

# Microsimulation-Based Cost Effectiveness Analysis of Integrated Cardiometabolic Health Screening in the United Kingdom, Germany, France, and Australia

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## Objectives

Cardiovascular, renal, and metabolic (CVRM) diseases are clinically interdependent, yet policies addressing these conditions are often developed in isolation, limiting overall effectiveness. The objective of this study was to develop an epidemiologic and economic model to estimate the clinical, economic, societal and environmental impact of integrated cardiometabolic health screening programs in Australia (AU), France (FR), Germany (DE) and the United Kingdom (UK), with the aim of informing policy recommendations.

## Methods

A discrete-time, patient-level microsimulation model was constructed to evaluate the impact of cardiometabolic health screening to assess screening effects on disease progression and healthcare resource use/costs. Inputs were derived from a targeted literature review and a steering committee. Dynamic risk equations, multimorbidity interactions, and annual health-state transitions were incorporated within synthetic/nationally representative cohorts with an assumed baseline screening rate for each country (UK/FR/AU at 9% & DE at 34.3%) and 80% of those diagnosed being treated and presented in US\$ (USD). Outcomes included events avoided, cost savings, and societal/environmental benefits.

## Results

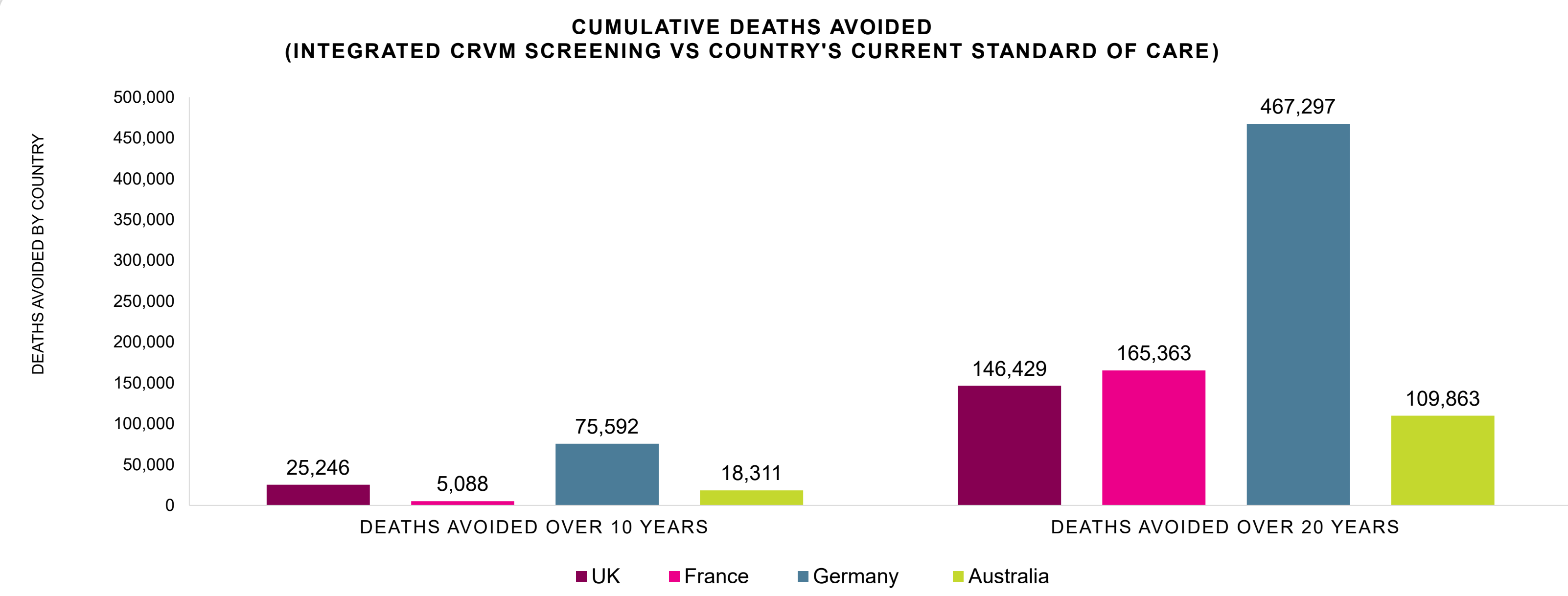


Figure 1: Cumulative Deaths Avoided by country: 10 & 20 Year Time Horizon

Figure 1 highlights cumulative deaths avoided by country over 10- and 20-years—positioning integrated cardiometabolic screening as a high-impact intervention on mortality versus each country's current standard of care. With an increased screening rate (25%) over baseline, the deaths avoided at a 20-year horizon increase to an estimated: UK-169,150; FR-190,803; DE-549,761; AU-128,174.

