WATER EFFICIENCY IN AGRI-PROCESSING

OVERVIEW, BEST PRACTICES AND OPPORTUNITIES

IFC | International Finance Corporation
WORLD BANK GROUP

Creating Markets, Creating Opportunities

Schweizerische Eidgenossens
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

March 25, 2

Agenda

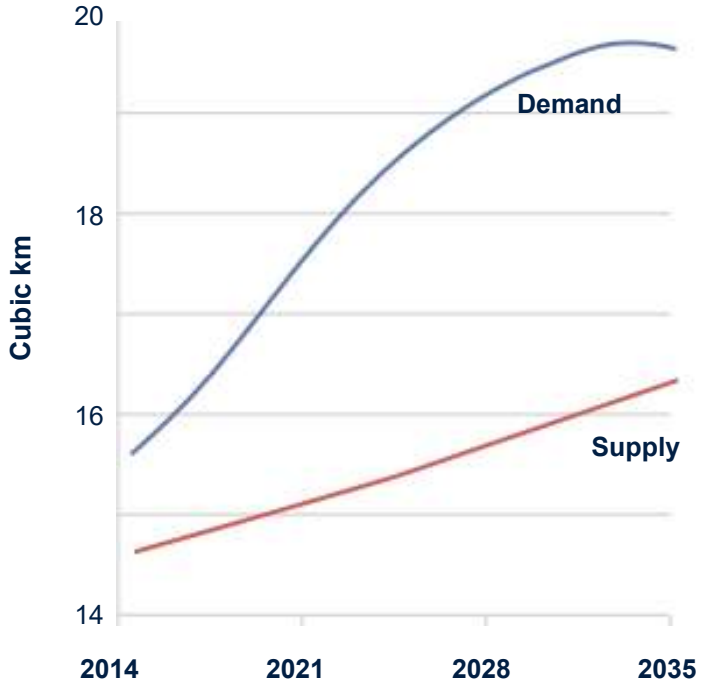
1. About IFC
2. The water challenge in South Africa and water use in agri-processing
3. IFC solutions for water efficiency
4. Water use benchmarks and best water efficiency practices
5. Project examples

IFC provides investment and advisory services to support private sector development globally

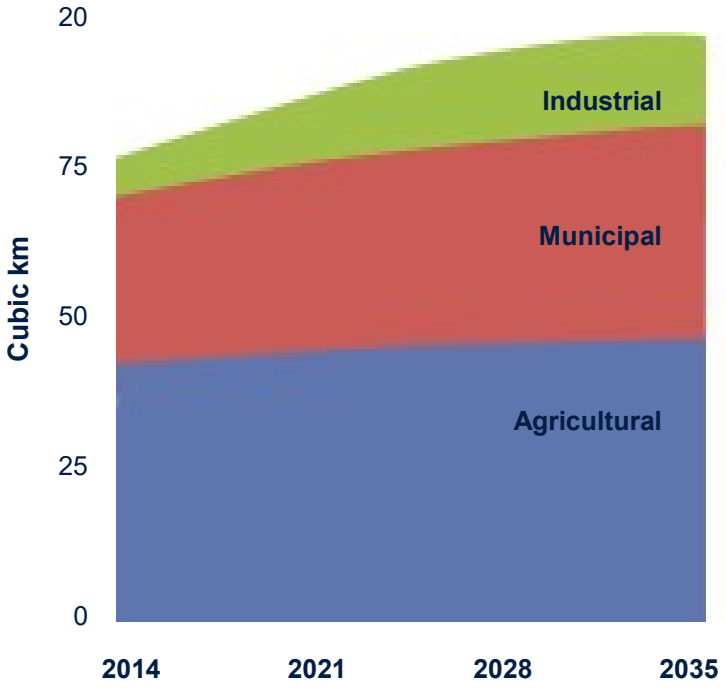
Why water efficiency in South Africa?

Forecasts indicate an increasing gap between supply and demand, with growth in industrial use contributing to growth in demand

South Africa's increasing gap between water demand and supply



Base case forecast of South African water demand by sector

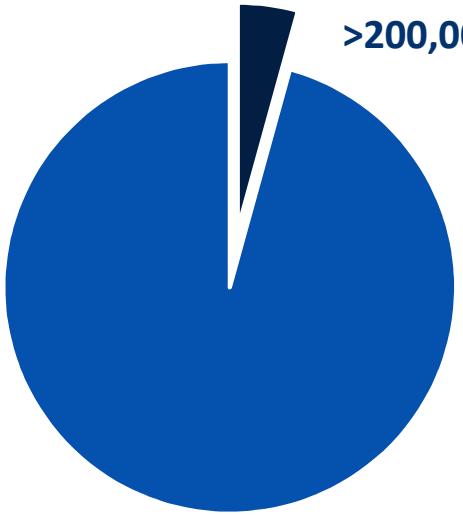


Source: Hedden and Cilliers, 2014, Parched prospects: The emerging water crisis in South Africa

