

Assessing the Total Cost of Ownership for Cold Chain Equipment

April 2016

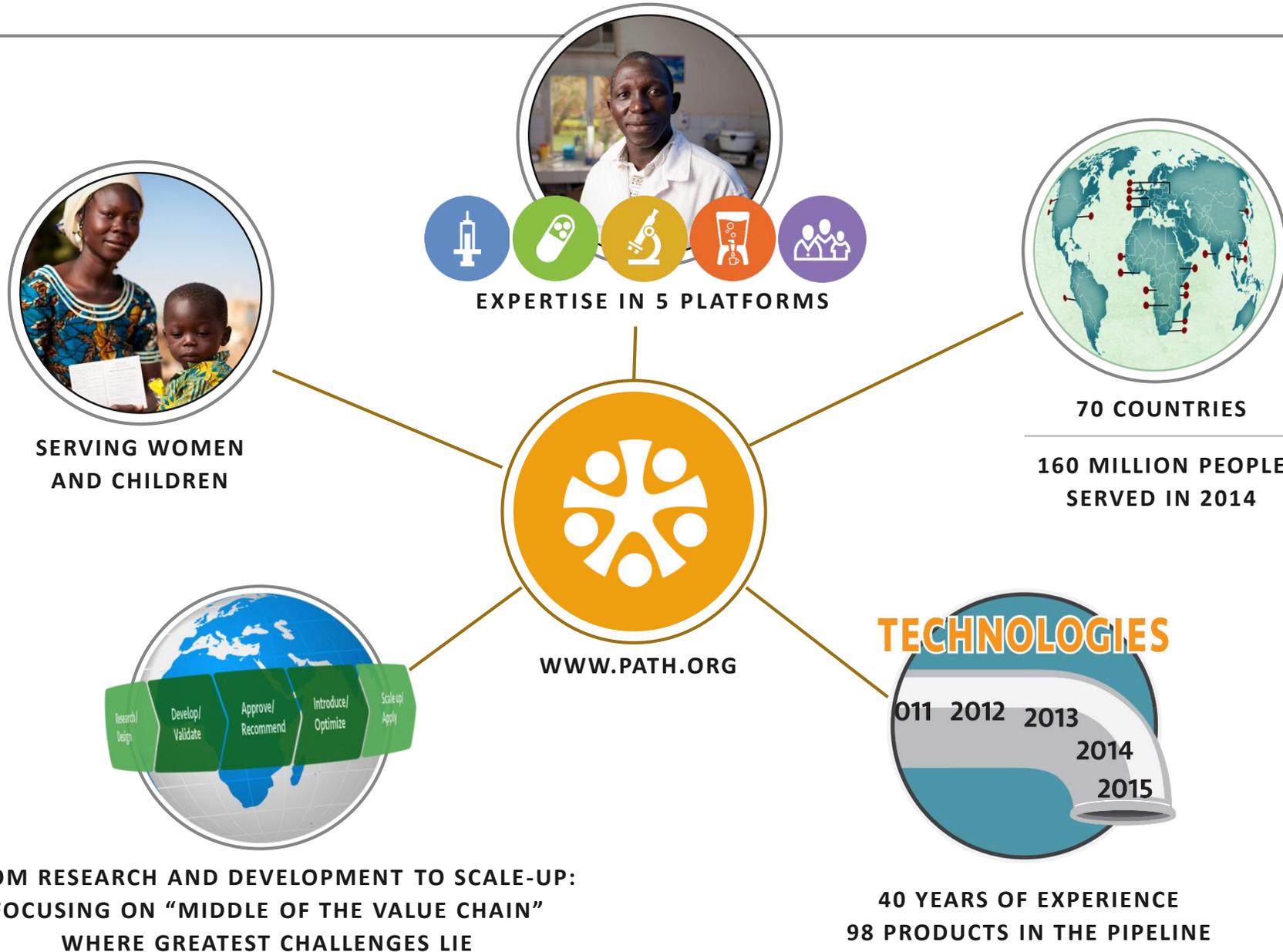
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Overview

- Background on PATH and our work in vaccine and pharmaceutical technologies.
- Introduction to the PATH Total Cost of Ownership (TCO) tool.
- A three-step approach to understanding TCO.

PATH: Accelerating global health innovation



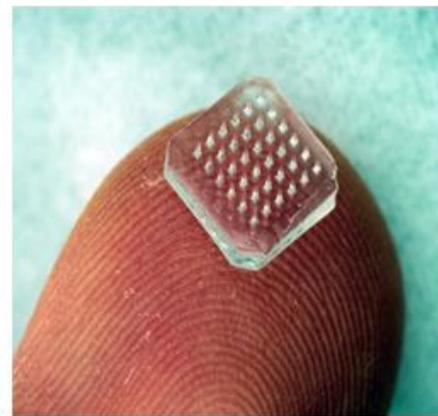
PATH's work in vaccine and pharmaceutical technologies

Our mission

To advance vaccine and pharmaceutical product and system innovations that reduce costs, ease logistics, improve safety, expand coverage, and maximize public health impact in low-resource settings.

