

WLC para Systems Programmers

OU

WLC: Você ainda vai ter um

Workload License Charges (WLC)

- Modalidade de cobrança de SW (em constante evolução)
- "Custo de SW desvinculado da capacidade instalada do HW"
- Baseada na utilização das Partições Lógicas
 - Não na utilização dos produtos
- Pré-reqs:
 - ▶ 64-bit addressing mode (z/Architecture):
 - HW: 2084 (z990), 2064 (z900)
 - 2066 (z800): em Parallel Sysplex com z990 ou z900
se Standalone => Entry WLC (EWLC)
 - SW: z/OS
 - ▶ Todas as imagens MVS-based na CPU precisam ser z/OS (64-bit)
 - ▶ Parallel Sysplex para agregação de MSUs de diferentes CPUs (como PSLC)

Workload License Charges (WLC)

- Duas "categorias" de produtos:
 - ▶ **Flat WLC** ("Legacy Products")
 - Uma licença por CPU (independe da capacidade da CPU)
 - ▶ **Variable WLC (VWLC)**
 - Requer "lista" de produtos por partição
 - ◆ Usa registros SMF tipo 89
 - ◆ Produtos sem registros SMF 89 => usar NO89 DD statement
- Duas modalidades:
 - ▶ **Full-Capacity WLC**
 - Baseada na capacidade instalada total da CPU onde o produto VWLC roda
 - ▶ **Sub-Capacity WLC**
 - Baseada na utilização por Partição Lógica onde o produto VWLC roda
 - ☛ Utilização da partição medida por "Rolling 4-hour Average"
 - ☛ Usa-se o maior valor de "Rolling 4-hour Average" no mês

Variable Workload License Charges (VWLC / EWLC) Products:

ID	VWLC / EWLC Product	SMF89
5694-A01	z/OS Version 1	Yes
5655-G52	z/OS.e Version 1 (EWLC only)	Yes
5655-147	CICS TS for OS/390	Yes
5697-E93	CICS TS for z/OS V2	Yes
5655-018	CICS/ESA V4	Yes
5695-DB2	DB2 FOR MVS/ESA V4	Yes
5655-DB2	DB2 for OS/390 V5	Yes
5645-DB2	DB2 UDB for OS/390 V6	Yes
5675-DB2	DB2 UDB for OS/390 V7	Yes
5655-C56	IMS V8	Yes
5655-B01	IMS V7	Yes
5655-158	IMS/ESA Version 6	Yes
5695-176	IMS/ESA Version 5	Yes
5695-137	MQSeries MVS/ESA	Yes
5655-A95	MQSeries for OS/390 V2	Yes
5655-F10	MQSeries for OS/390 V5	Yes
5648-A25	COBOL for OS/390 & VM V2	No
5655-G53	Enterprise COBOL for z/OS and OS/390	No
5655-H31	Enterprise PL/I for z/OS and OS/390	No
5697-ENV	IBM Tivoli NetView for z/OS	No
5655-K36	Lotus Domino for z/OS V6	Yes
5655-B86	Lotus Domino for S/390 V5	No
5645-006	System Automation OS/390 V2	No
5645-005	System Automation for OS/390	No
5697-WSZ	Tivoli Workload Scheduler for z/OS	No
5655-043	Tivoli NetView PM	No
5697-B82	Tivoli NetView for OS/390	No
5697-OPC	Tivoli OPC	No
5655-B22	VisualAge PL/I OS/390 V2	No
5706-254	Query Management Facility V3	No
5655-H32	Debug Tool for z/OS and OS/390	No

ID	zSeries IPLA Sub-Capacity Product Name	SMF89
5655-I35	IBM WebSphere Application Server for z/OS V5	Yes
5655-F31	IBM WebSphere Application Server for z/OS and OS/390 V4	Yes
5655-K12	IBM WebSphere Portal for z/OS and OS/390 V4	No
5655-I03	IBM WebSphere Host Publisher V4 for zSeries	No
5655-I58	IBM WebSphere MQ Integrator Broker for z/OS V2	No
5655-G97	IBM WebSphere MQ Integrator for z/OS V2	No
5655-BPM	IBM WebSphere MQ Workflow for z/OS V3	Yes
5655-I40	IBM WebSphere Data Interchange for z/OS V3	Planned
5655-K60	WebSphere Business Integration Message Broker for z/OS V5	No
5697-I11	WebSphere Business Integration Message Broker with R&F for z/OS V5	No
5655-K57	WebSphere Business Integration Event Broker for z/OS V5	No
5655-J67	WebSphere Studio Application Monitor V1	No
5655-I49	WebSphere Studio Asset Analyzer V2	No
5655-I14	WebSphere Studio Workload Simulator V1	No

Exemplos de Flat Workload License Charge Products:

5697-SD9	Tivoli Info Mgmt for z/OS	5695-014	IBM LIBRARY FOR REXX
5655-G99	DataInterchange/MVS V4	5655-A17	IBM SMARTBATCH FOR OS/390
5655-H01	DataInterchange/MVS-CICS V4	5688-228	APL2 MVS/VM V2
5655-007	NETVIEW V3R1	5688-216	C/370 AD/C COMP.
5688-197	AD/C COBOL/370 V1	5688-188	C/370 LIBR.
5668-958	VS COBOL II V1	5685-106	OV/MVS V1
5685-111	NETVIEW V2 MVS/ESA-CS	5695-010	CICS VSAM RECOVERY /ESA V2
5685-083	CICS V3 MVS/ESA	5688-206	CSP/370RS V4
5695-007	OPC/A MVS/ESA V1	5648-142	INFO V7 MVS
5685-DB2	DB2 V3	5685-013	IMS/ESA TM V4
5685-016	NETVIEW DM V1 MVS/XA	5688-087	VS FORTRAN COMP & LIBR
5688-235	AD/C PL/I MVS/VM V1	5655-102	DB2 PM V4
5685-093	IMS/VS DB TOOLS V2	5695-041	FAF V2
5688-218	CSP/370 AD V4	5665-290	DISOSS V3 MVS
5665-366	SDF/II	5685-151	AOC V1 V1
5648-092	APPLICATION SYSTEM V	5695-042	IODM/2 V2
5685-108	NETVIEW FTP V2 MVS	5648-A12	IXFP SNAPSHOT
5668-806	FORTRAN/390	5655-A23	DPROPR Capture for MVS V5.1
5695-171	INFO V6 MVS	5685-101	DW/370 MVS CICS V2
5655-103	DITTO/ESA FOR MVS V1	5695-081	CICSPLEX SM/ESA V1
5688-008	ESCON	5688-132	COMM SUBSYS FOR INTER
5668-910	OS PL/1 V2R1 COMP.&L		
5668-909	OS PL/1 V2		
5688-121	TPNS V3		
5695-013	IBM COMPILER FOR REXX		
5655-002	ASF V3 FOR MVS		
5695-101	E.P.D.M.		

Rolling 4-hour Average

CPU %

100

Intervalos de 5 minutos

80

60

40

20

0

0

1

2

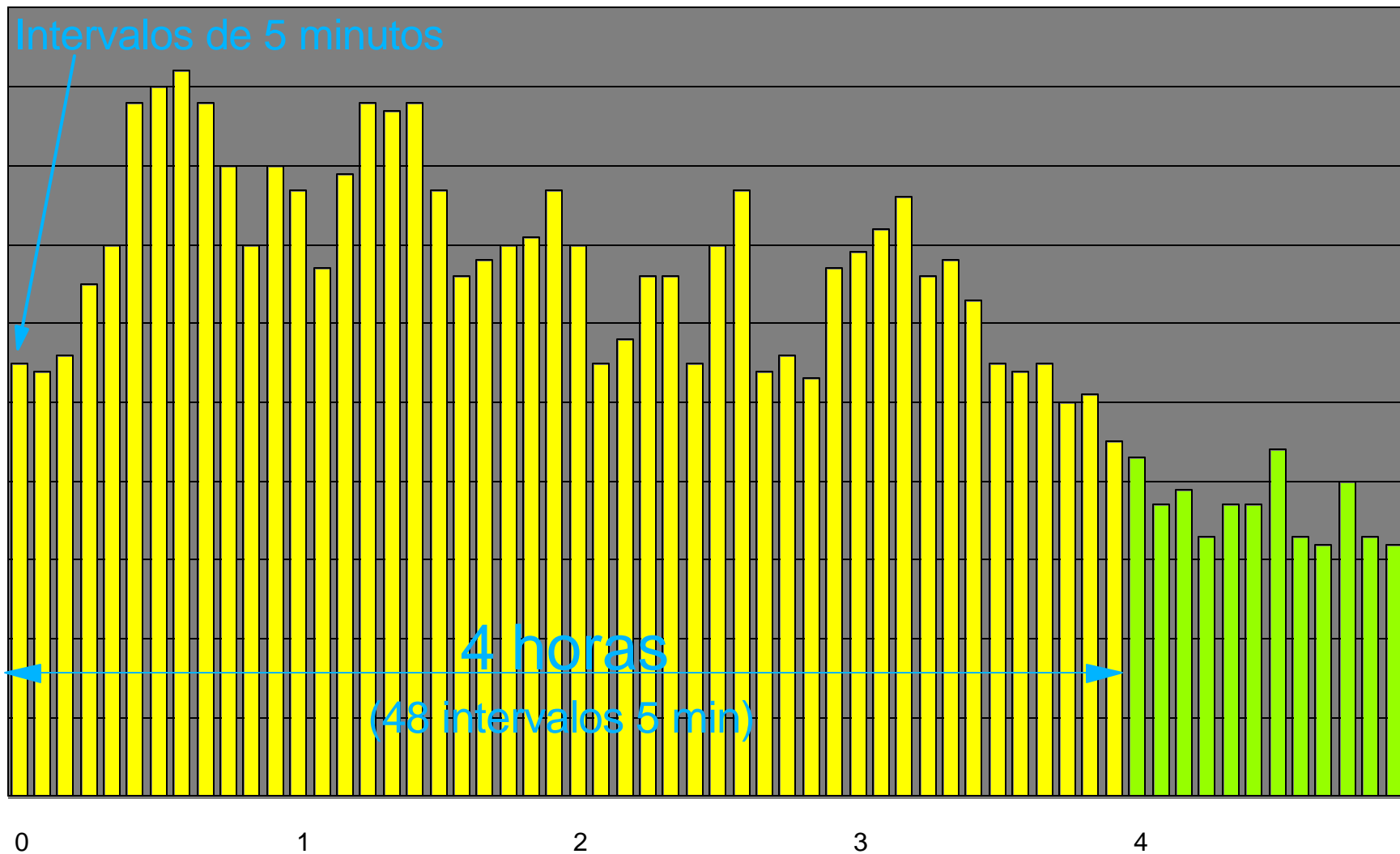
3

4

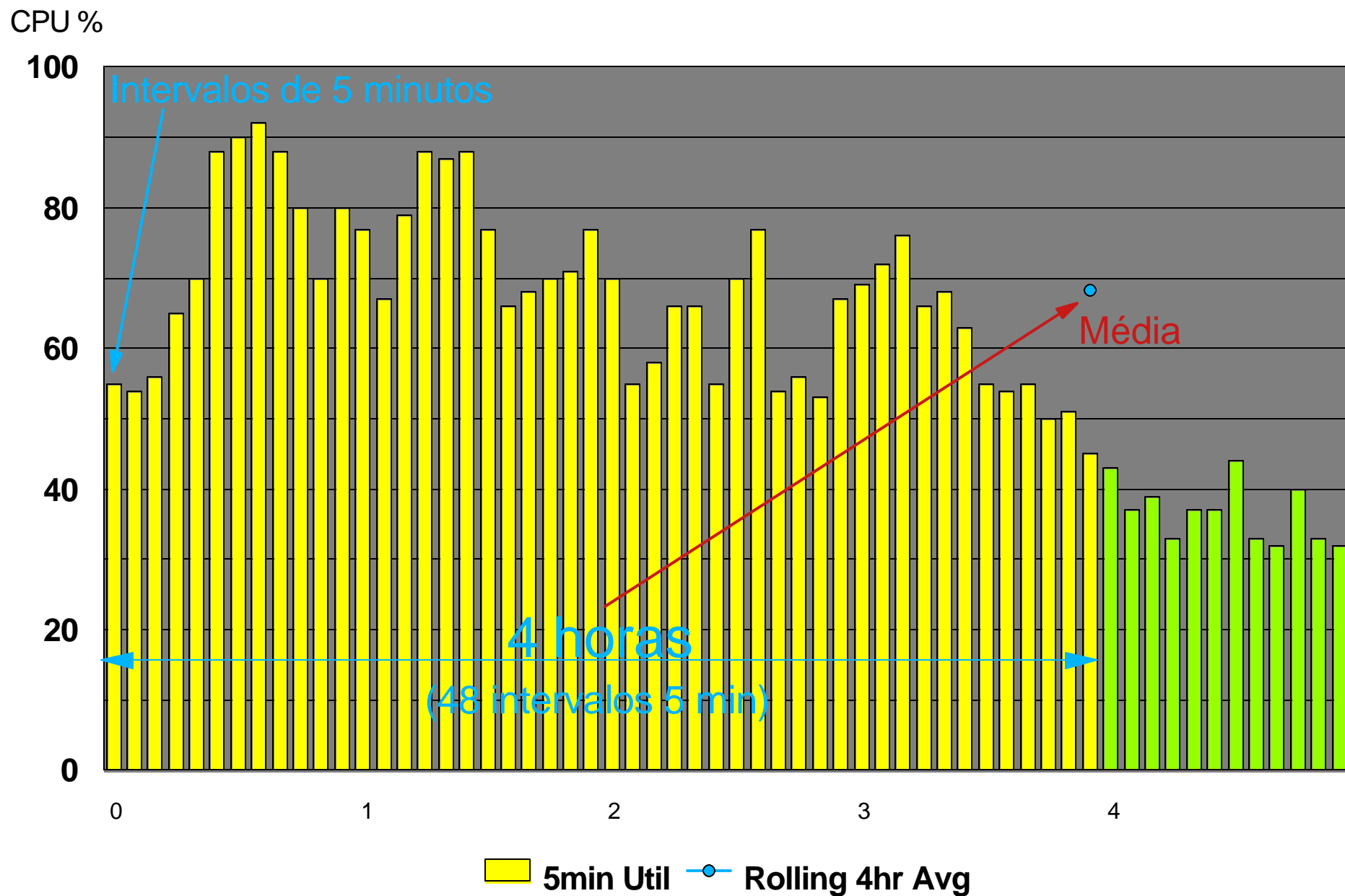
4 horas

(48 intervalos 5 min)

5min Util



Rolling 4-hour Average



Rolling 4-hour Average

CPU %

100

→ + 5 minutos (1 intervalo)

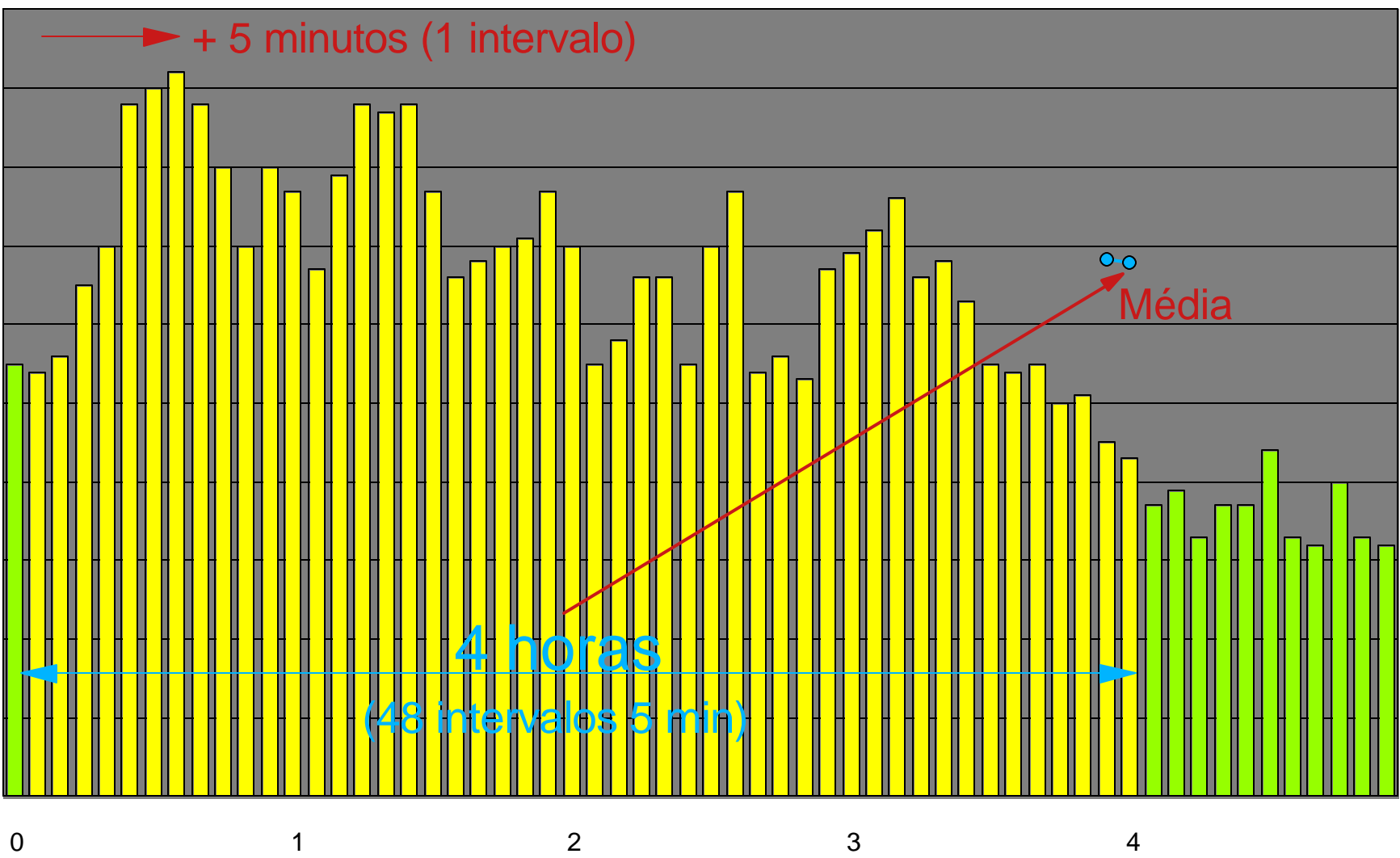
80

60

40

20

0

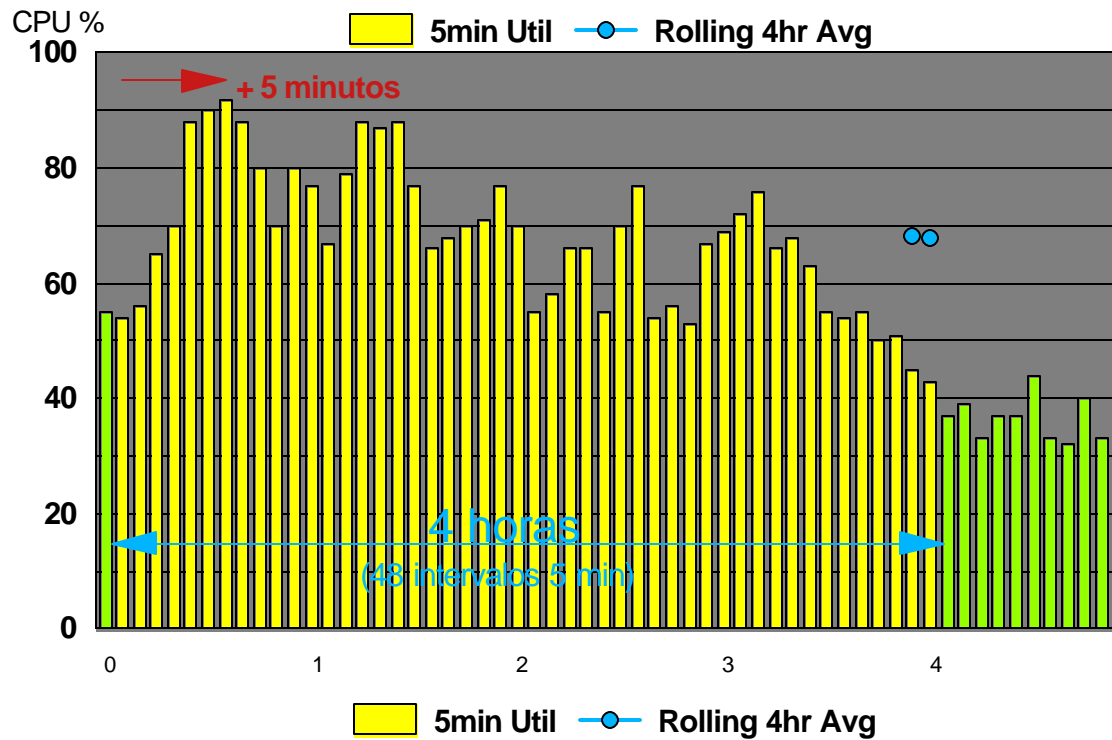
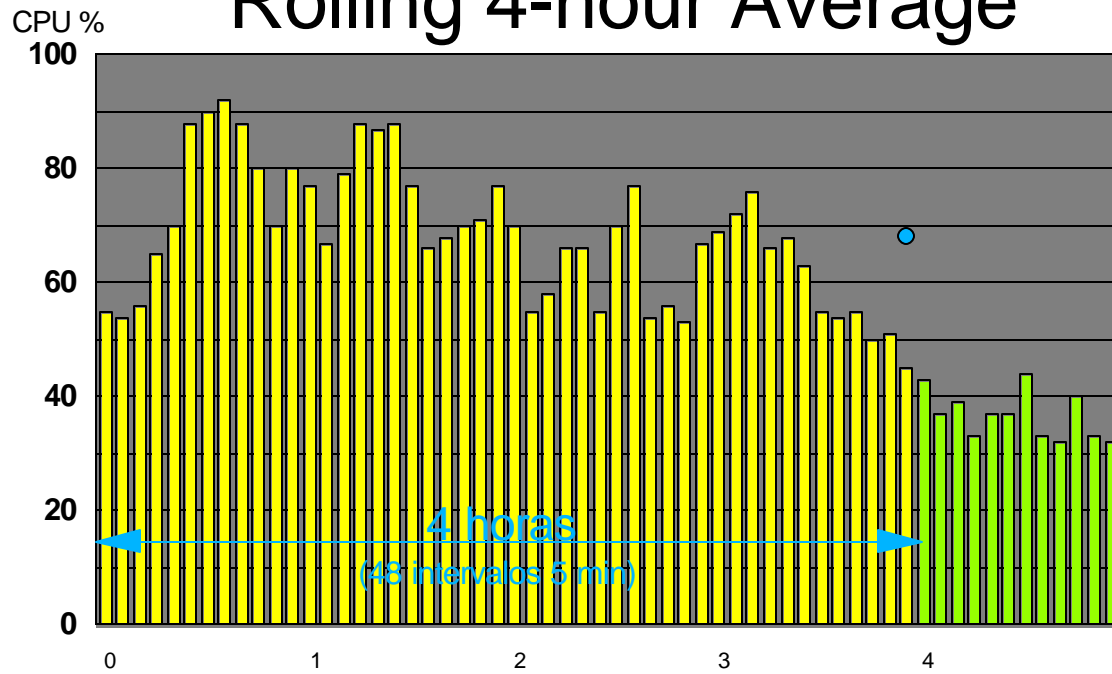