Water use in agri-processing

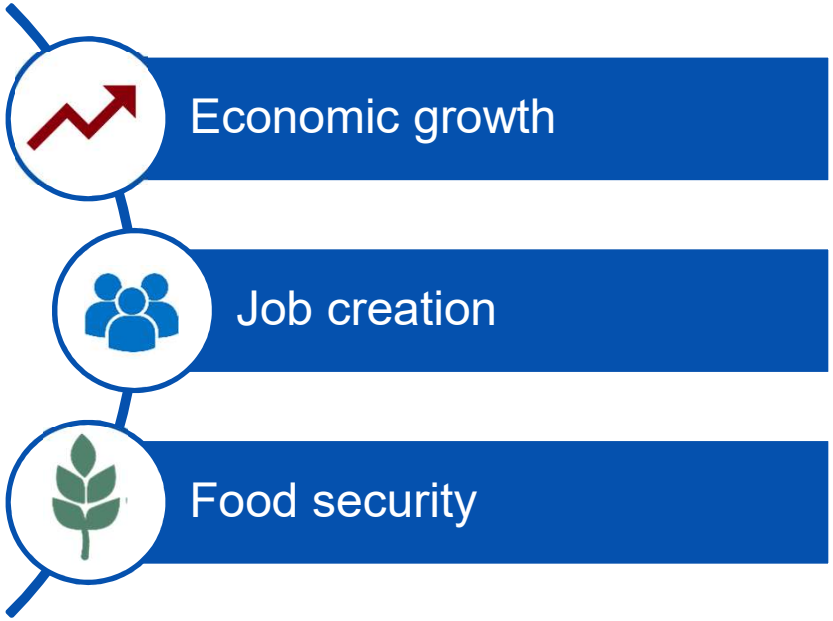
Agri-processing industry makes a significant contribution to the SA economy

4.3% contribution to GDP
>200,000 jobs

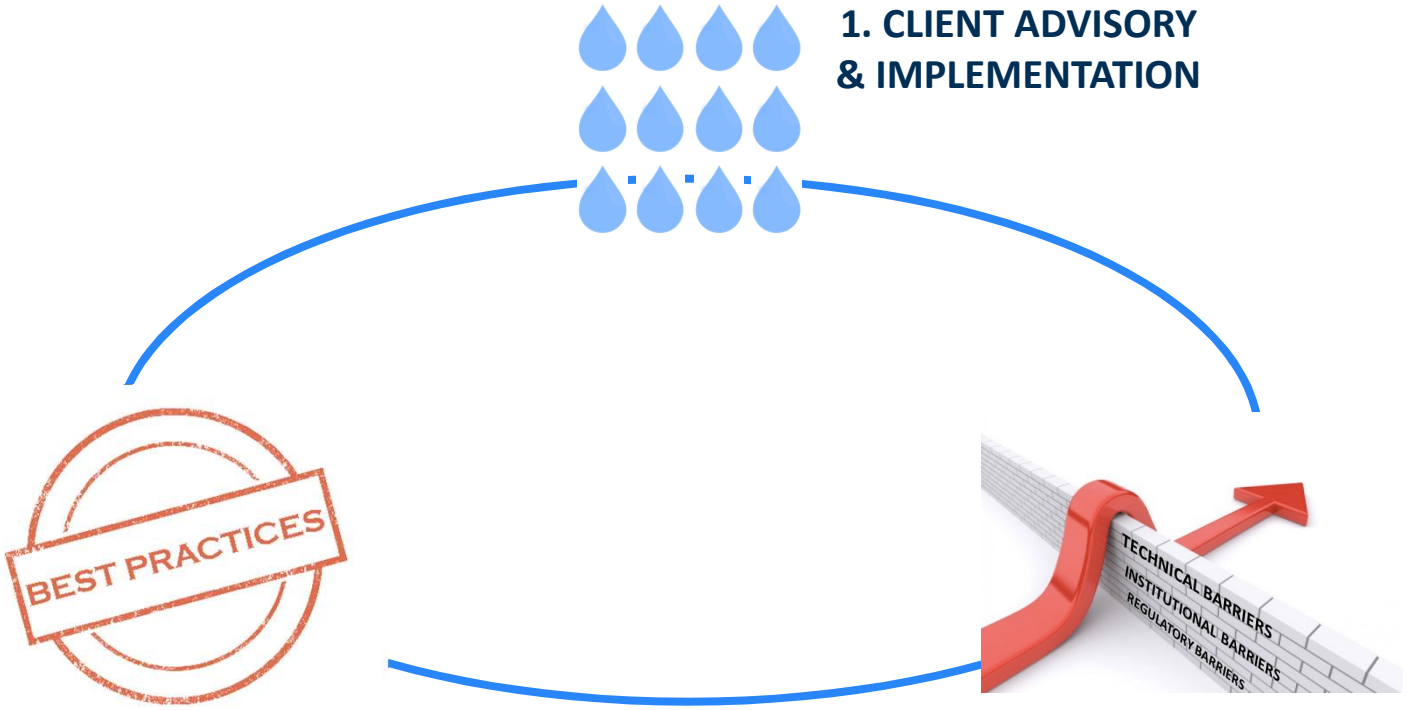


Sources: Department of Agriculture, 2017, Forestry and Fisheries, 2017, Agri-processing support, the dti, 2013, Agri-processing sector

Realization of benefits is closely tied to water availability



Resource Efficiency in Agri-Processing in South Africa: An initiative focused on water solutions



Why benchmarking?