Our approach

- Three interrelated yet thematically unique technical portfolios:
 - **Formulation and Stabilization Technologies.**
 - **Packaging and Delivery Technologies.**
 - **Supply Systems and Equipment.**



You recognize the need for new cold chain equipment—now what?

How can you:

- Become aware of available World Health Organization PQS prequalified cold chain equipment solutions?
- Evaluate or compare cold chain equipment costs and operating costs over time?
- Budget or plan for continued operation of new cold chain equipment?

Solution:

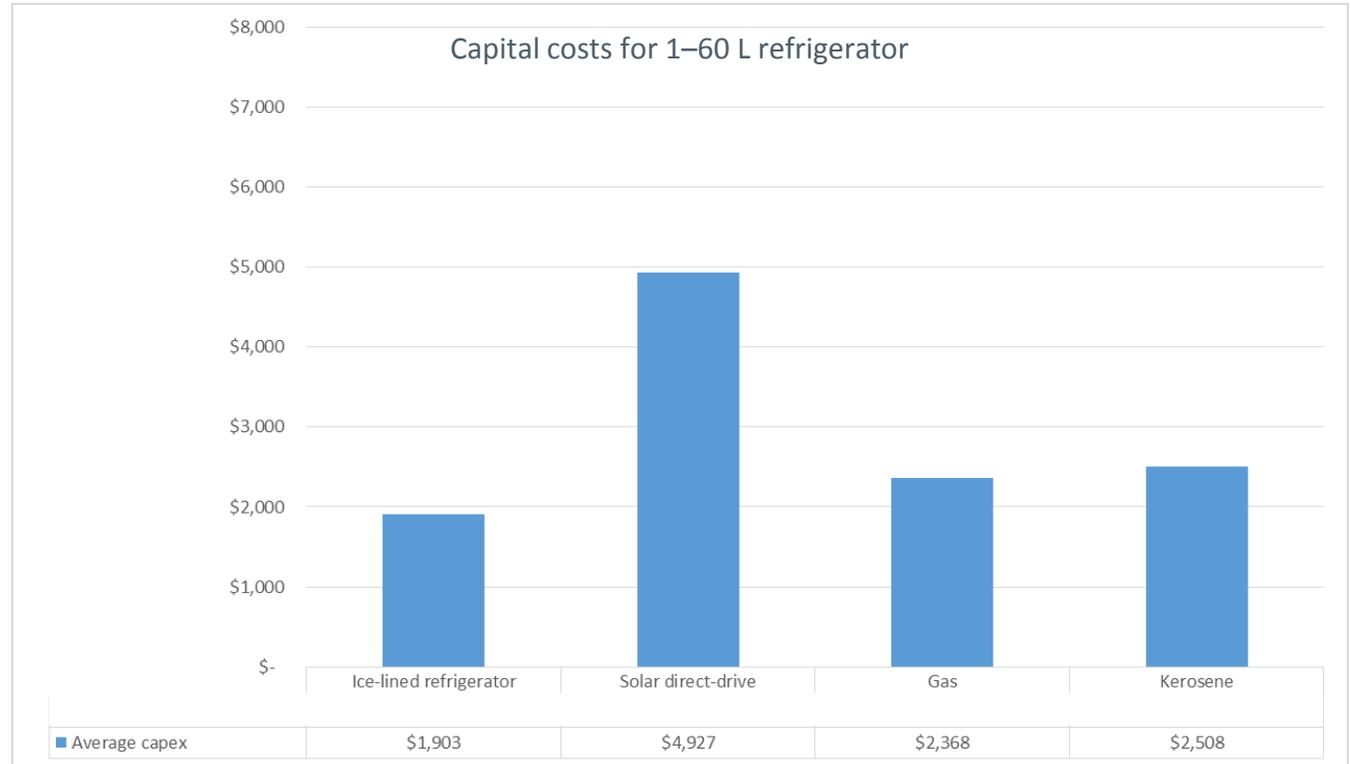
The PATH Total Cost of Ownership tool

What is total cost of ownership?

Total cost of ownership refers to all costs associated with owning and operating a unit of equipment over its useful life expectancy.

This includes:

- **Capital costs—**
The up-front unit price for equipment (as well as installation costs and spare parts).