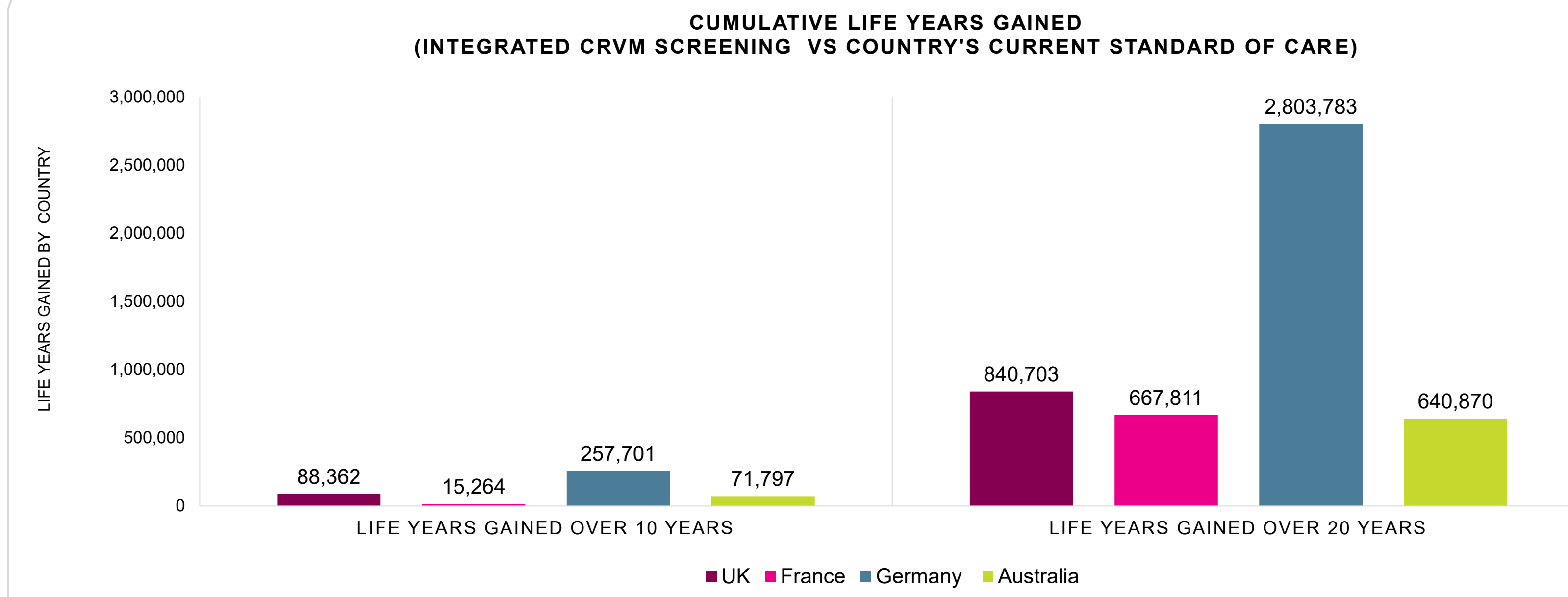


Figure 2: Cumulative Life Years Gained by country: 10 & 20 Year Time Horizon

Figure 2 reports cumulative life years gained by country over 10- and 20-years with the implementation of a comprehensive CVRM screening program when compared to each country's current standard of care, indicating that integrated screening improves survival and extends life expectancy through earlier identification and treatment optimization across cardiometabolic and renal conditions. Screening at 25% above baseline, increases the cumulative life years at 20 years to an estimated: UK-925,278; FR-769,573; DE-3,095,844; AU-756,998.

