Manual for POLYSYS Biomass Simulations

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Purpose

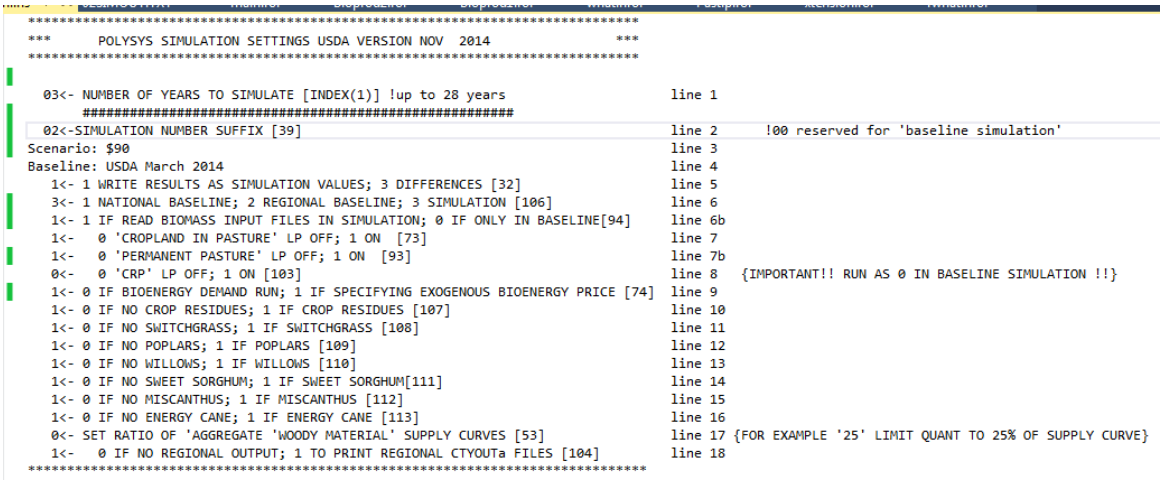
This manual describes how to:

And how to implement the following types of simulations using POLYSYS:

This manual also explains the model output files:

How to Begin Baseline and Simulation Scenarios

The main controller file to use to run the model is **SIM.INS**



```
*************************************************************************
***      POLYSYS SIMULATION SETTINGS USDA VERSION NOV  2014            ***
*************************************************************************

  03<- NUMBER OF YEARS TO SIMULATE [INDEX(1)] !up to 28 years          line 1
       ######################################################
  02<-SIMULATION NUMBER SUFFIX [39]                                    line 2     !00 reserved for 'baseline simulation'
Scenario: $90                                                          line 3
Baseline: USDA March 2014                                              line 4
   1<- 1 WRITE RESULTS AS SIMULATION VALUES; 3 DIFFERENCES [32]        line 5
   3<- 1 NATIONAL BASELINE; 2 REGIONAL BASELINE; 3 SIMULATION [106]    line 6
   1<- 1 IF READ BIOMASS INPUT FILES IN SIMULATION; 0 IF ONLY IN BASELINE[94]  line 6b
   1<-   0 'CROPLAND IN PASTURE' LP OFF; 1 ON  [73]                    line 7
   1<-   0 'PERMANENT PASTURE' LP OFF; 1 ON  [93]                      line 7b
   0<-   0 'CRP' LP OFF; 1 ON [103]                                    line 8   {IMPORTANT!! RUN AS 0 IN BASELINE SIMULATION !!}
   1<- 0 IF BIOENERGY DEMAND RUN; 1 IF SPECIFYING EXOGENOUS BIOENERGY PRICE [74]  line 9
   1<- 0 IF NO CROP RESIDUES; 1 IF CROP RESIDUES [107]                 line 10
   1<- 0 IF NO SWITCHGRASS; 1 IF SWITCHGRASS [108]                     line 11
   1<- 0 IF NO POPLARS; 1 IF POPLARS [109]                             line 12
   1<- 0 IF NO WILLOWS; 1 IF WILLOWS [110]                             line 13
   1<- 0 IF NO SWEET SORGHUM; 1 IF SWEET SORGHUM[111]                  line 14
   1<- 0 IF NO MISCANTHUS; 1 IF MISCANTHUS [112]                       line 15
   1<- 0 IF NO ENERGY CANE; 1 IF ENERGY CANE [113]                     line 16
   0<- SET RATIO OF 'AGGREGATE 'WOODY MATERIAL' SUPPLY CURVES [53]     line 17 {FOR EXAMPLE '25' LIMIT QUANT TO 25% OF SUPPLY CURVE}
   1<-   0 IF NO REGIONAL OUTPUT; 1 TO PRINT REGIONAL CTYOUTa FILES [104]  line 18
*************************************************************************
```

All the parts indicated in RED below can be changed by the user:

```
*************************************************************************
***      POLYSYS SIMULATION SETTINGS USDA VERSION NOV  2014            ***
*************************************************************************

  03<- NUMBER OF YEARS TO SIMULATE [INDEX(1)] !up to 28 years          line 1
       ######################################################
  02<-SIMULATION NUMBER SUFFIX [39]                                    line 2
Scenario: EISA by 2026                                                 line 3
Baseline: USDA March 2014                                              line 4
   1<- 1 WRITE RESULTS AS SIMULATION VALUES; 3 DIFFERENCES [32]        line 5
   3<- 1 NATIONAL BASELINE; 2 REGIONAL BASELINE; 3 SIMULATION [106]    line 6
   0<- 1 IF READ BIOMASS INPUT FILES IN SIM;0 IF ONLY IN BASELINE[94]  line 6b
   1<-   0 'CROPLAND IN PASTURE' LP OFF; 1 ON  [73]                    line 7
   1<-   0 'PERMANENT PASTURE' LP OFF; 1 ON  [93]                      line 7b
   0<-   0 'CRP' LP OFF; 1 ON [103]                                    line 8
   0<- 0 IF BIOENERGY DEMAND RUN; 1 IF SPECIFYING EXOGENOUS BIOENERGY PRICE [74]  line 9
   1<- 0 IF NO CROP RESIDUES; 1 IF CROP RESIDUES [107]                 line 10
   1<- 0 IF NO SWITCHGRASS; 1 IF SWITCHGRASS [108]                     line 11
   1<- 0 IF NO POPLARS; 1 IF POPLARS [109]                             line 12
   1<- 0 IF NO WILLOWS; 1 IF WILLOWS [110]                             line 13
   1<- 0 IF NO SWEET SORGHUM; 1 IF SWEET SORGHUM[111]                  line 14
   1<- 0 IF NO MISCANTHUS; 1 IF MISCANTHUS [112]                       line 15
   1<- 0 IF NO ENERGY CANE; 1 IF ENERGY CANE [113]                     line 16
   0<- SET RATIO OF 'AGGREGATE 'WOODY MATERIAL' SUPPLY CURVES [53]     line 17
   1<-   0 IF NO REGIONAL OUTPUT; 1 TO PRINT REGIONAL CTYOUTa FILES [104]  line 18
```

Baseline

To begin, you need to 'set the baseline' before running a 'change' scenario.

1. Set the number of years you want (up to 28) line 1.
2. The baseline simulation is always numbered '00', so set line2 to '00'.
3. You can also name the Scenario: 'BASELINE' line 3.
4. Set lines 7 thru 17 to the landgroups and biomass crops you want to include.
5. To set the baseline you must run the model 2 times: first line 6 as '1', then line 6 as '2'.
6. To have the model print out 'baseline' output, run the model with line 6 as '3'. You are 'simulating' the baseline now. This will generate output files 'output/00SIMOUT.TXT', and 'output/00CTYaOUT[year].txt'.
7. To **RUN** the model, either click on the 'exe' file in POLYSYS directory named **'aaaPOLY_v4.exe'** or in a DOS window, type in '**aaaPOLY_v4'**.

Simulations (or 'change' scenarios)

There is no need to 'rerun' the baseline, if you are doing scenarios (a) using 'whatif' files or (b) changing indices in SIM.INS. Simply keep Line 6 [106] = 3 and run the simulation.
If you change the underlying data files (.prn or .txt files) then you will need to make sure to read in the files by setting line 6b to '1'.

'Simulations' can only be run when line 6 [106]=3!

Once the baseline is set, you can run various 'change' scenarios.