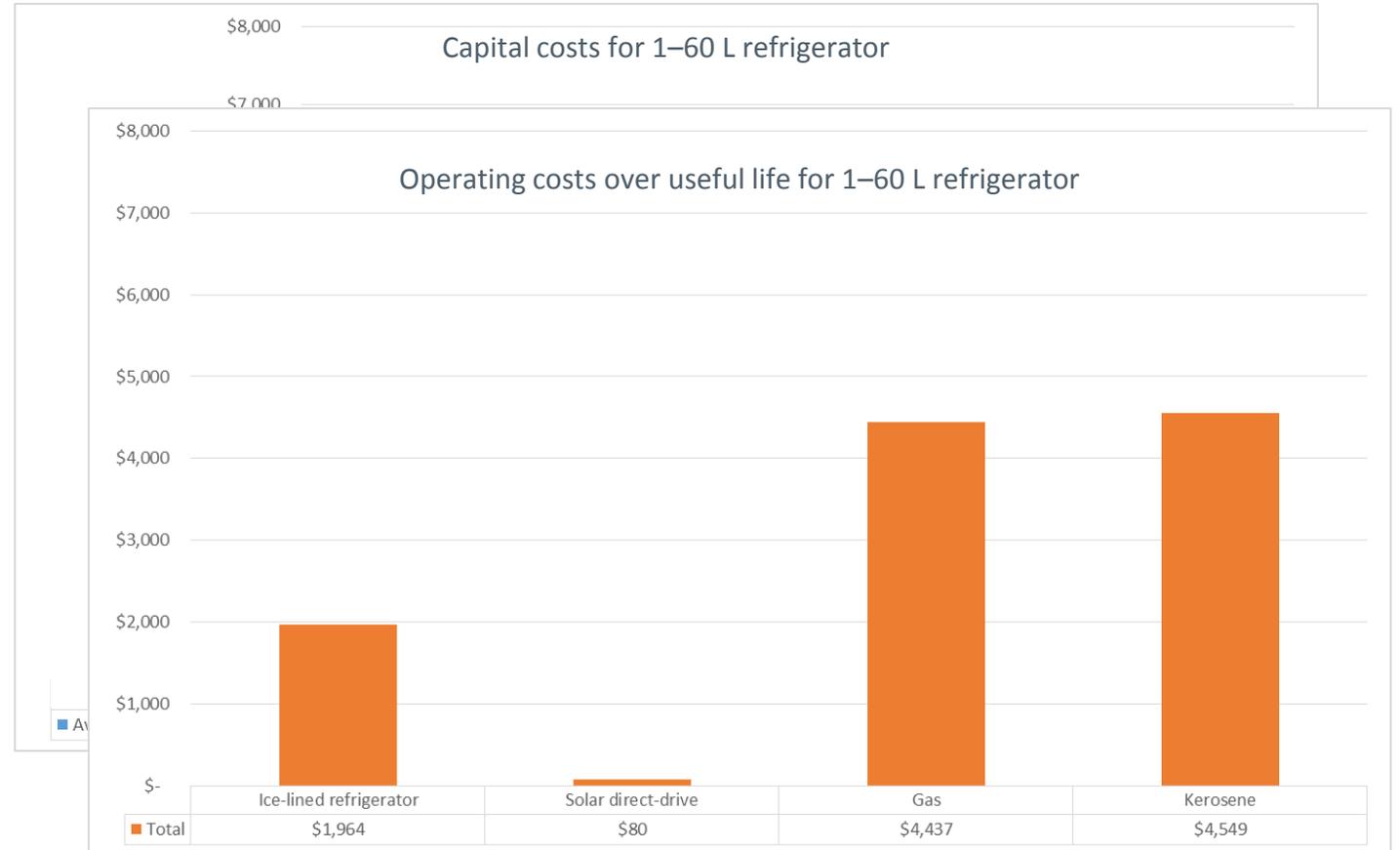


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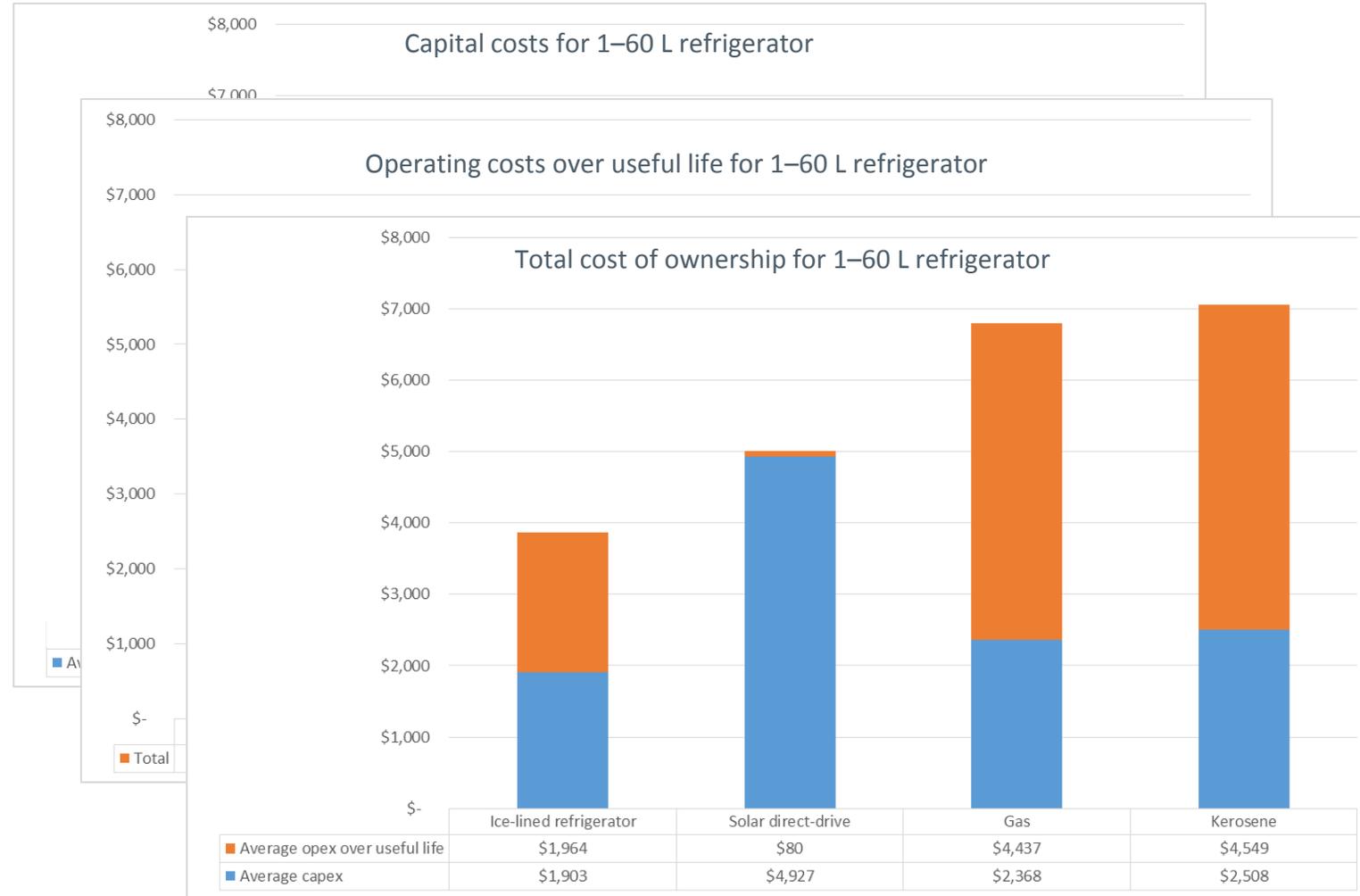


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- **Recurring operating expenses—**
The ongoing costs for energy or fuel, planned maintenance, and equipment repairs over the useful life.
- The **combination of capital costs** for equipment (capex) and **recurring operating costs** (opex) over the expected useful life of a CCE unit.



The PATH Total Cost of Ownership tool

Includes:

- Database of 87 CCE models.
 - 79 are PQS prequalified through PQS categories E001, E003, and E004.
- Country-specific inputs for localized costs (e.g., energy and labor).
- Need- and facility-based analysis for understanding optimal solutions, not just equipment comparisons.

The screenshot shows the website for the PATH Cold Chain Equipment Total Cost of Ownership Tool. At the top left is the PATH logo. To its right, a blue header bar contains the text "COLD CHAIN EQUIPMENT TOTAL COST OF OWNERSHIP TOOL". In the top right corner, the version "version 1.0.5" is noted. Below the header, there is a paragraph of instructions: "Instructions for use are located in the Overview & Instructions worksheet as well as in each of the black-colored worksheets. Please be sure to **enable macros before using** or the tool will not function properly. [Click for Google instructions](#). To check for the latest update of the Total Cost of Ownership (TCO) tool, click the link to compare versions. [TCO tool website](#)".

