

Seasonal Efficiency Concept for Middle East

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Introduction

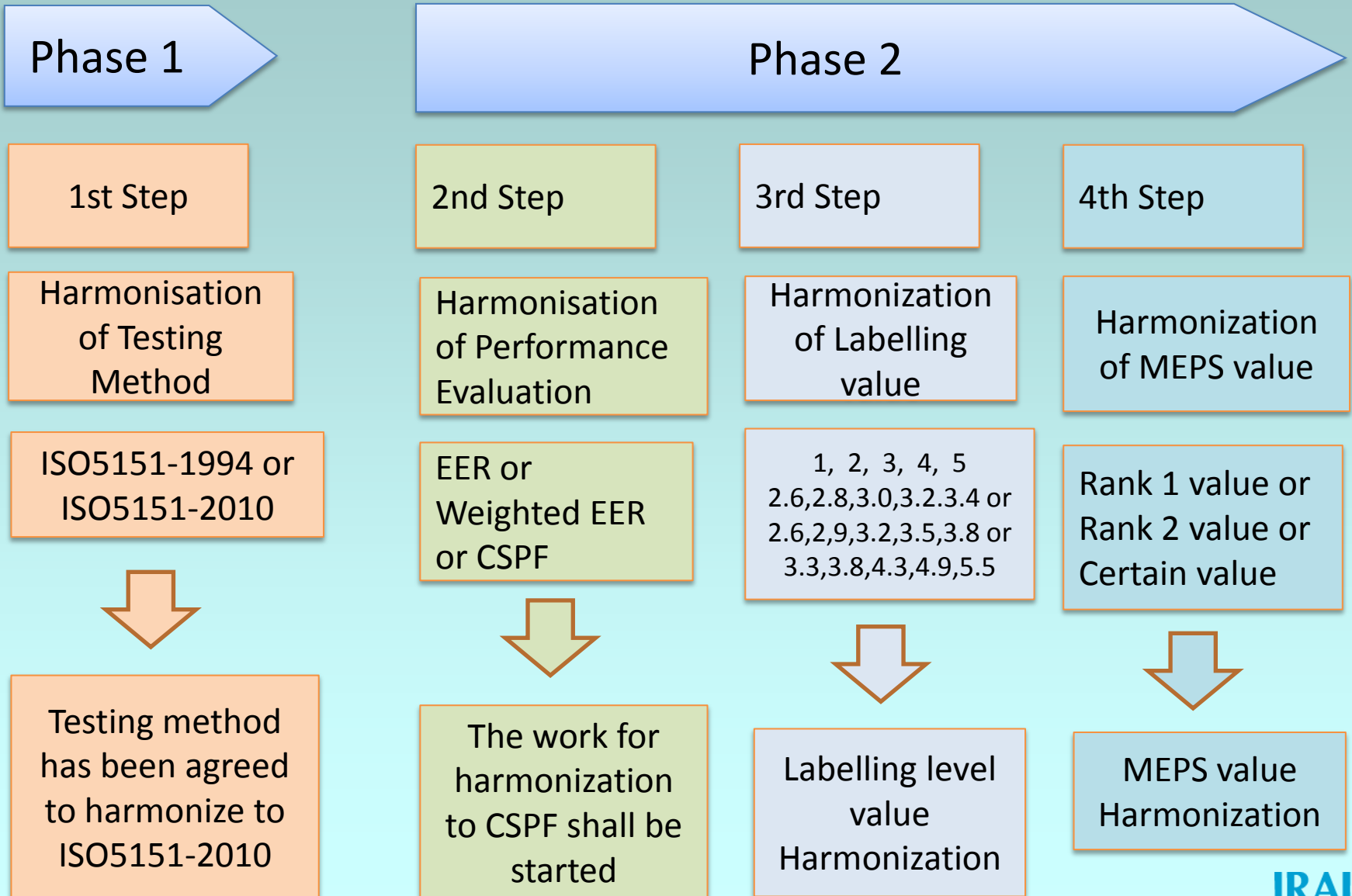
- Most of developed countries have employed or is employing seasonal efficiency or equivalent one.
- From the global efficiency point of view, the launch of seasonal efficiency in the countries in the Middle East the tropical area is highly desirable.
- However, the simple copy of the currently existing one in the developed countries is not appropriate and some modification or adjustment is needed by considering the higher ambient temperature.
- The technical approach and some suggestions will be presented.

