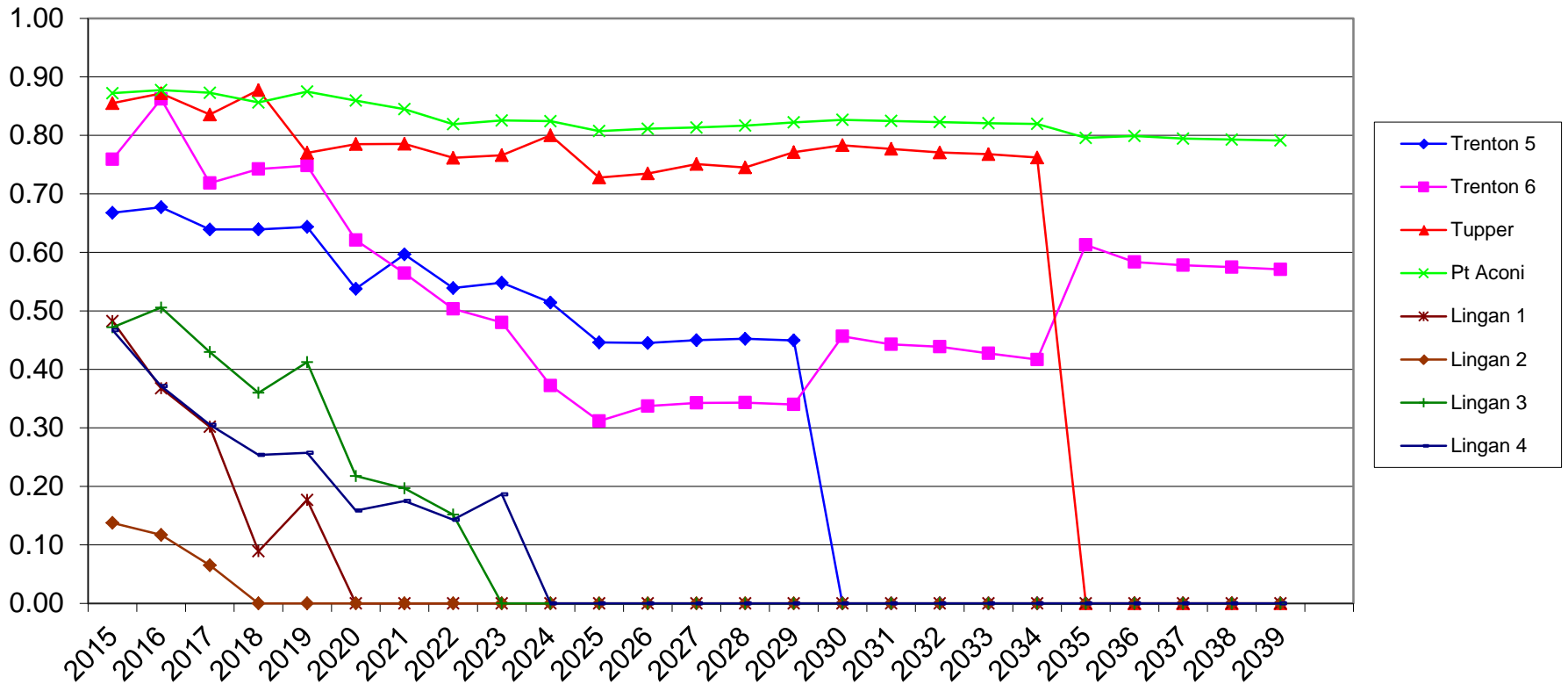
CRP8-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



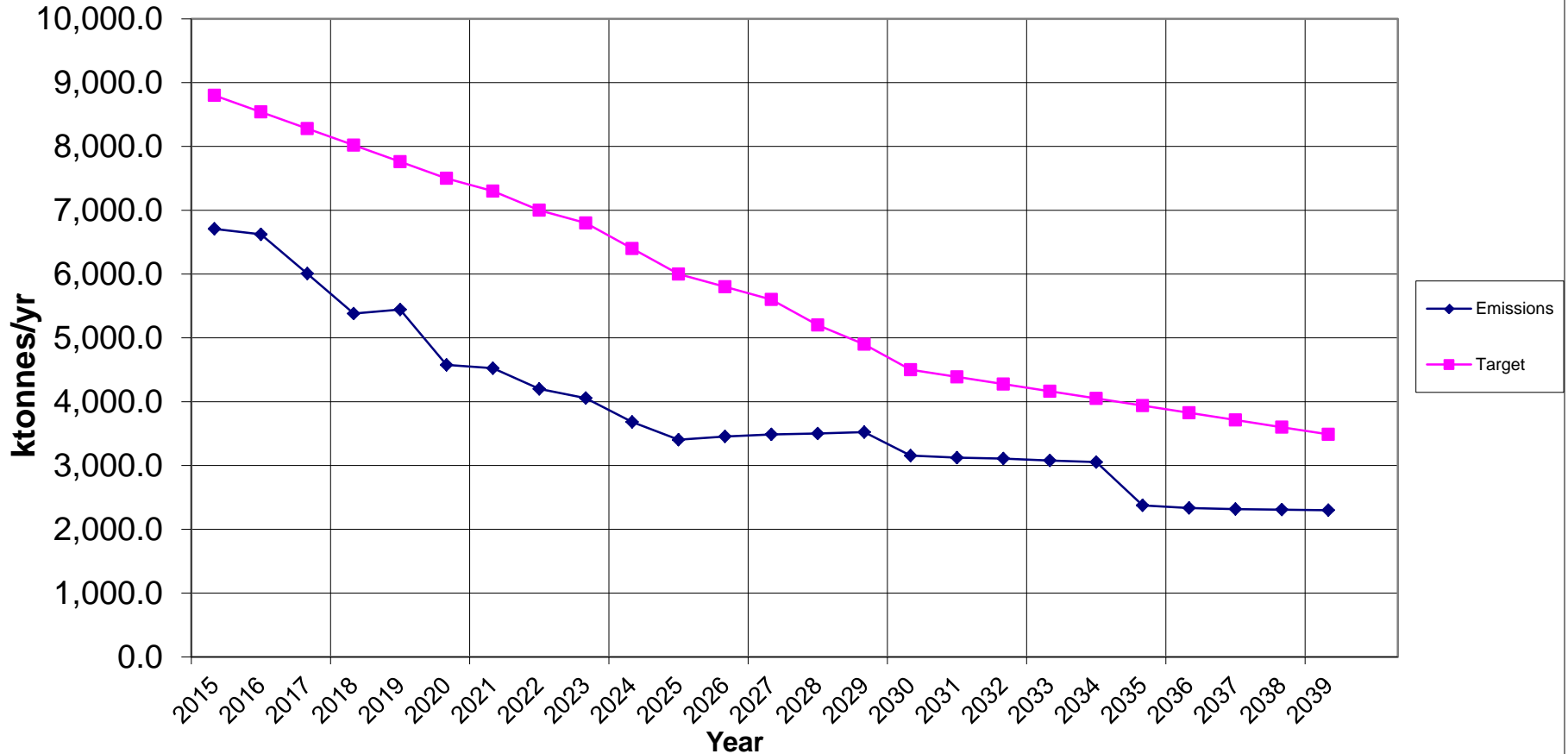
CRP8-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



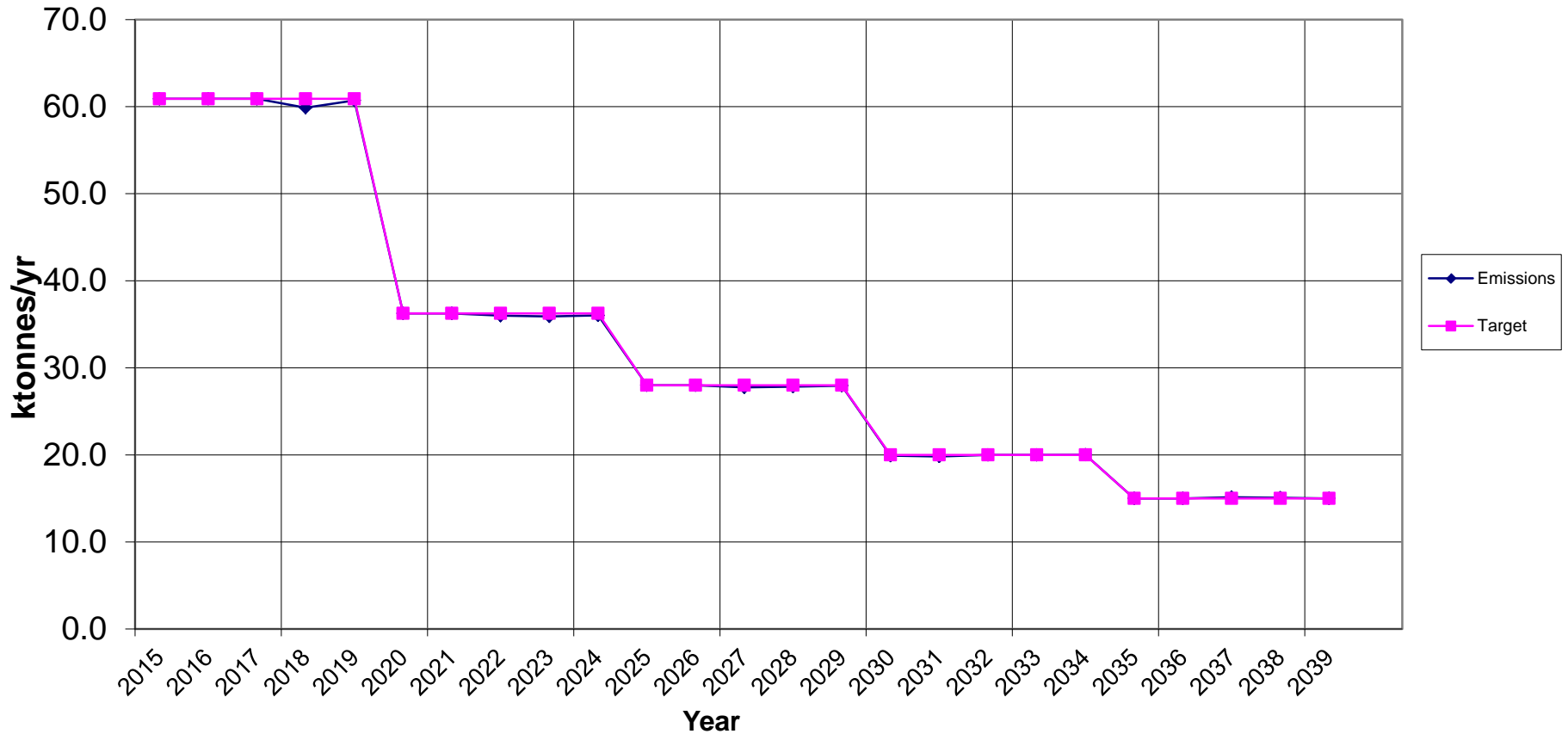
CRP8-1 Preliminary CO₂ Emissions

Projected CO₂ Emissions



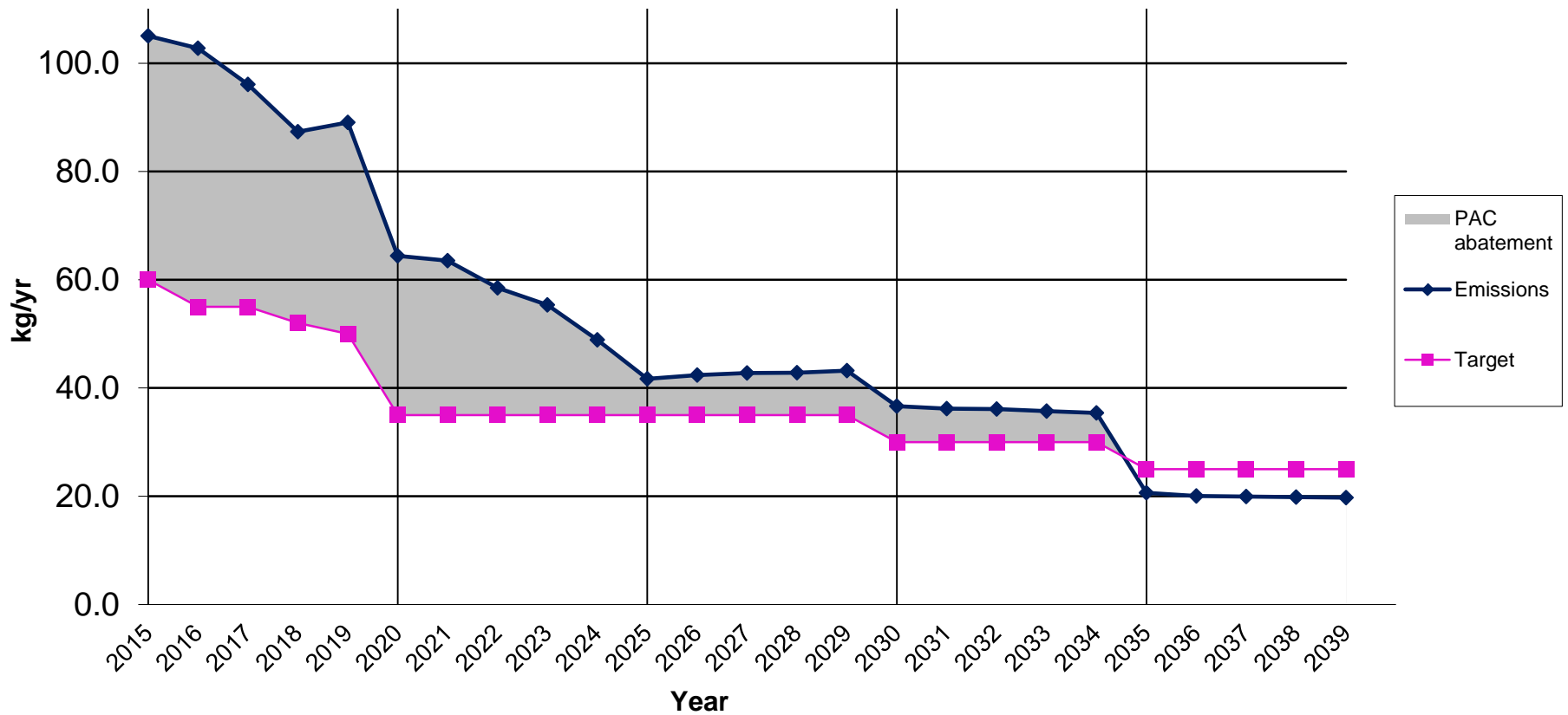
CRP8-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP8-1 Preliminary Mercury Emissions

Projected Mercury Emissions





CRP9 Preliminary Results

CRP9 Input Assumptions

Candidate Resource Plan 9 (CRP9):

- Base Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Minimum Coal Use
- Medium Wind (Wind integration: 2 x CT 50 MW and \$200M for reliability tie and transmission upgrades)
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP9 Preliminary Results

	CRP9-01-R01	CRP9-03-R01
	Least cost study period	Least cost in planning period
2015		
2016	DR Water H & DR Comm	DR Water H & DR Comm
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019	Mersey Phase 1	Mersey Phase 1
2020	Lingan 1 Retire PHBM 51.7 MW Firm	Lingan 1 Retire PHBM 51.7 MW Firm
2021	TUC 1 Retire	TUC 1 Retire
2022		
2023	Lingan 3 Retire Mersey Phase 2 Wind Block 150 MW 2 x 50 MW CT (wind integration)	Lingan 3 Retire Mersey Phase 2 Wind Block 150 MW 2 x 50 MW CT (wind integration)
2024	Lingan 4 Retire CC 145 MW	Lingan 4 Retire CT 34 MW & 2 x CT 50 MW
2025		
2026		
2027		
2028	TUC 2 Retire CT 50MW	TUC 2 Retire CT 34 MW
2029		
2030	Trenton 5 Retire 2 x CT 50MW	Trenton 5 Retire 2 x CT 50MW
2031		
2032		
2033		
2034		
2035	Tupper 2 Retire CT 50MW	Tupper 2 Retire CT 34 MW & CT 50 MW
2036		
2037		
2038		
2039		
Planning PV \$M	11,896	11,878
Study PV \$M	17,787	17,796

	Base DSM Program Adm Cost	Base DSM Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9

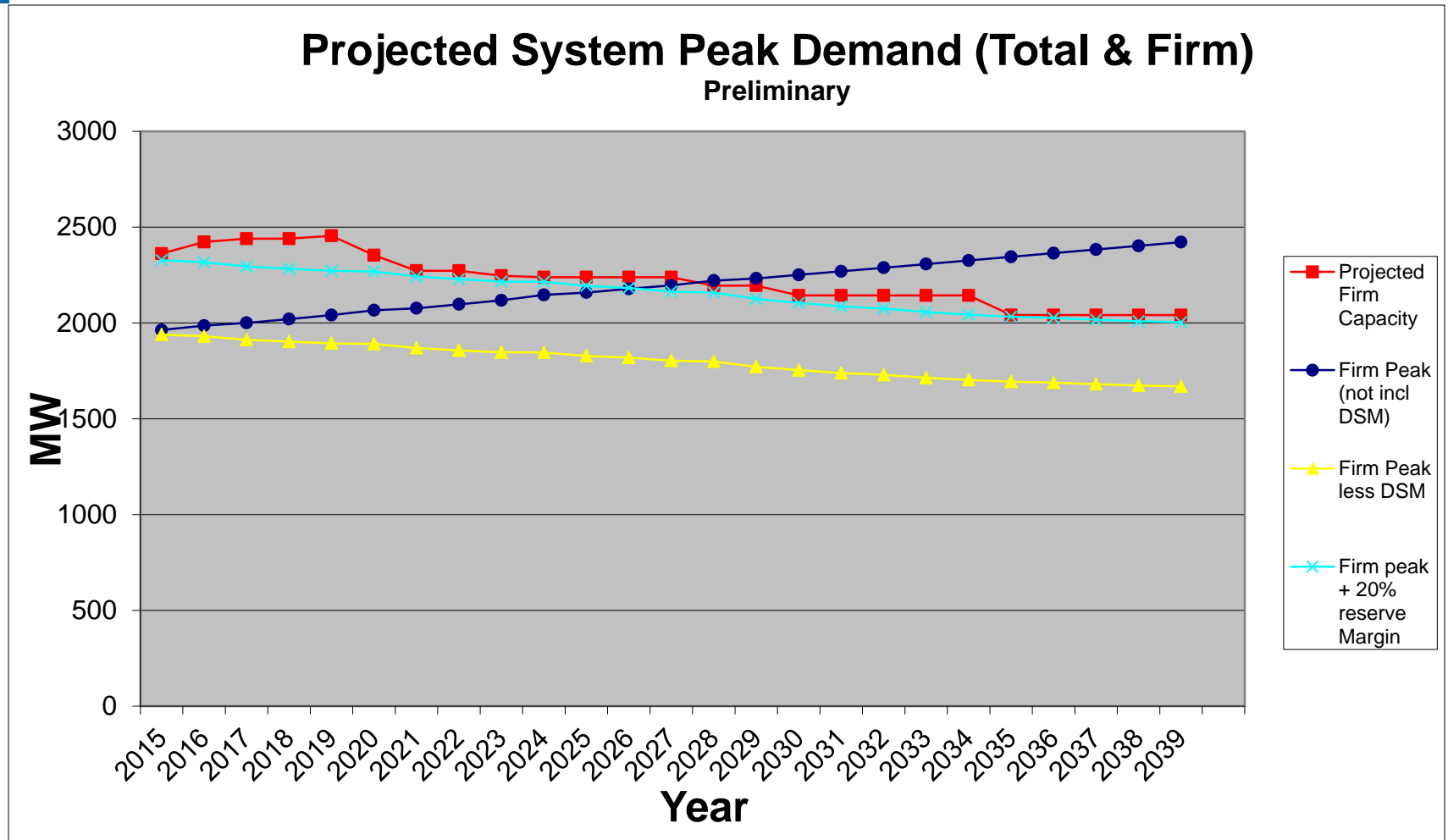


CRP9-1 Preliminary Results

CRP9-1 Preliminary Load and Resources

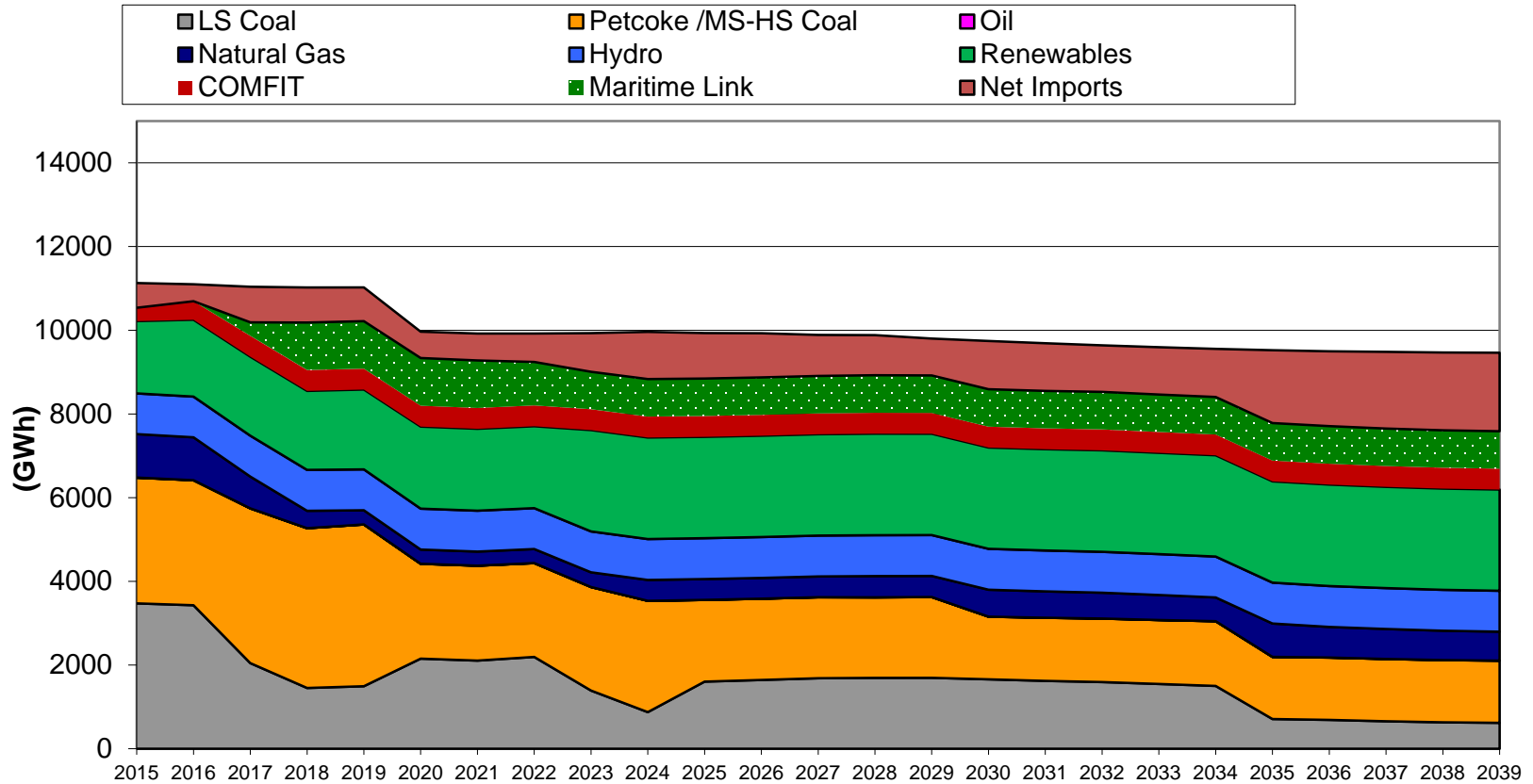
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	1	4	7	10	14	18	20	21	24	24	24	23	24	24	24
Firm Peak Less DR	1,940	1,931	1,912	1,903	1,894	1,890	1,870	1,857	1,847	1,846	1,828	1,754	1,693	1,689	1,681	1,674	1,670
RM Required	388	386	382	381	379	378	374	371	369	369	366	350.8	338.7	338	336	335	334
Required MWs	2,328	2,317	2,295	2,283	2,272	2,269	2,244	2,229	2,216	2,215	2,194	2,105	2,032	2,026	2,017	2,009	2,004
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REAWind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass						51.7											
Additional Wind									18								
Assumed Unit Retirement				-153		-153	-81		-158	-153		-150	-152				
Natural Gas Unit									98.8	145		98.8	49.4				
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	-101.3	-81.0	0.0	-26.2	-8.0	0.0	-51.2	-102.6	0.0	0.0	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	12.4	-68.6	-68.6	-94.8	-102.8	-102.8	-197.6	-300.2	-300.2	-300.2	-300.2	-300.2
Total Firm Capacity	2362	2423	2440	2440	2455	2354	2273	2273	2247	2239	2239	2144	2041	2041	2041	2041	2041
Surplus (Deficit) MWs above RM	34	106	145	157	183	85	29	44	30	23	45	39	9	15	24	33	38
Reserve Margin %	21.8%	25.5%	27.6%	28.3%	29.6%	24.5%	21.6%	22.4%	21.6%	21.3%	22.5%	22.2%	20.5%	20.9%	21.4%	21.9%	22.3%

CRP9-1 Preliminary Demand and DSM



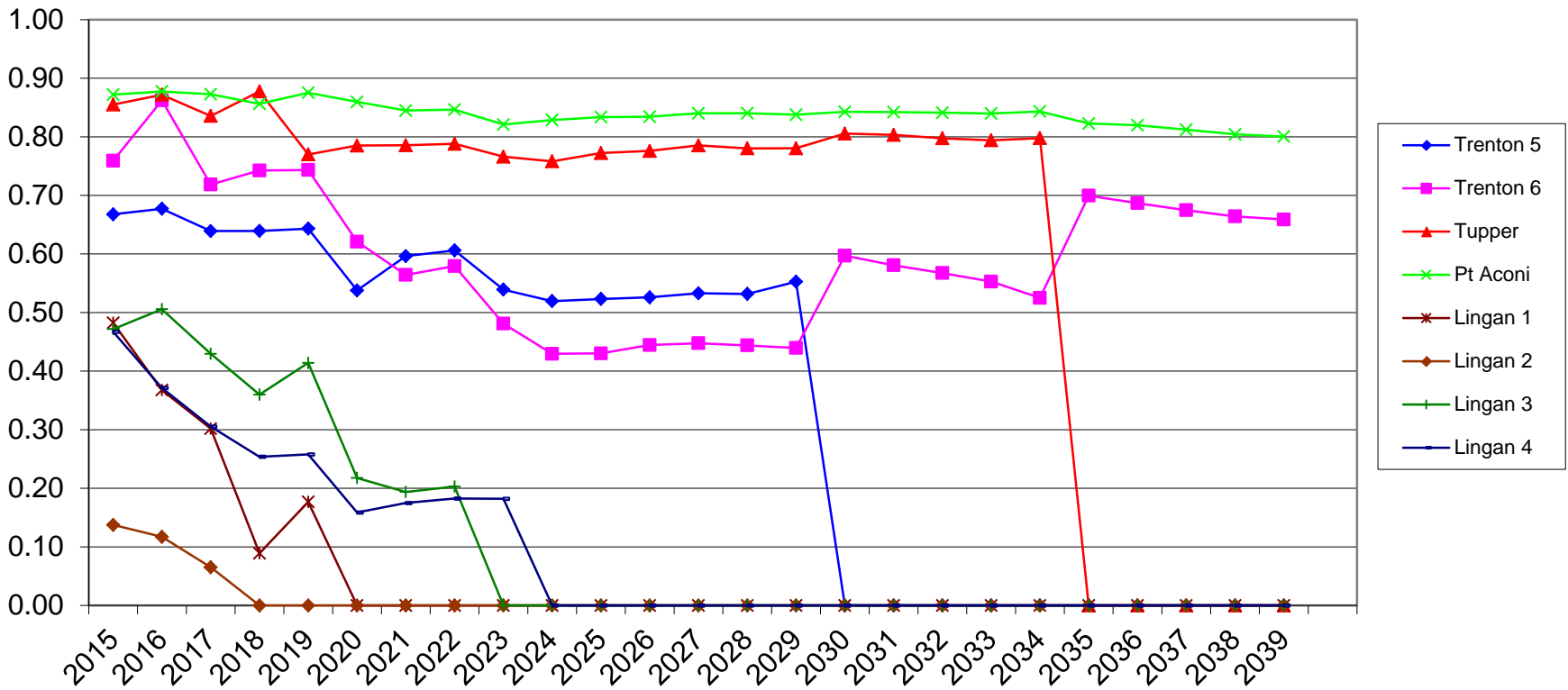
CRP9-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



