

CPAMP

Mecanismos de Aversão a Risco - MAR

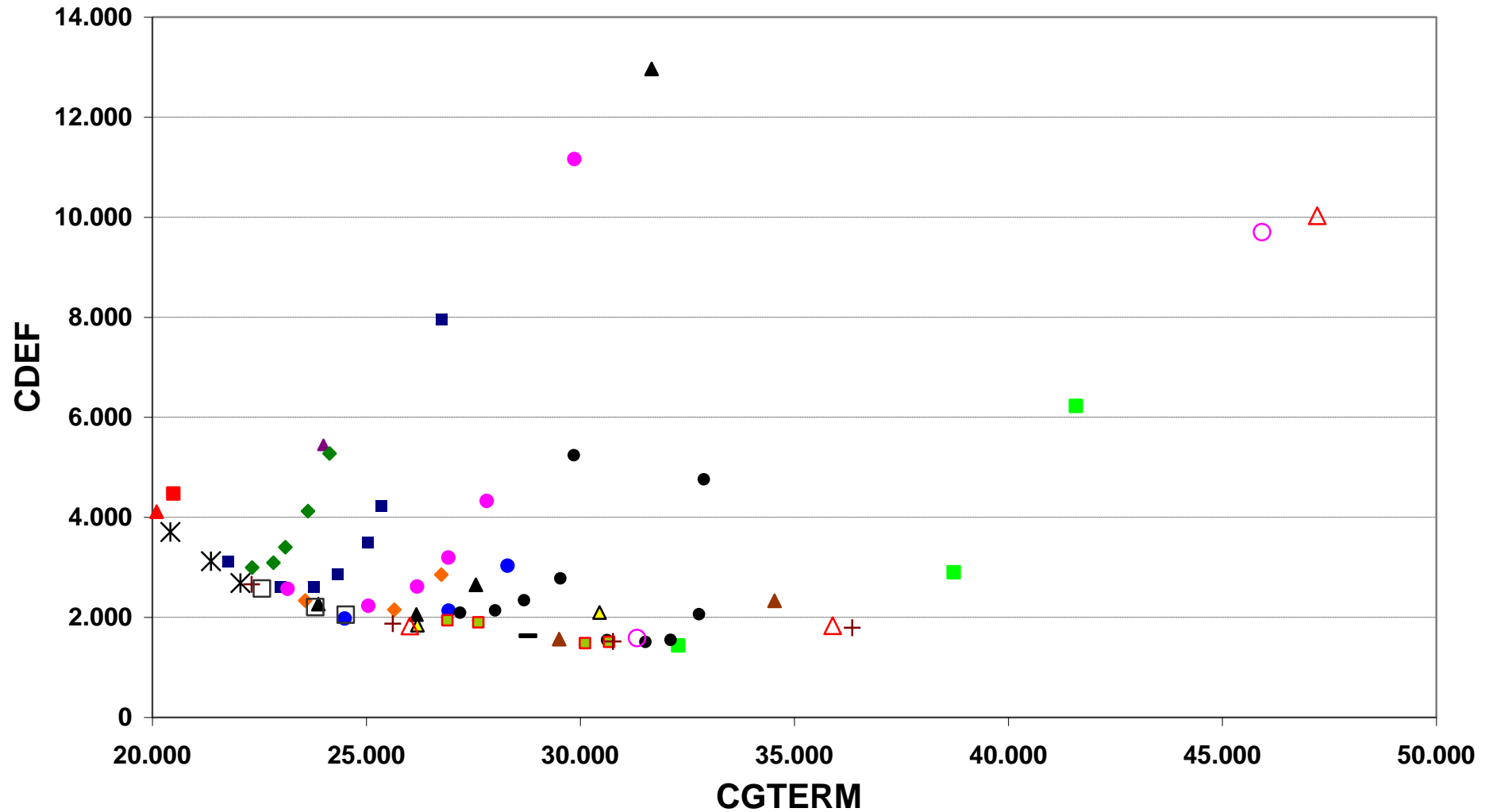
CVaR & SAR

Testes de Validação da Metodologia

24-07-2013

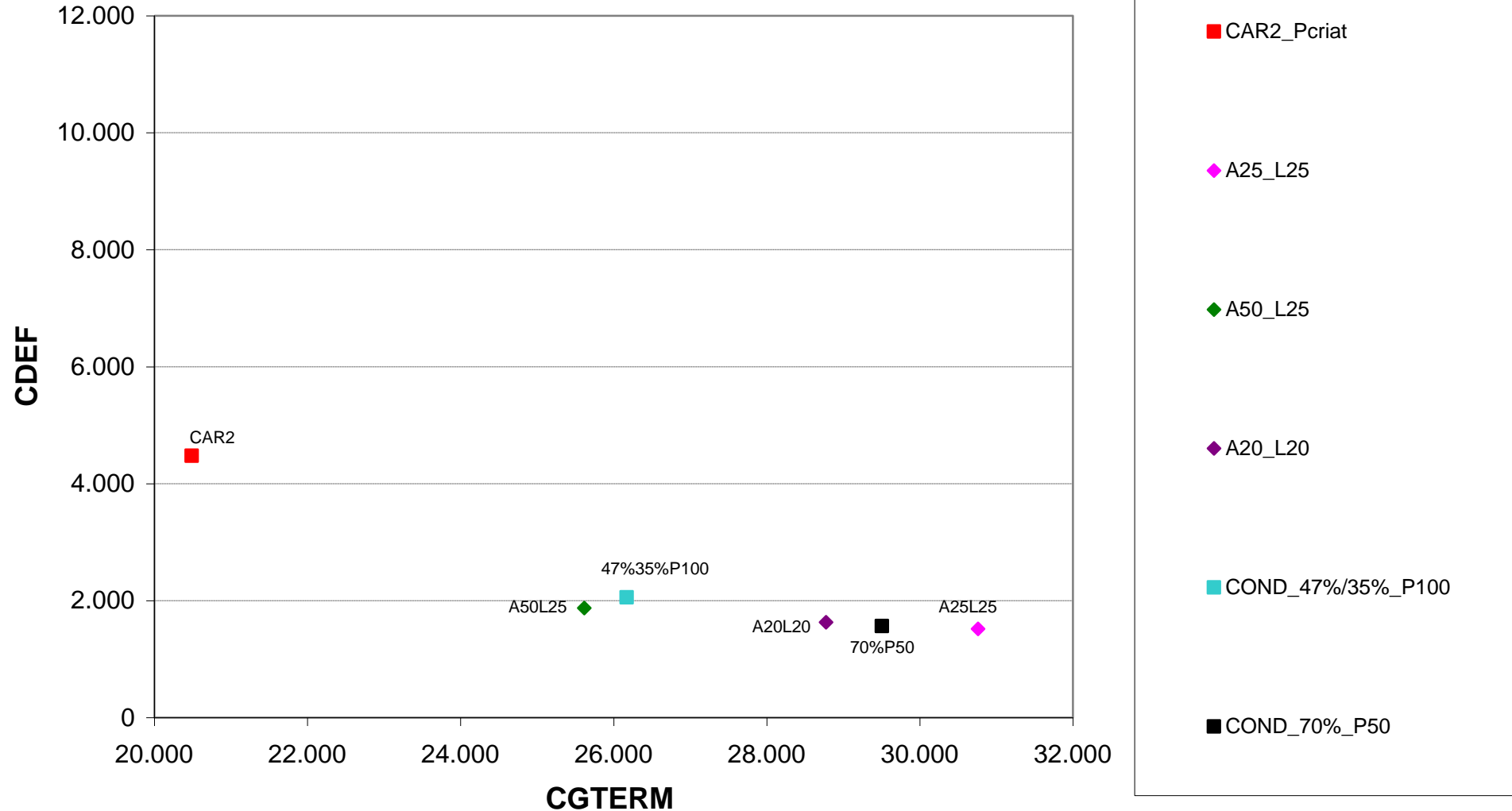
CVaR & SAR – pmo out 2012

PMO Outubro/2012: CDEF x CGTERM



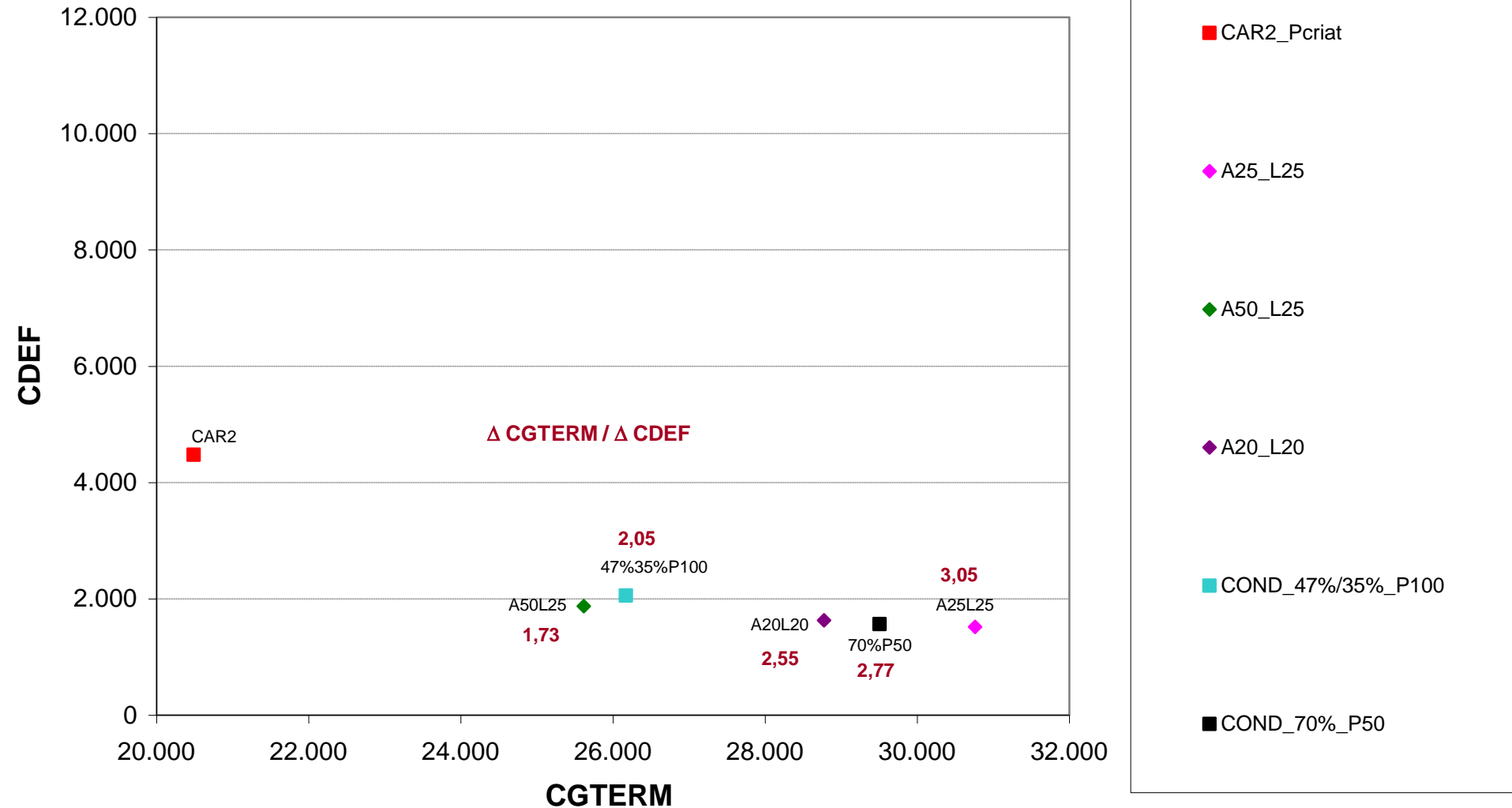
CVaR & SAR – pmo out 2012

PMO Outubro/2012: CDEF x CGTERM



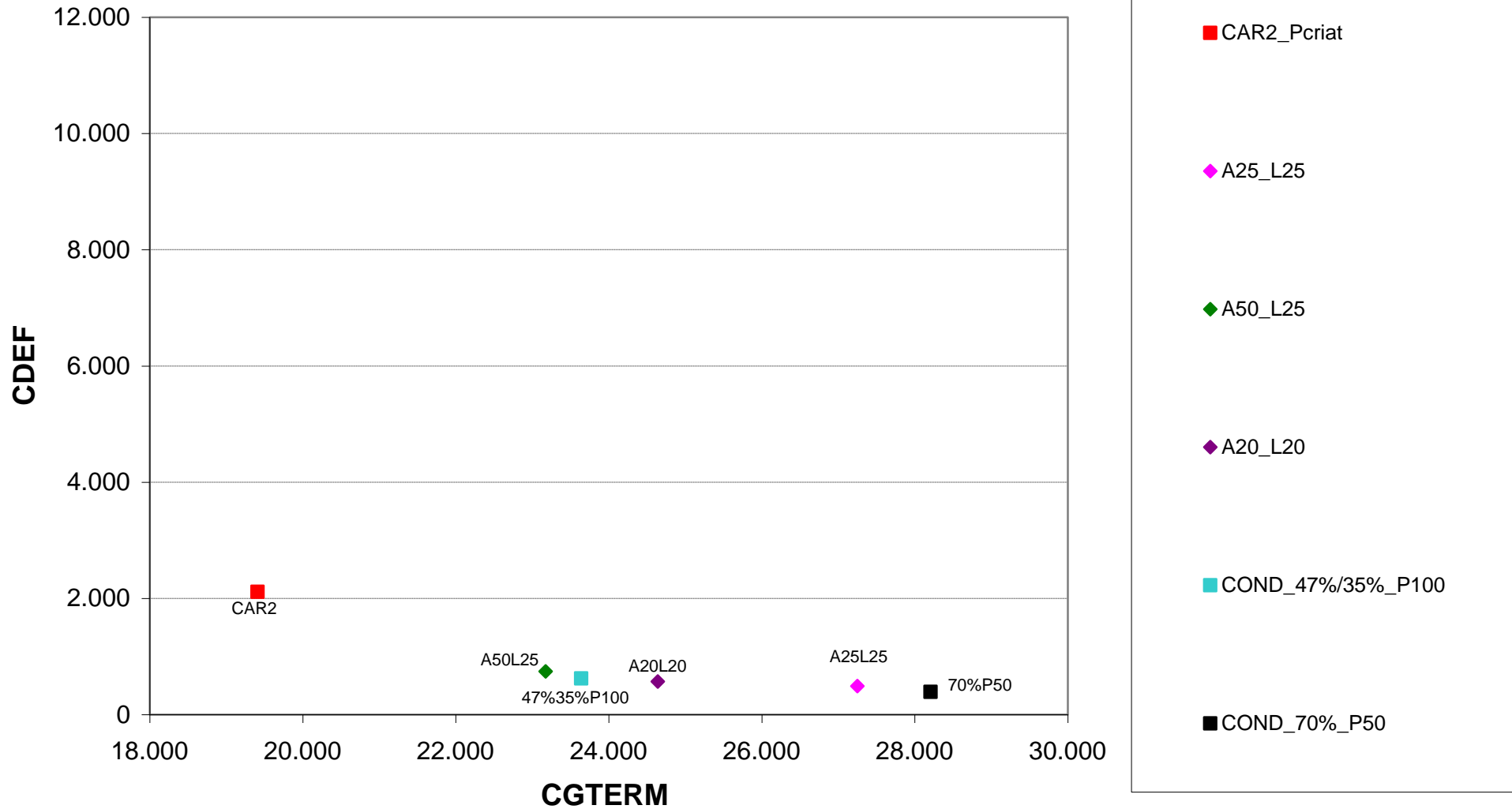
CVaR & SAR – pmo out 2012

PMO Outubro/2012: CDEF x CGTERM



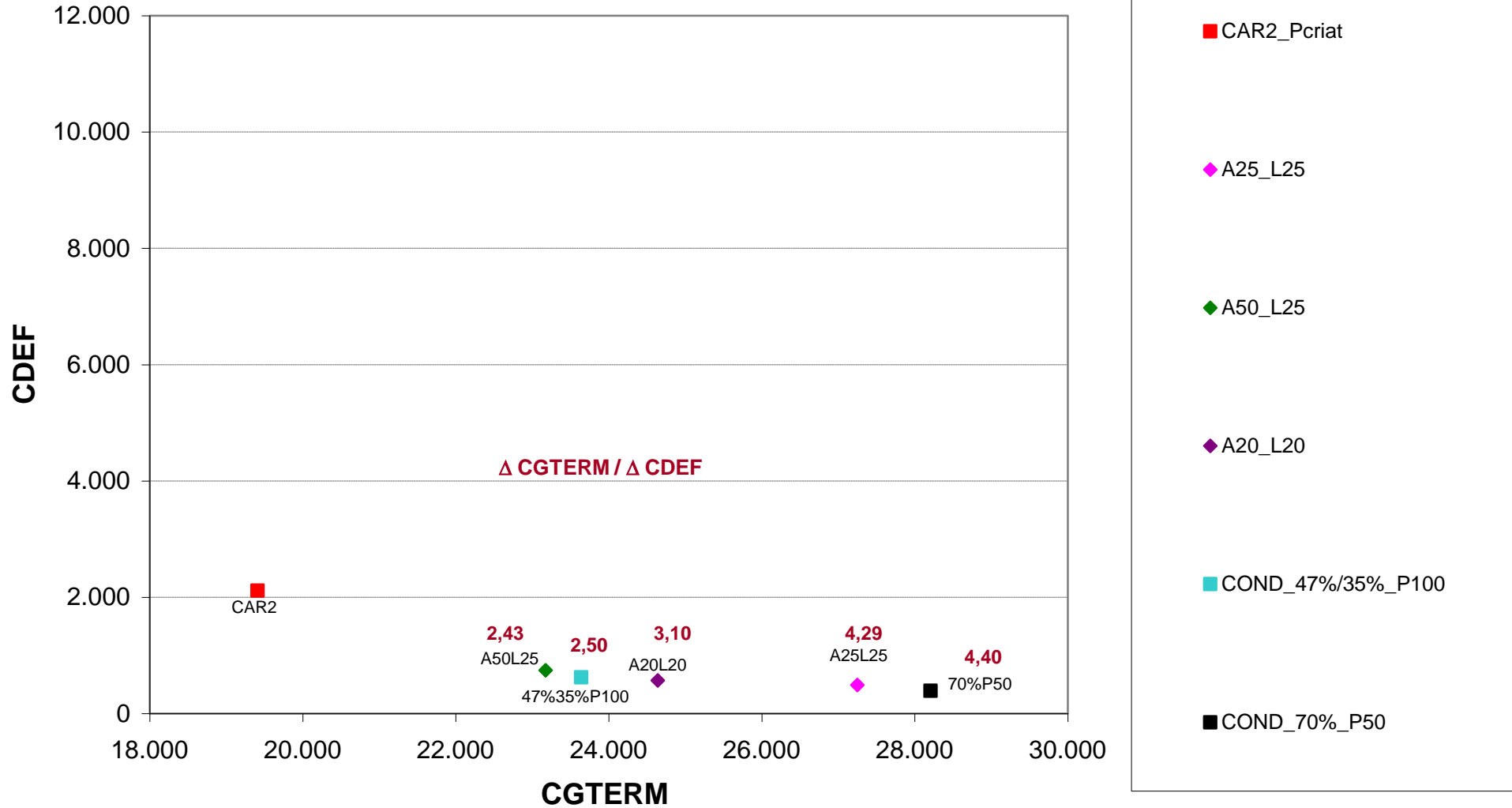
CVaR & SAR – pmo mar 2011

PMO Março/2011: CDEF x CGTERM



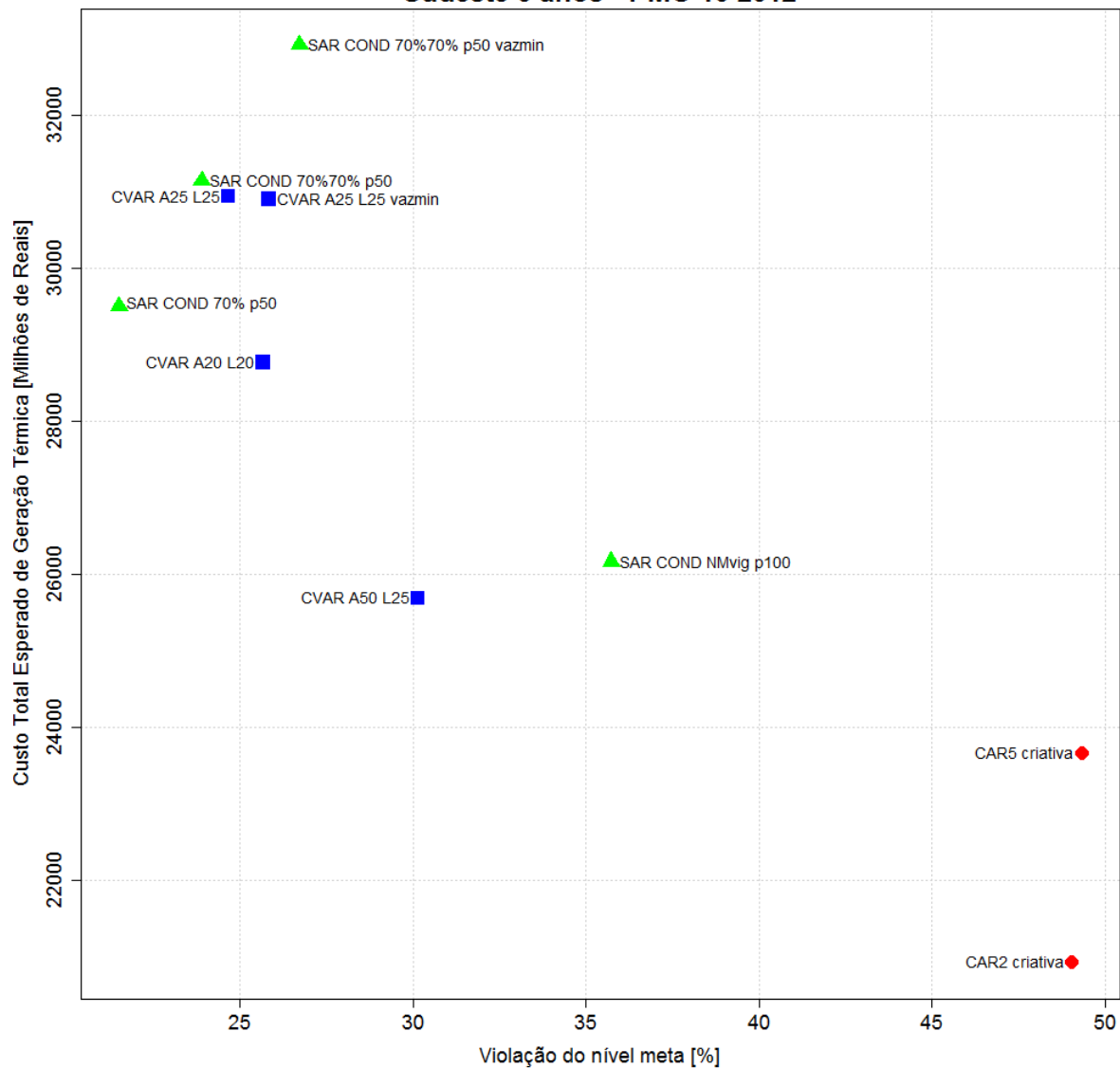
CVaR & SAR – pmo mar 2011

PMO Março/2011: CDEF x CGTERM



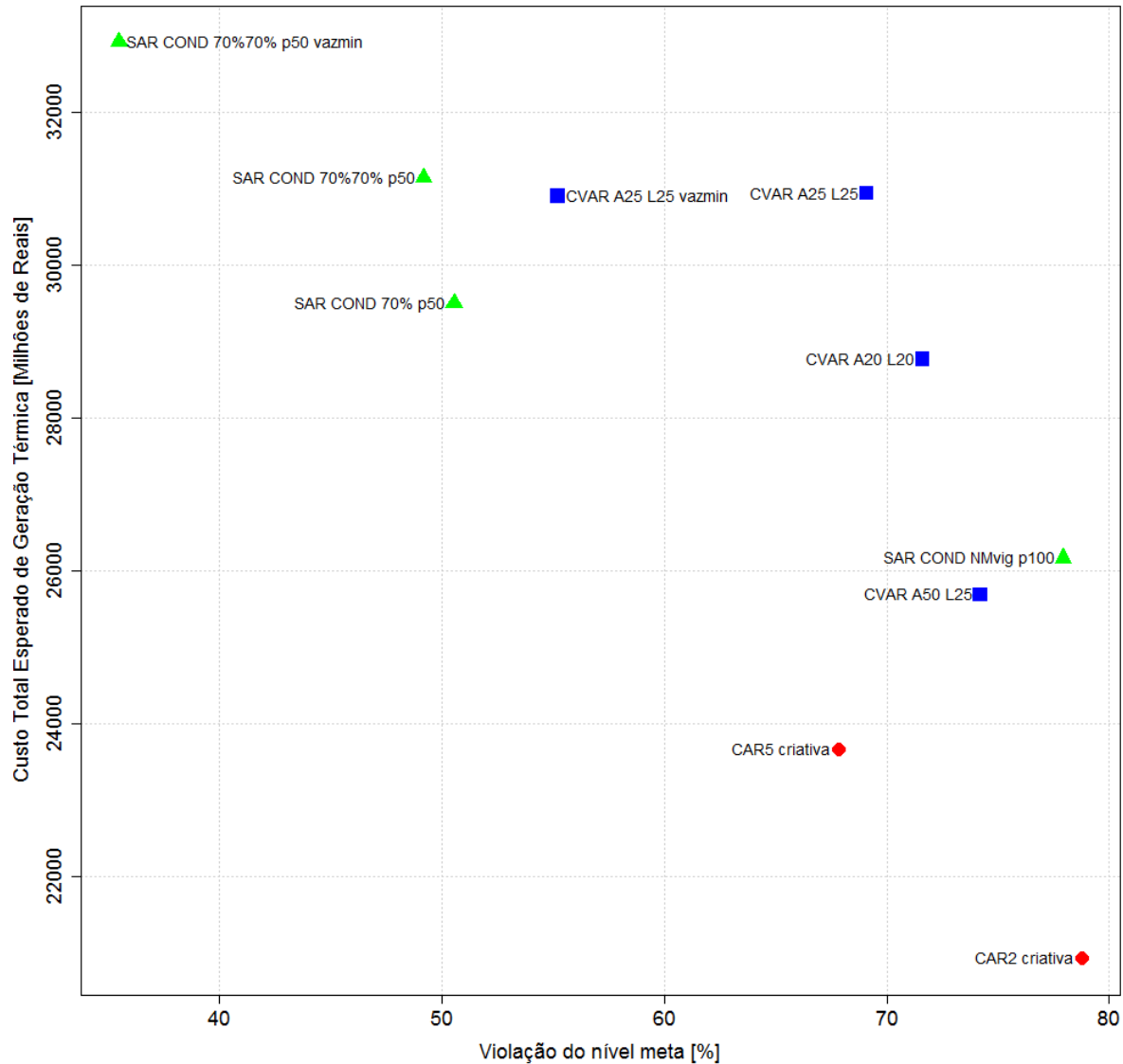
Violação x Custo de geração térmica SUDESTE

