Norwalk - Microgrid Incentive Application

Tesoro Sol

Date:1/7/2025

City: Norwalk

Overview:

The MIP program is an opportunity to increase energy resiliency for disadvantaged communities with critical infrastructure needs. Norwalk can utilize this opportunity to provide backup storage for the transit center and an additional local community customer of SCE.

In partnership with the private partner presenting the chance to Norwalk(Tesoro Sol), the city can utilize the energy generation and storage equipment to sell energy on the CAISO and perform net metering savings from Microgrid operations. These profits can then be used to install rooftop solar panels for the transit center and solve the transit centers' energy needs behind the meter, as the MIP requires equipment to be used only for CAISO sales and energy backups.

The Microgrid specified in this site assessment for the transit center based on a canopy setup is composed of 2.9MW of solar and 2.8 MW in residential batteries with a 7.92 MWh capacity.

Whats a community Microgrid:

A community Microgrid is like a neighborhood power system that usually works with the primary electric grid. The Microgrid traditionally has two modes, one of which is ("Blue Sky Mode"), and it shares power with the larger grid, storing and generating energy alongside it. But if the main grid goes down —because of bad weather, wildfires, or any planned or unplanned shutdown—the Microgrid can switch into its "Island Mode." That means it can disconnect from the primary grid and keep the lights on for the community by supplying its own electricity.

Details from Norwalk to get pre-application score:

The program requires at least two disadvantaged customers. With the first customer being the transit center, the Second disadvantage valued customer could be any properties on the same circuit, including:

Can the Social Security Building be utilized as one of the disadvantaged customers in the SCE MIP Program along with the transit center?
Imperial Hwy
Balsam St
Bloomfield Ave
Can the homes in the Solterra complex be used as customers for in the SCE MIP program, along with the transit center?
Imperial Hwy
Civic Center Dr
Hacienda Dr
Quail Ln

MIP Application Information

Contact Info:

Partner	**Tesoro Sol**	Dr. William Francis - wfrancis@goilios.com
Developer	Innovative Development Group (ASG, ACS, CIOPROUSA)	Elias Cortez - Email: cioprousa@gmail.com
Municipal	Norwalk	Jesus Gomez (City Manager)

EPC and Potential Financing: Greenrock

Local Authority having jurisdiction at the proposed Site, check which applies:	Norwalk	
Do you currently have Local or Tribal Government support?	Yes	
Government Agency or Tribe name?	Mayors Office	

Please explain the disadvantaged vulnerable community (DVC) resilience/ energy objectives and/or needs?

1. Install backup generation for Norwalks transit center and local residences.
2. build energy resiliency in an under served community with increasing energy load demand due to the growth in multi-modal electric transportation and affordable housing.
3. Generate Income for the city to support energy needs in future developments.

Estimated Number of DVC customers and/or critical/community resilience service facilities that the MIP Project will serve?

Site	Anticipated Accounts	Customer Type
Norwalk/Santa Fe Transit Center	**1**	Critical Infrastructure
Solterra Civic Center Apartments	**tbd**	residential
Social Security Administration Building	**tbd**	Commercial

List the potential anticipated funding sources:

1. **Financier**: GreenRock, IDG

Name of potential technical consultant or engineer:

- Dr. William Francis CFO and Energy Consultant
- Peter Ryan Energy Systems and Battery Consultant

With additional technical support from IDG associated companies. More specifically Greenrock, and American safety group.

Climate and Economic Justice Screening Tool: The tracts in the table below are the tracts that will be impacted by the community energy program. All the tracts in Norwalk qualify as a disadvantaged community with a large Hispanic base.

