



## SACOG Board of Directors

March 11, 2010

### Approve RUCS Technical Work Contract

**Issue:** Staff is seeking authority to execute a contract and initiate technical work focused on agriculture viability and ecosystem services for the Rural-Urban Connections Strategy (RUCS) project.

**Recommendation:** The Land Use & Housing Committee recommends that the Board authorize the Executive Director to direct staff to negotiate and execute a contract with Berkeley Economic Consulting, Inc. for consulting services related to technical work for the RUCS project.

**Committee Action/Discussion:** The RUCS team has been developing crop maps and data and modeling capacity to assess the viability of agriculture in the region. The initial consultant for this work is no longer available; however, staff has been in discussions with Dr. David Sunding from UC Berkeley to complete the project. Dr. Sunding's consulting firm, Berkeley Economic Consulting, Inc. (BEC), conducts similar work using GIS spatial analysis tools to assess agriculture viability, ecosystem services, and water resource management. BEC also employs econometric modeling to forecast changes in agricultural production and has applied these models locally to assist in the development of the Yolo County Natural Heritage Program. Work that would be conducted for SACOG includes:

- Updating data and models, including adding econometric models for forecasting purposes
- Assessing land use pattern affects on agricultural viability, particularly at the urban edge
- Estimating market values for ecosystem services such as carbon sequestration, energy production, and habitat provision
- Determining resource needs and availability including labor and water
- Assessing the potential for processing at various scales in the region
- Estimating economic multipliers for agriculture

This would be a sole-source contract since the range of data and modeling objectives for the RUCS project can be uniquely met by BEC. They have completed analogous work for Yolo County and already have a team assembled to apply this work to the entire SACOG region. BEC is very familiar with data and modeling structure used by SACOG, which would facilitate rapid transition to a new consultant. Staff is aware of spatial analysis for soil management, pest management, specific crops, or mechanized field management; however, aside from the previous consultant, SACOG staff is not aware of other consulting firms that conduct parcel-level polygon-based GIS economic analysis of agricultural systems. A contract in the amount of \$143,000 would be paid for with Caltrans Blueprint Grant funds and with federal earmark funds provided by Senator Boxer in 2005. Work would commence in April and finish in November 2010.

Approved by:

Mike McKeever  
Executive Director

MM:RS:DS:sb

Attachment

Key Staff: Rebecca Sloan, Director of External Affairs & Member Services, (916) 340-6224  
David Shabazian, Senior Planner, (916) 340-6231

**BERKELEY ECONOMIC CONSULTING, INC.**  
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Via Electronic Mail

February 25, 2010

David Shabazian  
Sacramento Area Council of Governments  
1415 L Street  
Sacramento, CA 95814

Dear David:

This letter is to present a scope of work and a set of task orders for economic research related to the development of SACOG's Rural-Urban Connections Strategy (RUCS). In 2008, the SACOG Board of Directors participated in a workshop on rural issues, and worked in Land Use and Housing Committee meetings to get the RUCS project underway. The Committee and staff identified five broad topic areas as areas of emphasis: land use and conservation, agricultural infrastructure, economic opportunities, forest management and regulations.

Within this overall set of topics, we have discussed SACOG's need for economic research related broadly to the issues of agricultural land use, the need for infrastructure and new markets for agricultural production. In particular, we have discussed economic research related to the following topics:

- Creation of agricultural districts
- Processing and backward linkages
- Urban impacts on cropping patterns
- Habitat potential of agricultural activities
- Agricultural multipliers
- Scale of commercial production
- Potential for carbon sequestration
- Energy production from agriculture
- Markets for agricultural labor
- Regional water supply and demand

This set of issues presents a number of exciting opportunities for novel, yet practical, economic research.

### *Task 1: Agricultural land use data and model*

Several of the topics listed above can be addressed (at least in part) with a land allocation model. Thus, the foundation of our research will be to specify and estimate an econometric model of agricultural land use in the SACOG area. This model will be similar to the work BEC has conducted for the Yolo County NCP/NCCP JPA, and with which I know you are at least somewhat familiar.

The model will be estimated based on a geo-referenced database that will build on the information your office has already collected. The database will include information on historical land allocation over some period (derived from Pesticide Use Reports and other sources), fixed effects such as soil quality and distance to various features, and time-varying effects including weather conditions and prices. In addition to being the basis of the statistical model of land allocation, the database will be a crucial source of information for all of the analysis described in this proposal.