Violações Nível Meta x Custo da Geração Térmica
Sudeste 5 anos - PMO 10 2012

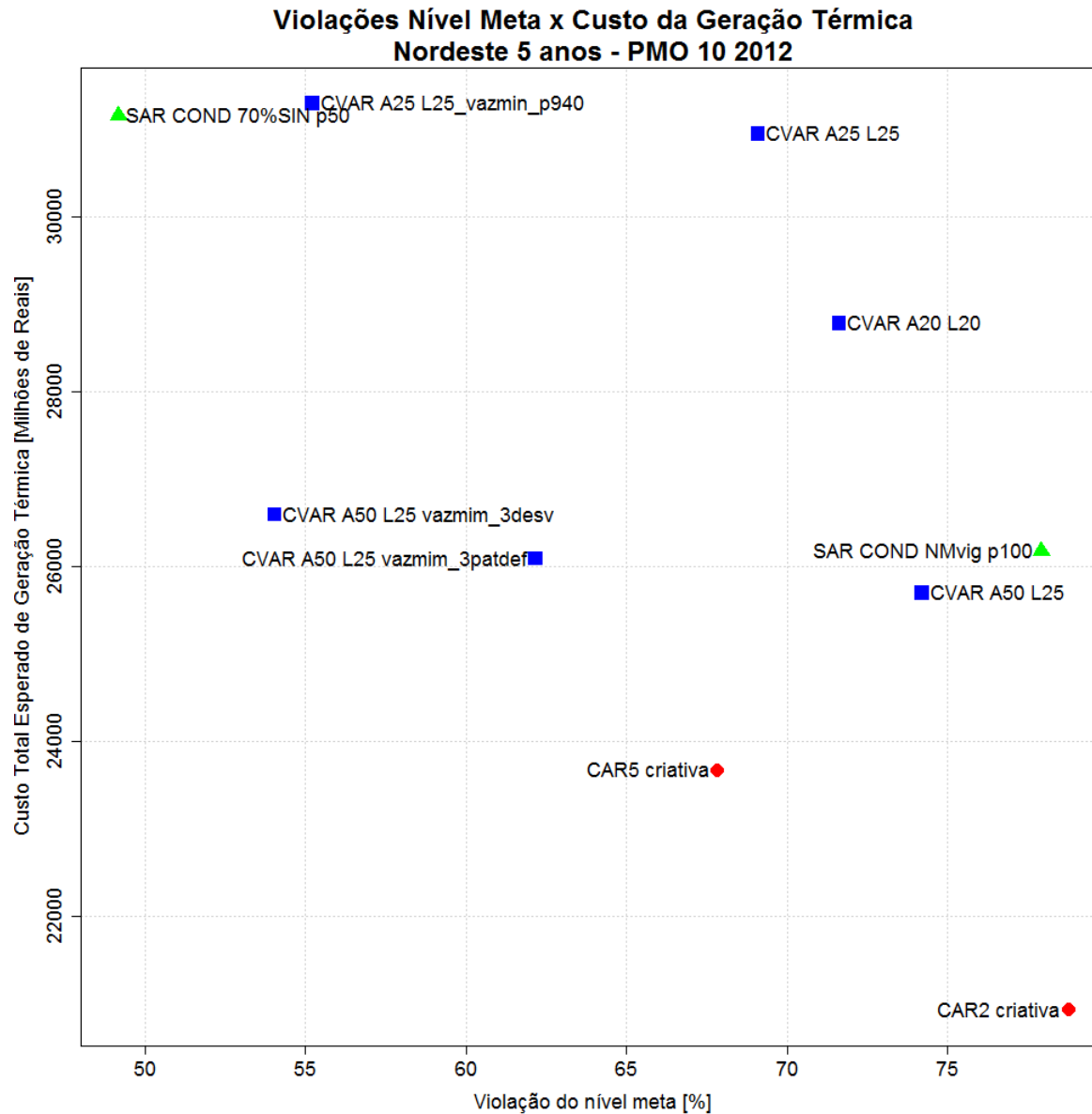


Violação x Custo de geração térmica NORDESTE

Violações Nível Meta x Custo da Geração Térmica
Nordeste 5 anos - PMO 10 2012

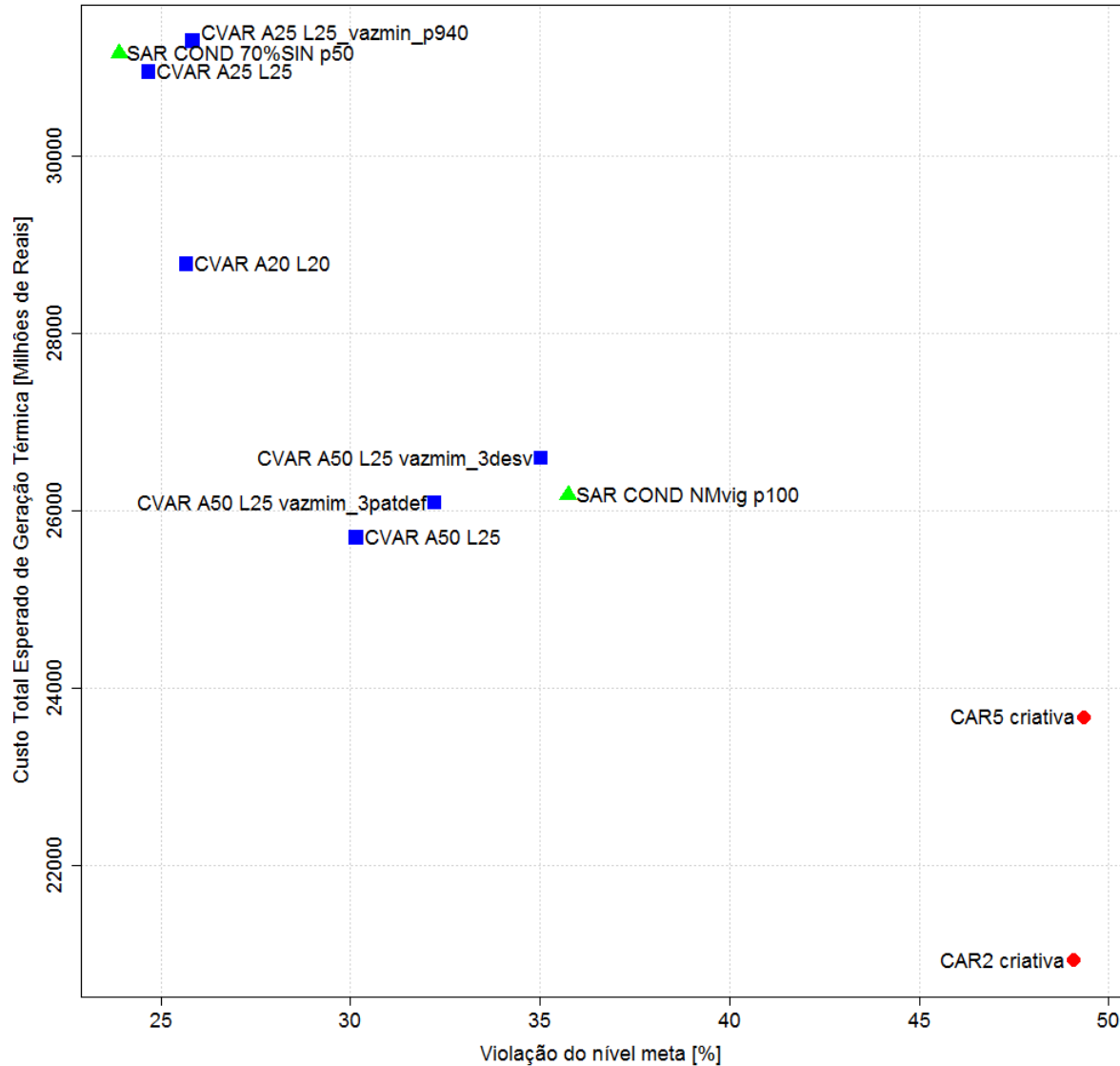


Violação x Custo de geração térmica NORDESTE



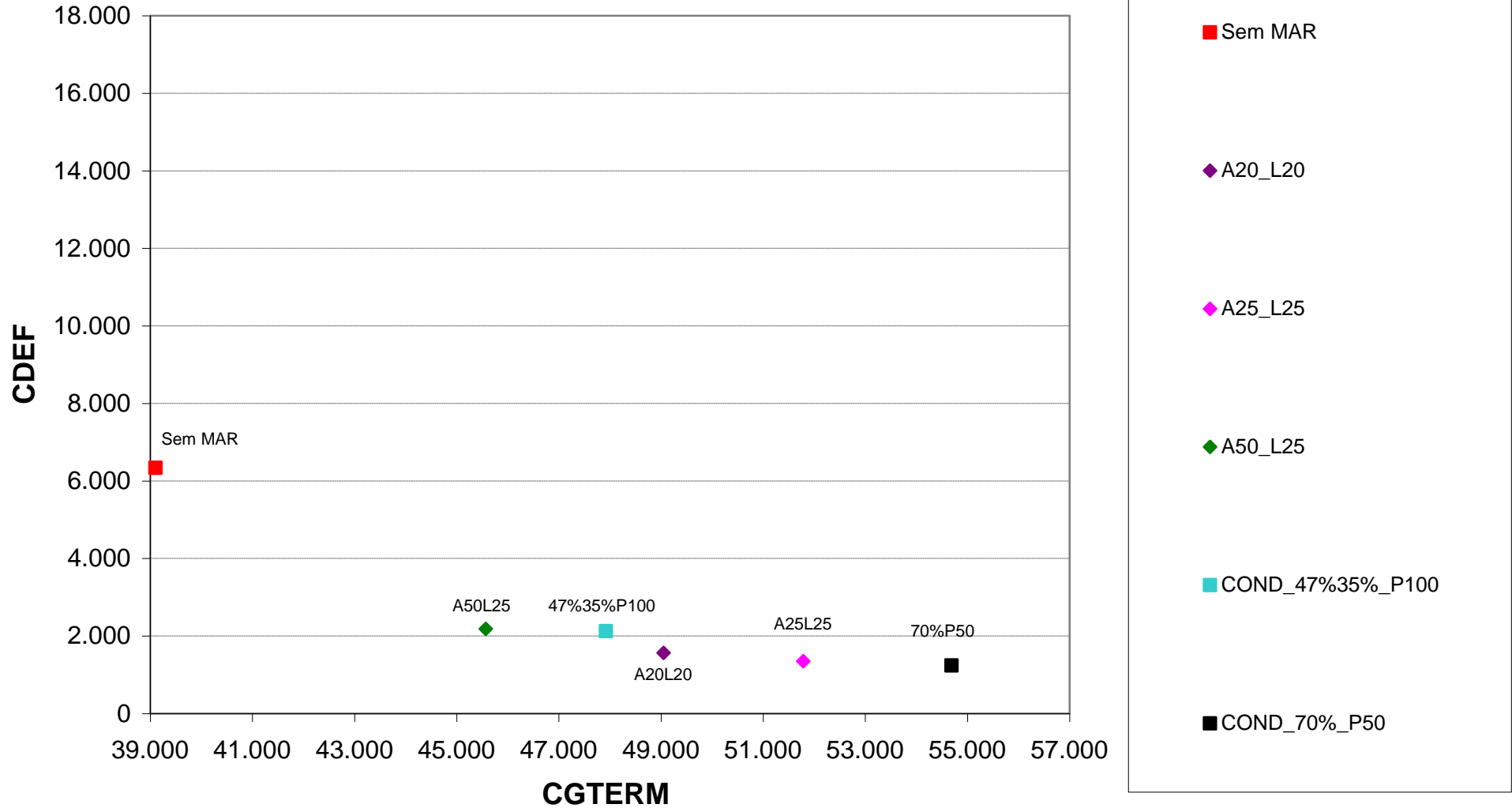
Violação x Custo de geração térmica SUDESTE