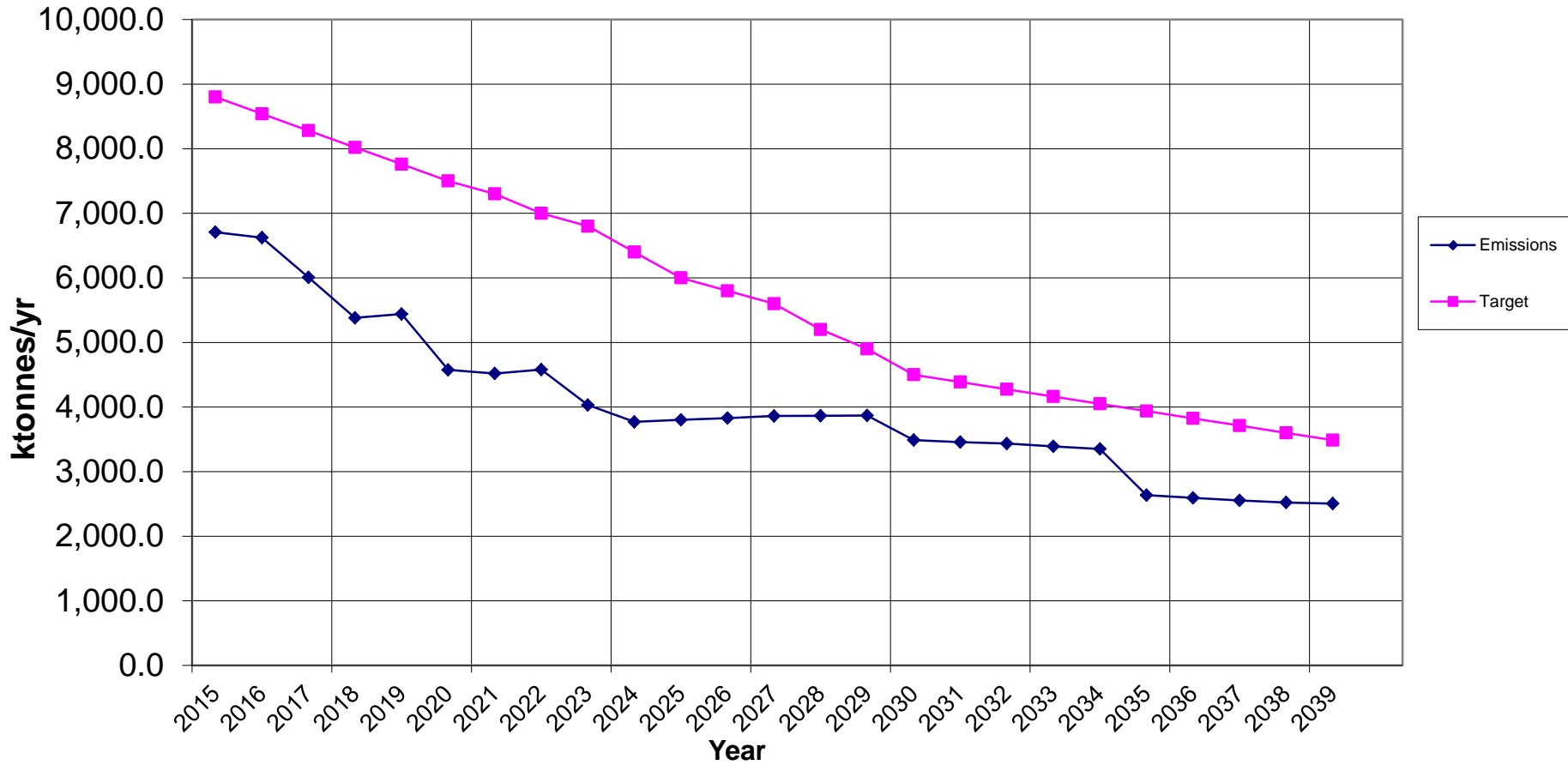
CRP9-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



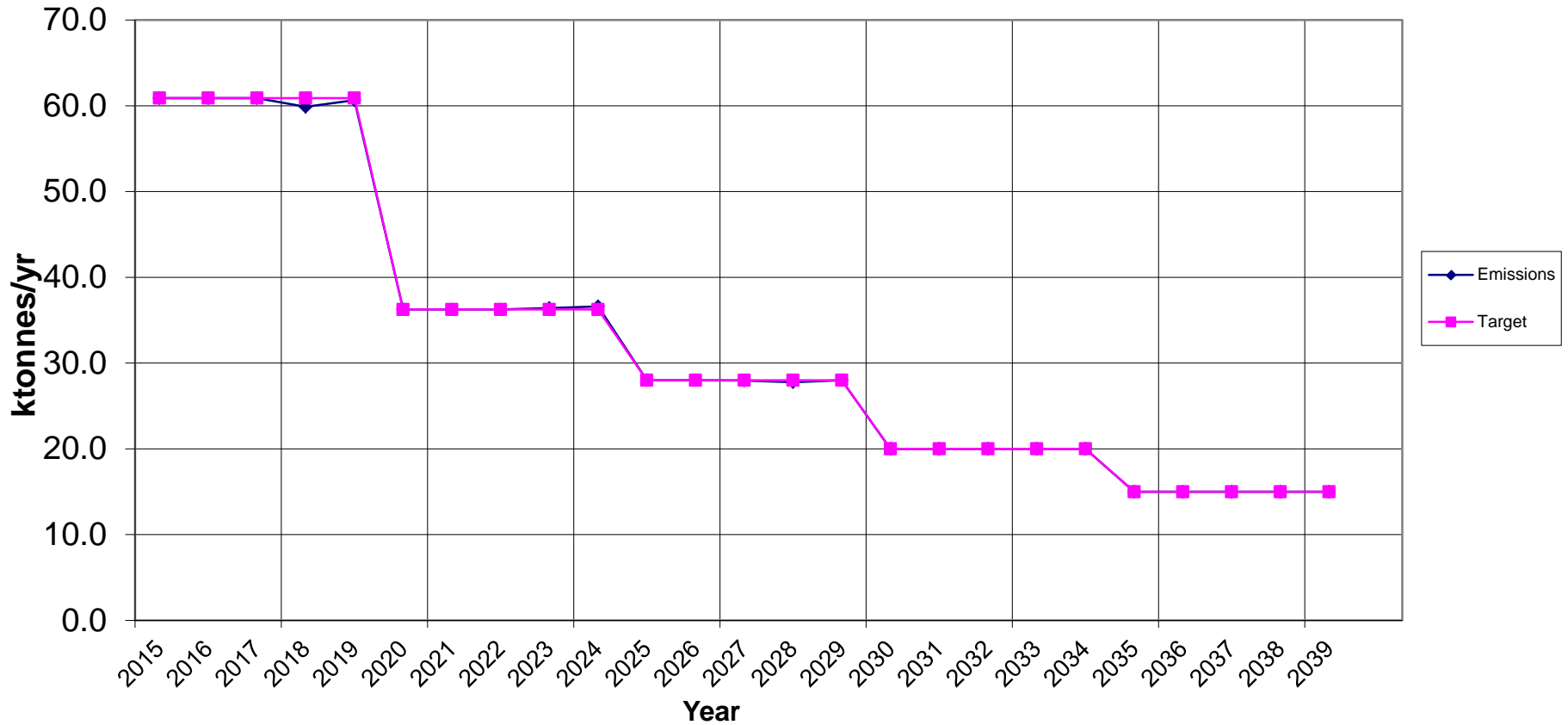
CRP9-1 Preliminary CO₂ Emissions

Projected CO2 Emissions



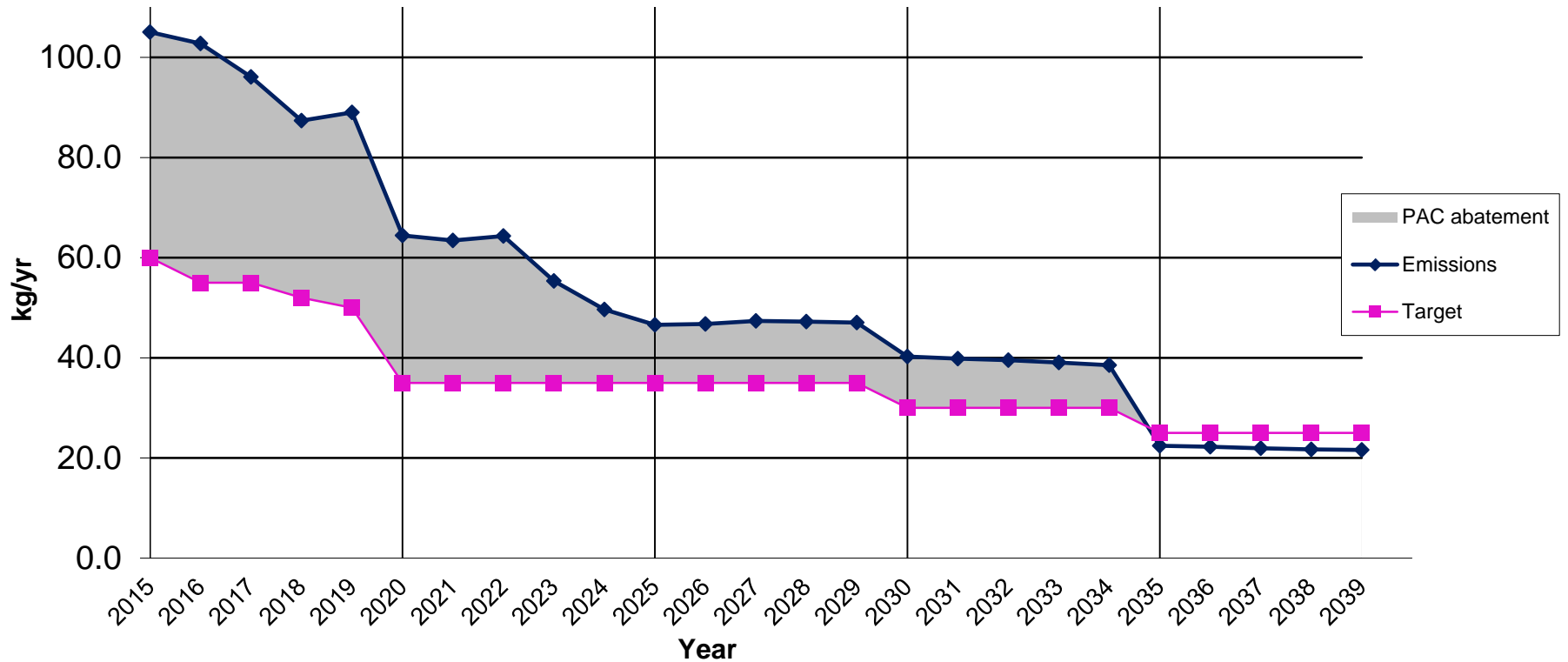
CRP9-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP9-1 Preliminary Mercury Emissions

Projected Mercury Emissions



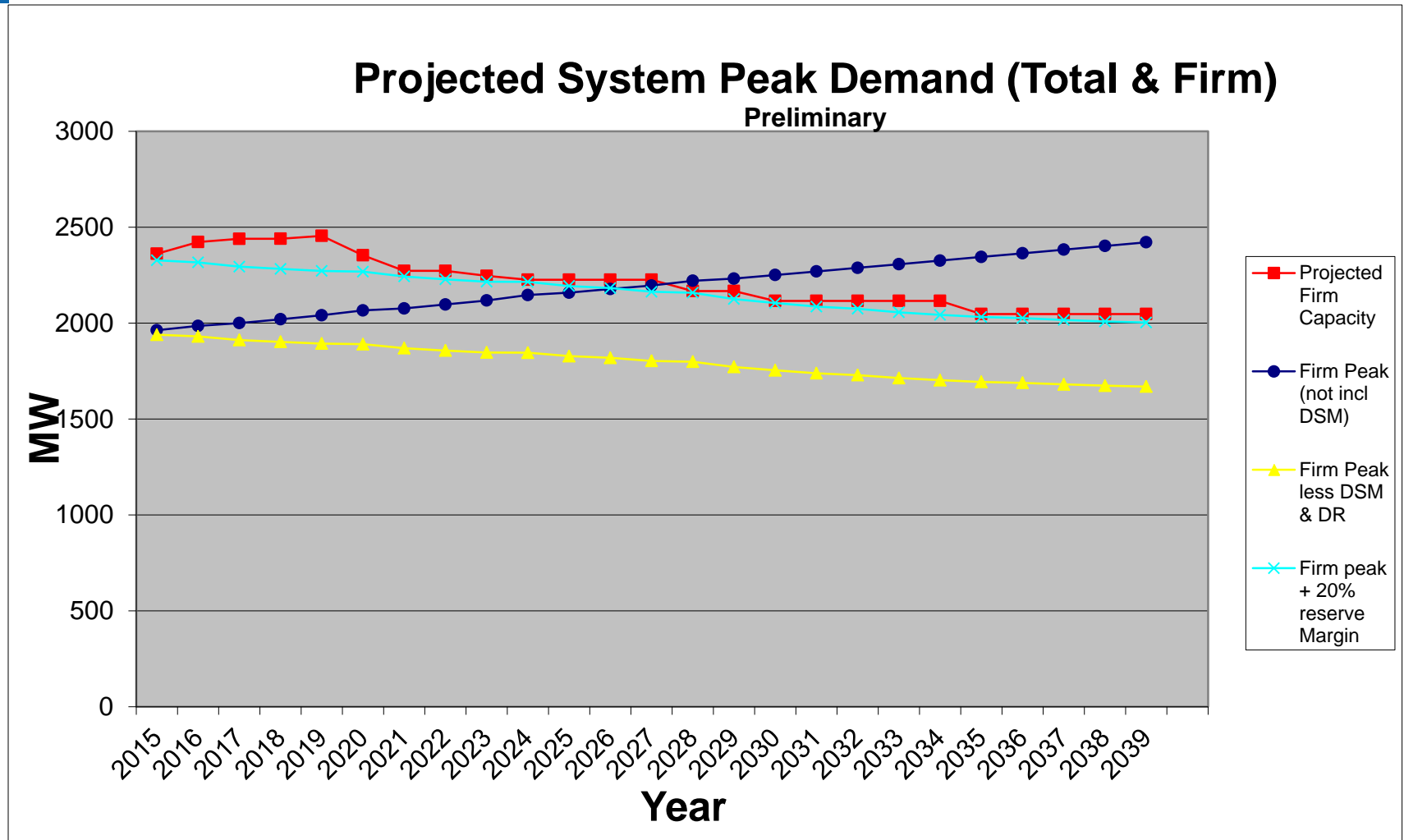


CRP9-3 Preliminary Results

CRP9-3 Preliminary Load and Resources

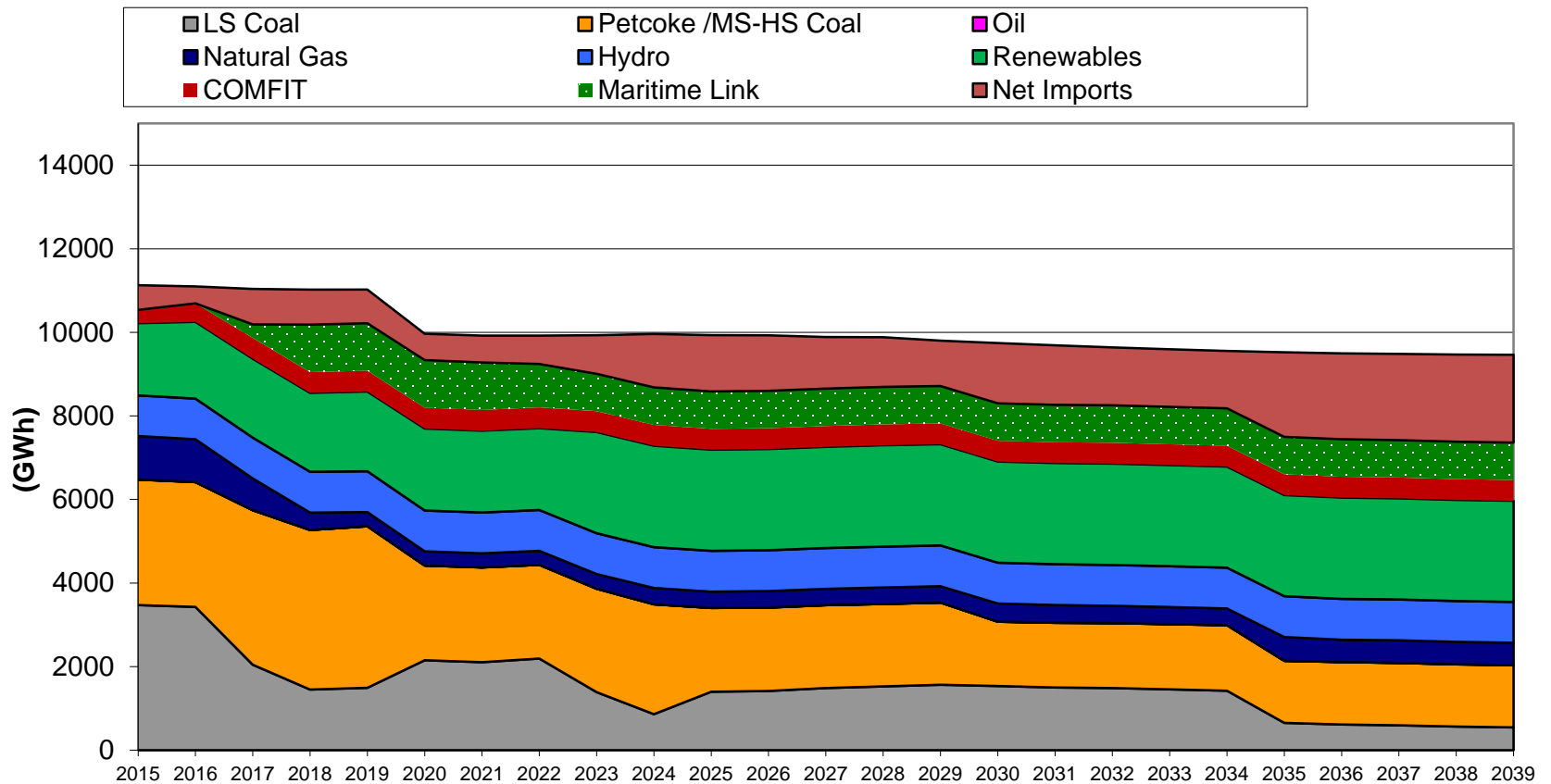
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	1	4	7	10	14	18	20	21	24	24	24	23	24	24	24
Firm Peak Less DR	1,940	1,931	1,912	1,903	1,894	1,890	1,870	1,857	1,847	1,846	1828	1754	1693	1,689	1,681	1,674	1,670
RM Required	388	386	382	381	379	378	374	371	369	369	366	350.8	338.7	338	336	335	334
Required MWs	2,328	2,317	2,295	2,283	2,272	2,269	2,244	2,229	2,216	2,215	2194	2105	2032	2,026	2,017	2,009	2,004
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass						51.7											
Additional Wind									18								
Assumed Unit Retirement				-153		-153	-81		-158	-153		-150	-152				
Natural Gas Unit									98.8	132.8		98.8	83.4				
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	-101.3	-81.0	0.0	-26.2	-20.2	0.0	-51.2	-68.6	0.0	0.0	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	12.4	-68.6	-68.6	-94.8	-115.0	-115.0	-225.2	-293.8	-293.8	-293.8	-293.8	-293.8
Total Firm Capacity	2362	2423	2440	2440	2455	2354	2273	2273	2247	2226	2226	2116	2048	2048	2048	2048	2048
Surplus (Deficit) MWs above RM	34	106	145	157	183	85	29	44	30	11	33	11	15	21	31	39	44
Reserve Margin %	21.8%	25.5%	27.6%	28.3%	29.6%	24.5%	21.6%	22.4%	21.6%	20.6%	21.8%	20.6%	20.9%	21.3%	21.8%	22.3%	22.6%

CRP9-3 Preliminary Demand and DSM



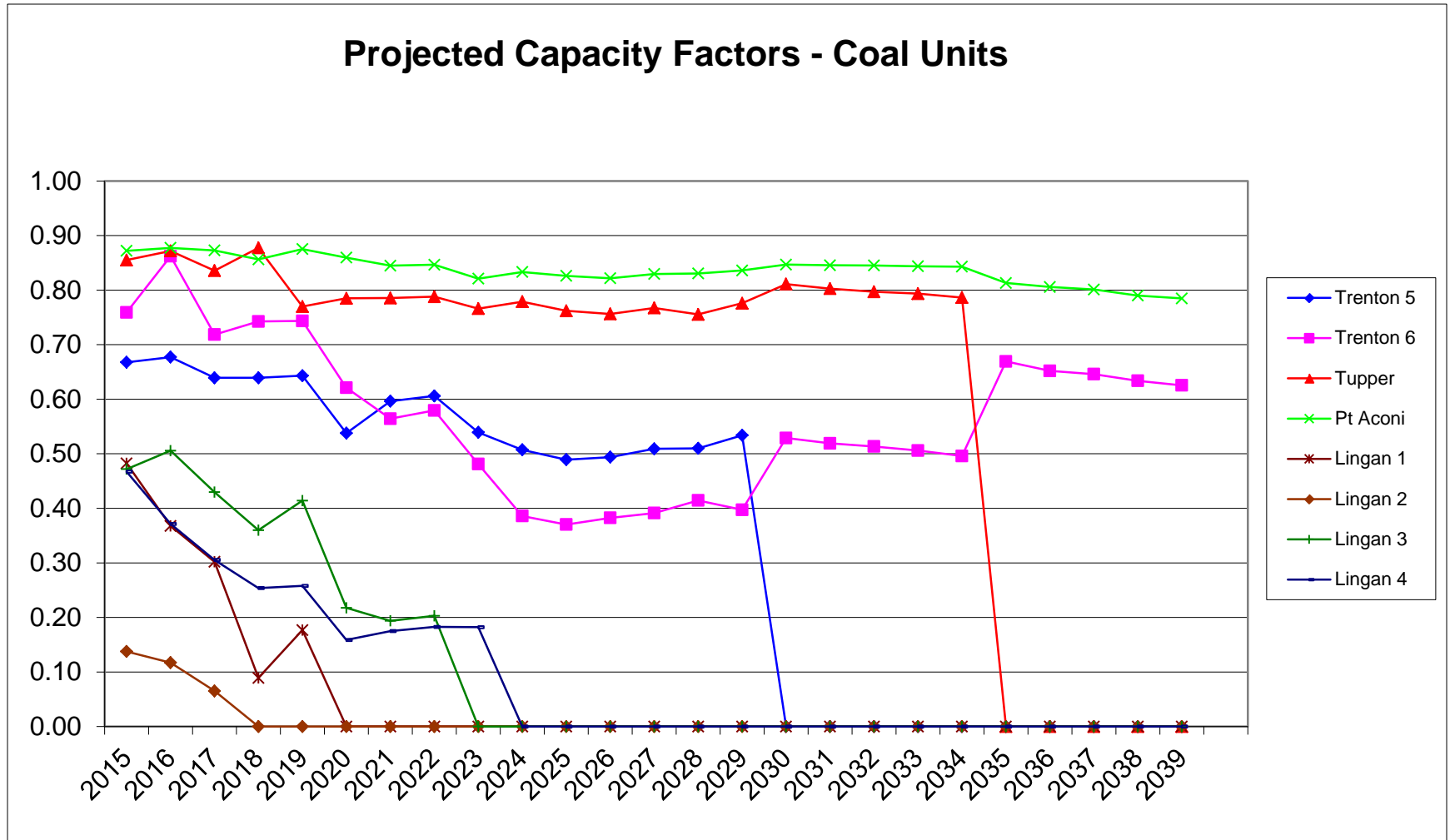
CRP9-3 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



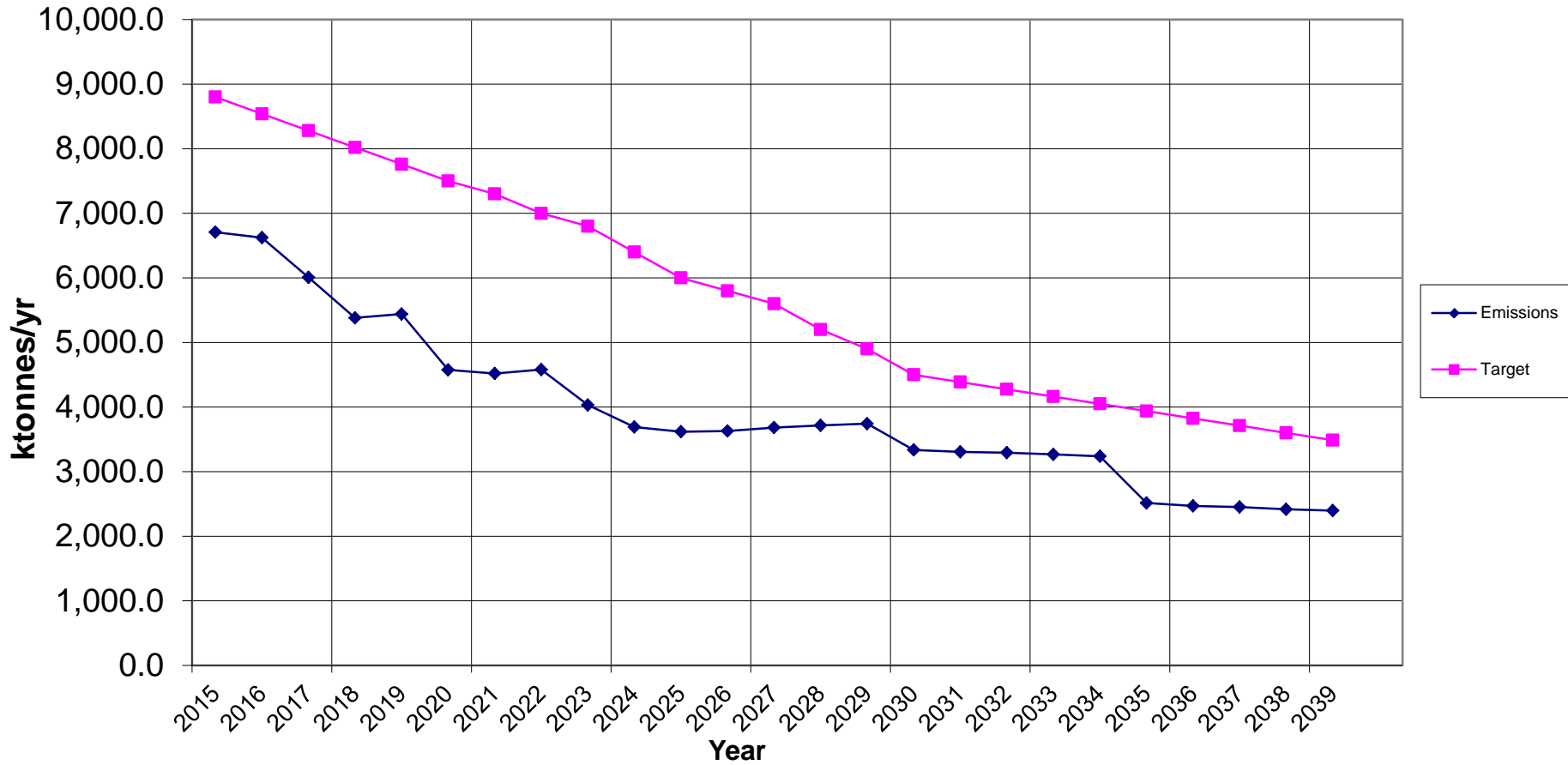
CRP9-3 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



