# 14

# Giving Hydrogen the Green Light and Putting It on the Fast-Track?

## *Consenting Hydrogen Developments in Aotearoa New Zealand*

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### 14.1 INTRODUCTION

Readers who enjoyed science lessons at school may recall an experiment in which hydrogen is made by applying a direct current to water and then seeing bubbles of hydrogen and oxygen.[1] This process – called 'electrolysis' – uses electricity to split water into its two component molecules, hydrogen and oxygen; hydrogen gas can then be stored and used like a battery to generate electricity when required.[2] This reaction takes place inside an electrolyser and is the process by which low-carbon, renewable-energy-derived 'green' hydrogen is made.[3] However, before the science classroom result can be replicated on an industrial scale, concerns around safety, purity of product and reliability of technology must be addressed.[4] Because of this, there are strict safety design standards for electrolysers, which must conform to the standards required by the country of installation.[5] Developers of electrolytic hydrogen projects must also obtain the necessary resource consents and permits.

[1] For a recap of this experiment, see: KiwiCo, 'Splitting water', available at <https://kiwico.com/diy/stem/quick-easy-experiments/splitting-water> accessed 21 February 2024.

[2] Advantages include the long-term storage of potential renewable energy. Disadvantages include the significant energy lost through the electrolysis: ENGIE, 'How does hydrogen power work?', available at <https://engie.com.au/home/about-engie/education/how-does-hydrogen-power-work> accessed 21 February 2024.

[3] Electrolysers consist of an anode and a cathode separated by an electrolyte, and they range in size from small, appliance-size equipment (which can support small-scale distributed hydrogen production) to large-scale, central production facilities, which can be tied directly to renewable electricity producing facilities. See US Department of Energy, 'Hydrogen production: Electrolysis', available at <https://energy.gov/eere/fuelcells/hydrogen-production-electrolysis> accessed 21 February 2024.

[4] See a discussion of the challenge and opportunities hydrogen generated from electrolysis see: M. T. Ahad, M. M. H. Bhuiyan, A. N. Sakib, A. Becerril Corral, A. Siddique, 'An overview of challenges for the future of hydrogen' (2023) 16 (20) Materials 6680, available at <https://doi.org/10.3390/ma16206680> accessed 21 February 2024.

[5] In one submission responding to the New Zealand Hydrogen *Vision*, it was noted that '[g]reen Hydrogen production (electrolysis method) relies on importing and setting up specialist, expensive hydrogen production plant (e.g. Hydrogenics from Belgium)', and that '[g]enerally, the following plant items and site infrastructure items need specialist technical design inputs in the development of a remote, stand-alone Green Hydrogen electrolyser production facility: Feed water to Electrolyser; Electrolyser drain outlet; Electrolyser to Compressor; Compressor to Filling station; Filling station to cylinder trailer; Nitrogen panel electrolyser/compressor/trailer filling station; All system vents (Hydrogen, Oxygen, Nitrogen); AC power in to the plant; AC power LV to Electrolyser/Compressor; Backup power; Instrument air system; General site movement's assessment': WSP, 'WSP submission on a vision for hydrogen in New

This chapter discusses the permitting regime for electrolysers in New Zealand. Two types are currently used on a large scale in New Zealand: alkaline (AEL) and polymer electrolyte membrane (PEM) electrolysers.[6] Both PEM and AEL electrolysers use an electric current to split water molecules into hydrogen and oxygen, but they use different types of electrolyte solution and different materials for the membrane and electrodes.[7] The type of electrolyser used will depend on the project's needs, although PEM electrolysers are often preferred, because they offer greater flexibility.[8] Irrespective of what type of electrolyser is chosen, resource consent will be needed before the project can proceed. This chapter asks what permits will be needed and what processes must be followed in order for an electrolytic hydrogen project to receive resource consent.

New Zealand may not initially seem the most 'obvious' choice for examining the way in which electrolytic hydrogen projects are permitted. After all, many states are currently considering how low-carbon, renewable-energy-derived 'green' hydrogen can support decarbonisation goals, and are investigating what may be the most appropriate applications and transition pathways for hydrogen within their energy systems and economies, and a number of national hydrogen strategies and polices have been published recently.[9] New Zealand is no exception, having published its *Vision for Hydrogen in New Zealand* Green Paper in September 2019.[10] However, unlike those states which are considering a range of hydrogen options,[11] New

Zealand', October 2019, at 20, available at <https://mbie.govt.nz/dmsdocument/10629-wsp-a-vision-for-hydrogen-in-new-zealand-green-paper-submission-pdf> accessed 21 February 2024 (hereinafter: WSP).

[6] NIWA, 'New Zealand's EnergyScape: Transitioning to a hydrogen economy: Hydrogen research strategy for facilitating the uptake of hydrogen as an energy carrier in New Zealand', May 2009, at 24, available at <www.mcguinnessinstitute.org/wp-content/uploads/2021/12/CRL-Stage-5-Hydrogen-Research-Strategy.pdf> accessed 21 February 2024. A range of emerging electrolyser technologies are also being explored, although capability is limited; the appeal of these is that they may be able to provide improved conversion efficiency and assist the integration of hydrogen energy into existing energy systems.

[7] PEM electrolysers use a proton exchange membrane as the electrolyte, which allows protons (positively charged hydrogen ions) to pass through the membrane while blocking other ions. This allows for high ionic conductivity and efficient hydrogen production. PEM electrolysers also use platinum-based electrodes, which are expensive but have a long lifespan and high activity. They are also relatively compact and require low operating pressures, making them relatively easy to integrate into existing systems. In contrast, AEL electrolysers use an alkaline solution as the electrolyte, which allows for a higher rate of hydrogen production, but which can be corrosive. AEL electrolysers also use cheaper, more durable electrodes (made from, for example, nickel and iron). Alkaline electrolysers can take up to fifty minutes to get up to full operating speed, compared to less than five minutes for PEM (which causes the electrodes to have a shorter lifespan) and they are generally less efficient than PEM electrolysers and require higher operating pressures. However, they can operate using a variety of water sources, including seawater and wastewater, as they are less sensitive to impurities in the feedwater. This can reduce the need for expensive water treatment systems. In general, PEM electrolysers are more efficient and have faster response times and longer lifespans, but they are also more expensive and require pure water and electricity as inputs.

