Analysis of Acquisition Costs of DRE and Precinct Based Optical Scan Voting Equipment for New York State

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In order to comply with the Help America to Vote Act (HAVA), New York State is planning to replace its existing lever machines with new equipment. The two types of systems under consideration are touch screen or pushbutton style voting machines (DREs), and hand marked paper ballots and precinct based optical scanners, augmented by ballot marking devices for disabled accessibility.

New Yorkers for Verified Voting (www.nyvv.org) has analyzed the acquisition costs for the state of these two types of voting systems.

Methodology

In order to estimate the cost of replacing existing lever machines, we contacted each county Board of Elections in New York State[*] to obtain the following information:

1. Number of polling places in the county.
2. Number of election districts in the county.
3. Number of lever machines in the county.
4. Number of polling places with multiple election districts.

From this data, we applied replacement formulas specified on the following pages for both DRE and optical scan systems.

Costs used were based on published prices, as far as they could be found, or were estimated based on statements made by vendors during machine demonstrations.

Limitations

Although smaller counties generally know exactly the requested numbers, larger counties often were less sure about some data and only provided approximate figures for lever machines. In some cases, counties were not able to provide the number of polling places with multiple election districts, in which case we calculated the figures from the number of polling places and election districts.

Results

Total acquisition costs for New York State:

- DRE system: $230,473,000

- Optical Scan: $114,423,640

- Cost Savings of Precinct Based Optical Scan Voting System: **$116,049,360**

County by county data, formulas and costs used are on the attached spreadsheet.

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[*] Totals for the five counties comprising New York City were obtained from the preliminary report done by the Electronic Voting Systems Department of the New York City Board of Elections released on March 11, 2005.

Costs and Formulas Used in this Analysis

Equipment Costs		
DRE System		
DRE	8,000	*See Note 1*
Accessible DRE	11,500	*See Note 2*
Smart Card Encoder	1,000	
Paper Ballot and Optical Scan System		
Optical Scanner	5,500	*See Note 3*
Ballot Marking Device	5,000	*See Note 4*
Privacy Booth	160	*See Note 5*

Note 1: Price based on Sequoia AVC Advantage Full Face Ballot DRE, quoted in The Syracuse Post Standard, March 9, 2005.

Note 2: Accessibility features are an extra cost option. This price is estimated based on vendor quotes for the accessible AVC Advantage DRE and information provided in the Syracuse Post Standard, March 9, 2005.

Note 3: Price based on 2004 Michigan Contract with ES&S.

Note 4: Price based on Automark ballot marking device, estimated.

Note 5: Price based on 2004 Michigan Contract with ES&S.

Per County Formulas Used In This Analysis		
Paper Ballot and Optical Scan System		
Optical Scanner Per Polling Place	1	*See Note 6*
Ballot Marker Per Polling Place	1	*See Note 7*
Privacy Booth Per Existing Lever Machine	1	*See Note 8*
DRE System		
Smart Card Encoder Per Election District	0	*See Note 9*
Accessible DRE Per Election District	1	*See Note 10*
DRE For Each Additional Lever Machine	1	

Note 6: A single optical scanner can manage different ballots from 5 or more Election Districts. Only one is required per polling place except in the largest polling places with many Election Districts. In this estimate, an additional optical scanner is added for each polling place with 5 or more Election Districts.

Note 7: A single ballot marking device can manage different ballots from 5 or more Election Districts. Only one is required per polling place except in the largest polling places with many Election Districts. In this estimate, an additional ballot marker is added for polling places with 5 or more Election Districts.

Note 8: Privacy booths replace existing lever machines on a one to one basis. If necessary, more can be added at low cost.

Note 9: The AVC Advantage does not require smart card encoders.

Note 10: The AVC Advantage is a push button style DRE with a large printed ballot that is fitted over the face of the machine. Since it cannot present different ballots for each Election District, at least one accessible machine is required per Election District.