Compare	Compare yourself to best-in-class companies
Educate	Learn about global best practices and generate innovative thinking
Gaps	Identify gaps and opportunities for improvement
Targets	Set targets, monitor and continuously improve
Savings	Improved efficiencies and cost savings which can lead to a strategic advantage

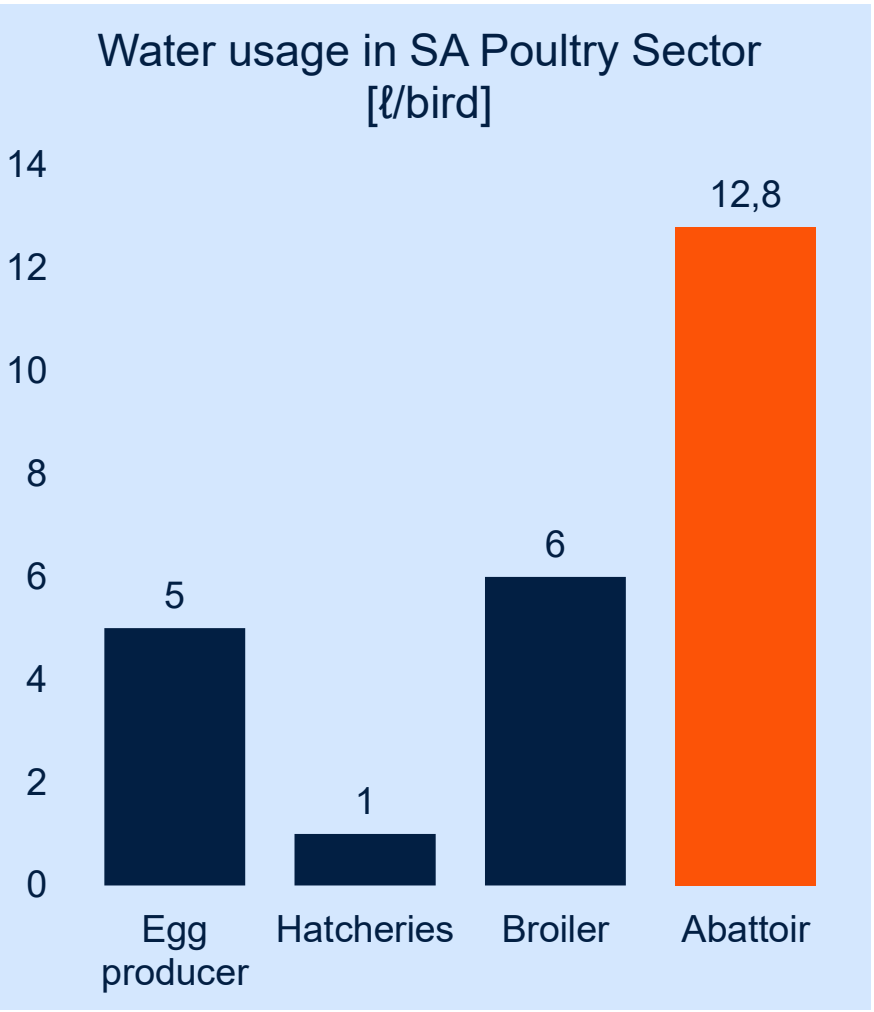
True cost of water:

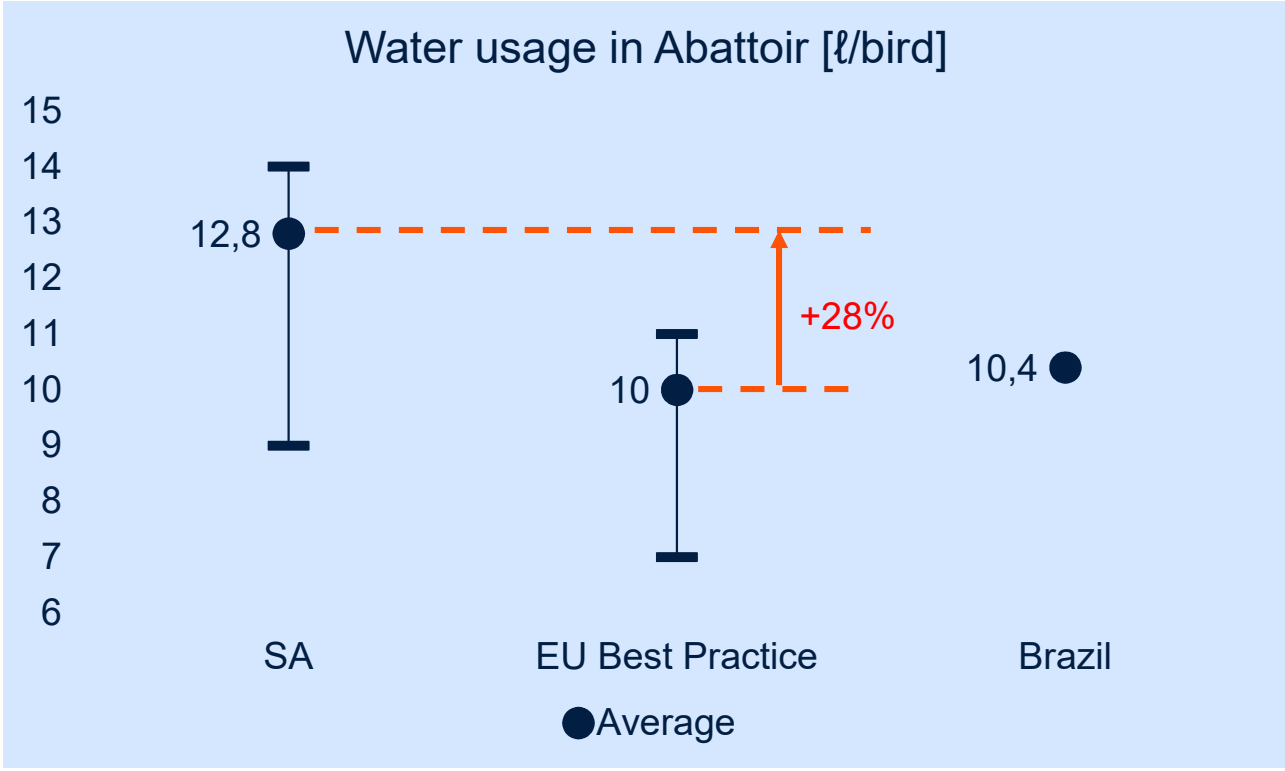
- Water treatment
- Effluent treatment and discharge
- Value of lost raw materials and product
- Pumping
- Maintenance
- Capital depreciation of equipment