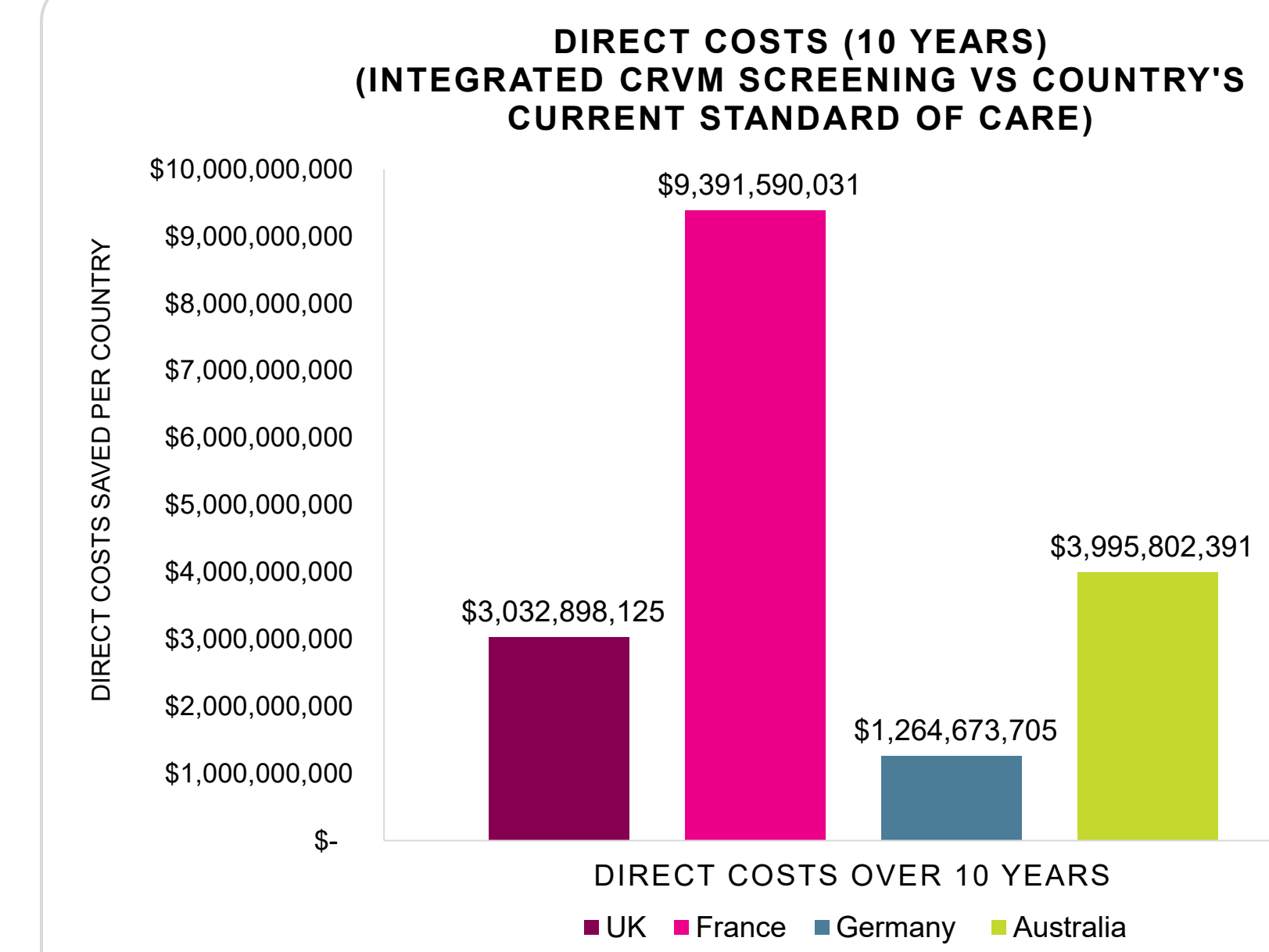


Figure 3a: Direct Costs in USD by Country: 10 Year Time Horizon

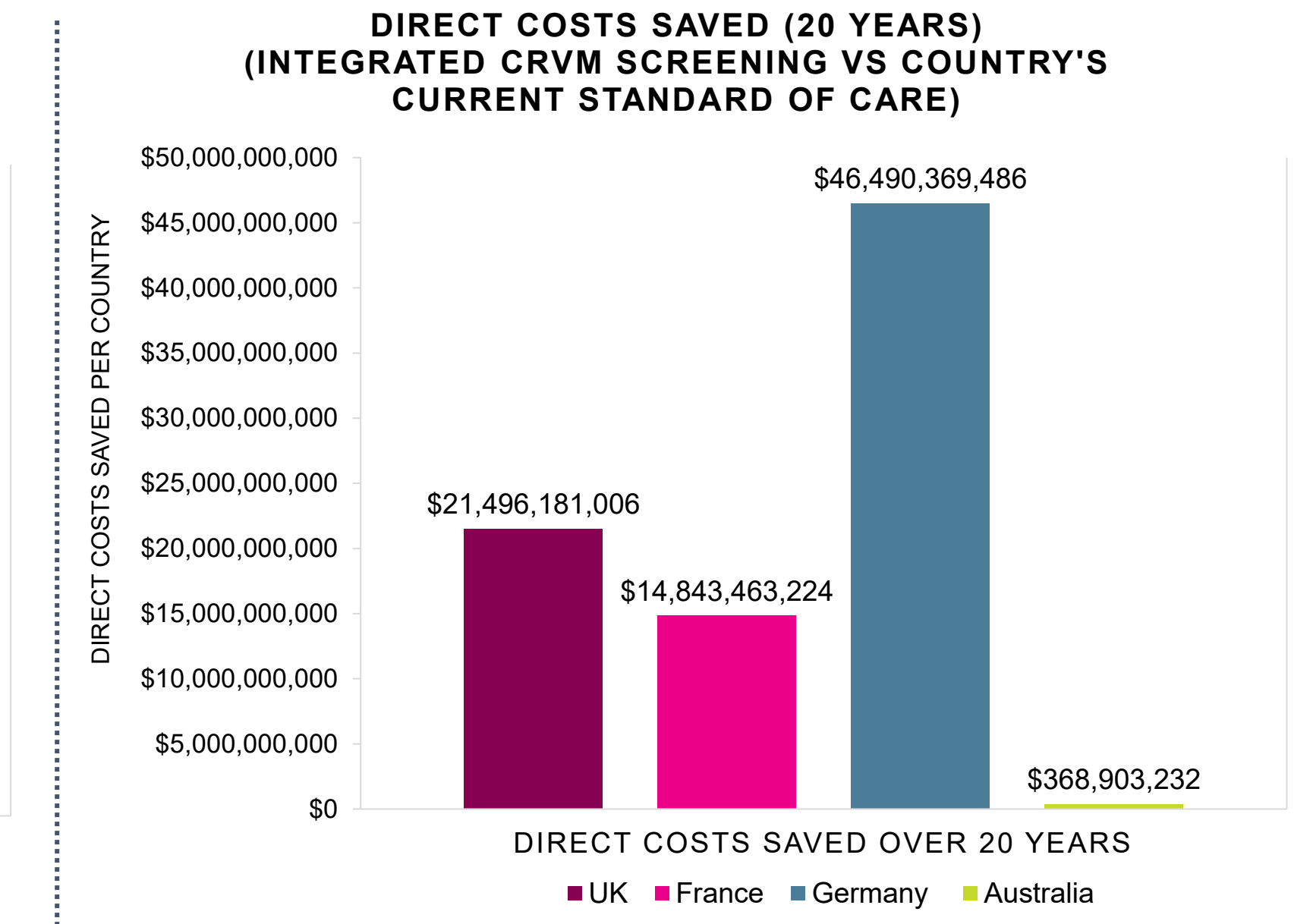


Figure 3b: Direct Costs Saved in USD by Country: 20 Year Time Horizon

Figures 3a and 3b highlight the estimated 10-year direct costs and 20-year direct costs saved by country if a comprehensive CVRM screening approach is implemented versus current screening standard of care, illustrating how integrated screening changes healthcare spending via avoided events and altered care pathways which are key drivers for cost-effectiveness and budget-impact interpretation. A 25% increase over baseline screening adjusts the direct costs saved at 20 years to an estimated: UK-\$26.16 billion; FR-\$18.93 billion; DE- \$44.89 billion; AU-\$1.24 billion.

