
Preparing Nations and Protecting Lives:

Pandemic Preparedness for Citizens and Economies

A White Paper by 3M

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Executive summary

Every life is precious. Governments worldwide are working hard to protect their citizens and their heroic health care workers, first responders, and essential workforce against the COVID-19 Global Pandemic. The COVID-19 pandemic has been a harsh test of the world's preparedness. Due to the global nature of the pandemic, the world has rushed to secure resources to fight COVID-19. This rush has created a massive spike in demand. In a world of just-in-time production and just-in-time consumption, little supply chain elasticity exists.

This poses a challenge when there are such dramatic spikes in demand. This is true in many critical categories including personal protective equipment (PPE). With COVID-19, the spikes in demand for PPE have been as high as 20x to 40x normal consumption levels. The entire industry capacity has not been enough to respond. Governments that were able to respond well had robust public policy frameworks and had implemented a national stockpile programme for PPE and other essential supplies.

3M operates in over 70 countries working closely with governments and the private sector during the pandemic. 3M has worked with governments on stockpiling programmes in many of these countries for nearly two decades. The purpose of this white paper is to share our experience and discuss global government best practices that we have observed for developing a robust, resilient, and sustainable national PPE stockpile.

We are eager to work with governments in the spirit of public-private partnership to serve the health needs of the public and that of other essential workers of the nation and to help protect heroic frontline health care workers and emergency responders in the fight against this COVID-19 pandemic and other future events.

In addition to stockpiling best practices, governments are well served when they:

- + Have the budgetary flexibility to procure what they need when they need it. These governments are not restricted to budget cycles for acquiring needed supplies.

- + Have the ability to authorize emergency use of appropriate PPE as part of their public health laws and regulations. This can facilitate rapid regulatory access to needed supplies beyond their borders.

- + Are resilient and can respond to a sudden spike in demand for PPE. They have access to a national stockpile of needed supplies. They can then assure frontline workers are equipped and protected.

- + Have “Emergency Supplies Stockpiling & Supply Chain Resilience” specified in their laws as a non-negotiable national requirement, which is supported with adequate funding.

+ Have legal and customs systems designed to fight product fraud and counterfeit.

+ Have PPE performance standards that are thoughtfully harmonised with other countries. This allows access to global supply chains. Unique and non-standard regulations make procurement even more difficult.

+ Allow for flow of goods through their borders.

Countries that erect export restrictions may be able to secure short term PPE supplies quickly. However, this strategy often results in an overall reduction in longer term access to necessary supplies.

+ Enter into Public-Private Partnerships (PPP) with critical best-in-class suppliers. This PPP strategy has proven more effective than simple procurement agreements.

In our white paper we describe in detail 11 global best practices to develop a robust, resilient, and sustainable stockpile programme.

1. The stockpile inventory must always be within its stated shelf life.
2. Streamlined stockpile product models simplify stockpile management.
3. Analytics to assist governments in developing a stockpile proportional in size to the minimum readiness levels expected in National Plans.
4. Stockpiles built using a range of high quality Personal Protective Equipment (PPE) that matches the intended purpose for use.
5. Personal protective equipment (PPE) stockpiles that fit a wide range of end-users.
6. Stockpiles sourced from a manufacturer(s) that can offer staggered procurement options, emergency use authorization experience, strategies to help manage product useful- life considerations, and other relevant advice.
7. Stockpiles sourced from a manufacturer(s) with a global footprint, production capacity, and sources of raw material, which can help mitigate potential export restrictions imposed by other nations.

8. Stockpiles sourced from a manufacturer(s) that has the capability to meet sporadic and modest spikes in demand.

9. Stockpiles sourced from a manufacturer(s) experienced and knowledgeable about pandemic preparedness.

10. Stockpiles sourced from a manufacturer prepared to be a partner with government health authorities rather than merely a supplier.

11. Stockpile demand planning tools allow for scenario planning and analytics by health authorities.

3M is eager to work with national and international governments and health authorities to help assure a long term robust, resilient, and sustainable stockpile programme is developed based on sound public health policy foundations and global government best practices. We are ready to apply our science to helping protect lives in public-private partnership with governments and specially to support heroic health care workers and other essential frontline workers that continue to help our sick and keep our society functioning.