Violações Nível Meta x Custo da Geração Térmica
Sudeste 5 anos - PMO 10 2012



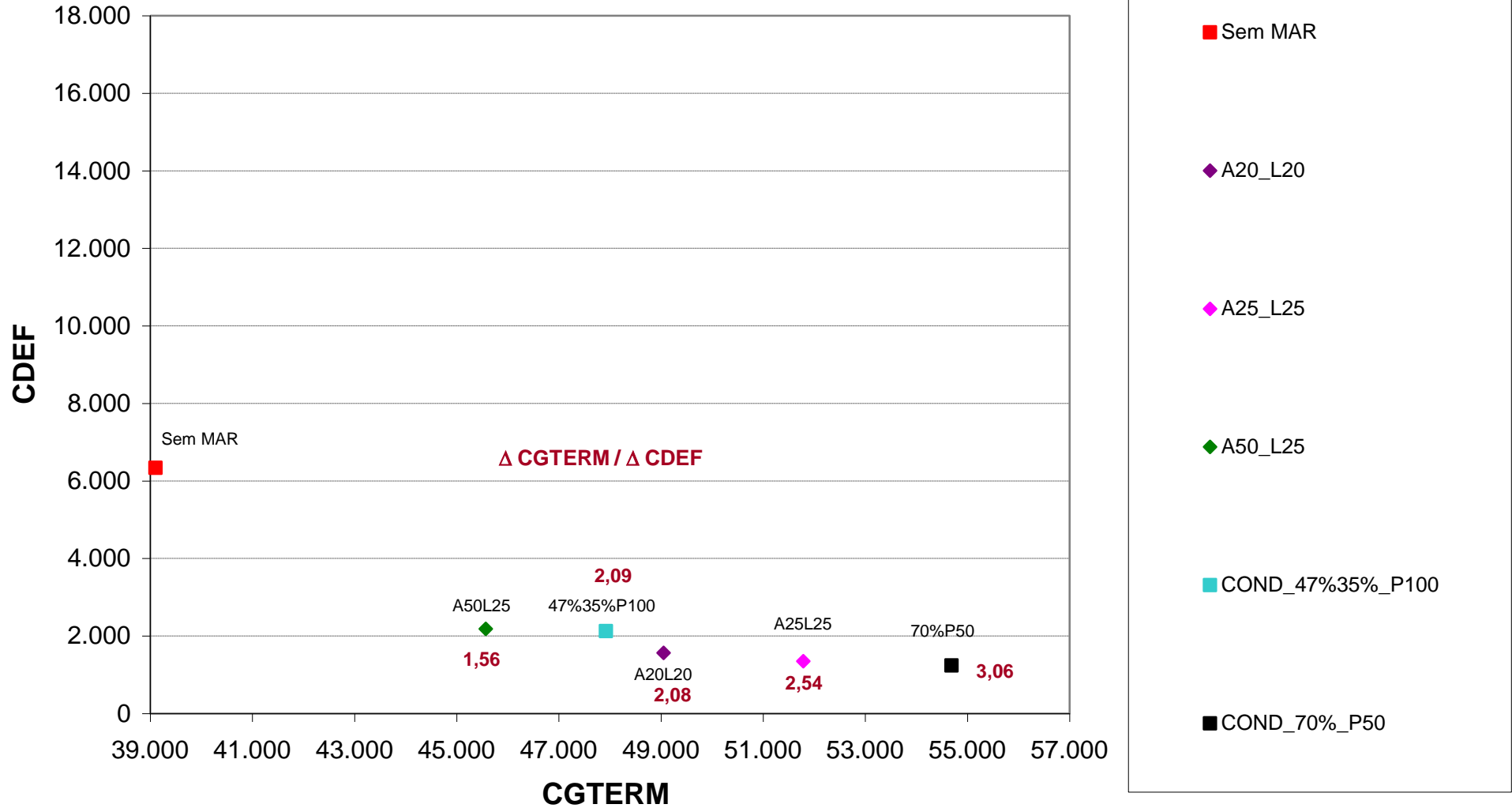
CVaR & SAR – PDE 2019

PDE 2019 : CDEF x CGTERM



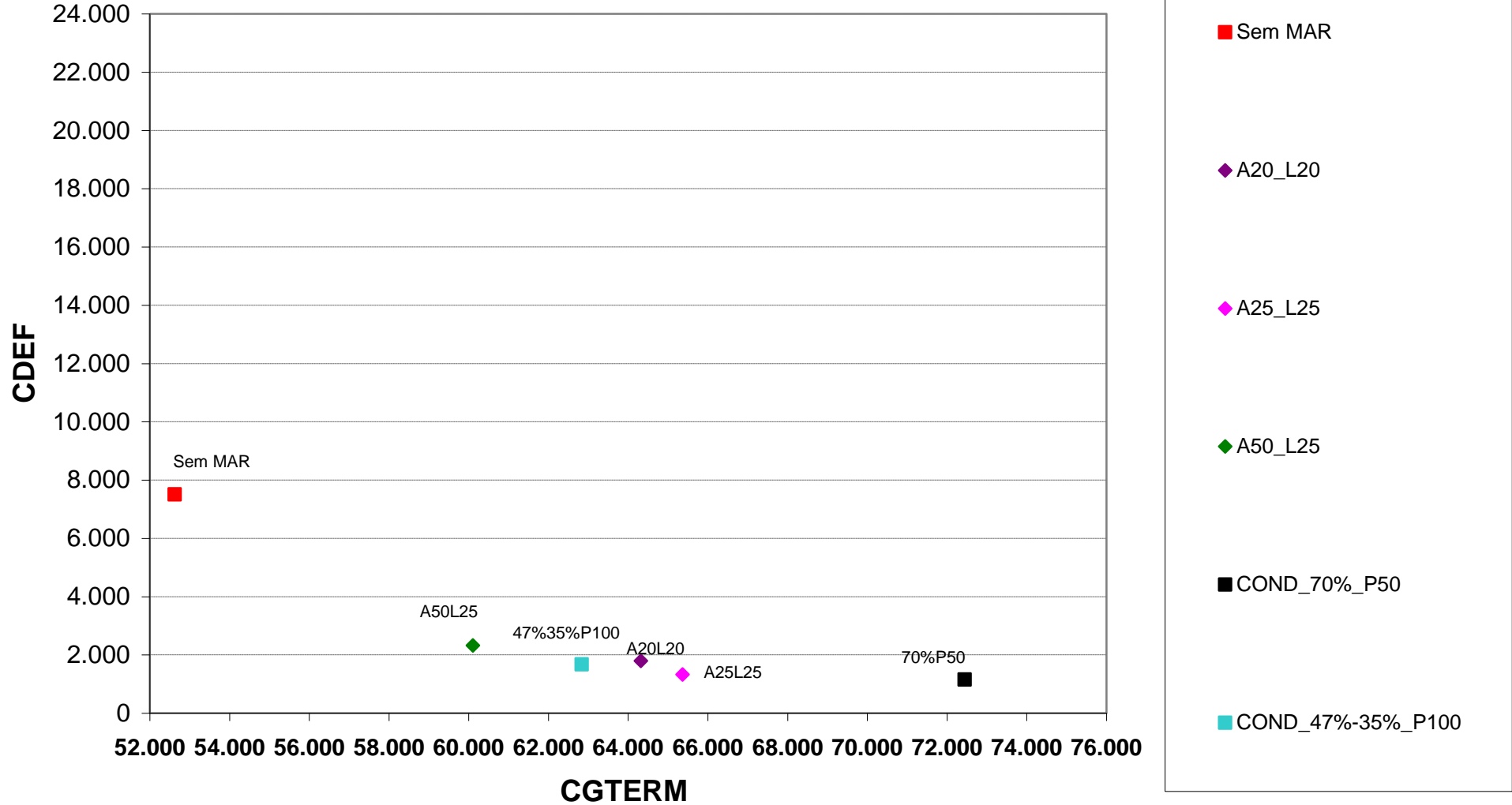
CVaR & SAR – PDE 2019

PDE 2019 : CDEF x CGTERM



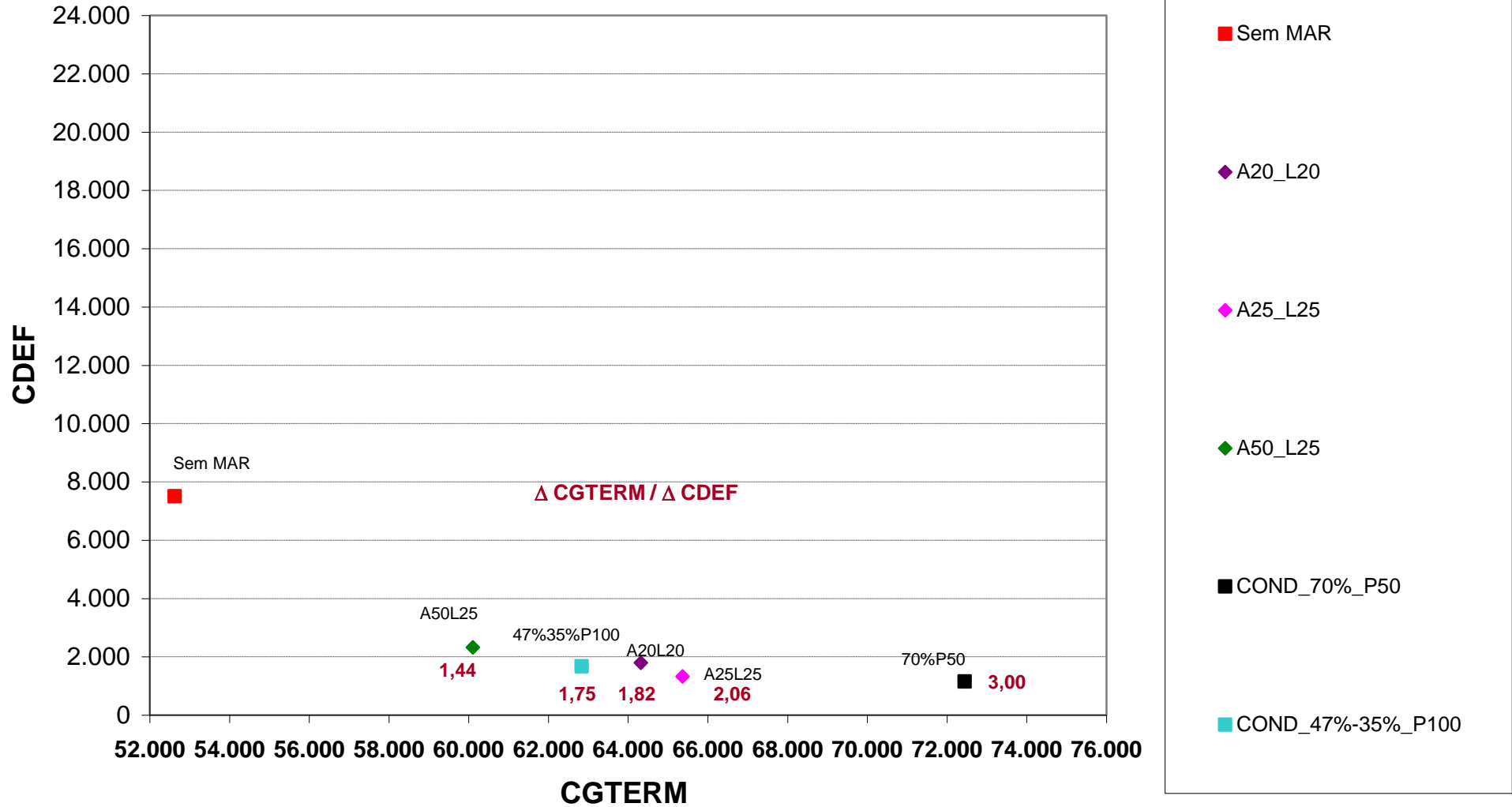
CVaR & SAR – PDE 2020

PDE 2020: CDEF x CGTERM



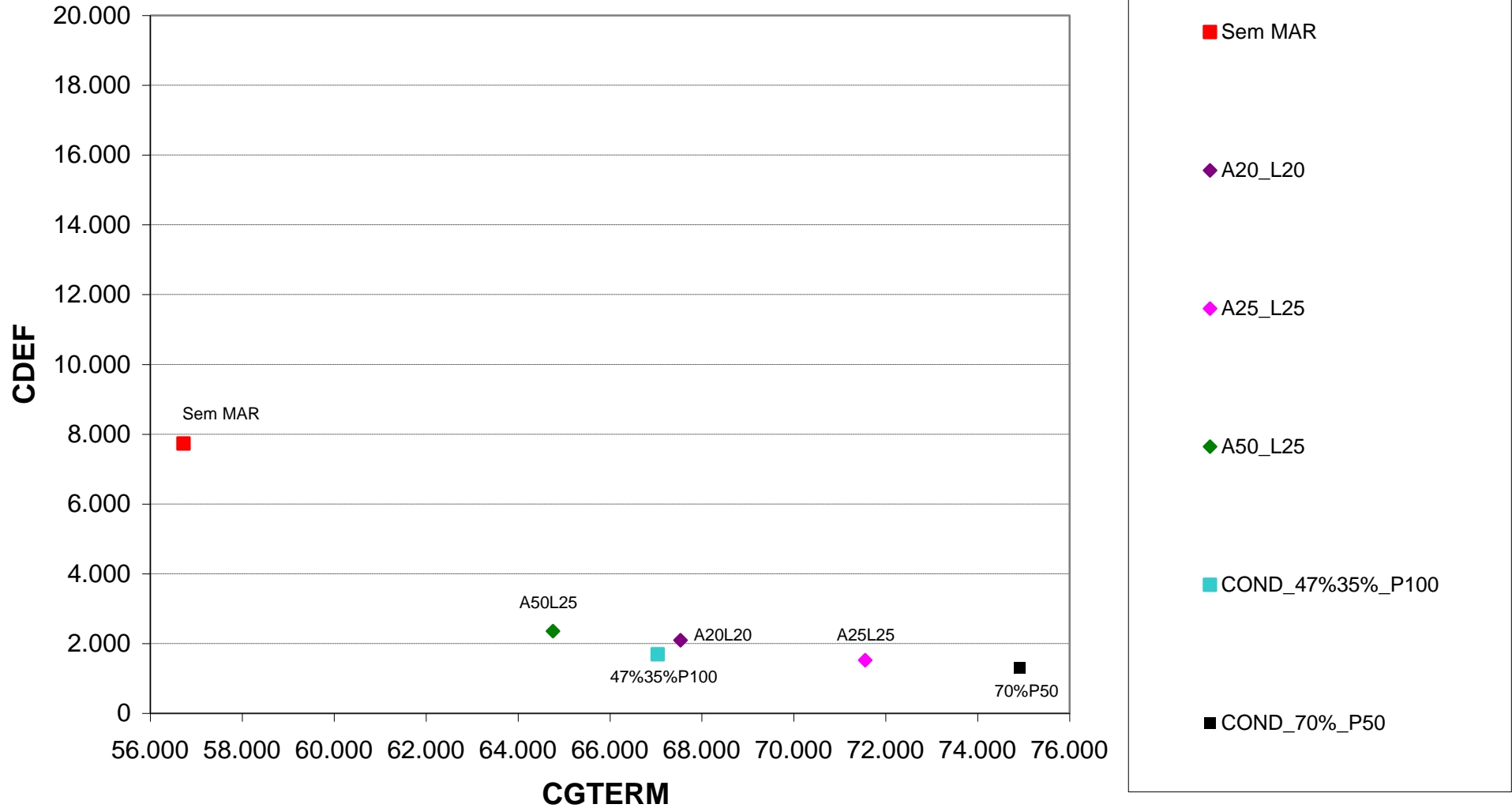
CVaR & SAR – PDE 2020

PDE 2020: CDEF x CGTERM



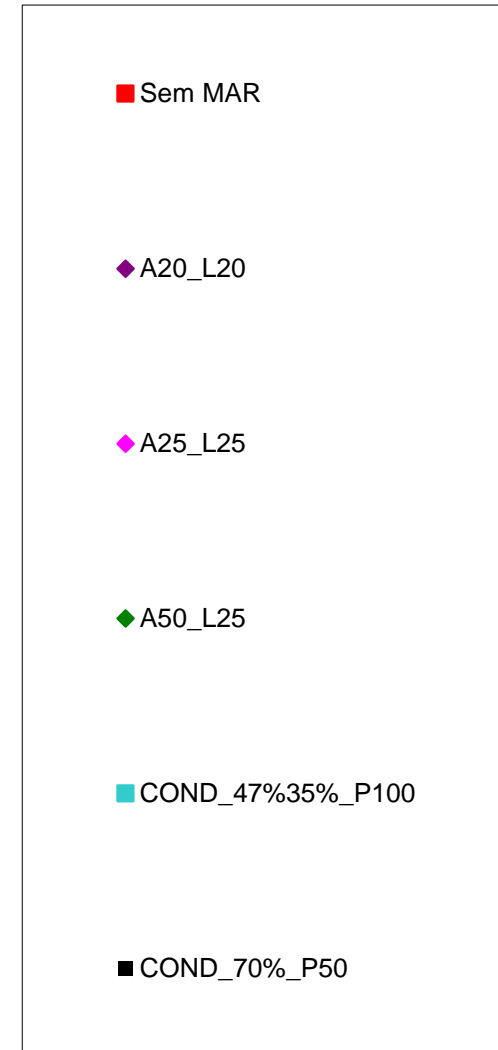
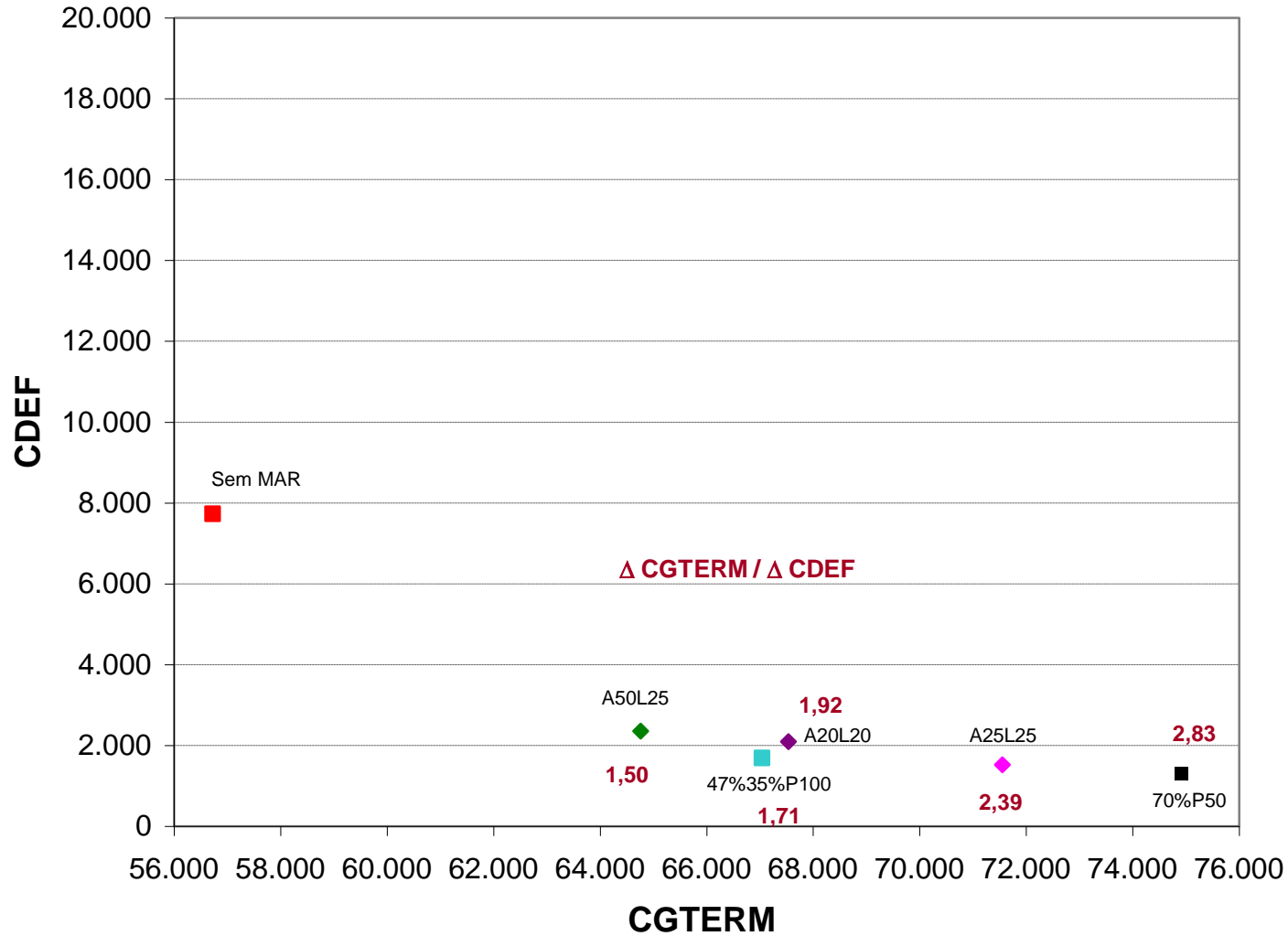
CVaR & SAR – PDE 2021

PDE 2021: CDEF x CGTERM



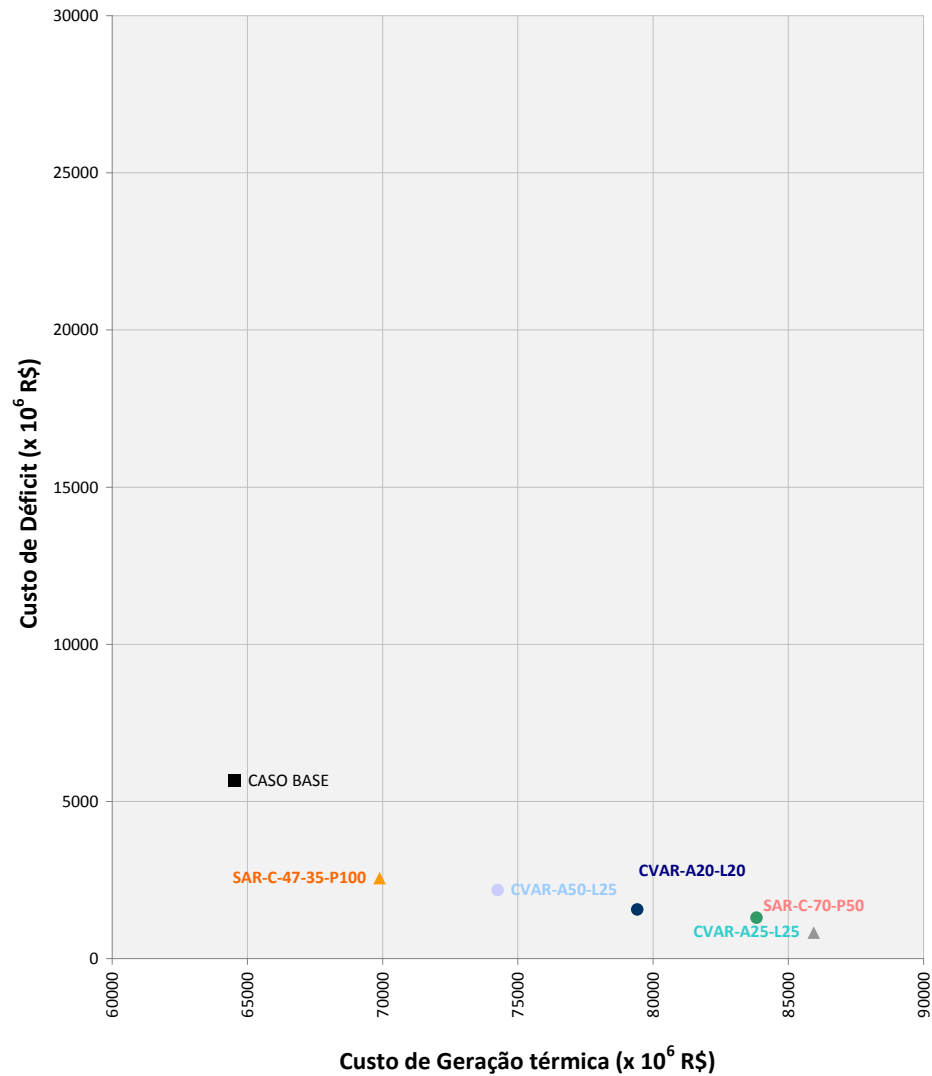
CVaR & SAR – PDE 2021

PDE 2021: CDEF x CGTERM



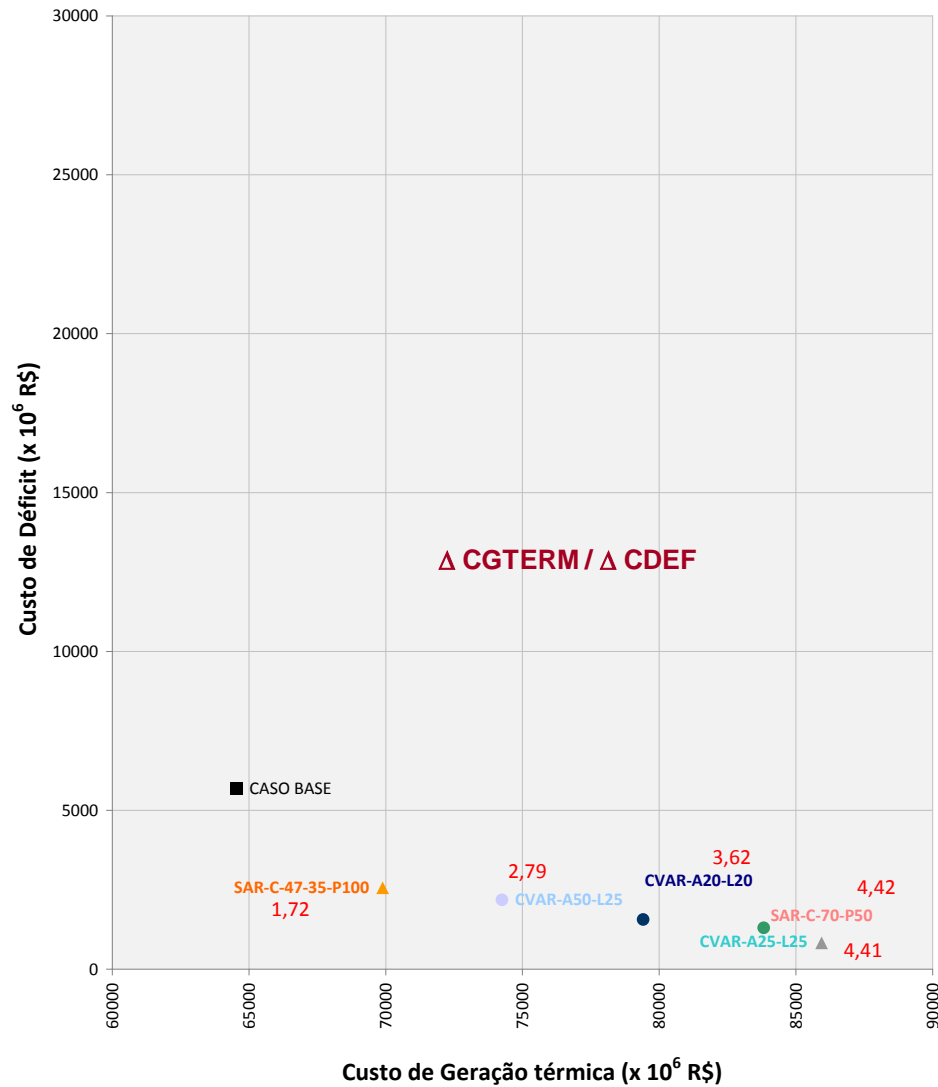
CVaR & SAR – LEN A-5/2012

LEN A-5/2012 - G. TÉRM x C. DÉF.



CVaR & SAR – LEN A-5/2012

LEN A-5/2012 - G. TÉRM x C. DÉF.

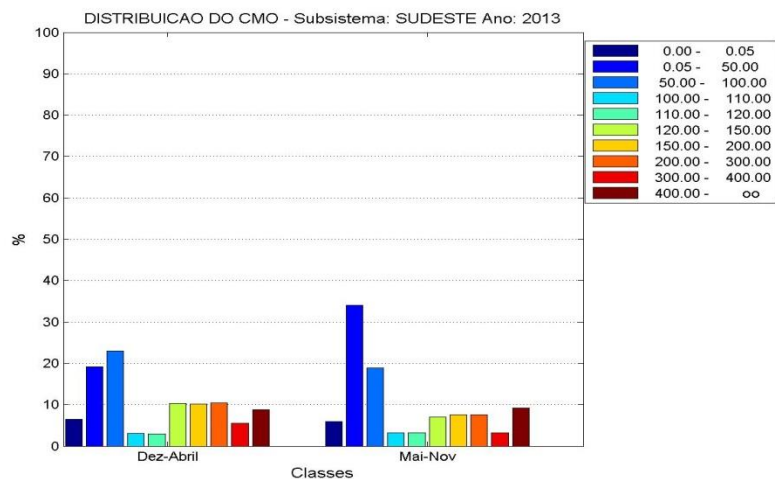


Mecanismos de Aversão a Risco - MAR

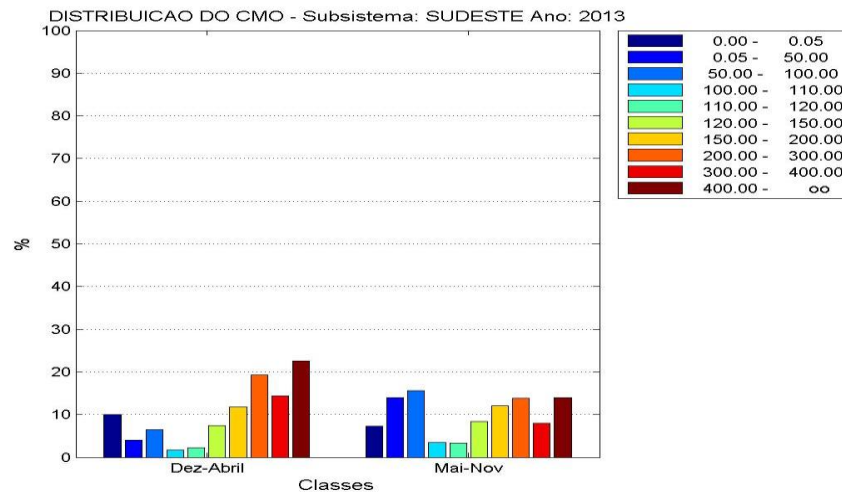
PMO-2012-10

Distribuição de Probabilidades do Custo Marginal de Operação - 2013

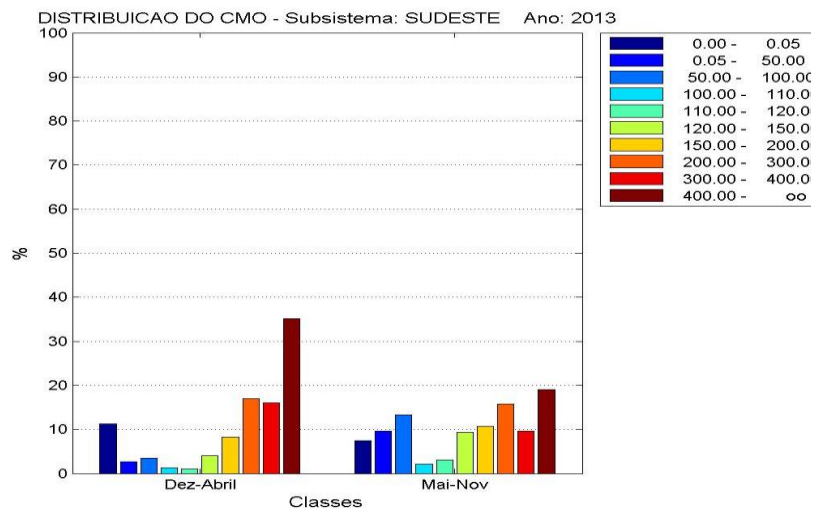
PMO-2012-10_CAR2_PenCriat



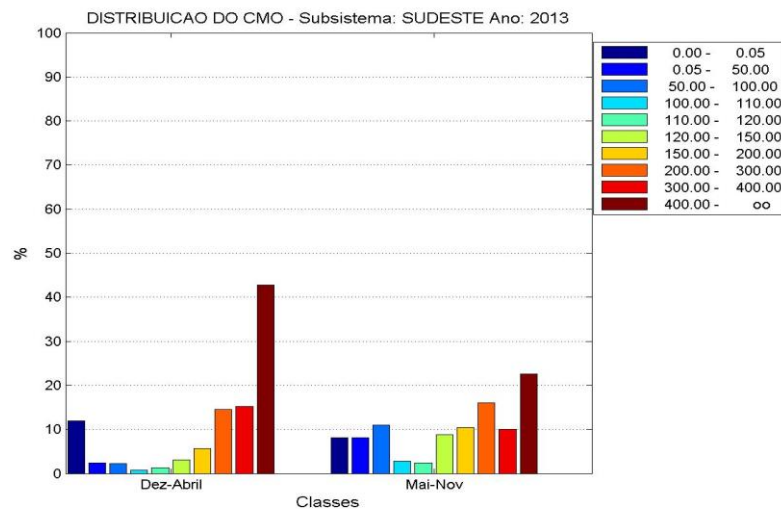
PMO-2012-10_alfa_50_lambda_25



PMO-2012-10_alfa_20_lambda_20

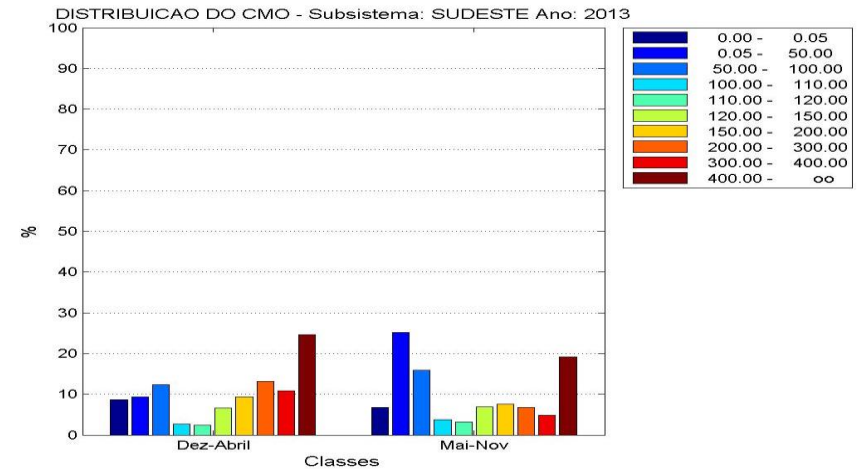
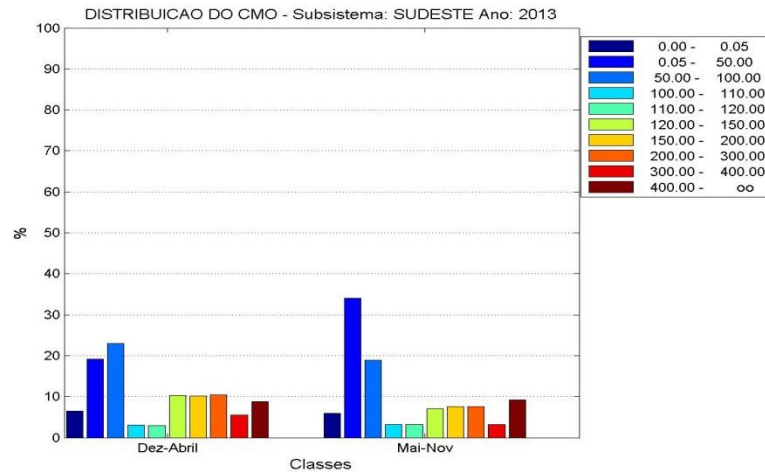


PMO-2012-10_alfa_25_lambda_25

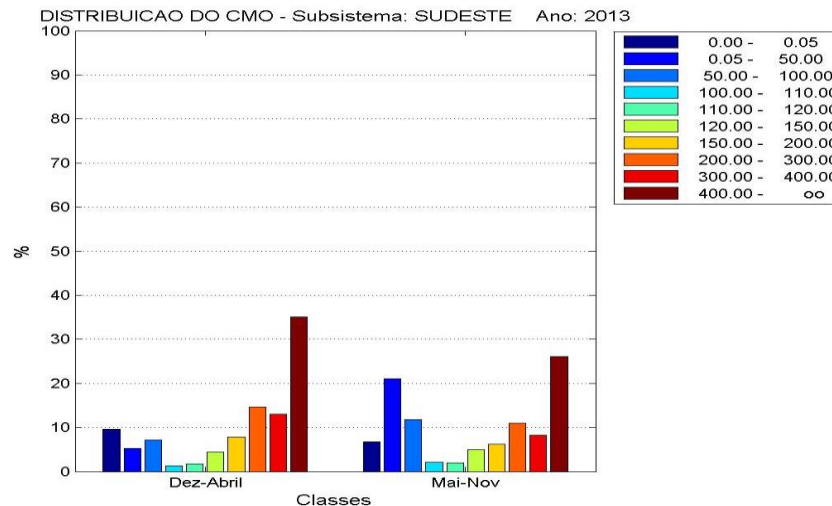


Distribuição de Probabilidades do Custo Marginal de Operação - 2013

PMO-2012-10_CAR2_PenCriat **PMO-2012-10_Cond_47%_35%_P100**



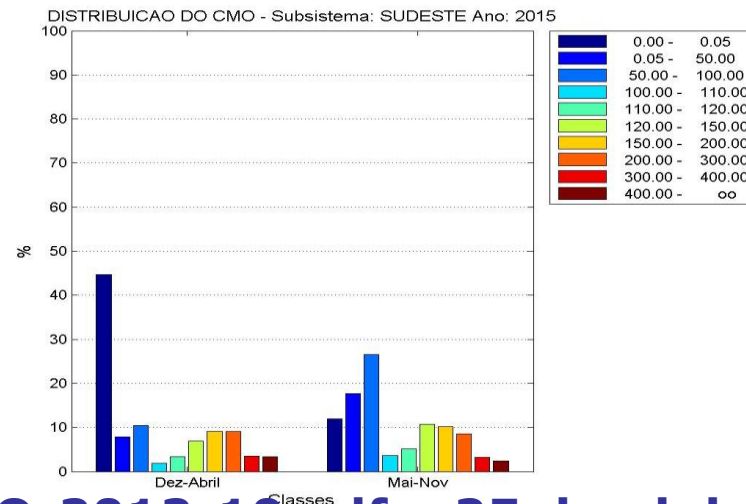
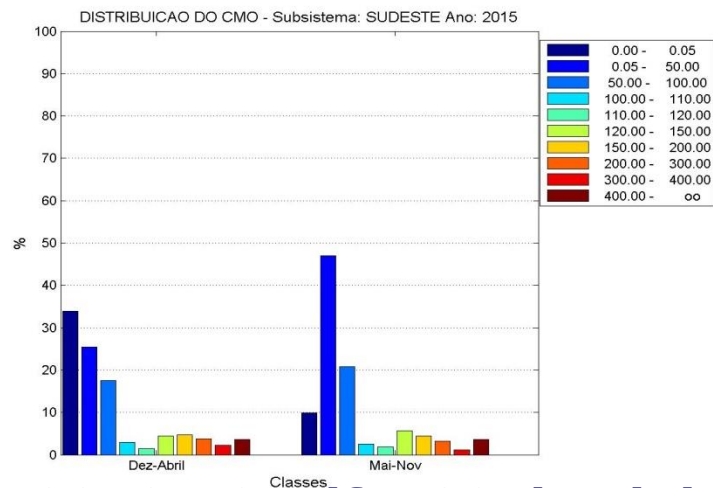
PMO-2012-10_Cond_70%_PEN50