Companies that adopt a systematic approach to water reduction typically achieve a 20 – 50% decrease in amount of water used.

Dairy UK. (2006). *Envirowise: Benchmarking water use in dairies*

Benchmarking: Poultry





SA poultry abattoirs on average use 28% more water than EU best practices

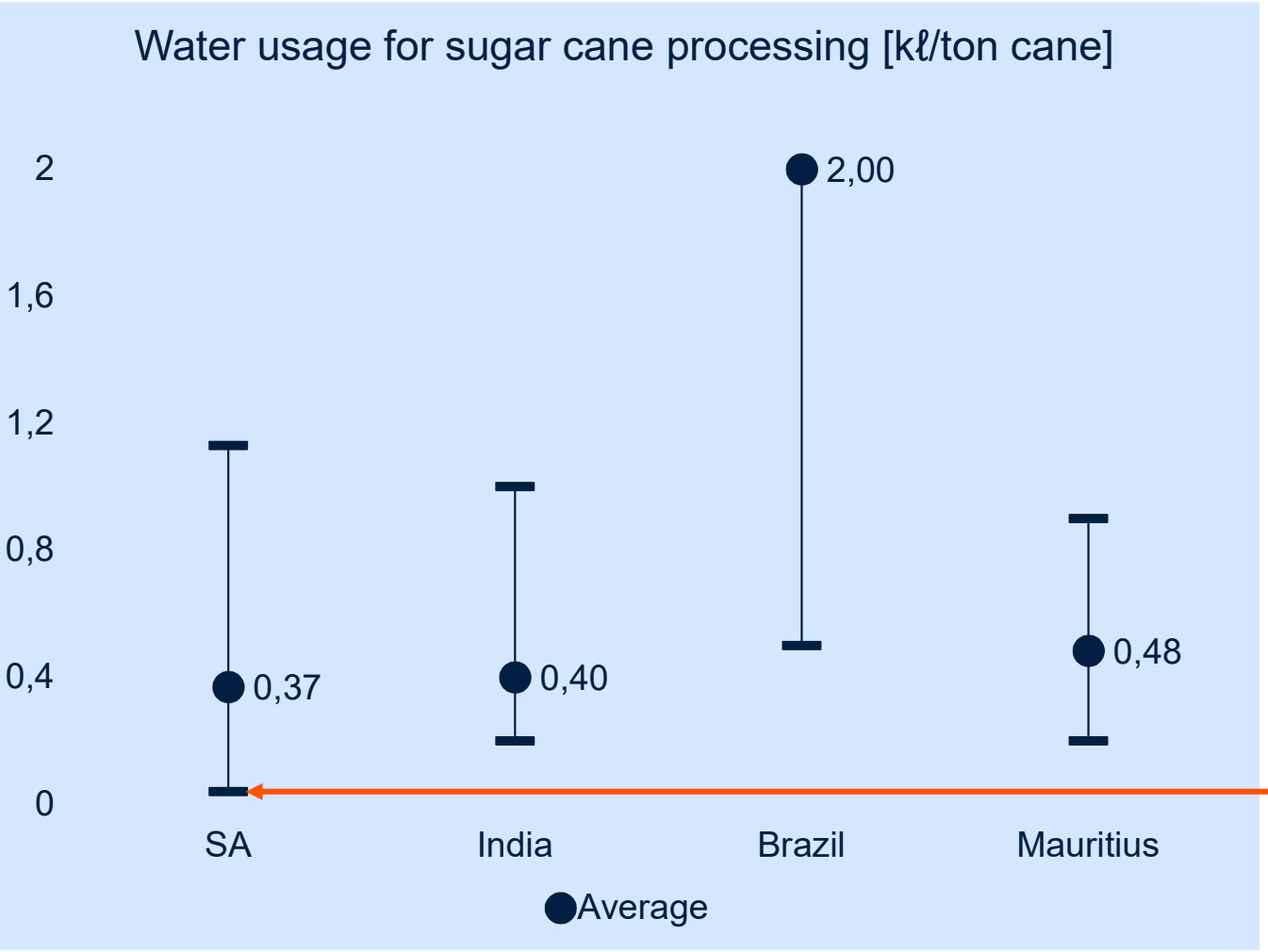
Pocock, G. Joubert, H. (2017). *NATSURV 9: Water and waste water management in the poultry industry*, Water Research Commission
European Commission. (2005). *Integrate pollution prevention control: Reference document on best available techniques in the slaughterhouse and animal by-products industries*
Barana, A. Botelho, V. Wiecheteck, G; Doll, M. Simões, D. (2013). *Rational use of water in a poultry slaughterhouse in the state of Paraná, Brazil: A case study*

