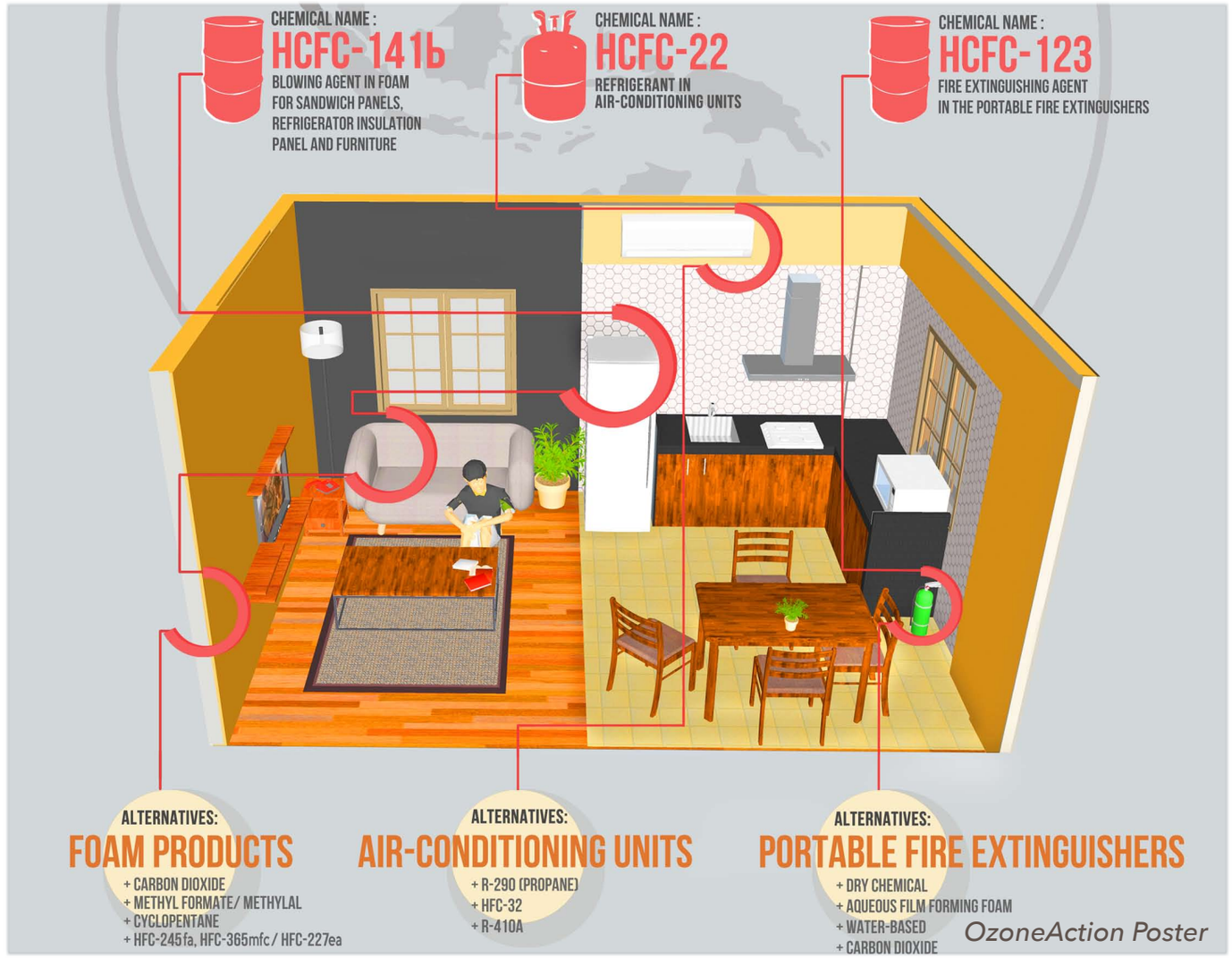


INNOVATION PROCESS AND IMPROVING THE EFFICIENCY OF RACHP EQUIPMENT FOR COUNTRIES WITH HIGH-AMBIENT TEMPERATURES

MAHER H. MOUSA

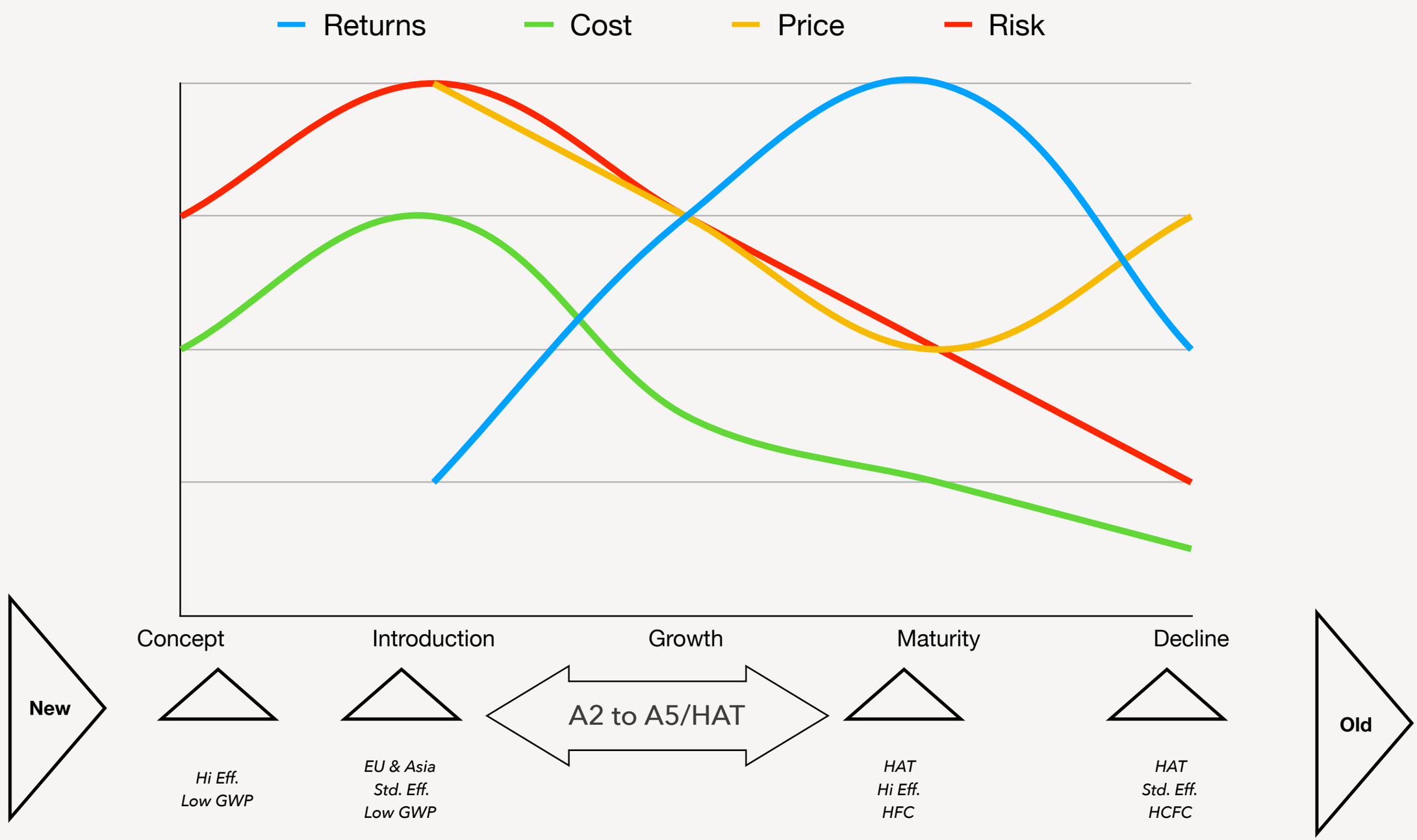
VIENNA, 9-10 JULY 2018

WORKSHOP ON ENERGY EFFICIENCY OPPORTUNITIES WHILE PHASING-DOWN HYDROFLUOROCARBON (HFCS)

OBJECTIVE

- Strategize for Montreal Protocol evolvement HCFCs ▶ HFCs ▶ ▶ ▶ ??
- Common ground
- Wise and balanced environmental policy
- Effective implementation and governance

PRODUCT LIFECYCLE



Source: Day, G. (1981) "The Product Life Cycle: Analysis and Application Issues", Journal of Marketing, 45 (4)