1. Pick a simulation number (line 2), and name your simulation (line 3).
2. Set the changes you want to make in the '*whatif*' files and save them with the matching 'simulation number' you picked in line 2. The changes will be activated in the model by what you put in 'whatif' files. There are 2 types of whatif files you can amend.
    1) whatif.SXX — for national level changes (to biomass prices or ethanol demand levels).
    2) Whatifrg.SXX and Whatifus.Sxx — for regional level changes.

Opening and changing whatif files

Getting the format right in the text files can be tricky.

a) Open the whatif, whatifrg, or whatifus file that you want to alter in notepad.
b) Make your changes.
c) Select 'save as'.
d) Set 'save as type' to 'ALL FILES'.
e) Put the suffix ".SXX", where XX is the simulation number you want to call it from.
f) Store all whatif files in the 'whatif' subfolder within the 2014POLY_V3 folder.

3. Run the executable '**aaa_POLY.exe**'
4. Output will be in the 'output' subfolder, named [simulation#]SIMOUT.TXT and [simulation#]CTYaOUT[year].TXT.

*Note: There is another way to run 'change' simulations besides using whatif files. You can also change the underlying 'readin' files. If you change the readin files, then you must make sure to read in the files by setting line 6b to '1'. By setting 6b to '1' you can run a particular simulation # with the newly changed data from the readin files. See *"4. Change feedstock conversion coefficients"* for an example of this method.

1. Simulate Different Biomass Prices

Don't need to rerun baseline index[106]=1 or 2. Just run a Simulation [106]=3.

1. Open up a *whatif.SXX* file (in the 'whatif' subfolder) and set the prices offered to individual crops and years.
   Each crop and year you want included must be set in the 'whatif' file.
   Below is the example of a $90 price offered to all crops and residues in 2013 thru 2030.
   The 'k' values correspond to particular crops. Appendix A provides a list of these crop codes.

Whatif.S02 :

```
************************************************************************
      P  O  L  Y  S  Y  S   -    N A T I O N A L  V A R I A B L E S
************************************************************************
-> EXOGENOUS PRICE RUN
-> INPUT THE DATA, FOLLOWING THE FORMAT BELOW AND THE TABLE HEADINGS
YEAR : CALENDAR YEAR FOR WHICH THE VARIABLE IS SIMULATED. Example : 1995
MTX  : MATRIX CONTAINING THE VARIABLE TO BE SIMULATED. Example: X,XS,CF
J    : VARIABLE CODE. Example : IF YIELD -> 3
K    : CROP CODE. Example: IF WHEAT -> 5
T    : P if % CHANGE FROM BASELINE. Example: 20% INCREASE ->  .20
                                             20% DECREASE -> -.20
       V if ABSOLUTE VALUE
-> CHARACTERS MUST BE PROVIDED IN UPPER CASE. HIT RETURN AFTER LAST DATA
------------------------------
YEAR MTX J  K T VALUE              EXPLANATION
----o---o--o-o-o-----------
2013 CF 09 9 V 90                 !MTX=CF=C MATRIX 'FIXED'
2014 CF 09 9 V 90                 !J=09=PRICE
2015 CF 09 9 V 90                 !K=9=CROP CODE NUMBER=SWITCHGRASS
2016 CF 09 9 V 90                 !T=V='VALUE'=90= $90 PER DRY TON
2017 CF 09 9 V 90
2018 CF 09 9 V 90
2019 CF 09 9 V 90
2020 CF 09 9 V 90
2013 CF 09 10 V 90                !K=10=CROP CODE NUMBER=POPLARS
2014 CF 09 10 V 90
2015 CF 09 10 V 90
2016 CF 09 10 V 90
2017 CF 09 10 V 90
2018 CF 09 10 V 90
2019 CF 09 10 V 90
2020 CF 09 10 V 90
2013 CF 09 11 V 90                !K=11=CROP CODE NUMBER=WILLOWS
2014 CF 09 11 V 90
2015 CF 09 11 V 90
2016 CF 09 11 V 90
2017 CF 09 11 V 90
2018 CF 09 11 V 90
2019 CF 09 11 V 90
2020 CF 09 11 V 90
2013 CF 09 15 V 90                !K=15=CROP CODE NUMBER=SWEAT SORGHUM
2014 CF 09 15 V 90
2015 CF 09 15 V 90
2016 CF 09 15 V 90
2017 CF 09 15 V 90
2018 CF 09 15 V 90
2019 CF 09 15 V 90
2020 CF 09 15 V 90
2013 CF 09 16 V 90                !K=16=CROP CODE NUMBER=MISCANTHUS
2014 CF 09 16 V 90
2015 CF 09 16 V 90
```

```
2016 CF 09 16 V 90
2017 CF 09 16 V 90
2018 CF 09 16 V 90
2019 CF 09 16 V 90
2020 CF 09 16 V 90
2013 CF 09 17 V 90                !K=17=CROP CODE NUMBER=ENERGY CANE
2014 CF 09 17 V 90
2015 CF 09 17 V 90
2016 CF 09 17 V 90
2017 CF 09 17 V 90
2018 CF 09 17 V 90
2019 CF 09 17 V 90
2020 CF 09 17 V 90
2013 EN 03 1 V 90                 !MTX=CF=EN MATRIX 'FIXED'=RESIDUE CROPS
2014 EN 03 1 V 90                 !J=03=PRICE
2015 EN 03 1 V 90                 !K=1=CROP CODE NUMBER=CORN RESIDUE
2016 EN 03 1 V 90                 !T=V='VALUE'=90= $90 PER DRY TON
2017 EN 03 1 V 90
2018 EN 03 1 V 90
2019 EN 03 1 V 90
2020 EN 03 1 V 90
2013 EN 03 5 V 90                 !K=5=CROP CODE NUMBER=WHEAT RESIDUE
2014 EN 03 5 V 90
2015 EN 03 5 V 90
2016 EN 03 5 V 90
2017 EN 03 5 V 90
2018 EN 03 5 V 90
2019 EN 03 5 V 90
2020 EN 03 5 V 90
```

2. Pick a simulation number (line 2) that matches the *whatif* file you created, and name your simulation (line 3).

3. In the Sim.ins, set index(74)=1 (line 9), to indicate you are setting exogenous prices.

4. Make sure index(106) = 3 (line 6), to indicate you will run a simulation.

5. Run 'aaa_POLY.exe'.

6. Output will be named *output/[simulation#]SIMOUT.TXT and [simulation#]CTYaOUT[year].TXT (for county level results)* or *[simulation#]stateOUT[year].TXT (for state-level results).*

2. Simulate different ethanol demand levels

Don't need to rerun baseline index[106]=1 or 2. Just run a Simulation [106]=3.

1. Pick a simulation number (line 2), and name your simulation (line 3).
2. Set the changes you want to make in the whatif files and save them with the matching 'simulation number' you picked in line 2. In your whatif.SXX file and set the ethanol demand levels of individual years.
3. Run the executable 'aaa_**POLY.exe**'.
4. Output will be named *output/[simulation#]SIMOUT.TXT and [simulation#]CTYaOUT[year].TXT*.

Below is the example of EISA levels achieved by 2026.

Example simulation is **whatif.S01.**

```
*************************************************************************
      P  O  L  Y  S  Y  S   -    N A T I O N A L  V A R I A B L E S
*************************************************************************
-> EXOGENOUS ETHANOL DEMAND RUN [Expanding ethanol demand to Energy Independence and
Security Act of 2007]
-> INPUT THE DATA, FOLLOWING THE FORMAT BELOW AND THE TABLE HEADINGS
YEAR : CALENDAR YEAR FOR WHICH THE VARIABLE IS SIMULATED. Example : 2014
MTX  : MATRIX CONTAINING THE VARIABLE TO BE SIMULATED. Example: BP is the bioprod matrix
J    : VARIABLE CODE. Example : j=2 is the 'ethanol' national demand
K    : CROP CODE. Example: in the 'bioprod' matrix there is no k values, so set to zero
M    : P if % CHANGE FROM BASELINE. Example: 20% INCREASE ->  .20
                                        20% DECREASE -> -.20
       V if ABSOLUTE VALUE  [VALUES READ IN BILLIONS OF GALLONS DEMAND]
-> CHARACTERS MUST BE PROVIDED IN UPPER CASE. HIT RETURN AFTER LAST DATA
------------------------------
YEAR MTX J  K M VALUE               EXPLANATION
----o---o--o-o-o-----------
2013 BP 02 0 V 0.50
2014 BP 02 0 V 1.77          !MTX=BP=BIOPROD MATRIX
2015 BP 02 0 V 2.35          !J=02='ETHANOL' NATIONAL DEMAND
2016 BP 02 0 V 3.20          !K=0={NO K VALUES IN BIOPROD MATRIX SO SET TO ZERO}
2017 BP 02 0 V 4.35          !M=V='VALUE'=THAT YEARS ETHANOL DEMAND IN BILLIONS OF GALLONS
2018 BP 02 0 V 5.81
2019 BP 02 0 V 7.77
2020 BP 02 0 V 9.12
2021 BP 02 0 V 10.47
2022 BP 02 0 V 12.21
2023 BP 02 0 V 13.95
2024 BP 02 0 V 15.95
2025 BP 02 0 V 18.95
2026 BP 02 0 V 20.00
2027 BP 02 0 V 20.00
2028 BP 02 0 V 20.00
2029 BP 02 0 V 20.00
2030 BP 02 0 V 20.00
```

3. Change Considered Feedstocks

Don't need to rerun baseline index[106]=1 or 2. Just run a Simulation [106]=3.