Data Category	6037552200	6037552301
County Name	Los Angeles County	Los Angeles County
Total Population	5686	4482
PM2.5 in the Air (Percentile)	98	98
Percent Hispanic or Latino	0.81	0.62
Identified as Disadvantaged Without Considering Neighbors	TRUE	TRUE
Percent of Individuals <100% Federal Poverty Line	16	6
Unemployment (Percent) (Percentile)	57	54
Linguistic Isolation (Percent) (Percentile)	93	91
Energy Burden (Percentile)	24	8
Traffic Proximity and Volume (Percentile)	98	94

Infomation comes from cjest online tool: https://screeningtool.geoplatform.gov/en/about#3/33.47/-97.5

MIP Site Breakdown:

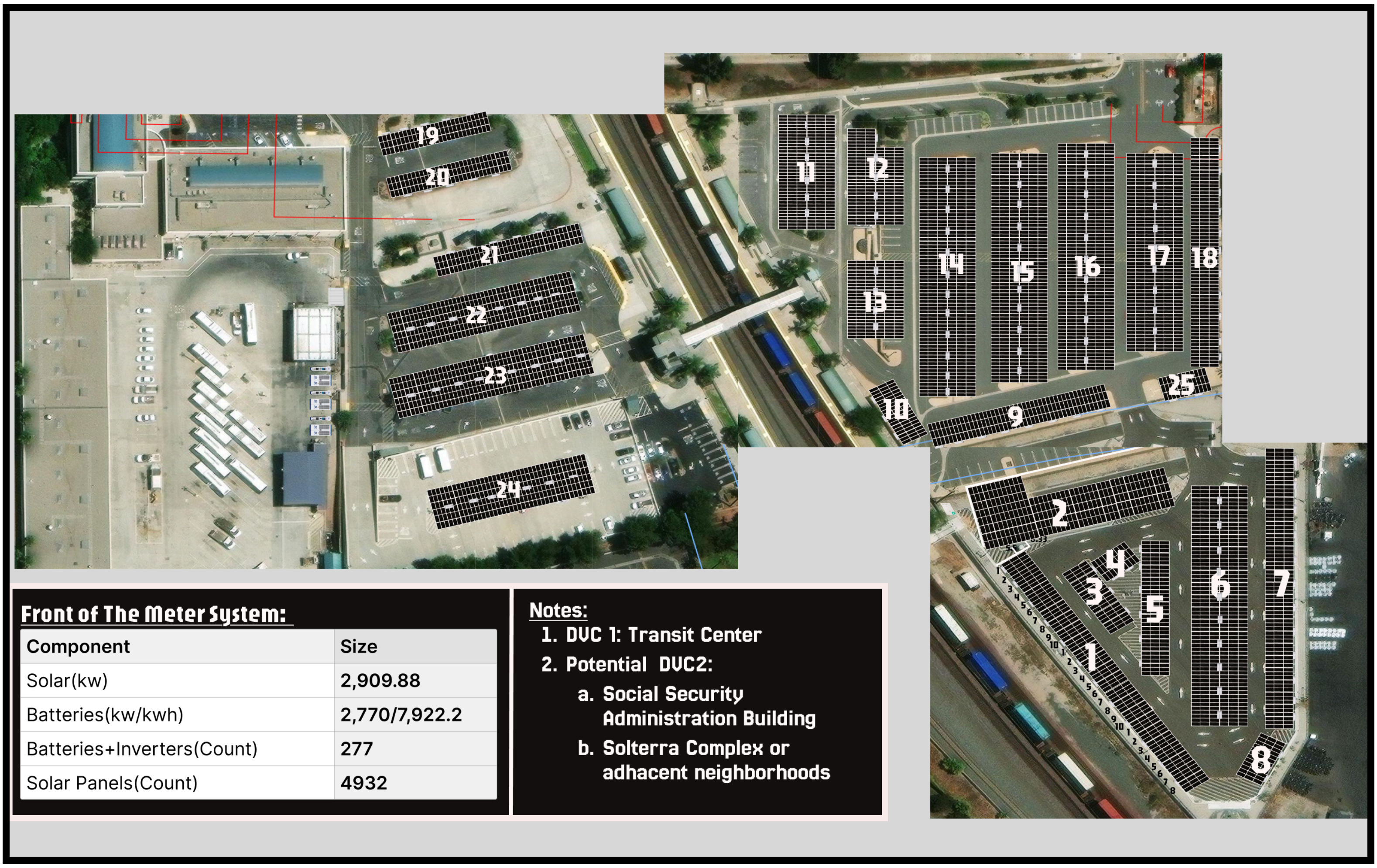
The site breakdown map displays the potential facilities the micro-grid will serve. One of the sites is the transit center, which is the site of the energy installation, with the other potential disadvantaged customers being the local residences, businesses, or state buildings also located on the cody circuit

