z17 and zVM7.4 Power Metrics

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Topics

Power & Environment Metrics

- Introduction
- Why do these metrics matter?
- Granularity

Power/Environment Metrics – Intro

Power before z/VM7.4 and the Z17

- Some power metric existed in the HMC
  - Were they used often? Probably not…
  - Data was not very granular
- The mainframe has always been power efficient
  - High power efficiency results in lower carbon footprint

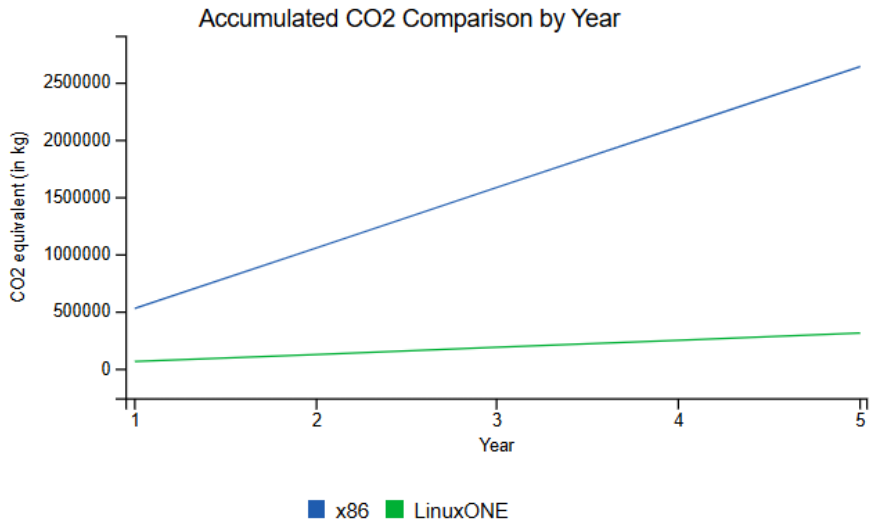
IBM's estimates: X86 vs z17 yearly power consumption for the same workload

X86 server

	Year 1	Year 2	Year 3	Year 4	Year 5	5 Year Total
Yearly kWh	1,477,094	1,477,094	1,477,094	1,477,094	1,477,094	7,385,468

IBM z17 server

	Year 1	Year 2	Year 3	Year 4	Year 5	5 Year Total
Yearly kWh	174,666	174,666	174,666	174,666	174,666	873,328



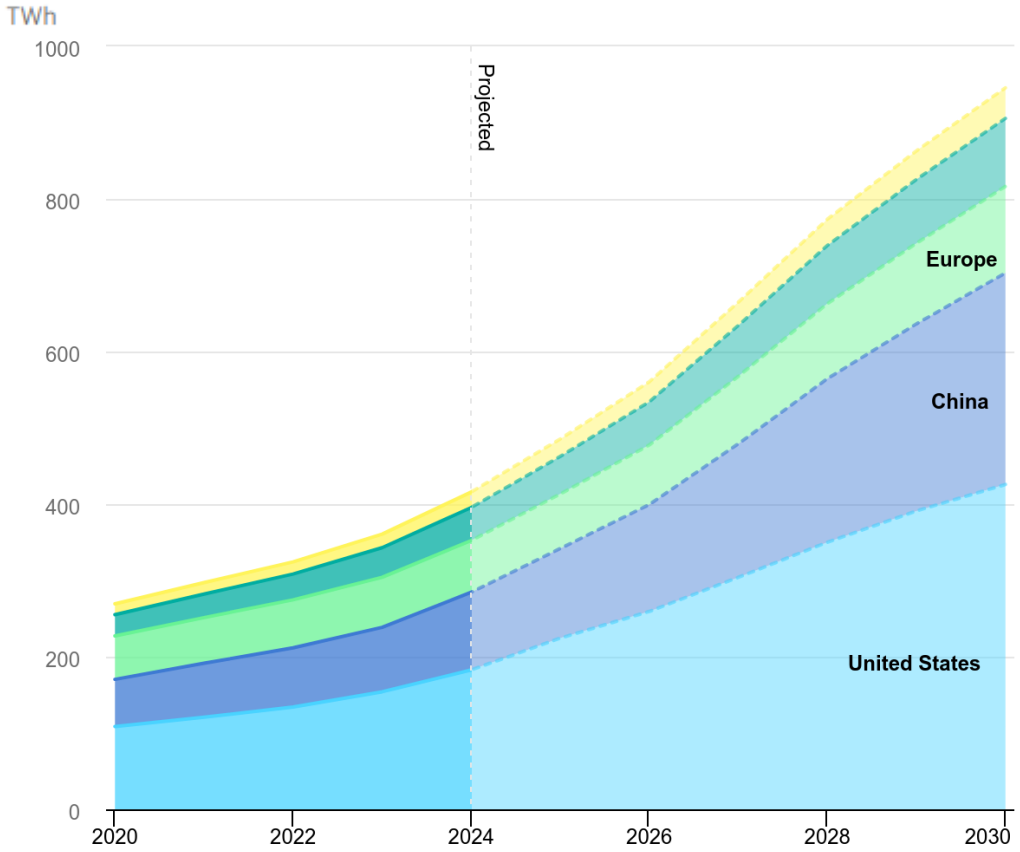
Source: IBM. "TCO and CO2e Calculator for IBM LinuxONE and Linux on IBM Z." *IBM*, n.d., accessed 17 Mar. 2026.

