## A world without antibiotics? ...I cannot imagine



## DSM Sinochem Pharmaceuticals, a leading manufacturer of sustainable antibiotics



Sinochem is a global Fortune 500 company and one of China's key state owned enterprises.

- 40,000 employees
- USD 50 billion turnover
- Several listed subsidiaries

#### Industries

- Energy
- Agriculture
- Chemicals
- Real Estate
- Finance



DSM is a global science-based company active in health, nutrition and materials.

- 22,000 employees
- EUR 9 billion turnover
- Listed at Euronext

#### Industries

- Life Sciences
- Materials Sciences

DSP is a joint venture between Royal DSM and Sinochem Group, and has more than 140 years of expertise and experience in fermentation technology and the pharmaceuticals industry.

We were among the first companies that scaled up Penicillin in the 1940s. Today, we are a global leading manufacturer of sustainable antibiotics, anti-fungals and next generation statins in which we apply green, enzymatic technology wherever we can. We develop and sell responsibly made generic active pharmaceutical ingredients (APIs) and drug products (DPs).



## ...running manufacturing operations in India, China, Europe and Latin America.



...following three basic requirements for making antibiotics responsibly - at every plant we run, anywhere



## Antibiotic Resistance a global health & wealth threat



Source: The Review on Antimicrobia Resistance, Jim O'Neill (2014)



## How AMR Emerges and Spreads

"AMR is mostly caused by the inappropriate use and overuse of antibiotics in humans and animals, but increasingly evidence shows that waste pharmaceuticals from excretion and disposal, including effluent from the pharmaceutical manufacturing process, is a concern in the development of resistance."







## Antibiotics Pollution: a cause of AMR



"There is growing evidence of API manufacturers that do not adequately treat waste products, with the result that high concentrations of antibiotic active ingredients are disposed into the local environment creating 'reservoirs' of antibiotic resistant bacteria."

Source: AMR Review, May 2016

Source: AMR Review, May 2016

## Antibiotics Pollution: a cause of AMR Why do we care?



No effective antibiotics = No modern healthcare



#### No effective antibiotics = No business



## Antibiotics Pollution: a complex issue

Requiring joint ownership, and leadership through the value chain to solve it



#### Today's complexities

- □ No auditable trails from Drug Product to Ingredients, while frequent subcontracting takes place
- □ No defined tolerance levels for antibiotic discharge, nor standards for antibiotic waste treatment
- No auditing framework that includes antibiotic discharge,
  i.e. GMP focuses on product and patients safety: sanitation of the facility (211.56) is in scope only
- □ No uniform diagnostics to measure antimicrobial activity in the environment
- □ No incentive/penalty system that supports environmentally responsible manufacturing
- $\hfill\square$  No environmental criteria included in buyers decisions, purchase and tender policies
- □ No company rating on AMR performance



## **Increasing stakeholder pressure on Industry to Act** The AMR Review proposed 2 interventions related to Antibiotic discharge associated with manufacturing

#### Proposed interventions:

**3.6** <u>Global bodies/national governments and regulators</u> should establish evidencebased, enforceable targets for maximum levels of antimicrobial active pharmaceutical ingredient (API) discharge associated with the manufacture of pharmaceutical products.

**3.7** <u>Pharmaceutical companies should improve monitoring of API emissions from directly-operated manufacturing facilities as well as those of third party suppliers, and support the installation of proper waste processing facilities to reduce or eliminate API discharge. Such efforts should be based in voluntary, transparent and auditable commitments, with a globally consistent 'quality mark' applied to end products produced on 'environmentally responsible' basis.</u>

(AMR Review, May 2016)





GENERAL ASSEMBLY OF THE UNITED NATIONS



## Increasing stakeholder pressure on Industry to Act

define tolerance levels for antibiotic discharges and standards for responsible manufacturing; introduce mechanisms to improve transparency, anchor environmental criteria in policies

#### Academia





#### International bodies





Prof. Joakim Larsson (University of Gothenborg), an acknowledged thought leader:

'Direct emission from pharmaceutical manufacturing is a source of much, much higher environmental discharges than that excreted from humans, especially through the selective & high concentrations of antibiotic activity'

'...some concentrations of pharmaceuticals we found in surface water samples where higher than the levels in a patients that undergo treatment...The use and misuse of antibiotics is a major driver behind the drug resistance problem, but large environmental discharges of antibiotics from pharma manufacturing can also contribute.'