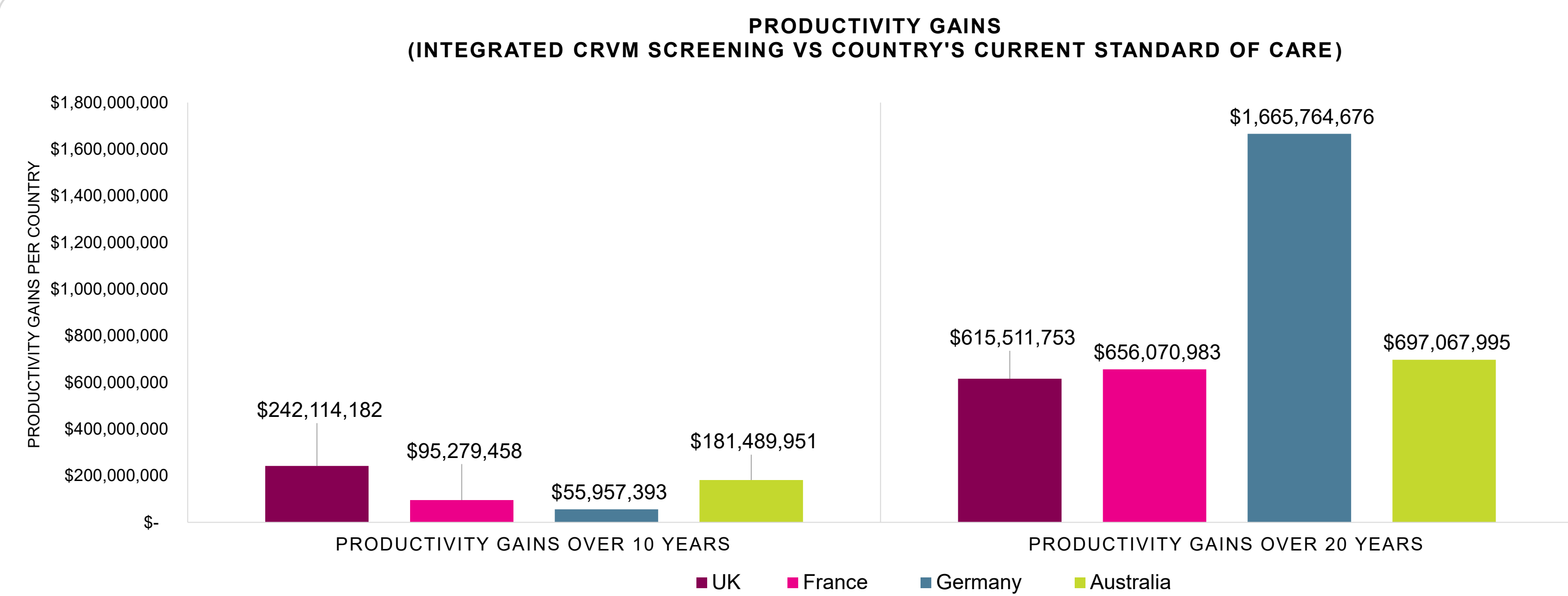


Figure 4: Productivity Gains in USD by Country: 10 & 20 Year Time Horizon

Figure 4 quantifies productivity gains by country over 10- and 20-years comparing a comprehensive CVRM screening program versus each country's current screening standard of care, supporting a broader value perspective by estimating non-healthcare benefits associated with avoided morbidity and improved functioning in working-age populations. At 20 years, an increase of the screening rate by 25%, adjusts the estimated productivity gains to: UK-\$677 million; FR-\$704 million; DE- \$1.49 billion; AU-\$729 million.

