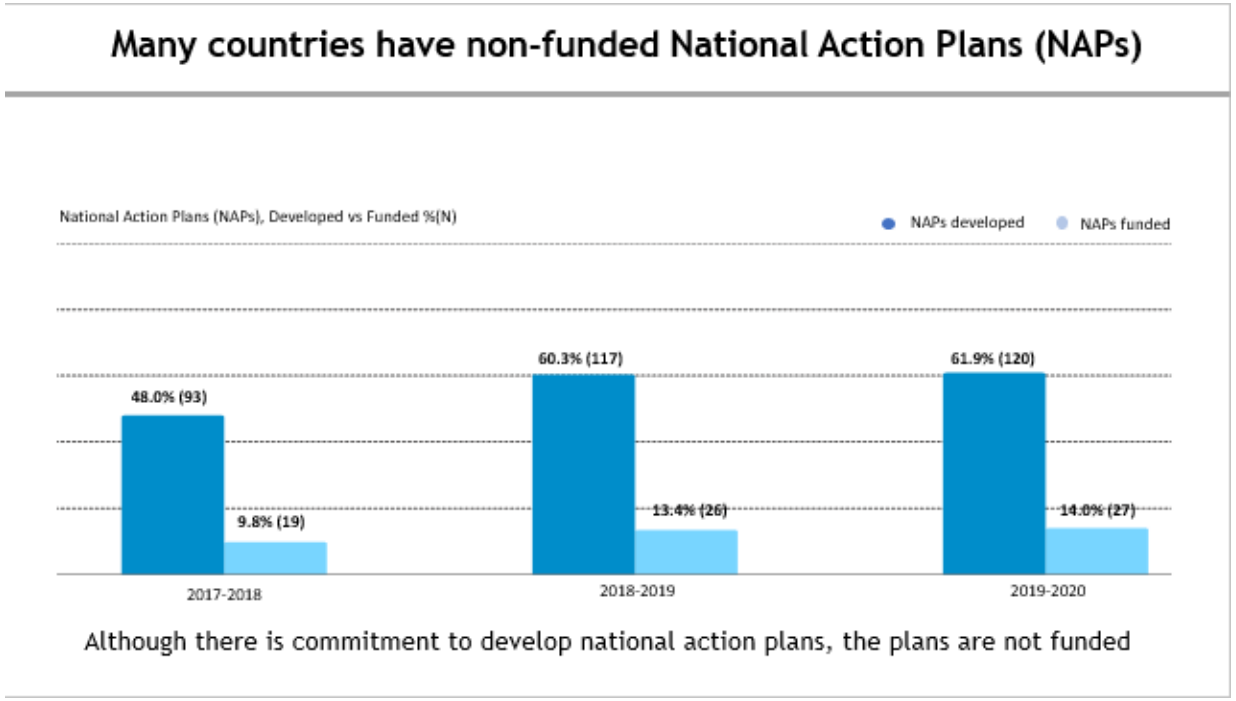
THE UNIVERSITY of EDINBURGH
Global Academy of Agriculture and Food Systems

Transdisciplinary objectives in AMU-AMR research

Dominic Moran (GAAFS)

NAPs are developed and not implemented due to lack of funding



Only 10-20% countries with NAPs made provision for funding

Funding is recognized as the greatest challenge by a survey among implementers of NAPs from countries