Some water-use best practices: Poultry

Waste water treatment	Effluent from WWTP can be used for irrigation
Dry-cleaning	e.g. Replace water troughs with conveyor belts for moving organs away from evisceration line
Pressure washing	Pressurised spray uses less water. Dry-cleaning before washing with water. First wash down can use recycled water.
Water metering & continuous improvement	Requires sub-metering and dedicated team to focus on water saving initiatives. Water savings potential of 5%.
Storm water management & rainwater harvesting	
Recirculate water for chillers & scalding	Bubbled accelerated floatation (BAF), ultra-filtration and ozone treatment can be used to recirculate water for chillers and scaling, resulting in water savings of up to 70%

Pocock, G. Joubert, H. (2017). *NATSURV 9: Water and waste water management in the poultry industry*, Water Research Commission
California Department of Water Resources. (2000). *Details of industrial water use and potential savings by sector: Appendix F*

Benchmarking: Sugar cane processing



Water usage of sugar cane processing is SA is good on average but there are some outliers

One sugar mill in SA recorded water use of 0.04 kℓ/ton cane. This mill does not have access to river water. 50% of its water intake is from municipal potable water and therefore made a concerted effort to implement best-practice policies and water-saving infrastructure

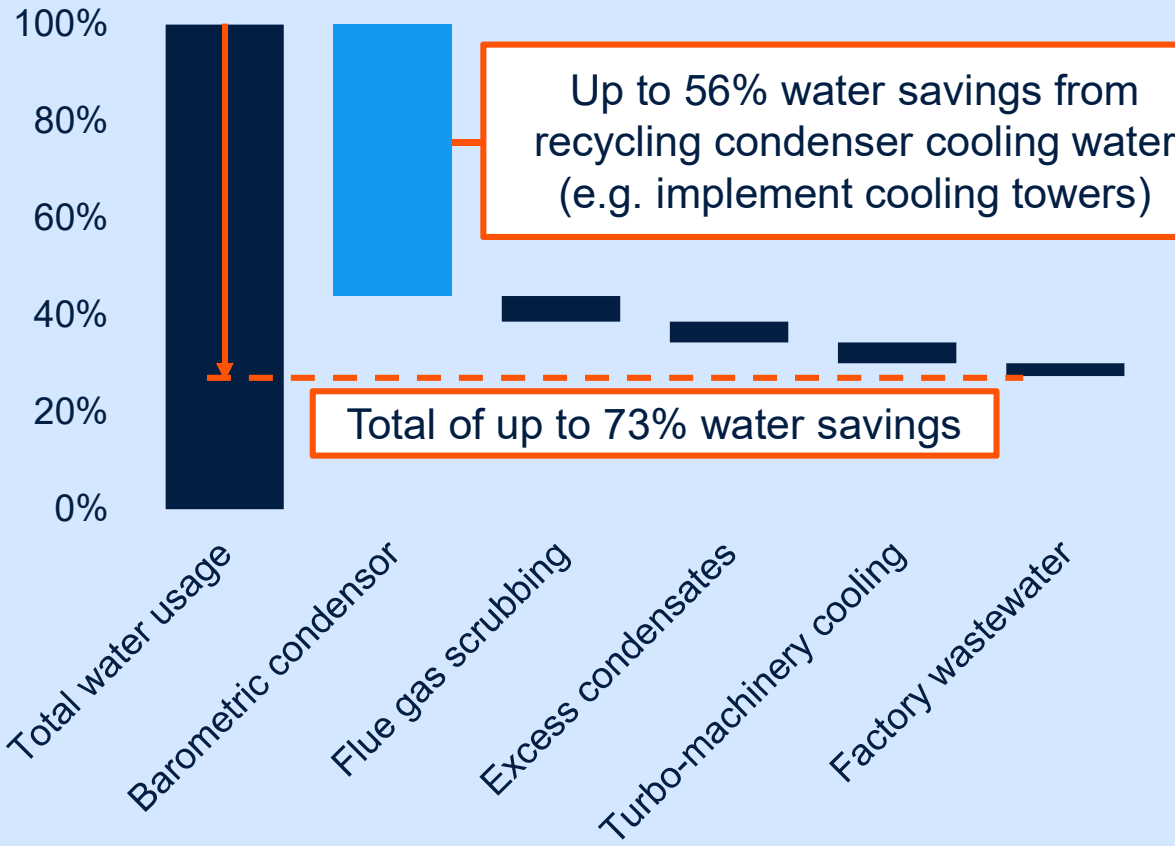
Deshmukh, G. K. Sonaje, N.P. (2017). *Water conservation in sugar industry: A case study of Lokmangal Sugar, Ethanol and Co-Generation Industries Ltd, Bhandarkavathe*
Welz, P. J. Ndobeni, A. (2017). *NATSURV 6: Water, wastewater and energy management and recommendations for best practice in the cane sugar processing industry*. Water Research Commission
Ramjeawon, T. (2000). *Cleaner production in Mauritian cane-sugar factories*