These are the potential locations for installing electrical equipment such as solar canopies, batteries, and inverters. The MIP installations will primarily be utilizing sections 6-10, and can increase the system size with some of the other sections if need be (i.e. section 2 and section 11).

Energy System Installation

System Description: The Santa Fe Springs/Norwalk Transit Center can enhance energy sustainability and resiliency, in the local region, by installing solar canopies that include high-power 500 W+ high-efficiency solar panels, lithium iron phosphate (LiFePO4) battery systems, and hybrid inverters. The canopy setups will cover up to two parallel rows of parking spots, generating clean energy and providing shade. Each battery bank, paired with up to 18 panels, stores surplus energy for distribution or grid independence during outages.

18 panels per Inverter battery pair allows for panel flexibility with the storage systems, allowing for interconnection of up to 15 kW PV(18 panels at 590 a watt is 10,620. The hybrid inverters efficiently manage energy flow and support grid integration, ensuring stable and reliable power. This Microgrid enhances resiliency for the transit center, supporting reliable operations while benefiting local communities and commerce with clean, dependable energy. The project promotes economic stability and environmental stewardship and positions the transit center as a regional clean energy innovation leader.



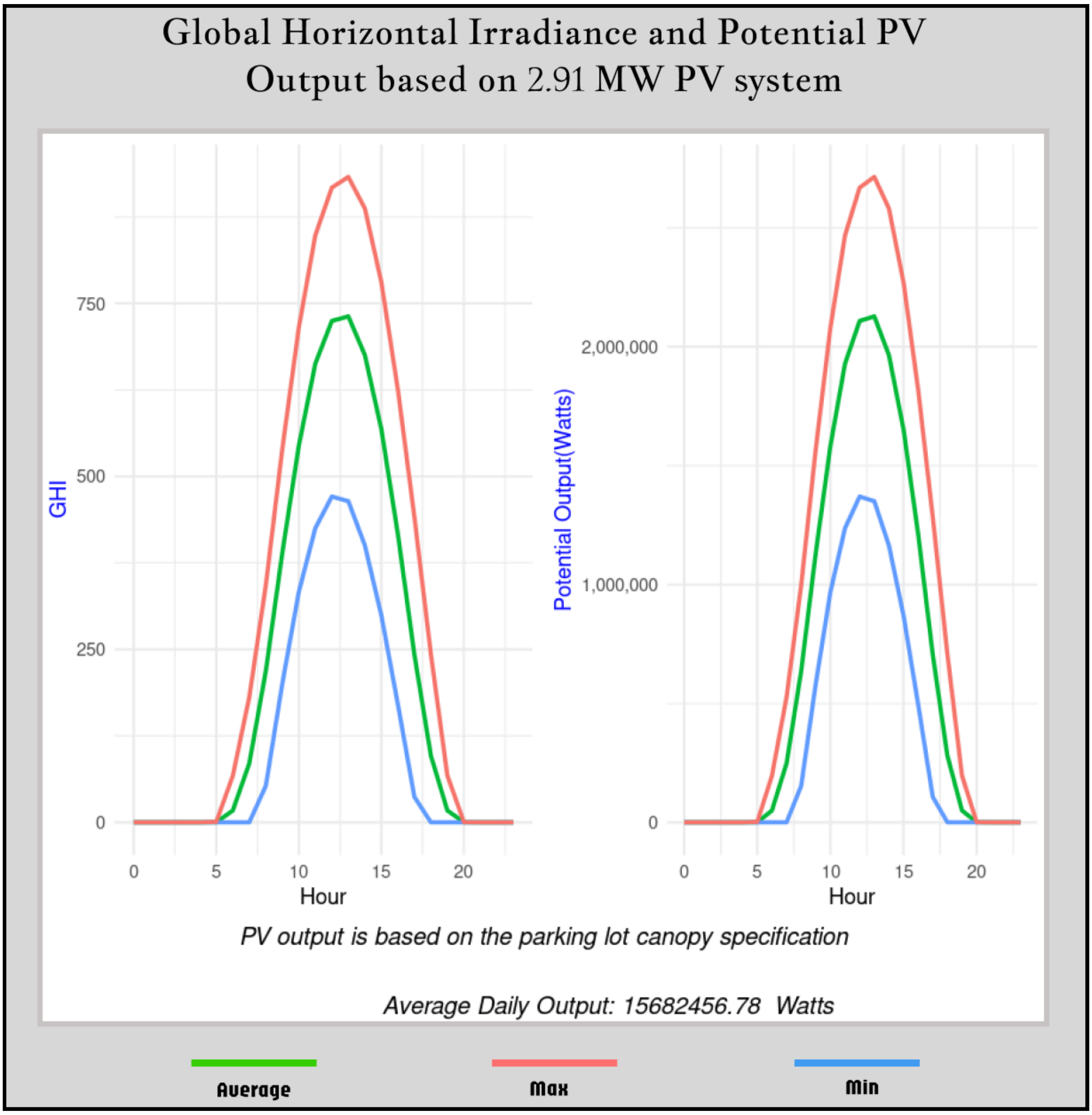
The system is composed of Solar canopies with a width of 2-3 panels and, additionally residential batteries.It features 4,932 solar panels with a total generating capacity of nearly 2,910 kW. In addition, 277 residential inverter-battery setups provide up to 277 kW of power output and 7,922.2 kWh of energy storage. Together, they create a robust, flexible energy solution that combines significant solar production with on-site energy storage. **Can utilize an AC bus or parallel AC buses to a transformer to deliver the energy generated from the PV canopies to the grid.**