4 horas
(48 intervalos 5 min)

Média

5min Util Rolling 4hr Avg

Rolling 4-hour Average



Rolling 4-hour Average

CPU %

100

A cada 5 minutos,
a média das últimas 4h

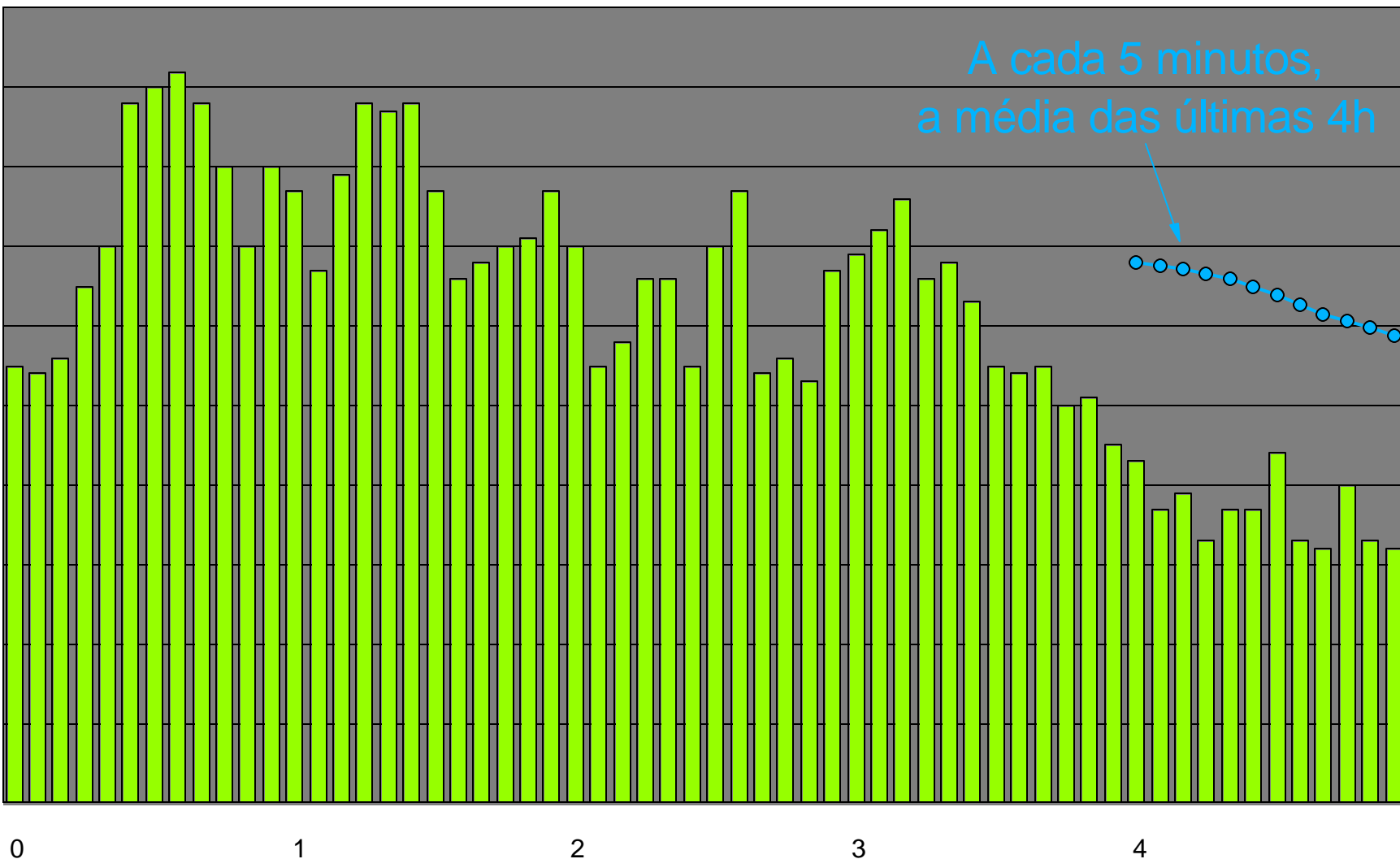
80

60

40

20

0

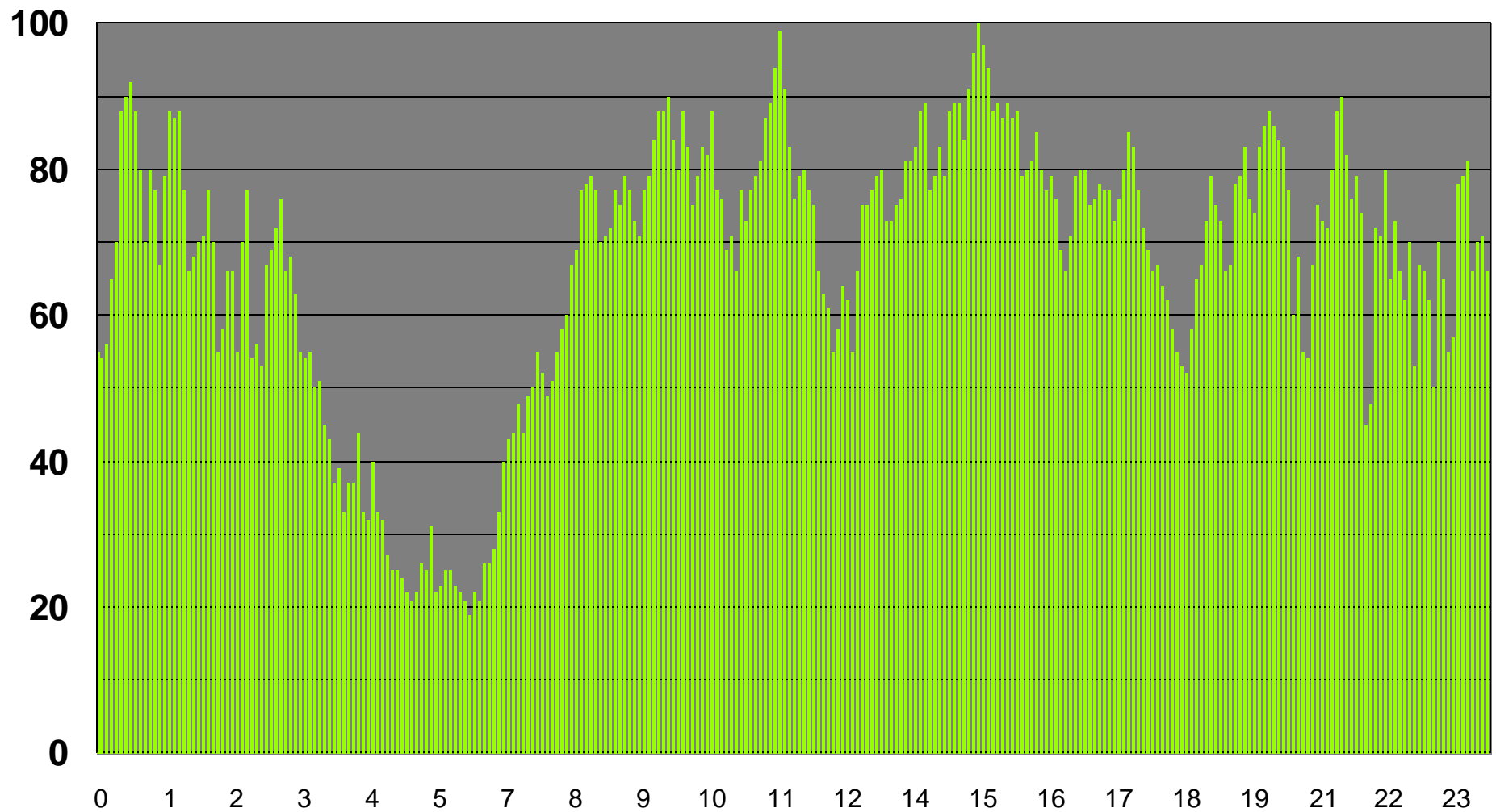


5min Util Rolling 4hr Avg

1 Partição, 1 Dia

MSUs

HW = 100 MSUs (Millions of Service Units per hour)

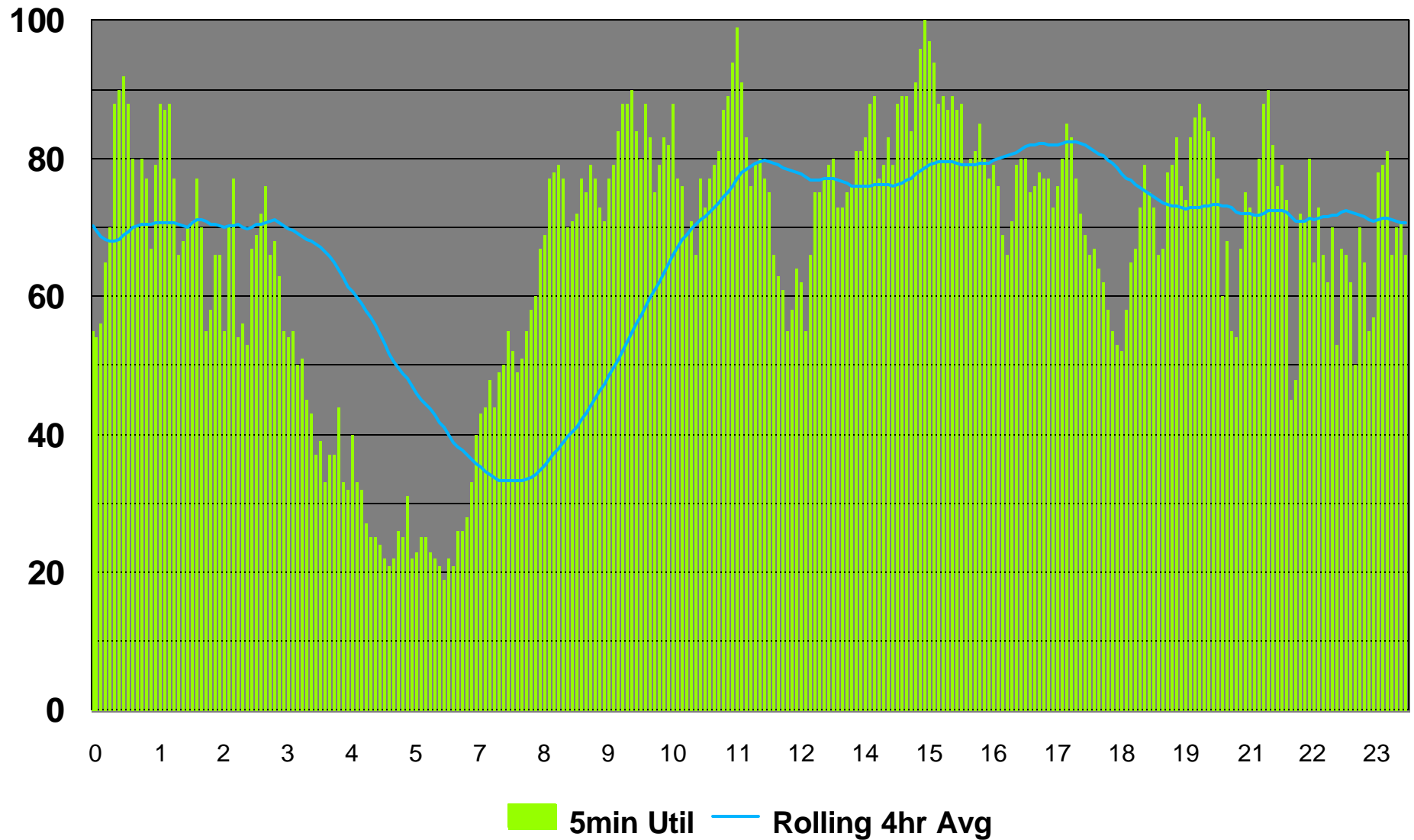


■ 5min Util

1 Partição, 1 Dia

MSUs

HW = 100 MSUs

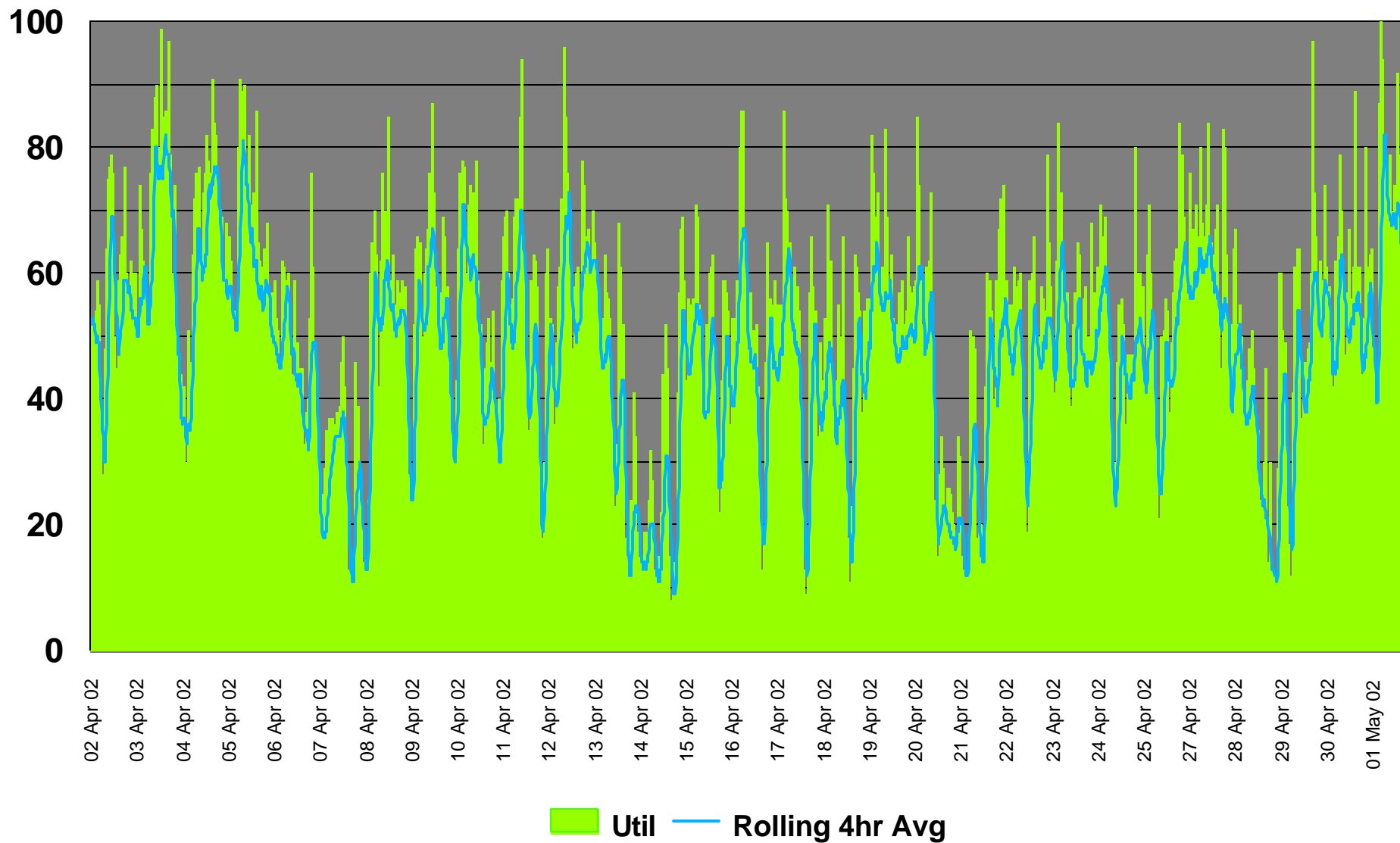


1 Partição, 1 Mês

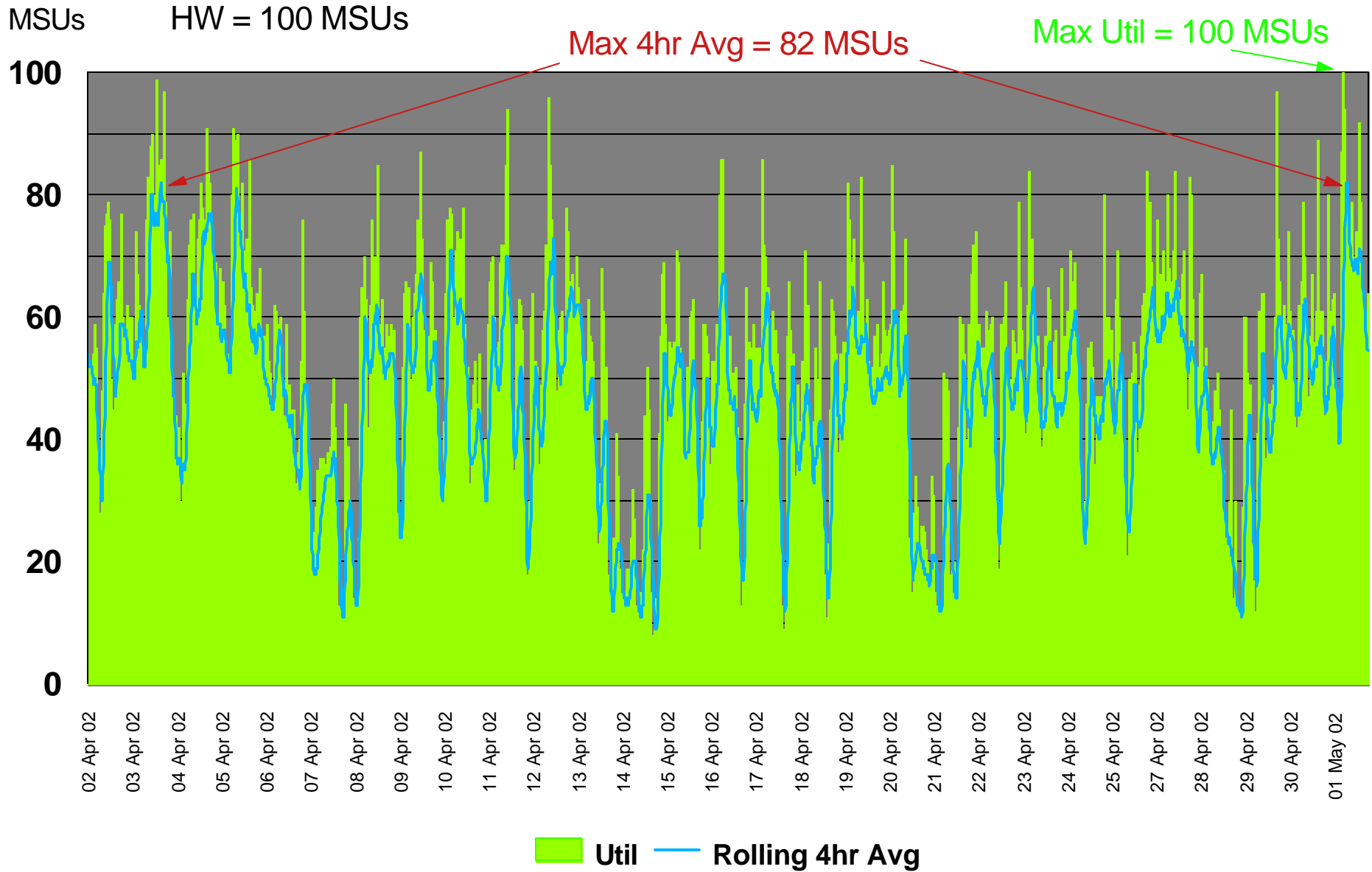
(dia 2 ao dia 1 do mês seguinte)