County	Registered Voters	Polling Places	Election Districts	Lever Machines	Polling Places with More than One Election District (Example: 29/2 = 29 polling places with 2 Election Districts)	Additional Accessible DRE	Additional Scanner	Additional Ballot Marker	Purchase Cost Optical Scan	Purchase Cost DRE	Additional Acquisition Cost of DREs
Albany	211,679	343	347	600					3,697,500	6,014,500	2,317,000
Allegany	30,770	40	40	48	8/2				427,680	524,000	96,320
Broome	136,853	162	211	211	29/2,7/3,2/4				1,734,760	2,426,500	691,740
Cattaraugus	54,150	52	79	79					558,640	908,500	349,860
Cayuga	52,393	51	65	65	5/2				545,900	747,500	201,600
Chautauqua	94,247	83	135	135					893,100	1,552,500	659,400
Chemung	57,957	55	85	107	16/2				594,620	1,153,500	558,880
Chenango	32,440	42	42	53					449,480	571,000	121,520
Clinton	50,071	51	70	70	4/2,5/3,1/5		1	1	557,200	805,000	247,800
Columbia	42,445	55	55	55					586,300	632,500	46,200
Cortland	33,710	42	42	48					448,680	531,000	82,320
Delaware	33,216	42	59	65	1/17		4	4	493,400	726,500	233,100
Dutchess	176,740	250	254	280	20/3				2,669,800	3,129,000	459,200
Erie	679,081	455	985	1070	139/1,183/2,75/3,41/4,12/5,4/6,1/7		17	17	5,127,200	12,007,500	6,880,300
Essex	28,617	30	39	39	6/1,2/2,1/3				321,240	448,500	127,260
Franklin	29,747	32	49	51	6/2, 2/4				344,160	579,500	235,340
Fulton	32,512	30	50	51	1/3, 18/2				323,160	583,000	259,840
Genesee	40,635	32	53	53	11/2,1/3,2/4				344,480	609,500	265,020
Greene	32,852	31	46	52	9/2,1/3,1/5,1>6		2	2	354,820	577,000	222,180
Hamilton	5,334	11	11	13	2/2				117,580	142,500	24,920
Herkimer	43,387	58	58	72					620,520	779,000	158,480
Jefferson	70,731	60	91	91	16/2,3/3,3/4				644,560	1,046,500	401,940
Lewis	18,423	30	30	31	1/2				319,960	353,000	33,040
Livingston	42,357	39	57	57					418,620	655,500	236,880
Madison	46,925	38	51	59					408,440	650,500	242,060
Monroe	463,643	406	827	972	150/2,58/3,41/4,6/5,3/6,3/>6		12	12	4,544,520	10,670,500	6,125,980
Montgomery	32,980	39	48	48	9/2				417,180	552,000	134,820
Nassau	914,553	420	1161	1500	127/2,82/3,55/4,42/5,20/6,3/7,2/8,1/9,2/11		72	72	5,406,000	16,063,500	10,657,500
New York City*	4,494,421	1400	6100	7800		1,400	2,800	2,800	45,348,000	99,850,000	54,502,000
Niagara	163,734	113	180	181	1/2				1,215,460	2,078,000	862,540
Oneida	127,212	123	192	192	22/2,9/3,4/4,1/5		1	1	1,332,720	2,208,000	875,280
Onondaga	306,860	271	457	457	107/2, 28/3, 6/4				2,918,620	5,255,500	2,336,880
Ontario	73,006	55	89	108	23/2,4/3,1/5		1	1	605,280	1,175,500	570,220
Orange	211,585	172	318	318					1,856,880	3,657,000	1,800,120
Orleans	26,982	15	40	40	4/2, 5/3,2/4, 1/6		1	1	174,400	460,000	285,600
Oswego	95,346	59	121	121	29/2,5/3,2/4,3/5,1/6		4	4	680,860	1,391,500	710,640
Otsego	38,242	42	57	69	10/2,1/3				452,040	751,500	299,460
Putnam	65,992	27	85	135	1/2,1/3,2/5,1/6,1/>6		2	2	326,100	1,377,500	1,051,400
Rensselaer	105,921	99	134	210	28/2,2/3,4/4				1,073,100	2,149,000	1,075,900
Rockland	183,230	141	270	270					1,523,700	3,105,000	1,581,300
Saratoga	151,663	122	201	201	29/2, 13/3,1/4, 1/12, 1/9, 1/4		5	5	1,365,660	2,311,500	945,840
Schenectady	103,449	80	128	173	29/2,6/3,2/4,1/5		1	1	878,180	1,832,000	953,820
Schoharie	18,597	29	29	36	7/2				310,260	389,500	79,240
Schuyler	13,748	17	17	18	1/2				181,380	203,500	22,120
Seneca	21,674	27	27	30	3/2				288,300	334,500	46,200
St. Lawrence	67,697	76	102	102	18/2,4/3,1/4				814,320	1,173,000	358,680
Steuben	57,590	65	85	96					697,860	1,065,500	367,640
Suffolk	933,561	354	1032	1460	86/2,82/3,60/4,33/5,16/6,8/>6		57	57	4,549,100	15,292,000	10,742,900
Sullivan	58,431	56	63	100	9/2,5/5		5	5	656,500	1,020,500	364,000
Tioga	37,717	42	48	48					448,680	552,000	103,320
Tompkins	65,603	48	78	78					516,480	897,000	380,520
Ulster	130,151	117	164	164	17/2,3/3,4/4,3/5		3	3	1,286,240	1,886,000	599,760
Warren	45,148	39	69	69	9/2,3/3,1/4,1/5,1/7		2	2	441,540	793,500	351,960
Washington	39,712	52	52	55	1/4				554,800	622,000	67,200
Wayne	60,880	43	67	67	13/2,1/3,2/4,2/5		2	2	483,220	770,500	287,280
Westchester	603,795	900	1022	1022					9,613,520	11,753,000	2,139,480
Wyoming	27,990	26	39	39	2/2,4/3,3/3,1/5		1	1	289,740	448,500	158,760
Yates	15,947	16	20	20	4/2				171,200	230,000	58,800
Totals									$ 114,423,640	$ 230,473,000	**$ 116,049,360**

