Championing a safe transition to low carbon inhalers

***PMPS* sat down with Paul Sullivan at DH Industries, Nick Atkinson at Bespak, and Amanda Rouse at Orbia Fluor & Energy Materials to discuss the green transition and the collaborations driving it forward**

Sustainability concerns are driving innovation in pressurised metered-dose inhalers (pMDIs). These utilise carriers for drug formulations, known as propellants, that are traditionally powerful greenhouse gases. Alternative propellants have been developed with a significantly lower global warming potential (GWP): HFA-152a and HFO-1234ze. While these can reduce pMDI carbon footprint, an industry-wide transition requires collaboration across the value chain.

Fortunately, this is underway, with key industry players Bespak, DH Industries, and Orbia Fluor & Energy Materials pooling their respective resources and expertise to raise awareness of best practices and develop the necessary infrastructure to meet demand. To this end, DH Industries designs and builds crucial pMDI production lines, Orbia supplies the low GWP medical-grade propellant HFA-152a, and Bespak, as a specialist inhalation CDMO, provides the facilities and expertise for low carbon pMDI drug-device product development and manufacture.

***PMPS*: How advanced is the transition to low carbon pMDIs and what is driving it?**

Nick Atkinson (NA): Major pharmaceutical companies are extremely close to completing the first wave of the transition. Big pharma has the funds to invest in clinical trials, facilities and equipment for low carbon pMDIs, and several have low carbon pMDI products already at or nearing approval – for example, AstraZeneca, GSK and Chiesi. There is a middle bracket of pharmaceutical companies that are waiting for these regulatory approvals from big pharma to demonstrate that low carbon pMDIs are achievable. The rest of the industry will follow once that occurs, but they may have a smaller budget and will need to think strategically.

Paul Sullivan (PS): From a technology perspective, we are ready to go. It is all proven. We are seeing a rise in next-generation propellant use for multiple reasons. The availability of current propellants is expected to decline over the coming years, while costs will increase. However, the main driver is sustainability. People want to use propellants with a lower GWP.

Amanda Rouse (AR): Additional major contributors to the transition are evolving environmental regulations and organisations' own net-zero targets. Patients such as asthma sufferers are keen for a solution, adding further pressure for change. In the UK, the NHS has tried to switch patients from pMDIs to dry powder inhalers (DPIs) in some cases to address sustainability concerns. This has created turbulence for many patients, adding fuel to the green transition.

***PMPS*: The low GWP propellant HFA-152a is flammable, while HFO-1234ze can become flammable depending on conditions. How much of a shift is required to manufacture with flammable propellants?**

PS: From an equipment perspective, flammability must be accounted for. Safe handling of the propellants requires Atmosphères EXplosibles (ATEX)-approved facilities with explosion-proof equipment. Filling companies also need to think about flammability when it comes to storage, delivery to mixing vessels and handling of the propellants throughout their facilities. However, the key thing to remember is that other industries have been using flammable propellants since the 1960s, including highly flammable propane and butane blends. As a result, the technology and equipment to handle flammable propellants is tried and tested. We handle flammable aerosols all the time. The only thing that is different is the pharmaceutical application.

AR: We are not looking at just a physical adaptation to the supply chain, but at a mindset change around flammability. A key element of the transition is managing expectations and educating others on the safe handling of flammable propellants. While HFA-152a is flammable, this is a manageable risk at manufacturing scale with the incorporation of ATEX. A lot is to be said around the culture of change management also. Orbia is fully committed to the transition and the safe practices associated, which is why we're heavily investing our SMEs' time into advising customers on how best to adapt their existing production facilities or even on setting up a new line or facility. The earlier these discussions begin, the more effective we can be in supporting customers in managing the safe handling topic.

NA: It's all about perspective. Deodorants and many other household products are flammable and widely available to anybody in the supermarket. It's highly feasible to leverage flammable propellants in pharma if safety standards are met. The handling challenges go beyond new equipment. There are changes within the labs to how we store bulk propellants, how we transport finished goods, how we test the products in the labs – everything. It requires a shift in the culture within the organisation, and greater awareness amongst our operators and maintenance teams. At Bespak, we are creating links with consumer aerosol manufacturers to educate ourselves on how onsite culture can ensure safety.

***PMPS*: How have each of your organisations invested to facilitate the transition?**

AR: Orbia has invested heavily in a small-scale HFA-152a production site and processing plant. That has been running for three years now and we are continuing to invest in it to meet the demands of the industry. We are also due to open a new HFA-152a commercial scale

Figure 1: Bespak's line 3, focused on the production of low Global Warming Potential (GWP) propellants HFA-152a and HFO-1234ze.

