



# Submission to the Victorian Electoral Matters Committee Inquiry into Electronic Voting

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## 1. Executive Summary

The iVote® system<sup>1</sup> for remote electronic voting has been used successfully for two NSW State General Elections [SGEs] and for six State by-elections in-between. With over 280,000 votes being cast using iVote at the 2015 SGE, making it the largest use of internet voting in the world so far, the NSW Electoral Commission (NSWEC) has gained valuable experience that can be shared with other jurisdictions.

This submission considers the implementation of electronic voting in NSW by way of iVote, with specific reference to the system's operation, implementation and acceptance among the electorate.

The NSWEC position on sharing the iVote technology platform and the experienced iVote team is also expanded upon in this submission. The NSWEC believes that staying at the leading edge of electronic voting (both in terms of service delivery and security) would be made easier if multiple Electoral Commissions in Australia were to share and contribute to the iVote platform.

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<sup>1</sup> iVote is a registered trademark of the NSW Electoral Commission. However, the registration symbol will not be used throughout the rest of this submission.

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### 3. Glossary

DRE - Direct Recording and Enumeration systems

GPV – General Postal Voter

iVote - The NSWEC electronic voting system comprising software components, hardware, networking, procedures and protocols required to deliver remote electronic voting services for the benefit of eligible NSW electors

IVR – Interactive Voice Response

PEEA - *Parliamentary Electorates and Elections Act 1912 (NSW)*

REV - Remote Electronic Voting Systems

SGE – State Government Election

SOC – Security Operations Centre

## 4. Introduction

The NSW Electoral Commission is pleased to be able to make this submission to the Committee's inquiry into electronic voting.

Since the 2011 SGE, the introduction of electronic voting in NSW – iVote - has been one of the most successful innovations in the conduct of elections in Australia. The main reasons for implementing the iVote system in NSW were to:

- improve enfranchisement of electors who would otherwise not be able to vote independently or have significant difficulty voting using an existing channel;
- improve enfranchisement of electors who would, by virtue of location during the election period, not otherwise be able to vote or have significant difficulty voting using an existing channel;
- reduce systemic errors in current voting processes. This would include reducing informality in ballots cast, reducing the risk of loss of ballot papers in transit between the voter and counting centre, as well as reducing the risk of transposition and counting errors; and
- reduce cost of voting and risks of failure associated with the management of postal voting.

The expansion of iVote has been a positive step for facilitating engagement with the democratic system. There was a massive increase in the use of electronic voting – an extraordinary 505% increase between the introduction of iVote for the SGE 2011 and its use at the SGE 2015. Electors who registered for iVote were more likely to have voted than those who registered for postal vote. In a world where people seek greater flexibility and the convenience of online operations, iVote contributes to increasing or at least maintaining voting participation.

The NSWEC is pleased to share iVote technology with other Electoral Commissions and the internal objectives driving this are the benefits of shared costs and the greater ability to maintain the level of expertise within the iVote team. In advancement of this, NSWEC and the Western Australian Electoral Commission (WAEC) are currently working together for the use of iVote at the WA SGE in March 2017 (enabling legislation was recently passed in the WA Parliament).

In regards to Victoria, it is worth noting that, whilst internet voting would require legislative change, the 'attendance mode' of iVote would support electronic voting under the current Victorian legislation and includes voter-verifiable paper receipts, so could offer a better voter experience with similar verifiability compared to the vVote project of 2014.

## 5. Types of Electronic Voting Systems

There are two broad categories of electronic voting systems, namely:

- Direct Recording and Enumeration (DRE) systems; and
- Remote Electronic Voting (REV) Systems.

Whilst the key features of each of these categories are described below, iVote is primarily a REV system; however, it has the capability to be used for attendance voting like a DRE system.