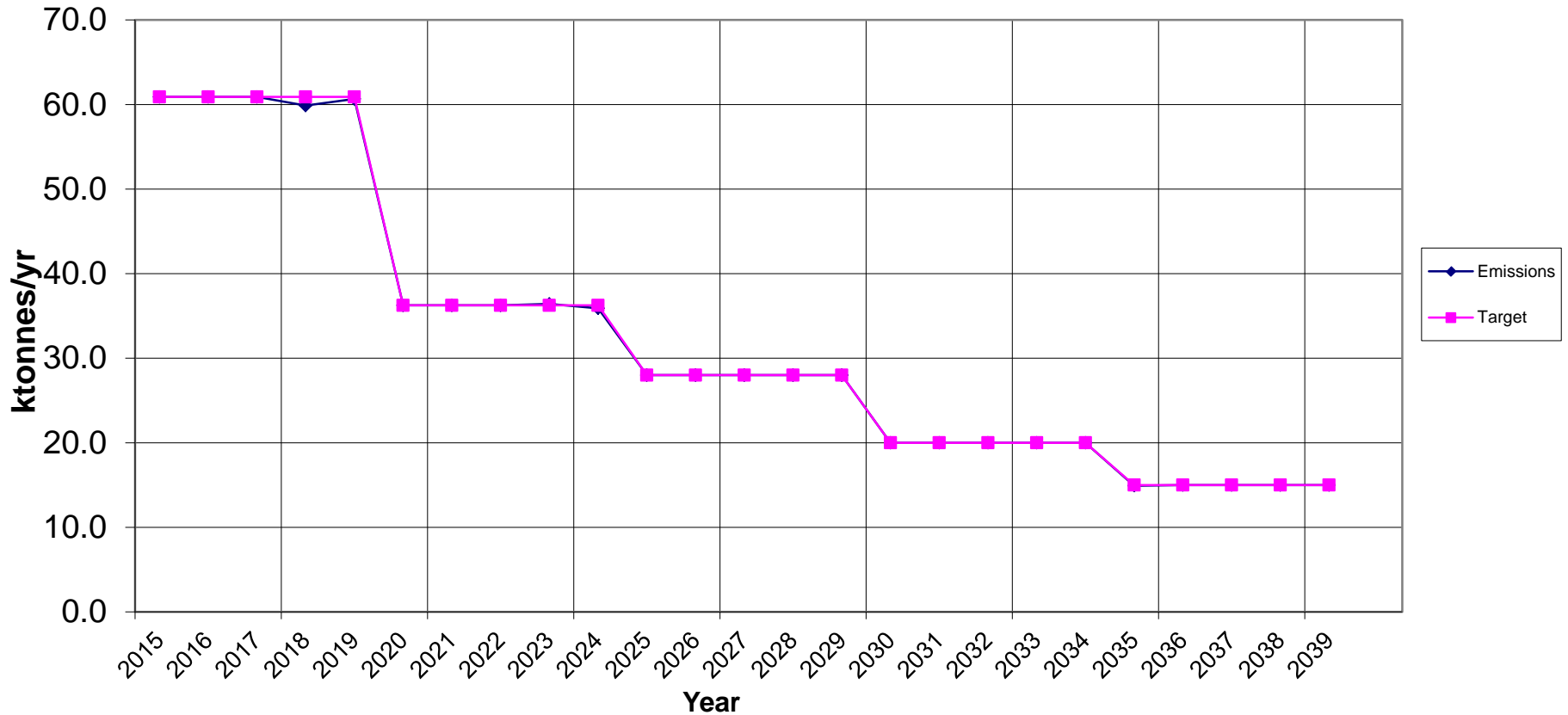
CRP9-3 Preliminary CO₂ Emissions

Projected CO2 Emissions



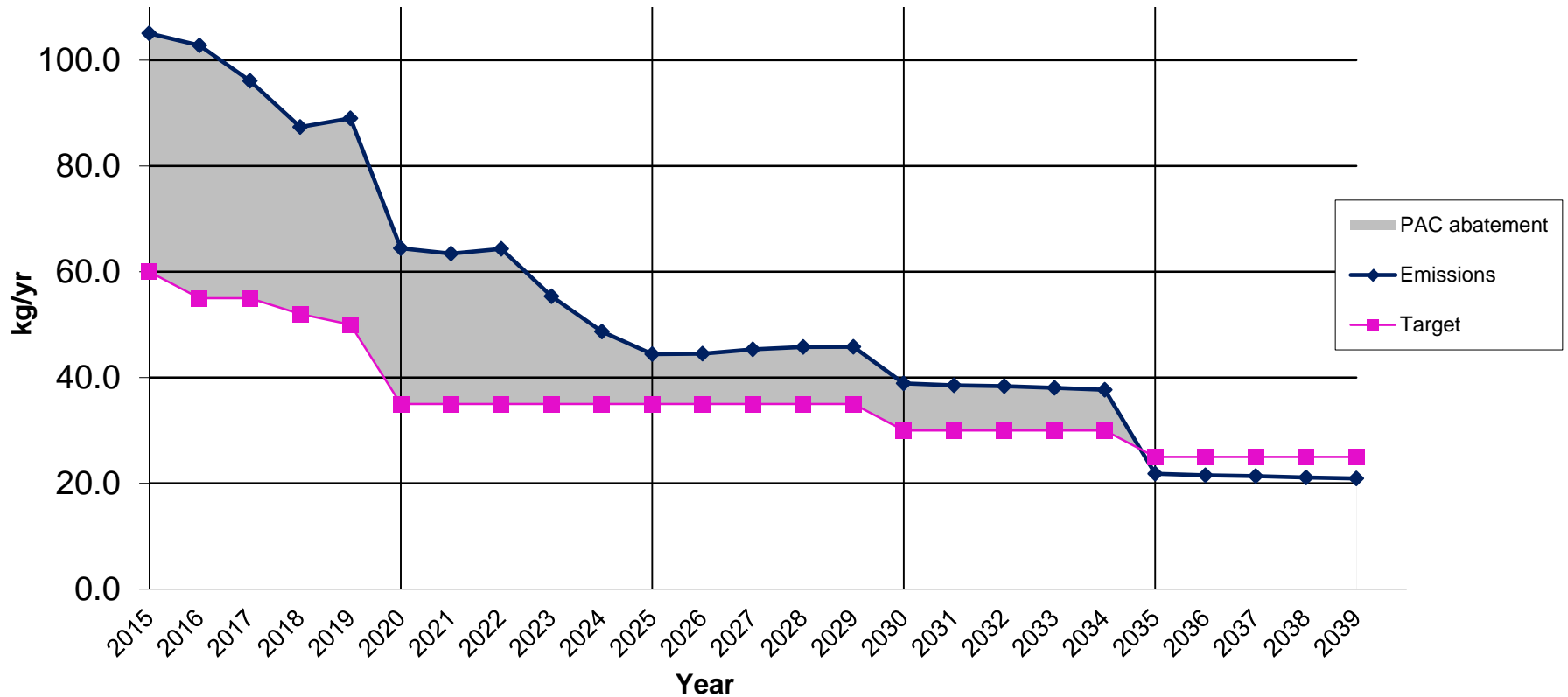
CRP9-3 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP9-3 Preliminary Mercury Emissions

Projected Mercury Emissions





CRP9WC Preliminary Results

CRP9WC Input Assumptions

Candidate Resource Plan 9 Wind Firm Capacity (CRP9WC):

- Base Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Minimum Coal Use
- Medium Wind (Wind integration: 2 x CT 50 MW and \$200M for reliability tie and transmission upgrades)
- Firm capacity credit for all wind assumed to be 24.1%
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP9WC Preliminary Results

CRP9WC-02-R01	
Least cost planning period	
2015	(All Wind 24.1% Firm Capacity Credit)
2016	DR Water H & DR Comm
2017	ML Oct 2017 Lin 2 retire
2018	
2019	Mersey Phase 1
2020	Lingan 1 Retire PHBM 51.7 MW Firm
2021	TUC 1 Retire
2022	
2023	Lingan 3 Retire Mersey Phase 2 Wind Block 150 MW 2 x 50 MW CT (wind integration)
2024	Lingan 4 Retire CT 50MW
2025	
2026	
2027	
2028	TUC 2 Retire CT 50MW
2029	
2030	Trenton 5 Retire CT 50MW & CT 34MW
2031	
2032	
2033	
2034	
2035	Tupper 2 Retire CT 50MW & CT 34MW
2036	
2037	
2038	
2039	
Planning PV \$M	11,797
Study PV \$M	17,664

	Base DSM	Base DSM
	Program Adm Cost	Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9



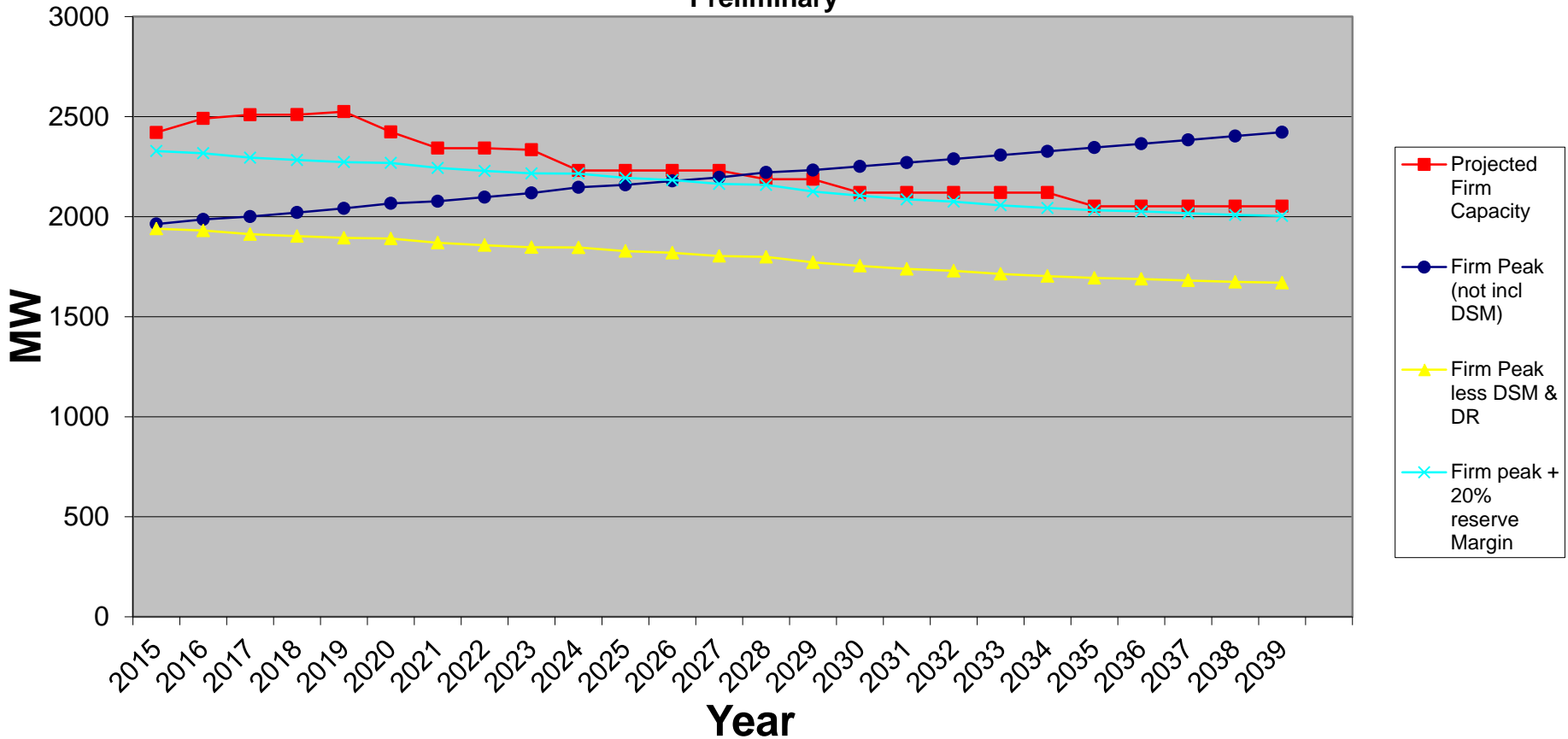
CRP9WC-2 Preliminary Results

CRP9WC-2 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	1	4	7	10	14	18	20	21	24	24	24	23	24	24	24
Firm Peak Less DR	1,940	1,931	1,912	1,903	1,894	1,890	1,870	1,857	1,847	1,846	1828	1754	1693	1,689	1,681	1,674	1,670
RM Required	388	386	382	381	379	378	374	371	369	369	366	350.8	338.7	338	336	335	334
Required MWs	2,328	2,317	2,295	2,283	2,272	2,269	2,244	2,229	2,216	2,215	2194	2105	2032	2,026	2,017	2,009	2,004
Existing MWs	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393	2393
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	20.04	6.47	7.2														
REA Wind	3.33	24.58															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass						51.7											
Additional Wind									36.15								
Assumed Unit Retirement				-153		-153	-81		-158	-153		-150	-152				
Natural Gas Unit									98.7	49.4		83.4	83.4				
Total Annual Additions	27.6	70.1	19.0	0.3	15.0	-101.3	-81.0	0.0	-8.1	-103.6	0.0	-66.6	-68.6	0.0	0.0	0.0	0.0
Total Cumulative Additions	27.6	97.6	116.6	116.8	131.8	30.5	-50.5	-50.5	-58.6	-162.2	-162.2	-272.4	-341.0	-341.0	-341.0	-341.0	-341.0
Total Firm Capacity	2420	2490	2509	2510	2525	2423	2342	2342	2334	2231	2231	2120	2052	2052	2052	2052	2052
Surplus (Deficit) MWs above RM	93	174	215	227	252	155	99	114	118	15	37	15	20	25	35	43	48
Reserve Margin %	24.8%	29.0%	31.2%	31.9%	33.3%	28.2%	25.3%	26.1%	26.4%	20.8%	22.0%	20.9%	21.2%	21.5%	22.1%	22.6%	22.9%

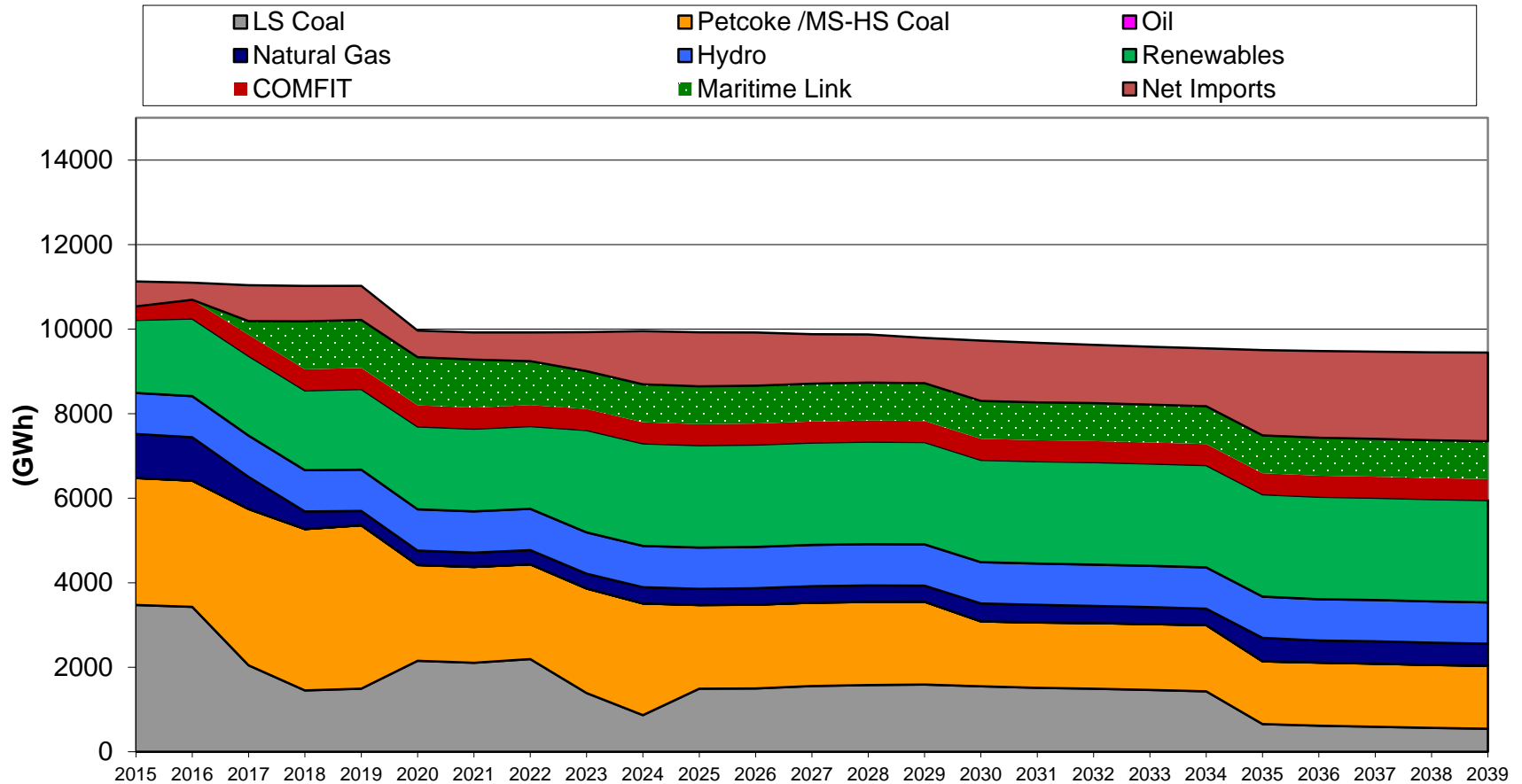
CRP9WC-2 Preliminary Demand and DSM

Projected System Peak Demand (Total & Firm) Preliminary



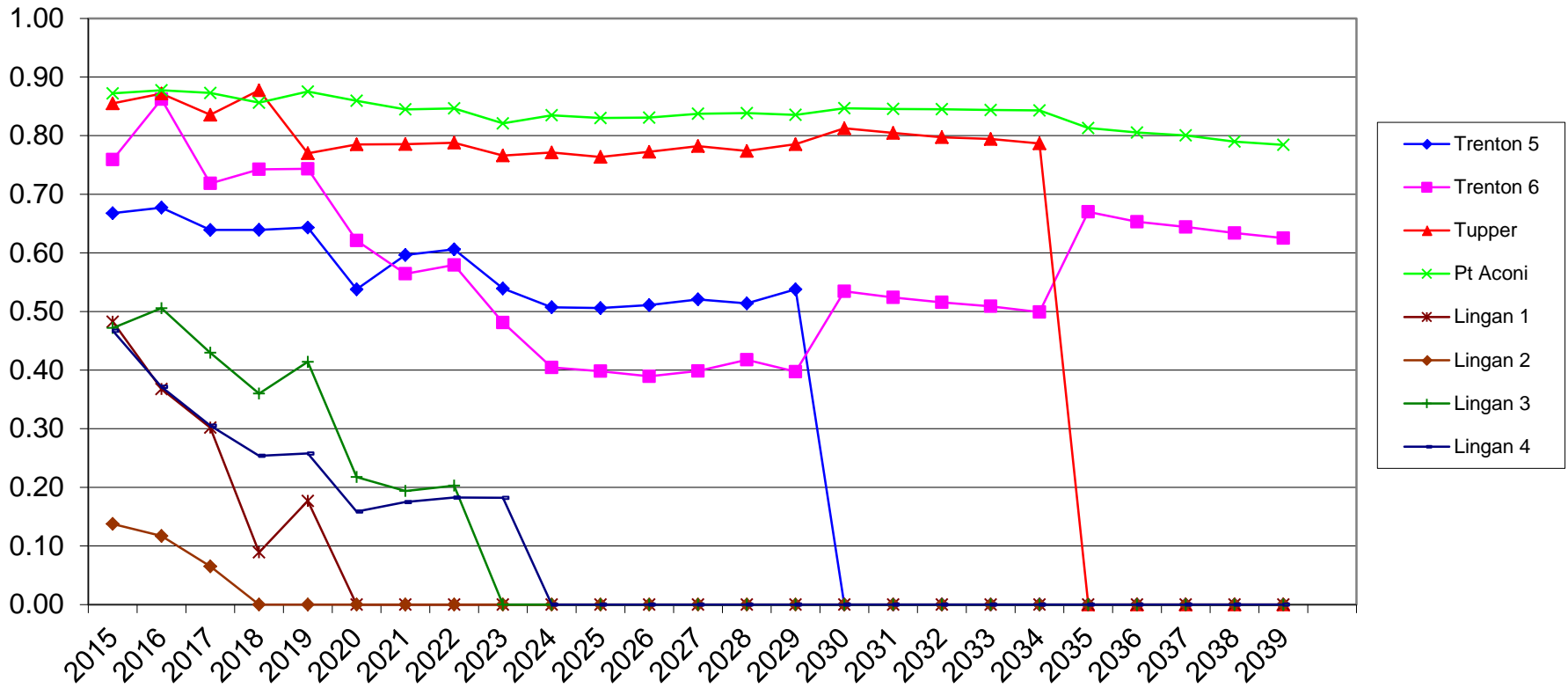
CRP9WC-2 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



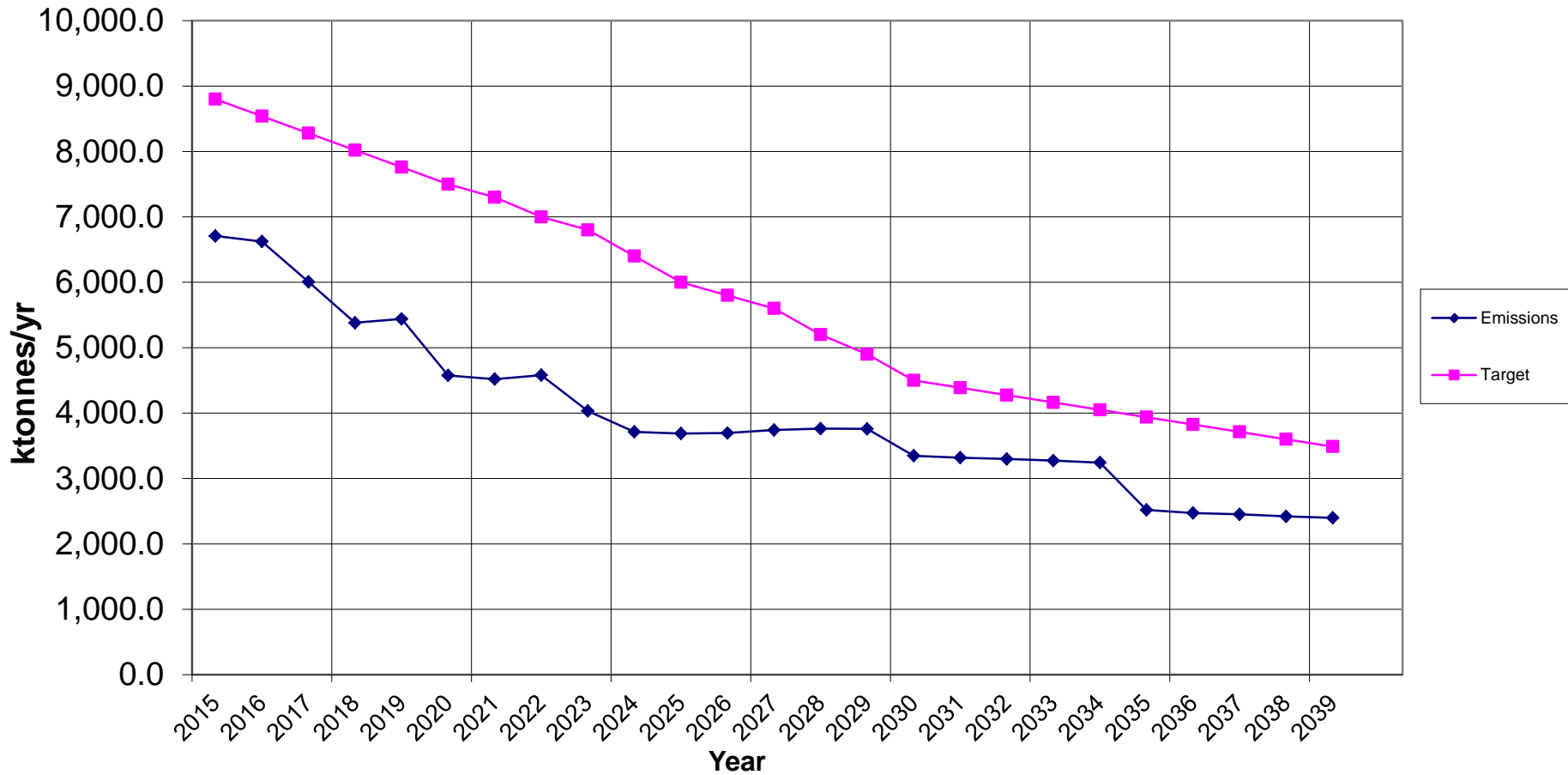
CRP9WC-2 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



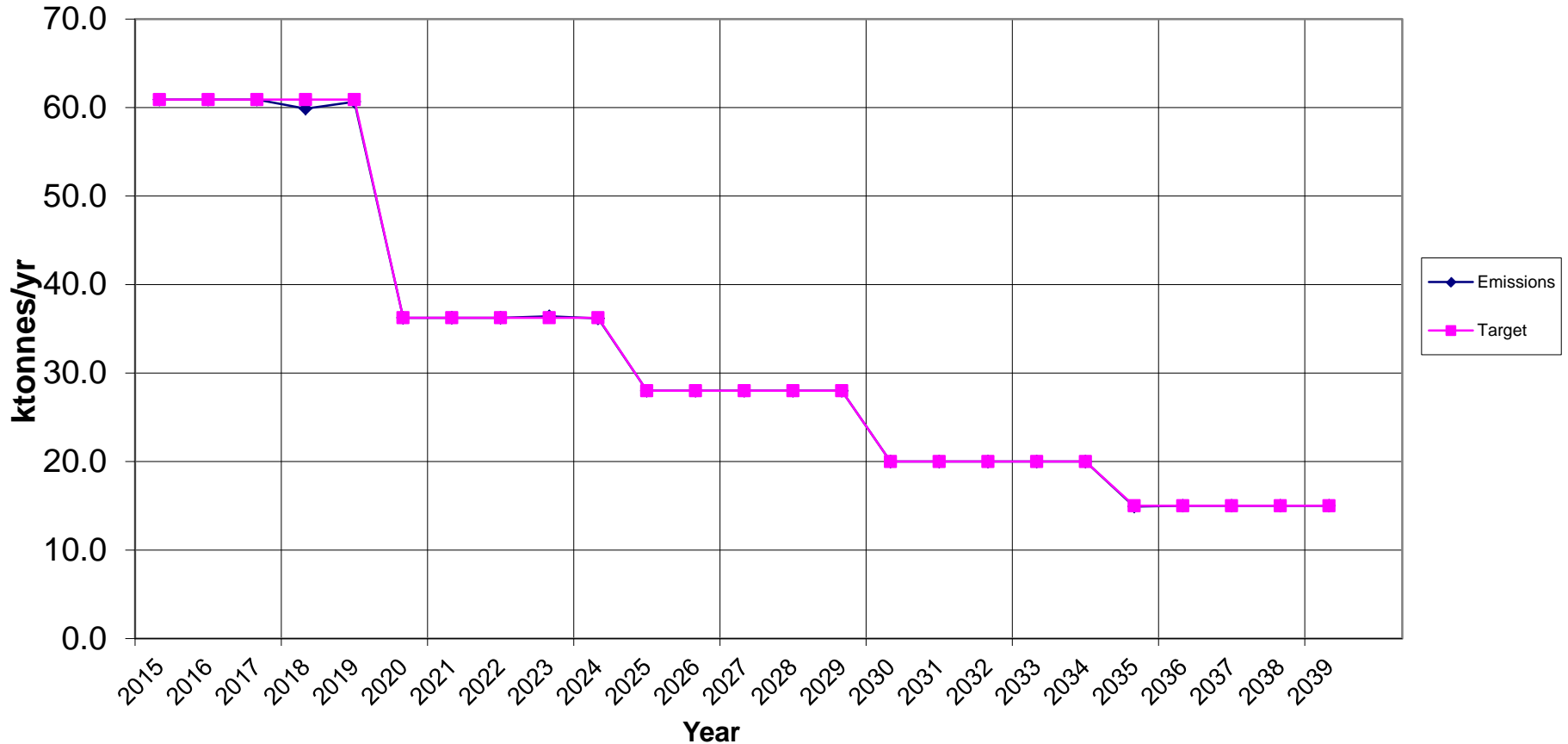
CRP9WC-2 Preliminary CO₂ Emissions

Projected CO₂ Emissions



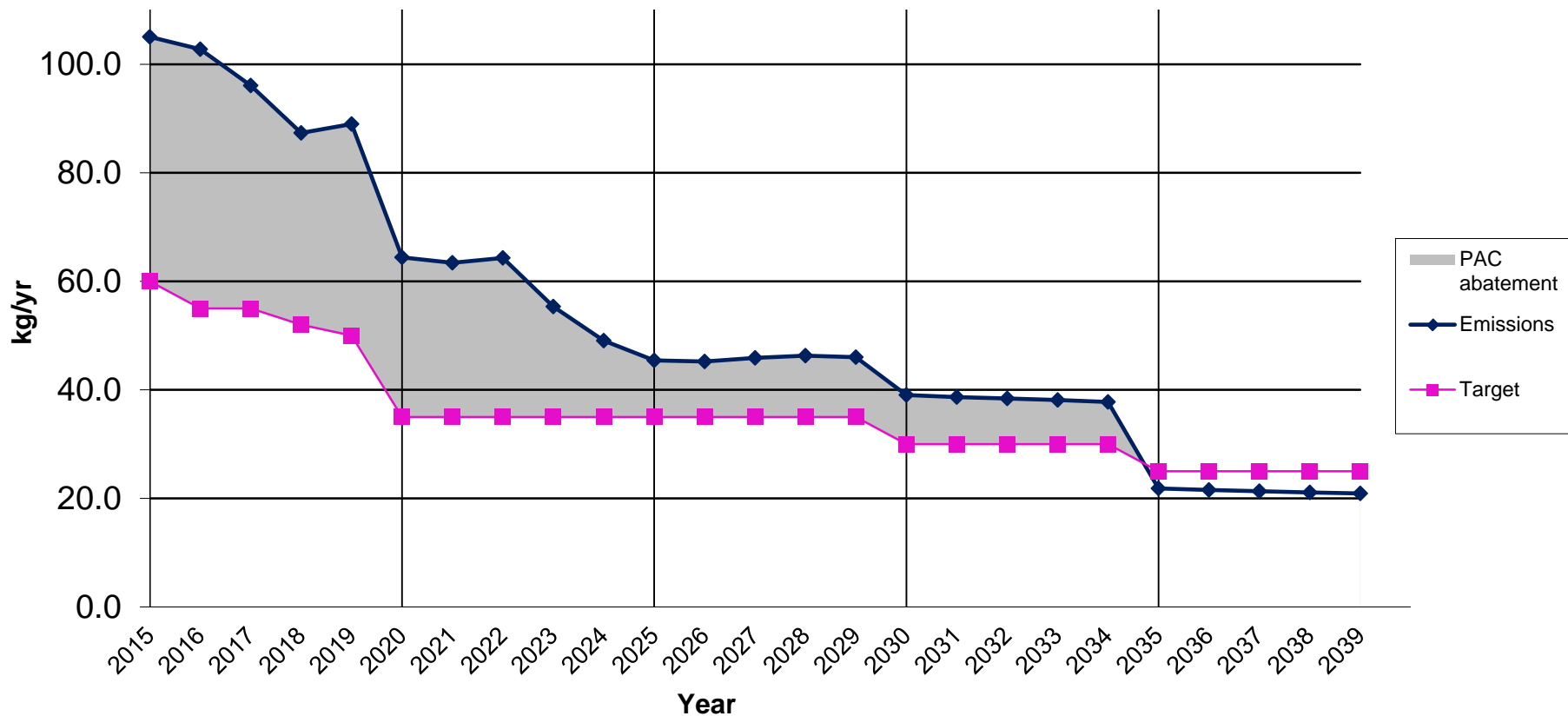
CRP9WC-2 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP9WC-2 Preliminary Mercury Emissions