MSUs

HW = 100 MSUs



1 Partição, 1 Mês



1 Partição, 1 Mês

PSLC = 100 MSUs

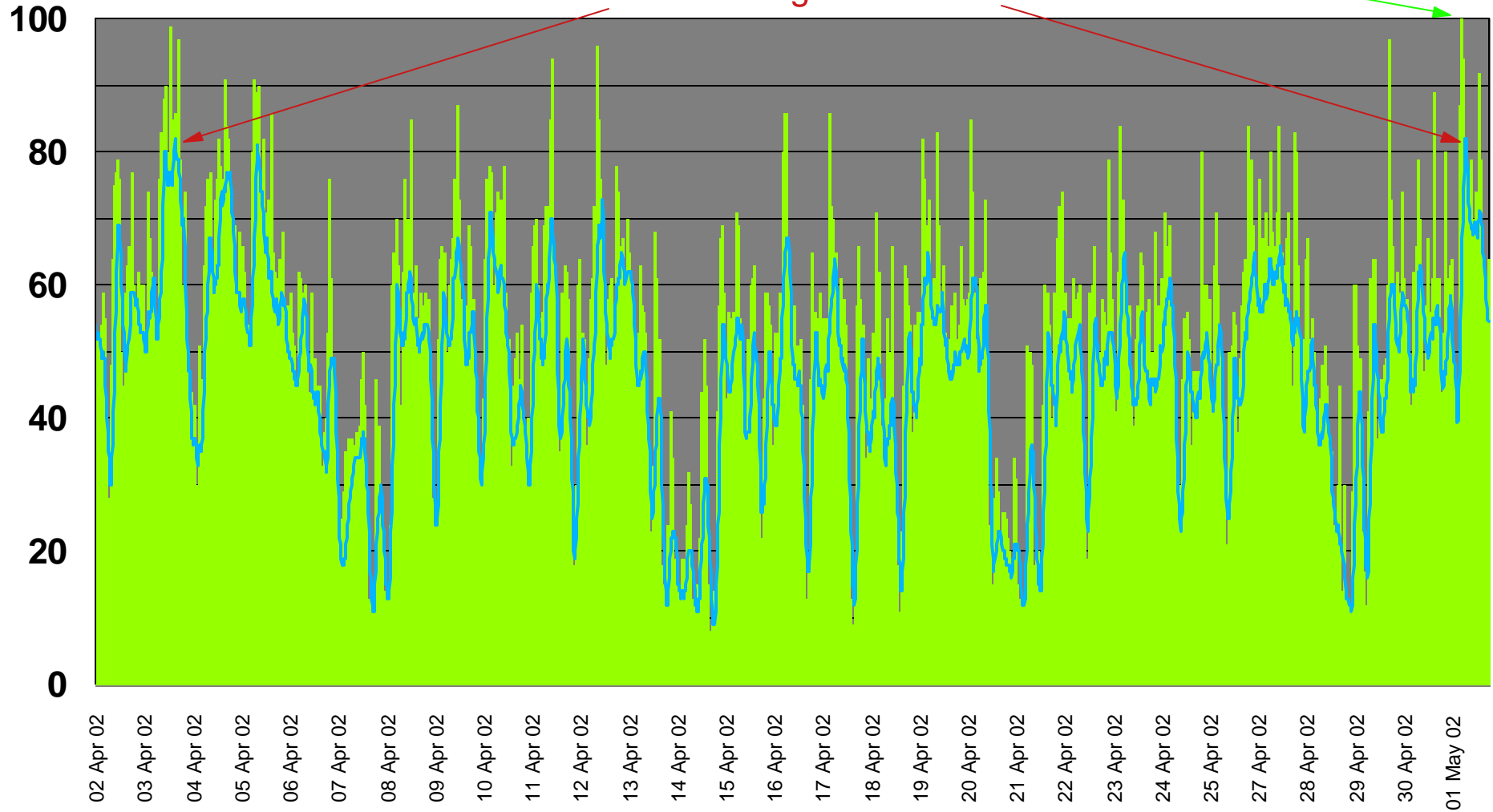
WLC = 82 MSUs

MSUs

HW = 100 MSUs

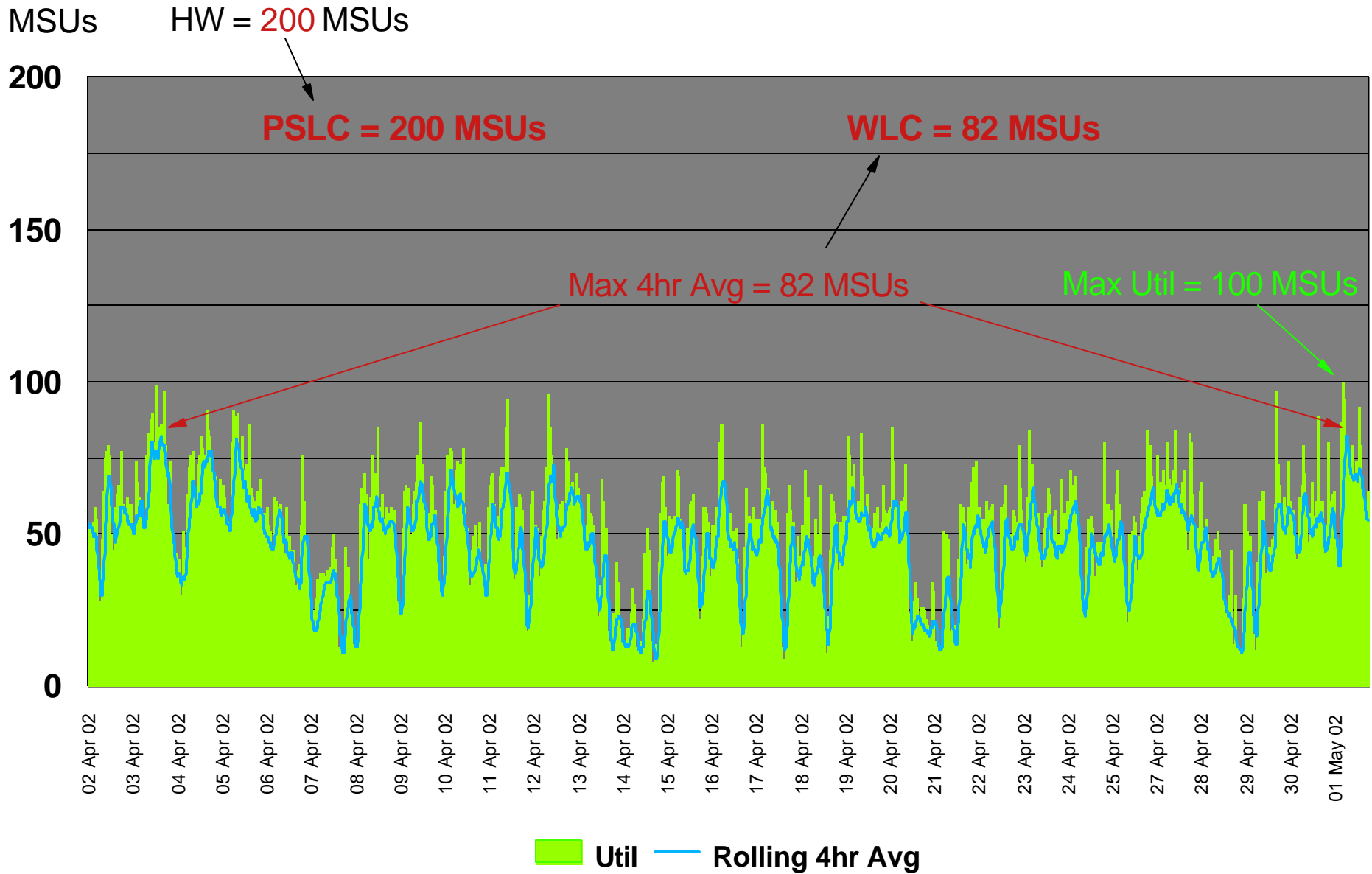
Max 4hr Avg = 82 MSUs

Max Util = 100 MSUs

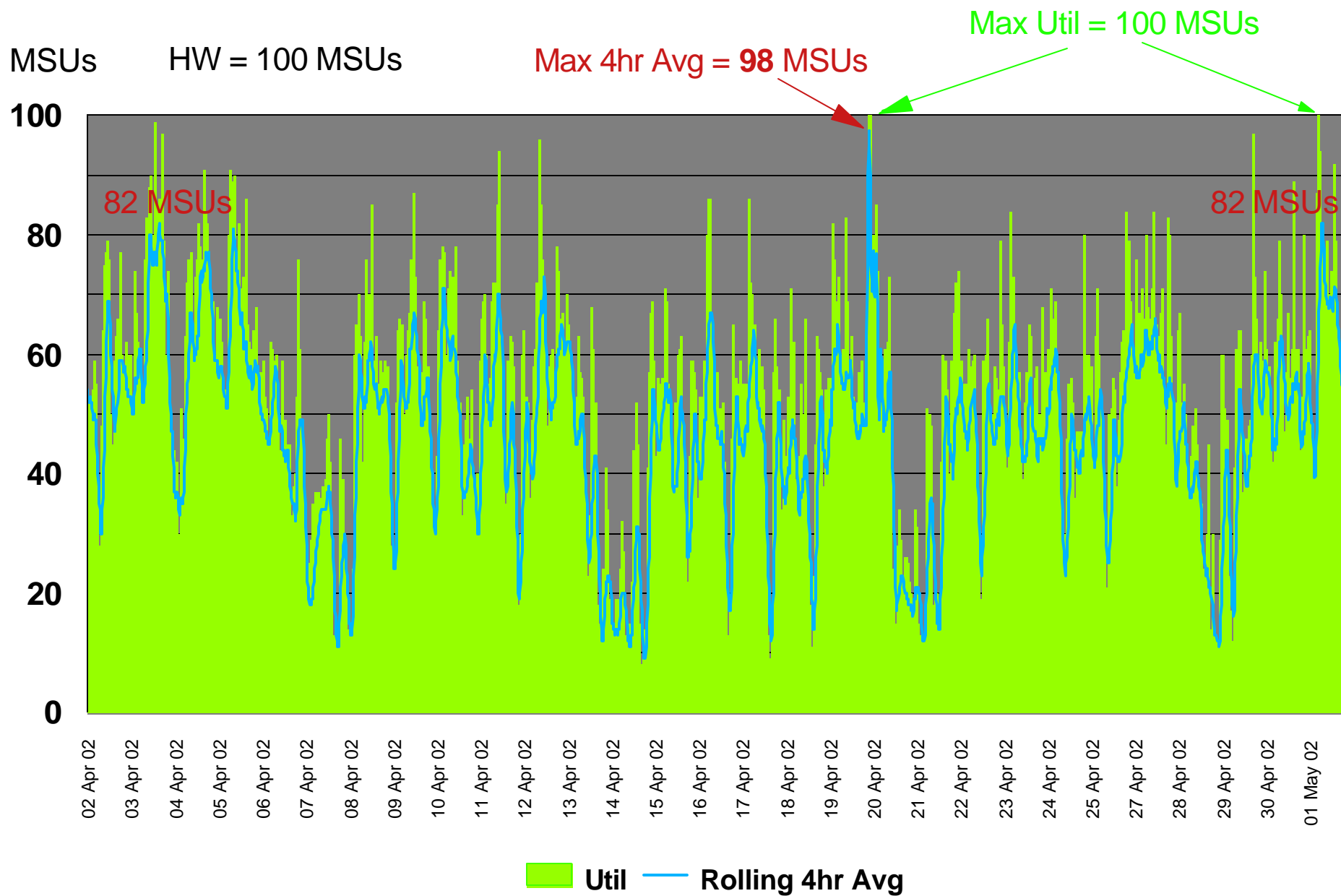


Util Rolling 4hr Avg

Upgrade de CPU (100 => 200 MSUs)



Pico "inesperado"



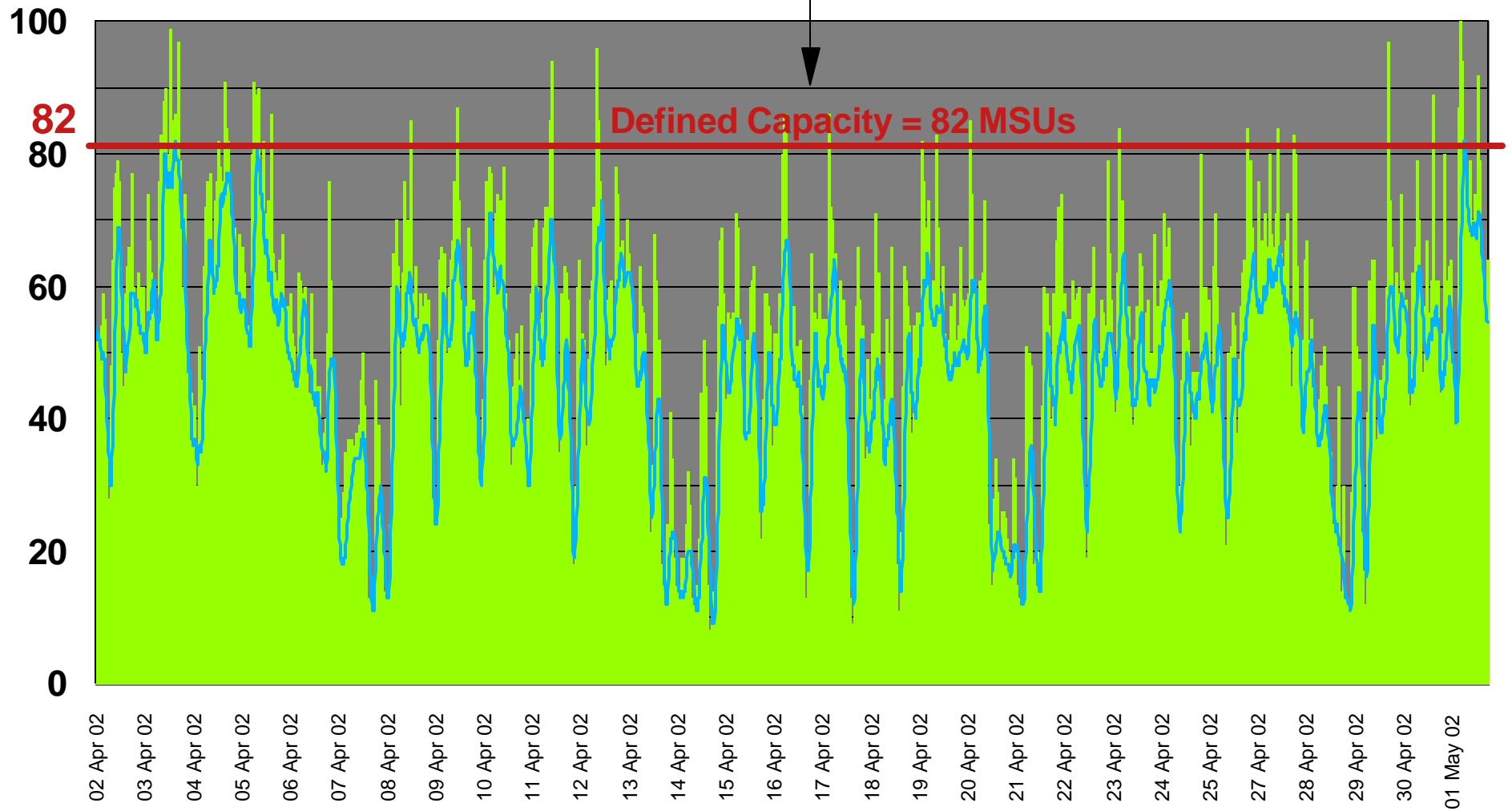
Defined Capacity (Opcional)