Activity: Harmonisation in ASEAN countries

ASEAN situation (Image for easier understanding)

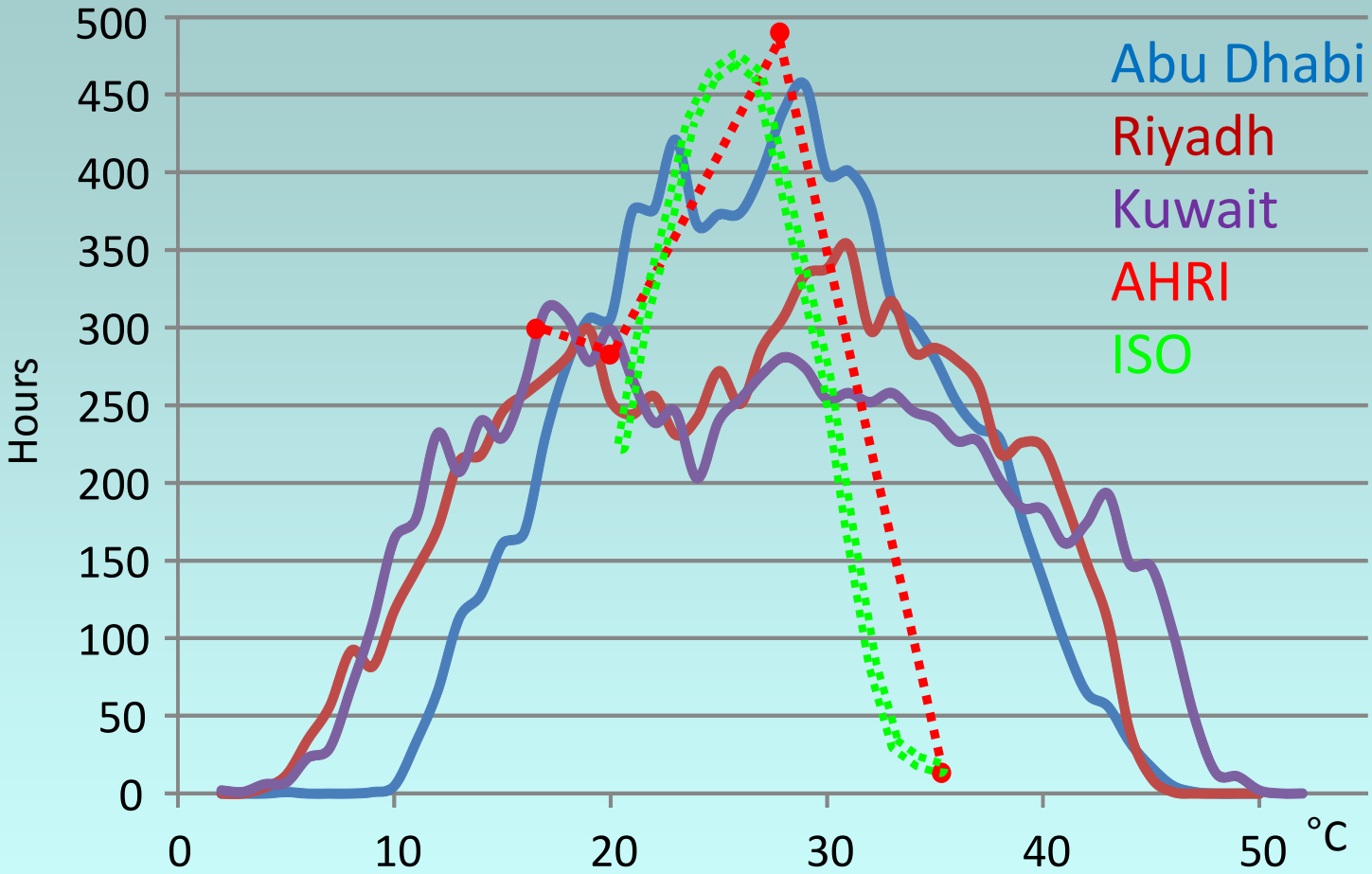
		Country A	Country B		Country C		Country D	
Testing Method		ISO5151-1994	ISO5151-1994		ISO5151-2010 ISO15042-2011		ISO5151-2010	
Performance Evaluation Criteria		All type	Fixed cap.	Inverter	Fixed cap.	Inverter	Fixed cap.	Inverter
Performance Evaluation Criteria		EER (COP)	EER (COP)	Weighted EER (COP)	EER (COP)	EER(COP) / Weighted EER(COP)	EER (COP)	CSPF
Labelling Level	5	3.22			5.5	4.86/5.5	3.4	3.8
	4	3.10	3.05	3.76	4.86	4.29/4.86	3.2	3.6
	3	2.82	2.92	3.34	4.29	3.78/4.29	3.0	3.4
	2			2.64	2.92	3.34/3.78	2.8	3.2
	1			2.5	2.64	3.06/3.34	2.6	3.0
MEPS Level		2.82	-	-	3.34	3.06/3.34	2.6	3.0

