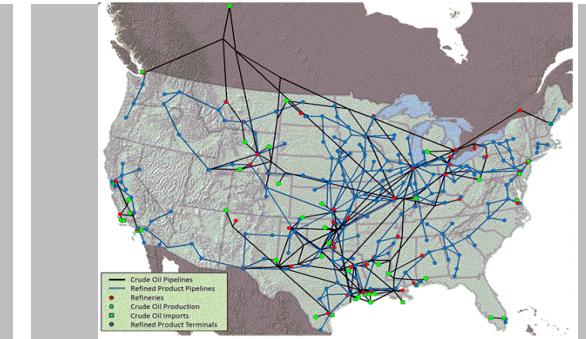


*Exceptional service in the national interest*



# Electric Power- Natural Gas Interdependency

By MIDN Simic Tuan





# NATIONAL INFRASTRUCTURE SIMULATION AND ANALYSIS CENTER

# National Infrastructure Simulation and Analysis Center (NISAC)

- Congress mandated that NISAC serve as a “source of national expertise to address critical infrastructure protection” research and analysis.
- Conducts modeling, simulation, and analysis of the nation's critical infrastructure. It assess critical infrastructure risk, vulnerability, interdependencies, and event consequences.
- Department within Department of Homeland Security
- Works with personnel from the Washington D.C Area, Sandia National Laboratory, and Los Alamos National Laboratory
- Building 1008

# Project #1

- **Job:** Convert data from a GPCM Model of U.S Natural Gas production to NetFlow Dynamics using Excel
- **Purpose:** NetFlow dynamics allows user to run simulations using a complex algorithm and create disruptions along the system
- **Application:** Find weak points within the pipeline system, see if system can withstand a natural disaster, high demand, pipeline failure, etc.

