

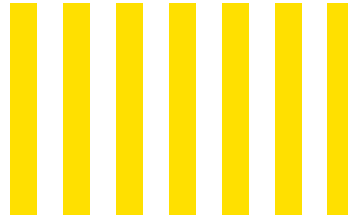


2006



International Gas Union
23rd World Gas Conference
5-9 June 2006, Amsterdam - NL

Gas: Powers the people
Preserves the world
Promoted by IGU



75 years
IGU

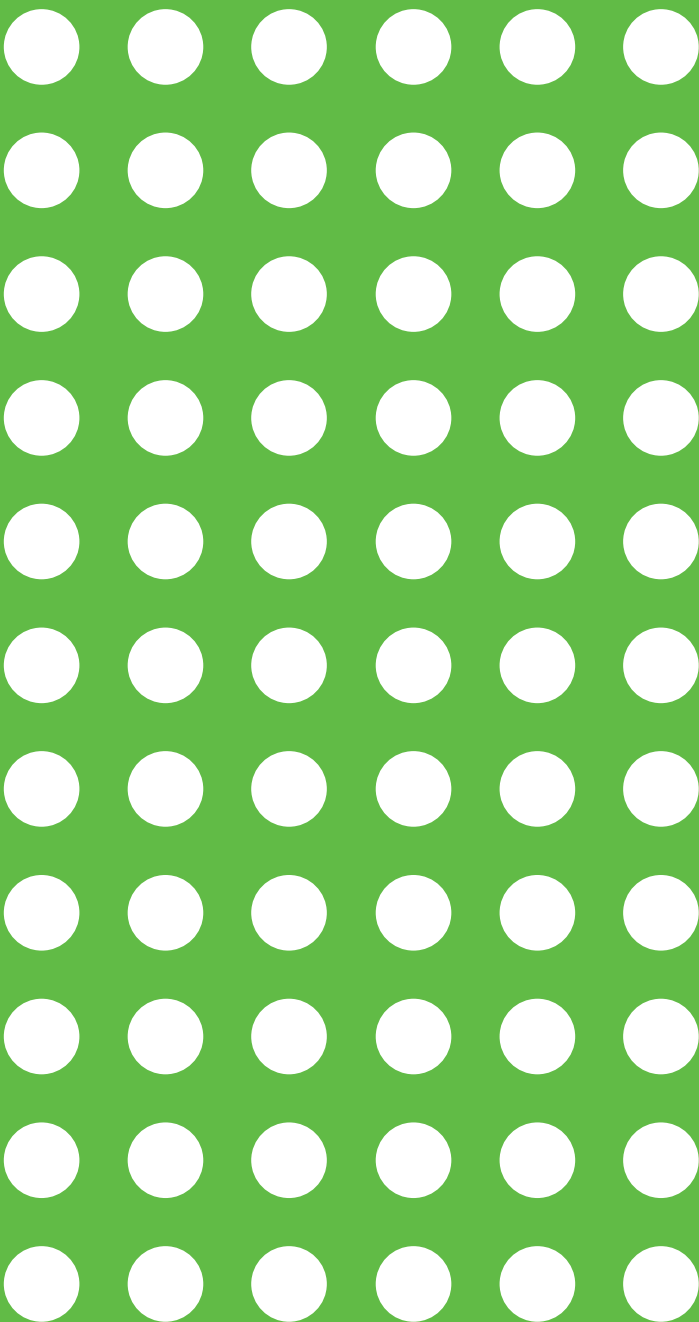


THE TRILOGY OF
SPECIAL PROJECTS



Sustainable Development and the Role of Gas

'It's up to gas!'



In preparation of the 2006 World Gas Conference, IGU launched three special projects: Gas to Power, Sustainability and Regulation. For all three, the aim was to engage governments, industry and other stakeholders in a dialogue on gas-related issues to achieve the best solutions for society at large.

The project Sustainable Development and the role of gas aimed at the important contribution that gas can have in a transition to a more sustainable production and use of energy. IGU has asked professor dr. Catrinus Jepma, scientific director Energy Delta Research Center, University of Groningen, the Netherlands and professor dr. Nebojša Nakićenović, professor of Power Systems and Energy Economics, Vienna University of Technology, and International Institute for Applied System Analysis, to carry out a study to explore the opportunities and threats for gas as a bridging fuel and to come forward with suggestions to the gas industry to position itself.