1. Pick a simulation number (line 2), and name your simulation (line 3).
2. Set the feedstock you want to consider in SIM.INS
3. Make changes in the whatif files and save them with the matching 'simulation number' you picked in line 2.
4. Run the executable '**aaaPOLY_v4.exe**'.
5. Output will be named [simulation#]SIMOUT.TXT and [simulation#]CTYaOUT[year].TXT.

```
*************************************************************************
***      POLYSYS SIMULATION SETTINGS USDA VERSION NOV  2014              ***
*************************************************************************

  14<- NUMBER OF YEARS TO SIMULATE [INDEX(1)] !up to 20 years          line 1
       ########################################################
  11< SIMULATION NUMBER; NEXT TWO LINES ARE TITLES  MAX -->[39]        line 2
Scenario: EISA by 2026, using only switchgrass                         line 3
Baseline: USDA March 2014                                              line 4
   1<- 1 WRITE RESULTS AS SIMULATION VALUES; 3 DIFFERENCES [32]        line 5
   3<- 1 NATIONAL BASELINE; 2 REGIONAL BASELINE; 3 SIMULATION [106]    line 6
   0<- 1 IF READ BIOMASS INPUT FILES IN SIM;0 IF ONLY IN BASELINE[94]  line 6b
   1<-   0 'CROPLAND IN PASTURE' LP OFF; 1 ON  [73]                    line 7
   1<-   0 'PERMANENT PASTURE' LP OFF; 1 ON  [93]                      line 7b
   0<-   0 'CRP' LP OFF; 1 ON [103]                                    line 8
   0<- 0 IF BIOENERGY DEMAND RUN; 1 IF SPECIFYING EXOGENOUS BIOENERGY PRICE [74]   line 9
   1<- 0 IF NO CROP RESIDUES; 1 IF CROP RESIDUES [107]                 line 10
   1<- 0 IF NO SWITCHGRASS; 1 IF SWITCHGRASS [108]                     line 11
   1<- 0 IF NO POPLARS; 1 IF POPLARS [109]                             line 12
   1<- 0 IF NO WILLOWS; 1 IF WILLOWS [110]                             line 13
   1<- 0 IF NO SWEET SORGHUM; 1 IF SWEET SORGHUM[111]                  line 14
   1<- 0 IF NO MISCANTHUS; 1 IF MISCANTHUS [112]                       line 15
   1<- 0 IF NO ENERGY CANE; 1 IF ENERGY CANE [113]                     line 16
   0<- SET RATIO OF 'AGGREGATE 'WOODY MATERIAL' SUPPLY CURVES [53]     line 17
   1<-   0 IF NO REGIONAL OUTPUT; 1 TO PRINT REGIONAL CTYOUTa FILES [104]   line 18
```

4. Change Feedstock Conversion Coefficients

When changing underlying input files, MUST set line 6b to 1 to make sure it reads the changes.

1. Save this original in a separate directory to keep track and restore.
2. Open up the file input\Original Input Files to Alter**databioprd_2013.xls** in excel.
3. Change any of the coefficients.
4. Save file back to the directory input/bio/ under the name *'databioprd_2013.prn* [space delimited file].
5. Set line 6b, or [94] = 1.
6. Run a Simulation [106]=3.

		Conversion Costs					
			2013	2014	2015	2016	2017
BIOPRD	11	Biomass to Elect($/KWH)	0.004	0.004	0.004	0.003	0.003
BIOPRD	12	Biomass to Ethanol ($ per gal)	1.472	1.398	1.324	1.249	1.175
BIOPRD	13	Corn Grain to Ethanol ($ per gal)	0.551	0.551	0.551	0.551	0.551
BIOPRD	14	Soybeans to Biodiesel ($ per gal)	0.436	0.436	0.436	0.436	0.436
BIOPRD	62	Wood to Elect($/kwh)	0.004	0.004	0.004	0.004	0.004
BIOPRD	63	Wood to Ethanol($/gal)	1.564	1.485	1.406	1.327	1.249
		Technical Coefficients	0.0521			1.0625	ratio of
		Electricity (Co-fire)	2013	2014	2015	2016	2017
BIOPRD	21	Corn Stover(KWH/DT)	1494	1494	1494	1494	1494
BIOPRD	22	Wheat Straw(KWH/DT)	1424	1424	1424	1424	1424
BIOPRD	23	Switchgrass(KWH/DT)	1532	1532	1532	1532	1532
BIOPRD	60	Wood(KWH/DT)	1576	1576	1576	1576	1576
		Ethanol					
BIOPRD	24	Corn Stover(gal/ton)	85	85	85	85	85
BIOPRD	25	Wheat Straw(gal/ton)	85	85	85	85	85
BIOPRD	26	Switchgrass(gal/ton)	85	85	85	85	85
BIOPRD	61	Wood(gal/ton)	85	85	85	85	85
BIOPRD	27	Corn Grain(gal/bu)	2.7	2.7	2.7	2.7	2.7
BIOPRD	28	Distillers Dried Grains(lbs/bu)	18.31	18.31	18.31	18.31	18.31
		Bio-Diesel					
BIOPRD	30	Soybeans(gal/bu)	1.4	1.4	1.4	1.4	1.4
BIOPRD	31	Oil biprod (lbs/bu)	11	11	11	11	11
BIOPRD	32	Meal biprod (lbs/bu)	45.5	45.5	45.5	45.5	45.5
		CREDITS					
BIOPRD	47	stover elect from ethanol production (kwh/dt)	200	200	200	200	200
BIOPRD	48	straw elect from ethanol production (kwh/dt)	185	185	185	185	185
BIOPRD	49	switchgrass elect from ethanol production (kwh/dt)	210	210	210	210	210

Notes:

Poplar, willow, miscanthus, sweet sorghum, and energy cane use 'switchgrass' coefficients.

5. Change County Crop Landuse Constraints

When changing underlying input files, MUST set line 6b to 1 to make sure it reads the changes.

This file sets a maximum amount of total county land that can be dedicated to any one crop. Data is max ratio of total county land mass allowed. Crops are in columns labeled 1 through 18 (see crop codes, appendix A).

1. Save original in separate directory to keep track and restore if needed.
2. Open file input\Original Input Files to alter**MAXACRE.xls** in excel.
3. Change any of the constraints (crop codes are named across columns).
4. Save file back to the directory input/ under the name MAXACRE.prn ('space delimited file').
5. Set line 6b, or [94] = 1.
6. Run a Simulation [106]=3.

COUNTY	NAME	STATE	FIPS_COD	POLYSYS	1	2	3	4	5	6	7	8	9	10
1	Autauga	AL	1001	90	1	1	1	1	1	1	1	1	0.25	0.25
2	Baldwin	AL	1003	91	1	1	1	1	1	1	1	1	0.25	0.25
3	Barbour	AL	1005	92	1	1	1	1	1	1	1	1	0.25	0.25
4	Bibb	AL	1007	89	1	1	1	1	1	1	1	1	0.25	0.25
5	Blount	AL	1009	88	1	1	1	1	1	1	1	1	0.25	0.25
6	Bullock	AL	1011	90	1	1	1	1	1	1	1	1	0.25	0.25
7	Butler	AL	1013	91	1	1	1	1	1	1	1	1	0.25	0.25
8	Calhoun	AL	1015	88	1	1	1	1	1	1	1	1	0.25	0.25
9	Chambers	AL	1017	89	1	1	1	1	1	1	1	1	0.25	0.25
10	Cherokee	AL	1019	88	1	1	1	1	1	1	1	1	0.25	0.25

6. Change Biomass Regional Yields (or costs)

When changing underlying input files, MUST set line 6b to 1 to make sure it reads the changes.