Distribuição de Probabilidades do Custo Marginal de Operação - 2015

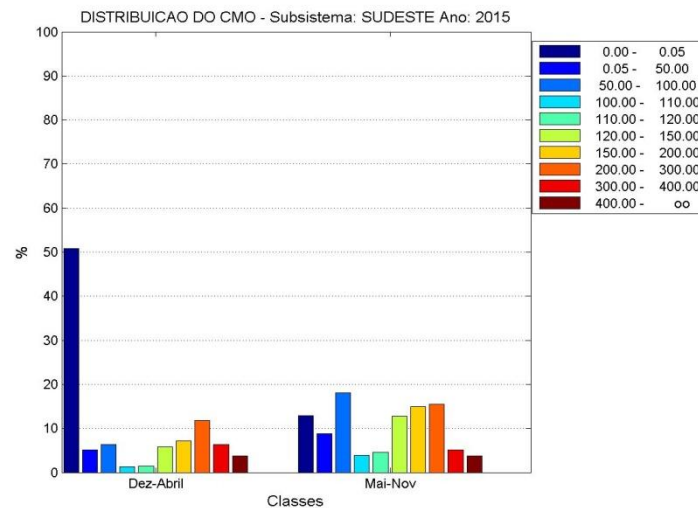
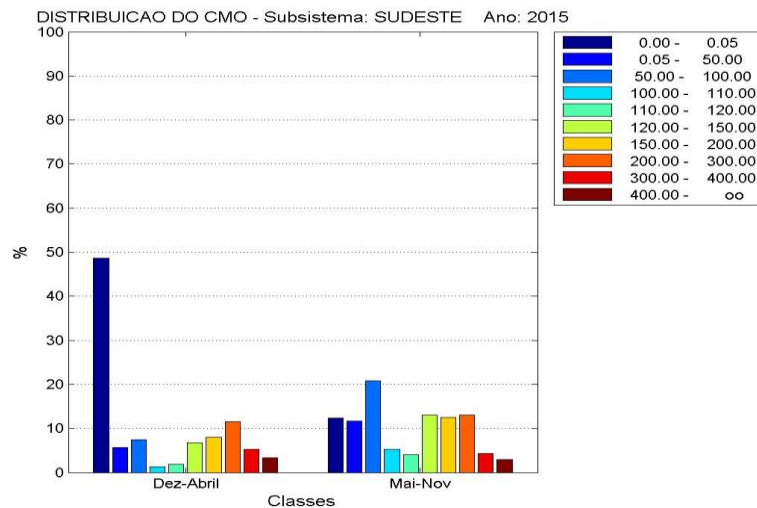
PMO-2012-10_CAR2_PenCriat

PMO-2012-10_alfa_50_lambda_25



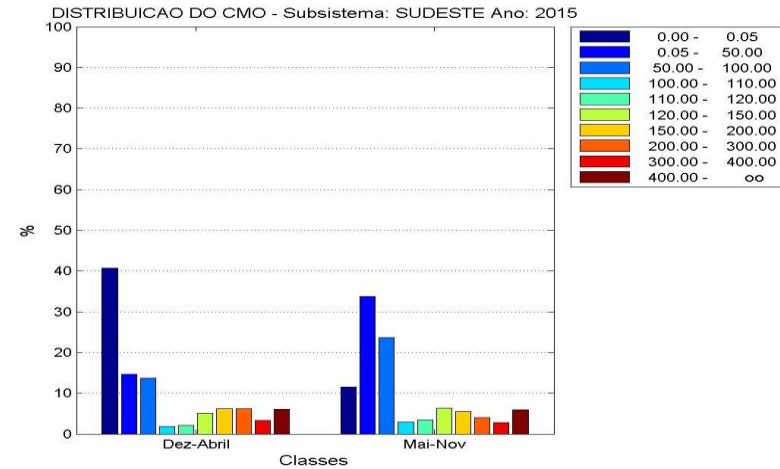
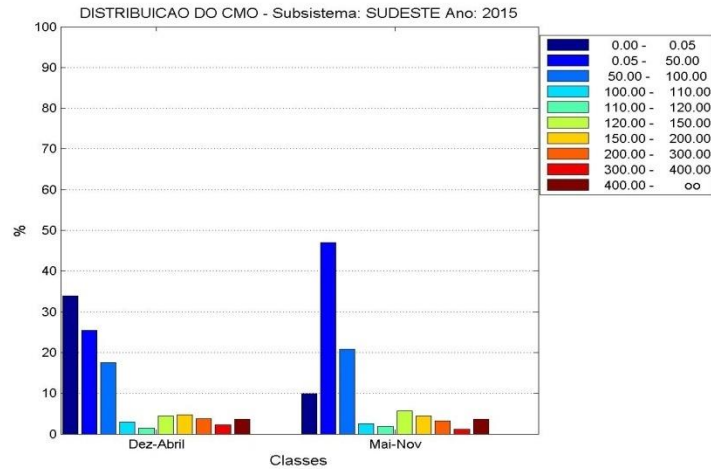
PMO-2012-10_alfa_20_lambda_20

PMO-2012-10_alfa_25_lambda_25

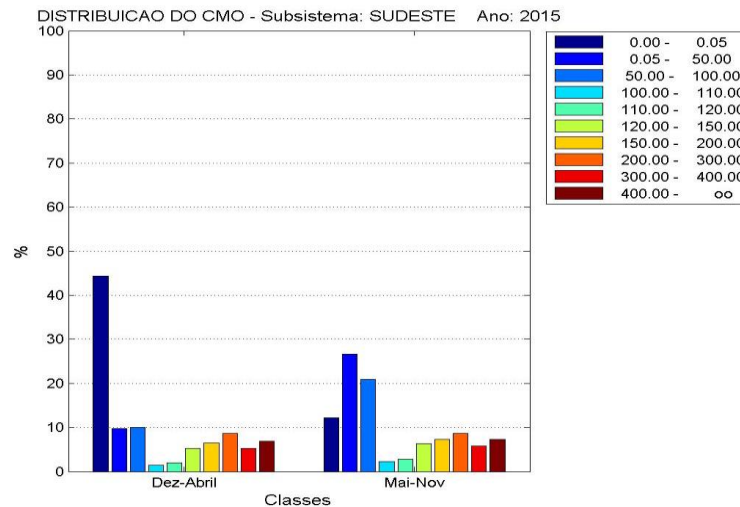


Distribuição de Probabilidades do Custo Marginal de Operação - 2015

PMO-2012-10_CAR2_PenCriat PMO-2012-10_Cond_47%_35%_P100



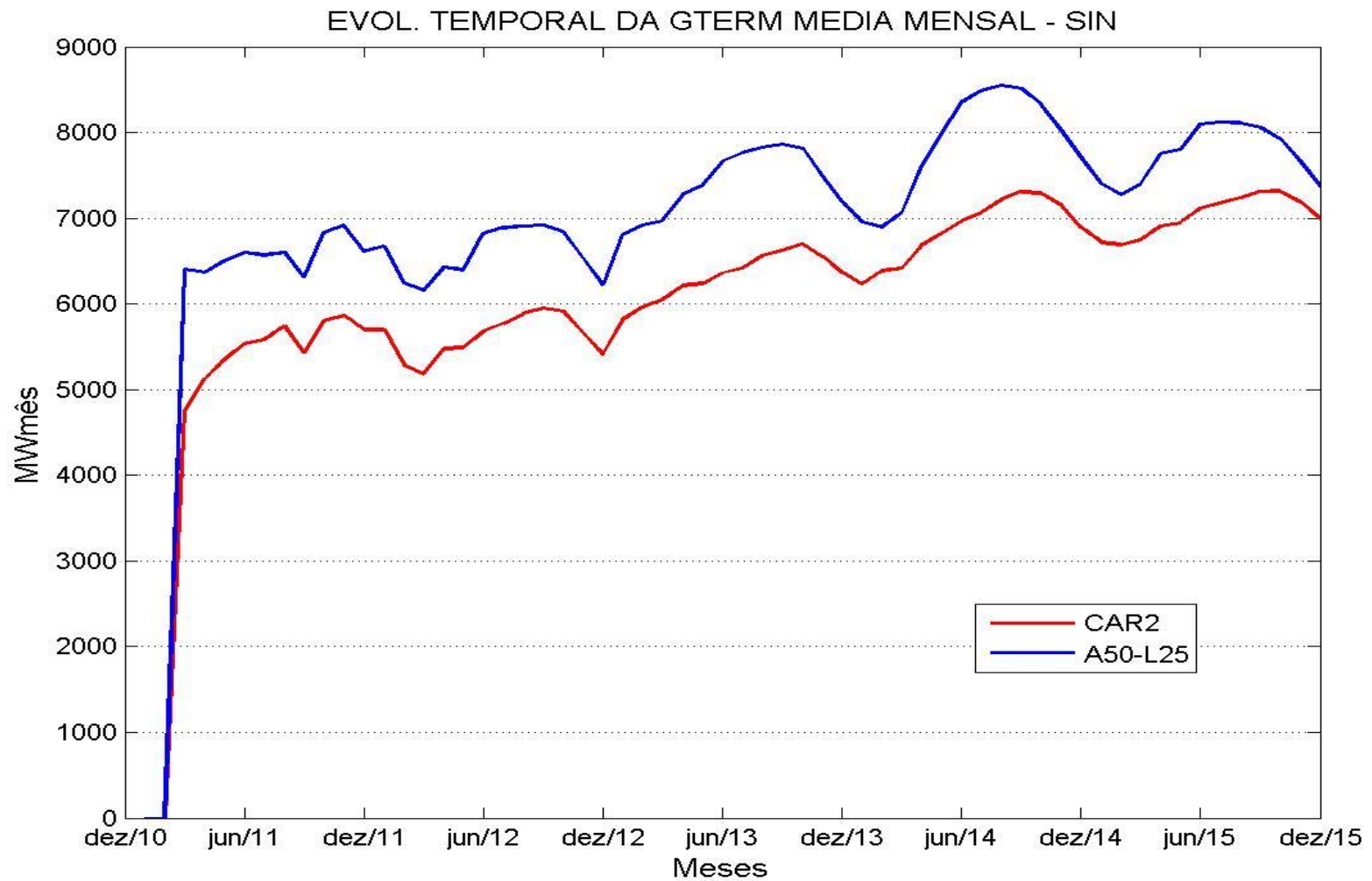
PMO-2012-10_Cond_70%_PEN50



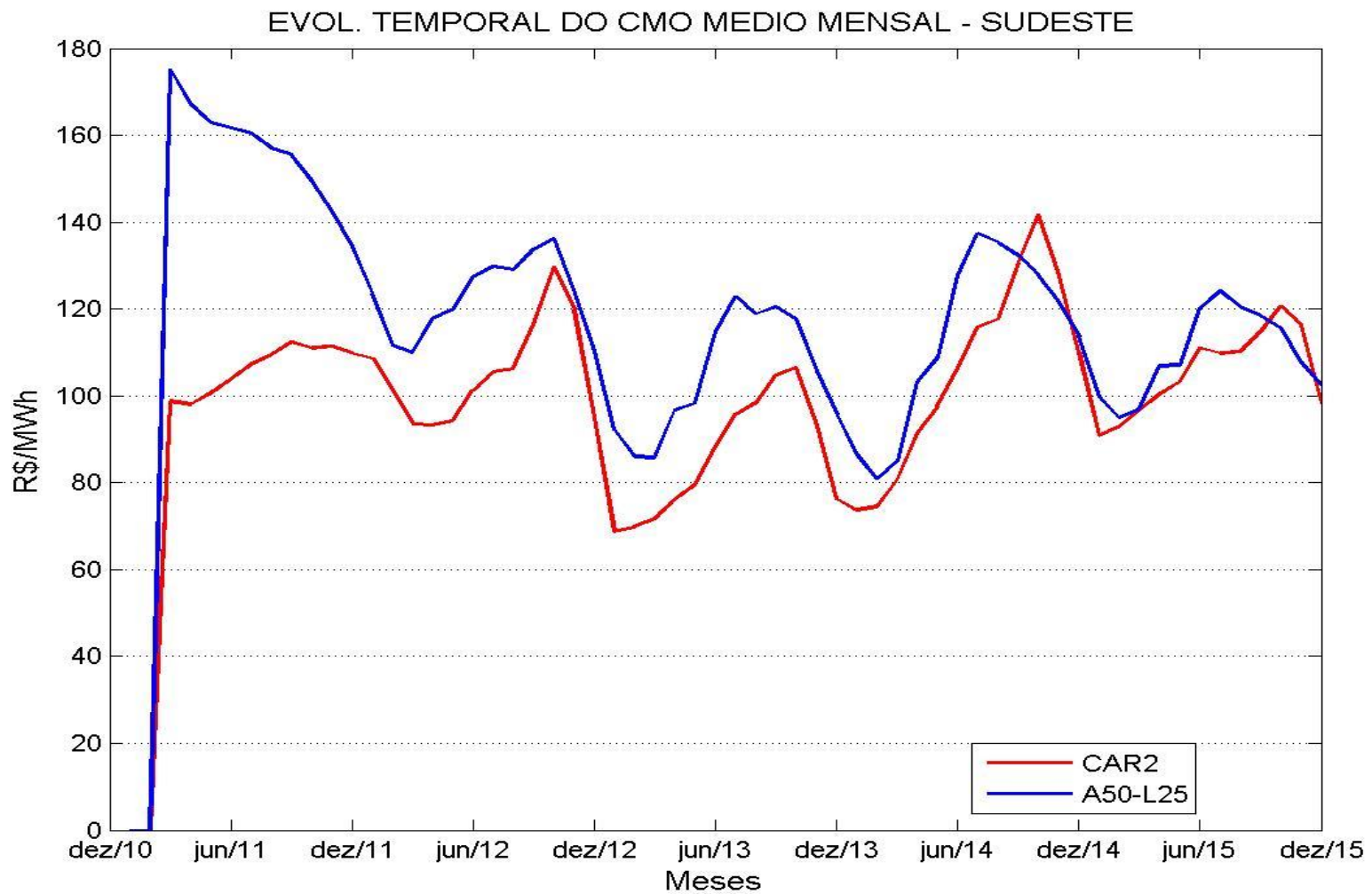
PMO 2011-03

- CCEE

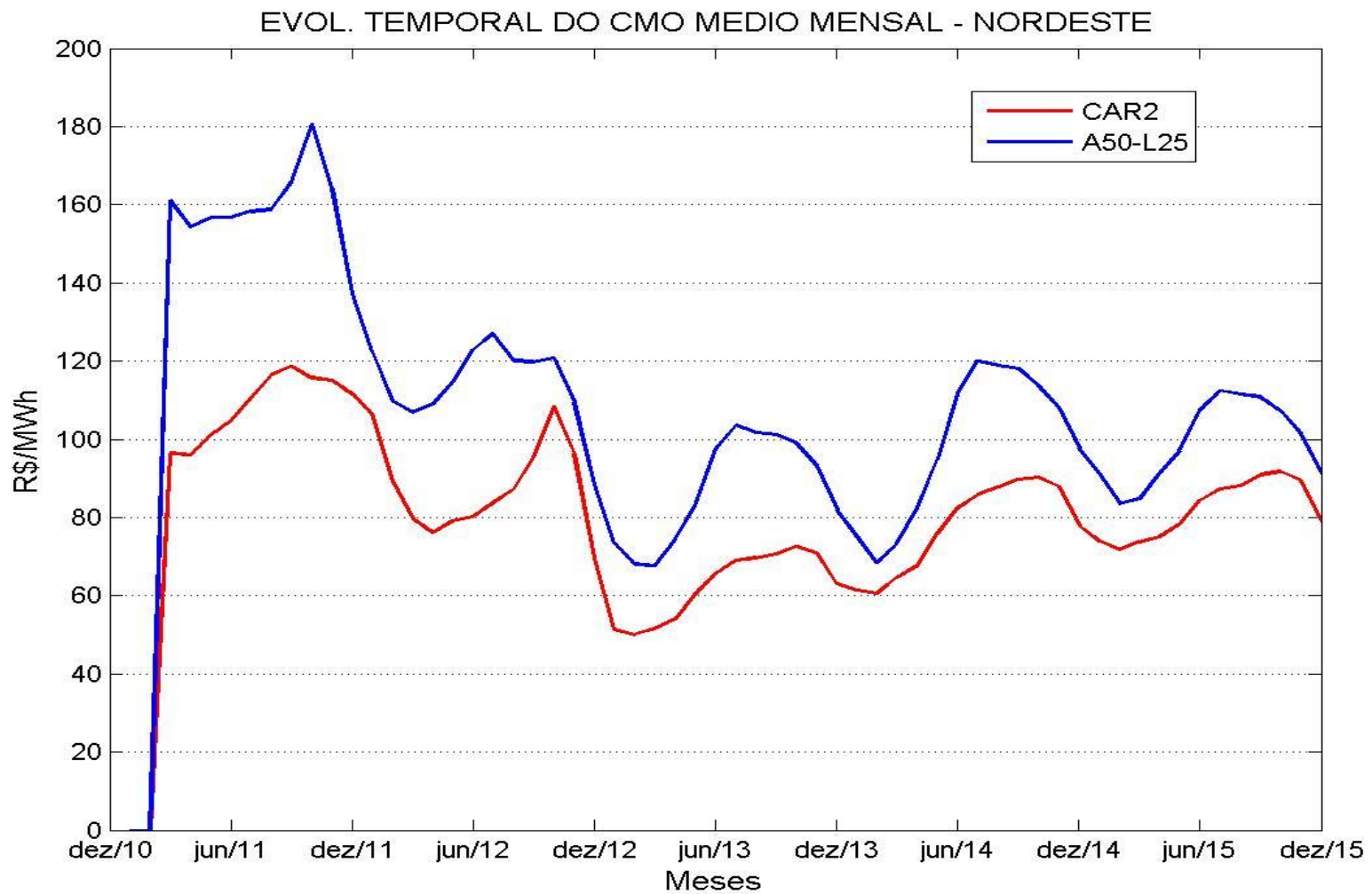
Evolução Temporal da Geração Térmica Média Mensal



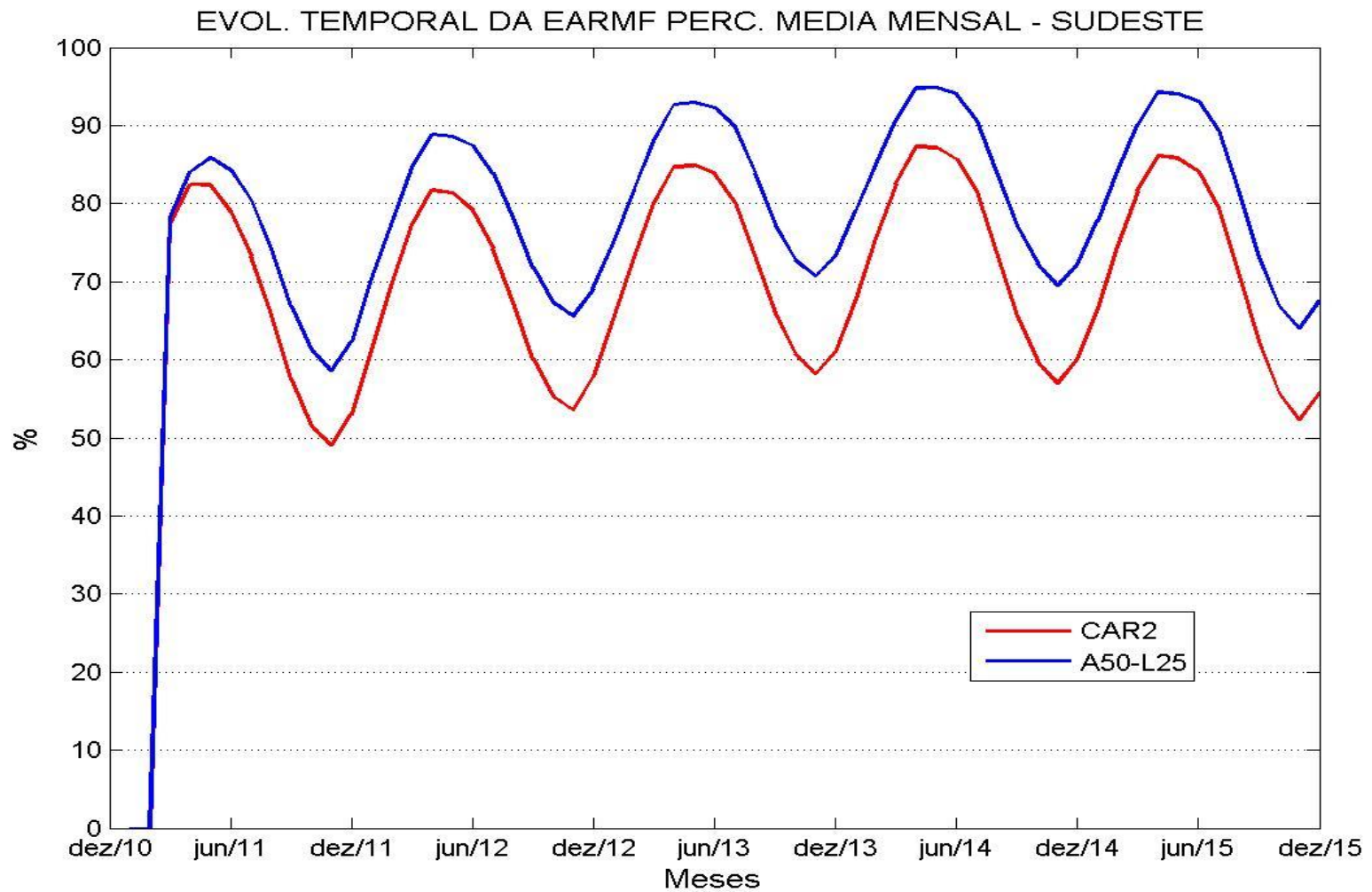
Evolução Temporal do Custo Marginal de Operação Médio Mensal



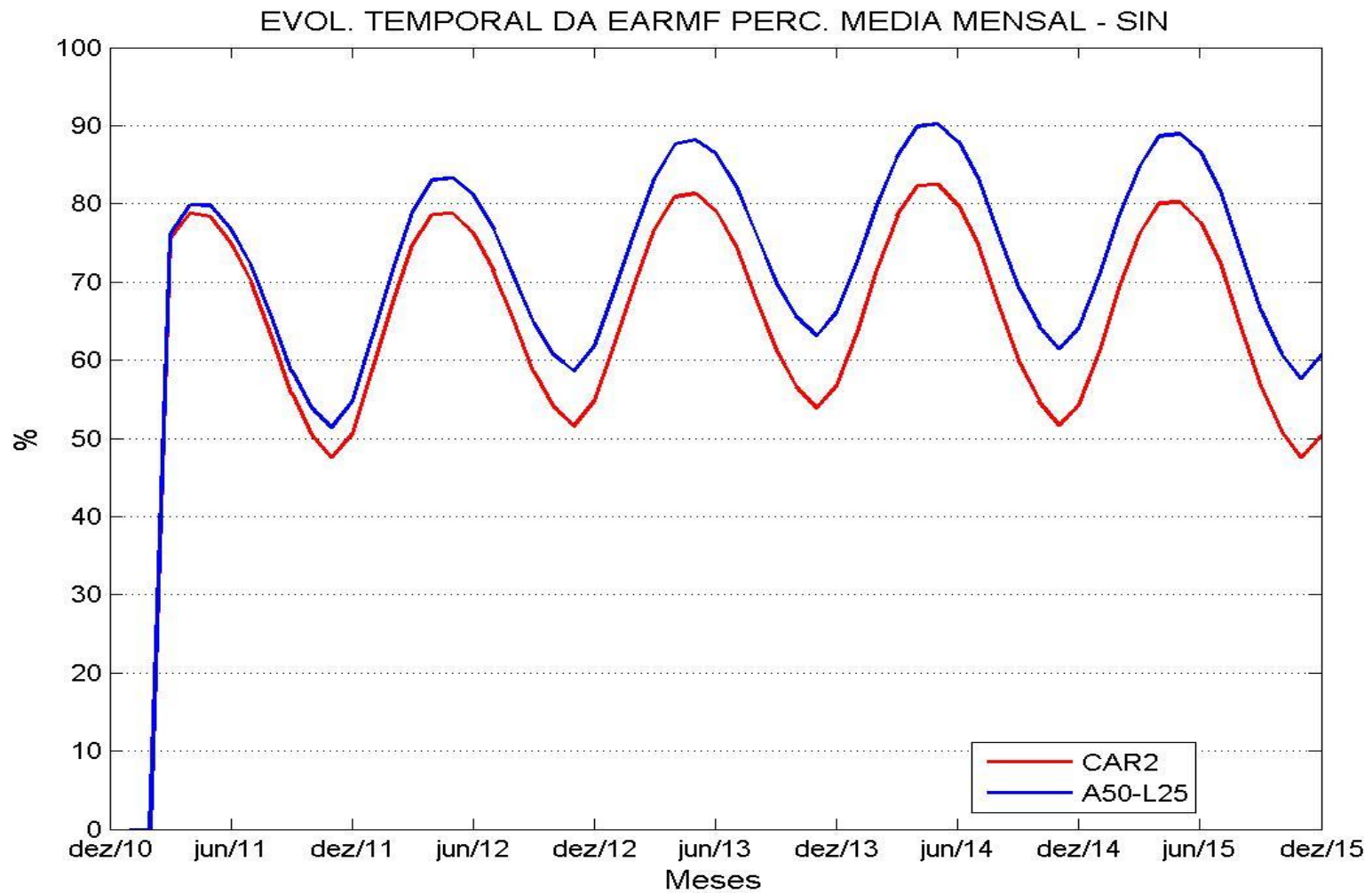
Evolução Temporal do Custo Marginal de Operação Médio Mensal