	canopies	panels	Watts	batteries/Inverters	kw/kwh Battery Output
1-5	85	765	451350	44	440000/1,258.4
6-10	88	792	467280	45	450000/1,287
11-15	148	1332	785880	74	740000/2,116.4
16-20	123	1107	653130	62	620000/1773200
21-25	104	936	552240	52	520000/1487200
Total	548	4932	2909880	277	2779/7,922.2

Further Breakdown in Appendix

Key Takeaways:

1. ***Modular setup utilizing hybrid inverter-battery pairs with canopies, Solar panels will connect to batteries through inverters with an integrated DC disconnect.***
2. ***Rigid metal or EMT conduit, or appropriate cable tray systems to carry wiring safely along canopy structures and down to inverters/batteries.***
3. ***Utilize AC buses to send energy to transformers from coupled inverter-battery pairs. Likely utilize multiple AC buses to simplify complexity in integrating the canopy sections***
4. ***Canopies are at most three panel length over a parking space.***
5. ***Program off-takers would need to be on the Cody Circuit, the residences surrounding the transit center are ideal candidates.***



Note: *These Photo-voltaic production estimates are based upon global horizontal irradiance simulation, conditioned on historical solar irradiance data for the Norwalk CA coordinates.*

Interconnection Information: The circuit Cody is on-site of the transit center with multiple interconnection points located on both the Imperial Highway side(near the transit center entrance) and the parking lot side on the opposite side of the tracks. DrPep displays an interconnection potential of up to 3MW for photovoltaics on the imperial highway. The parking lot power lines are not 3-phase, so they would require upgrades if utilized. This cost, if necessary, should be covered by the program.