### 5.1 DRE Voting Systems

DRE systems incorporate electronic voting devices which are installed at polling places, pre-poll or other designated locations. They require the roll-out, installation, configuration and test voting of devices at voting locations. Consequently, DRE electronic voting systems are used in limited deployment scenarios, at locations which are controlled.

The advantage of these systems is that they offer greater direct control of the voting process, as the elector can be authenticated in the usual way – i.e., face-to-face with an electoral official - and access to the system can be tightly controlled. The elector still must travel to the DRE voting device location in order to vote.

### 5.2 REV Systems

REV systems enable the elector to access the voting system at any location that has access to either a telephone or a web browser on an Internet connected computer. The benefit of this approach is that the system can take advantage of the communications infrastructure and devices already available and familiar to the elector, namely a telephone or computer and their associated assistive technology, such as screen magnifiers, screen readers or Braille keyboards.

The central infrastructure need only be deployed by the NSWEC within a secure data centre, and can be installed, configured and tested in advance of the election period. However, REV systems require additional attention to ensure that systems remain secure, robust and tamper proof during the course of the election event.

### 5.3 NSWEC view

The NSWEC considers that REV offers the bigger benefits to voters and the electoral process when compared to DRE, and is also the only financially sustainable electronic voting option. While iVote can support hundreds of thousands of voters from cost-effective central infrastructure, DRE requires the deployment of hardware to voting centres and the quantity of hardware must scale with the number of voters to be supported. The hardware devices deployed must be stored and secured between elections and will need replacement within two or three election cycles (as experienced now in the USA with machines purchased with Federal money from the *Help America Vote Act*), so there are higher costs for DRE to service the same number of voters as REV. However, the benefits of DRE are limited to electors who cannot cast their vote without assistance, because other voters who attend a

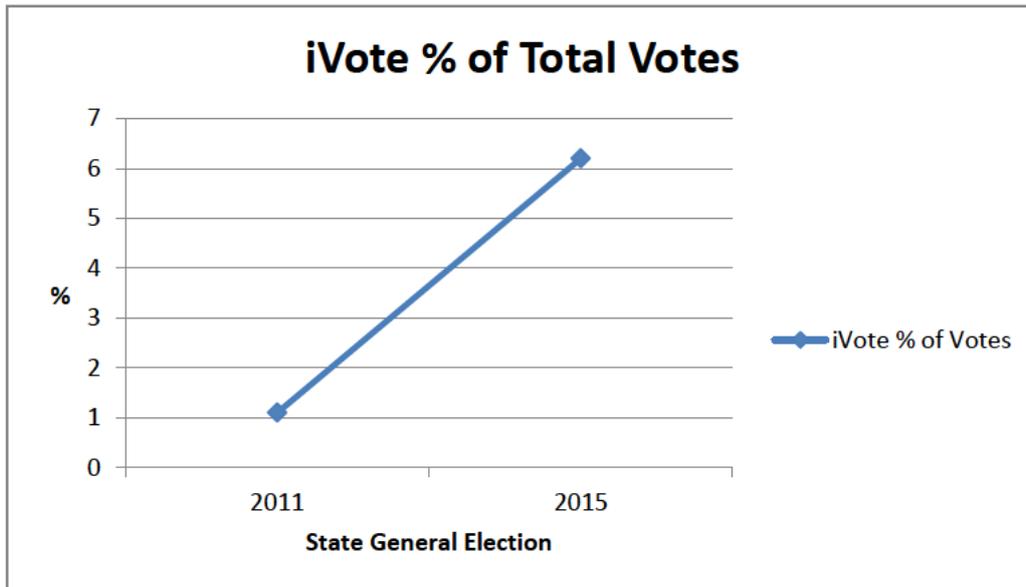
voting centre could simply use a paper ballot and it is of no use to voters who cannot attend a voting centre.

While the iVote design includes an attendance mode, it is only expected to be used in limited circumstances - NSWEC designed this mode as an alternative to absent voting for selected, larger polling places, but the *Parliamentary Electorates and Elections Act 1912* [PEEA] does not yet provide for its use in this manner - and would only be cost effective as part of the overall iVote system.