Introduction

Every life is precious. Governments worldwide are working diligently to protect their citizens and their heroic health care workers, first responders, and essential workforce against the COVID-19 Global Pandemic. The COVID-19 pandemic has been a harsh test of the world's preparedness. Due to the global nature of the pandemic, the world has rushed to secure resources to fit COVID-19. This rush has created a massive spike in demand. In a world of just-in-time production and just-in-time consumption, little supply chain elasticity exists when there are such dramatic spikes in demand. This is true in many critical categories from vaccines and medical supplies to personal protective equipment (PPE). With COVID-19, the spikes in demand for PPE for instance have been as high as 20x to 40x normal consumption levels. The entire industry capacity has not been sufficient to meet demand. Governments that were able to respond well had robust public policy frameworks and had implemented a national stockpile programme for PPE and other essential supplies.

The Global Preparedness Monitoring Board, co-convened by the World Health Organization and the World Bank, in its 2020 report wrote: *“Surge manufacturing capacity, stockpiling and fragile supply chains have proven to be major barriers to pandemic response. The majority of countries did not have sufficient stockpiles or the pre-existing capacity and resources to suddenly scale up manufacturing for all the necessary countermeasures to respond to a pandemic. The consequence of this has been a significant upsurge in the global demand for medical countermeasures, which has exposed the fragility of global supply chains for*

medical goods and the materials needed to develop them. This shortage of medical countermeasures has threatened countries' capacities to fit COVID-19." They further emphasised: *"National preparedness is key, but global and regional mechanisms for tracking potential pathogens, early alert, information sharing, research and development, regulatory capacity-building and harmonization, allocation of countermeasures, stockpiles and supply chains must also be strengthened and developed, sustained and financed."* (A World in Disorder. Global Preparedness Monitoring Board Annual Report 2020, World Health Organization)

Stockpiling remains a core strategy to bridge gaps in supply chains. Some governments have experience with stockpiling. Many do not possess such experience. The purpose of this white paper is to share observations of global government stockpiling best practices focused on personal protective equipment. 3M is a major global producer of personal protective equipment. In light of varying levels of domestic stockpiling expertise, we have gathered these observations in this report in the spirit of knowledge-sharing and to contribute towards capacity- building. Over the years we have worked with many governments around the world assisting in their response to infectious disease, natural and man-made disasters. Our teams on the ground in countries and regions around the world are ready to follow up with in-person conversation and support national and local efforts. This is especially important as governments collect lessons learned from the COVID-19 experience and introduce systemic reforms.

Stockpiling is one contributing action to assure heroic frontline health workers, first responders and essential personnel are protected. They deserve to have access to appropriate personal protective equipment in quantities needed to fulfil their duties.

Global pandemic preparedness plans

Every country in the world possesses one or more forms of emergency preparedness and response plans. Such plans focus on the biggest threats a nation anticipates.

According to the World Health Organization, *“an emergency response plan (ERP) is a document describing how an agency or organisation will manage its response to emergencies. An ERP describes the objectives, policies and concept of operations (CONOPS) for the response, as well as the structure, authorities and responsibilities to make that response systematic, coordinated and effective.”* (A strategic framework for emergency preparedness ISBN 978-92-4-151182-7 World Health Organization 2017).

Emergency response plans can cover a range of emergencies from infectious disease outbreaks to natural disasters to various man-made events. Response often requires the involvement of the national emergency response agency as well as relevant ministries and other key government agencies. Nongovernmental organisations as well as industry may also be involved for support. Each plan describes the anticipated inter-ministerial and inter-agency command and control response. One ministry or government agency often takes the lead and plays the coordinating role while others support based on their areas of national responsibility and expertise. Such coordination and cooperation is an important

function of a national emergency response plan.