Various drafts of the report have been discussed in a number of international workshops, where the relevant stakeholder groups were present. This brochure is a summary of the report.

On 7 June, the 23rd World Gas Conference will focus on Sustainable Development.

I would like to thank all those who participated in the project and the workshops and hope that it makes a contribution to the dialogue and cooperation between the stakeholders in governments, the gas industry and supporting institutions.

George H.B. Verberg
President International Gas Union 2003 – 2006

'It's up to gas!'



Security of supply, market structure, preferred energy mix, and, more than ever, sustainability are all issues moving to the top of the agenda of decision makers throughout the world. The natural gas industry continuously updates its position on these issues: what strategic stand holds out greatest promises for the future? What is the preferred role of the natural gas industry to promote the potential and position of gas?

The International Gas Union (IGU) facilitates its members by issuing topical reports and other strategic policy information to support the activities of its members. Sustainable Development and the role of Natural Gas has been one of the three Special Projects that has been carried out in the framework of the IGU Triennium 2003 - 2006. This brochure is based on the report by professor dr. Catrinus Jepma, scientific director Energy Delta Research Center, University of Groningen, the Netherlands and professor dr. Nebojša Nakićenović, professor of Power Systems and Energy Economics, Vienna University of Technology, and International Institute for Applied System Analysis, that has resulted from this project. Energy production and use has a potentially high impact on the environment. The reduction of emissions on a local and regional level (SO₂, NO_x) has gained high priority. Recently the local air conditions and the global climate change have been added to the agenda. This also puts forward challenges to the world gas industry. IGU aims to support industry leaders and policy makers in the energy industry to make well-informed decisions.

Developing and updating strategies for natural gas is an **attractive challenge**. Attractive, in the first place, because natural gas has much to offer in the transition process to a sustainable world of energy: meeting the energy needs of both present and future generations is a rewarding responsibility.

It is, at the same time, **a challenge** because the industry will have to be continuously aware of the way the energy story of this world is unfolding. When we will be looking back, one or more decennia from now, we would like to record that it was the right story we were in because we played the right cards. The industry should be aware of the trends and developments that may call for adequate response. It should therefore equip itself with a shared strategic framework that enables her to identify threats, opportunities and possible dilemmas, and to draw up consistent visions and scenario's. In this way the industry will be able to continue its success.

It's up to gas!

The future in storylines

In order to anticipate the future and to deliver our contribution in shaping it, four different 'storylines' will be presented. They are based on an exploration of the opportunities and threats that in various surveys have been identified. These storylines have been used to recognize possible positions that the international gas sector may face in the next three to four decades. There are reasons to believe that the so-called 'transition storyline' is the preferred one.

Drivers and obstacles explored

Demand for natural gas continues to grow faster than demand for other fuels. Gas fired power generation can still be considered as the main growth engine. Assuming long term price competitiveness, natural gas has major advantages in efficiency, economics, environmental impact and the possibility of following the demand growth in a modular way.

Also in other markets gas has the potential to grow, for example in public and private transport, especially in urban areas (both in new and old economies) that are suffering from air pollution. Moreover we see demand growth in domestic and business use, especially in rapidly developing regions, or in regions where reliable energy supply has been lacking so far.

Natural gas profits from the fact that it is the cleanest fossil fuel: low emissions of pollutants (particulate matter, sulphur, nitrogen oxides) and less than half carbon dioxide emissions compared with coal. Moreover, improved technologies for conversion of natural gas into electricity and other energy forms hold the promise of reducing most of the adverse environmental impacts even further more. Looking in a more remote future, natural gas qualifies as a precursor to energy forms like hydrogen. It embodies a way to prepare for a long-term development towards alternative energy systems. In short: **natural gas is the transition fuel par excellence.**

Can enough gas be made available to facilitate the growth? The answer is yes: natural gas resources are abundant and seem relatively straightforward to recover. Moreover, natural gas can be considered as a reliable source.

It would however be naive to underestimate a few counter forces for gas to be the transition fuel 'par excellence' and they deserve careful attention.