Proposal on the Step of Harmonisation





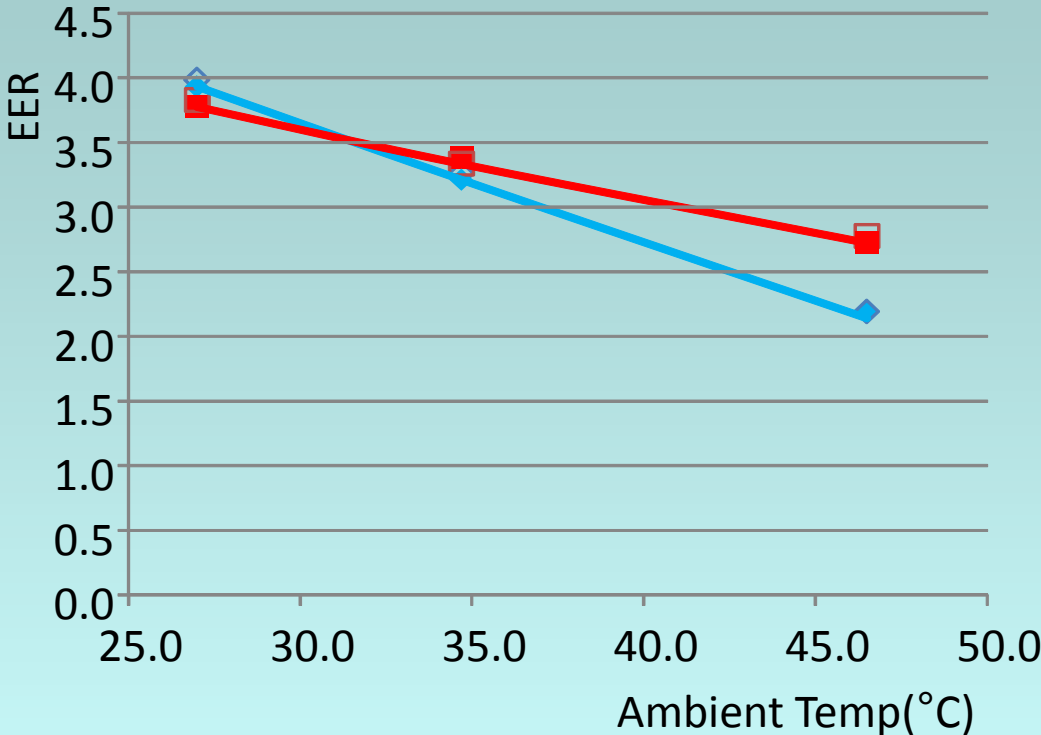
Middle East climate vs. SEER standards



Either AHRI or ISO reference is not very appropriate for Middle East.
→ Seasonal efficiency conditions based on middle east climate should be established according to ISO16358.