# Gas Pipeline Competition Model (GPCM)

Table Tools

File Home Create External Data Database Tools Fields Table

Views: All Access Objects

Supply\_Link\_Use\_Monthly Supply\_Monthly Demand\_Monthly

Case DCode Period Demand Dest\_Price Click to Add

15Q1base M - ALASKA 1/1/2011 10425.86 10.71875

15Q1base M - ALASKA 2/1/2011 9202.059 7.875

15Q1base M - ALASKA 3/1/2011 8611.543 5.46875

15Q1base M - ALASKA 4/1/2011 7433.602 0.3194599

15Q1base M - ALASKA 5/1/2011 5719.501 0.319543

15Q1base M - ALASKA 6/1/2011 5058.978 0.3155982

15Q1base M - ALASKA 7/1/2011 5002.548 0.3112062

15Q1base M - ALASKA 8/1/2011 5405.711 0.3035978

15Q1base M - ALASKA 9/1/2011 5979.373 0.295123

15Q1base M - ALASKA 10/1/2011 7023.101 0.290416

15Q1base M - ALASKA 11/1/2011 9591.068 0.2818052

15Q1base M - ALASKA 12/1/2011 8819.183 15.60955

15Q1base M - ALASKA 1/1/2012 10861.61 17.4984

15Q1base M - ALASKA 2/1/2012 8350.704 0.2576288

15Q1base M - ALASKA 3/1/2012 8580.66 0.2504085

15Q1base M - ALASKA 4/1/2012 6594.099 0.2430587

15Q1base M - ALASKA 5/1/2012 5791.365 0.2361622

15Q1base M - ALASKA 6/1/2012 4721.072 9.924283

15Q1base M - ALASKA 7/1/2012 5120.631 0.221222

15Q1base M - ALASKA 8/1/2012 4969.731 9.895436

15Q1base M - ALASKA 9/1/2012 5503.456 0.2354729

15Q1base M - ALASKA 10/1/2012 7379.749 0.2413438

15Q1base M - ALASKA 11/1/2012 7522.532 12.32791

15Q1base M - ALASKA 12/1/2012 9344.907 0.2528741

15Q1base M - ALASKA 1/1/2013 8794.086 16.76433

15Q1base M - ALASKA 2/1/2013 7201.286 0.2662957

15Q1base M - ALASKA 3/1/2013 8073.63 0.273995

15Q1base M - ALASKA 4/1/2013 6932.029 0.2807002

15Q1base M - ALASKA 5/1/2013 5348.297 0.2869249

15Q1base M - ALASKA 6/1/2013 4106.683 0.2926252

15Q1base M - ALASKA 7/1/2013 3909.321 0.2635445

15Q1base M - ALASKA 8/1/2013 4156.615 0.2662567

15Q1base M - ALASKA 9/1/2013 4585.49 0.2689171

15Q1base M - ALASKA 10/1/2013 5447.855 0.2750401

15Q1base M - ALASKA 11/1/2013 7890.821 0.2746121

15Q1base M - ALASKA 12/1/2013 8847.923 0.2759478

15Q1base M - ALASKA 1/1/2014 7505.858 0.2827195

15Q1base M - ALASKA 2/1/2014 7723.764 0.285788

15Q1base M - ALASKA 3/1/2014 7069.71 0.290208

15Q1base M - ALASKA 4/1/2014 5325.116 0.2830806

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15Q1base M - ALASKA 8/1/2014 4380.727 0.2719688