[8] PEM electrolysers are well-suited for applications that require rapid changes in hydrogen production.

[9] These strategies can be accessed from 'National Hydrogen Strategies and Roadmap Tracker', maintained by Colombia University's Centre for Global Energy Policy, available at <https://energypolicy.columbia.edu/publications/national-hydrogen-strategies-and-roadmap-tracker/> accessed 21 February 2024. See also Pasquale Marcello Falcone, Michael Hiete, Alessandro Sapio, 'Hydrogen economy and sustainable development goals: Review and policy insights' (2021) 31 Current Opinion in Green and Sustainable Chemistry 100506.

[10] Ministry of Business, Innovation and Employment, 'A vision for hydrogen in New Zealand', September 2019, available at <https://mbie.govt.nz/dmsdocument/6798-a-vision-for-hydrogen-in-new-zealand-green-paper> accessed 21 February 2024 (hereinafter: Ministry of Business, Innovation and Employment).

[11] Green hydrogen is produced by the electrolysis of water, using renewable electricity; it currently accounts for 4 per cent of hydrogen production: A. Nicita, G. Maggio, A. P. F. Andaloro, G. Squadrito, 'Green hydrogen as feedstock: Financial analysis of a photovoltaic-powered electrolysis plant' (2020) 45(20) International Journal of Hydrogen Energy 11395, available at <https://doi.org/10.1016/j.ijhydene.2020.02.062> accessed 21 February 2024. The low percentage is directly related to the high cost of hydrogen production using renewable energy compared with other processes using fossil fuels: A. G. Olabi, Mohammad Ali Abdelkareem, Mohamed S. Mahmoud, Khaled Elsaid,

Zealand's focus is firmly on green hydrogen,[12] which means the resource consent process for electrolysers is critical to New Zealand's hydrogen ambitions.[13] The *Vision* indicated the government's intention to develop a hydrogen roadmap;[14] an Interim Hydrogen Roadmap was released in August 2023, with a final Hydrogen Roadmap anticipated by the end of 2024.[15] These policy documents signal New Zealand's desire to position itself as a hydrogen exporter (and to contribute to the decarbonisation of other energy markets, particularly in Asia),[16] with the domestic hydrogen opportunity largely supplementing existing renewable energy activities.[17] Even so, developments in New Zealand are still at an early stage and the green hydrogen market in New Zealand is a 'nascent industry'.[18] Indeed, the existing hydrogen market in New Zealand is dominated by major industrial manufacturers (methanol production, ammonia and urea

Khaled Obaideen, Hegazy Rezk, Tabbi Wilberforce, Tasnim Eisa, Kyu-Jung Chae, Enas Taha Sayed, 'Green hydrogen: Pathways, roadmap, and role in achieving sustainable development goals' (2023) 177 Process Safety and Environmental Protection 664, available at <https://doi.org/10.1016/j.psep.2023.06.069> accessed 21 February 2024. For an analysis of the 'green-ness' of national hydrogen strategies, see Wenting Cheng, Sora Lee. 'How green are the national hydrogen strategies?' (2022) 14(3) Sustainability 1930, available at <https://doi.org/10.3390/su14031930> accessed 21 February 2024.

[12] Although hydrogen produced from fossil fuels and industrial processes may play a role in the transition of New Zealand's regions and existing industries, the *Vision* envisions a future where New Zealand is using renewable energy to produce green hydrogen.

[13] It must be pointed out that hydrogen derived from electrolysis may not be green hydrogen: hydrogen is considered green when the electricity used is from renewable sources. However, much of the electricity generated in New Zealand comes from renewable sources, which supports New Zealand's green hydrogen focus.

[14] The firm Castalia was engaged to develop a hydrogen supply, demand and export model; their report was released in June 2022: Castalia, 'New Zealand hydrogen scenarios' (2022), available at <https://mbie.govt.nz/dmsdocument/20118-new-zealand-hydrogen-scenarios-pdf> accessed 21 February 2024.

[15] Ministry of Business, Innovation and Employment, 'Interim Hydrogen Roadmap', August 2023, available at <https://ena.org.nz/assets/9927-Interim-Hydrogen-Roadmap-AUG23.pdf> accessed 21 February 2024. The Interim Roadmap feeds into broader energy strategy, with a New Zealand Energy Strategy expected in 2024, and aligns with other projects, including the Gas Transition Plan, Energy Market Measures project, Offshore Renewable Energy regulatory framework project and the New Zealand Battery Project. Hydrogen's potential to support a just transition is also recognised, as it may offer sustainable growth opportunities to regions with economies that have previously been reliant on the fossil fuel industry; in New Zealand, the H2 Taranaki Roadmap envisions a low-emissions hydrogen sector in the Taranaki region, which has previously been a focus of New Zealand's oil and gas production. See New Plymouth District Council, Venture Taranaki Trust, and Hiringa Energy, 'H2 Taranaki Roadmap' (2019), available at <https://venture.org.nz/assets/H2-Taranaki-Roadmap.pdf> accessed 21 February 2024.

[16] Hydrogen may be particularly attractive to those countries that are comparatively 'renewables-poor' (for example, Japan and South Korea) and which may need to import renewable energy to decarbonise their economies. New Zealand has signed hydrogen cooperation agreements with Singapore, Japan and South Korea; see the 'international collaboration' section of the Ministry of Business, Innovation and Employment' webpage 'Hydrogen in New Zealand', available at <https://mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-strategies-for-new-zealand/hydrogen-in-new-zealand/> accessed 21 February 2024.

[17] New Zealand already generates a significant proportion (82 per cent) of electricity from renewable energy resources (see Ministry of Business, Innovation and Employment, 'Energy in New Zealand 2022 shows a strong share of renewable energy', 18 August 2022, available at <https://mbie.govt.nz/about/news/energy-in-new-zealand-2022-shows-a-strong-share-of-renewable-energy> accessed 21 February 2024), so the role of hydrogen in supporting decarbonisation will be different in New Zealand than it is in other states, and will be focused on decarbonisation of 'hard to abate' sectors, such as steel-making, shipping and aviation, and other industrial processes (e.g., fertiliser, high temperature boilers) and decarbonisation of heavy transport (e.g., substituting diesel). However, New Zealand has a 'dry year problem', which means fossil fuels are relied on to supplement hydro-electricity and ensure sufficient electricity is generated – something green hydrogen may help to ameliorate. Nevertheless, recent analysis indicates that: 'even with highly optimistic assumptions about how cheaply hydrogen can be produced, hydrogen will be a substantially more expensive means of meeting consumers' heating needs than direct electric options': Concept Consulting, 'Which way is forward? Analysis of key choices for New Zealand's energy sector' (2022), available at <https://concept.co.nz/uploads/1/2/8/3/128396759/which_way_is_forward.pdf> accessed 21 February 2024.