Some key (stakeholder) questions

Top down

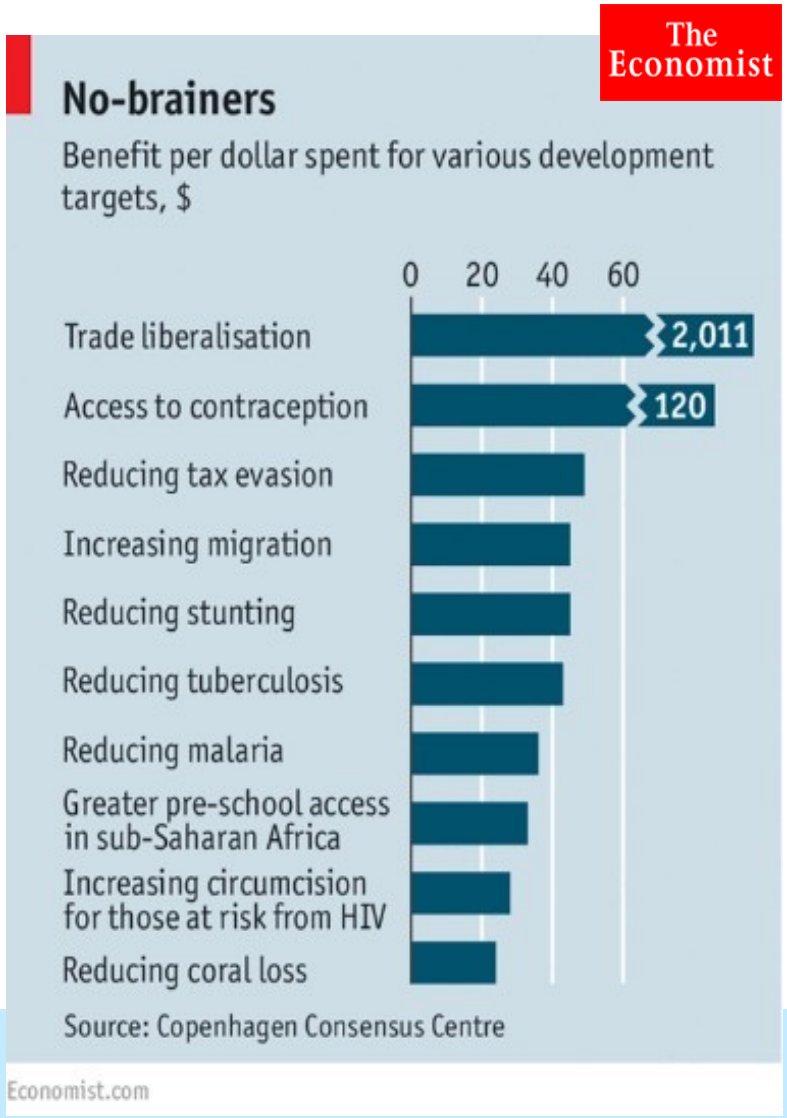
- How big is the problem; why is it a priority?
- Costs of inaction (global/local/setting specific)… and return on investment (public and private sector roles)

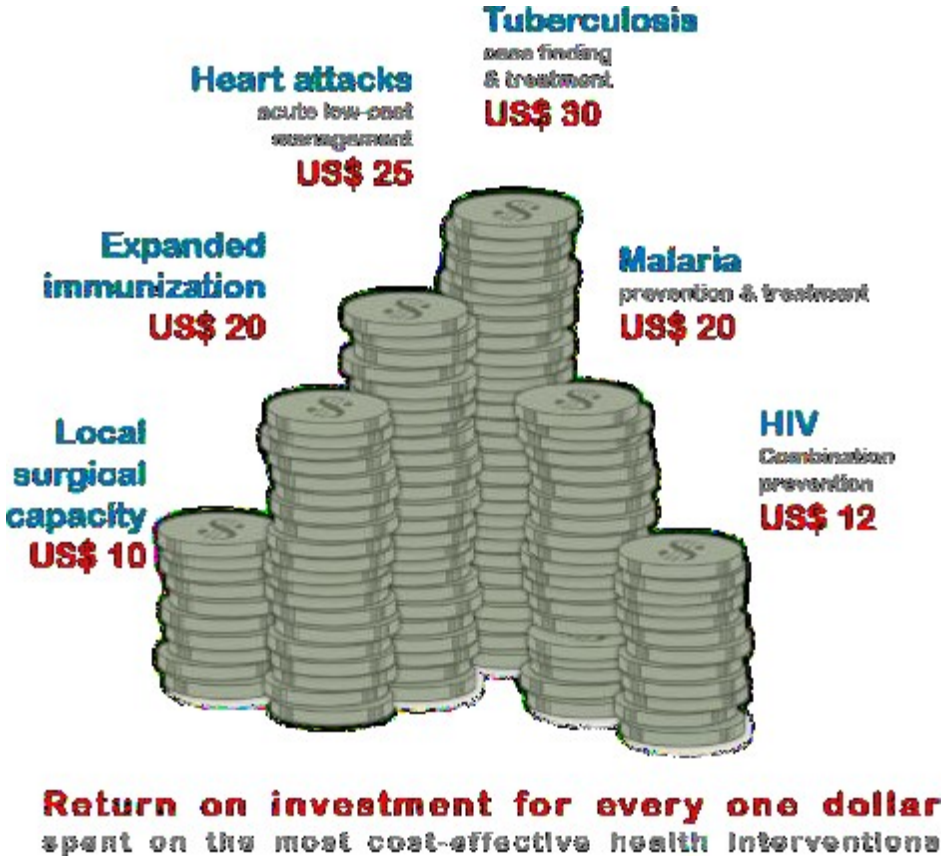
- O'Neill, OECD, World Bank, Quadripartite Group
- JPI AMR - GAP-ON€ network