Limite de MSUs por partição

MSUs

HW = 100 MSUs

Max 4hr Avg **Previsto** = 82 MSUs



Util Rolling 4hr Avg

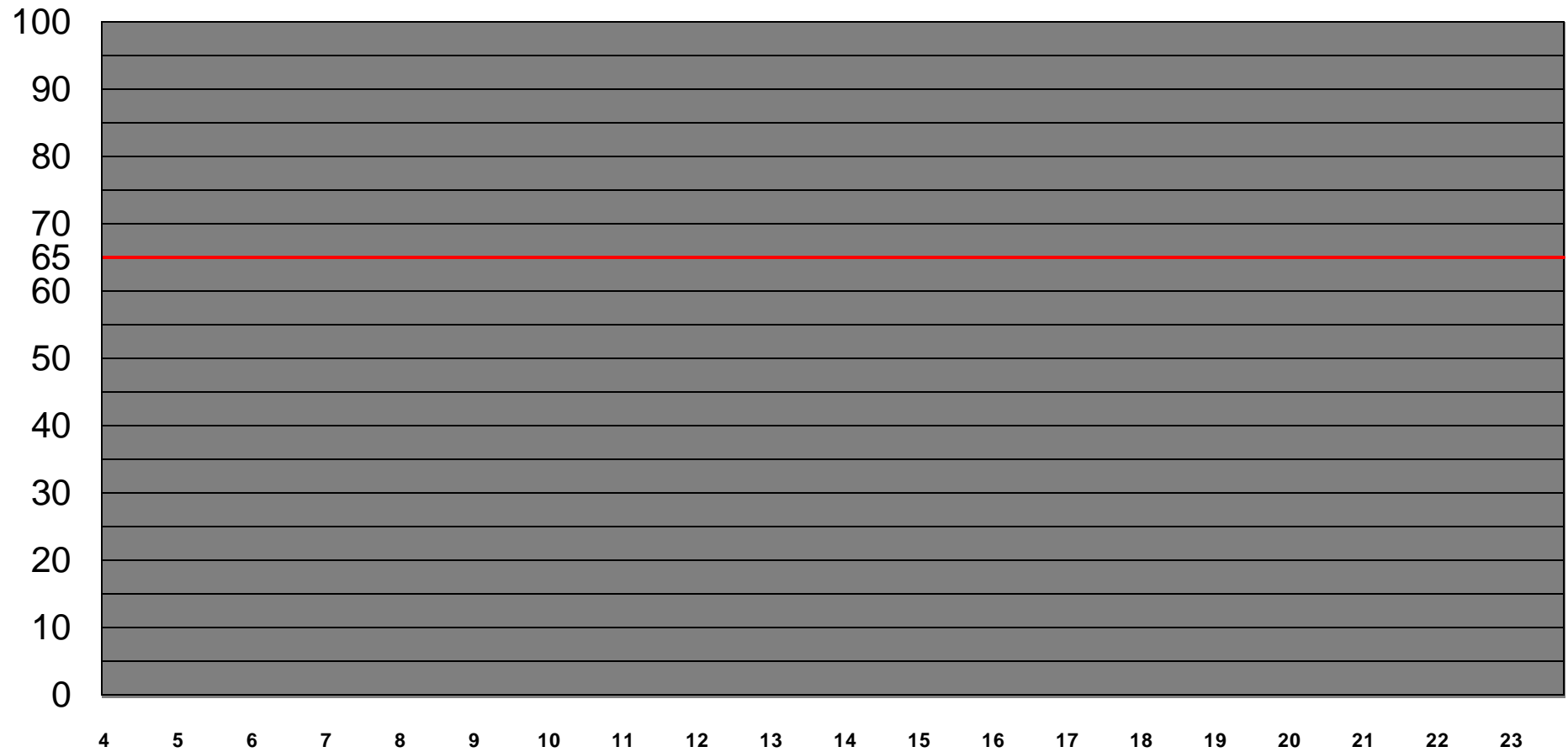
Defined Capacity

Limite de MSUs por partição

- se 4h Average > Defined Capacity: Soft Capping

Defined Capacity = 65 MSUs

MSUs



— Defined Capacity

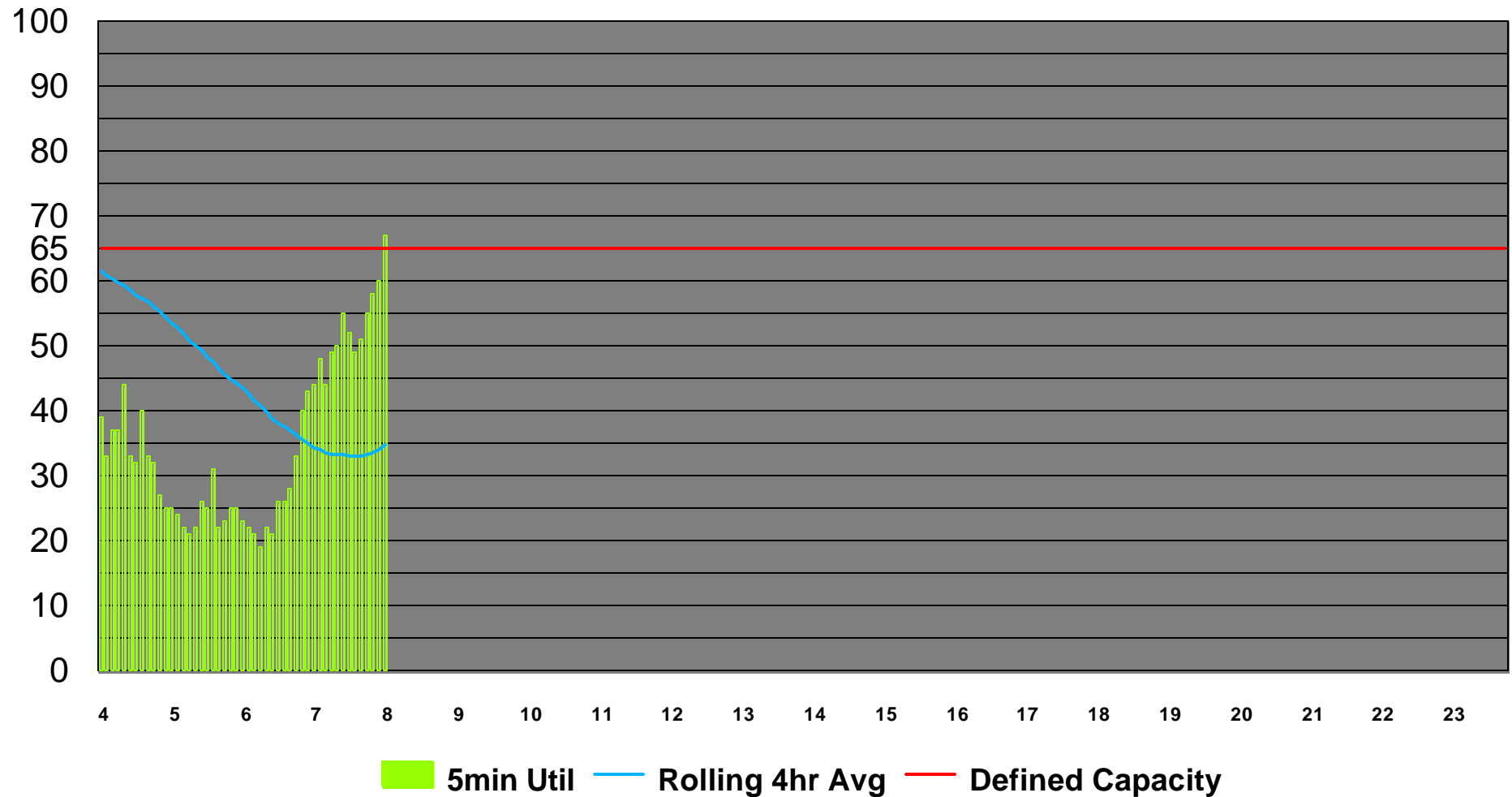
Defined Capacity

Limite de MSUs por partição

- se 4h Average > Defined Capacity: Soft Capping

Defined Capacity = 65 MSUs

MSUs



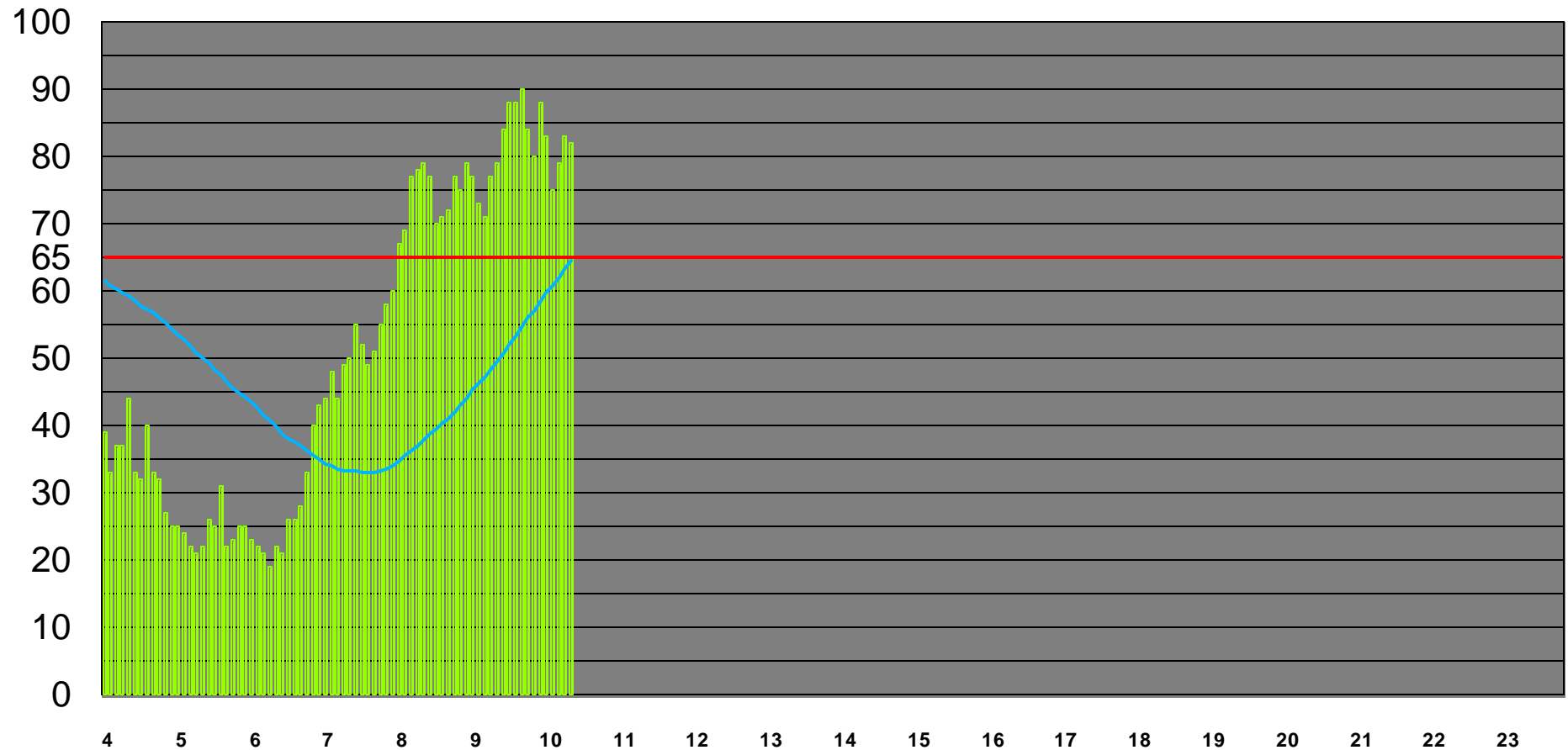
Defined Capacity

Limite de MSUs por partição

- se 4h Average > Defined Capacity: Soft Capping

Defined Capacity = 65 MSUs

MSUs



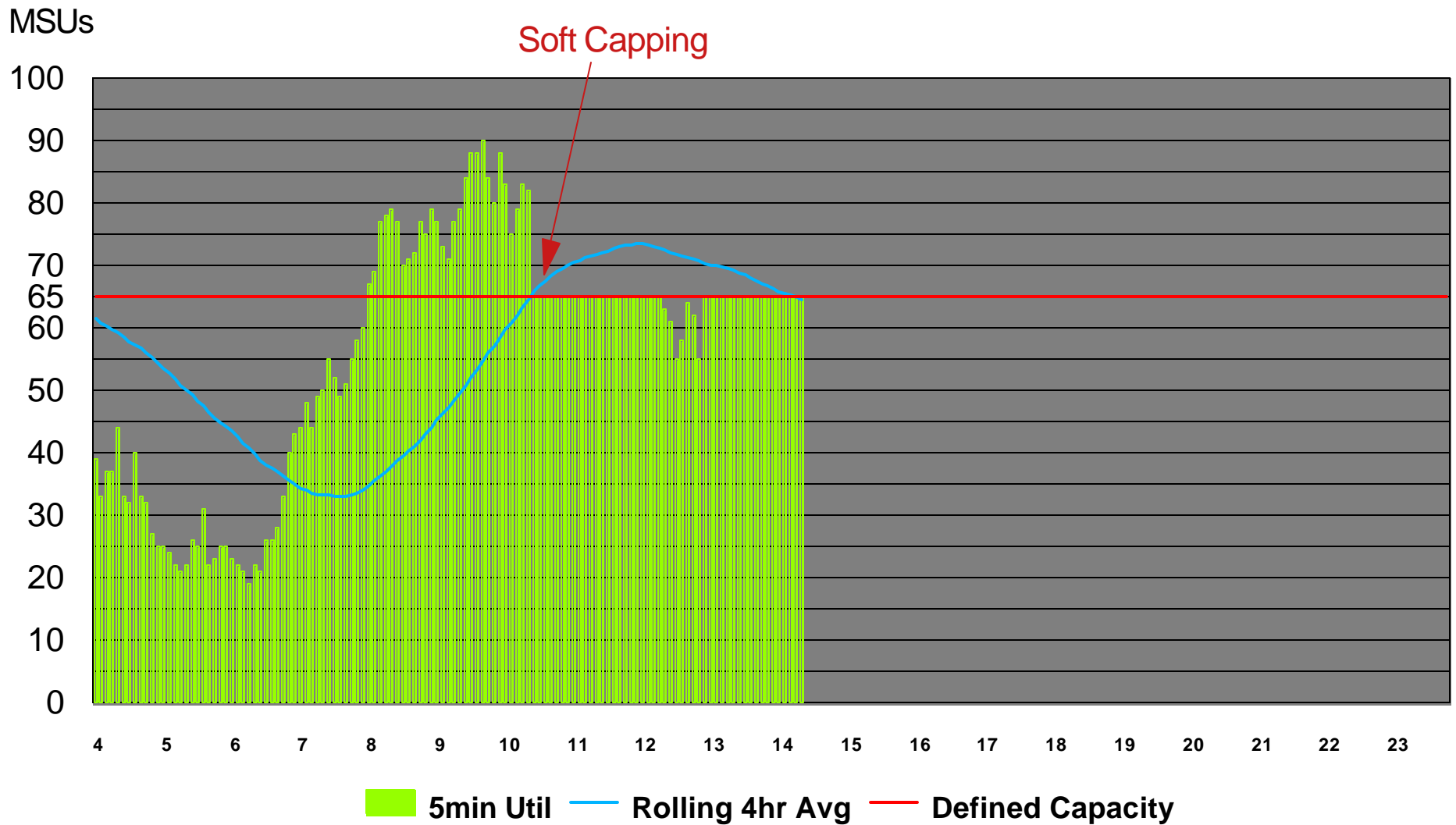
5min Util Rolling 4hr Avg Defined Capacity