[18] PwC, 'New Zealand's hydrogen regulatory pathway' (2022), available at <https://mbie.govt.nz/dmsdocument/25671-new-zealand-hydrogen-regulatory-pathway> accessed 21 February 2024 (hereinafter: PwC 2022).

production, refining and steel production) and the majority of hydrogen is produced in-house from domestic natural gas via steam methane reforming facilities, with a smaller proportion of electrolytic hydrogen for steel production.[19]

Because electrolysers are the hydrogen production devices with the most potential to support environmentally friendly, green hydrogen developments, consideration of the requirements for obtaining resource consent for an electrolytic hydrogen project offers a useful entry point for consideration of the way that New Zealand's regulatory framework for hydrogen supports its green hydrogen *Vision*. More immediately, the chapter makes a practical contribution to the hydrogen transition in New Zealand by setting out the current process for obtaining resource consent for electrolytic hydrogen projects.

Although there is no specific, dedicated regime for permitting electrolysers in New Zealand, a range of requirements must be met, particularly in relation to health and safety. Some of these are set out in legislation, while others, particularly technical specifications, are contained in standards.[20] Because compliance with these requirements will need to be demonstrated through the resource consent application process, this chapter focuses on that process, and notes these requirements in relation to it.

For context, the chapter begins with a brief overview of New Zealand's hydrogen regulatory environment (Section 14.2). It then considers New Zealand's resource management framework (Section 14.3), before discussing the specific requirements for resource consent for electrolytic hydrogen projects, with reference to a successful recent resource consent application (Section 14.3.2). The chapter then notes concerns about the efficacy of the resource consent process for supporting hydrogen developments, and suggested reforms (Section 14.4), before offering concluding remarks.

## 14.2 REGULATING HYDROGEN IN NEW ZEALAND

Despite current and planned hydrogen developments, there is no dedicated, hydrogen-specific regulatory framework for the production, transportation and storage of hydrogen in New Zealand.[21] Instead, a range of legislation, regulations and industry standards may be applicable.[22] For example, the Gas Act 1992 provides the legislative framework for the regulation, supply and use of gas in New Zealand, including hydrogen, and the protection of public health and safety and property.[23] Equally significant for electrolytic hydrogen projects is the Electricity Act 1992, which regulates the supply and use of electricity, and sets out safety requirements to

[19] See the discussion in Ministry of Business, Innovation and Employment.

[20] Standards are agreed specifications for products, processes, services and performance. They are generally voluntary but can also become legal requirements when cited in Acts, regulations or other legislative instruments.

[21] The firm Ernst & Young has noted that '[i]n our interactions with overseas investors, we hear: 'We are not considering investing in New Zealand as it is not a focus of the government, and there is no strategy in place. The lack of direction is impacting investor sentiment': Angela Ogier, Christina Houlihan, 'Could the New Zealand Hydrogen opportunity be closer than we think?' (2022), available at <https://ey.com/en_nz/energy-resources/could-the-new-zealand-hydrogen-opportunity-be-closer-than-we-think> accessed 21 February 2024.

[22] The range of regulations includes planning and resource management, electricity and gas, and health and safety rules and legislation.

[23] The Gas Act 1992 does not explicitly cover hydrogen, although it does cover biogas, coal gas and refinery gas, as well as natural gas. Nevertheless, hydrogen as a gas is classified as a permitted hazardous substance by the Environmental Protection Authority, and as a gas for fuel, it is covered by the Gas Act 1992. Related regulations are the Gas (Safety and Measurement) Regulations 2010; Gas (Levy of Industry Participants) Regulations 2020; Gas (Downstream Reconciliation) Rules 2008; Gas (Switching Arrangements) Rules 2008; Gas Governance (Compliance) Regulations 2008; Gas Governance (Critical Contingency Management) Regulations 2008.

protect electrical workers and the public.[24] The Health and Safety at Work Act 2015 sets out principles, duties and rights in relation to workplace health and safety, and covers hazardous activities, workplaces and facilities, while the Hazardous Substances and New Organisms Act 1996 covers storage and use of gas containers.[25] The Land Transport Act 1998 governs technical aspects of land transport and vehicle safety and provides for the safe transport of dangerous goods.[26]

In the Interim Roadmap the government committed to developing regulations to enable safe operation of hydrogen projects, and is focused on 'making changes needed to enable safe use of near-term activities such as production, storage and distribution, and applications like heavy road transport'.[27] To date, regulatory reform has been largely focused on amending provisions relating to natural gas to include coverage of hydrogen, and on ensuring adequacy of health and safety regulations, including hydrogen safety standards.[28] Recent consideration of how well New Zealand's current regulations,[29] standards[30] and health and safety requirements will cover anticipated hydrogen developments has identified the need for regulatory reform.[31]

A recent review concluded that hydrogen can generally be accommodated within the purpose of existing legislation, but the fit is imperfect and two significant issues arise: firstly, 'the novel uses and forms of hydrogen [cause] potential misalignment across legislation';[32] and, secondly, some legislative provisions are 'too prescriptive and therefore [exclude] hydrogen and its requirements'.[33] The review concluded that 'all proposed [hydrogen] activities were covered

[24] These requirements are supplemented by the Electricity (Safety) Regulations 2010, which provide for the management of electrical hazards by setting out requirements covering electrical safety, design, construction, installation, prevention of damage and the supply and use of electricity (including generation connected to electrolysers).

[25] Both Acts may require amendment to ensure they adequately cover the production, injection, transportation and use of hydrogen and hydrogen blends: FirstGas, 'Bringing zero carbon gas to Aotearoa: Hydrogen feasibility study – summary report' (2020), at 42, available at <https://cms.firstgas.co.nz/assets/Uploads/Documents/Firstgas-Group_Hydrogen-Feasibility-Study.pdf> accessed 21 February 2024 (hereinafter: FirstGas 2020).