Power Lines 1: Imperial Highway		
Power Line Voltage	SCE 12kV	
Circuit	Cody	Part of "Center 220/66" System
Circuit Available Load Capacity(MW)	1.45	
Power Line Distance	On the transit center property on the Imperial highway side	
Rule 21 Screen L	Likely to Pass	
Photovoltaic(MW)	3	
Uniform Load Integration Capacity(MW)	2	
Power Line Connected Substation	Pioneer	

Power Lines 2: Neighborhood Side		
Power Line Voltage	SCE 12kV	
Circuit	Cody	Part of "Center 220/66 System
Circuit Available Load Capacity(MW)	**-**	**Non-3 phase**
Power Line Distance	Neighborhood and parking lot side of the transit center	
Power Line Connected Substation	Pioneer	

System Component Details

The initial system specification covers only the panel, battery, and inverter types. We have not yet included the EBOS and SBOS details for the canopy structures and system aggregation strategy(i.e. AC bus) in our specs. Residential batteries from QPO will be used and are expected to be available for this project. While we are open to any solar panel vendor, we used Silfab panels for the current proposed system design.

Solar Canopy Spec Per Unit		
Panel Size (W):	590	
Dimensions (WxDxH):	89.7 in x 44.6 in x 1.4 in	
Panel Manufacturer:	silfab solar	
Link:	https://silfabsolar.com/wp-content/uploads/2024/09/Silfab-SIL-590-XM-Bifacial-Data-Generic-20240829-Final.pdf	
Fire Containment and Prevention	https://apfmag.com/pvstop-revolutionizing-solar-panel-fire-safety/	**PVSTOP seek to make the solar industry safer by containing and suppressing fires that erupt in solar panel systems**

Residential Battery(single unit)		
System Duration(Wh):	1.43 -2.86	
Size(kW)	10	
Max Capacity(kWh):	28.6	up to 8000 cycle life
Voltage Range:	40–58.4 V (DC)	
Max Current:	200 A	
Residential Battery Dimensions:	38.5" x 34.6" x 8.4" (980 x 880 x 215mm)	
Battery Weight	419.14	
Charge Type:	Asymmetric	Does not need to fully charge

Residential Inverter(single unit)		
Inverter Weight	98.23	
Max. PV Input Power	15 kW	
Number of MPPTs	3	
DC Input Voltage Range	90-520 V	
AC Output	10kw nominal	120/240 V Split Phase or 208 V L–L
Residential Inverters Dimensions:	15.7"× 31.5" × 9.0'"(400 × 800 × 230mm)	
Communication with BMS	CAN	Controlled Area Network
Inverter Power Factor	0.8	

Appendix

Solar Sections	Panels	Solar Power(kw)	Residential Inverter + Batteries	kw/kwh Battery Output
1	207	122.1	12	120/343.2
2	378	223020	21	210/600.6
3	54	31860	3	30/85.8
4	27	15930	2	20/57.2
5	99	58410	6	60/171.6
6	360	212400	20	200/572
7	207	122130	12	120/343.2
8	36	21240	2	20/57.2
9	135	79650	8	80/228.8
10	54	31860	3	30/85.8
11	216	127440	12	120/343.2
12	162	95580	9	90/257.4
13	144	84960	8	80/228.8
14	414	244260	23	230/657.8
15	396	233640	22	220/629.2
16	396	233640	22	220/629.2
17	342	201780	19	190/543.4
18	198	116820	11	110/314.6
19	81	47790	5	50/143
20	90	53100	5	50/143
21	108	63720	6	60/171.6
22	270	159300	15	150/429
23	288	169920	16	160/457.6
24	234	138060	13	130/371.8
25	36	21240	2	20/57.2
Total	**4932**	**2909880**	**277**	**277/7,922.2**