Defined Capacity

Limite de MSUs por partição

- se 4h Average > Defined Capacity: Soft Capping

Defined Capacity = 65 MSUs

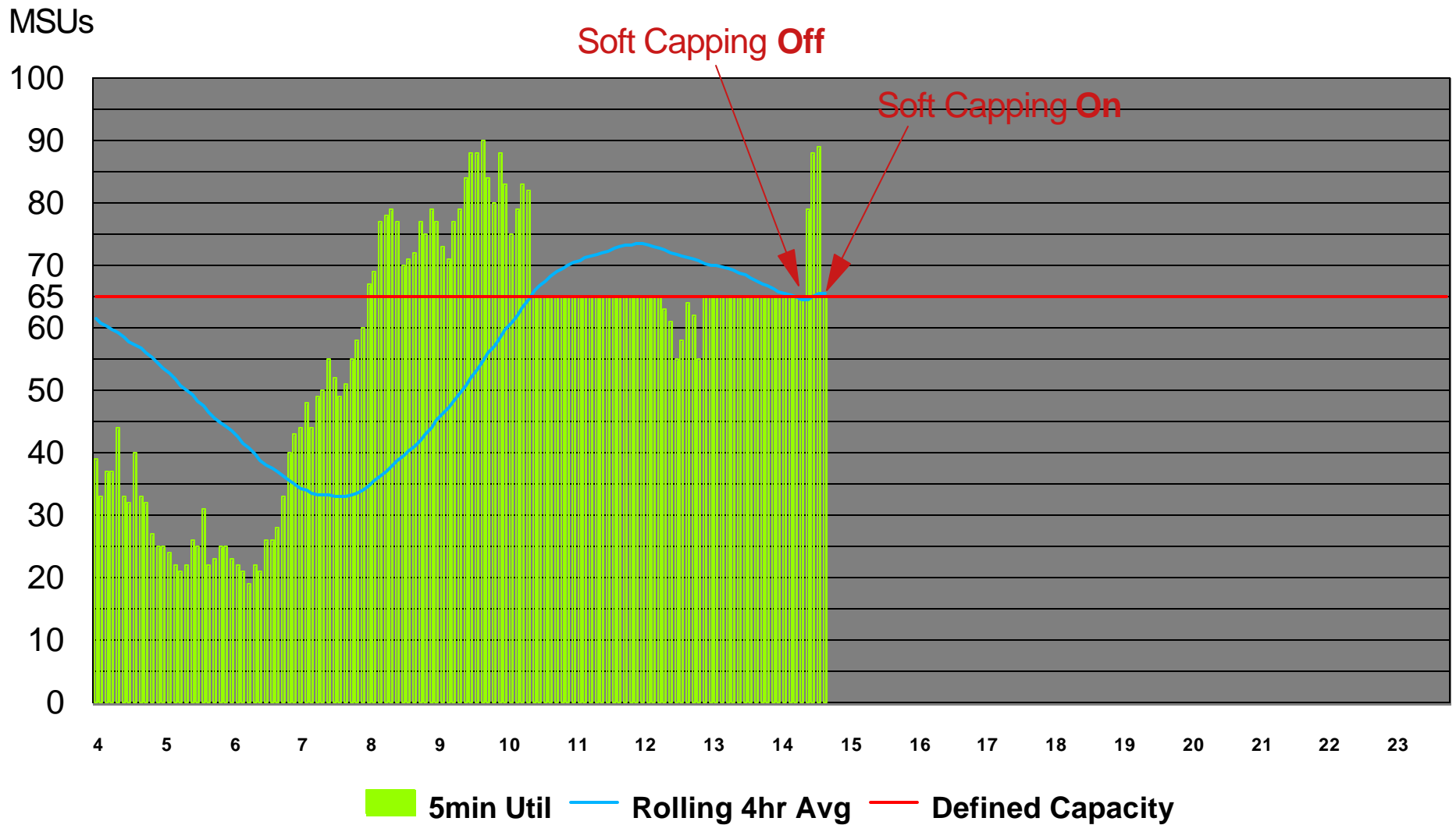


Defined Capacity

Limite de MSUs por partição

- se 4h Average > Defined Capacity: Soft Capping

Defined Capacity = 65 MSUs



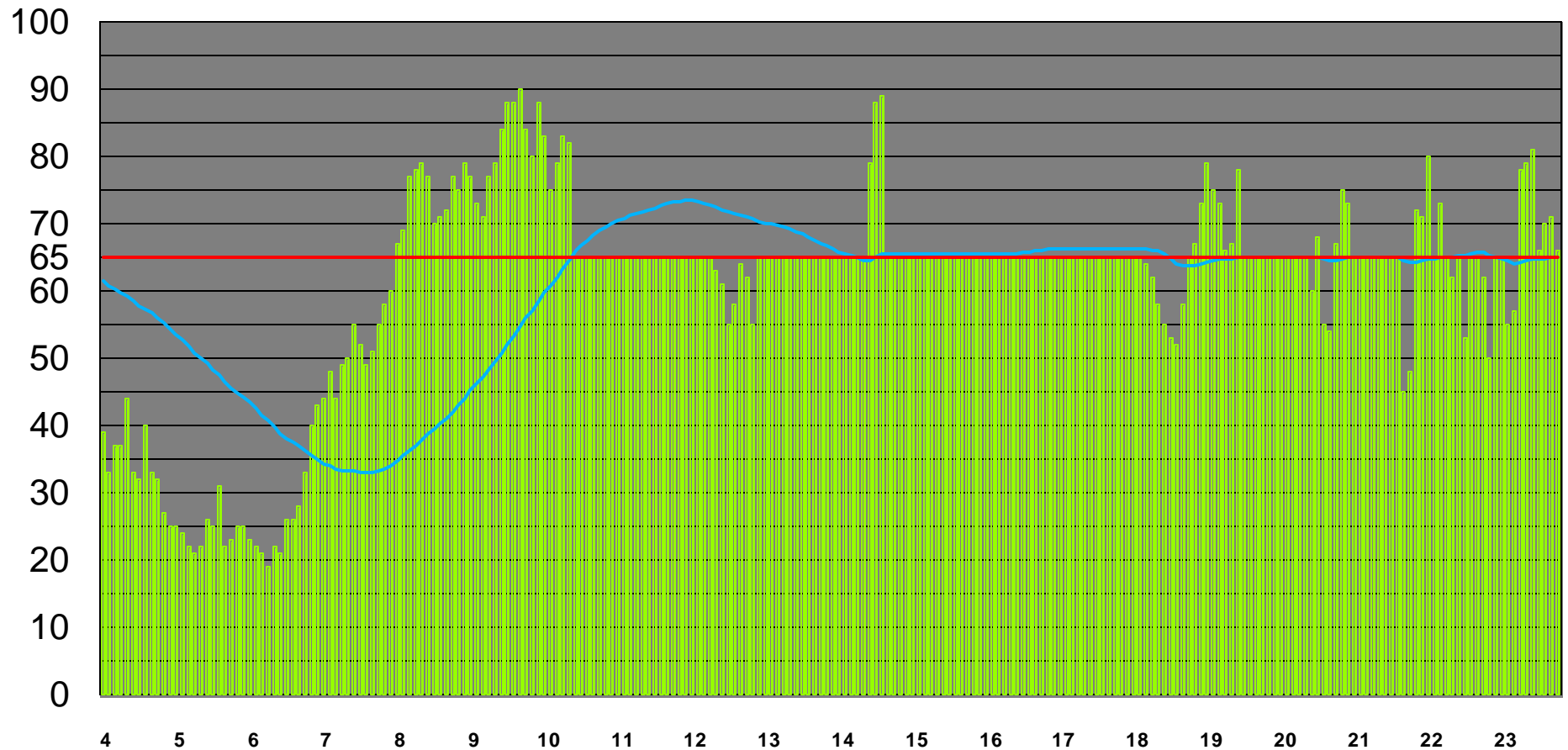
Defined Capacity

Limite de MSUs por partição

- se 4h Average > Defined Capacity: Soft Capping

Defined Capacity = 65 MSUs

MSUs

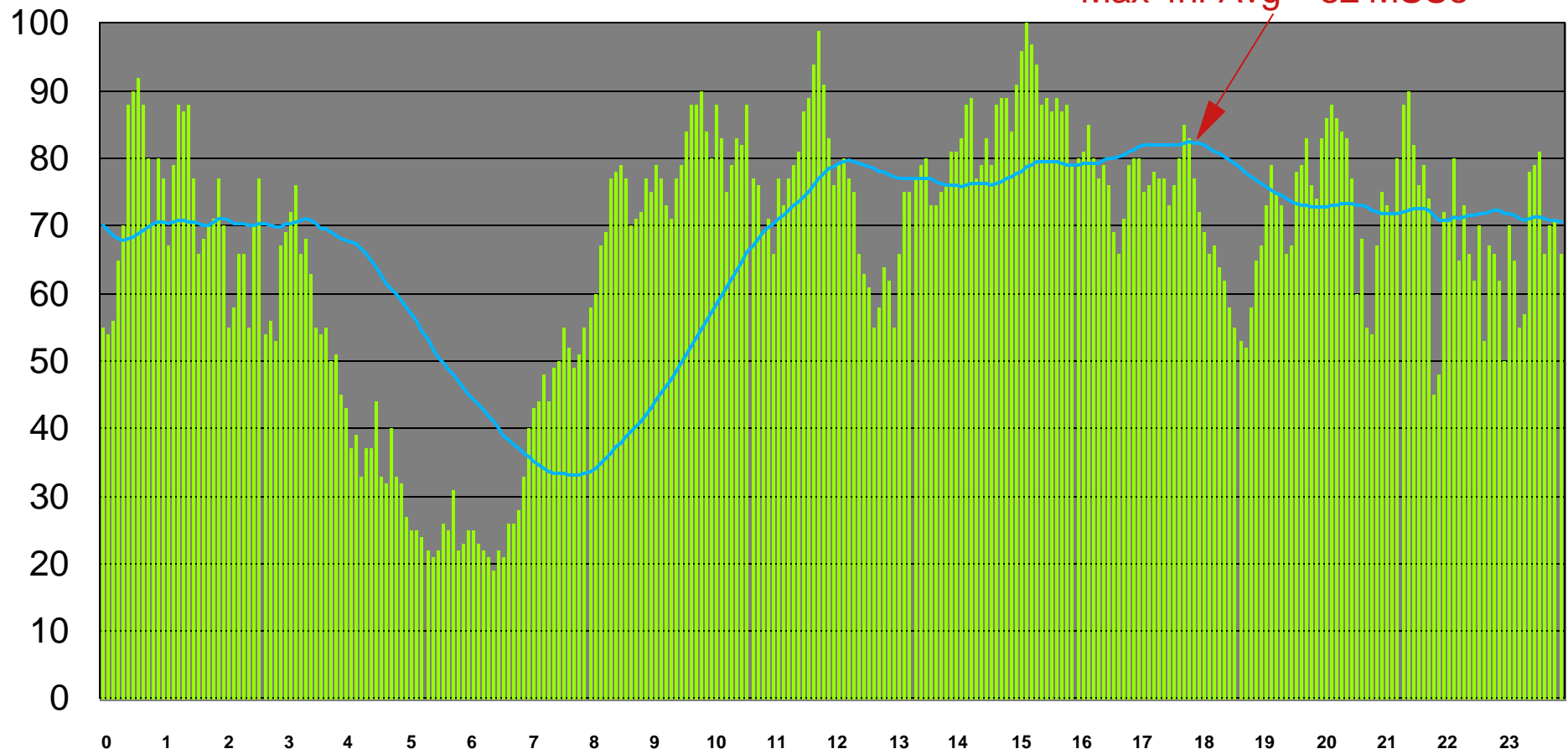


5min Util Rolling 4hr Avg Defined Capacity

1 Partição, 1 Dia

Sem Defined Capacity

MSUs



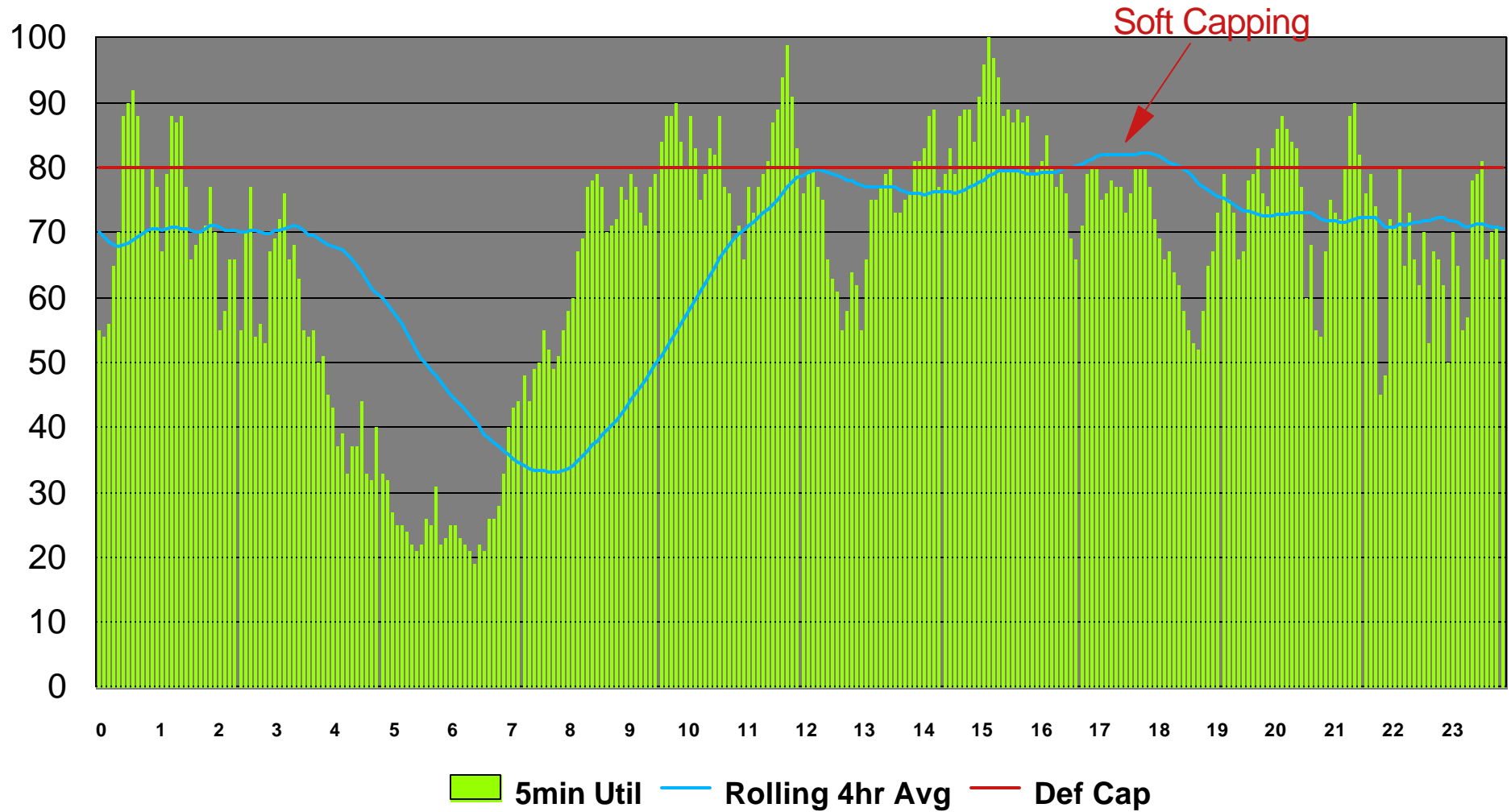
Max 4hr Avg = 82 MSUs

5min Util Rolling 4hr Avg

1 Partição, 1 Dia

Defined Capacity = 80 MSUs

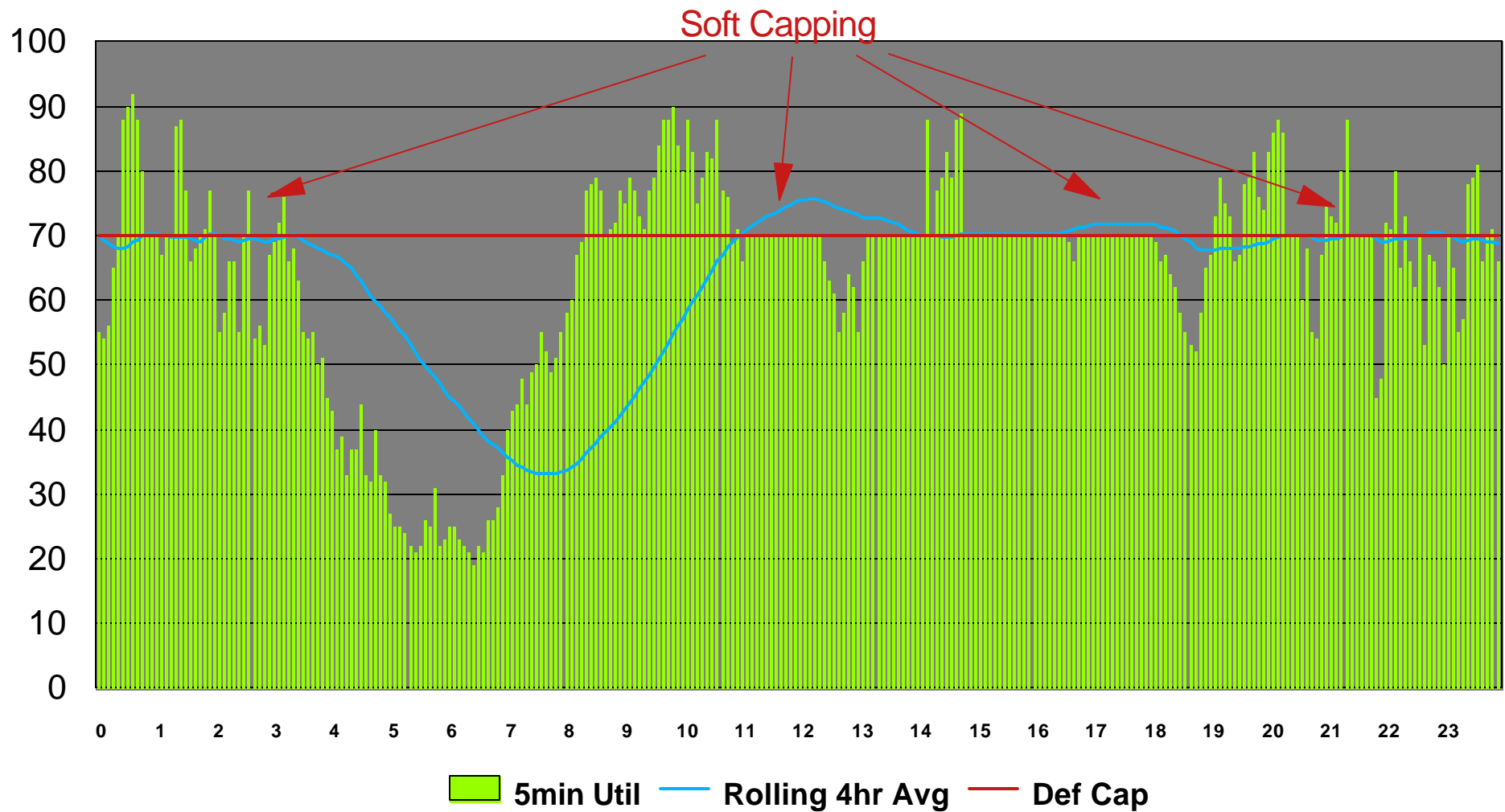
MSUs



1 Partição, 1 Dia

Defined Capacity = 70 MSUs

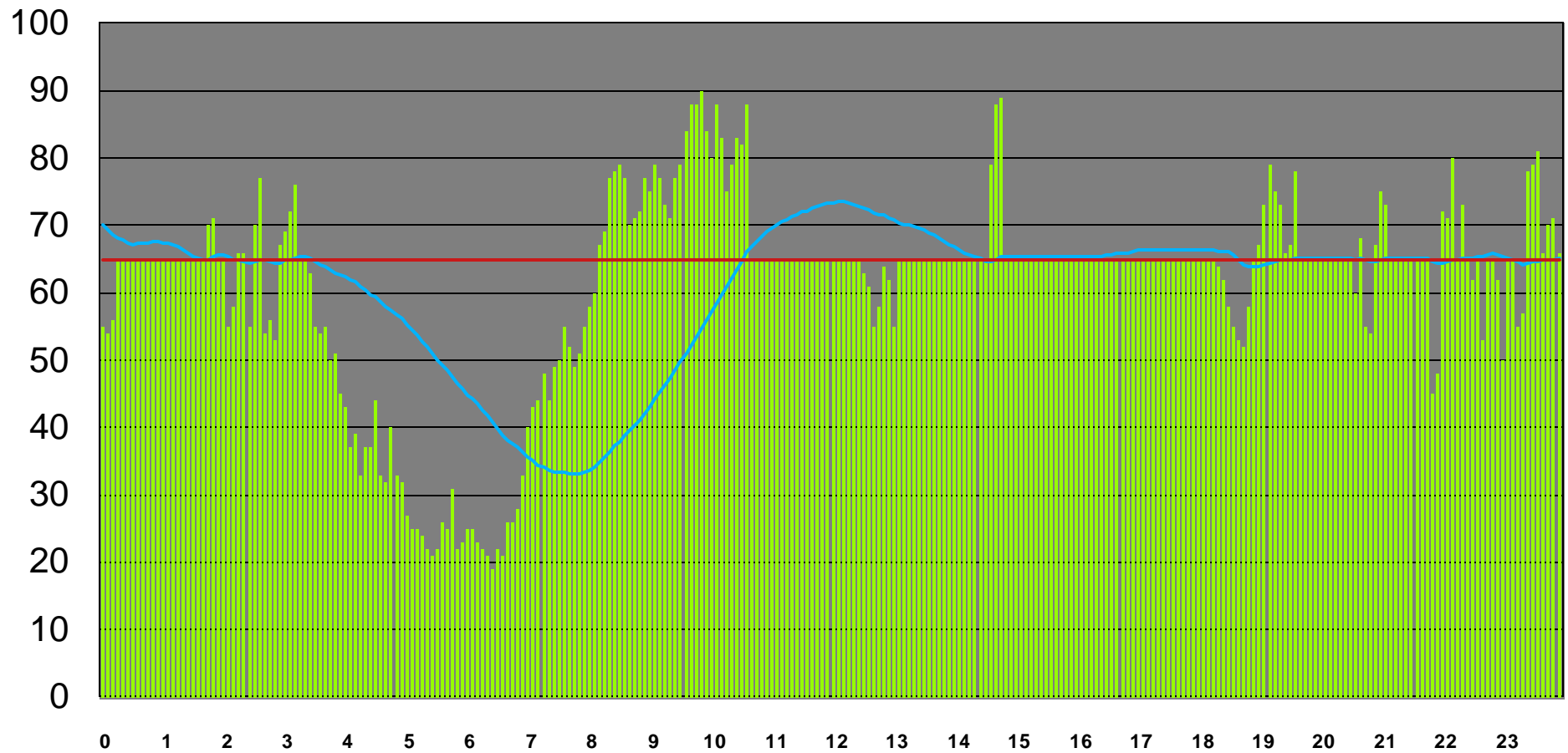
MSUs



1 Partição, 1 Dia

Defined Capacity = 65 MSUs

MSUs



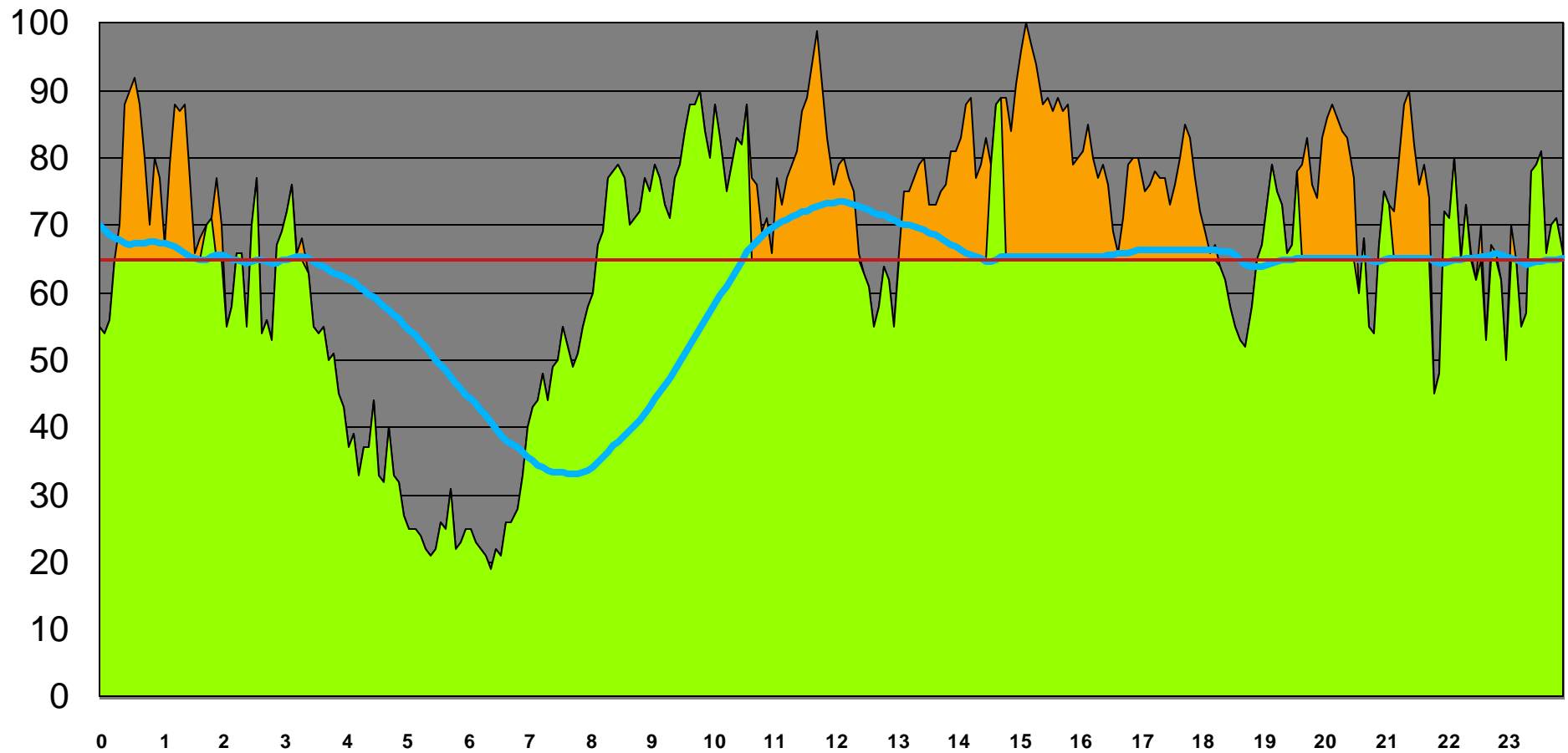
 5min Util  Rolling 4hr Avg  Def Cap

Simulação apenas...

Carga "desaparece" ?

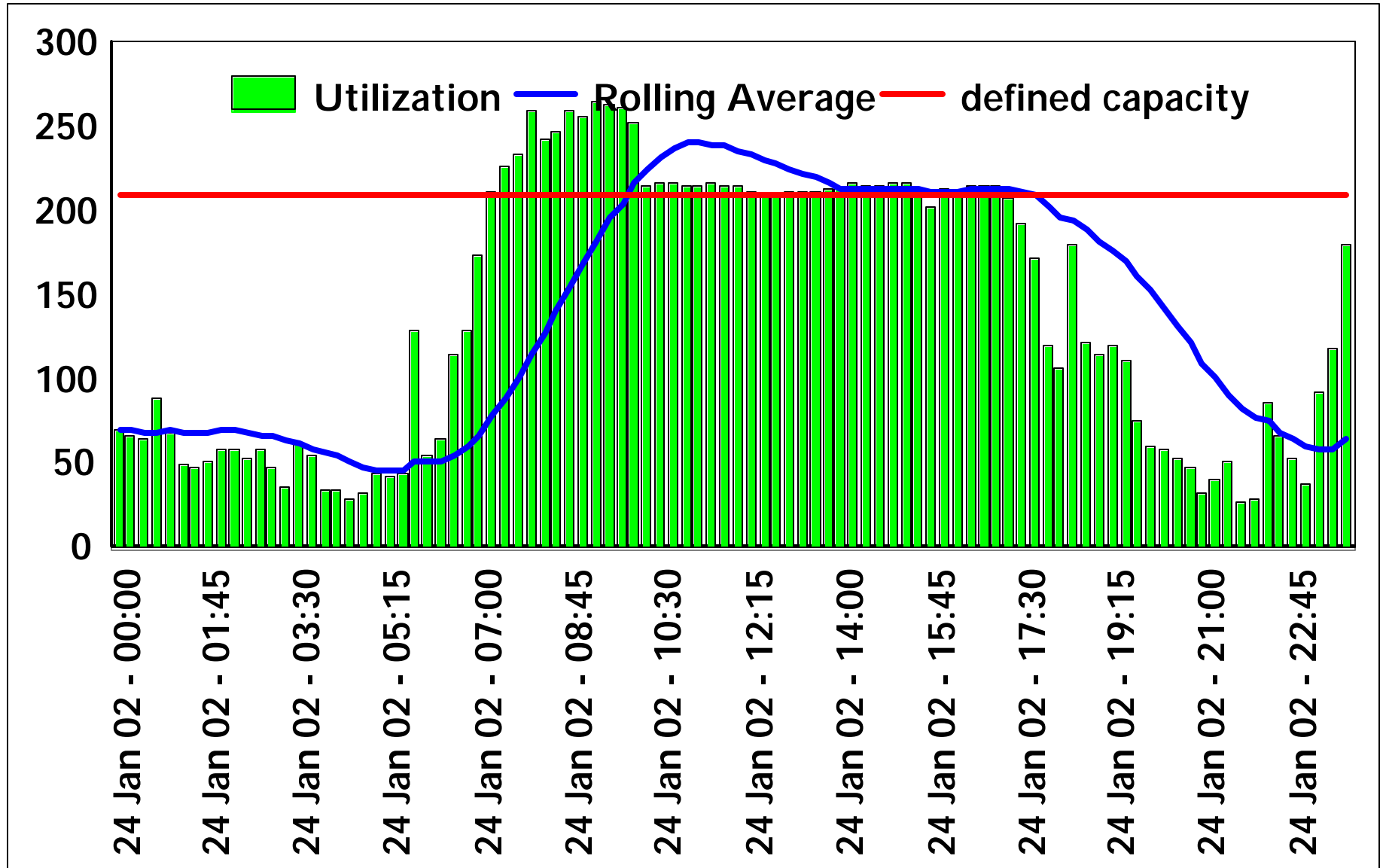
Defined Capacity = 65 MSUs

MSUs



5min Util Rolling 4hr Avg Def Cap Carga Excluída (Soft Capping)

Rolling 4-Hour Average Utilization

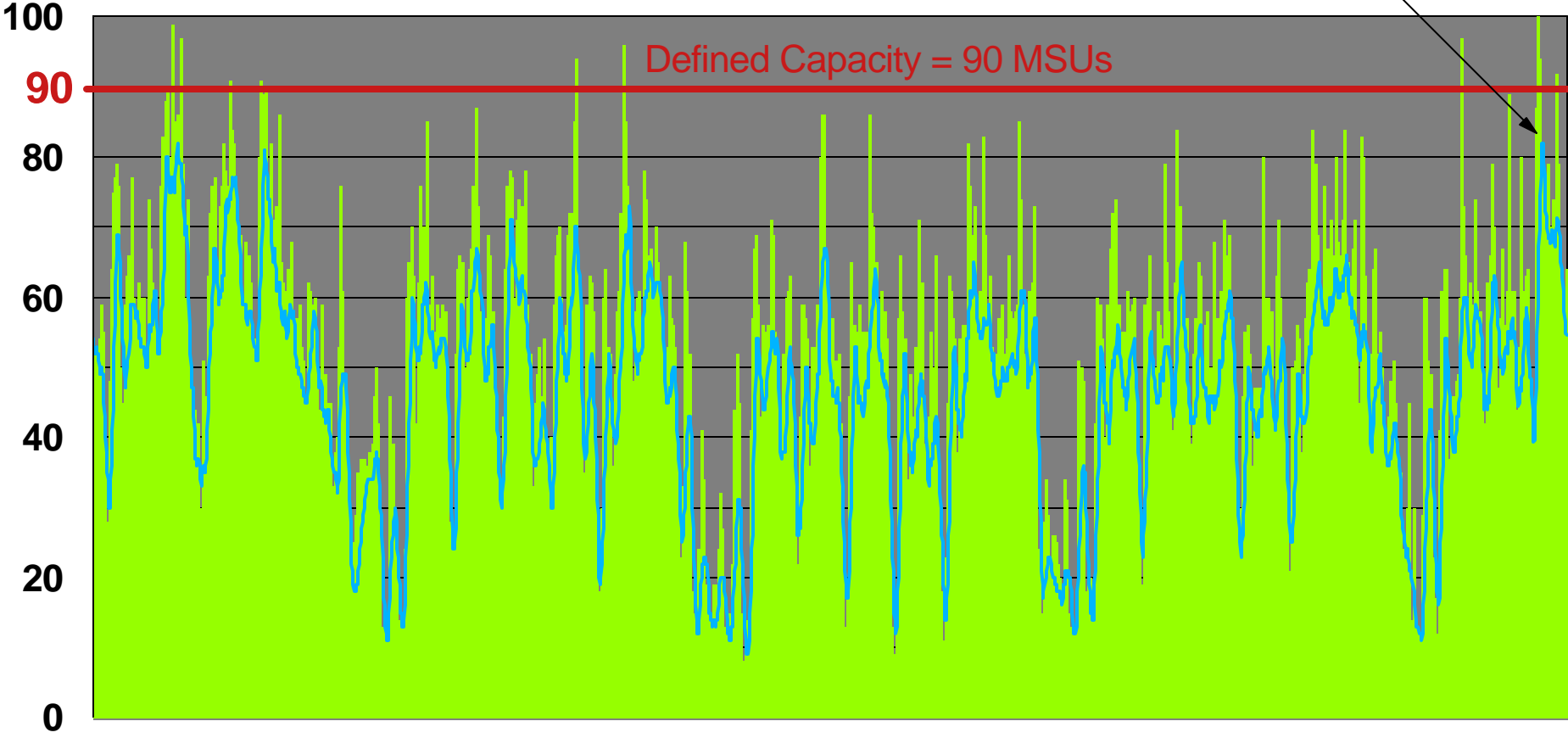


Capacidade no Mês

MSUs

HW = 100 MSUs

Max 4hr Avg = 82 MSUs



5min Util Rolling 4hr Avg

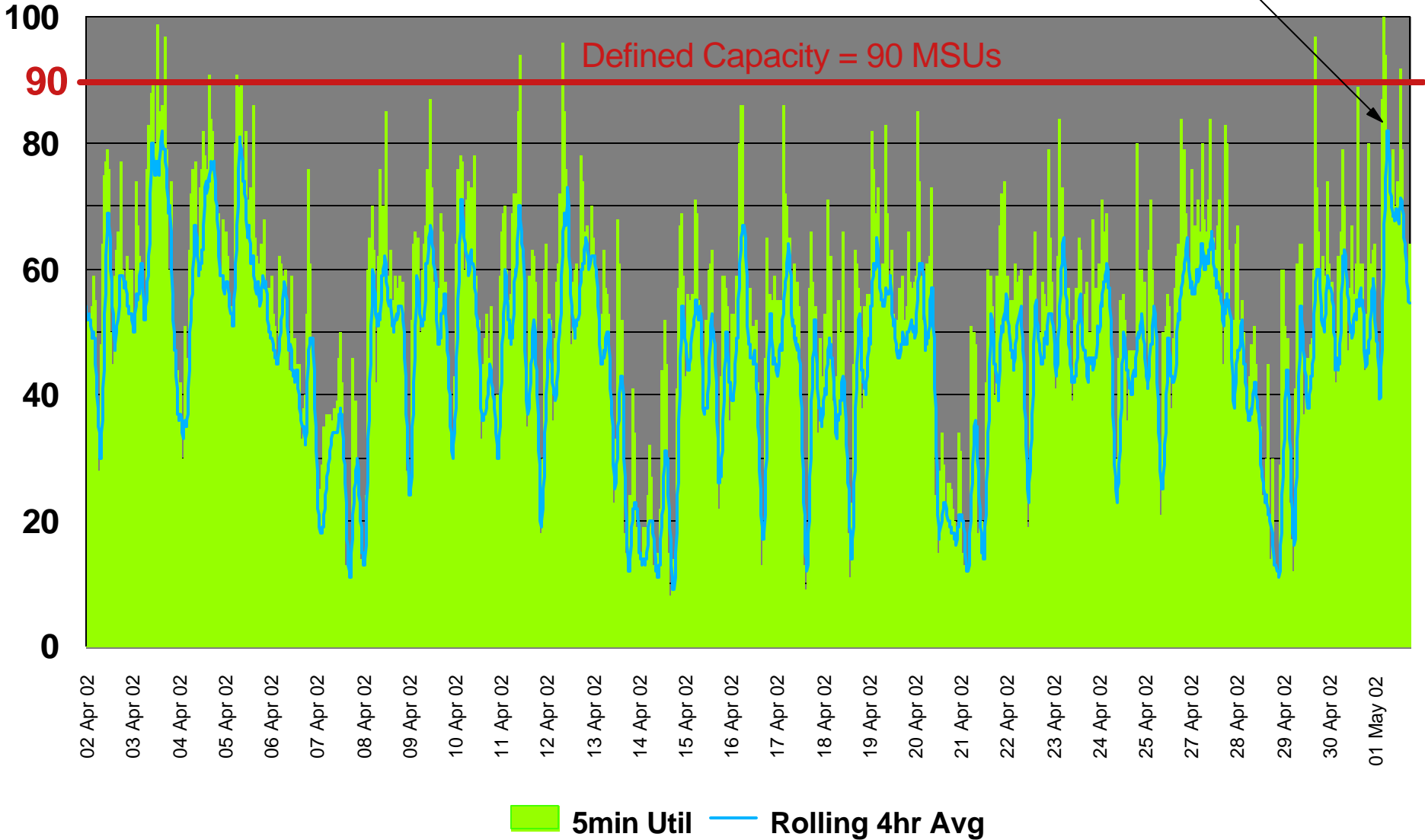
Capacidade no Mês

Menor valor entre:
- Max 4h Avg
- Defined Capacity (se houver)