[26] The Act is supplemented by the Land Transport Rule: Dangerous Goods 2005, which sets out requirements relating to quantity, packaging, labelling and marking, documentation, segregation, procedures, training and responsibility.

[27] The regulatory regimes in scope include (but are not limited to): the Health and Safety at Work (Hazardous Substances) Regulations 2017; the Electricity (Safety) Regulations 2010; the Gas (Safety and Measurement) Regulations 2010; the Land Transport Rule: Dangerous Goods 2005; and the Land Transport Rule: Vehicle Dimensions and Mass 2016.

[28] For more on this, see FirstGas 2020.

[29] In February 2022, the government engaged the firm PwC to undertake a review of existing regulatory frameworks; PwC assessed the regulatory frameworks against seven 'fit for purpose' criteria drawn from Treasury's 'Government Expectations for Good Regulatory Practice' guidelines and, in July 2022, PwC's review was released: PwC 2022. Contemporaneously, the Hydrogen Regulators Working Group was formed in April 2022; PwC worked directly with this group during the development of the report.

[30] Standards New Zealand investigated integrating hydrogen into New Zealand's energy landscape; its report, the Hydrogen Standards Review, was released slightly later, in May 2023: Standards New Zealand: 'Hydrogen standards review: Integrating hydrogen into New Zealand's energy landscape' (2023), available at <https://standards.govt.nz/assets/documents/news/hydrogen-report-v2.pdf> accessed 21 February 2024. The report recommends the direct adoption of fifteen international standards, as well as the modified adoption of an additional eight others and progressive updates to twenty Australia/New Zealand joint standards as well as the revision of eight New Zealand-specific standards.

[31] WorkSafe New Zealand established a working group to ensure the risks to health and safety in adopting new hydrogen technologies are adequately managed, regulatory gaps are identified, and regulatory barriers to industry adopting new hydrogen technologies are determined: Ministry of Business, Innovation and Employment, 'Hydrogen in New Zealand', available at <https://mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-strategies-for-new-zealand/hydrogen-in-new-zealand/> accessed 21 February 2024.

[32] PwC 2022, at 49; the example given is whether hydrogen is 'a gas used as a fuel under the Gas Act [1992] or . . . an engine fuel under the Energy (Fuels, Levies and References Act) [1989])'.

[33] Ibid, at 49.

by legislative purpose … [but] the existing regulatory frameworks fell short on fundamental criteria'.[34] Nevertheless, although 'none of [New Zealand's] regulatory frameworks are strictly "fit for purpose" to facilitate the future hydrogen economy … many of the issues that need to be resolved are not urgent or are relatively minor changes'.[35]

The review identified forty-four Acts and ninety-three Regulations and Rules that are potentially relevant to hydrogen.[36] There is not scope in this chapter to discuss all of these regulations in detail, but an application for resource consent for an electrolytic hydrogen project will, in particular, need to demonstrate how the project will comply with requirements concerning safety, so these regulations are briefly addressed in the context of resource consent applications.

## 14.3 OBTAINING RESOURCE CONSENT FOR ELECTROLYTIC HYDROGEN PROJECTS

Before constructing and operating an electrolytic hydrogen project in New Zealand, resource consent will need to be obtained. Depending on the size, location and type of the intended development, a hydrogen project may require a number of resource consents. In addition to obtaining consents for hydrogen projects, developers may also need to obtain them for the renewable energy projects that provide electricity for the electrolysis that converts water to hydrogen: for example, electricity generated from wind farms.[37] These consents are issued under the Resource Management Act 1991, which is the main piece of legislation that regulates the environmental impacts of activities in New Zealand.[38] Thus, consent applications are primarily concerned with the way the environment may be affected and the way resources, such as water, will be used in the hydrogen development, rather than with the technical specifications of the electrolyser. That said, a range of regulations apply to the safe operation of electrical equipment, especially where this will be occurring in a potentially hazardous environment, so technical specifications and details of how the project will comply with these requirements will be included with the application. Building consents may also be needed to construct the hydrogen facility.

### 14.3.1 *Resource Management Act 1991*

Since its enactment, the Resource Management Act 1991 (RMA) has played a central role in regulating the development of renewable energy generation in New Zealand.[39] Despite this, the

[34] Ibid, at 44.
[35] Ibid, at 49.
[36] Ibid, at 44. Of these, thirty-two Acts were mapped to the hydrogen value chain, with these grouped into four categories: safety; use of hydrogen; markets and measurements; and infrastructure and resources.
[37] Ibid, at 52, noting that consent applications for offshore wind farms in the exclusive economic zone must be made with the EPA under the Exclusive Economic Zone (EEZ) and Continental Shelf (Environmental Effects) Act (2012). If the wind farm lies in a Coastal Marine Area, there will be impacts under the RMA for regional councils. Submarine infrastructure may need protection under Submarine Cables and Pipelines Protection Act (1996).
[38] See the Environment Guide's overview of the Resource Management Act 1991, available at <https://environmentguide.org.nz/rma/> accessed 21 February 2024. Under the RMA, environmental management is guided by the principles set out in Part 2 of the Act and the policies set out in any national and regional policy statements, which together provide the context in which decisions are made on whether or not to allow activities.
[39] The Resource Management Act 1991 is one of the main regulatory tools governing the operation of New Zealand's renewable energy system; the others are the Electricity Industry Participation Code 2010 (which governs the operations of electricity market participants) and the Emissions Trading Scheme (which incentivises investment in renewable energy ahead of fossil fuels by requiring carbon emitters to obtain and surrender emissions units to match the emissions from their operating activities).

