

**REPORT OF THE TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL
(TEAP)**

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Corrigendum 2

Page 36, Sub-section 3.3.3, Summary of findings from EU study

Replace the existing paragraphs with the following:

The recent EU study (*Schwarz et al.* 2011) to accompany the revision of the regulation on fluorinated greenhouse gases contained an assessment of costs of different alternative technologies. Since this is the only recent source containing such information it is mentioned here.

The costs are broadly separated in ICCs and IOCs, although the definition did not necessarily match that of ICC and IOC within the Montreal Protocol context. The baseline for the calculations is the use of conventional HFCs.

For commercial refrigeration, incremental costs are indicated on a time basis, this implying that the immediate additional cost (2015) includes for market introduction costs, whereas the eventual costs (e.g., by 2020 or 2030) represent the differences in material and additional labour costs only. For other types of systems, the market introduction costs are not included since it is assumed that the large number of systems build within a short period enables these introduction costs to be rapidly overcome.

The ICC values are calculated by averaging the investment cost over the equipment lifetime.

The following table 3-21 shows that the production cost of equipment containing alternative refrigerants are mostly higher than the production cost of conventional HFC systems. However, it must be pointed out that the cost categories for ICC and IOC under the MLF refer to the manufacturing/installation of equipment only. In contrast, the EU study is not limited to the assessment of additional production cost of equipment. It intends to estimate the costs that arise to the operators of such equipment. These costs include not only the investment in new equipment but also the costs for its operation (*Schwarz et al.* 2011, Annexes IV, V¹).

In many cases, additional investment costs for new equipment are partly or even fully compensated by lower operational costs due to savings in energy consumption, in refrigerant costs, etc. As a consequence, the difference in total costs to operators is lower than the difference in investment costs for new equipment. In some cases, e.g. industrial refrigeration with ammonia (R-717), the total annual cost are lower for the alternative technology than for conventional HFC systems.

¹ http://ec.europa.eu/clima/policies/f-gas/studies_en.htm

Table 3-21: Cost impacts of alternative technologies from the EU F-gas study

Application	System type	HC-290/ HC-1270		R-744		R-717		HFC-1234yf	
		ICC	IOC	ICC	IOC	ICC	IOC	ICC	IOC
Comm refrig – cond units	Direct	+1%	+20% → 5% (2030)	+1%	+35% → 0% (2030)	n/a	n/a	+1%	35% → 0% (2030)
	Indirect	+1%	+35% → 0% (2030)	n/a	n/a	n/a	n/a	n/a	n/a
Comm refrig – central systems	Direct/ transcrit	n/a	n/a	Neg.	+25% → 0% (2030)	n/a	n/a	n/a	n/a
	Indirect (small)	Neg.	+30% → 0% (2030)	n/a	n/a	n/a	n/a	n/a	n/a
	Indirect (large)	Neg.	+15% → 0% (2020)	n/a	n/a	n/a	n/a	n/a	n/a
	CO2 sec (small)	Neg.	+50% → 0% (2030)	n/a	n/a	n/a	n/a	Neg.	+50% → 0% (2030)
	CO2 sec (large)	Neg.	+20% → 0% (2020)	n/a	n/a	n/a	n/a	Neg.	+20% → 0% (2020)
Industrial refrig	General	n/a	n/a	n/a		Neg.	+50%	n/a	
Air cond and heat pumps	Factory sealed	+0.5%	-1%	+0.5%	+20%	n/a	n/a	+0.5%	+6%
	air-to-air	+0.5%	-2%	+0.5%	+25%	n/a	n/a	+0.5%	+8%
	VRF	n/a	n/a	+1%	+20%	n/a	n/a	+1%	+12%
	ducted	n/a	n/a	+1%	+15%	n/a	n/a	+1%	+12%
Chillers	Small	+1 - +5%	+5%	+5 - +20%	+25%	+10 - +50%	+40%	+1 – 5%	+1%
	Large (incl centrif)	+1%	0%	++5%	+20%	+3 - +7%	+20%	+15%	+5%
Heat pumps	Heating only	+1%	+5%	+2%	+10%	n/a	n/a	+1%	+5%