To change biomass yields, you must alter the yields in the individual biomass crop readin files.

1. Open the file you want to change from the directory: input\Original Input Files to Alter\ in excel.
2. Make changes.
3. Save the file to the directory and format the model will pick up…

   Switchgrass: file "input/bio/**switchyield.prn**" space delimited

   Poplars: file "input/bio/**poplar.txt**" tab delimited

   Willows: file "input/bio/**willow.prn**" space delimited

   Sweet Sorghum: file "input/bio/**sweet.prn**" space delimited

   Miscanthus: FILE "input/bio/**miscanyield.prn**" space delimited
4. Set line 6b, or [94] = 1.
5. Run your simulation … [106]=3.

Notes:
All yields are in dry tons per year.
Harvested annually: switchgrass, sweet sorghum, miscanthus
Harvested every 4 years: willows
Harvested every 8 years: poplars

7. Change Landuse Types Available for Biomass

POLYSYS has 3 different 'landuse' linear programming modules.

The 'cropland' module is always on, but the 'pastureland' and the 'conservation reserve program' modules can be turned on and off with lines 7 and 8.

Pasture

There are two pastureland 'LP's; (a) 'Cropland in pasture', and (b) 'permanent pasture'. Turning the 'pastureland' LP on (line 7=1) will make non-irrigated US census defined 'cropland in pasture' available for transition to dedicated biomass crops if they out-compete pasture rental rates (see Appendix E: 'assumptions'). Turning the 'permanent pasture' LP on (line 7b=1) will do the same for permanent pasture. The assumption on where pastureland is considered available (ie, the 100th meridian can be changed in Example 11 in this manual).

CRP

When you are generating the 'baseline'(when line 6 is 1 or 2), make sure that the 'CRP LP is set to 0. If you want CRP in a simulation, you can change line 8 ='1' only when line 6='3'.

```
*****************************************************************************
***      POLYSYS SIMULATION SETTINGS USDA VERSION NOV  2014                ***
*****************************************************************************

  14<- NUMBER OF YEARS TO SIMULATE [INDEX(1)] !up to 20 years           line 1
     ###########################################################
  15< SIMULATION NUMBER; NEXT TWO LINES ARE TITLES  MAX -->[39]         line 2
Scenario: EISA by 2026, using CRP land also                             line 3
Baseline: USDA March 2014                                               line 4
   1<- 1 WRITE RESULTS AS SIMULATION VALUES; 3 DIFFERENCES [32]         line 5
   3<- 1 NATIONAL BASELINE; 2 REGIONAL BASELINE; 3 SIMULATION [106]     line 6
   0<- 1 IF READ BIOMASS INPUT FILES IN SIM;0 IF ONLY IN BASELINE[94]   line 6b
   1<-   0 'CROPLAND IN PASTURE' LP OFF; 1 ON  [73]                     line 7
   1<-   0 'PERMANENT PASTURE' LP OFF; 1 ON  [93]                       line 7b
   0<-   0 'CRP' LP OFF; 1 ON [103]                                     line 8
   0<- 0 IF BIOENERGY DEMAND RUN; 1 IF SPECIFYING EXOGENOUS BIOENERGY PRICE [74]    line 9
   1<- 0 IF NO CROP RESIDUES; 1 IF CROP RESIDUES [107]                  line 10
   1<- 0 IF NO SWITCHGRASS; 1 IF SWITCHGRASS [108]                      line 11
   1<- 0 IF NO POPLARS; 1 IF POPLARS [109]                              line 12
   1<- 0 IF NO WILLOWS; 1 IF WILLOWS [110]                              line 13
   1<- 0 IF NO SWEET SORGHUM; 1 IF SWEET SORGHUM[111]                   line 14
   1<- 0 IF NO MISCANTHUS; 1 IF MISCANTHUS [112]                        line 15
   1<- 0 IF NO ENERGY CANE; 1 IF ENERGY CANE [113]                      line 16
   0<- SET RATIO OF 'AGGREGATE 'WOODY MATERIAL' SUPPLY CURVES [53]      line 17
   1<-   0 IF NO REGIONAL OUTPUT; 1 TO PRINT REGIONAL CTYOUTa FILES [104]    line 18
```

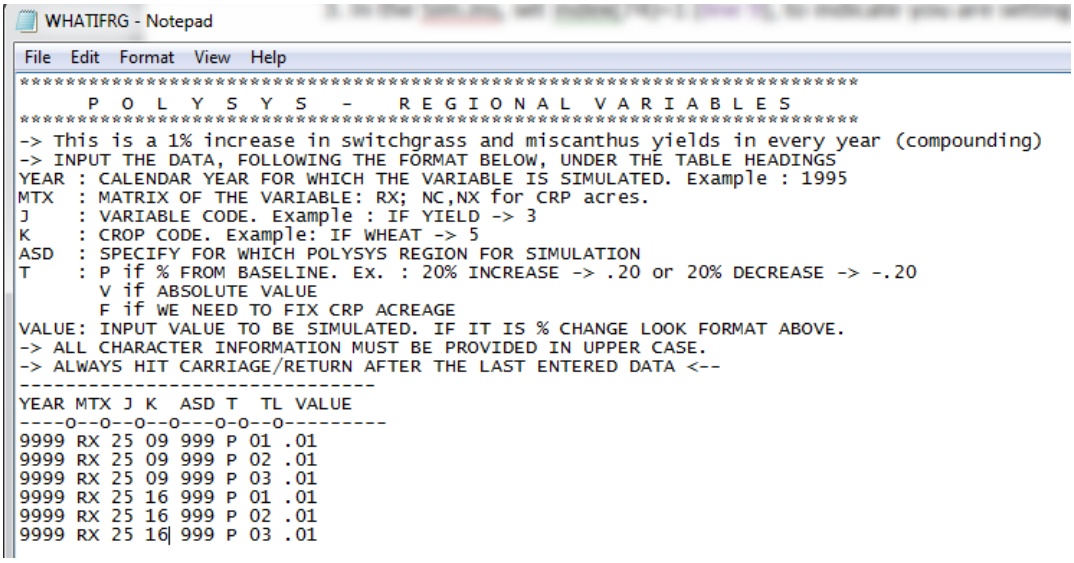
8. Change Yield Growth Assumptions

Option #1: set percentage cumulative changes occurring in all years

1. Open up an whatifrg.Sxx file and name the suffix to your SIM number.
2. Set the 'k' values to the crop you want.
3. Set the TL values to the tillage regime you want to change.
4. Set the 'Value' to the percentage change per year you want to change.
5. Keep 9999 in the 'Year' column to stipulate this change for all years.
6. Keep the 999 in the 'ASD' column to stipulate this change for all POLY regions.

Whatifrg.s03

Example of cumulative changes to switchgrass and miscanthus yield in all regions, all years

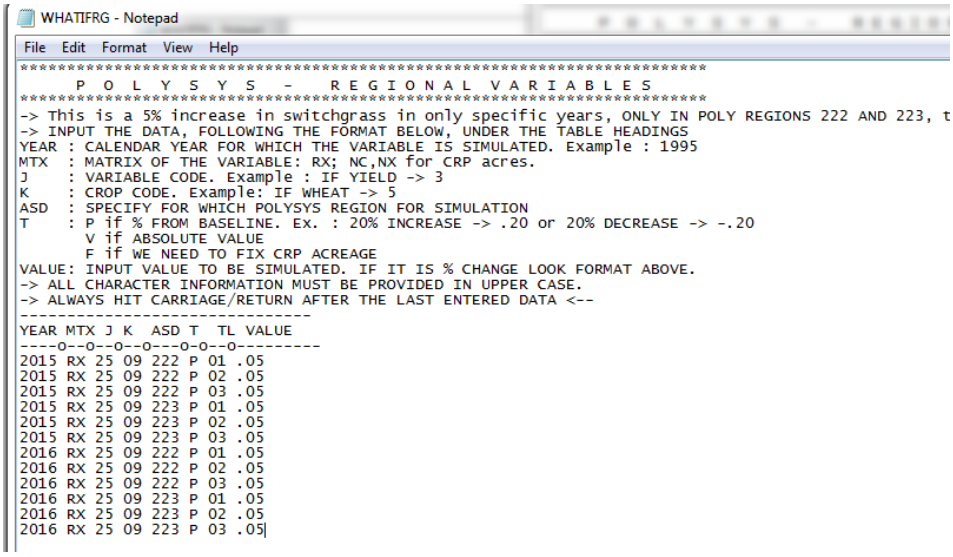


Option #2: percentage yield changes in specific years and POLY regions

1. Open up a whatifrg.Sxx file (from the 'whatif subfolder) and name the suffix to your SIM number.
2. Set the 'k' values to the crop you want.
3. Set the TL values to the tillage regime you want to change.
4. Set the 'Value' to the percentage change per year you want to change.
5. Set the 'Year' column to stipulate the year you want the change.
6. Set the 'ASD' column to stipulate the POLY region you want to change the yield.