Projected Mercury Emissions





CRP10 Preliminary Results

CRP10 Input Assumptions

Candidate Resource Plan 10 (CRP10):

- Base Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Medium Coal Use
- Medium Wind (Wind integration: 2 x CT 50 MW and \$200M for reliability tie and transmission upgrades)
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP10 Preliminary Results

CRP10-01-R01	
Least cost planning & study period	
2015	
2016	DR Water H & DR Comm
2017	ML Oct 2017 Lin 2 retire
2018	
2019	Mersey Phase 1
2020	
2021	
2022	
2023	TUC 1 Retire Mersey Phase 2 Wind Block 150 MW 2 x 50 MW CT (wind integration)
2024	Lingan 1 Retire PHBM 51.7 MW Firm
2025	
2026	
2027	
2028	
2029	
2030	TUC 2 Retire
2031	
2032	Trenton 5 Retire
2033	
2034	
2035	
2036	Lingan 3 Retire CT 50MW & CT 34MW
2037	Lingan 4 Retire CT 50MW & CT 34MW
2038	
2039	
Planning PV \$M	11,665
Study PV \$M	17,396

	Base DSM	Base DSM
	Program Adm Cost	Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9

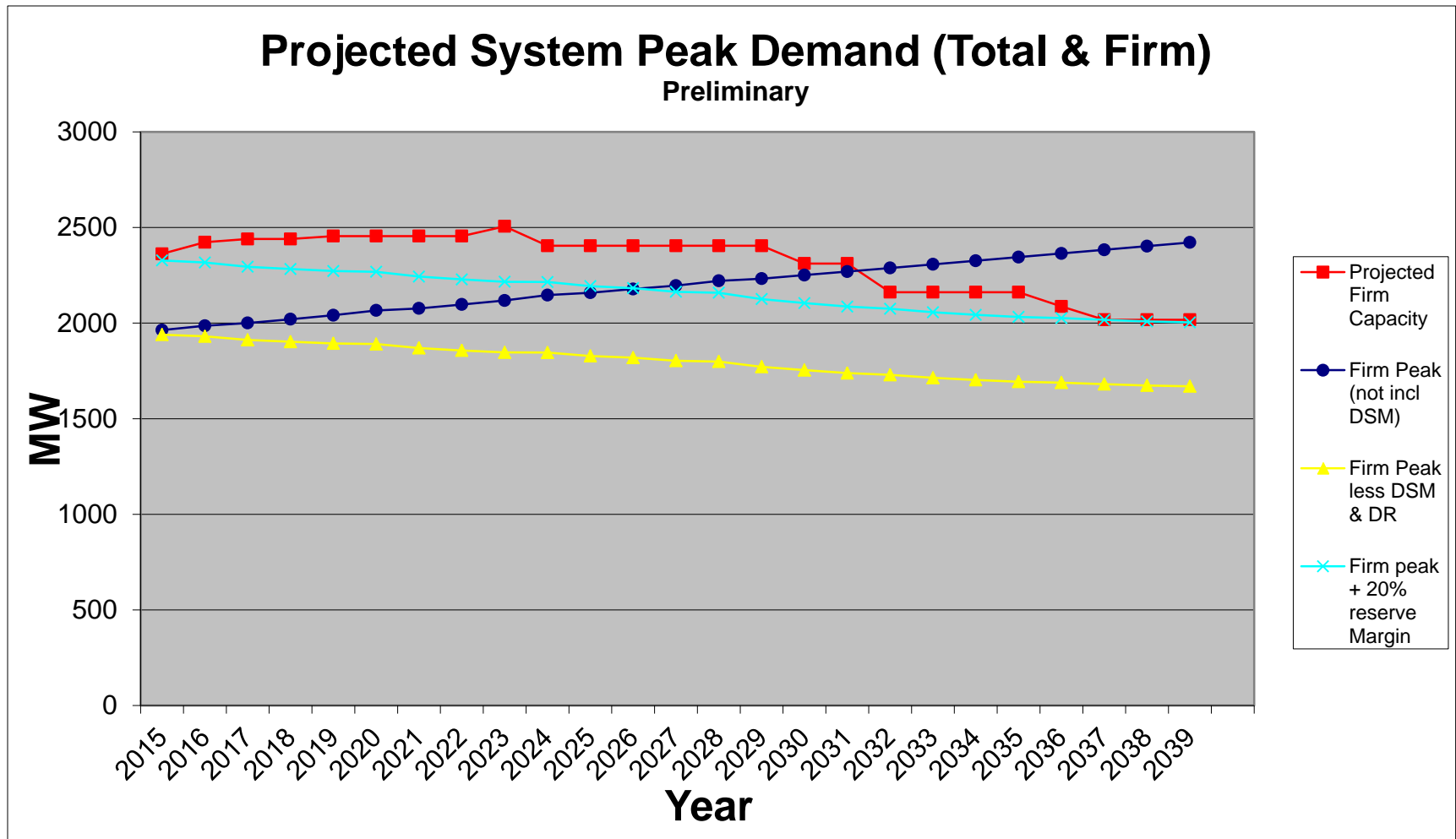


CRP10-1 Preliminary Results

CRP10-1 Preliminary Load and Resources

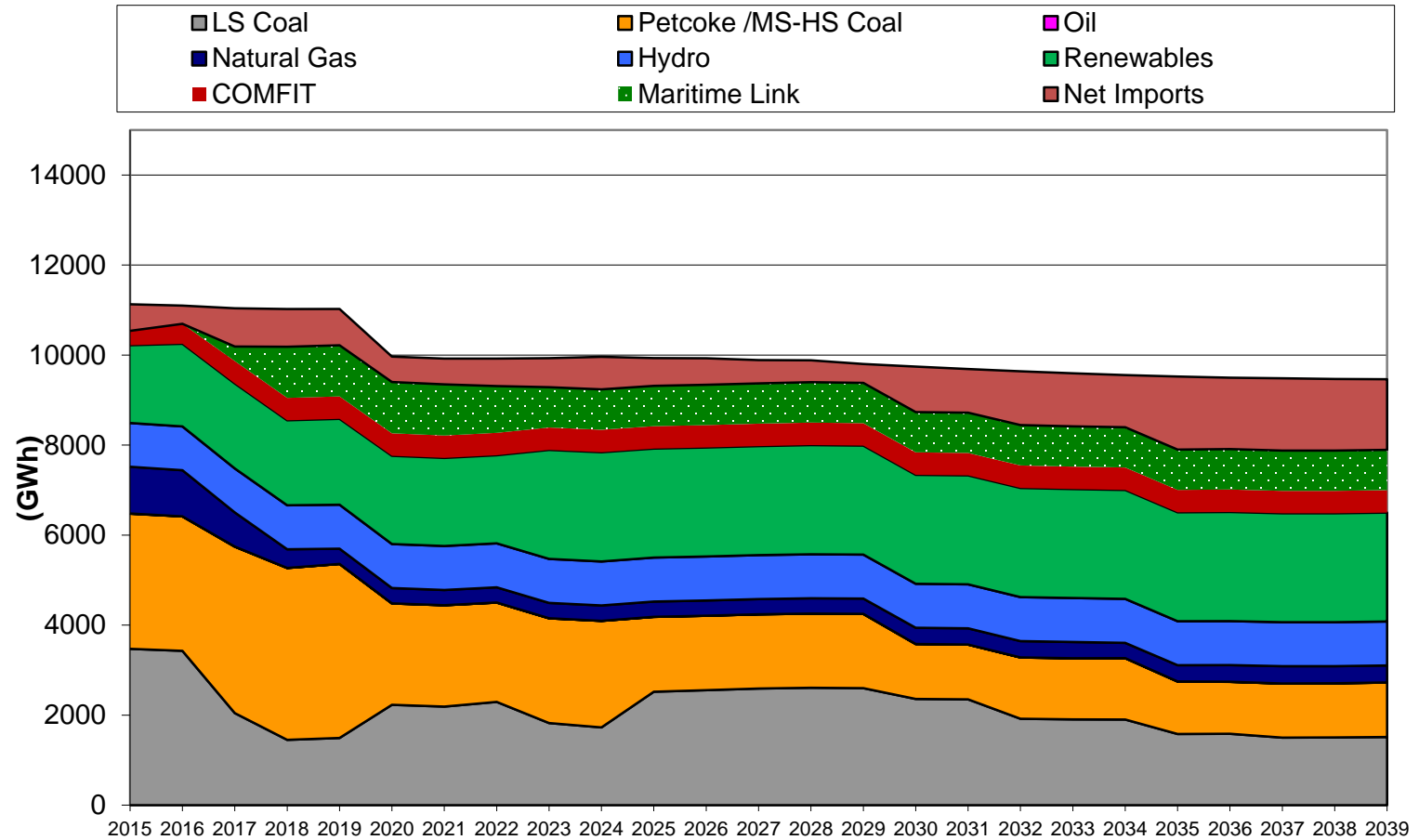
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,940	1,932	1,916	1,910	1,907	1,910	1,899	1,896	1,894	1,899	1,892	1,839	1,780	1,771	1,767	1,760	1,756
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	1	4	7	10	14	18	20	21	24	24	24	23	24	24	24
Firm Peak Less DR	1,940	1,931	1,912	1,903	1,894	1,890	1,870	1,857	1,847	1,846	1,828	1,754	1,693	1,689	1,681	1,674	1,670
RM Required	388	386	382	381	379	378	374	371	369	369	366	350.8	338.7	338	336	335	334
Required MWs	2,328	2,317	2,295	2,283	2,272	2,269	2,244	2,229	2,216	2,215	2,194	2,105	2,032	2,026	2,017	2,009	2,004
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass										51.7							
Additional Wind									18								
Assumed Unit Retirement				-153					-81	-153		-93		-158	-153		
Natural Gas Unit									98.8					83.4	83.4		
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	0.0	0.0	0.0	50.8	-101.3	0.0	-93.0	0.0	-74.6	-69.6	0.0	0.0
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	113.7	113.7	113.7	164.5	63.2	63.2	-29.8	-179.8	-254.4	-324.0	-324.0	-324.0
Total Firm Capacity	2362	2423	2440	2440	2455	2455	2455	2455	2506	2405	2405	2312	2162	2087	2017	2017	2017
Surplus (Deficit) MWs above RM	34	106	145	157	183	187	212	227	290	189	211	207	129	61	0	9	14
Reserve Margin %	21.8%	25.5%	27.6%	28.3%	29.6%	29.9%	31.3%	32.2%	35.7%	30.3%	31.5%	31.8%	27.6%	23.6%	20.0%	20.5%	20.8%

CRP10-1 Preliminary Demand and DSM



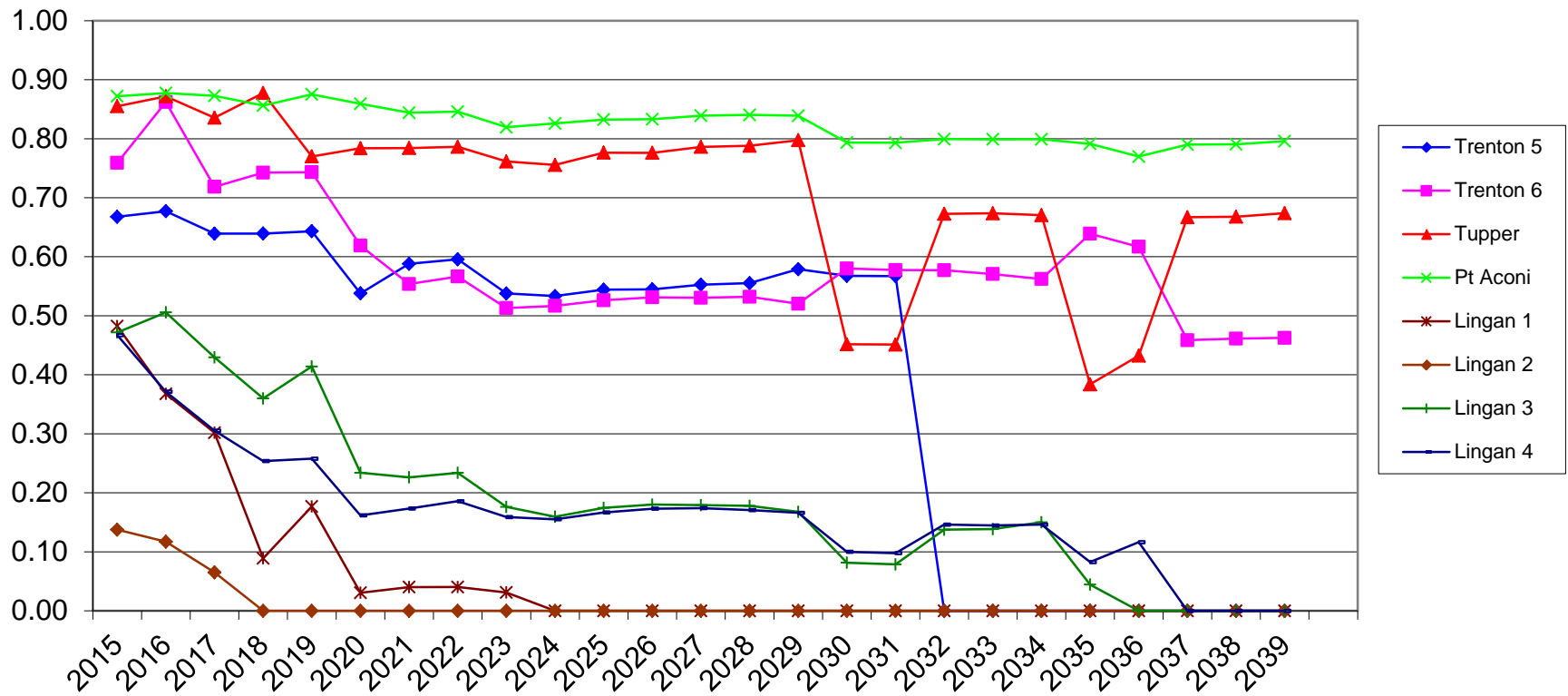
CRP10-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



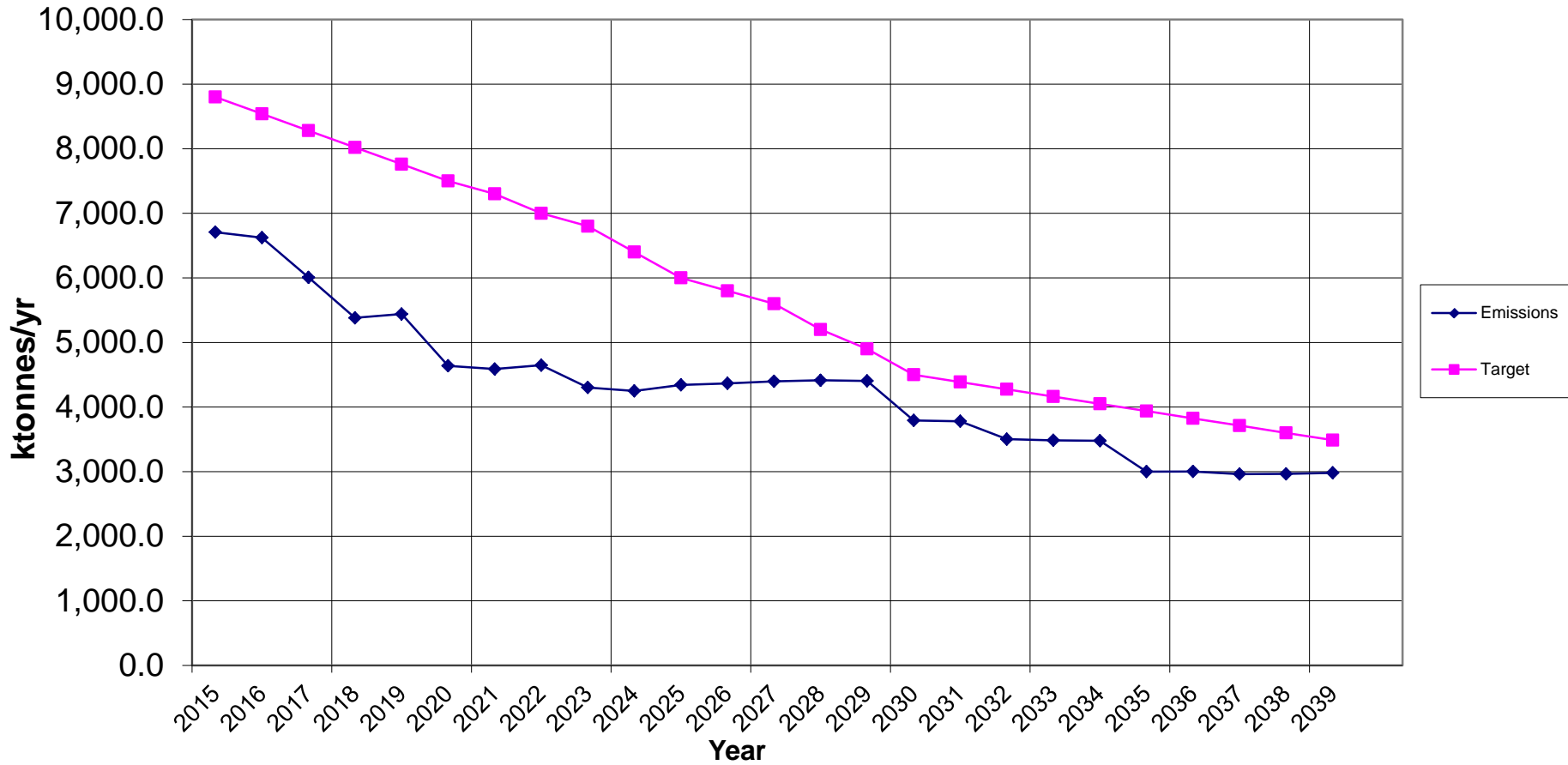
CRP10-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



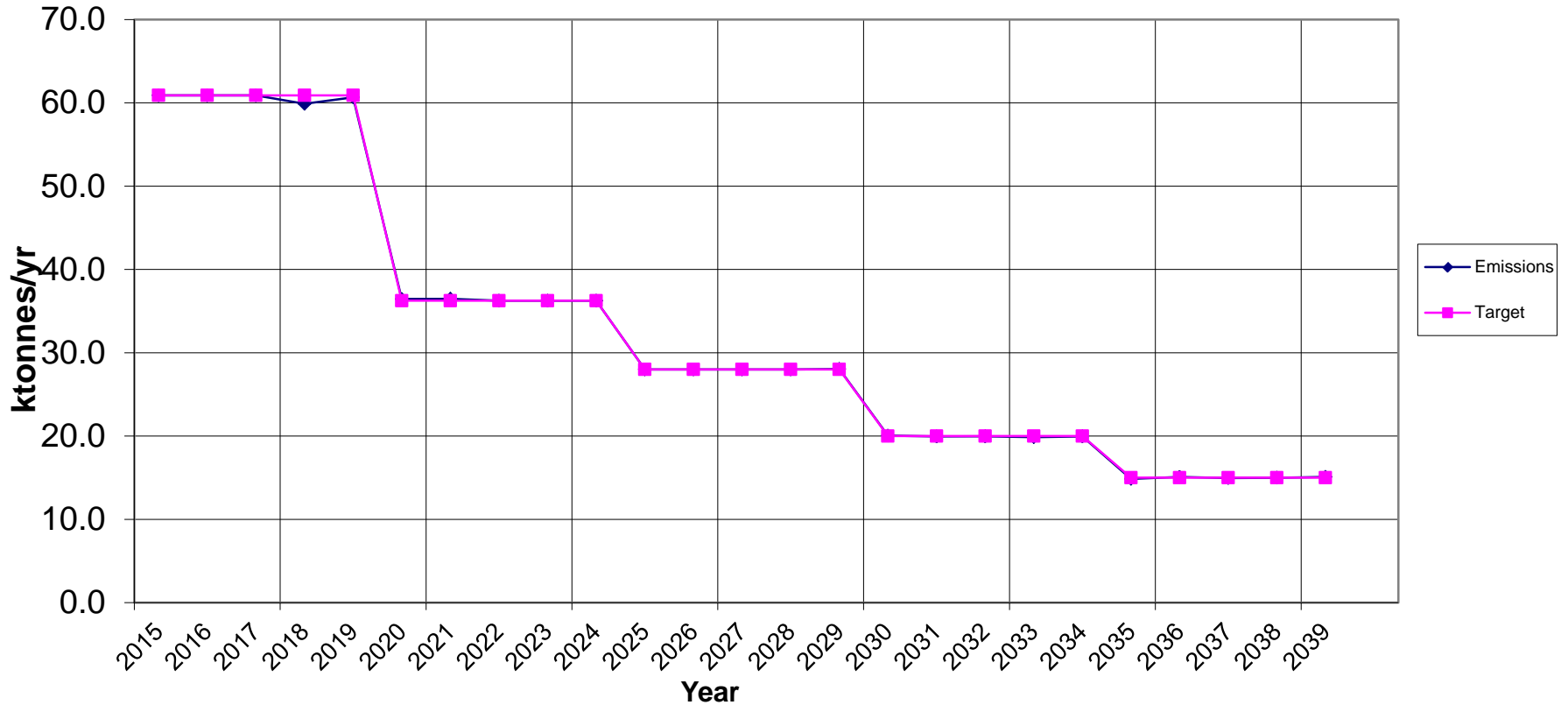
CRP10-1 Preliminary CO₂ Emissions

Projected CO₂ Emissions



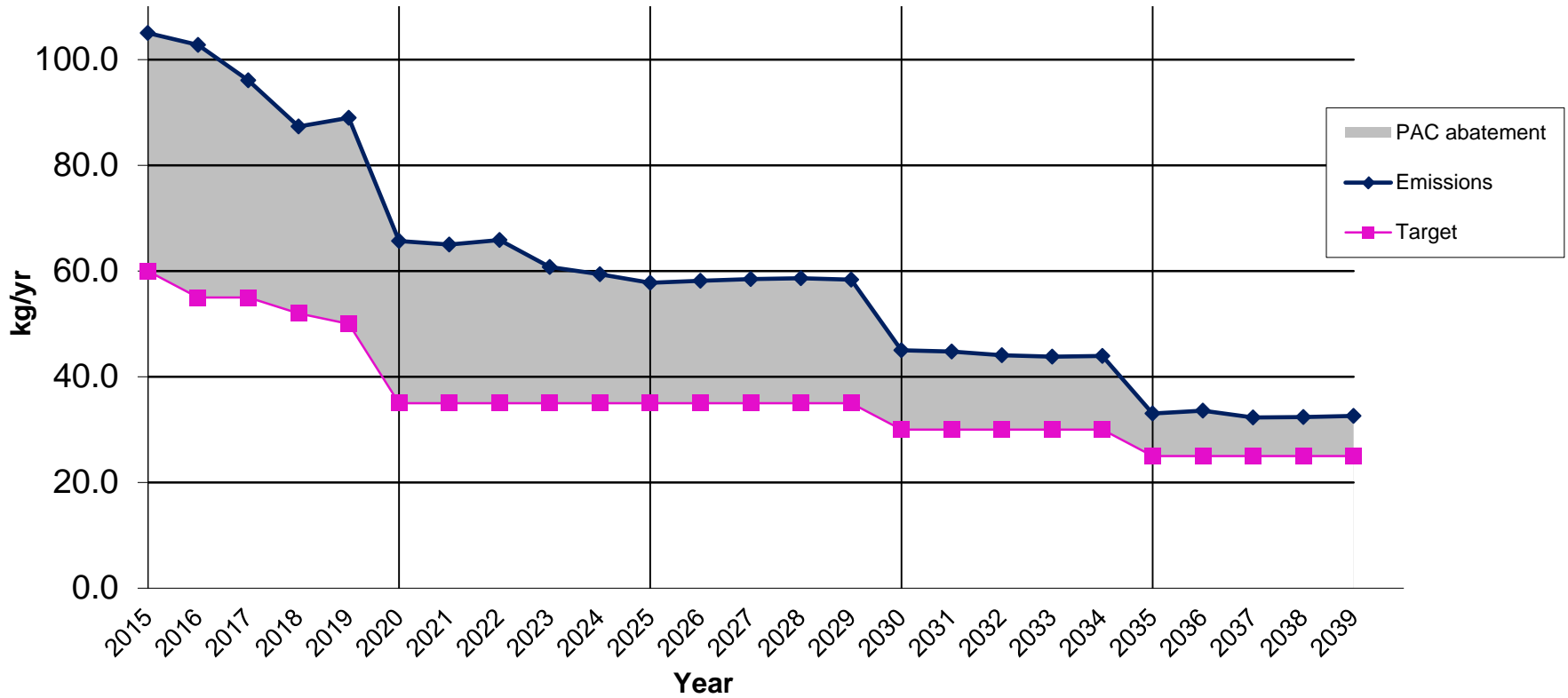
CRP10-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP10-1 Preliminary Mercury Emissions

Projected Mercury Emissions





CRP31 Preliminary Results

CRP31 Input Assumptions

Candidate Resource Plan 31 (CRP31):

- Base Load Forecast
- Base DSM (50% of Peak savings, 100% of energy savings)
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Maximum Coal Use
- Medium Wind (Wind integration: 2 x CT 50 MW and \$200M for reliability tie and transmission upgrades)
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP31 Preliminary Results

	CRP31-01-R01
	Least cost study period
2015	
2016	
2017	ML Oct 2017 Lin 2 retire
2018	
2019	
2020	
2021	
2022	
2023	Wind Block 150MW 2 x CT 50 MW (for wind integration)
2024	
2025	TUC 1 Retire
2026	
2027	
2028	
2029	
2030	
2031	CT 50MW
2032	CT 50MW TUC 2 Retire
2033	
2034	
2035	CC 145MW Tre 5 Retire
2036	CT 50MW
2037	
2038	
2039	PHBM 51.7 MW Firm CT 50MW & CT 34MW Lin 1 Retire
Planning PV \$M	11,625
Study PV \$M	17,522

	Base DSM	Base DSM
	Program Adm Cost	Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9