## 6. Overview of iVote

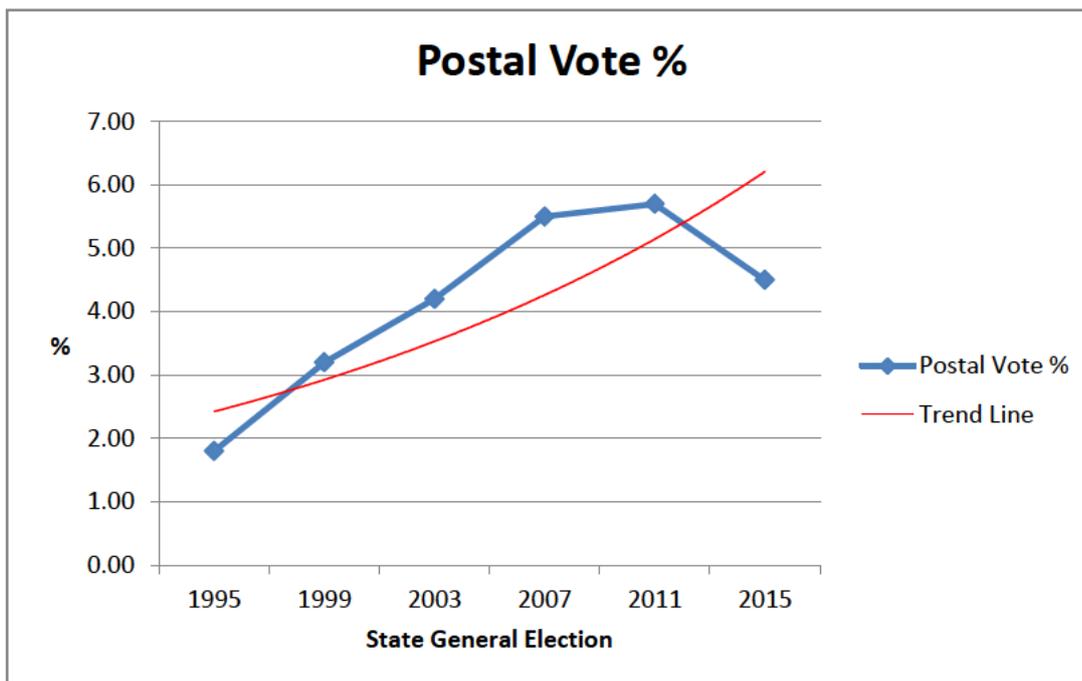
First delivered for SGE 2011 with great success, the iVote system comprised a core voting system provided by Everyone Counts, a US vendor, plus a NSWEC delivered system for the registration of eligible electors and delivery of iVote credentials to them. This system offered both telephone and internet voting and was also used over six subsequent by-elections.

At its introduction at SGE 2011, 46,864 NSW electors used iVote; at SGE 2015 this had increased to 283,669 votes, thereby considerably increasing its percentage of total votes cast:



Graph 1: iVote Percentages in the State General Elections from 2011 to 2015

The comparison with the downward trend in postal voting over the same period is striking:



## Graph 2: Postal Vote Percentages in the State General Elections from 1995 to 2015

The enhanced iVote system used for SGE 2015 added new features, including the ability of voters to verify their vote using a separate telephone verification service, and comprised three main components:

- Core voting system supplied by Scytl, a vendor based in Spain;
- Registration and Credential Management systems, delivered and operated by NSWEC; and
- Verification Service, developed by NSWEC/CGI and operated by AC3.

With the greater usage at SGE 2015, the overall cost per vote for iVote dropped well below \$20.00.