Solar Output based on System Spec and Global Horizontal Irradiance Estimates

Below is an appendix table showing estimated solar power production by hour, based on historical mean, minimum, and maximum Global Horizontal Irradiance (GHI) data for Norwalk, CA (sourced from Solcast). Each row represents an hour of the day (from 5:00 to 19:00), and includes GHI values alongside corresponding mean, minimum, and maximum potential solar output in watts. The "Total" row summarizes the daily cumulative GHI and energy production estimates.

hour	historical mean ghi	historical min ghi	historical max ghi	historical mean output (watts)	historical min output (watts)	historical max output (watts)
5	0.07	0.00	0.67	187.85	0.00	1,904.86
6	17.05	0.00	67.12	48,174.21	0.00	189,622.76
7	85.18	0.00	180.90	240,624.44	0.00	511,038.82
8	218.37	52.65	342.46	616,889.29	148,730.71	967,414.55
9	389.47	200.43	539.63	1,100,233.66	566,192.37	1,524,405.05
10	544.25	333.00	714.96	1,537,465.15	940,711.91	2,019,715.76
11	663.05	425.33	848.57	1,873,050.39	1,201,529.63	2,397,133.52
12	724.70	470.82	917.44	2,047,221.22	1,330,024.34	2,591,680.90
13	731.35	464.19	932.89	2,066,012.67	1,311,311.50	2,635,351.35
14	675.37	400.25	887.26	1,907,867.03	1,130,675.23	2,506,437.80
15	568.14	299.01	780.54	1,604,959.25	844,683.71	2,204,951.15
16	416.69	170.58	625.57	1,177,124.92	481,887.78	1,767,182.05
17	242.27	36.71	441.30	684,406.48	103,688.82	1,246,648.78
18	96.33	0.00	243.02	272,126.39	0.00	686,523.90
19	17.04	0.00	67.44	48,134.11	0.00	190,518.29
Total	**5,389.33**	**2,852.97**	**7,589.77**	**15,224,477.1**	**8,059,436.00**	**21,440,529.5**

Based on Norwalk CA GHI data sourced from solcast.

Below is a table showing hourly projections for solar irradiance (GHI) and corresponding solar power output. Each row lists the minimum, maximum, and average GHI, along with the estimated low, high, and mean solar generation in watts. These projections are derived from historical data and simulated using methods described in Perpiñán O (2012).

hour	Projected mean ghi	Projected min ghi	Projected max ghi	Projected min output (watts)	Projected max output (watts)	Projected mean output (watts)
5	17.13	11.54	26.69	32,594.66	75,400.48	48,386.00
6	75.99	0.43	152.01	1,208.43	429,414.51	214,655.64
7	164.63	0.54	301.64	1,527.12	852,108.80	465,071.35
8	306.21	99.89	469.50	282,188.73	1,326,290.71	865,024.30
9	471.79	250.84	636.98	708,596.27	1,799,422.88	1,332,756.35
10	616.22	380.94	776.47	1,076,112.03	2,193,454.18	1,740,759.41
11	714.72	469.90	874.34	1,327,434.77	2,469,952.17	2,019,029.12
12	749.67	498.10	915.34	1,407,092.60	2,585,751.68	2,117,769.89
13	714.73	459.24	884.30	1,297,313.40	2,498,079.97	2,019,045.51
14	616.30	361.97	789.50	1,022,539.47	2,230,280.10	1,741,003.18
15	472.08	227.70	655.05	643,222.51	1,850,469.29	1,333,578.34
16	306.84	85.15	491.77	240,538.78	1,389,222.59	866,792.87
17	183.93	15.88	320.84	44,851.27	906,341.24	519,588.51
18	93.11	15.41	161.51	43,530.64	456,264.14	263,025.59
19	16.72	3.40	28.70	9,612.11	81,087.41	47,241.20
Total	**5,520.07**	**2,880.93**	**7,484.64**	**8,138,362.79**	**21,143,540.1**	**15,593,727.2**

Perpiñán O (2012). "solaR: Solar Radiation and Photovoltaic Systems with R." *Journal of Statistical Software*, **50**(9), 1–32. doi:10.18637/jss.v050.i09.