INNOVATION/DEVELOPMENT MODES: A2 VS A5 COUNTRIES

Developed countries (Organic innovation mode)

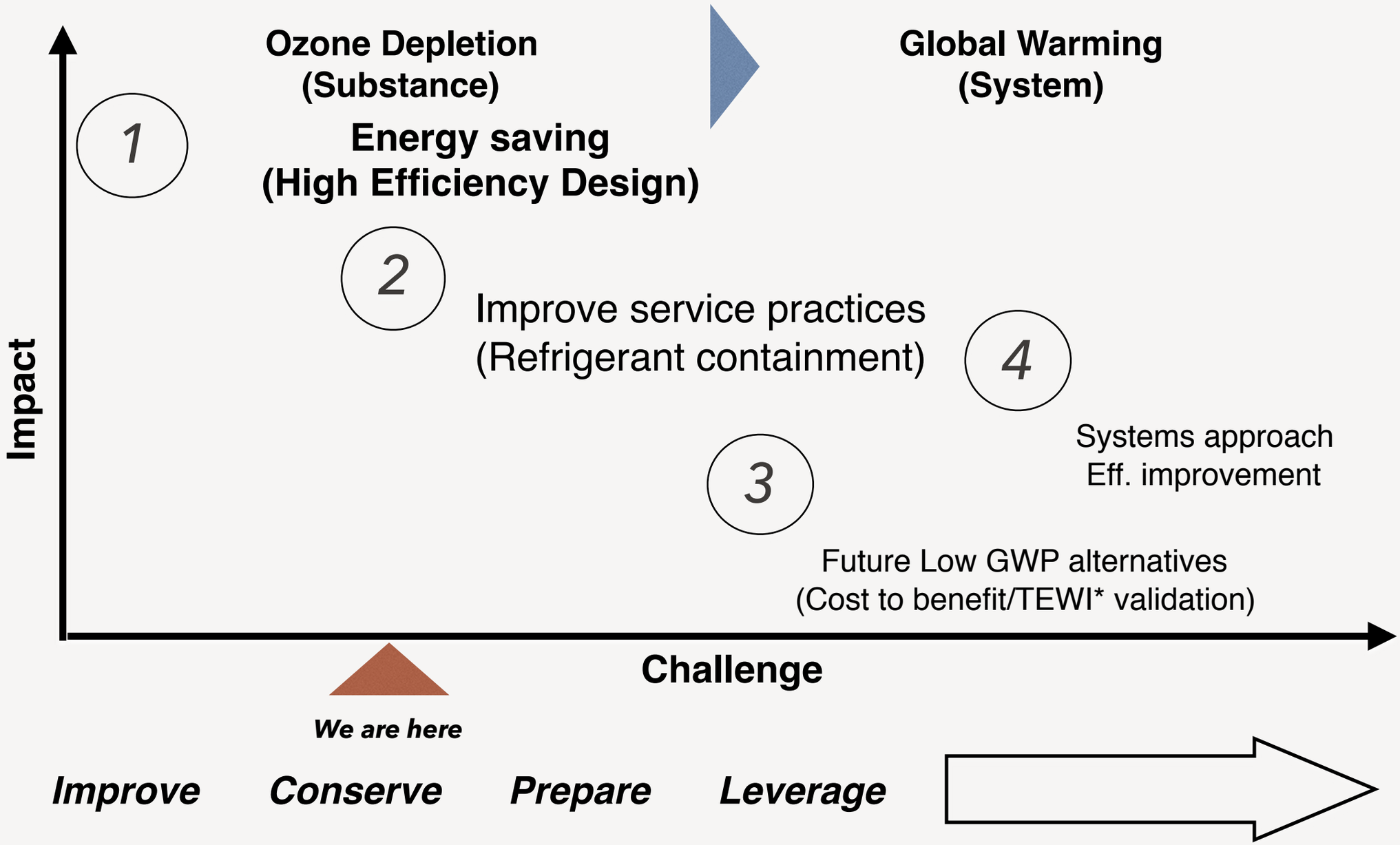
- Signal from science and Montreal protocol
- Knowledge ready to develop products and technologies
- Close integration with technology updates and management of change to enable standards and development
- Economy of scale matters
- Priority is for developed markets.