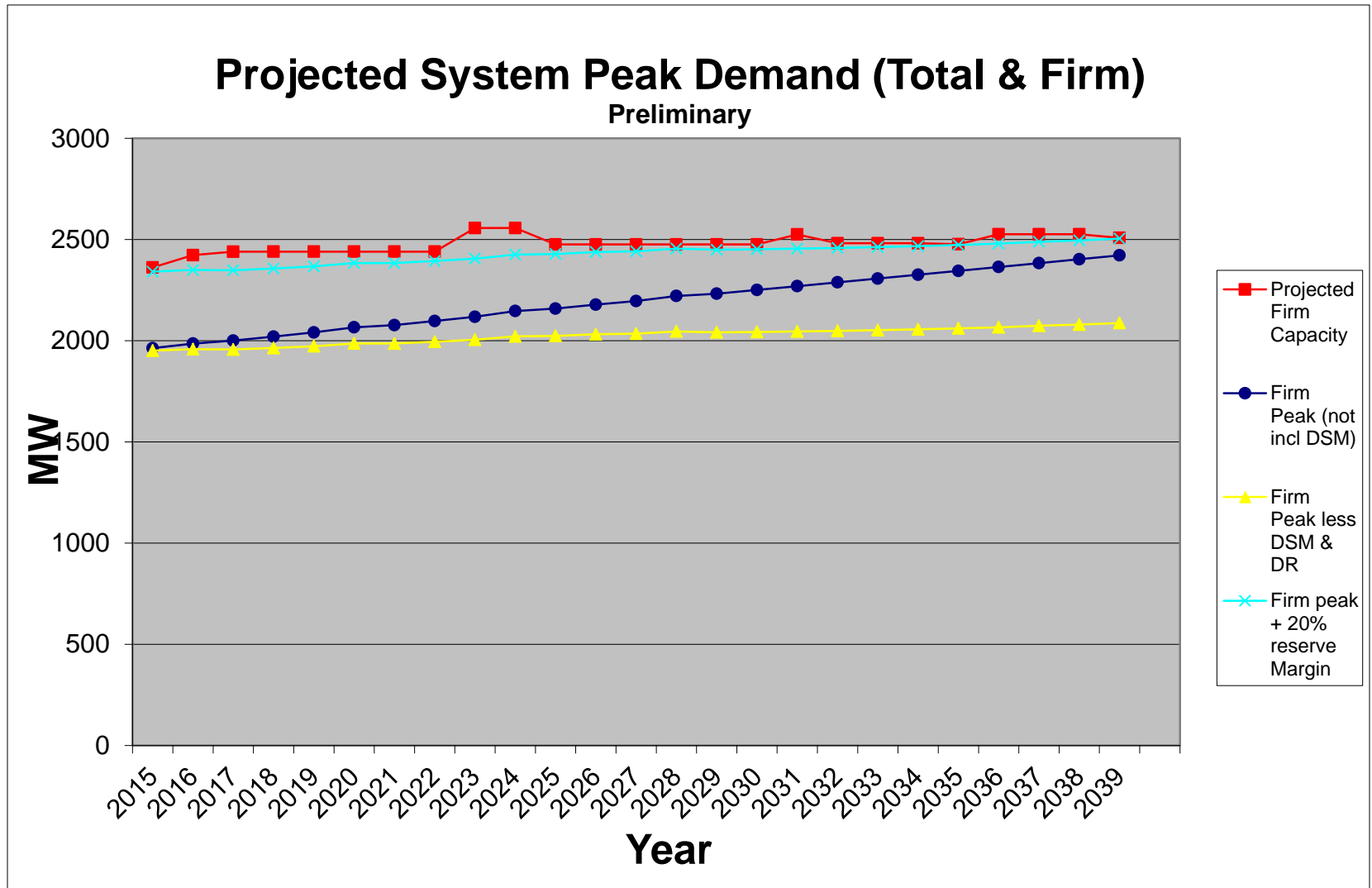


CRP31-1 Preliminary Results

CRP31-1 Preliminary Load and Resources

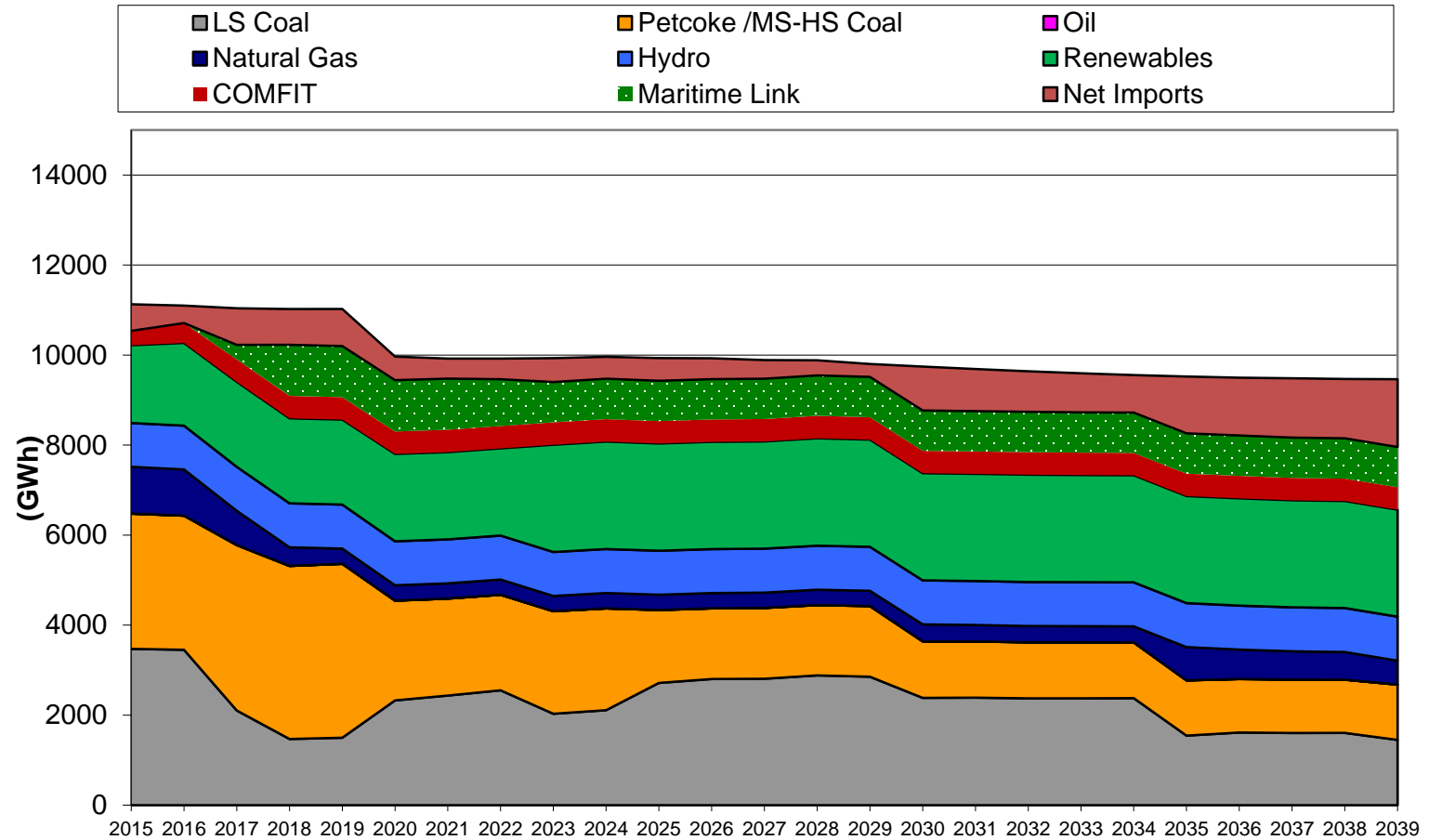
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,963	1,986	2,000	2,020	2,041	2,066	2,077	2,097	2,118	2,147	2,159	2,251	2,345	2,364	2,383	2,403	2,422
DSM	12	28	44	56	69	80	91	102	113	125	135	208	284	298	310	323	334
Firm Peak Less DSM	1,951	1,958	1,957	1,964	1,973	1,987	1,986	1,995	2,005	2,022	2,024	2,043	2,061	2,066	2,074	2,080	2,087
DRWH Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DRCM Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Firm Peak Less DR	1,951	1,958	1,957	1,964	1,973	1,987	1,986	1,995	2,005	2,022	2024	2043	2061	2,066	2,074	2,080	2,087
RM Required	390	392	391	393	395	397	397	399	401	404	405	408.7	412.2	413	415	416	417
Required MWs	2,341	2,350	2,348	2,357	2,367	2,384	2,384	2,394	2,406	2,426	2428	2452	2473	2,480	2,488	2,496	2,505
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass																	51.7
Additional Wind									18								
Assumed Unit Retirement				-153							-81		-150				-153
Natural Gas Unit									98.8				145.0	49.4			83.4
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	0.0	0.0	0.0	116.8	0.0	-81.0	0.0	-5.0	49.4	0.0	0.0	-17.9
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	98.7	98.7	98.7	215.5	215.5	134.5	134.5	135.3	184.7	184.7	184.7	166.8
Total Firm Capacity	2362	2423	2440	2440	2440	2440	2440	2440	2557	2557	2476	2476	2477	2526	2526	2526	2508
Surplus (Deficit) MWs above RM	21	73	92	83	73	56	57	46	151	131	47	24	4	46	38	30	3
Reserve Margin %	21.1%	23.7%	24.7%	24.2%	23.7%	22.8%	22.8%	22.3%	27.5%	26.5%	22.3%	21.2%	20.2%	22.3%	21.8%	21.5%	20.2%

CRP31-1 Preliminary Demand and DSM



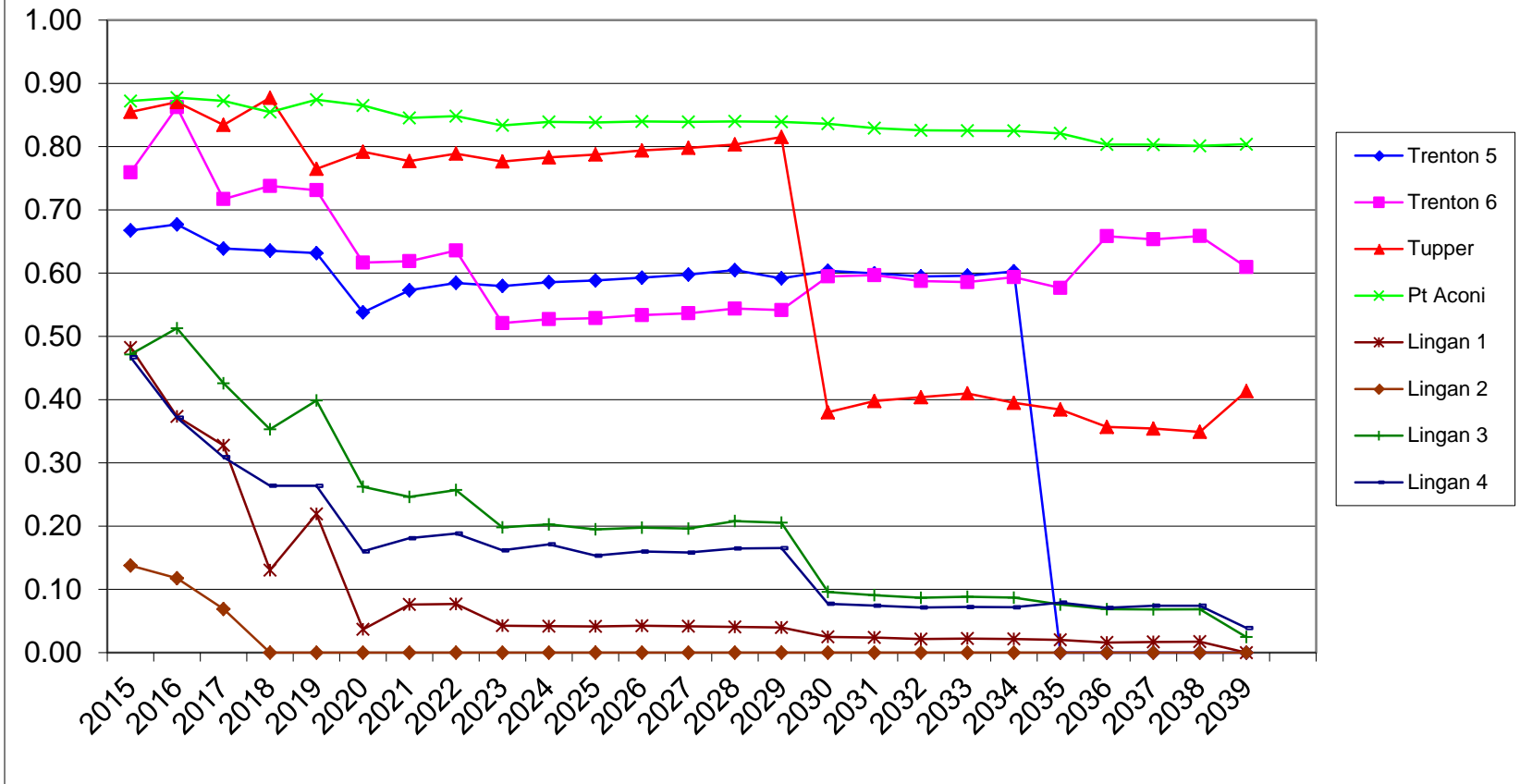
CRP31-1 Preliminary Energy by Resource Type

Preliminary - Energy By Resource Type



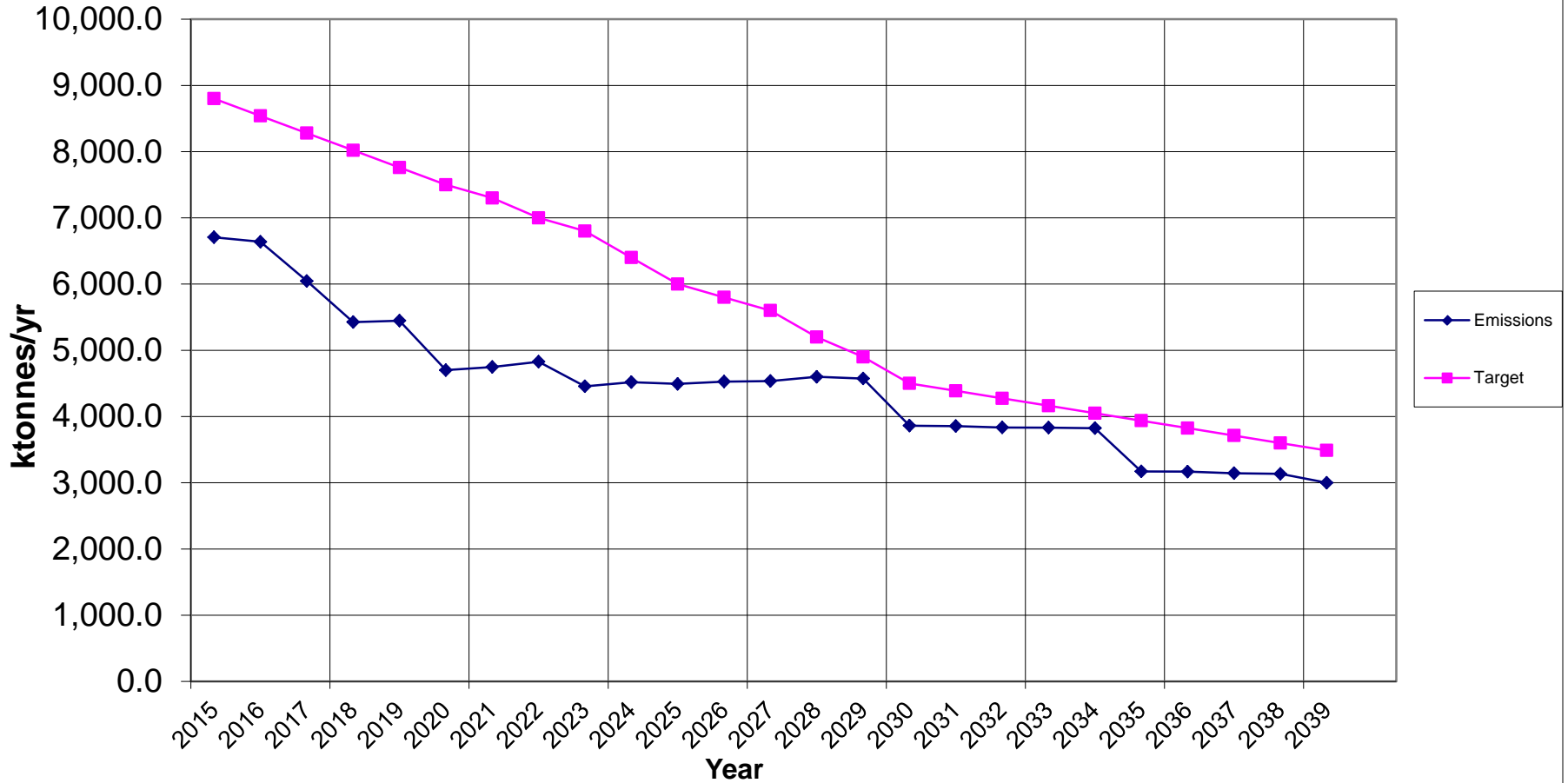
CRP31-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



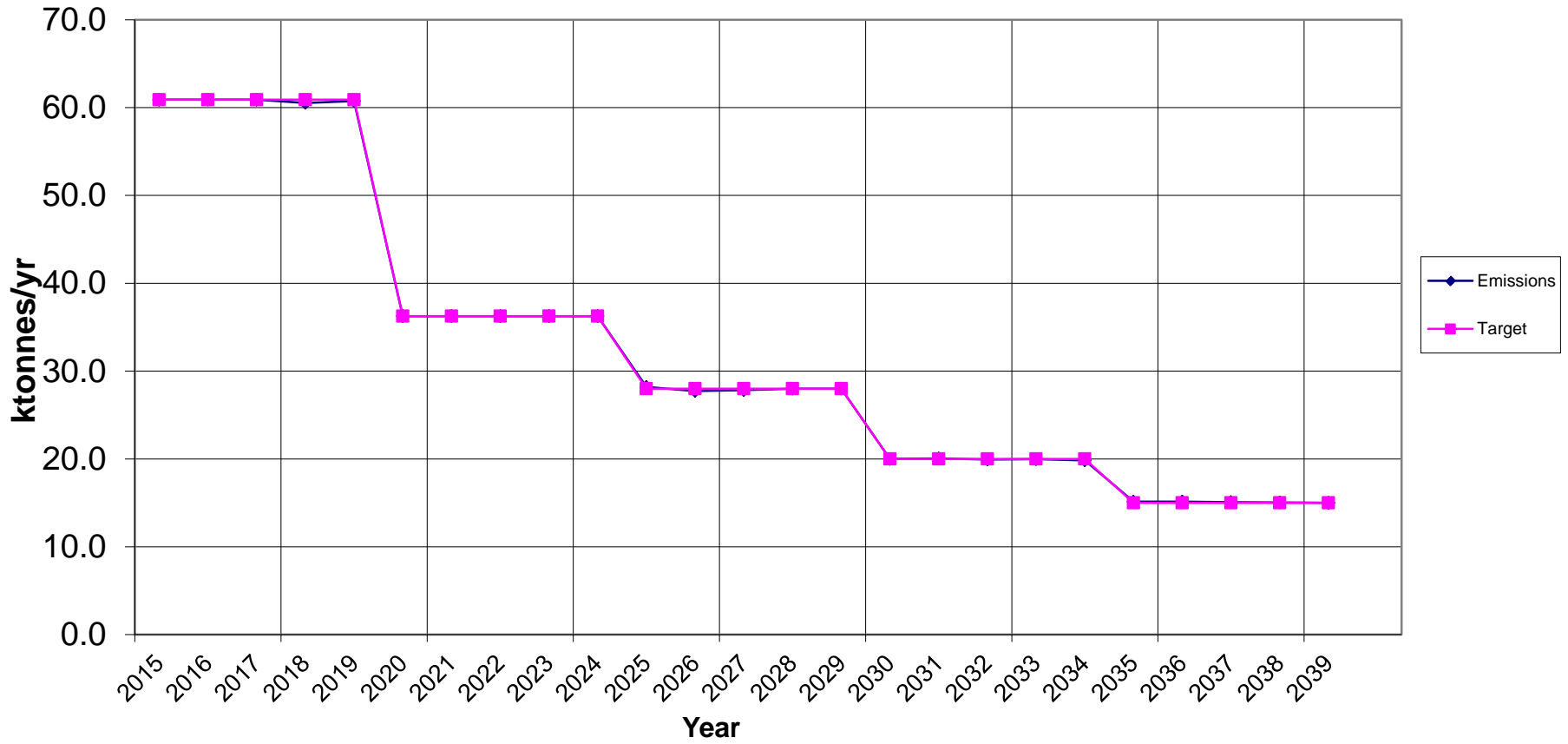
CRP31-1 Preliminary CO₂ Emissions

Projected CO2 Emissions



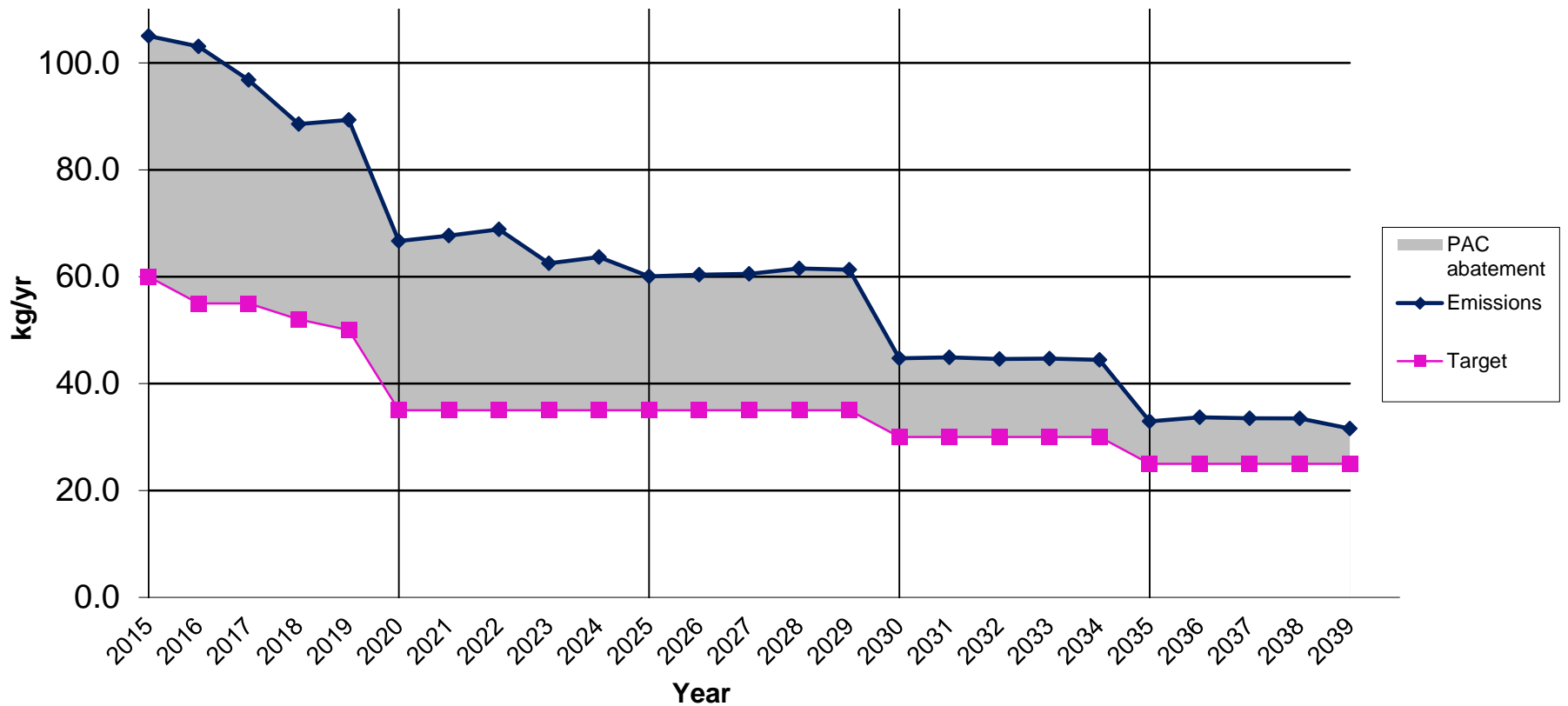
CRP31-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP31-1 Preliminary Hg Emissions

Projected Mercury Emissions





CRP21 Preliminary Results

CRP21 Input Assumptions

Candidate Resource Plan 21 (CRP21):

- High Load Forecast
- Base DSM
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Maximum Coal Use
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP21 Preliminary Results

	CRP21-01-WND-R01	CRP21-03-PPA-R01
	Least cost study period	Least cost planning period
2015		
2016		
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019	Mersey Phase 1	
2020	FGD (Lin 3/4 300 MW) Wind Block 150 MW 2 x 50 MW CT (wind integration)	FGD (Lin 3/4 300 MW) PPA 100MW Firm
2021		
2022		
2023	Mersey Phase 2	
2024		
2025	TUC 1 Retire	TUC 1 Retire
2026		
2027		
2028		
2029		
2030		
2031		
2032	TUC 2 Retire	TUC 2 Retire
2033		
2034		CT 50MW
2035	Tre 5 Retire CT 50MW	Tre 5 Retire CT 50MW
2036		
2037		
2038	CT 50MW	CT 50MW
2039	PHBM 45.4 MW Firm CT 50MW	PHBM 45.4 MW Firm CT 50MW
	Lin 1 Retire	Lin 1 Retire
Planning PV \$M	12,722	12,680
Study PV \$M	19,503	19,830

	Base DSM Program Adm Cost \$M	Base DSM Customer Cost \$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9

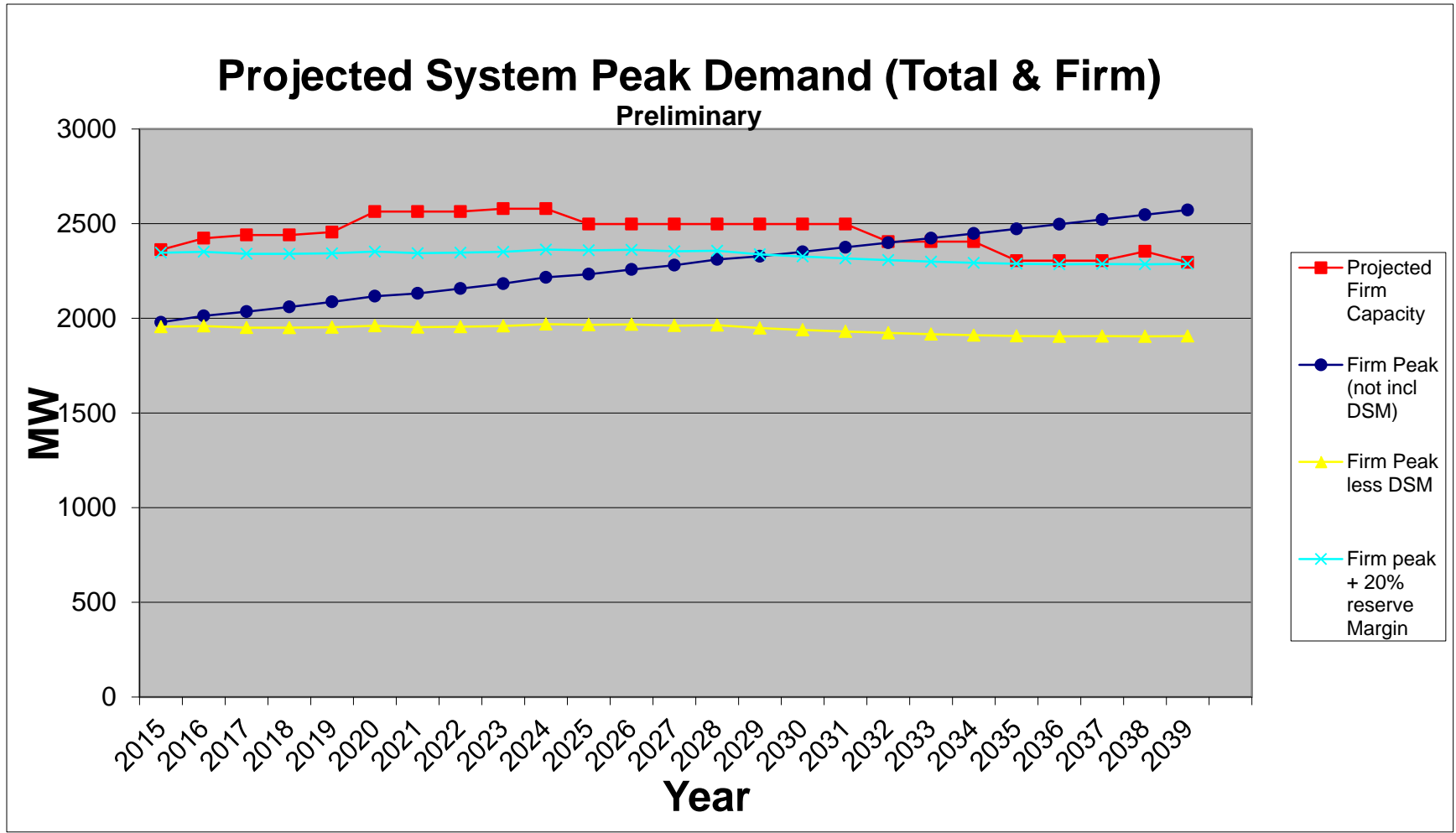


CRP21-1 Preliminary Results

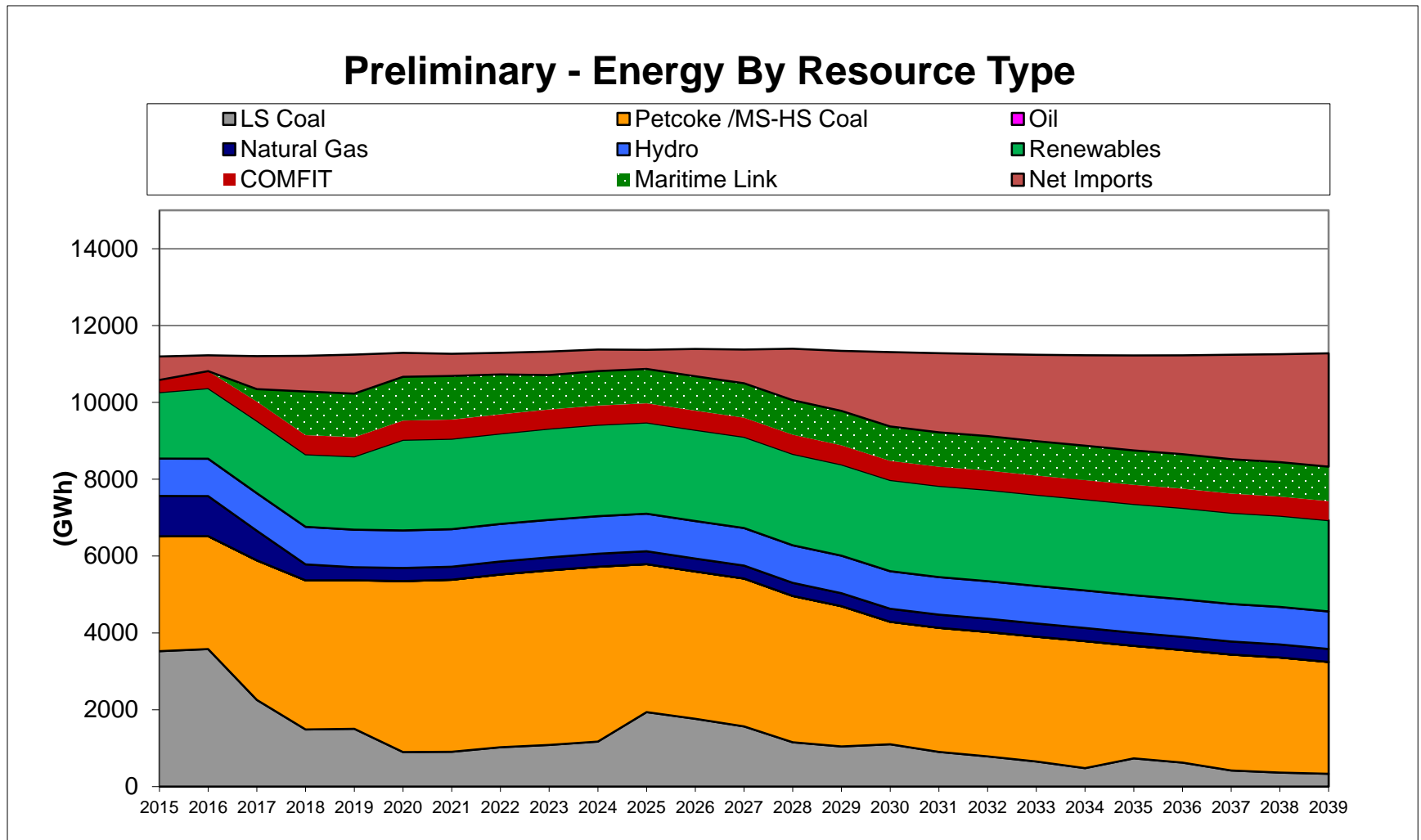
CRP21-1 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,979	2,013	2,035	2,060	2,087	2,117	2,132	2,157	2,183	2,216	2,233	2,351	2,472	2,497	2,522	2,547	2,572
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,955	1,959	1,951	1,950	1,953	1,960	1,953	1,956	1,959	1,969	1,966	1,939	1,907	1,904	1,906	1,905	1,906
RM Required	391	392	390	390	391	392	391	391	392	394	393	388	381	381	381	381	381
Required MWs	2,346	2,351	2,341	2,340	2,343	2,352	2,344	2,347	2,351	2,363	2,359	2,327	2,288	2,285	2,287	2,286	2,288
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass																	45.4
Additional Wind						18											
Assumed Unit Retirement				-153		-8					-81		-150				-153
Natural Gas Unit						98.7							49.4			49.4	49.4
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	108.7	0.0	0.0	15.0	0.0	-81.0	0.0	-100.6	0.0	0.0	49.4	-58.2
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	222.4	222.4	222.4	237.4	237.4	156.4	156.4	-37.2	-37.2	-37.2	12.2	-46.0
Total Firm Capacity	2362	2423	2440	2440	2455	2564	2564	2564	2579	2579	2498	2498	2304	2304	2304	2354	2295
Surplus (Deficit) MWs above RM	16	72	99	100	112	211	220	217	228	216	139	171	16	19	17	68	8
Reserve Margin %	20.8%	23.7%	25.1%	25.1%	25.7%	30.8%	31.2%	31.1%	31.6%	31.0%	27.1%	28.8%	20.8%	21.0%	20.9%	23.6%	20.4%