Bottom up

- Prioritisation of actions across settings
- Supply and demand sides
- Learning from other wicked pollution problems – e.g. Climate/GHG mitigation

Return of investment for AMR interventions to build compelling case is in the making





World Health Organization

Previous estimates of AMR economic impact and costs of containment are underestimated in a one health context

The World Bank estimated that by 2050 AMR can result in:

28 million people living in poverty

7.5% decline of livestock production

$1 trillion in additional healthcare costs

Cost of containment: USD 9 billions/year

TABLE 2. Cumulative Costs of AMR, Benefits of Containment, and Costs of Measures Cumulative to 2050, Present Discounted Values

Under Alternative Social Discount Rates, in $ Trillion (2007 Constant Dollars)				
	Social Discount Rate (Annual)			
	0%	1.4%	3.5%	5.5%
1. Costs (results of simulations)				
Low AMR-impact scenario	40	30	20	13
High AMR-impact scenario	120	85	54	36
2. Benefits if 50% of costs averted				
Low AMR-impact scenario	20	15	10	6
High AMR-impact scenario	60	42	27	18
3. Costs AMR action plan (Table 1)	0.3	0.3	0.2	0.2
4. Net benefits (2.–3.)				
Low AMR-impact scenario	19.7	14.7	9.8	5.8
High AMR-impact scenario	59.7	42.2	26.8	17.9

Source: World Bank, 2017. Drug-Resistant Infections: A Threat to Our Economic Future

In 2017, the World Bank estimated that US $9 billion is needed annually to address antimicrobial resistance, but experts believe that this may considerably underestimate the true cost of responding to antimicrobial resistance in a One Health context. More robust cost and benefit estimates are needed to galvanize global investment in the response to antimicrobial resistance. Furthermore, the current prediction on the global economic loss due to antimicrobial are all long term and futuristic. Immediate and annual impacts of antimicrobial resistance on the economy should be assessed and used to advocate for the urgency of action and investment on antimicrobial resistance.

(GLG second meeting, August 2021)

Building the case for financing the AMR response

Goal: Determine the cost and benefits of AMR response across different sectors to inform global, regional and country prioritization and resources mobilization

Expected Outcomes

An Estimate of **AMR economic impact** across sectors (**cost of inaction**)

A **package of AMR priority interventions** across sectors

An **estimate of the costs (cost of action) and return on investment of AMR actions** across sectors

A **toolbox for developing a Country investment case** to support multisectoral NAP implementation

The economic burden of AMR

Epidemiological data on colonization and infection with AMR pathogens (Table 2)
- human health
- animal health (companion animals and animals in the foodchain)
- environment

Probabilities associated with colonization and infections (Table 3 and 4): likelihood of incurring into costs

- Costs related to the human patient colonized or infected with AMR pathogen (Table 5)
- Costs related to the companion animal colonized or infected with AMR pathogen (Table 6)
- Costs related to farm animals colonized or infected with AMR pathogen (Table 7)
- Costs related to environment (Table 8)

What we do about it

- Supply side – invention of new antimicrobials (O'Neill)
- Demand side – who is using antimicrobials and how to regulate use
- What are the AMR consequences and where (which settings) can we intervene quickest and most cost effectively.
- AMU or AMR? Do we even know how much is being used?