New York City totals include Bronx, Kings, Queens, New York and Richmond counties

Comparing Annual Costs of DRE and Optical Scan systems

When comparisons of annual maintenance costs of touch-screen/pushbutton direct recording electronic (DRE) devices and paper ballot/precinct based optical scanner (PBOS) systems are made, critics of PBOS systems typically point to increased ballot printing costs as evidence that these systems have higher annual per election expenses. But critics leave some other ongoing costs out of the equation, and often misstate the variables involved in estimating printing costs for each system. This brief analysis evaluates in more detail the ballot printing cost argument, and adds storage and transportation costs to the picture.

✓ **Ballot Printing Costs**
   When comparing annual ballot printing costs for DRE and PBOS systems, many PBOS critics assume that PBOS systems require sufficient ballots be printed for greater than 100% of registered voters. They also incorrectly assume that no traditional paper ballots at all must be printed with DREs. To do an accurate comparison however, several questions about each system must be answered:

   1) How many ballots must be printed for each type of system?

      ❖ How many traditional paper ballots must be printed with DREs?
         ▪ Absentee ballots.
         ▪ Affidavit (provisional) ballots.
         ▪ Sufficient emergency ballots in case of DRE failure.
         ▪ DREs could require ballots printed for 33% or more of registered voters.
         ▪ Per ballot printing costs are higher than PBOS due to smaller quantities.

      ❖ How many ballots must be printed with PBOS?
         ▪ Practices of states currently using PBOS should be analyzed.
            • Okalahoma prints ballots for only 90% of registered voters.

   2) What is the per ballot printing cost?

      ❖ In states using precinct based optical scan, printing costs are .20/ballot to .50/ballot.

      ❖ Large volume discount costs are negotiated by state or counties.
         ▪ Print shops commonly charge a small up-charge for local, down ballot difference and will give volume pricing for large batches that are substantially similar.
            • Modern print shops use computer typesetting so small layout changes are less expensive.
         ▪ Competitive bidding process will guarantee lower per ballot prices.
            • New York State has over 11 million registered voters.

✓ **Lifetime of the System**
   The lifetime of the voting equipment must also be considered. Optical scanners have been used for 20 years in many precincts around the United States and have proven to be very robust and long lasting. DREs have not been used long enough to know their anticipated lifetime, but no touch screen device is warranted for more than 5 years, due to the high failure rate of touch screens. Also, the DREs with voter verified paper ballots are untested and their useful lifespan is still unknown.