The NSWEC project team managed the complex delivery project, which included:

- four separate systems, namely Core Voting, Registration, Credential Management and the Verification Service;
- three pairs of data centres, namely NSW GovDC for Core Voting, commercial hosting for the Verification Service and internal hosting for Registration and Credential Management;
- two call centres, a commercial mail house, IVR telephone systems, SMS and email communications, plus an external SOC (Security Operations Centre); and
- advertising and promotion of iVote including engagement with community and disability groups.

### 6.1 What is iVote?

iVote is a REV system that allows voting via a web browser over the internet (including mobiles and tablets) or voting by way of the telephone. Voters using the telephone can choose between an automated IVR system using DTMF touch tones to make their selections or talking with a human operator who uses the web iVote on behalf of the voter.

Under the provisions of the PEEA, the eligibility for iVote is currently restricted to electors who;

- are blind, with low vision or illiterate;
- have a disability;
- live in remote areas (more than 20km from a polling place); or
- are not in NSW on election day.

An elector would first register to use iVote, declaring their eligibility either online or through the call centre, then could vote after receiving their 'iVote number', which can be delivered by SMS, email, letter or a personal call from the iVote call centre. For electors who are blind, with low vision or illiterate, the only means of achieving a secret, independent vote (as required under the *UN Convention on the Rights of Persons with Disabilities*) is with electronic voting.

Throughout the project, NSWEC has engaged with other electoral bodies in the region. There have been visits to study iVote from New Zealand, Queensland and the Australian

Electoral Commission. Discussions with the Western Australian Electoral Commission have led to a plan to use iVote for the WA SGE in March 2017.

NSWEC formed a Technical Advisory Group for the 2015 iVote project, which comprised leading experts in internet voting and computer security, including the Dean of the School of Computing at the University of South Alabama and an Associate Professor at the IT University of Copenhagen.

While academics have yet to find a ‘perfect’ cryptographic solution for internet voting, leading some to maintain that it’s not ready to be used yet, NSWEC has formed an Academic Consultative Group with academics from the University of NSW and Macquarie University to further advance the iVote system.

## 6.2 Voter feedback

The usability of iVote across all categories of eligible electors is supported by the survey results of satisfaction across the available voting methods:

Mode of Voting	Satisfaction		
	Very	Fairly	Total
Election Day attendance voting	49%	37%	<b>86%</b>
Pre-poll attendance voting	70%	23%	<b>93%</b>
Postal voting	73%	22%	<b>95%</b>
<b>iVote</b>	80%	17%	<b>97%</b>

The post-election survey by IPSOS, which included in-depth interviews, gives excellent feedback on the iVote project, as reported in the following extracts:

Participants were generally highly satisfied with the ease of navigation, and made positive comments about the website’s layout and design.

*“I had no problems with using iVote.”*

*“I found it quite easy to navigate through.”*

*“Self-explanatory.”*

One participant had used iVote on his mobile phone, and also commented that the website was easy to use and appeared to be appropriately formatted for the smaller screen.

*“The mobile site worked really well...it was formatted to iPhone really well. I was really impressed by how well it displays on your phone.”*

The qualitative research reflected the finding that iVote was perceived as being more efficient than other methods. Overall, iVote was generally seen as quick and easy, with a turnaround time much faster than that of voting in-person, without having to wait in queues.

Further, iVote was seen as taking away the time pressure that many reported feeling when voting in-person, specifically feeling rushed to cast their vote in order to keep the line moving. As there was no perceived time limit to voting online, it meant being able to find out information about candidates as they were voting, having more time to make their mind up once at the ballot paper stage, and being able to ensure they were filling out the papers correctly.

*“It does make it an easy process because there’s no real time limit. You’ve got that time to sit back and read through and work out what it is that you need to do rather than feeling a bit of extra pressure on Election Day when you’re in the booth.”*

The full IPSOS report on iVote can be accessed on the NSWEC website<sup>2</sup>.