Key is that natural gas maintains and strengthens its hallmark as a reliable and affordable fuel in the opinion of policymakers, industry and consumers. The supply side is the key. Markets increasingly are becoming more dependent on imports, whereas the reserves are concentrated in just a few regions. This requires intense and long-term oriented cooperation on political and commercial levels between producing and consuming countries.

Secondly, uncertainty in the markets might hamper progress. The debates on regulation in the gas industry must result in clear structures and proper business incentives. Poorly designed regulation may threaten continuity of supply and demand, and harm business activity and investment. Also the debate on taxes and crediting must result in a clear picture for the future, in which the adverse environmental effects of the various fuels are embedded in the economic structure. Otherwise, investments and technological development will lag and lack. In the field of gas technology, the gas industry should be aware that market liberalization and competition will generate pressure on the R&D efforts, that can have a negative impact on the market share of gas.

Moreover, the debate on challenges and opportunities should have a realistic approach. Especially the pathway and timing to increasing share of renewables requires a balanced approach. The essential role that gas can play as a transitional link to a sustainable energy future needs to be clarified and promoted.

It goes without saying that gas competes intensively with other fuels. Gas from coal and coal bed methane is potentially competitive. Also nuclear might revive. Unconventional fossil resources may yield new, competitive fuel gases (e.g. tar sand gasification). Renewable sources of energy, wind, solar and biomass, will become more competitive and widespread. The natural advantages of gas could be challenged by technological breakthroughs to clean up coal.

Finally, there are societal issues to bear in mind, such as the growing debate about exploration and production activities in environmentally vulnerable areas as well in areas with indigenous people's land claims.



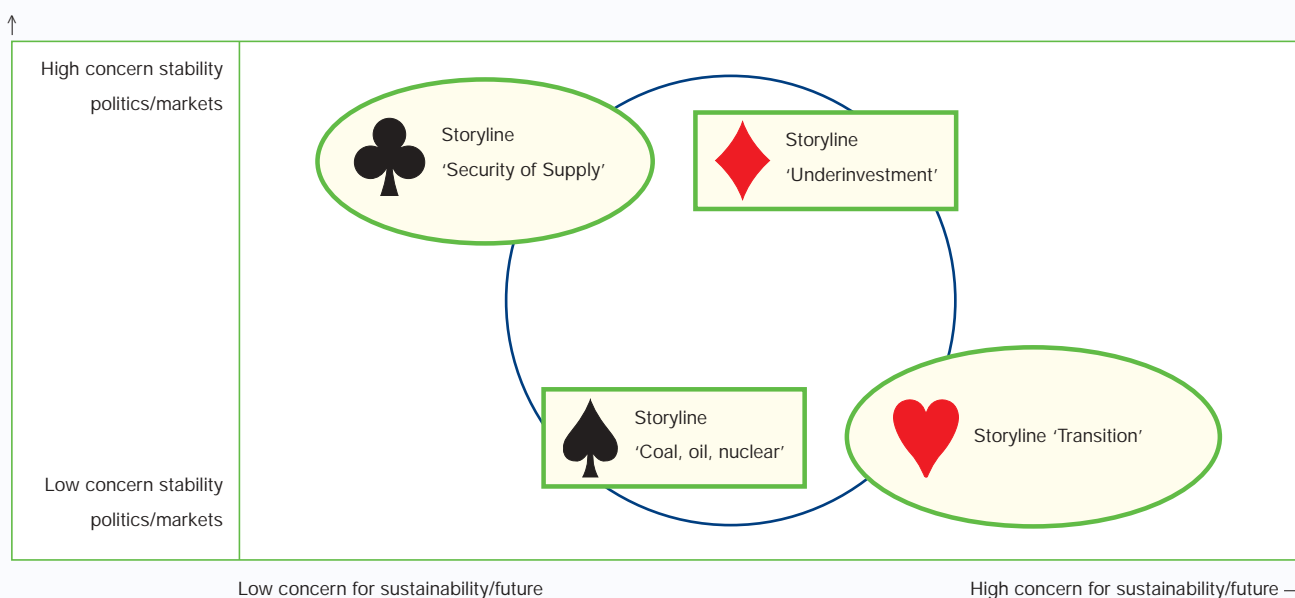
Four storylines

In order to provide a structured view of the future the project team has developed four storylines. In essence the storylines may be described along two dimensions. The first dimension reflects the degree of awareness and concern about the sustainability of the energy systems. The second dimension is to be regarded as the degree of (in)stability in the markets as well as at a political, regulatory and commercial level.