Whatifrg.s05

Example of percentage yield changes in specific years and POLY regions

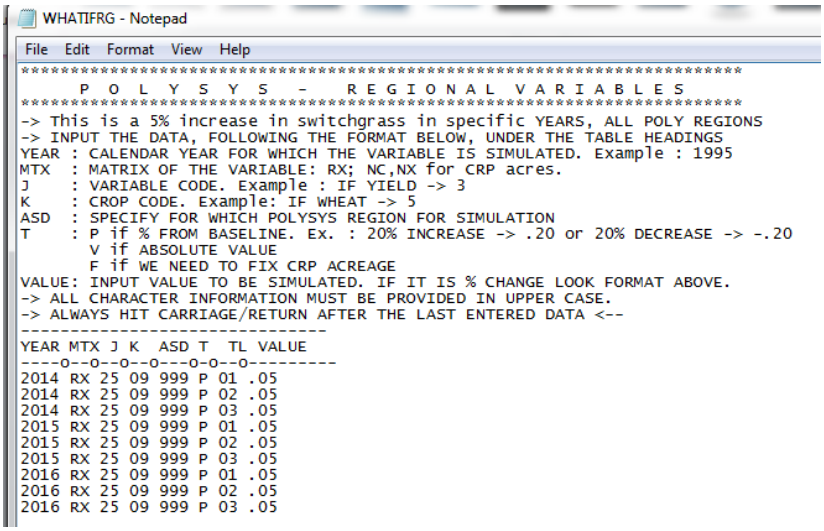


Option #3: percentage yield changes in specific years to ALL POLY regions

1. Open up a whatifrg.Sxx file (from 'whatif' subfolder) and name the suffix to your SIM number.
2. Set the 'k' values to the crop you want.
3. Set the TL values to the tillage regime you want to change.
4. Set the 'Value' to the percentage change per year you want to change.
5. Set the 'Year' column to stipulate the year you want the change.
6. Keep the 999 in the 'ASD' column to stipulate this change for all POLY regions.

Whatifrg.S04

Example of percentage yield changes in specific years to ALL POLY regions

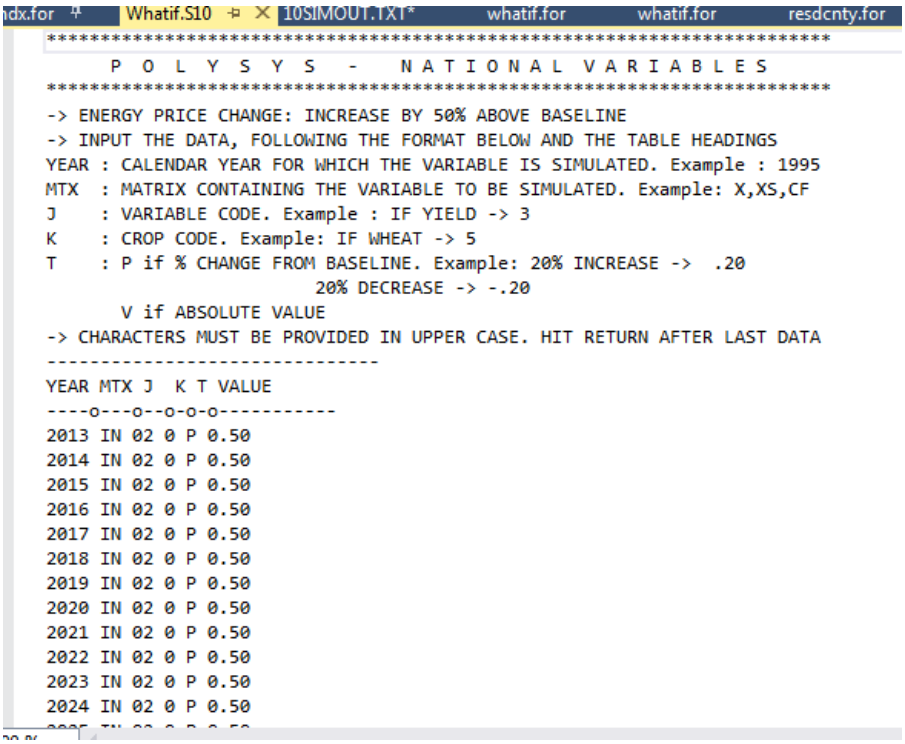


9. Change fossil fuel energy costs

1. Open up a whatif.SXX file (from 'whatif' subfolder) and set the 'MTX' value to "IN".
2. J must equal 2, k equal to 0, and T equal to 'P' for percentage.
3. In the 'value' field, put in the percent change (for 50%, enter 0.50, for -25%, enter -0.25).

Below is the example of a $90 price offered to all crops and residues in 2013 thru 2030.

Whatif.S10 : Example of energy price change.



Method: `$/AC CHANGE IN COST OF PRODUCTION = BTU'S * $perBTU * %CHANGE IN ENERGY COST`

Note: POLYSYS budgets have an estimated quantity of BTU's of energy in all inputs. These are taken from the literature in BTU's per unit of input. A 'baseline' energy price is also embedded in POLYSYS. For the 2014_v3, the price is equivalent to $3.00 per gal diesel. So if you want to estimate the impact of an energy change to $6.00 per gal diesel, you should enter a 100% increase. Please note that currently all 'types' of energy are assumed to increase along with others. So a 100% simulated increase impacts all inputs…direct diesel costs, fertilizer costs, and chemical costs based on their embodied btus. This may not be appropriate because some not all inputs are tied to 'diesel btus', for example, fertilizers btus are tied to natural gas. And although the cost of different energy types may be correlated and somewhat move together, they are not the same. In the future it might be good to decouple the 'energy types' to allow us to simulate an increase in 'diesel costs' separate from 'natural gas' costs.

10. Biodiesel Demand Run

Don't need to rerun baseline index[106]=1 or 2. Just run a Simulation [106]=3.

1. Pick a simulation number (line 2), and name your simulation (line 3).
2. Set the changes you want to make in the whatif files and save them with the matching 'simulation number' you picked in line 2. In your whatif.SXX file and set the ethanol demand levels of individual years.

   For biodiesel (using soybeans), the matrix code to enter is; BP 03 0 V .01.

   Values should be entered in 'billions of gallons'.
3. Run the executable '**aaa_POLY.exe'**.
4. Output will be named *output/[simulation#]SIMOUT.TXT and [simulation#]CTYaOUT[year].TXT*.

Below is the example of biodiesel demand going up to 340 mil gallons then declining a bit.

Example simulation is **whatif.s20**

```
************************************************************************
      P  O  L  Y  S  Y  S   -    N A T I O N A L  V A R I A B L E S
************************************************************************
-> Expanding BIODIESEL demand ( BP 03 )
-> INPUT THE DATA, FOLLOWING THE FORMAT BELOW AND THE TABLE HEADINGS
YEAR : CALENDAR YEAR FOR WHICH THE VARIABLE IS SIMULATED. Example : 2014
MTX  : MATRIX CONTAINING THE VARIABLE TO BE SIMULATED. Example: BP is the bioprod matrix
J    : VARIABLE CODE. Example : j=2 is the 'ethanol' national demand
K    : CROP CODE. Example: in the 'bioprod' matrix there is no k values, so set to zero
M    : P if % CHANGE FROM BASELINE. Example: 20% INCREASE ->  .20
                                        20% DECREASE -> -.20
       V if ABSOLUTE VALUE  [VALUES READ IN BILLIONS OF GALLONS DEMAND]
-> CHARACTERS MUST BE PROVIDED IN UPPER CASE. HIT RETURN AFTER LAST DATA
------------------------------
YEAR MTX J  K M VALUE
----o---o--o-o-o-----------
2013 BP 03 0 V .01                  BP = the bioproduct matrix
2014 BP 03 0 V .01                  j=03= biodiesel demand in billions of gallons
2015 BP 03 0 V .14
2016 BP 03 0 V .34
2017 BP 03 0 V .34
2018 BP 03 0 V .33
2019 BP 03 0 V .32
2020 BP 03 0 V .31
2021 BP 03 0 V .30
2022 BP 03 0 V .29
```

11. Reducing Corn Grain Ethanol Demand

Don't need to rerun baseline index[106]=1 or 2. Just run a Simulation [106]=3.