Power/Environment Metrics – Why?

Power Today

- Data centers are expanding at an unprecedented rate
- Power availability is becoming a bottleneck for expansion
- Power consumption is becoming a more major cost for data centers

Data center electricity consumption by region, Base Case, 2020-2030



Source: IEA (2025), *Data center electricity consumption by region, Base Case, 2020–2030*, CC BY 4.0

Power/Environment Metrics – Why?

Power related problems

- In the case of expansion, how much more power is needed, can this need be met?
- When there is a hardware power issue, how do you know? What do you know?
- How much power (money) are idle servers, adapters, switches, etc costing you? Should they be deactivated?
- Power is expensive, which systems are responsible for this expense?
- What is my carbon footprint?
- And many more…

Power/Environment Metrics – Why?

Power related solutions

- As of z/VM7.4 and the z17 new power related metrics are generated
  - IBM generated monitor metrics
    - Higher granularity power consumption on specific LPAR and CEC
    - Available on the z17 with z/VM7.4 or higher
  - Velocity Software metrics from the HMC
    - View of the entire mainframe
    - Broad but complete overview of power usage
    - Visibility into environmental metrics
    - Full metrics available on the z17, earlier models may have a subset of metrics

Notes:
HMC data monitoring must be turned on in order to see HMC related metrics
Research in progress. As such metric descriptions and performance reports are subject to change

Power/Environment Metrics – Granularity

Available Metrics

- **Power consumption by CEC**
  - LPARS
  - Standby
  - Infrastructure

```
Report: ESAPOWR      Hardware Power Consumption                  Tyler Local                ZMAP   5.2   03/17/26 Page   2611
--------------------------------------------------------------------------------------------------------------------------------
                              <Col. Data> <-----------Power Consumption(Watts)-----------> <--------Environmental metrics------->
                              Samples     <-------LPAR--------> <-----------CEC----------> <--BTUs/Hour---> <Temp(Celsius)>
Time     CEC Ser. LPAR        HMC Mon Sec Total  CPU  I/O  Stor Total LPARS Standby Infras Total  Air Water Room DewPt Exth Humid
-------- -------- --------    --- --- --- ----- ---- ---- ----- ----- ----- ------- ------ ----- ---- ----- ---- ----- ---- -----
06:02:00 HMC Data:
         P0040F78              1   0  60                        1254     0       0      0  4275 4275     0 18.6   8.3  29 0 24.7
         PLACEH1               .   .   .                          .     .       .      .     .    .     .    .     .    .     .
         PLACEH2               .   .   .                          .     .       .      .     .    .     .    .     .    .     .
         PLACEH3               .   .   .                          .     .       .      .     .    .     .    .     .    .     .
                  PLACEH1      .   .   .     .
                  PLACEH2      .   .   .     .
                  PLACEH3      .   .   .     .
                  PLACEH4      .   .   .     .
                  PLACEH5      .   .   .     .
                  PLACEH6      .   .   .     .
                  PLACEH7      .   .   .     .
                  PLACEH8      .   .   .     .

Monitor Data:
                  VLXPMW09     0   6  60  54.3 35.2 12.1   7.0  1530         341.8  610.4
```

In progress power performance report. Metrics labeled "." or starting with "PL" are expected but untested

Note: ***Research in progress. As such metric descriptions and performance reports are subject to change***

Power/Environment Metrics – Granularity

Available Metrics

- **Power consumption by LPAR**
  - CPU
  - I/O
  - Storage
  - Total

```
Report: ESAPOWR      Hardware Power Consumption                    Tyler Local                    ZMAP   5.2   03/17/26 Page   2611
-----------------------------------------------------------------------------------------------------------------------------------
                          <Col. Data> <-----------Power Consumption(Watts)-----------> <--------Environmental metrics------->
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         PLACEH3            .   .   .                           .     .       .      .     .    .     .    .     .    .     .
                  PLACEH1   .   .   .     .
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Power/Environment Metrics – Granularity

Available Metrics

- **Environmental Metrics**
  - Air
  - Water
  - Total
  - Room
  - Dewpoint
  - Exhaust
  - Humidity

Report: ESAPOWR Hardware Power Consumption Tyler Local ZMAP 5.2 03/17/26 Page 2611

			<Col. Data> Samples			<-----------Power Consumption(Watts)----------->								<--------Environmental metrics------->						
						<-------LPAR-------->				<----------CEC--------->				<--BTUs/Hour--->			<Temp(Celsius)>			
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	PLACEH1		.	.	.					.	.	.	.	.	.	.	.	.	.	.
	PLACEH2		.	.	.					.	.	.	.	.	.	.	.	.	.	.
	PLACEH3		.	.	.					.	.	.	.	.	.	.	.	.	.	.
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Power/Environment Metrics – Granularity

Available Metrics

- **Power consumption by LPAR**
  - Total

```
Report: ESAPOWR      Hardware Power Consumption                  Tyler Local                  ZMAP   5.2   03/17/26 Page   2611
-------------------------------------------------------------------------------------------------------------------------------

                          <Col. Data> <----------Power Consumption(Watts)-----------> <--------Environmental metrics------->
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Power/Environment Metrics

Takeaways

- Mainframes are power efficient compared x86 computers
  - Relatively low carbon footprint
  - With new power metrics this can be easily shown
- On z/VM7.4 and the z17 power consumption can be seen with significantly higher granularity

Thank you for listening!

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