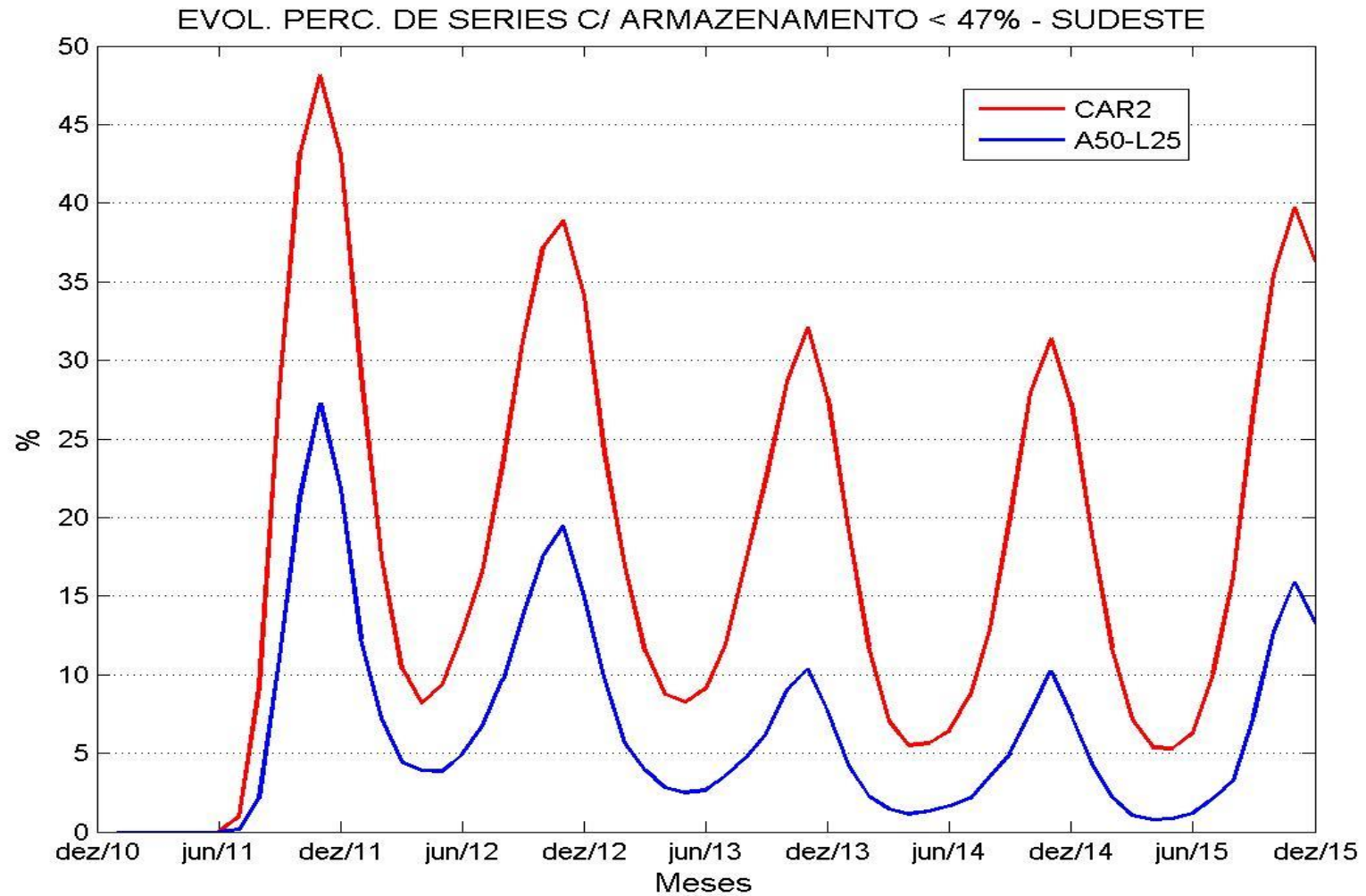
Evolução Temporal da Energia Armazenada Final Média Mensal Percentual



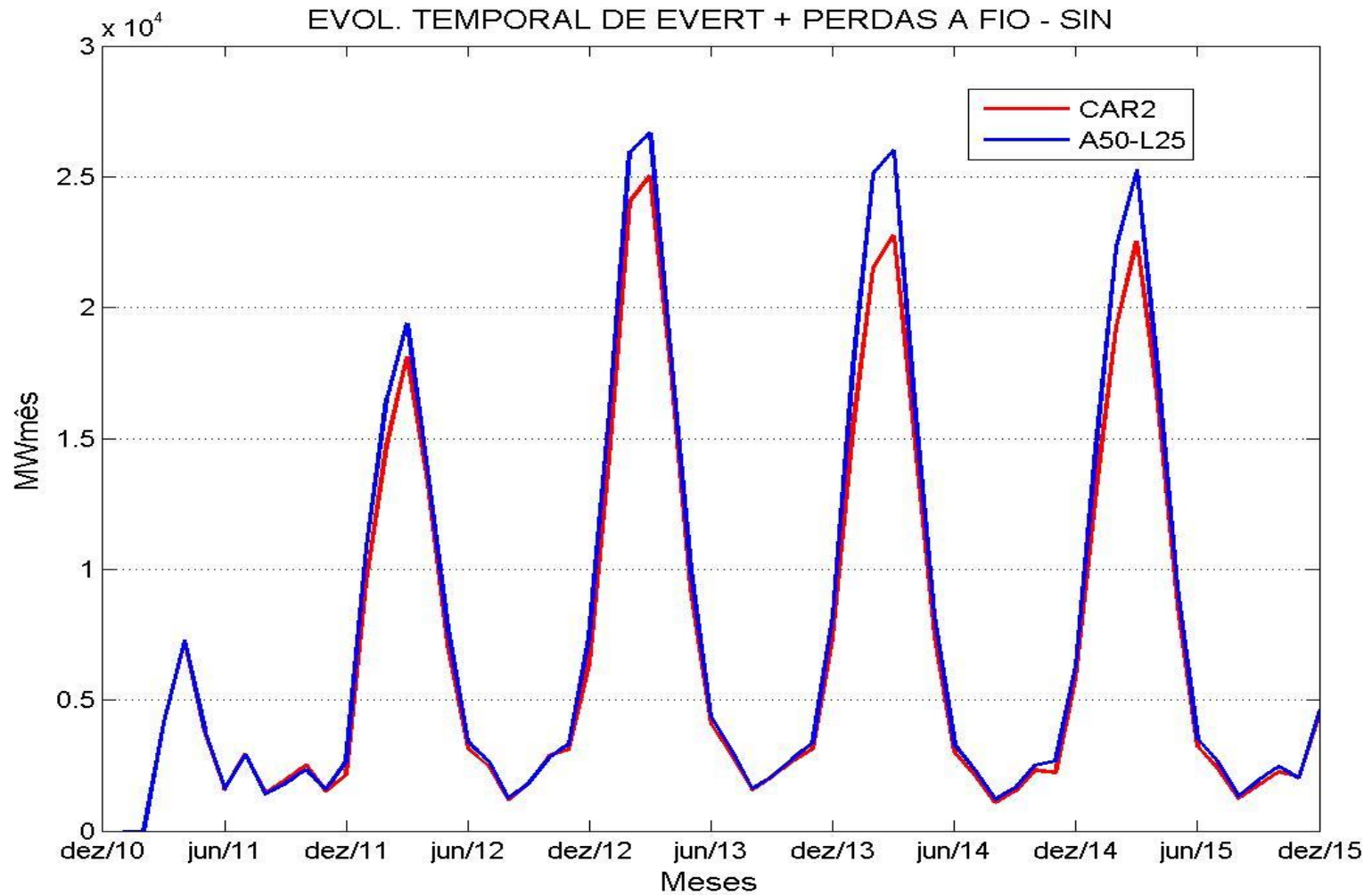
Evolução Temporal da Energia Armazenada Final Média Mensal Percentual



Evolução Temporal do Perc. do Armazenamento Inferior a um Determinado Nível



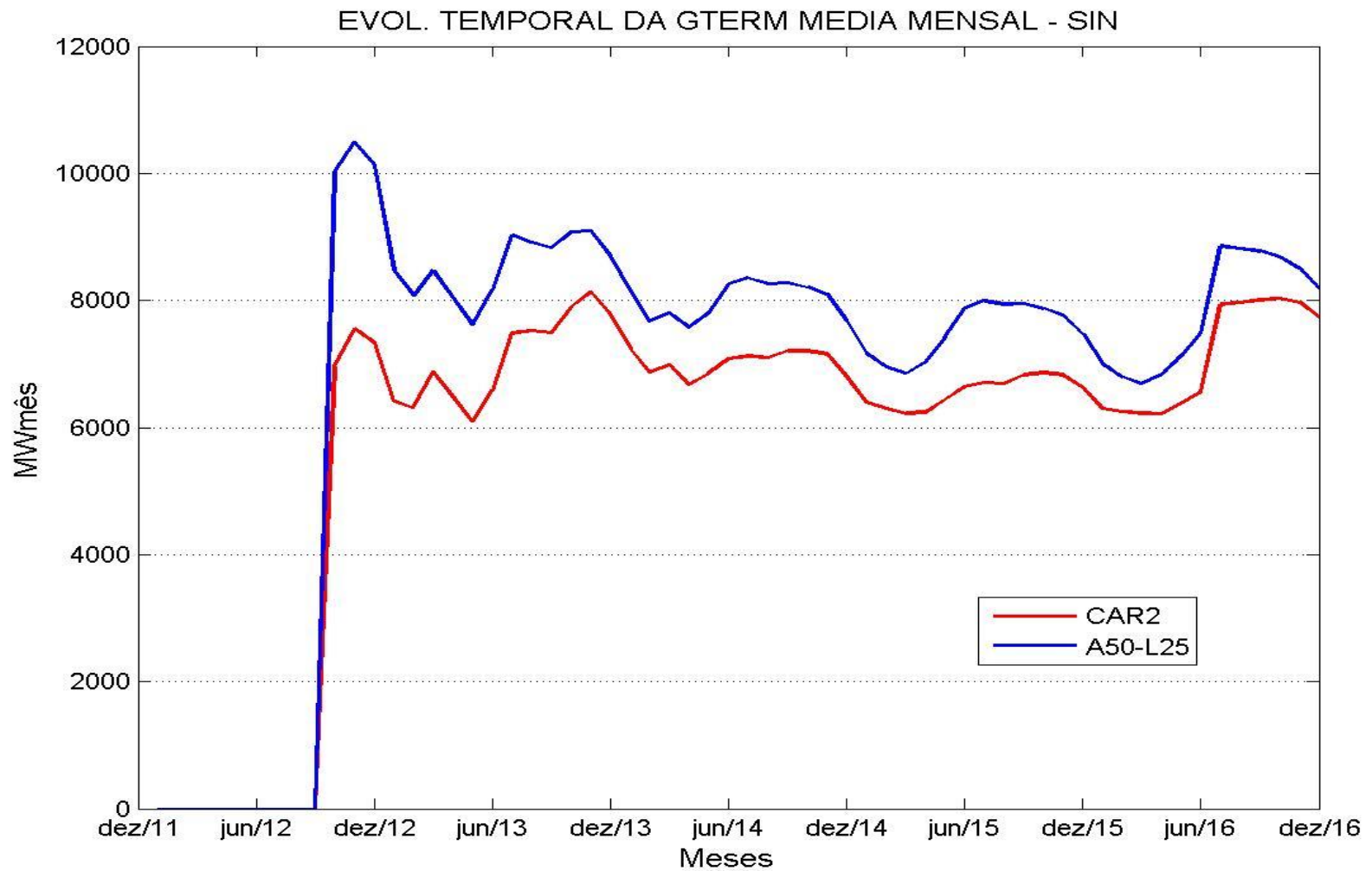
Evolução Temporal da Energia Vertida + Perdas a Fio d'água Média Mensal



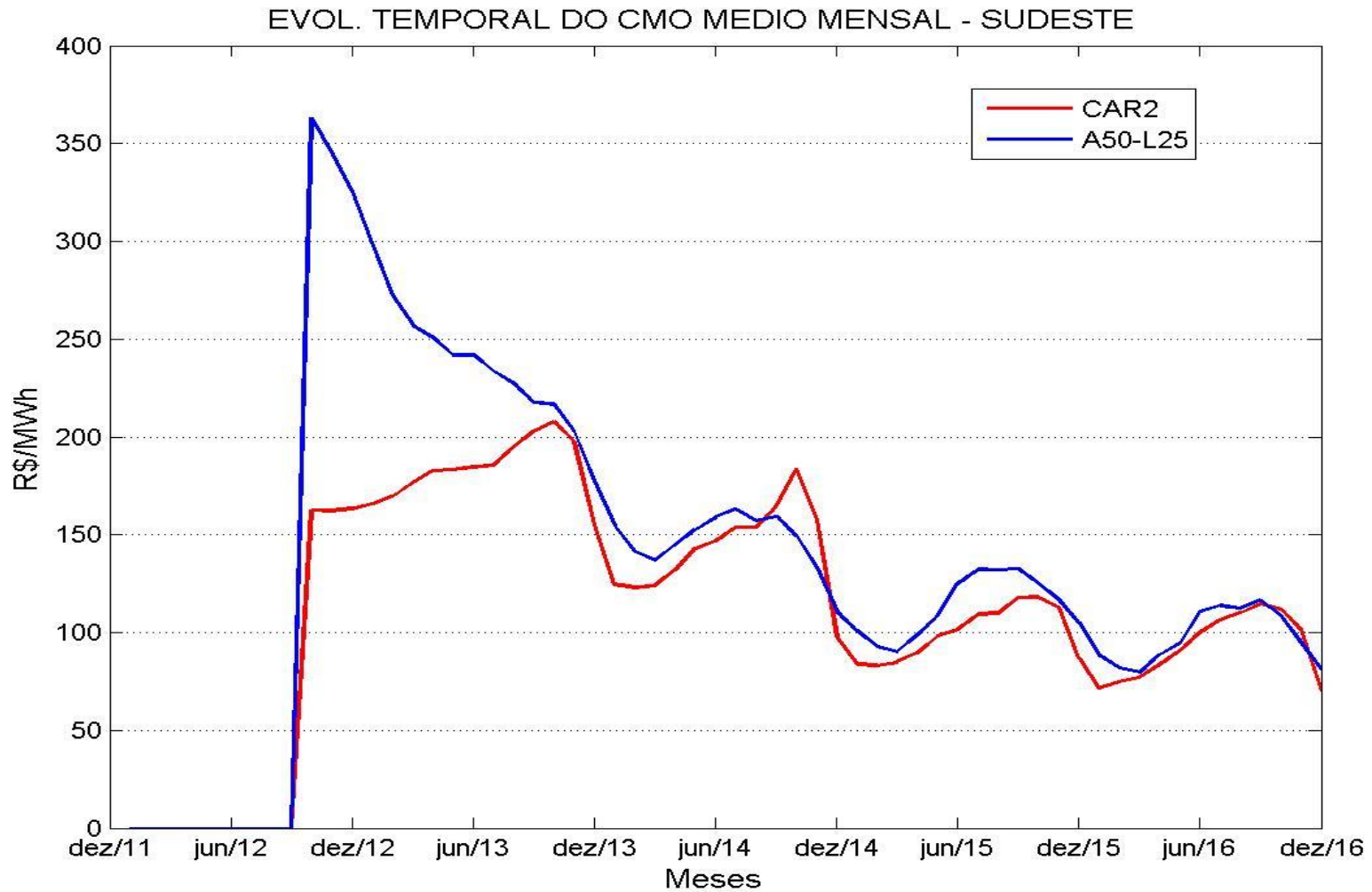
PMO 2012-10

- ONS

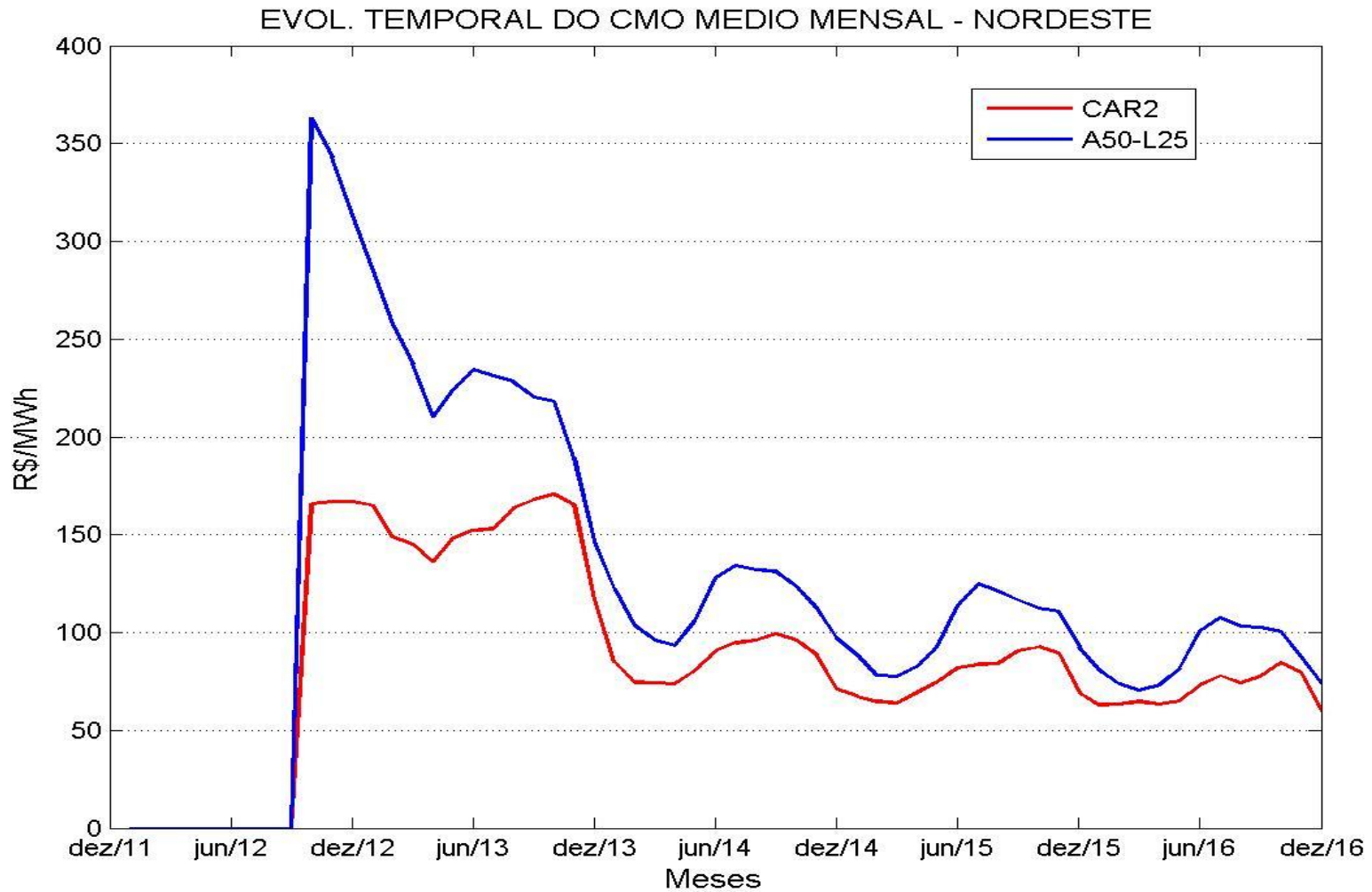
Evolução Temporal da Geração Térmica Média Mensal



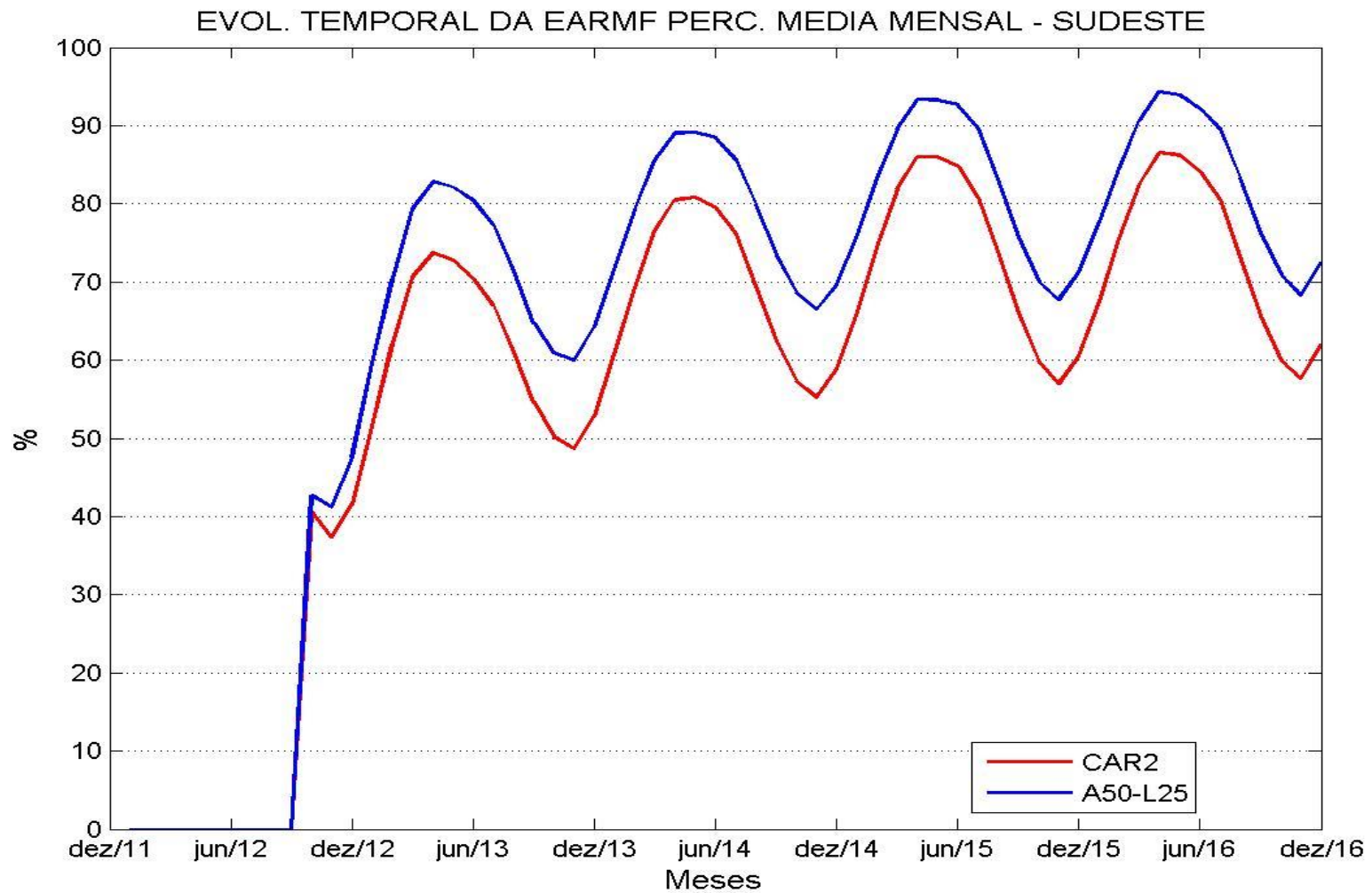
Evolução Temporal do Custo Marginal de Operação Médio Mensal



