

Section No.	Details	Reference
1.1 Applications	<ul style="list-style-type: none"> <li>•Air Conditioning</li> <li>•Heat Pumping</li> <li>•Domestic Refrigeration</li> <li>•Commercial Refrigeration</li> <li>•Transport Refrigeration</li> <li>•Mobil Air Conditioning</li> <li>•Industrial and Food Processing</li> </ul>	
1.2 System Types	<ul style="list-style-type: none"> <li>•Single stage</li> <li>•Multi-stage</li> <li>•Cascade</li> <li>•2nd loop</li> <li>•VCC</li> <li>•ABS</li> </ul>	
1.3 System Lifetime		<ul style="list-style-type: none"> <li>•US: DOE, Buildings Energy Data Book (2011)</li> <li>•EU: D. Clodic, S. Barrault, 1990 to 2010 Refrigerants Inventories in EU, 2011.</li> <li>•Xia Wang. Life Cycle Assessment for Carbon Emission of Residential Building[D]. Tianjing University, 2012.</li> <li>•UNEP/TEAP report, 1999. "The Implications to the Montreal Protocol of the Inclusion of HFCs and PFCs in the Kyoto Protocol".</li> <li>•IPCC, 2007, Climate Change</li> <li>•IPCC, 2014, Climate Change</li> </ul>
1.4 Refrigerants		<ul style="list-style-type: none"> <li>•NIST Refprop V. 9.0</li> <li>•Brown S, 2012</li> <li>•IPCC, 2007, Climate Change</li> <li>•IPCC, 2014, Climate Change</li> </ul>
1.5 GWP (100 Yrs.H)		<ul style="list-style-type: none"> <li>•UNEP, 2010 TOC Report</li> <li>•IPCC, 2007, Climate Change</li> <li>•IPCC, 2014, Climate Change</li> </ul>
1.6 Charge		<ul style="list-style-type: none"> <li>• ICF Consulting for U.S. EPA's Stratospheric Protection Division. (2005). Revised Draft Analysis of U.S. Commercial Supermarket Refrigeration Systems.</li> <li>• ICF International, Prepared for the U.S. Environmental Protection Agency. (2009). The U.S. Phaseout of HCFCs: Projected Servicing Needs in the U.S. Air-Conditioning and Refrigeration Sector.</li> <li>• Saba, S., Slim, R., Palandre, L., and Clodic, D. (2009). Inventory of Direct and Indirect GHG Emissions from Stationary Air Conditioning and Refrigeration Sources, with Special Emphasis on Retail Food Refrigeration and Unitary Air Conditioning.</li> <li>• Arthur D. Little for the account of the Alliance for Responsible Atmospheric Policy. (2002). Global Comparative Analysis of HFC and Alternative Technologies for Refrigeration, Air Conditioning, Foam, Solvent, Aerosol Propellant, and Fire Protection Applications: Final Report .</li> <li>• Godwin, D. S., Van Pelt, M. M., &amp; Peterson, K. (2003). Modeling Emissions of High Global Warming Potential Gases. 12th Annual Emission Inventory Conference: Emission Inventories-Applying New Technologies</li> <li>• EU: D. Clodic, S. Barrault, 1990 to 2010 Refrigerants Inventories in EU, 2011.</li> </ul>

Section No.	Details	Reference
2.1 Location (City, Country)	Cities listed in weather database	<ul style="list-style-type: none"> <li>•S. Wilcox and W. Marion, Users Manual for TMY3 Data Sets, Technical Report: NREL/TP-581-43156, May 2008.</li> <li>•Designer's Simulation Toolkit (DeST)</li> </ul>
2.2 Climate Data	Weather Data: weather database	<ul style="list-style-type: none"> <li>International Energy Agency, <a href="http://data.iea.org/ieastore/product.asp?dept_id=101&amp;pf_id=305">http://data.iea.org/ieastore/product.asp?dept_id=101&amp;pf_id=305</a>.</li> <li>•S. Wilcox and W. Marion, Users Manual for TMY3 Data Sets, Technical Report: NREL/TP-581-43156, May 2008.</li> </ul>
2.3 Utility Emission Rate		<ul style="list-style-type: none"> <li>•IEA, CO<sub>2</sub> Emissions from Fuel Combustion - 2011 Highlights</li> <li>•NERC, North American Electrical Grid Interconnections, 2007</li> <li>•NREL, 2011, Hourly Energy Emission Factors for Electricity Generation in the United States, Open Energy Info.</li> <li>•Energy Data Sources, U. S. Department of Energy, Feb. 2014</li> <li><a href="http://apps1.eere.energy.gov/buildings/energyplus/weatherdata_sources.cfm">http://apps1.eere.energy.gov/buildings/energyplus/weatherdata_sources.cfm</a>.</li> <li>•2010 Baseline Emission Factors for Regional Power Grids in China</li> <li>•China Electric Power Yearbook 2012</li> </ul>
2.4 Load Profile	AC/HP	<ul style="list-style-type: none"> <li>•AHRI Standard 210/240, Performance Rating of Unitary AC &amp; Air-source HP Equipment, 2008</li> <li>•ASHRAE Handbook - Fundamentals, 2013</li> <li>•Hourly load simulation tools: EnergyPlus and TRNSYS</li> <li>•Designer's Simulation Toolkit (DeST)</li> </ul>