      ❖ Optical Scanner lifetime – minimum 15 Years
         ▪ In Oklahoma, existing optical scanners have been in use for 14 years and are still going strong.

      ❖ DRE lifetime – 5 Years?
         ▪ Unknown, but touch screen are notoriously fragile components and are not warranted longer than 5 years.
         ▪ If 50% or more of DREs must be replaced within 5 years, this is a huge cost to counties that will not be covered by HAVA funds.

✓ **Storage Costs**
Full face DREs are large and heavy and require much greater storage and transportation costs compared to PBOS systems. Also, due to their greater number and size, DREs require a great deal more climate controlled storage space than is needed for PBOS systems.

  ❖ Full face ballot DREs
  ▪ Weigh over 200 pounds and take up 28 cubic feet when stored.
  ▪ At least one or more DREs are required for each existing lever machine.
  ▪ Full face ballot DRE Size and Weight
    • 3.5 Ft. wide x 4 Ft. high x 2 Ft. deep
    • 28 Cubic Feet
    • Weight – greater than 225 pounds
  ❖ Optical scanners / Ballot Markers
  ▪ Weigh 19-39 pounds and take up less than 4 cubic feet per device.
  ▪ They can be stacked up in storage, requiring far less space.
  ▪ Only one scanner and ballot marker is needed per polling place, except in the largest precincts.
  ▪ Optical Scanner / Ballot Marker Size and Weight
    • 2 Ft. wide x .75 Ft. high x 2.5 Ft deep
    • 3.75 Cubic Feet
    • Weight – app. 19 - 39 pounds.

✓ **Transportation Costs**
Moving the large, heavy, full face DREs is going to take a lot of time, and require a lot of space. Since DREs are quite sensitive, very heavy, and must be handled carefully, it is unlikely that election workers will be able to move the DREs to and from polling places during elections. Professional movers will need to be hired, a huge hidden expense.

  ❖ DREs are large, heavy, and extremely delicate. At least one DRE, perhaps more, is required for each existing lever machine.
  ▪ DREs may require professional movers to move to and from polls on Election Day.
  ❖ PBOS systems are smaller and lighter, and fewer machines are required.
  ▪ In states currently using PBOS, election workers move the scanners.

❖ **All voters use an identical ballot and the same system.** Absentee, disabled, military, and provisional voters use the same ballot; and the voter can immediately verify that the right ballot has been issued.

❖ **Paper ballots are easily understood by voters and are inherently voter verified.** All of us have had experience with pencils & paper; most of us have taken tests or filled out lottery tickets to be read by an optical scanner.

❖ **Paper ballots allow each voter to vote only once.** Each voter is given a single ballot when signing in at the polling place. Some DREs require "smart cards" to be inserted in the computer to allow voting. These could be compromised and used to vote several times.

❖ **Precinct-based optical scanners allow voters to correct mistakes and detect over-votes and under-votes**. Incorrectly completed ballots (e.g., over-voted ballots, smudged ballots, etc.) will be rejected by the scanner. Voters can then exchange the spoiled ballot for a new blank ballot and correct their mistakes. In the case of under-votes, they have the option of completing the same ballot or having the scanner accept it as is.

❖ **The paper ballot is the official record of the vote.** Since the vote is recorded by the voter on the paper rather than electronically, the scanner only counts the votes into memory and then deposits the ballot into a locked ballot box. The paper ballot marked by each voter is the official record of the vote and is used in recounts.

❖ **Paper ballots for optical scanners are easy to recount by hand.** Lay-out is clear and on quality paper, whereas DRE paper records are light, quickly-fading print on thermal, ATM-type paper; recounts are difficult.

❖ **Paper ballot systems easily accommodate additional voters at low cost.** If a precinct has an unexpectedly large turn-out, only additional privacy booths must be provided, since a single scanner can handle voters from multiple privacy booths and election districts.

❖ **Voters can continue to vote on paper ballots in the event of equipment failure.** Both DREs and optical scanners have back-up batteries; but in the event of a prolonged power failure or other type of equipment failure, voting can continue on paper ballots that later are either fed into the scanner or hand-counted.