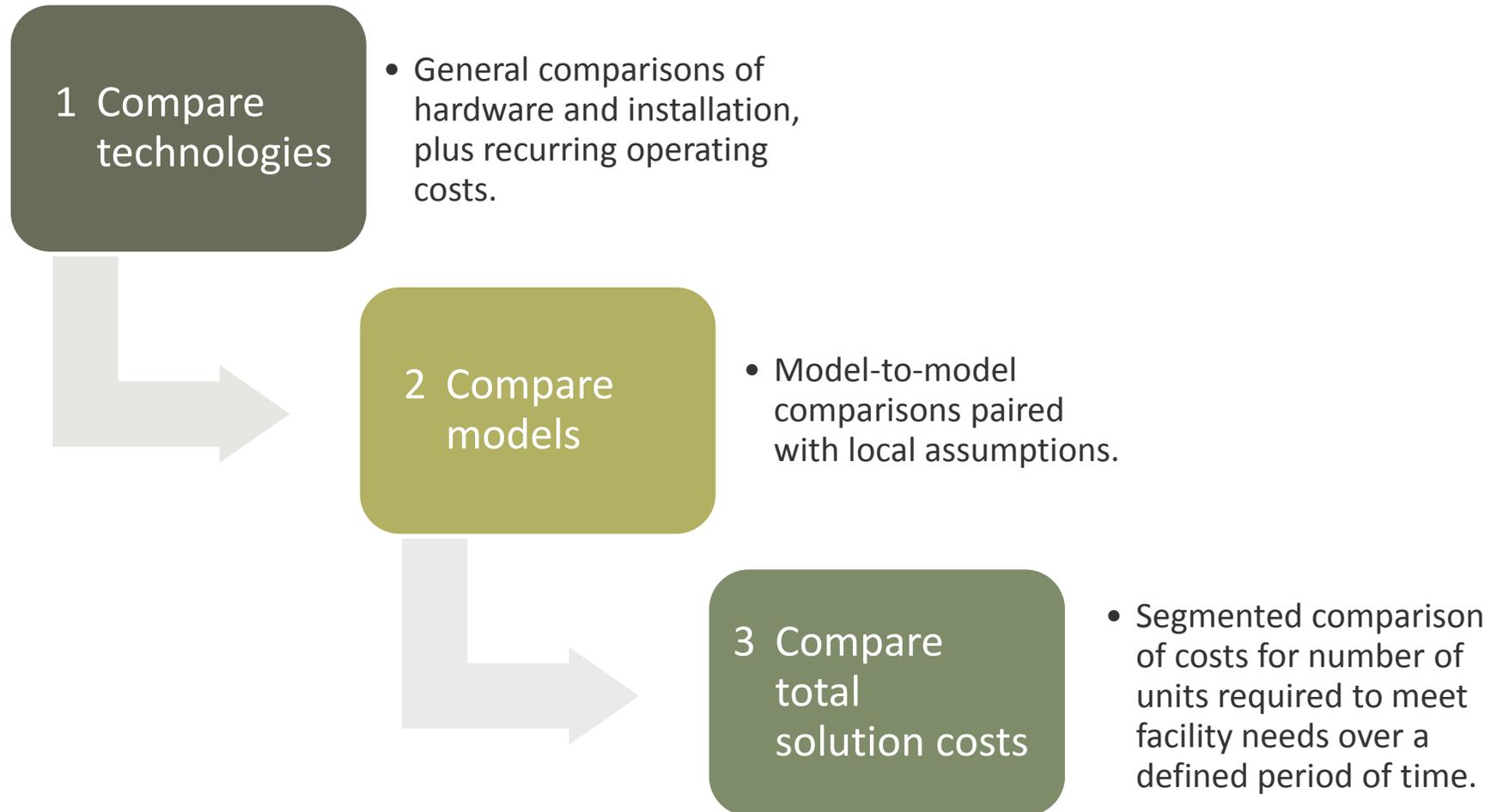
Below the instructions are three sections of quick links:

- Quick links:** Overview, Instructions, Acronyms, FAQ, CCE decision tree, Comparison tools, Total solution cost.
- Country/local assumptions:** Country and segment input and assumptions, Labor, maintenance, and installation assumptions.
- Technology/model assumption worksheets:** Cold room/freezer room, Ice-lined refrigerator, Freezer, Solar direct drive refrigerator, Long-term passive storage device, Solar w/battery, Gas refrigerator, Kerosene refrigerator.

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At the bottom right, a grey box contains the following text: "PATH thanks and acknowledges the following individuals and organizations for their contributions to the development of the tool: James Cheyne, Terry Hart, Tory Hart, John Lloyd, Steve McCarney, Soren Spanner, the World Health Organization, the United Nations Children's Fund, and Clinton Health Access Initiative. This work was conducted by PATH and supported in whole or part by a grant from the Bill & Melinda Gates Foundation. The views expressed herein are solely those of the authors and do not necessarily reflect the views of the Foundation."