Max 4hr Avg = **82 MSUs**

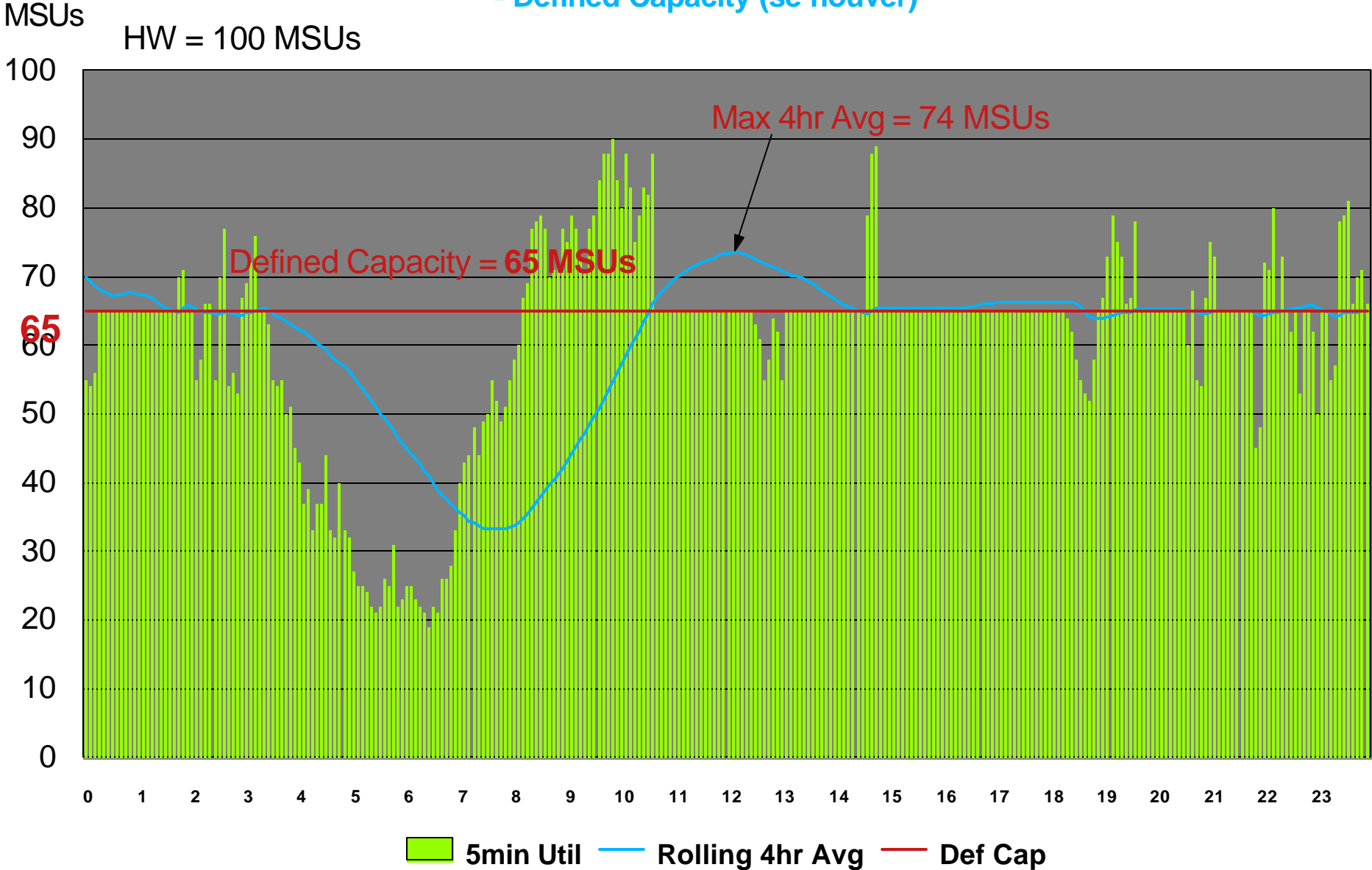
MSUs

HW = 100 MSUs

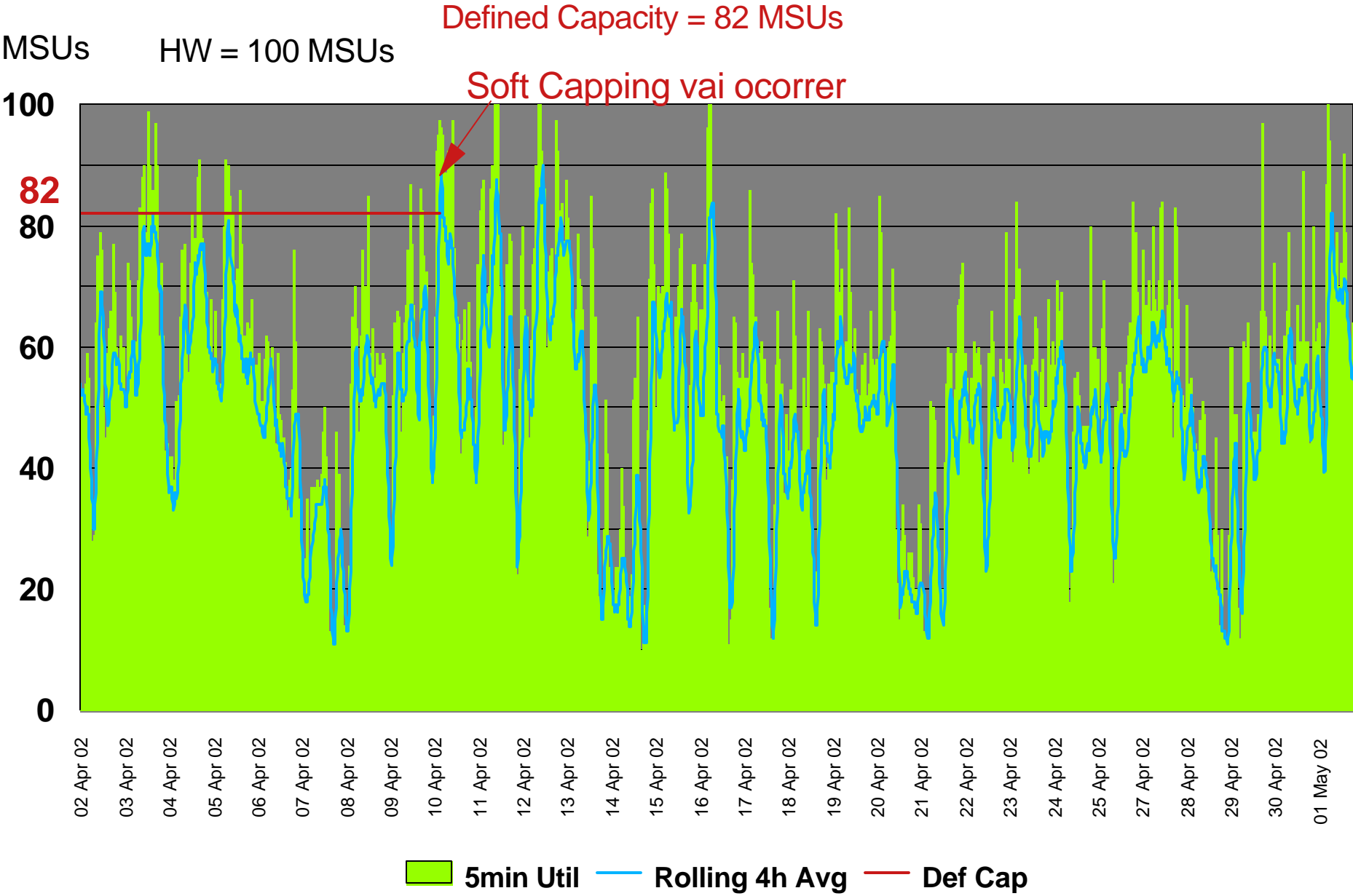


Capacidade no Mês

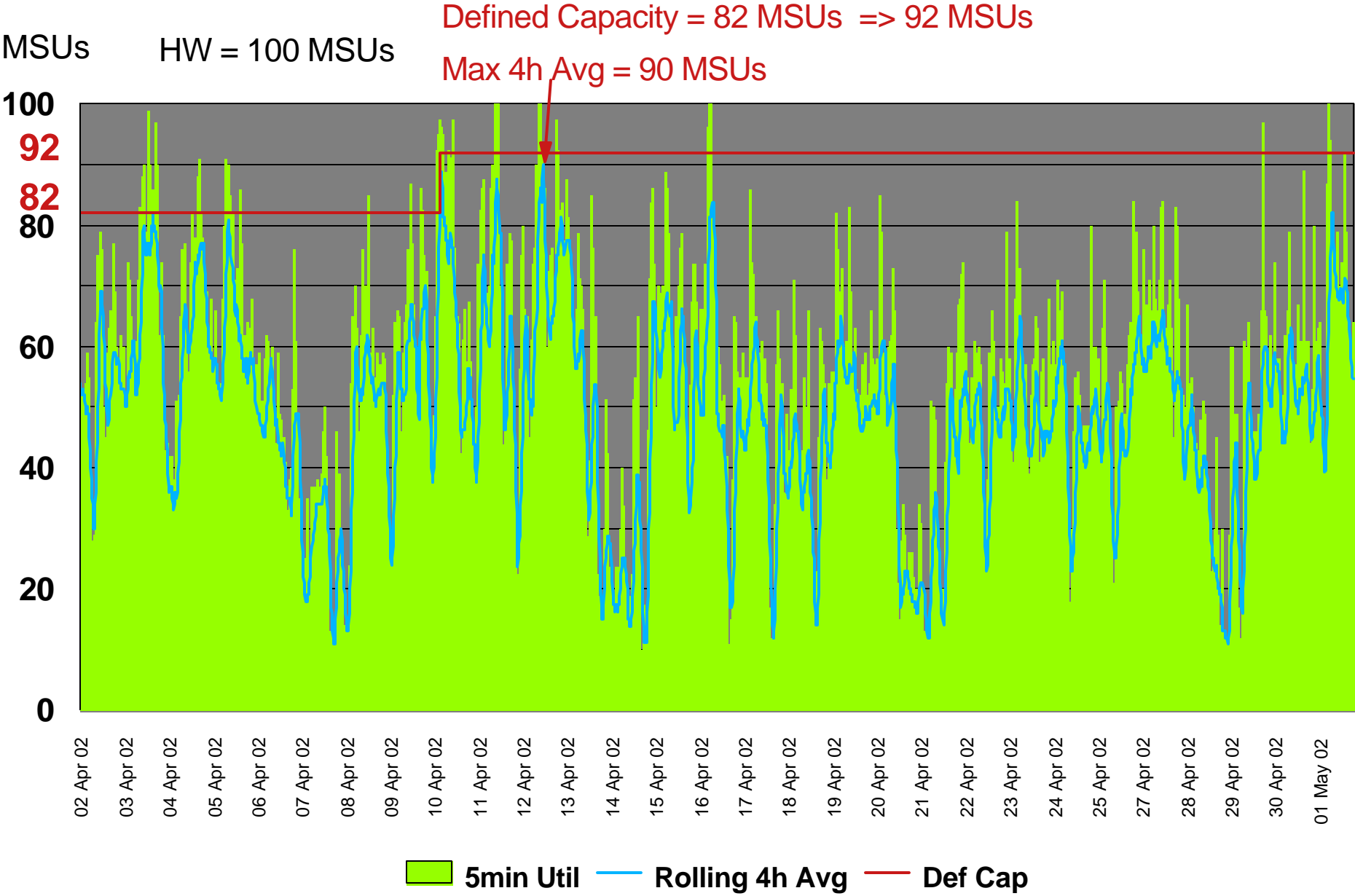
Menor valor entre:
- Max 4h Avg
- Defined Capacity (se houver)



Capacidade no Mês



Capacidade no Mês



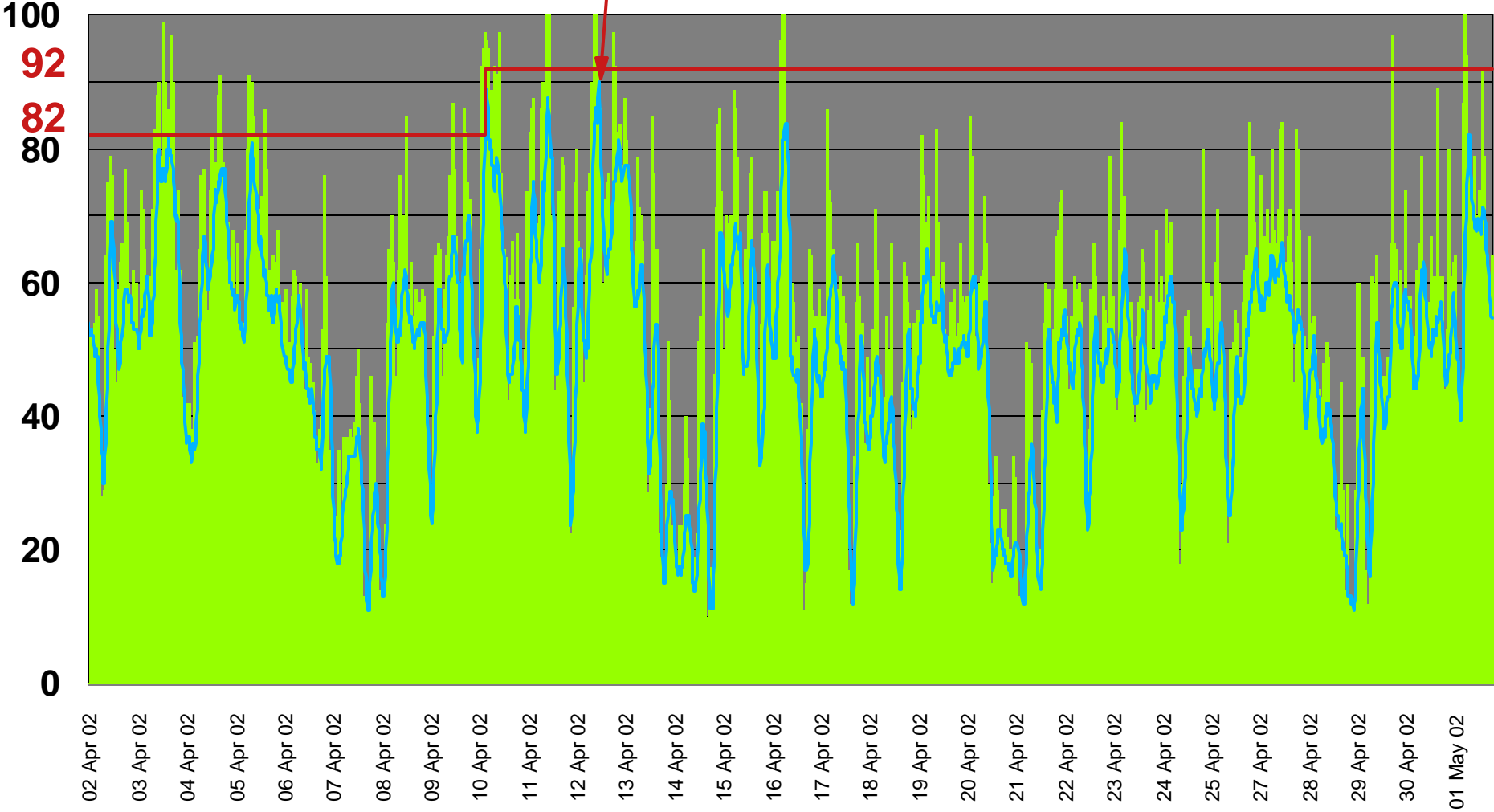
Capacidade no Mês

Menor valor entre:
- Max 4h Avg
- Maior Defined Capacity
(se houver)

MSUs

HW = 100 MSUs

Defined Capacity = 82 MSUs => 92 MSUs
Max 4h Avg = 90 MSUs



5min Util Rolling 4h Avg Def Cap

HMC: Image Profile - Options

Customize Image Profiles: G18

Image options

Minimum input/output (I/O) priority

Maximum input/output (I/O) priority

Defined capacity → Defined Capacity (em MSUs)

CP management cluster name

Valor usado na ativação da partição

Alterações dinâmicas => usar "Change LPAR Controls"
(em CPC Operational Customization)

General Processor Security Storage Options Load PCI Crypto

RMF Monitor I - Postprocessor

CPU Activity Report - Partition Data Report

PARTITION DATA REPORT

z/OS V1R4

SYSTEM ID NP1
RPT VERSION V1R2 RMF

DATE 04/15/2002
TIME 09.30.00

MVS PARTITION NAME NP1
IMAGE CAPACITY 100
 NUMBER OF CONFIGURED PARTITIONS 9
 NUMBER OF PHYSICAL PROCESSORS 9
 CP 9
 ICF 0
 WAIT COMPLETION NO
 DISPATCH INTERVAL DYNAMIC

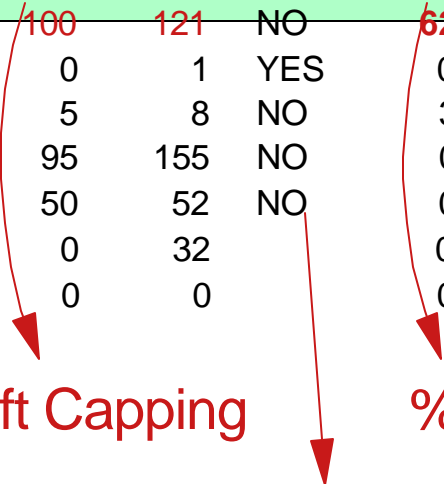


----- PARTITION DATA -----							-- LOGICAL PARTITION PROCESSOR DATA --			
		---- MSU ----		-- CAPPING --				----DISPATCH TIME DATA----		
NAME	S	WGT	DEF	ACT	DEF	WLM%	NUM	TYPE	EFFECTIVE	TOTAL
NP1	A	20	100	121	NO	62.2	1.2	CP	00.04.29.502	00.04.27.519
NP2	A	1	0	1	YES	0.0	4	CP	00.00.22.680	00.00.22.083
NP3	A	10	5	8	NO	3.3	1.0	CP	00.03.37.761	00.03.35.859
NP4	A	300	95	155	NO	0.0	0.3	CP	01.12.08.405	01.12.06.405
NP5	A	200	50	52	NO	0.0	4	CP	00.24.13.447	00.24.11.311
CFC1	A	DED	0	32		0.0	1	CP	00.14.59.611	00.14.59.625
CFC2	A	DED	0	0		0.0	1	CP	00.00.00.000	00.00.00.000
PHYSICAL										00.00.03.603
TOTAL									01.59.51.408	01.59.46.408
CB88	D									
CB89	D									

Soft Capping

% Soft Capping

"Hard" Capping



...

...

RMF Monitor III

CPC Report

% Soft Capping

Command ==> RMF V1R2 CPC Capacity Line 1 of 12
Scroll ==> HALF

Samples: 59 System: Z201 Date: 11/29/02 Time: 13.16.00 Range: 60 sec
Partition: Z2 2064 Model 114
CPC Capacity: 410 Weight % of Max: 74.2 4h MSU Average: 41
Image Capacity: 50 WLM Capping %: 5.4 4h MSU Maximum: 185

Partition	--- MSU ---	Cap	Proc	Logical	Util %	- Physical Util % -
	Def Act	Def	Num	Effect	Total	LPAR Effect Total
*CP						1.0 10.1 11.1
TZ1	130 122	NO	4.3	11.2	12.5	0.4 3.4 3.8
Z1	150 89	NO	5.2	9.3	9.6	0.1 3.5 3.6
Z2	50 58	NO	2.1	11.5	12.8	0.2 1.7 1.9
Z3	N/A 0	YES	2.4	8.8	10.6	0.3 1.5 1.8
PHYSICAL						0.1 0.1
*ICF						0.1 7.1 7.1
CF1	0 29		1	99.9	99.9	0.0 7.1 7.1
CF2	0 0		1	0.0	0.0	0.0 0.0 0.0
PHYSICAL						0.1 0.1

Soft Capping

"Hard" Capping

Partição P1:

z/OS
CICS
IMS
DB2

82 MSUs

MSUs HW = 100 MSUs

100

P1 Max 4h Avg = 82 MSUs

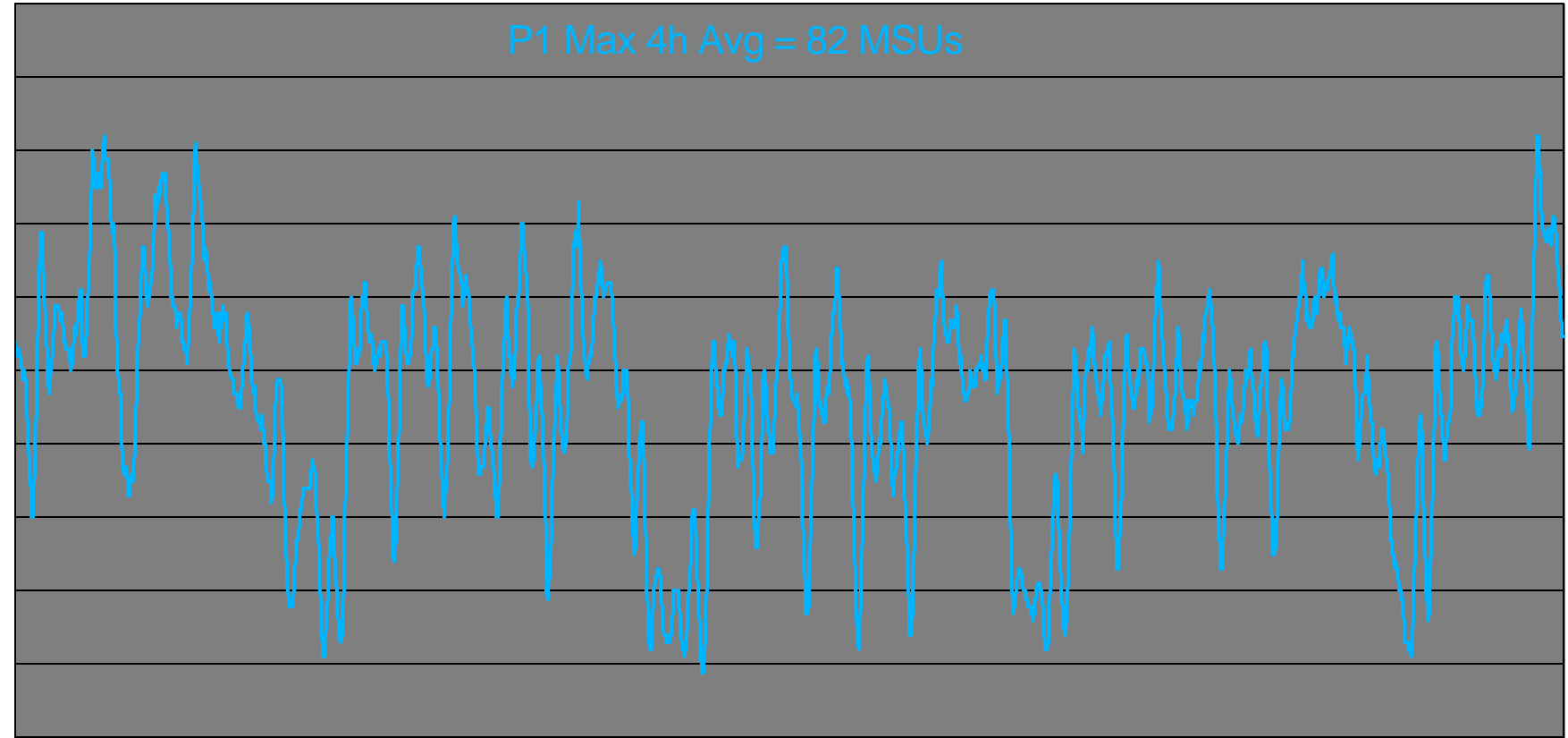
80

60

40

20

0



02 Apr 02 03 Apr 02 04 Apr 02 05 Apr 02 06 Apr 02 07 Apr 02 08 Apr 02 09 Apr 02 10 Apr 02 11 Apr 02 12 Apr 02 13 Apr 02 14 Apr 02 15 Apr 02 16 Apr 02 17 Apr 02 18 Apr 02 19 Apr 02 20 Apr 02 21 Apr 02 22 Apr 02 23 Apr 02 24 Apr 02 25 Apr 02 27 Apr 02 28 Apr 02 29 Apr 02 30 Apr 02 01 May 02