It has been our observation that many plans often lack an appendix describing the logistics and supply chain required to respond effectively to events of specific profit. This is especially true of pandemic plans. Pandemic plans are often focused on the influenza virus. COVID-19 demonstrated that other pathogens can emerge on a global basis and pose a pandemic threat. A logistics, supply chain and stockpile appendix to the national pandemic plan will make assumptions about various pandemic scenarios and their intensities. For each scenario a proportional logistics, supply chain and stockpile estimate must be developed. Consideration must include industry's capacity to respond during such an event. For each scenario of increasing severity, logistics needs, supply chain requirements and stockpiles also increase. In catastrophic events, speed of response is essential to effectiveness of response and saving lives. Lack of access to needed supplies and supply chains reduces effectiveness of response. COVID-19 was a pressure test of national pandemic emergency response plans and their associated logistics, supply chain and stockpile readiness.

Stockpiling is cited by the Global Preparedness Monitoring Board, co-convened by the World Health Organization and the World Bank, in its 2020 report as a component of emergency preparedness and response. One of the major challenges of stockpiling is to define an essential medicine and medical device and other equipment list. In this list for pandemics personal protective equipment is often a

key and essential focus. Once defined then the types of personal protective equipment and the level of required performance must be specified. While on the surface such specifications may seem simple, in a global climate of product scarcity during a pandemic, high quality products and broad range of specifications are essential to enable procurement officers to procure from a larger array of producers. This requires a collaborative working relationship among public health leaders, PPE regulators, procurement officers and industry.

Governments are well served when they:

- + Have the budgetary flexibility to procure what they need when they need it. These governments are not restricted to budget cycles for acquiring needed supplies.
- + Have the ability to authorise emergency use of appropriate PPE as part of their public health laws and regulations. This can facilitate rapid regulatory access to needed supplies beyond their borders.
- + Are resilient and can respond to a sudden spike in demand for PPE. They have access to a national stockpile of needed supplies. They can then assure frontline workers are equipped and protected.
- + Have “Emergency Supplies Stockpiling & Supply Chain Resilience”

specified in their laws as a non-negotiable national requirement, which is supported with adequate funding.

- + Have legal and customs systems designed to fight product fraud and counterfeit.

- + Have PPE performance standards that are thoughtfully harmonized with other countries. This allows access to global supply chains. Unique and non-standard regulations make procurement even more difficult.

- + Allow for flow of goods through their borders. Countries that erect export restrictions may be able to secure short term PPE supplies quickly. However, this strategy often results in an overall reduction in longer term access to necessary supplies.

- + Enter into Public-Private Partnerships (PPP) with critical best-in-class suppliers. This PPP strategy has proven more effective than simple procurement agreements.

In the following sections we describe in detail 11 global best practices to develop a robust, resilient, and sustainable stockpile programme.

1. The stockpile inventory must always be within its stated shelf life.
2. Streamlined stockpile product models simplify stockpile management.
3. Analytics to assist governments in developing a stockpile proportional in size to the minimum readiness levels expected in National Plans.
4. Stockpiles built using a range of high quality Personal Protective Equipment (PPE) that matches the intended purpose for use.
5. Personal protective equipment (PPE) stockpiles that fit a wide range of end-users.
6. Stockpiles sourced from a manufacturer(s) that can offer staggered procurement options, emergency use authorization experience, strategies to help manage product useful- life considerations, and other relevant advice.

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7. Stockpiles sourced from a manufacturer(s) with a global footprint, production capacity, and sources of raw material, which can help mitigate potential export restrictions imposed by other nations.
 8. Stockpiles sourced from a manufacturer(s) that has the capability to meet sporadic and modest spikes in demand.
 9. Stockpiles sourced from a manufacturer(s) experienced and knowledgeable about pandemic preparedness.
 10. Stockpiles sourced from a manufacturer prepared to be a partner with government health authorities rather than merely a supplier.
 11. Stockpile demand planning tools allow for scenario planning and analytics by health authorities.