CRP21-1 Preliminary Demand and DSM

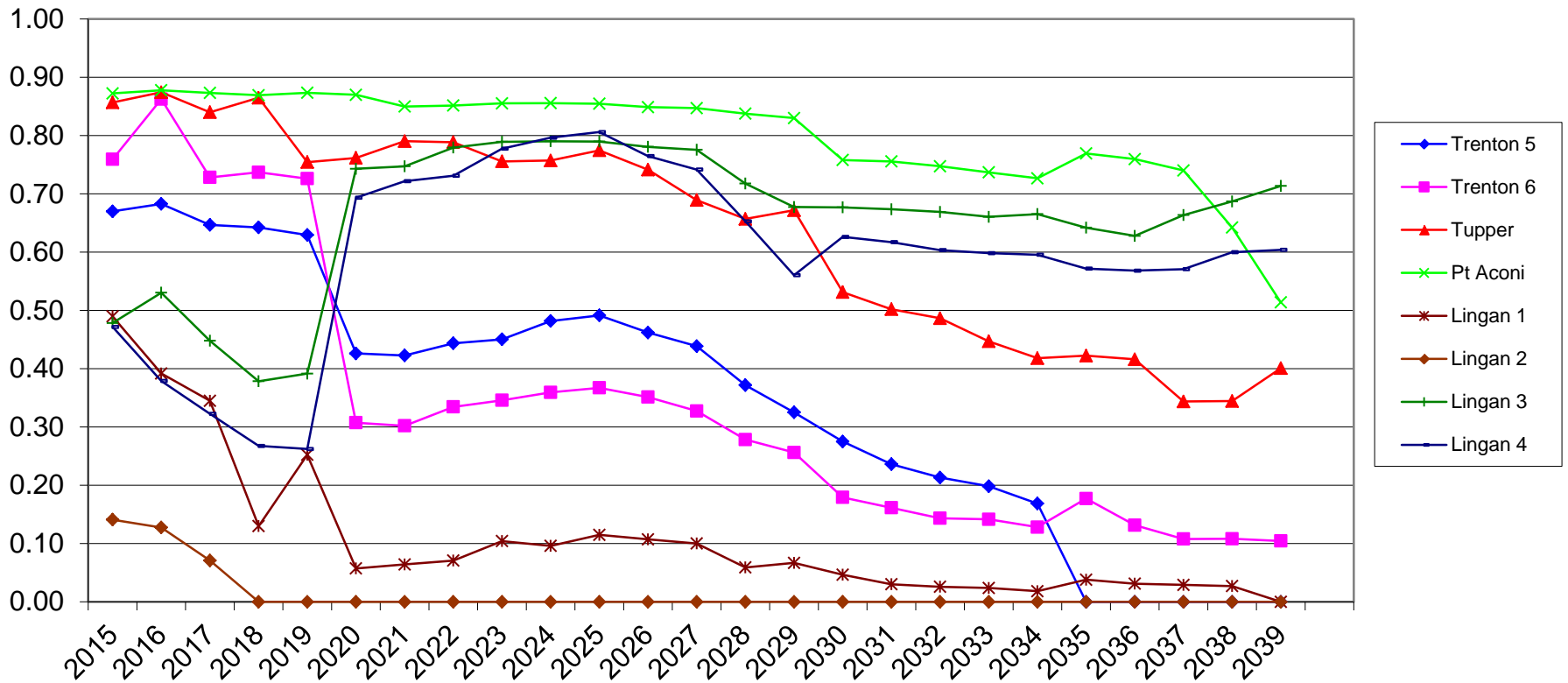


Preliminary Energy by Resource Type



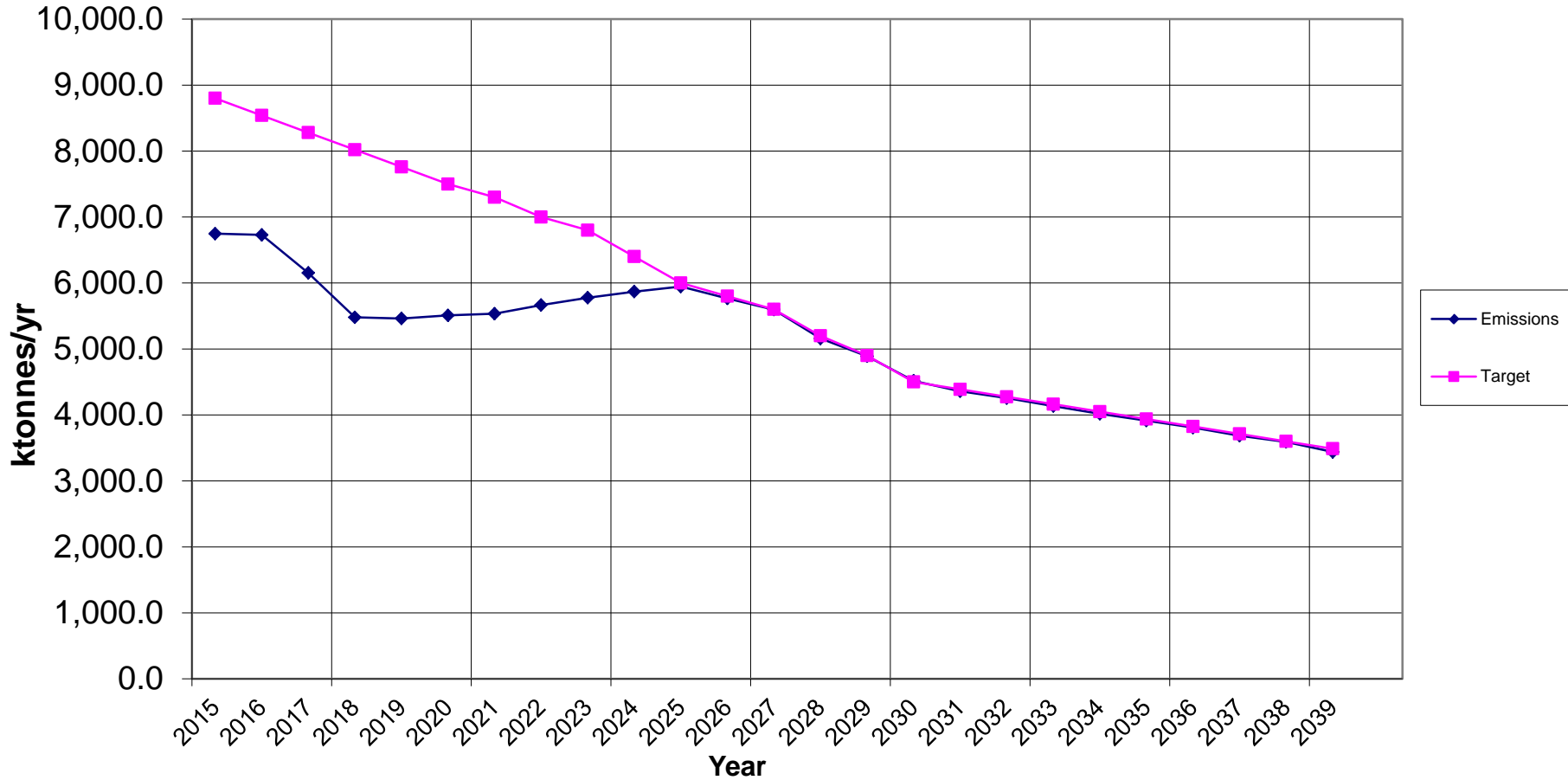
CRP21-1 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



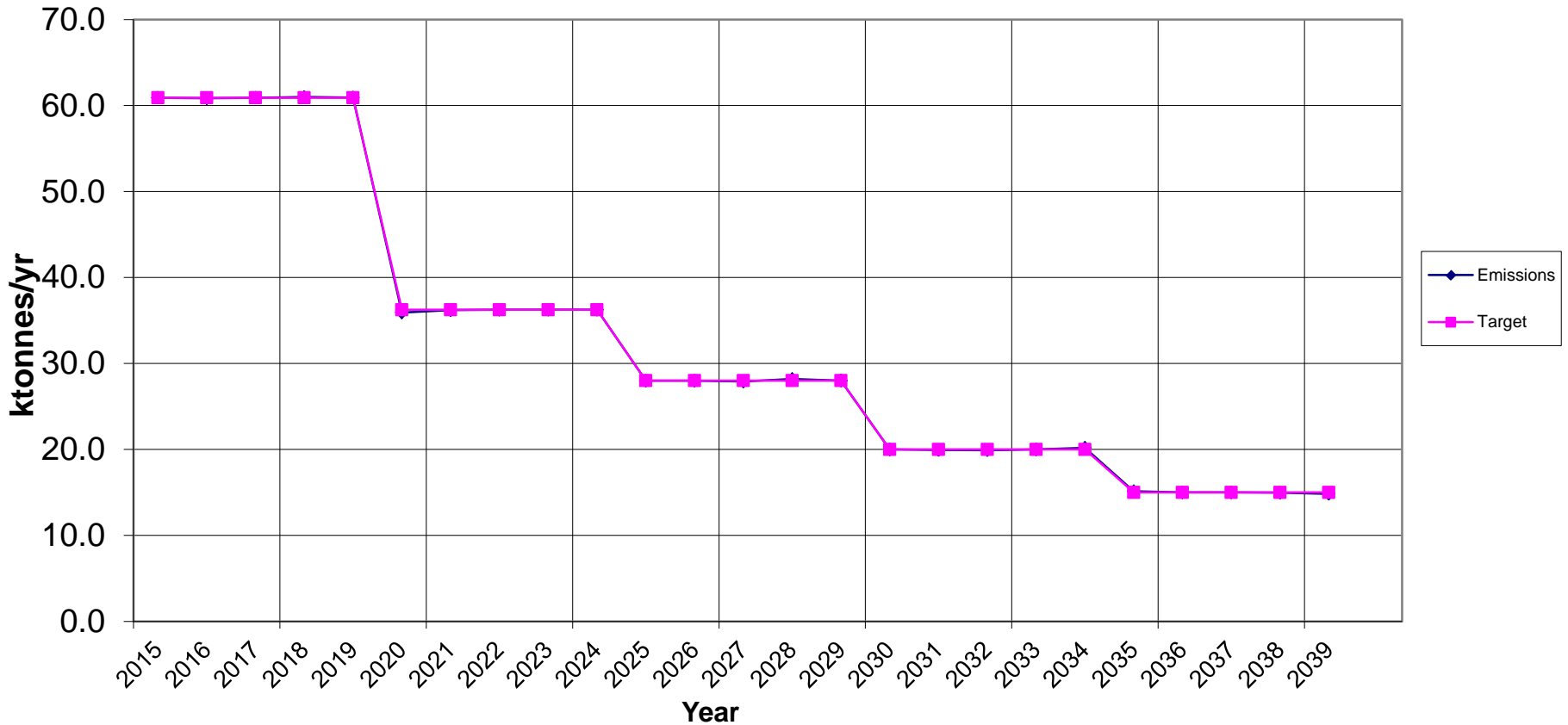
CRP21-1 Preliminary CO₂ Emissions

Projected CO2 Emissions



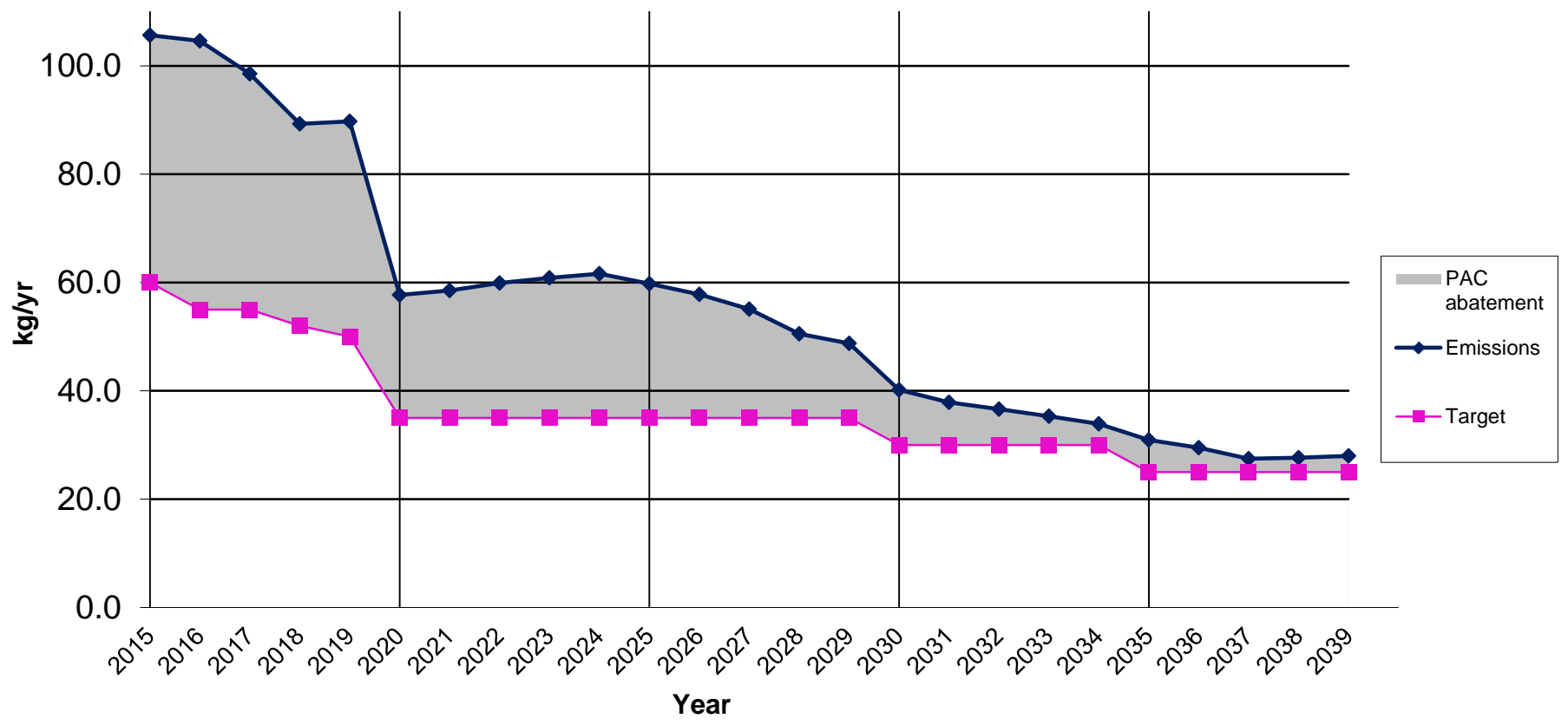
CRP21-1 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP21-1 Preliminary Hg Emissions

Projected Mercury Emissions



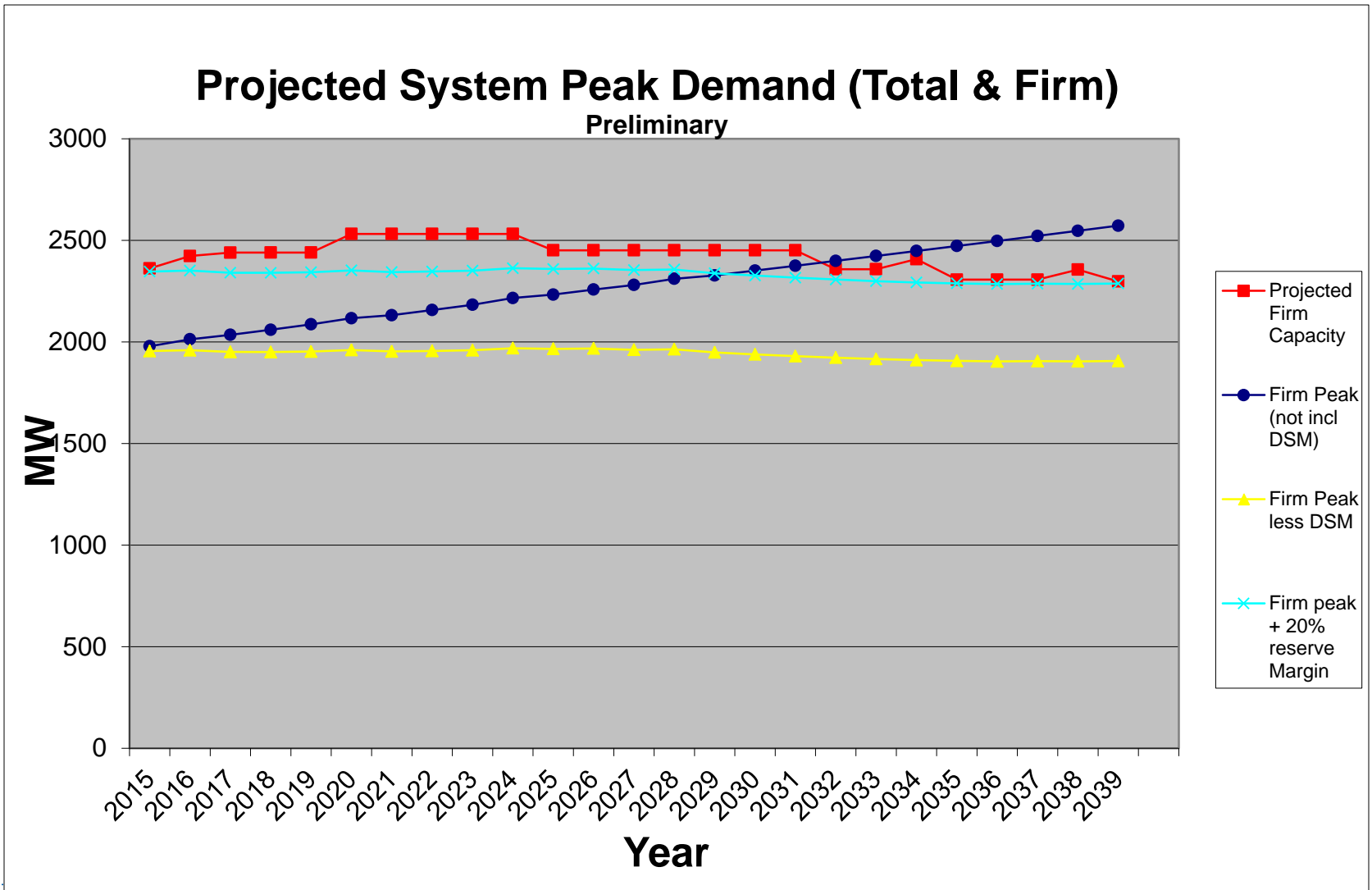


CRP21-3 Preliminary Results

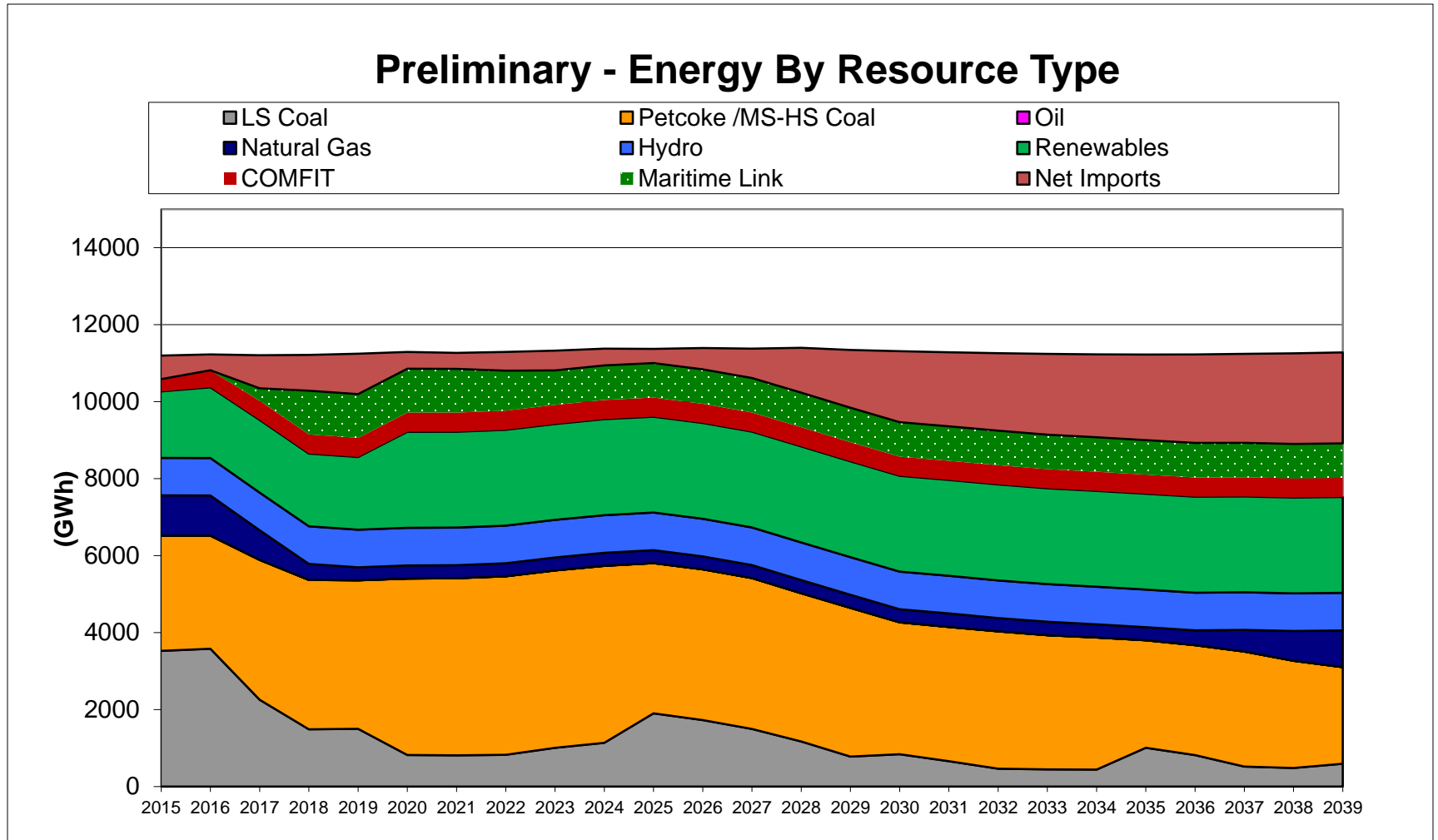
CRP21-3 Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,979	2,013	2,035	2,060	2,087	2,117	2,132	2,157	2,183	2,216	2,233	2,351	2,472	2,497	2,522	2,547	2,572
DSM	23	54	84	110	134	156	178	202	224	247	267	412	566	593	616	643	666
Firm Peak Less DSM	1,955	1,959	1,951	1,950	1,953	1,960	1,953	1,956	1,959	1,969	1,966	1,939	1,907	1,904	1,906	1,905	1,906
RM Required	391	392	390	390	391	392	391	391	392	394	393	388	381	381	381	381	381
Required MWs	2,346	2,351	2,341	2,340	2,343	2,352	2,344	2,347	2,351	2,363	2,359	2,327	2,288	2,285	2,287	2,286	2,288
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass																	45.4
PPA						100											
Assumed Unit Retirement				-153		-8					-81		-150				-153
Natural Gas Unit													49.4			49.4	49.4
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	92.0	0.0	0.0	0.0	0.0	-81.0	0.0	-100.6	0.0	0.0	49.4	-58.2
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	190.7	190.7	190.7	190.7	190.7	109.7	109.7	-34.5	-34.5	-34.5	14.9	-43.3
Total Firm Capacity	2362	2423	2440	2440	2440	2532	2532	2532	2532	2532	2451	2451	2307	2307	2307	2356	2298
Surplus (Deficit) MWs above RM	16	72	99	100	97	180	188	185	181	169	92	124	19	22	20	71	10
Reserve Margin %	20.8%	23.7%	25.1%	25.1%	25.0%	29.2%	29.6%	29.5%	29.2%	28.6%	24.7%	26.4%	21.0%	21.1%	21.1%	23.7%	20.6%

CRP21-3 Preliminary Demand and DSM

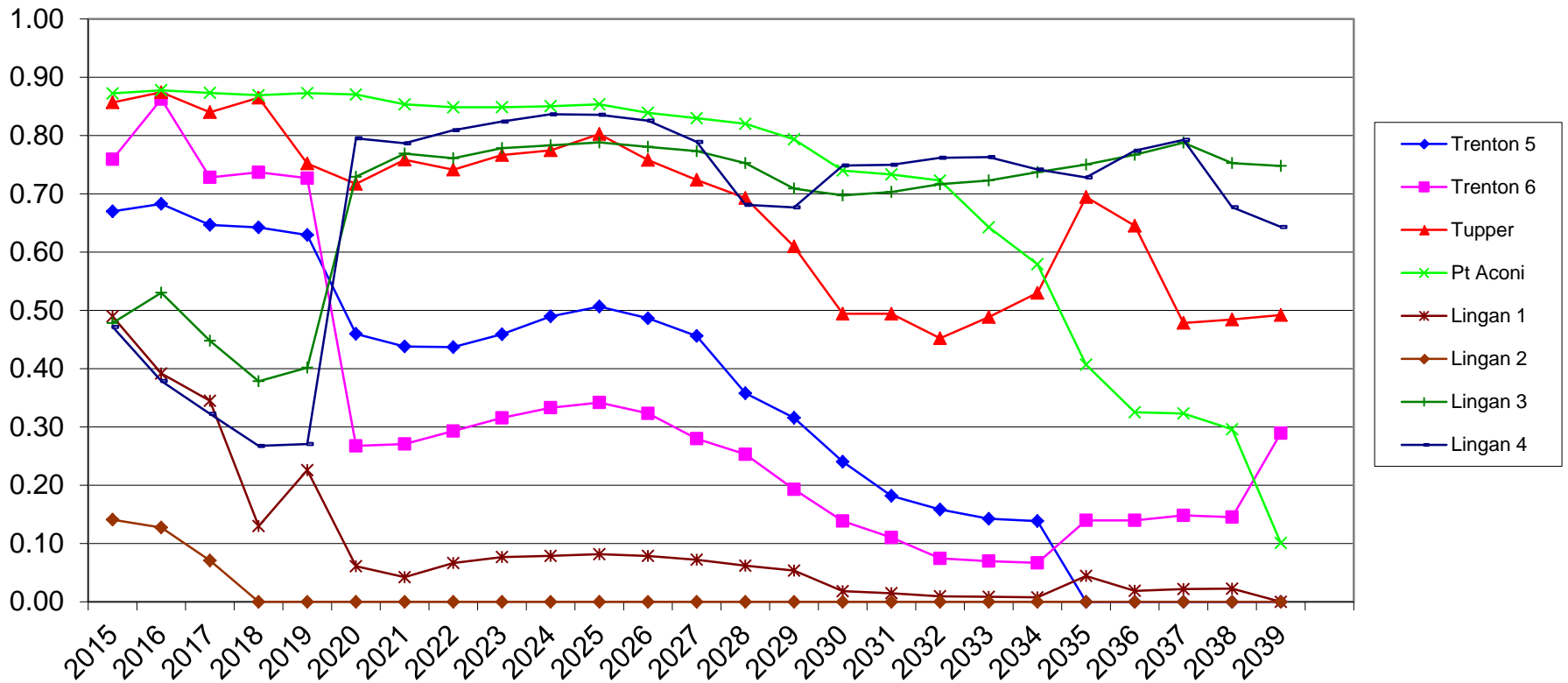


Preliminary Energy by Resource Type



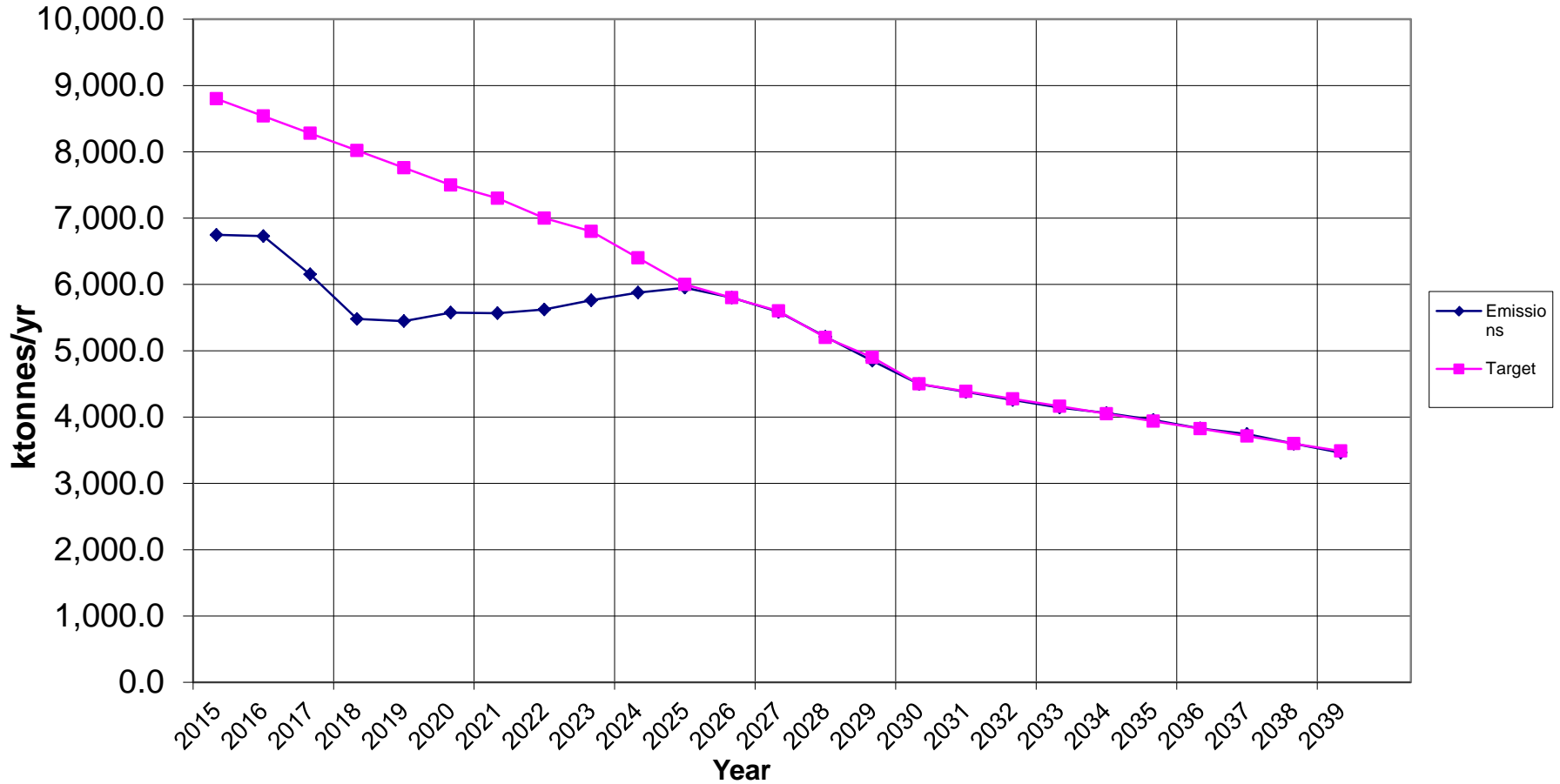
CRP21-3 Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