### 6.3 Comparison between iVote and postal vote failures to vote

iVote	SGE 2011		SGE 2015	
	No. Votes	%	No. Votes	%
Registered for iVote but voted some other way	2,756	5.40%	10,827	3.60%
iVoted	46,864	91.70%	283,669	94.60%
Registered for iVote but <b>did not vote at all</b>	1,483	2.90%	5,394	<b>1.80%</b>
Accepted iVote Registrations	51,103		299,890	

Postal	NSW				Victoria			
	SGE 2011		SGE 2015*		SGE 2010		SGE 2014	
	No. Votes	%	No. Votes	%	No. Votes	%	No. Votes	%
Registered for Postal but voted some other way	34,709	11.00%	54,736	18.80%	23,292	7.82%	10,893	3.27%
Postal Voted	245,295	77.80%	203,577	69.90%	257,441	86.43%	302,878	91.04%
Registered for Postal but <b>did not vote at all</b>	35,178	11.20%	33,122**	<b>11.40%</b>	17,138	5.75%	18,926	<b>5.69%</b>
Accepted Postal Registrations	315,182		291,435		297,871		332,697	

\* Note additionally 1,460 postal vote applicants in NSW were rejected and subsequently failed to vote.

\*\* NSW allows 4 days after election day to return postal votes while Victoria allows 9. Some 7,167 NSW votes were rejected as late.

It is very clear that iVote is a more reliable method of voting than postal voting; this is particularly true for electors who are overseas.

Of 5,856 postal votes sent overseas, only 129 entered the count. Most were General Postal Voters [GPV] as shown below:

<sup>2</sup> [http://www.elections.nsw.gov.au/\\_data/assets/pdf\\_file/0003/205689/14-036279 Ipsos Report - NSWEC General Election Research FINAL updated 110116.pdf](http://www.elections.nsw.gov.au/_data/assets/pdf_file/0003/205689/14-036279 Ipsos Report - NSWEC General Election Research FINAL updated 110116.pdf)

	PVD Accepted	% PVD Accepted	PVD Not Returned	% PVD Not Returned	PVD Rejected	% PVD Rejected	Grand Total	% Grand Total
<b>GPV</b>	<b>55416</b>	<b>67.5%</b>	<b>23055</b>	<b>28.1%</b>	<b>3590</b>	<b>4.4%</b>	<b>82061</b>	<b>28.2%</b>
Interstate	118	52.7%	90	40.2%	16	7.1%	224	
NSW	55231	72.0%	18622	24.3%	2895	3.8%	76748	
Overseas	67	1.3%	4343	85.3%	679	13.3%	5089	
<b>Online</b>	<b>32494</b>	<b>72.0%</b>	<b>9750</b>	<b>21.6%</b>	<b>2916</b>	<b>6.5%</b>	<b>45160</b>	<b>15.5%</b>
Interstate	706	61.3%	257	22.3%	189	16.4%	1152	
NSW	31772	72.6%	9378	21.4%	2643	6.0%	43793	
Overseas	16	7.4%	115	53.5%	84	39.1%	215	
<b>Paper PVA</b>	<b>115665</b>	<b>70.4%</b>	<b>42544</b>	<b>25.9%</b>	<b>6002</b>	<b>3.7%</b>	<b>164211</b>	<b>56.3%</b>
Interstate	1399	57.8%	737	30.5%	283	11.7%	2419	
NSW	114220	70.8%	41471	25.7%	5549	3.4%	161240	
Overseas	46	8.3%	336	60.9%	170	30.8%	552	
<b>Grand Total</b>	<b>203575</b>		<b>75349</b>		<b>12508</b>		<b>291432</b>	

Approximately 2,000 of the people to whom postal votes were sent overseas successfully used iVote to cast their vote.

## 7. Sustainability

It is the view of NSWEC that DRE voting is not sustainable for most Australian jurisdictions other than the limited use in the ACT, where the unique geographic scale makes it viable. Both the Victorian and AEC experiences have demonstrated high costs, low usage and very limited electoral benefits.