A three-step approach to understanding total cost of ownership



Step 1. Compare technologies

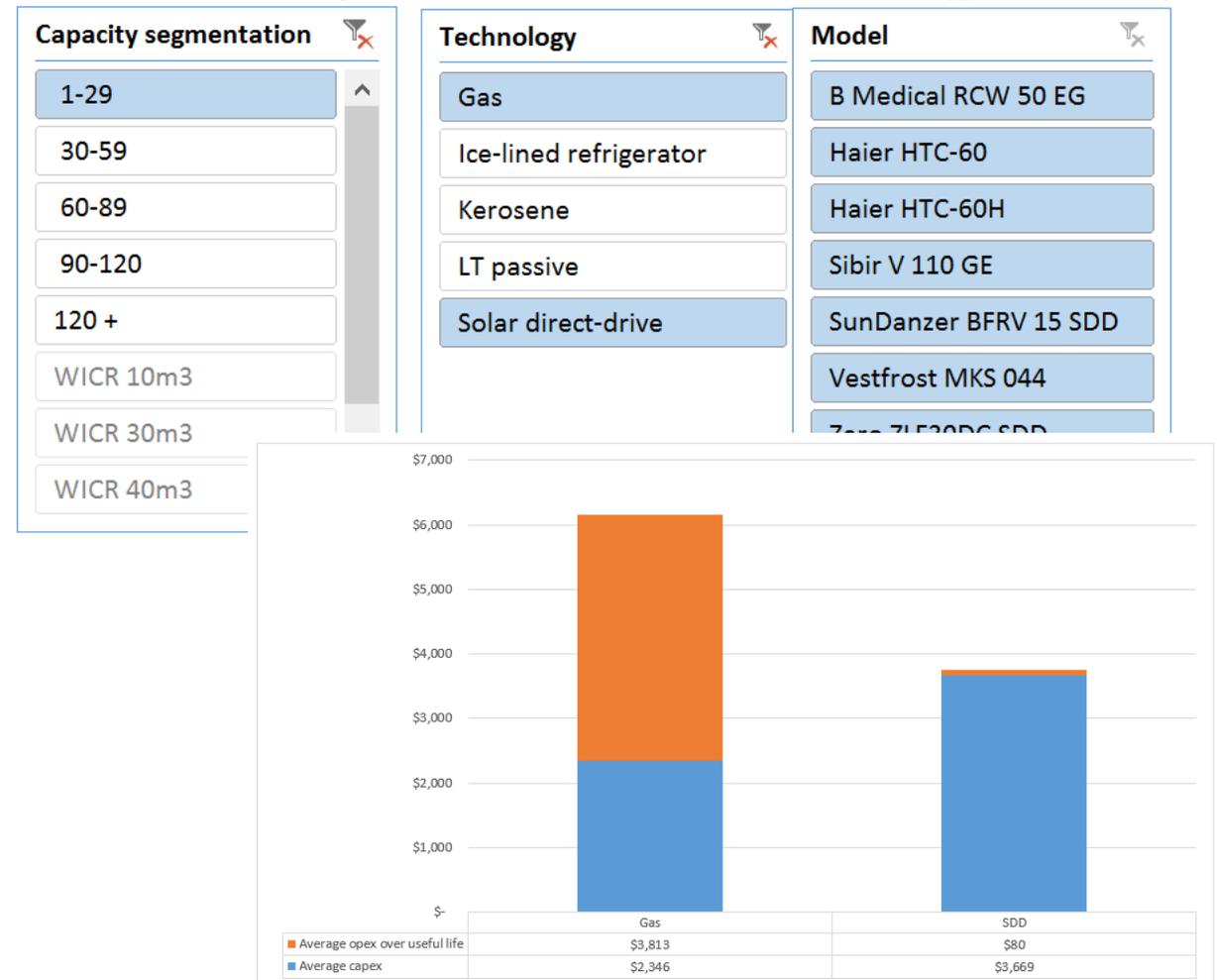
Country X wants to understand the cost differences between their existing LPG absorption refrigerators and SDD refrigerators as they prepare a recommendation for procurement. They have identified the need for 15–25 L of capacity per refrigerator, off-grid.

Steps:

- Select the comparison worksheet.

Comparisons ==> **TCO Comparison** Cost per Liter Comparison Opex Comparison

- Use the filters to select capacity and technology in comparison worksheets.
- Compare technology TCO.



Step 2. Compare models

Country X now wants to look at a breakdown of the different SDD refrigerator options.

- Step: Expand the selection in the table to view and compare TCO for SDD models.