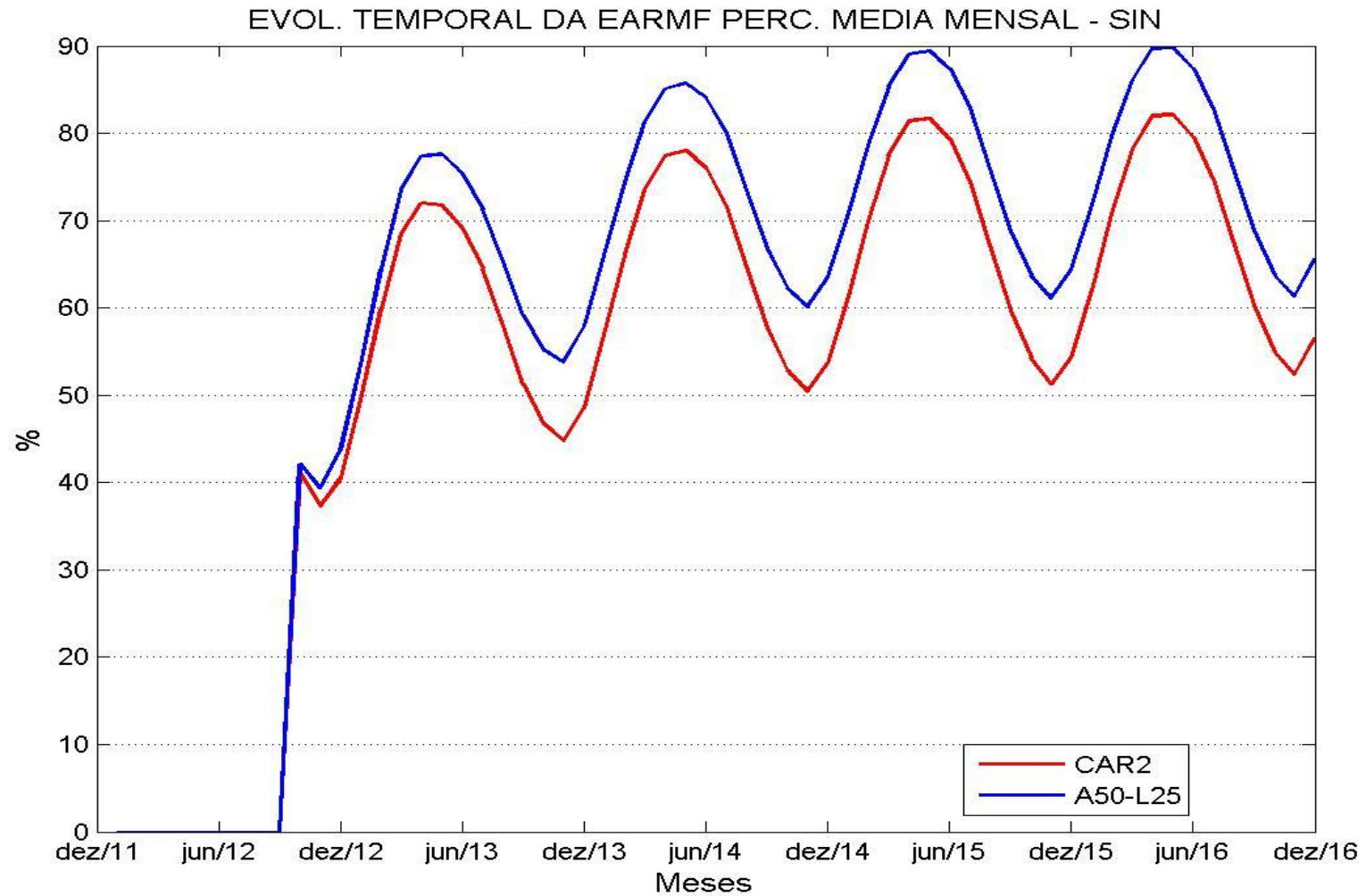
Evolução Temporal do Custo Marginal de Operação Médio Mensal



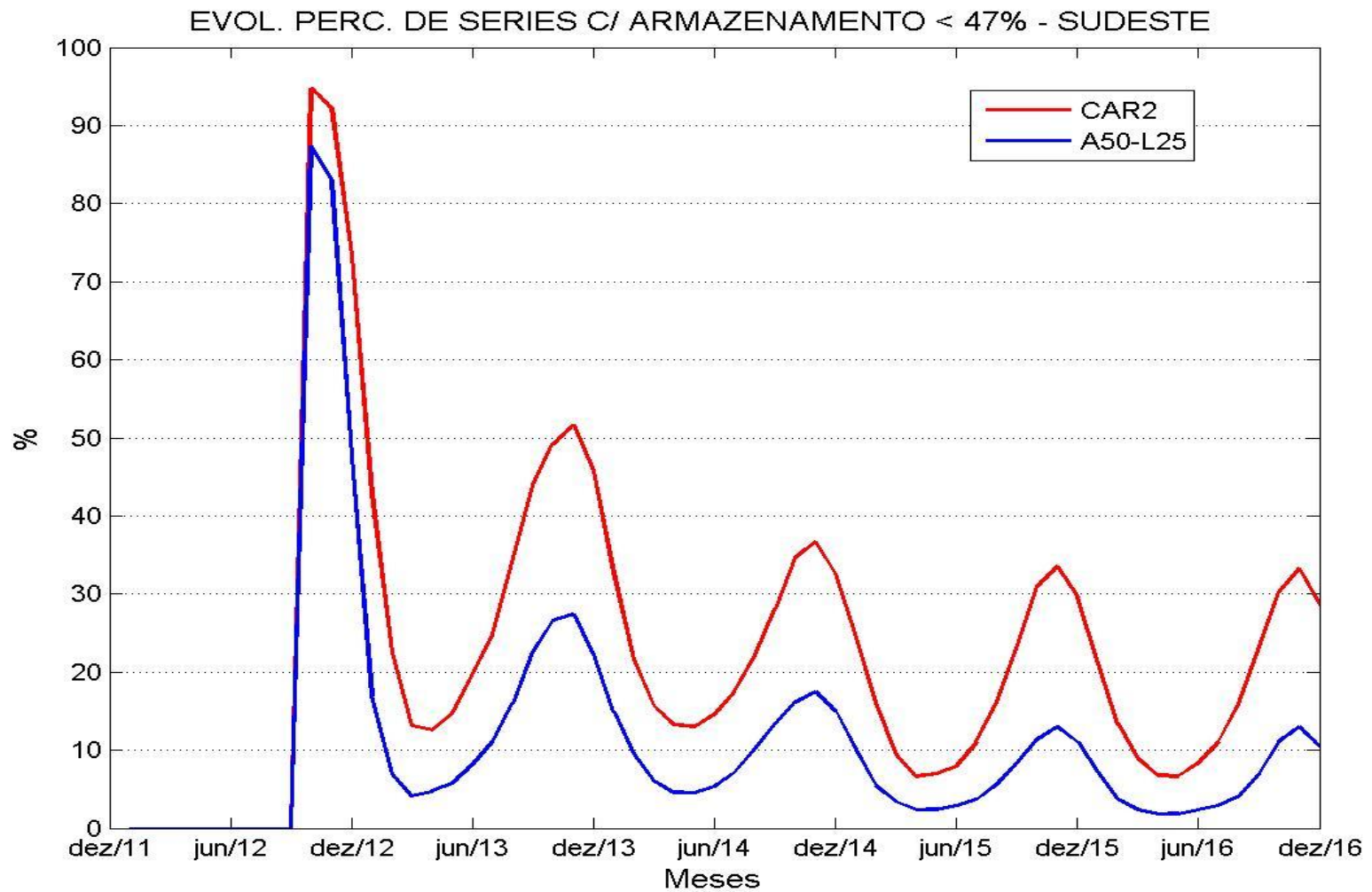
Evolução Temporal da Energia Armazenada Final Média Mensal Percentual



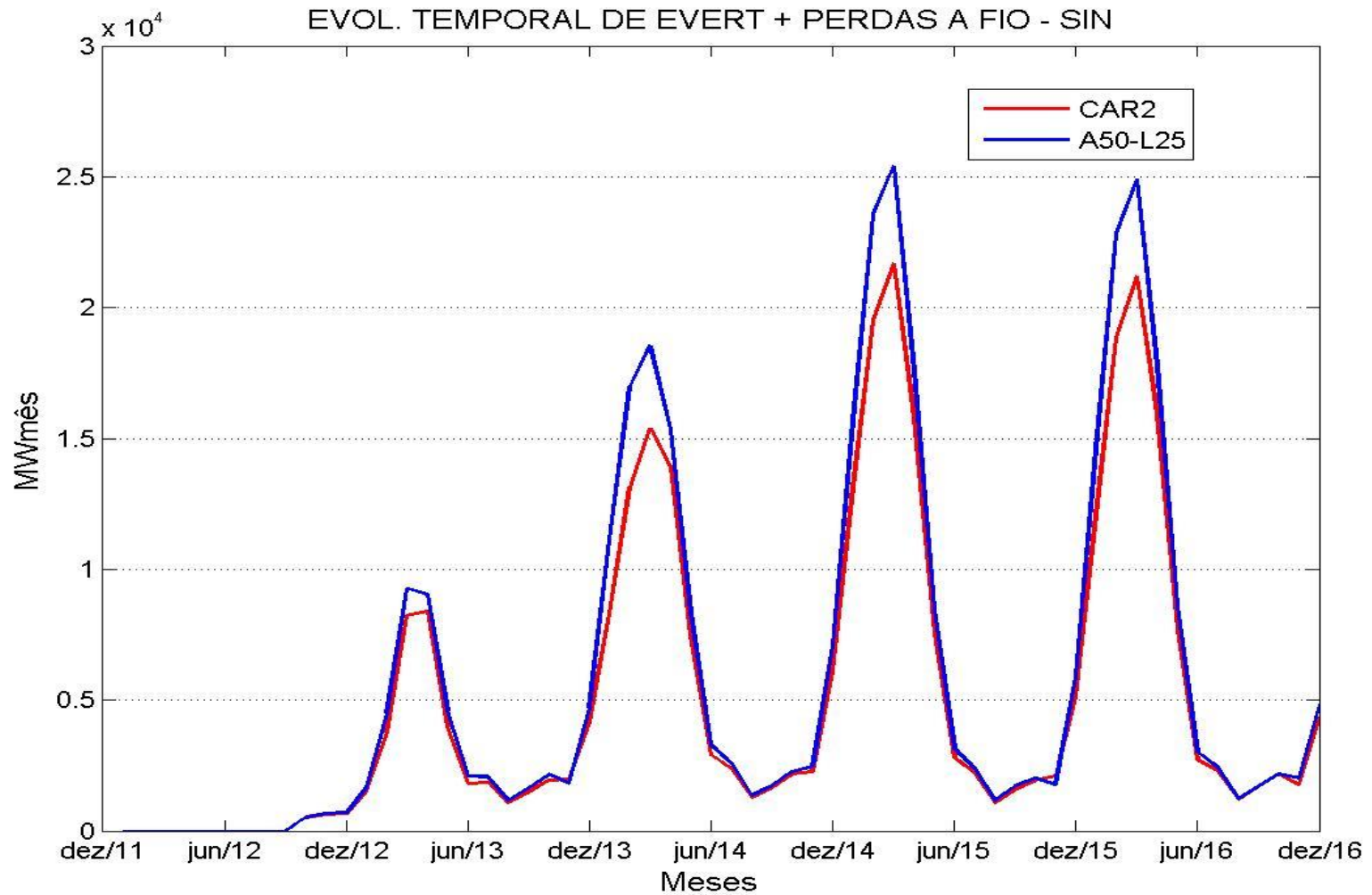
Evolução Temporal da Energia Armazenada Final Média Mensal Percentual



Evolução Temporal do Perc. do Armazenamento Inferior a um Determinado Nível



Evolução Temporal da Energia Vertida + Perdas a Fio Média Mensal



Planejamento da Operação de Curto Prazo

Newave / Decomp

Jan/2011 a Dez/2012

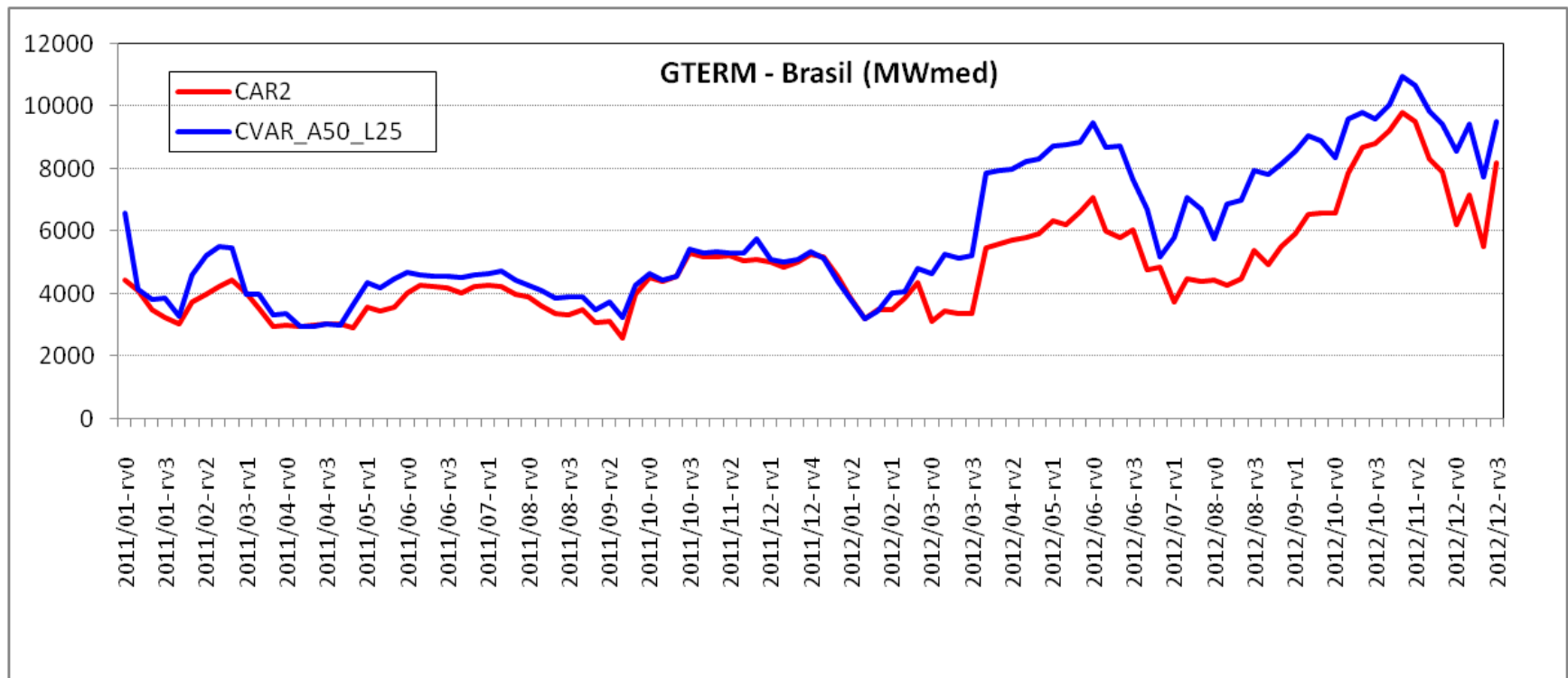
- ONS

Resultados NEWAVE/DECOMP

Jan/2011 a Dez/2012

1) Geração Térmica (MWmed)

Brasil

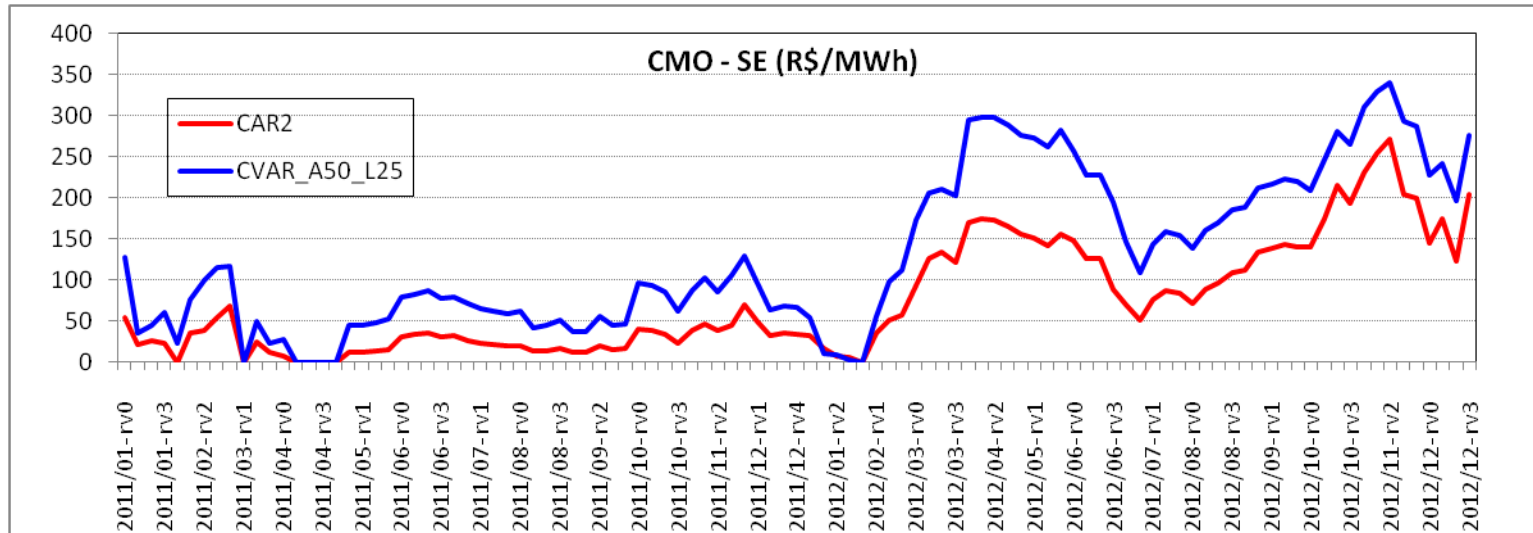


Resultados NEWAVE/DECOMP

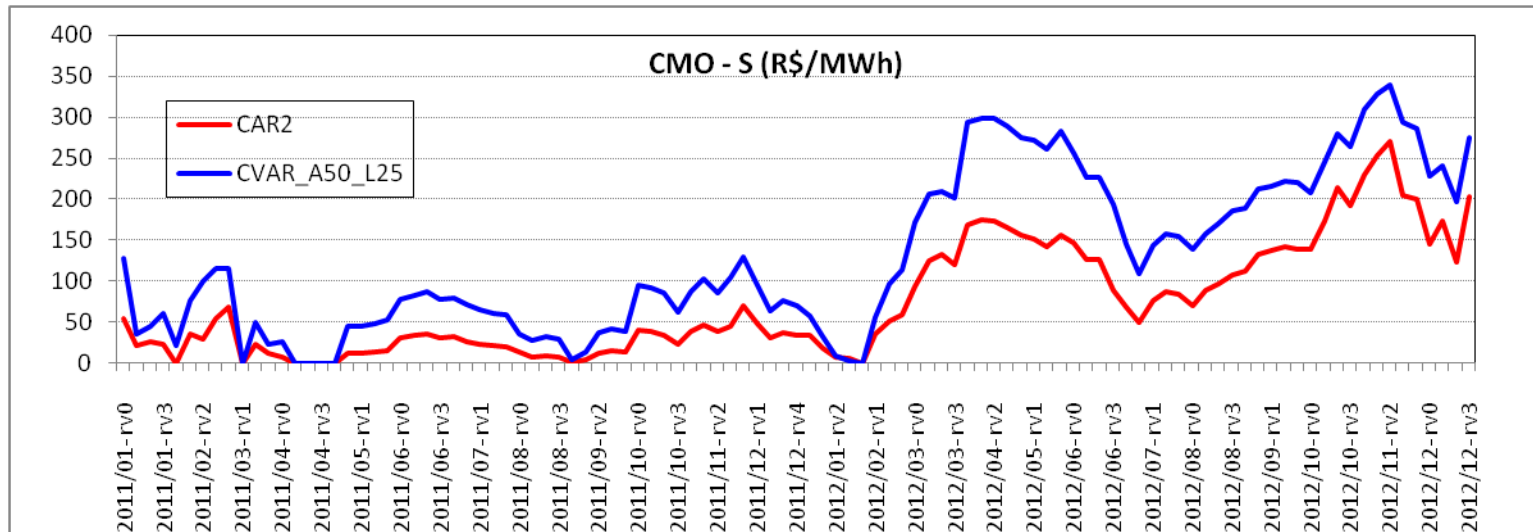
Jan/2011 a Dez/2012

2) Custo Marginal de Operação (R\$/MWh)

SE



S

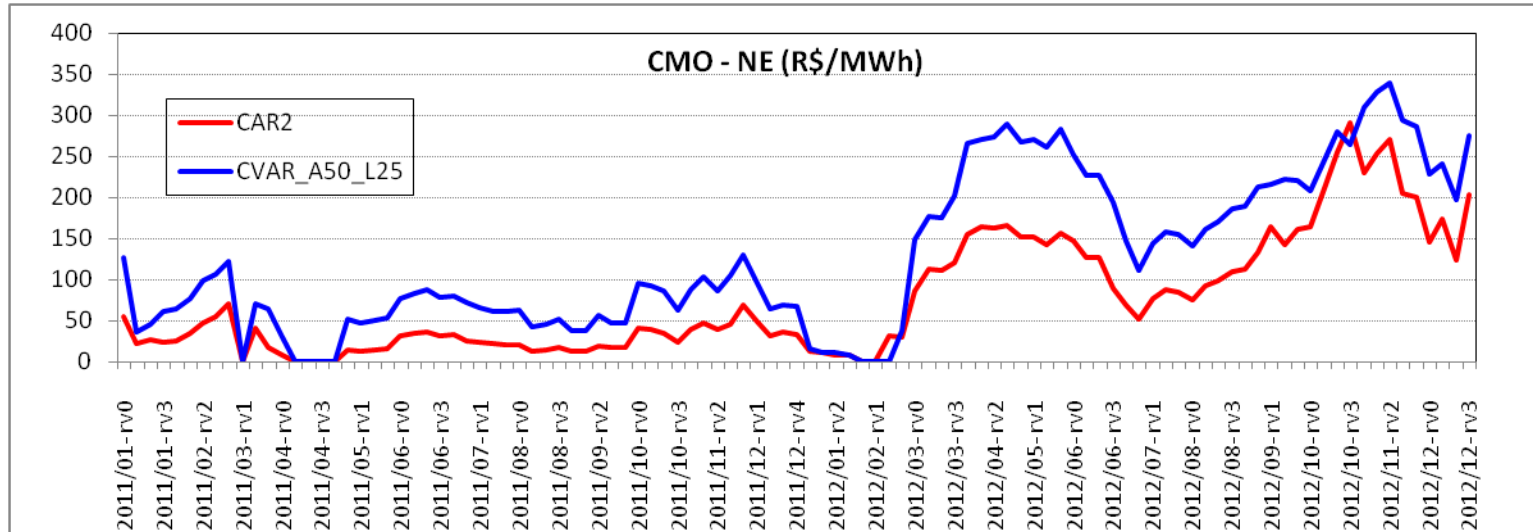


Resultados NEWAVE/DECOMP

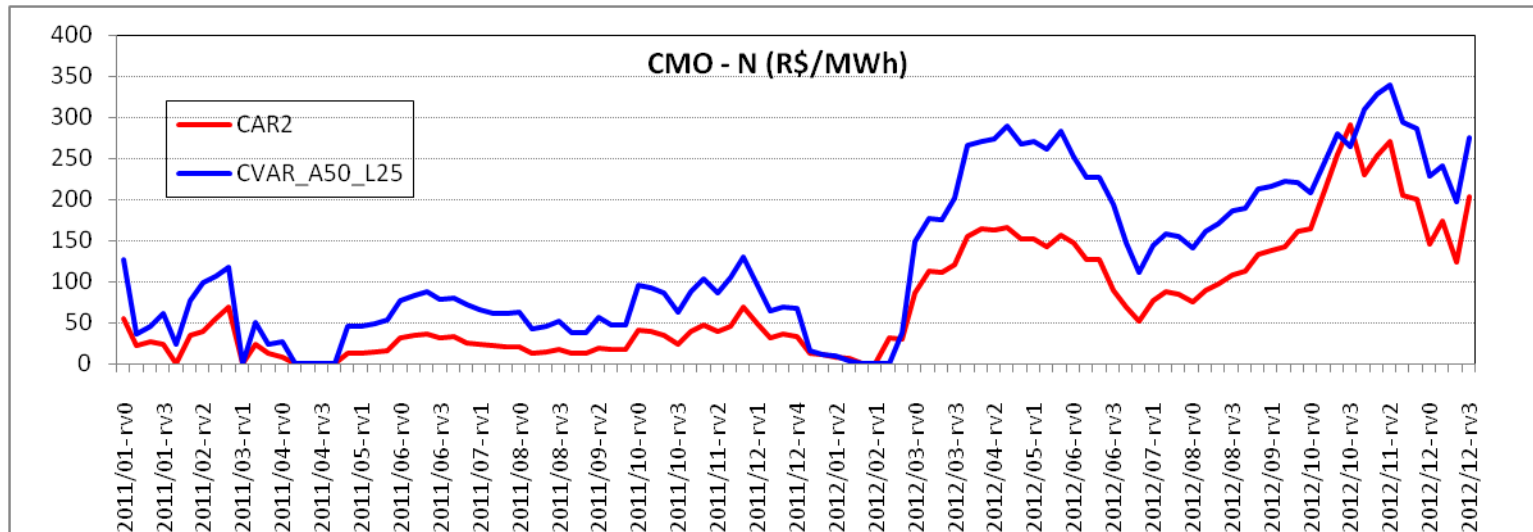
Jan/2011 a Dez/2012

2) Custo Marginal de Operação (R\$/MWh)