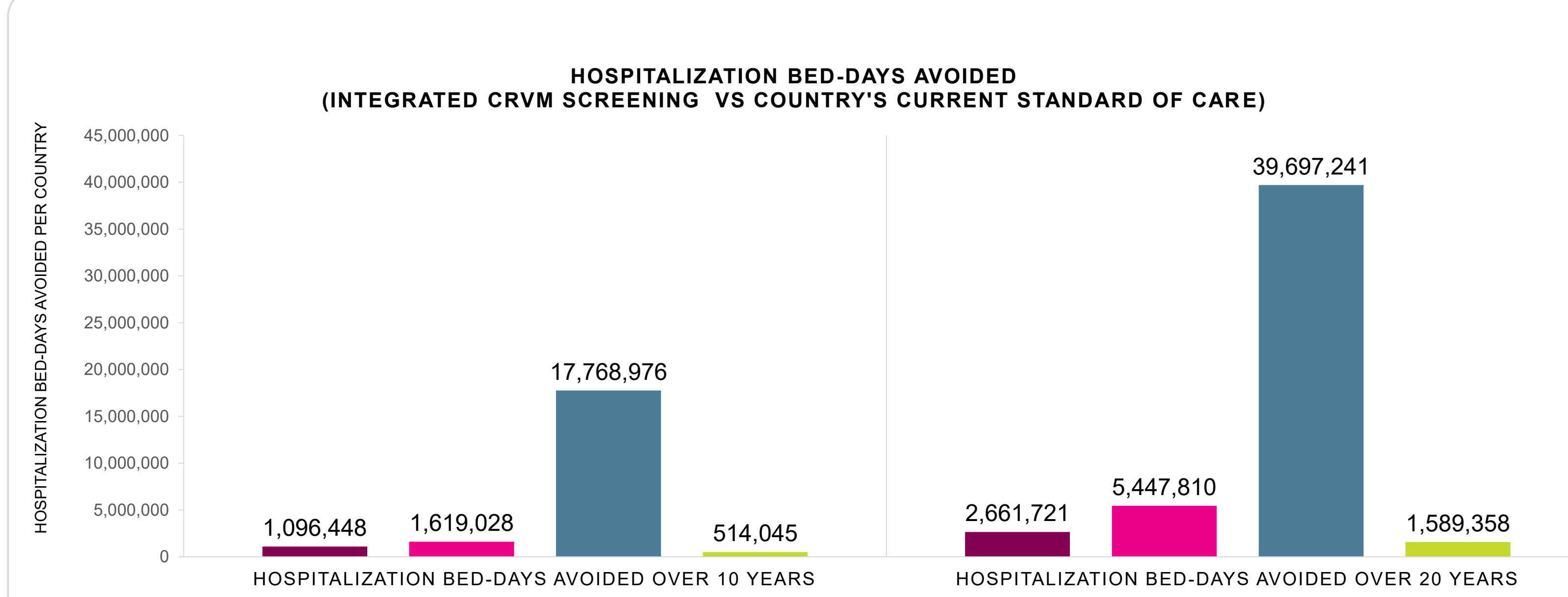


Figure 5: Hospitalization bed-days avoided by Country: 10 & 20 Year Time Horizon

Figure 5 presents hospitalization bed-days avoided by country over 10- and 20-years based upon the implementation of a comprehensive screening versus to each country's current screening standard of care, translating clinical benefits into system-capacity outcomes and highlighting potential downstream offsets through reduced inpatient utilization. Screening at a rate 25% over baseline screening rates, the 20-year avoided bed-days increase to: UK-3.3 million; FR-5.7 million; DE-43.5 million; AU-1.7million.