PPE stockpile policy recommendations

1. The Stockpile inventory must always be within its stated shelf life.

At the core of a robust national stockpile programme lays the central concept of life cycle management. Governments are well served by maximizing the life expectancy of the stock, so they use public funds prudently to replenish outdated stock with newly produced products. Stockpiling is equivalent to buying national insurance so that when disaster strikes governments can mobilise and serve their citizens. The fact that personal protective equipment (PPE) become obsolete after years of storage is simply a natural consequence of the fixed life expectancy each product possesses. There are many stockpiling best practices, such as appropriate long-term storage, rotation of stock and inventory management.

Effective national Stockpile management can be achieved through various strategies such as assuring controlled stockpile storage conditions, centralized stockpiles, and staggered procurement of stockpile supplies for effective stockpile rotation. It is essential that governments engage with manufacturers and logistics providers who have the knowledge, experience, and capability to offer advice on

the management of the stockpile of personal protective equipment.

Since the emergence of Severe Acute Respiratory Syndrome (SARS) in 2003, 3M has worked with governments on various stockpiling programmes. Our experience in designing a robust, resilient, and sustainable stockpile programme and providing governments with options that match their needs enable us to share our subject matter expertise with national stockpile authorities.

3M invites the government to work with 3M on defining options for the management of the stockpiled PPE to maximise the life expectancy and minimise the use of public funds in assuring the nation remains protected in the occasion of a significant event and subsequent massive demand spikes.

2. Streamlined stockpile product models simplify stockpile management.

Stockpiling programmes, at the national level, may contain a variety of different respiratory protection models. The larger the number of different products, the more complex the task of assuring those products are within their intended shelf life. The number of models of personal protective equipment (PPE) included in the stockpile simplifies the management of the PPE stockpile. Therefore, it is essential to seek respirators that have a design that can achieve a good fit on a large cross-section of the population. By doing so fewer PPE models may be needed thereby simplifying the maintenance of the stockpile.

Respirators should be selected to fit the intended population. No single respirator model is likely to fit 100% of any intended population. Therefore, individual fit testing is the only way to be sure the selected respirator fit each user effectively. Respirator fit testing is an important best practice and, in several countries, a legal requirement. Fit testing helps confirm a respirator wearer can achieve an adequate fit and therefore, can achieve the intended level of exposure reduction when

properly selected and worn. In addition, being trained, following donning instructions, and performing user seal cheque procedures according to each respirator model's User Instructions is vital to a wearer to achieve an adequate fit. The manufacturer may be able to provide a fit profit which is data-based information that can help predict which respirator models will fit a population.

Selecting several different models of respirators, based on their fit profit will allow stockpile managers to provide an adequate selection to fit most end users. Stockpile managers can work with the respirator manufacturer to help minimise the number of individual PPE models in the stockpile while not compromising the level of fit across the intended user population.

To discuss respirator model mix for stockpiling, please contact your 3M representatives. They can bring to your attention the product mix, strategies for stockpiling with as few individual product models as possible and discuss other stockpiling best practices. They will do so with inputs provided by the stockpile team based on your emergency preparedness plans.

3. Analytics to assist governments in developing a stockpile proportional in size to the minimum readiness levels in National Plans.

Any pandemic response will be reliant on a ready force of Health Care Workers (HCWs) and workers supporting the National Critical Infrastructure to assure society is functioning while the system responds to protecting lives and sustaining the economy. As a nation, a system of health care delivery networks and key National Critical Infrastructure companies, need to be able to ensure that all workers have access to appropriate personal protective equipment (PPE) to assure continuity of operations. Knowing what the day-to-day PPE consumption levels would be, and the duration of the event will be is essential in assuring the right amounts of products are available to assure frontline workers can do their jobs.

The challenge of predicting PPE consumption levels in a pandemic example is one of combining the medical science of an emerging disease and its associated epidemiology with PPE logistics and supply chain management. The developers of the stockpile must establish the type of PPE required and how many units are to

be stockpiled. While many countries and health systems and national infrastructure companies are good at developing emergency response plans, many such plans focus on clarifying roles and responsibilities to assure a coordinated action. Establishing what the Minimum Readiness Level (MRL) for the stockpile is essential to guide managers to stockpile the right amount of product to match the National Plans. The concept of MRL tied to scenarios and expectations of response in the national plans is essential to stockpile development and management.