Total cost comparison over useful life (per unit)

Capacity segmentation

- 1-29
- 30-59
- 60-89
- 90-120
- 120 +
- WICR 10m3
- WICR 30m3
- WICR 40m3

Technology

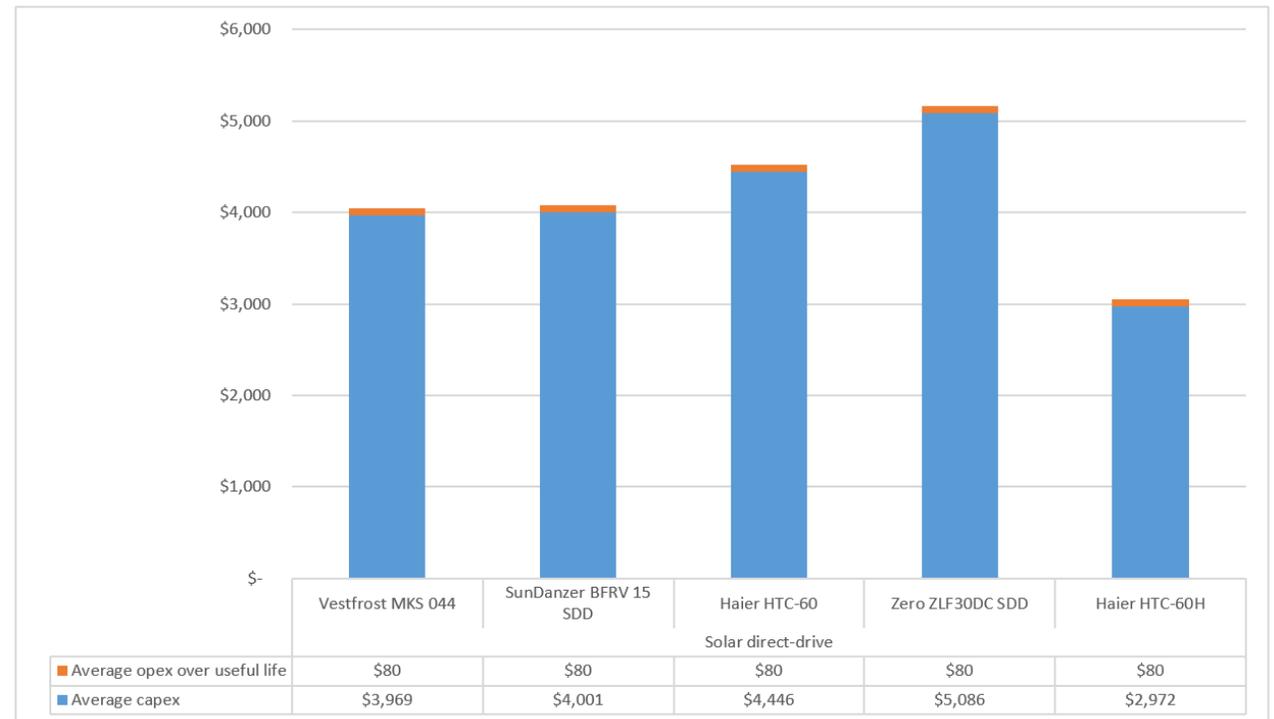
- Gas
- Ice-lined refrigerator
- Kerosene
- LT passive
- Solar direct-drive

Model

- Haier HTC-60
- Haier HTC-60H
- SunDanzer BFRV 15 SDD
- Vestfrost MKS 044
- Zero ZLF30DC SDD

To expand a technology to look at models, click on the plus (+) button below

Row Labels	Average capex	Average opex over useful life	Total cost of ownership
Solar direct-drive	\$ 4,095	\$ 80	\$ 4,175
Vestfrost MKS 044	\$ 3,969	\$ 80	\$ 4,049
SunDanzer BFRV 15 SDD	\$ 4,001	\$ 80	\$ 4,081
Haier HTC-60	\$ 4,446	\$ 80	\$ 4,526
Zero ZLF30DC SDD	\$ 5,086	\$ 80	\$ 5,166
Haier HTC-60H	\$ 2,972	\$ 80	\$ 3,052