15Q1base M - ALASKA 9/1/2014 4726.096 0.2738957

15Q1base M - ALASKA 10/1/2014 6678.754 3.5

15Q1base M - ALASKA 11/1/2014 7035.661 0.2656841

Record: 14 1 of 39831 > > No Filter Search

Datasheet View

# Conversion to Excel

P2296

Import

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
22778	84	ZN060-3	PEPL Mkt 3		IN	41.689439	-93.378939		0	0	0	0	0	0	Import	#####				
22779	84	ZN060-322	PEPL Mkt 3 to Mkt 2		IN	41.349173	-94.480261		0	0	0	0	0	0	Import	#####				
22780	84	ZN060-3R	PEPL Mkt 3 Rcpt		IN	41.349173	-94.480261		0	0	0	0	0	0	Import	#####				
22781	84	ZN060-F	PEPL Field		OK	35.844676	-101.889172		0	0	0	0	0	0	Import	#####				
22782	84	ZN060-IMP	PEPL Import		MI	42.281427	-83.386321		0	0	0	0	0	0	Import	#####				
22783	84	ZN060-XP	PEPL Export		MI	42.281427	-83.386321		0	0	0	0	0	0	Import	#####				
22784	84	ZN062-CLAY	Questar Clay Basin Stor INTX		UT	40.905385	-109.521106		0	0	0	0	0	0	Import	#####				
22785	84	ZN062-CLAYN	Questar Clay Basin to Kanda		WY	41.85194	-109.188005		0	0	0	0	0	0	Import	#####				
22786	84	ZN062-CLAYS	Questar Fidlar to Clay Basin		UT	41.21074	-110.616892		0	0	0	0	0	0	Import	#####				
22787	84	ZN062-COWS	Questar Northwest CO Sup		CO	39.98143	-108.237752		0	0	0	0	0	0	Import	#####				
22788	84	ZN062-KANDA	Questar Kanda to X016		WY	41.85194	-109.188005		0	0	0	0	0	0	Import	#####				
22789	84	ZN062-OPAL	Questar Opal INX		WY	42.070329	-110.521546		0	0	0	0	0	0	Import	#####				
22790	84	ZN062-PICE	Questar Pifice to Fidlar		CO	39.98143	-108.237752		0	0	0	0	0	0	Import	#####				
22791	84	ZN062-SKULL	Questar Skull Creek to Kanda		WY	41.85194	-109.188005		0	0	0	0	0	0	Import	#####				
22792	84	ZN062-SWY	Questar Southern WY Sup		WY	41.85194	-109.188005		0	0	0	0	0	0	Import	#####				
22793	84	ZN062-UINTA	Questar Utah Sup		UT	39.98143	-108.237752		0	0	0	0	0	0	Import	#####				
22794	84	ZN062-UT	Questar Fidlar to KRGT		UT	41.21074	-110.616892		0	0	0	0	0	0	Import	#####				
22795	84	ZN062-XBC	Questar Exp Blind Canyon		UT	41.21074	-110.616892		0	0	0	0	0	0	Import	#####				
22796	84	ZN062-X FID	Questar Exp Fidlar		UT	41.21074	-110.616892		0	0	0	0	0	0	Import	#####				
22797	84	ZN062-X KR	Questar Exp Kern River		UT	40.096629	-111.570769		0	0	0	0	0	0	Import	#####				
22798	84	ZN062-KRR	Questar Exp Kern River Rec		UT	40.096629	-111.570769		0	0	0	0	0	0	Import	#####				
22799	84	ZN062-X016	Questar X016 to Coalville		WY	41.21074	-110.616892		0	0	0	0	0	0	Import	#####				
22800	84	ZN064	Sea Robin		LA	29.860141	-92.381362		0	0	0	0	0	0	Import	#####				
22801	84	ZN066-0CTX	SoNat Z0 (Carthage TX)		TX	32.192004	-94.315422		0	0	0	0	0	0	Import	#####				
22802	84	ZN066-0N	SoNat Z0 (N LA)		LA	32.598888	-92.698387		0	0	0	0	0	0	Import	#####				
22803	84	ZN066-0S	SoNat Z0 (S LA)		LA	30.616307	-92.057063		0	0	0	0	0	0	Import	#####				
22804	84	ZN066-0SW	SoNat Z0 (SW LA)		LA	29.502976	-91.443469		0	0	0	0	0	0	Import	#####				
22805	84	ZN066-1N	SoNat Z1 (N MS)		MS	33.168327	-89.625165		0	0	0	0	0	0	Import	#####				
22806	84	ZN066-1NR	SoNat Z1 (N MS) Rcpt		MS	33.168866	-90.074677		0	0	0	0	0	0	Import	#####				
22807	84	ZN066-1S	SoNat Z1 (S MS)		MS	32.325144	-89.232839		0	0	0	0	0	0	Import	#####				
22808	84	ZN066-1SR	SoNat Z1 (S MS) Rcpt		MS	33.607342	-89.277291		0	0	0	0	0	0	Import	#####				
22809	84	ZN066-2N	SoNat Z2 (N AL)		AL	33.491412	-86.982429		0	0	0	0	0	0	Import	#####				
22810	84	ZN066-2NR	SoNat Z2 (N AL) Rcpt		AL	33.209841	-87.569174		0	0	0	0	0	0	Import	#####				
22811	84	ZN066-2S	SoNat Z2 (S AL)		AL	32.538745	-86.314971		0	0	0	0	0	0	Import	#####				
22812	84	ZN066-3E	SoNat Z3 (Elba Lat GA)		GA	31.999419	-81.119608		0	0	0	0	0	0	Import	#####				
22813	84	ZN066-3ER	SoNat Z3 (Elba Lat GA) Rcpt		GA	32.378148	-81.383933		0	0	0	0	0	0	Import	#####				
22814	84	ZN066-3MR	SoNat Z3 (S GA) Macon to SC		GA	32.786574	-83.719914		0	0	0	0	0	0	Import	#####				
22815	84	ZN066-3N	SoNat Z3 (N GA)		GA	34.803357	-84.981754		0	0	0	0	0	0	Import	#####				
22816	84	ZN066-3NR	SoNat Z3 (N GA) Rcpt		GA	34.01324	-85.147936		0	0	0	0	0	0	Import	#####				
22817	84	ZN066-3S	SoNat Z3 (S GA)		GA	32.479413	-84.989478		0	0	0	0	0	0	Import	#####				
22818	84	ZN066-3SE	SoNat Z3 (S GA) Macon to SC		GA	33.320534	-82.08429		0	0	0	0	0	0	Import	#####				
22819	84	ZN066-CYP	SoNat Cypress Lateral		GA	30.841741	-83.847302		0	0	0	0	0	0	Import	#####				
22820	84	ZN066-OFF	SoNat Z0 SE La Offshore		GOM-ELA	28.3942	-89.3305		0	0	0	0	0	0	Import	#####				

# Import Data to NetFlow Dynamics

The screenshot shows a web browser window for the NetFlow Dynamics - Data Manager. The URL is <https://nfd-data-editor.sandia.gov/NewModel.aspx>. The page title is "NetFlow Dynamics - Data Manager".

**Left Sidebar (Models Section):**

- Model
- Sources
- Sinks
- Nodes
- Edges
- Disruptions
- Results

**Right Content Area:**

**How to create a new model:**

**Without importing**

1. Enter the model name
2. Enter the model description
3. Click Save.

**With importing**

1. Browse to the model Excel file (xls or xlsx)
2. Click Import
3. Click Save

Note: In order to override the model name or description in the import file, simply enter the model name or description on this page.