RMA has been criticised for failing to achieve its purpose, for inadequately protecting the environment and for not enabling development.[40] At the time of writing, new legislation had recently been enacted that was intended to replace the RMA over the next decade.[41] This would have produced a significantly different environmental management regime; however, following a change in government in late 2023, this legislation was repealed, with further reform expected in future.[42]

The RMA's purpose is to ensure that natural and physical resources are managed sustainably.[43] The RMA does this in a decentralised way by requiring regional and district councils to manage natural and physical resources in their area.[44] These councils must prepare district or regional plans, which provide a framework for development in their region or district.[45] This means that, although the RMA provides the consenting framework, the consents are needed because of regional plans as well as national regulations. Additionally, the local plans and policies governing resource management can differ between districts and regions, and there may also be differences within a district, city or region. Complicating this interplay, the effects that certain activities may have on resources are managed through a hierarchy of planning documents developed under the RMA, which contain policies, standards and rules that prescribe whether an activity is permitted, or requires resource consent, or if it is prohibited.[46] These include National Environment Standards and National Policy Statements and Regional Policy Statements, as well as plans and strategies under other legislation.[47] Sometimes these National Environment Standards will override local rules to ensure a consistent set of rules across all councils. Thus, national direction balances localised decision-making; however, the different priorities of these policies may have to be reconciled.[48] This has particular relevance for

[40] See Resource Management Review Panel, 'New directions for resource management in New Zealand: Report of the Resource Management Review Panel: Summary and key recommendations', available at <https://environment.govt.nz/publications/new-directions-for-resource-management-in-new-zealand-report-of-the-resource-management-review-panel-summary-and-key-recommendations/> accessed 21 February 2024. Both the former (Labour) government and the recently elected (National-led) government are committed to resource management reform; however, their views on how best to do this are quite different.

[41] The Spatial Planning Act 2023 and the Natural and Built Environment Act 2023 came into effect on 24 August 2023 and was repealed on 23 December 2023.

[42] Resource Management (Natural and Built Environment and Spatial Planning Repeal and Interim Fast-track Consenting) Act 2023. While the repeal signals a reversion to the RMA provisions, the Government has confirmed it will retain the fast-track consenting provisions pending the introduction of further legislation.

[43] Resource Management Act 1991, s 5.

[44] New Zealand has eleven regional councils, sixty-one city or district councils and six unitary councils.

[45] Resource Management Act 1991, ss 64 and 73. See the Environment Guide's sections on 'District Plans' (available at <https://environmentguide.org.nz/rma/planning-documents-and-processes/district-plans/> accessed 21 February 2024) and 'Regional Plans' (available at <https://environmentguide.org.nz/rma/planning-documents-and-processes/regional-plans/> accessed 21 February 2024).

[46] The Environment Guide's section on 'Planning documents and processes' provides a useful overview: available at <https://environmentguide.org.nz/rma/planning-documents-and-processes/> accessed 21 February 2024.

[47] Resource Management Act 1991, ss 45 and 59. See the Environment Guide's section on 'National policy statements' (available at <https://environmentguide.org.nz/rma/planning-documents-and-processes/national-policy-statements/> accessed 21 February 2024) and 'Regional Policy Statements' (available at <https://environmentguide.org.nz/rma/planning-documents-and-processes/regional-policy-statements/> accessed 21 February 2024). The National Policy Statement for Renewable Electricity Generation 2011 is particularly relevant to renewable energy resource consent applications.

[48] For example, the National Policy Statement for Freshwater Management 2020 generally seeks to prioritise the health and well-being of freshwater ecosystems. However, the National Policy Statement for Renewable Electricity Generation recognises that there may be a need for an activity in a freshwater environment and allows regulatory authorities to give appropriate consideration to the benefits of hydro-generation when setting limits on water use, as well as requiring decision makers to have regard to the contributions and operational requirements of New Zealand's five largest hydro-generation schemes.

hydrogen developments because, on the one hand, national policy is being developed to support green hydrogen but, on the other, the regulations that will determine whether a project is consented to are much more localised. This may not be particularly problematic where a region is intended to be a 'hydrogen hub', but it does mean developers who are considering locating projects in different regions may be subject to different requirements in each region. For this reason, it has been suggested that a National Environment Standard for hydrogen would be helpful.[49]

The RMA classifies activities into six primary categories: 'permitted', 'controlled', 'restricted', 'discretionary', 'discretionary, non-complying' and 'prohibited'.[50] These categories determine whether a resource consent is required for particular activities. Rules in regional and district plans determine within which category an activity falls. The RMA prescribes the type of consent required and the process for obtaining a resource consent.[51] Types of resource consents include land use consents,[52] subdivision consents,[53] coastal permits,[54] water permits[55] and discharge permits.[56] For an electrolytic hydrogen project, the consent application would be expected to include land use consents, water permits and discharge permits. The duration of land use consents is unlimited, unless specified in the consent; the duration of other types of consent is a maximum of thirty-five years or the time specified in the consent.[57] The holder of a resource consent must comply with its conditions, which may include monitoring and reporting requirements.[58] Consents may be transferred.[59]

Because these consents relate to resource use, they do not deal with health and safety issues. These issues are instead governed by legislation: for example, the Electricity (Safety) Regulations 2010 provide for the management of electrical hazards by setting out requirements covering electrical safety, design, construction, installation, prevention of damage and the supply and use

[49] Ministry of Business, Innovation and Employment, 'Analysis of hydrogen vision submissions', undated, available at <https://mbie.govt.nz/dmsdocument/11343-analysis-of-hydrogen-vision-submissions> accessed 21 February 2024.

[50] Resource Management Act 1991, Part 6 s 87A.

[51] Ibid, Part 6 ss 87AA–139A. A resource consent provides permission to carry out an activity that would otherwise contravene ss 9, 11, 12, 13, 14, 15, 15A or 15B of the RMA, so long as it complies with any conditions attached to the consent.

[52] Ibid, ss 9 and 13, which authorise the use of land or the bed of a lake or river in a manner which contravenes a district rule, regional rule or national environmental standard.

[53] Ibid, s 11, which authorises the subdivision of land that is not expressly allowed by a rule in a district plan or national environmental standard.

[54] Ibid, s 12, which authorises any reclamation, structure, deposit or disturbance of the foreshore or seabed within the coastal marine area that is not expressly allowed by a rule in a regional coastal plan or national environmental standard.

[55] Ibid, s 14, which authorises the taking, use, damming or diversion of any water in a manner that contravenes a regional rule or national environmental standard.

[56] Ibid, s 15, which authorises discharge of contaminants to water or land unless the discharge is expressly allowed by a regional plan or national environmental standard.

[57] Ibid, s 123.

[58] The council may issue an abatement notice for breach of the conditions of a resource consent; or any person may apply to the Environment Court for an enforcement order requiring a consent holder to comply with the conditions of a resource consent (ss 314 and 322 of the Resource Management Act 1991). Contravention of an abatement notice or enforcement order is an offence (s 338 of the Resource Management Act 1991).