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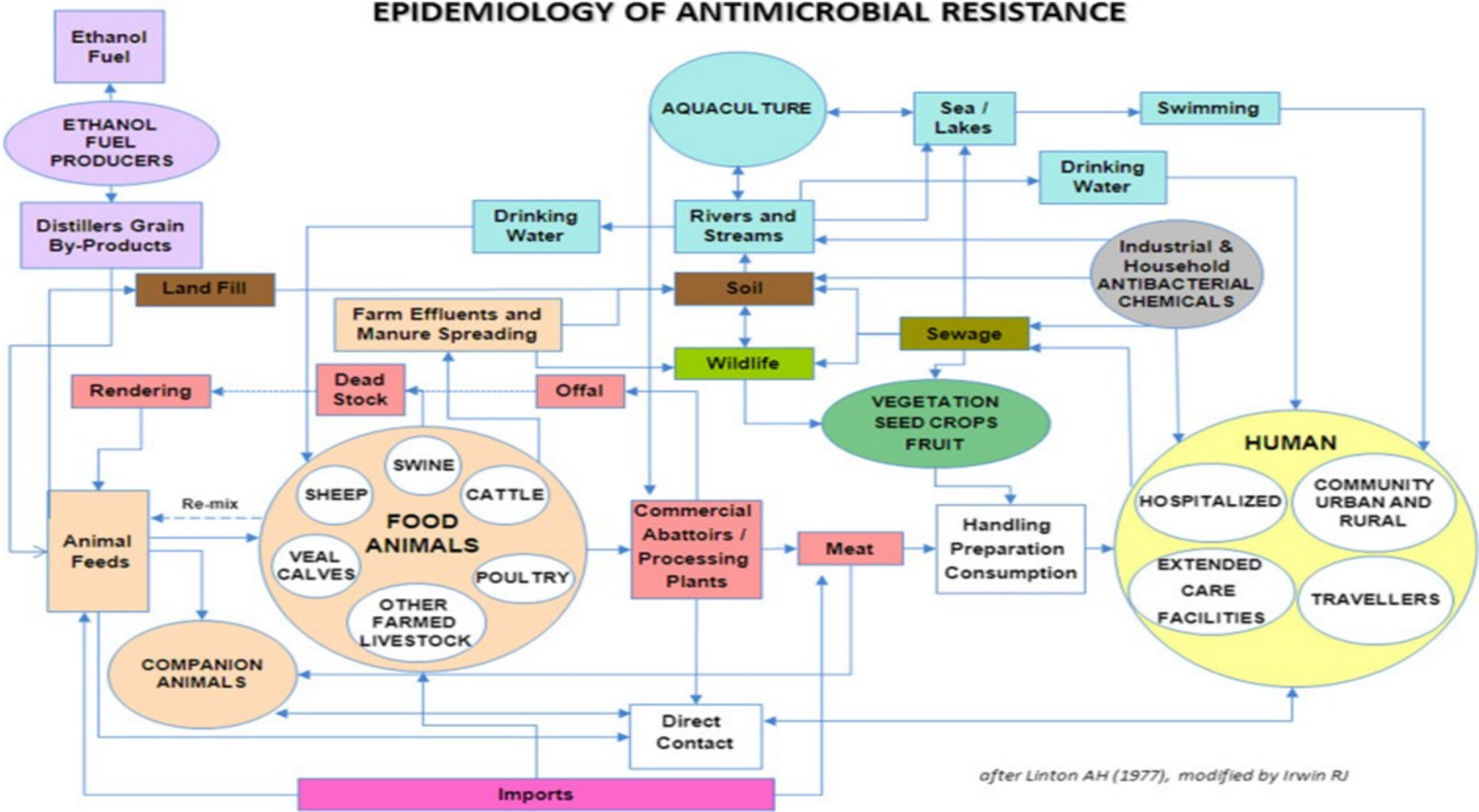
EPIDEMIOLOGY OF ANTIMICROBIAL RESISTANCE