The project team has played the cards and positioned two clearly distinctive storylines. We call these storylines 'hearts' and 'clubs'. The other two storylines are in the upper half ('diamonds') and lower half ('spades') of the diagram.

♣ On the left upper side is projected a storyline that we call 'the security of supply model'. Economic growth is high (especially Asia) and at the same time societies do not succeed in substantially decoupling energy use from this growth. Sustainability is hardly an issue. Security of supply concerns dominate the markets and foreign policy issues.

♠ This case shows a relatively low concern about sustainability and policy makers are pretty confident about political and market stability. This 'coal, oil and nuclear storyline' could occur if we assume technological break throughs, needed to sufficiently solve environmental and safety problems attached to the utilization of coal and nuclear and to establish public confidence.



♥ If public opinion and policy makers will attach weight to the climate and sustainability issue, and at the same time there is confidence in market and political stability, and an internationally harmonized emission policy is in place, the 'transition storyline' broadly applies. This is a future oriented, self-assured storyline, driven by air quality, technological innovation and awareness of the swing function of gas in combination with (a breakthrough development for) renewables. There is a general awareness of the fact that oil has past its peak and efficiency improvement in energy conversion is high. Compressed natural gas and liquids from gas will become significant in transport. New gases (hydrogen; biomass-based) will blend in, especially in niche markets.

♦ If there is a high concern for environment and climate issues, but problems and uncertainties in market and politics seem hard to manage in a coherent way, the world could face an 'underinvestment storyline'. In this case policy makers may fail to put a clear and convincing climate policy in place and investments may be subdued, even if the sector would be convinced of the need to adjust to the stricter environmental rules. Slow economic growth, ineffective regulation and uncertainty are decisive elements in this storyline.

Assessing the storylines

There are no probability figures attached to the four storylines. Theoretically, all four are equally possible. But are they equally desirable? They are not necessarily equally valuable for mankind. If sustainability is accepted as a major concern for the present and future generations, then evidently the first storyline ('hearts') in which gas can play an important role as the transition fuel, is the preferred one, because it reflects a world in which political and energy market stability can be combined with sustainability.

In order to realize the full transition potential of natural gas, the sector will have to tackle three major issues:

- ● ● The first issue to tackle: **security of supply**. The gas industry will have to develop answers to the growing concerns about an unbalanced import dependence of markets. The natural gas industry will have to maintain its image of reliability and security of supply in spite of the many changes in the fundamentals of the energy markets. In this context the gas industry has to address the issue of flexibility of supply: can it be developed – through production, trade and storage – such that demand can be met smoothly? Moreover, the industry has to be aware of a future gas market that will be dominated by International Oil (Resource) Companies (IRC's) and increasingly by National Resource Companies (NRC's). And how will this IRC-NRC coexistence affect the gas industry? Moreover, attention should be paid to the vulnerability of (international) transmission aspects, be it LNG or pipeline transportation.
- ● ● Secondly: competing **energy sources** – coal, nuclear and renewables – will not remain passive. Clean coal technologies are rapidly evolving, and a number of renewable technologies may develop to large-scale application. Diversifying energy sources may well gain strength. This emphasizes the importance of natural gas to be positioned as a fuel of great performance and reliability. The huge potential of natural gas should not be undercut by efforts and lobbies of competing energy sources. It is important that the gas industry has to

consider possibilities to establish mutually beneficial linkages with the suppliers of renewables, to support the role of natural gas as the transition fuel.

- ● ● The third major issue that could alter the picture substantially is that investments by the major players in the gas industry in the various stages of the chain will stay behind levels that would sustain a larger role for gas in the energy system. The gas industry is facing several **uncertainties** such as: the climate and other environmental policy regimes, the liberalization and regulatory regimes, the link between gas and oil prices, the public versus the private role with regard to investment, or the role of LNG and GTL, and also technological developments affecting natural gas demand and supply structures. In addition the gas sector may face changes that will absorb attention and energy away from investment decisions. Given the long lead times and significant resources typically required for gas infrastructure development, postponing investments may undermine the potential role of gas during the next decades. A matter of consideration is also the question whether the international gas market in the future will be dominated by freely functioning markets, or instead, by state intervention and rules.