[59] Land use consents and subdivision consents attach to the land and need not be formally transferred. Coastal permits can be transferred to another person by written notice to the council that granted the permit. Water permits can be transferred to any owner or occupier of the site in respect of which the permit is granted, by written notice to the council that granted the permit. A discharge permit can be transferred to any owner or occupier of the site in respect of which the permit is granted, or to any person if the transfer is permitted by a regional plan: see ss 134 to 137 of the Resource Management Act 1991.

of electricity (including generation connected to electrolysers). Electrolysers will need to be certified as compliant with these Regulations and certifications must be achieved prior to the project becoming operational.[60] Similarly, the Health and Safety at Work (Hazardous Substances) Regulations 2017 provide for the management of hazardous substances by setting our requirements for labelling and signage, storage, separation distances, control of substances and emergency preparation.[61] Compliance with these Regulations will be demonstrated by a Location Compliance Certificate, which must be provided by an approved New Zealand certifier.[62] And the Pressure Equipment, Cranes and Passenger Ropeways Regulations 1999 provide for the management of pressure equipment, and prescribe requirements for design, verification, manufacturing, inspection, certification, operation and maintenance. Again, compliance with these Regulations will be demonstrated by certification by an approved New Zealand certifier.[63] Even though these safety requirements are prescribed by legislation, they also arise within the scope of the consent process because a risk management process and assessment will be prepared and included with the documents in the resource consent application to fulfil the information requirements under the relevant district plan.

An application for resource consent can be made to the district council or regional council that administers the district or regional plan under which the resource consent is required.[64] The application must be accompanied by an assessment of environmental effects.[65] The council will determine whether the application will be publicly notified.[66] If the application is not publicly notified, it will take up to 20 working days; if the application is publicly notified, submissions can be lodged and a hearing held, which can take up to 130 working days.[67] The council will issue a decision and the applicant and any submitters have a right of appeal to the Environment Court against that decision.[68]

When determining resource consent applications, consenting authorities must consider the environmental impacts of allowing the activity, as well as any mitigating or offsetting proposals.[69] Public support for, and opposition to, the application must also be considered. The RMA encourages public participation; this means that some projects have faced significant opposition

[60] Certification will be carried out by the electrical installer, and will include an Electrical Inspection Certificate for hazardous areas and high voltage; a Certificate of Compliance; and an Electrical Safety Certificate. See WorkSafe's guidance on the 'Design, construction and inspection of high voltage electrical installations' (2017), available at <https://worksafe.govt.nz/topic-and-industry/electricity/installations-and-networks/high-voltage-electrical-installations/design/> accessed 21 February 2024.

[61] It has been observed that the Hazardous Substances Regulations and Pressure Regulations are 'very strict and don't always align with appropriate international standards': see WSP, at 6.

[62] See WorkSafe, 'Location compliance certificates' (2022), available at <https://worksafe.govt.nz/topic-and-industry/hazardous-substances/certification-authorisation-approvals-and-licensing/certification-of-sites/location-test-certificates/> accessed 21 February 2024.

[63] These certifications include: a Design Verification Certificate; a Fabrication Inspection; an Inspection Certificate; a Type Certification; an Equipment Certification of Conformity; a Hydrotest Certificate; and a Certificate of Competence. See WorkSafe, 'Pressure equipment, cranes and passenger ropeways regulations' (2017), available at <https://worksafe.govt.nz/laws-and-regulations/regulations/hse-pressure-equipment-cranes-and-passenger-ropeways-regs/> accessed 21 February 2024.

[64] Where an activity requires resource consents from more than one authority, joint hearings may be held: Resource Management Act 1991, s 102.

[65] Ibid, Schedule 4.

[66] Ibid, s 95.

[67] The key sections of ibid are ss 95, 97, 101, 101B, 103A, and 115.

[68] Ibid, s 120.

[69] Ibid, s 104.

and applicants can become involved in protracted hearing and appeal processes.[70] For hydrogen projects, safety can be a particular concern; even where an applicant can demonstrate compliance with health and safety regulations, safety concerns may still engender public opposition to a hydrogen project.

The RMA also requires consideration of the values and interests of the Indigenous Māori people when determining applications for resource consents.[71] Court assessments of the adverse effects the proposed land use would have on Māori values, interests and their relationship to their ancestral lands has resulted in the refusal of consent for some renewable energy projects.[72] Māori opposition could have particular significance for hydrogen projects for two reasons. Firstly, many Māori tribes own, or have rights over, land adjacent to renewable energy sources or facilities. This may enable them to locate hydrogen production facilities on their own land, but they may also be opposed to these developments.[73] Secondly, freshwater has enormous significance to Māori, and their views on using it for electrolysis will need to be considered: analogously, in relation to hydro-electric power, tribal spokespersons have noted that 'the water itself might be renewable, the rivers themselves are not'.[74] Māori opposition to an electrolytic hydrogen project could result from opposition to the renewable energy activities that power the electrolysis, rather than opposition to the hydrogen project per se, as was seen in the following recent example of an opposed application for resource consent. This example also demonstrates the resource consents that may be needed for electrolytic hydrogen projects.

[70] For example, in respect of wind farm developments, objections have focused on factors such as landscape effects, visual impacts, blade reflections, turbine noise and ecology.

[71] Decision makers are required, when exercising functions and powers under the RMA, to: (a) recognise the relationship of Māori and their culture and traditions with their ancestral lands, water, sites, *wāhi tapu* (sacred places, sites or places subject to long-term ritual restrictions on access or use) and other *taonga* (treasures or things of value, including socially or culturally valuable objects, resources, phenomena, ideas and techniques) as a matter of national importance; (b) have particular regard to *kaitiakitanga* (the exercise of guardianship); and (c) consider the principles of the Treaty of Waitangi, which is the treaty between the British Crown and the Indigenous Māori people, first signed on 6 February 1840, which established British sovereignty over New Zealand (although this is contested), and which is the basis for the New Zealand government's relationship with Māori – a relationship which is framed in terms of a partnership, based upon the 'principle of the Treaty', a concept which continues to evolve (see *New Zealand Māori Council* v. *Attorney-General* [1987] 1 NZLR 641, and subsequent cases).

[72] For example, *Unison Networks Ltd* v. *Hastings District Council* [2011] NZRMA 394 (HC). Opposition to electrolytic hydrogen projects may not be a principled objection to hydrogen developments, but may instead stem from opposition to the renewable energy project that powers the electrolysis.