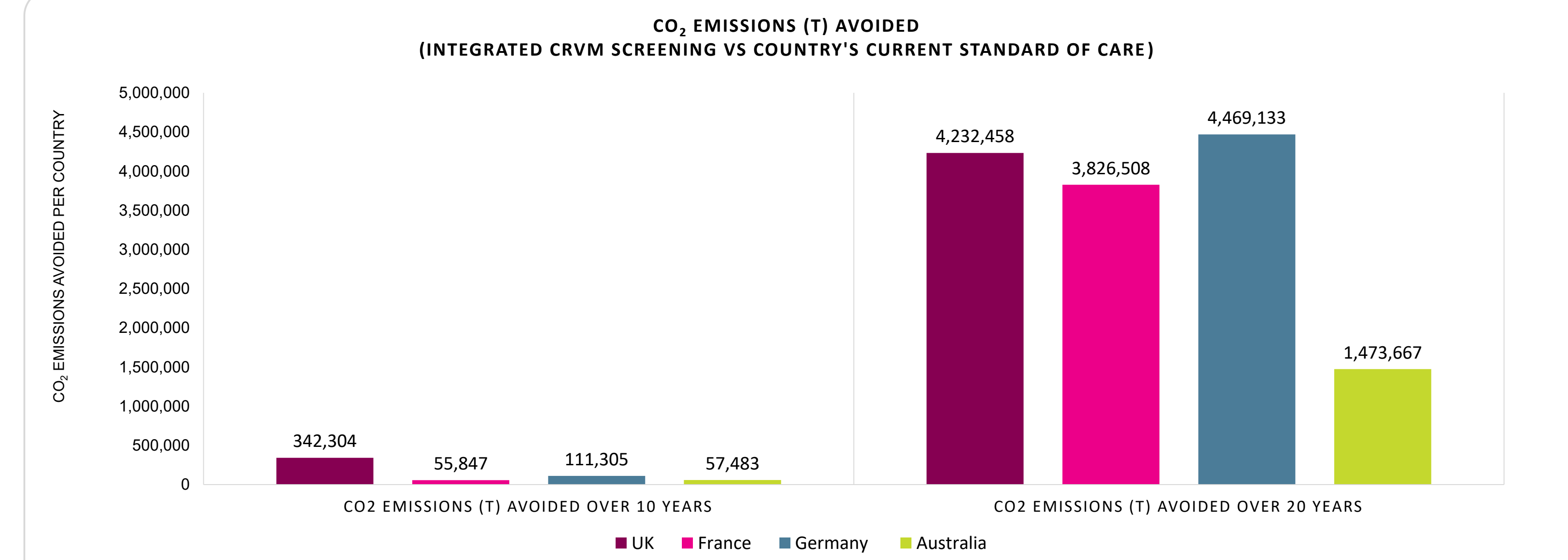


Figure 6: CO<sub>2</sub> Emissions Avoided by Country: 10 & 20 Year Time Horizon

Figure 6 reports CO<sub>2</sub> emissions avoided by country over 10- and 20-years comparing those with the implementation of comprehensive screening compared to each country's current screening standard of care. This extends the value narrative to environmental outcomes that may be relevant for broader assessment frameworks and health-system sustainability analyses. At a 20-year time horizon, an increase in screening rate by 25% is associated with an estimated increase in CO<sub>2</sub> emissions avoided to: UK-5.0 million; FR-4.4 million; DE-4.7 million; AU-1.7 million.

## Conclusions

**Mid-horizon value capture:** Holistic screening identifies high-risk individuals early enough to prevent or delay resource-intensive clinical events in the medium term, generating potential health system, economic, and environmental benefits before long-term horizons with a break even point between 10 and 20 years.

**Lives saved:** Integrated screening is estimated to reduce avoidable premature mortality by enabling earlier detection and intervention across CVRM cumulatively across the four countries saving an estimated 1 million lives over a 20-year time horizon assuming a 25% increase over baseline screening rates.

**Healthcare costs avoided:** Over a 20-year horizon, with baseline holistic screening rates there are potentially significant direct cost savings by preventing downstream acute events and high-cost long-term care. An increase in screening rate by 25% shows a cumulative estimated direct cost savings of \$91.2 billion over the projected 20 years.

**Productivity gains:** By preserving workforce health, integrated screening delivers potential productivity gains over 10 and 20 years through reduced absenteeism and work impairment. The estimated total across the four countries modeled could have an estimated productivity gain of \$3.6 billion.

**Value increases over time:** Mortality reductions, cost savings, environmental, and productivity benefits are all estimated to compound over the long term, reinforcing the case for early policy investment in prevention.

**System sustainability:** Taken together, the estimated combined health and economic benefits position integrated heart health checks as a high-value, fiscally responsible national prevention policy

1

**Integrated CVRM health checks outperform siloed screening,** enabling earlier and more accurate risk identification and improving long-term outcomes.

2

**Widening eligibility strengthens secondary prevention,** delivering additional health benefits and system value.

3

**Including uACR, eGFR and NT-proBNP is cost-effective** and supports earlier intervention across CVRM pathways.

4

Combined health, cost and productivity gains show that **integrated CVRM health checks are a sustainable, system-level prevention approach**