Developing and adjusting strategies

It is up to the gas industry to further discuss and develop its role in the spirit of the preferred storyline by implementing supportive actions to further enhance the image of natural gas as a clean, safe and reliable fuel – as the transition fuel par excellence. Embarking on a sustainability agenda will be to the benefit of the gas industry. Serious and coordinated action would be supportive to that end, a number of activities will need to be reviewed. Natural gas has excellent cards to play, but it's up to the gas industry to play them well.

The industry should improve its susceptibility for signals from its societal and business environment to monitor continuously its position in the energy market. This can provide a reliable basis for the required communication, promotion and interaction with the policy makers. At the same time, the industry can take initiatives towards its own products and processes to promote a favorable perception of it: 'be good and tell it'. And, finally, the industry can start up proactive programs aimed at strengthening its abilities to deal with developments in the field of regulation, technology and market. In a separate frame an elaborate set of possible actions is presented to you.

1. Be receptive and open-minded: keep being well informed about new developments, new players, new technologies and new market opportunities.

- Develop an information system and expertise network for analysis (e.g. based on a institutionalized network of universities and research centers linked to IGU) that keeps the sector continuously informed about the most relevant technology and market developments in the sector, and put that in the perspective of the developments in the other energy sectors that may directly or indirectly affect the role of natural gas.
- Systematically monitor and analyze the gas reserves/resources and gas exploration activities and investment worldwide and provide a reliable and up-to-date source of information on such issues.
- Think actively and creatively about establishing coalitions by integrating natural gas supply with renewables.

2. Communicate and promote: develop a clear commonly shared vision how to promote a successful gas industry future and actively communicate the special features of natural gas as a source of energy. Keep building on its image as *the transition fuel par excellence*.

- Keep emphasize in public statements and other communications the proven track record of natural gas as a clean, safe and reliable fuel.
- Start a publicity campaign in which natural gas is presented as **the** transition fuel based on a package of positive characteristics.
- Actively support the development and implementation of demonstration projects in different places in the world showing modern and green applications of natural gas.

3. Interact: get adequately involved in relevant consultation and decision-making processes among all stakeholders: international organizations, national and local governments, experts and academics and other energy stakeholders.

- Be engaged in the debates on future climate policy regimes and policies and measures based thereupon.
- Provide guidance to governments about different ways to diversify their energy security of supply and about the contractual and infrastructural possibilities to do so.

- Convince governments to pay sufficient attention in their foreign policies on the issue of security of supply of energy, and stress the need for more active diplomacy and international policy coordination for this purpose.
- Increase engagement and participation in: the discussions on the merits and risks of other energy carriers than natural gas, discussions on the international climate policy regimes, or discussions on security of supply and other foreign policy issues.

4. Ensure that the industry's own product and processes are exemplary.

- Stick to the IGU 'Guiding Principles for Sustainable Development' (October, 2003)
- Further develop standardized contracts and protocols for international gas trading and exploration management that match internationally and provide desirable levels of guarantees in terms of security of supply.
- Establish protocols for the safety and reliability of international gas transport systems and try to activate governments to guarantee security, if necessary, at vulnerable choke points in international gas transport.
- Improve the international coordination of gas value chain investment decisions through international networks and information exchange on the basis of a clear internationally shared vision on the future role of natural gas.
- Support frameworks that enable international consortia to finance and take responsibility for large-scale gas infrastructure investment projects, along with international agreements on conducive and stable legal and regulatory regimes.

5. Implement proactive programs to support and strengthen the sectors flexibility to cope with any policy, technology, and market development.