[73] For example, the geothermal power company Tuaropaki Power Company (which owns the Mokai Geothermal Power Station near Taupō) is partly owned by the Tuaropaki Ahu Whenua Trust. For more on this see J. Campion, 'Transformation through translation? Sustainable energy democracy, Indigenous values and the challenge of transforming the energy sector' in R. Fleming, K. Huhta, L. Reins (eds.), *Sustainable Energy Democracy and the Law*. (Brill: Leiden, 2021). See also K. Beasy, S. Lodewyckx, F. Gale, 'An analysis of emerging renewable hydrogen policy in Australia through an energy democracy lens' (2023), available at <https://ssrn.com/abstract=4369289> accessed 21 February 2024, for a discussion on how hydrogen developments may also be able to support energy democracy initiatives.

[74] J. L. MacArthur, S. Matthewman, 'Populist resistance and alternative transitions: Indigenous ownership of energy infrastructure in Aotearoa New Zealand' (2019) 43 Energy Research and Social Science 16–24, 20. In light of this, the view expressed by the New Zealand government in the *Vision for Hydrogen* (at 30) that 'Green hydrogen, as a fuel created from water using the sun or the wind, has a life cycle that begins and ends with water, and is thus a technology that is consistent with [Māori] perspective[s]' seems a little naïve. See also the discussion in Richard Meade, 'Role of Māori in the Transition to a Low-Emissions Economy' (Ministry for the Environment, 2021), available at <https://environment.govt.nz/assets/publications/Cognitus-Maori-Role-in-Low-Emissions-Transition-2021_06_05.pdf> accessed 21 February 2024.

### 14.3.2 *Example: Hiringia Energy Limited and Ballance Agri-Nutrients Limited Resource Consent Application*

Hiringa Energy Limited and Ballance Agri-Nutrients Limited entered into a Joint Development Agreement to build facilities that use wind-powered electricity generation to produce green hydrogen and baseload renewable electricity for the Ballance Plant, which uses natural gas to produce ammonia and urea.[75] Hiringia and Ballance applied to establish a renewable wind energy facility and associated hydrogen production, storage, offtake and refuelling infrastructure.[76] Seven resource consents had previously been issued by the Taranaki Regional Council for the Ballance Plant, which covered the taking of water for the project as well as discharges to air, land and water.[77] Although specific consents were not sought for the electrolyser, it was described in the application along with the green hydrogen activities the project will support and that way received scrutiny and approval, as part of the resource consent application.

The application demonstrates the significance of regional plans to resource consent applications in New Zealand. Although the RMA provides the consenting framework, the consents are needed because of regional plans as well as national regulations: the applicants sought consents under the South Taranaki District Plan (2015) and the Regional Fresh Water Plan for Taranaki, as well as the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 and the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.[78]

The application was made under the COVID-19 Recovery (Fast-Track Consenting) Act 2020. This fast-track consenting approach has been retained beyond the COVID pandemic, and is now discussed.

## 14.4 RESOURCE MANAGEMENT ACT REFORM

During the COVID-19 pandemic, a temporary fast-track consenting process was introduced.[79] Following this experience, a more permanent fast-track process was introduced in the Natural

[75] The application and related documents can be accessed from the Environmental Protection Authority page, available at <https://epa.govt.nz/fast-track-consenting/referred-projects/kapuni/application/> accessed 21 February 2024.

[76] Background is set out in the application, available at <https://epa.govt.nz/assets/Uploads/Documents/Fast-track-consenting/Kapuni-Green-Hydrogen/191149-COVID-19-RA-Consent-Application-and-AEE-Final_27-Aug-21.pdf> accessed 21 February 2024. Electricity produced by the wind farm would be transmitted to the Ballance Plant via underground cables, with 'up to 5 MW (2,000 kg per day) of green hydrogen production from electrolysis being generated'.

[77] Had these not already been granted, they would have needed to be included in the application. In January 2021, Ballance was granted a variation to two of these water permits to allow for a small amount of some of the water take under these existing permits to be used to make hydrogen in association with the project. Because the proposal was within the consented volumes, no increase to the consented water take volumes was required.

[78] Consents were required covering discharge of stormwater and sediment into surface water or onto or into land in circumstances where sediment from soil disturbance may enter water (in relation to the proposed earthworks); to discharge of contaminants or water into surface water (in relation to dewatering of turbine foundations); to take and use water from a well or bore (gain, in relation to dewatering of turbine foundations); and for construction, placement and use of any structure that is not permitted or controlled under the plan, which related to a proposed culvert within the tributary of a stream on the wind turbine site.

[79] The COVID-19 Recovery (Fast-Track Consenting) Act 2020 came into effect on 9 July 2020 and was repealed on 8 July 2023. Essentially, the Act provided for a process to fast-track projects aimed at stimulating the economy. Under the Act, expert consenting panels were appointed to decide on each fast-track application. The panels had similar powers to consenting authorities under the RMA, but followed an abridged process: available at <https://epa.govt.nz/fast-track-consenting/ftca/about/> accessed 21 February 2024. For example, the Act stated that expert consenting

and Built Environment Act 2023; although this Act has now been repealed,[80] the fast-track process has been retained.[81] The process has two application steps: firstly, a referral application, which involves applying to use fast-track consenting; and, secondly, a substantive application, which involves applying for resource consent or lodging a notice of requirement.[82] If the fast-track application is unsuccessful, the application may still proceed on the standard track. For successful fast-track applications, this is expected to reduce consenting time by an average of eighteen months per project.[83]

Does this support New Zealand's hydrogen aspirations? In principle, the fast-track process should reduce the problems of time and cost. However, even if the consent is granted promptly, it can still be challenged. As noted, both general public and Indigenous opposition can be a significant hurdle for hydrogen projects. For example, in the Hiringia and Ballance application referred to above, the fast-tracked consent was granted despite objections from environmental groups and some local Māori (who objected to the proposed location of the wind turbines), who then appealed against the granting of the project's resource consent.[84] In the High Court decision to dismiss the appeal, the Court held that the expert panel had 'properly considered' the application.[85] That decision was also appealed; the appeal was dismissed in December 2023.[86] Despite the applicant's eventual success in court, the litigation highlights the delays that hydrogen projects can face if a project is not supported, and – because the resource consent application in that example was a fast-track application – also highlights the limitation of the fast-track consenting process to achieve the desired efficiencies in energy development. The appeal against the consent being granted has eroded the temporal gains that the fast-track consent process offers, which suggests that consenting process abridgements that are designed to deliver procedural efficiencies to resolve substantive concerns over resource development may only be effective where a renewable energy project is supported (or at least not significantly opposed) by the community. This is not something that can necessarily be addressed via refinements to the consenting process; consultation and engagement with stakeholders may prove more effective. This may be a particular consideration for hydrogen projects, which can face significant public opposition.[87]

Of course, public opposition is not the only reason for delays in the consenting process. Obtaining consent for hydrogen developments may be particularly challenging because of regulatory uncertainty. It has been observed that New Zealand's '[r]egulation relating to use of

panels must not give public or limited notification about a consent application or notice of requirement. However, panels must invite written comments from some people or groups listed in the Act.