Some water-use best practices: Sugar cane processing

Simple water-saving measures

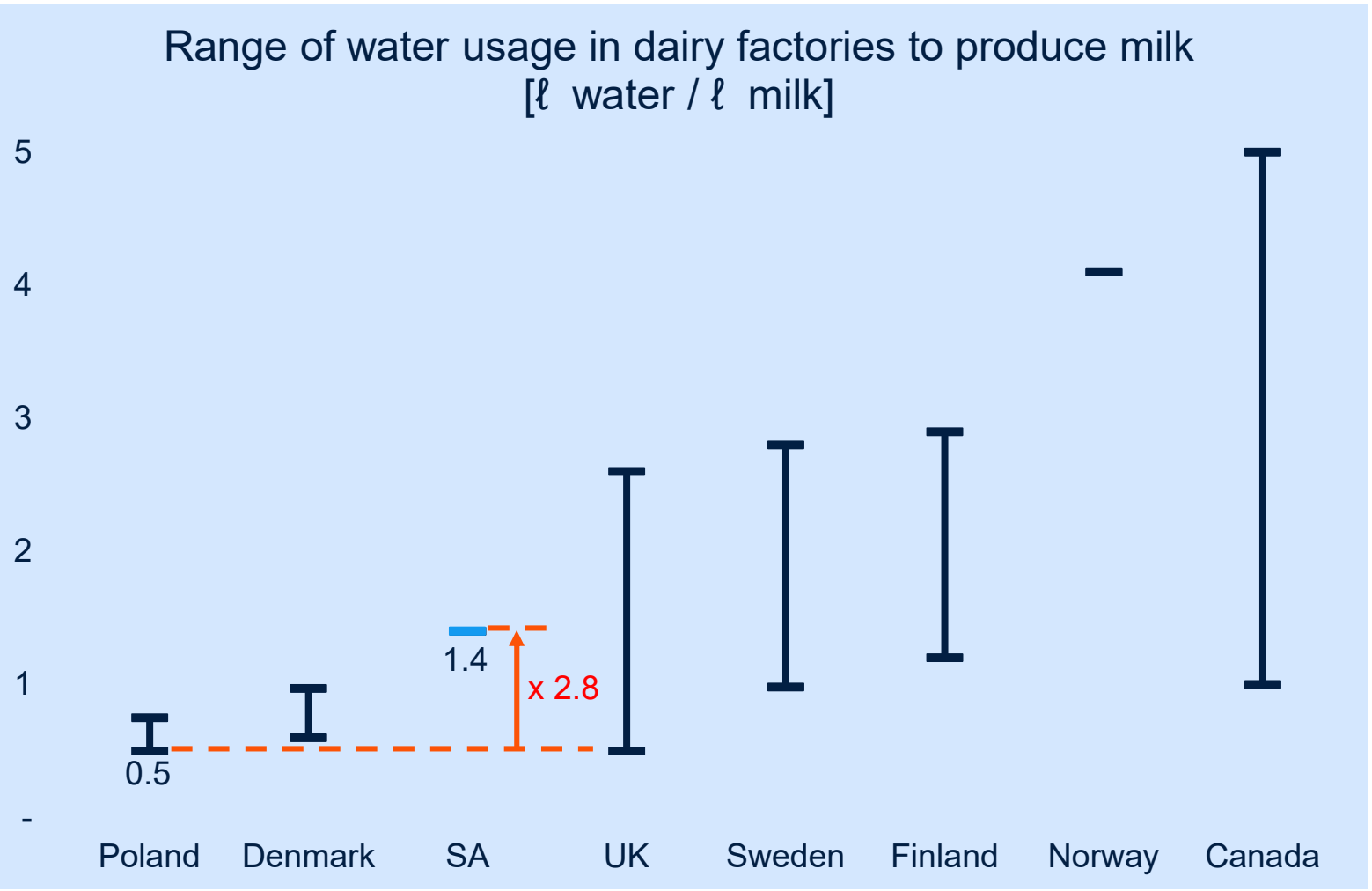
- Simple equipment upgrades
- Dry clean-up
- Water-use targets
- Water monitoring

Water savings from water recycling [% of total water usage]



Welz, P. J. Ndobeni, A. (2017). *NATSURV 6: Water, wastewater and energy management and recommendations for best practice in the cane sugar processing industry*. Water Research Commission
Ramjeawon, T. (2000). *Cleaner production in Mauritian cane-sugar factories*

Benchmarking: Dairy



Water use in SA dairy factories compares well to other sophisticated markets but is still 2.8 times more than the best practice

Chimonyo, M. Nsahlai, I.V. (2017). *NATSURV 4: Water and wastewater management in the dairy industry*. Water Research Commission
Dairy UK. (2006). *Envirowise: Benchmarking water use in dairies*
Wojdalski, J. Dróżdż, B. Piechocki, J. Gaworski, M. Zander, Z. Marjanowski, J. (2013). *Determinants of water consumption in the dairy industry*