Comparatively, the use of iVote for remote electronic voting at the 2015 NSW SGE demonstrated significant usage, sustainable costs and broad electoral benefits, from the enfranchisement of nearly 30,000 electors who would not have been able to vote without iVote, to the thousands of people who were able to vote without assistance due to iVote.

### 7.1 Participation - registrations and votes SGE2011 to SGE2015

As noted earlier, one key indicator of the success of iVote is the extent of its uptake by those electors who qualify under the PEEA to make use of it. The following charts show the exponential increase in electors registering to use iVote by web browser and subsequently casting their vote electronically.

#### SGE2011 registrations

<i>Registration Ground</i>	<i>Call Centre</i>	<i>Internet</i>	<i>Total</i>	<i>% Total</i>
People outside NSW on polling day	7,375	40,074	<b>47,449</b>	92%
People who live 20km from a Polling Place	419	1,415	<b>1,834</b>	4%
People with Disabilities	350	1,123	<b>1,473</b>	3%
People who are blind or have low vision or are illiterate	376	413	<b>789</b>	2%
<b>Total</b>	<b>8,520</b>	<b>43,025</b>	<b>51,545</b>	<b>100%</b>

#### SGE2015 registrations

<i>Registration Ground</i>	<i>Call Centre</i>	<i>Internet</i>	<i>Total</i>	<i>% Total</i>
People outside NSW on polling day	8,156	263,613	<b>271,769</b>	91%
People who live 20km from a Polling Place	389	8,552	<b>8,941</b>	3%
People with Disabilities	1,227	12,706	<b>13,933</b>	5%
People who are blind or have low vision or are illiterate	679	4,617	<b>5,296</b>	2%
<b>Total</b>	<b>10,451</b>	<b>289,488</b>	<b>299,939</b>	<b>100%</b>

#### SGE2011 votes

<i>Criteria</i>	<i>Total votes</i>	<i>% Total</i>
People outside NSW on polling day	<b>43,257</b>	92%
People who live 20km from a Polling Place	<b>1,643</b>	4%
People with Disabilities	<b>1,296</b>	3%
People who are blind or have low vision or are illiterate	<b>668</b>	1%
<b>Total</b>	<b>46,864</b>	<b>100%</b>

**SGE2015 votes**

<i>Criteria</i>	<i>Total votes</i>	<i>% Total</i>
People outside NSW on polling day	257,730	91%
People who live 20km from a Polling Place	8,407	3%
People with Disabilities	12,714	4%
People who are blind or have low vision or are illiterate	4,818	2%
<b>Total</b>	<b>283,699</b>	<b>100%</b>

The NSWEC was particularly pleased with the increased presence of electors with disabilities, and the fact that in 2015 nearly 5,000 electors who are unable to read a paper ballot were able to participate.

**7.2 Ongoing sustainability**

As mentioned previously, while the NSWEC has established a sustainable model of electronic voting for NSW, the Commission is very aware of the challenges presented by the 4-year election cycle in regards to maintaining the expertise within the iVote team and ensuring that the technology and processes behind iVote are continually improved as the field of electronic voting rapidly evolves.

To this end, NSWEC is strongly engaged with academia around iVote and is working with computer scientists at UNSW and Macquarie University, as well as political scientists at the University of Sydney.

It is expected that technologies like Blockchain<sup>3</sup> may become relevant to electronic voting and there will be new technical threats arising in the future that must be addressed, requiring NSWEC to continue to invest in maintaining the level of expertise and technology.

Consequently, NSWEC is very supportive of other Electoral Commissions in Australia adopting iVote so that the information, knowledge and investment can be shared.

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<sup>3</sup> The blockchain is seen as the main technical innovation of bitcoin, where it serves as the public ledger of all bitcoin transactions. A blockchain is a distributed database that maintains a continuously-growing list of data records, hardened against tampering and revision.