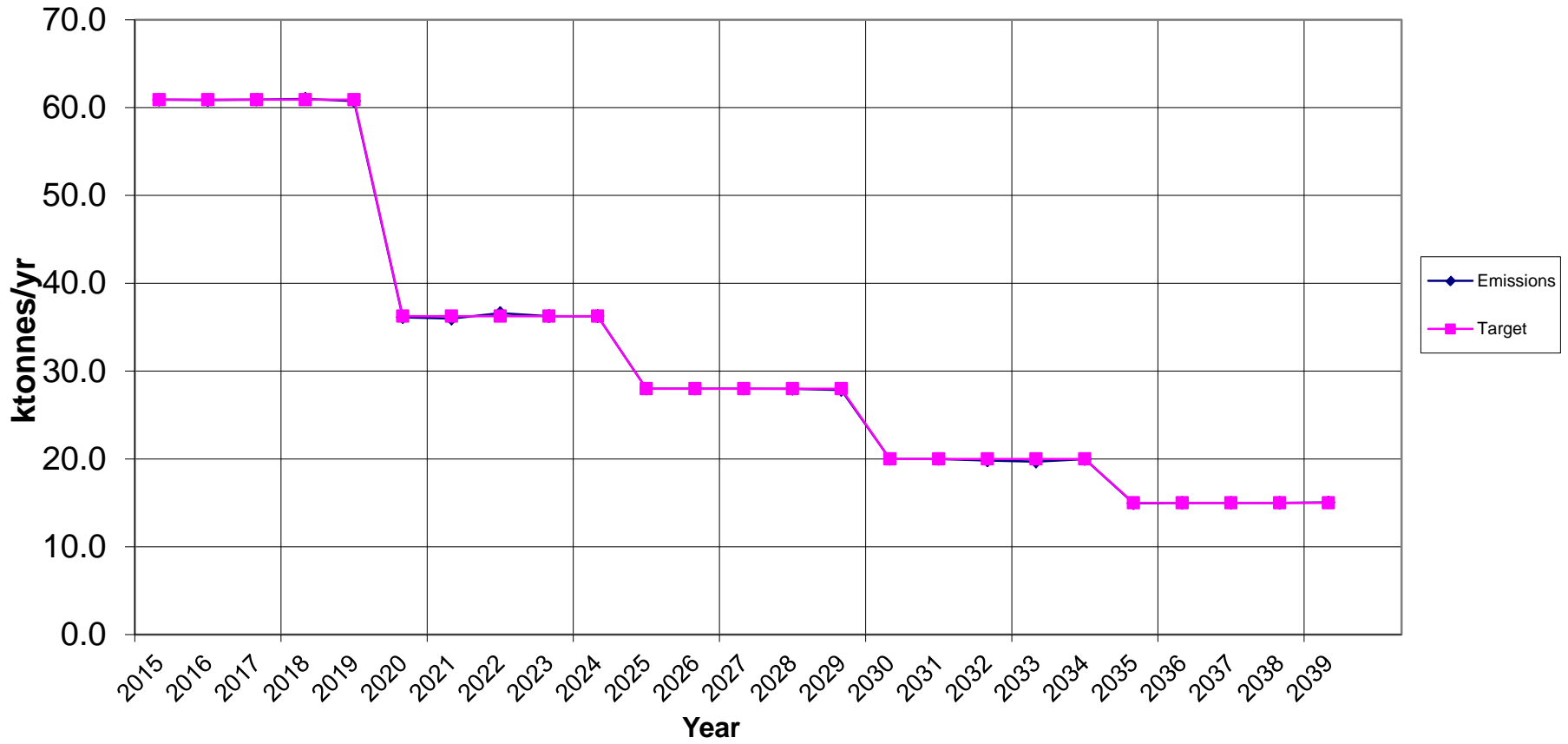
CRP21-3 Preliminary CO₂ Emissions

Projected CO2 Emissions



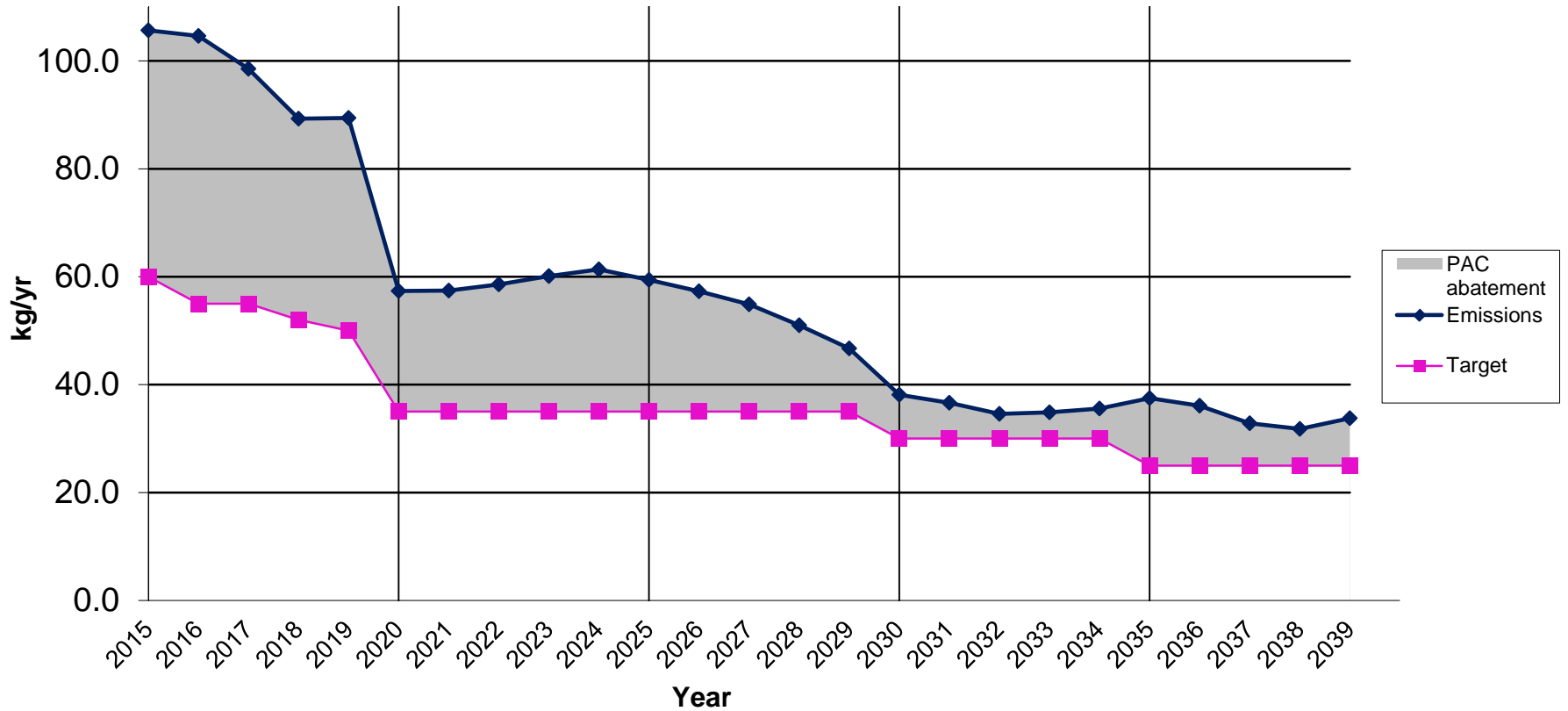
CRP21-3 Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP21-3 Preliminary Hg Emissions

Projected Mercury Emissions





CRP32 Preliminary Results

CRP32 Input Assumptions

Candidate Resource Plan 32 (CRP32):

- High Load Forecast
- Base DSM (50% of peak savings, 100% of energy)
- Emissions - Scenario A
- Planned and committed resources are fixed in the plan (REA wind, COMFIT, Maritime Link/ Retire Lin #2)
- Maximum Coal Use
- Constraints
 - Planning reserve margin min = 20%
 - RES: 2015-2019 = 25%; 2020-2039 = 40%

CRP32 Preliminary Results

	CRP32-01-WND-R01	CRP32-01-PPA-R01
	Least cost study period	Least cost planning period
2015		
2016	DR Water Heaters	DR Water Heaters
2017	ML Oct 2017 Lin 2 retire	ML Oct 2017 Lin 2 retire
2018		
2019	Mersey Phase 1	
2020	FGD (Lin 3/4 300 MW) Wind Block 150 MW 2 x 50 MW CT (wind integration)	FGD (Lin 3/4 300 MW) PPA 100MW Firm
2021		
2022		
2023	Mersey Phase 2	
2024		
2025	TUC 1 Retire CT 50MW	TUC 1 Retire CT 50MW
2026		
2027		CT 50MW
2028	CT 50MW	
2029		
2030		
2031		
2032	TUC 2 Retire CT 50MW	TUC 2 Retire CT 100MW
2033		
2034		
2035	Tre 5 Retire CT 50MW & CT 100MW	Tre 5 Retire CT 50MW & CT 100MW
2036	CT 34MW	CT 50MW
2037		
2038	CC 145 MW	
2039	PHBM 51.7 MW Firm	PHBM 51.7 MW Firm CC 145 MW
	Lin 1 Retire	Lin 1 Retire
Planning PV \$M	12,925	12,907
Study PV \$M	20,008	20,236

	Base DSM Program Adm Cost	Base DSM Customer Cost
	\$M	\$M
2015	50.7	37.9
2016	50.5	39.9
2017	50.0	41.2
2018	52.4	41.6
2019	57.0	32.2
2020	61.5	28.0
2021	56.9	28.4
2022	54.1	28.4
2023	51.5	29.2
2024	50.8	28.6
2025	50.6	29.9
2026	52.1	33.8
2027	54.8	36.8
2028	58.5	41.4
2029	60.7	34.0
2030	63.1	37.2
2031	62.6	40.6
2032	61.4	40.8
2033	59.3	41.4
2034	56.7	41.7
2035	47.7	48.4
2036	46.5	48.0
2037	45.4	47.6
2038	44.4	46.8
2039	43.5	46.3
NPV	700.8	474.9



CRP32-1 (WIND) Preliminary Results

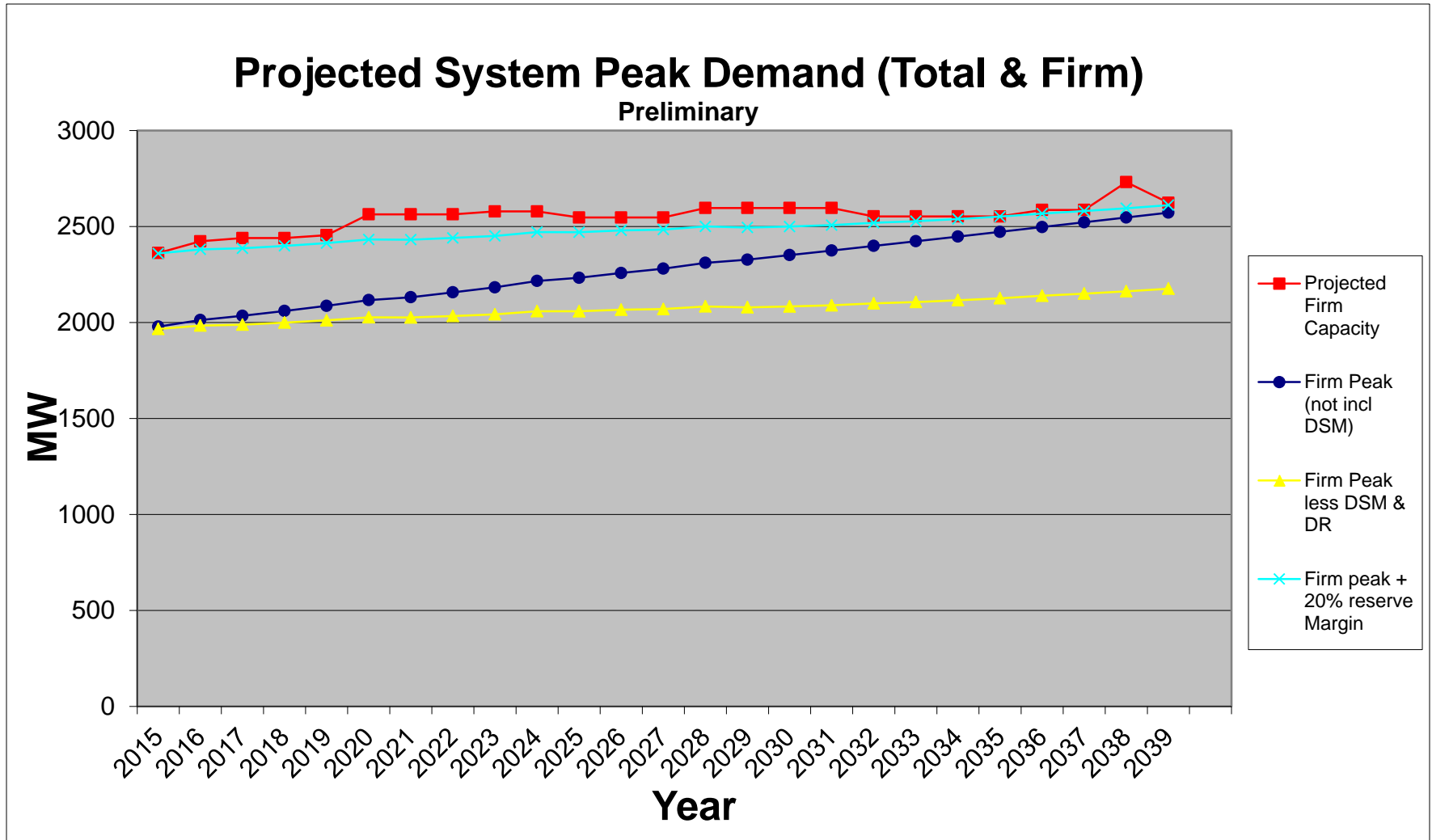
CRP32-1 (WIND)

Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,979	2,013	2,035	2,060	2,087	2,117	2,132	2,157	2,183	2,216	2,233	2,351	2,472	2,497	2,522	2,547	2,572
DSM	12	28	44	56	69	80	91	102	113	125	135	208	284	298	310	323	334
Firm Peak Less DSM	1,967	1,985	1,991	2,004	2,018	2,037	2,041	2,055	2,070	2,091	2,098	2,144	2,188	2,199	2,212	2,224	2,238
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Firm Peak Less DR	1,967	1,984	1,989	1,999	2,011	2,027	2,026	2,034	2,043	2,059	2059	2083	2126	2,139	2,151	2,163	2,176
RM Required	393	397	398	400	402	405	405	407	409	412	412	416.7	425.3	428	430	433	435
Required MWs	2,360	2,381	2,387	2,399	2,414	2,433	2,432	2,441	2,451	2,471	2470	2500	2552	2,567	2,581	2,595	2,611
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8		15				15								
PH Biomass																	45.4
Additional Wind						18											
Assumed Unit Retirement				-153		-8					-81		-150				-153
Natural Gas Unit						98.7					49.4		149.4	34		145	
Total Annual Additions	20.7	60.9	16.9	0.3	15.0	108.7	0.0	0.0	15.0	0.0	-31.6	0.0	-0.6	34.0	0.0	145.0	-107.6
Total Cumulative Additions	20.7	81.6	98.5	98.7	113.7	222.4	222.4	222.4	237.4	237.4	205.8	255.2	211.0	245.0	245.0	390.0	282.4
Total Firm Capacity	2362	2423	2440	2440	2455	2564	2564	2564	2579	2579	2547	2597	2552	2586	2586	2731	2624
Surplus (Deficit) MWs above RM	2	42	53	41	41	131	132	123	128	108	77	96	1	19	6	136	12
Reserve Margin %	20.1%	22.1%	22.7%	22.0%	22.1%	26.5%	26.5%	26.0%	26.2%	25.2%	23.7%	24.6%	20.0%	20.9%	20.3%	26.3%	20.6%

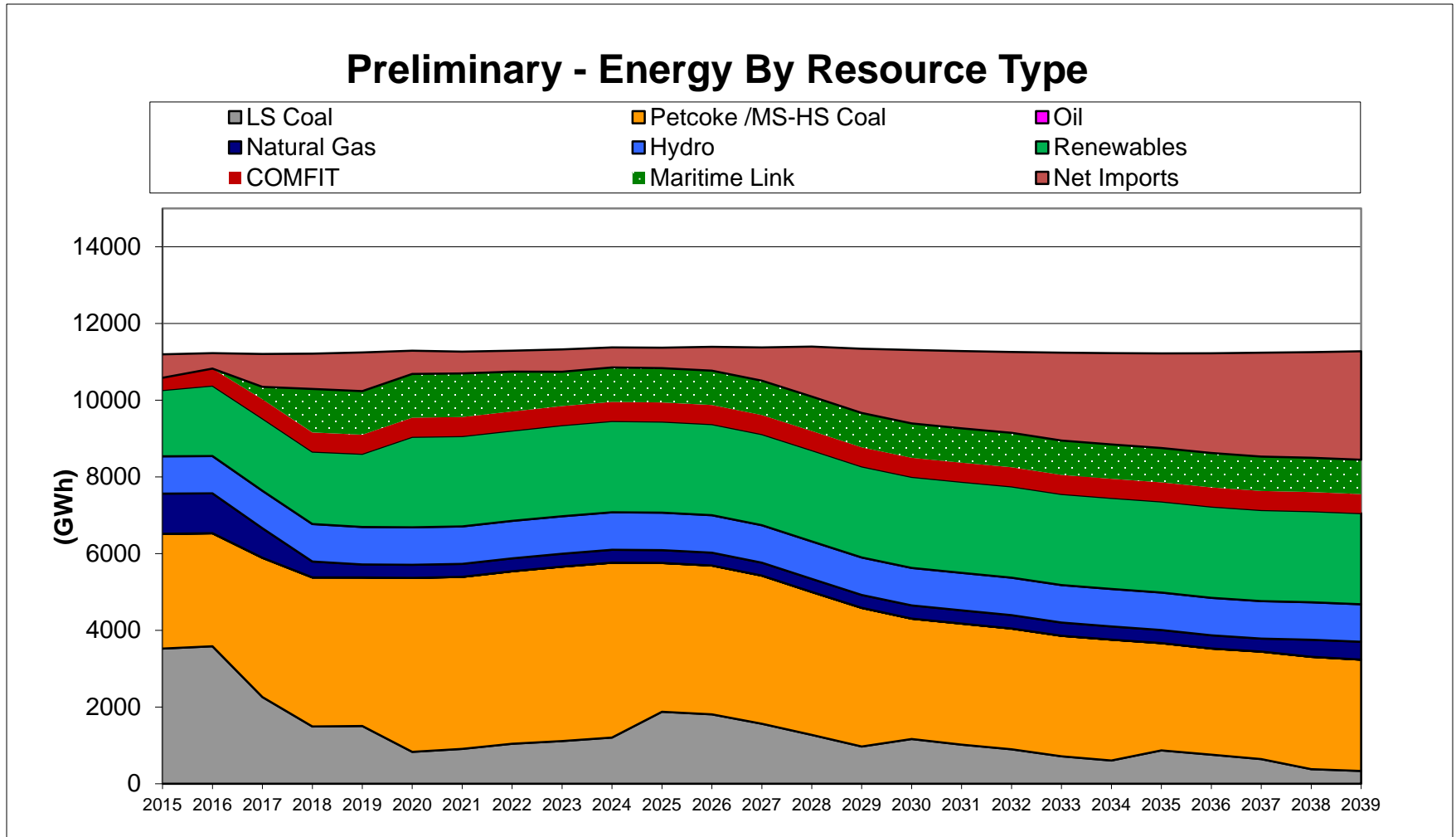
CRP32-1 (WIND)

Preliminary Demand and DSM



CRP32-1 (WIND)

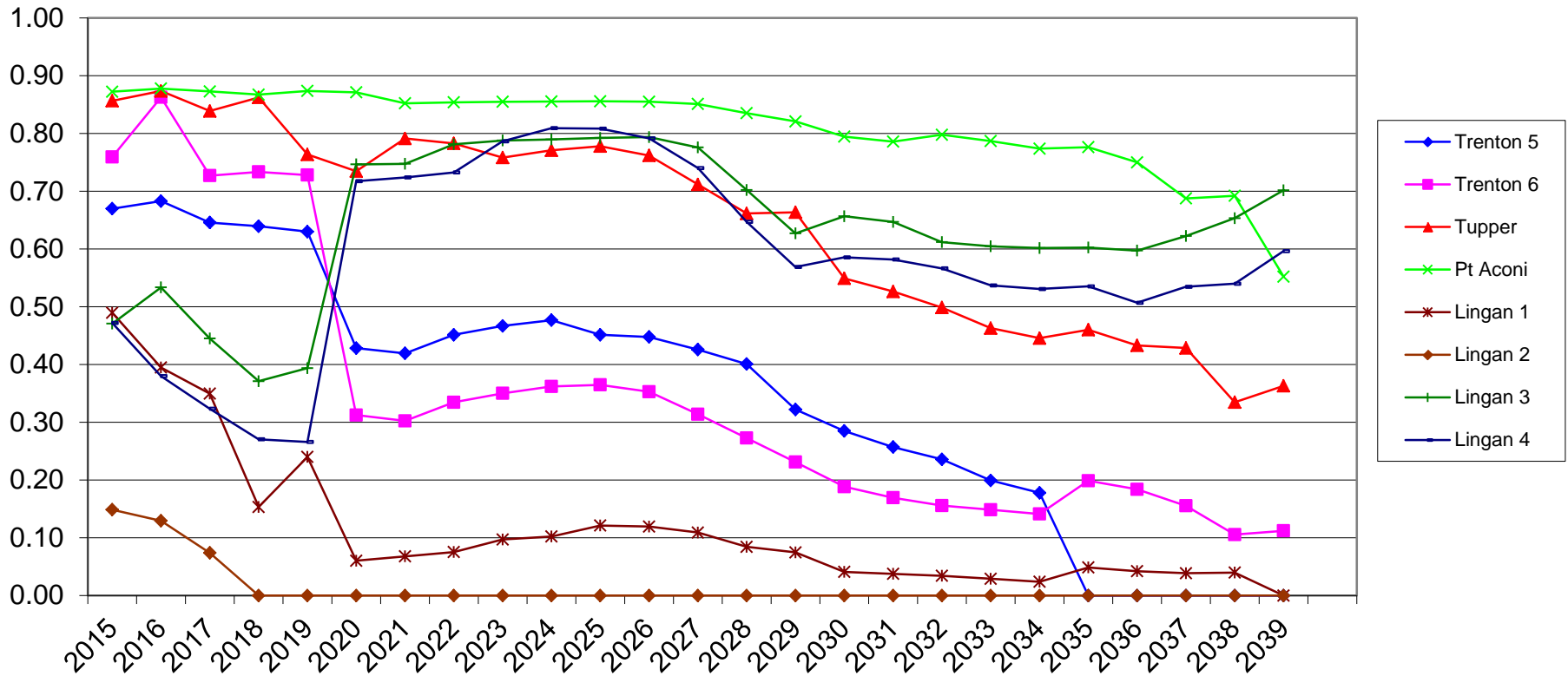
Preliminary Energy by Resource Type



CRP32-1 (WIND)

Preliminary Coal Capacity Factors

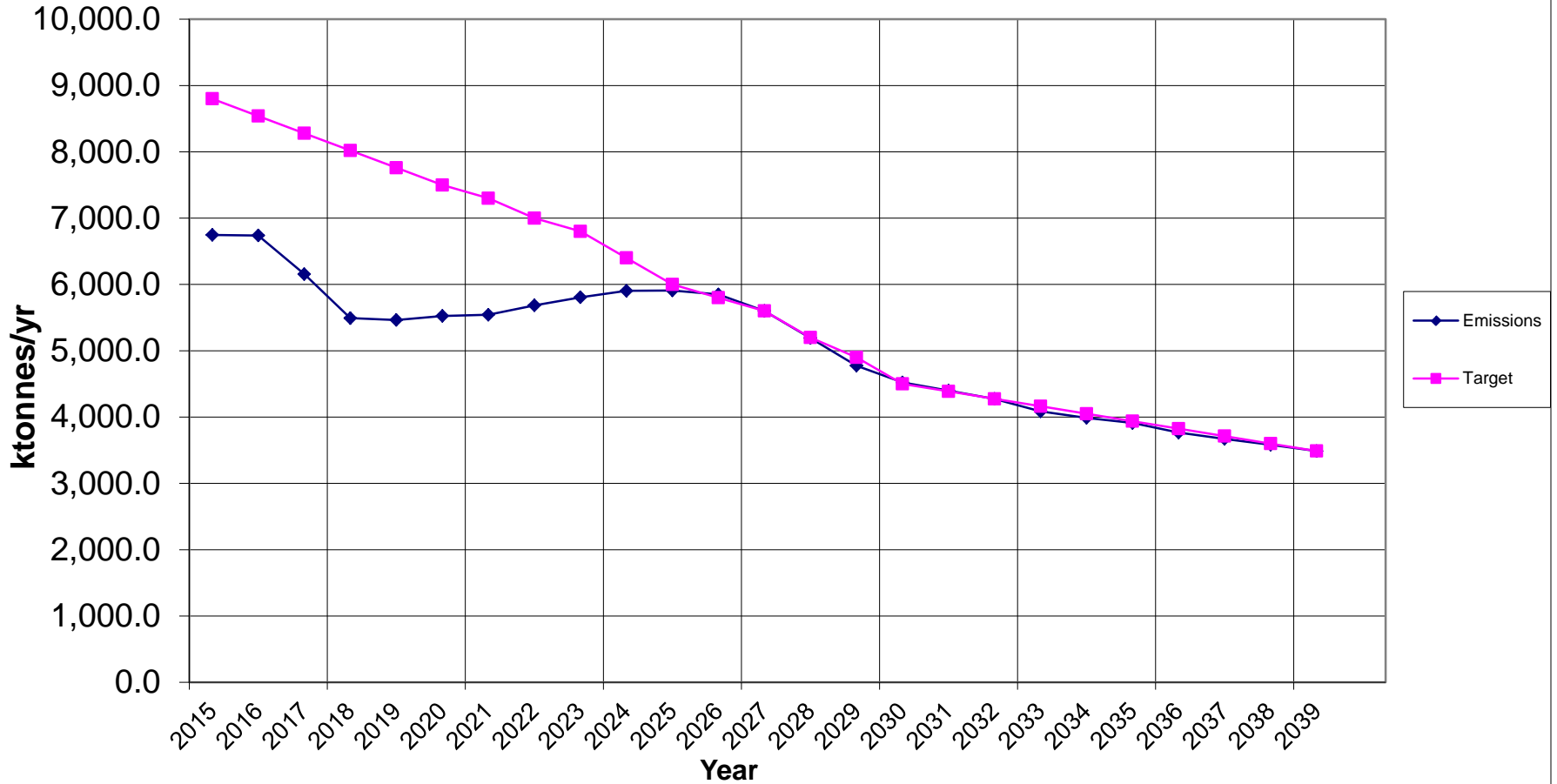
Projected Capacity Factors - Coal Units



CRP32-1 (WIND)