I propose to estimate a multinomial logit (ML) model explaining crop choice as a function of fixed and time-varying effects. The ML model generates predictions of crop choice for every parcel in the sample. In addition, we will estimate a Markov transition probability model that is well suited to the phenomenon of crop rotation. The Markov model is essentially a ML model with lagged crop choice as an independent variable. We have used this framework successfully in the Yolo County study.

The land use model will be configured to accommodate new land uses for activities such as dairies. Using dairies as an example of land use analysis that would be modeled for all agriculture land uses, we would assume a size and location, and then calculate the amount of land needed for waste disposal and production of feed. The model would then recalculate the crop types on the remaining parcels.

With respect to geographic coverage, I suggest that the model be estimated based on observed parcels in Yolo, Sutter and Yuba Counties. These counties account for the large majority of commercial agriculture in the SACOG area, and in each case, I expect that we will be able to find the information needed to estimate the model successfully.

#### Deliverables:

- Agricultural land use data situated with a GIS
- Estimated land use model
- Projections of land use probabilities at the parcel level
- Written report on findings

Due Date: May 27, 2010

Total Cost: \$42,600

### *Task 2: Agricultural districts*

Agricultural districts have already been defined in at least a preliminary way for the SACOG region. BEC will review the work already completed, together with available documentation, and make an assessment regarding its usefulness. We will use the

estimated land use model developed in Task 1 to identify rotational patterns in the data that will help to refine the definitions of agricultural districts. We will also conduct a series of interviews with local growers and Farm Bureau representatives.

Deliverables:

- Review of agricultural districts
- Application of land use model to the definition of districts
- Interviews with local growers
- Assessment of proper district boundaries
- Report describing findings

Due Date: May 27, 2010

Total Cost: \$7,200

### *Task 3: Processing scale*

This task will address the question of processing scale that would function for local markets, as opposed to those that are inter-regional. BEC will assist in the development of a pro forma income statement that includes factors such as the cost of the facility, the crop volume needed to support the facility, the amount of water and other inputs required for production, the per unit cost of the output, truck trips (and emissions), effects on crops grown, and location.

The question of whether the presence of processing facilities influences cropping patterns will be facilitated by the land use database and econometric model, but will also require other kinds of research. We will need to detail the current location of processing facilities used by growers of major crops in the region, and develop estimates of transportation costs. It would then be possible to calculate the cost savings and other benefits that would result from having processing facilities in other locations. The econometric model would then help us determine the change in the likelihood that various crops would be grown in the SACOG region.

Deliverables:

- Assist with development of pro forma
- Test influence of processing facilities on land allocation
- Assist with development of report

Due Date: May 27, 2010

Total Cost: \$10,500

### *Task 4: Urban fringe effects*

This task will address the influence of the urban fringe on cropping patterns. This relationship can be quantified and tested using the estimated land use model developed in

Task 1. Indeed, the influence of urban development on cropping patterns can be tested directly with the land use model by comparing urban fringe areas to other parts of the agricultural landscape and testing for significant differences.

Deliverables:

- Statistical identification of the influence of urban edge effects using land use model
- Written report of findings

Due Date: May 27, 2010

Total Cost: \$6,000

#### *Task 5: Agricultural habitat*

I propose to examine the question of agricultural habitat in much the same way as we did for the Yolo County HCP/NCCP, although in somewhat less detail. The first step in the investigation would be to identify classes of crops that have significant value to species of concern. Then the land use model could be used to estimate the potential value of that land as habitat, particularly if easements are used for preservation.

Deliverables:

- Work with local biologists to identify habitat associations for species of interest
- Apply land use model to forecast future habitat availability in the agricultural sector and estimate market value of that habitat
- Written report of findings

Due Date: May 27, 2010

Total Cost: \$12,800

#### *Task 6: Multipliers*

This task will assess the contributions of agriculture to the regional economy. We will review labor multipliers calculated within the IMPLAN framework and will also review the RIMS multipliers calculated by the state of California. BEC's analysis will cover both crop production as well as food processing activities. We will also check the labor requirements in the IMPAN model against relevant University of California Cost of Production Studies. BEC will also develop multipliers for different types of agriculture, such as locally-oriented agriculture as opposed to traditional production agriculture.