1. Pick a simulation number (line 2), and name your simulation (line 3).

2. Set the changes you want to make in the whatif files and save them with the matching 'simulation number' you picked in line 2. In your whatif.SXX file and set the ethanol demand levels of individual years.

   To reduce ethanol demand, we will reduce the 'baseline' corn-grain ethanol demand by a specified percentage. We will enter percentage changes to the (X 05) matrix in a whatif statement and make sure to put a "P" for 'percentage change.

3. Run the executable '**aaa_POLY.exe**'.

4. Output will be named *output/[simulation#]SIMOUT.TXT and [simulation#]CTYaOUT[year].TXT*.

Below is the example of reducing corn grain ethanol demand by 100% by 2025.

Example simulation is **whatif.s13**

```
************************************************************************
      P  O  L  Y  S  Y  S   -    N A T I O N A L  V A R I A B L E S
************************************************************************
-> whatif.s13 NASA2011 corn grain diminishes to nothing by 2025
-> INPUT THE DATA, FOLLOWING THE FORMAT BELOW AND THE TABLE HEADINGS
YEAR : CALENDAR YEAR FOR WHICH THE VARIABLE IS SIMULATED. Example : 1995
MTX  : MATRIX CONTAINING THE VARIABLE TO BE SIMULATED. Example: X,XS,CF
J    : VARIABLE CODE. Example : IF YIELD -> 3
K    : CROP CODE. Example: IF WHEAT -> 5
T    : P if % CHANGE FROM BASELINE. Example: 20% INCREASE ->  .20
                                        20% DECREASE -> -.20
       V if ABSOLUTE VALUE
-> CHARACTERS MUST BE PROVIDED IN UPPER CASE. HIT RETURN AFTER LAST DATA
------------------------------
YEAR MTX J K T VALUE
----o--o--o-o-o-----------
2013 X  05 1 P -0.1
2014 X  05 1 P -0.175
2015 X  05 1 P -0.25
2016 X  05 1 P -0.325
2017 X  05 1 P -0.4
2018 X  05 1 P -0.475
2019 X  05 1 P -0.55
2020 X  05 1 P -0.625
2021 X  05 1 P -0.7
2022 X  05 1 P -0.775
2023 X  05 1 P -0.85
2024 X  05 1 P -0.925
2025 X  05 1 P -1.0
```

12. Expand/contract Pastureland allowed to convert to biomass

Currently only pastureland acres EAST of about the 100th meridian can convert to other uses (like dedicated crops. The variable 'east' that is defined as either at '0' for 'not available, or a '1' for available to convert. The east variable is set in the pastacres.prn file. To alter;

1. Save this original in a separate directory to keep track and restore.
2. Open up the file input/original files to alter/pastacres.xls in excel.
3. In the last column named 'east', set the counties you want available by setting to '1'.
4. Save file back to the directory input\pasture\pastacres.prn [space delimited file].
5. Run a Simulation [106]=3.

COUNTY	COUNTNAME	STATE	FIPS_CODE	POLYSYS	allpast	permpast	croppast	irrigpast	pastyld	EastOfLine
1	Autauga	AL	1001	90	42503	23770	10994	2638	1.38	1
2	Baldwin	AL	1003	91	38905	23744	8883	3700	1.38	1
3	Barbour	AL	1005	92	56682	25674	17925	6299	1.44	1
4	Bibb	AL	1007	89	14485	9760	1619	61	1.4	1
5	Blount	AL	1009	88	79402	54921	10770	1000	1.37	1
6	Bullock	AL	1011	90	48997	24182	6175	0	1.38	1
7	Butler	AL	1013	91	32997	18075	5605	69	1.38	1
8	Calhoun	AL	1015	88	31150	19536	5848	1206	1.37	1
9	Chambers	AL	1017	89	46888	26963	4684	1700	1.4	1
10	Cherokee	AL	1019	88	33621	22568	5951	590	1.37	1
11	Chilton	AL	1021	89	37122	24024	5804	2511	1.4	1
12	Choctaw	AL	1023	91	17809	10878	2854	80	1.38	1
13	Clarke	AL	1025	91	18857	11065	1659	0	1.38	1
14	Clay	AL	1027	89	42945	29400	4755	100	1.4	1
15	Cleburne	AL	1029	88	24654	15583	4945	743	1.37	1
16	Coffee	AL	1031	92	53505	30637	13784	6121	1.44	1
17	Colbert	AL	1033	87	46540	26074	8848	1811	1.34	1

13. Taking Land out of conventional crop production

This method allows the user of POLYSYS to remove a set amount of land from specified counties out of conventional commodity crop production. For example, you may want to simulate the impact of conversion of Y amount of land in North Dakota counties to new biodiesel crops. Here, we only stipulate the amount of cropland that will be converted out of commodity production. We are not entering any cost or price data. We are just assuming these acres will convert.;

1. Open up a whatifcnty.Sxx file (from 'whatif' subfolder) and name the suffix to your SIM number.
2. Set the 'CNTY' values to counties you want to make changes (values are in the 'B' column of INDEX_ALL REGIONS.xls file along with the county name).
3. Set the T to either 'P' for percentage change, or 'V' for value change.
4. Set the 'Value' to the percentage change, or acres, you want to TAKE OUT of conventional crop production. Two examples are below, one for 'percentage' change and one for 'value' change.

Example simulation whatifcnty.S62 (percentage reduction)

```
*************************************************************************
      P  O  L  Y  S  Y  S   -    COUNTY LEVEL CHANGES
*************************************************************************
-> THIS IS FOR DAVE ARCHER TO SPECIFY HOW MANY ACRES IN EACH COUNTY ARE TAKEN OUT OF
PRODUCTION FOR BIO-ENERGY PRODUCTION
-> INPUT THE DATA, FOLLOWING THE FORMAT BELOW, UNDER THE TABLE HEADINGS
YEAR : CALENDAR YEAR FOR WHICH THE VARIABLE IS SIMULATED. Example : 2015
CNTY  : COUNTY NUMBER (1-3110)  EXAMPLE:  1220
T    : P if % FROM BASELINE. Ex. : 20% CONVERSION -> .20
       V if ABSOLUTE VALUE of acres converted.
VALUE: THIS IS THE NUMBER OF ACRES THAT WILL BE REMOVED FROM CONVENTIONAL CROPS AND PUT
INTO BIO-ENERGY CROP PRODUCTION
------------------------------
YEAR CNTY T  VALUE
----o----o-o---------
2014   1957   P      0.25
2014   1958   P      0.25
2014   1959   P      0.25
2014   1960   P      0.25
2014   1961   P      0.25
2014   1962   P      0.25
2014   1963   P      0.25
2014   1964   P      0.25
2014   1965   P      0.25
2014   1966   P      0.25
2014   1967   P      0.25
2014   1968   P      0.25
2014   1969   P      0.25
2014   1970   P      0.25
2014   1971   P      0.25
2014   1972   P      0.25
```

Example simulation whatifcnty.S63

```
************************************************************************
      P  O  L  Y  S  Y  S   -    COUNTY LEVEL CHANGES
************************************************************************
-> THIS IS FOR DAVE ARCHER TO SPECIFY HOW MANY ACRES IN EACH COUNTY ARE TAKEN OUT OF
PRODUCTION FOR BIO-ENERGY PRODUCTION
-> INPUT THE DATA, FOLLOWING THE FORMAT BELOW, UNDER THE TABLE HEADINGS
YEAR : CALENDAR YEAR FOR WHICH THE VARIABLE IS SIMULATED. Example : 2015
CNTY  : COUNTY NUMBER (1-3110)  EXAMPLE:  1220
T    : P if % FROM BASELINE. Ex. : 20% INCREASE -> .20 or 20% DECREASE -> -.20
       V if ABSOLUTE VALUE
VALUE: THIS IS THE NUMBER OF ACRES THAT WILL BE REMOVED FROM CONVENTIONAL CROPS AND PUT
INTO BIO-ENERGY CROP PRODUCTION
------------------------------
YEAR CNTY T  VALUE
----o----o-o---------
2014   1958   V      50000
2014   1959   V      50000
2014   1960   V      50000
2014   1961   V      50000
2014   1962   V      50000
2014   1963   V      50000
2014   1964   V      50000
2014   1965   V      50000
2014   1966   V      50000
2014   1967   V      50000
2014   1968   V      50000
2014   1969   V      50000
2014   1970   V      50000
2014   1971   V      50000
2014   1972   V      50000
2014   1973   V      50000
2014   1974   V      50000
```

OUTPUT: National Level output (XXSIMOUT.TXT)

You can open as a text file into excel by using the 'text to columns' feature in excel. Make sure the columns are set right!