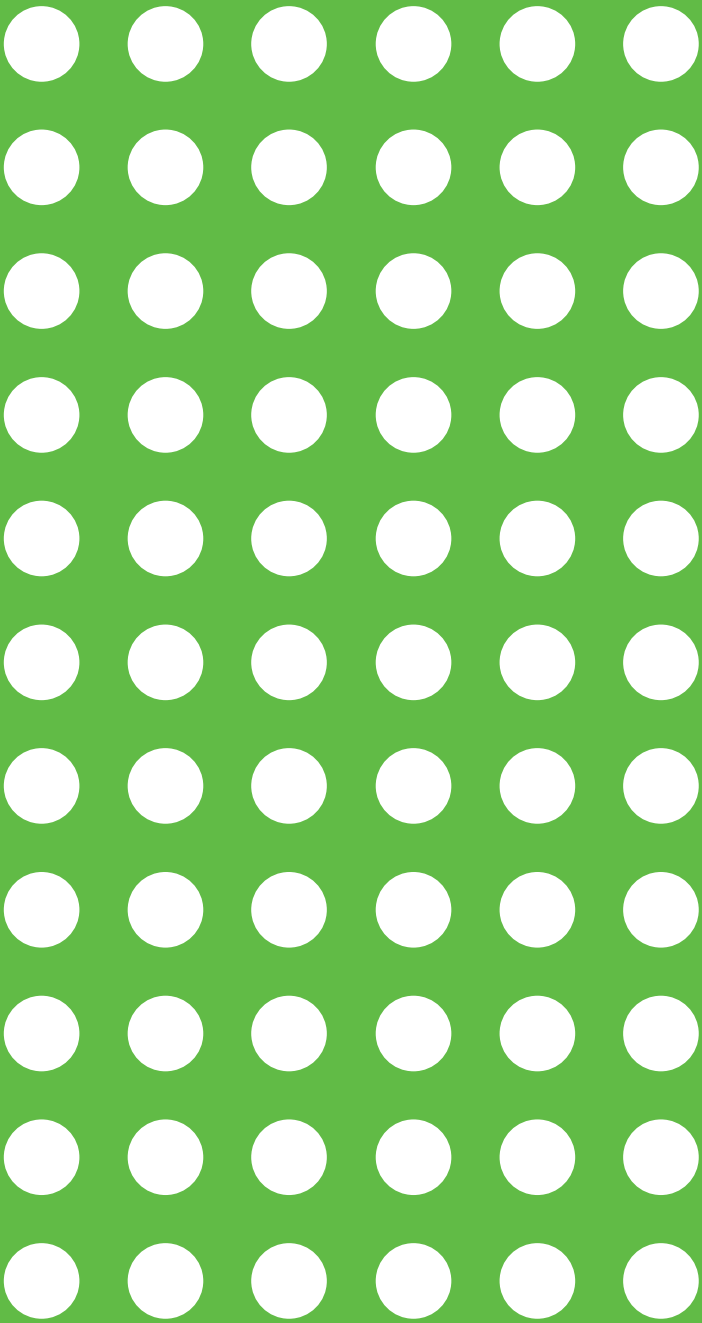
- Promote natural gas in the international energy market. Develop regulatory systems, that are sufficiently conducive to investment in gas infrastructure such that security of supply problems can be prevented, and improve international coordination between national regulators.
- Develop an information system that can signal market and other trends in an early stage in order to enable proactive coordinated action in the gas industry.



'It's up to gas!'

The above recommendations are results of the IGU Triennium 2003 - 2006. They aim to continuously activate the gas industry and policy makers to position gas according to its attractive features as a fossil fuel. The years in which the offered recommendations and suggestions for actions actually can contribute to the position of natural gas and a sustainable energy supply are lying ahead of us. It is up to the gas industry in the next triennium to use the recommendations in order to extend the success story of natural gas. IGU can play a continuing important role in catalizing the thoughtprocess and in supporting their membership. As a gas industry, we can be confident that gas, as a transition fuel, has the full potential to serve the interests of not only our but also future generations.

It's up to gas!