Deliverables:

- Labor and value added multipliers for crop production and food processing in the SACOG region
- Refinement of multipliers using crop budget data

- Write up of results

Due Date: May 27, 2010

Total Cost: \$4,900

*Task 7: Scale of production*

BEC will use available land use data to assess the minimal and optimal scale of production for various farming activities. The basis for this analysis will be the Agricultural and Land Use Model developed in Task 1. The econometric model will allow us to assess the influence of parcel size on the probability of growing various crop types. The underlying land use data will also indicate actual parcel sizes selected by farmers under current market conditions.

Deliverables:

- Asses the current parcel sizes for various crop types
- Test the influence of parcel size on land allocation using econometric model
- Report describing findings

Due Date: July 1, 2010

Total Cost: \$6,000

*Task 8: Carbon markets*

Recent developments in public policy regarding climate change suggest that there may be a potential market for carbon sequestration in California agriculture. This task will assess whether or not private markets are likely to result in a significant income stream to farmers in the SACOG region. BEC will develop estimates of the market price of carbon using information from the Chicago and European climate exchanges. We will also review forecast estimates of the potential price of carbon should California or the United States develop meaningful cap-and-trade systems. BEC will also gather information on the potential amount of carbon sequestration resulting from various agricultural practices such as low tillage production or selection of orchard crops.

Deliverables:

- Collection of available information on future carbon prices
- Assessment of income potential from carbon sequestration in the SACOG region
- Report describing results of the analysis

Due Date: July 1, 2010

Total Cost: \$14,000

### *Task 9: Energy production*

In this task BEC will summarize the income producing potential from biofuels in the SACOG region. We will summarize the state of available technology with respect to

- Cellulosic ethanol production from rice straw
- Conversion of food processing waste into biofuels
- Production of ethanol food stock

This task will produce a reconnaissance-level analysis based on available information from the academic literature regarding basic technology development.

Deliverables:

- Analysis of income producing potential of biofuels
- Written report describing finding

Due Date: July 1, 2010

Total Cost: \$14,000

### *Task 10: Agricultural labor markets*

Any future growth in the agricultural sector will require an adequate labor supply. BEC will work with experts from UC Davis on assessing the infrastructure – including housing and transportation – that the SACOG region should focus on in order to provide an adequate farm labor supply. BEC will draw upon the land use model in forecasting future labor needs by region.

Deliverables:

- Assess future labor requirements in terms of quantity and location
- Assist with development of report

Due Date: November 1, 2010

Total Cost: \$9,000

### *Task 11: Agricultural water*

BEC will draw upon the land use database to facilitate an analysis of supplies and demands across the agricultural sector in the region. We will assess evapotranspiration requirements (consumptive use) of various crops. Additionally, we will survey irrigation efficiency choices by crop and region. This task will also include the identification of agricultural water supplies. Once this accounting is complete, BEC will develop estimates of future water needs and the potential supplies that can accommodate this demand growth.

Deliverables:

- Account of water use and supplies

- Written description of future water balance

Due Date: November 1, 2010

Total Cost: \$11,000

The following table details the labor expense calculations described above:

	<i>Director</i>	<i>Senior Consultant</i>	<i>Analyst</i>	
<i>Rates</i>	\$300	\$225	\$125	
<i>Hours by Task</i>				
1. Land Use Model	32	80	120	\$42,600
2. Agricultural Districts	8	8	24	\$7,200
3. Processing	4	8	60	\$10,500
4. Urban Fringe	4	8	24	\$6,000
5. Habitat	8	24	40	\$12,800
6. Multipliers	4	12	8	\$4,900
7. Scale of Production	4	8	24	\$6,000
8. Carbon Markets	12	24	40	\$14,000
9. Energy Production	12	24	40	\$14,000
10. Labor	8	16	24	\$9,000
11. Agricultural Water	8	16	40	\$11,000
12. Direct Project Expenses				\$5,000
			Total Labor	\$143,000

In preparing this budget, I have used BEC's public sector rates, which are heavily discounted from our normal rates. The rates quoted above are inclusive of all indirect costs, and any direct expenses incurred in the course of the project (e.g., travel, photocopying, data purchases, etc.) will be billed to SACOG at actual cost. Given the scope of work described in this proposal, I expect that these expenses will be less than \$5,000. Thus, the total budget for this project is \$143,000.

Thanks for the time and effort you have spent describing SACOG's RUCS project, and the potential role of economic analysis in this planning effort. Please do not hesitate to get in touch with me if you have any questions regarding this proposal.

Sincerely,

David Sunding  
 Director, Berkeley Economic Consulting  
 Professor, UC Berkeley