[80] The Natural and Built Environment Act 2023 was repealed by the Resource Management (Natural and Built Environment and Spatial Planning Repeal and Interim Fast-Track Consenting) Act 2023.

[81] Resource Management (Natural and Built Environment and Spatial Planning Repeal and Interim Fast-Track Consenting) Act 2023, Schedule 1, Clause 8.

[82] As with the approach taken under the COVID-19 Recovery (Fast-Track Consenting) Act 2020, an expert consenting panel is appointed to decide on the substantive application for each fast-track project. See the Environmental Protection Authority, 'Overview: Fast-track consenting under the Natural and Built Environment Act 2023', available at <https://epa.govt.nz/fast-track-consenting/nbea/overview/> accessed 21 February 2024. A list of fast-tracked projects can be found on the Environmental Protection Authority website: <https://epa.govt.nz/fast-track-consenting/fast-track-projects/> accessed 21 February 2024.

[83] RNZ, 'Government refers wind and solar projects for fast-track consenting', 7 August 2023, available at <https://rnz.co.nz/news/political/495294/government-refers-wind-and-solar-projects-for-fast-track-consenting> accessed 21 February 2024.

[84] *Te Korowai o Ngāruahine Trust* v. *Hiringa Energy Ltd* [2022] NZHC 2810, (2022) 24 ELRNZ 269.

[85] Ibid, at [315].

[86] *Greenpeace Aotearoa Incorporated* v. *Hiringa Energy Ltd* [2023] NZCA 672.

[87] See the discussion of public opposition in Lorenzo Squintani and Stan Schouten's Chapter 11 in this book.

green hydrogen in infrastructure and resource management is the [regulatory] area posing the most uncertainty' for hydrogen developers.[88] A consequence of the many considerations that consenting authorities must take into account has been that applications take time to process – and projects can be held up, with the delay sometimes being significant, until consent is obtained.[89] Uncertainty over the way the existing regulatory frameworks permit and constrain hydrogen activities exacerbates this situation; consequently, 'hydrogen projects meeting a specific set of criteria of being nationally significant may experience streamlined risk assessment and resource consent processes', whereas 'it may be more difficult for local authorities to consider the unique risks of hydrogen and it may be better for a central body, such as the [Environmental Protection Authority], to manage the consenting process ... [which] would reduce the burden on Councils in understanding the unique risks associated with hydrogen'.[90]

This need for a consistent, national body-led approach was also picked up in the submissions received following the release of the *Vision* Green Paper, with several supporters of hydrogen noting 'the lack of a clear regulatory framework for hydrogen' and raising 'issues about uncertainty with regulatory coverage, regulatory boundaries, consenting under the RMA and what standards are relevant'.[91] A National Environment Standard covering hydrogen was recommended by some submitters, who suggested that this could ensure consistent rules and guidelines for hydrogen use across different territorial authorities.[92]

The suggestion of a National Environment Standard for hydrogen, and for a national-level agency to consider hydrogen resource consent applications, highlights the limitations of the localised decision-making process developed under the RMA to support New Zealand's national hydrogen *Vision* – and the limitations of improvements, such as the streamlined, fast-tracked consenting approach, to address delays in processing consent applications which are rooted in uncertainty over the application of current regulations to hydrogen activities. The suggestion is a sensible one and, along with updates to regulatory coverage to ensure hydrogen activities are within the scope of current legislation, regulations and standards, may provide sufficient regulatory changes to support the hydrogen *Vision*. However, without community support, hydrogen may not achieve its potential either. Any changes to the consent process must still provide for community engagement and participation. Regulatory certainty must be achieved through consenting processes that support national hydrogen policies while taking account of community concerns.

## 14.5 CONCLUDING REMARKS

This chapter asked the question 'which permits or resource consents are needed in order to build and operate an electrolyser in New Zealand?' and identified resource consents that may be needed and the process for applying for these. Implicit in that discussion is the broader question of whether 'New Zealand's resource consenting regime supports its hydrogen *Vision*?' Although legislation is in place that facilitates hydrogen development, there is still uncertainty and

[88] PwC 2022, at 13.
[89] Ian Llewellyn, 'Greenpeace accused of derailing emissions reductions', 6 December 2022, available at <https://businessdesk.co.nz/article/law-regulation/greenpeace-accused-of-derailing-emissions-reductions> accessed 21 February 2024.
[90] PwC 2022, at 53.
[91] Ministry of Business, Innovation and Employment, 'Analysis of Hydrogen Vision submissions', undated, available at <https://mbie.govt.nz/dmsdocument/11343-analysis-of-hydrogen-vision-submissions> accessed 21 February 2024.
[92] Ibid, at 6.

complexity. For resource consents, uncertainty can cause delays, which may frustrate the very progress the *Vision* is promoting. This is something that should be considered as further reform of New Zealand's resource management framework occurs.

Ultimately, New Zealand is interested in developing its hydrogen capacity and has the potential to do this successfully. But, to achieve this, a supportive regulatory regime that facilitates the desired hydrogen developments will be needed. While, in theory, hydrogen appears to be within the scope of existing regulations, a hydrogen-specific framework would help tremendously with removing uncertainties and the delays these can cause.

## FURTHER READING

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Ministry of Business, Innovation and Employment, 'A vision for hydrogen in New Zealand', September 2019, available at <https://mbie.govt.nz/dmsdocument/6798-a-vision-for-hydrogen-in-new-zealand-green-paper> accessed 21 February 2024

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