Figure 2: Orbia's small-scale HFA-152a plant, which recently received significant investment for expansion

plant in the northwest of England in late 2026, which has required a multimillion-dollar investment. This will further increase our capacity to full commercial scale as the transition gains momentum. Aside from building new processing plants to facilitate the transition, at Orbia we have also heavily invested in delivering application support to companies looking to adopt HFA-152a.

PS: At DH Industries, we have invested significantly in our capacity to produce filling lines, because the whole of the industry is starting to transition at the same time. In the last 18 months or so, we have invested in a new 20,000sq ft facility to assemble the equipment. We have also extended our existing facility and brought on approximately 30 new employees to build the machines, which is about a 50% increase in our workforce. As we have expanded our capabilities, we have also tried to build in sustainability. Approximately two-thirds of the electricity we use is generated through our own solar panels and infrastructure.

NA: As Bespak is a specialist inhalation CDMO that offers end-to-end services, we're well placed to lead the transition from a development and manufacturing perspective. Starting back in 2018, we have been building up our knowledge base on low GWP propellants and have subsequently made strategic investments in low carbon pMDI capabilities for our customers. We currently provide pilot scale capability with both next-generation propellants to support early-phase developments and clinical trial supply and can manufacture pMDIs with HFO-1234ze at commercial scale. HFA-152a commercial scale will also be available soon. Additionally, as a CDMO that manufacture valves, actuators and finished products, we are in an excellent position to evolve pMDI components for compatibility with low GWP propellants and we are doing precisely that.

PMPS: How are you collaborating to streamline the transition?

PS: Flammability is a key concern in the industry, so we partnered up to produce a handling guide with best practices for HFA-152a. That involved input from Orbia on the bulk storage and handling and from the Bespak team on how to operate with low GWP propellants within the pMDI production facility. My team at DH Industries contributed knowledge on the equipment and safety systems that are needed. Beyond the guide, we collaborate closely with Bespak and Orbia at a host of industry events and visit each other's sites in the UK. At the end of the day, supply

Figure 3: Site of full scale 152a plant June 25. Key industry members met in June 2025 to commemorate 30 years of Orbia's medical propellant brand, Zephex and to also visit the site of the new full-scale HFA-152a plant in the North West of England, due for completion in 2026

must meet demand, which requires increased capacity across the board – in terms of equipment, facilities, components and propellants.

AR: At Orbia, we have experts in flammability who are well positioned to provide the industry with advice, education and support when and where it's needed. The handling guide previously mentioned has been helpful, but beyond that our efforts to amplify the message are also key. For example, our experts are becoming more involved in the International Society for Aerosols in Medicine (ISAM) and FDA conferences, as well as delivering more detailed messaging on the topic at the likes of DDL, RDD and other industry conferences.

NA: The guide we worked on together has been positively received. By collaborating to educate the industry in this way, we can allay concerns and streamline the transition, meaning patients can retain access to the pMDIs they rely upon. We are also partnering with OzUK and H&T Presspart and with the Medicines Evaluation Unit (MEU) to strengthen the full low carbon pMDI ecosystem, from development through to clinical trials and into commercialisation. We recognise that collaboration across the value chain is essential to get ahead of the curve and build up the infrastructure and are working with our partners to ensure a smooth transition.

Nick Atkinson is portfolio manager for strategic engineering projects at **Bespak**. Nick has extensive knowledge in the design and implementation of manufacturing systems for orally inhaled and nasal drug products, across all manufacturing scales. Nick has led the implementation of new adaptions to existing manufacturing processes at clinical and commercial scale, and prior to his current role led the engineering project delivery team.

Paul Sullivan is the managing director of **DH Industries Limited** – a part of the Pamasol organisation that specialises in turnkey equipment solutions for aerosol and spray product manufacturing. With over 35 years at DH Industries, Paul has extensive experience – from R&D installations to full-scale production lines – and leads the company in technical and business development capacities. Paul is an active member of BAMA and frequently speaks at industry events.

Amanda Rouse has worked in global and regional marketing roles on a global scale throughout the last 17 years. She has operated within industries that are making significant step changes in their ways of working to reach net zero targets. Amanda's passion for decarbonisation brought her to **Orbia Fluor & Energy Materials,** where she focuses on the low-GWP propellant transition within its pharmaceutical business. Based out of the UK, Amanda leads marketing, communications and the BU's thought leadership effort within Orbia Fluor & Energy Materials pharmaceutical business.