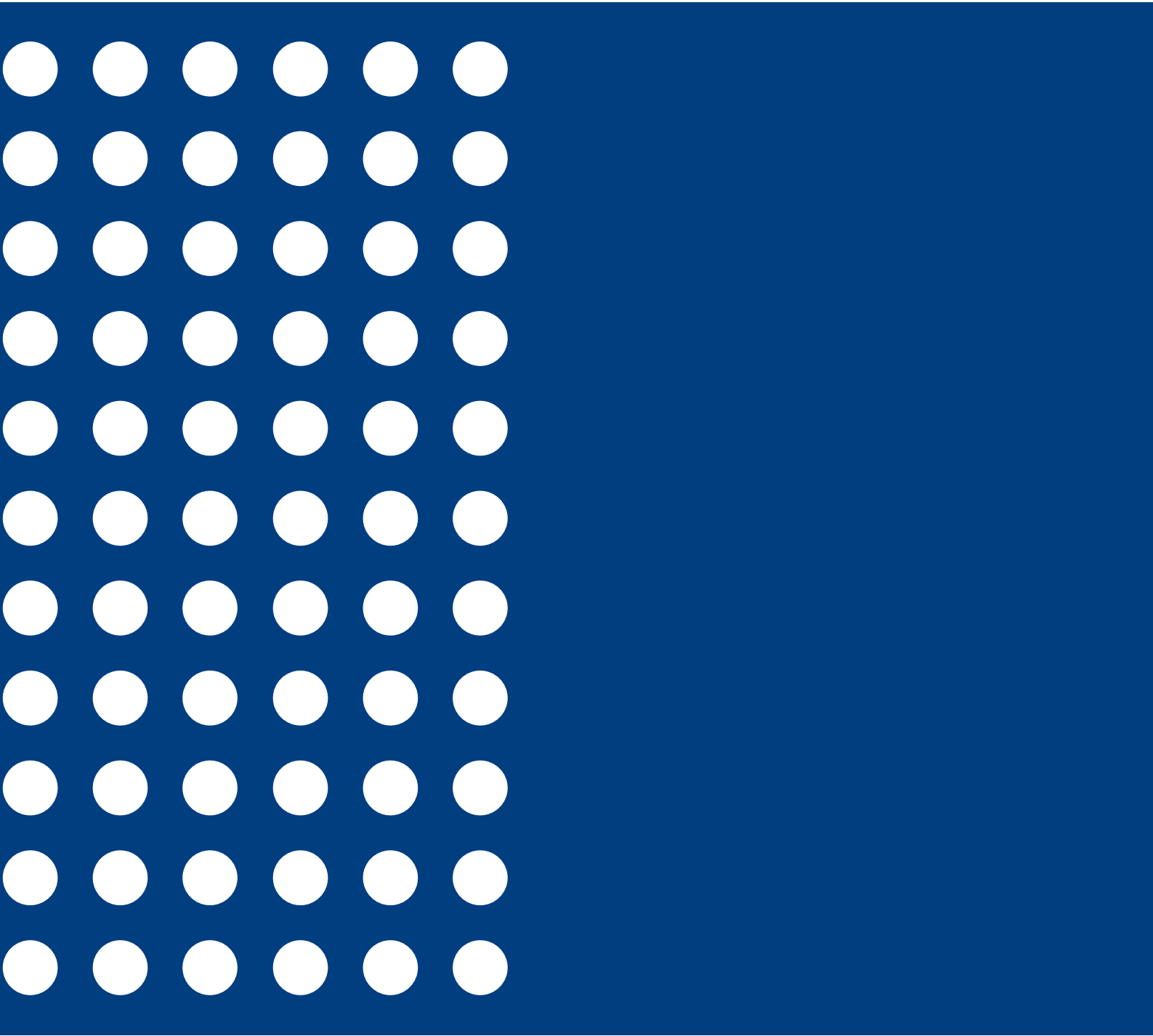
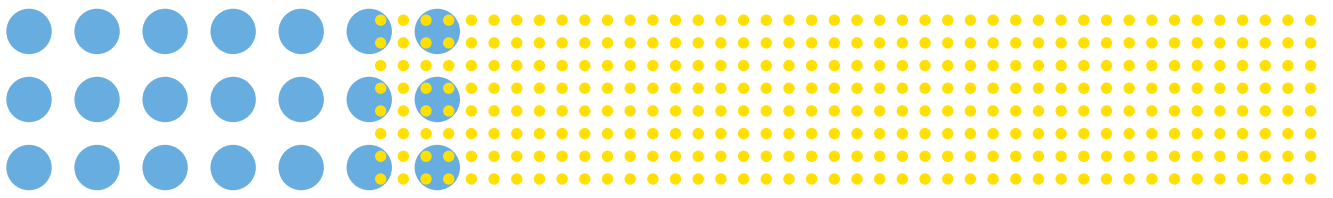
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