Preliminary CO₂ Emissions

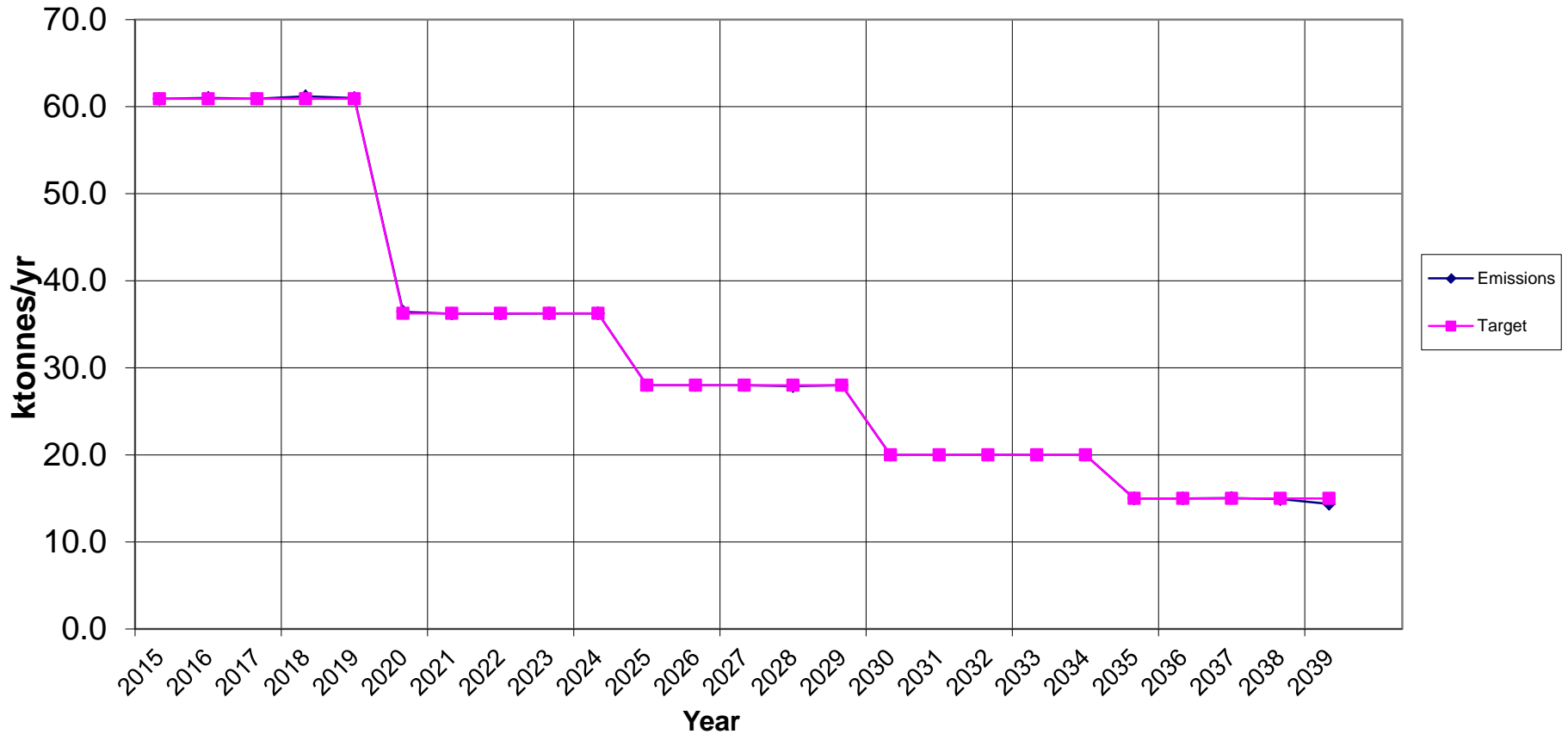
Projected CO₂ Emissions



CRP32-1 (WIND)

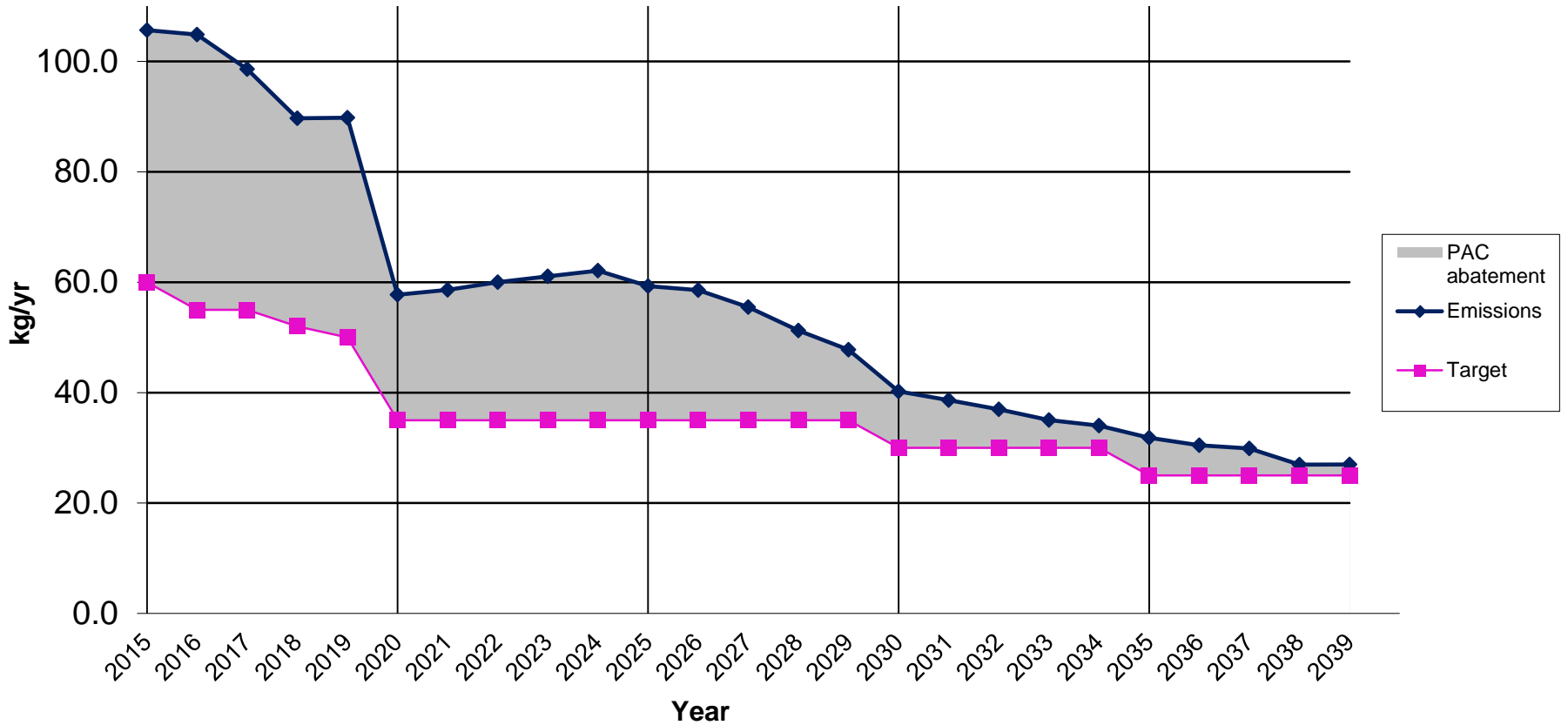
Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP32-1 (WIND) Preliminary Hg Emissions

Projected Mercury Emissions





CRP32-1 (PPA) Preliminary Results

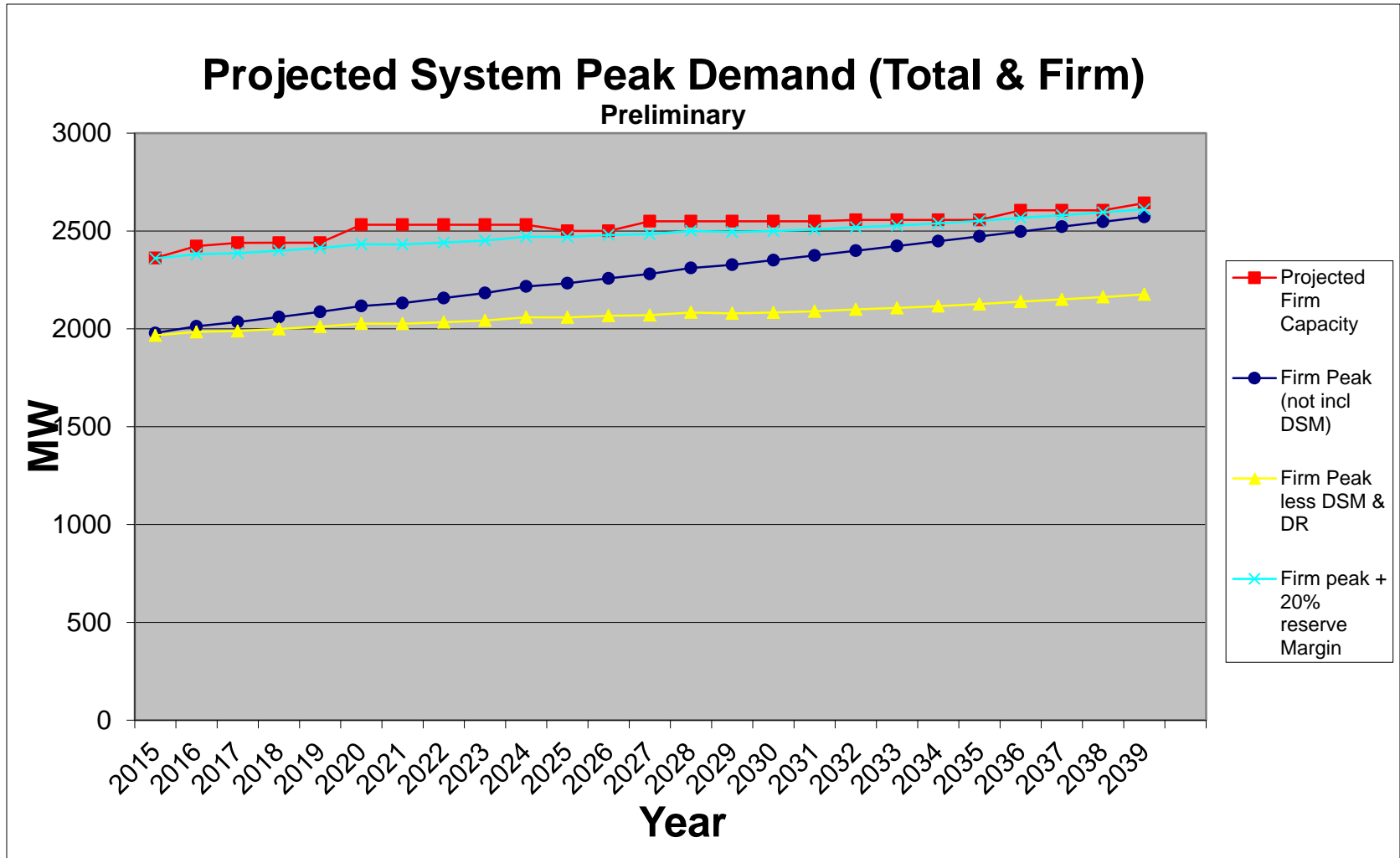
CRP32-1 (PPA)

Preliminary Load and Resources

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2030	2035	2036	2037	2038	2039
Firm Peak	1,979	2,013	2,035	2,060	2,087	2,117	2,132	2,157	2,183	2,216	2,233	2,351	2,472	2,497	2,522	2,547	2,572
DSM	12	28	44	56	69	80	91	102	113	125	135	208	284	298	310	323	334
Firm Peak Less DSM	1,967	1,985	1,991	2,004	2,018	2,037	2,041	2,055	2,070	2,091	2,098	2,144	2,188	2,199	2,212	2,224	2,238
DRWH Reduction	0	1	2	4	7	10	15	21	27	32	39	60	62	60	62	62	62
DRCM Reduction	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Firm Peak Less DR	1,967	1,984	1,989	1,999	2,011	2,027	2,026	2,034	2,043	2,059	2059	2083	2126	2,139	2,151	2,163	2,176
RM Required	393	397	398	400	402	405	405	407	409	412	412	416.7	425.3	428	430	433	435
Required MWs	2,360	2,381	2,387	2,399	2,414	2,433	2,432	2,441	2,451	2,471	2470	2500	2552	2,567	2,581	2,595	2,611
Existing MWs	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341	2341
Resource Additions (MW):																	
Burnside #4		33															
COMFIT - Biomass	4.2	6															
COMFIT - Wind	14.14	4.56	5.1														
REA Wind	2.35	17.34															
Maritime Link				153.3													
Small Biomass PPA			10														
Hydro			1.8														
PH Biomass																	45.4
PPA						100											
Assumed Unit Retirement				-153		-8					-81		-150				-153
Natural Gas Unit											49.4		149.4	49.4			145
Total Annual Additions	20.7	60.9	16.9	0.3	0.0	92.0	0.0	0.0	0.0	0.0	-31.6	0.0	-0.6	49.4	0.0	0.0	37.4
Total Cumulative Additions	20.7	81.6	98.5	98.7	98.7	190.7	190.7	190.7	190.7	190.7	159.1	208.5	214.9	264.3	264.3	264.3	301.7
Total Firm Capacity	2362	2423	2440	2440	2440	2532	2532	2532	2532	2532	2501	2550	2556	2606	2606	2606	2643
Surplus (Deficit) MWs above RM	2	42	53	41	26	99	101	91	81	61	30	50	5	38	25	11	32
Reserve Margin %	20.1%	22.1%	22.7%	22.0%	21.3%	24.9%	25.0%	24.5%	24.0%	23.0%	21.5%	22.4%	20.2%	21.8%	21.2%	20.5%	21.5%

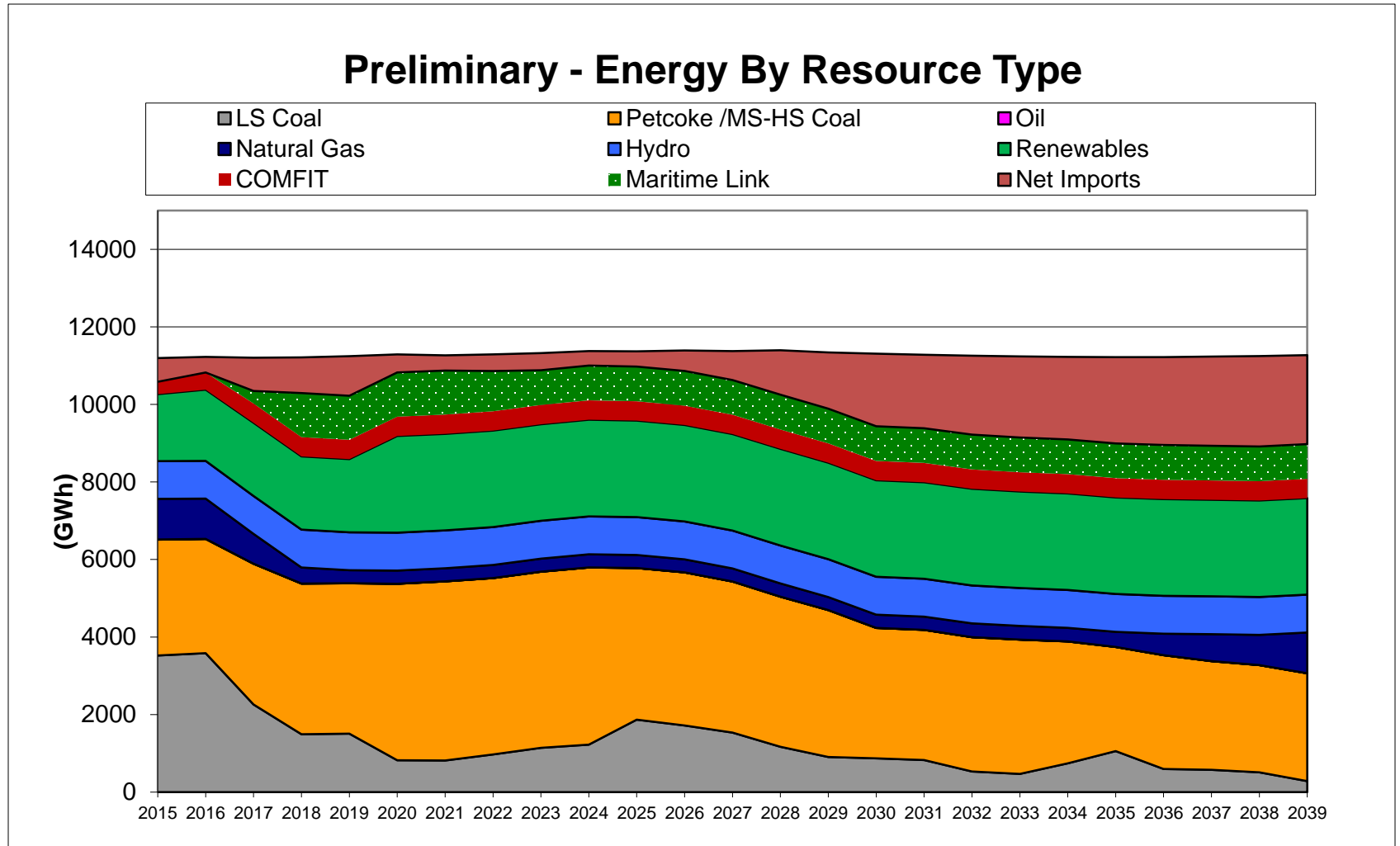
CRP32-1 (PPA)

Preliminary Demand and DSM



CRP32-1 (PPA)

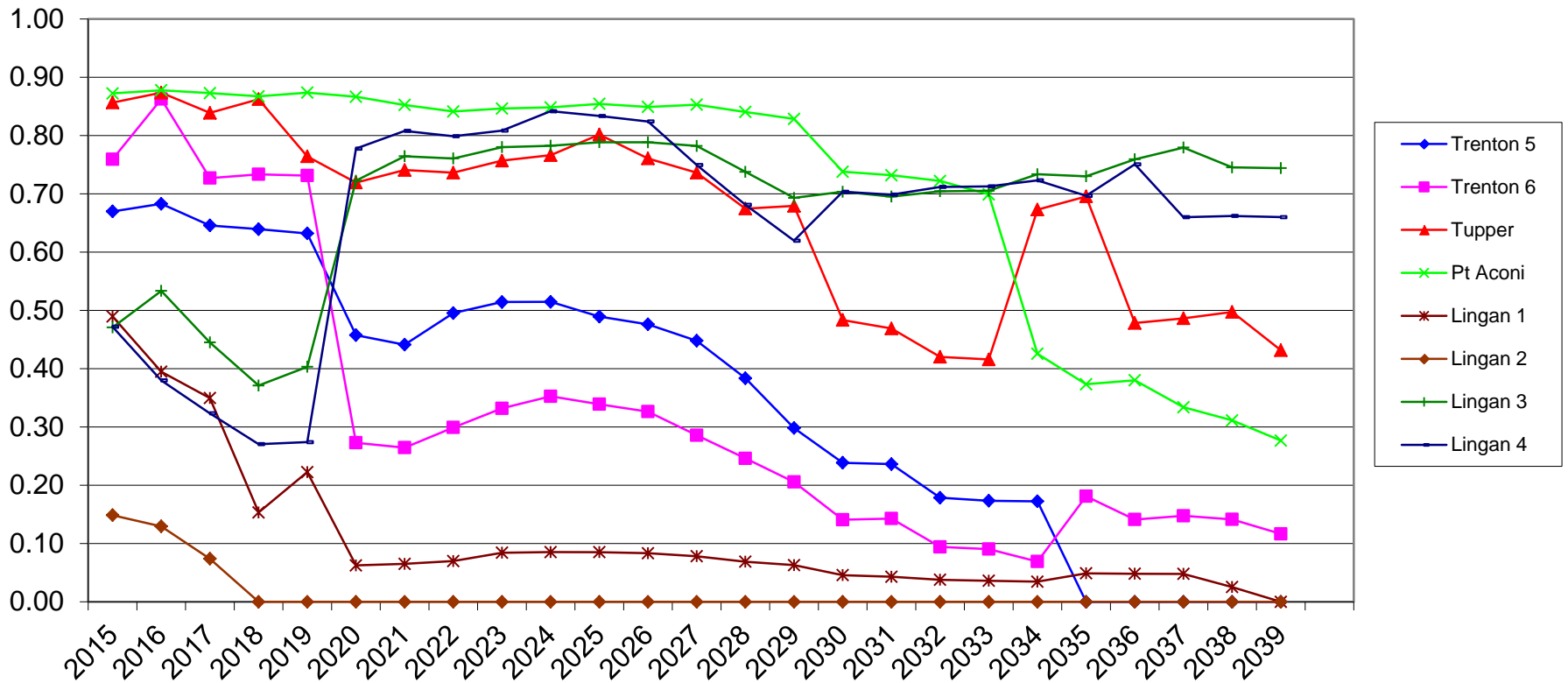
Preliminary Energy by Resource Type



CRP32-1 (PPA)

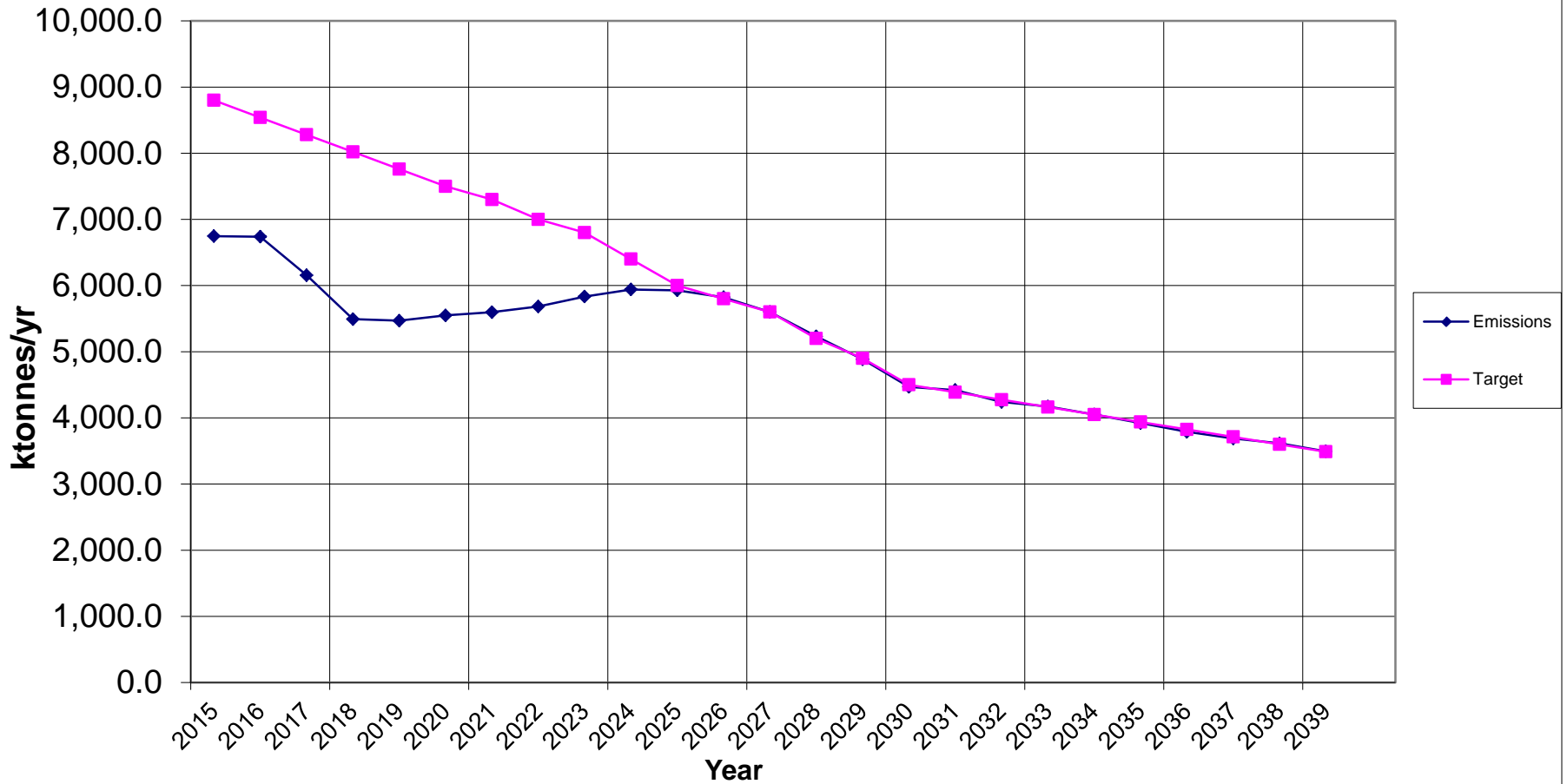
Preliminary Coal Capacity Factors

Projected Capacity Factors - Coal Units



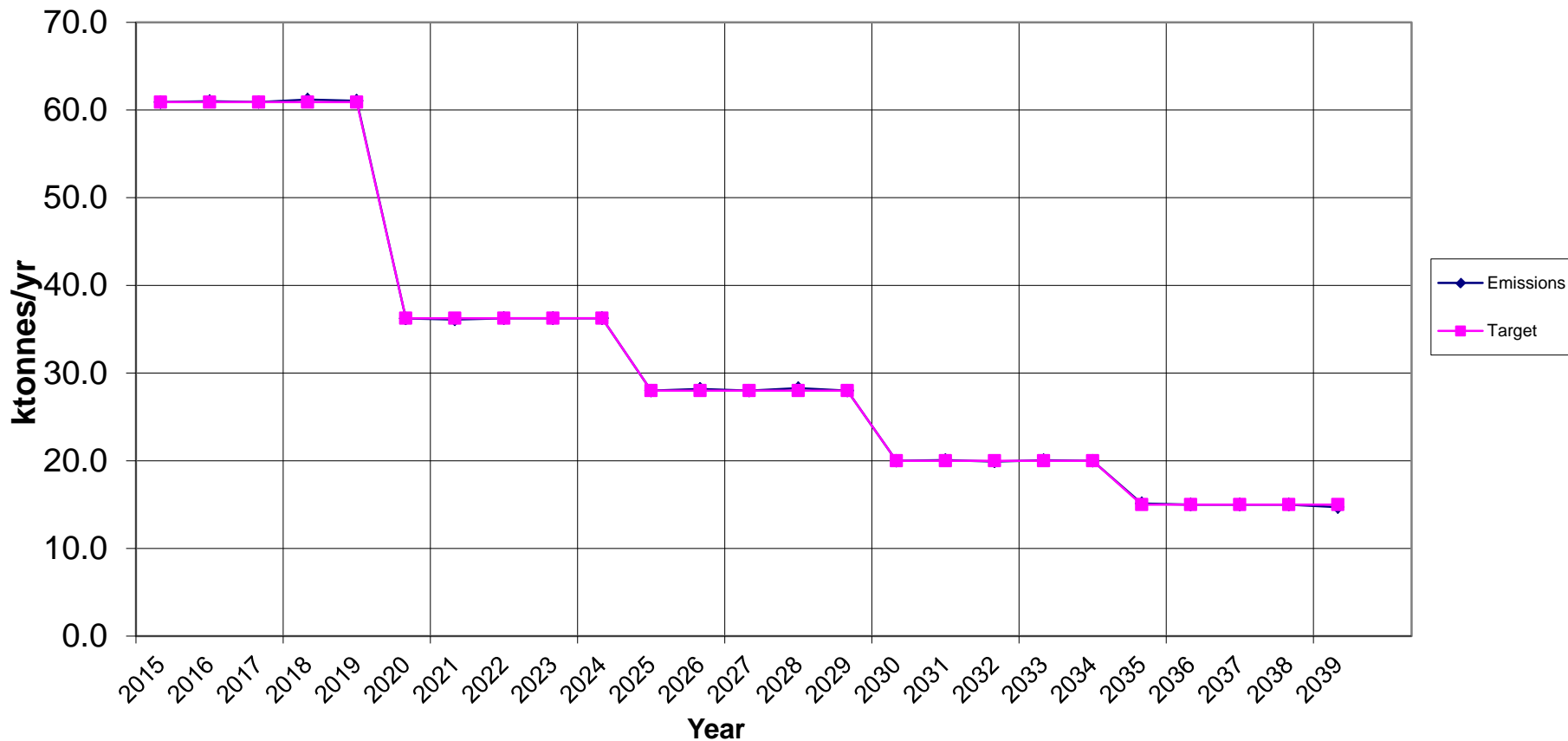
CRP32-1 (PPA) Preliminary CO₂ Emissions

Projected CO₂ Emissions



CRP32-1 (PPA) Preliminary SO₂ Emissions

Projected SO₂ Emissions



CRP32-1 (PPA) Preliminary Hg Emissions

Projected Mercury Emissions