❖ **Voting will take less time and lines will move fast with paper ballots.** Some people, particularly the elderly, find computers unfamiliar and will find the marking of a paper ballot more comfortable than using DREs. Separate ballot marking devices will enable other voters to continue voting even when it takes longer for a disabled person, an elderly person, or someone needing to use the multi-lingual features of the marking device to vote. Optical scanners take just seconds to read and verify a ballot, and no problems with lines are experienced in states using precinct based scanners**.**

❖ **Only one optical scanner and one small marking-device per precinct will require storage between elections.** Optical scanners and ballot markers are much smaller than DREs and can be stacked in storage, requiring far less storage space and cost during the year than DRE systems. They are also small, and easy to transport to and from polling places during elections and do not require professional movers to handle them.

❖ **The scanner only counts votes;** therefore, it is much less complex and will require much less maintenance and upgrading over the years than DREs which are a newer, unproven technology.

❖ **Optical scanners are a reliable, mature technology that has been used successfully in U.S. elections for 20 years.** About 30% of precincts in the United States use paper ballots and precinct based optical scan systems. Many states are now adopting PBOS systems to meet HAVA compliance. Arizona, Minnesota, Michigan, Ohio, Oklahoma and West Virginia are some examples of states that have decided to use this reliable, auditable, cost effective voting technology.

Disadvantages of Direct Record Electronic (DRE) Systems

❖ **Electronic touch screen or pushbutton systems (DREs) lack transparency.** The voter cannot observe the process inside the computer and must simply trust that the votes registered on the screen are correctly processed by the hardware and software of the computer. This lack of transparency is not solved by having a print-out for voter verification. A paper receipt does not rule out bugs or malicious code in the software. It does not erase the influence of vendors in developing and maintaining the equipment. Nor does it erase the effect of having computer novices running electronic elections and the possibility of malfunctioning hardware or software.

❖ **Touch Screen computers (DREs) equipped for voter verification raise usability issues.** Since the DRE ballot and the printed thermal paper ballot have different formats, the voter cannot easily verify the vote as is possible with an optical scan paper ballot. Humans do not make comparisons accurately when the items are in different formats and locations. Also, the additional time needed to compare the screen with the small DRE printout will slow down the voting process, leading to long lines.

❖ **Recounts pose serious problems for DREs as well as for DREs with voter verification printer systems.** DRE systems have two ballots - the electronic record stored by the DRE, and the voter verifiable paper ballots printed by the DRE. Disputes about which ballot, paper or electronic, is the "real" ballot can result when totals do not match. In addition, with all DREs, the hardware components and the electronic memory must be preserved for recounts. But the electronic memory must be completely erased between elections. The contents of the electronic ballot must be preserved until any recount litigation is over; this could be a problem when DREs need to be prepared for upcoming local elections.

❖ **Logic and Accuracy Tests on DREs Are Complex and Opaque.** In one method, election workers follow a script and enter test votes into a DRE via the touch screen. This process can be very time consuming, expensive, and can only be performed on a small fraction of the machines that will be deployed. The second method bypasses the touch screen and uses a "test cartridge" that is plugged into the voting machine to simulate a human casting votes via the touch screen. This method is more efficient; but it is also opaque to anyone witnessing the test, since one cannot verify what the test cartridge is actually doing. By contrast, optical scan voting systems provide a transparent and publicly verifiable means for conducting logic and accuracy tests. A test deck of paper ballots can be marked by election observers and then publicly counted by hand until all agree on the correct count. That test deck can then be run through the optical scanner, and its vote count is then compared to the publicly-verified manual count of that same test deck.

❖ **DREs require election districts to manage at least two different systems**. With DRE systems, election officials must not only prepare the computers for voting but must also provide paper ballots for absentee, military, and provisional voting. The different types of ballots must be counted and added to the total.

❖ **Full face DREs are large and heavy, requiring increased storage and transportation costs.** The full face ballot DREs weigh over 100 pounds and take up 26 cubic feet when stored. Optical scanners and ballot markers weigh 15 pounds and take up about 3 cubic feet per device, and can be stacked in storage. Much more climate controlled storage space is required for DREs than for scanner based systems. Also, because the DREs are large, heavy, and extremely delicate, it is unlikely that election workers will be able to move the DREs to and from polling places during elections. Professional movers will need to be hired, a huge hidden expense.