3M has developed demand planning tools that have been used by many governments since the SARS outbreak in 2003. 3M's demand planning tools draw from the local emergency plans and make projections of the amount of PPE needed for stockpiling based on the details in each of those plans.

The tools are available at no cost from 3M. A separate white paper is available detailing the functions and features of these demand planning tools.

To setup a demand planning session simply contact your 3M representative.

4. Stockpiles built using a range of Personal Protective Equipment (PPE) that matches the intended purpose for use.

Particulate respirators are designed to help reduce exposure to particles, including those containing viruses spread through the inhalation transmission route. This includes such pathogens as SARS-CoV-2 and the influenza virus. Occupational use of particulate respirators in a pandemic will be by high- risk individuals, health care workers, first responders, and employees whose activities are especially required in the Critical National Infrastructure (water, electricity, transportation etc.). Particulate air purifying respirators are available in three types: disposable, reusable, and powered air purifying units. Disposable respirators are stockpiled most frequently. However, there may be occasions where a reusable or powered purifying air respirators may prove to be more economical and practical.

3M has deep subject matter expertise in providing products for the stockpile of PPE. Our PPE includes respirators (particulate disposable, reusable respirators

and powered and supplied air respirators), goggles, coveralls, and hearing protection products. Our industry leading PPE has long offered health and safety solutions designed to meet the highest industry standards of excellence.

3M also has global expertise in pandemic preparedness. 3M operates in over 70 countries. The company has provided a high level of expertise, modelling tools and

technical advice to many governments globally. We offer product and services for varied working environments that can help protect employees and assets as well as provide recovery assistance during and after the incident.

3M invites your government to engage in the spirit of public and private partnership with 3M to evaluate how to design a robust national stockpile matching the national priorities established by your government. We can share global best practices, outcome-based information on selection and use, and the minimization of individual product models in a stockpile while maximizing protection and fit for workers.

5. Personal protective equipment (PPE) stockpiles that fit a wide range of end-users.

Tight-fitting respirators, such as filtering facepiece respirators (sometimes called disposable respirators) and elastomeric (sometimes called reusable) respirators, are designed to seal tightly to a wearer's face. The better the seal, the more inhaled air will travel through the respirator's filter. A poor seal results in air and particles bypassing the filter and entering the breathing zone. Because each person has different facial features, each person may receive a different amount of exposure reduction with a particular respirator model. In situations where a respirator is used with the intention to reduce a wearer's exposure, a fit test can confirm that the stated level of protection can be achieved for an individual with a specific model of respirator. Fit testing helps assure the worker has a good face to facepiece seal, the respirator is compatible with any other PPE required to be worn and that it is stable on the wearer's face.

It is always considered a best practice to fit test workers with the respirator they will use. Some countries including the United States, Canada, the United Kingdom and Australia require that an individual fit test be performed for each respirator model that the wearer will use. Some countries require fit testing the first time a new respirator model is used and refresher training and fit testing regularly thereafter. In order to determine the mix of respirators to include in a stockpile, administrators can discuss the fit profile of the respirator models with the manufacturer. This will help indicate what percentage of a given population the respirator is expected to generally fit. This may help assess how many models should be placed in stockpile to increase the likelihood that, when fit tested, a relatively high proportion of people will pass the fit-test.

As pioneers in the field of respiratory protection, 3M not only invented the first single use NIOSH approved filtering facepiece disposable respirator, we helped develop the qualitative fit testing protocol used today. We have a deep bench of experienced and passionate scientists and engineers eager to spread knowledge about and increase understanding of this crucial part of respiratory protection.

6. Stockpiles sourced from a manufacturer(s) that can offer staggered procurement options, emergency use authorisation experience, strategies to help manage product useful-life considerations, and other relevant advice.

The global COVID-19 experience demonstrated the need for key attributes of a well-run stockpile management programme based on a resilient supply chain as its backbone. A flexible supply chain relies on buffers within the country so it can respond to spikes in demand in the short-term while long-term procurement takes place. Countries that have not had previous stockpile programmes or that have allowed stockpiled product to expire may not have the institutional memory of the key attributes of a robust programme which maximise the usefulness of the PPE as well as public value. We will recount key features of such a programme in this section.