NE



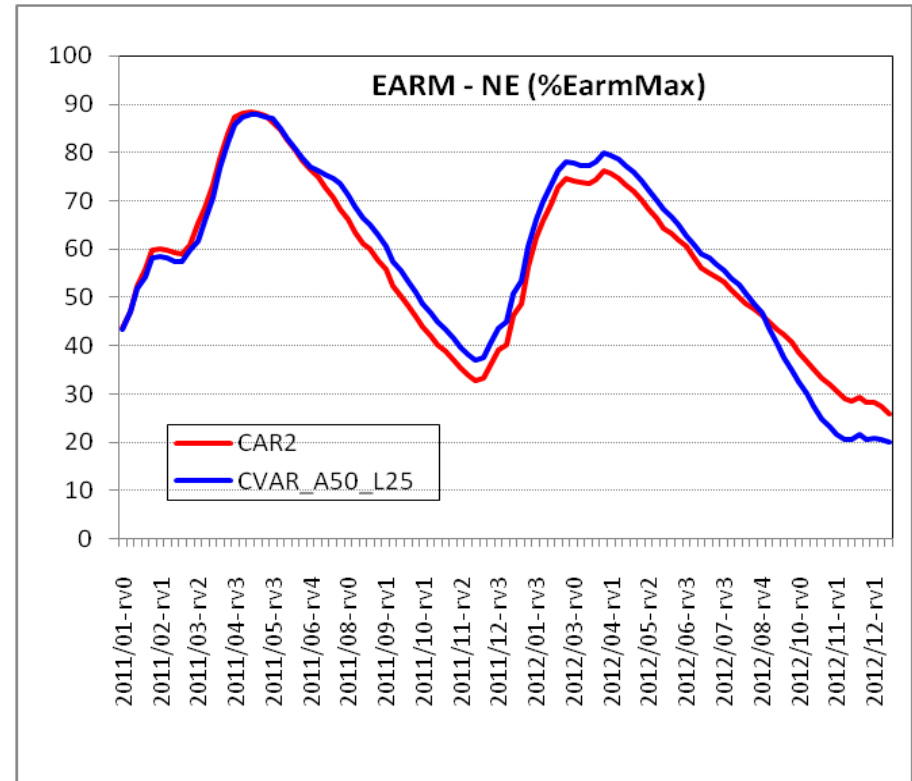
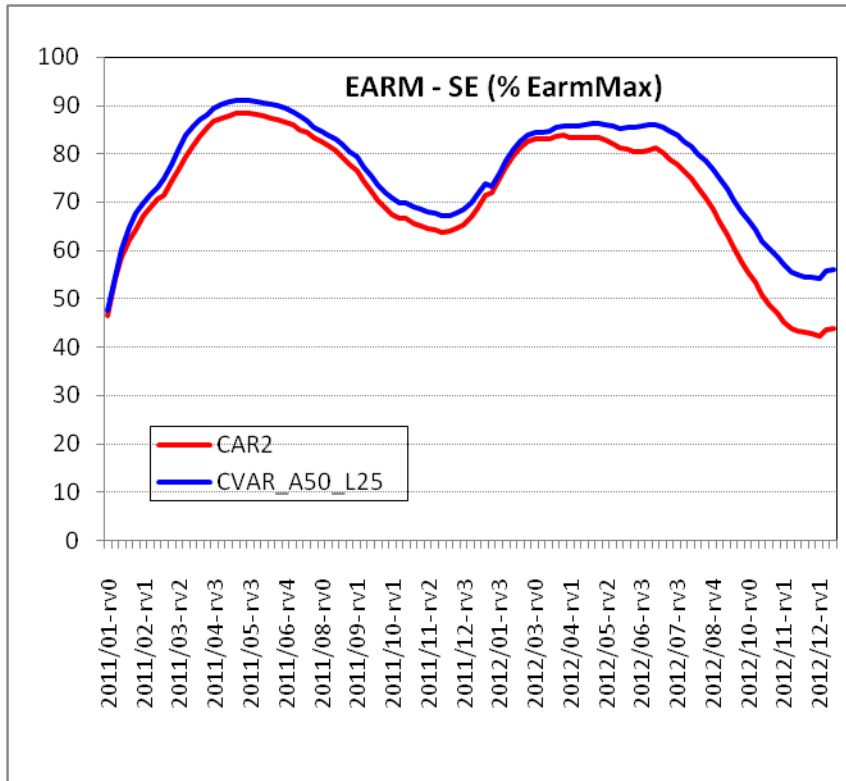
N



Resultados NEWAVE/DECOMP

Jan/2011 a Dez/2012

3) Energia Armazenada Final (%)



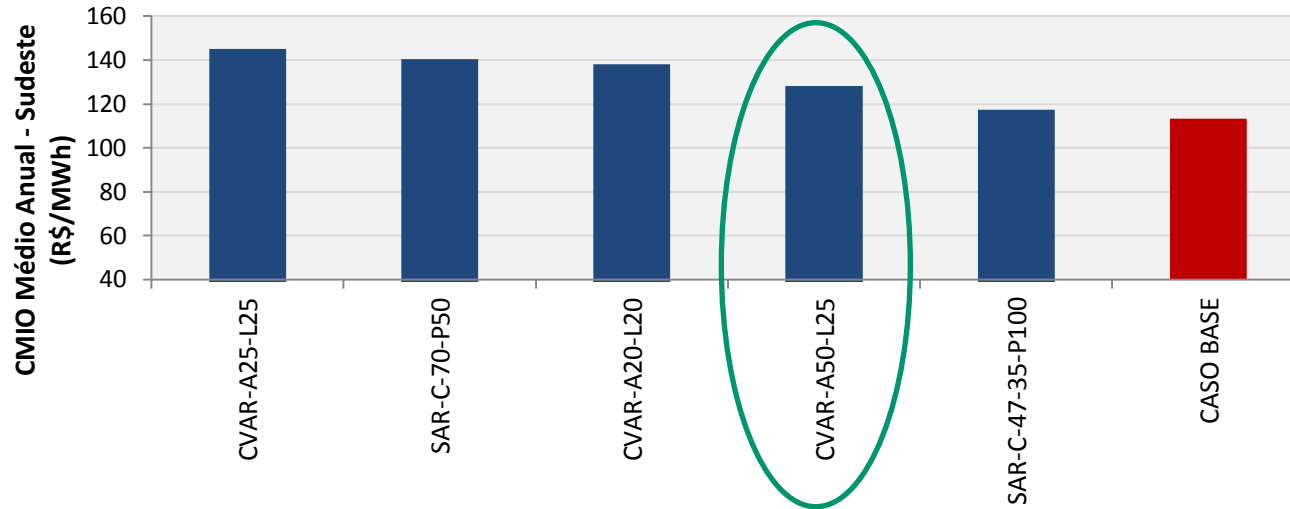
Planejamento da Expansão - EPE

ANÁLISES

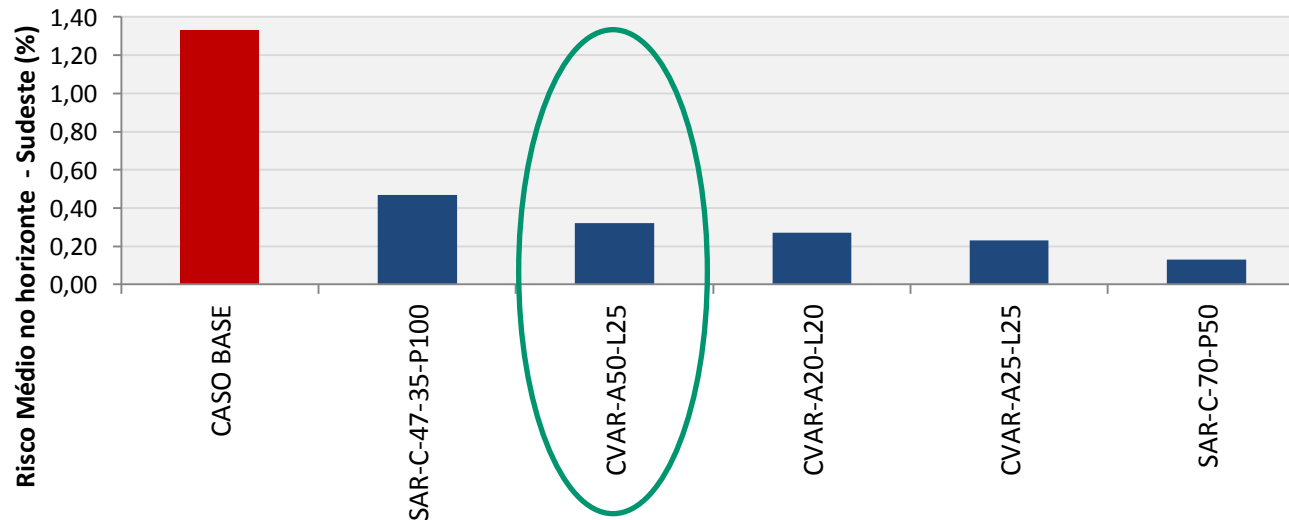
GARANTIA FÍSICA

CMO e Risco por Metodologias

LEN A-5/2012 - CMO Médio Anual - Sudeste

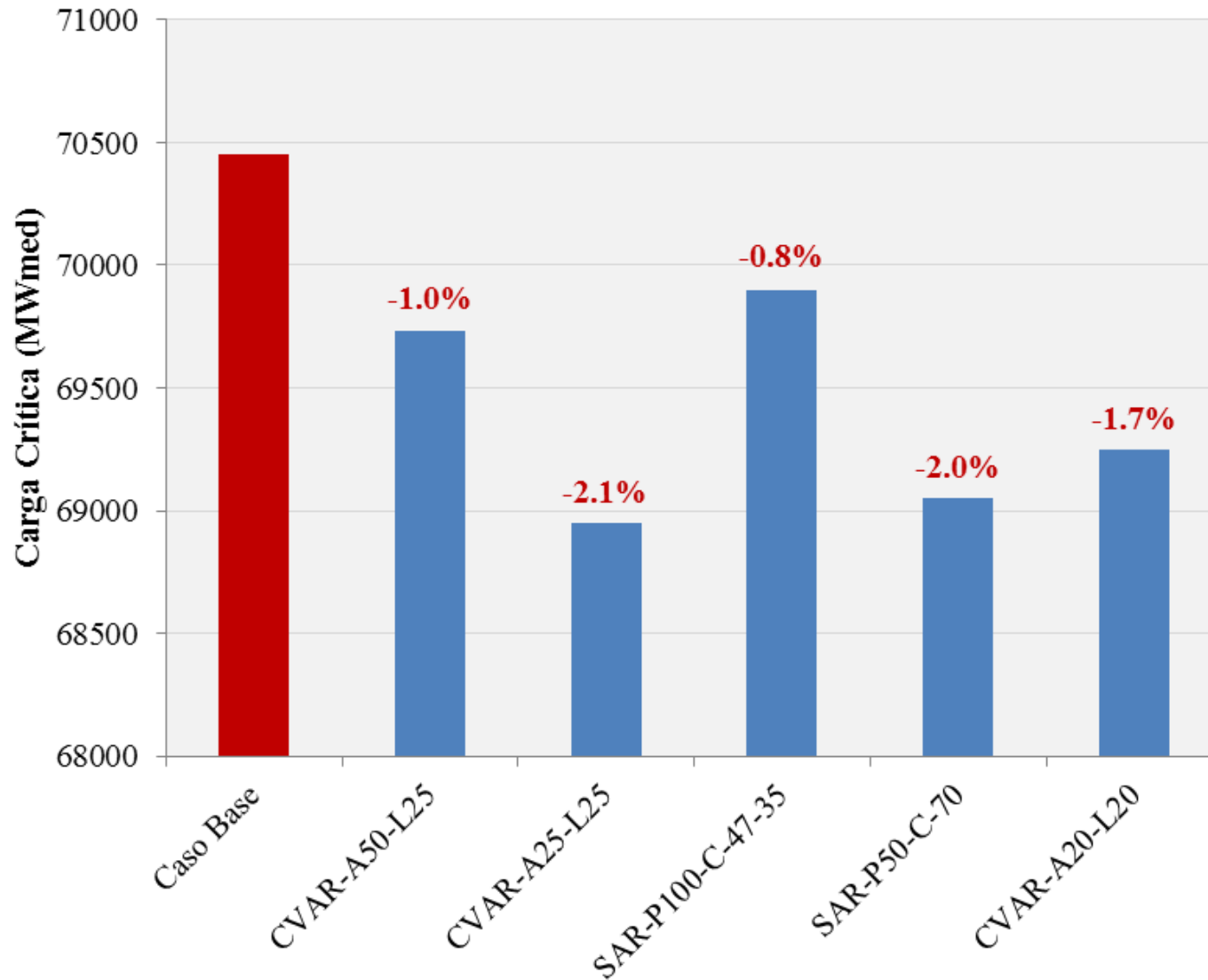


LEN A-5/2012 - Risco médio no horizonte- Sudeste

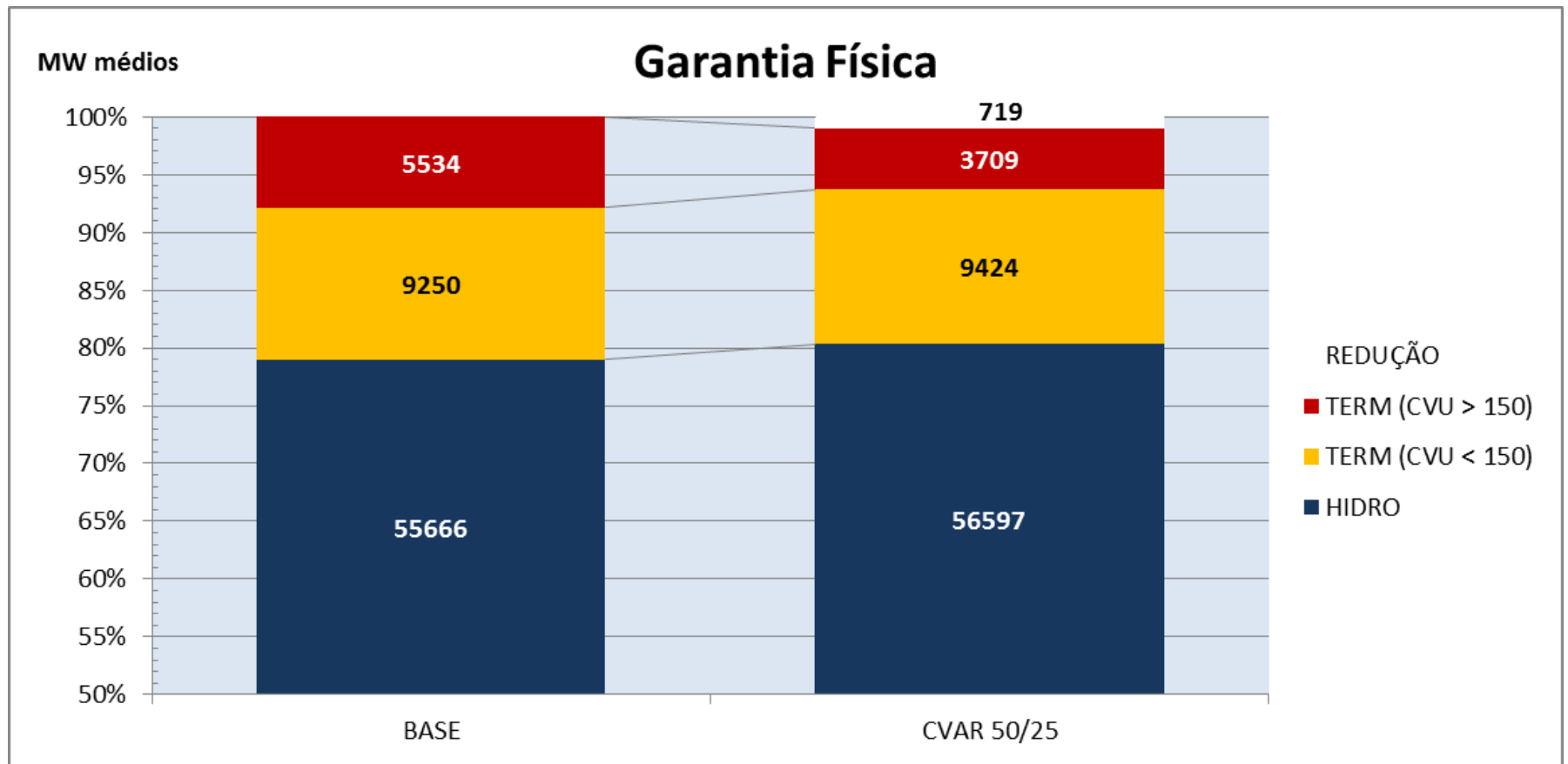


Impactos na Garantia Física

Carga Crítica



Impactos na Garantia Física



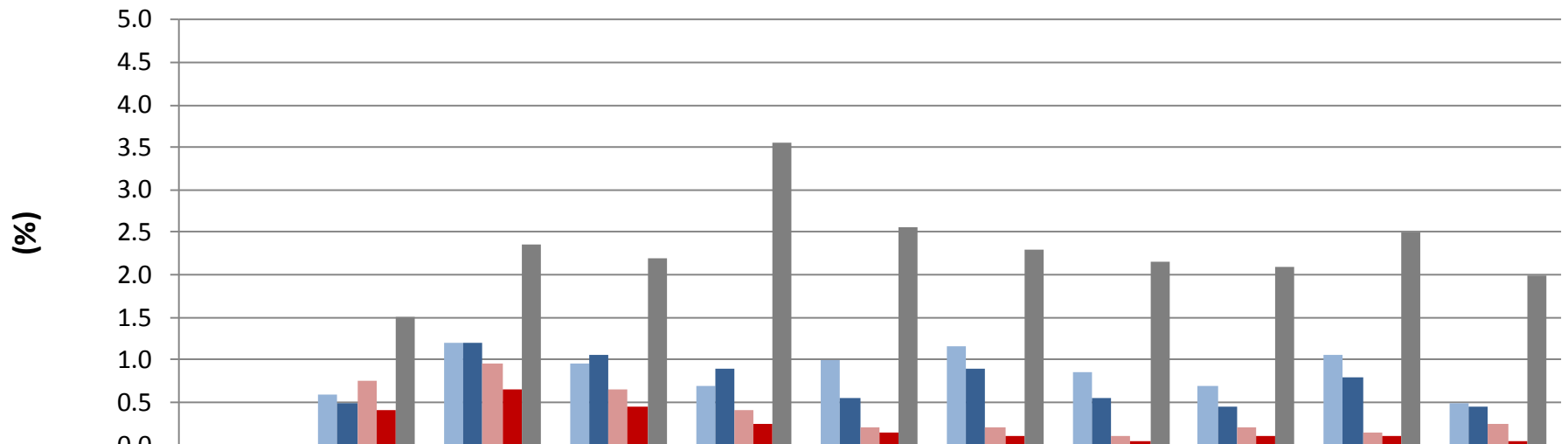
ANÁLISES

PLANO DECENAL

Risco de Déficit por Metodologias

PDE 2021

Risco de Déficit - Sudeste - PDE 2021

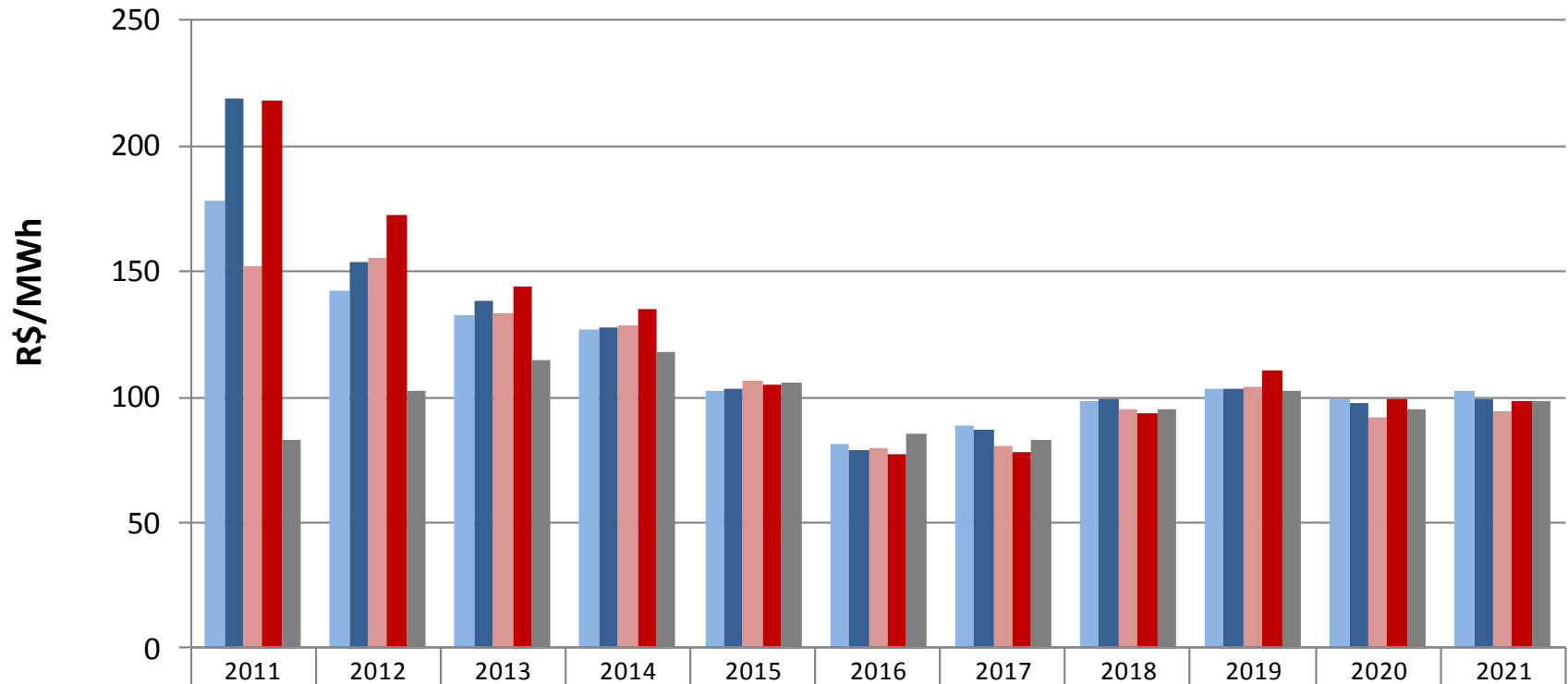


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
CVaRa50-l25	0.0	0.6	1.2	1.0	0.7	1.0	1.2	0.9	0.7	1.1	0.5
CVaRa20-l20	0.0	0.5	1.2	1.1	0.9	0.6	0.9	0.6	0.5	0.8	0.5
SAR 47-35 p 100	0.0	0.8	1.0	0.7	0.4	0.2	0.2	0.1	0.2	0.2	0.3
SAR 70 p50	0.0	0.4	0.7	0.5	0.3	0.2	0.1	0.1	0.1	0.1	0.1
Base	0.0	1.5	2.4	2.2	3.6	2.6	2.3	2.2	2.1	2.5	2.0

CMO por Metodologias

PDE 2021

CMO -Sudeste

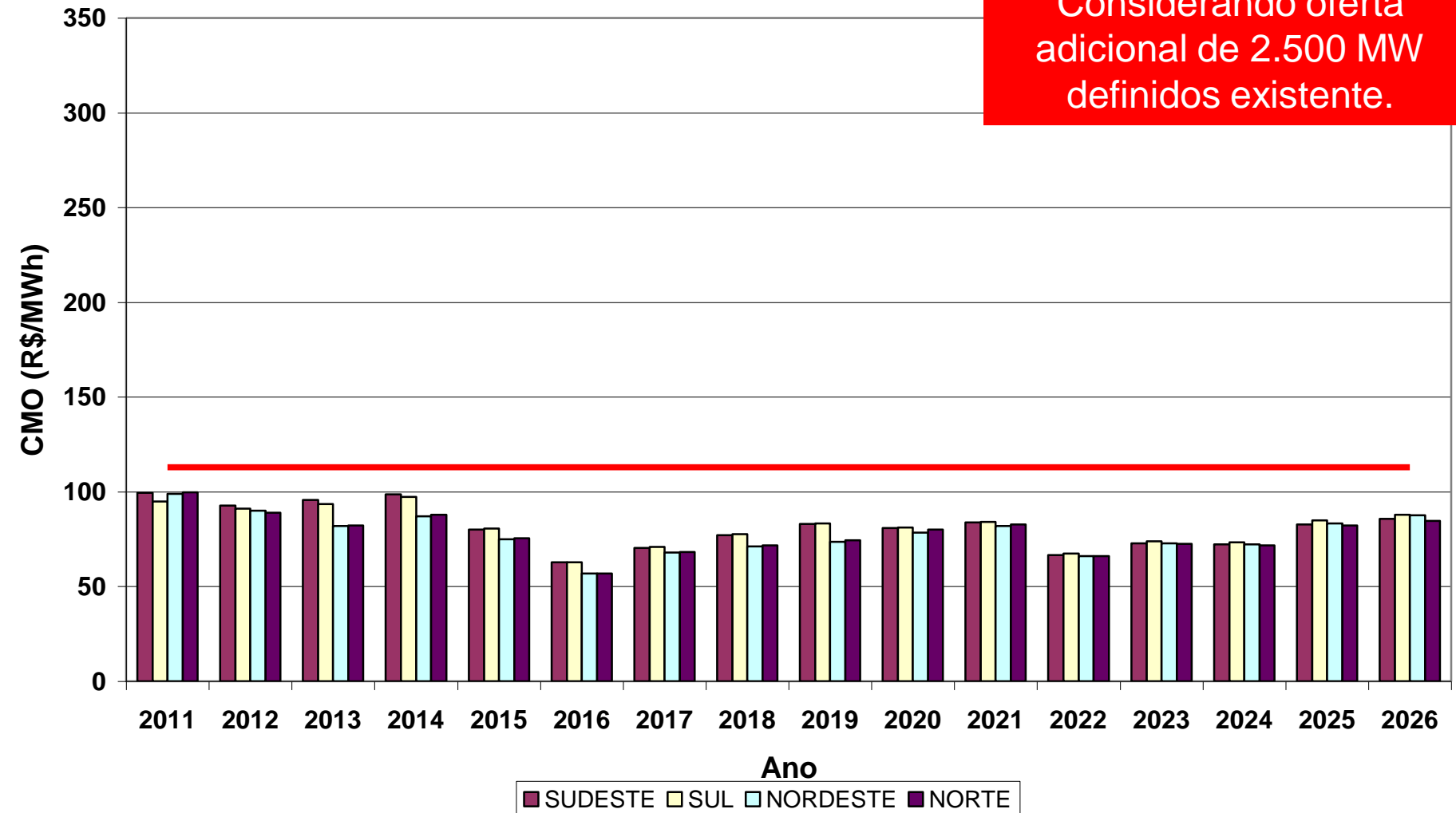


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
CVAR-50-25	178	142	132	127	103	81	89	98	103	99	102
CVAR-20-20	219	154	138	128	103	79	87	99	103	98	99
SAR-Cond-47-35-P100	152	155	134	129	107	80	81	95	104	92	95
SAR-Cond-70-50	218	173	144	135	105	77	78	93	111	99	98
BASE	83	103	115	118	106	85	83	95	102	95	99

Análise dos Anos Iniciais

PDE 2021 - CVaR A50-L25

Considerando oferta adicional de 2.500 MW definidos existente.