❖ **DREs being sold to New York State have not been developed yet!** The full-face ballot DREs that vendors have demonstrated up to now in New York are not yet fully equipped with disabled accessibility and voter verification features. But state HAVA legislation requires both. Yet vendors continue to demonstrate machines that are not the ones they are trying to sell to NY because they haven't been developed yet! It takes a long time to design, build, test, debug, retest and certify DRE+VVPB equipment. Why are vendors trying to sell NYS equipment for use in 2006 that doesn't yet exist?

❖ **NEVER BUY VERSION 1.0 OF A NEW TECHNOLOGY!** New York State is looking at spending over $200 million dollars on full face DRE systems that are not yet fully designed, built, or tested in actual use. Paper ballots and optical scanners are a superior, auditable, reliable technology with a proven track record that can be purchased and maintained for a fraction of the cost of DREs.

Decertified voting machines prompt option No. 2

BY CARA HOST, *Staff writer*
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WAYNESBURG - Voters in Greene County will use No. 2 pencils, not electronic machines, to select candidates in the May 17 primary.

Last week, the Pennsylvania Department of State decertified UniLect Patriot voting machines that have been used in Greene, Beaver and Mercer counties. That determination outlawed the use of those machines for any election in the state and forced the affected counties to find alternative ways to count votes.

Leaders from each of the counties, as well as representatives from the Department of State, met in Beaver County Monday to discuss the situation. Pam Snyder, chairman of the Greene County commissioners, said the group seemed to reach a consensus.

"It looks like everyone's going to go with the optical scan. It's a paper ballot and basically, the voters will have to fill in the little ovals," she said.

Because of the tight timeline between now and the primary, a paper-based election method was the only system that could be established. With the optical scan, forms will be counted by machine. Election workers will not have to count the votes by hand unless there is a call for a manual recount. "It's going to be fine. These changes should not hinder voters in any way," Snyder said.

Greene County could have reverted to its old method. Before the county purchased about 95 UniLect Patriot Direct Recording Electronic Voting machines in 1998, local elections officials spent hours counting paper ballots by hand. The electronic machines were supposed to streamline the process.

The county will obtain the necessary equipment for the optical scan and probably use that system for at least the next two elections, the May primary and the general election in November, Snyder said.

The Department of State will reimburse the county for any costs incurred because of the change in election methods. If the county chooses to purchase an electronic voting system again, those costs may be covered through the federal Help America Vote Act.

The state decertified the UniLect Patriot Direct Recording Electronic Voting System because it froze and malfunctioned during testing on Feb. 15. The state believes that glitch may explain why there were so many undervotes in the counties that used the machines in the presidential election. Undervotes occur when a voter fails to cast a ballot for a certain office. The statewide average of undervoting is 1.49 percent. But, according to a Grove City College study, the undervote rate in Greene was 4.5 percent. The UniLect Patriot system is certified for use in 14 states.

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VOTING MACHINES

Dade studies switch to paper ballots

Miami-Dade County officials are studying whether to replace an expensive, controversial touch-screen

voting system after a series of mishaps.

BY NOAKI SCHWARTZ
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Three years after spending $24.5 million to install a controversial touch-screen voting system, Miami-Dade County elections officials have been asked to study scrapping the system in favor of paper-based balloting.

The request from County Manager George Burgess follows the recent resignation of Elections Supervisor Constance Kaplan and the revelation that hundreds of votes in recent elections hadn't been counted.

In a memo, Burgess asked new elections chief Lester Sola to assess whether optical scanners, which count votes marked on ''bubble sheets,'' would deliver more accurate results. Burgess also wants information on how much a switch would cost -- and how much it might save in the long run.

County officials say the machines have more than tripled Election Day costs.

''It's a confluence of bad facts,'' said Lida Rodriguez-Taseff, head of the Miami-Dade Election Reform Coalition and a longtime critic of the elections department. ``You have lousy technology that doesn't inspire voter confidence combined with outrageous costs for that lousy technology.''