Section No.	Details	Reference
3.1 Regular Emissions	Annual operating	IPCC, 2006, Guidelines for National Greenhouse Gas Inventories US: ADL, 2002, Global Comparative Analysis of HFC and Alternative EU: D. Clodic, S. Barrault, 2011, 1990 to 2010 Refrigerants Inventories in EU Japan: JRAIA, 2004, LCCP of Some HVAC&R Applications in Japan IIR Informatory Note 24 on Refrigeration Technology, 2014 2006 IPCC Guidelines for National Greenhouse Gas Inventories
3.2 Irregular Emissions		IIR Informatory Note 24 on Refrigeration Technology, 2014
3.3 Service Emission	Installation	IPCC, 2006, Guidelines for National Greenhouse Gas Inventories
	Repair service	IIR Informatory Note 24 on Refrigeration Technology, 2014
3.4 End-of-Life Emission	Remaining	IPCC, 2014, Climate Change IPCC, 2007, Climate Change UNEP, 2003c: 2002 Report of the Refrigeration, Air Conditioning and Heat Pumps Technical Options Committee – 2002 IPCC, 2006, Guidelines for National Greenhouse Gas Inventories
	Recovery	IPCC, 2006, Guidelines for National Greenhouse Gas Inventories EU: D. Clodic, S. Barrault, 2011, 1990 to 2010 Refrigerants Inventories in EU
3.5 Leakage during Production & Transport		Johnson, C., 2004, Earth Technologies Forum, U.S. EPA.
3.6 Decomposition		Weckert, W., 2008, D-NS, Thesis
Adaptive GWP		<ul style="list-style-type: none"> <li>Baral, A, Minjares, R., and Urban, R., Upstream Climate Impacts from Production of R-134a and R-1234yf refrigerants used in Mobile Air Conditioning Systems. International Council on Clean Transportation, Aug. 2013.</li> <li>Methodology for Ecodesign of Energy-Related Products, MEErP 2011 Methodology Report Part 2: Environmental Policies and Data, Prepared for the European Commissions, 2011</li> </ul>

Section No.	Details	Reference
4.1 Energy Consumption of the System		<ul style="list-style-type: none"> <li>• ISO 13612-2: 2014</li> <li>•Zhaojian Li. Study on the Life Cycle Consumption of Energy and Resouce of Air Conditoning in Urban Residential Building in China[D]. Tsinghua University, 2007</li> <li>• ANSI/AHRI Standard 210/240 with Addenda 1 and 2 2008.</li> </ul>
4.2 Energy to Make Components/System		Johnson, C., 2004, Earth Technologies Forum, U.S. EPA
	Steel	-Steel's Contribution to a Low Carbon Future: WorldSteel Position Paper. 2014 World Steel Association.
	Aluminum	-U.S. Energy Requirements for Aluminum Production BCS Report prepared for DOE, Feb 2007.
		-International Aluminum Institute, "Global Life Cycle Inventory Data for the Primary Aluminum Industry: 2010 Data. World Aluminum, August 2013.
	Copper	-"The Environmental Profile of Copper Products: A Cradle to Gate Life-Cycle Assessment for Copper Tube, Sheet and Wire Produced in Europe.", European Copper Institute Copper Alliance, 2012.
	Plastic	-Franklin Associates report prepared for the American Chemistry Council , July 2014, "Cradle-To-Gate Life Cycle Inventory of Nine Plastic Resins and Four Polyurethane Precursors".
-EPA "Plastics" U. S. Environmental Protection Agency, Waste Reduction Model Version 13. June 2014.		
Recycling	-EPA, "Metals." U. S. Environmental Protection Agency, Waste Reduction Model Version 13. June 2014.	
	-EPA, "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2012." U. S. Environmental Proection Agency. 2012.	
		•Zhaojian Li. Study on the Life Cycle Consumption of Energy and Resouce of Air Conditoning in Urban Residential Building in China[D]. Tsinghua University, 2007
4.3 Energy to Produce & Transport Refrigerant	Embodied energy	<ul style="list-style-type: none"> <li>• Johnson, C., 2004, Earth Technologies Forum, U.S. EPA</li> <li>• China Statistical Yearbook 2008</li> <li>• Zhaojian Li. Study on the Life Cycle Consumption of Energy and Resouce of Air Conditoning in Urban Residential Building in China[D]. Tsinghua University, 2007</li> <li>• Weckert, W., 2008, D-NS, Thesis</li> </ul>
4.4 Energy to Produce & Transport Components/System		<ul style="list-style-type: none"> <li>• Weckert, W., 2008, D-NS, Thesis</li> <li>• Zhaojian Li. Study on the Life Cycle Consumption of Energy and Resouce of Air Conditoning in Urban Residential Building in China[D]. Tsinghua University, 2007</li> </ul>
4.5 Energy for End-of-Life, Recycling/Recovery of System and Refrigerant		<ul style="list-style-type: none"> <li>• Weckert, W., 2008, D-NS, Thesis</li> <li>• Stratus Engineering, 2010, Analysis of Equipment and Practices in the Reclamation Industry, Draft Report For EPA.</li> <li>-EPA, "Metals." U. S. Environmental Protection Agency, Waste Reduction Model Version 13. June 2014.</li> <li>-EPA, "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2012." U. S. Environmental Proection Agency. 2012.</li> </ul>
		<p>Hill, W., Papisavva, S., 2005. "Life Cycle Analysis Framework; a Comparison of HFC-134a, HFC-134a Enhanced, HFC-152a, R744, R744 Enhanced, and R290 Automotive Refrigerant Systems". SAE Technical Series Paper, 2005-01-1511, Society of Automotive Engineers, Warrendale, PA.</p> <p>"IIR-LCCP-EmissionsDatabase_Version1.exp" University of Maryland Department of Mechanical Engineering ACTA Consortium. 2014.</p> <ul style="list-style-type: none"> <li>• Zhaojian Li. Study on the Life Cycle Consumption of Energy and Resouce of Air Conditoning in Urban Residential Building in China[D]. Tsinghua University, 2007</li> </ul>