System design and evaluation

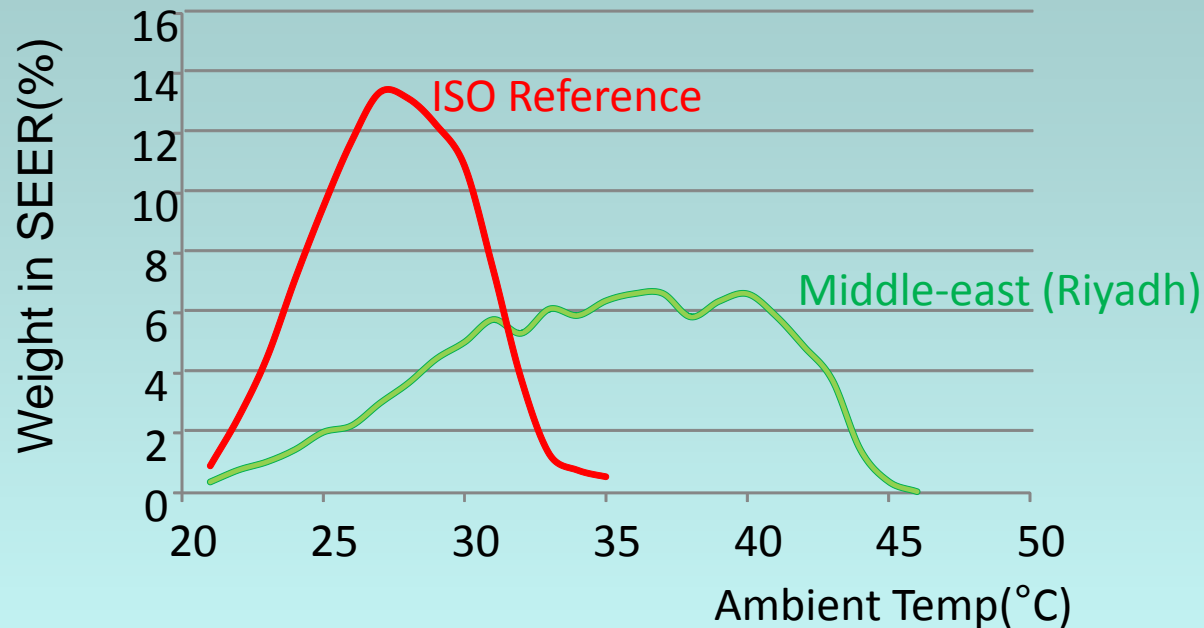


The right application of standard will lead to the right evaluation and the right direction of design.

- SEER with current ISO reference conditions: Blue > Red
- Middle East conditions: Red > Blue

Difference in weighting

ISO reference vs. Middle East conditions



In the current ISO reference, the efficiency in 25-30 °C ambient condition has major impact, but 30-40 °C range is important in Middle East condition.

→ Optimisation of AC design based on the reference by considering the climate will lead to high efficiency in Middle East.