Burgess' April 4 directive came just days after Kaplan resigned amid revelations that a coding glitch in the county's iVotronic touch-screen machines tossed out hundreds of votes in six recent elections.

''What I've noticed about this system from the very beginning is that there are so many things that can happen and, therefore, maybe it's not the system we should've gotten years ago,'' said Mayor Carlos Alvarez, who met with Burgess and elections officials Monday to discuss the issue.

Any change would stir controversy after the county spent millions in 2002 to become one of the larger clients of Election Systems & Software, which makes iVotronic. But county officials say ensuring voter confidence is crucial.

''Sometimes lessons are expensive,'' said County Commissioner Katy Sorenson, who said she will wait for the manager's report before weighing in on the machines.

After the 2000 presidential election debacle, officials wanted ''the best, most sophisticated technology,'' Sorenson recalled. At the time that meant buying 7,200 iVotronics, a paperless machine that stores votes on hard drives and discs -- despite concerns that there were no paper receipts.

In Broward County, Mayor Kristin Jacobs said she regrets that the county also chose iVotronics over optical scan machines.

''I understand that we've invested a lot of money in the electronic machines, but I would be more comfortable with optical scan because it gives you the ease of computerization and a paper trail,'' she said. ``Hindsight is 20-20. In retrospect I probably would have gone with optical scan but we're beyond that now, and we've had minimal problems in Broward.''

Still, in the new machines' first major test, the 2002 primary was marred in both counties by poorly trained pollworkers who struggled with the new technology.

In 2004, officials in Broward and Miami-Dade considered a plan to add printers to the touch-screen machines for the

presidential election, but the effort fizzled because the technology was not state-certified and would have cost up to $1,200 per machine. In the end, those elections went smoothly, but critics continued to demand a paper trail.

More recently the machines received another blow when the Miami-Dade elections department revealed that a staffer's coding error had led to hundreds of ballots being thrown out in last month's special referendum on slots. Kaplan said the number of missing votes would not have affected the election's outcome, but the same error was found in five other municipal elections.

Amid the problems, the cost of the actual elections -- about one countywide and 30 or so municipal races per year -- has increased. Sola said the Nov. 2 countywide election cost $6.6 million because of increased labor costs to program the machines, set up the equipment and print backup ballots. He said previous punchcard elections ran from $1 million to $2 million.

Those familiar with optical scanners, already used to count absentee ballots, estimate that it would cost about $8 million to equip the county's 749 precincts with them.

In a statement, ES&S officials said they are very proud of the work they have done ``to greatly enhance the county's voting process.''

''This is a partnership that we hope will continue well into the future,'' read the statement. ``Regarding the specific type of voting equipment Miami-Dade County may decide is best for them and their voters, that question is entirely up to the county to decide.''

Sola has until May 27 to report back to Burgess.

Herald staff writer Beth Reinhard contributed to this article.

Operating Cost Comparison
for Different Types of Voting Systems

Rosemarie Myerson, a voter in Sarasota County, took the initiative to study the operating expenses of her county's elections office for a period of 6 years and compare those costs with the operating costs of the elections office in her neighboring county, Manatee.

The results of her study are startling.

[Ms. Myerson's article](#) in the Herald Tribune

Comparison of Operating Costs

Punch Card and Electronic Voting Machines in Sarasota County, Florida
and Optical Scanners in Manatee County, Florida
by [Rosemarie F. Myerson](#)

February 8, 2005

To the Commissioners of Sarasota County:

This is an analysis of the annual expenditures by the Supervisor of Elections Office of Sarasota County for the fiscal years 1999 through 2004. The goal is first to compare the expenditures of Sarasota's election office before the purchase of Direct Recording Electronic Voting Machines (DREs) with the expenditures after the machines were purchased in October or November 2001. This purchase was recommended to the commissioners by the Supervisor of Elections and the $4,700,000 cost of these machines was paid by the commissioners' budget not by the Supervisor of Elections'.

This report also compares Sarasota County's election office expenditures with those of Manatee County. Manatee purchased Optical Scanners in 1997. Since Manatee's registered voting population is approximately 20% smaller than Sarasota's, one needs to take this fact into consideration when comparing the expenditures of each county's elections office. We added 25% to Manatee's annual costs to estimate what it might have cost Manatee if they had had 25% more voters. All data are given at the end of this paper.