BIOPRODUCTS SUMMARY					, 20	13-2028				
----------	---------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Item	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
----------	---------	-------	-------	-------	-------	-------	-------	-------	-------	-------
------Prices--------										
Biomass ($/dt)	35	42	42	43	45	47	49	51	53	56
Corn ($/bu)	4.5	3.8	3.32	3.25	3.38	3.65	3.7	3.88	3.84	4.15
Soybeans($/bu)	12.15	9.5	8.84	9.11	9.15	9.17	9.57	9.56	9.9	9.86
Soybean Oil($/lb)	0.42	0.35	0.35	0.38	0.37	0.36	0.38	0.37	0.39	0.37
Soybean Meal($/ton)	394.53	307.07	276.11	277.67	282.86	289.37	298.02	302.8	309.74	316.86
Feedstock Production										
Stover(mil.dt)	2.1	17	20.8	28.3	40.7	64.9	83.6	97.4	109.3	123.7
Straw(mil.dt)	0	8.1	8.3	9.8	11.8	14.2	15	16.4	17.1	20
Switchgrass(mil.dt)	0	0	0	0	0	0	0.1	0.1	0.3	0.5
Miscanthus (mil.dt)	0	0	0	0	0	0	0	0	0	0
Poplars (mil.dt)	0	0	0	0	0	0	0	0	0	0
Willows (mil.dt)	0	0	0	0	0	0	0	0	0	0
SweetSorgh(mil.dt)	0	0	0	0.1	0.1	0.4	0.7	1.1	1.7	2.8
E.Cane(mil.dt)	0	0	0	0	0	0	0	0	0	0
Algae (mil.dt)	0	0	0	0	0	0	0	0	0	0
CRP Harvest(mil.dt)	0	0	0	0	0	0	0	0.2	0.5	1
Wood Resid (mil.dt)	0	0	0	0	0	0	0	0	0	0
TOT BIOMASS(mil.dt)	2.1	25.2	29.1	38.1	52.7	79.6	99.3	115.3	128.9	147.9

OUTPUT: County level crop output (XXCTYOUTa[year].TXT)

It is best to open county-level data in ACCESS database management because of the size.

YEAR	COUNTY	FIPS	POLY	CROP	TILLAGE	YIELD	PLANT	HARVEST	RODUCTIO	otVARCOS	racRETURI
	Polysys county number	fips code number	polysys region (305 total)	Crop code; 1 through 18 see sheet 'crop codes')	Tillage code: (see sheet 'tillage code')	yield per acre (see sheet yield units')	acres planted	acres harveste d	total producti on in county in crop units)	total variables costs in county ($)	Net returns per acre ($)
2026	1	1001	90	1	1	0	0	0	0	0	106.5681
2026	1	1001	90	1	2	0	0	0	0	0	-2.0586
2026	1	1001	90	1	3	130.5184	153.5117	117.7176	15364.31	52108.76	114.611
2026	1	1001	90	2	1	0	0	0	0	0	-239.992
2026	1	1001	90	2	2	0	0	0	0	0	-322.903
2026	1	1001	90	2	3	0	0	0	0	0	-217.172

Continued…

TOTALe	TOTALc	LDPS	CCPS	OTNETRTRN	SOILCARB	CARBCOST	PRICE	OWERPYM	NPV
Total BTU's FROM DIRECT AND INDIRECT OPERATI ONS AND INPUTS	Total carbon emission s FORM DIRECT AND INDIRECT OPERATI ONS AND	Total Loan Deficienc y Payment s ($)	total counter Cyclical payment s ($)	Total next returns ($)	Total Soil carbon accumula tions (metric ton C)	total $ going to carbon incentive s ($)	Market price $ per unit (see sheet 'yield units')	Grower Payment s ($/dry ton biomass)	Net present value per acre ($ per acre over 10 year planning horizon)
0	0	0	0	0	0	0	4.1486	0	766.1008
0	0	0	0	0	0	0	4.1486	0	-14.7989
7.97E+08	34.5719	0	0	17814.35	0	0	4.1486	0	823.9194
0	0	0	0	0	0	0	4.478	0	-1725.26
0	0	0	0	0	0	0	4.478	0	-2321.3
0	0	0	0	0	0	0	4.478	0	-1561.22
0	0	0	0	0	0	0	2.4748	0	-640.279
0	0	0	0	0	0	0	2.4748	0	-908.282

OUTPUT: State level crop output (XXSTATEOUTa[year].TXT)

YEAR	Polysys county number	State fips code number	State Abbeviation	Crop code; 1 through 18 see sheet 'crop codes')	Tillage code: (see sheet 'tillage code')	yield per acre (see sheet yield units')	acres planted	acres harvested	total production in county in crop units)	Total Soil carbon accumulations (metric ton C)	Market price $ per unit (see sheet 'yield units')	total variables costs in county ($)	Total Loan Deficiency Payments ($)	total counter Cyclical payments ($)	Total next returns ($)	Net returns per acre ($)	Grower Payments ($/dry ton biomass)
YEAR	SIM#	STATE	STATECOD	CROP	TILLAGE	YIELD	PLANT	HARVEST	PRODUCTI	SOILCARB	PRICE	totVARCO	LDPS	CCPS	TOTNETRT	peracRETU	GROWERPY
2015	AAA0	1	AL	1	1	124.6913	144653.5	112378.6	14012633	0	3.6107	38335280	0	0	17120518	118.3554	0
2015	AAA0	1	AL	1	2	130.5657	142769.3	120952.5	15792242	5345.796	3.6107	50330680	0	0	11689390	81.8761	0
2015	AAA0	1	AL	1	3	147.374	505849.8	464485.9	68453152	3288.829	3.6107	1.59E+08	0	0	1.1E+08	217.6453	0
2015	AAA0	2		1	1	0	0	0	0	0	0	0	0	0	0	0	0
2015	AAA0	2		1	2	0	0	0	0	0	0	0	0	0	0	0	0
2015	AAA0	2		1	3	0	0	0	0	0	0	0	0	0	0	0	0
2015	AAA0	3		1	1	0	0	0	0	0	0	0	0	0	0	0	0

OUTPUT: County Crop residues (XXRESIDUES.TXT)

Crop residue output data for all years, counties, and crops are in **XXRESIDUES.TXT**. The 'XX' is the simulation number you ran.

Example output in file 'residues_data_explanations.xls'. This is what it looks like:

YEAR	FIPS	K	T	TOTALYIELD	POTENTHA	CSTDT	PRICE	GROWERPAYMENT	RETURNSPERAC	HARVACRES	HARVPROD	DIRECTe	DIRECTc	FERTe	FERTc	CfromN	TOTe	TOTc	DCARBCOS	ENERGYCOST
Year of Simulation	fips code number	Crop code; 1 through 18 see sheet 'crop codes')	Tillage code: (see sheet 'tillage code')	Total biomass yield regardless of constraints (dry tons per acre)	Total potential havestable yield given constraints (dry tons per acre)	cost of harvesting per dry ton	offered market price	profit per ton above costs (per dry ton)	net returns per acre	total harvested acres	total harvested production									
YEAR	FIPS	K	T	TOTALYIEL	TOTPOTEN	CSTDT	PRICE	GROWERPAYMENT	RETURNSPERAC	HARVACRES	HARVPROD	DIRECTe	DIRECTc	FERTe	FERTc	CfromN	TOTe	TOTc	ADCARBC	ADENERGYCOST
2013	1001	1	1	2.571	0	294.062	90	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	1001	1	2	2.64	2.64	42.788	90	74.591	124.643	0	0	0	0	0	0	0	0	0	0	0
2013	1001	1	3	2.644	2.644	42.788	90	74.591	124.84	444.339	1174.945	0	0	0	0	0	0	0	0	0
2013	1001	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	1001	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	1001	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	1001	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	1001	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Any easy way to sort through the data in this file is to ***import into Microsoft ACCESS***.
Once in ACCESS, queries can be built to pull what you need out.