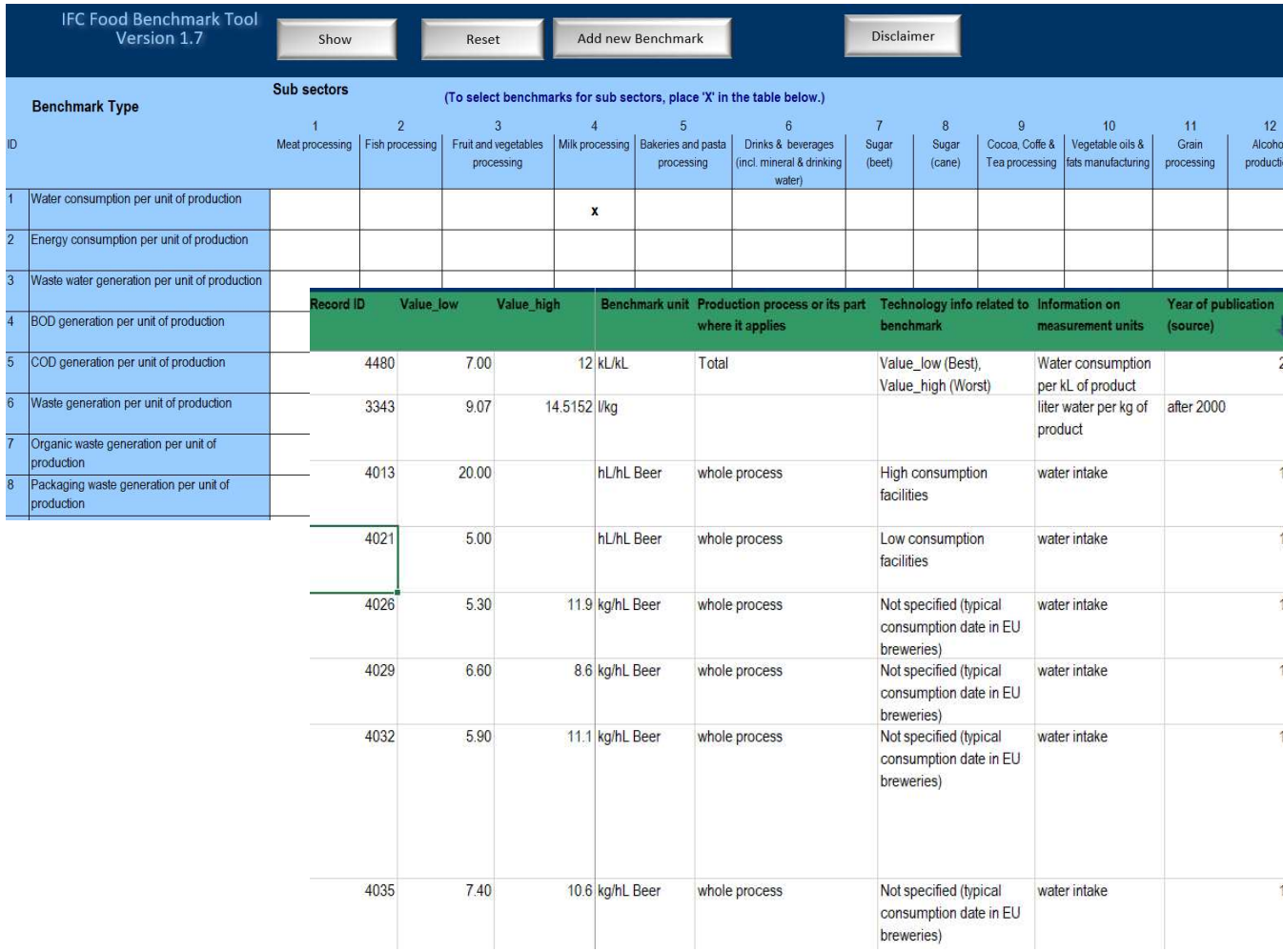
Some water-use best practices: Dairy

Water sub-metering & monitoring	Additional water meters in devices and production lines with highest water consumption for detailed and regular water metering per unit of final product.
Reuse of condensate from evaporators	Condensate can be used for cleaning vehicles, rinsing process equipment and fire fighting purposes
Reuse condensate for boiler feed make-up	
Implement Cleaning-In-Place methods and use of self locking spray guns	Clean interior surfaces of pipes, vessels, process equipment etc without disassembly. Fully automated systems are highly effective. Final rinse water can be re-used for initial rinses.
Closed circuit cooling water systems	Also recover heat from water with heat exchanger
Trays under machines and conveyors	Minimise waste to floor and recover waste to use as animal feed

Dairy UK. (2006). *Envirowise: Benchmarking water use in dairies*
Wojdalski, J. Dróżdż, B. Piechocki, J. Gaworski, M. Zander, Z. Marjanowski, J. (2013). *Determinants of water consumption in the dairy industry*