The Chinese Academy of Sciences, and Environmental Science and Technology, mapped antibiotic concentrations and discharges in Chinese waterways:

"The team found concentrations of over 1,000 nanograms per liter in the environment. China lacks standards for antibiotic concentrations in the environment, but 1,000 nanograms per liter is very high [...] human activities have a huge impact on antibiotic emissions."

On Sep 21, 2016 The United Nations General Assembly issued a Political Declaration on AMR: Among many other statements, the UNGA acknowledges that AMR is caused by residues of antimicrobials into soil, crops and water [3]...and calls for multi-stakeholder approach to reduce it [10-e].

The World Health Organization announced a research agenda to collect evidence on the importance of antibiotic residues and resist organisms in the environment (Oct 2016)



## Increasing stakeholder pressure on Industry to Act

define tolerance levels for antibiotic discharges and standards for responsible manufacturing; introduce mechanisms to improve transparency, anchor environmental criteria in policies

#### Investors



Global investors such as Nordea and BNP Paribas have raised concerns about the potential damage to global health and environment caused by uncontrolled antibiotic discharges:

'We demand the pharmaceutical holdings to ensure that their suppliers have adequate waste management systems in place'.

'Pharma supply chains are as opaque as they are complex...There is compelling body of research on the negative effects posed by pollution from antibiotics manufacturing plants in India...There is a need for transparency and strong environmental standards at every stage of supply chain

#### NGOs



Increased pressure from several NGOs to various value chain players to increase transparency, clean up supply chain, introduce legislation

'We demand transparency, clean production & legislation'. Changing Markets - June 2015

'Blacklist Pharma companies that contribute to AMR through irresponsible manufacturing practices...demand greater transparency, review procurement policies and supplier code of conducts, include environment criteria in GMP'. EPHA - August 2016



# DSPs Position: Pharma Industry should stop buying, using and selling irresponsibly made antibiotics.





Environmental criteria for the manufacturing of antibiotics to be included in existing legislation/mechanisms. Targets should be science-driven and risk based while covering discharge concentrations and good practice methods to reduce environmental impact of antibiotics manufacturing.



Use the best technology available with the lowest environmental impact throughout the supply chain



Operate dedicated wastewater treatment plants 24/7/365 at every antibiotic manufacturing site



Apply antimicrobial activity tests to ensure disposed water is clean



Manufacturers to drive higher standards and mechanisms to improve transparency through their supply chains by establish a common framework for antibiotic discharge via e.g. PSCI and/or via a 'Quality Mark' or 'Industry Label'





## Industry Response

#### Industry Roadmap on AMR presented at UNGA HLM on AMR, following the WEF Declaration

#### On Sep 20, 2016:

13 Leading Bio-Pharma, including DSP, issued a UNGA Roadmap on AMR:

Among other commitments focusing on Excess Use, Access to Antibiotics, and new collaboration forms,

the environmental impact of antibiotics production is given high priority.



The group of leading bio-pharma companies commit to:

- 1) Reduce environmental impact from production of antibiotics, including a review of the companies' manufacturing and supply chains, establishing a common framework to assess and manage antibiotic discharge;
- 2) Ensure Antibiotics are used only by those who need them, via i.e. education programs, examination of the companies' promotional activities, sharing of surveillance data, and reducing uncontrolled antibiotic purchase (OtC/Web);
- 3) Improve access to current/future antibiotics and vaccines, reduce the prevalence of substandard / counterfeit antibiotics by i.e. serialization; strengthen health systems and address access bottlenecks; establishing new business models that balance access needs, appropriate use, and adequate return
- 4) Explore new opportunities for open collaborations between industry and the public sector to address challenges in R&D of new antibiotics, vaccines and diagnostics, recognizing the value these bring to society.



### Industry Response Measures to reduce environmental impact from production of antibiotics



We support measures to reduce environmental impact from production of antibiotics, and will:

- i. Review our own manufacturing and supply chains to assess good practice in controlling releases of antibiotics into the environment.
- ii. Establish a common framework for managing antibiotic discharge, building on existing work such as **PSCI** ‡, and start to apply it across our own manufacturing and supply chain by 2018.
- iii. Work with stakeholders to develop a practical mechanism to transparently demonstrate that our supply chains meet the standards in the framework.
- iv. Work with independent technical experts to establish sciencedriven, risk based targets for discharge concentrations for antibiotics and good practice methods to reduce environmental impact of manufacturing discharges, by 2020.



To conserve existing antibiotics today, and for next generations to come...