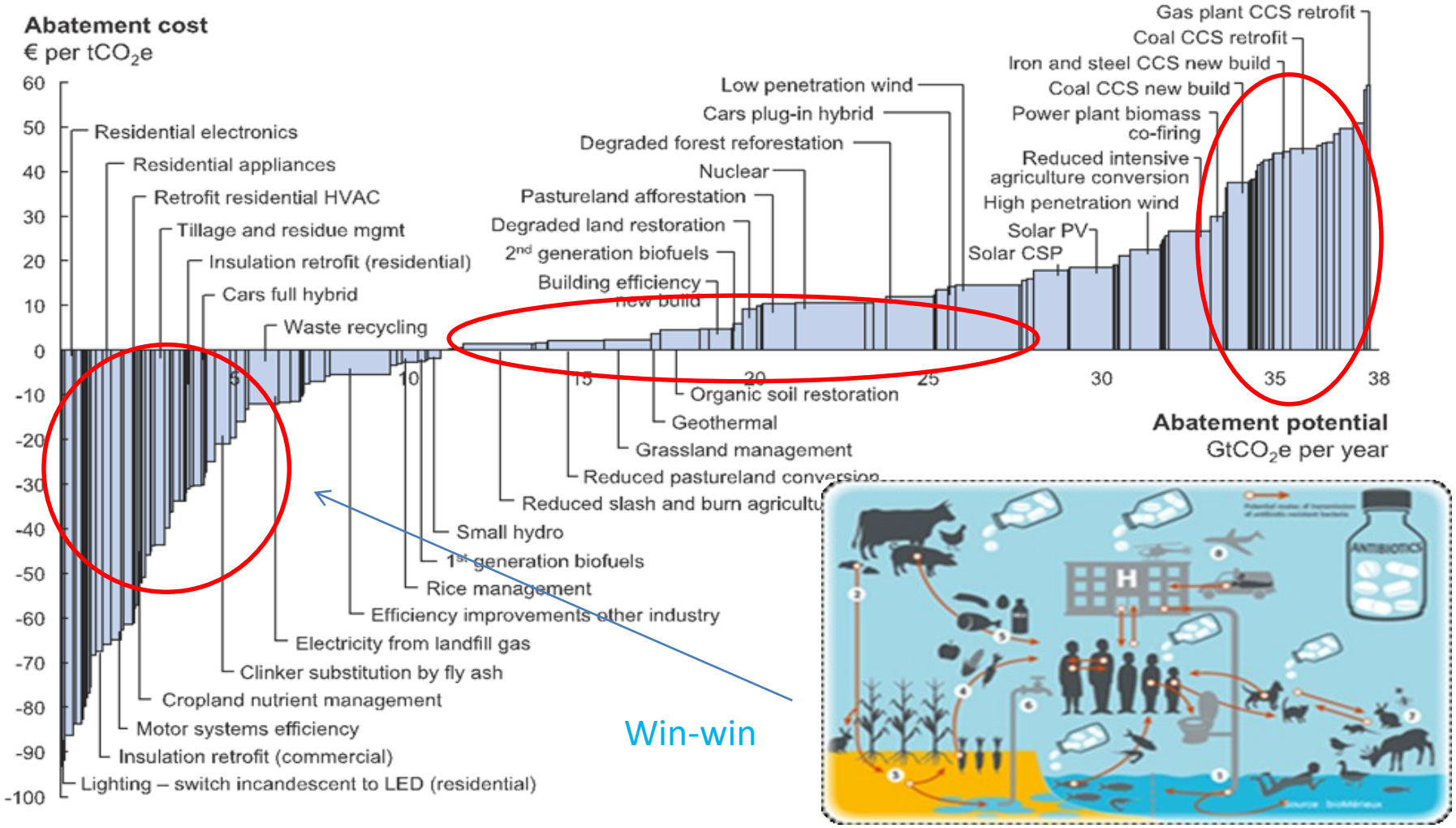
after Linton AH (1977), modified by Irwin RJ

Learning from GHG mitigation

- Some questions to prioritise interventions
- Technical - does a measure actually work to reduce AMU or break AMR transmission?
- Economic - How much does it cost to implement (financial and economic)? whether it be cost-of-illness, cost-utility, or cost-benefit in structure
- Behavioural - will people actually do it?
- Policy - is there a policy/institution to incentivise compliance?

Nb policy potential (unsurprisingly) much less than technical potential

The One Health AMR Abatement Cost Curve



Some research/policy questions

- Which measures are lowest cost or win-win ?
- Which can we do now ? Are less uncertain?
- Which need more research ?
- Which measures interact ?
- Which measures are most easily uptaken?
- What are key behavioural barriers?
- Which measures have a policy or regulation for implementation?
- Earliest impact?

- Place-based evidence - local/national/global
- Specific v sensitive interventions.