**Form Fields:**

Model Name:

Model Description:

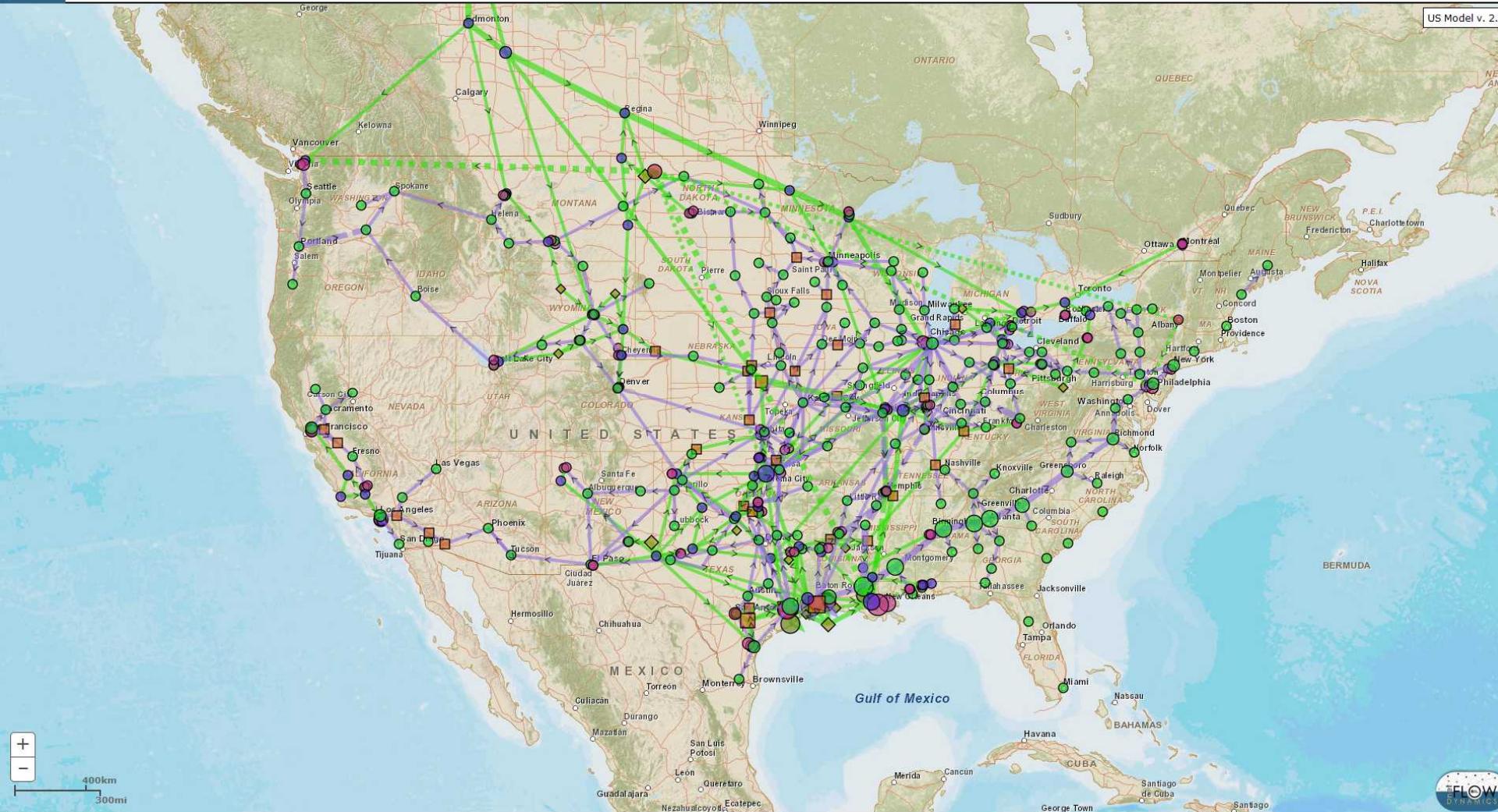
**Buttons:**

Import  Browse...  Save  Cancel

# NetFlow Dynamics

NetFlow Dynamics Basemaps Models Map Services Controls Run Simulation Results Database Manager Search Filter Help About

-100.47592, 44.62910



# Outside Sandia