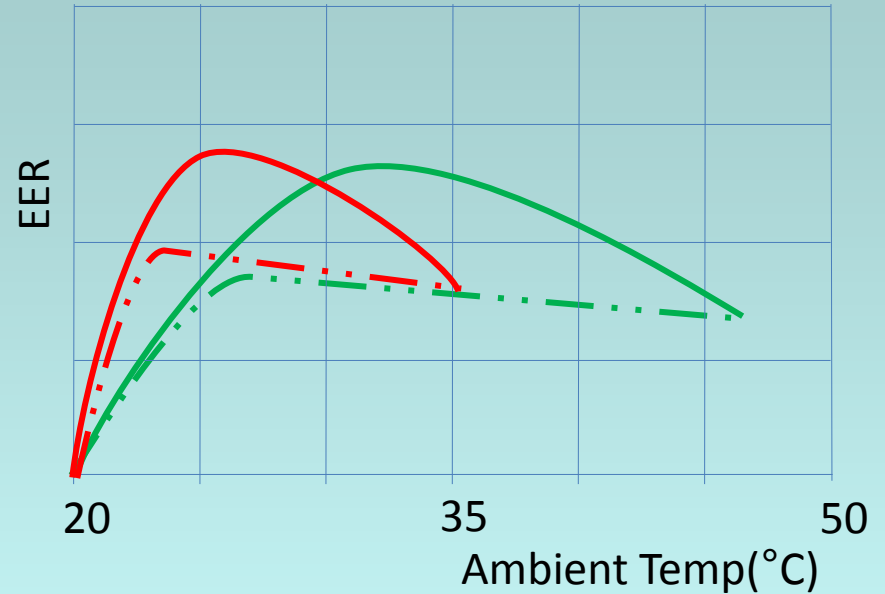
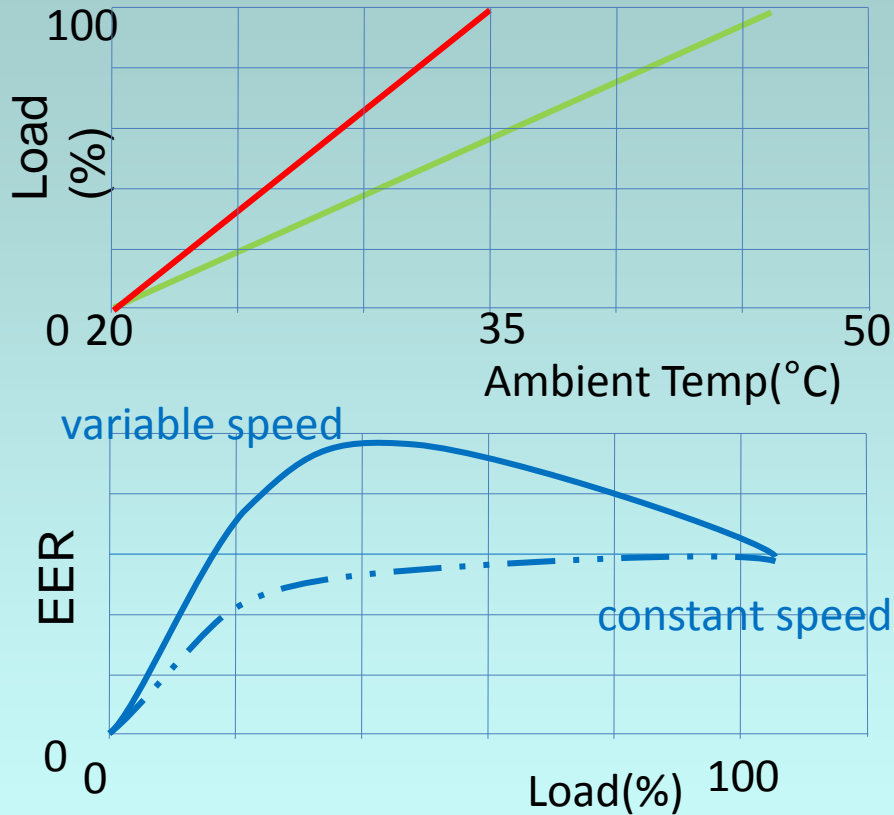
Seasonal efficiency for Middle East

Example of proposal from the practical point of view

- T3 condition for 100% load
- T1 condition for 50%
- 29°C ambient for 25%
- Hours for each temperature should be chosen from a representative city or determined from the average of several representative cities.



Effect of load ratio: variable speed is promising



Variable speed technology has high potential for energy efficiency in Middle East.



Conclusions and suggestions

- Seasonal Efficiency standard for Middle East should be established, ASAP. The establishment according to ISO16358 by considering the higher ambient temperature is suggested.
- The standard by considering the climate correctly will lead to the high efficiency in Middle East.
- The early launch of MEPS in SEER will accelerate the efficiency improvement in Middle East.
- The technology of variable speed compressors and fans has the high potential in near future.



Seasonal Efficiency Concept for Middle-east

Thank you for your kind attention.