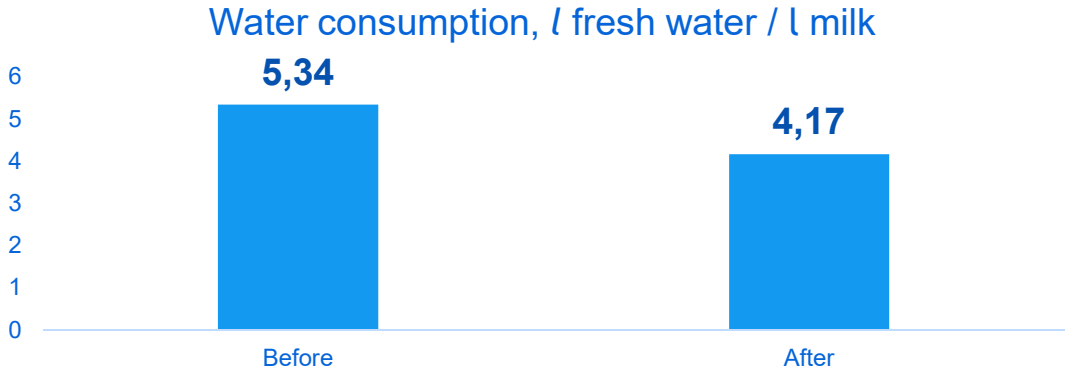
Sector-level initiative example: IFC food benchmarking tool

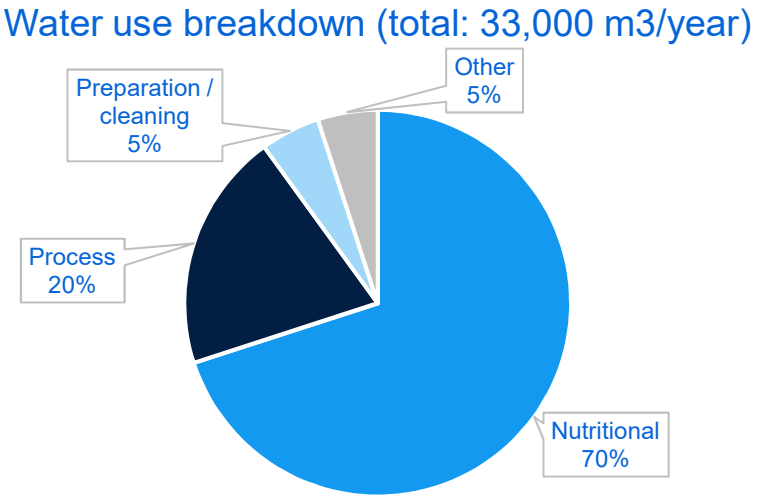
- **Facilitates international performance comparisons across 12 agri- and food processing subsectors**
- **Focus on energy, water, wastewater and waste (8 key groups of indicators)**
- **Includes data from international best practice guides, EU, US, Australia and Eastern European countries**
- **Over 1,500 benchmarks in total across all subsectors and categories**



Project example: a dairy farm in Canada

- The company: a medium-sized dairy farm
- The challenge: water scarcity risk
- Detailed water footprint assessment conducted to determine use breakdown and benchmark performance
- Limited potential to reduce nutritional water
- Projects focused on water reuse: recovery of condensate from evaporators, boilers; closed circuit cooling, change in prep/cleaning protocols
- Total savings: 6,236 m3/year (18.9%)





Project example: a vegetable processing company in Egypt

The company: a major frozen vegetable producer

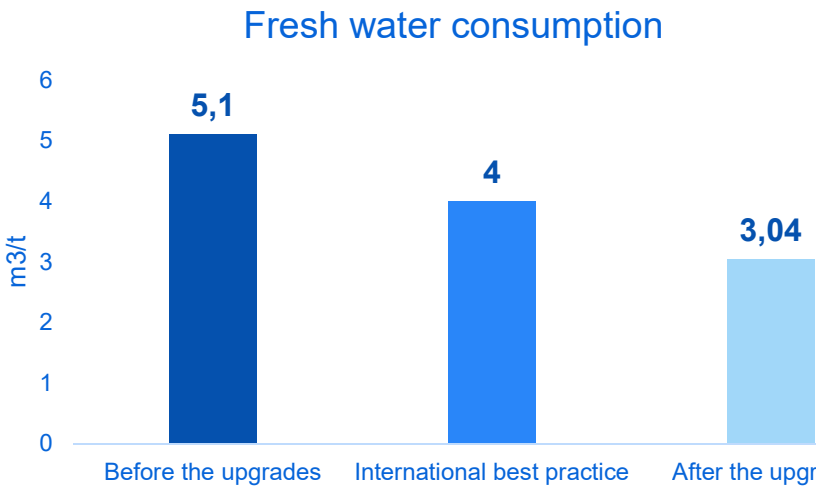
Resource efficiency already a priority with the use of:

- Modern chillers
- Cooling towers
- Water-efficient washing system

The challenge: water consumption still high; wastewater discharge putting pressure on the sewerage system and the environment

mplemented projects:

oject	Savings
mination of leakages	26,000 m³/year
stewater / greywater reuse	120,000 m³/year



Contact information

Alexander Larionov

Cell: +27 84 385 3809
+1 202 290 8739
E-mail: alarionov@ifc.org

Raymond Greig

Cell: +27 74 919 3392

E-mail: rgreig@ifc.org