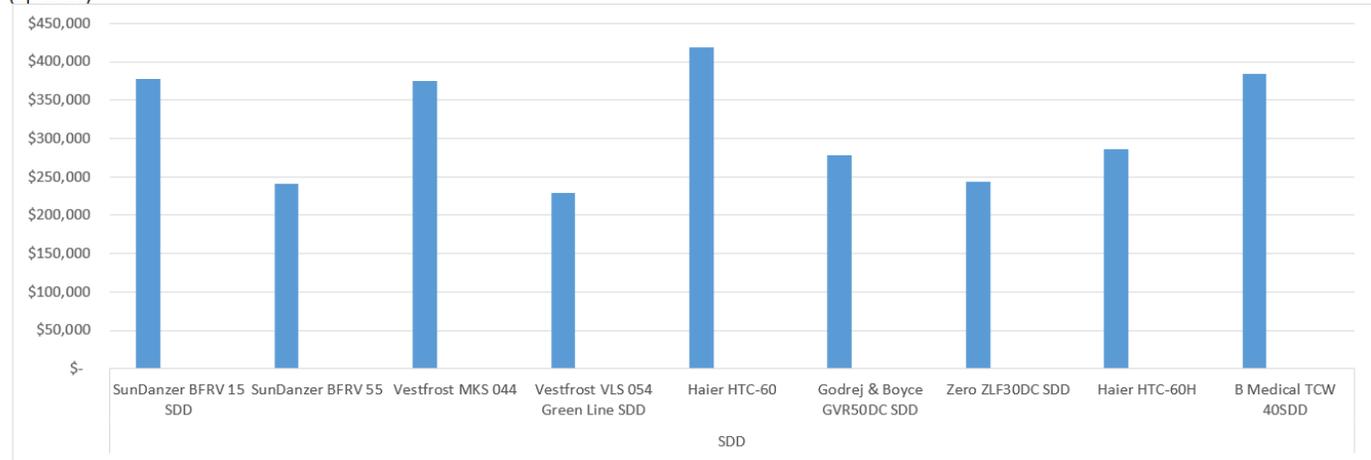
Step 3. Total solution costs output example

- Compare total costs in context of country needs

Total solution costs over forecasted years

Forecast horizon **10** <-- Select number of years to calculate (up to 20)

Capacity segmentation	Technology	Model
1-29	Gas	B Medical TCW 40S...
30-59	ILR	Godrej & Boyce GV...
60-89	Kerosene	Haier HTC-60
90-120	LT passive	Haier HTC-60H
120 +	SDD	SunDanzer BFRV 15 ...
	Solar w/battery	SunDanzer BFRV 55
		Vestfrost MKS 044
		Vestfrost VLS 054 G...



Cold chain level (segmentation) evaluated
 Number of facilities to equip
 Needed storage volume per facility

User-defined field
45
25.3

When selecting a capacity segment, it may be useful to select the next larger segment as well to compare costs for larger equipment.

Technology/Model	Solution Cost	Number of Units required	Useful life (years)	Unit price	Opex per year	TCO per unit	Net vaccine capacity (liters)	Gross freezer capacity (liters)	Operating range (°C)	Holdover (hours)	Shipping weight (kg)	Dimensions	TechNet review
SDD	\$ 314,832	65	10										
SunDanzer BFRV 15 SDD	\$ 378,250	90	10	\$ 2,440	\$ 8	\$ 4,203	15	0	5 to 43	107.48	147	77 x 69 x 59.5	BFRV 15 SDD Review
SunDanzer BFRV 55	\$ 240,849	45	10	\$ 3,235	\$ 8	\$ 5,352	55	0	5 to 43	65.16	218	88 x 96.5 x 71	BFRV 55 Review
Vestfrost MKS 044	\$ 375,407	90	10	\$ 2,396	\$ 8	\$ 4,171	20	0	20 to 32	114	88	87.6 x 72.7 x 69.7	MKS 044 Review
Vestfrost VLS 054 Green Line SDD	\$ 229,211	45	10	\$ 3,043	\$ 8	\$ 5,094	56	0	5 to 43	79.4	85	85 x 72 x 60	VLS 054 Green Line SDD Review
Haier HTC-60	\$ 418,310	90	10	\$ 2,750	\$ 8	\$ 4,648	21	0	10 to 32	119.42	98	78.8 x 65.4 x 87.5	HTC-60 Review
Godrej & Boyce GVR50DC SDD	\$ 278,550	45	10	\$ 4,070	\$ 8	\$ 6,190	47	0	10 to 43	83	240	121.5 x 79.5 x 75	GVR50DC SDD Review
Zero ZLF30DC SDD	\$ 243,449	45	10	\$ 2,950	\$ 8	\$ 5,410	27	0	5 to 32	87.2666667	65	102.5 x 56 x 60	N/A
Haier HTC-60H	\$ 285,705	90	10	\$ 1,380	\$ 8	\$ 3,175	21	0	5 to 43	109.35	110	78.8 x 65.4 x 87.5	N/A
B Medical TCW 40SDD	\$ 383,759	45	10	\$ 6,121	\$ 8	\$ 8,528	36	4.8	5 to 43	93.4	120	78 x 103 x 90	TCW 40SDD Review

Thank you

To download the most recent version of the tool in English or French, please visit:

www.path.org/publications/detail.php?i=2576

Questions, feedback, and suggestions?

Contact Matt Morio at mmorio@path.org

Business Analytics Officer

PATH

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