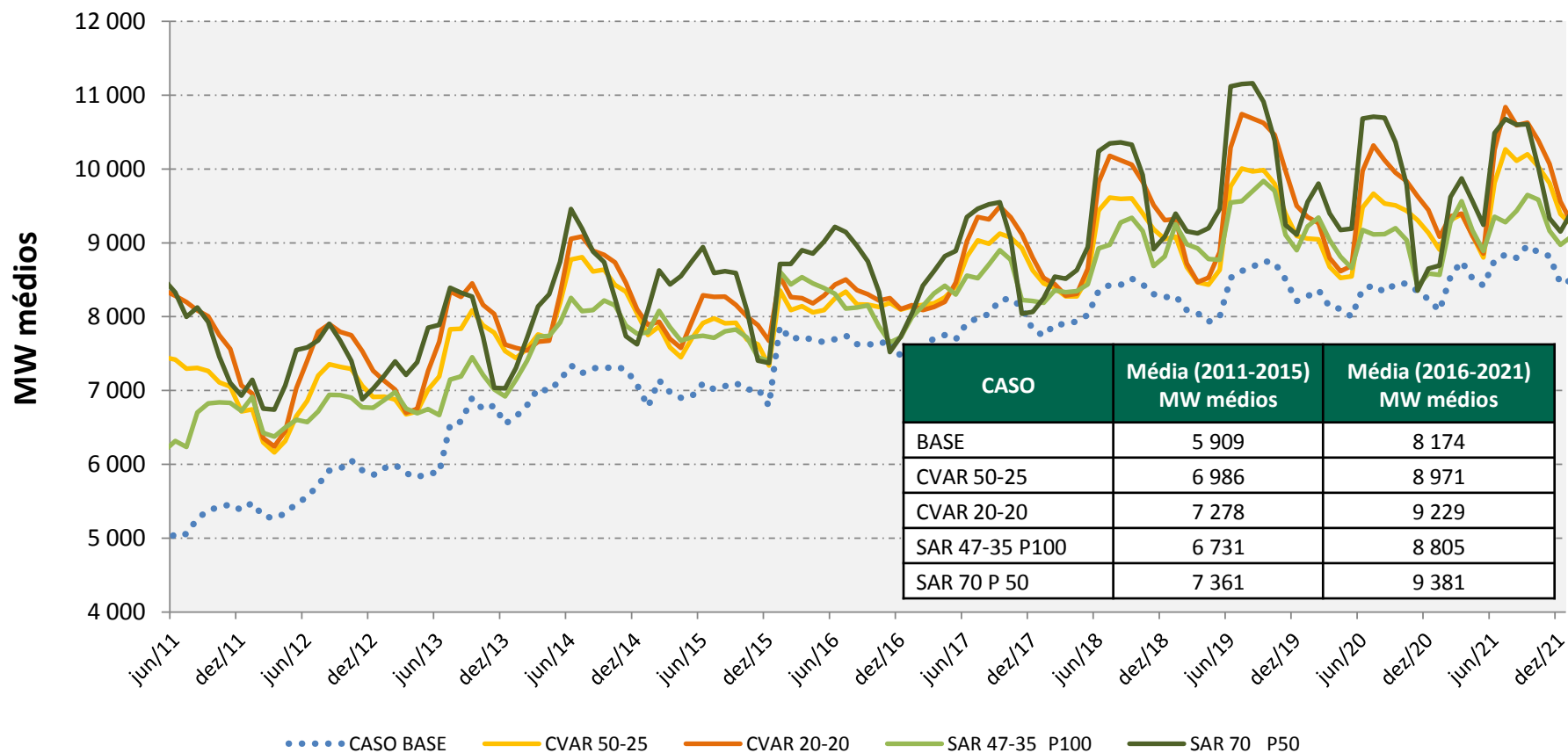


Geração Térmica por Metodologias

PDE 2021

Comparação dos Casos CVAR e SAR Convergidos com o Caso Base

Geração Térmica - Total SIN



CVaR & SAR – PDE 2019, 2020, 2021

Expansão Necessária para Reconvergência

(a partir do 3º ano)

MAR	PDE 2019			PDE 2020			PDE 2021		
	Expansão (MW)	Ano	Local	Expansão (MW)	Ano	Local	Expansão (MW)	Ano	Local
A50 L25	0	-	-	0	-	-	200 200	2015 2019	Sudeste Sul
A20 L20	250	2018	Sul	600 200 300	2020 2020 2025	Sudeste Sul Nordeste	250 250 250 250	2015 2015 2019 2019	Sudeste Sul Sudeste Sul
A25 L25	1000	2013	Sudeste	750 300 300 200	2020 2020 2020 2020	Sudeste Sul Nordeste Norte	600 500	2015 2015	Sudeste Sul
47%-35% P100	0	-	-	0	-	-	200 200 300 300	2015 2015 2019 2019	Sudeste Sul Sudeste Sul
70% P50	1000	2018	Sudeste	450 200	2020 2020	Sudeste Sul	750 750	2015 2015	Sudeste Sul

RESULTADOS

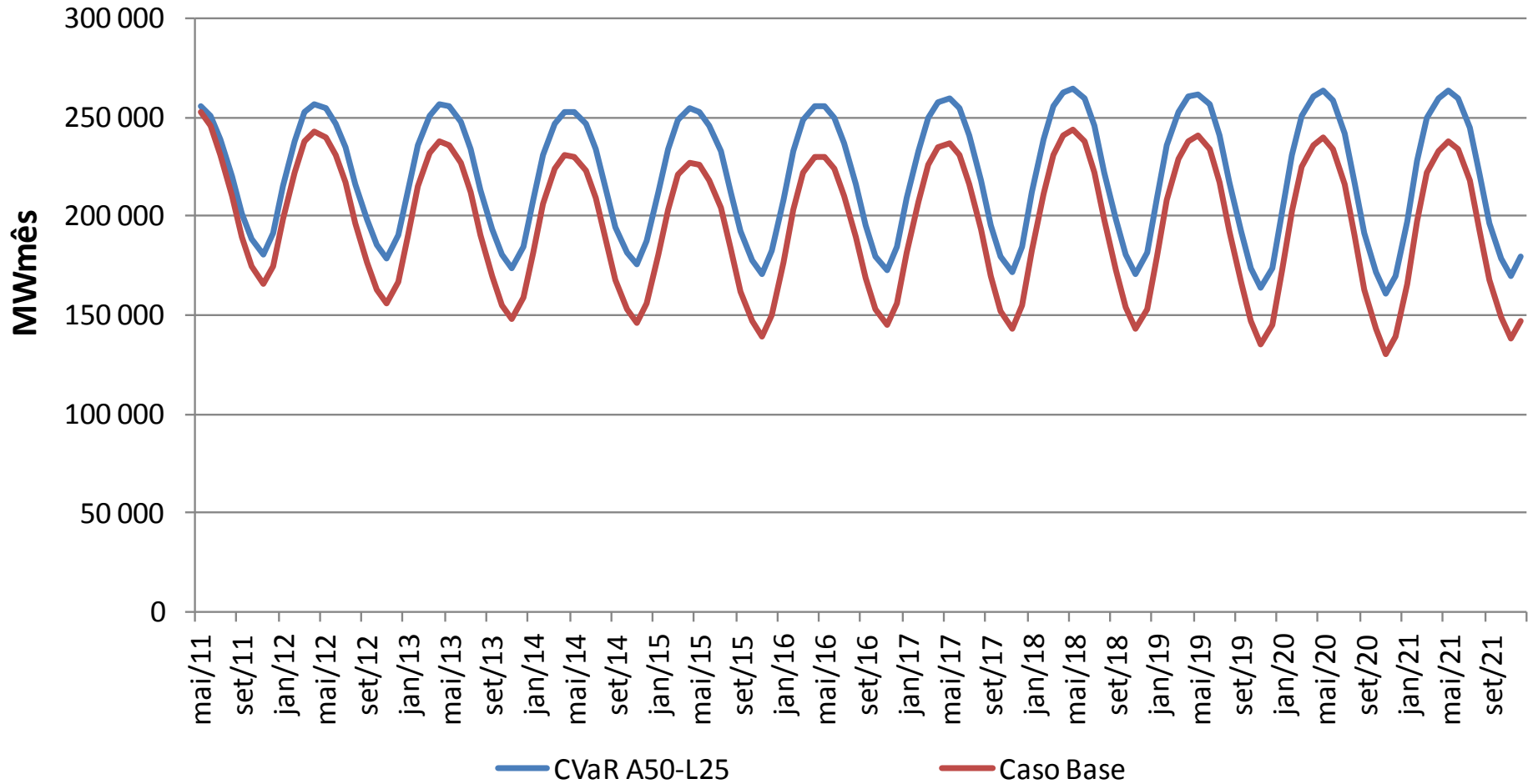
PDE 2021

CVaR $\alpha=50$ I25

PLANO DECENAL 2021

Energia Armazenada Final

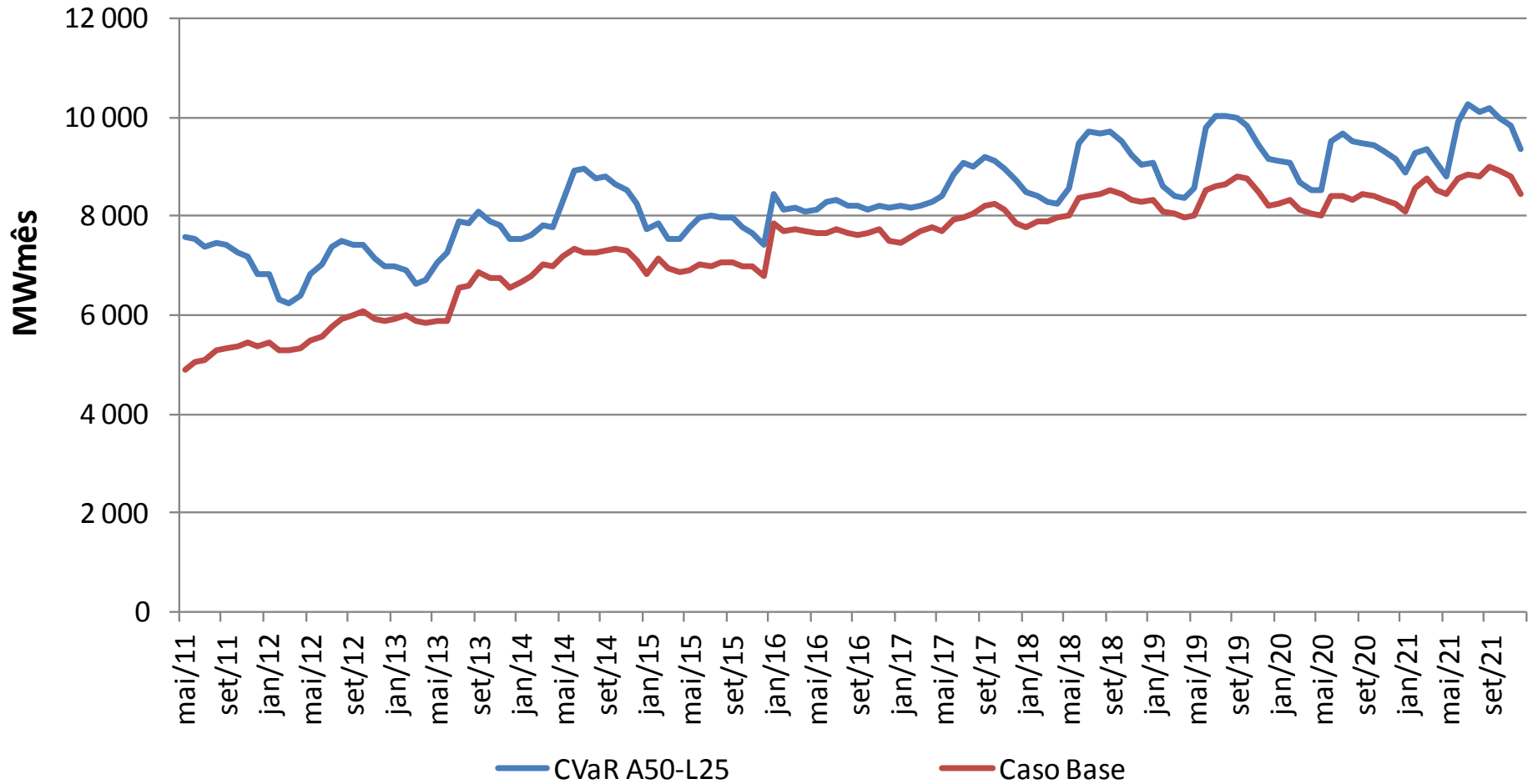
EARMF - SIN



PLANO DECENAL 2021

Geração Térmica Total - SIN

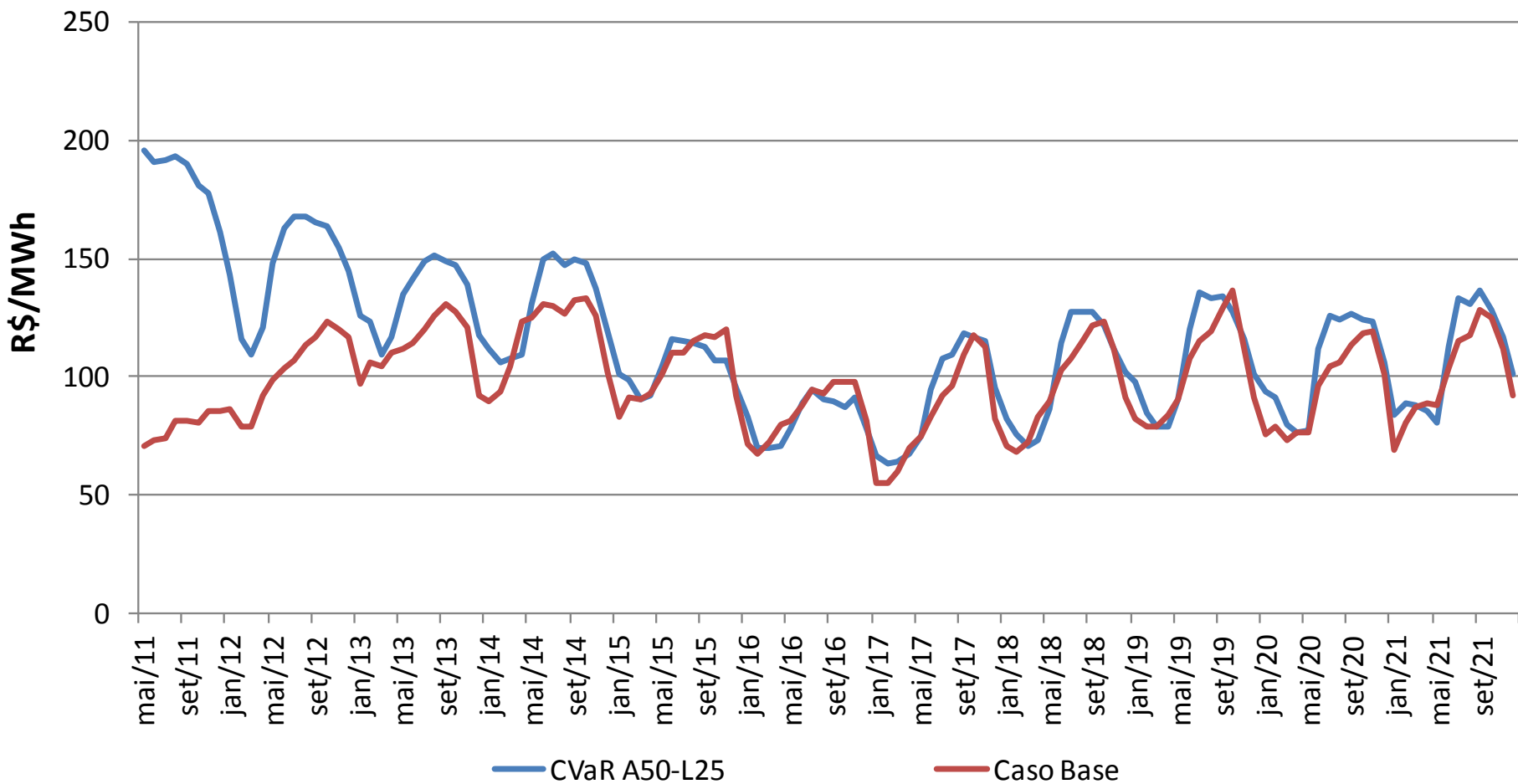
GTERT - SIN



PLANO DECENAL 2021

CMO Médio Mensal

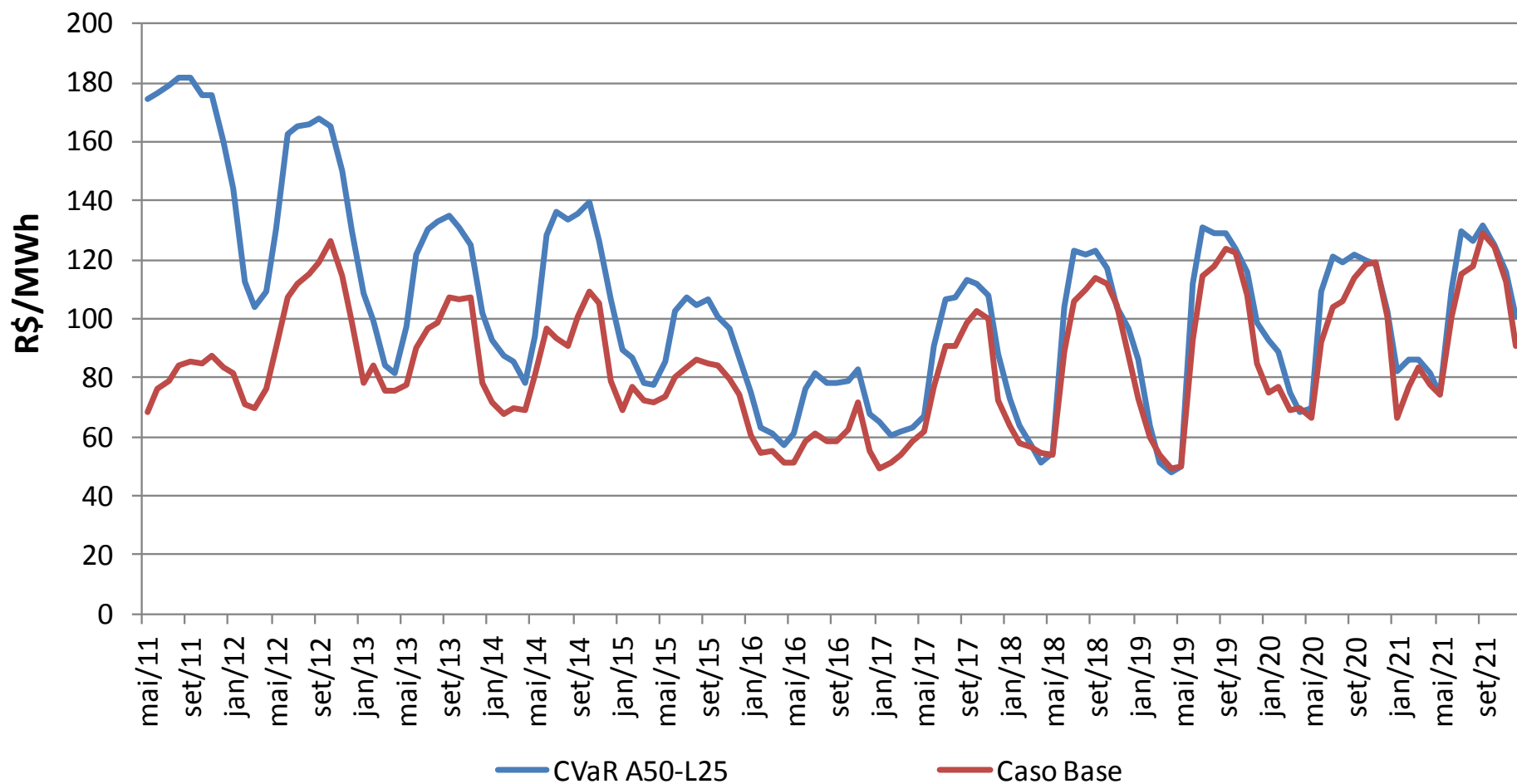
CMO - Sudeste/Centro-Oeste



PLANO DECENAL 2021

CMO Médio Mensal

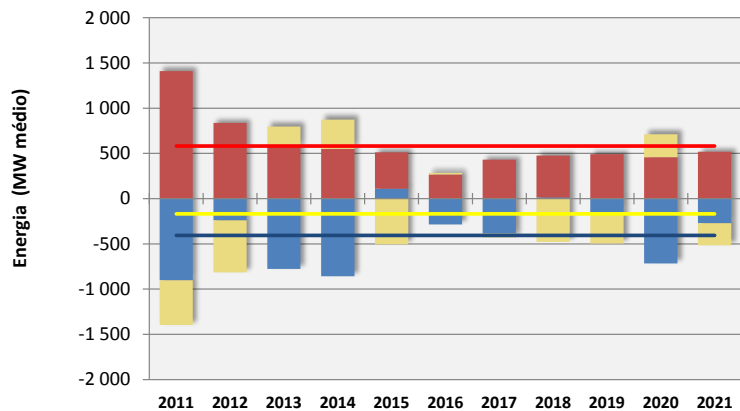
CMO - Nordeste



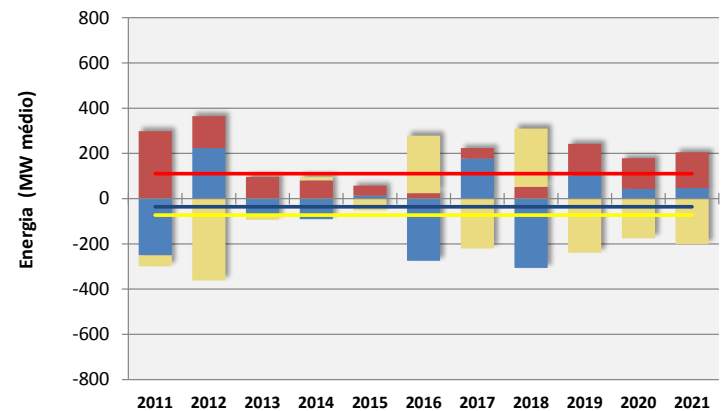
PLANO DECENAL 2021

Atendimento à carga – Comparação sem MAR

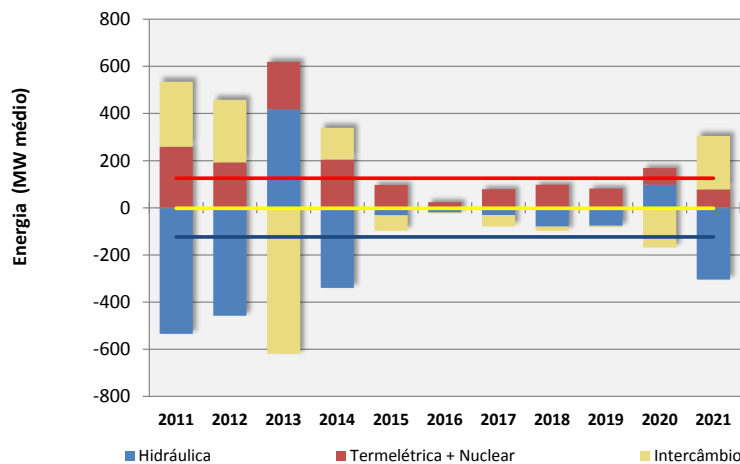
CVAR 50-25 versus Caso Base | Sudeste + Paraná



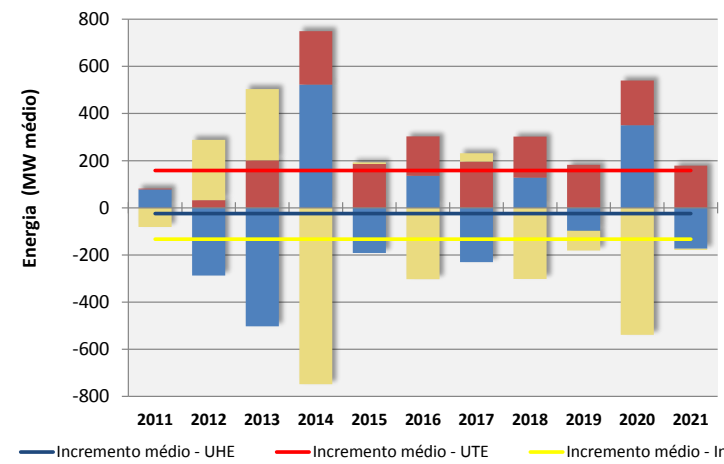
CVAR 50-25 versus Caso Base | Sul



CVAR 50-25 versus Caso Base | Nordeste



CVAR 50-25 versus Caso Base | Norte



■ Hidráulica ■ Termelétrica + Nuclear ■ Intercâmbio

— Incremento médio - UHE — Incremento médio - UTE — Incremento médio - Intercâmbio