All products age and slowly degrade as a function of storage time. Products without shelf-life information can create a risk of having products that may be past their useful life and do not perform to expectations and leaving the stockpile manager with no idea of when to replenish and replace that stock. No one wants to send product to frontline health care workers that does not work or may fail in the field. Stockpile managers should enquire about shelf-life information on respirators and that the manufacturer stands behind its performance. For example, a stockpile of PPE such as respirators may have a 5-year shelf life and many countries tend to procure the stock over the life of the product. In this case they would procure one-fifth of the stock every year for 5 years. That way on the 6th year only 20% of the stock needs to be replaced versus 100% of the stock if the entire stockpile was procured in one year. Also, equal annual procurement gives budget planners more predictability in government financing of the stockpile. Another option is to purchase the full stock on year one and withdraw 20% each year for regular government use (hospitals, training etc.) and replace the used stock with 20% new stock. This option ensures full allotment of necessary stock from day one. Options were further detailed in Attribute 1 in this white paper. Many countries have found developing provisions in their laws for authorizing emergency use of substantially equivalent products to be a very practical way of enabling access to more products in their markets. These national Emergency Use Authorisations are an effective public health mechanism for mitigating scarcity of products in the country.

Finally, a robust cycling of stocked product will minimise the amount of product that reaches the end of their life cycle. For product that does pass its expiry date countries have taken various approaches to their removal from the national stockpiles while still finding suitable uses. Some countries have downgraded respirators for use as face coverings. Some have used respirators for training purposes, some have donated to select humanitarian causes and events. 3M can work with governments on their PPE stockpile so these elements of a robust, resilient, and sustainable stockpile programme can be implemented. 3M can share country best practices and broker connections to other countries' health authorities and those responsible for stockpiling for a substantive and meaningful dialogue.

We invite you to discuss your needs in this area with your local 3M team. With subject matter expertise and global exposure to over 70+ countries and engagement as a supplier and advisor to national preparedness and response strategies we can share our collective knowledge with you to help enable better outcomes for the country.

7. Stockpiles sourced from a manufacturer(s) with a global footprint, production capacity, and sources of raw material, which can help mitigate potential export restrictions imposed by other nations.

Governments are well served by working with manufacturers that have a global footprint and production capabilities. As COVID-19 demonstrated, several countries were quick to erect personal protective equipment (PPE) export restrictions when the outbreak happened. Export restrictions slow the flow of goods and services around the world and have a negative impact on public health readiness of many countries. Producers with broad production footprints can provide products from their many manufacturing sites located in different geographies. While not completely immune from export restrictions, they have better flexibility to navigate. To appreciate its significance, the Director-General of the World Health Organization has argued that “*we can’t stop COVID-19*”

without protecting health workers” (WHO 2020). Those workers require gloves, medical masks, respirators, face shields, gowns, and other essential equipment. As the Coronavirus has spread, shortages have arisen. Between 1 Jan 2020 and 21 March 2020, 46 export curbs on medical supplies were introduced by 54 governments. Thirty-three of those export curbs were announced between 1 March 2020 and 21 March 2020, an indication of just how quickly new trade limits spread across the globe. Starting in April the export restrictions grew, only slowing down in the middle of 2020.

Governments should ask manufacturers to demonstrate their production capacity around the world. The larger the global footprint the greater the manufacturer’s ability to respond to restrictions imposed on the movement of PPE by customs authorities of various countries. The only sure way to minimise risk of access to PPE in times of crisis is to assure enough stocks are in the country, accessible to the government, at any time.

3M has operations in 70+ countries. There are scientists and engineers with subject matter expertise on PPE available in these countries. 3M produces PPE in 14 countries spread around the world. In 2020 3M significantly increased our respirator production, delivering 2 billion respirators around the world – or more than three times that of our 2019 production. 3M’s increased capabilities have alleviated some shortages. Yet stockpiling or planned delivery remains the most viable national option for readily accessible PPE.