Developing countries (Mechanistic innovation mode)

- Localization of pre-developed products
- Knowledge controlled, IP limitations, high level of control and authority over technology with loyalty considerations.
- Limited access to technology updates and management of change to enable standards and development.
- Specific local needs (HAT) are not entertained (Economy of scale matters)
- Low priority in product development and change

Source: Burns, T. and Stalker, G. (1994) The Management of Innovation, 3rd edition, London: Tavistock Publications.

ENVIRONMENTAL IMPACT REDUCTION OPPORTUNITIES: HAT- RACHP

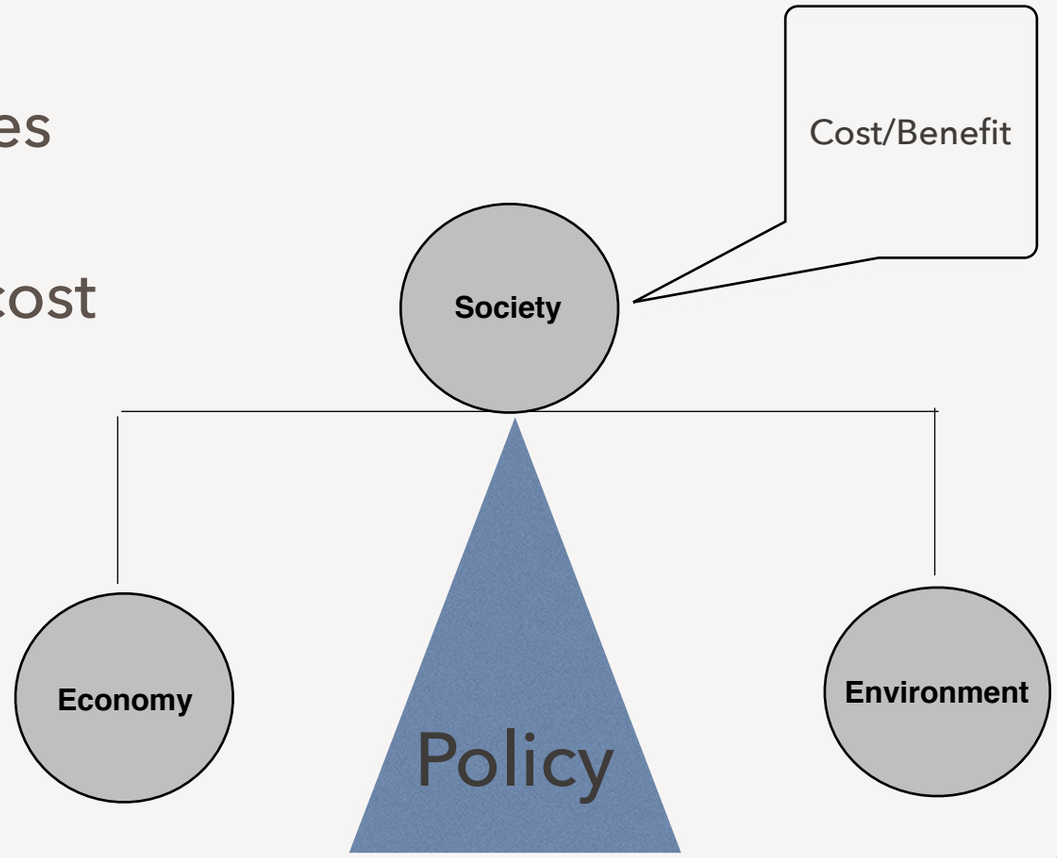


**TEWI is the total equivalent warming impact*

Source: Mousa, M. (2015)'Effective and Safe Refrigerant Implementation for HVAC in High Ambient Climates' HFCs workshop, Bangkok, Thailand

REALITY IN HAT

- Energy efficiency standards = elevated baseline
- HCFCs phase out in most of the HVAC applications
- HVACR is a necessity (cooling), and relatively higher loads
- Local industry and economic challenges
- Rapid growth in energy demand and cost
- Developing service industry/practices



CONCLUSION

- HAT is challenging
- We need to move forward wisely
    - Comprehensive cost/benefit evaluation method - Common ground towards systems approach
    - More industry collaboration, engagement and institutional development
    - More capacity building - Technology / Service

Thank You

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