APPENDEX A: Crop Codes

	Crop Code	Crop
k=	1	Corn
	2	Grain Sorghum
	3	Oats
	4	Barley
	5	Wheat
	6	Soybeans
	7	Cotton
	8	Rice
	9	Switchgrass
	10	Poplars
	11	Willows
	12	Alfalfa
	13	Algae
	14	MiG Pasture Conversion (some versions)
	15	Sweet Sorghum
	16	Miscanthus
	17	Energy Cane
	18	[empty]

APPENDEX B: Tillage (or in some cases, 'landuse' codes) Codes

Tillage Codes:

T=

1 conventional Tillage
2 Reduced Tillage
3 No-Tillage

EXCEPT when K (crop) = 9-11, or 13-18 where

T=

1 cropland results
2 cropland in pasture' results
3 permanent pasture results

APPENDEX C: Yield Units

Crop Code	Crop	Yield unit
1	Corn	Bushels
2	Grain Sorghum	Bushels
3	Oats	Bushels
4	Barley	Bushels
5	Wheat	Bushels
6	Soybeans	Bushels
7	Cotton	lbs
8	Rice	lbs
9	Switchgrass	dry tons
10	Poplars	dry tons
11	Willows	dry tons
12	Alfalfa	dry tons
13	Algae	dry tons
14	MiG Pasture Conversion (some versions)	
15	Sweet Sorghum	dry tons
16	Miscanthus	dry tons
17	Energy Cane	dry tons
18	[empty]	

Appendix D: Index of counties and regions

See separate WORD file named ‘MANUAL_appendix D’.

Appendix E: Maps

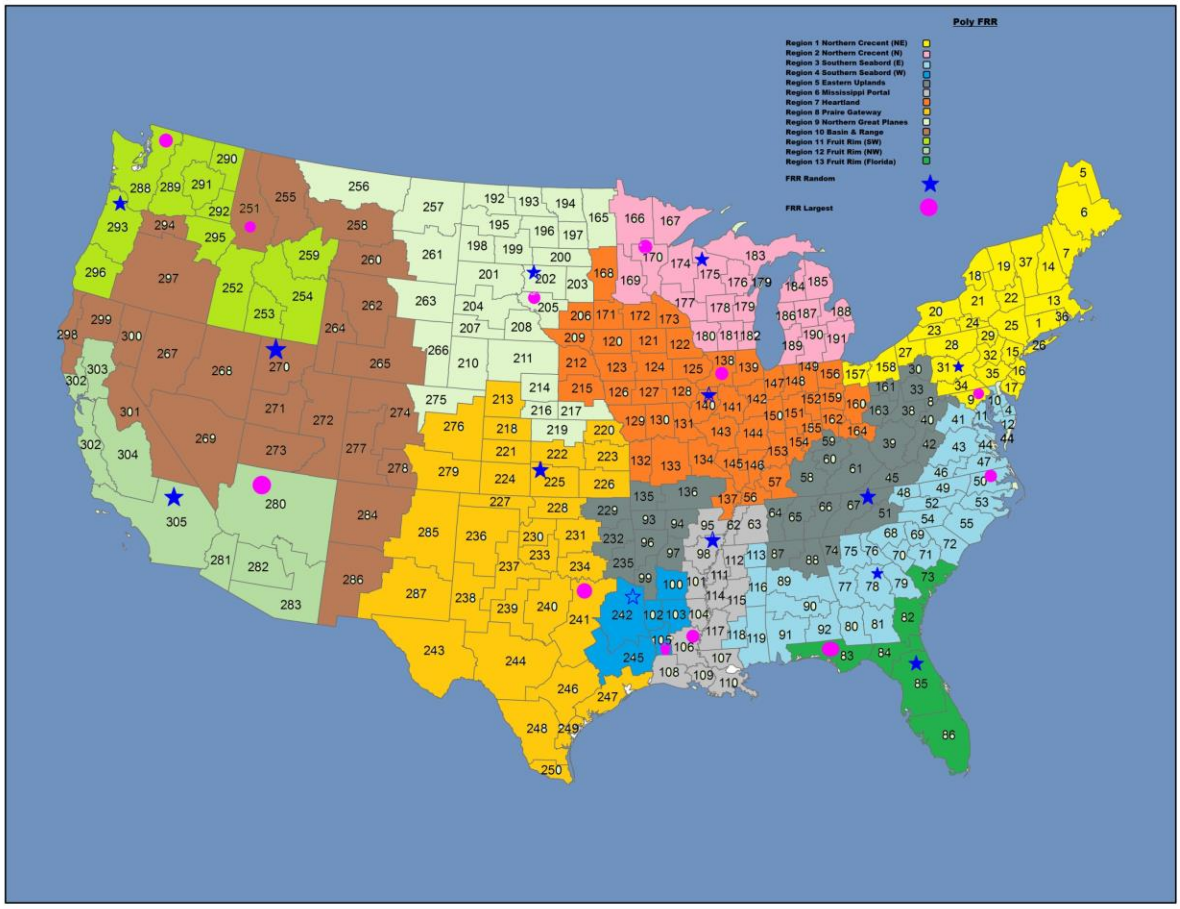


Figure E1. Map of all 305 POLYSYS regions, the 13 POLYSYS Farm Resource Regions (PFRR) (colored areas), with the POLSYS region with the most acreage in corn within each PFRR (blue stars). The blue stared regions are used as representative regions. Operation budgets are compiled for only the stared regions. The interpolation method uses the stared regions to interpolate values for all other regions. Full explanation of the GIS interpolation method is described in document entitled:
'Documentation_budget_interpolation_may2013'

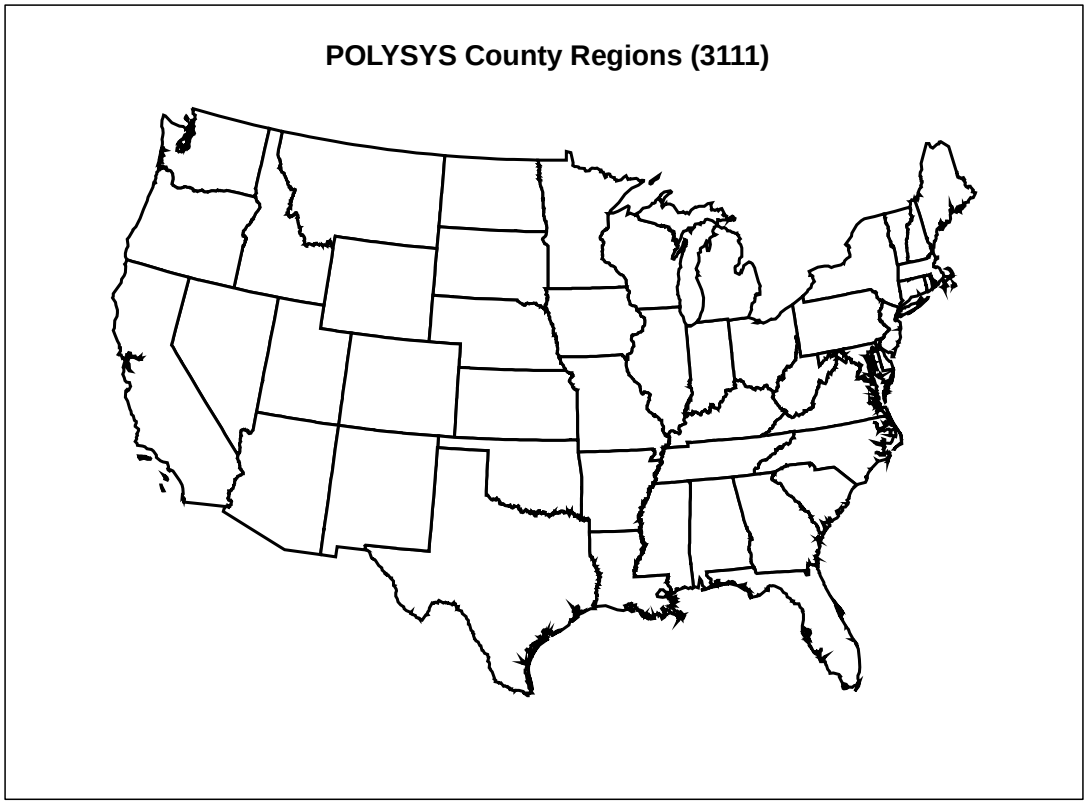


Figure E2: POLYSYS linear programming models run at the county level.