3M is focused on applying 3M science to improve the health, safety, and productivity of workers all over the world. Today we have a special focus on COVID-19 and helping protect the heroic frontline health care workers, first responders and essential workers.

Through our strong technical leadership and training and education efforts, we strive to inspire action and assist governments and industry around the world to continue operating safely. We can discuss best practice stockpiling strategies with governments. This public-private partnership can play a pivotal role in capacity building and ultimately supplying the PPE for national stockpiles.

8. Stockpiles sourced from a manufacturer(s) that has the capability to meet sporadic and modest spikes in demand.

COVID-19 has created a pressure test of the public health system. Both governments and suppliers have had to make rapid adjustments to respond. As countries look to secure additional inventory of respirators or extend the use of existing supplies, some countries have successfully adopted several strategies to increase the availability of new supplies and/or optimise the use of existing supplies within their system. Building capacity, metering consumption, and maximizing access to supplies by fast-track regulatory green channels and flexible procurement criteria are all instrumental strategies that 3M can assist governments in implementing to help address spikes in demand.

At 3M we used our technology and manufacturing capabilities to ramp up production. Our teams were in close contact with governments allowing them to respond with agility – and perhaps most importantly, they are aligned around a singular vision: Serve the national need shoulder to shoulder with government for the best possible outcomes. Our spirit of service and servant leadership and our corporate vision of “Science. Applied to Life.” was brought forth in our response in this pandemic by applying our science to improve every life. When COVID-19 hit, 3M doubled its production of respirators in weeks to help quickly protect nurses, doctors, first responders and essential workforce. 3M continued to expand our capacity throughout 2020, and ultimately produced 2 billion respirators globally by year end. This has given us the longer-term capability to respond to spikes in demand with more production capacity. However, it is noteworthy to mention, demand was 20 to 40 times higher than normal. This means stockpiling remains the only viable long-term method of assuring government access to PPE at a moment’s notice.

We invite the government to engage with 3M and work together to develop a logistics stockpile plan that is based on the national pandemic or COVID-19 response plan. By synchronizing our offering with the government’s needs we can arrive at a desired position to meet these needs as heroic health care practitioners, and first responders work hard to provide care to citizens across the nation.

9. Stockpiles sourced from a manufacturer(s) experienced and knowledgeable about pandemic preparedness.

Governments prepare for a variety of emergencies based on various risk factors their countries face. Some are prone to earthquakes, fires, tsunamis, and other natural disasters. They prepare for industrial accidents and man-made events. They also must prepare for infectious disease outbreaks whether they are outbreaks or pandemics. COVID-19 taught many governments several important lessons. A key lesson was that many government pandemic plans lacked a logistics and supply chain plan or at least the ability to realistically implement the plan. Lack of such an important component creates national scarcity for critical products. Governments also learned that engaging with a supplier with prior experience across many different types of emergencies, including infectious

disease outbreaks, is preferred. Such manufacturers have lived the challenge of providing products faced against global demand. They can rapidly mobilise their resources and have the institutional memory to work effectively.

Governments are well served to ask manufacturers and suppliers for their experience in large disaster response and infectious disease outbreaks. Practical examples of bottlenecks and barriers that the manufacturers share will inform the government about what they can do to alleviate these issues. For instance, in many cases developing a national stockpile will benefit the country when the need for product arises and manufacturers that have worked on similar stockpiles in other countries can help by sharing winning strategies including logistics.

Many of the recommendations of this white paper are based on the long history 3M has had in working with governments around the world on national and subnational stockpiles. Over the course of two decades, we have intensified our efforts, developed tools and techniques, and increased production capacity to be responsive to government needs.

We welcome entering a substantive dialogue with the government sharing our knowledge and credentials in having worked on a variety of such events and sharing what internal mechanisms we have put in place to be a reliable partner to governments in pandemic preparedness and response..

Health Epidemics		Disasters
2003	SARs (CoV)	France Forest Fire
2004		Indian Ocean Earthquake and Tsunami
2005		Pakistan Earthquake, Hurricane Katrina
2006		Ecuador Volcano, Indonesia Earthquake/Tsunami
2007		
2008		Hurricane Ike and California Wildfires
2009		

10. Stockpiles sourced from a manufacturer prepared to be a partner with government health authorities rather than a supplier.