— P1 4h Avg

Partição P1:

z/OS
CICS
IMS
DB2
MQSeries

82 MSUs

67 MSUs

MSUs HW = 100 MSUs

100

P1 Max 4h Avg = 82 MSUs

P1 Max 4h Avg com MQSeries = 67 MSUs

80

60

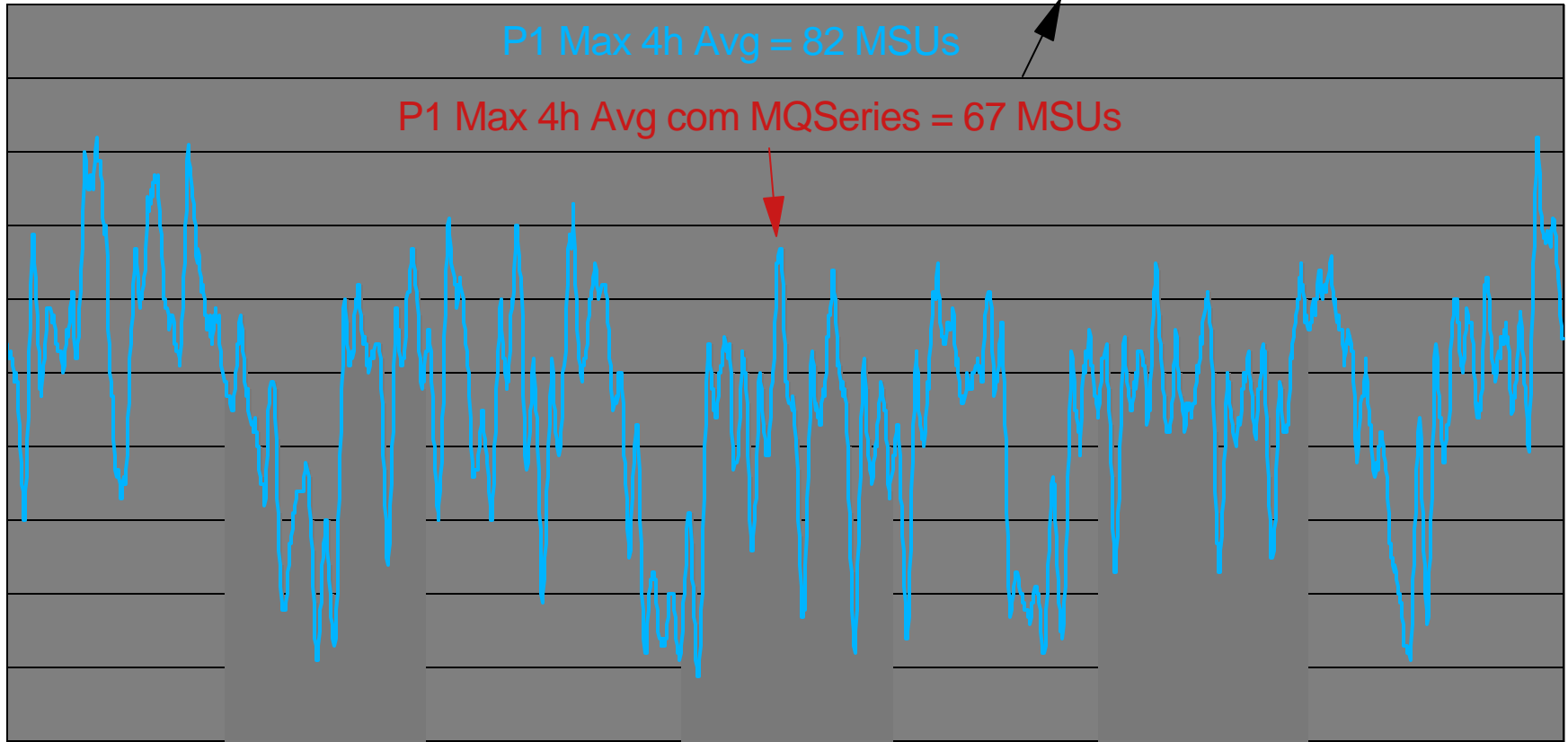
40

20

0

02 Apr 02 03 Apr 02 04 Apr 02 05 Apr 02 06 Apr 02 07 Apr 02 08 Apr 02 09 Apr 02 10 Apr 02 11 Apr 02 12 Apr 02 13 Apr 02 14 Apr 02 15 Apr 02 16 Apr 02 17 Apr 02 18 Apr 02 19 Apr 02 20 Apr 02 21 Apr 02 22 Apr 02 23 Apr 02 24 Apr 02 25 Apr 02 27 Apr 02 28 Apr 02 29 Apr 02 30 Apr 02 01 May 02

— P1 4h Avg ■ MQSeries em uso



Partição P1:

z/OS
CICS
IMS
DB2

82 MSUs

MSUs

HW = 100 MSUs

100

P1 Max 4h Avg = 82 MSUs

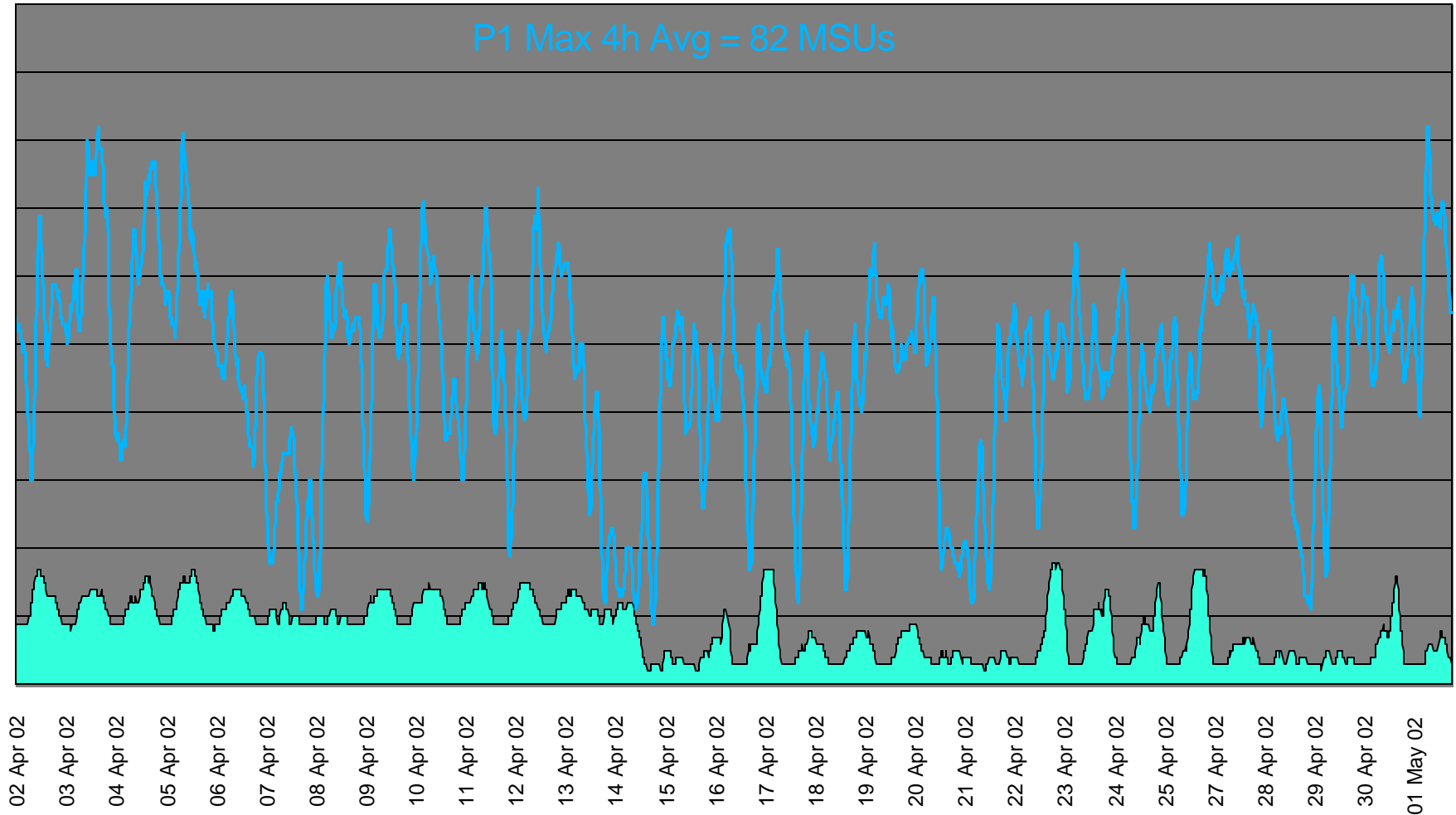
80

60

40

20

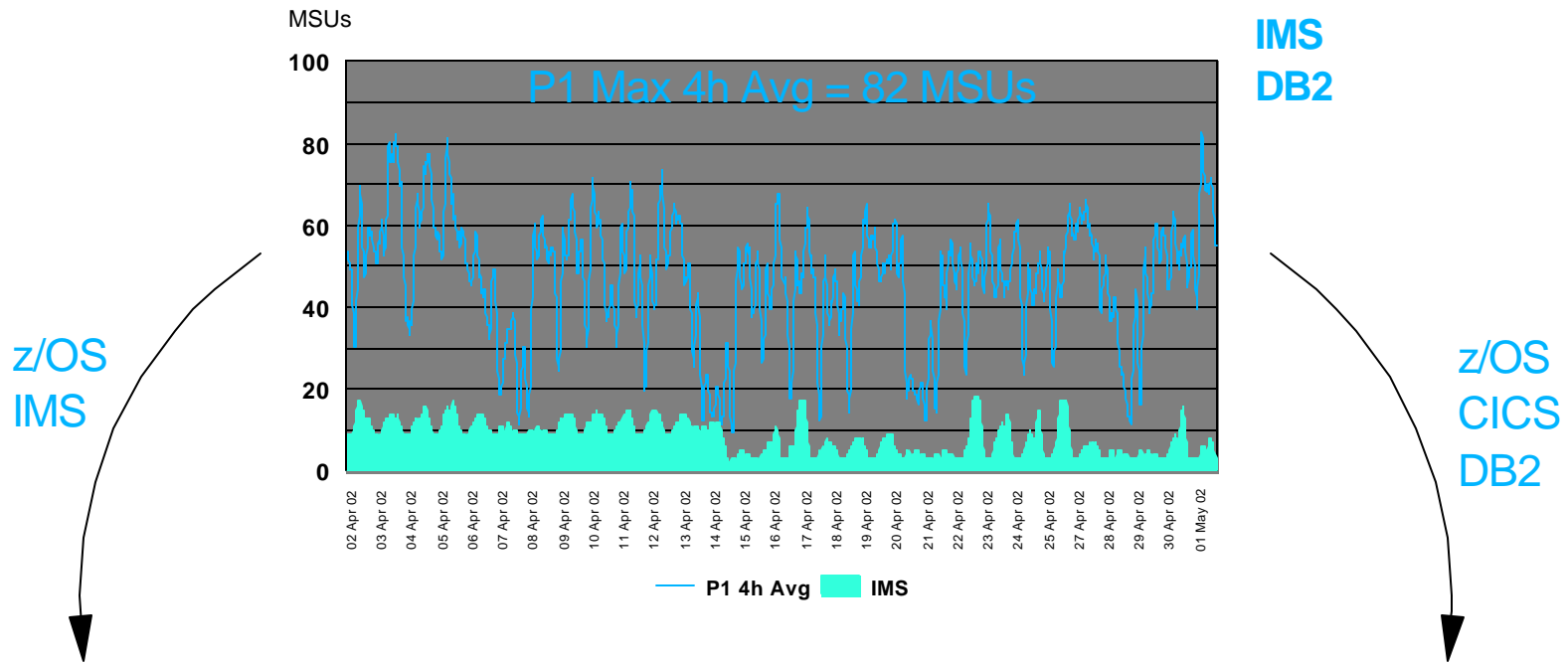
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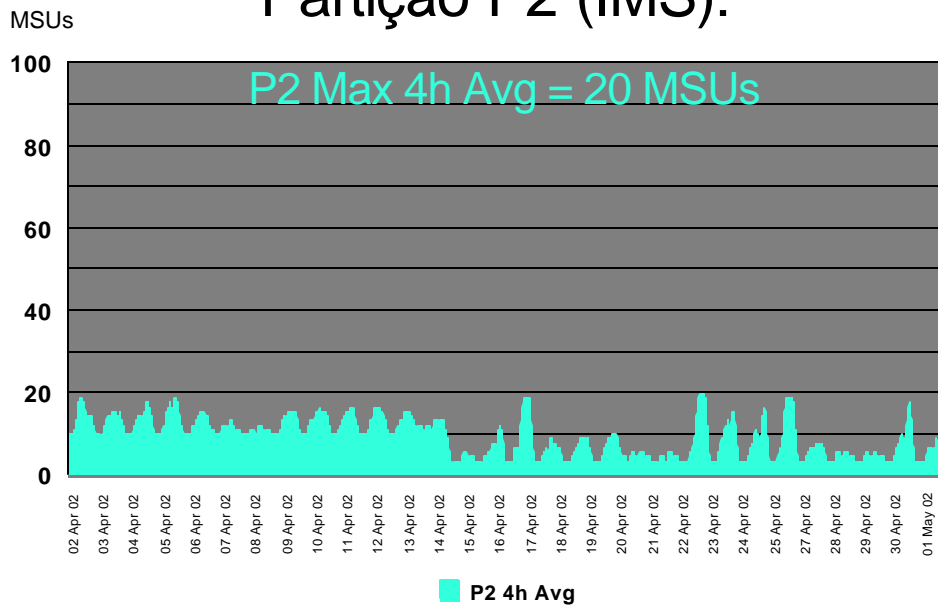
— P1 4h Avg IMS

Divisão da Partição P1:

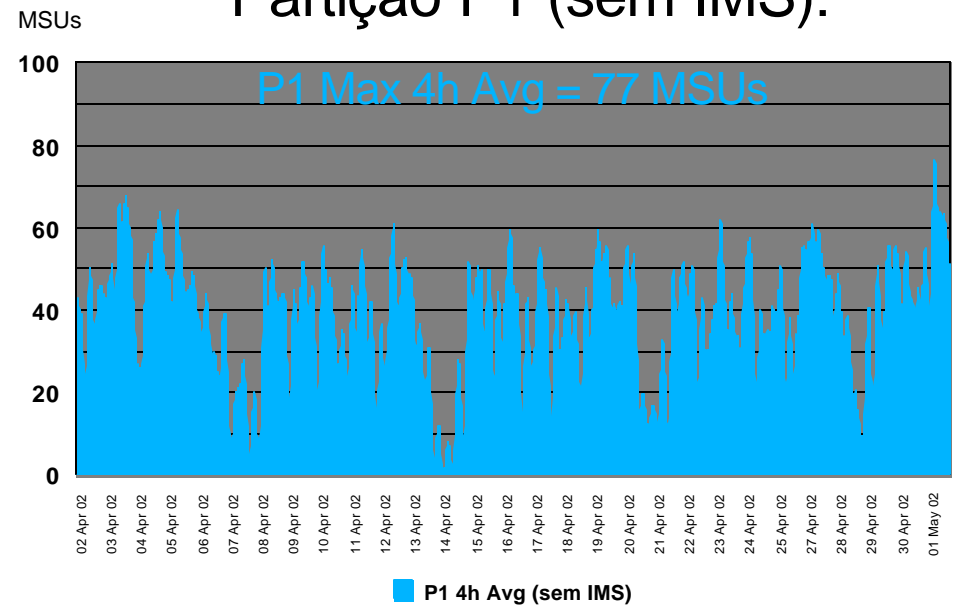
z/OS
CICS
IMS
DB2



Partição P2 (IMS):

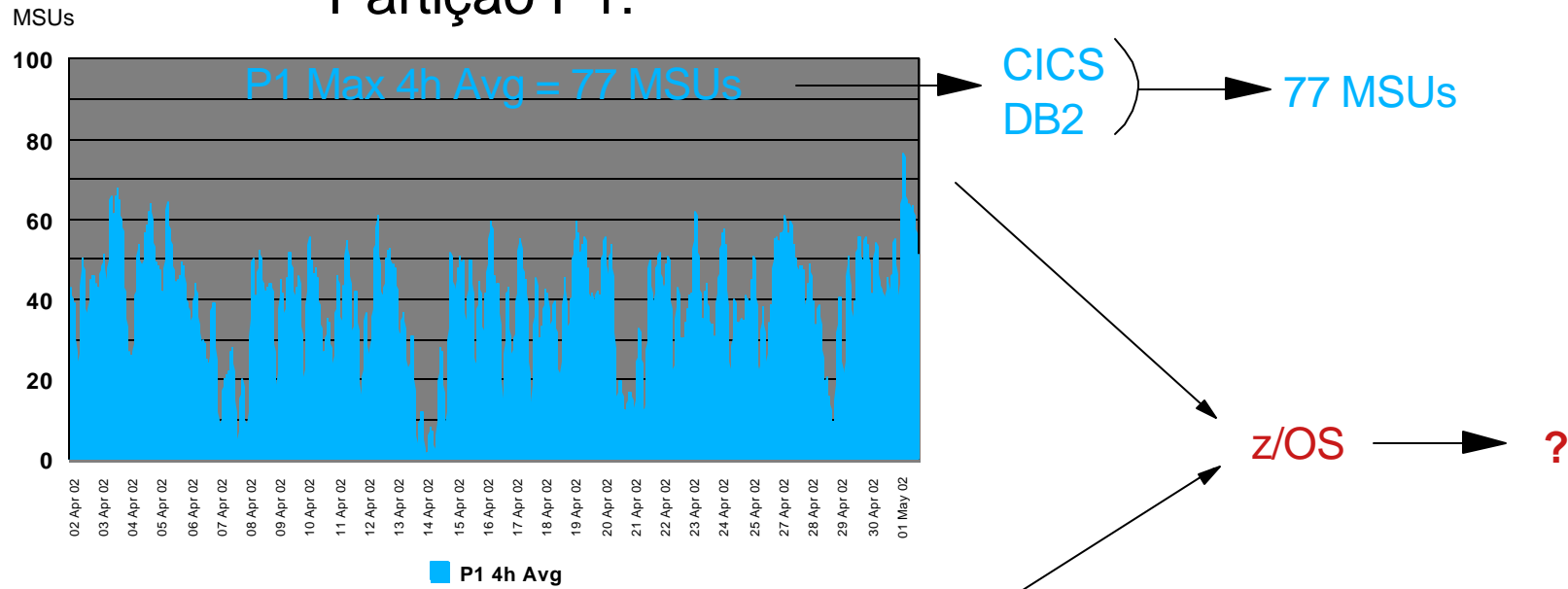


Partição P1 (sem IMS):

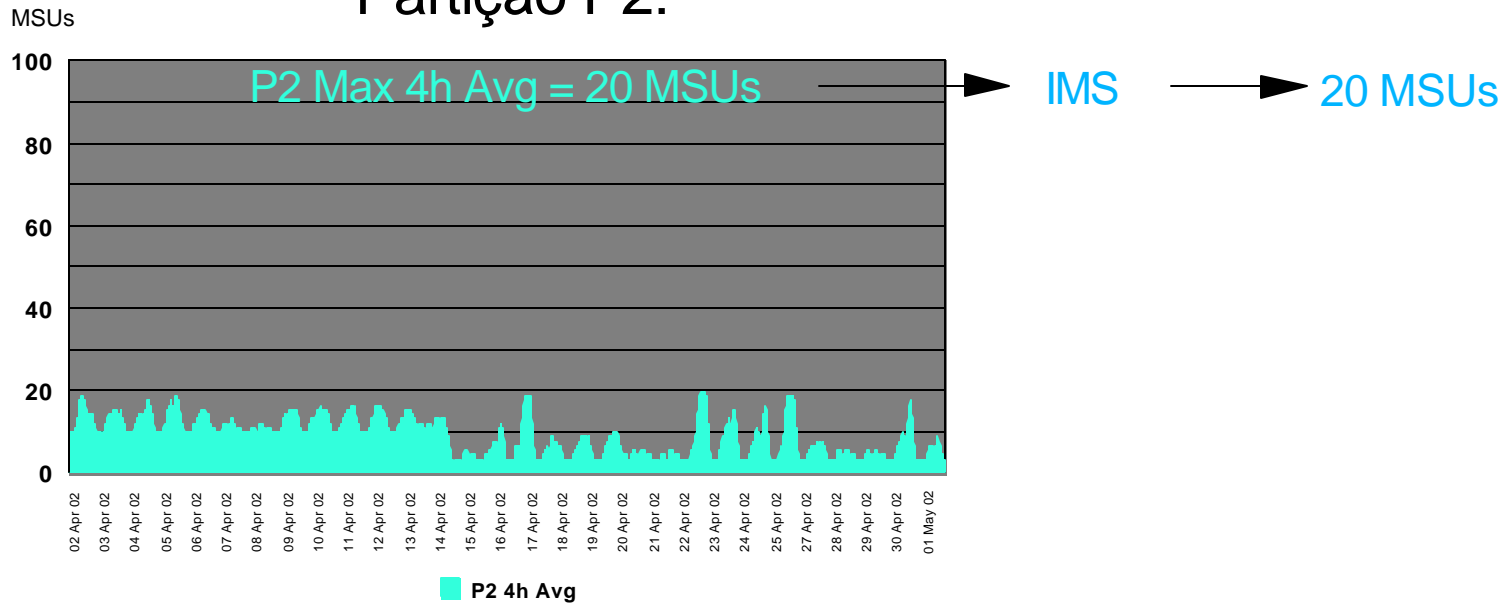


Duas Partições

Partição P1:

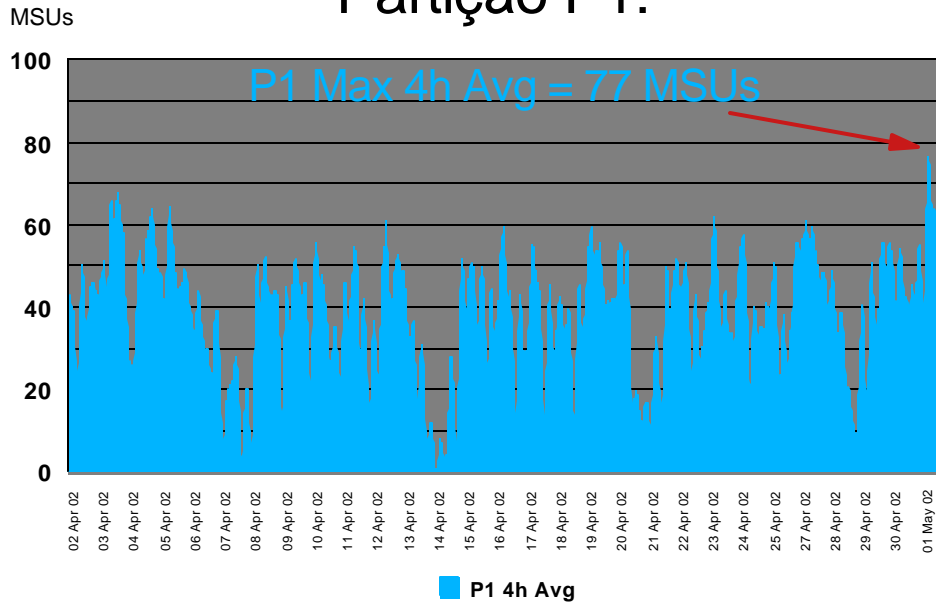


Partição P2:

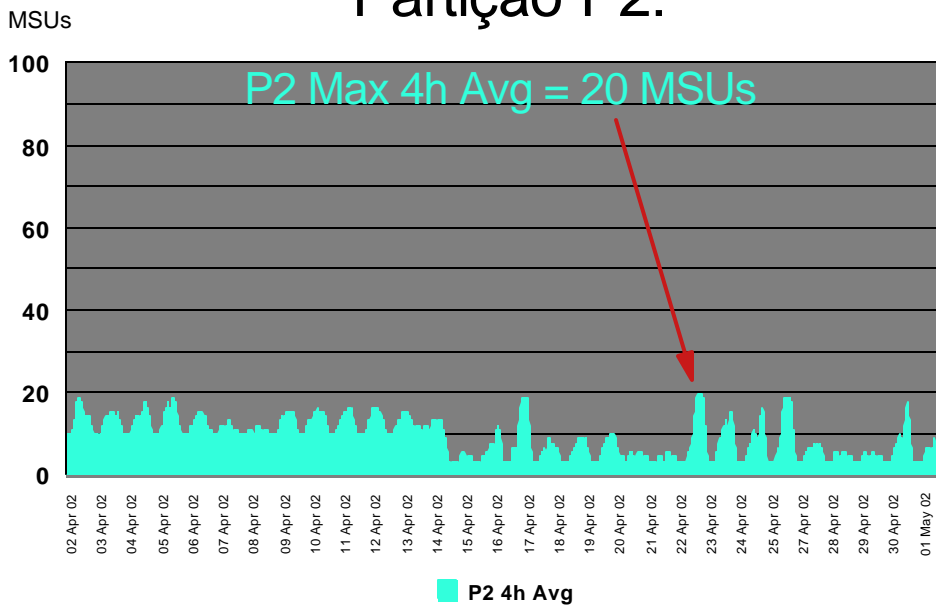


Duas Partições: **na mesma CPU**

Partição P1:



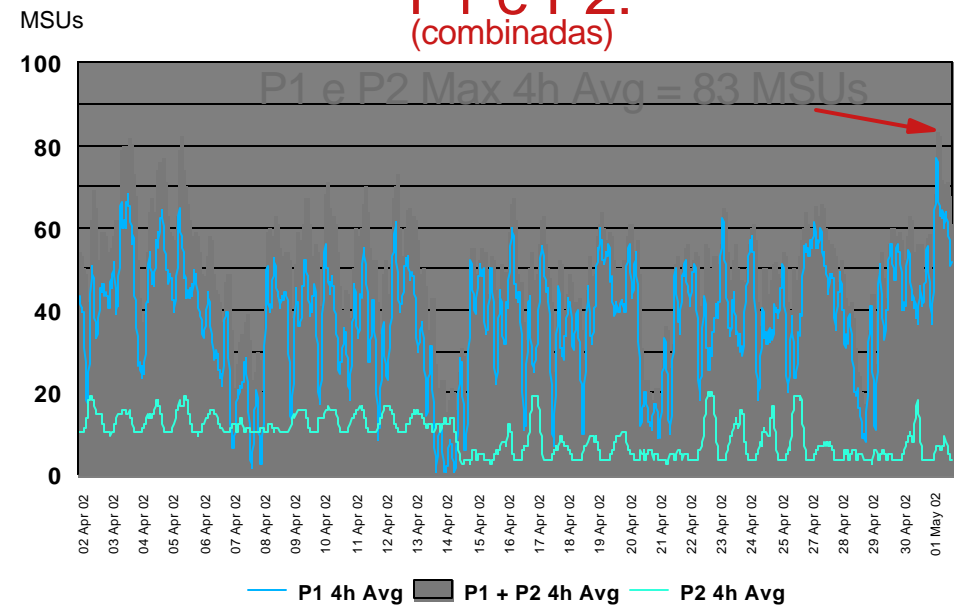
Partição P2:



zSeries CPU

P1	P2
z/OS	z/OS
CICS	IMS
DB2	

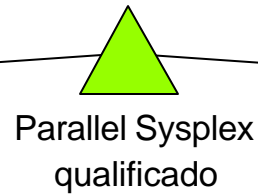
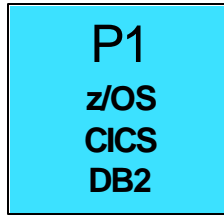
P1 e P2: (combinadas)



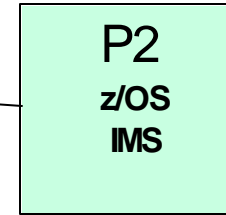
	P1	P2	P1 e P2
z/OS			83 MSUs
CICS	77 MSUs		
DB2	77 MSUs		
IMS		20 MSUs	

Duas Partições: em CPUs diferentes

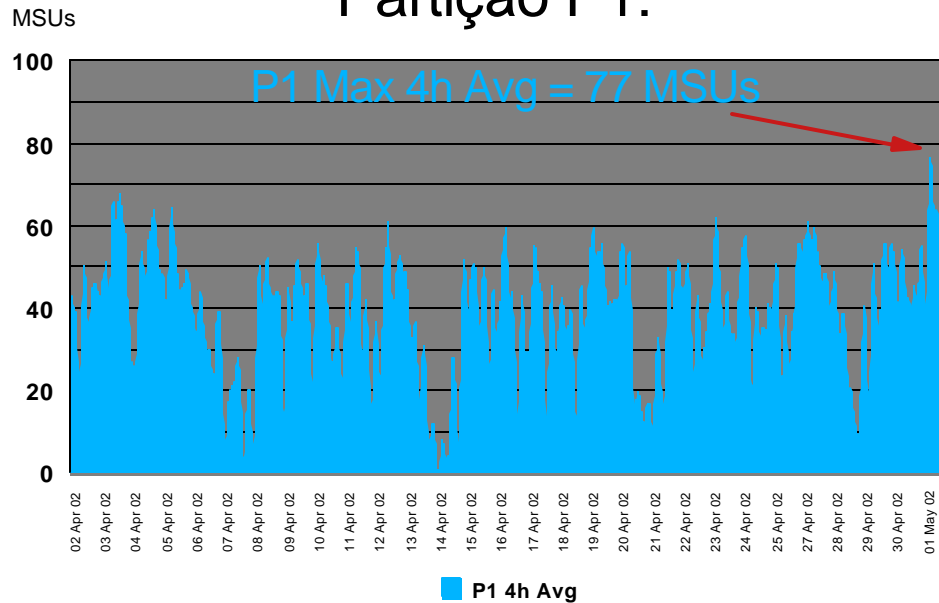
zSeries CPU



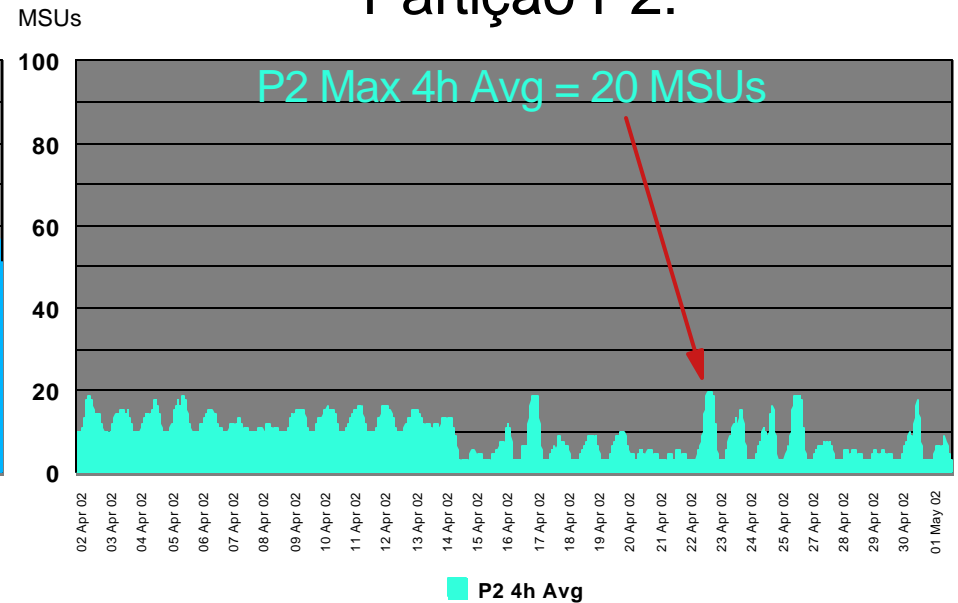
zSeries CPU



Partição P1:



Partição P2:



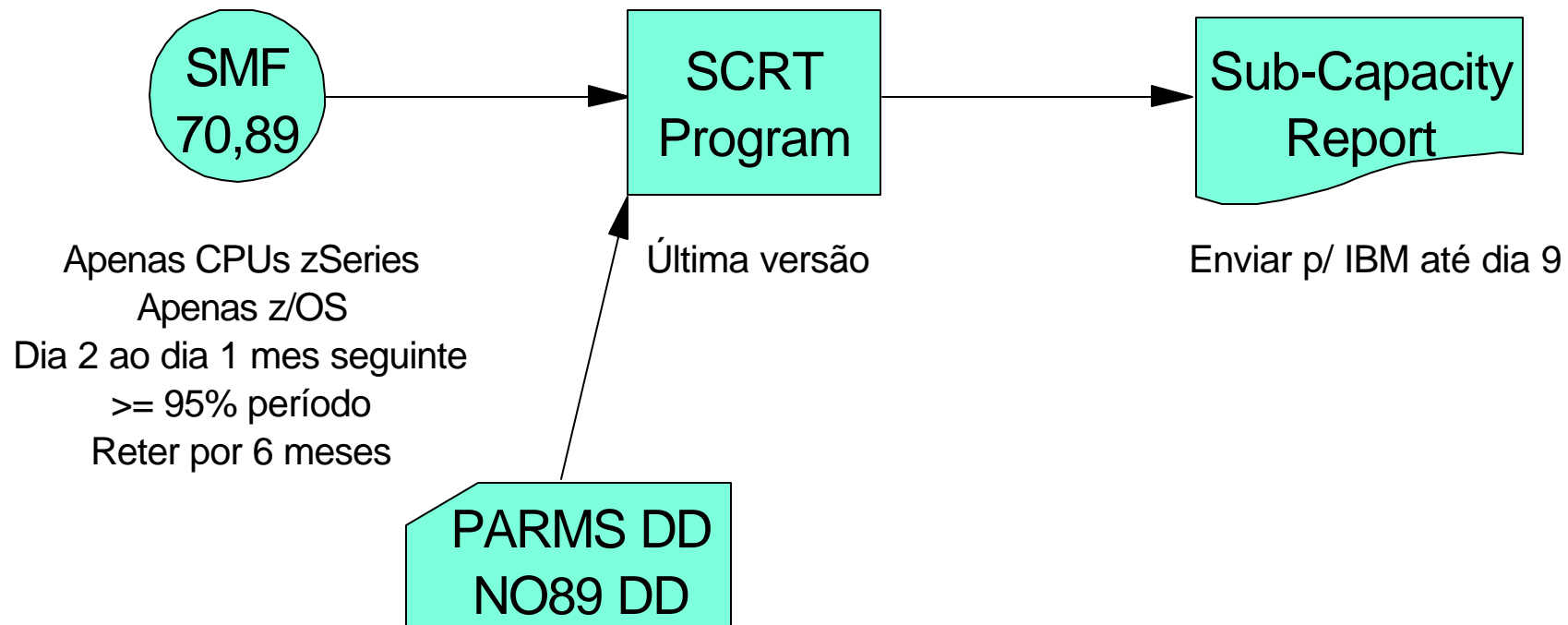
	P1	P2	Total
z/OS	77 MSUs	20 MSUs	97 MSUs
CICS	77 MSUs		77 MSUs
DB2	77 MSUs		77 MSUs
IMS		20 MSUs	20 MSUs

(P1 e P2 = 83 MSUs)
combinadas

Sub-Capacity Reporting Tool (SCRT)

Gera relatórios para envio a IBM

→ Para cobrança em WLC Sub-Capacity



Sub-Capacity Report

```
===== SUB-CAPACITY REPORT=====
Run Date/Time                               04 Mar 2002 - 19:00
Name of Person Submitting Report:           John Customer
E-Mail Address of Report Submitter:         customer@abc.com
Phone Number of Report Submitter:          444-999-9999

Customer Name                                ABC Corporation
Customer Number                             1234567
Machine Serial Number                       02-12345
Machine Type and Model                     2064-116
Machine Rated Capacity (MSUs)              441
Purchase Order Number                      98765
Is this machine a member of a pricing aggregation?  yes
Customer Comments

The data supplied in this report will be used to adjust your billing for all VWLC products
listed under the VWLC Product Name column on this report. In accordance with our agreement,
IBM will treat a change in product licensed capacity as an order.
If the MSUs have changed since the last report, your billing will increase or decrease accordingly.

The data supplied in this report will be used to bill those IPLA products listed under
the IPLA Product name column in this report which exceed your entitled capacity.
In accordance with our agreement, IBM will treat the use of a product in excess of its
entitled capacity as an order and you will be billed for the amount in excess of your entitlement.

Note: This report is expected to provide a "% data collected" > 95% and data reporting
period beginning on the 2nd of the previous month and ending on the 1st of the current month.

=====
TOOL INFORMATION
Tool Release                               5.1
Reporting Period                           2 Feb, 2002 - 1 Mar, 2002
% Data Collected                          100% for 28 days
Any MVS or OS/390 executing on this machine? NO <- If yes, ineligible for sub-CEC

=====
```

Sub-Capacity Report

=====

PRODUCT SUMMARY INFORMATION

WWLC Product Name	WWLC Product ID	Tool MSUs	Customer MSUs	Customer Comments
z/OS V1	5694-A01	388	XXXXX	
DB2 UDB for OS/390 V7	5675-DB2	388	XXXXX	
CICS TS for OS/390	5655-147	258	XXXXX	
IMS V7	5655-B01	162	XXXXX	
Lotus Domino for S/390	5655-B86	388	XXXXX	

IPLA Product Name	IPLA Product ID	Tool MSUs	Customer MSUs	Customer Comments
IBM WebSphere Application Server for z/OS V5	5655-I35	388	XXXXX	

DETAIL DATA SECTIONS - FOR CUSTOMER ANALYSIS PURPOSES ONLY

DETAIL LPAR DATA SECTION

	Highest	Hour Count	Date/Time	2nd Highest	Hour Count	Date/Time
SYSA	258	1	07 Feb 02 - 01:45	256	2	07 Feb 02 - 02:00
SYSB	162	2	21 Feb 02 - 12:30	161	2	21 Feb 02 - 13:00
CPC	388	1	02 Feb 02 - 12:15	386	2	02 Feb 02 - 12:00

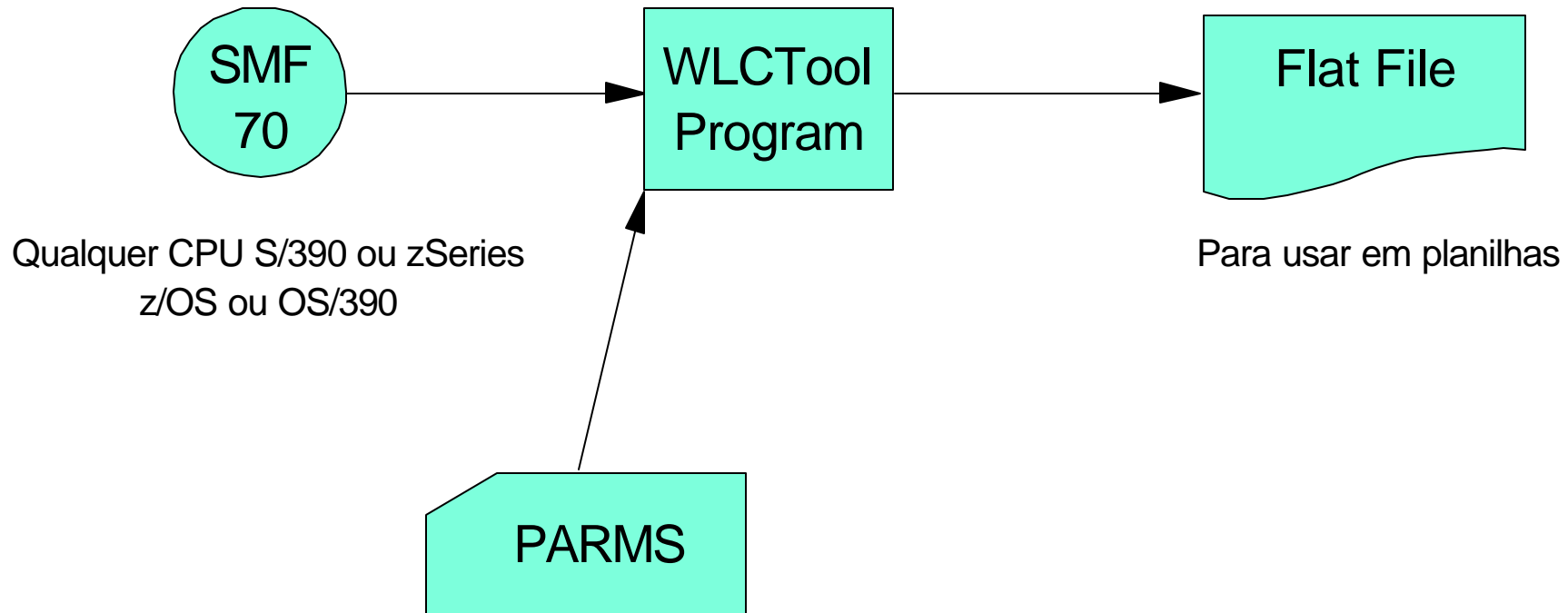
PRODUCT MAX CONTRIBUTORS

Product Name	Product ID	Highest	Date/Time	SYSA	SYSB
z/OS V1	5694-A01	388	02 Feb 02 - 12:15	233	155
DB2 UDB for OS/390 V7	5675-DB2	388	02 Feb 02 - 12:15	233	155
CICS TS for OS/390	5655-147	258	02 Feb 02 - 12:15	258	
IMS V7	5655-B01	162	21 Feb 02 - 12:30		162
IBM WebSphere Application Server for z/OS V5	5655-I35	388	02 Feb 02 - 12:15	233	155

WLC Tool

Calcula Rolling 4-hour Avg histórica por partição

→ Para estimar quantidade de MSUs por partição



zSeries Software Pricing Website

www.ibm.com/zseries/swprice

WLC

EWLC

WLC Tool

Download WLC Tool

WLC Tool Instructions

Sub-Capacity Reporting Tool (SCRT)

Download SCRT

SCRT User Guide

SCRT Instructions

WLC Product Listing

Defined Capacity & Logical CPs

CPU = 100 MSUs, 4 CPs

Partição	Logical CPs	Defined Capacity
P1	4	< 100 MSUs
P2	2	< 50 MSUs
P3	1	< 25 MSUs

Defined Capacity, Logical CPs & Weight

CPU = 100 MSUs, 4 CPs

Partição	Logical CPs	Defined Capacity	Weight
P1	4	< 100 MSUs	60
P2	2	< 50 MSUs	10
P3	1	< 25 MSUs	30

Defined Capacity, Logical CPs, Weight & Capping

CPU = 100 MSUs, 4 CPs

Partição	Logical CPs	Defined Capacity	Weight	Capping ?	Defined Capacity
P1	4	< 100 MSUs	60	Yes	< 60 MSUs
P2	2	< 50 MSUs	10	No	< 50 MSUs (10)
P3	1	< 25 MSUs	30	Yes	< 25 MSUs