The first fact that jumps out from the data is that after the purchase of the DREs there was an increase of over $1,100,000 per year in the three year average annual expenses of Sarasota County Elections Office. It costs Sarasota Office of Elections an extra million dollars each year to maintain and operate the DREs in years without any major election. Sarasota's fiscal year ends September 30th and the 2004 presidential election was in November so the presidential election cost will be included in the fiscal 2005 expenses. Furthermore the costs to keep Sarasota's DREs is rising annually ($90,000 per year). The data shows clearly that using DREs is much more expensive for Sarasota County than using punch cards.

Comparing the categorized expenses for Sarasota's three years pre DRE purchase to the three years post DRE purchase, an analysis of each of the three major expenditure categories shows that the three year average for Personal Services jumped $544,630; the average for Operating Expenses jumped $440,000 and the average for Capital Outlay doubled for the three years post DRE purchase. (The three year averages were used to smooth out the data for any extraordinary costs in any one year.)

It is useful to compare the election expenses of Sarasota after the purchase of the DREs to those of Manatee County whose Optical Scanners were used for all its elections in the years we are considering. Sarasota does own two Optical Scanners but uses them only to count absentee

ballots. For Manatee, the 2002 through 2004 average annual cost increased $268,494 for their Optical Scanners versus 1999 through 2001. This is much less than the $1,100,000 increase in Sarasota County's total costs comparing the same two periods.

Next we calculated what Manatee's Optical Scanner costs would have averaged in the last three years if Manatee had had Sarasota's voting population (i.e. adding 25%); the "adjusted data" is $1,724,256. This three year estimated average yearly cost for optical scanners is $1,159,402 less per year than it cost Sarasota County annually for DREs over the same period. The data show that the ES&S iVotronic machines purchased for Sarasota County in late 2001 cost probably $1,100,000 more to maintain and operate annually than Sarasota would have had to spend for Optical Scanners based on the "adjusted Manatee data".

There would have been real savings if the Sarasota County Commissioners had decided to throw away the DREs in April 2004 and spent $600,000 to buy Optical Scanners for the entire county as SAVE had suggested to the commissioners. The Supervisor of Elections said that paper ballots were expensive. Manatee bought their paper ballots for 20 cents each. For 100,000 voters this amounts to $20,000, a trivial sum compared to the estimate of $1,100,000 that the DREs annually cost Sarasota over Optical Scanners. It seems time for the County Commissioners to consider once again replacing the DREs with an Optical Scan System

The Sarasota data are taken from the yearly reports of independent certified public accountants for Sarasota County's Supervisor of Elections in their annual "Special Purpose General Fund Statement of Revenues, Expenditures and Changes in Fund Balance". The Manatee annual data come from the Office of the Supervisor of Elections Total Expenditures.

Annual Expenses for Sarasota County
1999 through 2004

	1999	2000	2001	average '99 through '01		2002	2003	2004	average '02 through '04
Personal Services	$1,197,330	$1,256,108	$1,155,320	$1,202,919		$1,643,534	$1,605,523	$1,985,600	$1,744,886
Operating Expense	$450,384	$449,369	$423,065	$440,939		$882,091	$767,428	$931,668	$860,396
Capital Outlay	$176,836	$16,052	$205,743	$132,877		$266,510	$509,924	$58,697	$278,377
Totals	$1,824,550	$1,721,529	$1,784,128	$1,776,735		$2,792,135	$2,882,875	$2,975,965	$2,883,659

Annual Expenses for Manatee County
1999 through 2004

	1999	2000	2001	average '99 through '01		2002	2003	2004	average '02 through '04
Actual Data	$1,049,892	$1,106,213	$1,176,628	$1,110,911		$1,226,910	$1,343,007	$1,568,298	$1,379,405
To correct for Manatee 20% smaller voting population, add 25% to Manatee data									
Adjusted Data	$1,312,365	$1,382,766	$1,470,785	$1,388,639		$1,533,638	$1,678,759	$1,960,373	$1,724,256