The COVID-19 rush to procure personal protective equipment (PPE) showed that while volumes of product can be sold from a supplier to a government, a key aspect of the Government-Supplier relationship is the sharing of knowledge that will have a positive impact on national public health outcomes. The range of relationships go from simply a procurement role between government and supplier to one where the supplier has a seat at the table and shares with government the global best practices various governments have accomplished, and the errors or challenges that did not work out so well. Because the concept of stockpiling is so new to many government health authorities, this type of knowledge sharing is critical in government's decision-making process to create

the best national value in a stockpile.

3M has been working on government stockpiles since 2003 with the emergence of Severe Acute Respiratory Syndrome (SARS). We have developed tools for governments to use to predict their needs during such disasters. Other tools have been developed for stockpile management. Training and capacity building have been a key contribution from 3M. And because 3M Operations have been in the country for decades, the strong local presence assures that 3M is only a call away from engaging and working with government closely. We understand the daunting challenges countries face in these global crises and we have developed tools to share and give governments options. So, beyond manufacturing lines producing products, the vast knowledge we hold is also at the disposal of governments.

Often this begins by developing a Memorandum of Understanding (MOU) with the government to provide scope for needed areas and topics of interest by government. This creates a framework so 3M can contribute to maximizing public value and positive impact on people's lives through close partnership and with the leadership of government.

We invite governments to reach out to our country leadership team so we can discuss how best we can serve such national needs.

11. Stockpile demand planning tools allow for scenario planning and analytics by health authorities.

Any public health pandemic response will be reliant on there being a ready force of health care workers (HCWs) to care for the sick. These include General Practitioners (GPs), nurses, ambulance officers and other emergency personnel who are trained, ready and willing to be mobilized. In many countries, lack of confidence by their HCWs about their own protection during outbreaks have created high levels of absenteeism. We must give confidence to our HCWs. If we do, then our HCWs will come to work, knowing that they may not infect themselves in the process, or transmit disease to their own families and friends. Governments need to be able to ensure that our HCWs have access to appropriate

personal protective equipment (PPE) in the numbers necessary.

Most pandemic plans contain important details about roles and responsibilities when disasters strike, and national outbreaks happen. These plans assure government leadership can act decisively in time of crisis with a clear command and control structure. What most plans lack, however, is a logistics and supply chain appendix to describe inventory of resources required to accomplish the mission.

3M has developed an analytical tool called the 3M™ Emergency Preparedness & Response – PPE Surge Capacity Demand Planning Tool which, based on assumptions that can be derived from the National Pandemic Plan or National COVID-19 Response Plan, other scenarios, or user-defined parameters can be utilized for what-if stockpile analysis.

3M assists governments globally to have access to this demand planning tool free of charge. 3M is also available to conduct workshops with government experts who can provide data input variables and assumptions to run the statistical simulations for different service delivery nodes. We invite governments to request such a workshop so we can simulate scenarios of interest using governments own input and data and provide projections of the range of stockpile levels.

Conclusion and call to action

When compared to the national health care budget, an effective stockpiling programme is a modest national investment in assuring healthcare workers, emergency responders and essential personnel are protected during a global infectious disease outbreak that will inevitably reach all countries.

Reforms to public health policy frameworks, trade policy frameworks and global best practices for stockpiles of personal protective equipment are essential to protecting those heroic workers that risk their lives to save the nations' citizens and ensure societal operation. We have detailed these best practices in this white

paper and are eager to engage in conversation to share more information. Knowledge sharing and capacity building are key 3M values we bring to governments around the world.

3M is eager to work with national and international governments and health authorities to help assure a long term robust, resilient, and sustainable stockpile programme is developed based on sound public health policy foundations and global government best practices. We are ready to apply our science to helping protect lives in public-private partnership with governments and specially to support heroic health care workers and other essential frontline workers that continue to help our sick and keep our society functioning.

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